

Project Manual

Customer: Novartis Singapore Pharmaceutical Manufacturing

Ref.No.:

Project no.: 1315690

Date of issue 29.04.2014

Revision 1.0

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Installation, commissioning and programming of the equipment should only be undertaken by qualified personnel.

Certificate + Reports

- CE Declaration of Conformity for Machinery
- Final inspection report
- Test protocol - cabinet construction

Konformitätserklärung

Declaration of Conformity
Déclaration de Conformité

Wir erklären hiermit, dass das Dosiersystem:
We declare herewith, that the feeding system:
Nous déclarons ci-après que l'installation de dosage:

PTS (P100 P-Series Receiver)

⊕ II 3D / 1D T100°C X

Projektnummer / *Project number* / *Numéro de projet*: **1315690**
 Ident Nr. / *Ident no.* / *Numéro Ident*: **M-347750**

konform ist mit den Bestimmungen der unten genannten EG-Richtlinien. Folgende EG-Richtlinien und harmonisierte Normen wurden angewendet:

is in conformity with the provisions of the below listed EC-Directives. The following EC-Directives and harmonized standards have been applied:

est conforme aux dispositions des Directives CE suivantes. Les Directives CE suivants et les normes harmonisées ont été appliquées:

EG-Richtlinien / <i>EC-Directives</i> / <i>Directives CE</i>	Normen / <i>Standards</i> / <i>Normes</i>
2006/42/EG: Maschinenrichtlinie	EN ISO 12100-1:2003
2006/42/EC: <i>Machinery Directive</i>	EN ISO 12100-2:2003
2006/42/CE: <i>Directive pour les Machines</i>	EN ISO 13850:2008
	EN ISO 13857:2008
	EN ISO 14121-1:2007
	EN 60204-1:2006
	EN 1037-1995 + A1:2008
	EN 349:1993 + A1:2008
	EN 62079 :2001

Die technische Dokumentation ist vollständig vorhanden. Dokumentationsverantwortlicher ist:

The technical documentation is complete. Responsible for documentation is:

La documentation technique est complète. Le responsable de la documentation est:

Andreas Rykart, Engineering Manager, Coperion K-Tron (Schweiz) GmbH, Lenzhardweg 43/45, CH 5702 Niederlenz

Niederlenz, 15.04.2014

Andreas Rykart
 Engineering / *Engineering*



Gerhard Wirz
 Geschäftsführer / *Managing director*



Konformitätserklärung
Declaration of Conformity
Déclaration de Conformité

Wir erklären hiermit, dass das Dosiersystem:
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Anwendung / Execute / Emploi	EG-Richtlinien/EC-Directives/Directives CE	Normen / Standards / Normes
Nein No Non	2006/95/EG: Niederspannungs-Richtlinie 2006/95/EC: Low Voltage Directive 2006/95/EG: Directive Basse Tension	EN 61010-1:2001
Ja Yes Oui	2004/108/EG: EMV-Richtlinie 2004/108/EC: EMC-Directive 2004/108/CE: Compatibilité Électromagnétique	EN 61000-6-2:2005 EN 61000-6-4:2007
Ja Yes Oui	94/9/EG: Geräte und Schutzsysteme zur bestimmungsmässigen Verwendung in explosionsgefährdeten Bereichen 94/9/EC: Equipment and protective systems intended for use in potentially explosive atmospheres 94/9/CE: Appareils et les systèmes de protection destinés à être utilisés en atmosphères explosibles	EN 61241-0:2006 EN 61241-1:2004 EN 60079-0:2006 EN 13463-1:2009 EN 13463-5:2003 EN 1127-1:2007
Nein No Non	97/23/EG: Druckgeräte-Richtlinie 97/23/EC: Pressure Equipment Directive 97/23/CE: Équipements sous pression	AD 2000

Die technische Dokumentation ist vollständig vorhanden. Dokumentationsverantwortlicher ist:
The technical documentation is complete. Responsible for documentation is:
La documentation technique est complète. Le responsable de la documentation est:

Andreas Rykart, Engineering Manager, Coperion K-Tron (Schweiz) GmbH, Lenzhardweg 43/45, CH 5702 Niederlenz

K-Tron hinterlegt die technische Dokumentation bei benannter Stelle:
 K-Tron deposits the technical documentation with the notified body:
 K-Tron dépose le dossier technique chez l'organisme notifié:
 SEV (electrosuisse), Ident.No.: 1258

Niederlenz, 15.04.2014

Andreas Rykart
 Engineering / *Engineering*

Gerhard Wirz
 Geschäftsführer / *Managing director*




Bestimmungsgemässe Verwendung zu Konformitätserklärung

Intended use to declaration of conformity

Utilisation prévue pour la déclaration de conformité

Projektnummer / Project number / Numéro de projet: 1315690

Ident Nr. / Ident no. / No de ident: M-347750

PTS (P100 P-Series Receiver)

 II 3D / 1D T100°C X

Zeichnungs Nr. / Drawing number / Numéro de dessin: 1315690500 B

Bestimmungsgemässe Verwendung:

Intended use:

Utilisation prévue:

Die Ausrüstung wird für die kontinuierliche oder diskontinuierliche Dosierung, Durchflussbestimmung oder Förderung von leicht- bis schwerfließenden Schüttgütern eingesetzt.

This equipment is used for continuous or discontinuous feeding, metering or conveying of good to bad flowing bulk material.

L'équipement est utilisé pour le dosage, le transporte pneumatique en continu ou discontinu ou pour mesurer le débit de matières avec un bon à mauvais écoulement.

Aufstellungsumgebung der Anlage:

Surrounding area of the equipment:

Zone de processus externe de l'appareil:

Das System ist ausgeführt für den Betrieb in nicht-gas-explosionsgefährdeten Bereichen. Geräte ohne Kategorie für Gas sind zur Verwendung in Bereichen bestimmt, in denen eine gas-explosionsfähige Gasatmosphäre nicht in solchen Mengen zu erwarten sind, dass spezielle Vorkehrungen bei der Konstruktion, der Installation und dem Einsatz erforderlich sind. Aufstellungsumgebung ohne gas-explosionsgefährdete Atmosphäre (Schüttgutprozessraum siehe unten).

The system is built for use in non-gas-explosive hazardous areas. Non classified equipment for gas The system is built for a non classified area. The use in a hazardous surrounding area is not allowed ! Surrounding area of the equipment without gas-explosive atmosphere (internal process area see below).

L'appareil est conçu pour fonctionner avec des atmosphères non-explosibles. Les appareils sans catégorie gaz sont conçus pour pouvoir fonctionner dans les endroits dans lesquels des atmosphères explosibles seront dans des quantités telles qu'elles ne nécessiteront pas des constructions, installations et mesures spéciales pour l'utilisation. Zone de processus externe de l'appareil sans atmosphères explosibles (voir plus bas pour la zone de processus interne).

Das System ist ausgeführt als ein Gerät der Gruppe II, Gerätekategorie 3D zur Verwendung mit brennbarem Staub mit einer minimalen Zündenergie >1mJ. Geräte der Kategorie 3D sind zur Verwendung in Bereichen (Zone 22) bestimmt, in denen bei Normalbetrieb nicht damit zu rechnen ist, dass eine explosionsfähige Atmosphäre in Form einer Wolke brennbaren Staubes in Luft auftritt, wenn sie aber dennoch auftritt, dann nur kurzzeitig. Die Kategorie 3D gilt für die Aufstellungsumgebung des Gerätes (Schüttgutprozessraum siehe unten).

The system is built as equipment of the group II, equipment category 3D for use with combustible dusts with a minimum ignition energy >1mJ. Equipment of category 3D is intended for use in areas (zone 22) in which an explosive atmosphere in the form of a cloud of combustible dust in air is not likely to occur in normal operation but, if it does occur, will persist for a short period only. The category 3D applies for the surrounding area of the equipment (internal process area) see below).

L'appareil est conçu comme appareil du groupe II catégorie 3D, pour pouvoir fonctionner en présence de poussières combustibles avec une énergie minimale d'inflammation >1mJ. Les appareils de la catégorie 3D sont conçus pour pouvoir fonctionner dans les endroits (Zone 22), dans lesquels des atmosphères explosibles dues au mélange d'air et de poussières seront peu probables et, si elle surviennent, ne subsisteront que brièvement. La catégorie 3D s'applique à la zone de processus externe de l'appareil (voir plus bas pour la zone de processus interne).

Schüttgutprozessraum:**Internal process area of the equipment:****Zone de processus interne de l'appareil:**

Der Schüttgutprozessraum ist ausgeführt für den Betrieb in nicht-gas-explosionsgefährdeten Bereichen. Geräte ohne Kategorie für Gas sind zur Verwendung in Bereichen bestimmt, in denen eine gas-explosionsfähige Gasatmosphäre nicht in solchen Mengen zu erwarten sind, dass spezielle Vorkehrungen bei der Konstruktion, der Installation und dem Einsatz erforderlich sind. Schüttgutprozessraum ohne gas-explosionsgefährdete Atmosphäre.

The internal process area is built for use in non-gas-explosive hazardous areas. Non classified equipment for gas The system is built for a non classified area. The use in a hazardous surrounding area is not allowed ! Internal process area without gas-explosive atmosphere.

L'intérieur de l'appareil, défini comme zone de processus, est conçu pour fonctionner avec des atmosphères non-explosibles. Les appareils sans catégorie gaz sont conçus pour pouvoir fonctionner dans les endroits dans lesquels des atmosphères explosibles seront dans des quantités telles qu'elles ne nécessiteront pas des constructions, installations et mesures spéciales pour l'utilisation. Zone de processus interne de l'appareil sans atmosphères explosibles.

Der Schüttgutprozessraum ist ausgeführt als ein Gerät der Gruppe II, Gerätekategorie 1D zur Verwendung mit brennbarem Staub mit einer minimalen Zündenergie >1mJ. Geräte der Kategorie 1D sind zur Verwendung in Bereichen bestimmt, in denen damit zu rechnen ist, dass andauernd, über längere Zeiträume oder häufig eine explosionsfähige Atmosphäre durch Staub/Luft-Gemischen gelegentlich auftritt. Die Kategorie 1D gilt für den Schüttgutprozessraum.

The internal process area is built as equipment of the group II, equipment category 1D for use with combustible dusts with a minimum ignition energy >1mJ. Equipment of category 1D is intended for use in areas (zone 20) in which an explosive atmosphere in the form of a cloud of combustible dust in air is present continuously, or for long periods or frequently. The category 1D applies for the internal process area.

L'intérieur de l'appareil, défini comme zone de processus, est conçu comme appareil du groupe II catégorie 1D, pour pouvoir fonctionner en présence de poussières combustibles avec une énergie minimale d'inflammation >1mJ. Les appareils de la catégorie 1D sont conçus pour pouvoir fonctionner dans les endroits (Zone 20), dans lesquels règne constamment, pour une longue période ou fréquemment, des atmosphères explosibles dues au mélange d'air et de poussières. La catégorie 1D s'applique à la zone de processus interne de l'appareil.

Allgemeine Daten:**General data:****Données générales:**

Umgebungstemperatur / Ambient temperature / Température ambiante: Tamb = 0...40°C

Schüttguttemperatur / Bulk material temperature / Température de matériel: Tprod = 0...50°C

Sicherheitshinweise:**Safety note:****Conseils de sécurité:**

Das ganze System muss durchgängig geerdet sein.

The whole system must be generally grounded.

Beschreibung / Typ Description / Type Description / Type	Kennzeichnung Richtlinie 94/9/EG Marking Directive 94/9/EG Marquage Directive 94/9/EG	EG Konformitätserklärung EG Declaration of Conformity EG Déclaration de Conformité	K-Tron Artikel-Nr. K-Tron Item No. K-Tron No. d'article
Feeder (Equipment): K-Tron PTS (P100 P-Series Receiver)	Ex II 3D / 1D T100°C X; ; Tamb=0...40°C Tprod=0...50°C; Year: 2014; K-Tron 1090034901	K-Tron doc. No.: 1000000202 / 15.04.2014 Project No.: 1315690 / M-347750	1315690 / M-347750
Sub-assembly : K-Tron P-Series receiver (w/o Flap)	"Ex II 3GD T5 T100°C, Tamb= -10...+50°C" "K-Tron 0990034908"	Part of equipment	Part of equipment
CORA: Sole Valve S.V.RCRC 200	EX II 1D/2GD c T6°C 0°C Ta +40°C 85°C (T6) Ex II 2GD/2GD c II B T6°C Ta +40°C 85°C (T6)	DNV MUNO 0496.ATEX.07/3163	0000030861
CORA: Rotay Valve R.V.200RCRC	EX II 1D/2GD c T6°C 0°C Ta +40°C 85°C (T6) Ex II 2GD/2GD c II B T6°C Ta +40°C 85°C (T6)	DNV MUNO 0496.ATEX.07/3163	0000030860
E+H Niveausensor Type: FTM50-4TDAA2A72AC	Ex II 1/3D Ex tD A20/22 IP6X, t +23K	KEMA 05 ATEX 2066	0000026818
HBM: Wägezelle Type: Z6FD1 200kg	Ex II 3G Ex nA II T6 Ex II 3D Ex tD A22 IP68 T+80°C Umax = 12V -30°C ≤ Ta ≤ 70°C	HBM Doc. No. 261/2009-09	0000025420
HBM: Klemmenkasten Type: VKK2R-8 Ex	Ex II 2D 3D IP65 T80°C T80°C Ta < 70°C, Umax =12V	HBM Doc. No. 237/2009-10	0000025421
Netter Druckluft-Turbinenvibrator Typ NCT 29 i SE	ATEX II 2 G D 85°C (T6)	Doc. No. NV 2003 001 X	0-32304 (0-30686)
Abrasion-proof and antistatic suction and transport hose AIRDUC® PUR-INOX 351 MHF-AS	Antistatic material: electrical and surface resistance < 10 ⁹ Ω	Norres CE statement	0000040374 0000040385 0000040392 0000040393 0000040400



DICHIARAZIONE CE DI CONFORMITÀ Ai sensi della Direttiva 94/9/CE "Atex"	EC DECLARATION OF CONFORMITY According to Directive 94/9/EC "Atex"
Il sottoscritto Salvatore Lardieri costruttore e legale rappresentante della : <i>The undersigned Salvatore Lardieri manufacturer and legal representative of:</i>	CO.RA s.r.l. loc. Chiappini, 51 55010 - Spianate - Altopascio (Lucca)
Attesta, sotto la sua responsabilità, che il prodotto: Certificate, under his responsibility, that the product:	
Valvola Intercettazione Polveri: Tipo / <i>Interception Powder Valve: Type</i>	SOLE VALVE
N° matricola <i>Serial Number</i>	S.V.M/14/0245/1

E' conforme ai requisiti essenziali di sicurezza e salute stabiliti dall'Allegato II della Direttiva **94/9/CE (Atex)** ed è stato soggetto ad una procedura di valutazione della conformità per la categoria II 1D/2GD e II 2GD/2GD.

Is in compliance with the essential requisition about safety and health, established from the Attached II of the ATEX Directive 94/9/EC (Atex) and also has been subjected to a valuation of conformity for the category II 1D/2GD and II 2GD/2GD.

Norme armonizzate applicate: / *Uniformed apply norms:*

UNI EN 13463-1 Apparecchi non elettrici per atmosfere potenzialmente esplosive. Parte 1 metodo e requisiti di base / *Non-electrical equipment for use in potentially explosive atmospheres. Part 1: Basic method and requirements*

UNI EN 13463-5 Apparecchi non elettrici per atmosfere potenzialmente esplosive .Parte 5: Protezione tramite sicurezza costruttiva "c" / *Non-electrical equipment for use in potentially explosive atmospheres Part 5: Protection by constructional safety "c"*

EN 1127-1 Prevenzione dell'esplosione e protezione contro l'esplosione . parte 1: concetti fondamentali e metodologia / *Explosive atmospheres. Explosion prevention and protection. Part 1: Basic concepts and methodology*

Linee guida **GMP** / *Good Manufacturing Practice (GMP),*

La presente dichiarazione CE di conformità include anche il soddisfacimento ai requisiti essenziali di sicurezza stabiliti alle Direttive Comunitarie: **2006/42/CE..**

The present CE conformity declaration also includes the satisfactions to the essential safety requirements established from the Communitarian Directives: 2006/42/CE..

Il prodotto è idoneo per essere utilizzato in apparecchiature classificate: / *The product is used to classify equipment:*

Categoria 1 Guarnizione in Viton: / Category 1 Viton Gasket	CE 2049 Ex II 1D/2GD c 0°C Ta+40°C 85°C (T6)
Categoria 1 Guarnizione in SI-P.T.F.E.: / Category 1 SI-P.T.F.E. Gasket:	CE 2049 Ex II 1D/2GD c 0°C Ta+40°C 85°C (T6)
Categoria 2 Guarnizione in Viton: / Category 2 Viton Gasket:	CE 2049 Ex II 2GD/2GD c IIA T6 °C 0°CTa+40°C
Categoria 2 Guarnizione in SI-P.T.F.E.: / Category 2 SI-P.T.F.E. Gasket:	CE 2049 Ex II 2GD/2GD c IIB T6 °C 0°CTa+40°C

la marcatura è apposta sul prodotto./ *branded on product.*

Le condizioni di installazione del prodotto sono riportate nel manuale di uso e manutenzione./ *Product's installation requirement are written on the Use and Maintenance Manual.*

Organismo Notificato per l'Esame CE del Tipo: <i>Notified Organism for the CE Type examination:</i>	DNV-MODULO UNO S.c.a.r.l. N.B. N° 2049 Via Cuorgnè N° 21 – 10156 – Torino (Italy)		
Numero di certificato dell'Esame CE del Tipo: <i>Certificate number for EC Type Examination:</i>	DNV MUNO 0496.ATEX.07/3163		
Organismo Notificato per la Sorveglianza della produzione: <i>Notified Organism for the production surveillance:</i>	DNV-MODULO UNO S.c.a.r.l. N.B. N° 2049 Via Cuorgnè N° 21 – 10156 – Torino (Italy)		
Numero di attestato di conformità : <i>Conformity Certificate Number:</i>	DNV MUNO 0496.ATEX.07/3192		
Luogo e data/ Place and date	Nome e Cognome / Name and surname	Posizione / Position	Firma / Signature
Spianate, li 27/03/2014	Sig. / Mr. Salvatore Lardieri	Legale Rappresentante –Presidente Legal Representative – President	

Compilato da LORENZO LAZZERINI

Mod.261 rev.0





DICHIARAZIONE CE DI CONFORMITÀ Ai sensi della Direttiva 94/9/CE "Atex"	EC DECLARATION OF CONFORMITY According to Directive 94/9/EC "Atex"
Il sottoscritto Salvatore Lardieri costruttore e legale rappresentante della : <i>The undersigned Salvatore Lardieri manufacturer and legal representative of:</i>	CO.RA s.r.l. loc. Chiappini, 51 55010 - Spianate - Altopascio (Lucca)
Attesta, sotto la sua responsabilità, che il prodotto: Certificate, under his responsibility, that the product:	
Valvola Intercettazione Polveri: Tipo / <i>Interception Powder Valve: Type</i>	ROTARY VALVE
N° matricola <i>Serial Number</i>	R.V.M/14/0245/1

E' conforme ai requisiti essenziali di sicurezza e salute stabiliti dall'Allegato II della Direttiva **94/9/CE (Atex)** ed è stato soggetto ad una procedura di valutazione della conformità per la categoria II 1D/2GD e II 2GD/2GD.

Is in compliance with the essential requisition about safety and health, established from the Attached II of the ATEX Directive 94/9/EC (Atex) and also has been subjected to a valuation of conformity for the category II 1D/2GD and II 2GD/2GD.

Norme armonizzate applicate: / *Uniformed apply norms:*

UNI EN 13463-1 Apparecchi non elettrici per atmosfere potenzialmente esplosive. Parte 1 metodo e requisiti di base / *Non-electrical equipment for use in potentially explosive atmospheres. Part 1: Basic method and requirements*

UNI EN 13463-5 Apparecchi non elettrici per atmosfere potenzialmente esplosive .Parte 5: Protezione tramite sicurezza costruttiva "c" / *Non-electrical equipment for use in potentially explosive atmospheres Part 5: Protection by constructional safety "c"*

EN 1127-1 Prevenzione dell'esplosione e protezione contro l'esplosione . parte 1: concetti fondamentali e metodologia / *Explosive atmospheres. Explosion prevention and protection. Part 1: Basic concepts and methodology*

Linee guida **GMP** / *Good Manufacturing Practice (GMP),*

La presente dichiarazione CE di conformità include anche il soddisfacimento ai requisiti essenziali di sicurezza stabiliti alle Direttive Comunitarie: **2006/42/CE..**

The present CE conformity declaration also includes the satisfactions to the essential safety requirements established from the Communitarian Directives: 2006/42/CE..

Il prodotto è idoneo per essere utilizzato in apparecchiature classificate: / *The product is used to classify equipment:*

Categoria 1 Guarnizione in Viton: / Category 1 Viton Gasket	CE 2049 Ex II 1D/2GD c 0°C Ta+40°C 85°C (T6)
Categoria 1 Guarnizione in SI-P.T.F.E.: / Category 1 SI-P.T.F.E. Gasket:	CE 2049 Ex II 1D/2GD c 0°C Ta+40°C 85°C (T6)
Categoria 2 Guarnizione in Viton: / Category 2 Viton Gasket:	CE 2049 Ex II 2GD/2GD c IIA T6 °C 0°CTa+40°C
Categoria 2 Guarnizione in SI-P.T.F.E.: / Category 2 SI-P.T.F.E. Gasket:	CE 2049 Ex II 2GD/2GD c IIB T6 °C 0°CTa+40°C

la marcatura è apposta sul prodotto./ *branded on product.*

Le condizioni di installazione del prodotto sono riportate nel manuale di uso e manutenzione./ *Product's installation requirement are written on the Use and Maintenance Manual.*

Organismo Notificato per l'Esame CE del Tipo: <i>Notified Organism for the CE Type examination:</i>		DNV-MODULO UNO S.c.a.r.l. N.B. N° 2049 Via Cuorgnè N° 21 – 10156 – Torino (Italy)	
Numero di certificato dell'Esame CE del Tipo: <i>Certificate number for EC Type Examination:</i>		DNV MUNO 0496.ATEX.07/3163	
Organismo Notificato per la Sorveglianza della produzione: <i>Notified Organism for the production surveillance:</i>		DNV-MODULO UNO S.c.a.r.l. N.B. N° 2049 Via Cuorgnè N° 21 – 10156 – Torino (Italy)	
Numero di attestato di conformità : <i>Conformity Certificate Number:</i>		DNV MUNO 0496.ATEX.07/3192	
Luogo e data/ Place and date	Nome e Cognome / Name and surname	Posizione / Position	Firma / Signature
Spianate, li 27/03/2014	Sig. / Mr. Salvatore Lardieri	Legale Rappresentante –Presidente Legal Representative – President	

Compilato da LORENZO LAZZERINI

Mod.261 rev.0



(1) **EC-TYPE EXAMINATION CERTIFICATE**

(2) **Equipment and protective systems intended for use in potentially explosive atmospheres - Directive 94/9/EC**

- (3) EC-Type Examination Certificate Number: **KEMA 05ATEX2066** Issue Number: **2**
- (4) Equipment: **Level Limit Switch Soliphant M Type FTM 50-....., Type FTM 51-..... and Type FTM 52-.....**
- (5) Manufacturer: **Endress + Hauser GmbH + Co. KG**
- (6) Address: **Hauptstrasse 1, 79689 Maulburg, Germany**
- (7) This equipment and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.
- (8) KEMA Quality B.V., notified body number 0344 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the directive.
The examination and test results are recorded in confidential test report number 2101492-3.
- (9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:
- | | | |
|--------------------------|--------------------------|---------------------------|
| EN 61241-0 : 2006 | EN 61241-1 : 2004 | EN 61241-11 : 2006 |
|--------------------------|--------------------------|---------------------------|
- (10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.
- (11) This EC-Type Examination Certificate relates only to the design, examination and tests of the specified equipment according to the Directive 94/9/EC. Further requirements of the directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.
- (12) The marking of the equipment shall include the following:



II 1/2 D	Ex tD A20/21 IP6X T + 23 K or Ex tD [iaD] A20/21 IP6X T + 23 K or
II 1/3 D	Ex tD A20/22 IP6X T + 23 K or Ex tD [iaD] A20/22 IP6X T + 23 K or
II 2 (1) D	Ex tD [iaD] A21 IP6X T + 23 K or
II 3 (1) D	Ex tD [iaD] A22 IP6X T + 23 K or
II 1/2 D	Ex iaD 20/21 IP6X T + 10 K or
II 1/3 D	Ex iaD 20/22 IP6X T + 10 K

This certificate is issued on 12 March 2007 and, as far as applicable, shall be revised before the date of cessation of presumption of conformity of (one of) the standards mentioned above as communicated in the Official Journal of the European Union.

KEMA Quality B.V.



P.T. van Nijen
Certification Manager



(13) **SCHEDULE**

(14) **to EC-Type Examination Certificate KEMA 05ATEX2066**

Issue No. 2

(15) **Description**

Level Limit Switches Soliphant M Type FTM 50-....., Type FTM 51-..... and Type FTM 52-..... are used to detect the level limit of powdered or fine grain solids, using a vibrating fork sensor.

The level limit switch consists of an electronics enclosure, made of plastic (enclosure F16), aluminium (enclosures T13, F13 or F17), or stainless steel (enclosure F15), and a stainless steel sensor.

The sensor is a piezo driven vibrating fork, directly mounted to the electronics enclosure (type FTM 50-...) or connected via an extension tube (type FTM 51-...) or a cable (type FTM 52-...).

All models can be executed as a remote version with the intrinsically safe sensor separately mounted from the electronics enclosure. The maximum length of the connection cable between the electronics enclosure and the sensor is 17 m.

The versions of the level limit switch for high process temperatures are provided with a temperature spacer.

Optionally, the process connected parts can completely or partially be provided with a coating or a protective layer.

Depending on the electronics insert, the output is a switched load in the supply line (FEM 51), a transistor switch (FEM 52), a potential free relay contact (FEM 54) or a current signal (FEM 55, 2-wire 8/16 mA current).

The enclosure of the level limit switch provides a degree of protection of at least IP66 in accordance with EN 60529.

Ambient temperature range: -40 °C to +70 °C (enclosure F16);
-50 °C to +70 °C (other enclosures).

Process temperature range: -50 °C to +300 °C (type FTM 50-... and type FTM 51-...);
-40 °C to +80 °C (type FTM 52-...).

The surface temperature of the electronics enclosure "T" exceeds the ambient temperature by not more than 23 K (compact versions and electronics enclosure of separate versions) respectively 10 K (sensor enclosure of separate versions).

The temperature rise is determined with a dust layer of excessive thickness (sensor enclosure of separate versions), respectively for a dust layer with a thickness of max. 5 mm (all electronics enclosures).

Marking

Depending on the variation of the Level Limit Switch Soliphant M, the marking shall include the following:

Type FTM 50-..... and Type FTM 51-..... (compact version)



II 1/2 D
II 1/3 D

Ex tD A20/21 IP6X T + 23 K (exclusive enclosure F16) or
Ex tD A20/22 IP6X T + 23 K

Type FTM 52-..... (compact version)



II 1/2 D
II 1/3 D

Ex tD [iaD] A20/21 IP6X T + 23 K (exclusive enclosure F16) or
Ex tD [iaD] A20/22 IP6X T + 23 K

(13) SCHEDULE**(14) to EC-Type Examination Certificate KEMA 05ATEX2066**

Issue No. 2

Separate version, electronics enclosureII 2 (1) D
II 3 (1) DEx tD [iaD] A21 IP6X T + 23 K (exclusive enclosure F16) or
Ex tD [iaD] A22 IP6X T + 23 KSeparate version, sensorII 1/2 D
II 1/3 DEx iaD 20/21 IP6X T + 10 K or
Ex iaD 20/22 IP6X T + 10 K**Electrical data**Electronics insert FEM 51 (2-wire, switched load)Supply: 19 ... 253 Vac, 50/60 Hz, max. 0,83 W
Output: max. 350 mA
 $U_m = 253 \text{ Vac}$ Electronics insert FEM 52 (transistor switch)Supply: 10 ... 55 Vdc, max. 0,83 W
Output: PNP transistor, max. 350 mA
 $U_m = 253 \text{ Vac}$ Electronics insert FEM 54 (relay contacts)Supply: 19 ... 55 Vdc, max. 1,3 W, or
19 ... 253 Vac, 50/60 Hz, max. 1,3 W
Output: 2 potential free change-over contacts, max. 6 A
 $U_m = 253 \text{ Vac}$ Electronics insert FEM 55 (2-wire, 8/16 mA)Supply/output: 11 ... 36 Vdc, 8 or 16 mA, max. 0,6 W
 $U_m = 253 \text{ Vac}$ Sensor circuits, all electronics insertsInternal circuit, or for connection to the separate sensor, in type of protection intrinsic safety
Ex iaD.

The sensor circuit is connected to earth.

Installation instructions

The installation manual of the manufacturer, provided with the equipment shall be followed in detail in order to assure safe operation.

(13) **SCHEDULE**

(14) **to EC-Type Examination Certificate KEMA 05ATEX2066**

Issue No. 2

Routine tests

Routine tests in accordance with EN 50020:

- each transformer T100 and T101 shall be subjected to a voltage test with a test voltage of 1808 Vac during 2 s between primary and secondary windings without breakdown.

(16) **Test Report**

KEMA No. 2101492-3.

(17) **Special conditions for safe use**

None.

(18) **Essential Health and Safety Requirements**

Assured by compliance with the standards listed at (9).

(19) **Test documentation**

As listed in Test Report No. 2101492-3.



Konformitätserklärung

Declaration of Conformity

Déclaration de Conformité

Document: 237 / 2009-10

Wir,

We,

Nous,

Hottinger Baldwin Messtechnik GmbH, Darmstadt

erklären in alleiniger Verantwortung,
dass das Produkt

declare under our sole
responsibility that the product

déclarons sous notre seule
responsabilité que le produit

Junction box

Type: VKK2R-8Ex

Ex II 2 G or Ex II 3 G or Ex II 2 D or Ex II 3 D

auf das sich diese Erklärung
bezieht, mit der/den folgenden
Norm(en) oder normativen
Dokument(en) übereinstimmt (siehe
Seite 2) gemäß den Bestimmungen
der Richtlinie(n)

to which this declaration relates is
in conformity with the following
standard(s) or other normative
document(s) (see page 2)
following the provisions of
Directive(s)

auquel se réfère la présente
déclaration est conforme à la (aux)
norme(s) ou autre(s) document(s)
normatif(s) (voir page 2)
conformément aux dispositions de
la (des) Directive(s)

94/9/EC - *Directive 94/9/EC of the European Parliament and of the Council of 23 March 1994 on the approximation of the laws of the Member States concerning equipment and protective systems intended for use in potentially explosive atmospheres*

EG-Baumusterprüfbescheinigung:
EC type examination certificate:
Attestation CE de type:

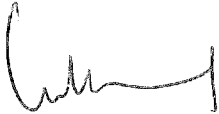
PTB 05 ATEX 2014
*Physikalisch-Technische Bundesanstalt
Bundesallee 100, D-38116 Braunschweig
Identification no. 0102*

Die Absicherung aller produkt-
spezifischen Qualitätsmerkmale
erfolgt auf Basis eines zertifizierten
Qualitätsmanagementsystems nach
ISO 9001.
Die Überprüfung der sicherheits-
relevanten Merkmale (Elektro-
magnetische Verträglichkeit, Sicher-
heit elektrischer Betriebsmittel) stellt
ein von der DATech erstmals 1991
akkreditiertes Prüflaboratorium
unabhängig im Hause HBM sicher.

All product-related features are
secured by a certified quality
system in accordance with
ISO 9001.
The safety-relevant features
(electromagnetic compatibility,
safety of electrical apparatus) are
secured at HBM by an independent
testing laboratory which has been
accredited by DATech in 1991 for
the first time.

La garantie de toutes les
caractéristiques de qualité d'un
produit spécifique s'effectue sur la
base d'un système d'assurance
qualité certifié selon la norme
ISO 9001.
Le contrôle des caractéristiques
relatives à la sécurité (compatibilité
électromagnétique, sécurité
d'équipement électrique) est assuré
chez HBM de manière
indépendante par un laboratoire
d'essais, accrédité pour la première
fois en 1991 par DATech.

Darmstadt, 2009-10-01


Andreas Hüllhorst, CEO


Dr. Wolfram Meiritz, CFO

Document: 237 / 2009-10

Diese Erklärung bescheinigt die Übereinstimmung mit den genannten Richtlinien, beinhaltet jedoch keine Zusicherung von Eigenschaften.

Die Sicherheitshinweise der mitgelieferten Produktdokumentation sind zu beachten.

This declaration certifies conformity with the directives mentioned, but is no warranty of characteristics.

The safety instructions of the included product documentation must be complied with.

Cette déclaration certifie la conformité avec les directives citées mais n'inclut pas de garantie des caractéristiques techniques.

Les consignes de sécurité de la documentation jointe au produit doivent être suivies.

Folgende Normen werden zum Nachweis der Übereinstimmung mit den Vorschriften der Richtlinie(n) eingehalten:

The following standards are met as proof of conformity with the provisions of the Directive(s):

Pour la preuve de conformité aux dispositions de la (des) Directive(s) le produit répond aux normes:

EN 60079-0:2006	Electrical apparatus for explosive gas atmospheres - Part 0: General requirements (IEC 60079-0:2004, modified)
EN 60079-7:2007	Explosive atmospheres - Part 7: Equipment protection by increased safety "e" (IEC 60079-7:2006)
EN 60079-11:2007	Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i" (IEC 60079-11:2006)
EN 60079-15:2005	Electrical apparatus for explosive gas atmospheres - Part 15: Construction, test and marking of type of protection "n" electrical apparatus (IEC 60079-15:2005)
EN 61241-0:2006	Electrical apparatus for use in the presence of combustible dust - Part 0: General requirements (IEC 61241-0:2004+Corrigendum 1:2005, modified)
EN 61241-1:2004	Electrical apparatus for use in the presence of combustible dust - Part 1: Protection by enclosures "tD" (IEC 61241-1:2004)
EN 61241-11:2006	Electrical apparatus for use in the presence of combustible dust - Part 11: Protection by intrinsic safety "iD" (IEC 61241-11:2005 + Corrigendum 1:2006)

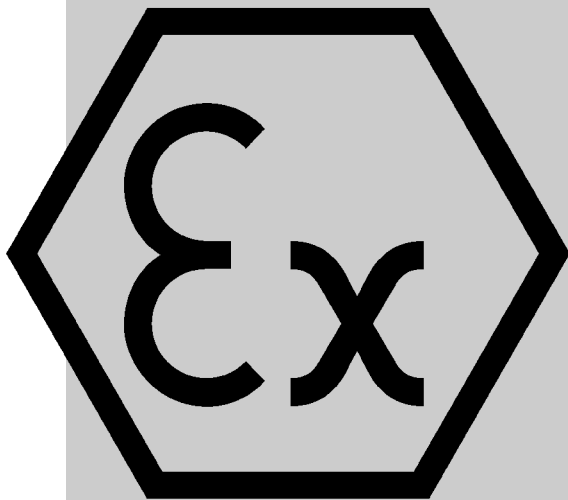
Safety instructions for Ex load cells

Sicherheitshinweise
zu Ex-Wägezellen

Consignes de sécurité
pour pesons Ex

Advertencias de seguridad
para células de carga Ex

Avvertenze di sicurezza
per celle di carico Ex



II 2 G (Zone 1)
II 2 D (Zone 21)

C16
C2
U2
PW15AH
HLC
RSC
Z6

These load cells are passive equipment for use in potentially explosive atmospheres. They belong to **equipment group II, equipment category 2**.

The load cells approved for use in **Zone 1** (gases/vapours/mists) according to EC-type examination certificate **PTB 01 ATEX 2208 / 2209** comply with the type of protection “intrinsic safety” **EEx ia II C** for connection to an intrinsically safe circuit with the following maximum values:

Ex-Load cells	U_i	I_i	P_i	Temperature class at ambient temperature T_a	L_i per m cable	C_i per m cable
C16, C2, U2, PW15AH, HLC, RSC, Z6	22 V	469 mA	1.25 W	T6: $-30\text{ °C} < T_a < +40\text{ °C}$	0.6 $\mu\text{H/m}$	162 pF/m
	22 V	469 mA	1.25 W	T4: $-30\text{ °C} < T_a < +70\text{ °C}$	0.6 $\mu\text{H/m}$	162 pF/m
HLC, RSC, Z6	13 V	483 mA	2 W	T4: $-30\text{ °C} < T_a < +70\text{ °C}$	0.6 $\mu\text{H/m}$	162 pF/m

The following values apply to load cells approved for use in **Zone 21** (air/dust mixtures) according to EC-type examination certificate **DMT 03 ATEX E 033**:

max. surface temperature	ambient temperature range	max. permiss. excitation voltage
80 °C [176 °F]	$-30\text{ °C} \dots 70\text{ °C}$ [$-22\text{ °F} \dots 158\text{ °F}$]	12 V

The load cells may only be used by qualified personnel. Qualified personnel means persons who are familiar with the installation, commissioning and operation of the product as well as the concept of the type of protection and who have the necessary qualification for their job.

The field of application is defined in accordance with the information provided by the attached copies of the EC-type examination certificates, the technical data and the specified safety regulations. Using the load cells beyond the data specified in the mounting instructions is not permissible and will not be considered as intended use.

The load cells must have direct conductive contact with the surrounding structure, which, on its part, is connected to the potential compensation of the system as a whole. When the connection cables have an additional external protective metal braid, this must be connected to the potential of the surrounding construction by an adequate number of suitable clamps. The connection cable must be laid in a manner that it is protected from damage and tensile stress.

Restrictions on use due to materials for load cells made from stainless steel:

Please take into account that even stainless steels and their welding seams can be affected by corrosive substances, especially if they contain chloric salts. In these cases the operator must take additional protective measures. The additional protective measures have to be checked regularly in appropriate intervals to ensure that they are effective. It is essential to comply with the respective national laws and safety regulations for the use of load cells in potentially explosive atmospheres.

All documentation supplied with this product should be retained for future reference!

Diese Wägezellen sind passive Betriebsmittel für den Einsatz in explosionsgefährdeten Bereichen. Sie gehören zur **Gerätegruppe II, Gerätekategorie 2**.

Die gemäß EG-Baumusterprüfung **PTB 01 ATEX 2208 / 2209** für den Einsatz in **Zone 1** (Gase/ Dämpfe/Nebel) zugelassenen Wägezellen entsprechen der Zündschutzart "Eigensicherheit" **EEx ia II C** für den Anschluss an einen eigen-sicheren Stromkreis mit den folgenden Höchstwerten:

Ex-Wägezellen	U _i	I _i	P _i	Temperaturklasse bei Umgebungstemperatur T _a	L _i pro m Kabel	C _i pro m Kabel
C16, C2, U2, PW15AH, HLC, RSC, Z6	22 V	469 mA	1,25 W	T6: -30 °C < T _a < + 40 °C	0,6 μH/m	162 pF/m
	22 V	469 mA	1,25 W	T4: -30 °C < T _a < + 70 °C	0,6 μH/m	162 pF/m
HLC, RSC, Z6	13 V	483 mA	2 W	T4: -30 °C < T _a < + 70 °C	0,6 μH/m	162 pF/m

Für die gemäß EG-Baumusterprüfung **DMT 03 ATEX E 033** für den Einsatz in **Zone 21** (Staub/Luft-Gemische) zugelassenen Wägezellen gelten folgende Werte:

max. Oberflächentemperatur	Umgebungstemperaturbereich	höchstzul. Speisespannung
80 °C	-30 °C ... 70 °C	12 V

Die Wägezellen sind nur von qualifiziertem Personal einzusetzen und zu verwenden. Qualifiziertes Personal sind Personen, die mit Montage, Inbetriebnahme und Betrieb des Produktes und mit dem Konzept der Zündschutzart vertraut sind und die über die ihrer Tätigkeit entsprechende Qualifikation verfügen.

Der Einsatzbereich ist entsprechend den Angaben in beiliegenden Kopien der EG-Baumusterprüfbescheinigungen, den technischen Daten und den aufgeführten Sicherheitsbestimmungen definiert. Ein Betrieb der Wägezellen über die in der Montageanleitung angegebenen Daten hinaus ist nicht zulässig und gilt als nicht bestimmungsgemäßer Gebrauch.

Die Wägezellen müssen in unmittelbarem leitfähigem Kontakt zu der umgebenden Konstruktion stehen, die ihrerseits in den Potentialausgleich der gesamten Anlage eingebunden ist. Bei Anschlusskabeln mit zusätzlichem äußerem Metall-Schutzgeflecht, ist dieses mit geeigneten Schellen in ausreichender Anzahl an das Potenzial der umgebenden Konstruktion anzuschliessen. Das Anschlusskabel muss so verlegt werden, dass es gegen Beschädigung und vor Zugbelastung geschützt ist.

Materialbedingte Einsatzbeschränkungen f. Wägez. aus nicht rostendem Stahl: Beachten Sie in Ihrem Anwendungsfeld, dass auch nicht rostende Stähle und deren Schweißnähte durch aggressive Medien, insbesondere mit chlorhaltigen Salzen, angegriffen werden können. In diesen Fällen sind von der Betreiberseite zusätzliche Schutzmaßnahmen vorzusehen. Die zusätzlichen Schutzmaßnahmen sind durch regelmäßige Kontrollen in angemessenen Abständen auf ihre Wirksamkeit zu überprüfen. Beachten Sie die jeweiligen länderspezifischen Rechts- und Sicherheitsvorschriften für den Einsatz von Wägezellen in explosionsgefährdeten Bereichen.

Bitte bewahren Sie alle mitgelieferten Dokumente für spätere Zwecke auf!

Ces pesons sont considérés comme du matériel passif utilisable en atmosphères explosibles. Ils appartiennent au **groupe d'appareils II, catégorie d'appareils 2**.

Les pesons qui conforment à l'examen CE de type **PTB 01 ATEX 2208 / 2209** sont conçus pour l'utilisation en **Zone 1** (gaz, vapeurs, brouillards) et satisfont aux exigences du mode de protection "sécurité intrinsèque" **EEx ia II C** pour le raccordement à un circuit électrique à sécurité intrinsèque avec les valeurs maximales suivantes :

Pesons Ex	U _i	I _i	P _i	Classe de température à températ. ambiante T _a	L _i par m câble	C _i par m câble
C16, C2, U2, PW15AH, HLC, RSC, Z6	22 V	469 mA	1,25 W	T6: -30 °C < T _a < + 40 °C	0,6 µH/m	162 pF/m
	22 V	469 mA	1,25 W	T4: -30 °C < T _a < + 70 °C	0,6 µH/m	162 pF/m
HLC, RSC, Z6	13 V	483 mA	2 W	T4: -30 °C < T _a < + 70 °C	0,6 µH/m	162 pF/m

Les valeurs suivantes sont valables pour les pesons qui conformément à l'examen CE de type **DMT 03 ATEX E 033** sont conçus pour l'utilisation en **Zone 21** (mélanges d'air avec des poussières) :

température max. de surface	plage de température ambiante	tension d'aliment. max. admiss.
80 °C	-30 °C ... 70 °C	12 V

Les pesons ne peuvent être utilisés que par du personnel qualifié. Par personnel qualifié on entend des personnes familiarisées avec l'installation, la mise en oeuvre et le fonctionnement du produit et avec la conception du mode de protection, et qui disposent des qualifications exigées par leur fonction.

Le domaine d'application est défini par les données fournies dans les copies ci-jointes des certificats d'examen CE de type, des caractéristiques techniques et des règlements de sécurité mentionnés. Toute utilisation du peson au-delà des données indiquées dans les instructions de montage n'est pas autorisée et est considérée comme utilisation non conformément à leur destination.

Les pesons doivent être en contact conducteur direct avec la construction entourante, qui, pour sa part, est intégrée dans la liaison équipotentielle du système complet. Pour les câbles de liaison munis d'une tresse de protection métallique extérieure supplémentaire, il est nécessaire de raccorder cette dernière au potentiel de la construction qui l'entoure à l'aide d'un nombre suffisant de brides appropriées. Le câble de liaison doit être posé de manière à être protégé contre toute endommagement et charge en traction.

Contraintes d'utilisation dues au matériau pour les pesons en acier inoxydable :

Considérez dans votre domaine d'application que des substances agressives, notamment avec du sel chloré, peuvent agir également sur les aciers inoxydables et leurs soudures. Dans ce cas, l'utilisateur doit prendre des mesures de protection supplémentaires. L'efficacité de ces mesures de protection supplémentaires devra être vérifiée régulièrement dans des intervalles raisonnables. Respectez les règlements et les consignes de sécurité locales en vigueur lors de l'utilisation des pesons en atmosphères explosibles.

Veillez conserver l'ensemble des documents fournis à des fins ultérieures !

Estas células de carga son productos pasivos para el uso en lugares con peligro de explosión. Pertenecen al **grupo de aparato II, categoría de aparato 2**.

Las células de carga autorizadas según el ensayo de homologación CE **PTB 01 ATEX 2208 / 2209** para el uso en **Zona 1** (gases/vapores/néboas) corresponden a la clase de protección contra ignición "seguridad intrínseca"

EEx ia II C para la conexión a un circuito intrínseco con los siguientes valores máximos:

Células de carga Ex	U _i	I _i	P _i	Clase de temperatura a temperatura ambiental T _a	L _i por m de cable	C _i por m de cable
C16, C2, U2, PW15AH, HLC, RSC, Z6	22 V	469 mA	1,25 W	T6: -30 °C < T _a < + 40 °C	0,6 μH/m	162 pF/m
	22 V	469 mA	1,25 W	T4: -30 °C < T _a < + 70 °C	0,6 μH/m	162 pF/m
HLC, RSC, Z6	13 V	483 mA	2 W	T4: -30 °C < T _a < + 70 °C	0,6 μH/m	162 pF/m

Los valores siguientes son válidos para las células de carga autorizadas según el ensayo de homologación CE **DMT 03 ATEX E 033** para el uso en **Zona 21** (polvos/suspensiones de polvos en aire):

temperatura máx. de superficie	rango de temperatura ambiental	tensión de alimentación máxima
80 °C	-30 °C ... 70 °C	12 V

El montaje y manejo de las células de carga debe realizarse únicamente por personal cualificado. Bajo personal cualificado entendemos a las personas que poseen experiencia en el montaje, puesta en servicio y funcionamiento del producto y que poseen conocimientos acerca del concepto de clase de protección contra ignición, además de disponer de la cualificación para su labor.

El campo de aplicación de las células de carga se restringe al indicado en los datos expuestos en la copia adjunta del certificado de homologación de la CE, en la hoja de características y en las normas de seguridad expuestas. No está permitido el funcionamiento de las células de carga fuera del ámbito descrito en los datos facilitados en las instrucciones de montaje, en cuyo caso se consideraría uso no adecuado.

Las células de carga deben estar en contacto directo conductivo con la construcción que les rodea, la cual esta incluida en la compensación de potencial de la instalación completa. En caso de cables de conexión con trenzado de metal externo adicional, éste deberá conectarse al potencial de la construcción circundante con el número suficiente de abrazaderas apropiadas. El cable de conexión debe ser colocado de tal manera que este protegido de daños y de cargas de tracción.

Restricciones de uso concernient. al mat. para células d. carga de acero inoxid.: Tenga en cuenta en su campo de uso que un medio agresivo, especialmente sales con cloro pueden deteriorar incluso acero inoxidable y sus soldaduras. Si este fuera el caso, deberían tomarse medidas de protección adicionales por parte del usuario. Las medidas de protección adicionales deberán ser sometidas regularmente a controles de funcionamiento. Tenga en cuenta las normas jurídicas y de seguridad de los diferentes países para el uso de las células de carga en lugares con peligro de explosión.

¡Guarde toda la documentación suministrada para propósitos futuros!

Queste celle di carico sono materiale passivo destinato ad essere utilizzato in atmosfera potenzialmente esplosiva che appartengono al **gruppo di apparecchi II, categoria di apparecchi 2**.

Le celle di carico che secondo la procedura di esame CE del tipo **PTB 01 ATEX 2208 / 2209** sono approvate per l'uso in **Zona 1** (gas/vapori/nebbie) rispondono alle esigenze del tipo di protezione "sicurezza intrinseca" **EEx ia II C** per il collegamento ai circuiti elettrici a sicurezza intrinseca con i seguenti valori massimi:

Celle di carico Ex	U _i	I _i	P _i	Classe di temperatura a temperat. ambientale T _a	L _i per m di cavo	C _i per m di cavo
C16, C2, U2, PW15AH, HLC, RSC, Z6	22 V	469 mA	1,25 W	T6: -30 °C < T _a < + 40 °C	0,6 µH/m	162 pF/m
	22 V	469 mA	1,25 W	T4: -30 °C < T _a < + 70 °C	0,6 µH/m	162 pF/m
HLC, RSC, Z6	13 V	483 mA	2 W	T4: -30 °C < T _a < + 70 °C	0,6 µH/m	162 pF/m

I seguenti valori sono validi per le celle di carico che secondo la procedura di esame CE del tipo **DMT 03 ATEX E 033** sono approvate per l'uso in **Zona 21** (miscele aria+polveri):

massima temperat. superficiale	campo di temperat. ambientale	massima tens. di alimentazione
80 °C	-30 °C ... 70 °C	12 V

Le celle di carico dovranno essere utilizzate solamente da personale qualificato. Per personale qualificato si intende il personale che abbia acquisito familiarità con l'installazione, la messa in servizio e il funzionamento del prodotto e con il concetto del tipo di protezione e che disponga delle necessarie qualifiche.

Il campo di impieghi è definito in conformità ai dati contenuti nelle copie allegate del certificato di esame CE del tipo, delle caratteristiche tecniche e delle norme di sicurezza specificate. Una utilizzazione delle celle di carico oltre ai dati specificati nelle istruzioni di montaggio non è ammessa e non sarà considerata come impiego conforme alla loro destinazione.

È necessario che sia un contatto conduttore diretto fra le celle di carico e la costruzione circondante, che, da sua parte, deve essere collegata al sistema di compensazione di potenziale dell'impianto. In caso di cavi di collegamento dotati di ulteriore maglia di protezione metallica esterna, quest'ultima deve essere fissata con fascette apposite e in numero adeguato al potenziale della costruzione circostante. Il cavo di connessione dovrà essere posato in modo tale da essere protetto da eventuali danneggiamenti e carichi a trazione.

Limitazioni di uso dovute al materiale per celle di carico in acciaio inossidabile: Tenete presente nel Vostro campo di impieghi che anche i tipi di acciaio inossidabile e i loro cordoni di saldatura possono essere attaccati da mezzi aggressivi, in particolare con sale contenente cloro. In questo caso si dovranno prevedere da parte dell'utilizzatore ulteriori misure di protezione. L'efficacia delle misure di protezione supplementari dovrà essere verificata in intervalli adeguati per mezzo di regolari controlli. Osservare le norme giuridiche e le disposizioni di sicurezza vigenti nel paese destinatario relative all'utilizzazione delle celle di carico in atmosfera potenzialmente esplosiva.

Conservare tutti i documenti in dotazione per scopi futuri!

**Konformitätserklärung****Declaration of Conformity****Déclaration de Conformité**

Document: 261 / 2009-09

Wir,

We,

Nous,

Hottinger Baldwin Messtechnik GmbH, Darmstadt

erklären in alleiniger Verantwortung,
dass das Produktdeclare under our sole
responsibility that the productdéclarons sous notre seule
responsabilité que le produit**Load cell****Series C16..., C2..., U2..., PW15AH..., HLC..., RSC..., Z6...****Ex II 2G for Zone 1 und Ex II 2D for Zone 21**auf das sich diese Erklärung
bezieht, mit der/den folgenden
Norm(en) oder normativen
Dokument(en) übereinstimmt (siehe
Seite 2) gemäß den Bestimmungen
der Richtlinie(n)to which this declaration relates is
in conformity with the following
standard(s) or other normative
document(s) (see page 2)
following the provisions of
Directive(s)auquel se réfère la présente
déclaration est conforme à la (aux)
norme(s) ou autre(s) document(s)
normatif(s) (voir page 2)
conformément aux dispositions de
la (des) Directive(s)

2004/108/EC - Directive 2004/108/EC of the European Parliament and of the Council of 15 December 2004 on the approximation of the laws of the Member States relating to electromagnetic compatibility and repealing Directive 89/336/EEC

94/9/EC - Directive 94/9/EC of the European Parliament and of the Council of 23 March 1994 on the approximation of the laws of the Member States concerning equipment and protective systems intended for use in potentially explosive atmospheres

EG-Baumusterprüfbescheinigung:
EC type examination certificate:
Attestation CE de type:**PTB 01 ATEX 2208 resp. 2209**
Physikalisch-Technische Bundesanstalt
Bundesallee 100, D-38116 Braunschweig
Identification no. 0102

and

DMT 03 ATEX E 033
DEKRA EXAM GmbH
Dinnendahlstraße 9, D-44809 Bochum
Identification no. 0158Die Absicherung aller produkt-
spezifischen Qualitätsmerkmale
erfolgt auf Basis eines zertifizierten
Qualitätsmanagementsystems nach
ISO 9001.Die Überprüfung der sicherheits-
relevanten Merkmale (Elektro-
magnetische Verträglichkeit, Sicher-
heit elektrischer Betriebsmittel) stellt
ein von der DATech erstmals 1991
akkreditiertes Prüflaboratorium
unabhängig im Hause HBM sicher.All product-related features are
secured by a certified quality
system in accordance with
ISO 9001.The safety-relevant features
(electromagnetic compatibility,
safety of electrical apparatus) are
secured at HBM by an independent
testing laboratory which has been
accredited by DATech in 1991 for
the first time.La garantie de toutes les
caractéristiques de qualité d'un
produit spécifique s'effectue sur la
base d'un système d'assurance
qualité certifié selon la norme
ISO 9001.Le contrôle des caractéristiques
relatives à la sécurité (compatibilité
électromagnétique, sécurité
d'équipement électrique) est assuré
chez HBM de manière
indépendante par un laboratoire
d'essais, accrédité pour la première
fois en 1991 par DATech.

Darmstadt, 2009-09-18

Andreas Hüllhorst, CEO

Dr. Wolfram Meitz, CFO

Hottinger Baldwin Messtechnik GmbH

Im Tiefen See 45 · D-64293 Darmstadt · Germany · Tel. +49 6151 803 0 · Fax +49 6151 803 9100 · Email: info@hbm.com · www.hbm.com

Zertifiziert nach ISO 9001 und ISO 14001 (DQS-000001)
Certified acc. to ISO 9001 and ISO 14001 by DQSAkkreditiert als DKD-Kalibrierlab. (DKD-K-00101)
Accredited as calibration laboratory by DKDAkkreditiert als EMV-Prüflab. (DAT-P-012/ DAT-P-006)
Accredited as EMC testing laboratory by DATech



Seite 2 zu

Page 2 of

Page 2 du

Document: 261 / 2009-09

Diese Erklärung bescheinigt die Übereinstimmung mit den genannten Richtlinien, beinhaltet jedoch keine Zusicherung von Eigenschaften. Die Sicherheitshinweise der mitgelieferten Produktdokumentation sind zu beachten.

This declaration certifies conformity with the directives mentioned, but is no warranty of characteristics. The safety instructions of the included product documentation must be complied with.

Cette déclaration certifie la conformité avec les directives citées mais n'inclut pas de garantie des caractéristiques techniques. Les consignes de sécurité de la documentation jointe au produit doivent être suivies.

Folgende Normen werden zum Nachweis der Übereinstimmung mit den Vorschriften der Richtlinie(n) eingehalten:

The following standards are met as proof of conformity with the provisions of the Directive(s):

Pour la preuve de conformité aux dispositions de la (des) Directive(s) le produit répond aux normes:

EN 61326-1:2006

Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements (IEC 61326-1:2005)

EN 61326-2-3:2006

Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 2-3: Particular requirements - Test configuration, operational conditions and performance criteria for transducers with integrated or remote signal conditioning (IEC 61326-2-3:2006)

EN 45501:1992

Metrological aspects of non-automatic weighing instruments; Annex B.3: performance tests for disturbances

EN 60079-0 : 2006

Electrical apparatus for explosive gas atmospheres - Part 0: General requirements (IEC 60079-0:2004, modified)

EN 60079-11:2007

Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i" (IEC 60079-11:2006)

EN 61241-0:2006

Electrical apparatus for use in the presence of combustible dust - Part 0: General requirements (IEC 61241-0:2004+Corrigendum 1:2005, modified)

EN 61241-1:2004

Electrical apparatus for use in the presence of combustible dust - Part 1: Protection by enclosures "tD" (IEC 61241-1:2004)

C21185-F1, Vers. 12, 05/2009

Hottinger Baldwin Messtechnik GmbH

Im Tiefen See 45 · D-64293 Darmstadt · Germany · Tel. +49 6151 803 0 · Fax +49 6151 803 9100 · Email: info@hbm.com · www.hbm.com

Zertifiziert nach ISO 9001 und ISO 14001 (DQS-000001)
Certified acc. to ISO 9001 and ISO 14001 by DQSAkkreditiert als DKD-Kalibrierlab. (DKD-K-00101)
Accredited as calibration laboratory by DKDAkkreditiert als EMV-Prüflab. (DAT-P-012/ DAT-P-006)
Accredited as EMC testing laboratory by DATech

Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin



(1) EC-TYPE-EXAMINATION CERTIFICATE (Translation)

(2) Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres - **Directive 94/9/EC**

(3) EC-type-examination Certificate Number:

PTB 01 ATEX 2208



(4) Equipment: Load cells, type series C16, C2, U2, PW,

(5) Manufacturer: Hottinger Baldwin Messtechnik GmbH

(6) Address: Im Tiefen See 45, 64293 Darmstadt, Germany

(7) This equipment and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.

(8) The Physikalisch-Technische Bundesanstalt, notified body No. 0102 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive.

The examination and test results are recorded in the confidential report PTB Ex 02-21294 .

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 50014:1997 + A1 + A2

EN 50020:1994

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-type-examination Certificate relates only to the design, examination and tests of the specified equipment in accordance to the Directive 94/9/EC. Further requirements of the Directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.

(12) The marking of the equipment shall include the following:

 **II 2 G EEx ia IIC T4 or T6**

Zertifizierungsstelle Explosionsschutz

Braunschweig, February 19, 2002

By order:

(signature)

L.S.

Dr.-Ing. U. Johannsmeyer
Regierungsdirektor

sheet 1/2

EC-type-examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt. In case of dispute, the German text shall prevail.

Physikalisch-Technische Bundesanstalt • Bundesallee 100 • D-38116 Braunschweig

Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin



SCHEDULE

(13)

(14) **EC-TYPE-EXAMINATION CERTIFICATE PTB 01 ATEX 2208**

(15) Description of equipment

The load cells of type series C16, C2, U2, PW are used to convert mechanical quantities (mass) into a proportional electrical signal.

The maximum permissible ambient temperature depending on the temperature class is:

T6: 40 °C T4: 70 °C

Electrical data:

Input and evaluation circuit

type of protection Intrinsic Safety EEx ia IIC
for connection to a certified intrinsically
safe circuit only

Maximum values:

$U_i = 22 \text{ V}$

$I_i = 469 \text{ mA}$

$P_i = 1.25 \text{ W}$

$L_i = 24 \text{ } \mu\text{H}$ (for 12m cable length)

$C_i = 3.2 \text{ nF}$ (for 12m cable length)

(16) Test report PTB Ex 02-21294

(17) Special conditions for safe use

none

Notes for manufacture and operation

When the shield of the connecting cable is connected at both ends, the cable length is limited to 50 m (2nd grounding point).

(18) Essential health and safety requirements

met by compliance with the standards mentioned above

Zertifizierungsstelle Explosionsschutz

Braunschweig, February 19, 2002

By order:

(signature) L.S.

Dr.-Ing. U. Johannsmeyer
Regierungsdirektor

sheet 2/2

EC-type-examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt. In case of dispute, the German text shall prevail.

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Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin




1. SUPPLEMENT

according to Directive 94/9/EC Annex III.6

to EC-TYPE-EXAMINATION CERTIFICATE PTB 01 ATEX 2208

(Translation)

Equipment: Load cells, type series C16, C2, U2, PW

Marking:  II 2 G EEx ia IIC T4 or T6

Manufacturer: Hottinger Baldwin Messtechnik GmbH

Address: Im Tiefen See 45, 64293 Darmstadt, Germany

Description of supplements and modifications

The load cells of type series C16, C2, U2, PW may in future also be manufactured and operated in accordance with the test documents listed in the test report. The modifications concern a part of the electrical data and corrections of specifications indicated on the type label.

Electrical data:

Input and evaluation circuit

type of protection Intrinsic Safety EEx ia IIC
for connection to a certified intrinsically safe circuit only

Maximum values:

$U_i = 22$ V

$I_i = 469$ mA

$P_i = 1.25$ W

$L_i = 0.6$ μ H (per meter cable length)

$C_i = 162$ pF (per meter cable length)

All other specifications remain without changes.

Test report: PTB Ex 02-22155

Zertifizierungsstelle Explosionsschutz

Braunschweig, July 08, 2002

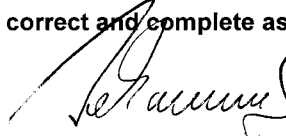
By order:

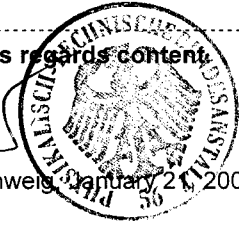
(signature)

L.S.

Dipl.-Ing. R. Wilkens

3 pages, correct and complete as regards content.
By order:


Dr.-Ing. Johannsmeyer Braunschweig, January 21, 2004
Regierungsdirektor



Sheet 1/1

EC-type-examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt. In case of dispute, the German text shall prevail.


Physikalisch-Technische Bundesanstalt • Bundesallee 100 • 38116 Braunschweig, Germany

Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin



2. SUPPLEMENT
according to Directive 94/9/EC Annex III.6
to EC-TYPE-EXAMINATION CERTIFICATE PTB 01 ATEX 2208
(Translation)

Equipment: Load cells, type series C16, C2, U2, PW

Marking:  II 2 G EEx ia IIC T4 or T6

Manufacturer: Hottinger Baldwin Messtechnik GmbH

Address: Im Tiefen See 45, 64293 Darmstadt, Germany

Description of supplements and modifications

In the future the load cells of type series C16, C2, U2, PW may also be manufactured and operated in accordance with the test documents listed in the test report. The modifications concern the extension of the type code for further variants and for the type series PW 15 and CSA, the details and the material of the type label as well as the cable grip and the plug connector of the connecting cable.

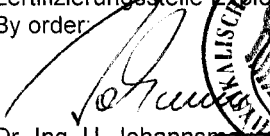
The range of the permissible ambient temperature has been extended as follows::

temperature class	permissible ambient temperature
T6	-30 °C ... +40 °C
T4	-30 °C ... +70 °C

All other specifications as well as the electrical data of the 1st supplement to the EC-type examination certificate apply without changes also to this 2nd supplement.

Test report: PTB Ex 07-26340

Zertifizierungsstelle Explosionschutz
By order:


Dr.-Ing. U. Johannsmeyer
Direktor und Professor



Braunschweig, February 22, 2007

Sheet 1/1

EC-type-examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt. In case of dispute, the German text shall prevail.

Physikalisch-Technische Bundesanstalt • Bundesallee 100 • 38116 Braunschweig, Germany

Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin




3. SUPPLEMENT

according to Directive 94/9/EC Annex III.6

to EC-TYPE-EXAMINATION CERTIFICATE PTB 01 ATEX 2208

(Translation)

Equipment: Load cells, type series C16, C2, U2, PW, CSA

Marking:  II 2 G EEx ia IIC T4 or T6

Manufacturer: Hottinger Baldwin Messtechnik GmbH

Address: Im Tiefen See 45, 64293 Darmstadt, Germany

Description of supplements and modifications

In the future the load cells of type series C16, C2, U2, PW, CSA may also be manufactured and operated according to the test documents listed in the test report. The modifications concern the extension of the type series for types PW22 and SP4, the design of the type label as well as the adaption to the current state of the standard series EN 60079-et sqq. and, therefore, the marking of the equipment. This will read in future:

Marking:  II 2 G Ex ia IIC T4 or T6

The electrical data change with respect to the marking of the input and evaluation circuit (the values apply without changes):

Electrical data

Input and evaluation circuit

type of protection Intrinsic Safety Ex ia IIC
only for connection to a certified intrinsically
safe circuit

Maximum values:

$U_i = 22$ V

$I_i = 469$ mA

$P_i = 1.25$ W

$L_i = 0.6$ μ H (per m cable length)

$C_i = 162$ pF (per m cable length)

All other data and specifications of the EC-type examination certificate including the 1st and 2nd supplement apply without changes also to this 3rd supplement.

ZSEx10101e.dot

Sheet 1/2

EC-type-examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt. In case of dispute, the German text shall prevail.

Physikalisch-Technische Bundesanstalt • Bundesallee 100 • 38116 Braunschweig • GERMANY

Physikalisch-Technische Bundesanstalt



Braunschweig und Berlin

3. SUPPLEMENT TO EC-TYPE-EXAMINATION CERTIFICATE PTB 01 ATEX 2208

Applied standards

EN 60079-0:2006

EN 60079-11:2007

Assessment and test report: PTB Ex 09-28323

Zertifizierungssektor Explosionschutz
By order:

Dr.-Ing. U. Johannsmeyer
Direktor und Professor



Braunschweig, March 9, 2009

Sheet 2/2

EC-type-examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt. In case of dispute, the German text shall prevail.

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Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

PTB



(1) EG-Baumusterprüfbescheinigung

- (2) Geräte und Schutzsysteme zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen - **Richtlinie 94/9/EG**
- (3) EG-Baumusterprüfbescheinigungsnummer




PTB 01 ATEX 2208

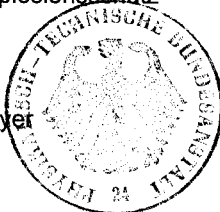
- (4) Gerät: Wägezellen, Typenreihen C16, C2, U2, PW
- (5) Hersteller: Hottinger Baldwin Messtechnik GmbH
- (6) Anschrift: Im Tiefen See 45, 64293 Darmstadt, Deutschland
- (7) Die Bauart dieses Gerätes sowie die verschiedenen zulässigen Ausführungen sind in der Anlage und den darin aufgeführten Unterlagen zu dieser Baumusterprüfbescheinigung festgelegt.
- (8) Die Physikalisch-Technische Bundesanstalt bescheinigt als benannte Stelle Nr. 0102 nach Artikel 9 der Richtlinie des Rates der Europäischen Gemeinschaften vom 23. März 1994 (94/9/EG) die Erfüllung der grundlegenden Sicherheits- und Gesundheitsanforderungen für die Konzeption und den Bau von Geräten und Schutzsystemen zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen gemäß Anhang II der Richtlinie.
- Die Ergebnisse der Prüfung sind in dem vertraulichen Prüfbericht PTB Ex 02-21294 festgehalten.
- (9) Die grundlegenden Sicherheits- und Gesundheitsanforderungen werden erfüllt durch Übereinstimmung mit
- EN 50014:1997 + A1 + A2 EN 50020:1994**
- (10) Falls das Zeichen „X“ hinter der Bescheinigungsnummer steht, wird auf besondere Bedingungen für die sichere Anwendung des Gerätes in der Anlage zu dieser Bescheinigung hingewiesen.
- (11) Diese EG-Baumusterprüfbescheinigung bezieht sich nur auf Konzeption und Prüfung des festgelegten Gerätes gemäß Richtlinie 94/9/EG. Weitere Anforderungen dieser Richtlinie gelten für die Herstellung und das Inverkehrbringen dieses Gerätes. Diese Anforderungen werden nicht durch diese Bescheinigung abgedeckt.
- (12) Die Kennzeichnung des Gerätes muß die folgenden Angaben enthalten:

 **II 2 G EEx ia IIC T4 bzw. T6**

Zertifizierungsstelle Explosionsschutz
Im Auftrag

Braunschweig, 19. Februar 2002


Dr.-Ing. U. Johannsmeyer
Regierungsdirektor



Seite 1/2

EG-Baumusterprüfbescheinigungen ohne Unterschrift und ohne Siegel haben keine Gültigkeit.
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Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin



(13) **Anlage**

(14) **EG-Baumusterprüfbescheinigung PTB 01 ATEX 2208**

(15) Beschreibung des Gerätes

Die Wägezellen der Typenreihen C16, C2, U2, PW dienen zur Umformung mechanischer Größen (Masse) in ein proportionales elektrisches Signal.

Die höchstzulässige Umgebungstemperatur beträgt für die Temperaturklasse

T6: 40 °C T4: 70 °C

Elektrische Daten

Eingangs- und Auswertestromkreis

in Zündschutzart Eigensicherheit EEx ia IIC
nur zum Anschluss an einen bescheinigten
eigensicheren Stromkreis

Höchstwerte:

$U_i = 22 \text{ V}$

$I_i = 469 \text{ mA}$

$P_i = 1,25 \text{ W}$

$L_i = 24 \text{ } \mu\text{H}$ (bei 12m Kabellänge)

$C_i = 3,2 \text{ nF}$ (bei 12m Kabellänge)

(16) Prüfbericht PTB Ex 02-21294

(17) Besondere Bedingungen

keine

Hinweise für Herstellung und Betrieb:

Wird der Schirm des Anschlusskabels an beiden Kabelenden angeschlossen, ist die Länge des Kabels auf 50 m begrenzt (2. Erdpunkt).

(18) Grundlegende Sicherheits- und Gesundheitsanforderungen

erfüllt durch Übereinstimmung mit den vorgenannten Normen

Zertifizierungsstelle Explosionsschutz
Im Auftrag

Braunschweig, 19. Februar 2002

iv Johann
Dr.-Ing. U. Johannmeyer
Regierungsdirektor



Seite 2/2

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Physikalisch-Technische Bundesanstalt


Braunschweig und Berlin



1. E R G Ä N Z U N G

gemäß Richtlinie 94/9/EG Anhang III Ziffer 6

zur EG-Baumusterprüfbescheinigung PTB 01 ATEX 2208

Gerät: Wägezellen, Typenreihen C16, C2, U2, PW
 Kennzeichnung:  II 2 G EEx ia IIC T4 bzw. T6
 Hersteller: Hottinger Baldwin Messtechnik GmbH
 Anschrift: Im Tiefen See 45, 64293 Darmstadt, Deutschland

Beschreibung der Ergänzungen und Änderungen

Die Wägezellen, Typenreihen C16, C2, U2, PW dürfen künftig auch nach den im Prüfbericht aufgeführten Prüfungsunterlagen gefertigt und betrieben werden. Die Änderungen betreffen einen Teil der elektrischen Daten und Berichtigungen der Typenschildangaben.

Elektrische Daten

Eingangs- und Auswertestromkreis

in Zündschutzart Eigensicherheit EEx ia IIC
 nur zum Anschluss an einen bescheinigten
 eigensicheren Stromkreis

Höchstwerte:

$$U_i = 22 \text{ V}$$

$$I_i = 469 \text{ mA}$$

$$P_i = 1,25 \text{ W}$$

$$L_i = 0,6 \text{ } \mu\text{H} \text{ (pro Meter Kabellänge)}$$

$$C_i = 162 \text{ pF} \text{ (pro Meter Kabellänge)}$$

Alle übrigen Angaben bleiben unverändert.

Prüfbericht: PTB Ex 02-22155

Zertifizierungsstelle Explosionschutz
 Im Auftrag

Braunschweig, 8. Juli 2002

Dipl.-Ing. R. Wilkens



Seite 1/1

EG-Baumusterprüfbescheinigungen ohne Unterschrift und ohne Siegel haben keine Gültigkeit.
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 Auszüge oder Änderungen bedürfen der Genehmigung der Physikalisch-Technischen Bundesanstalt.

Physikalisch-Technische Bundesanstalt • Bundesallee 100 • D-38116 Braunschweig

Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin



2. ERGÄNZUNG

gemäß Richtlinie 94/9/EG Anhang III Ziffer 6

zur EG-Baumusterprüfbescheinigung PTB 01 ATEX 2208

Gerät: Wägezellen, Typenreihen C16, C2, U2, PW

Kennzeichnung:  II 2 G EEx ia IIC T4 bzw. T6

Hersteller: Hottinger Baldwin Messtechnik GmbH

Anschrift: Im Tiefen See 45, 64293 Darmstadt, Deutschland

Beschreibung der Ergänzungen und Änderungen

Die Wägezellen, Typenreihen C16, C2, U2, PW dürfen künftig auch nach den im Prüfbericht aufgeführten Prüfungsunterlagen gefertigt und betrieben werden. Die Änderungen betreffen die Erweiterung des Typenschlüssels um weitere Varianten und für die Typenreihen PW 15 und CSA, die Angaben und das Material des Typenschildes sowie die Zugentlastung und den Stecker des Anschlusskabels.

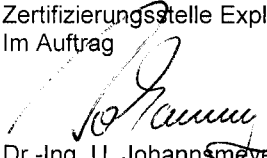
Der Bereich der zulässigen Umgebungstemperatur wurde wie folgt erweitert:

Temperaturklasse	höchstzulässige Umgebungstemperatur
T6	-30 °C ... +40 °C
T4	-30 °C ... +70 °C

Alle übrigen Angaben sowie die elektrischen Daten der 1. Ergänzung zur EG-Baumusterprüfbescheinigung gelten unverändert auch für diese zweite Ergänzung.

Prüfbericht: PTB Ex 07-26340

Zertifizierungsstelle Explosionsdruck
Im Auftrag


Dr.-Ing. U. Johannsmeyer
Direktor und Professor



Braunschweig; 22. Februar 2007

Seite 1/1

EG-Baumusterprüfbescheinigungen ohne Unterschrift und ohne Siegel haben keine Gültigkeit.
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Auszüge oder Änderungen bedürfen der Genehmigung der Physikalisch-Technischen Bundesanstalt.

Physikalisch-Technische Bundesanstalt • Bundesallee 100 • D-38116 Braunschweig

Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin




3. E R G Ä N Z U N G

gemäß Richtlinie 94/9/EG Anhang III Ziffer 6

zur EG-Baumusterprüfbescheinigung PTB 01 ATEX 2208

Gerät: Wägezellen, Typenreihen C16, C2, U2, PW, CSA

Kennzeichnung:  **II 2 G EEx ia IIC T4 bzw. T6**

Hersteller: Hottinger Baldwin Messtechnik GmbH

Anschrift: Im Tiefen See 45, 64293 Darmstadt, Deutschland

Beschreibung der Ergänzungen und Änderungen

Die Wägezellen der Typenreihen C16, C2, U2, PW, CSA dürfen künftig auch nach den im Prüfbericht aufgeführten Prüfungsunterlagen gefertigt und betrieben werden. Die Änderungen betreffen die Erweiterung der Typenreihe um die Typen PW22 und SP4, die Ausführung des Typenschildes sowie die Anpassung an den aktuellen Stand der Normenreihe EN 60079-ff und somit die Kennzeichnung des Gerätes. Diese lautet künftig:

Kennzeichnung:  **II 2 G Ex ia IIC T4 bzw. T6**

Die elektrischen Daten ändern sich hinsichtlich der Kennzeichnung des Eingangs- und Auswertestromkreises (die Werte bleiben unverändert):

Elektrische Daten

Eingangs- und Auswertestromkreis

in Zündschutzart Eigensicherheit Ex ia IIC
nur zum Anschluss an einen bescheinigten
eigensicheren Stromkreis

Höchstwerte:

$$U_i = 22 \text{ V}$$

$$I_i = 469 \text{ mA}$$

$$P_i = 1,25 \text{ W}$$

$$L_i = 0,6 \text{ } \mu\text{H} \quad (\text{pro Meter Kabellänge})$$

$$C_i = 162 \text{ pF} \quad (\text{pro Meter Kabellänge})$$

Alle übrigen Daten und Angaben der EG-Baumusterprüfbescheinigung einschließlich der 1. und 2. Ergänzung gelten unverändert auch für diese 3. Ergänzung.

Seite 1/2

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Physikalisch-Technische Bundesanstalt



Braunschweig und Berlin

3. Ergänzung zur EG-Baumusterprüfbescheinigung PTB 01 ATEX 2208

Angewandte Normen

EN 60079-0:2006

EN 60079-11:2007

Bewertungs- und Prüfbericht: PTB Ex 09-28323

Zertifizierungssektor Explosionsschutz
Im Auftrag

Braunschweig, 9. März 2009


Dr.-Ing. U. Johannsmeyer
Direktor und Professor



Seite 2/2

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Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin



(1) EC-TYPE-EXAMINATION CERTIFICATE (Translation)

(2) Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres - **Directive 94/9/EC**



(3) EC-type-examination Certificate Number:

PTB 01 ATEX 2209

(4) Equipment: Load cells, type series HLC, RSC, PWS, THC, Z6, PW15

(5) Manufacturer: Hottinger Baldwin Messtechnik GmbH

(6) Address: Im Tiefen See 45, 64293 Darmstadt, Germany

(7) This equipment and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.

(8) The Physikalisch-Technische Bundesanstalt, notified body No. 0102 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive.

The examination and test results are recorded in the confidential report PTB Ex 02-21499 .

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 50014:1997 + A1 + A2

EN 50020:1994

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-type-examination Certificate relates only to the design, examination and tests of the specified equipment in accordance to the Directive 94/9/EC. Further requirements of the Directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.

(12) The marking of the equipment shall include the following:

II 2 G EEx ia IIC T4 or T6

Zertifizierungsstelle Explosionsschutz

Braunschweig, February 19, 2002

By order:

(signature) L.S.

Dr.-Ing. U. Johannsmeyer
Regierungsdirektor

sheet 1/2

EC-type-examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt. In case of dispute, the German text shall prevail.

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Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin



(13)

SCHEDULE

(14)

EC-TYPE-EXAMINATION CERTIFICATE PTB 01 ATEX 2209

(15) Description of equipment

The load cells of type series HLC, RSC, PWS, THC, Z6, PW15 are used to convert mechanical quantities (mass) into a proportional electrical signal.

For relationship of the maximum permissible ambient temperature and the temperature class to the electrical data, reference is made to the following table:

Electrical data:

Input and evaluation circuit

type of protection Intrinsic Safety EEx ia IIC
for connection to a certified intrinsically
safe circuit only

U_i	I_i	P_i	T_{amb}	temperature-class	L_i for 6 m cable length	C_i for 6 m cable length
22 V	469 mA	1.25 W	40 °C	T6	12 μ H	1.9 nF
22 V	469 mA	1.25 W	70 °C	T4		
13 V	483 mA	2 W	40 °C	T4		

(16) Test report PTB Ex 02-21499

(17) Special conditions for safe use

none

Notes for manufacture and operation

When the shield of the connecting cable is connected at both ends, the cable length is limited to 50 m (2nd grounding point).

(18) Essential health and safety requirements

met by compliance with the standards mentioned above

Zertifizierungsstelle Explosionsschutz

Braunschweig, February 19, 2002

By order:

(signature) L. S.

Dr.-Ing. U. Johannsmeyer
Regierungsdirektor

sheet 2/2

EC-type-examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt. In case of dispute, the German text shall prevail.

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Braunschweig und Berlin




1. SUPPLEMENT

according to Directive 94/9/EC Annex III.6

to EC-TYPE-EXAMINATION CERTIFICATE PTB 01 ATEX 2209

(Translation)

Equipment: Load cells, type series HLC, RSC, PWS, THC, Z6, PW15

Marking:  II 2 G EEx ia IIC T4 or T6

Manufacturer: Hottinger Baldwin Messtechnik GmbH

Address: Im Tiefen See 45, 64293 Darmstadt, Germany

Description of supplements and modifications

The load cells of type series HLC, RSC, PWS, THC, Z6, PW15 may in future also be manufactured and operated in accordance with the test documents listed in the test report. The modifications concern the extension of the type series HLC for the variant F1, a part of the electrical data and corrections of specifications indicated on the type label.

Electrical data:

Input and evaluation circuit

type of protection Intrinsic Safety EEx ia IIC

for connection to a certified intrinsically safe circuit only

U_i	I_i	P_i	T_{amb}	temperature-class	L_i per meter cable length	C_i per meter cable length
22 V	469 mA	1.25 W	40 °C	T6	0.6 μ H	162 pF
22 V	469 mA	1.25 W	70 °C	T4		
13 V	483 mA	2 W	40 °C	T4		

All other specifications remain without changes.

Test report: PTB Ex 02-22156

Zertifizierungsstelle Explosionsschutz

Braunschweig, July 08, 2002

By order:

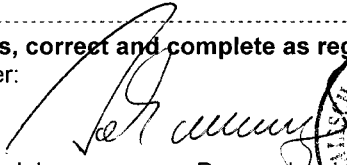
(signature)

L.S.

Dipl.-Ing. R. Wilkens

3 pages, correct and complete as regards content.

By order:


Dr.-Ing. Johannsmeyer Braunschweig, January 21, 2004
Regierungsdirektor

Sheet 1/1

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Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin



2. SUPPLEMENT

according to Directive 94/9/EC Annex III.6

to EC-TYPE-EXAMINATION CERTIFICATE PTB 01 ATEX 2209

(Translation)

Equipment: Load cells, type series HLC, RSC, PWS, THC, Z6, PW15

Marking:  II 2 G EEx ia IIC T4 or T6

Manufacturer: Hottinger Baldwin Messtechnik GmbH

Address: Im Tiefen See 45, 64293 Darmstadt, Germany

Description of supplements and modifications

In the future the load cells of type series HLC, RSC, PWS, THC, Z6, PW15 may also be manufactured and operated in accordance with the test documents listed in the test report. The modifications concern the extension of the type code for further variants and for the type series Z 7, the details and the material of the type label as well as the cable grip and the plug connector of the connecting cable.

The range of the permissible ambient temperature has been extended as follows:

temperature class	permissible ambient temperature
T6	-30 °C ... +40 °C
T4	-30 °C ... +70 °C

All other specifications as well as the electrical data of the 1st supplement to the EC-type examination certificate apply without changes also to this 2nd supplement.

Test report: PTB Ex 07-26341

Zertifizierungsstelle für Explosionschutz
By order:

Dr.-Ing. U. Johannsmeyer
Direktor und Professor



Braunschweig, February 22, 2007

Sheet 1/1

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Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin




3. SUPPLEMENT

according to Directive 94/9/EC Annex III.6

to EC-TYPE-EXAMINATION CERTIFICATE PTB 01 ATEX 2209

(Translation)

Equipment: Load cells, type series HLC, RSC, PWS, THC, Z6, PW15, Z7

Marking:  II 2 G EEx ia IIC T4 or T6

Manufacturer: Hottinger Baldwin Messtechnik GmbH

Address: Im Tiefen See 45, 64293 Darmstadt, Germany

Description of supplements and modifications

In the future the load cells of type series HLC, RSC, PWS, THC, Z6, PW15, Z7 may also be manufactured and operated according to the test documents listed in the test report. The modifications concern the extension of the type series for types RSC C and PW15 B, the design of the type label as well as the adaption to the current state of the standard series EN 60079-et sqq. and, therefore, the marking of the equipment. This will read in future:

Marking:  II 2 G Ex ia IIC T4 or T6

The electrical data change with respect to the marking of the input and evaluation circuit (the values apply without changes):

Electrical data

Input and evaluation circuit

type of protection Intrinsic Safety Ex ia IIC
only for connection to a certified intrinsically
safe circuit

U_i	I_i	P_i	T_{amb}	Temperature-class	L_i per meter cable length	C_i per meter cable length
22 V	469 mA	1.25 W	40 °C	T6	0.6 μ H	162 pF
22 V	469 mA	1.25 W	70 °C	T4		
13 V	483 mA	2 W	40 °C	T4		

All other data and specifications of the EC-type examination certificate including the 1st and 2nd supplement apply without changes also to this 3rd supplement.

Sheet 1/2

EC-type-examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt. In case of dispute, the German text shall prevail.

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Physikalisch-Technische Bundesanstalt



Braunschweig und Berlin

3. SUPPLEMENT TO EC-TYPE-EXAMINATION CERTIFICATE PTB 01 ATEX 2209

Applied standards

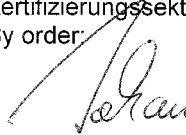
EN 60079-0:2006

EN 60079-11:2007

Assessment and test report: PTB Ex 09-28322

Zertifizierungssektor Explosionsschutz
By order:

Braunschweig, March 9, 2009


Dr.-Ing. U. Johannsmeyer
Direktor und Professor



Sheet 2/2

EC-type-examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt. In case of dispute, the German text shall prevail.

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Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

PTB



(1) EG-Baumusterprüfbescheinigung

- (2) Geräte und Schutzsysteme zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen - **Richtlinie 94/9/EG**
- (3) EG-Baumusterprüfbescheinigungsnummer



PTB 01 ATEX 2209

- (4) Gerät: Wägezellen, Typenreihen HLC, RSC, PWS, THC, Z6, PW15
- (5) Hersteller: Hottinger Baldwin Messtechnik GmbH
- (6) Anschrift: Im Tiefen See 45, 64293 Darmstadt, Deutschland
- (7) Die Bauart dieses Gerätes sowie die verschiedenen zulässigen Ausführungen sind in der Anlage und den darin aufgeführten Unterlagen zu dieser Baumusterprüfbescheinigung festgelegt.
- (8) Die Physikalisch-Technische Bundesanstalt bescheinigt als benannte Stelle Nr. 0102 nach Artikel 9 der Richtlinie des Rates der Europäischen Gemeinschaften vom 23. März 1994 (94/9/EG) die Erfüllung der grundlegenden Sicherheits- und Gesundheitsanforderungen für die Konzeption und den Bau von Geräten und Schutzsystemen zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen gemäß Anhang II der Richtlinie.

Die Ergebnisse der Prüfung sind in dem vertraulichen Prüfbericht PTB Ex 02-21499 festgehalten.

- (9) Die grundlegenden Sicherheits- und Gesundheitsanforderungen werden erfüllt durch Übereinstimmung mit

EN 50014:1997 + A1 + A2 EN 50020:1994

- (10) Falls das Zeichen „X“ hinter der Bescheinigungsnummer steht, wird auf besondere Bedingungen für die sichere Anwendung des Gerätes in der Anlage zu dieser Bescheinigung hingewiesen.
- (11) Diese EG-Baumusterprüfbescheinigung bezieht sich nur auf Konzeption und Prüfung des festgelegten Gerätes gemäß Richtlinie 94/9/EG. Weitere Anforderungen dieser Richtlinie gelten für die Herstellung und das Inverkehrbringen dieses Gerätes. Diese Anforderungen werden nicht durch diese Bescheinigung abgedeckt.
- (12) Die Kennzeichnung des Gerätes muß die folgenden Angaben enthalten:

 **II 2 G EEx ia IIC T4 bzw. T6**

Zertifizierungsstelle Explosionsschutz
Im Auftrag

Braunschweig, 19. Februar 2002

U. Johannsmeyer
Dr.-Ing. U. Johannsmeyer
Regierungsdirektor



Seite 1/2

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(13) Anlage

(14) EG-Baumusterprüfbescheinigung PTB 01 ATEX 2209

(15) Beschreibung des Gerätes

Die Wägezellen der Typenreihen HLC, RSC, PWS, THC, Z6, PW15 dienen zur Umformung mechanischer Größen (Masse) in ein proportionales elektrisches Signal.

Die Abhängigkeit der höchstzulässigen Umgebungstemperatur und der Temperaturklasse von den Elektrischen Daten ist der nachfolgenden Tabelle zu entnehmen.

Elektrische Daten

Eingangs- und Auswertestromkreis

in Zündschutzart Eigensicherheit EEx ia IIC
nur zum Anschluss an einen bescheinigten
eigensicheren Stromkreis

U_i	I_i	P_i	T_{amb}	Temperatur- klasse	L_i bei 6 m Kabellänge	C_i bei 6 m Kabellänge
22 V	469 mA	1,25 W	40 °C	T6	12 μ H	1,9 nF
22 V	469 mA	1,25 W	70 °C	T4		
13 V	483 mA	2 W	40 °C	T4		

(16) Prüfbericht PTB Ex 02-21499

(17) Besondere Bedingungen

keine

Hinweise für Herstellung und Betrieb:

Wird der Schirm des Anschlusskabels an beiden Kabelenden angeschlossen, ist die Länge des Kabels auf 50 m begrenzt (2. Erdpunkt).

(18) Grundlegende Sicherheits- und Gesundheitsanforderungen

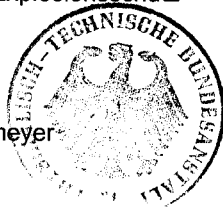
erfüllt durch Übereinstimmung mit den vorgenannten Normen

Zertifizierungsstelle Explosionsschutz

Im Auftrag

i.v. Johannsmeyer

Dr.-Ing. U. Johannsmeyer
Regierungsdirektor



Braunschweig, 19. Februar 2002

Seite 2/2

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Braunschweig und Berlin



1. ERGÄNZUNG

gemäß Richtlinie 94/9/EG Anhang III Ziffer 6

zur EG-Baumusterprüfbescheinigung PTB 01 ATEX 2209

Gerät: Wägezellen, Typenreihen HLC, RSC, PWS, THC, Z6, PW15

Kennzeichnung:  II 2 G EEx ia IIC T4 bzw. T6

Hersteller: Hottinger Baldwin Messtechnik GmbH

Anschrift: Im Tiefen See 45, 64293 Darmstadt, Deutschland

Beschreibung der Ergänzungen und Änderungen

Die Wägezellen, Typenreihen HLC, RSC, PWS, THC, Z6, PW15 dürfen künftig auch nach den im Prüfbericht aufgeführten Prüfungsunterlagen gefertigt und betrieben werden. Die Änderungen betreffen die Erweiterung um die Ausführungsvariante F1 der Typenreihe HLC, einen Teil der elektrischen Daten und Berichtigungen der Typenschildangaben.

Elektrische Daten

Eingangs- und Auswertestromkreis

in Zündschutzart Eigensicherheit EEx ia IIC
nur zum Anschluss an einen bescheinigten
eigensicheren Stromkreis

U_i	I_i	P_i	T_{amb}	Temperatur- klasse	L_i pro Meter Kabellänge	C_i pro Meter Kabellänge
22 V	469 mA	1,25 W	40 °C	T6	0,6 μ H	162 pF
22 V	469 mA	1,25 W	70 °C	T4		
13 V	483 mA	2 W	40 °C	T4		

Alle übrigen Angaben bleiben unverändert.

Prüfbericht: PTB Ex 02-22156

Zertifizierungsstelle Explosionschutz
Im Auftrag

Braunschweig, 8. Juli 2002

Dipl.-Ing. R. Wilkens



Seite 1/1

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Braunschweig und Berlin



2. ERGÄNZUNG

gemäß Richtlinie 94/9/EG Anhang III Ziffer 6

zur EG-Baumusterprüfbescheinigung PTB 01 ATEX 2209

Gerät: Wägezellen, Typenreihen HLC, RSC, PWS, THC, Z6, PW15

Kennzeichnung:  II 2 G EEx ia IIC T4 bzw. T6

Hersteller: Hottinger Baldwin Messtechnik GmbH

Anschrift: Im Tiefen See 45, 64293 Darmstadt, Deutschland

Beschreibung der Ergänzungen und Änderungen

Die Wägezellen, Typenreihen HLC, RSC, PWS, THC, Z6, PW15 dürfen künftig auch nach den im Prüfbericht aufgeführten Prüfungsunterlagen gefertigt und betrieben werden. Die Änderungen betreffen die Erweiterung des Typenschlüssels um weitere Varianten und für die Typenreihe Z 7, die Angaben und das Material des Typenschildes sowie die Zugentlastung und den Stecker des Anschlusskabels.

Der Bereich der zulässigen Umgebungstemperatur wurde wie folgt erweitert:

Temperaturklasse	höchstzulässige Umgebungstemperatur
T6	-30 °C ... +40 °C
T4	-30 °C ... +70 °C

Alle übrigen Angaben sowie die elektrischen Daten der 1. Ergänzung zur EG-Baumusterprüfbescheinigung gelten unverändert auch für diese zweite Ergänzung.

Prüfbericht: PTB Ex 07-26341

Zertifizierungsstelle Explosionschutz
Im Auftrag



Dr.-Ing. U. Johannsmeyer
Direktor und Professor

Braunschweig, 22. Februar 2007

Seite 1/1

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Braunschweig und Berlin



3. ERGÄNZUNG

gemäß Richtlinie 94/9/EG Anhang III Ziffer 6

zur EG-Baumusterprüfbescheinigung PTB 01 ATEX 2209

Gerät: Wägezellen, Typenreihen HLC, RSC, PWS, THC, Z6, PW15, Z7

Kennzeichnung: Ex II 2 G EEx ia IIC T4 bzw. T6

Hersteller: Hottinger Baldwin Messtechnik GmbH

Anschrift: Im Tiefen See 45, 64293 Darmstadt, Deutschland

Beschreibung der Ergänzungen und Änderungen

Die Wägezellen der Typenreihen HLC, RSC, PWS, THC, Z6, PW15 und Z7 dürfen künftig auch nach den im Prüfbericht aufgeführten Prüfungsunterlagen gefertigt und betrieben werden. Die Änderungen betreffen die Erweiterung der Typenreihe um die Typen RSC C und PW15 B, die Ausführung des Typenschildes sowie die Anpassung an den aktuellen Stand der Normenreihe EN 60079-ff und somit die Kennzeichnung des Gerätes. Diese lautet künftig:

Kennzeichnung: Ex II 2 G Ex ia IIC T4 bzw. T6

Die elektrischen Daten ändern sich hinsichtlich der Kennzeichnung des Eingangs- und Auswertestromkreises (die Werte bleiben unverändert):

Elektrische Daten

Eingangs- und Auswertestromkreis

in Zündschutzart Eigensicherheit Ex ia IIC
nur zum Anschluss an einen bescheinigten
eigensicheren Stromkreis

U_i	I_i	P_i	T_{amb}	Temperatur- klasse	L_i pro Meter Kabellänge	C_i pro Meter Kabellänge
22 V	469 mA	1,25 W	40 °C	T6	0,6 μ H	162 pF
22 V	469 mA	1,25 W	70 °C	T4		
13 V	483 mA	2 W	40 °C	T4		

Alle übrigen Daten und Angaben der EG-Baumusterprüfbescheinigung einschließlich der 1. und 2. Ergänzung gelten unverändert auch für diese 3. Ergänzung.

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Seite 1/2

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Physikalisch-Technische Bundesanstalt



Braunschweig und Berlin

3. Ergänzung zur EG-Baumusterprüfbescheinigung PTB 01 ATEX 2209

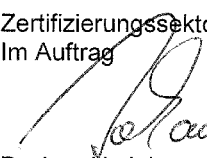
Angewandte Normen

EN 60079-0:2006 EN 60079-11:2007

Bewertungs- und Prüfbericht: PTB Ex 09-28322

Zertifizierungssektor Explosionsschutz
Im Auftrag

Braunschweig, 9. März 2009


Dr.-Ing. U. Johannsmeyer
Direktor und Professor



Seite 2/2

EG-Baumusterprüfbescheinigungen ohne Unterschrift und ohne Siegel haben keine Gültigkeit.
Diese EG-Baumusterprüfbescheinigung darf nur unverändert weiterverbreitet werden.
Auszüge oder Änderungen bedürfen der Genehmigung der Physikalisch-Technischen Bundesanstalt.
Physikalisch-Technische Bundesanstalt • Bundesallee 100 • 38116 Braunschweig • DEUTSCHLAND



Translation

(1) EC-Type Examination Certificate

- (2) **- Directive 94/9/EC -**
Equipment and protective systems intended for use
in potentially explosive atmospheres

- (3) **DMT 03 ATEX E 033**

- (4) **Equipment:** Load Cell type Z6*, HLC*, THC*, RSC*, C2*, C16*, U2*, RT* and RTN*

- (5) **Manufacturer:** Hottinger Baldwin Messtechnik GmbH

- (6) **Address:** 64201 Darmstadt, Germany

- (7) The design and construction of this equipment and any acceptable variation thereto are specified in the schedule to this type examination certificate.

- (8) The certification body of Deutsche Montan Technologie GmbH, notified body no. 0158 in accordance with Article 9 of the Directive 94/9/EC of the European Parliament and the Council of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive.

The examination and test results are recorded in the test and assessment report BVS PP 03.2044 EG.

- (9) The Essential Health and Safety Requirements are assured by compliance with:

EN 50281-1-1:1998 Dust explosion protection

- (10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

- (11) This EC-Type Examination Certificate relates only to the design, examination and tests of the specified equipment in accordance to Directive 94/9/EC.
 Further requirements of the Directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate

- (12) The marking of the equipment shall include the following:



II 2D IP 68 T 80 °C

Type HLC*, THC*, C16*, RT* and RTN*

II 2D IP 67 T 80 °C

Type Z6*, RSC*, C2*, U2*

Deutsche Montan Technologie GmbH

Essen, dated 10. March 2003

Signed: Dr. Jockers

Signed: Dr. Eickhoff

DMT-Certification body

Special services unit

Page 1 of 2 to DMT 03 ATEX E 033

This certificate may only be reproduced in its entirety and without change

Am Technologiepark 1 45307 Essen Germany Phone +49 201 172-1416 Fax +49 201 172-1716
 (until 31.05.2003: Deutsche Montan Technologie GmbH Am Technologiepark 1 45307 Essen)



(13) Appendix to

(14) **EC-Type Examination Certificate**

DMT 03 ATEX E 033

(15) 15.1 Subject and type

Load Cell types Z6*, HLC*, THC*, RSC*, C2*, C16*, U2*, RT* and RTN*

The * stands for different designs and options without influence on explosion protection

15.2 Description

The load cell types Z6*, HLC*, THC*, RSC*, C2*, C16*, U2*, RT* and RTN* converts mechanical quantity (mass) into a proportional electrical signal.

The housing consists of stainless steel, the power is supplied either by a separately certified cable entry or through an integrated cable gland with permanently attached cable.

15.3 Parameters

15.3.1 Electrical data

Supply voltage	max.	DC	12 V
Bridge resistance		350...	4000 Ω
Current	max.		34 mA

15.3.2 Thermal data

Permitted ambient temperature	- 20 °C...+	70 °C
Maximum surface temperature		80 °C

15.3.3 Protection according to EN 60529

15.3.3.1 type HLC*, THC*, C16*, RT* and RTN* IP 68

15.3.3.2 type Z6*, RSC*, C2* and U2* IP 67

(16) Test and assessment report

BVS PP 03.2044 EG as of 10.03.2006

(17) Special conditions for safe use


None

We confirm the correctness of the translation from the German original.
In the case of arbitration only the German wording shall be valid and binding.

44809 Bochum, 08.06.2006

BVS-Hk/Ar E 0837/06

EXAM BBG Prüf- und Zertifizier GmbH


Certification body


Special services unit

Page 2 of 2 to DMT 03 ATEX E 033

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(until 31.05.2003: Deutsche Montan Technologie GmbH Am Technologiepark 1 45307 Essen)



Translation

1st Supplement

(Supplement in accordance with Directive 94/9/EC Annex III number 6)

to the EC-Type Examination Certificate DMT 03 ATEX E 033

Equipment: Load Cell type Z6*, HLC*, THC*, RSC*, C2*, C16*, U2*, RT*, RTN*, PW15AH* and CSA*

Manufacturer: Hottinger Baldwin Messtechnik GmbH

Address: 64293 Darmstadt, Germany

Description

The Load Cells Type PW15AH* and Type CSA* are added. Both types are made of stainless steel and are welded so that they are hermetically tight.
The permitted temperature range is enlarged.

Subject and type

Load Cell types Z6*, HLC*, THC*, RSC*, C2*, C16*, U2*, RT*, RTN*, CSA* and PW15aH*

The * stands for different designs and options without influence on explosion protection.

Parameter

Electrical data without change

Thermal data

Maximum surface temperature T	80 °C
Permitted ambient temperature	-30 °C... +70 °C

Degrees of protection according to EN 60529

Type HLC*, THC*, C16*, RT*, RTN*, PW15AH*	IP 68
Type Z6*, RSC*, C2*, U2*, CSA*	IP 67

The Essential Health and Safety Requirements of the modified equipment are assured by compliance with:

EN 61241-0:2006 General requirements
EN 61241-1:2004 Protection by enclosure 'tD'

The marking of the equipment shall include the following:



II 2D Ex tD A21 IP 68 T 80 °C
II 2D Ex tD A21 IP 67 T 80 °C

Type HLC*, THC*, C16*, RT*, RTN* and PW15AH*
Type Z6*, RSC*, C2*, U2* and CSA*

Page 1 of 2 to DMT 03 ATEX E 033 / N1

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DEKRA EXAM GmbH Dimmendahlstrasse 9 44809 Bochum Germany Phone +49 234/3696-105 Fax +49 234/3696-110 E-mail zs-exam@dekra.com
(until 31.05.2003: Deutsche Montan Technologie GmbH Am Technologiepark 1 45307 Essen Germany)

Special conditions for safe use

none

Test and assessment report

BVS PP 03.2044 EG as of 10.05.2007

DEKRA EXAM GmbH

Bochum, dated 10. May 2007

Signed: Dr. Jockers

Signed: Dr. Eickhoff

Certification body_____
Special services unit

We confirm the correctness of the translation from the German original.
In the case of arbitration only the German wording shall be valid and binding.

44809 Bochum, 10.05.2007

BVS-Hk/Mi A 20060712

DEKRA EXAM GmbH

Certification body

Special services unit

Page 2 of 2 to DMT 03 ATEX E 033 / N1

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(until 31.05.2003: Deutsche Montan Technologie GmbH Am Technologiepark 1 45307 Essen Germany)



- (1) **EG-Baumusterprüfbescheinigung**
- (2) **- Richtlinie 94/9/EG -**
Geräte und Schutzsysteme zur bestimmungsgemäßen Verwendung
in explosionsgefährdeten Bereichen
- (3) **DMT 03 ATEX E 033**
- (4) **Gerät:** **Wägezellen Typ Z6*, HLC*, THC*, RSC*, C2*, C16*, U2*, RT* und RTN***
- (5) **Hersteller:** **Hottinger Baldwin Messtechnik GmbH**
- (6) **Anschrift:** **D 64201 Darmstadt**
- (7) Die Bauart dieses Gerätes sowie die verschiedenen zulässigen Ausführungen sind in der Anlage zu dieser Baumusterprüfbescheinigung festgelegt.
- (8) Die Zertifizierungsstelle der Deutsche Montan Technologie GmbH, benannte Stelle Nr. 0158 gemäß Artikel 9 der Richtlinie 94/9/EG des Europäischen Parlaments und des Rates vom 23. März 1994, bescheinigt, dass das Gerät die grundlegenden Sicherheits- und Gesundheitsanforderungen für die Konzeption und den Bau von Geräten und Schutzsystemen zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen gemäß Anhang II der Richtlinie erfüllt.
 Die Ergebnisse der Prüfung sind in dem Prüfprotokoll BVS PP 03.2044 EG niedergelegt.
- (9) Die grundlegenden Sicherheits- und Gesundheitsanforderungen werden erfüllt durch Übereinstimmung mit
 EN 50281-1-1:1998 Staubexplosionsschutz
- (10) Falls das Zeichen „X“ hinter der Bescheinigungsnummer steht, wird in der Anlage zu dieser Bescheinigung auf besondere Bedingungen für die sichere Anwendung des Gerätes hingewiesen.
- (11) Diese EG-Baumusterprüfbescheinigung bezieht sich nur auf die Konzeption und die Baumusterprüfung des beschriebenen Gerätes in Übereinstimmung mit der Richtlinie 94/9/EG.
 Für Herstellung und in Verkehr bringen des Gerätes sind weitere Anforderungen der Richtlinie zu erfüllen, die nicht durch diese Bescheinigung abgedeckt sind.
- (12) Die Kennzeichnung des Gerätes muss die folgenden Angaben enthalten:

II 2D IP 68 T 80 °C Typ HLC*, THC*, C16*, RT*, RTN*
II 2D IP 67 T 80 °C Typ Z6*, RSC*, C2*, U2*

Deutsche Montan Technologie GmbH
 Essen, den 10. März 2003

DMT-Zertifizierungsstelle

Fachbereichsleiter

Seite 1 von 2 zu DMT 03 ATEX E 033
 Dieses Zertifikat darf nur unverändert weiterverbreitet werden.
 Am Technologiepark 1, 45307 Essen, Telefon (0201)172-1416, Telefax (0201)172-1716



(13) Anlage zur

(14) **EG-Baumusterprüfbescheinigung**

DMT 03 ATEX E 033

(15) 15.1 Gegenstand und Typ

Wägezellen Typ Z6*, HLC*, THC*, RSC*, C2*, C16*, U2*, RT* und RTN*

Das * steht für verschiedene Ausführungen und Varianten, die jedoch keinen Einfluss auf den Explosionsschutz haben

15.2 Beschreibung

Die Wägezellen Typ Z6*, HLC*, THC*, RSC*, C2*, C16*, U2*, RT* und RTN* dienen zur Umformung mechanischer Größen (Masse) in ein proportionales elektrisches Signal.

Das Gehäuse besteht aus rostfreiem Stahl, die Zuführung der Energie erfolgt je nach Ausführung entweder durch eine gesondert bescheinigte Kabel- und Leitungseinführung oder durch eine integrale Kabel- und Leitungseinführung mit fest angeschlossener Leitung.

15.3 Kenngrößen

15.3.1 Elektrische Daten

Versorgungsspannung	max.	DC	12 V
Brückenwiderstand		350... 4000	Ω
Strom	max.		34 mA

15.3.2 Thermische Daten

Zulässige Umgebungstemperatur	- 20 °C...+ 70 °C
Maximale Oberflächentemperatur	80 °C

15.3.3 Schutzart nach EN 60529

15.3.3.1 Typ HLC*, THC*, C16*, RT* und RTN* IP 68

15.3.3.2 Typ Z6*, RSC*, C2* und U2* IP 67

(16) Prüfprotokoll
BVS PP 03.2044 EG, Stand 10.03.2003

(17) Besondere Bedingungen für die sichere Anwendung
Entfällt



1. Nachtrag

(Ergänzung gemäß Richtlinie 94/9/EG Anhang III Ziffer 6)

zur EG-Baumusterprüfbescheinigung DMT 03 ATEX E 033

Gerät: Wägezellen Typ Z6*, HLC*, THC*, RSC*, C2*, C16*, U2*, RT*, RTN*, PW15AH* und CSA*

Hersteller: Hottinger Baldwin Messtechnik GmbH

Anschrift: 64293 Darmstadt

Beschreibung

Die Wägezellen Typ PW15AH* und Typ CSA* kommen hinzu.
Beide Typen bestehen aus rostfreiem Stahl und sind hermetisch dicht verschweißt.
Der zulässige Umgebungstemperaturbereich wird erweitert.

Gegenstand und Typ

Wägezellen Typ Z6*, HLC*, THC*, RSC*, C2*, C16*, U2*, RT*, RTN*, CSA* und PW15AH*

Das * steht für verschiedene Ausführungen und Varianten, die jedoch keinen Einfluss auf den Explosionsschutz haben.

Kenngößen

Elektrische Daten unverändert

Thermische Daten

Maximale Oberflächentemperatur T	80 °C
Zulässige Umgebungstemperatur	-30 °C... +70 °C

Schutzart nach EN 60529

Typ HLC*, THC*, C16*, RT*, RTN*, PW15AH*	IP 68
Typ Z6*, RSC*, C2*, U2*, CSA*	IP 67

Die grundlegenden Sicherheits- und Gesundheitsanforderungen der geänderten Ausführung werden erfüllt durch Übereinstimmung mit

EN 61241-0:2006 Allgemeine Anforderungen
EN 61241-1:2004 Schutz durch Gehäuse 'tD'

Die Kennzeichnung des Gerätes muss die folgenden Angaben enthalten:



II 2D Ex tD A21 IP 68 T 80 °C Typ HLC*, THC*, C16*, RT*, RTN* und PW15AH*
II 2D Ex tD A21 IP 67 T 80 °C Typ Z6*, RSC*, C2*, U2* und CSA*



Besondere Bedingungen für die sichere Anwendung bzw. Verwendungshinweise entfällt

Prüfprotokoll

BVS PP 03.2044 EG, Stand 10.05.2007

DEKRA EXAM GmbH

Bochum, den 10. Mai 2007



Zertifizierungsstelle



Fachbereich

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All details describe our products in general form only.
They are not to be understood as express warranty and do not constitute any liability whatsoever.

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Salvo modificaciones.

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Con riserva di apportare modifiche.

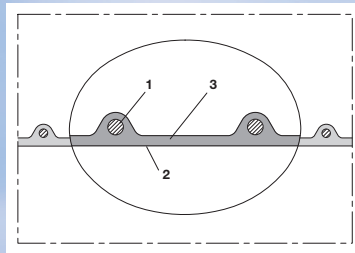
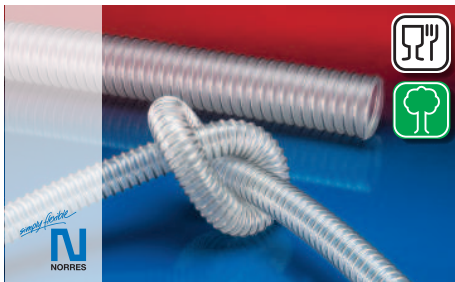
Tutte le informazioni descrivono i nostri prodotti in modo generico. Esse non assicurano quindi le caratteristiche dei prodotti, e non costituiscono alcuna garanzia e quindi nessuna responsabilità.

Hottinger Baldwin Messtechnik GmbH

Im Tiefen See 45 • 64293 Darmstadt • Germany
Tel. +49 6151 803-0 • Fax: +49 6151 803-9100
Email: info@hbm.com • www.hbm.com

measure and predict with confidence





Absaug- und Förderschlauch für die Lebensmittel- und Pharmaindustrie (FDA); PUR + Edelstahl, mittelschwer, innen glatt

Anwendungen: Absaug- und Förderschlauch, mit besonderer Eignung:

- für abrasive Feststoffe wie Stäube, Pulver, Fasern und Späne
- für gasförmige und flüssige Medien
- für Sauger, Fördergeräte, Verdichter und Kompressoren
- für die Lebensmittel- und Pharmaindustrie

Eigenschaften

- mittelschwere Ausführung
- hoch abriebfest (Abriebfestigkeit ca. 2,5 - 5 mal besser als die meisten Gummimaterialien und ca. 3 - 4 mal besser als die meisten Weich-PVC's)
- innen glatt
- strömungstechnisch optimiert
- flexibel
- hohe Zug- und Reißfestigkeit
- Wandung lebensmittelecht nach: FDA 21 CFR 177.2600 und 178.2010, EG Richtlinie 2002/72/EG einschließlich Änderungsrichtlinien 975/2009 und Verordnung Nr. 10/2011

- Zulassung nach EG Richtlinie 2002/72/EG einschließlich der Änderungsrichtlinie 975/2009 und Verordnung Nr. 10/2011 durch unabhängiges Prüfinstitut für den gesamten Schlauch
- geruchs- und geschmacksfrei
- mikrobe- und hydrolysefest
- gute Chemikalienbeständigkeit
- gute UV- und Ozonbeständigkeit
- sehr gute Kälteflexibilität (besser als vergleichbare Ester-Polyurethane)
- kleinste Biegeradien
- abknicksicher
- weichmacher- und halogenfrei
- gas- und flüssigkeitsdicht
- schwerentflammbar nach: UL94-HB
- gemäß TRBS 2153 (ehemals BGR 132): zur Ableitung elektrostatischer Aufladung bei Erdung der Spirale, empfohlen für viele Anwendungen mit Ausnahme brennbarer Schüttgüter
- RoHS konform

Temperaturbereich

- ca. -40 °C bis ca. +90 °C
- kurzzeitig bis ca. +125 °C

Konstruktion, Werkstoff

AIRDUC® Profilschlauch

1. in der Wandung fest eingegossener Federstahldraht Spirale: Edelstahldraht (INOX)
2. strömungsoptimiertes Profil
Wandung: speziell Premium Ether-Polyurethan (Pre-PUR®)
3. Wandstärke ca. 1,0 mm

Liefervarianten








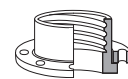

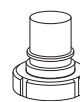
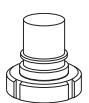
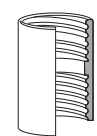
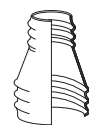
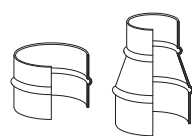
- Über- und Unterlängen
- transparent (Standard)
- Sonderfarben: teileingefärbt, voll eingefärbt
- kundenspez. Sonderaufdruck
- Wandung: „bioplastic“ Kunststoff auf Basis nachwachsender Rohstoffe ohne Lebensmitteleignung und ohne UL - Zulassung
- als konfektionierte Leitung mit CONNECT Anschlussstücken
- kundenspez. Anschlussstücke

Ø-Innen mm	Ø-Außen mm	Empf. Betriebsgrenzw.		Biege- radius mm	Gewicht kg/m	Lagerlängen m	weitere Fertigungslängen m	Bestellnummer
		Überdruck bar	Unterdruck bar					
25	32	2,690	0,495	35	0,200	10	-	351-0025-1103
32	40	2,120	0,460	44	0,280	10	-	351-0032-1103
38	46	1,795	0,430	51	0,320	10	-	351-0038-1103
40	48	1,710	0,420	53	0,340	10	-	351-0040-1103
50	58	1,370	0,365	64	0,410	10	-	351-0050-1103
60	68	1,150	0,285	75	0,490	10	-	351-0060-1103
65	73	1,060	0,255	80	0,530	10	-	351-0065-1103
70	79	0,990	0,210	87	0,590	-	10	351-0070-1103
75	84	0,920	0,195	92	0,640	10	-	351-0075-1103
80	89	0,860	0,175	98	0,680	10	-	351-0080-1103
100	109	0,690	0,120	120	0,970	10	-	351-0100-1103
120	129	0,580	0,105	142	1,160	-	10	351-0120-1103
125	134	0,560	0,085	147	1,200	10	-	351-0125-1103
150	159	0,460	0,075	175	1,520	10	-	351-0150-1103
160	169	0,435	0,065	186	1,610	-	10	351-0160-1103
180	189	0,385	0,055	208	1,810	-	10	351-0180-1103
200	209	0,350	0,055	230	2,000	10	-	351-0200-1103

Weitere Abmessungen und Längen auf Anfrage lieferbar. Alle angegebenen Werte wurden bei 20 °C ermittelt und sind ca. Angaben. Technische Änderungen vorbehalten. Bitte beachten Sie unseren Technischen Anhang unter www.norres.com.



Zubehör

13.1.0  CLAMP 212	13.5.0  CLAMP 212 EC	13.6.0  CLAMP 217	13.7.0  CLAMP 213	13.8.0  CONNECT 240 + 241
13.9.0  CONNECT 242	13.10.0  CONNECT 243	13.11.0  CONNECT 244	13.12.5  CONNECT INOX 245	13.12.6  CONNECT INOX 247
13.12.7  CONNECT INOX 249	13.13.0  CONNECT 246	13.14.0  CONNECT 223	13.18.0  CONNECT 270-271	



Declaration of conformity in compliance with ATEX Directive 94/9/EC

We herewith confirm that the pneumatic linear vibrators

Series NTS 120 E - NTS 350 E

are in compliance with the following regulations:

**94/9/EC
2006/42/EC**

Used harmonised standards:

**DIN EN ISO 12100-1:2004-04
DIN EN ISO 12100-2:2004-04
EN 1127-1:2008-02
EN 13463-1:2009-07**

The sign X placed after the certificate number indicates that the equipment is subject to special conditions for safe use specified in the enclosure to this certificate.

The marking of the pneumatic linear vibrators includes additionally:

 II 2 G D 85°C (T6)

NetterVibration

i.A. A. Werkmann
(quality manager)



Annex to the declaration of conformity NTS E

Description:

The pneumatic linear vibrators series NTS E generate linear vibrations. Vibration is generated by a freely oscillating, automatically reversing piston. Both masses, the piston on the one side and the mass fastened to the housing on the other, thereby vibrate against each other relative to their total weights.

The body may be of hard coated aluminium, cast iron or stainless steel depending on the type of NTS whereas the pistons are made either of steel or bronze. The drive medium can be either clean (filtered), lubricated compressed air or lubricated nitrogen.

Markings:

Netter Vibration, address ...

type: ... (according version)

$+5^{\circ}\text{C} \leq T_{a.} \leq 60^{\circ}\text{C}$

serial number

year

 II 2 G D 85°C (T6)

documentation number: NV 2003 003 X

Do not open housing screws

Technical documentation:

No. NV 2003 003 X

Special conditions for safe use:

- The pneumatic linear vibrator has to be fixed with the supplied safety washers. The safe fixing has to be checked regularly.
- In zones with explosive gas (zone 1) the exhaust air must be safely piped away, except special designs with bronze piston.

NetterVibration

i.A. A. Werkmann
(quality manager)

14.6 CE Certification



In the past years, the European Union has made the CE mark mandatory for many products (such as pressure vessels, toys, construction products, machine equipment, medical products, etc.).

The CE mark certifies that the product in question meets the requirements of one or more directives of the new EU policies for the product's area of application. If a product that falls under the new directives (such as machinery) does not bear the CE mark, then it may no longer be marketed after a particular date (January 1, 1995 in the case of machinery). A product properly labelled with the CE mark may be sold without restriction in any EU country (unlimited free trade).

With regard to NORRES hoses, the following applies:

1. The products by definition of the EU directive for machinery (89/392/EC) are not classified as machinery or safety components. Nor are these products subject to low voltage and EMC guidelines, medical product guidelines, etc. .
2. Products that are not subject to one of the new EU directives are not permitted to bear the CE mark. Consequently, we are also not able to provide a declaration of conformity (manufacturer's declaration).

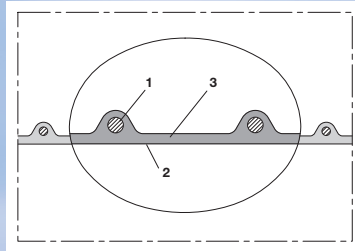
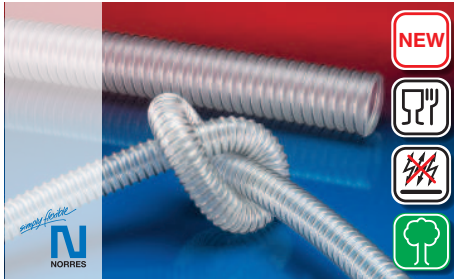
(The following product groups are exceptions to this: special designed hose systems, electrically conductive hoses, cable protection hoses and fittings for cable protection hoses.)

Other products in our selection, such as special cable protection systems, medical respiration hoses or also pre-assembled electrically conductive hose system solutions can have the CE mark applied to them. It is possible to issue a certificate of conformity in these cases.

Moreover, we have a certified, ongoing quality management system subject to external monitoring and can provide you with safety data sheets for each product in accordance with DIN EN 292.

As the operating conditions of the user are outside our direct control and the constructive variety is too large, we can not guarantee the accuracy of the data.

Engineering modifications subject to change.



Abrasion-proof and antistatic suction and transport hose; PUR <math>< 10^9 \Omega</math> + stainless steel, medium-heavy, smooth interior

Applications: Abrasion-proof and antistatic suction and transport hose, especially suitable:

- for transporting inflammable bulk materials and in areas liable to contain explosive mixtures (explosion prevention)
- for abrasive solids such as dust, powder, fibres and chips
- for gaseous media such as vapors and smoke
- for de-dusting and suction plants
- for the food and pharmaceutical industry

Properties

- according to TRBS 2153, the wall is permanently capable of electrostatic discharge owing to the non-migrating antistatic material: electrical and surface resistance <math>< 10^9 \Omega</math>, recommended for transporting inflammable bulk materials
- light model
- highly abrasion-proof (abrasion resistance about 2.5 to 5 times better than most rubber materials and about 3 to 4 times better than most soft PVC 's)

- smooth interior
- optimized flow properties
- flexible
- high tensile strength and tear resistant
- food grade wall, complies with: EU Directive 2002/72/EC, incl. the latest Amending Directive 975/2009/EC
- approved by an independent testing laboratory for the complete hose acc. to EU Directive 2002/72/EC, incl. amending Directive 2007/19/EC
- odourless and tasteless
- microbe and hydrolysis resistant
- good resistance to mineral oils and gasoline
- good resistance to chemicals
- good resistance to UV and ozone
- very good low temperature flexibility (better than comparable ester-polyurethanes)
- small bending radius
- kink-proof
- free of softener and halogen
- gas and liquid tight
- conform to RoHS guideline

Temperature Range

- -40 °C approx. to +90 °C approx.

Design, material

- AIRDUC® profile hose
1. spring steel wire spiral embedded in wall spiral: stainless steel wire (INOX)
 2. profile with optimised flow properties wall: permanently antistatic premium ether-polyurethane (Pre-PUR®)
 3. wall thickness 1.0 mm approx.

Delivery variants








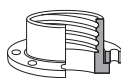





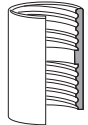
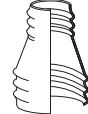
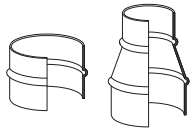
- cut lengths and special lengths
- transparent (standard)
- customer-specific product marking
- wall: „bioplastic“ material derived from renewable raw materials without food applicability
- customised connectors

I.D.	O.D.	Rec. operating limits		Bending Radius	Weight	Stock Lengths	Further Production Lengths	Order No.
		Overpressure	Vacuum					
mm	mm	bar	bar	mm	kg/m	m	m	
32	40	2,120	0,460	44	0,280	10	-	351-0032-1018
38	46	1,795	0,430	51	0,320	-	10	351-0038-1018
40	48	1,710	0,420	53	0,340	10	-	351-0040-1018
50	58	1,370	0,365	64	0,410	10	-	351-0050-1018
60	68	1,150	0,285	75	0,490	10	-	351-0060-1018
70	79	0,990	0,210	87	0,590	-	10	351-0070-1018
75	84	0,920	0,195	92	0,640	-	10	351-0075-1018
80	89	0,860	0,175	98	0,680	10	-	351-0080-1018
90	99	0,770	0,155	109	0,750	-	10	351-0090-1018
100	109	0,690	0,120	120	0,970	10	-	351-0100-1018
110	119	0,630	0,110	131	1,060	-	10	351-0110-1018
125	134	0,560	0,085	147	1,200	10	-	351-0125-1018
140	149	0,495	0,085	164	1,340	-	10	351-0140-1018
150	159	0,460	0,075	175	1,520	10	-	351-0150-1018
160	169	0,435	0,065	186	1,610	-	10	351-0160-1018
180	189	0,385	0,055	208	1,810	-	10	351-0180-1018
200	209	0,345	0,055	233	2,030	10	-	351-0200-1018
225	234	0,310	0,040	257	2,160	-	10	351-0225-1018
250	259	0,280	0,020	285	2,390	-	10	351-0250-1018
300	309	0,230	0,020	340	2,860	-	10	351-0300-1018

Other diameters and lengths available on request. All values indicated here are approximate figures based on a temperature of 20 °C. Data subject to change without notice. Please also refer to our Technical Appendix on www.norres.com.



Accessories

- | | | | | |
|--|--|--|--|--|
| 13.1.0

CLAMP 212 | 13.5.0

CLAMP 212 EC | 13.6.0

CLAMP 217 | 13.7.0

CLAMP 213 | 13.8.0

CONNECT 240 + 241 |
| 13.9.0

CONNECT 242 | 13.10.0

CONNECT 243 | 13.11.0

CONNECT 244 | 13.12.0

CONNECT 245 | 13.12.2

CONNECT 245 CSH |
| 13.12.5

CONNECT INOX 245 | 13.12.6

CONNECT INOX 247 | 13.12.7

CONNECT INOX 249 | 13.13.0

CONNECT 246 | 13.14.0

CONNECT 223 |
| 13.18.0

CONNECT 270-271 | | | | |

Freigabe - Protokoll

Release – Report

Auftragsnummer / Order number:

..... 7315690

***Coperion K-Tron (Schweiz) GmbH bestätigt, dass die Qualität der gelieferten Anlage geprüft ist und die Vorgaben gemäss Bestellung sowie die allgemeingültigen Normen eingehalten sind.
Die Ausführung entspricht den festgelegten Kundenanforderungen.***

***Coperion K-Tron (Switzerland) LLC confirms that the quality of the delivered equipment has been inspected and the specifications according to the order and the general standards has been considered.
The design represents the agreed upon customer requirements.***

Bemerkungen / Remarks:

.....
.....
.....
.....

Abteilung / Department

Datum / Date:

Visum / Visa:

Montage / Assembly

13.06.14

[Signature]

Endprüfung / Inspection

13.06.2014

N. Veluz

Verkauf / Sales

16.6.14

[Signature]

Engineering / Proj. Manager
(Pharma / Food / ATEX only)

16.6.14

[Signature]

Montageleitung / Manager Assembly

16.6.14

[Signature]





Coperion K-Tron (Schweiz)
GmbH
Lenzhardweg 43/45
CH-5702 Niederlenz


ENDPRÜFUNG- PROTOKOLL / FINAL INSPECTION CERTIFICATE

Werkzeugnis gemäss EN10204-2.2
Test report according to EN10204-2.2

Kunde: Customer:	<i>Novartis</i>	Projekt Nr.: Project No.:	<i>1315690</i>	K-Tron MO No.:	
Tag No.:				Kunden Ref.Nr.: Customer PO No.:	

Mechanisches Prüfprotokoll (Endprüfung Kundenauftrag) Mechanical inspection protocol (final test customer project)

Prüfpunkte mechanisch	Checkpoints mechanic	Geprüft / Checked	Trifft nicht zu / N/A
Projekt-Spez. (Anforderungen) überprüft	Project Specification (requirements) checked	X	
Masch. Dimensionen n. Massbild überprüft	Dimension as per arrangmnt. drwg checked	X	
Spezial Anforderungen eruiert / überprüft	Special requirements determined / checked	X	
Dosierer (Typ, Ausführung) überprüft	Feeders (type, execution) checked	≅	X
Rahmen (Typ, Ausführung) überprüft	Frames (type, execution) checked	X	
Waagen (Typ, Ausführung) überprüft	Scales (type, execution) checked		X
Messdosen (Typ, Ausführung) überprüft	Load cells (type, execution) checked	X	
Trichter (Grösse, Ausführung) überprüft	Hoppers (size, execution) checked	X	
Motoren (Typ, Ausführung) überprüft	Motors (type, execution) checked		X
Getriebe (Typ, Ausführung) überprüft	Gears (type, execution) checked		X
Rührwerke (Typ, Ausführung) überprüft	Agitators (type, execution) checked		X
Schutzvorrichtungen montiert / überprüft	Safety devices assembled / checked	X	
Pick-up mechanisch eingestellt	Pick-up mechanically adjusted		X
Sicherungen der Getriebe-Aufhängung montiert	Safety devices of gear-suspension assembl.		X
Erdungen montiert	Groundings assembled		X
Auslaufrohre montiert	Outlet tubes assembled		X
Schnecken Rundlauf überprüft (streift nicht)	Screws concentric run checked (no scratching)		X
Lackierung (Ausführung, Schäden) überprüft	Painting (execution, defects) checked		X
Alle mechanischen Funktionen überprüft	All mech. functionalities checked	X	
Maschinen – Schilder montiert	Ident. Labels installed	X	
Warnschilder montiert	Warning labels installed	X	
Jet - Filter mech. überprüft	Jet - Filter mech. checked		X
Nachfüll-System mech. überprüft	Refill - System mech. checked		X
Abscheider / Einzelfördergerät mech. überprüft	Receiver / Loader mech. checked		X
Sackschütte mech. überprüft	Big Bag Dump Station mech. checked		X
Vordosierer mech. überprüft	Pre-feeder mech. checked		X
Druck- / Dichtheitstests durchgeführt	Pressure- / leakage tests executed		X
Oberfl. - Rauheitstests durchführt	Surface roughness tests executed		X
Lärmmessung durchgeführt	Noise level test executed		X
Farbschichtdicke gemessen	Painting thickness checked		X
PMI Test durchgeführt	PMI test executed		X
Farbeindringprüfung durchgeführt	Dye penetration test executed		X
Ersatzteile / lose Teile überprüft	Spare parts / loose parts checked	X	

Bemerkungen / remarks:	Mech.	Endprüfung / Final inspection	
		Name / Visa 	Datum / Date <i>13.06.14</i>

Kunde: Customer:		Projekt Nr.: Project No.:		K-Tron MO No.:	
Tag No.:				Kunden Ref.Nr.: Customer PO No.:	


Elektrisches Prüfprotokoll (Endprüfung Kundenauftrag) Electrical inspection protocol (final test customer project)			
Prüfpunkte elektrisch	Checkpoints electrical	Geprüft / Checked	Trifft nicht zu / N/A
Projekt-Spez. (Anforderungen) überprüft	Project Specification (requirements) checked	X	
Schemata (inkl. Revisionen) erstellt	El. Drawing (incl. revision) established	X	
Disposition überprüft	Arrangement drawing checked	X	
Spannung nach Schemata überprüft	Voltage as per el. drawing checked	X	
Programmierungen ausgeführt / überprüft	Programing executed / checked	X	
Batterie überprüft und eingeschaltet	Batteries checked and connected	X	
K-Link Protokoll eingestellt / überprüft	K-Link protocol adjusted / checked		X
Wandler eingestellt / überprüft	Converters adjusted / checked		X
Wago Module programmiert / überprüft	Wago Module programmed / checked		X
Hilscher Box konfiguriert / überprüft	Hilscher Box configured / checked		X
Profibuskarte / Modbus plus überprüft	Profibus Board / Modbus plus checked		X
Ethernetkarten – Treiber installiert	Ethernet board – driver installed		X
Düsensteuerung eingestellt / überprüft	Nozzle adjusted / checked		X
Frequenzumformer eingestellt / überprüft	Frequency transformer adjusted / checked		X
Leistungsteil eingestellt	Power supply adjusted		X
Pick-up, Zähnezah (Indikator) eingestellt	Pick-up (indicator) adjusted		X
Drehzahl (UPM) eingestellt / überprüft	Speed (RPM) adjusted / checked		X
Drehrichtung Schnecke / Band überprüft	Correct rotation screw / belt checked		X
Getriebe (High / Low) überprüft	Gear (High / Low) checked		X
Vol. / Grav. Regelverhalten überprüft	Vol. / grav. Control mode checked		X
Verdrahtung nach Schema ausgeführt /	Wiring as per electrical drwg executed / checked	X	
Regel-System (Typ, Ausführung) überprüft	Control System (type, execution) checked	X	
Schnittstelle, Sprache eingestellt	Interface, language adjusted	X	
Alle Funktionen nach Schema überprüft	All functionalities checked as per El. drwg	X	
Bezeichnungs- / Warschilder montiert	Ident. - / Warning - Labels installed	X	
Jet - Filter elektr. überprüft	Jet - Filter electr. checked		X
Nachfüll-System elektr. überprüft	Refill - System electr. checked		X
Abscheider / Einzelfördergerät elektr. überprüft	Receiver / Loader electr. checked		X
Sackschütte elektr. überprüft	Big Bag Dump Station electr. checked		X
Vordosierer elektr. überprüft	Pre-feeder electr. checked		X
Bandüberwachung überprüft	Belt monitoring checked		X
Pendelweg Vibrator eingestellt / überprüft	Vibratory feeder amplitude adjusted / checked		X
Gewichtstest durchgeführt	Weighing - test executed		X
Ersatzteile / lose Teile überprüft	Spare - / loose parts checked	X	
Vorauslieferung (papiermässig) überprüft	Advanced delivery checked		X

Bemerkungen / remarks:	Electr.	Endprüfung / Final inspection	
		Name / Visa	Datum / Date
		N. Vekic	13.06.2014

Kunde: Customer:	<i>Novartis</i>	Projekt Nr.: Project No.:	<i>1315690</i>	K-Tron MO No.:	
Tag No.:				Kunden Ref.Nr.:	
				Customer PO No.:	

**Geräte und Schutzsysteme in explosionsgefährdeten Bereichen (94/9/EG) (Endprüfung Kundenauftrag)
 Equipment and protective systems in potentially explosive atmospheres (94/9/EC) (final insp. cust. proj.)**

Prüfpunkte mechanisch	Checkpoints mechanic	Geprüft / Checked	Trifft nicht zu / N/A
Ex-Zahnriemen in Getriebe montiert	Ex- pulleys in gear assembled		X
Horiz. -RW: RW-Flügel / Trogwand ≥ 1 mm (überall Mindest – Abstand ≥ 1 mm)	Horiz. Agitator: Agitator blad / Troughwall ≥ 1 mm Min. clearance ≥ 1 mm		X
Vert.-RW: RW-Flügel / Trichterwand ≥ 5 mm (überall Mindest – Abstand ≥ 5 mm)	Vert. Agitator: Agitator blad / hopperwall ≥ 5 mm Min. clearance ≥ 5 mm		X
Schnecken: Konzentrität überprüfen Mind. Abstand ≥ 1 mm	Screws: concentricity checked Min. clearance ≥ 1 mm		X
Dichtungen, Faltenbalg, Manschetten, Flex etc. montiert nach Vorgaben gemäss Begleitpapieren (Zeichnung, Stückliste etc.) (Dichtheit nur bei Staub erforderlich)	Seals, bellows, sleeves, flex connections etc. assembled as defined in production documents (drawings, bill of material etc.) (tightness for dust only)	✓	
Maschinen-Komponenten komplett geerdet nach Montageanweisung 17.05-0006	Machine components completely grounded according to assembly instruction 17.05-0006	✓	
Ex-Anlage als solche gekennzeichnet mit Schild	Ex – machines as such marked by label	✓	

Bemerkungen / remarks:	Mech.	Endprüfung / Final inspection	
		Name / Visa	Datum / Date
			<i>13.06.14</i>

Prüfpunkte elektrisch	Checkpoints electrical	Geprüft Checked	Trifft nicht zu N/A
Limiten der Umfangsgeschwindigkeiten (Schnecken, Rührwerke, Band) eingestellt / überprüft (siehe "bestimmungsgemässen Gebrauch" als Teil der Konformitätserklärung)	Limits of circumferential speed (screws, agitators, band) adjusted / checked (see "intended use as per declaration of conformity")		X
Kabel, Stecker (Ex-Typ) montiert (Schirm)	Cables, plugs (Ex-type) assembled (shield)	X	
Komponenten in Ex-Ausführung montiert.	Explosion proved components assembled	X	
Systeme bzw. Komponenten eingestellt nach Herstellerangaben.	Systems resp. Components set according to Manufacturer description		X

Bemerkungen / remarks:	Electr.	Endprüfung / Final inspection	
		Name / Visa	Datum / Date
		<i>N. Vekić</i>	<i>13.06.2014</i>



CERTIFICATE FOR PROOF OF COMPLIANCE FOR INDUSTRIAL CONTROL PANELS

Verification of safety for the electrical equipment
of industrial machines according

EN 60439-500 / DIN VDE 0660

Common data of machine under test

Description / Number : 14-4545 K-Tron
Number of protocol : 9
Equipment used for tests : Profitest 204, M5077, 5470
Date of tests : 07.03.2014
Responsible person : D. Ries


The following protocol confirms that all tests for proof of electrical safety of the described machine according to the standards mentioned above have been carried out with great care.

The tests have been carried out by skilled persons according DIN VDE 0105 Part 1 / 5.75, Subclause 3.2.1.

The machine under test does meet the requirements of EN 60439-500/ DIN VDE 0660

Comment:
.....
.....
.....

Gelnhausen

_____, 07.03.2014,
Signature 

ENCLOSURE: protocols of tests

ENC. 1: Verification of the continuity of the protective bonding circuit

- The continuity of the protective bonding circuit to all accessible parts of the machine has been proved by visual inspection and by test
- Tests were made between the PE terminal and relevant points that are part of the protective bonding circuit.
- Tests were made with AC at line frequency and a current of at least 10 Amps at a voltage not exceeding 24 V rms. The duration of the test and the maximum acceptable voltage drop across the protective circuit are recorded with each test result.

Total number of tests carried out: 22

Tests with insufficient results:

Number of test	Voltage drop	Resist. of prot. con.	Duration	Limit	Note
----------------	--------------	-----------------------	----------	-------	------

List of all test results:

Number of test	Voltage drop	Resist. of prot. con.	Duration	Limit	Note
1.	30.00mV	3.50mOhm	2.00 s	1.34 Ohm	Montageplatte
2.	30.00mV	3.30mOhm	2.00 s	1.34 Ohm	Gehäuse
3.	30.00mV	3.70mOhm	2.00 s	1.34 Ohm	Tür
4.	30.00mV	3.10mOhm	2.00 s	1.34 Ohm	-X0
5.	140.0mV	14.00mOhm	2.00 s	1.34 Ohm	-X2
6.	30.00mV	3.40mOhm	2.00 s	1.34 Ohm	-X1
7.	70.00mV	7.70mOhm	2.00 s	1.34 Ohm	-10X5
8.	560.0mV	56.10mOhm	2.00 s	1.34 Ohm	-10E3
9.	30.00mV	3.40mOhm	2.00 s	1.34 Ohm	Hutschiene 1
10.	250.0mV	25.60mOhm	2.00 s	1.34 Ohm	Hutschiene 2
11.	30.00mV	3.10mOhm	2.00 s	1.34 Ohm	SPS-Schiene
12.	140.0mV	14.70mOhm	2.00 s	1.34 Ohm	Hutschiene 3
13.	260.0mV	26.20mOhm	2.00 s	1.34 Ohm	Hutschiene 4
14.	140.0mV	14.60mOhm	2.00 s	1.34 Ohm	Hutschiene 5
15.	210.0mV	21.00mOhm	2.00 s	1.34 Ohm	Hutschiene 6
16.	170.0mV	17.60mOhm	2.00 s	1.34 Ohm	Hutschiene 7
17.	30.00mV	3.20mOhm	2.00 s	1.34 Ohm	Hutschiene 8
18.	40.00mV	4.10mOhm	2.00 s	1.34 Ohm	-12G1
19.	90.00mV	9.60mOhm	2.00 s	1.34 Ohm	Schirmschiene 1
20.	60.00mV	6.30mOhm	2.00 s	1.34 Ohm	Schirmschiene 2
21.	60.00mV	6.70mOhm	2.00 s	1.34 Ohm	Schirmschiene 3
22.	90.00mV	9.70mOhm	2.00 s	1.34 Ohm	Schirmschiene 4

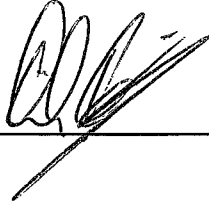
The machine under test does meet the requirements of
EN 60439-500 / DIN VDE 0660

Comment:

.....
.....
.....

07.03.2014,

Signature

A handwritten signature in black ink, consisting of several loops and a long horizontal stroke at the end, positioned above a solid horizontal line.

ENC. 2: Insulation resistance tests

- Insulation resistances were measured between the PE terminal and the phase terminals of the machine not connected to the line.
- Limits and test voltages are recorded with each test result.
- The test duration was extended to ensure stable readings where necessary.

Total number of tests carried out: 4

Tests with insufficient results:

Number of test	Insulation resistance	Nom. test voltage	Limit value	Note
----------------	-----------------------	-------------------	-------------	------

List of all test results:

Number of test	Insulation resistance	Nom. test voltage	Limit value	Note
1.	> 1.00GOhm	500.0 V	1.00MOhm	PE-L1
2.	> 1.00GOhm	500.0 V	1.00MOhm	PE-L2
3.	> 1.00GOhm	500.0 V	1.00MOhm	PE-L3
4.	> 1.00GOhm	500.0 V	1.00MOhm	PE-N

The machine under test does meet the requirements of EN 60439-500 / DIN VDE 0660.

Comment:

.....
.....
.....
.....

07.03.2014,

Signature



ENC. 5: High Voltage test

- Tests were carried out at 1000V AC or twice the operation voltage, if more than 500V AC.
- Voltage, current, duration and rise-time are recorded with each test.
- In case of insulation breakdown, the breakdown voltage is shown.

Total number of tests carried out: 4

Tests with insufficient results:

Number of test	Test voltage	Current	Duration	Nominal voltage	Note
----------------	--------------	---------	----------	-----------------	------

List of all test results:

Number of test	Test voltage	Current	Duration	Nominal voltage	Note
1.	2.52kV	310.0uA	8.50 s	2.50kV	PE-L1
2.	2.52kV	300.0uA	8.50 s	2.50kV	PE-L2
3.	2.51kV	270.0uA	8.50 s	2.50kV	PE-L3
4.	2.52kV	230.0uA	8.50 s	2.50kV	PE-N

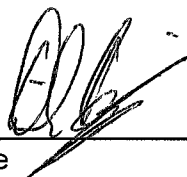
The machine under test does meet the requirements of EN 60439-500 / DIN VDE 0660.

Comment:

.....
.....
.....
.....

07.03.2014,

Signature



System overview

- Data Sheets
- P+ID Scheme
- FDS
- Flowchart
- Electrical Grounding Concept / Testplan
- Instrument List



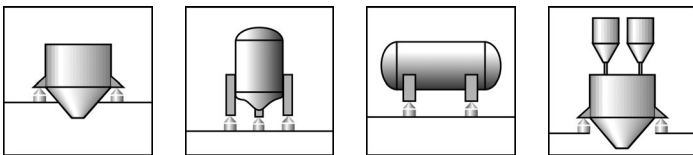
Z6...

Load cell

Special features

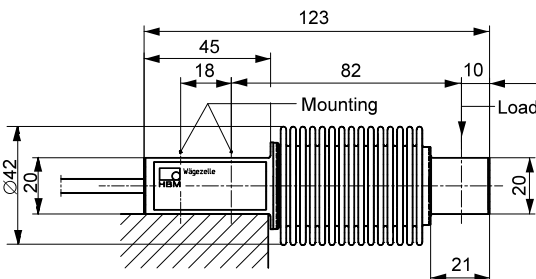


- Welded-on metal bellows
- Nominal (rated) loads: 5 kg ... 1 t
- Load cells and installation aids made of rust-resistant materials
- Verifiable up to 6000 divisions, test report as per OIML R60
- Six-wire circuit
- Optimized for parallel connection by off-center load compensation
- Meets EMC requirements as per DIN EN 45501
- Options:
Ex-protection designs as per ATEX 95

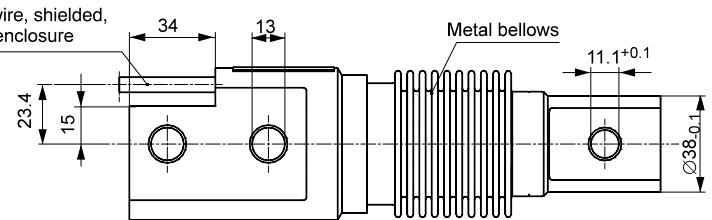
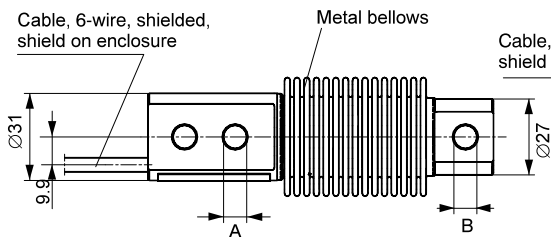
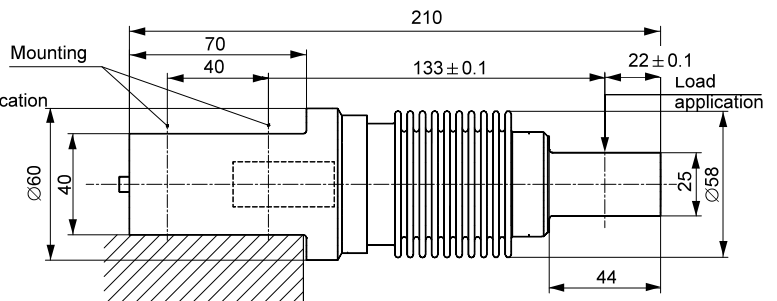


Dimensions (in mm; 1 mm = 0.03937 inches)

Z6; Nominal (rated) loads 5 kg...500 kg



Z6; Nominal (rated) load 1 t



	A	B
5...200 kg	8.2	8.2
500 kg	10.5	11.1

Cable Ø5.4; 3 m long (standard version)

Specifications

Type		Z6FD1	Z6FC3	Z6FC3MI	Z6FC4	Z6FC6			
Accuracy class to OIML R 60		D1	C3	C3/MI7.5	C4	C6			
Number of scale intervals (n_{LC})		1000	3000	3000	4000	6000			
Nominal (rated) load (E_{max})	kg	5; 10; 20; 50; 100; 200; 500	10; 20; 50; 100; 200; 500	50; 100; 200	20; 50; 100; 200; 500	50; 100; 200;			
	t	1	1	-	-	-			
Minimum scale division (v_{min})	% of E_{max}	0.0360	0.0090	0.0066					
Return of minimum dead load signal (D_{DR})		-	-	0.5 · E_{max} / 7500					
Nominal (rated) sensitivity (C_n)	mV/V	2							
Sensitivity tolerance with load appl. in spec. direction	%	+(1;-0.1)	± 0.05 ¹⁾						
Temperature coefficient of sensitivity (TC_S) ²⁾	% of C_n /10 K	± 0.0500	± 0.0080	± 0.0080	± 0.0070	± 0.0040			
Temperature coefficient of zero signal (TK_0)		± 0.0500	± 0.0125	± 0.0093	± 0.0093	± 0.0093			
Relative reversibility error (d_{hy}) ²⁾		± 0.0500	± 0.0170	± 0.0066	± 0.0130	± 0.0080			
Non linearity (d_{lin}) ²⁾	% of C_n	± 0.0500	± 0.0180	± 0.0180	± 0.0150	± 0.0110			
Load creep (d_{DR}) in 30 min.		± 0.0490	± 0.0166	± 0.0098	± 0.0125	± 0.0083			
Input resistance (R_{LC})	Ω	350...480							
Output resistance (R_0)		356 ± 0.2	356 ± 0.12						
Reference voltage (U_{ref})	V	5							
Nominal supply voltage range (B_u)		0.5...12							
Insulation resistance (R_{is})	GΩ	> 5							
Nominal ambient temperature range (B_T)		-10...+40							
Operating temperature range (B_{tu})	°C	-30...+70							
Storage temperature range (B_{st})		-50...+85							
Limit load (E_L)		150							
Breaking load (E_d)	% of E_{max}	≥ 300							
Nominal (rated) load	kg	5	10	20	50	100	200	500	1000
Relative permissible oscillatory stress	% of E_{max}	100	100	100	100	100	100	70	100
Nominal (rated) displacement (s_{nom}) approx.	mm	0.24	0.3	0.29	0.27	0.31	0.39	0.6	0.55
Weight, (G) approx.	kg	0.5	0.5	0.5	0.5	0.5	0.5	0.5	2.3
Degree of protection (IP) as per EN60529 (IEC529)		IP 68 (tougher test conditions: 1 m water column;100 h)							
Material:	Measuring body Bellows Cable inlet gland Cable sheath	Stainless steel ³⁾ Stainless steel ³⁾ Stainless steel / Viton® PVC							

1) For load cell Z6FC3/10kg: ≤ ± 0.1 %.

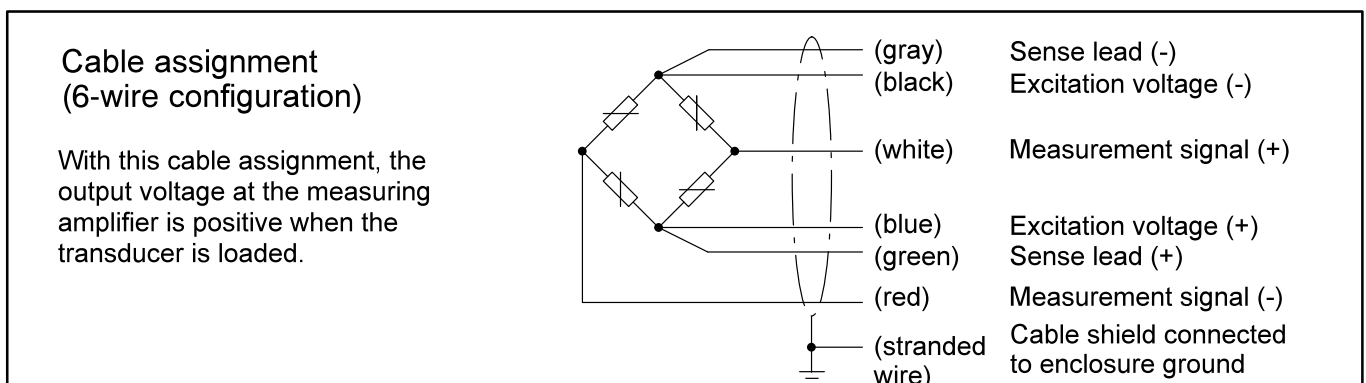
2) The values for linearity deviation, relative reversibility error and temperature effect on sensitivity are typical values. The sum of these values is within the cumulative error limits laid down by OIML R60.

3) As per EN 10088-1

Options:

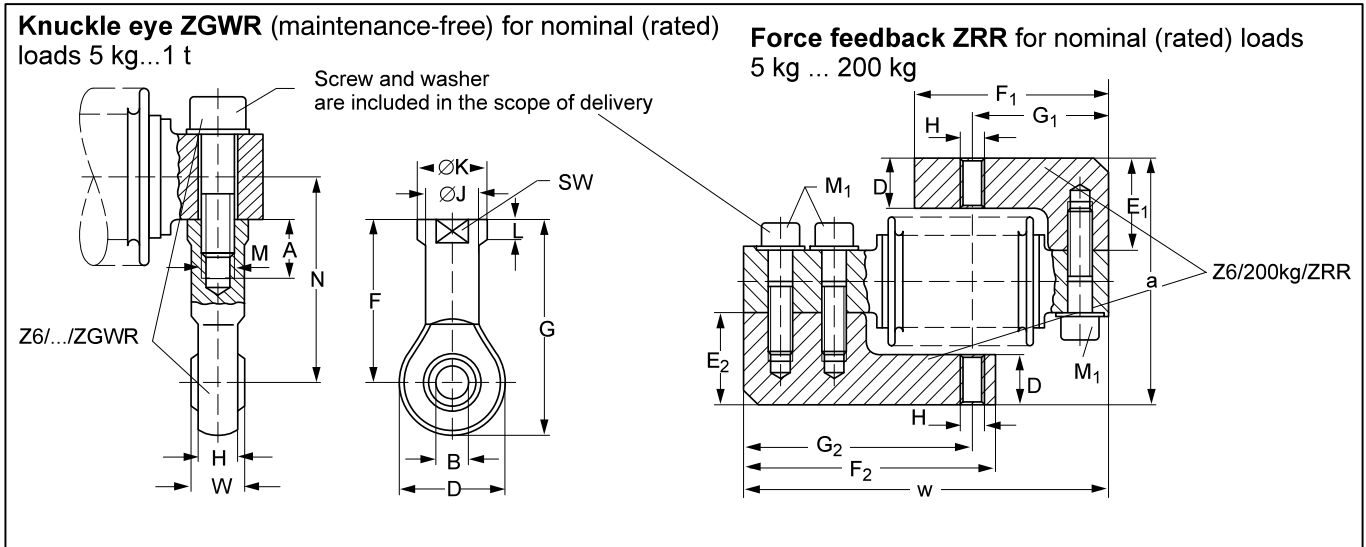
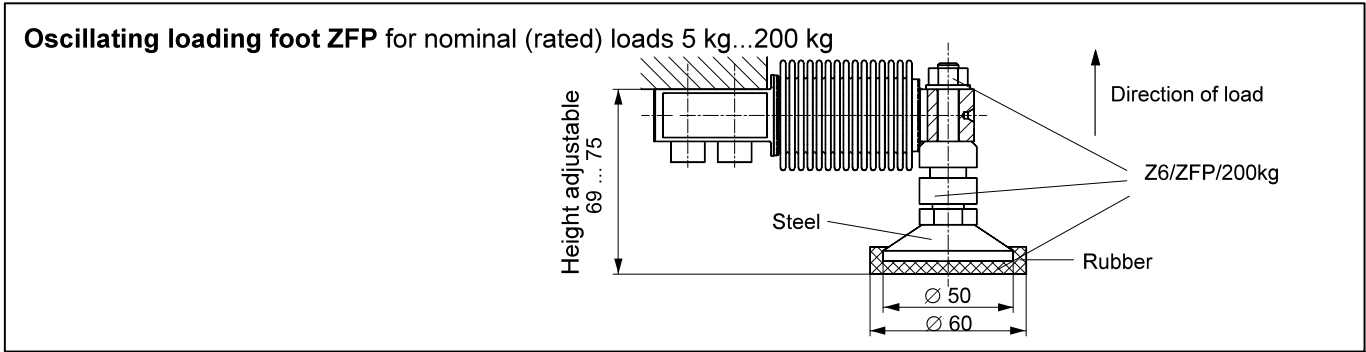
Ex-protection designs as per ATEX 95:

- II 2 G EEx ia IIC T4 or T6 (Zone 1) *)
 - II 3 G EEx nA II T6 (Zone 2)
 - II 2 D IP68 T80°C (Zone 21) *)
 - II 3 D IP68 T80°C (Zone 22 for non-conductive dust)
- *) with EC type examination certificate



Installation aids, not included in scope of delivery (Dimensions (in mm; 1 mm = 0.03937 inches))

Note: All installation aids are made of non-rusting material. The rubber parts of the ZEL are made of chloroprene rubber.

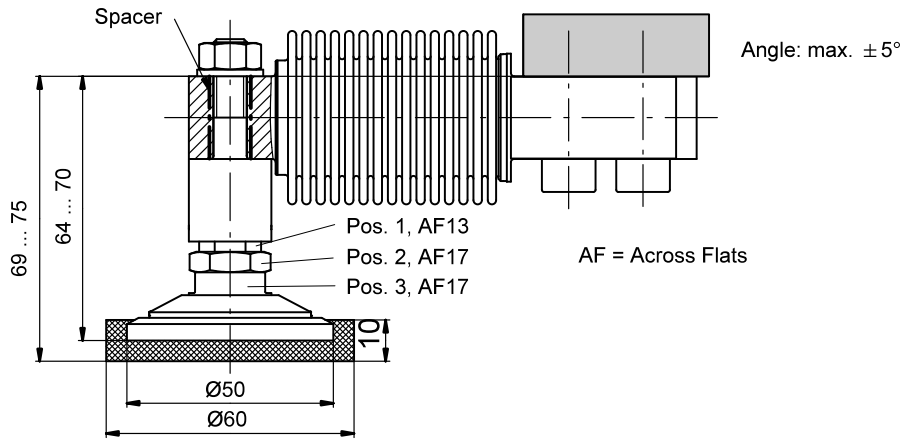


Nominal (rated) load	ZGWR	A	B	D	F	G	H	Ø J	Ø K	L	M	SW	W	N
5...200 kg	Z6/200kg/ZGWR	16	8 ^{H7}	24	36	48	9	12.5	16	5	M8	14	12	46
500 kg	Z6/1t/ZGWR	20	10 ^{H7}	28	43	57	10.5	15	19	6.5	M10	17	14	53
1 t	Z6/1t/ZGWR	20	10 ^{H7}	28	43	57	10.5	15	19	6.5	M10	17	14	55.5

Nominal (rated) load	ZRR	D	E ₁	E ₂	F ₁	F ₂	G ₁	G ₂	H	M ₁	a	w	Depth
5...200 kg	Z6/200kg/ZRR	16	30	30	65	85	46	77	M8	M8x30	80 ± 1.1	123	15

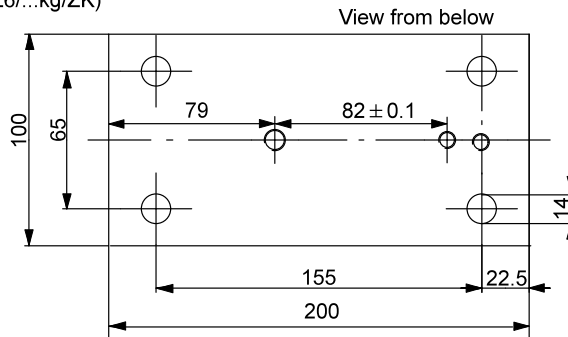
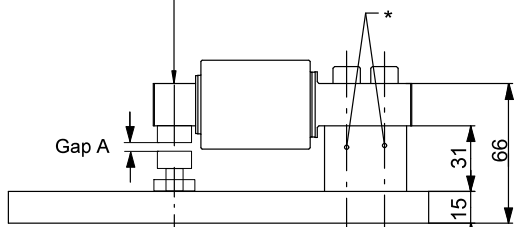
Nominal (rated) load	Cone, conical pan ZK	Ø C	D	E	Ø U	X
5...200 kg	Z6/200kg/ZK	15	16	21	8.1 _{-0.05}	26
500 kg	Z6/1t/ZK	18	24	32	11 _{-0.05}	34
1 t	Z6/1t/ZK	18	24	32	11 _{-0.05}	36.5

Oscillating loading foot PCX for nominal (rated) loads 5 kg... 500 kg (Z6/PCX/500kg);
 1 set comprising 4 pieces Z6/PCX/500kg



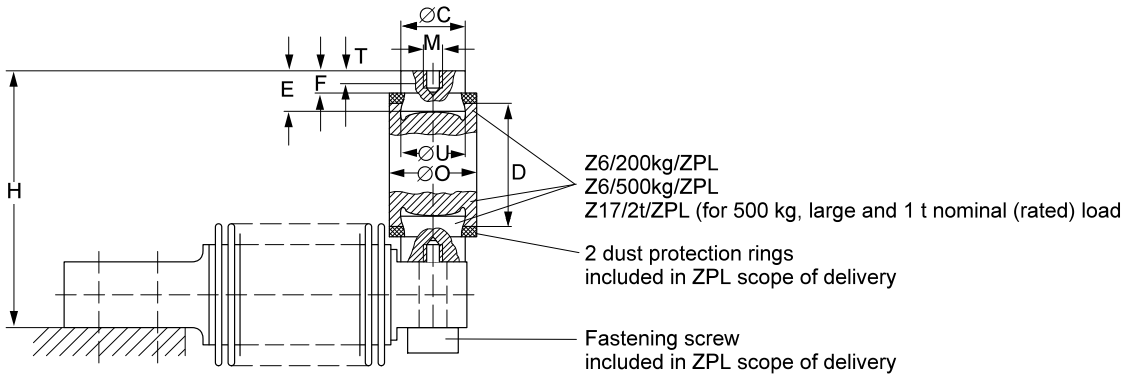
Base plate / Mounting set for nominal (rated) loads 5 kg (Z6/ZPU/200kg) ... 500 kg (Z6/ZPU/500kg)

Load application (Z6/...kg/ZPL; Z6/...kg/ZEL; Z6/...kg/ZK)



* Tightening torque M_A : 23 N·m (200 kg); 45 N·m (500 kg)
 Gap A: In a load cell loaded with the nominal (rated) load, there should be a gap width 0.05 mm

Pendulum bearing ZPL for nominal (rated) loads 5 kg...1 t

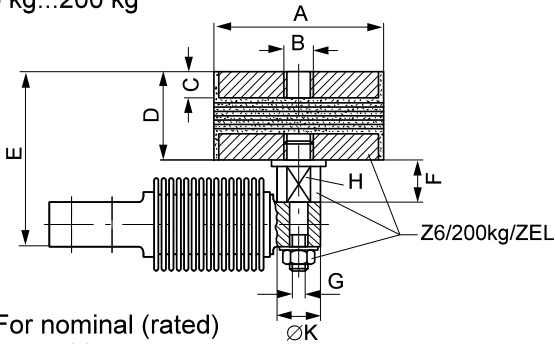


Nominal (rated) load	Pendulum bearing ZPL	Ø C	D	H	M	Ø O	T	E	F	Ø U	F_R^* (% of the load)	s_{max}^{**} (mm)
5...200 kg	Z6/200kg/ZPL	20 _{-0.2}	45	89 ^{+0.6} _{-0.8}	M8	30	6.5	17	9	20 ^{D10}	2.8	3.5
500 kg	Z6/500kg/ZPL	20 _{-0.2}	45	89 ^{+0.6} _{-0.8}	M8	30	6.5	17	9	20 ^{D10}	2.8	3.5
1 t	Z17/2t/ZPL	30 _{-0.1}	60	126.5	M10	46	8	22	14	30 ^{D10}	2	7.5

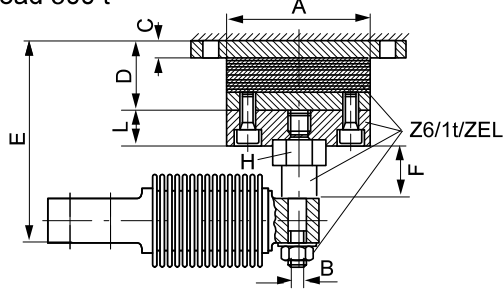
* F_R : Force feedback in N, with 1 mm lateral displacement

** s_{max} : Maximum perm. lat. displacement with nominal (rated) loading

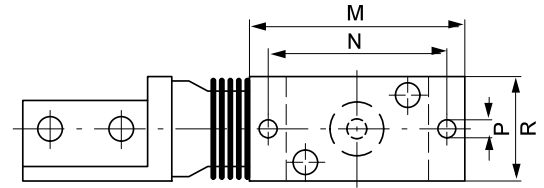
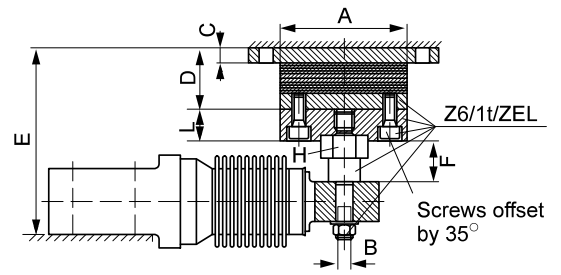
**Rubber-metal bearing ZEL for nominal (rated) loads
5 kg...200 kg**



**For nominal (rated)
load 500 t**



For nominal (rated) loads 1 t



Correct installation position of the rubber-metal bearing

Nominal (rated) load	ZEL	A	B	C	D	E	F	G	H	K	L	M	N	P	R	F _R *	s _{max} **
5...200 kg	Z6/200kg/ZEL	75	M12	12	40	79 ± 1.3	18.5	M8	SW17	19	-	-	-	-	-	163	3
500 kg	Z6/1t/ZEL	80	M10	10	39	105 ^{+2.1} _{-2.2}	26	-	SW27	-	20	120	100	9	60	400	4.5
1 t	Z6/1t/ZEL	80	M10	10	39	117 ^{+2.1} _{-2.2}	26	-	SW27	-	20	120	100	9	60	400	4.5

* F_R: Force feedback in N, with 1 mm lateral displacement

** s_{max}: in mm, Maximum perm. lat. displacement with nominal (rated) loading



Order no.

K-Z6_

Code	Option 1: Design
F	Z6F
G	Z6G (big) [only with Option 2 = C3 + Option 3 = 500]

Code	Option 2: Accuracy
D1	D1 (OIML) [not with Option 1 = G]
C3	C3 (OIML)
C4	C4 (OIML) [only with Option 3 = 20 / 50 / 100 / 200 / 500 + Option 5 = S]
C6	C6 (OIML) [only with Option 3 = 50 / 100 / 200 + Option 5 = S]

Code	Option 3: Capacity
5	5kg [only with Option 2 = D1]
10	10kg [only with Option 2 = D1 / C3]
20	20kg [only with Option 2 = D1 / C3 / C4]
50	50kg
100	100kg
200	200kg
500	500kg [only with Option 2 = D1 / C3 / C4]
1000	1t [only with Option 2 = D1 / C3]

Code	Option 4: Ex protection (accord. to ATEX 95)
N	non ATEX
1	ATEX Zone 1 + 21 and FM 
2	ATEX Zone 2 + 22 (non-conductive dust) 

Code	Option 5: Cable length
S	3m (standard)
6	6m [not with Option 2 = C6]
12	12m [not with Option 2 = C6]

Code	Option 6: Miscellaneous
N	without

K-Z6_ - [] - [] [] [] [] - [] [] [] [] - [] - [] [] [] - [] [] [] []

[]: Not all codes can be combined with each other. Please take heed of the terms in the square brackets!

Subject to modifications.
All product descriptions are for general information only. They are not to be understood as a guarantee of quality or durability.

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VKK2R-8 Ex

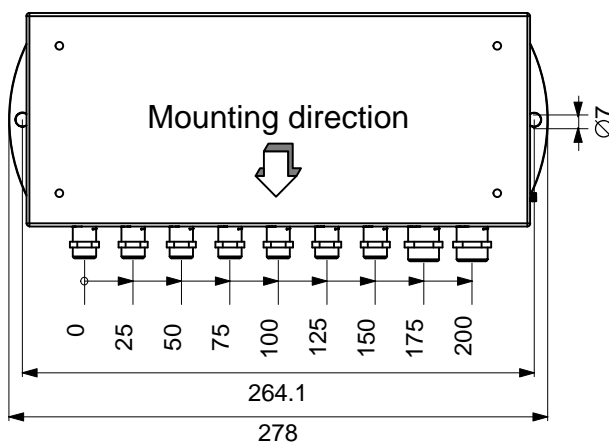
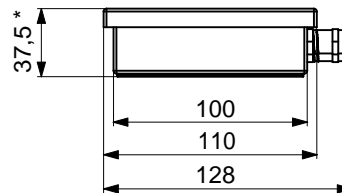
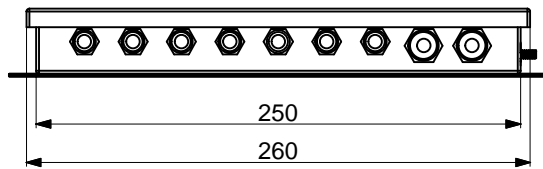
Junction box



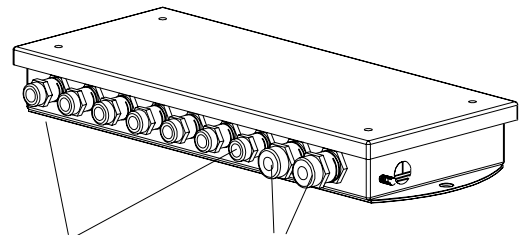
Special features

- EC-type examination certificate
PTB05 ATEX 2014
- Parallel connection of up to 8
load cells for use in potentially
explosive atmospheres:
Zone 1, 2 and 21, 22
- Corner balancing via integrated
resistor network
- Housing in stainless steel

Dimensions (in mm; 1 mm = 0.03937 inches)



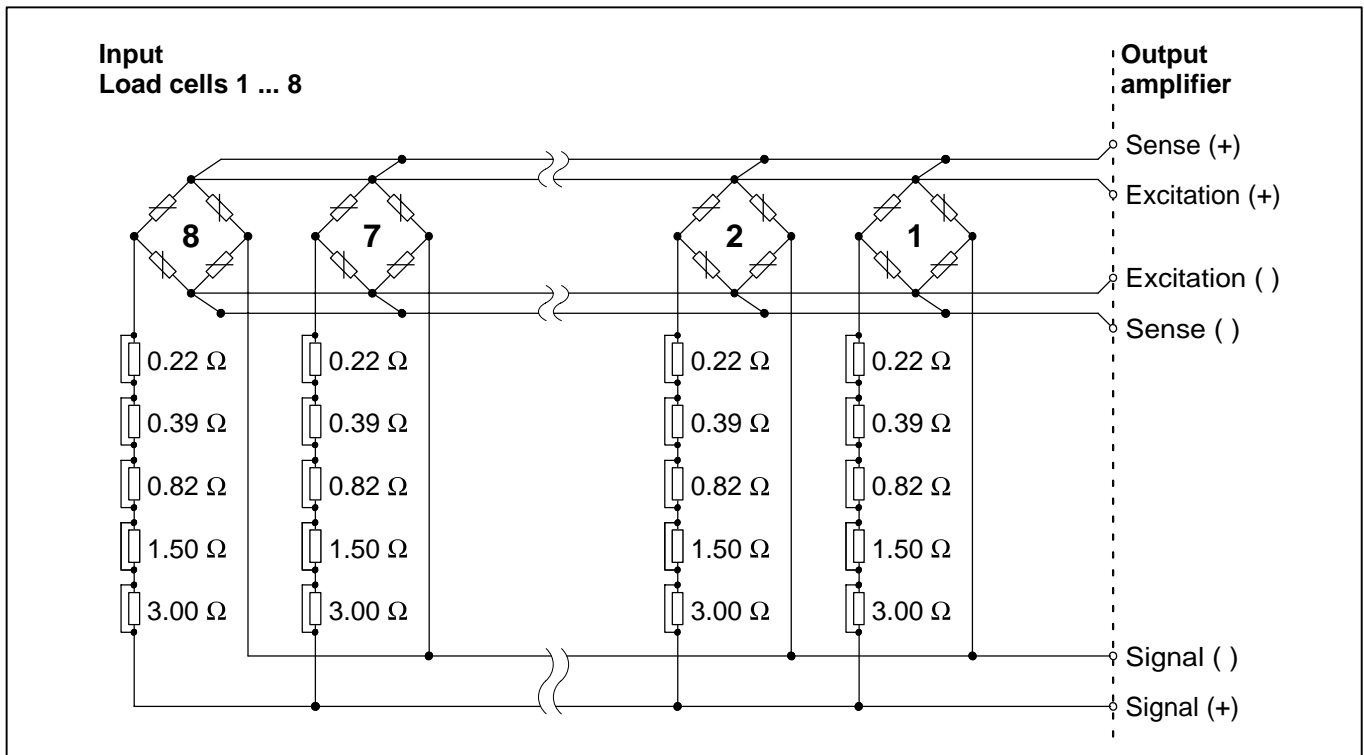
* with rubber sealing
(mounted state)



7x M12, a.f. 14 for
cable diameter
5 ... 6.5 mm

2x M16, a.f. 17 for
cable diameter
5 ... 9 mm

Corner load balancing



Specifications

Type	VKK2R-8 Ex	
Max. permissible voltage	V	Zone 1, 2; 21; 22 12
Designation		Zone 1, 21, 22 (intrinsic safety) 22
Resistor network for corner load balancing	Ω	II 2 G Ex e II T4 II 2 D Ex tD A21 IP65 T 80 °C II 3 G Ex nA II C T4 II 3 D Ex tD A22 IP65 T 80 °C
Nominal temperature range		0.22...5.93 (in 31 steps)
Operating temperature range	°C [°F]	20...+70 [4...+158]
Storage temperature range		20...+70 [4...+158]
Interference immunity check		40...+85 [40...185]
Electromagnetic field (26...1000 MHz)	V/m	10
Burst (to connected cables)	V	1000
Electrostatic discharge (to housing)	V	6000
Weight, approx.	kg	1
Max. wire cross section of cable strands	mm ²	1.5
Degree of protection according to EN 60529 (IEC 529)		IP65 (dust tight and protected against water jets)
Materials:		stainless steel
Housing		
Ex screwed cable gland:		
Sleeve nut		7 x M12, a.f.14; 2 x M16, a.f.17 nickel-plated brass
Clamping cone		Neoprene for cable Ø 5...9 mm with M16 x 1.5 for cable Ø 5...6.5 mm with M12 x 1.5

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Application

Simultaneously aerating and vibrating bulk material, the low profile Coperion K-Tron aeration pads provide an effective flow aid for use when discharging all types of granular or powdered materials.

Overcoming bridging and rat-holing, the special design of the device causes a vibration as fluidizing air flows between the rim of the diffuser and the bin wall.

The aeration pads are generally only activated during discharge, resulting in very low air consumption. Depending on the bulk material and application, blower air is generally between 5 to 20 psig (0.3 to 1.3 Bar).

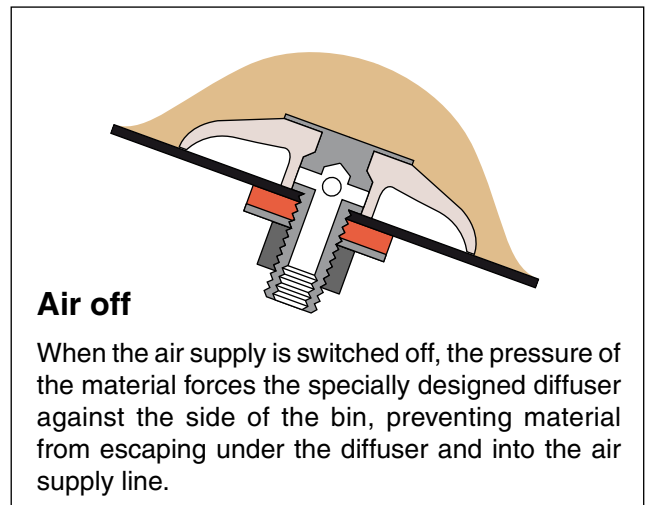
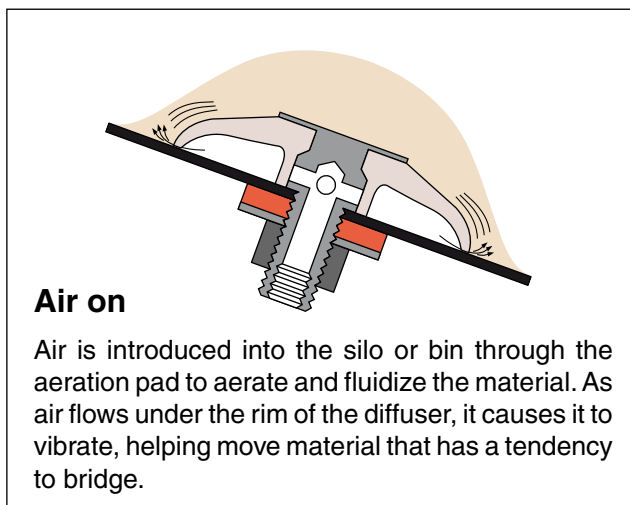


Design

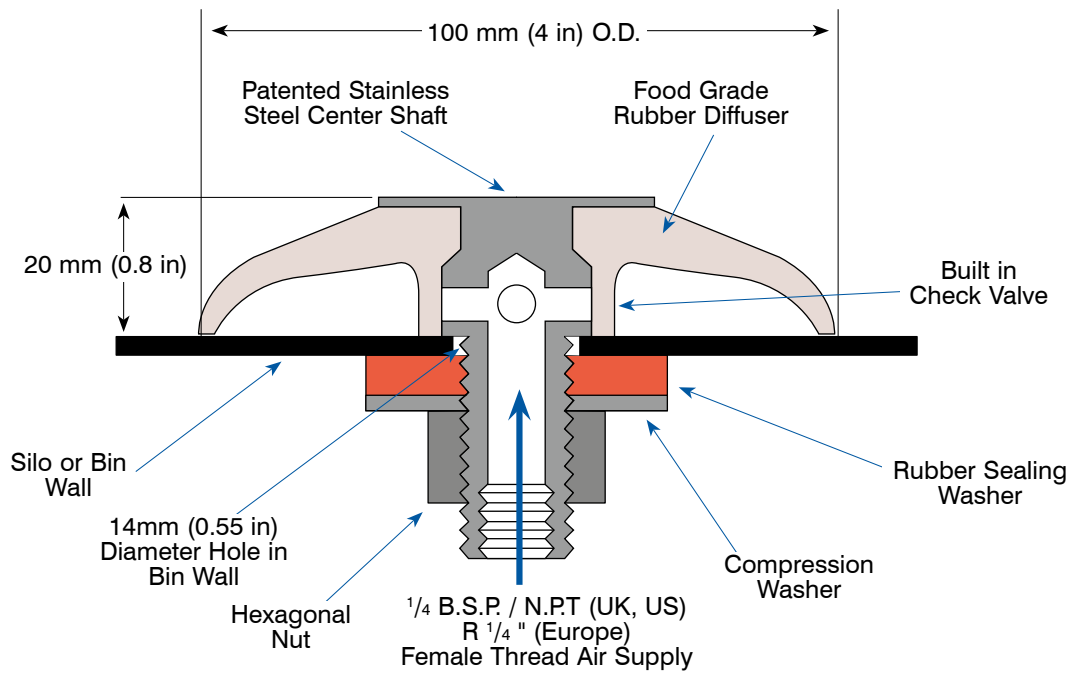
- Stainless steel (316L) shaft with food grade silicone rubber diffuser
- Vibrating action promotes material flow
- Compatible with any type of silo or bin
- Low profile improves material flow
- Captive diffuser eliminates risk of detachment during operation
- Uses pressured air 5 to 20 psig (0.3 to 1.3 Bar)
- Safe for use in hazardous areas
- Rated for temperature up to 205°C [401°F]

Features

- Retrofitted in minutes
- Suitable for granular or powdered materials
- Suitable for abrasive materials
- Durable construction
- Totally maintenance free
- Self-cleaning and hygienic



Construction of an Internal Access Aeration Pad



Installation Instructions for External Access Aeration Pads



1 Cut a 46 mm (1.81 in) diameter hole in the bin wall, remove sharp edges. Fit T-Bar into the threaded adaptor on the aeration pad with all washers, etc., as shown.



2 Squeeze the rubber section through the hole in the bin.



3 Pass the centralizing bar through the bin wall ensuring it is vertically mounted (see step 4) and the spigot is located within the hole.



4 Maintain a backwards pull on the T-Bar to ensure the centralizing bar remains located and vertical. Slide the sealing washer inwards and pass over the threaded boss.



5 When the sealing washer is in position with the threaded boss protruding, screw on the retaining nut.



6 Tighten the retaining nut and remove the T-Bar, connect the air supply and the aeration pad is ready to use.

Application

The Coperion Coperion K-Tron P100 is designed to convey powders and meets the rigid 3A Dairy sanitary requirements. With the choice of various discharge valve types (powered flap and active driven butterfly valves) the P100 can be used for conveying only applications such as hopper loading, as well as loss-in-weight feeder refill applications, where the receiver is not always emptied completely.

Design

The P100 receiver is available in two outlet configurations: powered flap valve (FP) or butterfly valve (BV). The receiver body is made of stainless steel DIN 1.4404 [AISI 316L], with internal and external electropolished surface passivation. The modular construction and sanitary design without pockets or dead spaces allow for easy disassembly and cleaning as well as simple expansion with extension modules. Tri-Clover quick release fittings ensure quick disconnection from conveying and vacuum piping. All units have reverse jet filter cleaning.

Mechanical Features

- Sanitary design for easy cleaning
- Rugged modular design
- Steep cone angles ensure excellent discharge
- Large area reverse jet filter for efficient powder conveying

Controls

For single receiver applications, we offer the LSR Controller. In loss-in-weight feeder refill applications, the LSR Controller can also be interfaced with Coperion K-Tron SmartConnex™ feeder controls.

For systems with multiple receivers, Coperion K-Tron microprocessor controls or a variety of PLC control solutions are available, which can also be integrated into Coperion K-Tron feeder control systems.

Hazardous Location Options:

- NEC Class I, Div. 2, Group C & D
- ATEX 2GD/1D (outside/inside)
Standard receiver is 3D/3D

Note: the receiver is designed for handling bulk materials with a Minimum Ignition Energy (MIE) above 10 mJ.

Conveying Rates

- P100-FP-300 flap valve version Ø 300 mm [12 in]
up to 4000 kg/h [8800 lb/h]
- P100-BV-200 butterfly valve version Ø 200 mm [8 in]
up to 3600 kg/h [7920 lb/h]

Based on a distance of 15 m [50 ft] and bulk density of 0.5 kg/dm³ [31 lb/ft³]. Rates vary with material characteristics, conveying distance and plant layout.

Technical Data

Standard Mechanical Specifications

- Stainless steel DIN 1.4404 [AISI 316L] for material contact parts
- Surface finish electropolished
- Welds continuous as laid
- Holding capacity: P100-FP-300 96.2 dm³ [3.4 ft³]
P100-BV-200 90.2 dm³ [3.2 ft³]



*P100 receiver,
with 200 mm [8 in]
butterfly valve*

*P100 receiver,
with 300 mm [12 in]
powered discharge valve*

- Stainless steel band clamps
- Sealing and gaskets, FDA listed food grade materials:
Clamp ring: silicone, translucent
Tri-clamp: white silicone, FDA approved
Flap valve: flap bonded silicone sheet, translucent
Butterfly valve rubber sleeve: EPDM, black
- Convey line connection; spigots with Tri-clamps, 50.8 mm [2 in], 63.5 mm [2.5 in], 76.2 mm [3 in]
- Vacuum line connection; spigots with Tri-clamps, 76.2 [3 in]
- P100-BV-200 butterfly valve discharge, Ø 200 mm [8 in]
- P100-FP-300 power flap valve discharge, Ø 300 mm [12 in]
- Polyester pleated cartridge filters with stainless steel end caps
6 filters total 3 m² [32.3 ft²]; length 400 mm [15.7 in]
- Automatic reverse jet filter
4 dm³ [0.14 ft³] SS air reservoir; 4 bar max [60 psi]
- Material certificate EN 10204-2.1

Standard Electrical Specifications

- Signal voltage 24 VDC

Weights

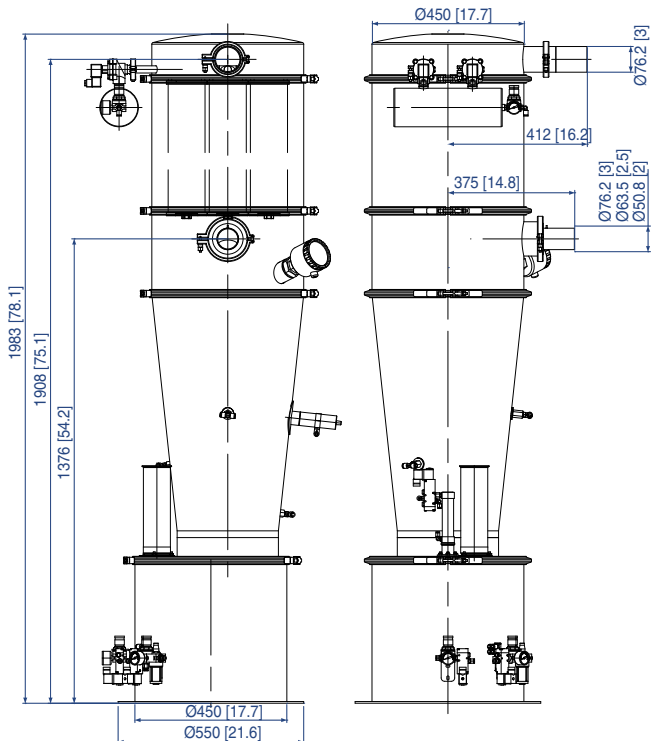
- P100, without options: 75 kg [165 lb]

Operating Temperature

- -10° C to +50° C [14° F to 122° F]
for indoor use only - not suitable for outdoor use

Dimensions of P100 mm [in]

P100 with 300 mm [12 in] flap valve



Options

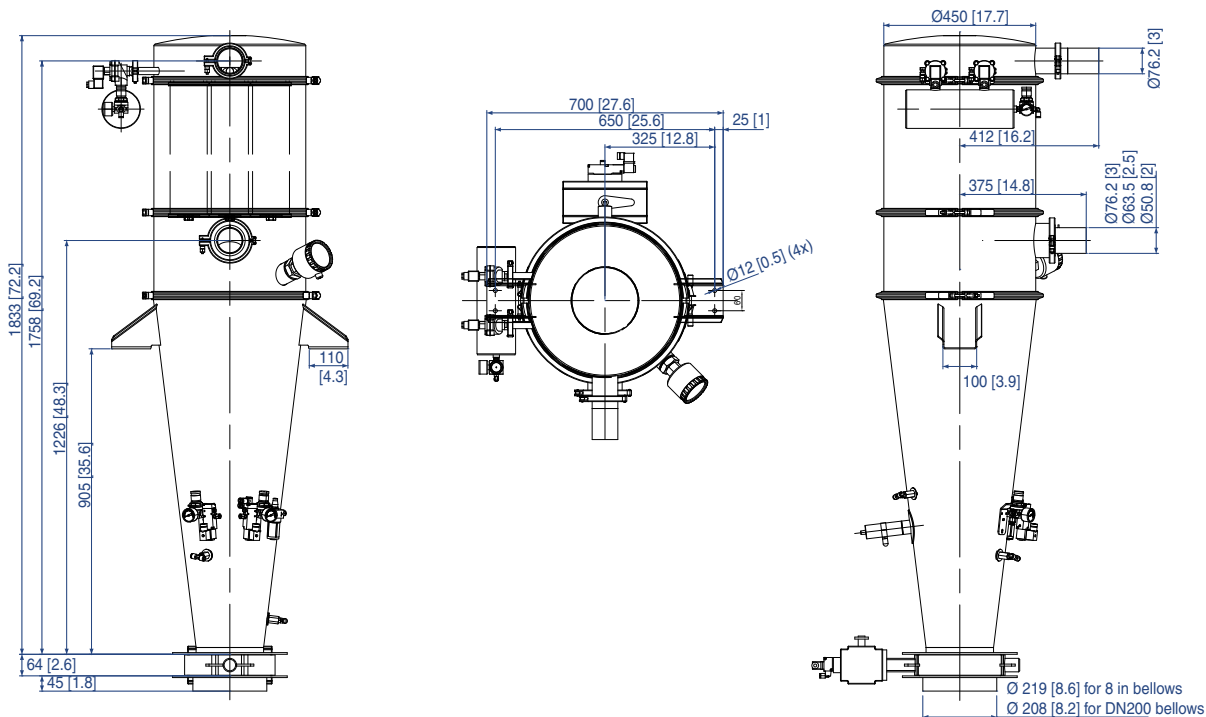
Mechanical

- 60 dm³ [2.12 ft³] extension module
- Slide gate valves as alternative for butterfly type
- PTFE coated filter media
- Open pleated filter type for PTFE execution
- Filter basket with GORE-TEX® cloth
- EPDM white rubber sleeve for butterfly valve
- Vibrator as discharge aid
- Aeration pads as discharge aid
- Fill valve, loose
- Stainless steel enclosure for solenoids and pressure regulators supplied loose
- Material certificates type EN10204-2.1

Electrical

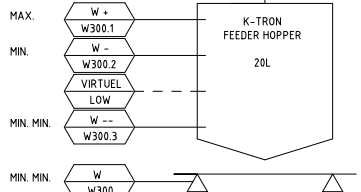
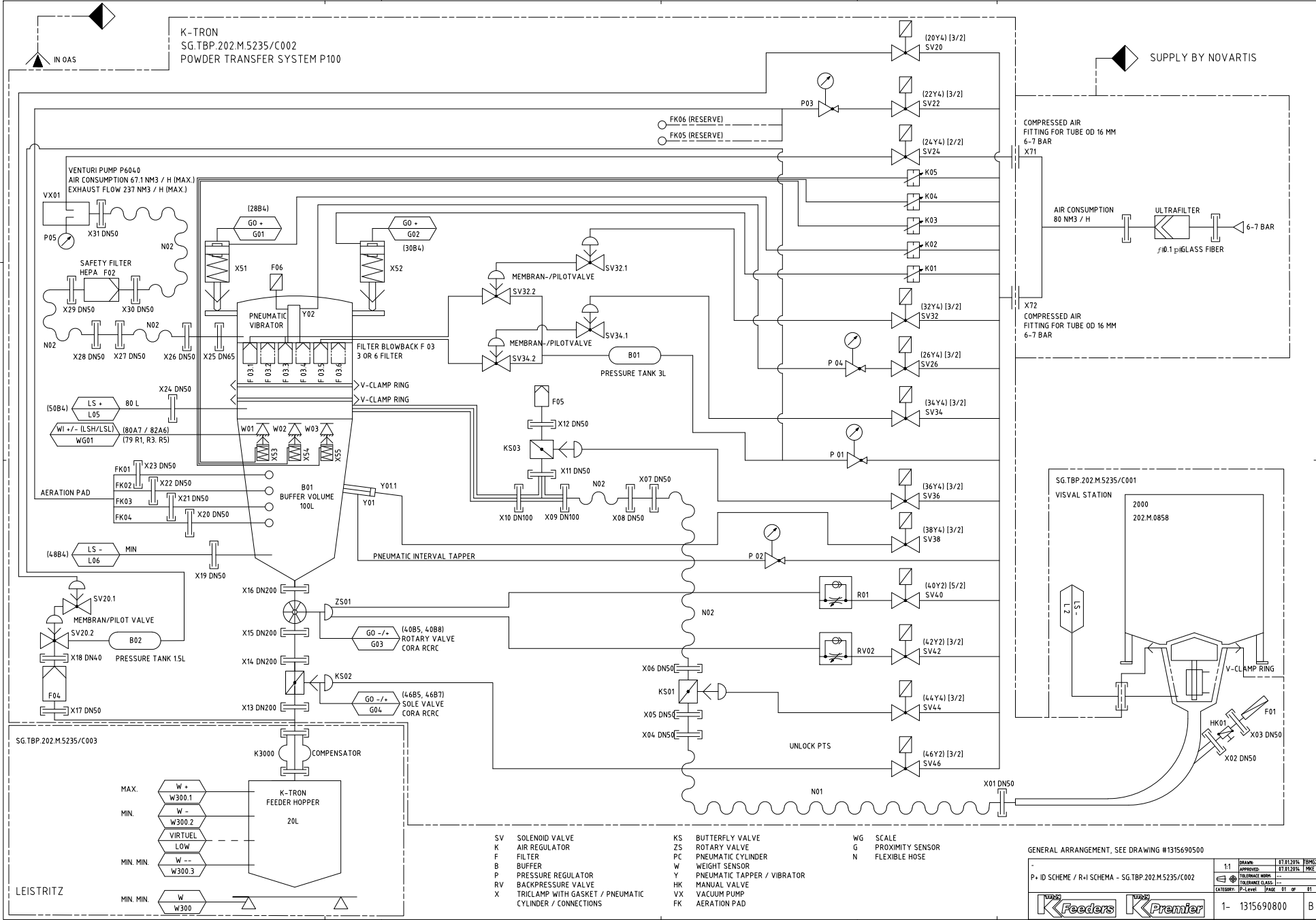
- Level probes (capacitive or tuning fork type)
- Terminal box mounted, painted aluminum or stainless steel finish
- LSR Controller
- Central microprocessor or PLC controls

P100 with 200 mm [8 in] butterfly valve



Caution: Measurements are for general reference only. Please consult dimensional drawing for exact measurements.

K-TRON
SG.TBP.202.M.5235/C002
POWDER TRANSFER SYSTEM P100



- | | | | | | |
|----|---|----|-----------------------------|----|------------------|
| SV | SOLENOID VALVE | KS | BUTTERFLY VALVE | WG | SCALE |
| K | AIR REGULATOR | ZS | ROTARY VALVE | G | PROXIMITY SENSOR |
| F | FILTER | PC | PNEUMATIC CYLINDER | N | FLEXIBLE HOSE |
| B | BUFFER | W | WEIGHT SENSOR | | |
| P | PRESSURE REGULATOR | Y | PNEUMATIC TAPPER / VIBRATOR | | |
| RV | BACKPRESSURE VALVE | HK | MANUAL VALVE | | |
| X | TRICLAMP WITH GASKET / PNEUMATIC CYLINDER / CONNECTIONS | VX | VACUUM PUMP | | |
| | | FK | AERATION PAD | | |

GENERAL ARRANGEMENT, SEE DRAWING #1315690500

11	DRAWN	07.03.2016	DP/PC
	APPROVED	07.01.2016	DP/PC
	TECHNICAL MANAGER		
	TECHNICAL CLASS		
	CATEGORY	IP-Level	PAGE 01 of 01

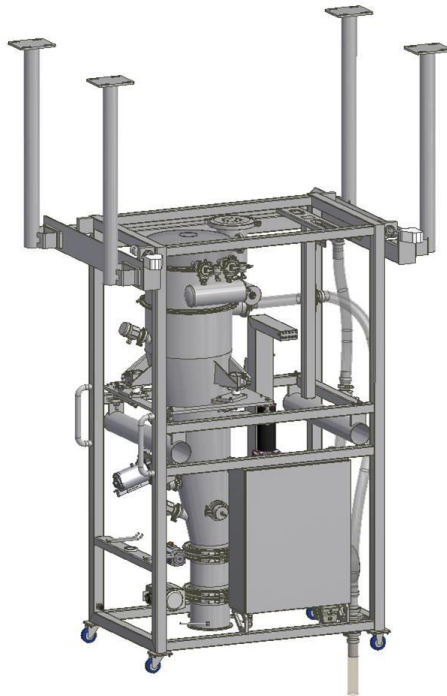
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**DESIGN SPECIFICATION
(FDS / HDS / SDS)
SG.TBP.202.M.5235
Powder Transfer System**

Date: 15.04.2014
Revision: 1.0
Supplier:Coperion K-Tron
Project Nr.: 1315690
Customer: Novartis
Document Nr:
1315690-FDS-R001



Customer:



**Novartis Singapore Pharmaceutical
Manufacturing Pte Ltd.
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637461 Singapore
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Supplier:





**K-Tron(Schweiz)LLC
Lenzhardweg 43/45
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Switzerland**



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This FDS was created, checked and approved:

Name	Signature Reason	Function/Department	Signature	Date
S.Händel, K-Tron	Author	Automation Engineer		15.04.2014
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Version history


Date	Version	Change / Addition
17.03.2014	0.0	Initial Release
15.04.2014	1.0	Incorporated Comments by Novartis

Applicable documents


Document	Title	Version
URS	SG.TBP.202.M.5235_URS	1.0
DS	SG.TBP.202.M.5235_C002_DS	1.0
P&ID Plan	1315690800	B
Circuit Diagram	1315690700 Wiring Diagram	A
Flow Diagram	1315690-FBD-R001	1.0
Instrument list	1315690-IL	A
Pneumatic Schematic	1315690801	A

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1 Introduction

1.1 Instigation

Based on customer requirements, a pharma level vacuum conveying system P100/100dm³ will be engineered and produced. The device is designed for the pneumatic transport of powders in a pharmaceutical environment. The maximal feed rate is 274.2 dm³/h.

1.2 Purpose

This document specifies the Software- and Hardware components, as well as the to-be-created applications based on the system's requirements. Hardware- or Software related components or functions, which were planned but not included in the project scope, will be labelled as "options".

1.3 Project scope

The execution of this project is carried out in a pharmaceutical environment and in concordance with the current guidelines.

2 System behaviour

2.1 Operating modes and Line conditions.


The operation is differentiated in two modes; the automated operation (Chap. 2.2) and the manual operation (Chap. 2.3). Furthermore a start up fill function (Chap. 2.2.1) is selectable. The switching of the operating modes are done at the HMI operator panel (82A6).

2.2 Automated operation

General:

Before the start-up and filling process can begin the pneumatic receiver Cart has to be positioned in the mounting bracket. This is achieved through pneumatic cylinders which interlock the Cart as soon as the compressed air supply is connected. In the case of an error-free interlock 1 green lamp (combined signal for left and right Interlock) will be displayed on the Operator terminal (62A1).

The two Level sensors type FTM50 (L05 – 80dm³ and L06 - empty) will be displayed visually at the Operator terminal (62A1) if they are covered by the product.

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The vibrator Y01 and the fluidisation cushions FK01-FK04 must be able to be turned on & off at all times through the Operator terminal (62A1) during automated operation.

The vibrator Y01 will always be switched on should the level indicators L05 and L06 not deliver a comprehensible result (example: L05 is covered and L06 isn't). Here the vibration is activated and then a pause, which is set up through the HMI operator panel (82A6) (identical with the time in automated control) is inserted. Should the condition subsequently not have normalised itself, the process will be repeated twice and in case there is still no change, an alarm will be activated.

2.2.1 Start and filling process

The Visual Station receives the "Enable" Signal (hardwired) as soon as the Cart is brought into position and the Line is in automated operation.

The filling is differentiated in two filling methods which can be pre-selected over the HMI operator panel (82A6).

Control of the filling by the Level sensor L05


If the Cart with the P100 pneumatic receiver is brought in to position, the Enable is given (Hardware signal) by the Panel 62A1 and the IBC in Visual station is not empty and is ready with product material available(hardwired signals) the conveying process starts. First the safety flap KS01 is opened and the ventilation flap KS03 is closed. Afterwards the Venturi-System VX01 (SV24) is started. The pneumatic receiver P100 is filled with the product from Visual emptying station SG.TBP.202.M.5235/C001 through continuously generated vacuum. When the product reaches the level indicator L05 (80dm3) the conveying process runs for a specified time, which can be defined through the HMI operator panel (82A6), and then starts the line cleaning sequence. In this process the safety flap KS01 is closed and the ventilation flap KS03 is opened, so that for a preselected time (selectable on the HMI operator panel (82A6) the conveying line will be emptied.

If during the conveying process the Visual Station signals "empty"(hardwired) the conveying continues for another 25s and then stops. The conveying can only be restarted once the Visual Station is brought back to the operational state.

The conveying process restarts after successful emptying sequence, if the above mentioned start conditions are given and no emptying request to the P100 pneumatic receiver, respectively no refilling request(hardwired) from the K-Tron feeding scale SG.TBP.202.M.5235/C003 exist.

2.2.2 Controlling of the filling with the scales' weight signal

Here the filling process gets started under the above described circumstances, but the filling sequence is controlled by the weighing scale. Through the HMI operator panel (82A6) an upper and lower fill-level in kg is selected (no Range check is performed for the Operator's inputs). If the weight drops under the lower fill-level, the filling process starts. The conveying then runs until the upper level is exceeded. The level sensor L05 just acts as an overflow protection (to stop conveying) which means the upper fill-level must always be lower than the level sensor L05. Should the level sensor L06 signals empty, the conveying starts (underrun protection), even if the lower fill-level is not underrun.

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2.2.3 Emptying procedure

As soon as the K-Tron weighing scale SG.TBP.202.M.5235./C003's refill request stands and the enable for the emptying is given by the Leistritz control system (Hardware signal) is given, the emptying of the pneumatic receiver P100 begins. If necessary at this time, a still active conveying process of the pneumatic receiver P100 shall be stopped automatically. If the Cora flap KS02 is built in and pre-selected over the HMI operator panel (82A6), it will be opened now. With the feedback signal "Flap KS02 open" the Product discharge through the Cora-Rotary-Valve ZS01 begins. The Flap Y01 (SV38) and/or the four fluidisation cushions FK01, FK02, FK03 and FK04 (SV22) can be operated if necessary or required at any time. All related parameters to do this can be entered at the HMI operator panel (82A6) .

2.2.4 Filter cleaning

The filter cleaning of the Filters F03.1 – F03.6 will be executed depending on the pre-selection done at the HMI operator panel (82A6) . They can be activated during or after the conveying, during the emptying, during the line cleaning or in an adjustable interval. The length of the cleaning impulse as well as the amount of impulses can also be parameterised at the HMI operator panel (82A6) .

Furthermore the amount of filter rows (single or dual) can be selected or rather pre-selected. In the "dual" mode two filter rows (Type: P100 Filter) are cleaned alternately with the selected impulse times. The selected amounts of impulses distribute themselves correspondingly to the separate impulse rows. The "single" mode relates to just one single filter row (Type: P10 / P30 Filter)

During the filter cleaning the safety flap KS01 is closed and the ventilation flap KS03 is opened (exception: cleaning during conveying and during circuit cleaning), to relieve the over-pressure to the atmosphere which will be created through the jetting of the filters.


The vibrator Y02 will be activated according to the pre-selection done at the HMI operator panel (82A6) . It is possible during or after the conveying, during the emptying, during the line cleaning or in adjustable interval. The length of the cleaning impulse as well as the amount of impulses can also be parameterised at the HMI operator panel (82A6) .

The filter cleaning can be activated at all times through an in-built button in the Panel 62A1. For this the same parameters are used as in a regular cleaning.

The feeding scale's ventilation filter F04 is cleaned after each refill or during the refill. The amount of impulses, as well as the pulse length and pause can be selected on the HMI operator panel (82A6).

2.2.5 Initial filling

The initial filling function is a preparation for the vacuum receiver system for the first refill process of the differential feeding scales (SG.TBP.202.M.5235./C003). As soon as the Line is switched on through the "Line On/Off" switch on the Panel 62A1, a dialogue appears on the HMI operator

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panel (82A6) where an initial filling can be selected. For the initial filling to be started, the pneumatic receiver Cart has to be put in position and interlocked with the pneumatic receiver P100 as described above (Chapter 2.1.1.1) and the enable signal (product existent and ready, hardwired signals) from the Visval-Container emptying station must be given. Furthermore the level indicator sensors L05 and L06 can't be covered with product. After the level indicator L05 (80L) is reached the conveying process is stopped. When the maximum allowed conveying time expires and the level indicator L05 is not yet reached an alarm is generated. The initial filling can at all times be stopped through activation of the „Line On/Off“ switch.

2.2.6 Weight Control

The PTS pneumatic receiver is assembled on load cells, which indicate the amount of powder (net weight) located in the device on the HMI operator panel (82A6) . Before each start-up fill process the scale system is to be set to 0 manually by using the function “tare”. There is no check for plausibility of the weight if this function is performed.


Through the HMI operator panel (82A6) an alarm limit for maximum and minimum weight can be entered. For this corresponding alarms are generated.

Furthermore the weight is indicated on the HMI operator panel (82A6) and the Operator terminal (62A1) .

2.2.7 Batch changeover

The “empty” signal can be created through the sensor L06 or the weight during the batch changeover. The selection is made on the HMI operator panel (82A6). Furthermore a minimal time duration is selected, in which the Cora Rotary-Valve will run, after SG.TBP.202.M.5235/C002 has signalled as empty. After this time is passed, it is assumed that the SG.TBP.202.M.5235/C002 is empty and the batching change can begin.

Note: This Function is only active, if the Control from the Extruder(ME001) is enabled by the dedicated Button on the HMI(82A6).

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2.3 Manual mode

The three flaps (KS01, KS02, KS03), the valves (SV20, SV24, SV32, SV34, SV38), the Cora-Rotary-Valve (ZS01) and the conveying device P100 can be controlled manually with the HMI operator panel (82A6) 82A6. Here all of the interlocks are still active as they are during automated mode, to avoid damages.

All alarms are still active, are shown on the HMI operator panel (82A6) and are available for the control system as a combined alarm contact (Hardware-Signal).

Filter cleaning F03.1-F03.6 (SV 32,SV34):

The manual operation opens & closes the respective valve.

Filter cleaning F04 (SV20):

The manual operation opens & closes the valve.

Venturi-Pump VX01 (SV 24):

In manual operation the Venturi-Pump can be turned on & off, if the safety flap KS01 or the ventilation flap KS03 is open. Thus to avoid the creation of a vacuum in a then closed system.

Flap Y01 (SV 38):

In manual operation the flap can be turned on & off without any further conditions.

Fluidisation cushions FK01,FK02,FK03,FK04 (SV22):

In manual operation the fluidisation cushions can be turned on & off without any further conditions.

Safety flaps KS01(SV44):

In manual operation the safety flaps can be turned on & off without any preconditions.

Ventilation flaps KS03(SV36):


In manual operation the ventilation flaps can be turned on & off without any preconditions.

Cora-Flap KS02(SV46):

In manual operation the Cora-Flap can be turned on & off without any preconditions.

Cora Rotary-Valve ZS01(SV40,SV42):

In manual operation the Cora Rotary-Valve can be activated through the ON-switch on the HMI operator panel (82A6). The Rotary-Valve now moves between the two end positions until the OFF-switch on the HMI operator panel (82A6) is activated.

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If the Cora-Flap KS02 has been selected at the HMI operator panel (82A6), the flap must first be opened in manual mode. This is a software safety interlock to avoid a pile-up of the product in the emptying channel and damages to the Rotary-Valve.

Vibrator Y 02:

In manual operation the vibrator can be turned on & off without any further conditions.


3 Alarms and Alarm related behaviour

The signals and alarms are generated according to their activation conditions and are indicated on the HMI operator panel (82A6) .

Alarm/Signal	Reaction
Receiver max Conveying time exceeded	Process is stopped, must be cleared to continue
Receiver max Discharge Time exceeded.	Process is not stopped
Error Feedback KS02 Cora Flap”	Control will be taken back, has to be cleared Consecutive faults possible
Error Feedback ZS01 Cora Flap	Control will be taken back, has to be cleared Consecutive faults possible
Line Started, but frame is not in position	Process can't be started, must be cleared
Emergency Stop Triggered	Process can't be started, must be cleared
Error Level Probe; Bridging or Product Deposits	Level indicator in the conveying device P100 status isn't logical (through bridge generation or product accumulation)
Siwarex error external power supply (24V)	The power supply of the Siwarex assembly group fails
Siwarex ADC	A/D converter Siwarex on the limit
Siwarex min voltage at sensing wires	Minimum Voltage at signal wires of the loadcells
Siwarex Error Watchdog ¹	Error Siwarex internal watchdog
Siwarex Error EPROM ¹	Error EPROM Siwarex
Siwarex Error EEPROM ¹	Error EEPROM Siwarex
Scales weight below min level	Weight of the scales is smaller than the min. limit
Scales weight above max level	Weight of the scales is higher than the max. limit

Note: ¹: Actual Error Message comes from the Siwarex module; the message may differ from the stipulated message in the table

No protocols are to be carried out.

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The collective alarm must be indicated through a lamp at the Operator terminal (62A1) . The Alarms can be cleared by a corresponding button.

The refill alarm of the K-Tron twin screw feeder SG.TBP.202.M.5235./C003 should be gripped by the existing KCM (9K11) and made available for the SPS of the SG.TBP.202.M.5235./C002 vacuum conveying system, so that an in-built alarm lamp on the Novartis operator panel can be activated.

4 User administration

To change the settings for the Conveying system the user has to be signed on as an Operator Maintenance, Supervisor or administrator. For this the user administration can create appropriate users. Administration rights are necessary to add new users.


All actions which are to be executed by the operator will still need a corresponding login (password).

The following settings were preselected for the password administration:

- Amount of days the password is valid: 365
- Password generations: 3
- warning days: 90
- Amount of incorrect login attempts: 3
- Minimum password length: 8

Furthermore the Auto Log off time for each individual user can be configured on the HMI(82A6).

Function Buttons	User Groups with Min Rights and Above
Receiver	Supervisor
Cora	Operator
System	Administrator
Knocker	Operator
Fluidisation	Supervisor
User	Administrator
Filter Cleaning	Maintenance
Scale	Maintenance
Filter Cleaning Feeder	Maintenance
Control by ME001 Active	Operator
Batch Changeover	Supervisor

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5 Applied Hardware

5.1 Introducing

This chapter describes the Hardware components of the system and their interaction.

5.2 PLC Components

Siemens item number	Firmware	Description
6ES7 315-2AH14-0AB0	V3.3.2	CPU 315C-2 DP
6ES7 322-1BH01-0AA0		DO16xDC24V/0.5A
6ES7 321-1BH02-0AA0		DI16xDC24V/0.5A
6ES7 321-1BL00-0AA0		DI32xDC24V
6ES7 322-1BL00-0AA0		DO32xDC24V
7MH4950-1AA01		SIWAREX U-1
6GK7 343-1EX30-0XE0	V2.0	CP 343-1

5.3 HMI Components

Siemens item number	Firmware	Description
6AV6 643-0CB01-1AX1	V01.01.04.00_01.16	MP 277 8" Colour Touch Panel

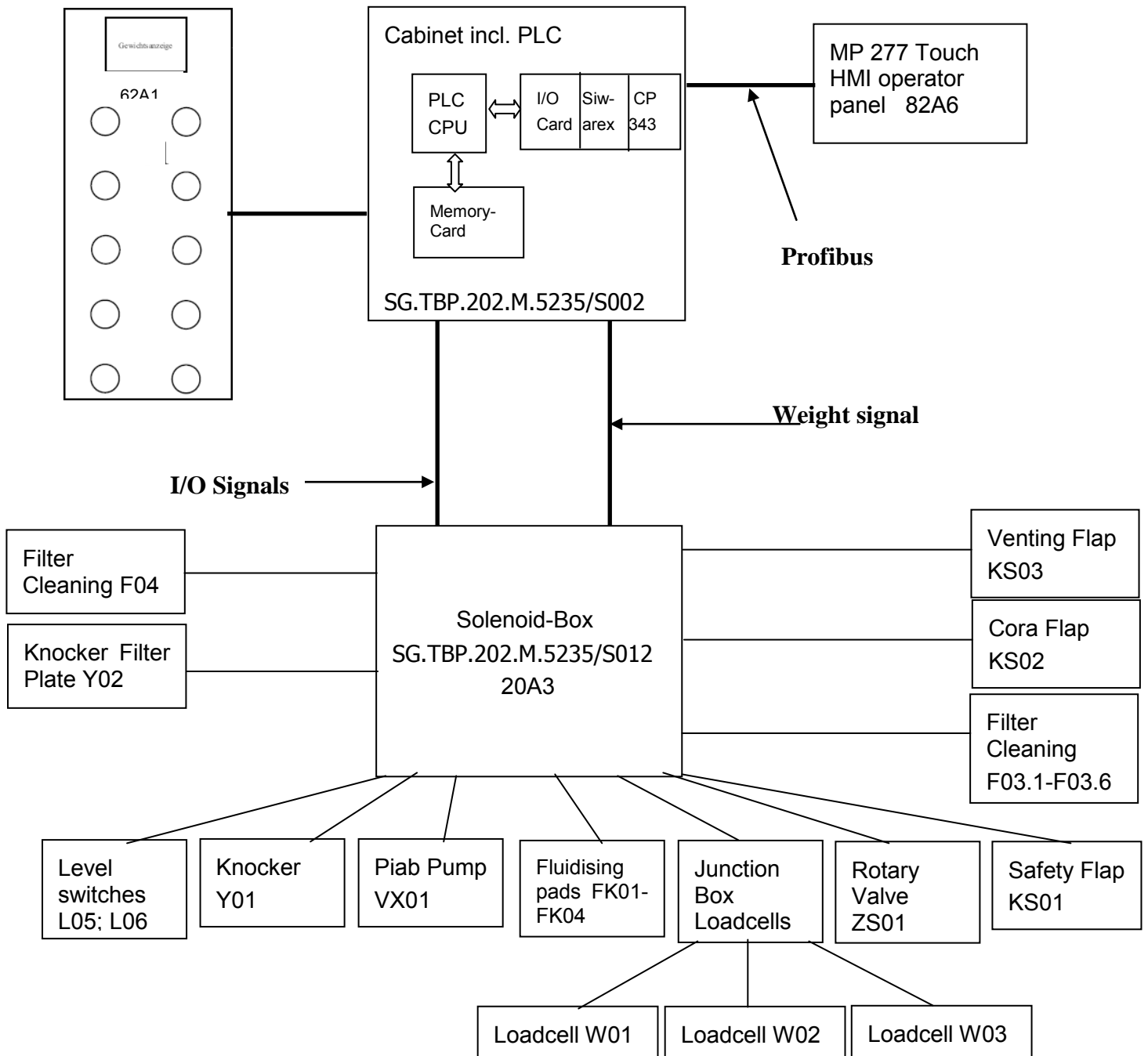


5.4 Additional Components

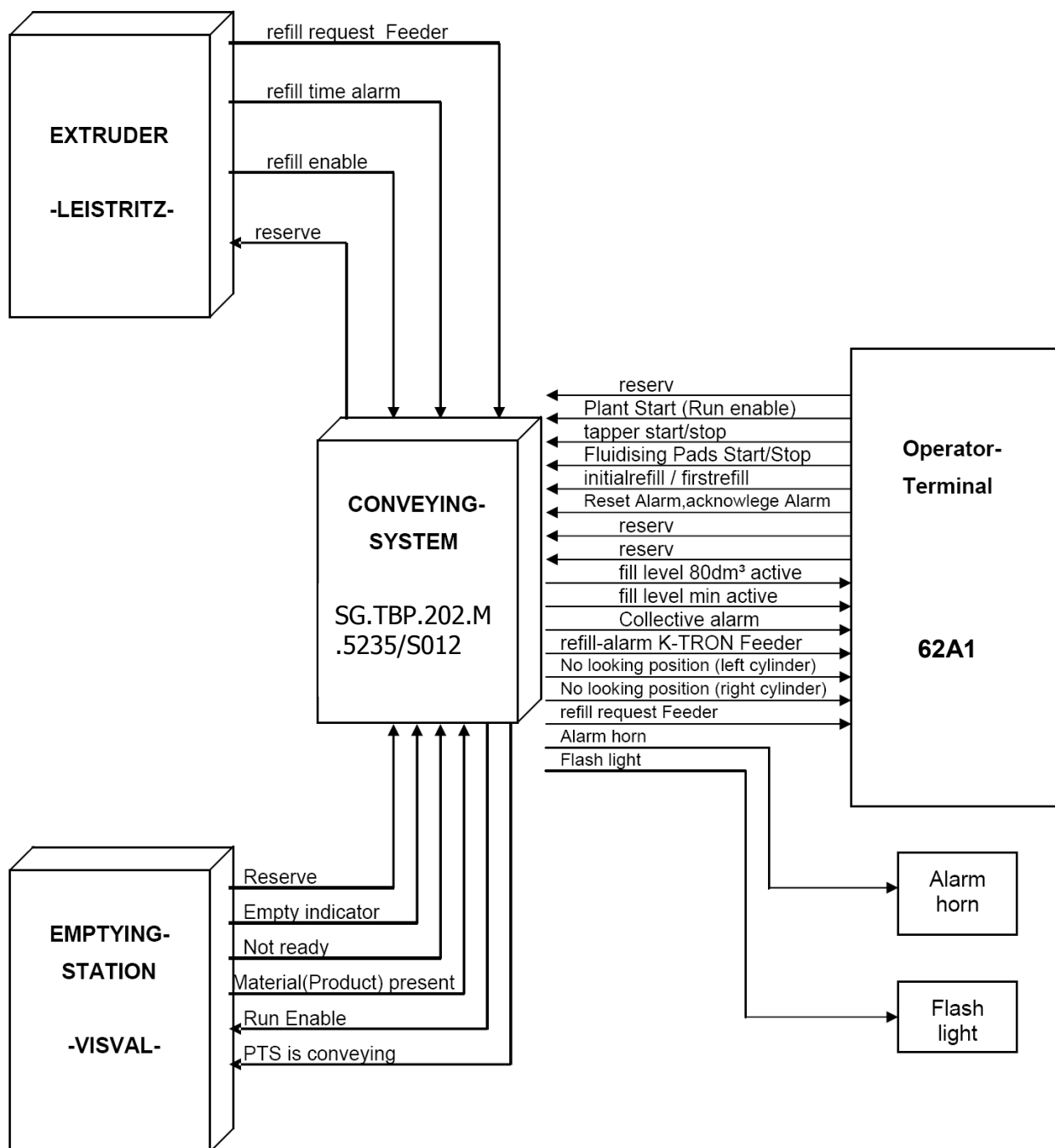
Item	Description / Manufacturer
Operator Terminal	Incl. several Buttons, Lamps and Weight display Siebert
Solenoid Box	Incl. Festo Valvecluster, pressure gauge and compressed air distributor
Loadcells HBM	Incl. Junction box attached at the PTS Cart
Level switches	Endress+Hauser
Knocker	MCTAG GBR
Pneumatic Vibrator Filter plate	Netter
Fluidising pads	K-Tron
Rotary Valve	CO.RA. S.r.l.
Safety Flap	CO.RA. S.r.l.
Butterfly Valves DN50	M&S Armaturen GmbH
Pneumatic Cylinders	Festo
Venturi Pump	PIAP

For more detailed information's about the instruments, please refer to the Instrument list 1315690-IL Rev. A

5.5 PTS Internal Block diagram



5.6 Hardware Signal Exchange



5.7 Software Signal Exchange

Data Exchange from Leistritz to K-Tron via Industrial Ethernet

<i>Melt Extruder (M5235-ME1)</i>	<i>PTS Buffer (M5235- C2)</i>	<i>TYPE</i>	<i>Description</i>
DB206	DB206		
DBW0	DBW0	INT	Life- Counter
DBX2.0	DBX2.0	BOOL	Trigger: Enable PTS Conveying On
DBX2.1	DBX2.1	BOOL	Trigger: Knocker Discharge Aid On
DBX2.2	DBX2.2	BOOL	Trigger: Enable Discharge (Cora Flap) On
DBX2.3	DBX2.3	BOOL	C001-Container Discharge Station: Level 1 (Empty)
DBX2.4	DBX2.4	BOOL	C001-Container Discharge Station: Level 2 (Full)
DBX2.5	DBX2.5	BOOL	C001-Container Discharge Station: Running
DBX2.6	DBX2.6	BOOL	Trigger: Fluidisation Discharge Aid On
DBX2.7	DBX2.7	BOOL	Reserve
DBX3.0	DBX3.0	BOOL	Trigger: Enable PTS Conveying Off
DBX3.1	DBX3.1	BOOL	Trigger: Knocker Discharge Aid Off
DBX3.2	DBX3.2	BOOL	Trigger: Enable Discharge (Cora Flap) Off
DBX3.3	DBX3.3	BOOL	Trigger: Fluidisation Discharge Aid Off
DBX3.4	DBX3.4	BOOL	Reserve
DBX3.5	DBX3.5	BOOL	Reserve
DBX3.6	DBX3.6	BOOL	Reserve
DBX3.7	DBX3.7	BOOL	Reserve
DBX4.0	DBX4.0	BOOL	Reserve
DBX4.1	DBX4.1	BOOL	Reserve
“	“	“	Reserves
DBB11	DBB11	Byte	Reserve
DBX12.0	DBX12.0	BOOL	Common Alarm Line PTS
DBX12.1	DBX12.1	BOOL	PTS max Conveying Time expired
DBX12.2	DBX12.2	BOOL	PTS Discharge Time expired
DBX12.3	DBX12.3	BOOL	PTS Discharge request during conveying
DBX12.4	DBX12.4	BOOL	PTS Number of cycles in filling mode reached
DBX12.5	DBX12.5	BOOL	ZS1 Cora Flap Error Feedback
DBX12.6	DBX12.6	BOOL	KS1 Error Feedback

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<i>Melt Extruder (M5235-ME1)</i>	<i>PTS Buffer (M5235- C2)</i>	<i>TYPE</i>	<i>Description</i>
DB206	DB206		
DBX12.7	DBX12.7	BOOL	Alarm Receiver Frame not in Position
DBX13.0	DBX13.0	BOOL	Emergency stop released
DBX13.1	DBX13.1	BOOL	Alarm Initial Filling not possible, not tared
DBX13.2	DBX13.2	BOOL	Error Level Probes PTS; Status is not logical(bridging in the hopper)
DBX13.3	DBX13.3	BOOL	Siwarex Error external Power supply (24V)
DBX13.4	DBX13.4	BOOL	Siwarex ADC
DBX13.5	DBX13.5	BOOL	Siwarex Min Voltage at Sense wires
DBX13.6	DBX13.6	BOOL	Siwarex Error Watchdog
DBX13.7	DBX13.7	BOOL	Siwarex Error EPROM
DBX14.0	DBX14.0	BOOL	Siwarex Error EEPROM
DBX14.1	DBX14.1	BOOL	Weight < min. Limit
DBX14.2	DBX14.2	BOOL	Weight > max. Limit
DBX14.3	DBX14.3	BOOL	Alarm Life Counter ME001
DBX14.4	DBX14.4	BOOL	Line is not enabled
DBX14.5	DBX14.5	BOOL	Max runtime has expired
DBX14.6	DBX14.6	BOOL	Alarm 12
DBX14.7	DBX14.7	BOOL	Alarm 13
DBX15.0	DBX15.0	BOOL	Alarm 14
DBB16	DBB16	BYTE	Alarm 15
DBB17	DBB17	BYTE	Reserve
DBB18	DBB18	BYTE	Reserve
DBB19	DBB19	BYTE	Reserve
DBB20	DBB20	BYTE	Reserve
DBB21	DBB21	BYTE	Reserve
DBB22	DBB22	BYTE	Reserve
<i>Total length: 24Byte</i>			


Data Exchange from K-Tron to Leistritz via Industrial Ethernet

<i>PTS Buffer (M5235- C2)</i>	<i>Melt Extruder (M5235-ME1)</i>	<i>TYPE</i>	<i>Description</i>
DB207	DB207		
DBW0	DBW0	INT	Life- Counter
DBD2	DBD2	Real	Actual weight in the hopper PTS
DBB6	DBB6	BYTE	Reserve
DBB7	DBB7	BYTE	Reserve
DBB8	DBB8	BYTE	Reserve
DBB9	DBB9	Byte	Reserve
DBX10.0	DBX10.0	BOOL	Automatic mode PTS i.O.
DBX10.1	DBX10.1	BOOL	Reserve
DBX10.2	DBX10.2	BOOL	PTS Level min (1=empty)
DBX10.3	DBX10.3	BOOL	PTS Level max (80l)
DBX10.4	DBX10.4	BOOL	Reserve
DBX10.5	DBX10.5	BOOL	PTS is running
DBX10.6	DBX10.6	BOOL	Vibrators are running
DBX10.7	DBX10.7	BOOL	Discharge request On (Signal is connected to the Feeder controller (K-Tron)
DBX11.0	DBX11.0	BOOL	Cora Flap is running
DBX11.1	DBX11.1	BOOL	Fluidisation Discharge Aid is running
DBX11.2	DBX11.2	BOOL	PTS in Automatic on
DBX11.3	DBX11.3	BOOL	Reserve
DBX11.4	DBX11.4	BOOL	Reserve
DBX11.5	DBX11.5	BOOL	Reserve
DBX11.6	DBX11.6	BOOL	Reserve
DBX11.7	DBX11.7	BOOL	Reserve
DBX12.0	DBX12.0	BOOL	Common Alarm Line PTS PTS
DBX12.1	DBX12.1	BOOL	PTS max Conveying Time expired
DBX12.2	DBX12.2	BOOL	PTS Discharge Time expired
DBX12.3	DBX12.3	BOOL	Reserve
DBX12.4	DBX12.4	BOOL	PTS Number of cycles in filling mode reached
DBX12.5	DBX12.5	BOOL	ZS1 Cora Flap Error Feedback
DBX12.6	DBX12.6	BOOL	KS1 Error Feedback
DBX12.7	DBX12.7	BOOL	Alarm Receiver Frame not in Position
DBX13.0	DBX13.0	BOOL	Emergency Stop released

**DESIGN SPECIFICATION
(FDS / HDS /SDS)
SG.TBP.202.M.5235
Powder Transfer System**

Date: 15.04.2014
Revision: 1.0
Supplier:Coperion K-Tron
Project Nr.: 1315690
Customer: Novartis
Document Nr:
1315690-FDS-R001

<i>PTS Buffer (M5235- C2)</i>	<i>Melt Extruder (M5235-ME1)</i>	<i>TYPE</i>	<i>Description</i>
<i>DB207</i>	<i>DB207</i>		
DBX13.1	DBX13.1	BOOL	Alarm Initial Filling not possible, not tared
DBX13.2	DBX13.2	BOOL	Error Level Probes PTS; Status is not logical(bridging in the hopper)
DBX13.3	DBX13.3	BOOL	Siwarex Error external Power supply (24V)
DBX13.4	DBX13.4	BOOL	Siwarex ADC
DBX13.5	DBX13.5	BOOL	Siwarex Min Voltage at Sense wires
DBX13.6	DBX13.6	BOOL	Siwarex Error Watchdog
DBX13.7	DBX13.7	BOOL	Siwarex Error EPROM
DBX14.0	DBX14.0	BOOL	Siwarex Error EEPROM
DBX14.1	DBX14.1	BOOL	Weight < min. Limit
DBX14.2	DBX14.2	BOOL	Weight > max. Limit
DBX14.3	DBX14.3	BOOL	Alarm Life Counter ME001
DBX14.4	DBX14.4	BOOL	Line is not enabled
DBX14.5	DBX14.5	BOOL	Max runtime has expired
DBB17	DBB17	BYTE	Reserve
DBB18	DBB18	BYTE	Reserve
DBB19	DBB19	BYTE	Reserve
DBB20	DBB20	BYTE	Reserve
<i>Total length: 21Byte</i>			

	DESIGN SPECIFICATION (FDS / HDS /SDS) SG.TBP.202.M.5235 Powder Transfer System	Date: 15.04.2014 Revision: 1.0 Supplier:Coperion K-Tron Project Nr.: 1315690 Customer: Novartis Document Nr: 1315690-FDS-R001
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6 Applied Software

6.1 Introducing

This chapter describes the used software modules and the necessary engineering tools.

6.2 Software goals and principles

This software is designed to control a pneumatic conveying system with several instruments and operational options. All functions shall be implemented with reusable software blocks according to IEC 61131(were applicable). All logical terms shall be done in Ladder logic. Mathematical or pointer logic may be done in structured text.

6.3 Engineering Tools

Description	Firmware	Release
Simatic Manager Step7	V5.5+SP2	V5.5.2.0
WinCC flexible	2008 SP3 Update 3	K01.04.00.03_01.05.00.09

6.4 Software Block Description

Block number	Version	Description
FB 77 Totalizer	0.1	Calculates the Totalizer value out of the Netweight. K-Tron standard block
FB 88 Statistics	0.1	Calculates several statistical values, in this project for the cora rotary valve. K-Tron standard block
FB 111 FilterClearV0_2	0.2	Handles all functions for the filter cleaning(pulse and pause time, number of pulses). Used for filter cleaning receiver, feeder and filter plate. K-Tron standard block
FB124 LoaderV0_6	0.6	Provides the sequence and logic for the conveying process. K-Tron standard block
FC 10 Pos_Cart	0.1	Handles the positioning of the Cart(feedback signals, process enable, lamp, Alarm). Project specific
FC 20 Receiver	0.1	Includes the logic for start and stop of the conveying process, as well as filter cleaning and Totalizer calculation

FC 30 Emptying	0.1	Includes the logic for the discharge sequence from the Receiver to the K-Tron feeder. Project specific
FC 40 Alarm	0.1	Alarm handling. Project specific
FC 50 Anst_Periph	0.1	Provides the control for peripheral devices like knocker, vibrators or fluidising pads with several options like Bypass or Impulse. K-Tron standard block
FC60 ME001_Functions	0.1	For interfacing to Melt Extruder
FC 70 Flt_Dos	0.1	Includes the logic for the Filter cleaning of the K-Tron feeder(F04) . Project specific
FC 80 Siwarex	0.1	Handles the read and write function for a Siwarex U module. K-Tron standard block
FC 100 Takt	0.1	Provides a adjustable square-wave-signal. K-Tron standard block
FC 104 Valve	0.1	Provides control for a valve. K-Tron standard block
FC 105 Cora_Valve	0.1	Provides the control for a cora rotary valve. K-Tron standard block
FC 106 Scale	0.0	Provides the complete handling of a scale according to the K-Tron standard. K-Tron standard block
FC 120 Time	1.0	Provides handling for reading and setting the date and time of the PLC. K-Tron standard block

6.5 Date/Time Settings

Time and Date Settings: MM/DD/YYYY HH:MM:SS: AM/PM

6.6 System Parameter List

This chapter is only showing configurable Parameters. More Parameters are available on the HMI, but only for displaying.

Receiver Menu

Parameters	Setting	Range
Max. conveying time	600s	0-999s
Max. discharge time	300s	0-999s
Line clearing	3s	0-99s
Close Time	3s	0-99s
Settle Time Level Probe	3s	0-99s
max. cycles Fill Mode	5	5
Lag time Conveying probe	10s	10s
Discharge mode	"LWF"	"Fill", "LWF"
Conveying mode	"Level"	"Time", "Level"
Use Level Probe	Yes	Yes, No

Knocker Menu

Parameters	Setting	Range
Preselect Knocker	ON	ON, Off
Run time	10s	0-999s
On time	500ms	0-9999ms
Pause Time	5s	0-99s
On delay	5s	0-99s

Filter cleaning Menu

Parameters	Setting	Range
Filter type	Dual	Single, Dual
Filter cleaning during Discharge	NO	YES ,NO
Filter cleaning during Conveying	YES	YES ,NO
Filter cleaning after Conveying	No	YES ,NO
Filter cleaning during line clearing	No	YES ,NO
Filter cleaning interval	No	YES ,NO
Interval time	600s	0-9999s
Lag time filter cleaning	5s	0-999s
Length cleaning pulse	200ms	0-9999ms
Length pulse pause	5s	0-999s
Number of pulses	2	0-999
Settings for vibrator filter plate		
Filter cleaning during Discharge	Yes	YES ,NO
Filter cleaning during Conveying	No	YES ,NO
Filter cleaning after Conveying	No	YES ,NO
Length Pulse	5s	0-999s
Length pulse pause	5s	0-999s
Number of pulses	3	0-999

Cora Menu

Parameters	Setting	Range
KS 02 preselection flap	ON	ON, OFF

Fluidisation Menu

Parameters	Setting	Range
Preselect Fluidisation	On	On, OFF
Operating mode	CYCLE	Cont., CYCLE
Run time	10s	0-999s
Cycle Operation on	3s	0-99s
Cycle Operation off	5s	0-99s
On delay	5s	0-99s

Scale Menu

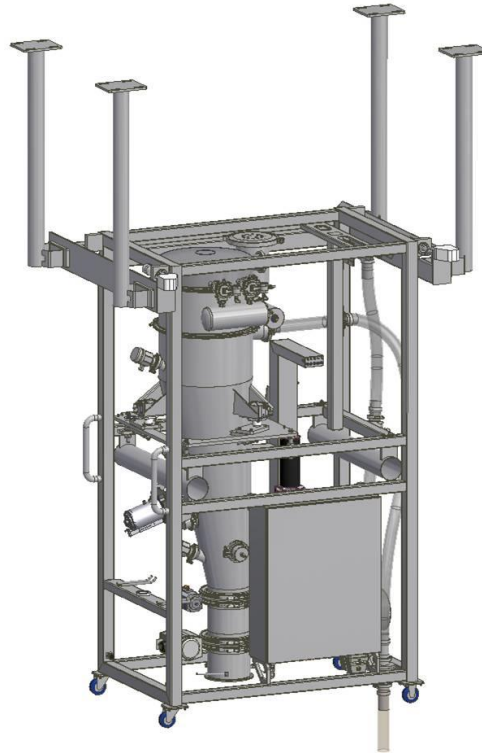
Parameters	Setting	Range
Tare weight	175.4kg	0.0-9999.9kg
Span	1.0714	0.0000-9.9999
Capacity	600.0kg	0.0-9999.9kg
Filling by weight/Level	Weight	Level, Weight
Filling level High	30kg	0.0-99.9kg
Filling level Low	20kg	0.0-99.9kg
Scale empty limit	0.1kg	0.0-99.9kg
Alarm limit weight low	0.0kg	0.0-99.9kg
Alarm limit weight high	65kg	0.0-999.9kg

Filter cleaning Feeder Menu

Parameters	Setting	Range
Filter cleaning during refilling	No	Yes, No
Filter cleaning after refilling	Yes	Yes, No
Lag time filter cleaning	0s	0-99s
Length cleaning pulse	200ms	0-999ms
Length pulse pause	3s	0-999s
Number of pulses	1	0-999

Batch changeover Menu

Parameters	Setting	Range
Empty Signal by weight or probe	Probe	Weight, Probe
Max. weight mode probe	10kg	0-99kg
Scale empty limit	2kg	0-99kg
lag time Batch changeover	30s	0-99s



Customer:




**Novartis Singapore Pharmaceutical
Manufacturing Pte Ltd.
10 Tuas Bay Lane
637461 Singapore
Singapore**



Supplier:



**K-Tron(Schweiz)GmbH
Lenzhardweg 43/45
CH - 5702 Niederlenz
Switzerland**

	Sequence Diagram SG.TBP.202.M.5235 Powder Transfer System	Date: 15.04.2014
		Revision: 1.0 Supplier: Coperion K-Tron Project Nr.: 1315690 Customer: Novartis Document Nr: 1315690-FBD-R001

This FBD was created, checked and approved:

Name	Signature Reason	Function/Department	Signature	Date
S.Händel, K-Tron	Author	Automation Engineer		15.04.2014
M.Keller, K-Tron	Reviewer	Project Manager		15.04.2014
Ho Sook Hwa	Reviewer	NSPM Qualification Coordinator		
Loke May Lam	Approver	NSPM Process Engineer		
Shivabalan Kanesan	Approver	NSPM Automation Engineer		
Panicker Shreekumar	Approver	NSPM Project Manager		

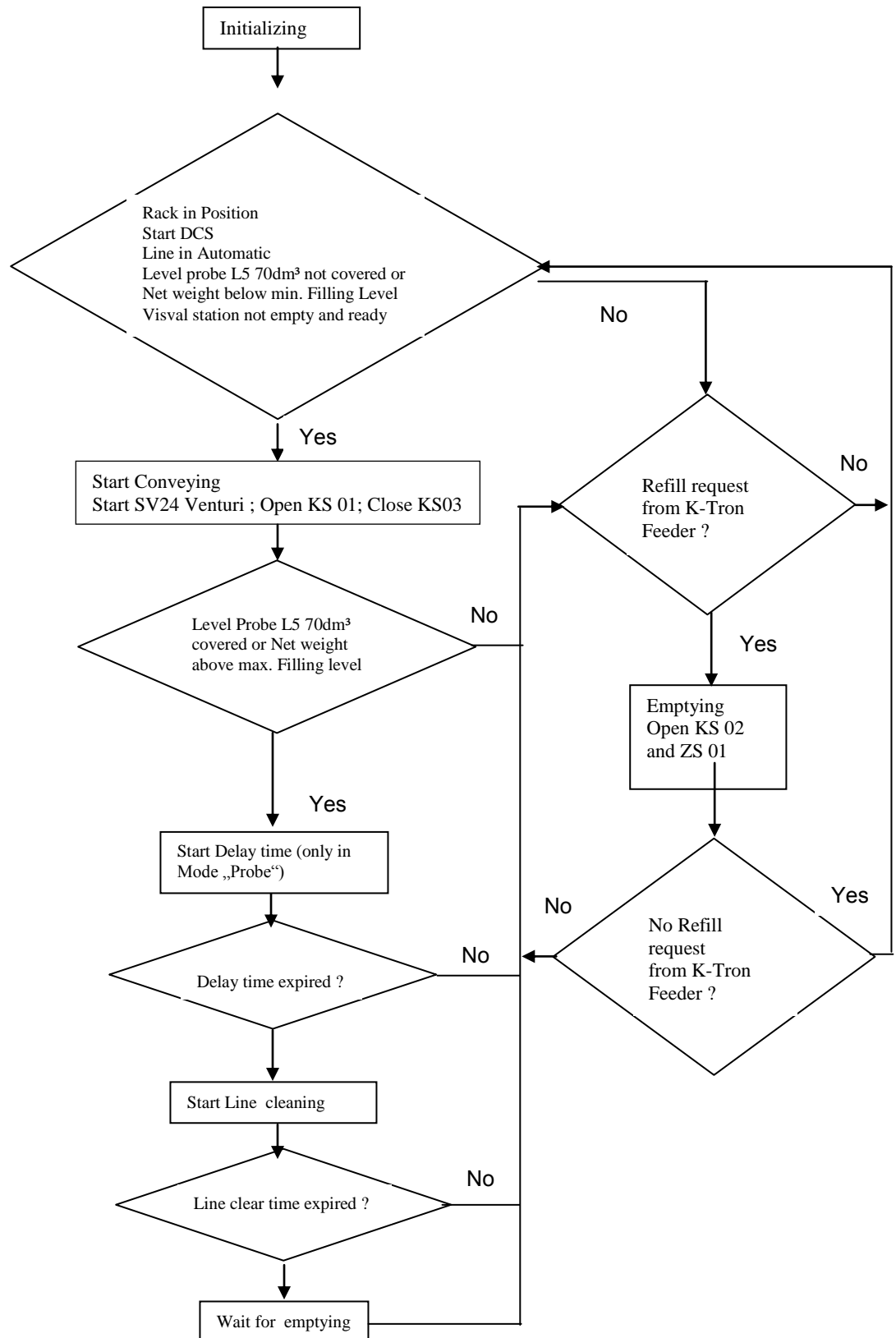
Version history

Date	Version	Change / Addition
17.03.2014	0.0	Initial Release
15.04.2014	1.0	Incorporated Comments by Novartis

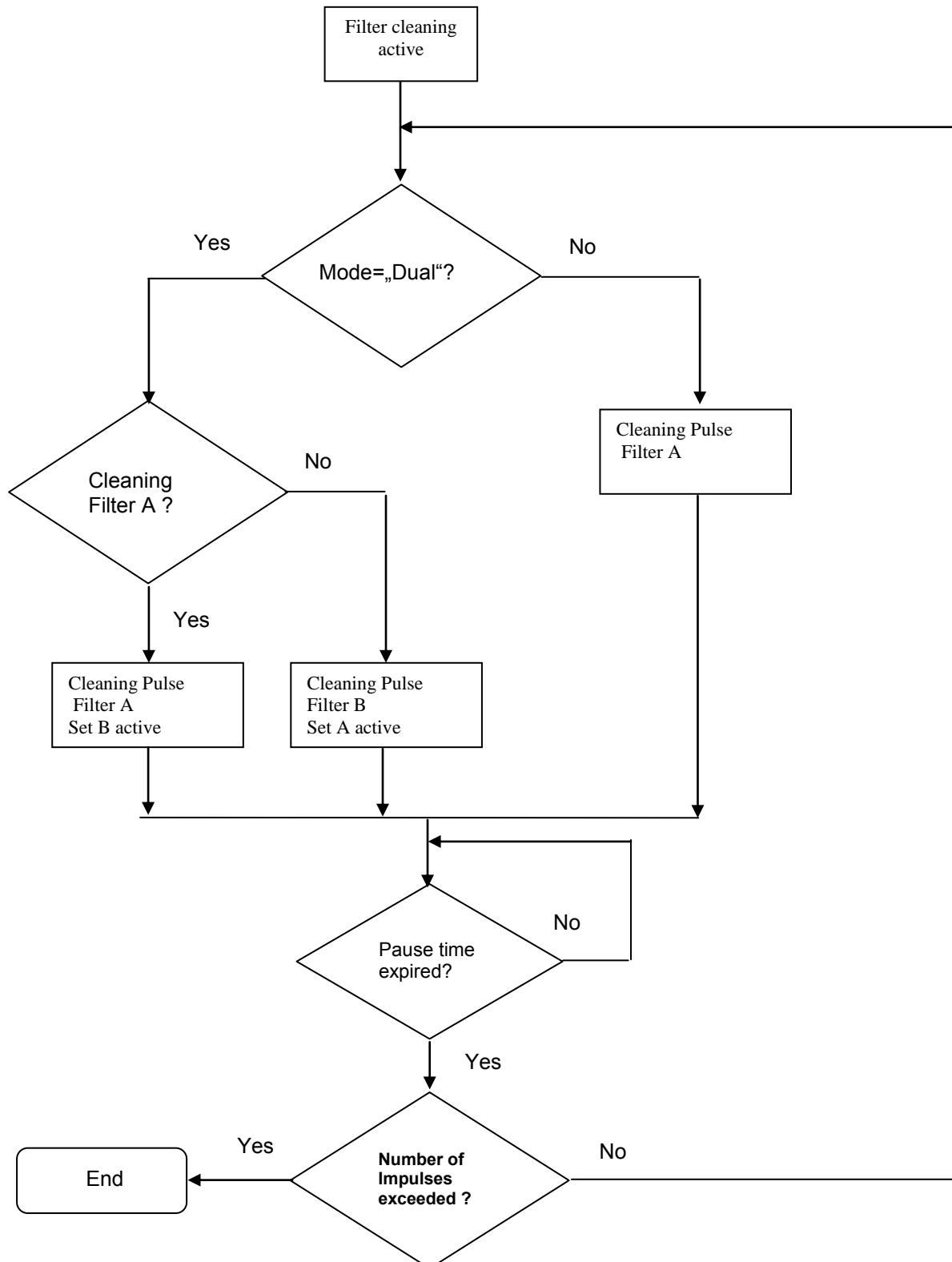
Applicable documents

Document	Title	Version
URS	SG.TBP.202.M.5235_URS	1.0
DS	SG.TBP.202.M.5235_C002_DS	1.0
P&ID Plan	1315690800	B
Circuit Diagram	1315690700 Wiring Diagram	A
Functional Design Specification	1315690-FDS-R001	1.0
Instrument list	1315690-IL	A

Sequence Conveying and Discharge



Sequence Filter cleaning





Electrical grounding concept

(EGC)

**SG.TBP.202.M.5235/C002
Powder Transfer System (PTS)**

Date: 16.04.2014

Revision: 0.0

Supplier: Coperion

K-Tron

Project No.: 1315690

Customer: Novartis

Singapore

Document No:

1315690-EGC-R000



Owner:



**Novartis Singapore Pharmaceutical
Manufacturing Pte Ltd.**

10 Tuas Bay Lane

637461 Singapore

Singapore

Supplier:




Coperion K-Tron (Schweiz) GmbH



Lenzhardweg 43/45

CH - 5702 Niederlenz

Schweiz

	Electrical grounding concept (EGC) SG.TBP.202.M.5235/C002 Powder Transfer System (PTS)	Date: 16.04.2014 Revision: 0.0 Supplier: Coperion K-Tron Project No.: 1315690 Customer: Novartis Singapore
		Document No: 1315690-EGC-R000

This electrical grounding concept was created, checked and approved:

Name	Signature Reason	Function/Department	Signature	Date
S.Händel K-Tron	Author	Automation Engineer/Service		16.04.2014
M. Keller K-Tron	Reviewer	Engineering Manager		16.04.2014
Ho Sook Hwa	Reviewer	NSPM Qualification Coordinator		
Loke May Lam	Approver	NSPM Process Engineer		
Shivabalan Kanesan	Approver	NSPM Automation Engineer		
Panicker Shreekumar	Approver	NSPM Project Manager		
Yap Yee Boon	Approver	NSPM Project QA		

Version history

Date	Version	Change / Addition
16.04.2014	0.0	Initial Release



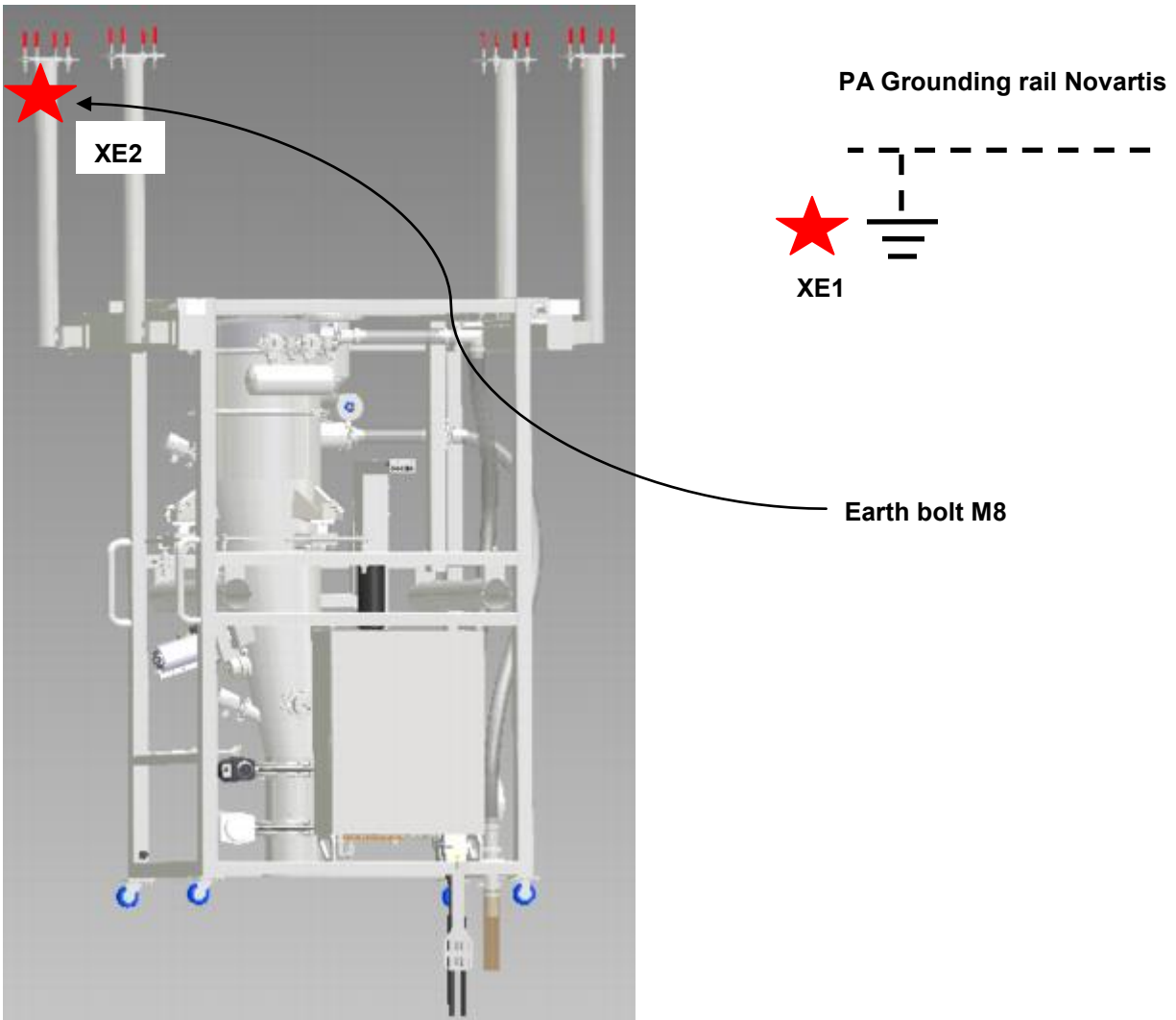
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		Document No: 1315690-EGC-R000

Table of electrical grounding points

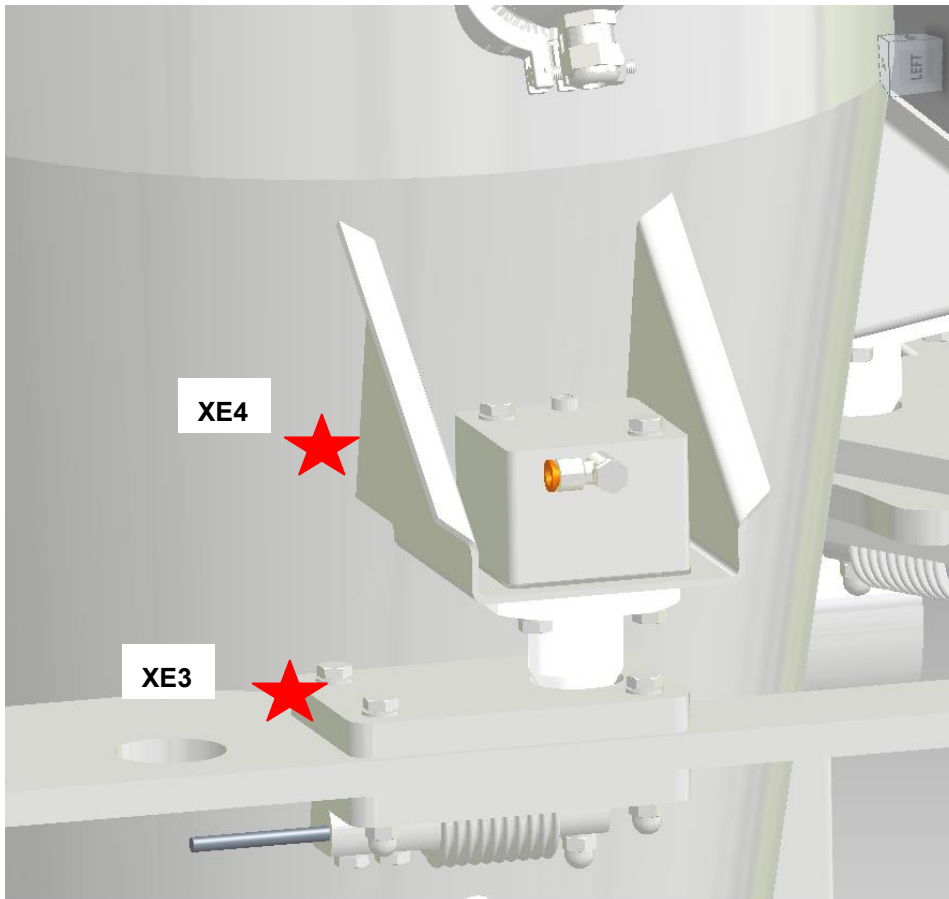
Check-point 1	Check-point 2	Description	Picture no.	Resistance Ω
XE1	XE2	Grounding rail -PA building Novartis / PTS cart rail	1	
XE3	XE4	PTS cart / P100 receiver	2	
XE5	XE6	Take-Off pot Visval Station / Conveying pipe butterfly valve	3	
XE7	XE8	Conveying pipe butterfly valve / Conveying pipe scale decoupling piece	4	
XE9	XE10	Conveying pipe scale decoupling piece / Product inlet into P100 receiver	5	
XE11	XE12	Vacuum pipe P100 receiver / Vacuum pipe scale decoupling piece	6	
XE13	XE14	Vacuum pipe scale decoupling piece / Vacuum pipe Safety filter	6 + 7	
XE15	XE16	Vacuum pipe Safety filter / PIAP Venturi pump	7	
XE17	XE18	CORA Rotary Valve (Rotor) / CORA valve housing	8	
XE19	XE20	CORA Sole Valve (Flap) / CORA valve housing	8	
XE21	XE22	PTS cart rail / PTS cart	9	
XE23	XE24	PTS cart rail / PTS cart	10	
XE25	XE26	Grounding rail – PA Novartis / K-Tron control panel (see electrical schematic No. 1315690702 Rev. A, sheet no. 10)	11	

	Electrical grounding concept (EGC) SG.TBP.202.M.5235/C002 Powder Transfer System (PTS)	Date: 16.04.2014 Revision: 0.0 Supplier: Coperion K-Tron Project No.: 1315690 Customer: Novartis Singapore
		Document No: 1315690-EGC-R000

Picture No. 1



Picture No. 2





**Electrical grounding concept
(EGC)**

**SG.TBP.202.M.5235/C002
Powder Transfer System (PTS)**

Date: 16.04.2014

Revision: 0.0

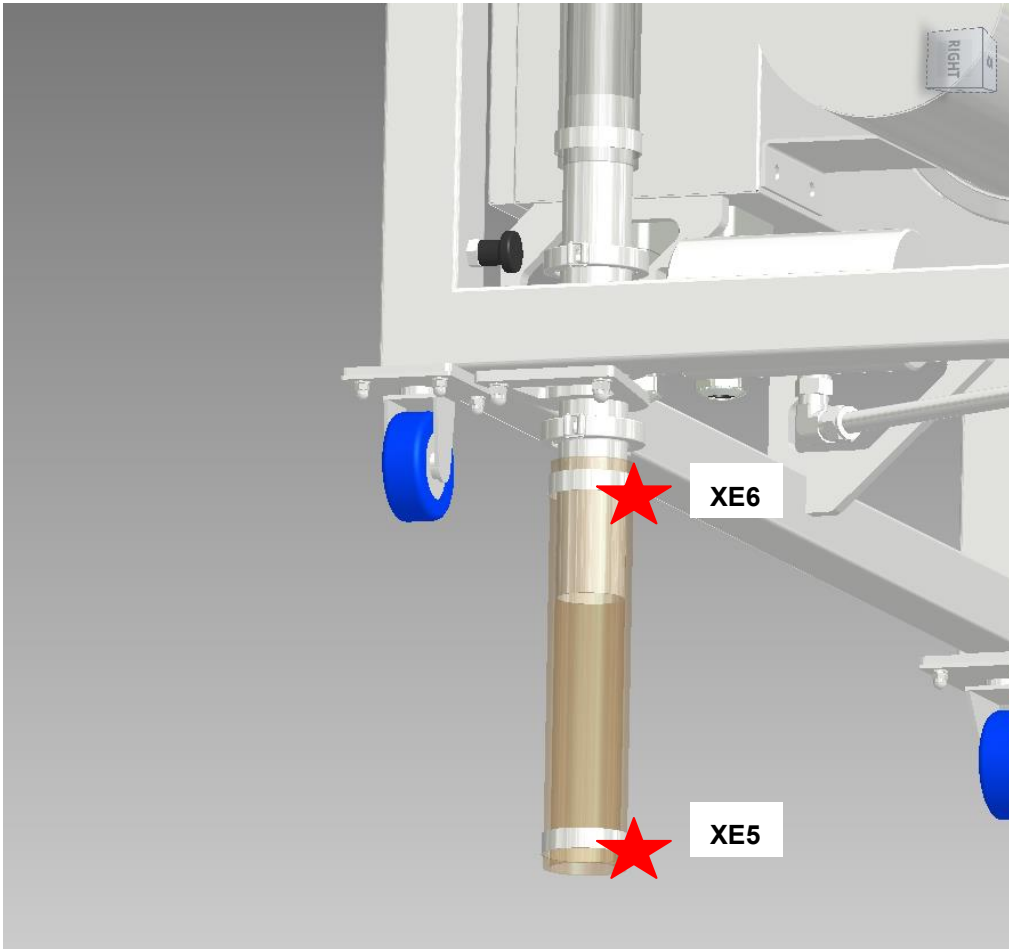
Supplier: Coperion
K-Tron

Project No.: 1315690

Customer: Novartis
Singapore

Document No:
1315690-EGC-R000

Picture No. 3





**Electrical grounding concept
(EGC)**

**SG.TBP.202.M.5235/C002
Powder Transfer System (PTS)**

Date: 16.04.2014

Revision: 0.0

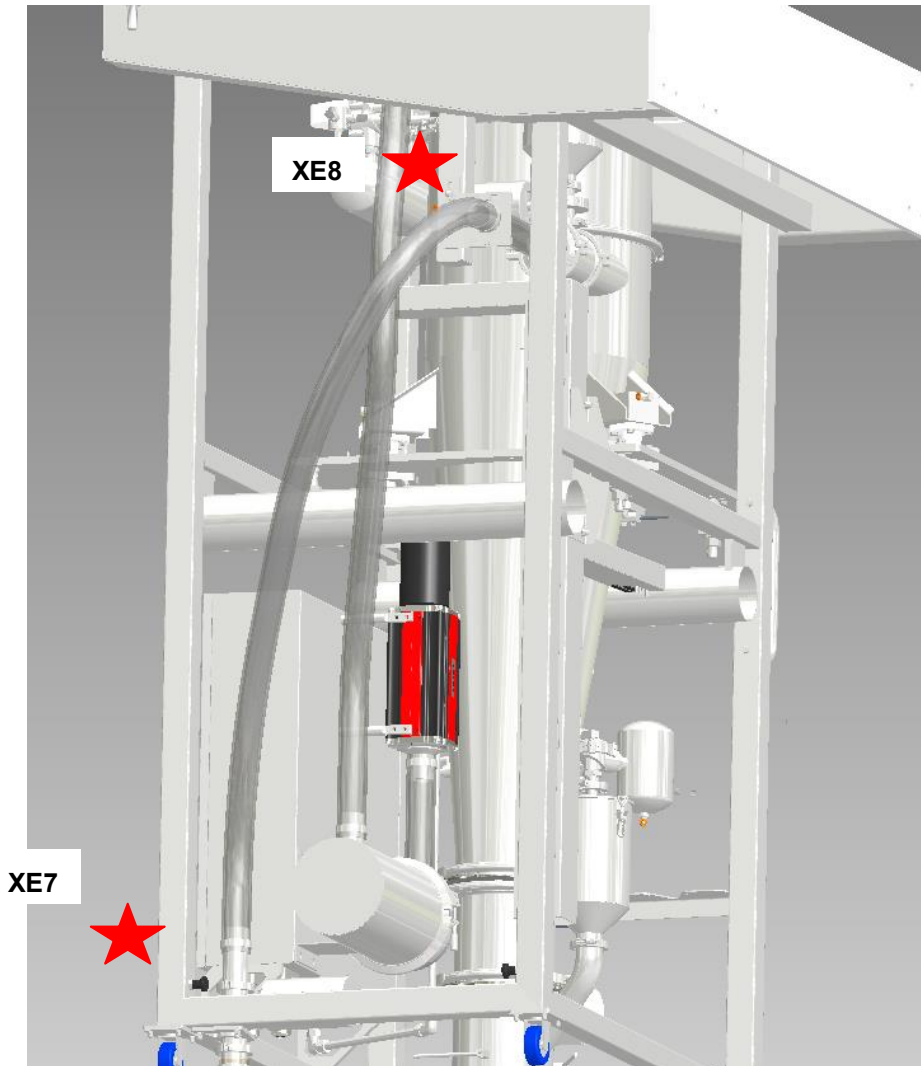
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K-Tron

Project No.: 1315690

Customer: Novartis
Singapore

Document No:
1315690-EGC-R000

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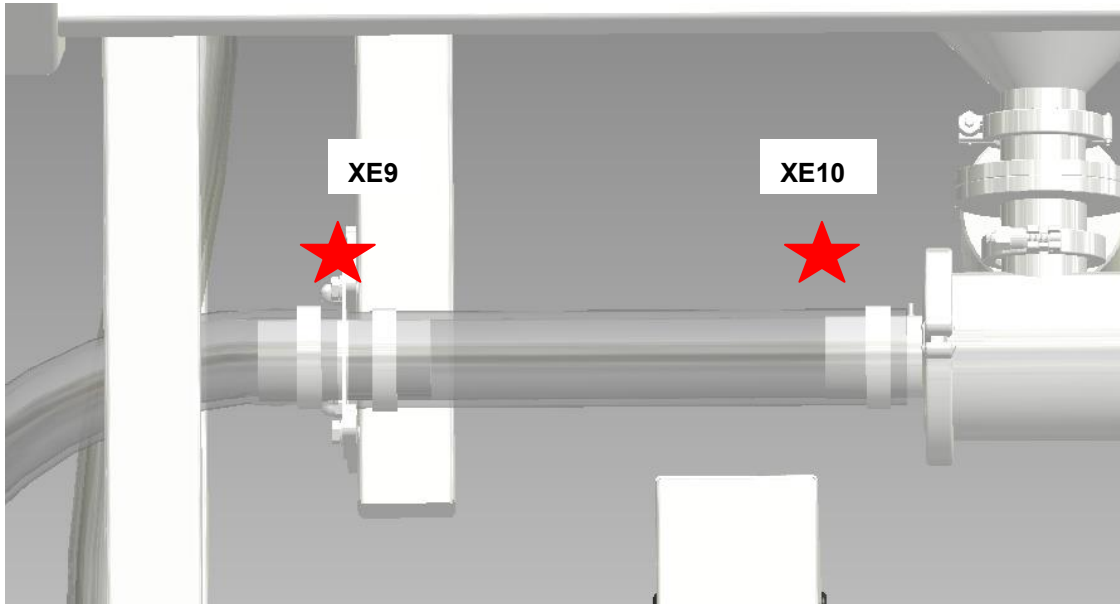




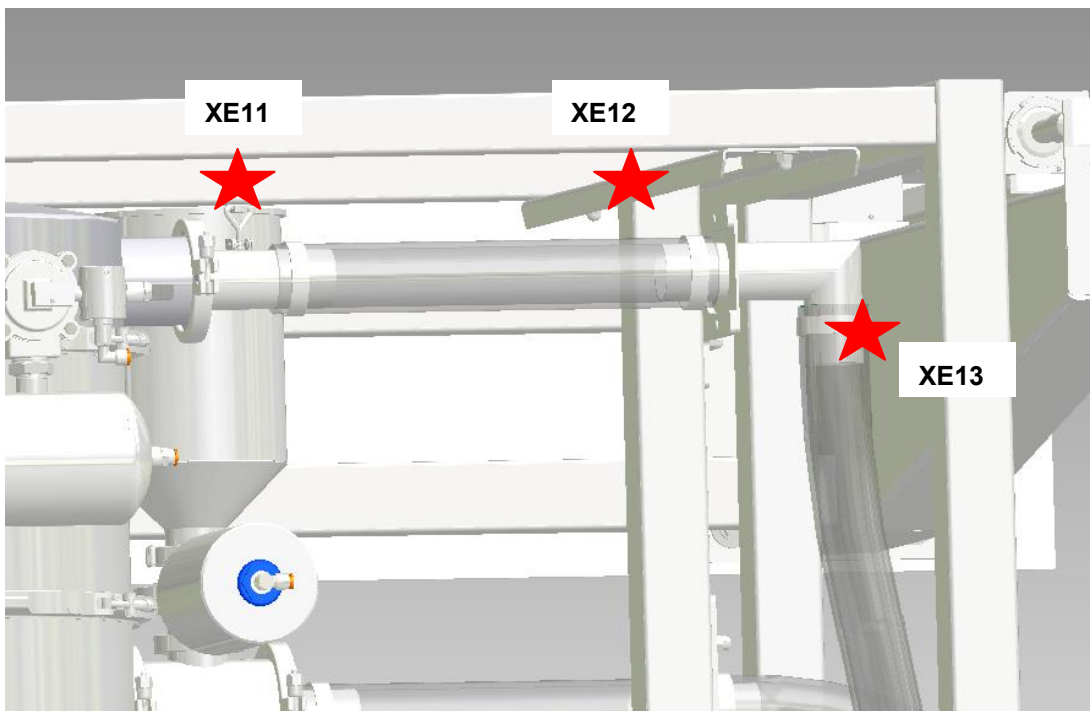
**Electrical grounding concept
(EGC)**
**SG.TBP.202.M.5235/C002
Powder Transfer System (PTS)**

Date: 16.04.2014
Revision: 0.0
Supplier: Coperion
K-Tron
Project No.: 1315690
Customer: Novartis
Singapore
Document No:
1315690-EGC-R000

Picture No. 5



Picture No. 6





**Electrical grounding concept
(EGC)**

**SG.TBP.202.M.5235/C002
Powder Transfer System (PTS)**

Date: 16.04.2014

Revision: 0.0

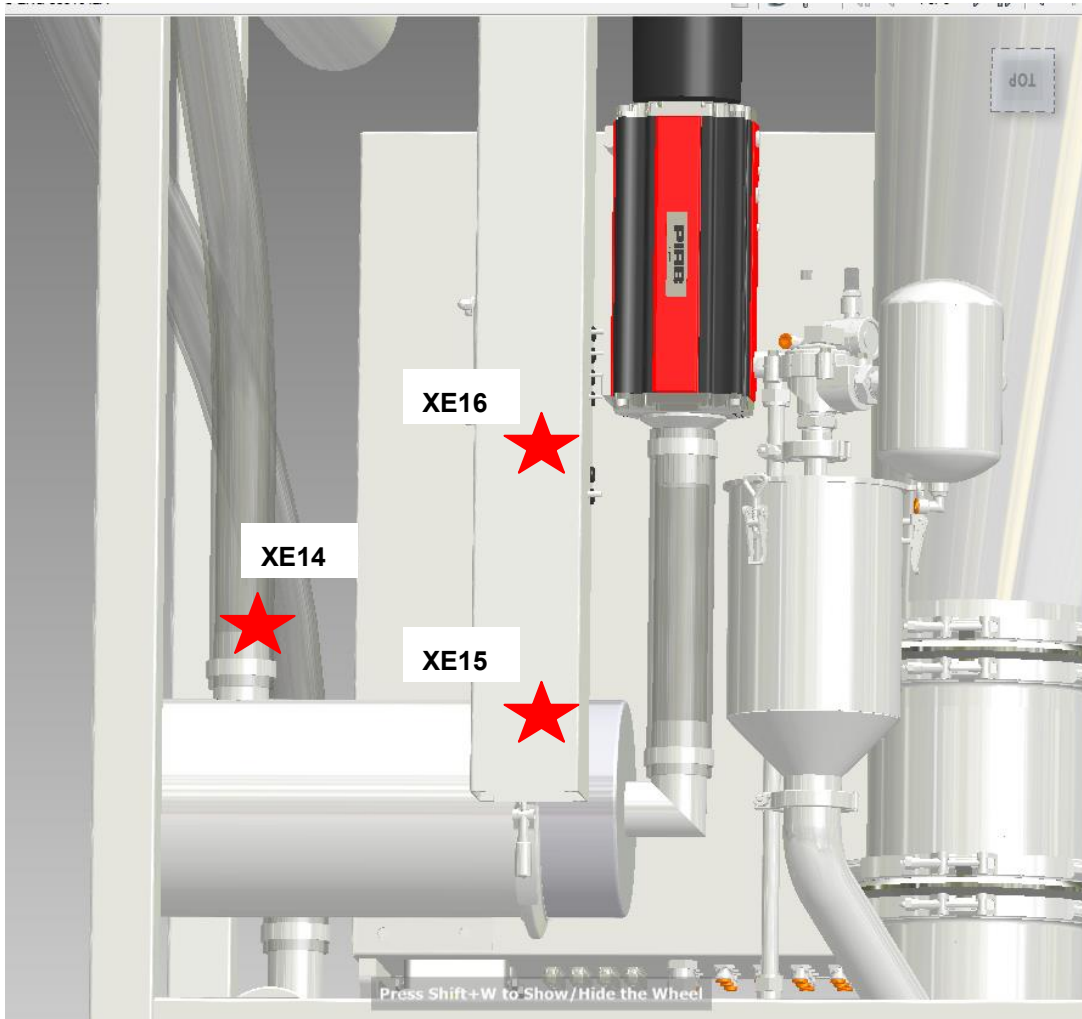
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K-Tron

Project No.: 1315690

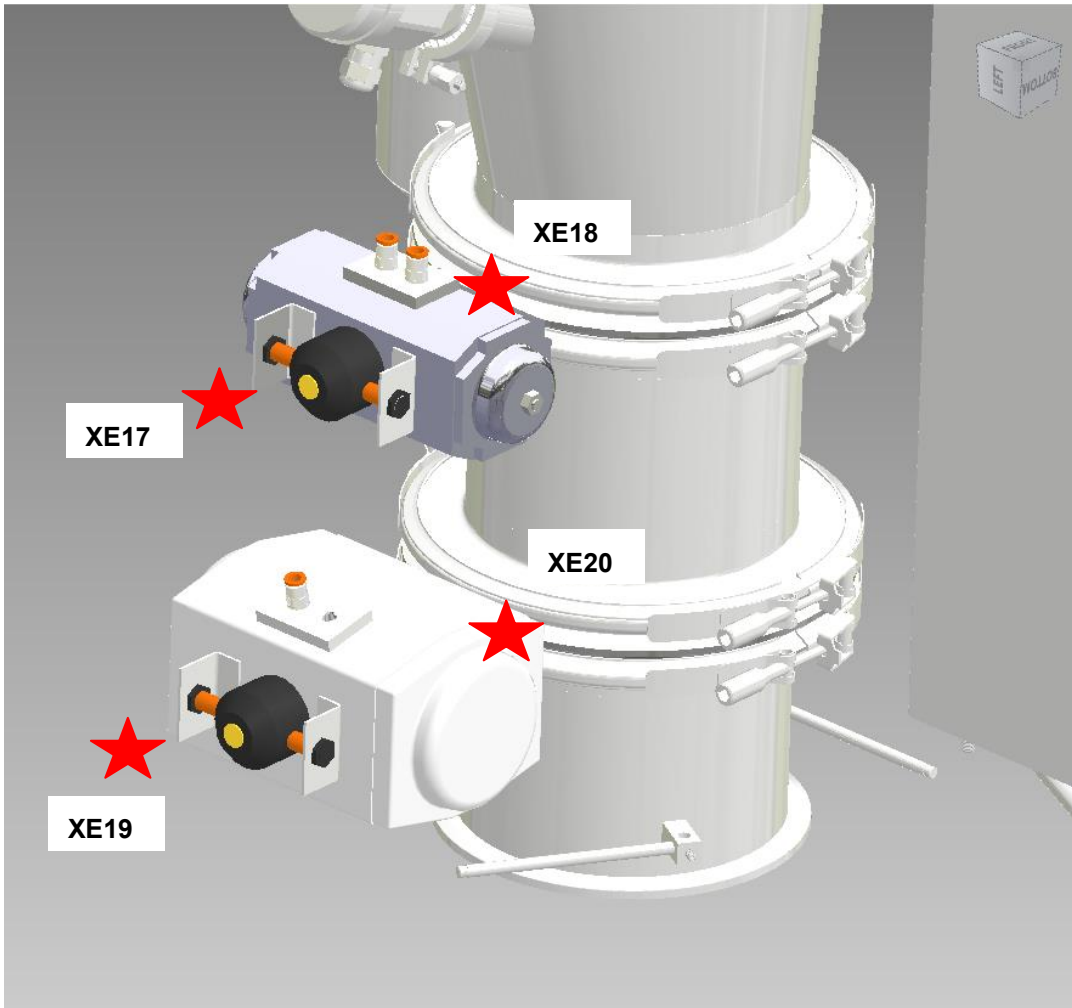
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Singapore


Document No:
1315690-EGC-R000

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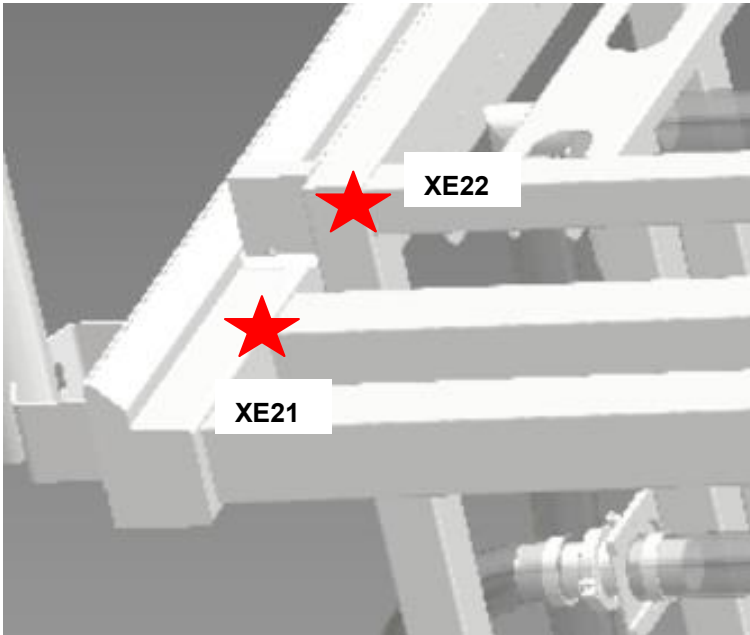


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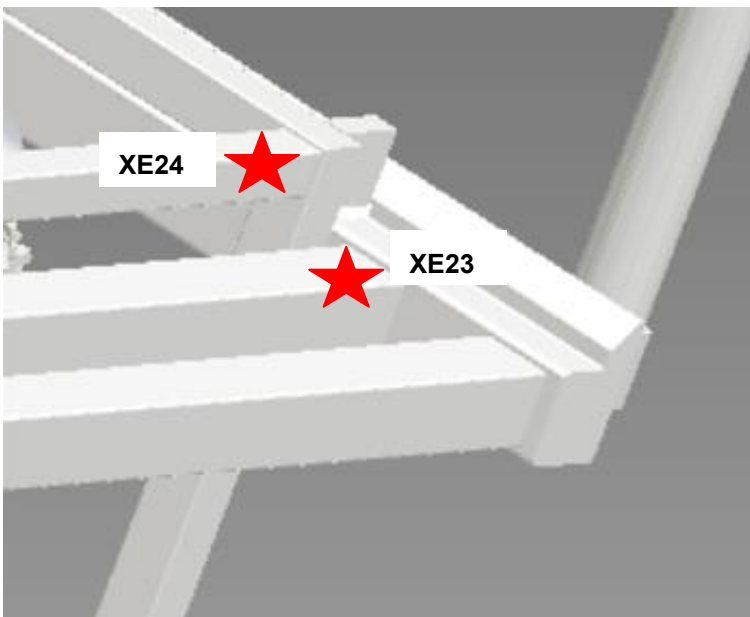


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		Document No: 1315690-EGC-R000

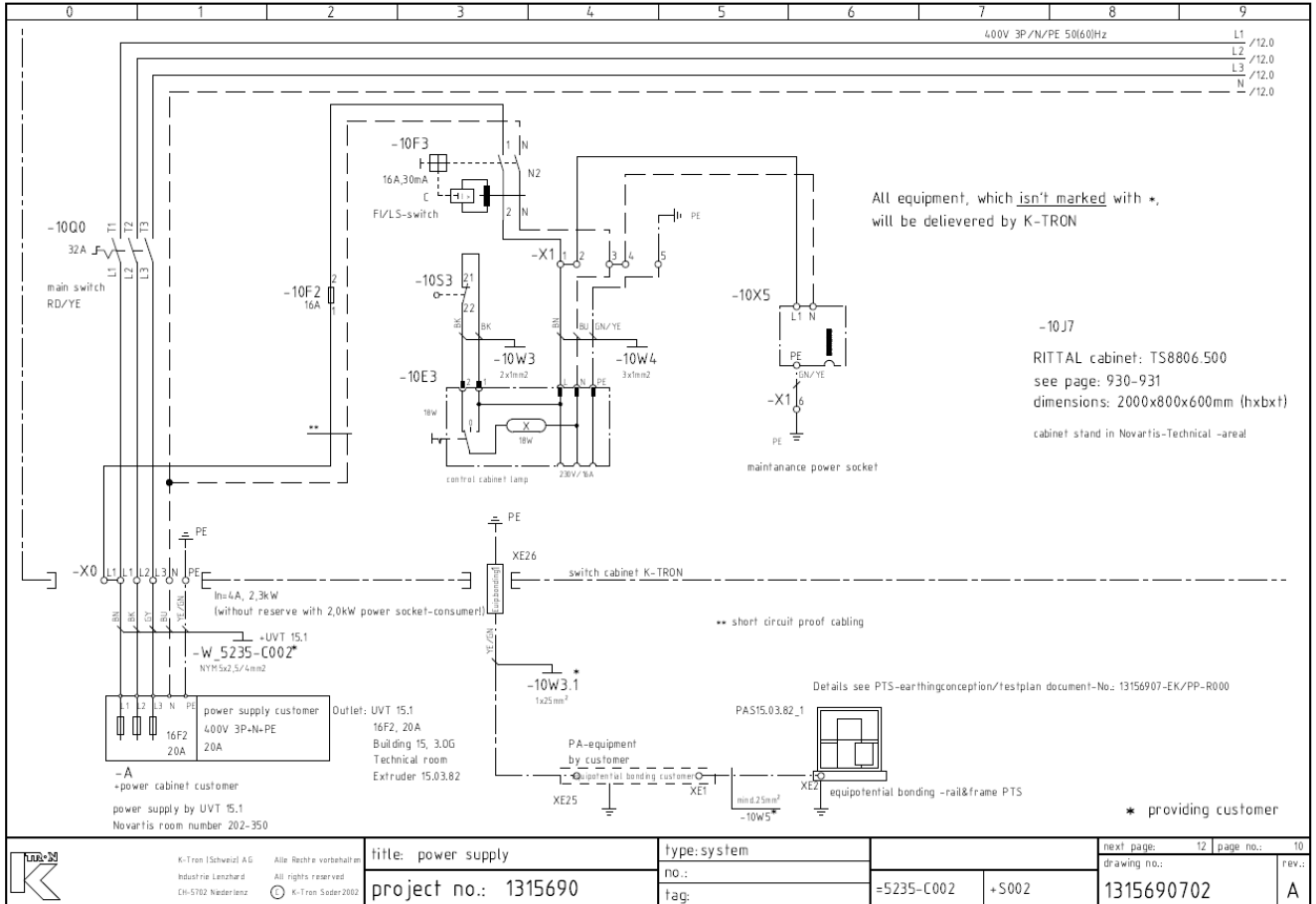
Picture no. 9



Picture no. 10



Picture no. 11





Instrument List

(Referring to P&ID 131569080)

K-Tron Project 1315690

Novartis Singapore

Doc.No. 1315690-IL Rev. A

17.Mar. 2014

SG.TBP.202.M.5235/C002

PTS buffer to Melt Extruder

Tag	K-Tron Part No	FUNCTION / DESCRIPTION	INSTRUMENTATION TYPE	Manufacturer Name	Model Name	Signal Type	LINE SIZE / CONN.	Measuring Range	Process Range	Calibration Tolerance	Calibration Frequency	Serial Number
B 01	0000018910	Air pressure tank	Pressure tank	K-Tron	3 Liter	n/a	G 1/4" / G 3/4"	n/a	1 - 6 bar	n/a	n/a	later
B 02	0000018898	Air pressure tank	Pressure tank	K-Tron	1.5 Liter	n/a	G 1/4" / G 3/4"	n/a	1 - 6 bar	n/a	n/a	later
F 01	0000011741	Air intake filter	Filter	Mahle	852 656 TI 56/2-0,25 V4A 3.1	n/a	DN 50	n/a	n/a	n/a	n/a	n/a
F 02	0000018651	Safety HEPA Filter	Filter	K-Tron	Model 2 Hepa	n/a	n/a	n/a	n/a	n/a	n/a	n/a
F 03 1	0000011741	Powder separation filter	Filter	Mahle	852 656 TI 56/2-0,25 V4A	n/a	n/a	n/a	n/a	n/a	n/a	n/a
F 03 2	0000011741	Powder separation filter	Filter	Mahle	852 656 TI 56/2-0,25 V4A	n/a	n/a	n/a	n/a	n/a	n/a	n/a
F 03 3	0000011741	Powder separation filter	Filter	Mahle	852 656 TI 56/2-0,25 V4A	n/a	n/a	n/a	n/a	n/a	n/a	n/a
F 04	0000011741	Air exchange filter	Filter	Mahle	852 656 TI 56/2-0,25 V4A	n/a	n/a	n/a	n/a	n/a	n/a	n/a
F 05	0000011741	Air exchange filter	Filter	Mahle	852 656 TI 56/2-0,25 V4A	n/a	n/a	n/a	n/a	n/a	n/a	n/a
F 06	0000032304	Silencer	Filter	Netter	n/a (part of 0000032304)	n/a	G 1/4"	n/a	n/a	n/a	n/a	n/a
FK 01	0000017818	Powder aeration pad	Flow aid	K-Tron	n/a	n/a	n/a	n/a	0 - 1 bar	n/a	n/a	n/a
FK 02	0000017818	Powder aeration pad	Flow aid	K-Tron	n/a	n/a	n/a	n/a	0 - 1 bar	n/a	n/a	n/a
FK 03	0000017818	Powder aeration pad	Flow aid	K-Tron	n/a	n/a	n/a	n/a	0 - 1 bar	n/a	n/a	n/a
FK 04	0000017818	Powder aeration pad	Flow aid	K-Tron	n/a	n/a	n/a	n/a	0 - 1 bar	n/a	n/a	n/a
G 01	(0000026822)	Position switch pneumatic Cylinder	Proximity sensor	Festo AG	SME-8M-DS-24V-K-5-OE	Non-contacting PNP, NPN	n/a	n/a	n/a	n/a	n/a	n/a
G 02	(0000026822)	Position switch pneumatic Cylinder	Proximity sensor	Festo AG	SME-8M-DS-24V-K-5-OE	Non-contacting PNP, NPN	n/a	n/a	n/a	n/a	n/a	n/a
G 03 -	(0000030860)	Position switch pneumatic valve drive closed	Proximity sensor	Pepperl + Fuchs	NCN4-12GM40-E2-V1-3G-3D	PNP NO	n/a	n/a	n/a	n/a	n/a	n/a
G 03 +	(0000030860)	Position switch pneumatic valve drive open	Proximity sensor	Pepperl + Fuchs	NCN4-12GM40-E2-V1-3G-3D	PNP NO	n/a	n/a	n/a	n/a	n/a	n/a
G 04 -	(0000030861)	Position switch pneumatic valve drive closed	Proximity sensor	Pepperl + Fuchs	NCN4-12GM40-E2-V1-3G-3D	PNP NO	n/a	n/a	n/a	n/a	n/a	n/a
G 04 +	(0000030861)	Position switch pneumatic valve drive open	Proximity sensor	Pepperl + Fuchs	NCN4-12GM40-E2-V1-3G-3D	PNP NO	n/a	n/a	n/a	n/a	n/a	n/a
HK 01	0000031532	Manual air intake regulation valve	Ball valve	Trimat	100130 63810 DN50	n/a	DN 50	n/a	n/a	n/a	n/a	n/a
K 01	0000024371	Air regulator	Air regulator	Festo AG	GRLA-1/8-QS-8-RS-D	n/a	G 1/8"	n/a	n/a	n/a	n/a	n/a
K 02	0000024371	Air regulator	Air regulator	Festo AG	GRLA-1/8-QS-8-RS-D	n/a	G 1/8"	n/a	n/a	n/a	n/a	n/a
K 03	0000024371	Air regulator	Air regulator	Festo AG	GRLA-1/8-QS-8-RS-D	n/a	G 1/8"	n/a	n/a	n/a	n/a	n/a
K 04	0000024371	Air regulator	Air regulator	Festo AG	GRLA-1/8-QS-8-RS-D	n/a	G 1/8"	n/a	n/a	n/a	n/a	n/a
K 05	0000024371	Air regulator	Air regulator	Festo AG	GRLA-1/8-QS-8-RS-D	n/a	G 1/8"	n/a	n/a	n/a	n/a	n/a
KS 01	0000018894	Butterfly valve conveying line	Butterfly valve	M&S Armaturen	Scheibvenitill SV04 CC DN50	n/a	DN 50	n/a	n/a	n/a	n/a	n/a
KS 02	0000030861	Butterfly valve receiver discharge	Butterfly valve	CO.RA. S.r.l.	S.V.RCRC 200	n/a	DN 200	n/a	n/a	n/a	n/a	later
KS 03	0000018894	Butterfly valve bypass conveying line	Butterfly valve	M&S Armaturen	Scheibvenitill SV04 CC DN50	n/a	DN 50	n/a	n/a	n/a	n/a	n/a
L 05	0000026818	Level sensor max. (80) receiver	Level sensor	Endress + Hauser	Soliphant M FTM50	3 wire PNP	Tri Clamp ISO2852, DN40-51 (2")	n/a	n/a	n/a	n/a	later
L 06	0000026818	Level sensor min. receiver	Level sensor	Endress + Hauser	Soliphant M FTM50	3 wire PNP	Tri Clamp ISO2852, DN40-51 (2")	n/a	n/a	n/a	n/a	later
P 01	0000026937	Pressure regulator	Pressure regulator	Aircom Pneumatic GmbH	REA-04DUE + MANOMETER G1/4	n/a	G 1/2"	n/a	0-10 bar	6 bar	n/a	n/a
P 02	0000024364	Pressure regulator	Pressure regulator	Metal Work UK Limited	MR Bit 1/4	n/a	G 1/4"	n/a	0-13 bar	6 bar	n/a	n/a
P 03	0000026937	Pressure regulator	Pressure regulator	Aircom Pneumatic GmbH	REA-04DUE + MANOMETER G1/4	n/a	G 1/2"	n/a	0-10 bar	0 - 1 bar	n/a	n/a
P 04	0000024364	Pressure regulator	Pressure regulator	Metal Work UK Limited	MR Bit 1/4	n/a	G 1/4"	n/a	0-13 bar	6 bar	n/a	n/a
PV 01	0000025580	Backpressure valve	Backpressure valve	Festo AG	GRLA-F-1/8-8	n/a	G 1/8"	n/a	n/a	n/a	n/a	n/a
PV 02	0000025580	Backpressure valve	Backpressure valve	Festo AG	GRLA-F-1/8-8	n/a	G 1/8"	n/a	n/a	n/a	n/a	n/a
SV 20	0000026936	Solenoid valve	Solenoid valve	Festo AG	197648 15P-K05-4G-YR-4K-K- KM-D	n/a	n/a	n/a	n/a	n/a	n/a	n/a
SV 20.1	0000025808	Pilot valve	Pilot valve	Humphrey	HV SS250A 3/2 Pilot SPR 1/4"	n/a	NPT 1/4"	n/a	n/a	n/a	n/a	n/a
SV 20.2	0000025000	Filter backwash valve	Membran valve	Mecair	VXM208	n/a	G 1,5"	n/a	n/a	n/a	n/a	n/a
SV 22	0000026936	Solenoid valve	Solenoid valve	Festo AG	197648 15P-K05-4G-YR-4K-K- KM-D	n/a	n/a	n/a	n/a	n/a	n/a	n/a
SV 24	0000018761	Solenoid valve 2/2 Way N.C. W Pilot Control	Solenoid valve	ODE	21WA3K0B130+21WA4K0B130+BDAA08024CS	n/a	G 1/2"	n/a	6 bar	n/a	n/a	n/a
SV 26	0000026936	Solenoid valve	Solenoid valve	Festo AG	197648 15P-K05-4G-YR-4K-K- KM-D	n/a	n/a	n/a	n/a	n/a	n/a	n/a
SV 32	0000026936	Solenoid valve	Solenoid valve	Festo AG	197648 15P-K05-4G-YR-4K-K- KM-D	n/a	n/a	n/a	n/a	n/a	n/a	n/a
SV 32.1	0000025808	Pilot valve	Pilot valve	Humphrey	HV SS250A 3/2 Pilot SPR 1/4"	n/a	NPT 1/4"	n/a	n/a	n/a	n/a	n/a
SV 32.2	0000025000	Filter backwash valve	Membran valve	Mecair	VXM208	n/a	G 1,5"	n/a	n/a	n/a	n/a	n/a
SV 34	0000026936	Solenoid valve	Solenoid valve	Festo AG	197648 15P-K05-4G-YR-4K-K- KM-D	n/a	n/a	n/a	n/a	n/a	n/a	n/a
SV 34.1	0000025808	Pilot valve	Pilot valve	Humphrey	HV SS250A 3/2 Pilot SPR 1/4"	n/a	NPT 1/4"	n/a	n/a	n/a	n/a	n/a
SV 34.2	0000025000	Filter backwash valve	Membran valve	Mecair	VXM208	n/a	G 1,5"	n/a	n/a	n/a	n/a	n/a
SV 36	0000026936	Solenoid valve	Solenoid valve	Festo AG	197648 15P-K05-4G-YR-4K-K- KM-D	n/a	n/a	n/a	n/a	n/a	n/a	n/a
SV 38	6110-00520	Solenoid valve	Solenoid valve	Festo AG	MFH-3-1/8 24V	n/a	G 1/8"	n/a	n/a	n/a	n/a	n/a
SV 40	0000026936	Solenoid valve	Solenoid valve	Festo AG	197648 15P-K05-4G-YR-4K-K- KM-D	n/a	n/a	n/a	n/a	n/a	n/a	n/a
SV 42	0000026936	Solenoid valve	Solenoid valve	Festo AG	197648 15P-K05-4G-YR-4K-K- KM-D	n/a	n/a	n/a	n/a	n/a	n/a	n/a
SV 44	0000026936	Solenoid valve	Solenoid valve	Festo AG	197648 15P-K05-4G-YR-4K-K- KM-D	n/a	n/a	n/a	n/a	n/a	n/a	n/a
SV 46	0000026936	Solenoid valve	Solenoid valve	Festo AG	197648 15P-K05-4G-YR-4K-K- KM-D	n/a	n/a	n/a	n/a	n/a	n/a	n/a
VX 01	0000024267	Vacuum pump	Venturi pump	Piab	P6400-V-CX-00-AA-05	n/a	G 2,5"	n/a	n/a	671 NM3/hr.	n/a	later
W 01	0000025420	Loadcell PTS (belongs to WG01)	Loadcell	HBM	K-26 -F-D1-200-2-6-N	analog	n/a	0-200 kg	n/a	n/a	n/a	later
W 02	0000025420	Loadcell PTS (belongs to WG01)	Loadcell	HBM	K-26 -F-D1-200-2-6-N	analog	n/a	0-200 kg	n/a	n/a	n/a	later
W 03	0000025420	Loadcell PTS (belongs to WG01)	Loadcell	HBM	K-26 -F-D1-200-2-6-N	analog	n/a	0-200 kg	n/a	n/a	n/a	later
X 51	0000026822	Pneumatic air cylinder PTS lock system	Pneumatic air cylinder	Festo AG	SGL ESNU-50-50	n/a	n/a	n/a	n/a	n/a	n/a	n/a
X 52	0000026822	Pneumatic air cylinder PTS lock system	Pneumatic air cylinder	Festo AG	SGL ESNU-50-50	n/a	n/a	n/a	n/a	n/a	n/a	n/a
X 53	0000025301	Pneumatic air cylinder PTS scale protection	Pneumatic air cylinder	Festo AG	AIEVU-50-10-A-P-A	n/a	n/a	n/a	n/a	n/a	n/a	n/a
X 54	0000025301	Pneumatic air cylinder PTS scale protection	Pneumatic air cylinder	Festo AG	AIEVU-50-10-A-P-A	n/a	n/a	n/a	n/a	n/a	n/a	n/a
X 55	0000025301	Pneumatic air cylinder PTS scale protection	Pneumatic air cylinder	Festo AG	AIEVU-50-10-A-P-A	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Y 01	0000030683	Pneumatic tapper	Pneumatic tapper	MCTAG	EA 102	n/a	n/a	n/a	0 - 2 bar	n/a	n/a	n/a
Y 02	0000032304	Pneumatic vibrator receiver filter plate	Pneumatic vibrator	Netter	NCT 29 i SE	n/a	n/a	n/a	n/a	n/a	n/a	n/a
ZS 01	0000030860	Rotary valve receiver discharge	Rotary valve	CO.RA. S.r.l.	R.V. 200 RCRC	n/a	DN 200	n/a	n/a	n/a	n/a	later
P05	0000024267	Pressure gauge	Venturi pump	Piab	n/a (part of 0000024267)	n/a	G 1/8"	n/a	0...100 kPa	n/a	n/a	n/a
-52A2	0000036688	Multifunctional counter	Operating hours counter	HENGSTLER	TICO 772; Type: 0772202	n/a	n/a	n/a	n/a	n/a	n/a	n/a

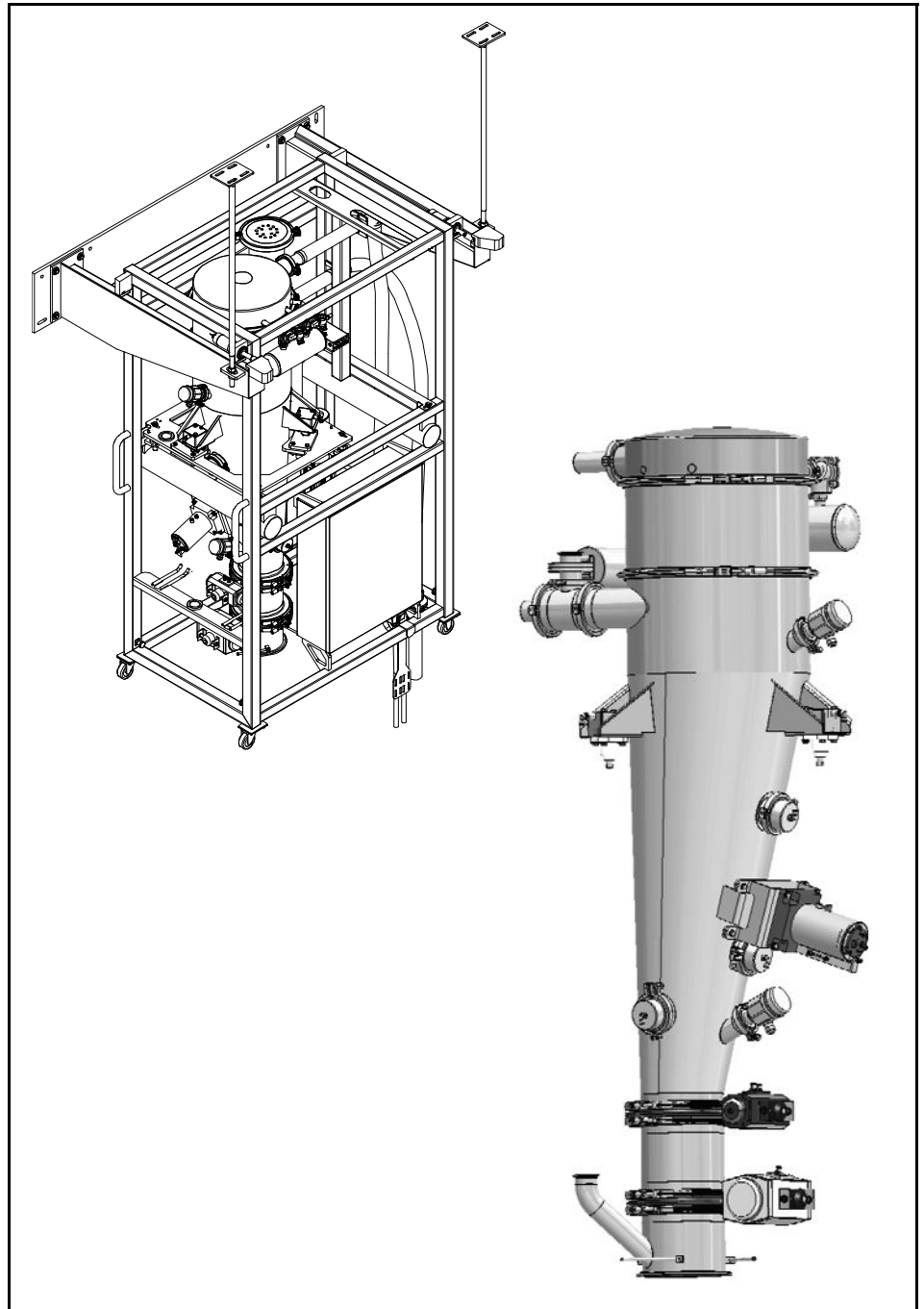
Chapter 3:

Conveying equipment

- PTS Powder Transfer System

OPERATING AND MAINTENANCE INSTRUCTIONS

PTS Powder Transfer System (P100 Receiver)



Read this document prior to operating the device.
This document contains all safety and warning notes.
Original operating instructions

1190023602-EN Rev. 1.0.0



Service

If you need assistance, please call your local service centre or

Coperion K-TRON Schweiz GmbH Tel. 0041 (0) 62 / 885 71 71
Lenzhardweg 43/45 Fax 0041 (0) 62 / 885 71 80
CH-5702 Niederlenz

Coperion K-Tron Pitman, Inc. Tel. 001 (0) 856 / 589 0500
590 Woodbury Glassboro Road Fax 001 (0) 856 / 589 81 13
Sewell, New Jersey 08080 USA

Coperion K-TRON Salina Tel. 001 (0) 785 / 825 16 11
606 N. Front St. Fax 001 (0) 785 / 825 8759
Salina, KS 67402-0017

Web: www.coperionktron.com

Before you call...

- ⇒ Do you have alarm displays? Are you able to eliminate the causes?
- ⇒ Have you modified part of the system, product or operating mode?
- ⇒ Have you tried to remedy the fault in accordance with the operating instructions?
- ⇒ Note the project or order number You will find these on the machine or in the system manual.
 - Example: 0403214

Using the manual:

- ⇒ This arrow identifies an individual action.
- 1. Numbers identify a sequence of actions which have to be executed step-by-step.
- ▲ This symbol identifies a general safety note.



Reference to another manual.



Important information.



This symbol indicates that tools are required for the following task.



Specifies where information or a situation must be checked.

If an error or omission is found, please contact:

documentation@coperionktron.com

Doc. No.: 1190023602-EN

Date: 2014/Apr/28

Original: 1190023602-EN

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1 General information

1.1 Target groups








Target group	Definition
Operator	Instructed person.
Specialist in general	A specialist is an experienced person who has worked for at least two years without interruption in the respective field. A specialist must have extensive knowledge in theory and practice in this field and know the potential risks. A specialist must be able to work or provide instructions at his own responsibility.
Specialist, ATEX	Qualified technician with a special knowledge of ATEX and pneumatics.
Electrician	Qualified electrician with a special knowledge of ATEX.

1.2 Warnings





Warning	Risk stage	Consequences of non-adherence
	Directly hazardous situation	Death, serious injury
	Potentially risky situation	Death, serious injury
	Potentially risky situation	Minor injuries
	Potentially risky situation	Property damage

1.3 Symbols




1.3.1 General

Symbol	Meaning
	All instructions after this symbol must be adhered to.
	This symbol indicates a general safety note.
	This arrow is used for indicating a single action.
1. , 2.	The numbers indicate a sequence of activities.
	Reference to another manual.
	Important information.
	This symbol indicates that a tool will be required for the following task.
	This symbol indicates that data or conditions must be checked.

1.3.2 Warning sign

Symbol	Meaning
	Ex-Protecion Kindly follow the safety notes and warnings for devices meant for use in potentially explosive areas.
	Electrical hazard This sign indicates an electrical hazard.
	No hands icon Do not place hands or other body parts into moving parts or machine.
	Warning of hearing damage Warning note that the device is loud or that occasional noise peaks occur that will cause damage to hearing.

1.3.3 Directional signs

Symbol	Meaning
	Ground icon Indicates that a ground/PE connection is required.
	Power icon Power off and disconnect air supply before working on the machine.
	Ear protection Ear protection must be worn.

2 Safety



Adhere to safety instructions for explosion-protected devices, see [Chapter 12 - "Explosion protection"](#).

The system was designed for operation in areas without the risk of gas explosions. Devices without classification are intended for use in areas in which the concentration of explosive gases is not expected to reach levels that require special precautions regarding design, installation or use. The minimum ignition energy must be higher than 3 mJ when the devices are used in an environment containing flammable dust.

2.1 Proper use

The device is intended for continuous or discontinuous dosing, flow measurement or transport of easily flowing to poorly flowing bulk goods.

It consists mainly of a receiver with attachments. The receiver is used to separate the material transported from the transport gas.

- ▲ Only operate when the trolley is positioned and fastened in the holder.
- ▲ Only operate when stationary.
- ▲ Only operate completely mounted devices.
- ▲ Only operate when all open connections are closed.
- ▲ Only operate when all ground connections were checked according to the test plan 1104657-EGC-R001, see system documentation.
- ▲ Only operate according the technical data specified.
- ▲ Only transport dry products.
- ▲ Products that pose a health hazard must be handled according to the additional safety instructions for handling such products.
- ▲ ATEX-certified assemblies according to the declaration of conformity must be used when working with dusts that could result in an explosive atmosphere.

Tampering with and changes to the safety systems of the device are prohibited.

2.2 Obvious abuse

Obvious abuse is any inappropriate use.

Examples:

- ▲ Transport of liquids.
- ▲ Transport of wet products.
- ▲ Transport of explosive gases and gas/air mixtures.
- ▲ Transport of substances that are hazardous to health without the necessary protective equipment (e.g. protective clothing, protective respirator).
- ▲ Transport of substances that react chemically with the materials of the device.

2.3 Systems manual

The systems manual is delivered with the system and contains important information for the operation of the device such as overviews, drawings and instructions for the attached components.

- ▲ The instructions in the system manual are part of these operating instructions and must be adhered to.

It is particularly important to adhere to the:

- Test plan for grounding 1104657-EGC-R001
- P+I diagram 1-1104657800
- Flow diagram 1104657-FBD-R001
- Operating instructions
- Installation and maintenance instructions
- Spare parts lists with spare parts drawings

2.4 Special risks

DANGER



Danger of explosion!

- ▲ When working with dusts that could result in an explosive atmosphere, ATEX-certified assemblies must be used. See declaration of conformity.
- ▲ The intake of alien materials (metal parts, stones) must be prevented by the operator.
- ▲ Only use original Coperion K-Tron (Switzerland) LLC seals and filters.

DANGER



Mortal danger as a result of live wires!

- ▲ Work on the electrical system may only be performed by an electrician.

WARNING



Shearing due to moving flaps / valves!

- ▲ Reaching into the receiver may lead to loss of limbs.
- ▲ Ensure that it is not possible to reach into the danger zone while the device is installed.
- ▲ Switch off the power supply to the valves before working on the receiver. Separate the compressed air supply, bleed compressed air tanks, switch off the main switch and secure it against switching on.

WARNING



Noise during filter cleaning!

- ▲ Noise may lead to permanent hearing damage.
- ▲ Ear protection must be worn.

▲ WARNING



Danger due to dust!

- ▲ Dust can cause severe and permanent damage to the respiratory organs.
 - ▲ Take note of the material safety data sheets (MSDS) for the products.
 - ▲ Regularly check seals and replace them, when required.
 - ▲ Wear breathing protection.
-

2.5 General safety instructions

2.5.1 Responsibilities of the owner

- ▲ Ensure that only qualified and trained personnel work with the device.
- ▲ Ensure that the specifications in the operating and maintenance instructions are adhered to.
- ▲ Establish personnel responsibilities for operation and maintenance.
- ▲ Ensure that the personnel have read and understood the operating instructions for all the installed components, particularly these safety notes.
- ▲ Immediately replace damaged or missing parts.
- ▲ The intake of unapproved materials must be prevented by the operating company using suitable methods.
- ▲ The operating company of the device is responsible for compliance with the legally stipulated accident and safety regulations.

2.5.2 Organizational measures

- ▲ Always keep the operating instructions within easy reach of the device. Ensure that they are always complete and legible.
- ▲ Observe the safety notes for the connected devices.
- ▲ The generally valid, legal and other binding regulations for accident prevention and environmental protection must also be adhered to.
- ▲ Work instructions must be provided in addition to the operating instructions. They must refer to the risks when handling this device and the products moving in it. The instructions must contain information regarding the necessary personal protective equipment (e.g. safety shoes, protective gloves, breathing protection, hearing protection). The instructions should only fill a few pages and be available in the immediate vicinity of the device.
- ▲ The operating company must ensure that staff is wearing the necessary personal protective equipment.
- ▲ The operating company must compile an individual maintenance checklist. This must be done in accordance with the information contained in these operating instructions. The information must be adjusted according to the local circumstances.

2.5.3 Safety-conscious work

- ▲ Read the operating instructions, in particular these safety notes, and follow these instructions.
- ▲ Ensure that only authorised personnel enter the operating range and danger zone of the device.
- ▲ Any changes (including changes in the operational behavior) which affect safety must be reported immediately to the responsible member of the staff.
- ▲ Immediately stop the use of damaged devices. In particular, when protective installations are defective or electrical cables are damaged.
- ▲ Always keep safety in mind while working.
- ▲ Switch off the device at the main switch and detach it from the compressed air supply before performing any work on it.

2.5.4 Safety devices

- ▲ Never alter the mechanical safety devices or the electrical control system for the safety devices.
- ▲ Only operate equipment with all safety devices in place.
- ▲ Check the function of the protective devices on a daily basis.
- ▲ Do not open or remove any lids or covers during the operation.
- ▲ Do not change any electrical protective installations, e.g. fuses. Increased risk of accident.
- ▲ Replace damaged cable joints and connections immediately.

2.5.5 Additional equipment

- ▲ modifications of the device are prohibited.
- ▲ The operator is responsible for complying with all safety regulations related to interoperation with any additional equipment.

2.5.6 Customer service and repairs

- ▲ Repair of the device may only be performed.
 - by the responsible Coperion K-Tron (Switzerland) LLC customer service
(for customer service address, see system manual)
 - or –
 - by specialised staff trained by Coperion K-Tron (Switzerland) LLC.
- ▲ Only use original Coperion K-Tron (Switzerland) LLC parts.

2.5.7 Shut-down procedure

- ▲ The operator is responsible for the proper removal and disposal of the equipment from service.

2.5.8 Disposal

- ▲ The local environmental protection regulations must be adhered to.

3 Application

The device mainly consists of a receiver with attached components. The receiver is used to separate the material transported from the transport gas.

3.1 Function

3.1.1 Trolley

The receiver and the control box are mounted on a mobile trolley. The trolley is pushed into the support track. The trolley is fastened on the tracks by two pneumatic cylinders as soon as compressed air is supplied. This state is indicated on the operating panel of the customer.

The support track is fastened to the wall and ceiling.

- (1) Support track
- (2) Pneumatic cylinder
- (3) Trolley
- (4) Control box
- (5) Rollers
- (6) Handle

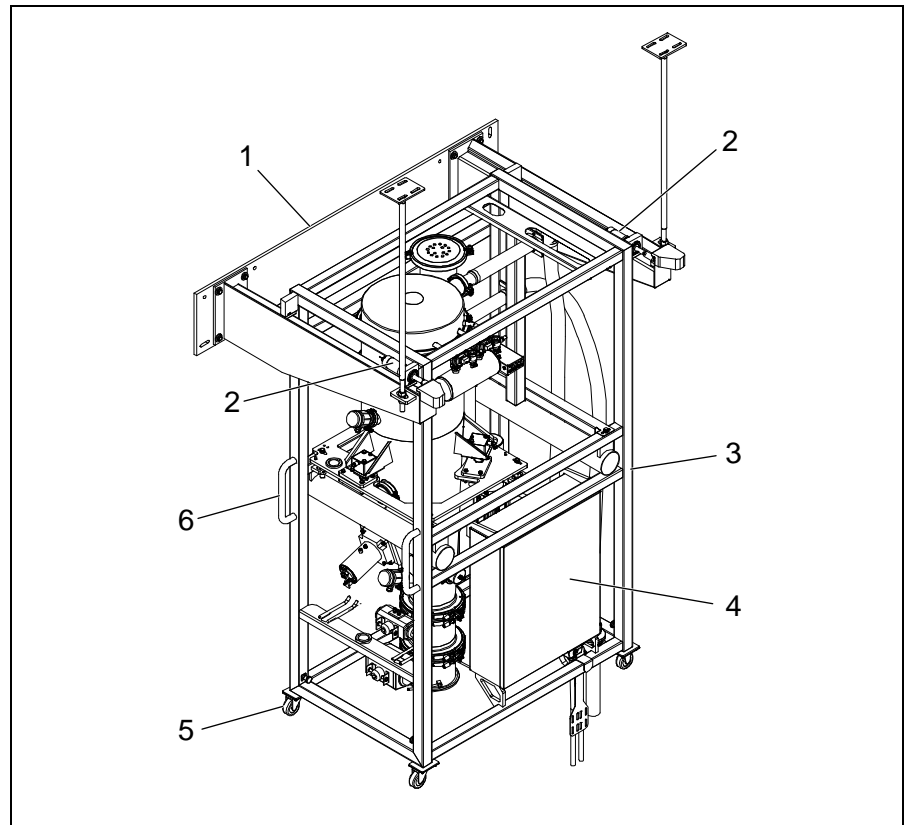


Fig. 3.1 Trolley with receiver and control box

3.1.2 Receiver P100

The receiver separates the material transported from the transport gas in a vacuum conveyor system. The transported material is separated into a downstream dosing container.

The filling level in the receiver is optionally determined by a level sensor or the weight signal of the scale.

- (1) Lid
- (2) V-clamp
- (3) Membrane valve, filter cleaning
- (4) Compressed air tank
- (5) Vibrator (made by Netter)
- (6) Filter cartridge
- (7) V-clamp
- (8) Level sensor
- (9) Load cell
- (10) Fluidising pad
- (11) Knocker, pneumatic
- (12) Fluidising pad
- (13) Level sensor L06
- (14) Cora pivot flap ZS01
- (15) Cora flap KS02
- (16) Lever
- (17) Cylinder outlet
- (18) V-clamp
- (19) Connection pipe, bin vent filter F04
- (20) Cylinder
- (21) V-clamp
- (22) Fluidising pad
- (23) Hopper
- (24) Load cell
- (25) Connection pipe, product supply
- (26) Connection pipe, filter F05
- (27) Ventilation flap KS03
- (28) Hopper
- (29) Connection pipe, vacuum

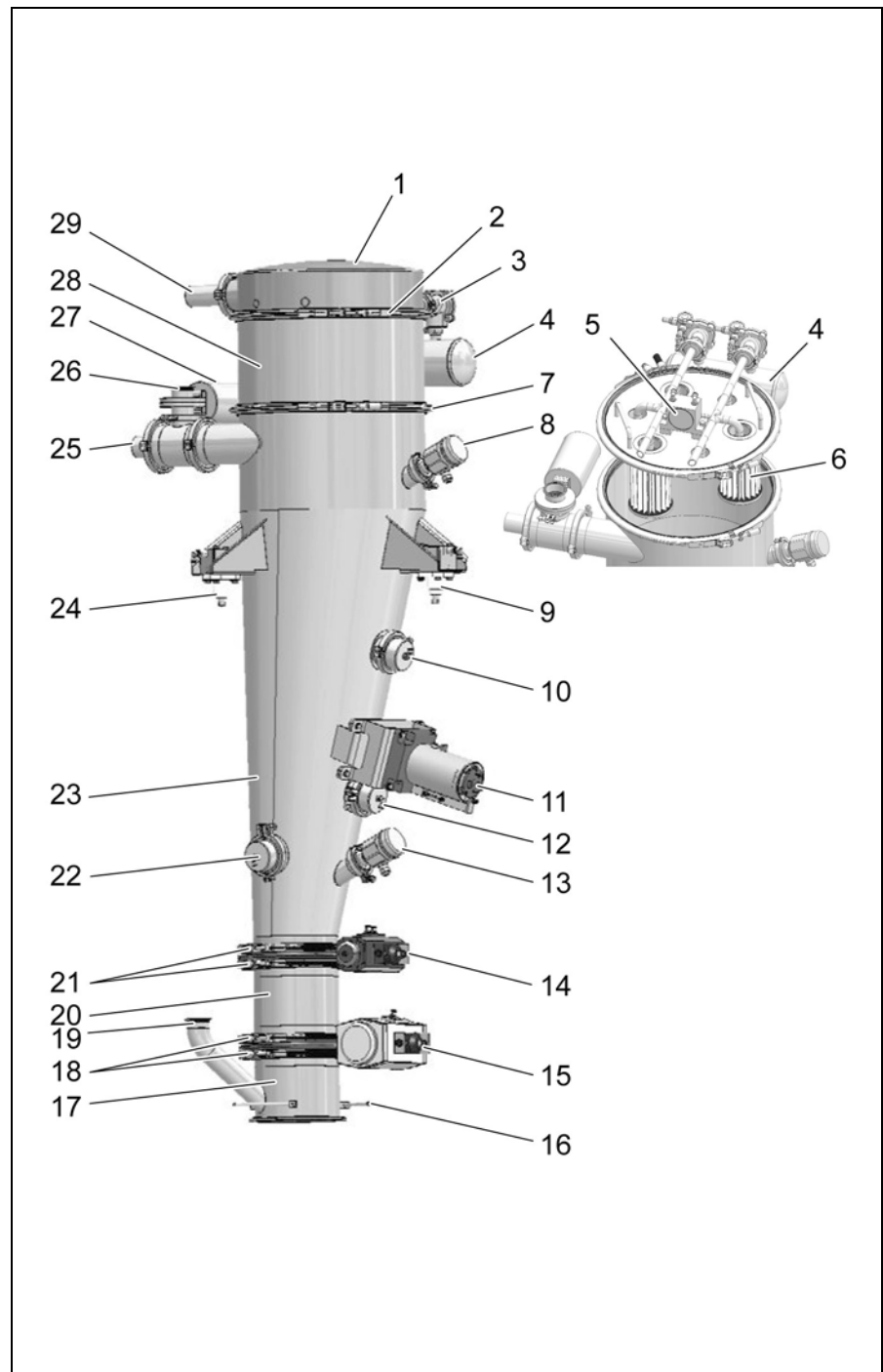


Fig. 3.2 Receiver

3.2 Components

3.2.1 Load cells

The receiver is suspended on three load cells. The weight of the products in the receiver is determined by differential weighing.

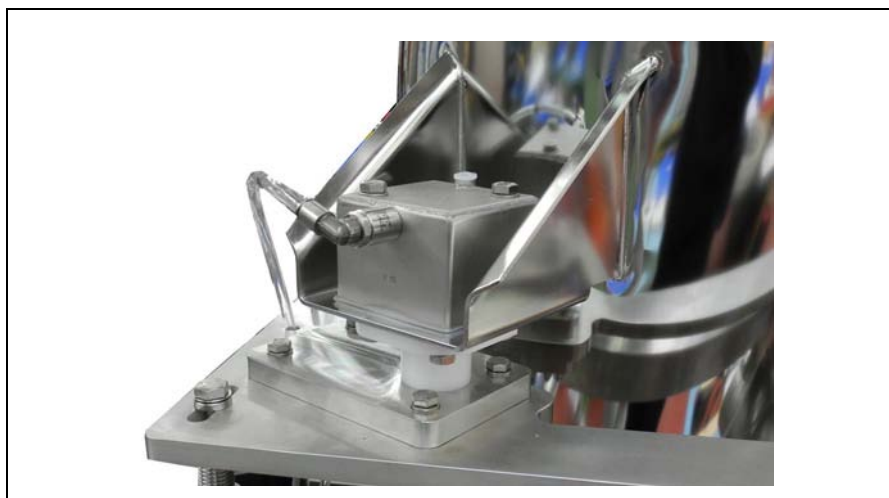


Fig. 3.3 Load cell

3.2.2 Filter cartridges and filter cleaning

Filter cartridges under the lid of the receiver are used to separate the product dust from the transport air.

When standard settings are applied, the filters are cleaned with compressed air pulses during the discharge period. The product dust collected on the filters is blown off. At the end of the discharge period, the receiver is filled with a new product batch.

The compressed air impulses are blown into the filters through two membrane valves. The compressed air required for filter cleaning is stored in a compressed air tank.

- (1) Handle
- (2) Tube sheet
- (3) Pressure pipe
- (4) Membrane valve
- (5) Compressed air tank
- (6) Filter cartridge

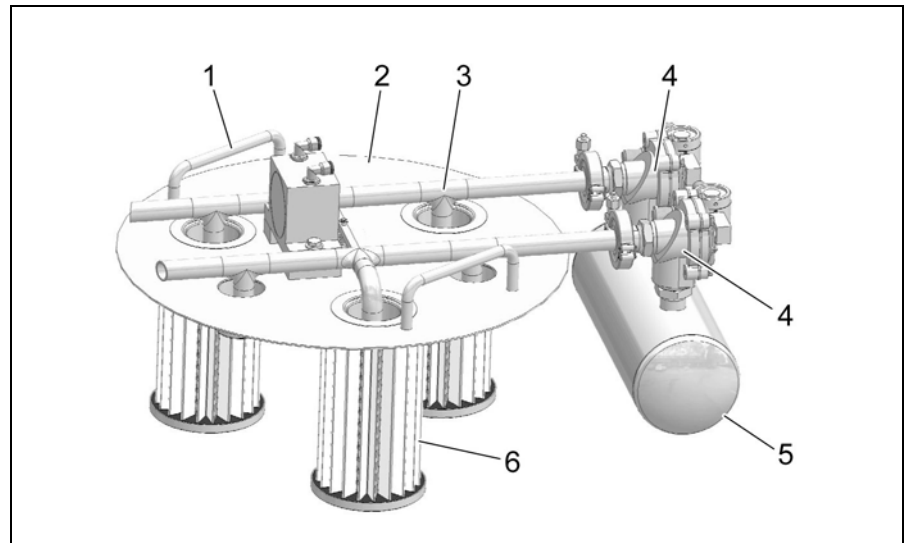


Fig. 3.4 Filter cleaning, receiver

3.2.3 Air filter

The air is cleaned by a filter

- (1) Dust filter F05
- (2) Bin vent filter with jet nozzle F04
- (3) Safety filter HEPA F02

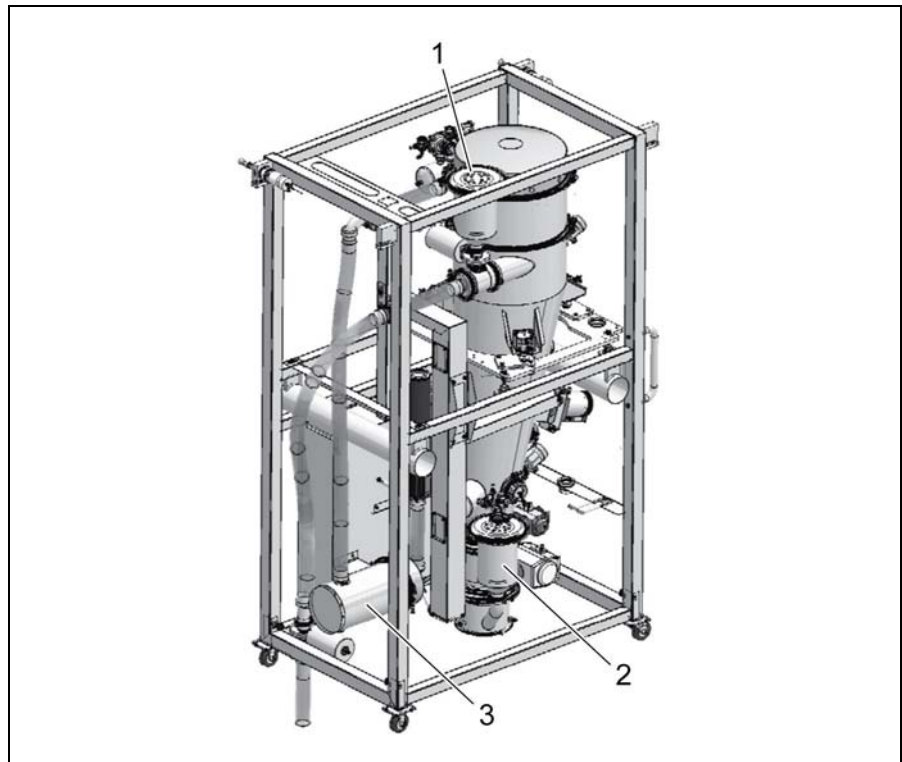


Fig. 3.5 Position of the air filters

- (1) Filter F01
- (2) Manual stop valve
- (3) Connection for hose to safety flap KS01
- (4) Connection option for level sensor
- (5) Connection to discharge station

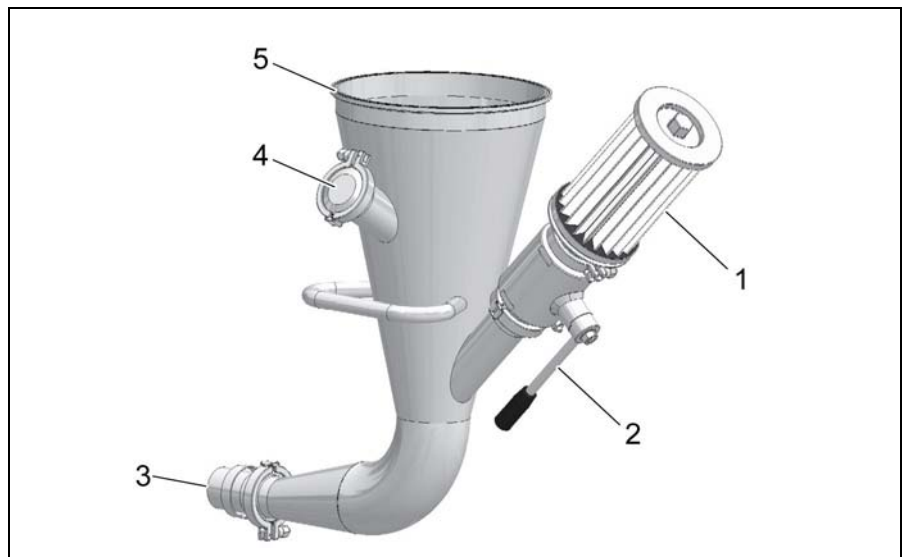


Fig. 3.6 Filter F01 after discharge station

- (1) Lid
- (2) Clamping ring
- (3) O-ring
- (4) Filter plate
- (5) Filter
- (6) TRI CLAMP seal
- (7) Filter retainer

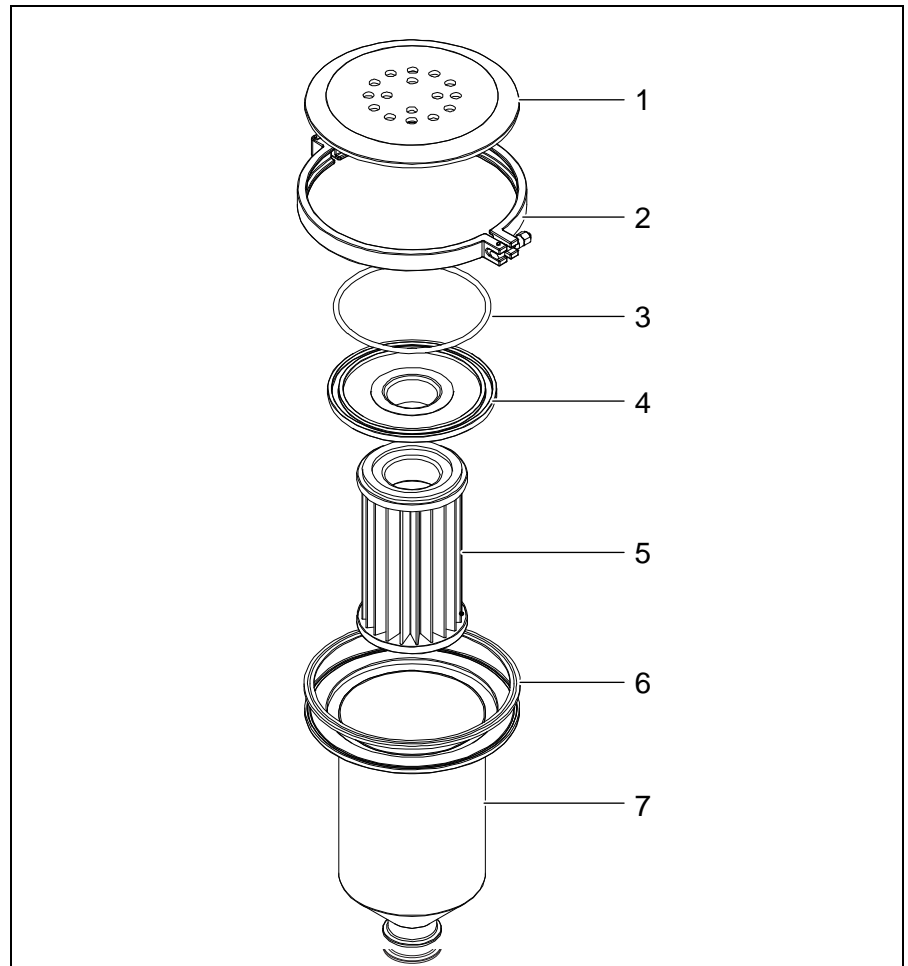


Fig. 3.7 Dust filter F05

- (1) Filter
- (2) Pressure tank
- (3) Membrane valve
- (4) Adapter
- (5) Clamping ring
- (6) TRI FLANGE seal
- (7) Lid
- (8) Nozzle
- (9) O-ring
- (10) Tube sheet
- (11) Filter
- (12) Clamping ring
- (13) TRI CLAMP seal
- (14) Filter retainer

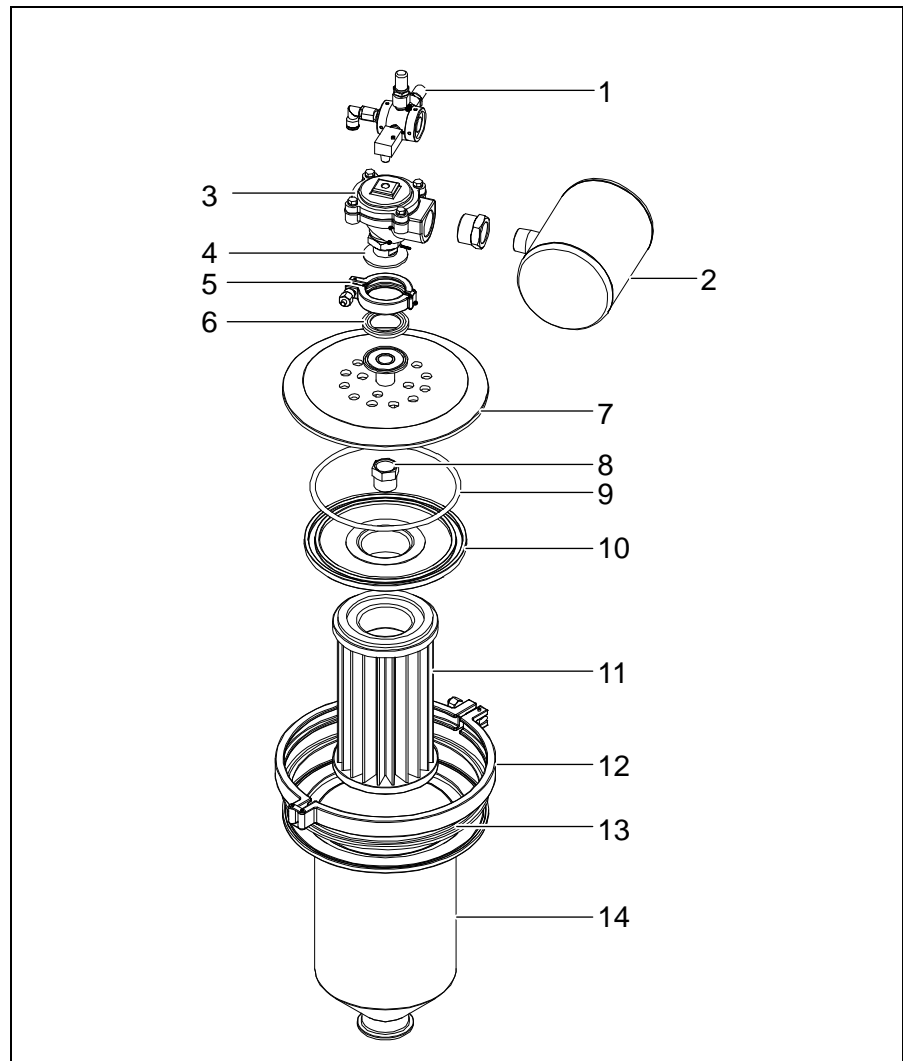


Fig. 3.8 Bin vent filter F04

3.2.4 PIAB pump

The vacuum is created by the PIAB pump. The PIAB pump works according to the Venturi principle. The HEPA filter cleans the air supplied.

- (1) PIAB vacuum pump
- (2) Safety filter HEPA F02
- (3) Clamp

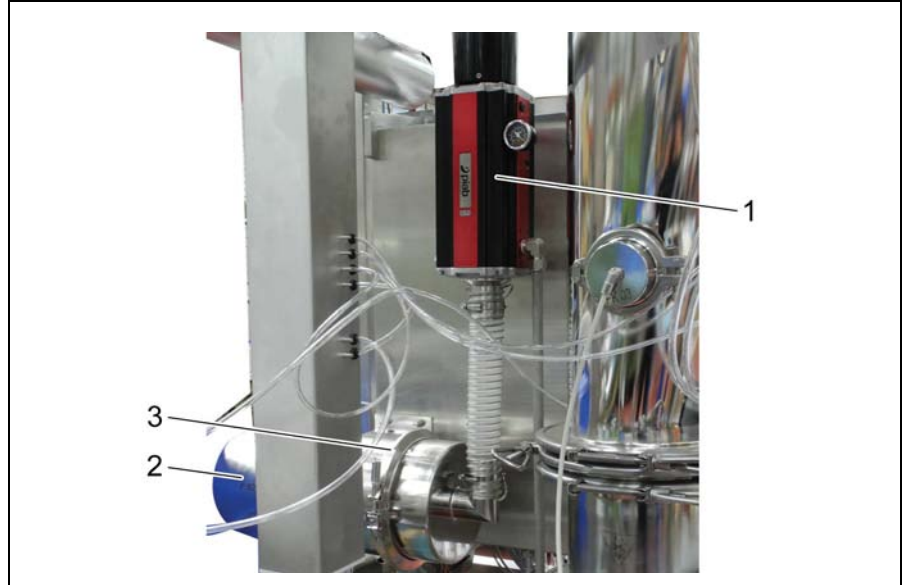


Fig. 3.9 PIAB pump

3.2.5 Knocker and fluidising pad

These components prevent bridge formation by the products in the receiver. They contribute to better flow properties during discharge.

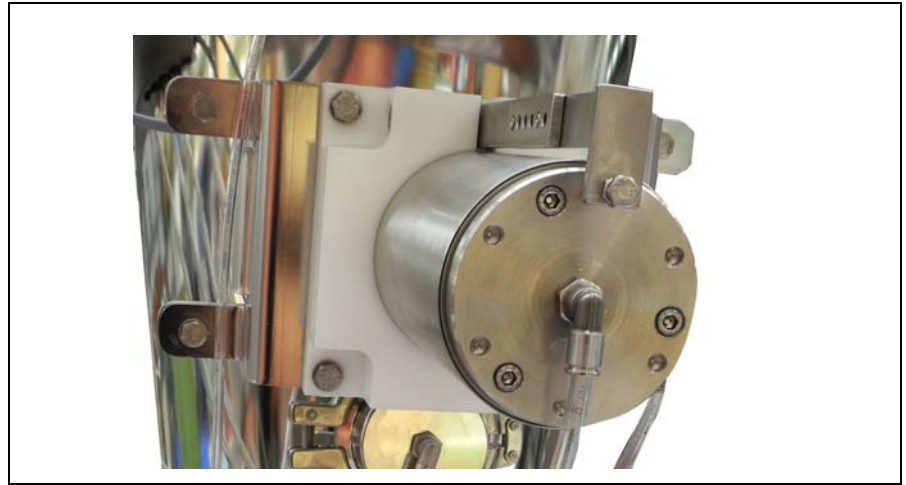


Fig. 3.10 Knocker Y01

The installed diffusor is in contact with the container wall. Air blown between the container wall and the diffusor initiates vibration of the diffusor and thus also of the products.

- (1) Clamping ring
- (2) Housing
- (3) Clamping seal for compressed air hose
- (4) Compressed air hose
- (5) Installation rod
- (6) Counter support
- (7) Pipe with outside thread, for air supply
- (8) Diffusor

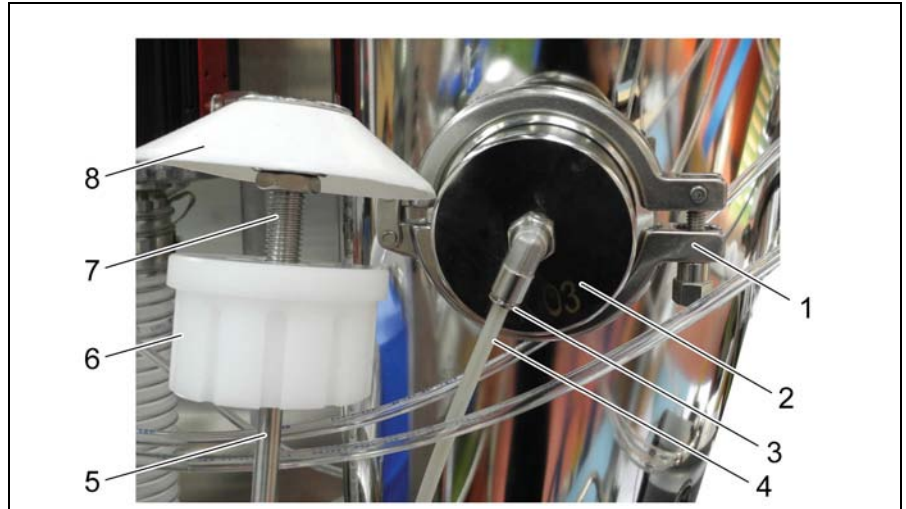


Fig. 3.11 Installed and uninstalled fluidising pads

3.2.6 Storage facilities for cleaning

Storage facilities on the trolley are used for safe storage of sensors that have been removed for cleaning.

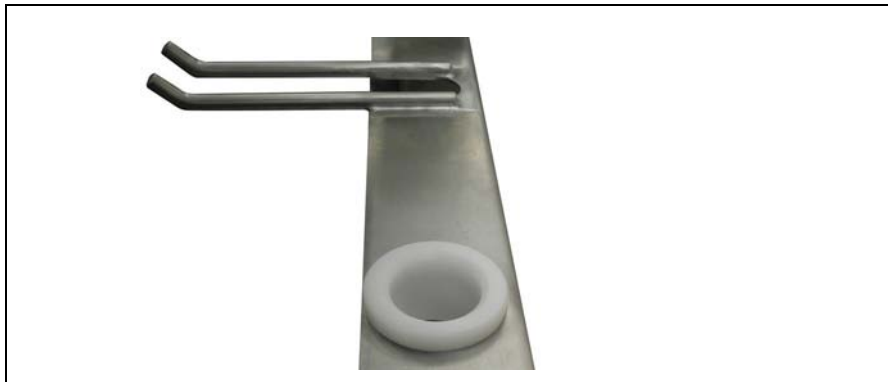


Fig. 3.12 Storage for valves (on top) and level sensors (at the bottom)

The compressed air pipes of the de-installed components are placed onto the fittings for cleaning purposes. This procedure closes the pipes so that no water can get inside them.

(1) Fitting for hose storage



Fig. 3.13 Fitting for hose storage

3.2.7 WIP cleaning nozzle

The cleaning nozzle is used to clean the inside of the receiver. The cleaning liquid initiates a rotating movement of the nozzle that ensures cleaning in all places.

The nozzle is installed for cleaning instead of the level sensors.

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Cleaning may only take place when the conveyor system is switched off.

The cleaning nozzle may only be operated while it is installed to prevent injuries due to cleaning liquids. The openings of the receiver must be closed.

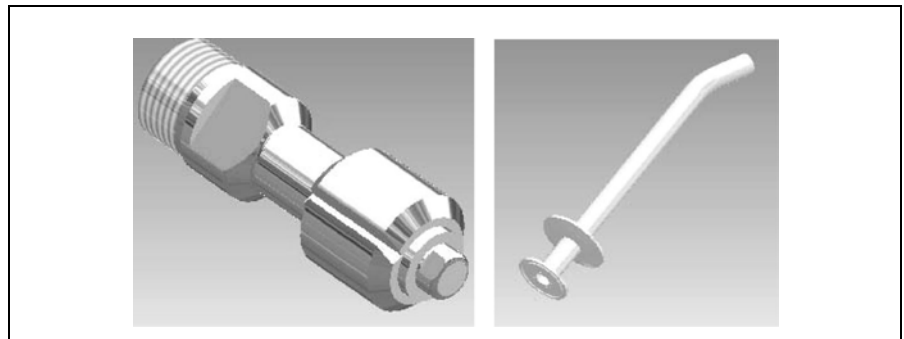


Fig. 3.14 Cleaning nozzle

3.2.8 Control box and connections

The control box contains components for setting and controlling the pressure.

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The control box contains live components. The control box may therefore only be opened by electricians.

The components in the control box are labelled according to the P+I plan and the pneumatic plan.

- (1) Pressure reducer P01
- (2) Block with solenoid valves
- (3) Terminal strip (electricity)
- (4) Pressure distribution plate
- (5) Pressure reducer P04
- (6) Pressure reducer P02
- (7) Pressure reducer P03



Fig. 3.15 Control box

- (1) Compressed air connection X71, general connection, compressed air supply by customer
- (2) Compressed air connection X72, for PIAB pump, compressed air supply by customer
- (3) Electrical connection (2x Harting plug)

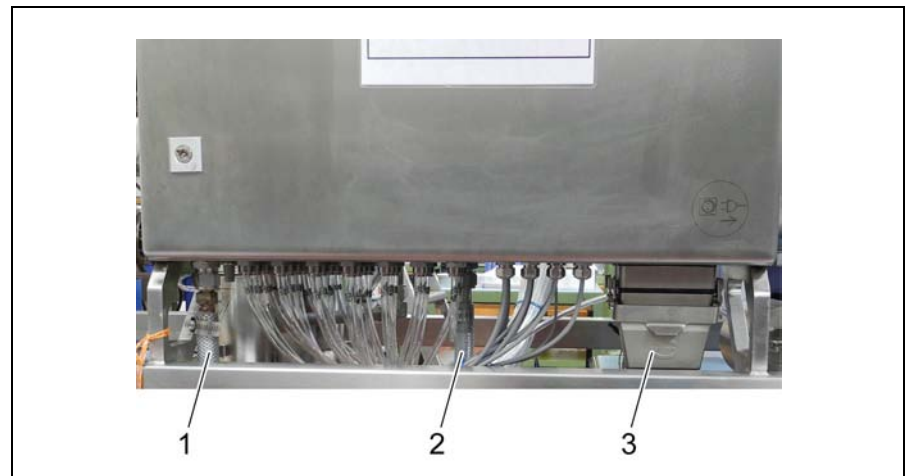


Fig. 3.16 Connections at the control box

3.2.9 Connection for product supply

The product is supplied through a flexible hose.

- (1) Dust filter F05
- (2) Ventilation flap KS03
- (3) Connection pipe, horizontally installed
- (4) Flexible hose
- (5) Flexible hose (connection of product supply)

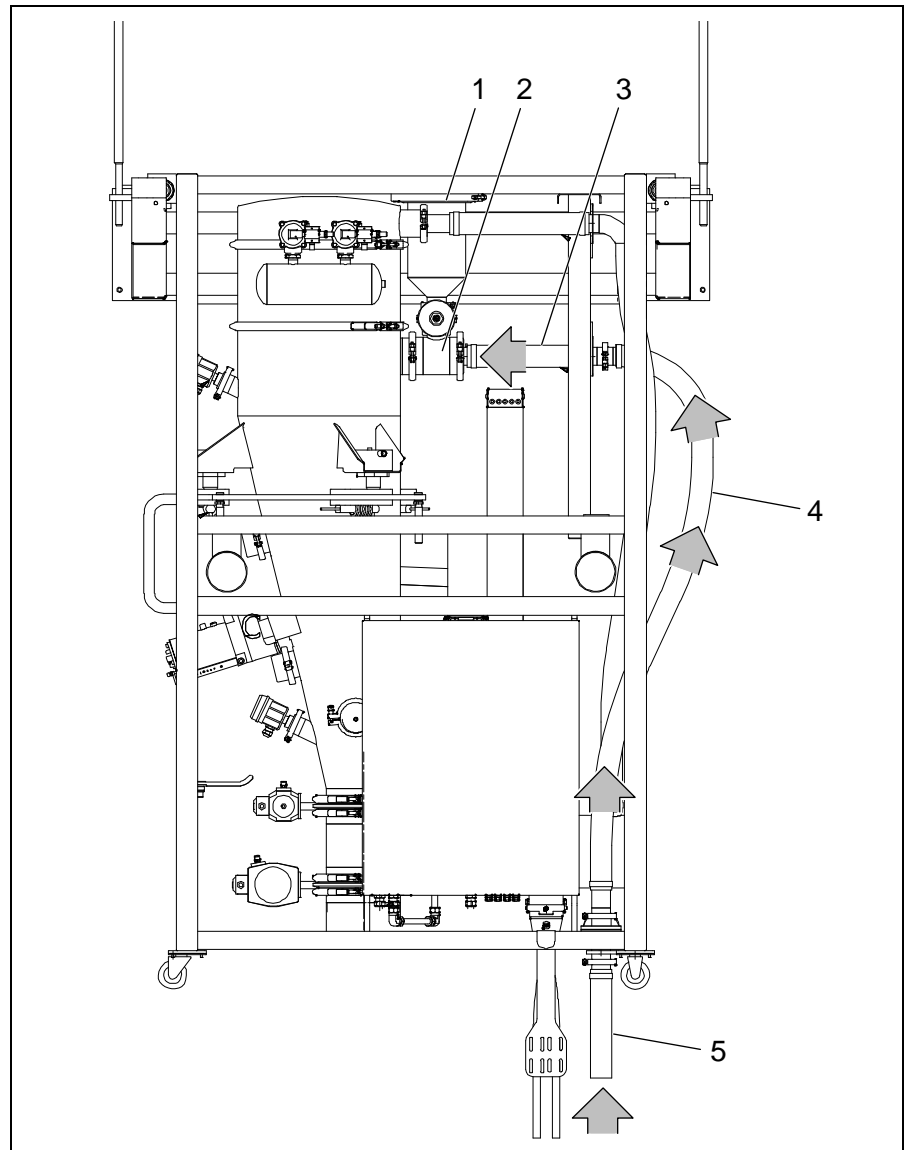


Fig. 3.17 Product supply

3.3 Flow diagram

3.3.1 Weight monitoring

The receiver is mounted on load cells. The net weight is kg of the products in the receiver is shown on the Coperion K-Tron (Switzerland) LLC operating panel.



The weighing system must be manually set to "0" using the "Tare" function before initial filling.

3.3.2 Initial filling

The initial filling function is used to prepare the suction conveyor system for the first refilling process of the differential dosing scale (W300). As soon as the system is switched on with the "System ON/Off" switch at the panel on the customer side, the Coperion K-Tron (Switzerland) LLC operating panel shows a dialogue that allows the operator to select whether initial filling is to be performed.

The following conditions must be fulfilled before initial filling can take place:

- The trolley must be moved into position and locked.
- The release signal of the (product present and ready) from the discharge station must be on.
- The level sensors L05 and L06 may not be occupied.

The transport process is terminated when the filling level in the receiver has been reached. An alarm is generated when the maximum permitted transport time is exceeded and the level sensor L05 has not been reached.

Initial filling can be terminated at any time by pressing the "System On/Off" switch again.



Initial filling is not possible when the system is controlled from a control centre.

3.3.3 Control of the filling level

Control with the level sensor L05

The transport process starts when the system is in automatic mode and the level sensor L05 is not occupied. The safety flap KS01 is opened and the ventilation flap KS03 is closed.

Thereafter, the Venturi system is started. The continuously produced vacuum fills the receiver with product from the discharge station. The transport process continues for an adjustable time period after the product has reached the level sensor L05. In this case the safety flap KS01 is closed and the ventilation flap KS03 is opened so that the conveyor line is emptied during this pre-set time period. Thereafter, cleaning of the conveyor line starts.

The transport stops after 25 seconds when the discharge station reports "Empty" during the transport process. Transport can only be continued after the discharge station is again ready for operation.

The transport process starts again when the discharge has been completed, the starting conditions are fulfilled and no new discharge request is pending.

Control by weight signal

The weight signal of the scale is evaluated for control purposes.

An maximum and minimum filling level are defined in the Coperion K-Tron (Switzerland) LLC controller. The filling process is started when the weight drops below the minimum filling level. Transport continues until the maximum filling level has been exceeded. The starting conditions (automatic operation, level sensor L05 not occupied) must be fulfilled.

Transport starts when level sensor L06, which is mounted at the bottom, reports "Empty", even when the filling level did not drop below the minimum level.

The level sensor L05, which is mounted on top, is only used to prevent overflow. The upper filling level must therefore always be below L05.

3.3.4 Discharge process

As soon as a refilling request of the Coperion K-Tron (Switzerland) LLC dosing scale is pending and the release for discharge is available from the control system, the discharge of the receiver starts.

A currently active conveying process of the receiver will be interrupted when required.

The Cora flap KS02 is opened when it has been preselected at the Coperion K-Tron (Switzerland) LLC operating panel. The feedback message "KS02 open" is sent when the product discharge with the Cora pivot flap ZS01 starts.

The knocker and/or the four fluidising beds can be switched on to improve the discharge process.

3.3.5 Batch change

The empty message during the batch change can be created by the weight signal or the level sensor L06. The selection is performed by the Coperion K-Tron (Switzerland) LLC operating staff.

The Cora pivot flap ZS01 remains open for a set lag time to ensure that the receiver runs completely empty. After expiry of this time limit it is assumed that the receiver is completely empty and that a batch change can be performed.

3.3.6 Filter cleaning

Cleaning of the filters Filter F03.1 - F03.6 is performed according to the pre-selection at the Coperion K-Tron (Switzerland) LLC operating panel, either during or after conveying, during discharge, during line cleaning or after an adjustable interval. The length of the cleaning impulse as well as the number of impulses can also be set at the Coperion K-Tron (Switzerland) LLC operating panel.

The Coperion K-Tron (Switzerland) LLC operating panel can be used to set or pre-set the number of filter rows (single or dual). In "Dual" mode, two filter rows (Type: P100 filter) are alternately cleaned using pre-set impulse times. The number of impulses set is distributed over the individual filter rows. The "Single" mode uses a single filter row (Type: P10 / P30 filter) which is not used in this context.

During filter cleaning, the safety flap KS01 is closed and the ventilation flap KS03 is open (except when cleaning during the conveying period and when cleaning the line), so that the overpressure created by blowing off the filters can escape into the atmosphere.

The vibrator Y 02 is activated according to the pre-selection at the Coperion K-Tron (Switzerland) LLC operating panel, either during or after conveying, during discharge, during line cleaning or after an adjustable interval. The period for which it remains switched on as well as the number of impulses can also be set at the Coperion K-Tron (Switzerland) LLC operating panel.

Filter cleaning can be triggered at any time with a button installed on the customer control panel. The parameters used are the same as for the regular cleaning procedure.

The bin vent filter F04 of the differential dosing scale is cleaned after each refilling process. The number of impulses as well as the length of the pulses and breaks can be set at the Coperion K-Tron (Switzerland) LLC operating panel.

3.3.7 Manual mode

All flaps (KS01, KS02, KS03), the valves (SV20, SV24, SV32, SV34, SV38), the Cora pivot flap (ZS01) and the receiver can be manually operated at the Coperion K-Tron (Switzerland) LLC operating panel.



All locks that apply in automatic mode remain active in manual mode to prevent damage.

PIAB pump VX01



The safety flap KS01 or the ventilation flap KS03 must be opened before the PIAB pump is switched on. This prevents a vacuum from being generated in the closed system.

Knocker Y01

The knocker can be switched on or off without restrictions during manual operation.

Fluidising pads FK01, FK02, FK03, FK04

The fluidising pads can be switched on and off in manual mode without any further conditions.

Safety flap KS0

The safety flap KS01 can be opened or closed without restrictions during manual operation.

Ventilation flap KS03

The ventilation flap KS03 can be opened or closed without restrictions during manual operation.

Cora flap KS02

The Cora flap can be opened or closed without restrictions during manual operation.

Cora pivot flap ZS01

The pivot flap can be activated with the on/off switch at the T-Tron operating panel in manual mode. The pivot flap then moves between the two end positions until the off button is pressed at the Coperion K-Tron (Switzerland) LLC operating panel.





Flap KS02 must be opened for manual operation of the pivot flap ZS01 before the Cora flap KS02 is deselected at the Coperion K-Tron (Switzerland) LLC operating panel. A safety lock is included to prevent a blockage of product in the discharge channel and damage to the pivot flap.



4 Technical data



The device and the attached components are certified for ATEX, see declaration of conformity.

The safety instructions for explosion protected devices must be adhered to, see [Chapter 12 - "Explosion protection"](#).

Manufacturer	Coperion K-Tron (Switzerland) LLC
Description	PTS Powder Transfer System
Conformity	  II (For detailed marking see declaration of conformity)
ATEX	II 3D / 1D T100°C X
Permitted products	Powders that do not chemically react with the materials of the device.
Product temperature	0 °C to +50 C [+32 °F to 122 °F]
Compressed air connections	Filtered, dry, oil-free compressed air
Min. pressure	6 bar [87 PSIG]
Max. pressure	7 bar [101.5 PSIG]
Air consumption	See P+I diagram 1-1104657800
Receiver P100	
Capacity	100 litres
Weight with pivot flap	155 kg [342 lb] ±10%
Max. surface temperature	See declaration of conformity
Max. compressed air	6 bar [90 PSI] filtered, dry and oil-free
Max. pressure for filter cleaning	4 bar [60 PSI] filtered, dry and oil-free
Max. pressure for dropping	6 bar [90 PSI] filtered, dry and oil-free
Number of cleaning filters	3 or 6
Filter surface	In total approx. 9 m ² [100 ft ²] made of 100% woven polyester
Material	Stainless steel, material number 1.4404 (AISI 316L)
Filter material	Polyester with PTFE coating, filter cartridges
Seals	Natural rubber, white, food quality (FDA)
Table page 1 of 2	

Load cells																									
Capacity	3 x 200 kg [3x441 lb]																								
Track																									
Weight	155 kg [342 lb] ±10%																								
PTS																									
Weight with receiver	420 kg [1367 lb] ±10%																								
Dimensions (height x width x depth)	2256 mm x 1475 mm x 941.6 mm [88.8 in x 37.1 in x 32.5 in] See Drawing 1104657000																								
Operating temperature range	0 °C to +40 C [+32 °F to 104 °F]																								
Relative humidity:	5 to 95 %, not condensating																								
Noise level	< 70 dB (A)																								
Marking	<div style="border: 1px solid black; padding: 10px;">  <div style="float: right;">Country of Origin: Switzerland Ursprungsland: Schweiz</div> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 60%;">Typ/Type</td> <td style="width: 15%;"><input type="text"/></td> <td style="width: 5%; text-align: center;">—</td> <td style="width: 20%; text-align: center;">1</td> </tr> <tr> <td>Ident.-No.</td> <td><input type="text"/></td> <td style="text-align: center;">—</td> <td style="text-align: center;">2</td> </tr> <tr> <td>Ambient temperature</td> <td><input type="text"/></td> <td style="text-align: center;">—</td> <td style="text-align: center;">3</td> </tr> <tr> <td>Material temperature</td> <td><input type="text"/></td> <td style="text-align: center;">—</td> <td style="text-align: center;">4</td> </tr> <tr> <td>Jahr/Year</td> <td><input type="text"/></td> <td style="text-align: center;">—</td> <td style="text-align: center;">5</td> </tr> <tr> <td>Kennzeichnung / Marking</td> <td><input type="text"/></td> <td style="text-align: center;">—</td> <td style="text-align: center;">6</td> </tr> </table> <div style="margin-top: 10px;"> <p>K-Tron (Schweiz) GmbH CH-5702 Niederlenz</p>  <p>Patents pending</p> </div> </div>	Typ/Type	<input type="text"/>	—	1	Ident.-No.	<input type="text"/>	—	2	Ambient temperature	<input type="text"/>	—	3	Material temperature	<input type="text"/>	—	4	Jahr/Year	<input type="text"/>	—	5	Kennzeichnung / Marking	<input type="text"/>	—	6
Typ/Type	<input type="text"/>	—	1																						
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Table page 2 of 2																									

5 Transport, storage and disposal

NOTICE

Damage to the load cells during transport!

- ▲ Remove load from the load cells and protect them from strain (transport lock) before the transport.
 - ▲ Do not lift at the load cell.
-

5.1 Transport



See delivery note for weight information.

5.1.1 Unpacking

1. Check whether the supplied goods are complete and check them for transport damage.
2. Report any damage immediately to shipper and to Coperion K-Tron (Switzerland) LLC.
3. Dispose of packaging material according to the local regulations.

5.1.2 Transport by crane

⚠ DANGER

Risk posed by falling transport material!



- ▲ Only have the equipment transported by authorized and qualified personnel.
- ▲ Wear personal protective equipment (protective helmet, safety shoes and protective gloves).
- ▲ Select the lifting gear in accordance with the total weight to be transported.
- ▲ Take note that the centre of gravity is not in the middle.
- ▲ Do not stand under suspended loads.
- ▲ Ensure that there are no bystanders on the transport path.



- ⇒ Make sure all clamps are securely fastened.
- ⇒ Check all attached components for firm attachment.
- ⇒ Do not crush cables and compressed air pipes.

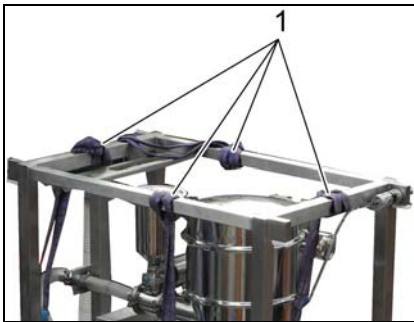


Fig. 5.1 Transport by crane

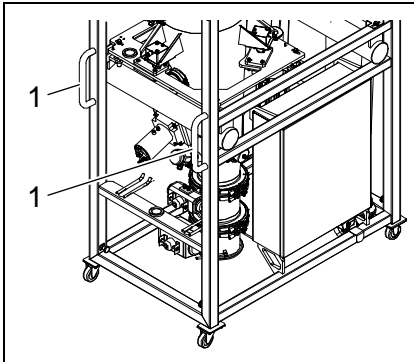
1. Fasten and secure the lifting tools (1) to the trolley.
2. Lift slightly to determine the centre of gravity.
3. Move the device to the place of installation.

5.1.3 Transport on rollers

The device can be moved on the rollers attached when the transport path is even and the distance to the place of installation is not too long.

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- ⇒ Make sure all clamps are securely fastened.
- ⇒ Check all attached components for firm attachment.
- ⇒ Do not crush cables and compressed air pipes.



1. Push the trolley at the handles (1) to the place of installation.

Fig. 5.2 Transport on rollers

5.2 Storage

NOTICE

Property damage caused by improper storage!

▲ The device must be properly stored.

- Empty and clean the device and add a material safety data sheet (MSDS), indicating which product was last transported.
- Seal all openings with blank flanges, blank stoppers or plastic covers.
- Close open ends of compressed air pipes.
- Ensure that the storage space meets the following requirements:
 - Dry
 - Not condensating
 - Frost-free

5.3 Disposal

▲ WARNING



Risk of injury and poisoning by the transport medium!

- ▲ Personal protective clothing is to be worn for all work on the device.
 - ▲ The safety instructions for handling these materials must be adhered to.
-

- Dispose of the device in accordance with the local regulations.

6 Installation

DANGER



Danger of explosion!

- ▲ When working with dusts that could result in an explosive atmosphere, ATEX-certified assemblies must be used.
- ▲ Only use original Coperion K-Tron (Switzerland) LLC seals and filters.
- ▲ After installation, check all grounding points with a measuring device according to the test plan.
See Document No. 1104657-EGC-R001.

6.1 Prepare the installation site.



6.1.1 Requirements for the place of installation.

- The device must be freely accessible.
- Sufficient space for maintenance and repair work.
- Even.
- Clean (no oil, dust or other pollutants).
- Sufficient carrying capacity (own weight, product weight and operating forces).
- The positional stability of the device must be ensured.
- Sufficient air volume in the building. Air consumption see P+I diagram.

6.1.2 Mount the track



The trolley is rolled onto the support track and fastened by pneumatic clamping. The track must therefore be mounted at the right height and then levelled.

For dimensions see Drawing No. 1104657500.

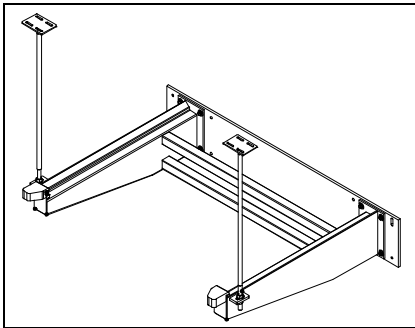


Fig. 6.1 Track

1. Draw the height level onto the wall.
2. Mount the track on the wall and ceiling using suitable fastening elements.

6.1.3 Check and adjust the height

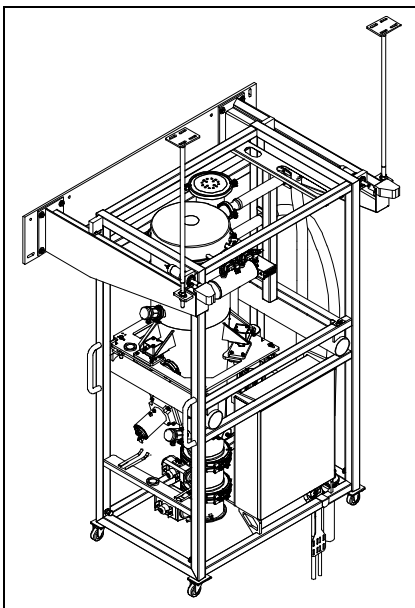
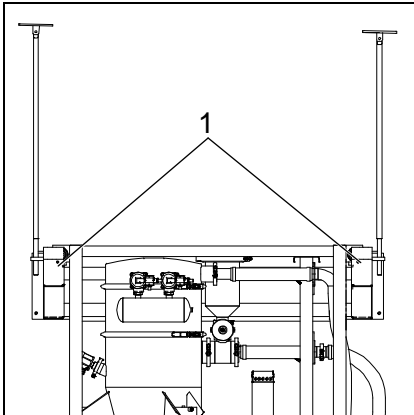


Fig. 6.2 The trolley is fastened on the track

1. Roll the trolley onto the track.
2. When the height of the trolley and the track do not exactly correspond:
 - Either loosen the rack and adjust its height,
 - or adjust the height of the rollers on the trolley.

6.1.4 Levelling the track



⇒ Level the track at the supports (1) for the trolley. The adjustment range of the ceiling attachment is ± 50 mm.

Fig. 6.3 Levelling

6.2 Install the components

The device is completely assembled when it is handed over. The installation regulations must be adhered to during later installation / de-installation.



▲ CAUTION

Risk of injury and damage to goods!

- ▲ Take note of the installation instructions in the documentation of the components. See system manual.

6.2.1 Equipotential bonding (ATEX)

NOTICE

Risk of explosion due to wrong installation!

- ▲ Each clamping ring establishes a connection for which consistent electrostatic conduction must be ensured.

- (1) Housing or cover
- (2) V-clamp
- (3) Housing or filter extension
- (4) Seal
- (5) Sealing ring
- (6) Tube sheet

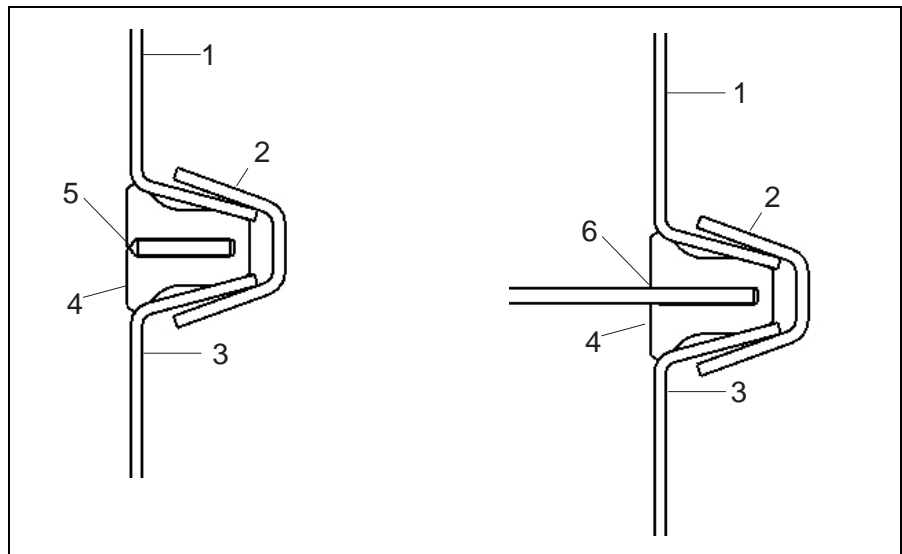


Fig. 6.4 Equipotential bonding at the clamping ring

6.2.2 Installing the flaps

Flaps are, for example:

- Slide gate valve
- Pivot flaps

WARNING

Risk of crushing and shearing!

Risk of injury due to moving flaps.



- ▲ Ensure that the flaps are not powered before the installation.
 - ▲ Switch off the main switch and release the pressure in the device and the pipes. Secure against switching on.
 - ▲ Take note of the installation instructions in the documentation of the components. See system manual.
 - ▲ Install the flaps so that reaching into the flaps is not possible.
 - ▲ Attach a warning note at or next to the flap.
-

6.3 Hose assembly

⚠ DANGER



Danger of explosion!

- ▲ Static discharge caused by improper grounding may result in accidents or explosions! All transport equipment, transport and vacuum pipes must be grounded.

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- Any pipe installation plans given in the system manual should be consulted before installation.
- Install the pipes as straight as possible. Use as few pipe bends as possible.
- Support the pipes at least every 6 m [20 ft].
- Plan sufficient space for access to the pipe fittings, e.g. using a ladder or scaffolding.
- Firmly attach the pipe supports to the wall or ceiling.
- Pipes should be cut off straight and the edges folded over.
- Use appropriate hoisting equipment to move the pipes.
- Correctly link the pipes with the appropriate couplings.
- Check the correct assembly of the clamping rings, seals and filters.
- Measure the electricity flow through the grounding connections before start-up. Low-resistance equipotential bonding to ground.

6.3.1 Rigid transport pipe

The ground connection between the various system components takes place via bushings. A stainless steel strip constitutes the electrical connection between the two parts.



Fig. 6.5 Rigid transport pipe



Fig. 6.6 Flexible transport pipe

6.3.2 Flexible transport pipe (hose)

All hose sections should have a ground wire molded in the hose.

⇒ Connect the hose at the end with a conductive connection to the ground conductor. This prevents the build-up of static electricity in the non-conductive part of the system.

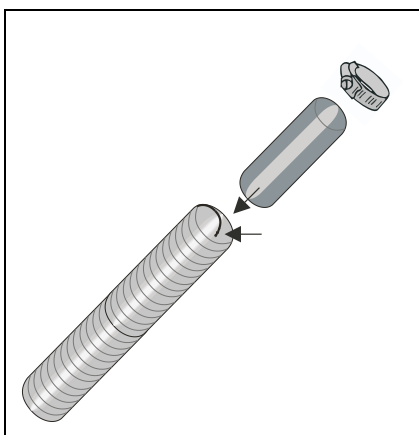


Fig. 6.7 Link to transport pipe

6.3.3 Connection of flexible transport pipe (hose)

1. Strip out approximately 50 mm [2 in] of the ground wire on each end of the hose.
2. Install the grounding connection on the inside.
3. Slide the hose over the pipe.
4. Before tightening the hose clamps, ensure that the ground connector is in contact with metal.

Or:

⇒ Use a special hose clamp with a ground connection.



Fig. 6.8 Hose clamp

6.3.4 Installation of a flexible transport pipe (hose)

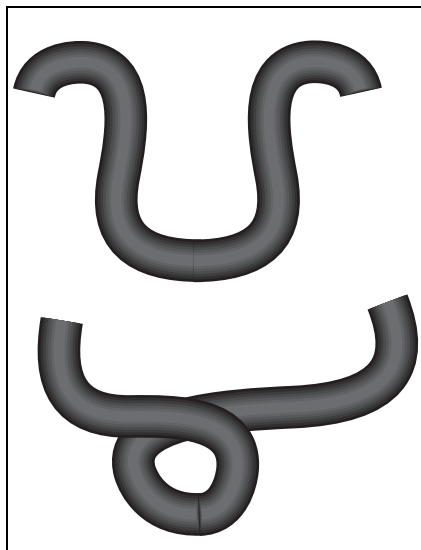


Fig. 6.9 Wrong installation of the transport pipe

- ⇒ Install transport pipe without loops and indentations.
- ⇒ Install transport pipes along the shortest possible route.

6.4 Electrical connection

⚠ DANGER



Mortal danger as a result of live wires!

- ▲ The device may only be electrically connected by an electrician.
- ▲ Observe the local regulations.



Connect the ground connection to a low-impedance equipotential bonding, see the grounding information on the device.



Provide a lockable main switch to disconnect the main power supply from the conveying device.



Information concerning the electrical connection is provided in the connection plan.

1. Connect the device according to the connection plan.
2. Ground the conveying device carefully.



⚠ DANGER



Danger of explosion!

- ▲ Check all grounding points with a measuring device according to the test plan before initial operation.
See Document No. 1104657-EGC-R001.

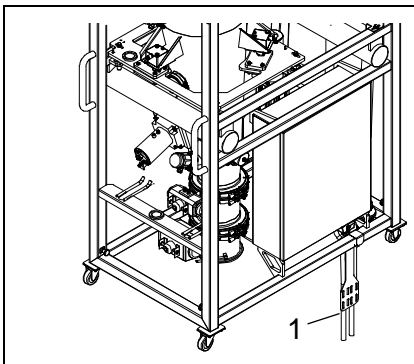


Fig. 6.10 Cable strain relief

1. Secure power cables with cable strain relief (1).

6.5 Compressed air in general

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- Take note of the requirements for compressed air, see [Chapter 4 - "Technical data"](#).
- First establish the compressed air connections at the solenoid valves and then the respective electrical connections.

⇒ Adjusting the compressed air for filter cleaning. Adjustment value, see [Chapter 4 - "Technical data"](#).

7 Start-up



⚠ DANGER

Danger of explosion!

- ▲ When working with dusts that could result in an explosive atmosphere, ATEX-certified assemblies must be used.
- ▲ Static discharge caused by improper grounding may result in accidents or explosions! All transport devices, transport and vacuum pipes connected must be grounded.

NOTICE

Risk of damage by foreign bodies!

- ▲ Before start-up ensure that the device is free of objects.



For more information see system operating instructions and functional design in the systems project manual.

7.1 Remove the transport locks

⇒ Remove the transport locks in the load cells.

7.2 Establish the supply connection

NOTICE

Damage due to overvoltage!

- ▲ Switch off the main switch for the power supply before establishing the electrical connection.

1. Switch off the main switch.
2. Switch off the compressed air supply.
3. Connect the supply connections to the control box.

- (1) Compressed air connection X71, provided by the customer
- (2) Compressed air connection X72, provided by the customer
- (3) Electrical connection

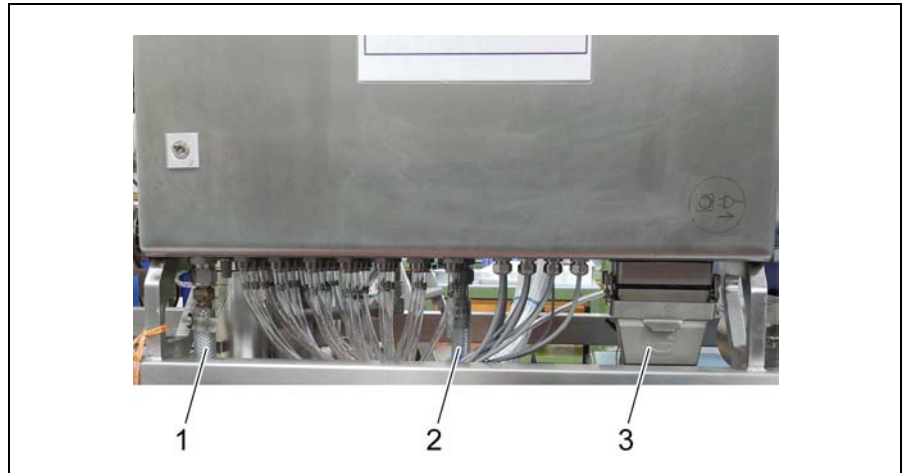


Fig. 7.1 Connections at the control box

7.3 Start-up checklist

1. Check whether all connections have been established.
2. Check whether all V-clamps are closed.
3. Check all grounding points with a measuring device according to the test plan. See Document No. 1104657-EGC-R001.
4. Check the compressed air connection, see [Chapter 4 - "Technical data"](#).

7.4 Switching on and starting the device.



Take note of the [Chapter 8 - "Operation"](#) instructions.

7.5 Adjusting the suction power at the suction pot

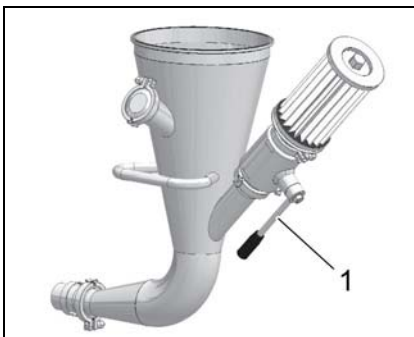


Fig. 7.2 Filter F01 after discharge station

1. Fully open the valve (1).
2. While material is being conveyed to the farthest receiver, slowly close the valve (1) until a steady flow of material is achieved.

8 Operation



⚠ DANGER

Danger of explosion!

- ▲ When working with dusts that could result in an explosive atmosphere, ATEX-certified assemblies must be used.
- ▲ Regularly clean the device of dirt and dust deposits.

⚠ WARNING

Risk of injury and poisoning!

- ▲ Take note of [Chapter 2.4 - "Special risks"](#).
- ▲ Take note of the material safety data sheets (MSDS) for the products transported..
- ▲ Wear personal protective equipment (e.g. hearing protection, respirator, protective gloves, safety shoes).



⚠ CAUTION

No hands icon

- ▲ The device may only be operated when it is impossible to reach into the flap openings.
- ▲ Do not reach into the openings and flaps.



NOTICE

Risk of damage to goods by the products!

- ▲ Do not fill in products that react chemically with the materials used in the device. This includes products that contain the following substances:
 - Acid
 - Iodine
 - Chromium
 - Bromium

8.1 Preparatory measures

8.1.1 Slide the trolley into the support track

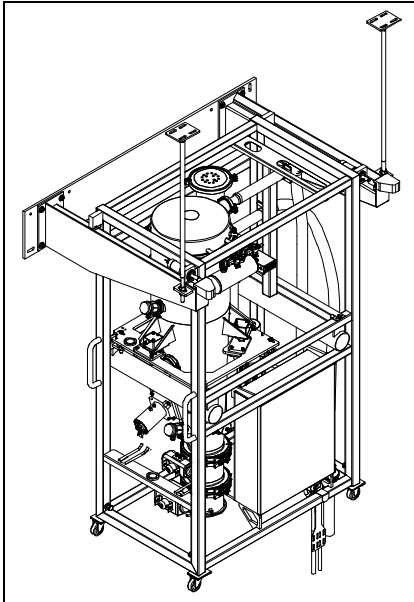


Fig. 8.1 The trolley is fastened on the track

⇒ Roll the trolley onto the track.

The trolley will be fastened by two pneumatic cylinders as soon as compressed air is supplied.

8.1.2 Switch the power supply and compressed air supply on the customer side on/off

1. Switch on the compressed air supply on the customer side and set the adjustment value according to [Chapter 4 - "Technical data"](#).
2. Switch on the power supply on the customer side using the main switch.

8.2 Switching the device on/off

⇒ Switch the equipment on/off with the provided controls



For operation of the control panel, see the system manual.

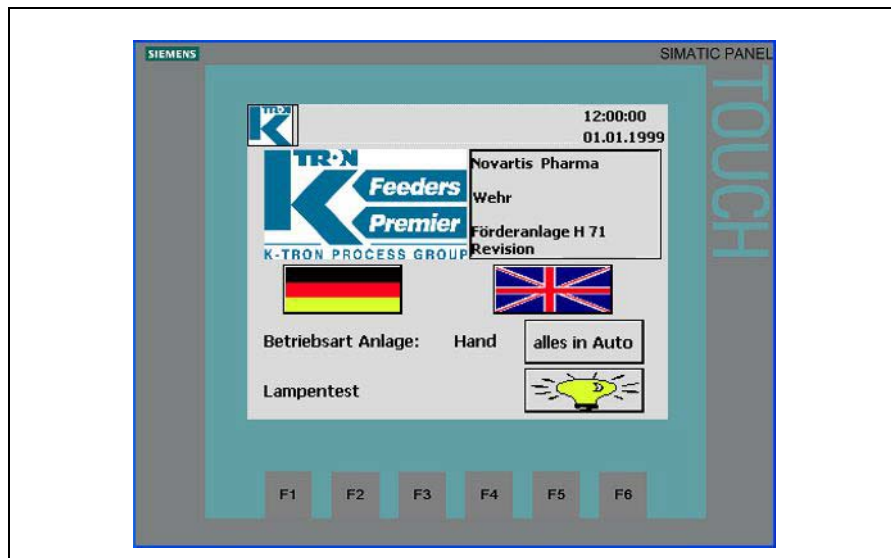


Fig. 8.2 Control System: Start screen

8.3 Operation

The system is operated with the control panel. The system is usually operated in automatic mode.



For a complete description of the control panel, see the system manual.

8.3.1 Flow diagram

See [Chapter 3.3 - "Flow diagram"](#).

8.3.2 Home page of the controls

The overview shows the system structure. The current status of the individual flaps, valves and filling level monitors is shown. The current step of the transport system is shown at the bottom edge.

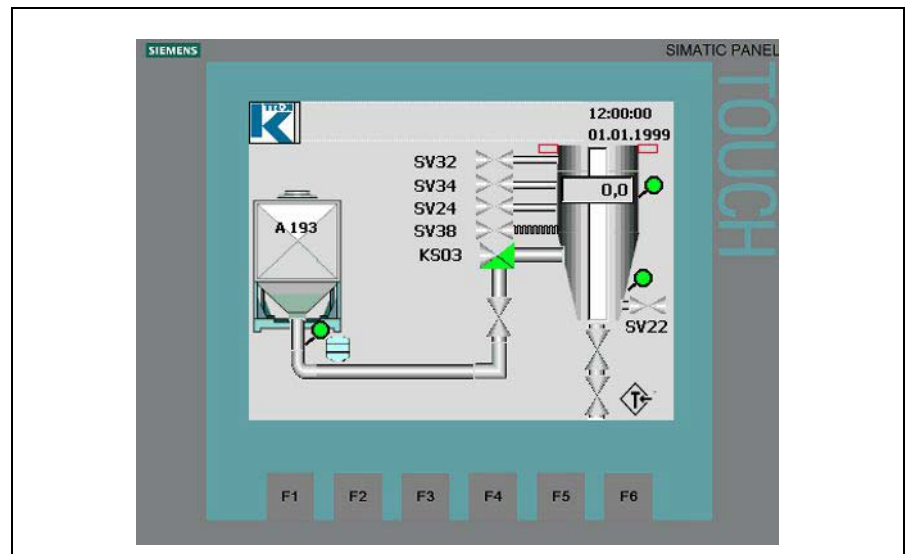


Fig. 8.3 Control System: Overview



The weighing system must be manually set to "0" using the "Tare" function before initial filling.

8.3.3 Manual mode

Touching a valve, flap or the transport system opens a pop-up window in which the respective actuator can be manually operated. All safety-related interlocks remain active during manual operation.

NOTICE

Risk of damage to property!

- ▲ Inappropriate operation may lead to damage or unintended procedures.
- ▲ Only operators trained to operate the system may use it in manual mode. The operator must be aware of the procedures for and consequences of operation.

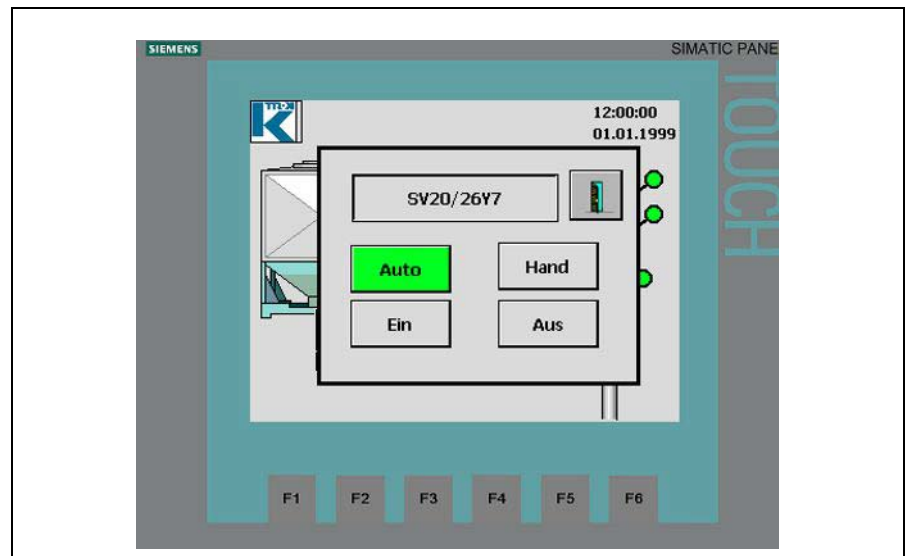


Fig. 8.4 Manual mode: Operation of the individual components



Flap KS02 must be opened for manual operation of the pivot flap ZS01 before the Cora flap KS02 is deselected at the Coperion K-Tron (Switzerland) LLC operating panel. A safety lock is included to prevent a blockage of product in the discharge channel and damage to the pivot flap.

8.3.4 Settings

These menus are used to program the system.

- For example, it is possible to select whether the fluidising pads are to be activated.
- It can also be selected whether it should be possible to control the system via the control system, in parallel to the digital signals.

The settings are performed in sub-menus.

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The submenus are secured by a password.

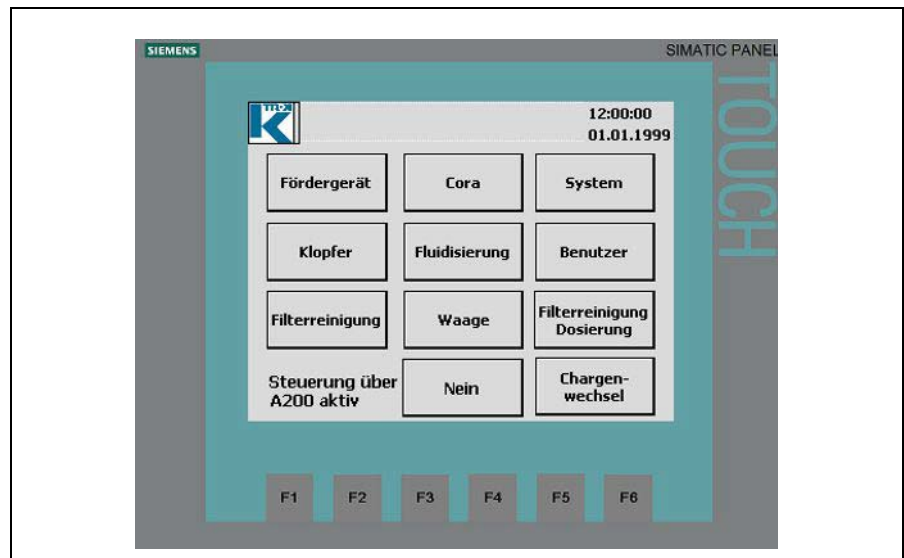


Fig. 8.5 Settings: Overview of the submenus

9 Cleaning

9.1 Notes on cleaning



⚠ DANGER

Danger of explosion!

- ▲ Ensure that the explosive atmosphere is dissipated by sufficient ventilation.
- ▲ Avoid sparks. Sparks can be generated when cleaning with metallic cleaning tools (e.g. vacuum cleaner with metal pipe) that are not grounded.



⚠ WARNING

Risk of injury posed by unintentional switching on!

- ▲ Switch off the device before every intervention and secure it against unintentional restarting (see chapter [Chapter 9.1.1 - "Switching off the installation"](#)).
- ▲ Depressurise the system.



⚠ WARNING

Risk of injury and poisoning!

- ▲ Take note of [Chapter 2.4 - "Special risks"](#).
- ▲ Take note of the material safety data sheets (MSDS) for the products.
- ▲ Take note of the material safety data sheets (MSDS) for the cleaning liquid.
- ▲ Wear personal protective equipment (e.g. protective respirator, protective gloves, safety shoes).

NOTICE

Damage to goods due to overvoltage!

- ▲ Switch off the power supply before disconnecting or connecting the electrical plug-in connectors.

NOTICE

Damage to property caused by corrosive and toxic detergents!

- ▲ Follow the safety regulations for dealing with cleaning agents. After use dispose properly the cleaning agents.
- ▲ Use only cleaning agents with $5.0 < \text{pH} < 8.5$.
- ▲ Clean with non-toxic cleaning agents and disinfectants.
- ▲ Only use cleaning agents that not affect the used seal and filter materials (silicone / PTFE / Teflon / polyester fabric not included).
- ▲ Any residues of cleaning agent on parts with product contact are not allowed.
- ▲ Do not clean with high pressure cleaners, steam cleaner or compressed air.
- ▲ Not remove product adhesion with force.
- ▲ Keep electrical components dry.
- ▲ All parts must be dry cleaned before assembly.



- Switch off the device before cleaning, see [Chapter 9.1.1 - "Switching off the installation"](#).
- Do not use steam pressure or high-pressure cleaning devices.
- Clean only with mild air stream.
- In case of external soiling, clean with a damp cloth and use normal industrial cleaners
- Use vacuum cleaner or soft brush for cleaning.
- Remove dust layers over 5 mm.
- Do not clean the filters wet. Replace dirty filters.

9.1.1 Switching off the installation

1. Stop the product supply.
2. Run the receiver empty.

When the device must be accessible from all sides:

3. Loosen the locking of the trolley in the track.
4. Push out the trolley. Take note of the lines connected..

Switch off the supplies.

5. Switch off the device at the main switch and secure the switch with a padlock.
6. Switch off the compressed air supply.
7. Attach warning signs at the supply points (power supply, compressed air supply).



9.2 Cleaning with parts removal

The parts / components to be removed before a product change include:

- Hoses for vacuum duct
- Hose of PIAB pump, HEPA safety filter
- Hoses for product supply
- Safety flap KS01
- Lid of receiver
- Compressed air tank
- Dust filter F05
- Ventilation flap KS03
- Filter plate with cleaning filter
- Hopper, top part
- Ventilation filter F04 with compressed air tank
- Cylinder outlet
- Cora flap KS02
- Hopper outlet
- Cora pivot flap ZS01
- Level sensors
- Fluidising pad



Systems manual:

- The spare part drawings show all relevant components in explosion views.
- Notes concerning cleaning and installation of components made by other manufacturers are included in the instruction documents provided.

WARNING



Shearing due to moving flaps / valves!

- ▲ Separate flaps / valves from the power supply before de-installation.
- ▲ Separate the compressed air pipe and the electrical plug-in connector from the component.



- It is explicitly recommended to exchange the complete filter before changing products when cross-contamination is possible.



9.2.1 Preparatory measures

1. Switch off the device, see [Chapter 9.1.1 - "Switching off the installation"](#).
2. Depressurise the compressed air tank (5) by manually activating the valves (4).

- (1) Handle
- (2) Tube sheet
- (3) Pressure pipe
- (4) Membrane valve
- (5) Compressed air tank
- (6) Filter cartridge

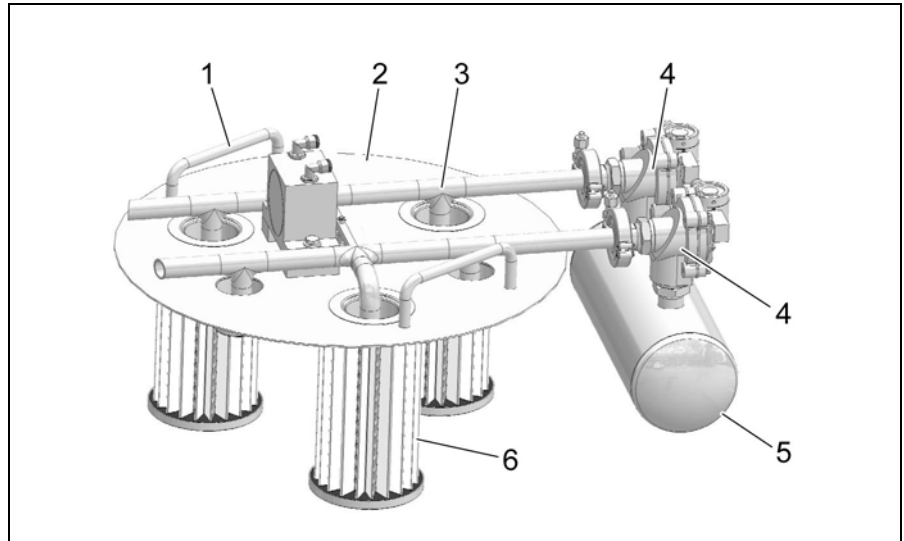


Fig. 9.1 Filter cleaning, receiver

3. Pull the compressed air hoses from the components to be removed and place them onto the fittings. This prevents cleaning liquid / water from entering into the pressure hoses.

- (1) Fitting for hose storage

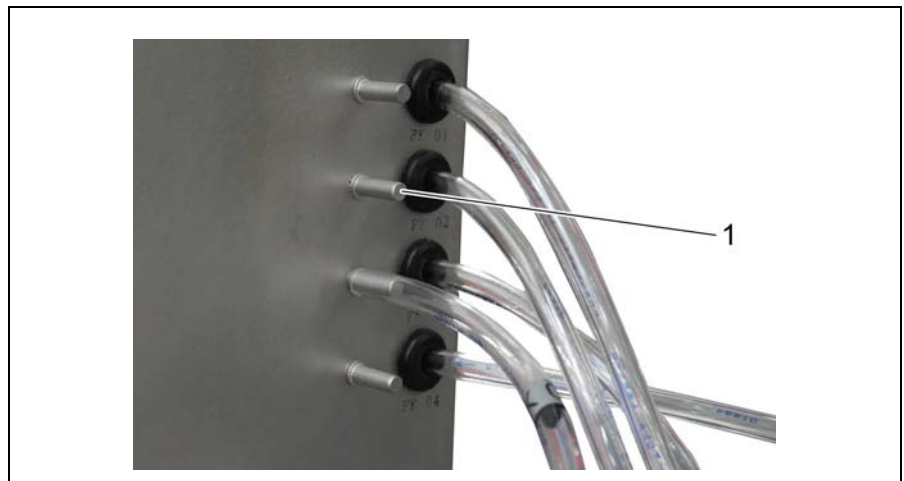


Fig. 9.2 Fitting for hose storage

4. Disconnect the electrical plug-in connections from the components to be removed.

9.2.2 Hoses for vacuum duct

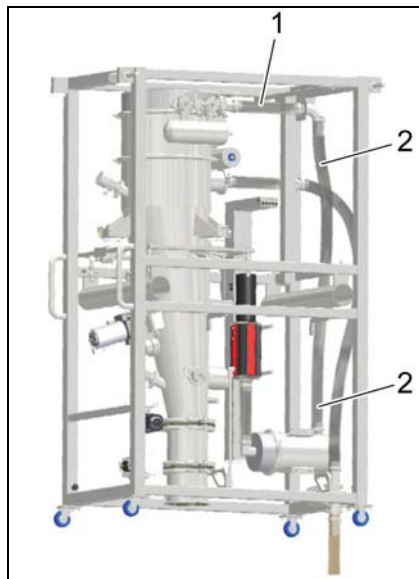


Fig. 9.3 Picture without control cabinet.

1. Remove hose clamps on the horizontal hose (1).
2. Remove hose clamps on the vertical hose (2).
3. Pull off the hoses.

9.2.3 Hose of PIAB pump, HEPA safety filter

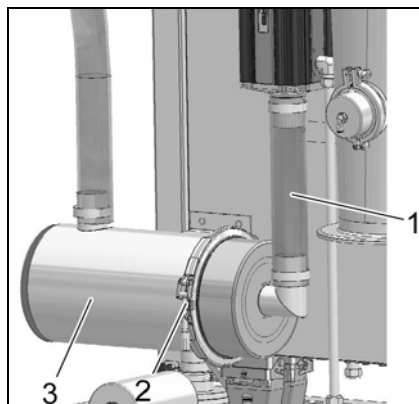


Fig. 9.4 HEPA safety filter

Removing the hose:

1. Remove hose clamps on the hose (1).
2. Remove the hose.

De-install the safety filter:

1. Loosen and remove the V-clamp (2).
2. Remove the filter retainer (3).
3. Remove the V-sealing ring.
4. Remove the V-clamp.
5. Remove the filter.

Seals:

1 x V-sealing ring, Ø 200 mm

9.2.4 Hoses for product supply

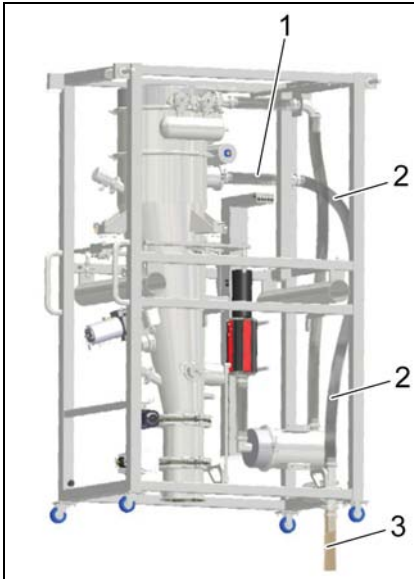


Fig. 9.5 Picture without control cabinet

1. Remove hose clamps on the horizontal hose (1).
2. Remove hose clamps on the vertical hose (2).
3. Loosen the hose clamp at the product supply hose (3).
4. Pull off the hoses.

9.2.5 Safety flap KS01

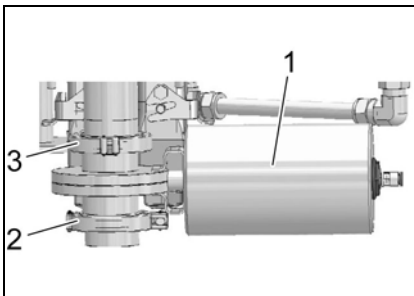


Fig. 9.6 Safety flap KS01

1. Loosen clamp ring (2).
2. Hold the safety flap (1) and loosen the clamp ring (3).
3. Remove the safety flap.

Seals:

2 x TRI CLAMP, Ø 64 mm

9.2.6 Lid of receiver

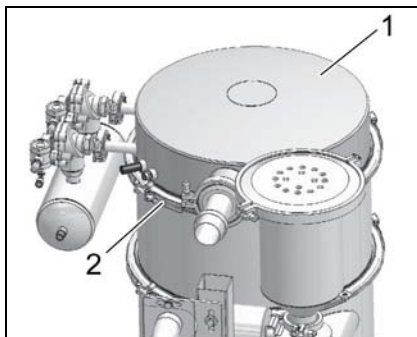


Fig. 9.7 Lid

1. Loosen and remove the V-clamp (2).
2. Remove the lid (1) together with the pressure tank in upwards direction.
3. Remove the V-sealing ring
4. Remove the V-clamp

Seals:

1 x V-sealing ring, Ø 450 mm

9.2.7 Compressed air tank

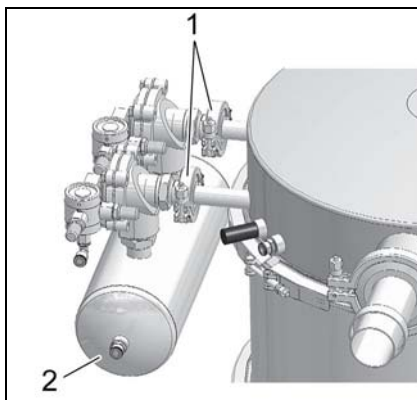


Fig. 9.8 Lid

1. Ensure that the compressed air tank (2) is unpressurised.
2. Loosen and remove the clamp rings (1).
3. Remove the pressure tank (2) together with the valves.

Seals:

2 x TRI FLANGE, Ø 50.5 mm

9.2.8 Dust filter F05

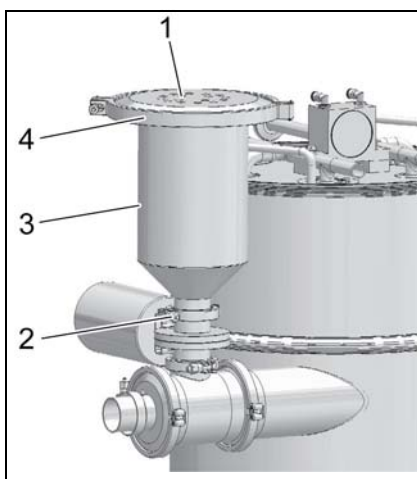


Fig. 9.9 Dust filter F05

1. Hold the filter retainer (3) and loosen the clamp ring (2).
2. Remove the filter retainer by pulling it upwards.
3. Loosen clamp ring (4).
4. Remove the lid (1).
5. Remove the filter

Seals:

1 x TRI FLANGE, Ø 64 mm
1 x O-ring, Ø160 mm
1 x TRI CLAMP, DN 200 mm

9.2.9 Ventilation flap KS03

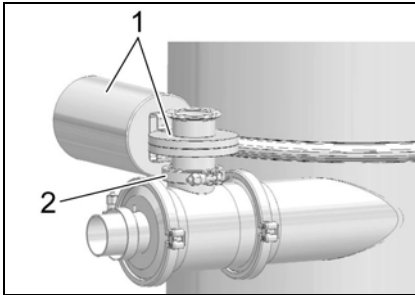


Fig. 9.10 Ventilation flap KS03

1. Hold the ventilation flap (1) and loosen the clamp ring (2).
2. Remove the ventilation flap.

Seals:

1 x TRI FLANGE, Ø 64 mm



- For cleaning the flap see the system manual.

9.2.10 Filter plate with cleaning filter

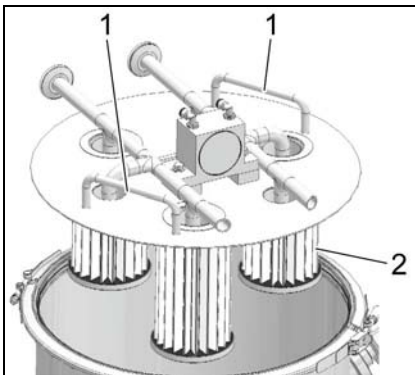


Fig. 9.11 Cleaning filter

1. Pull the filter plate by its handles (1) straight up and remove it.
2. Unscrew the filter cartridges (2) from the filter holder.
3. Clean the filter holder and reuse it.
4. Replace the filter cartridges (2), when required.

9.2.11 Hopper, top part

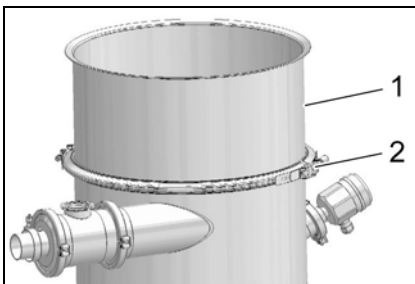


Fig. 9.12 Hopper

1. Loosen and remove the V-clamp (2).
2. Remove hopper (1) in upwards direction.
3. Remove the V-clamp
4. Remove the V-sealing ring

Seals:

1 x V-sealing ring, Ø 450 mm

9.2.12 Ventilation filter F04 with compressed air tank

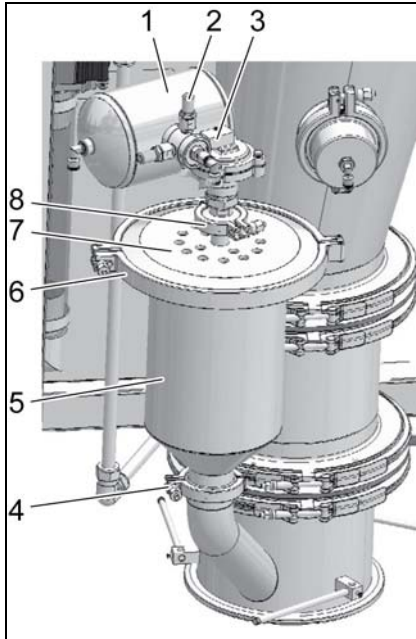


Fig. 9.13 Ventilation filter F04 with pressure tank

1. Depressurise the compressed air tank (1) by manually activating the valve (3).
2. Hold the pressure tank (1) and loosen the clamp ring (8).
3. Remove the pressure tank.
4. Loosen and remove the V-clamp (6).
5. Remove the lid (4).
6. Remove the filter plate with the O-ring.
7. Remove the filter.
8. Remove the V-clamp.
9. Remove the V-sealing ring.
10. Hold the filter retainer (5) and loosen the clamp ring (6).
11. Remove the filter retainer.
12. Replace the filters (2), when required.

Seals:

- 1 x TRI FLANGE, Ø 50.5 mm
- 1 x O-ring, Ø160 mm
- 1 x TRI CLAMP, DN 200 mm
- 1 x TRI FLANGE, Ø 64 mm

9.2.13 Cylinder outlet

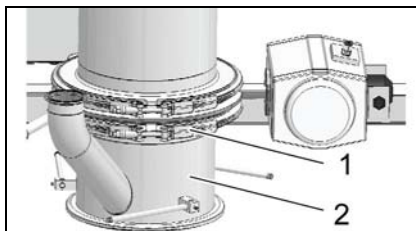


Fig. 9.14 Outlet

1. Hold the cylinder (2).
2. Loosen and remove the V-clamp (1).
3. Remove the cylinder.

Seals:

- 1 x O-ring, Ø 220 mm

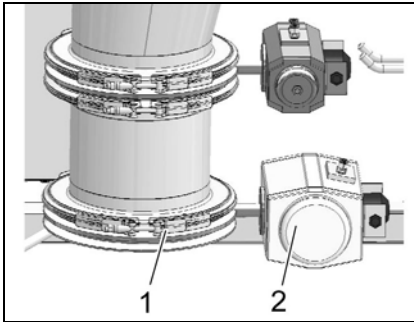


Fig. 9.15 Cora flap KS02



9.2.14 Cora flap KS02

1. Hold the flap (2).
2. Loosen and remove the V-clamp (1).
3. Remove the flap.

Seals:

1 x O-ring, Ø 220 mm

- For cleaning the flap see the system manual.

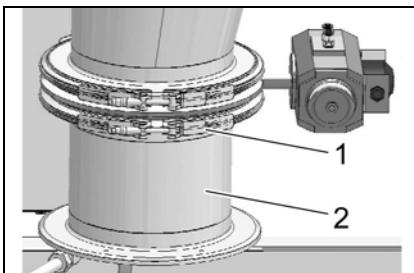


Fig. 9.16 Outlet

9.2.15 Hopper outlet

1. Hold the cylinder (2).
2. Loosen and remove the V-clamp (1).
3. Remove the cylinder.

Seals:

1 x O-ring, Ø 220 mm

9.2.16 Cora pivot flap ZS01

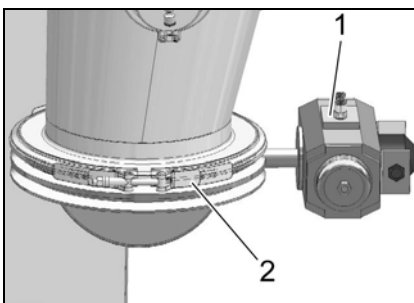


Fig. 9.17 Cora pivot flap ZS01

1. Hold the flap (2).
2. Loosen and remove the V-clamp (1).
3. Remove the flap.

Seals:

1 x O-ring, Ø 220 mm

- For cleaning the flap, see the system manual.



9.2.17 Level sensors

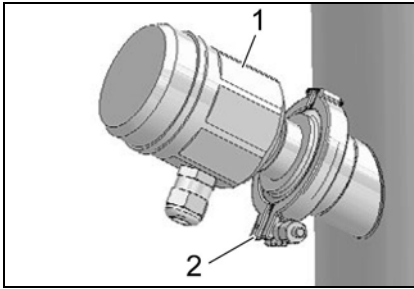


Fig. 9.18 Level sensor

1. Hold the sensor (1).
2. Loosen and remove the clamp ring (2).
3. Pull out the sensor.

Seals:

1 x TRI FLANGE, Ø 64 mm

9.2.18 Fluidising pad

De-install:

1. Press in the clamping lock (3) and pull off the compressed air hose (3).
2. Screw out the connection for the compressed air hose.
3. Open the clamp ring (1).
4. Remove the housing (2) and seal.
5. Screw the installation rod into the pipe.
6. Turn out the counter support. The diffuser can then be carefully pulled out of the container wall.

- (1) Clamping ring
- (2) Housing
- (3) Clamping seal for compressed air hose
- (4) Compressed air hose
- (5) Installation rod
- (6) Counter support
- (7) Pipe with outside thread, for air supply
- (8) Diffusor

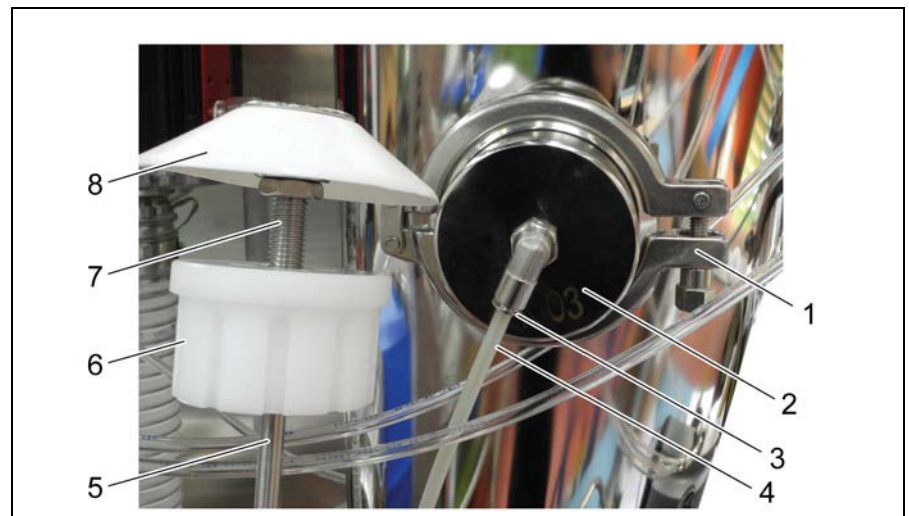


Fig. 9.19 Installed and uninstalled fluidising pads

Seals:

1 x TRI FLANGE, Ø 91 mm

Installation:

1. Screw the installation rod (5) into the pipe (7).
2. Push the diffusor (8) through the hole in the container wall.
3. Pull back the diffusor and screw in the counter support.
4. Screw out the installation rod (5).
5. Push the seal onto the flange.
6. Place the housing (2) onto the flange and fasten the clamp ring (1).
7. Screw in the connection for the compressed air hose.

9.2.19 Clean the de-installed parts**▲ WARNING****Risk of injury and poisoning!**

- ▲ Take note of the material safety data sheets (MSDS) for the products.
- ▲ Take note of the material safety data sheets (MSDS) for the cleaning liquid.
- ▲ Wear personal protective equipment (e.g. protective respirator, protective gloves, safety shoes).

⇒ Clean the de-installed parts using suitable methods and cleaning agents.

9.3 Cleaning with WIP cleaning nozzle

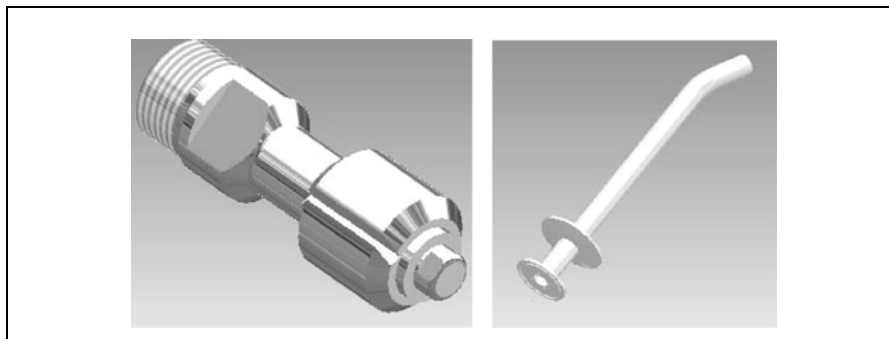


Fig. 9.20 Cleaning nozzle

▲ WARNING



Risk of injury!

- ▲ Risk of injury due to escaping cleaning liquid.
- ▲ Before using the cleaning nozzle, ensure that all receiver openings are closed.
- ▲ Wear personal protective equipment when handling cleaning liquid.

1. Switch off the device, see [Chapter 9.1.1 - "Switching off the installation"](#).
2. Removing the level sensors, see [Chapter 9.2.17 - "Level sensors"](#).
3. Install cleaning nozzles instead of the level sensors.
4. Check whether all openings of the receiver have been closed.
5. Place the collecting container for the cleaning liquid under the hopper outlet.
6. Ensure that the flaps KS02 and ZS01 are open.
7. Start the cleaning process.

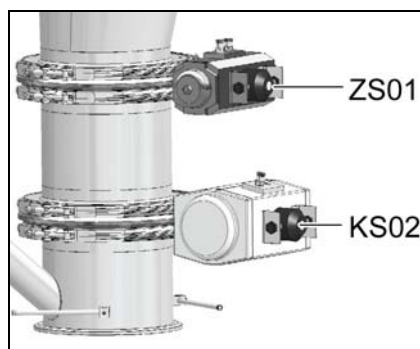


Fig. 9.21 Hopper outlet

9.4 Installing the components



⚠ DANGER

Risk of explosion due to wrong installation!

- ▲ Only use original Coperion K-Tron (Switzerland) LLC seals and filters.
- ▲ Check all grounding points with a measuring device according to the test plan before the initial operation.
See Document No. 1104657-EGC-R001.

-
- The de-installation of the components is described in Chapter [Chapter 9.2 - "Cleaning with parts removal"](#).
 - When the installation is not separately described, it takes place in reverse order of de-installation.
 - Check the state of all seals and sealing surfaces before the installation.

10 Maintenance



Close adherence to the inspection and maintenance intervals is absolutely necessary to ensure safe working conditions and explosion protection!



- Maintenance work may only be carried out by trained technicians.
- Only qualified electricians may work on the electrical equipment.



System manual:

- The spare part drawings show all relevant components in explosion views.
- Notes concerning installation and maintenance of components made by other manufacturers are included in the instruction documents provided.

10.1 Safety instructions for maintenance

DANGER



Risk of explosion due to wrong installation!



- ▲ Only use original Coperion K-Tron (Switzerland) LLC seals and filters.
- ▲ Check all grounding points with a measuring device according to the test plan before initial operation.
See Document No. 1104657-EGC-R001.

DANGER



Mortal danger as a result of live wires!

- ▲ Work on the electrical system may only be performed by an electrician.

WARNING



Risk of injury posed by unintentional switching on!

- ▲ Switch off the device before every intervention and secure it against unintentional restarting (see chapter [Chapter 10.2 - "Switching off the installation"](#)).
- ▲ Depressurise the system.

▲ WARNING



Risk of injury and poisoning!

- ▲ Take note of [Chapter 2.4 - "Special risks"](#).
- ▲ Take note of the material safety data sheets (MSDS) for the products.
- ▲ Wear personal protective equipment (e.g. protective respirator, protective gloves, safety shoes).

▲ CAUTION



Risk posed by compressed air!

- ▲ Depressurise the system.
Depressurise the compressed air tanks by manually activating the downstream valve.

10.2 Switching off the installation



1. Stop the product supply.
2. Run the receiver empty.
3. Loosen the locking of the trolley in the track.
4. Switch off the device at the main switch and secure the switch with a padlock.
5. Switch off the compressed air supply.
6. Attach warning signs at the supply points (power supply, compressed air supply).
7. Push out the trolley. Take note of the lines connected.
8. Depressurise the compressed air tanks by manually activating the downstream valve. Remove the compressed air line from the valve (clamp connection).
9. Pull the compressed air hoses from the components to be removed and place them onto the fittings.

(1) Fitting for hose storage

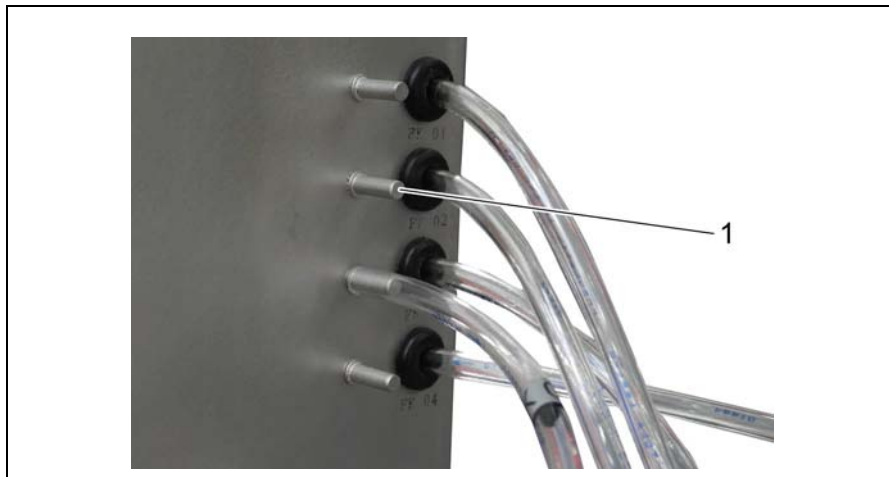


Fig. 10.1 Fitting for hose storage

10. Disconnect the electrical plug-in connections from the components to be removed.

10.3 Maintenance intervals

i

It is explicitly recommended to exchange the complete filter before changing products when cross-contamination is possible.

The valid interval is always the one that ends first.

Element	Checkpoints	Interval
Mechanics	<ul style="list-style-type: none"> Eliminate dust accumulation more than 5 mm [0.2 in] through cleaning. Check convey and vacuum line mechanical connections for tightness. Check safety symbols at the equipment for legibility and completeness. 	⇒ Check pressure regulator
Flaps	<ul style="list-style-type: none"> Take note of the manufacturer's instructions. See system manual. 	⇒ Every 6 months or during cleaning
Seals	<ul style="list-style-type: none"> Check for leaks. 	⇒ Weakly.
Filter	<ul style="list-style-type: none"> Exchange. Check the nozzle for filter cleaning. 	⇒ As required ⇒ Every 6 months
Pneumatics	<ul style="list-style-type: none"> Check solenoid valves for leaks. Check compressed air pipes for leaks. 	⇒ Check pressure regulator ⇒ Check pressure regulator
Pneumatic system, maintenance unit on customer side	<ul style="list-style-type: none"> Check the compressed air settings. Check pressure reducer (in the switch box). Customer side: <ul style="list-style-type: none"> Empty water-separator. Exchange the filter element. 	⇒ Daily ⇒ Every 6 months ⇒ As required ⇒ As required
Equipotential bonding	<ul style="list-style-type: none"> Check equipotential bonding. Also see Chapter 10.5 - "At the end of the maintenance work". 	⇒ Weekly and after every de-installation of components
Electric	<ul style="list-style-type: none"> Visually check all electrical cables and connections. Electrical inspection with test protocol by an electrician (insulation inspection, voltage inspection, protective conductor, protection against residual voltages) 	⇒ Daily ⇒ Every 4 years

10.4 Replace parts



- The de-installation of the components is described in Chapter [Chapter 9.2 - "Cleaning with parts removal"](#).
- When the installation is not separately described, it takes place in reverse order of de-installation.
- Check the state of all seals and sealing surfaces before installation.
- Only use original seals.

10.5 At the end of the maintenance work



▲ DANGER

Danger of explosion!

- ▲ Check all grounding points with a measuring device according to the test plan before the initial operation.
See Document No. 1104657-EGC-R001.

10.5.1 Table of grounding points

Extract from Document No. 1104657-EGC-R001.

Measuring Point 1	Measuring Point 2	Description
XE1	XE2	Grounding rail EB customer building / suspension rail PTS
XE3	XE4	PTS frame / P100 receiver container
XE5	XE6	Suction pot discharge station / suction pipe closing flap
XE7	XE8	Suction pipe closing flap / suction pipe trolley decoupling piece
XE9	XE10	Suction pipe trolley decoupling piece / product inlet P100
XE11	XE12	Vacuum pipe P100 receiver / trolley decoupling piece
XE13	XE14	Vacuum pipe trolley decoupling piece / P2 safety filter
XE15	XE16	Vacuum pipe P2 safety filter / PIAP Venturi pump
XE17	XE18	CORA rotary valve (rotor) / CORA valve housing
XE19	XE20	CORA sole valve (flap) / CORA valve housing
XE21	XE22	Suspension rail PTS / PTS frame
XE23	XE24	Suspension rail PTS / PTS frame
XE25	XE26	Grounding rail EB customer / Coperion K-Tron (Switzerland) LLC mounting plate

11 Troubleshooting



- ⇒ Please observe the error messages which are displayed on the connected control device or host computer (see operating instructions for the relevant control device).
- ⇒ Document faults and call the local service center (customer service see project manual).

⚠ DANGER



Mortal danger as a result of live wires!

- ▲ Work on the electrical system may only be performed by an electrician.

⚠ WARNING



Risk of injury posed by unintentional switching on!

- ▲ Switch off the device before every intervention and secure it against unintentional restarting.
- ▲ Depressurise the system.



1. Stop the product supply.
2. Switch off the device at the main switch and secure the switch with a padlock.
3. Switch off the compressed air supply.
4. Attach warning signs at the supply points (power supply, compressed air supply).
5. Depressurise the compressed air tanks by manually activating the downstream valve. Remove the compressed air line from the valve (clamp connection).

11.1 Troubleshooting table

Error	Cause	Remedy
Convey cycle does not start	<ul style="list-style-type: none"> • Receiver full 	⇒ Empty receiver.

Table page 1 of 4

Error	Cause	Remedy
No material conveyed during the convey cycle	• Bridge formation around the suction lance	⇒ Break bridge / rathole. Switch on the knocker and the fluidising pads to ensure reliable transport.
	• Bridge formation in the hopper	⇒ Changing the settings of the knocker and fluidising pads. Also see operating instructions in the system manual.
	• Hopper at pick-up empty	⇒ Refill hopper.
	• Conveyer line blocked	⇒ Free blockage.
System does not convey enough material	• Leak in system	⇒ Check all valves are closed correctly. Check all connections are secure and leak-free.
	• Air material mixture insufficiently rich	⇒ Adjust suction lance to increase solid to air ratio (see Chapter 7.5 - "Adjusting the suction power at the suction pot").
	• Overfill in the receiver	⇒ Increase the transport time and decrease the discharge time until an optimal level has been reached. Do not overfill the container! ⇒ Check the level sensor.
	• Leak in system	⇒ Check all valves are closed correctly. Check all connections are secure and leak-free.
	• Blocked filter	⇒ Replace valve. ⇒ Check all filters and replace if necessary.
	• Kinks "Goose necks" in flex hose	⇒ Straighten flex hose.
	• Air intake at pick-up blocked	⇒ Free blockage.
	• Sequencing valve does not work.	⇒ Check valves.

Table page 2 of 4

Error	Cause	Remedy
Malfunction of the solenoid valve	<ul style="list-style-type: none"> • Malfunction from solenoid valve 	<ul style="list-style-type: none"> ⇒ Check for dirt in the solenoid valve. Clean with compressed air. ⇒ The solenoid valve does not work properly when a continuous stream of air can be detected at the outlet. Remove the valve core, and clean out any dirt, scale, or rust. If the valve core is damaged or worn, it will need to be replaced. ⇒ If there is no air flow from the exhaust port of the solenoid valve, check for the correct electrical connection to the solenoid valve. ⇒ If there is correct voltage to the solenoid valve (24 V DC), check for a drop in voltage across the solenoid coil during its designated pulse cycle. If full voltage is detected across the coil during the pulse cycle, the coil may be burned out.
Short life span of the filters	<ul style="list-style-type: none"> • Moisture in the compressed air • Dust and conveying air 	<ul style="list-style-type: none"> ⇒ Ensure that the air from the compressed air source is dry. Moisture on the filters causes rot and shortens the life span of the filters. ⇒ Ensure that the condensate container (customer side) is regularly emptied. ⇒ Check the dust and conveying air for corrosive conditions.
Dirty exhaust air	<ul style="list-style-type: none"> • Filter installation • Damaged filter • Dirty air 	<ul style="list-style-type: none"> ⇒ Check for proper installation of the filters or filter element. ⇒ Check the filters for wear or holes. Exchange, when required. ⇒ Ensure that the air from the compressed air supply is dry.
Filter cleaning does not work	<ul style="list-style-type: none"> • Filter cleaning switched off. • Wrong settings for filter cleaning. 	<ul style="list-style-type: none"> ⇒ Check the settings at the control panel. Also see operating instructions in the system manual.

Table page 3 of 4

Error	Cause	Remedy
Sluggish pulsing	• Too little air pressure	⇒ Ensure that the pressure in the compressed air store quickly returns to a pressure of approx. 5.5 to 6.9 bar (80 to 100 PSI) after each pulse.
	• Problems with the filter cleaning valve	⇒ The filter cleaning valve is not functioning correctly.
Failure of the solenoid valve (filter cleaning)	⇒ Valve stays open.	⇒ When the valve remains open, no pressure is accumulated in the compressed air tank. The bleed hole in the valve may be obstructed. Disassemble the valve and clean the bleed hole, or replace the valve.
	⇒ Valve stays closed.	⇒ If the valve stays closed, compressed air will not pulse the filters. The diaphragm inside the valve may be broken. Replace the valve, if necessary.
	⇒ Valve is not working.	⇒ Check for tight connections from the valve to the air accumulator and housing. ⇒ Check the magnetic valve for pressure impulse treatment of the filters.

Table page 4 of 4

12 Explosion protection

12.1 Safety notes

12.1.1 General



- ▲ The explosion-protected device may only be used in zones designated in the declaration of conformity or in non-classified areas.
- ▲ For the maximum surface temperature of the device see the declaration of conformity.
- ▲ The device may only be used within the environmental temperature range indicated in the declaration of conformity.
- ▲ The intake of alien materials (metal parts, stones) must be prevented by the operator.
- ▲ The plant owner has to ensure that the information on the rating plate of the individual drives have to agree with the conditions in the area of use on site.
- ▲ The plant owner has to ensure that the power supply agrees with the information on the rating plate of the individual drives.

12.1.2 Operation of the device in accordance with ATEX



The explosion protected device belongs to device group II.

- ▲ For the device class see marking on the device or declaration of conformity.

12.1.3 Standards and directives



- ▲ Observe and fulfill the following instructions, standards and directives when installing and erecting explosion-proof systems:

Standards 99/92/EG (ATEX 137)

12.2 Area of use in an explosive atmosphere



The owner is responsible for ensuring that the system is installed in the intended zone. The corresponding class is described in the declaration of conformity.

12.2.1 Explosion proof marking

The marking on the device shows the device class. The declaration of conformity shows the zone in which the device may be used.

12.2.2 Zones and device classes (gas)

Zone	Description	Devices of the class
Zone 0	An area in which an explosive atmosphere, i.e. a mixture of air and flammable gases, vapours or mists is either frequently or constantly present over an extended period.	1G
Zone 1	An area in which a dangerous mixture of air and flammable gases, vapours or mists sometimes forms during normal operation, constituting an explosive atmosphere.	2G
Zone 2	An area in which a dangerous mixture of air and flammable gases, vapours or mists constituting an explosive atmosphere usually does not exist or only for short periods.	3G

12.2.3 Zones and device classes (dust)

Zone	Description	Devices of the class
Zone 20	An area in which a dangerous, explosive atmosphere in the form of a cloud of flammable dust suspended in the air is either constantly present, or frequently or for long periods at a time.	1D
Zone 21	An area in which a dangerous, explosive atmosphere in the form of a cloud of flammable dust suspended in the air may form at times under normal operating conditions.	2D
Zone 22	Area in which a dangerous, explosive atmosphere in the form of a cloud of flammable dust in the air is normally not formed or is only formed for short periods during normal operation.	3D

12.2.4 Dust deposits and glow temperature



- ▲ The requirements regarding reduced glow temperature in the event of dust deposition with reference to Standard IEC/EN 60079-14 Chapter 5.6.3.1 must be adhered to.

In case of dust deposits of up to 5 mm:

- Glow temperature of the material at a thickness of the layer of dust 5 mm: \geq max. surface temperature (T_{max}) + 75 K.
 $T_{max} = T_{5mm} - 75 \text{ }^{\circ}\text{C}$

In case of dust deposits greater than 5 mm to max. 50mm:

- The difference to be observed between the glow temperature of the material and the surface temperature (T_{max}) depends on how thick the dust layer is. The context is shown in Fig. 1 of the standard EN 60079-14 Chapter 5.3.3.2.1
- Avoid dust deposits > 5 mm (see [Chapter 9.2 - "Cleaning with parts removal"](#)).

Dust deposits \geq 50 mm avoid or complete covered:

- Not allowed.

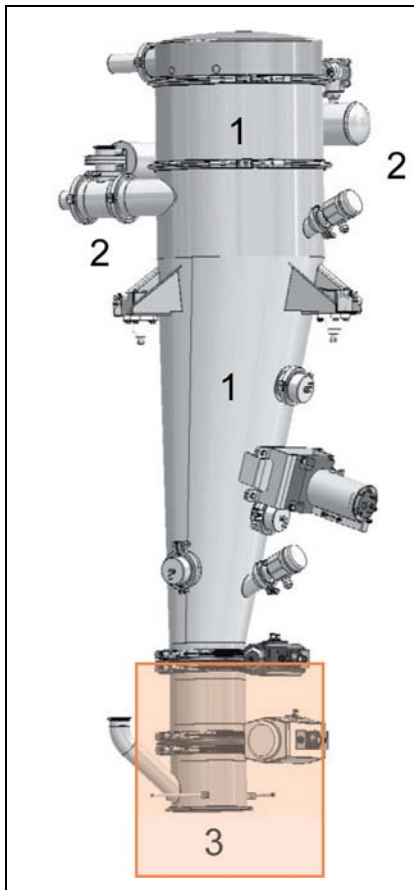
12.3 Device classes within and outside the device

⚠ DANGER



Danger of explosion!

- ▲ Seals, O-rings, bellows, collars and sheet parts must be undamaged, clean and built in correctly.
- ▲ Always work carefully during mounting and maintenance.
- ▲ Replace defective parts immediately.



The device is structured into 3 sections:

(1) Bulk good processing space (inside): Zone 20 / class 1D

(2) Outside: Zone 22 / class 3 D

(3) Bulk good processing space (discharge area): Zone 20 / class 1D

Components at connections, such as seals, O-rings, bellows, packing and sheet parts, must separate the various device categories in side and outside securely from each other. (See declaration of conformity.)

Fig. 12.1 Device classes inside/outside

Attaching Parts Conveying Equipment

- PIAB Venturi P6040
- MS Butterfly Valve
- CORA Rotary Valve
- CORA Sole Valve
- Compact Cylinder AEVU-50-10-A-P-A Festo
- Round Cylinder ESNU-50-50-P-MA Festo
- MCTAG Tapper
- Netter Vibrator
- Aeration Pads 1190023601

Piab gives you service all over the world.
To find your local distributor, please visit www.piab.com.

MANUAL

Vacuum pump P6040

No need to compromise



www.piab.com

Art. No. 0117656, Rev.4
Piab AB, 2011-09, Printed in Sweden by Elanders



(GB) Safety
(DK) Advarselsymboler
(DE) Warnsymbole
(ES) Señales de advertencia

(FR) Sécurité
(IT) Segnali di avvertenza
(NL) Waarschuwingsymbolen
(NO) Sikkerhet

(PT) Sinais Avisadores
(SE) Säkerhet
(FI) Varoitusmerkit

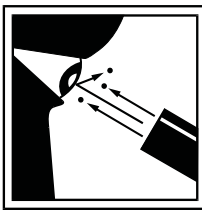
(GB) Warranty
(DK) Garanti
(DE) Garantie
(ES) Garantía

(FR) Garantie
(IT) Garanzia
(NL) Garantie
(NO) Garanti

(PT) Garantia
(SE) Garanti
(FI) Takuu
(日) 保証に関して



- Vacuum force
- Vakuumkraft
- Vakuumkraft
- Fuerza de vacío
- Force d'aspiration
- Potenza di aspirazione
- Vakuumkracht
- Vakuumkraft
- Vácuo ligado
- Vakuumkraft
- Voimakas imu
- 真空力



- Exhaust
- Udblæs
- Abluft
- Aire procedente
- Evacuation de l'air
- Aria di scarico
- Utitlaatlucht
- Eksos
- Saida de ar
- Utblås
- Poistoilma
- 排気



- Unrestricted exhaust
- Forbudt blokere udblæsningen
- Abluft nicht blockieren
- Prohibido bloquear la salida del aire
- Interdit de bloquer l'évacuation de l'air
- Lo scarico della pompa non deve
- essere ostruito
- Pompuittlaat vrijhouden
- Forbudt å blokkere eksos
- O escape da bomba deve ser livre
- Förbjudet blockera utblås
- Ulospuhalluksen esto kielletty
- 排気口を塞がないで下さい。

(GB) The Piab Vacuum Pump has a 5 year warranty against manufacturing defects. The warranty is valid for the vacuum pump only and covers no other costs.

(DK) Piab vakuumpumper har 5 års garanti mod fabrikationsfejl. Garantien gælder kun vakuumpumperne, men ikke andre omkostninger eller fragtomkostninger.

(DE) Bei Herstellungsfehlern an der Piab Vakuumpumpe geben wir 5 Jahre Garantie. Verschleißteile wie z.B. Filter sind ausgeschlossen.

(ES) La bomba de vacío Piab tiene una garantía de 5 años contra defectos de fabricación. La garantía es válida para la bomba de vacío solamente sin cubrir gastos extras.

(FR) La pompe à vide Piab est garantie 5 ans contre les défauts de fabrication. La garantie est valable uniquement pour la pompe, et ne couvre pas d'autres frais, par exemple les frais d'expédition.

(IT) La pompa a vuoto Piab ha 5 anni di garanzia contro i difetti di fabbricazione. La garanzia è valida solo per la pompa a vuoto e non copre altri costi.

(NL) Piab vacuümpompen hebben een garantietermijn tegen fabricagefouten van 5 jaar. De garantie geldt alleen voor de pomp en dekt geen andere kosten.

(NO) Piab Vakuumpumper har 5 års garanti mot fabrikasjonsfeil. Garantien gjelder kun vakuumpumpen og dekker ikke andre kostnader eller fraktkostnader.

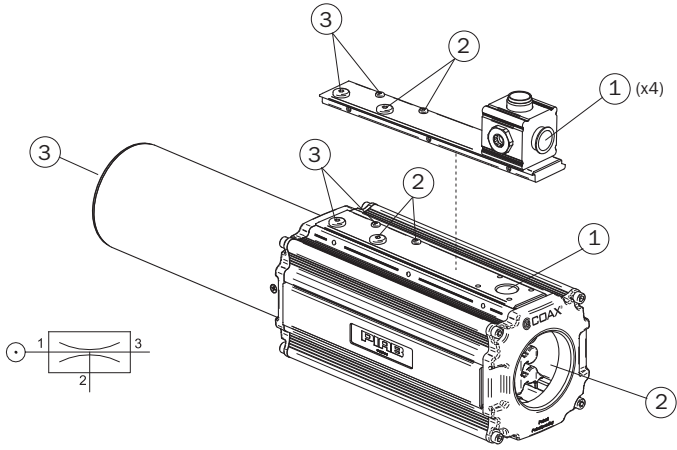
(PT) As bombas de vacío Piab têm 5 anos de garantia contra defeitos de fabrico. A garantia é válida somente para as bombas de vacío não cobrindo outros custos.

(SE) Piab Vakuumpump har 5 års garanti mot fabrikationsfel. Garantien omfattar enbart vakuumpumpen och täcker ej andra kostnader eller fraktkostnader.

(FI) Piab-tyhjäpumpuilla on 5-vuoden takuu koskien valmistusvirheitä. Takuu koskee ainoastaan tyhjäpumpua, eikä peitä muita kustannuksia taikka lähetyskuluja.

(日) ピアブのポンプには製造上の欠陥に限り五年間の保証があります。保証はポンプのみ有効です。

1. INSTALLATION/CONNECTIONS



Recommended hose dimensions in mm [in.] (internal diameter)

Connections	COAX® Cartridge Pi				
	7/8	9/10	11/12	13/14	15/16
1 Compressed air	>11 [0.43]	>11 [0.43]	>12 [0.47]	>13 [0.51]	>14 [0.55]
2 Vacuum	>35 [1.38]	>40 [1.57]	>40 [1.57]	>40 [1.57]	>45 [1.77]
3 Exhaust	>40 [1.57]	>45 [1.77]	>50 [1.97]	>55 [2.17]	>60 [2.36]

Applies on hoses up to 2 m [6.6 feet] long

Connections	COAX® Cartridge Si				
	7/8	9/10	11/12	13/14	15/16
1 Compressed air	>8 [0.31]	>9 [0.35]	>10 [0.39]	>10 [0.39]	>11 [0.43]
2 Vacuum	>35 [1.38]	>40 [1.57]	>40 [1.57]	>45 [1.77]	>45 [1.77]
3 Exhaust	>40 [1.57]	>40 [1.57]	>50 [1.97]	>50 [1.97]	>50 [1.97]

Applies on hoses up to 2 m [6.6 feet] long

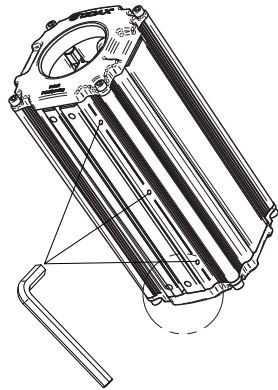
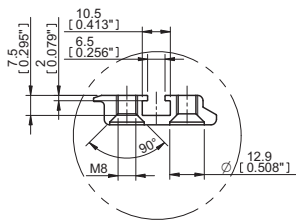
Connections	COAX® Cartridge Xi				
	7/8	9/10	11/12	13/14	15/16
1 Compressed air	>8 [0.31]	>9 [0.35]	>10 [0.39]	>10 [0.39]	>11 [0.43]
2 Vacuum	>35 [1.33]	>40 [1.57]	>40 [1.57]	>45 [1.77]	>45 [1.77]
3 Exhaust	>40 [1.57]	>40 [1.57]	>50 [1.97]	>50 [1.97]	>50 [1.97]

Applies on hoses up to 2 m [6.6 feet] long

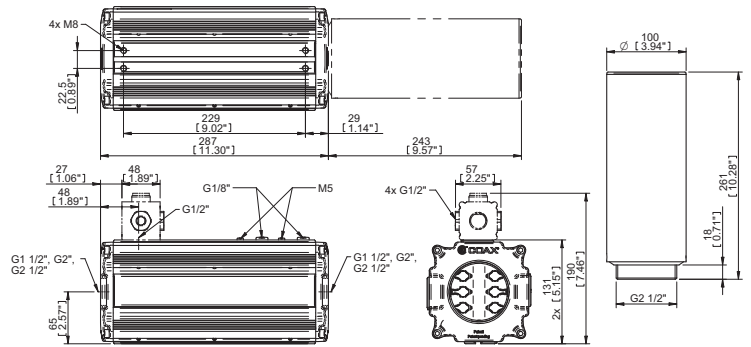
Feed pressure, vacuum level and exhaust pressure

COAX® Cartridge	Feed pressure MPa [psi]	Max. vacuum -kPa [inHg]	Max. exhaust pressure MPa [psi]
Pi	0.30 [43.5]	40 [26]	1.4 [20.3]
Si	0.60 [87]	75 [22]	0.8 [11.6]
Xi	0.45[65]	96 [28]	0.9 [13.0]

2. MOUNTING

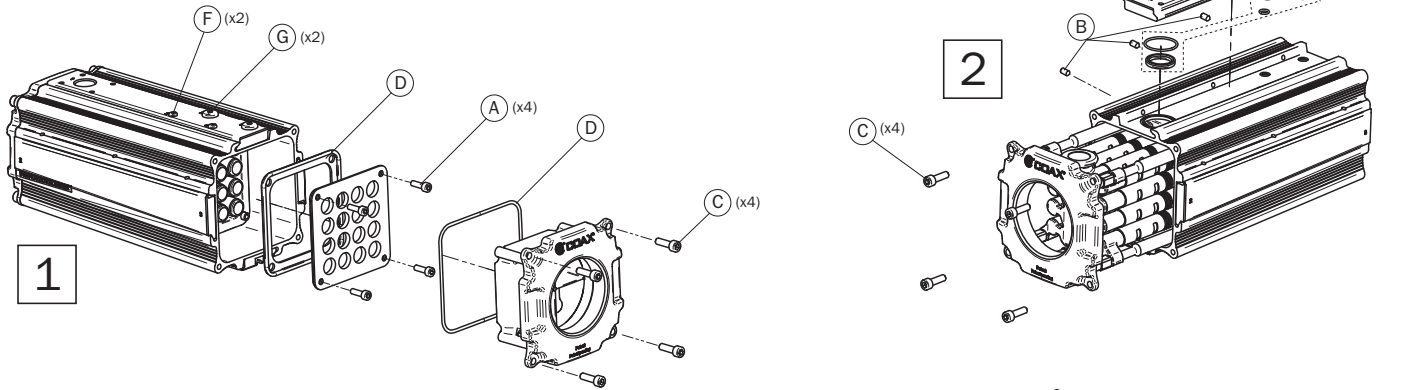


3. DIMENSIONS

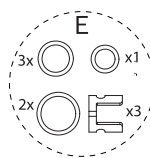
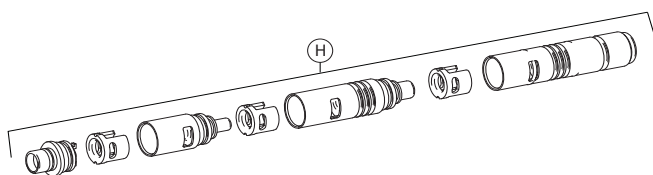
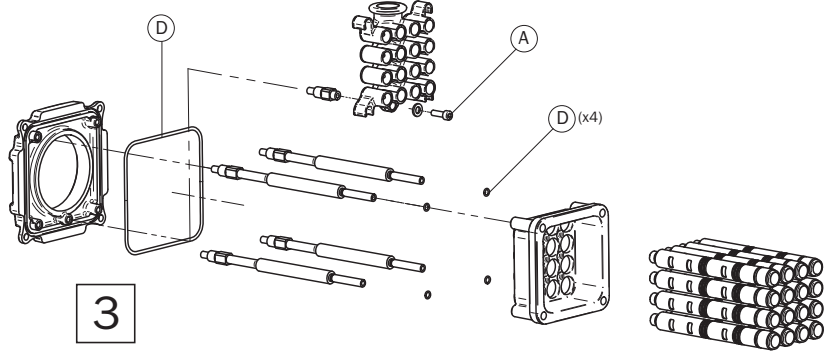


4. SPARE PARTS

DISASSEMBLY order 1→2→3



Description	Art. No.
A Screw kit 5x MC6S M5x16 A2	0117777
B Stop screw kit 3x S6SS M5x10 A2	0117778
C Screw kit 4x MC6S 6x20 A2	0117779
D Gasket kit	0117780
E Spare part kit Midi COAX	0109531
F Plug M5 cpl. x1	0106553
G Plug G1/8" PPS, x1	3107093
Plug G1/2", x1	0118314
Flap valve D=15	0106234
Connection 4x G1/2"	0117786
Connection G1/2"	0117787
COAX® Cartridge Midi Pi 48-3	0106639
COAX® Cartridge Midi Pi 48-3 A	0107714
COAX® Cartridge Midi Si 32-3	0107053
COAX® Cartridge Midi Si 32-3 A	0107713
COAX® Cartridge Midi Xi 40-3	0118724
COAX® Cartridge Midi Xi 40-3 A	0118725





M&S Armaturen GmbH

PARTNER NOT JUST SUPPLIER.

Operation Manual

-Translation of the original-

Butterfly valve SV04 DIN / INCH

M&S Article No. 5XXX4 - 5XX40



TYPE EL
NOVEMBER 2003



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Rev.1 / 15.01.2013
BA52240GB.docx

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2 Safety advice

2.1 Marking of safety instructions in operating instructions



Danger

Danger warnings are denoted by the danger symbol which appears on the left and are framed.

warnings



Information

Descriptions to which particular attention must be paid are denoted by this symbol which appears on the left and are also framed.

2.2 Intended use

The M&S butterfly valves SV04 are only intended for use as described. Any use beyond that is considered to be improper use. M&S is not liable for any resulting damage, the risk is solely with the operator. Requirement for perfect safe operation of the valve are proper transport and storage as well as professional set-up and assembly. Proper use also includes adherence to the requirements for operation, maintenance and repair. Unauthorised changes and modifications that impair the safety of the valve are not permitted. Only use original spare parts and accessories approved by the manufacturer.

2.3 Personnel

Operating and maintenance personnel must be qualified for the respective tasks. They must have had special instructions about any occurring hazards and must know and observe the safety advices mentioned in the operating instructions.

2.4 General instructions

The used is obliged to operate the valve in perfect condition only. Apart from the operating instructions, the following apply

- pertinent regulations on the prevention of accidents
- generally accepted safety-related rules
- internal work and safety regulations



3 Use and operating principle

M&S butterfly valves are used to open and close (partially or completely) pipeline sections. They are mainly used in pipelines, power units and tanks and containers.

The butterfly valves are pressure-containing equipment in the sense of EC Directive 97/23/EC regarding pressure equipment. They are classified according to Annex II in Article 3, Paragraph 3 and must therefore not receive a CE-marking.

4 Transport and storage



When you receive the butterfly valve, check the information on order and delivery papers to make sure they correspond.

Check that the delivery is complete, and check its condition.

If there are visible signs of transit damage and/or packing units are missing, notify the forwarding agent immediately in the consignment note. You (the recipient) should take recourse against the forwarding agent immediately in writing, and M&S Armaturen GmbH must be informed of this action.

Complaints regarding transit damage that is not immediately evident must be made to the forwarding agent within 6 days.

The recipient must bear the costs for claims made after this period.

4.1 Transport



The packing units/valves must only be transported using suitable lifting equipment and slinging gear.

Pay attention to the graphic symbols on the packaging.

Transport the butterfly valve carefully to prevent damage from sudden impacts; exercise due care when loading/unloading.



5 Installation / disassembly / assembly

5.1 Installation



Install the butterfly valve without tension into the pipeline system.

The butterfly valve can be installed in any installation position.

When installing the installation type SV04 with weld-in connection, pay attention to correct alignment of the handle or the pneumatic actuator, respectively.

After installation, the butterfly valve has to be actuated manually or pneumatically.

5.1.1 Installation butterfly valve type SV04 with thread or clamping connection on both sides

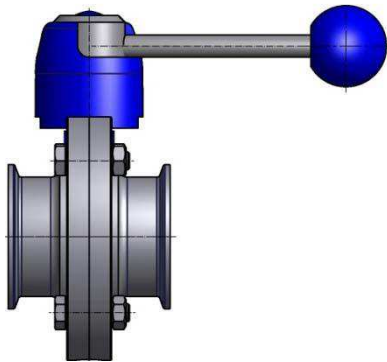


Figure 1
Butterfly valve SV04 CC
DIN/inch
Art.-No.: 54440/54404

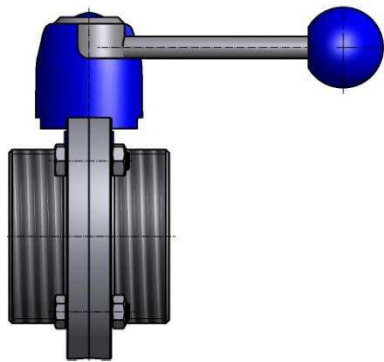


Figure 2
Butterfly valve SV04 MM
DIN/inch
Art.-No.: 55540/55504

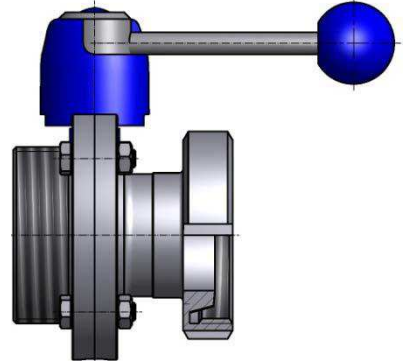


Figure 3
Butterfly valve SV04 ML
DIN/inch
Art.-No.: 55604/55640

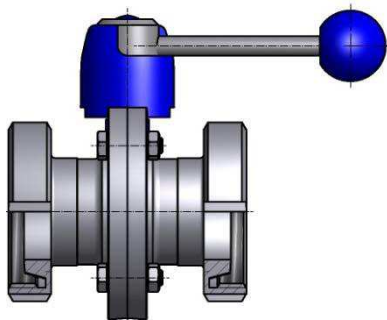


Figure 4
Butterfly valve DA
DIN
Art.-No.: 56640

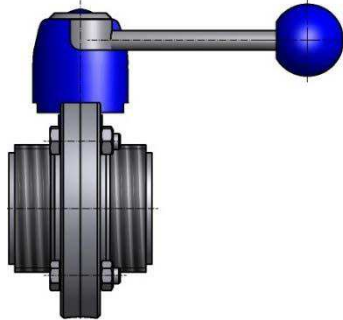


Figure 5
Butterfly valve SV04 MM
IDF/DS/RJT/SMS
Art.-No.: 55544/55554/55564/55574

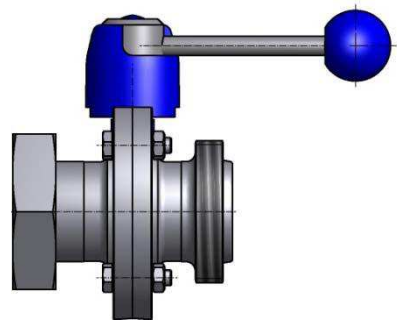


Figure 6
Butterfly valve SV04 LM
IDF/DS/RJT/SMS
Art.-No.: 56544/56554/56564/56474

The butterfly valve type SV04 with thread or clamp connection on both ends (see figures 1-6) is delivered ready for installation. During installation into the pipeline system, make sure to pay attention to tension-free seat (pipe connections plane parallel and centred to each other).



Butterfly valve SV04 DIN / INCH

5.1.2 Installation butterfly valve type SV04 with weld-in connection

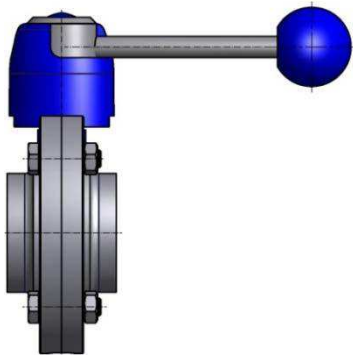


Figure 7
Butterfly valve SV04 WW
DIN/inch/ISO
Art.-No.: 52240/52204/52248

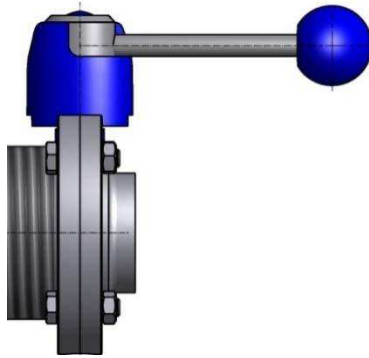


Figure 8
Butterfly valve SV04 MW
DIN/inch
Art.-No.: 55240/55204

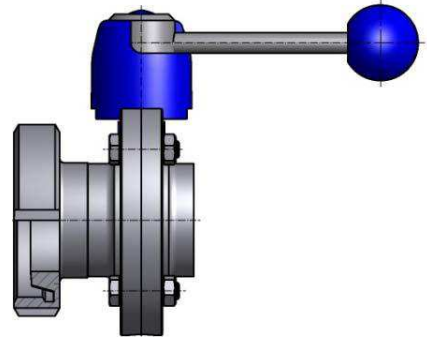


Figure 9
Butterfly valve SV04 LW
DIN/inch
Art.-No.: 56240/56204

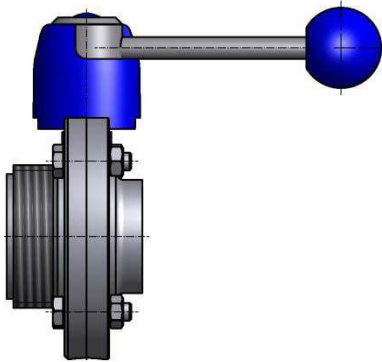


Figure 10
Butterfly valve SV04 MW
IDF
Art.-No.: 55244

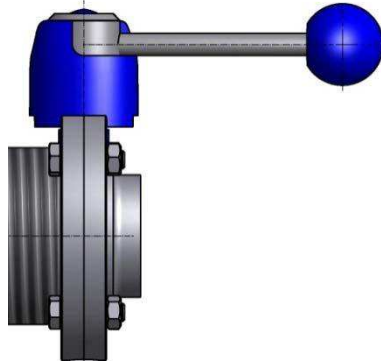


Figure 11
Butterfly valve SV04 MW
DS/SMS
Art.-No.: 55254/55274

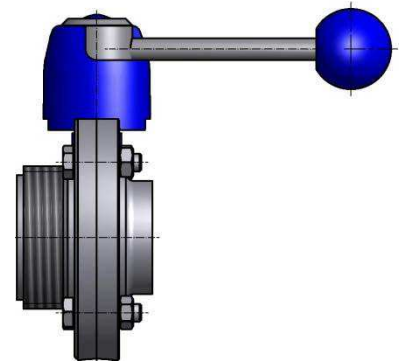


Figure 12
Butterfly valve SV04 MW
RJT
Art.-No.: 55264

The butterfly valve type SV04 with weld-in connection on one or both ends (see figures 7-12) must be completely dismantled before welding it in (see chapter Disassembly). All components must be removed from the valve. The welding must then be done in partially assembled state without actuator, gasket, disc, friction bearing and plug. When welding, pay attention not to transmit any outer deformation tension to the butterfly valve. The subsequent assembly may only be done after the part has cooled down and been cleaned.



5.1.3 Installation butterfly valve type SV04 BF (between flanges)

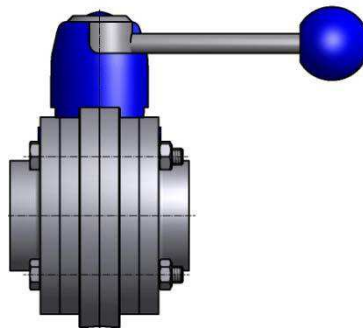


Figure 13
Butterfly valve SV04 BF
DIN/inch
Art.-No.: 56040/56004

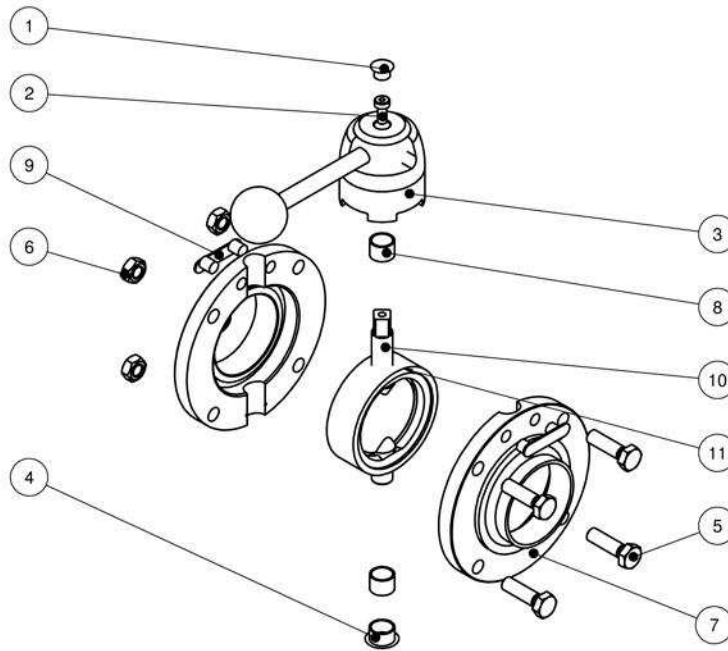
Before installation of the butterfly valve type SV04 BF (see figure 13), the handle or the actuator with the bracket have to be removed. Furthermore, separate the counter flanges from the valve body (see chapter Disassembly). The counter flanges are welded to the given pipelines. The drilling pattern of both flanges must be aligned. The subsequent assembly may only be done after the part has cooled down and been cleaned.

5.2 Disassembly



Butterfly valves may only be disassembled by specialist personnel who have received the necessary technical training, and are equipped with the experience and knowledge to carry out the tasks involved.

5.2.1 Disassembly butterfly valve SV04 with handle HB04



1	Plug
2	Hexagon-socket screw
3	Handle HB04
4	Plug
5	Hexagon-head screw
6	Hexagon nut
7	BV body
8	Friction bearing
9	Clip
10	Butterfly valve disc
11	BV gasket SV04

Figure 14 Disassembly butterfly valve SV04 with handle HB04

- Remove plugs (1,4)
- Pull lever off the handle HB04 (3) and then undo accessible hexagon-socket screw (2) using an Allen key size 4
- Remove handle HB04 (3) completely
- Undo the hexagon screws (5) and hexagon nuts (6)
- Pull the BV body (7) apart.
- Remove butterfly valve disc (10) together with the BV gasket (11) and friction bearing (8)
- Remove BV gasket (11) and friction bearing (8) from the butterfly valve disc (8)



5.2.2 Disassembly butterfly valve type SV04 with pneumatic actuator PAMS

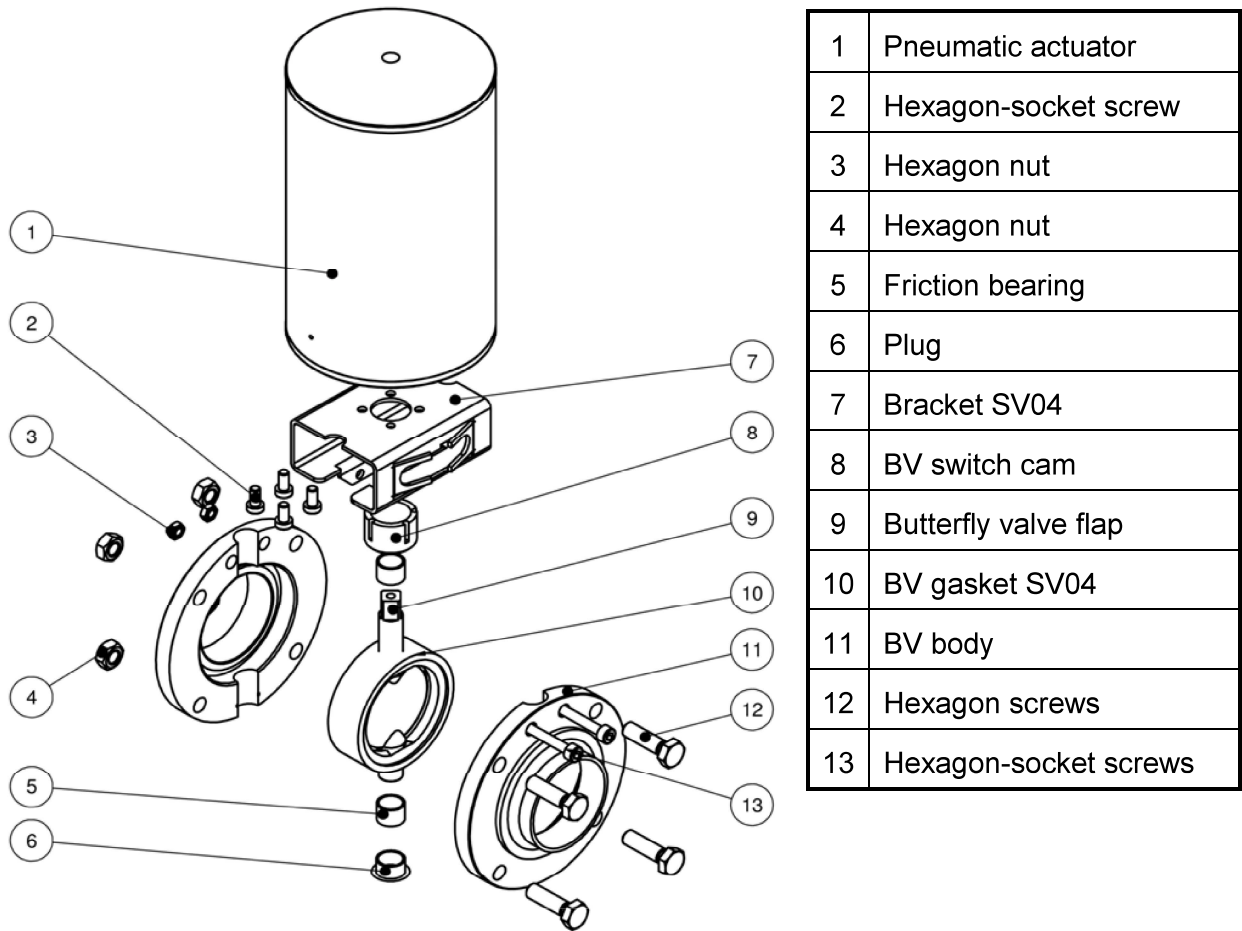


Figure 15 Disassembly butterfly valve type SV04 with pneumatic actuator PAMS

- Undo and remove hexagon-socket screws (13) and hexagon nuts (3)
- Remove the pneumatic actuator (1) completely with bracket (7) from the valve
- Remove BV switch cam (8) and plugs (6)
- Undo the hexagon screws (12) and hexagon nuts (4)
- Pull the BV body (11) apart.
- Remove butterfly valve disc (9) together with the BV gasket (10) and friction bearing (5)
- Remove BV gasket (10) and friction bearing (5) from the valve disc (9)

5.2.3 Disassembly butterfly valve SV04 BF with HB04 or PAMS

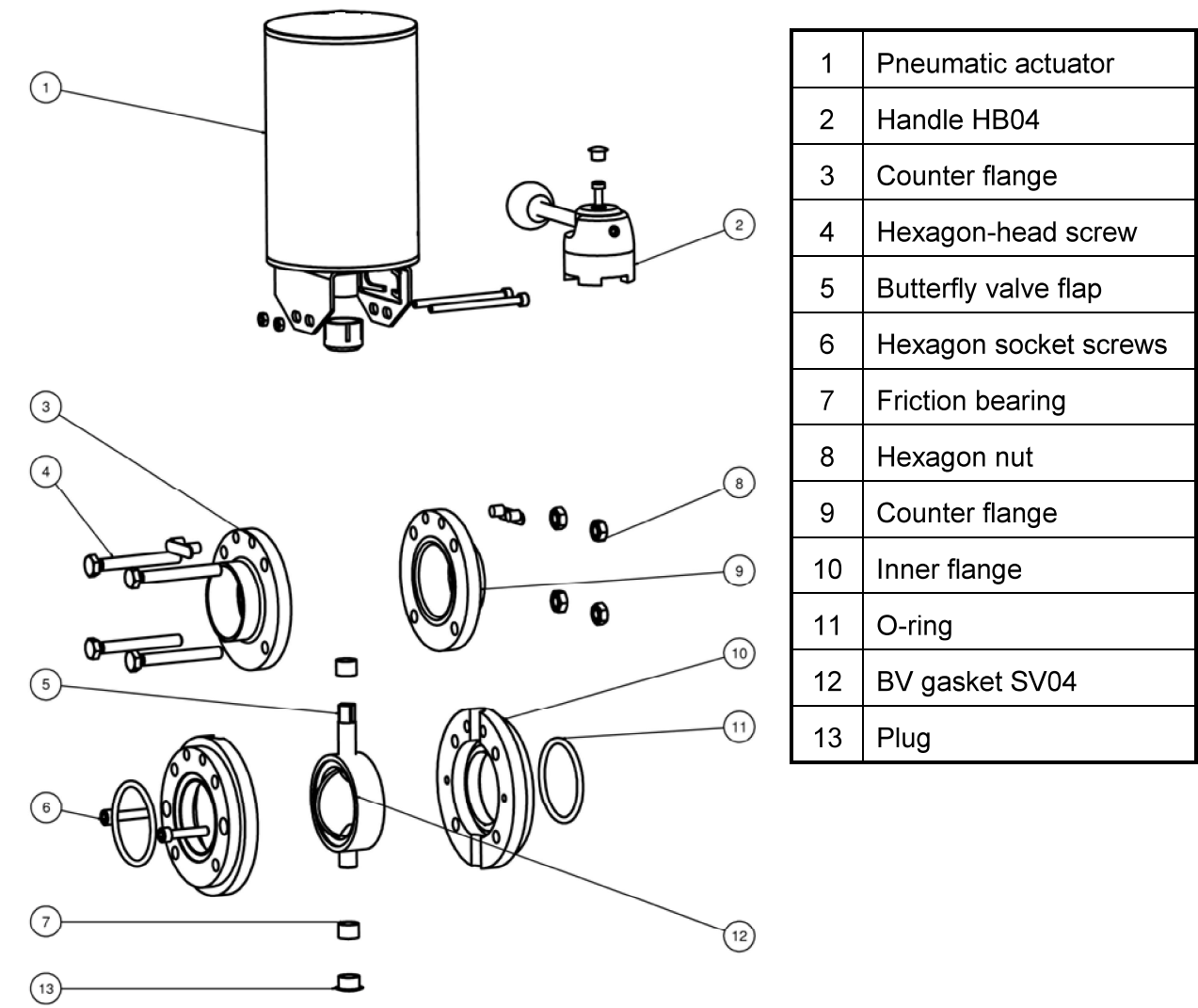


Figure 16 Disassembly butterfly valve SV04 BF with HB04 or PAMS

- Disassemble pneumatic actuator (1) or handle HB04 (2), respectively (see chapter 5.2.2 or 5.2.3)
- Undo and remove the hexagon screws (4) and hexagon nuts (8)
- Separate the counter flanges (3,9) from the valve body
- Undo hexagon-socket screws (6) and remove plugs (13)
- Pull inner flanges (10) apart
- Remove butterfly valve disc (5) together with the BV gasket (12) and friction bearing (7)
- Remove BV gasket (12) and friction bearing (7) from the butterfly valve disc (5)
- Replace any damaged O-rings (6)



5.3 Assembly of the butterfly valve gasket



During assembly make sure not to damage the gasket.

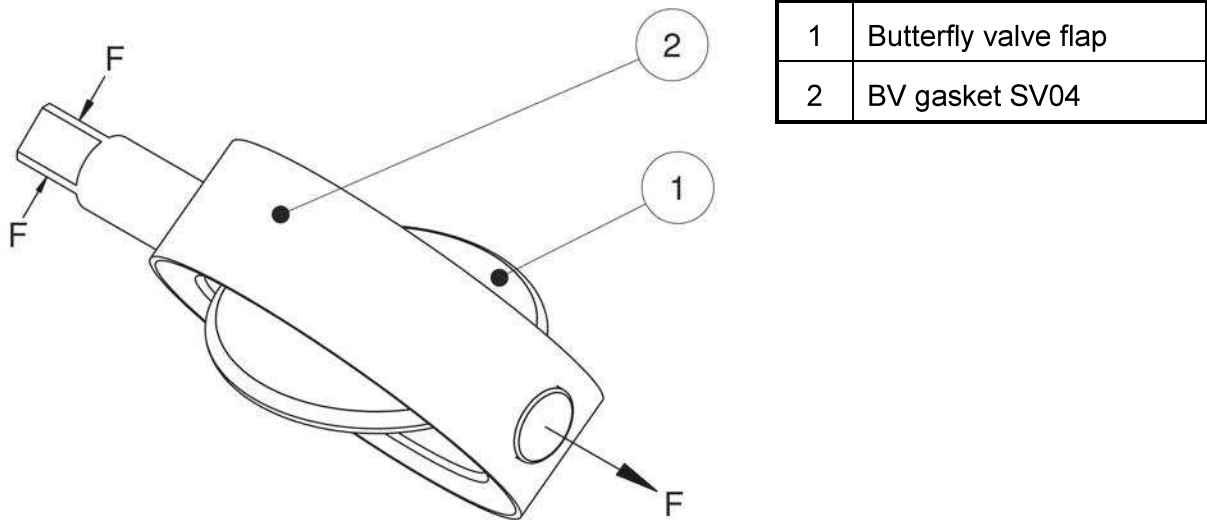


Figure 17 Assembly of the butterfly valve gasket

- Clean the butterfly valve disc (1) and slightly grease the drilled holes of the BV gasket (2) with a lubricant suitable for the process and the elastomer.
- Carefully push the butterfly valve disc (1) at the square side through an axle hole of the gasket, using a suitable tool if necessary.
- Clamp the butterfly valve disc (1) with the BV gasket (2) mounted on one side at its square e.g. in a vice.
- Turn the BV gasket (2) until it is at a 90° angle to the butterfly valve disc (1).
- Pull the BV gasket (2) manually with its free hole over the exposed end of the butterfly valve disc (1)
- Unclamp the butterfly valve disc (1) with the BV gasket (2) mounted.

5.4 Assembly butterfly valve type SV04 with HB04 or PAMS

Assemble the butterfly valve in reverse order to disassembly (see 6.2)



Butterfly valve SV04 DIN / INCH

6 Repairs/Maintenance



In order to ensure highest operational safety of the butterfly valves, replace all wear parts on a regular basis.

The maintenance intervals differ from case to case, the operator should define them by himself basing on sporadic checks.



M&S Armaturen GmbH cannot accept liability for claims made as a result of nonobservance of these Operating Instructions or constructional changes to the butterfly valve.

Any other use or use outside the defined scope is considered to be improper use. M&S Armaturen GmbH will not accept liability for losses incurred as a result of improper use.

7 Cleaning



Observe the safety data sheets by the cleaning agent manufacturers! Only use cleaning agents that do not attack stainless steel, elastomer nor plastic.

- Clean individual parts thoroughly



8 Technical Data

8.1 EHEDG [European Hygienic Engineering & Design Group]

M&S butterfly valves are EHEDG certified.

According to EU Directive 98/37/EC and 93/42/EEC, all production steps in the production of food products must be under hygienic conditions.

8.2 Materials

Material: 1.4301/1.4307 - AISI 304/304L (in contact with product)
1.4404 - AISI 316L (in contact with product)

Gaskets: VMQ, EPDM, FKM, NBR, HNBR

8.3 Permissible operating pressures butterfly valve type SV04

Table 1: Permissible operating pressures butterfly valve type SV04

DN		max. permissible operating pressure [MPa]	Max. permitted operating pressure [bar]	max. permissible operating temperature [°C]
15-25	1"	1.0	10	Elastomer dependent
32				
40	1.5"			
50	2"			
65	2.5"			
80	3"			
100	4"			
125				
150				



8.4 Flow coefficients (K_V -values) butterfly valve type SV04

Table 2: Flow coefficients (K_V -values) butterfly valve type SV04

DN	15	20	25	32	40	50	65	80	100	125	150	200
K_V [m ³ /h]	12	20	28	50	78	130	200	290	450	610	800	1800

DN			33.7	42.4	48.3	60.3	76.1	88.9	114.3
K_V [m ³ /h]			28	50	78	130	200	290	450

DN			1"		1.5"	2"	2.5"	3"	4"
K_V [m ³ /h]			20		70	122	175	230	440

8.5 Torques and permissible operating pressures PAMS

Table 3: Torques, permissible operating pressures and air consumption

Variant	Maximum closing moment [Nm]	Operating pressure [MPa]	Operating pressure [bar]	Air consumption [l/stroke]
NC/NO size 0	35	0.48-0.80	4.8-8.0	0.8-1.2
NC/NO size 1	65	0.48-0.80	4.8-8.0	1.2-2.0
NC/NO size 2	100	0.48-0.80	4.8-8.0	3.0-5.0
DA size 0	50 (6bar)	0.30-0.80	3.0-8.0	0.5-1.2
DA size 1	80 (6bar)	0.30-0.80	3.0-8.0	0.8-2.0
DA size 2	130 (6bar)	0.30-0.80	3.0-8.0	1.9-5.0

8.6 Requirements control air for PAMS

Table 4: Requirements control air for PAMS

Requirement	Quality class	Standard
Solids content	6	acc. to ISO 8573-1
Water content	4	acc. to ISO 8573-1
Oil content	3	acc. to ISO 8573-1



9 Optional trigger and query systems

9.1 End position feedback

The feedback device is located at the bracket SV04. By the installation of inductive proximity switches M12x1 and a switch cam, the position "OPEN" and/or "CLOSED" can be queried, respectively.

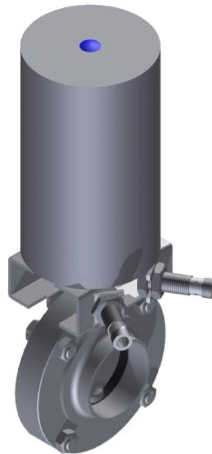


Figure 18: Butterfly valve type SV04 with pneumatic actuator and end position feedback

9.2 Control and feedback head TOP09

The control and feedback head TOP09 is an extension module for the pneumatic actuator PAMS. The valve position detection is done by inductive proximity switches. The integrated pilot valve controls two single-acting actuators. In case of double-acting actuators, two pilot valves control the actuator.

The design of control head and pneumatic actuator allows for an internal control air flow without external hoses. Apart from the electric position feedback, the device status is displayed optically at the control head itself by a mechanic position indicator.

The control and feedback head can be adapted to any M&S standard element. A splashwater-protected housing contains both the proximity switches for position query and the pilot valves required for triggering.





Figure 19: Butterfly valve type SV04 with pneumatic actuator and control head TOP09

For further information please refer to the operating instructions "Control head TOP09, plastic version".

You can find this manual under the following link on the internet:

[Link to the operating instructions Control and feedback head TOP09](#)



9.3 Control head AS-i

The control head AS-i is an extension module for the pneumatic actuator PAMS with an AS-Interface field bus interface. A contact-free analogue sensor element detects the valve position after detecting the valve end positions automatically by means of the teach function during commissioning and storing them. The integrated pilot valve controls single- or double-acting actuators.



Figure 20: Butterfly valve type SV04 with pneumatic actuator and control head AS-i

For further information please refer to the operating instructions "Control head Type 8691".

You can find this manual under the following link on the internet:

[Link to the operating instructions ASI control head Type 8691](#)



9.4 Electro-pneumatic position controller (EPPC)

With the electro-pneumatic position controller (EPPC) for the pneumatic actuator PAMS, the actuator position or the valve disc position is controlled according to the set position value. The set value specification is done by an external standard signal 4 to 20 mA or via AS interface.



Figure 21: Butterfly valve type SV04 with pneumatic actuator and electro-pneumatic position controller (EPPC)

For further information please refer to the operating instructions "Digital electro-pneumatic position controller type 8694".

You can find this manual under the following link on the internet:

[Link to the operating instructions electro-pneumatic position controller type 8694](#)



9.5 Electro-pneumatic process controller (EPPC/PR)

With an electro-pneumatic process controller (EPS/PR) for the pneumatic actuator PAMS, the actual value of the process factor is directly applied to the device as a 4-20 mA signal. The process controller calculates the set value for the position controller by a set/actual value comparison.



Figure 11: Butterfly valve type SV04 with pneumatic actuator and electro-pneumatic process controller (EPPC/PR)

For further information please refer to the operating instructions "Digital electro-pneumatic process controller Type 8693".

You can find this manual under the following link on the internet:

[Link to the operating instructions electro-pneumatic process controller type 8693](#)





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Use and Maintenance Manual

Rotary Valve Atex



WORK ORDER	PRODUCT DESCRIPTION	CUSTOMER	ORDER No.
M/14/0245/EW	R.V. 200 RCRC	COPERION K-TRON	P163127
WRITTEN BY	CHECKED BY	APPROVED BY	
Barbara Bardelli	Alessandro Ceccanti	Salvatore Lardieri	

CO.RA. S.r.l. Spianate–Altopascio (Lu)	Use and Maintenance Manual	Rotary Valve Atex	Date Rev.4	20/07/2007 Pag. 2 of 28
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1 INTRODUCTION

1.1 PRELIMINARY OBSERVATION

This Use and Maintenance Manual should be read before handling, installing, using, maintaining or removing the **ROTARY VALVE**. Therefore, this manual should be maintained complete and kept in a safe place. In case of frequently consultation, copies should be made available.

The handling, installation, use, maintenance or operational removal of the valve, with any tool, device, action or anything- not included in this manual- is considered incorrect. Consequently, the manufacturer declines all responsibility for any consequence that might be the result of any such actions on people or objects.

The handling, installation, use, maintenance or operational removal of the valve should always be carried out by qualified personnel and under suitable conditions for such a task. It is forbidden that children or unskilled personnel carry out these operations.

Unauthorized people are not allowed to stay near the valve when it is functioning, throughout its working life.

The removal of the safety systems or any other device supplied by the manufacturer to protect the operator is under the unique and solely responsibility of the purchaser or the valve user.

Any mechanical, electrical or operational modification (not included in this manual) to the logical control, to the circuits, to the accident prevention systems, without previous authorization of the manufacturer is forbidden.

Please note that valve handling, installation, use, maintenance or operational removal can be a source of danger, when they are not carried out in accordance with the instructions given in this manual, or without the due care and attention that such operations demand.

Please do not hesitate to contact us for any assistance that you may require. **Please note that lack of compliance with the instructions contained in this manual shall invalidate the warranty.**

For any further queries that you might have, do not hesitate to contact:
















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1.1.1 EXPLANATION OF TERMS USED IN THIS MANUAL

To help understanding this manual, the following is an explanation of the used terms.

- **DANGER AREA:** the area inside or near the valve which represent a hazard for safety and health of the exposed person in the area.
- **EXPOSED PERSON:** anyone who is totally or partly inside a danger area.
- **OPERATOR:** the person entrusted to operate, adjust and clean the machine.
- **QUALIFIED TECHNICIAN:** a qualified person who has been trained from you to carry out extraordinary maintenance or repairs which require particular knowledge of the machine and its operation, and of the safety devices and how they are activated.

Table 1-1 Symbols used throughout the manual

INFORMATION		General information
WARNING		General danger
		Electrical danger
		Crushing and cutting danger
PROHIBITION		General prohibition
		Do not carry out maintenance while machine running
		Do not stand or cross within distance of moving parts
OBLIGATION		Ear defenders MUST be worn
		Helmet MUST be worn
		Protective gloves MUST be worn
		Protective overalls MUST be worn
		Safety boots MUST be worn
		Protective goggles MUST be worn

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1.2 WARRANTY

We guarantee the **ROTARY VALVE** for any material and/or manufacturing fault and/or any defect for a twelve month period from the delivery date.

During the warranty period, we undertake to remove or solve, timely due, any fault or defect of the valve, provided that the valve has been correctly installed and used in accordance with the instructions given in this manual.

Defective parts under warranty will be repaired or replaced free of charge by the manufacturer. Transport and/or delivery costs, as well as any cost of the technician travel from and to the user's headquarters that might be incurred by the manufacturer, shall be paid by the customer, i.e. the purchaser.

This commitment excludes all other conditions of warranty established by law.

The warranty excludes all expendables and materials in relation to the valve and the electrical sections.

Attention!!!

The use of the valve with no original spare parts provokes the decay of the security and the warranty requirements.

1.3 USING THE INSTRUCTION MANUAL



This Instruction Manual is addressed to the users (operators, maintenance personnel, etc.)



The instructions must be known, available, understood and used.



Before the start-up the valve, please read the technical instructions in this manual and follow them carefully.



Keep this manual and all the attached publications (if present) in an accessible place which is known to all users (operators and maintenance personnel).

It is advisable to make a copy of this manual and keep it in a safe place.

2 TRANSPORT AND HANDLING



2.1 TRANSPORTATION MEANS

Packaging used by the Constructor is suitable for the type and size of **ROTARY VALVE** delivered and will grant protection during transport until its delivery to the customer.

The type of packaging depends on the distance, customer's instructions and the period of time that the **ROTARY VALVE** will have to remain in the packaging.

2.2 WEIGHT

DN	WW (Kg)	WR (Kg)	RR (Kg)	WCWC (Kg)	WCRC (Kg)	RCRC (Kg)
80	3.5	3.7	3.8	4.3	4.6	5
100	4	4.2	4.4	4.8	5.1	5.5
150	5.6	5.9	6.2	6.6	6.9	7.4
200	7.6	7.9	8.1	8.8	9.2	9.7
250	11.5	11.7	12	13	13.6	14.3
300	13.7	14	14.5	16.2	16.8	17.3

2.3 HANDLING

Handling of the **ROTARY VALVE** must always be carried out by lifting equipment suitable for its weight and size in order to prevent injury to people or damage to objects and/or to the valve itself due to vibrations, knocks, scraping, etc.

The handling of packaging, either manually or with lifting equipment, must be carried out exclusively by personnel who have been properly informed about the risks involved, in accordance with the laws in force in the country of use.

2.4 STORING

The storage of a **ROTARY VALVE** should be in a dry, clean environment; resting on a clear rubber or silicone layer.

WARNING!!

For long term storage, the rotor must be opened (10°) to avoid damage to the gasket.



2.5 OVERALL DIMENSIONS

All dimensions are given in the **ROTARY VALVE** layout (see fig.2.2)

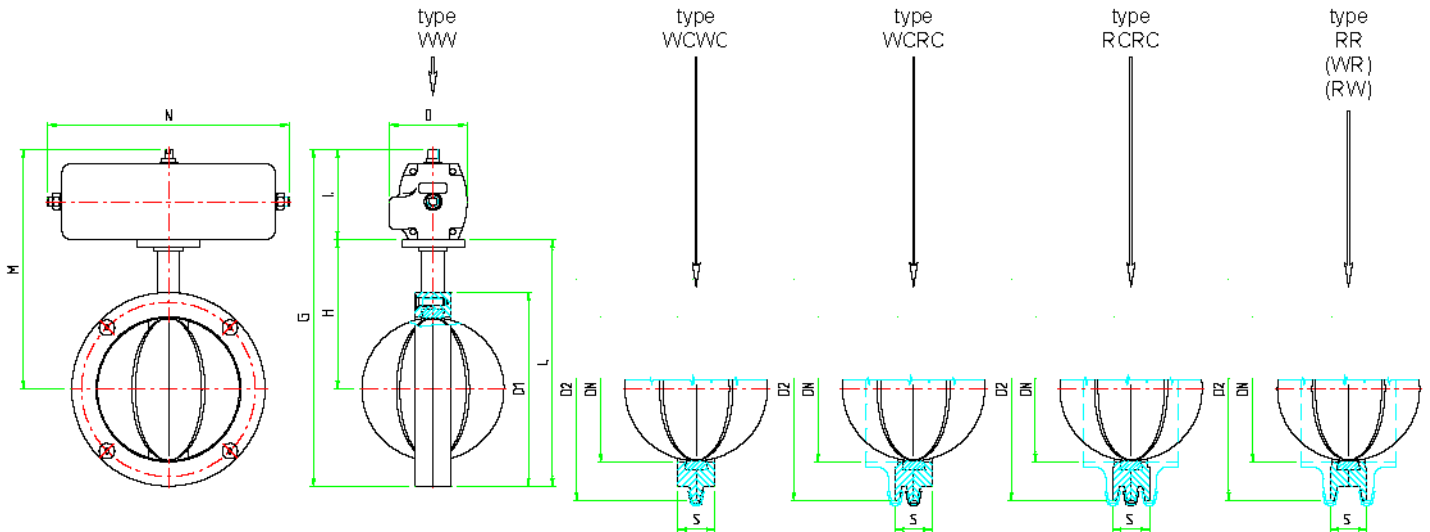


Fig.2.2

DN	D1 (mm)	D2 (mm)	S (mm)	G (mm)	H (mm)	I (mm)	L (mm)	M (mm)	N (mm)	O (mm)	Att.
80	130	160	38	268	120	93	185	193	250	80	AD 63-180
100	150	180	38	298	130	93	205	223	250	80	AD 63-180
150	200	230	38	348	155	93	255	248	250	80	AD 63-180
200	250	280	38	398	180	93	305	273	250	80	AD 63-180
250	306	330	40	488	213	122	366	335	310	105	AD 85-180
300	370	400	40	549	242	122	427	364	310	105	AD 85-180

All data are subjected to change without notice.



3 VALVE DESCRIPTION

3.1 TECHNICAL FEATURES

Characteristics

- ◆ Body in satin (polished on request) AISI 316L (DIN 1.4404)
- ◆ Rotor in polished AISI 316L (DIN 1.4404)
- ◆ Rotor with 6 (8 on request) rotating lobes with adjustable speed.
- ◆ Without O-Ring (OR) seals on the shaft.
- ◆ Easy to disassemble, inspect, clean, especially the versions with **QUICK RELEASE CLAMP**.
- ◆ Reduced weight and dimension.
- ◆ Materials: stainless steel and silicone.
- ◆ Manufactured in accordance with G.M.P. regulations.
- ◆ Allows continuous feeding of granules and powders without obstruction of the flow.
- ◆ Pressure and vacuum seal (when the valve is in closed position).
- ◆ High resistance to temperature.
- ◆ Interchangeable components with **SOLE VALVE®** and **TABLET VALVE®**
- ◆ ISO5211 double-acting (AD) pneumatic actuator of anodised aluminium.
- ◆ Compressed air control: 4÷6 bar (58÷87 psi)
- ◆ Operating consumption at a pressure of 5.6 bar (80 psi):
AD63-180= 0.26 l., approx.
AD85-180= 0.55 l., approx.
- ◆ Each valve wears the **CO.RA. S.r.l.** trade mark and identification batch number.
- ◆ On each valve is printed **CO.RA. S.r.l.** trade mark and identification batch number, to trace in the long run.

Example:

 **I/01/298/AG**

Advantages

- ◆ Smaller and lighter than traditional star valves.
- ◆ Stops only in closed position.
- ◆ Minimum friction between rotor and seal thanks to reduced contact surface.
- ◆ No need for lubrication.
- ◆ Can also be sterilised in autoclave.

Applications

- ◆ Standing valve for powder containers.
- ◆ Where product flow control is required, especially to feed mills, tablet press machines, capsule fillers, micro-dosing machines and sieves.

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3.2 GENERAL DESCRIPTION

Thanks to its star shape and alternating movement (180° in one direction alternating, 180° in the opposite direction), the **ROTARY VALVE** collects the product and transfers it into to the charging machine while blocking the upstream flow.

The alternating movement prevents product bridging across the valve. Speed and rest times can be adjusted according to the customer's needs.

The **ROTARY VALVE** is compact and light.

It is made of stainless steel AISI 316L; the gasket is made of silicone according to the FDA 177.2600 standards.

ROTARY VALVE type WW

Installed onto the outlet of a container or processing equipment with reduces cleaning and sanitizing needs. Removable by unscrewing the locking screws.

ROTARY VALVE type WR (RW)

Installed onto the outlet of a container or processing equipment or without many cleaning and sanitizing needs. Recommendable when one of the machines works with granules or bulk transfer and has to be frequently replaced.

Disassembly by clamp allows a quick replacing of the receiving container.

ROTARY VALVE type WCWC

Installed onto the outlet of a container or processing equipment in case of frequent cleaning and sanitizing operations. Its complete disassembly is immediate, by opening the clamp.

Components can be exposed to a careful cleaning and sanitizing. Afterwards reassembly can be performed without any tool.

ROTARY VALVE type WCRC

Installed onto the outlet of a container or processing equipment in case of frequent cleaning and sanitizing operations. Its complete disassembly is immediate, by opening the clamp.

Components can be thoroughly cleaned and sanitized. Afterwards it is easily reassembled without any tool.

ROTARY VALVE type RCRC

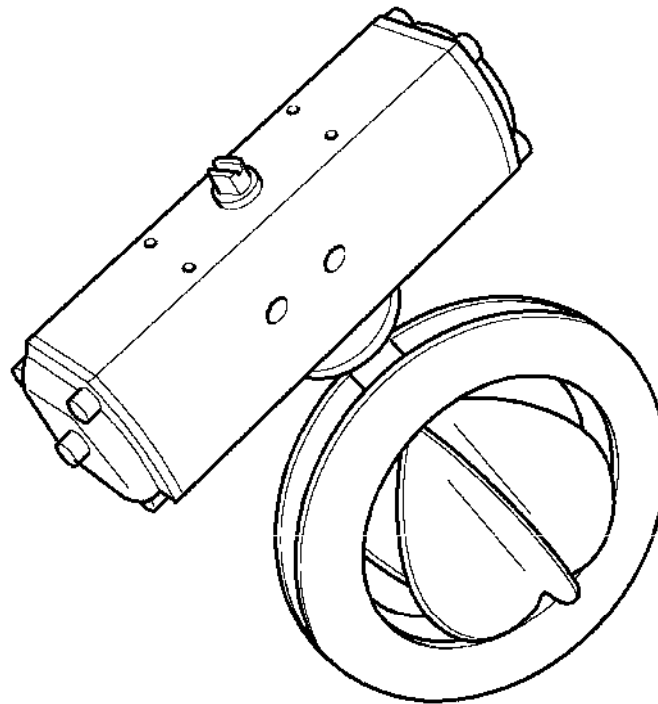
Installed onto the outlet of a container or processing equipment in case of frequent cleaning and sanitizing operations. It is also suitable for splitting the upper machine from the lower material receiving container. This kind of connection is very helpful when it is necessary not to have bulk or granules dispersion during the discharge operations. Full and immediate disassembly by releasing clamp connection.

3.3 PURPOSE

The **ROTARY VALVE** is designed by our technicians to solve flow control problems in a pharmaceutical system. In particular, it allows granules and powders to be fed continuously and performs product precision dosing to feed:

- ❖ Mills.
- ❖ Tablet Press Machines.
- ❖ Capsule Fillers Machines.
- ❖ Micro-Dosing Machines.
- ❖ Sieves.

The valve design meets processing requirements, allowing a quick and easy cleaning without any tool.



Picture 3.1

3.4 PNEUMATIC SYSTEM

The pneumatic diagram for the **ROTARY VALVE** and the list of components are to be found under the **section 5.** And **section 7.**

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4 SAFETY DANGER PROTECTION



4.1 RECCOMENDATION OF PREVENTIVE MEASURES THAT SHOULD BE TAKEN

4.1.1 SAFETY REGULATIONS

To keep the valve in perfect working order and to guarantee safe operator use, we recommend the following regulations to be carefully followed:

- 1) Give a copy of the instruction manual to every operator.
- 2) Keep the valve in perfect working condition and always use its safety guards.
- 3) Before carrying out any maintenance, cleaning or lubricating any electrical (if present) or mechanical parts, disconnect the valve from any electrical and/or pneumatic supply. Ensure that there is no air in the pressure system by disconnecting the air compressor.
- 4) The replacement and repair of electrical parts (if present) must be carried out exclusively by qualified technicians.
- 5) In case of presence of any electrical part, the electrical supply cables will be appropriately indicated with danger tags.
- 6) Do not remove these tags and do not make any intervention on these cables or on electrical parts without first taking all the necessary precautions (e.g. switching off the electrical supply upstream).
- 7) Do not use water to extinguish fire on electrical parts. Use the special extinguishers according to regulations in force in the country of use.
- 8) Keep away from moving parts.
- 9) It is strictly prohibited to make temporary or hand-made connections to the electrical (if present) or pneumatic supply.
- 10) During automatic and manual cycles, the operator's station for monitoring, checking and adjusting operations stays always outside the danger area guards.
- 11) There is no need of a special training course on the use of this valve.
- 12) Only the manufacturer's original spare parts can be used on the valve.
- 13) Before beginning to work, ensure that all the safety guards are in the right position and in perfect working condition.
- 14) In case of defective or abnormal operation the valve shall be stopped and this event shall be reported to the person in charge (e.g. unusual noises, damaged parts, incorrect movement, etc.).
- 15) It is important to establish a regular program of inspection and maintenance.
- 16) Wear safety shoes when installing, assembling, maintaining or cleaning the valve.
- 17) When lifting weights, do not bend your back. Keep always your torso straight.
- 18) Make sure that work clothes are in perfect condition, are suitable for the working environment, and in conformity with the regulations in force in the country of use.

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ATTENTION!!

The operator's working area should be kept free from large and/or obstructing objects to ensure that nothing will interfere with the movement of the valve or prevent the operator from stopping it immediately in the event of an emergency.

The valve shall never be operated when its moving parts are not protected with the safety.

It is forbidden to modify any safety guards protecting the danger areas.

4.2 DANGER AREAS – RESIDUAL HAZARDS

Before disassembly, ensure disconnection from the electrical (if present) and pneumatic supply upstream and check that the valve and the system are not under pressure by disconnecting the compressed air supply.

Disassembling the actuator can be hazardous and may cause operation problems.

When the butterfly actuator is switched on, it kicks because of the opening force.

Consequently, ensure that the valve is properly secured to its support.

Keep hands and fingers off from the valve when switching it on.

If the valve is supplied with control panels, it is dangerous to open them, unless the pneumatic supply upstream is disconnected.

As well as those already described, a further dangerous point of the valve is the contact area between the rotor and the valve body.

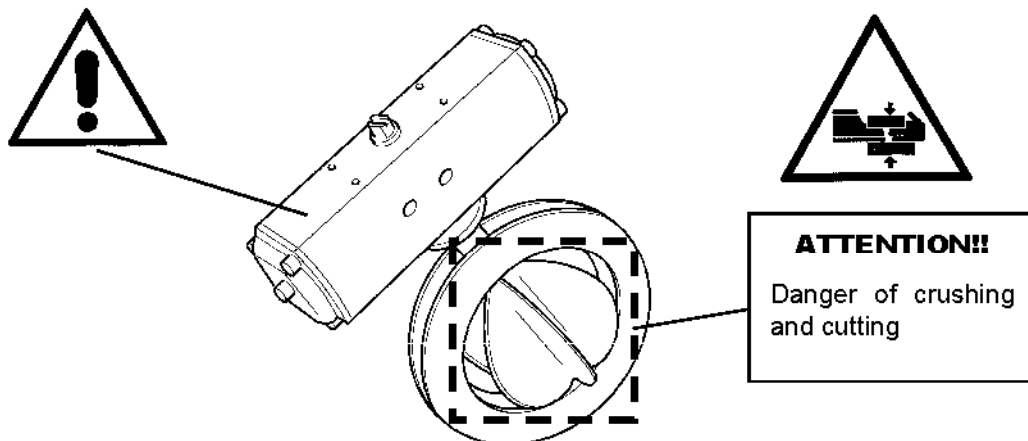
Keep fingers and hands off from the rotor turning area.

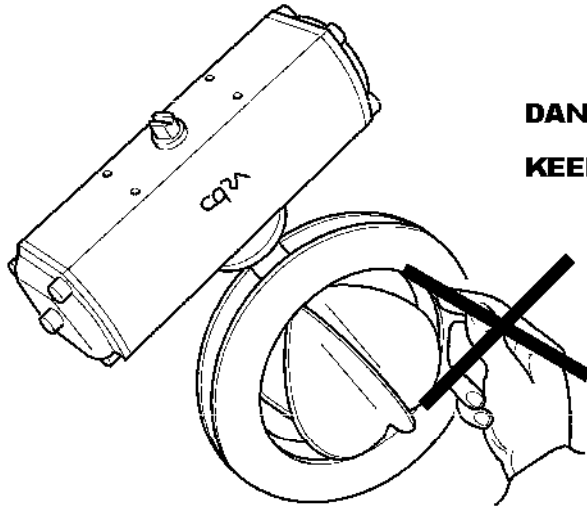
Never get close to the rotor before disconnecting the pneumatic power upstream and ensuring that there is no compressed air in the pneumatic system by disconnecting the compressed air. In the case of presence of electrical components, disconnect the electrical supply upstream.



N.B. Accidents can happen, if these warnings are not observed.

To prevent any accident, maximum care must be taken when the valve is in motion.





DANGER!
KEEP AWAY!!

ATTENTION!!

The ROTARY VALVE is only designed to be part of machinery, systems, containers, etc., It has no other purpose apart from these applications. In accordance with EU Directive 2006/42/CE, the ROTARY VALVE is designed to be assembled inside a machine and to be an integral part of that machine. On its own, it provides no protection against any of the hazards arising from its use and

maintenance. It is forbidden to operate the ROTARY VALVE, until the machine of which it will become an integral part has been declared in conformity with the provisions of Directive 2006/42/CE.

The installer of the ROTARY VALVE is obliged to install it inside the appropriate line or system and to take all necessary actions to prevent or limit machine hazards, as provided under the laws in force.

The risks that should be avoided are included in, but not limited to, the following list:

- **Limbs crushing or trapping in moving parts.**
- **Exposure to material processed in the system in which the machine is mounted.**
- **Ergonomic risks, due to control panel incorrect position.**
- **Ergonomic risks during maintenance due to valve incorrect position**

4.2.1 NOT ALLOWED USE

CO.RA. S.r.l. valves can only be used with material in granule and powder form. Other purposes not mentioned in this manual are prohibited.

4.3 SAFETY SYSTEMS

The **ROTARY VALVE** shall be assembled in a system which is already fitted with an emergency pushbutton. By pushing the button, all valve operations will immediately stop. If the **ROTARY VALVE** is assembled on a system without an emergency pushbutton, the customer shall install one immediately.

The **ROTARY VALVE** is part of the equipment. Therefore, the customer shall make any modification required by the system to guarantee that the **ROTARY VALVE** is correctly installed and it is in conformity with current safety regulations in the country of use, as well as with the specifications contained in this manual.

5 ASSEMBLING THE VALVE



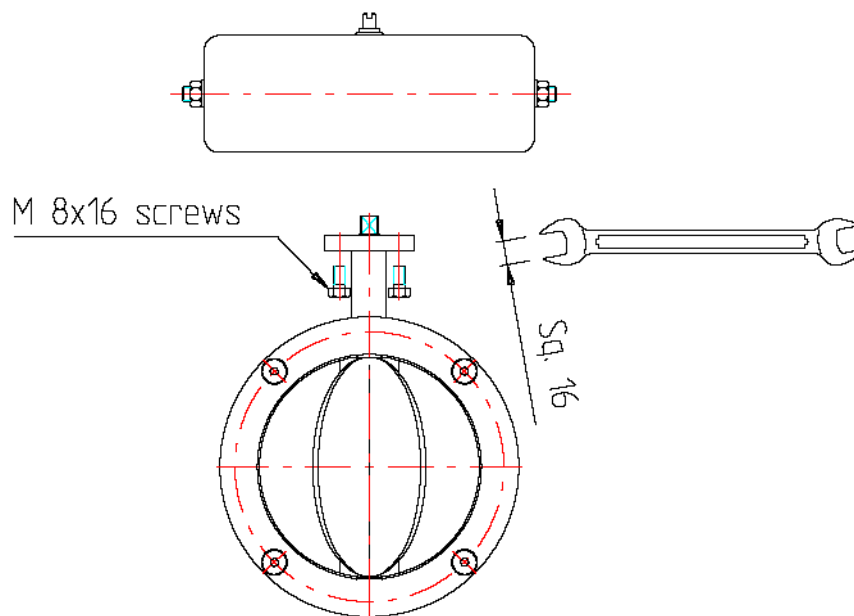
5.1 CHECKS AND PRELIMINARY OPERATIONS

The valve is always shipped in perfect working conditions after being tested at our factory.

- ◆ When you receive the valve, open the packaging and check that the valve has not been damaged during transport. In case of damage, report to the carrier immediately.

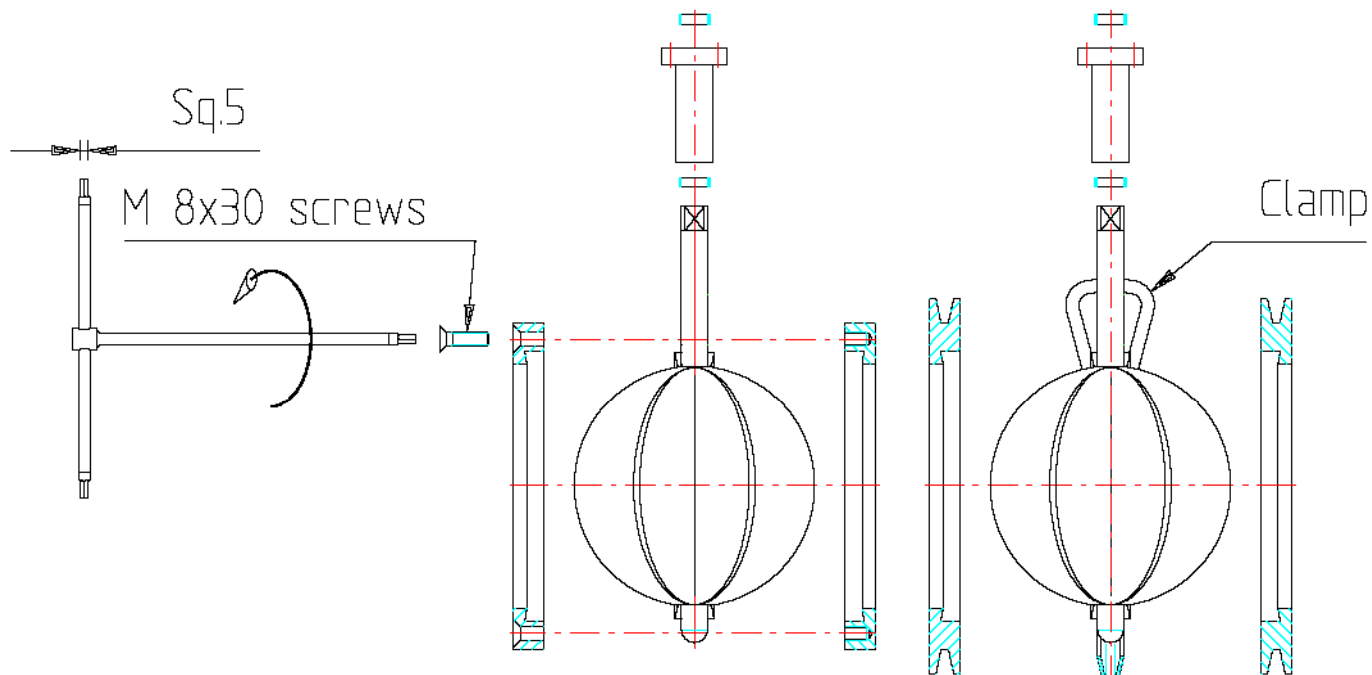
5.2 VALVE DISASSEMBLY

- ◆ To remove **ACTUATOR** unscrew 4 hexagonal head M 8x16 screws with spanner (Sq. 16)

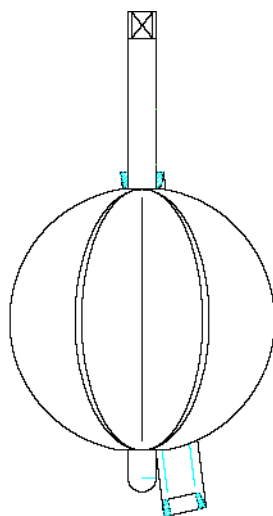


- Unscrew the 6 M 8x30 flat head screws (4 for the light version) to disassemble the halfbodies in the **WW**, **WR**, **RW** and **RR** types
- Unscrew the clamp golfare in the **WC**, **WCRC**, and **RCRC types** (for safety reason the assembly of the clamp prevents golfare sliding away from the trough part)

- Extract the support and the rotor with the gasket



- Carefully extract the gasket.



We recommend to carry out this operation on a suitable table, covered with a clean rubber layer.

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5.3 VALVE INSTALLATION AND SAFETY CONDITIONS

Type WW between 2 flanges

The **ROTARY VALVE should** be positioned between 2 flanges and secured by means of screws. Open the vane slightly to check that it opens easily. Leave the rotor slightly open. Tighten the flange screws in a clockwise direction. Test opening and closing.

Type WW, WR on piping/stub pipe (welding on half-body W)

Disassemble the valve. Extract vane and gasket. Reassemble the half-bodies with support and connect them slowly with the piping by crosswise spot welding. After cooling, remove the valve and reassemble all the components. Test opening and closing.

Type WW, WR with spigot type S on piping/stub pipe

Disassemble the valve. Extract vane and seal. Reassemble the half-bodies with support. Connect the spigot to the piping slowly by crosswise spot welding. After cooling, disassemble the valve and reassemble all the components. Test opening and closing.

Type WCWC, WCRC on piping/stub pipe (welding on half-body WC)

Disassemble the valve. Extract vane and gasket. Reassemble the half-bodies with support and connect them to piping slowly by means of crosswise spot welding. After cooling, disassemble the valve and reassemble all the components. Test opening and closing.

Type WCWC, WCRC with spigot type S welded on piping/stub pipe

Disassemble the valve. Extract vane and gasket. Reassemble the half-bodies with support. Connect the spigot to the piping slowly by means of crosswise spot welding. After cooling, disassemble the valve and reassemble all the components. Test opening and closing.

Type RR and RCRC

Tighten the valve between flanges with clamp. Test opening and closing.

Type RR and RCRC with clamp type B and MOUNTING FLANGE type MF

Connect MF slowly to piping by means of crosswise spot welding. After cooling connect valve to flange MF with relevant clamp. Test opening and closing.

Please, remember that welding operations are normally carried out at the manufacturer's facility.

ATTENTION!!

WELDING OPERATIONS SHOULD BE CARRIED OUT ONLY BY SUITABLY TRAINED PERSONNEL. THEY ARE INFORMED ABOUT THE RISKS INVOLVED IN THESE OPERATIONS AND SUPPLIED WITH ADEQUATE TOOLS AND SAFETY CLOTHING ACCORDING TO THE REGULATIONS IN FORCE IN THE COUNTRY OF USE.

TAKE SUITABLE SAFETY MEASURES AGAINST HAZARDS OF USING MANUAL EQUIPMENT, IN ACCORDANCE WITH THE LAWS IN FORCE IN THE COUNTRY OF USE.

The valve and control panel (where present) should be accessible for start- up, checking and maintenance operations. The instructions regarding ergonomics should be considered when assembling the valve with other components. The control panel should be particularly positioned at not less than 1 m. and lower than 1.5 m. from floor.

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5.4 ALLOWED ENVIRONMENTAL CONDITIONS

The devices contained in valve systems with actuator and solenoid valve have a protection level of **IP65**. They are also suitable for use in normal environments. If the valve is used in special environments (e.g. with greater fire hazards), the user should provide the information necessary to choose the most suitable executions.

Operating temperature: min. +5°C - max. +40°C

Altitude: 1000 mt. a.s.l.

ATTENTION!!

The **ROTARY VALVE** must be connected to the earthing circuit.

5.5 CONNECTING THE VALVE TO POWER SUPPLY

5.5.1 CONNECTION TO PNEUMATIC SUPPLY

For further information, refer to paragraph 3.1, 5.6 and section 7 under ATTACHMENTS.

5.6 INFORMATION ABOUT VALVE NOISE

The level of equivalent continuous acoustic pressure measured at the working area is less than 70dB.

6 MAINTENANCE



6.1 GENERAL RULES

The **ROTARY VALVE** has been designed to reduce maintenance operations to a minimum. The rules to follow should always be respected in order to guarantee long life and trouble-free operation:

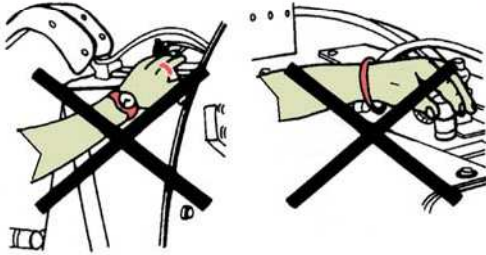
- keep the valve clean and in order
- avoid temporary or urgent repairs

The strict observance of regular maintenance rules are extremely important if any anomalies are to be avoided and time and equipment required for any maintenance operations can be foreseen.

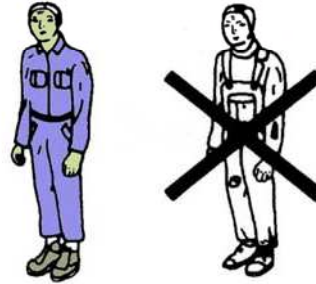
ATTENTION!!

- All cleaning, ordinary and extraordinary maintenance operations must be carried out when the valve is stopped, with the switch on the control panel positioned to "0", and with the electrical supply (where present) or pneumatic supply locked out upstream. Ensure that there is no pressurised air left in the system by disconnecting the compressed air. Expose the appropriate tag to indicate that maintenance work is in progress.
- Remove items that could cause accidents (watch, bracelet, rings, etc.), as shown in pict.6.1.
- Wear suitable clothing (coveralls or a shirt with elasticated cuffs) or roll sleeves up to prevent them being caught, as shown in Pict. 6.2.

Warning: Take suitable safety measures against the hazards of using manual equipment, in according to the laws in force in the country of use.



Pict. 6.1



Pict. 6.2

6.2 PREVENTIVE MAINTENANCE

The ordinary maintenance operations required are described in this paragraph. In order to prevent production from being unexpectedly interrupted and to extend the life of the valve, it is advisable to carry out these instructions properly. It is also very important to respect the safety regulations described in this Manual.

6.2.1 MAINTENANCE AND PREVENTIVE CHECKS

At the end of every working day, position the selector switch “B” on the control panel to “0”.

- Check wear and tear of bushings inside the pneumatic actuator support frequently.
- Check the butterfly valve seals and the pneumatic actuator seal kit.
- Ensure that the pressure reaches the manometer.
- Ensure that the solenoid valve is operating.
- Visually check the position of the cam positioner.

With the exception of normal maintenance, it is always advisable to contact the manufacturer if any anomaly occurs. Always call the manufacturer for replacements.

6.2.2 PROGRAM OF FORSEEN SUBSTITUTIONS

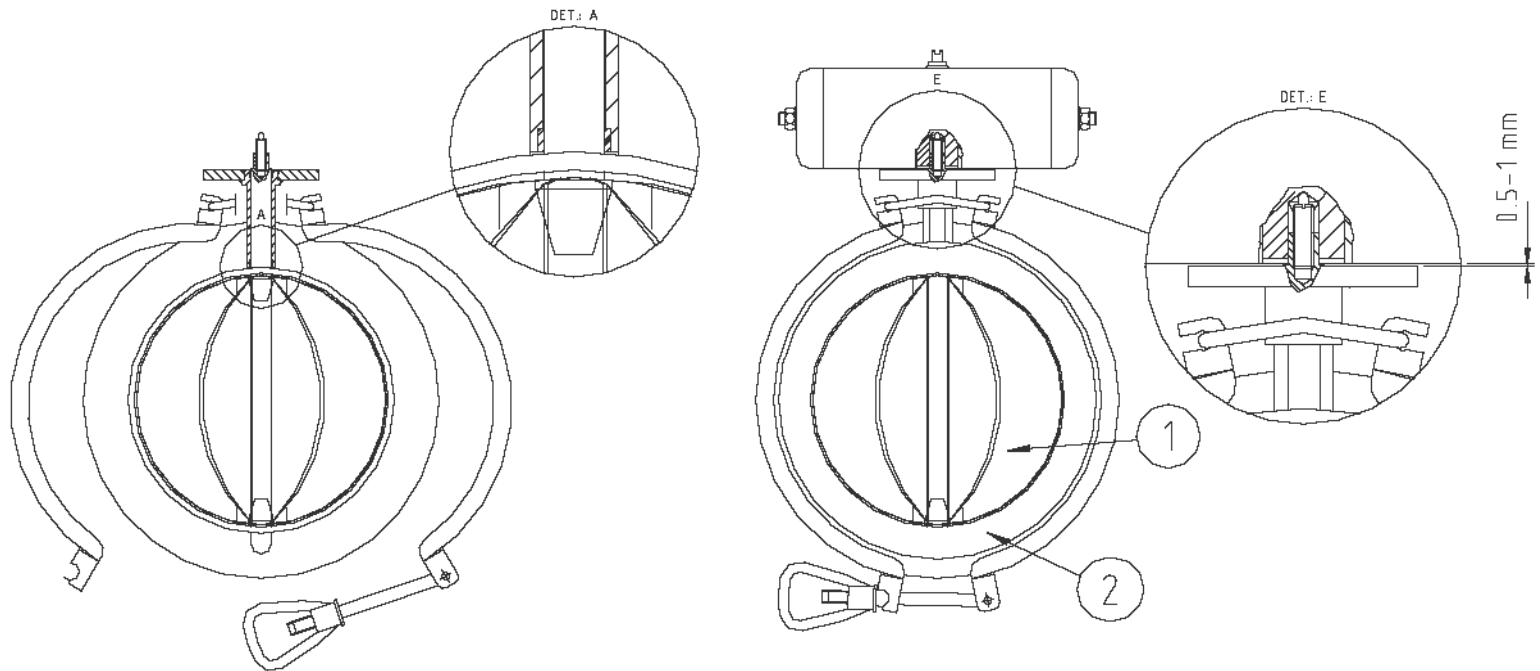
Description	References		Substitution (*)
	See drawing § 8.1	Pos.	
Support: Superior Bushing	SC2255 Rev. 5	8	600.000 cycles
Support: Inferior Bushing	SC2255 Rev. 5	10	3.500.000 cycles
Spring Plunger	SC2255 Rev. 5	16	3.500.000 cycles

(*) Indicative value. Product reference: lactose

6.3 REGULATION

The valve has an earthing system made up of a spring-mounted pressure plate M8 screwed on the top of the vane square. This is useful to assure the electrical continuity in case of a dysfunctional situation.

The pressure plate has to be mounted on the rotor, as in the following pictures:



- Insert the supports on the vane, until they beat on the gasket (picture 1)
- Mount also the missing half body through the clamp (or screws if applicable)
- Match the actuators to the supports until it's perceived that the pressure spring rejects the actuator. This has to be done when there is about 0.5-1 mm to the matching of the actuator with the support.
- Check the correct assembling with a Multimeter, measuring the resistance between point 1 and 2 (picture 2).

6.3.1 REGULAR CLEANING

Program cleaning interventions after every discharged product batch or anyway every 15.000 cycles.

To clean the valve, use a detergent compatible with stainless steel, plastic material (P.T.F.E.) and the other valve materials.

ATTENTION!!

To clean the valve, always use a wet cloth.

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6.4 DISASSEMBLY FROM PRODUCTION

Although no toxic or dangerous materials are used in the construction of the valve. Disposal of all its parts must be according to the procedures and laws of the country in which it was installed.

7 SAFETY INSTRUCTIONS IN ACCORDANCE WITH THE DIRECTIVES 94/9/CE (ATEX)



7.1 INTRODUCTION

The safety instructions in this document integrate and substitute, where in conflict, those mentioned in the user and maintenance manual.

The safety instructions refer to the installation, use and maintenance of the **ROTARY VALVE**, explosion proof and destined to be used in potential explosive atmosphere.

ATTENTION!!

The current instructions are essential for the correspondence of the valve to the qualifications of the directives 94/9/EC and therefore have to be: known, available, included and used.

The authorised installation, inspection and maintenance personnel of the valve has to get an appropriate technical preparation in order to handle conditions of potential explosion and related risks.

Any valve use which does not conform to the indicated instructions given in the user and maintenance manual, as well as to this current integration, declines the safety qualifications and the protection against explosion danger.

The risks related to the use of the valve in the specific conditions mentioned in the user's and maintenance manual and the current integration have been analysed: the analysis of the risks related to the interfacing with other components of the system and referred to the installer.

7.2 PLACE OF INSTALLATION

The essential safety qualifications against the risk of explosion in the classified areas are being described in the directives **94/9/EC** and **99/92/EC**.

The relative criteria to the classification of the areas are being indicated in the harmonised European standards **EN-60079-10** and **EN 1127-1**.



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7.3 PRINTING AND GENERAL INFORMATION'S

The CO.RA valve in accordance to the normative 94/9/EEC carries the following identification brand:

Category 1 with in SI-P.T.F.E e VITON:

  II 1D/2GD c 0°C Ta+40°C 85°C (T6)

	The symbol indicated is in compliance with attachment X of directive 94/9/CE and identifies that the product is in conformity with the essential safety and health requirements (r.e.s.s.) of said directory. 2049 registered number (4 figures) by the notified organism involved in guaranteeing the quality of the product.
	Specific symbol of the ATEX 94/9/CE directive, as per II attachment of the above mentioned directive.
II	Belonging group of the equipment in hand. Group II refers to the equipment in use NOT in mine.
1D/...	Internal passage: suitable to work in zones with presence of air/dusts mixtures which continuatively happen, for long periods or frequently during the normal working. Category of the device in relation to the process interface (in this case the process interface can be a zone 20, 21 or 22).
.../2GD	External environment: suitable to work in zones with presence of air/gas, vapours or fog or air/dusts mixtures which occasionally happen, during the normal working Category of the device in relation to the process interface (in this case the process interface can be a zone 1, 2, 21 or 22).
c	Type of protection through constructive security for the devices in category 2 or upper levels
0°C Ta+40°C	Working environment temperature between 0°C and+40 °C
85°C (T6)	Peak superficial temperature of the valves according to the use conditions foreseen in the working environment characterized by the previous temperatures.

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Category 2 with Viton Gasket:



II 2GD/2GD c IIA 0°C Ta+40°C 85°C (T6)

CE 2049	The symbol indicated is in compliance with attachment X of directive 94/9/CE and identifies that the product is in conformity with the essential safety and health requirements (r.e.s.s.) of said directory. 2049 registered number (4 figures) by the notified organism involved in guaranteeing the quality of the product.
	Specific symbol of the ATEX 94/9/CE directive, as per II attachment of the above mentioned directive.
II	Belonging group of the equipment in hand. Group II refers to the equipment in use NOT in mine.
2GD/...	Internal passage: suitable to work in zones with presence of air/gas, vapours or fog or air/dusts mixtures which occasionally happen, during the normal working Category of the device in relation to the process interface (in this case the process interface can be a zone 1, 2, 21 or 22).
.../2GD	External environment: suitable to work in zones with presence of air/gas, vapours or fog or air/dusts mixtures which occasionally happen, during the normal working Category of the device in relation to the process interface (in this case the process interface can be a zone 1, 2, 21 or 22).
c	Type of protection through constructive security for the devices in category 2 or upper levels
IIA	Working suitability guaranteed only for gas/vapors belonging to group IIA established in compliance with CEI EN 50014 norm.
0°C Ta+40°C	Working environment temperature between 0°C and +40 °C
85°C (T6)	Peak superficial temperature of the valves according to the use conditions foreseen in the working environment characterized by the previous temperatures.

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Category 2 with SI-P.T.F.E. gasket:



II 2GD/2GD c IIB 0°C Ta+40°C 85°C (T6)

CE 2049	The symbol indicated is in compliance with attachment X of directive 94/9/CE and identifies that the product is in conformity with the essential safety and health requirements (r.e.s.s.) of said directory. 2049 registered number (4 figures) by the notified organism involved in guaranteeing the quality of the product.
	Specific symbol of the ATEX 94/9/CE directive, as per II attachment of the above mentioned directive.
II	Belonging group of the equipment in hand. Group II refers to the equipment in use NOT in mine.
2GD/...	Internal passage: suitable to work in zones with presence of air/gas, vapours or fog or air/dusts mixtures which occasionally happen, during the normal working Category of the device in relation to the process interface (in this case the process interface can be a zone 1, 2, 21 or 22).
.../2GD	External environment: suitable to work in zones with presence of air/gas, vapours or fog or air/dusts mixtures which occasionally happen, during the normal working Category of the device in relation to the process interface (in this case the process interface can be a zone 1, 2, 21 or 22).
c	Type of protection through constructive security for the devices in category 2 or upper levels
IIB	Working suitability guaranteed only for gas/vapors belonging to group IIA established in compliance with CEI EN 50014 norm.
0°C Ta+40°C	Working environment temperature between 0°C and+40 °C
85°C (T6)	Peak superficial temperature of the valves according to the use conditions foreseen in the working environment characterized by the previous temperatures.

CO.RA. S.r.l. Spianate–Altopascio (Lu)	Use and Maintenance Manual	Rotary Valve Atex	Date 20/07/2007 Rev.4 Pag. 24 of 28
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7.4 INSTALLATION AND START-UP

ATTENTION!

THE INSTALLATION OF THE VALVE ON THE PLANT, ESPECIALLY THE WELDING OPERATIONS, HAVE TO BE DONE IN ABSOLUTE ABSENCE OF POTENTIAL EXPLOSIVE ATMOSPHERE.

THE VALVE IS NOT ALLOWED TO BE USED WITH NON CONDUCTIVE LIQUIDS.

THE VALVE IS NOT ALLOWED TO BE INSTALLED IN SYSTEMS WHICH MAY GENERATE ADIABATIC COMPRESSION OR COLLISION WAVES.

Please note the following general precautions:

- Check earthing of the valve.
- Make sure that the gasket is not worn.
- Make sure that there is no deposit of powder.
- Make sure that the bushings are not over worn.

ATTENTION!!

THE ALLOWED PRESSURE IS BETWEEN 0.8 - 1.1 bar

Before making the valve work, after the installation and every maintenance intervention, it is necessary to check that there are no obstacles to movement and that opening/closure torque is correct and equal to the one declared; shall this not be the case, inspect the moving parts and eventually contact CO.RA S.r.l.

It is necessary to install a filter to avoid the trespassing of any object with a diameter bigger than 2 cm.

7.5 VALVE'S CLEANING

ATTENTION!

CLEAN THE VALVE EXCLUSIVELY WITH A HUMID CLOTH

Verify periodically (every batch) that there is no deposit on the inside of the valve.

7.6 TEMPERATURE CLASS

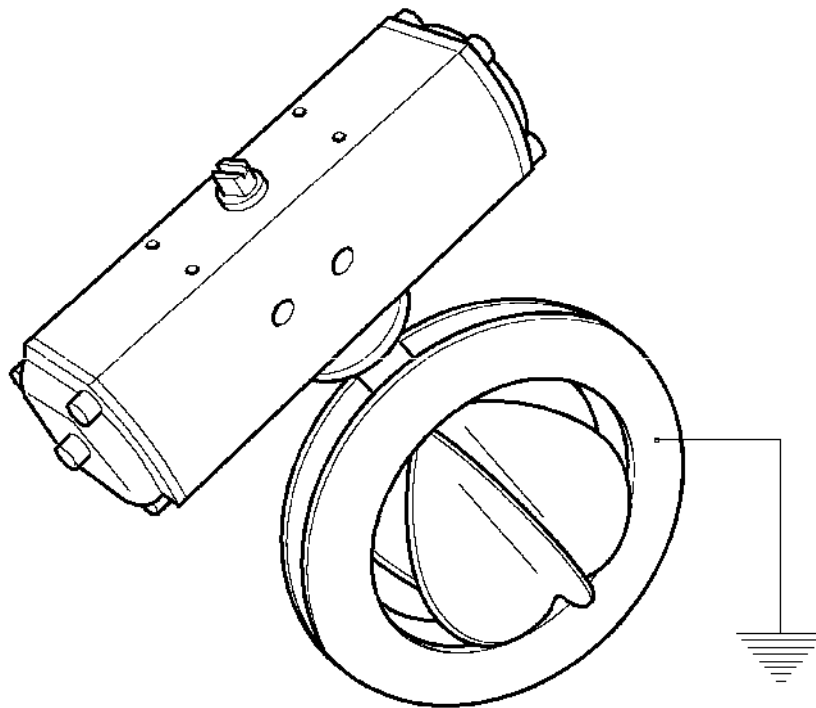
The temperature reference classes are T6. Find bellow the operational conditions:

Allowed variation of the surrounding temperature: $0^{\circ}\text{C} < T_{\text{amb}} < 40^{\circ}\text{C}$

CO.RA. S.r.l. Spianate–Altopascio (Lu)	Use and Maintenance Manual	Rotary Valve Atex	Date 20/07/2007 Rev.4 Pag. 25 of 28
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7.7 EARTHING

In picture 7.1 the earthing point to which the user has to attach the earthing wire is indicated. This wire should have an appropriate section. See also drawing SC2255 Rev.4.



Pict.7.1

ATTENTION!!

THE VALVE SHOULD ALWAYS HAVE EARTHING INDEPENDENTLY FROM ANY OTHER ORGAN ATTACHED TO IT. THE LACK OF EARTHING OR INCORRECT EARTHING DECLINES THE SAFETY QUALIFICATIONS AND THE PROTECTION AGAINST EXPLOSION DANGER.

7.7.1 LIQUID AND POWDER COMPATIBILITY OF PROCESS AND MATERIAL.

The user should always use compatible materials with the used product with reference to the design conditions of the same valve.

ATTENTION!!

THE VALVE SHALL NOT BE USED WITH INCOMPATIBLE PRODUCTS WITH ITS COMPONENT MATERIALS, OR IN AN ENVIRONMENT WITH INCOMPATIBLE LIQUID PRESENCE UNDER ANY CIRCUMSTANCES.

7.8 INTERFACE WITH ACTUATION SYSTEM

The features of the useable actuations are listed on the following table:

Actuation abbreviation	Max. angular velocity	Max. Peripheral Velocity	Feeding	
			Pneumatic	Electric
AP3	6.28 rad/s	0.62 m/s (With max. interceptor diameter 198mm)	5-6 Bar	
AP4	3.35 rad/s	0.50 m/s (With max. interceptor diameter 298mm)	5-6 Bar	
AP5	2.09 rad/s	0.41 m/s (With max. interceptor diameter 398mm)	5-6 Bar	
INOX Variance API65/180°	6.28 rad/s	0.62 m/s (With max. interceptor diameter 198mm)	5-6 Bar	
INOX Variance API85/180°	3.14 rad/s	0.62 m/s (With max. interceptor diameter 398mm)	5-6 Bar	
Me	50	1.0 m/s (With max. interceptor diameter 398mm)	5-6 Bar	
MEEEx	92	0.72 m/s (With max. interceptor diameter 148mm)		220-380 V

In case of the supplying of an actuation system as: a pneumatic or electric actuator; electrical or pneumatic motor, CO.RA. S.r.l., will provide the valuation and declaration of conformity of the supplied system.

In case of the assembling of an actuation system as: pneumatic or electrical actuator; pneumatic or electric motor from the final user other than the above mentioned actuation systems, the final user will have to install components that will not affect the possible trigger sources of the Valve in question, suitable for the category and marked according to the Atex 94/9/CE directive.

Attention!

The use of the valve with no original spare parts provokes the decay of the security and the warranty requirements.

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8 TECHNICAL ATTACHMENTS

8.1 ATTACHMENTS INDEX

Att. I Attachment 1 - Rotary Valve

Att. II Explode Drawing SC2255 Rev. 5

Att. III Trade Mark: Flowserve - CE Conformity Declaration Flowserve:

- Installation, Operating & Maintenance Instructions: Additional safety information for Automax Supernova S, B, SN & SNA Actuators.
- Declaration of conformity for Automax Supernova series: S, B, SN & SNA Actuators.

Att. IV Inductive Proximity Sensors Mod. Pepperl & Fuchs Mod. NCN4-12GM40-E2-V1-3G-3D

- CE Declaration of Conformity
- Operating Manual

Att. V Atex Declaration

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CO.RA. S.r.l. • Loc. Chiappini, 51 • I-55010 SPIANATE - ALTOPASCIO (Lucca) - Italy

Tel. +39.0583.20.590 r.a. • Fax. +39.0583.20.481

Email: info@coraitaly.net • Web site: www.coraitaly.net

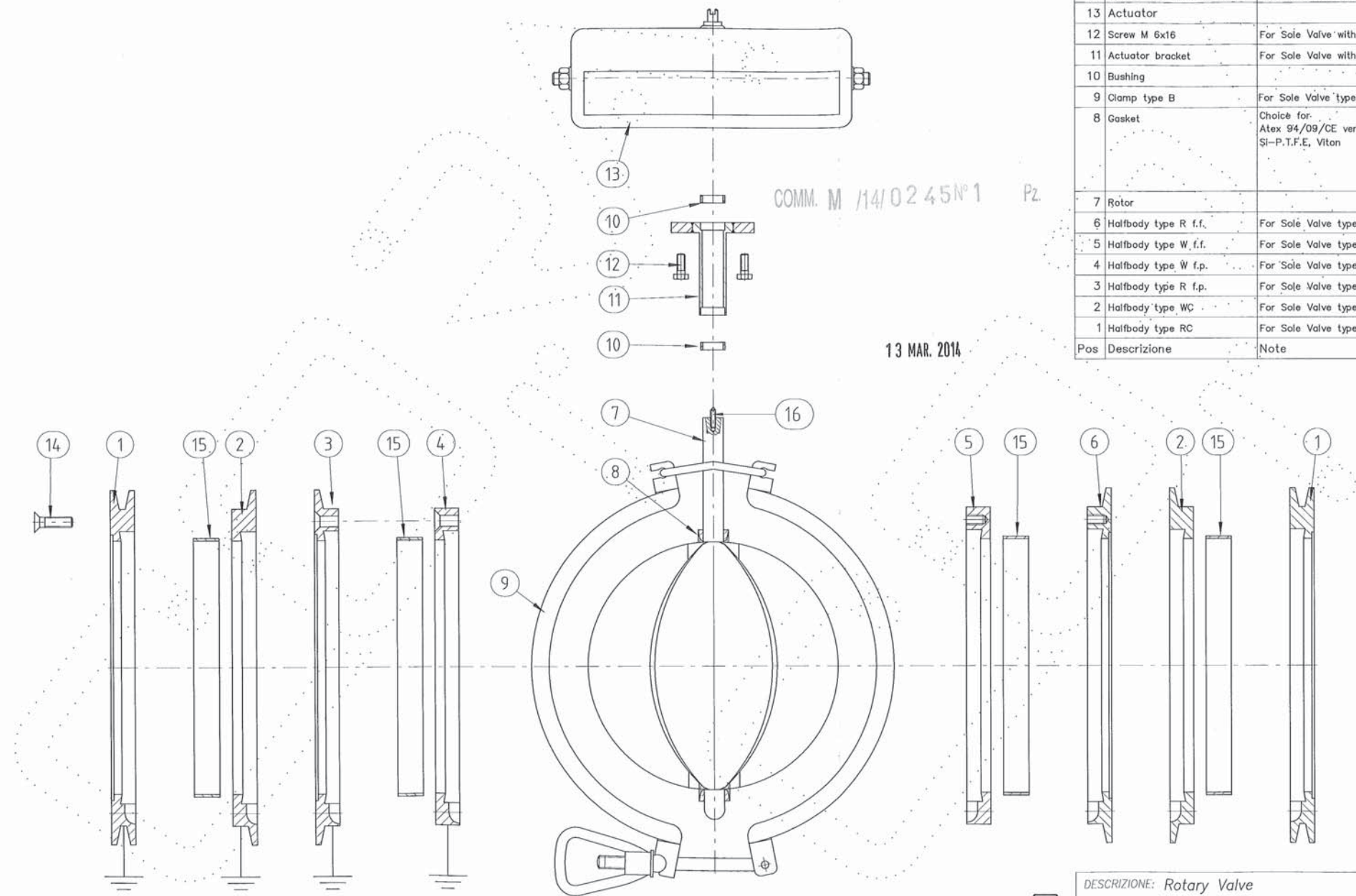


DICHIARAZIONE CE DI CONFORMITÀ Ai sensi della Direttiva 94/9/CE "Atex"		EC DECLARATION OF CONFORMITY According to Directive 94/9/EC "Atex"	
Il sottoscritto Salvatore Lardieri costruttore e legale rappresentante della : <i>The undersigned Salvatore Lardieri manufacturer and legal representative of:</i>		CO.RA s.r.l. loc. Chiappini, 51 55010 - Spianate - Altopascio (Lucca)	
Attesta, sotto la sua responsabilità, che il prodotto: Certificate, under his responsibility, that the product:			
Valvola Intercettazione Polveri: Tipo / <i>Interception Powder Valve: Type</i>		ROTARY VALVE	
N° matricola <i>Serial Number</i>		R.V.M/14/0245/1	
<p>E' conforme ai requisiti essenziali di sicurezza e salute stabiliti dall'Allegato II della Direttiva 94/9/CE (Atex) ed è stato soggetto ad una procedura di valutazione della conformità per la categoria II 1D/2GD e II 2GD/2GD. <i>Is in compliance with the essential requisition about safety and health, established from the Attached II of the ATEX Directive 94/9/EC (Atex) and also has been subjected to a valuation of conformity for the category II 1D/2GD and II 2GD/2GD.</i></p> <p>Norme armonizzate applicate: / <i>Uniformed apply norms:</i> UNI EN 13463-1 Apparecchi non elettrici per atmosfere potenzialmente esplosive. Parte 1 metodo e requisiti di base / <i>Non-electrical equipment for use in potentially explosive atmospheres. Part 1: Basic method and requirements</i> UNI EN 13463-5 Apparecchi non elettrici per atmosfere potenzialmente esplosive .Parte 5: Protezione tramite sicurezza costruttiva "c" / <i>Non-electrical equipment for use in potentially explosive atmospheres Part 5: Protection by constructional safety "c"</i> EN 1127-1 Prevenzione dell'esplosione e protezione contro l'esplosione . parte 1: concetti fondamentali e metodologia / <i>Explosive atmospheres. Explosion prevention and protection. Part 1: Basic concepts and methodology</i> Linee guida GMP / <i>Good Manufacturing Practice (GMP),</i></p>			
<p>La presente dichiarazione CE di conformità include anche il soddisfacimento ai requisiti essenziali di sicurezza stabiliti alle Direttive Comunitarie: 2006/42/CE.. <i>The present CE conformity declaration also includes the satisfactions to the essential safety requirements established from the Communitarian Directives: 2006/42/CE..</i></p>			
Il prodotto è idoneo per essere utilizzato in apparecchiature classificate: / <i>The product is used to classify equipment:</i>			
Categoria 1 Guarnizione in Viton: / Category 1 Viton Gasket		CE 2049 Ex	II 1D/2GD c 0°C Ta+40°C 85°C (T6)
Categoria 1 Guarnizione in SI-P.T.F.E.: / Category 1 SI-P.T.F.E. Gasket:		CE 2049 Ex	II 1D/2GD c 0°C Ta+40°C 85°C (T6)
Categoria 2 Guarnizione in Viton: / Category 2 Viton Gasket:		CE 2049 Ex	II 2GD/2GD c IIA T6 °C 0°CTa+40°C
Categoria 2 Guarnizione in SI-P.T.F.E.: / Category 2 SI-P.T.F.E. Gasket:		CE 2049 Ex	II 2GD/2GD c IIB T6 °C 0°CTa+40°C
<p>la marcatura è apposta sul prodotto./ <i>branded on product.</i> Le condizioni di installazione del prodotto sono riportate nel manuale di uso e manutenzione./ <i>Product's installation requirement are written on the Use and Maintenance Manual.</i></p>			
Organismo Notificato per l'Esame CE del Tipo: <i>Notified Organism for the CE Type examination:</i>		DNV-MODULO UNO S.c.a.r.l. N.B. N° 2049 Via Cuorgnè N° 21 – 10156 – Torino (Italy)	
Numero di certificato dell'Esame CE del Tipo: <i>Certificate number for EC Type Examination:</i>		DNV MUNO 0496.ATEX.07/3163	
Organismo Notificato per la Sorveglianza della produzione: <i>Notified Organism for the production surveillance:</i>		DNV-MODULO UNO S.c.a.r.l. N.B. N° 2049 Via Cuorgnè N° 21 – 10156 – Torino (Italy)	
Numero di attestato di conformità : <i>Conformity Certificate Number:</i>		DNV MUNO 0496.ATEX.07/3192	
Luogo e data/ Place and date	Nome e Cognome / Name and surname	Posizione / Position	Firma / Signature
Spianate, li 27/03/2014	Sig. / Mr. Salvatore Lardieri	Legale Rappresentante –Presidente Legal Representative – President	

Compilato da LORENZO LAZZERINI

Mod.261 rev.0





16	Spring plunger M4	For Atex 94/09/CE version	INOX
15	Spigot	Welded to halfbody	AISI 316L
14	Flated head screw M 8x30	For Sole Valve type WW, RR, WR, RW	INOX
13	Actuator		Aluminium
12	Screw M 6x16	For Sole Valve with actuator	INOX
11	Actuator bracket	For Sole Valve with actuator	AISI 304
10	Bushing		P.T.F.E.
9	Clamp type B	For Sole Valve type RCRC, WCRC, WCWC	AISI 304
8	Gasket	Choice for: Atex 94/09/CE version : SI-P.T.F.E, Viton	Choice: Silicone, SI-P.T.F.E. Viton, EPDM, Coated B
7	Rotor		AISI 316L
6	Halfbody type R f.f.	For Sole Valve type RR and WR	AISI 316L
5	Halfbody type W f.f.	For Sole Valve type WW and RW	AISI 316L
4	Halfbody type W f.p.	For Sole Valve type WW and WR	AISI 316L
3	Halfbody type R f.p.	For Sole Valve type RR and RW	AISI 316L
2	Halfbody type WC	For Sole Valve type WCWC and WCRC	AISI 316L
1	Halfbody type RC	For Sole Valve type RCRC and WCRC	AISI 316L
Pos	Descrizione	Note	Materiale

COMM. M /14/02 45N°1 Pz.

13 MAR. 2014



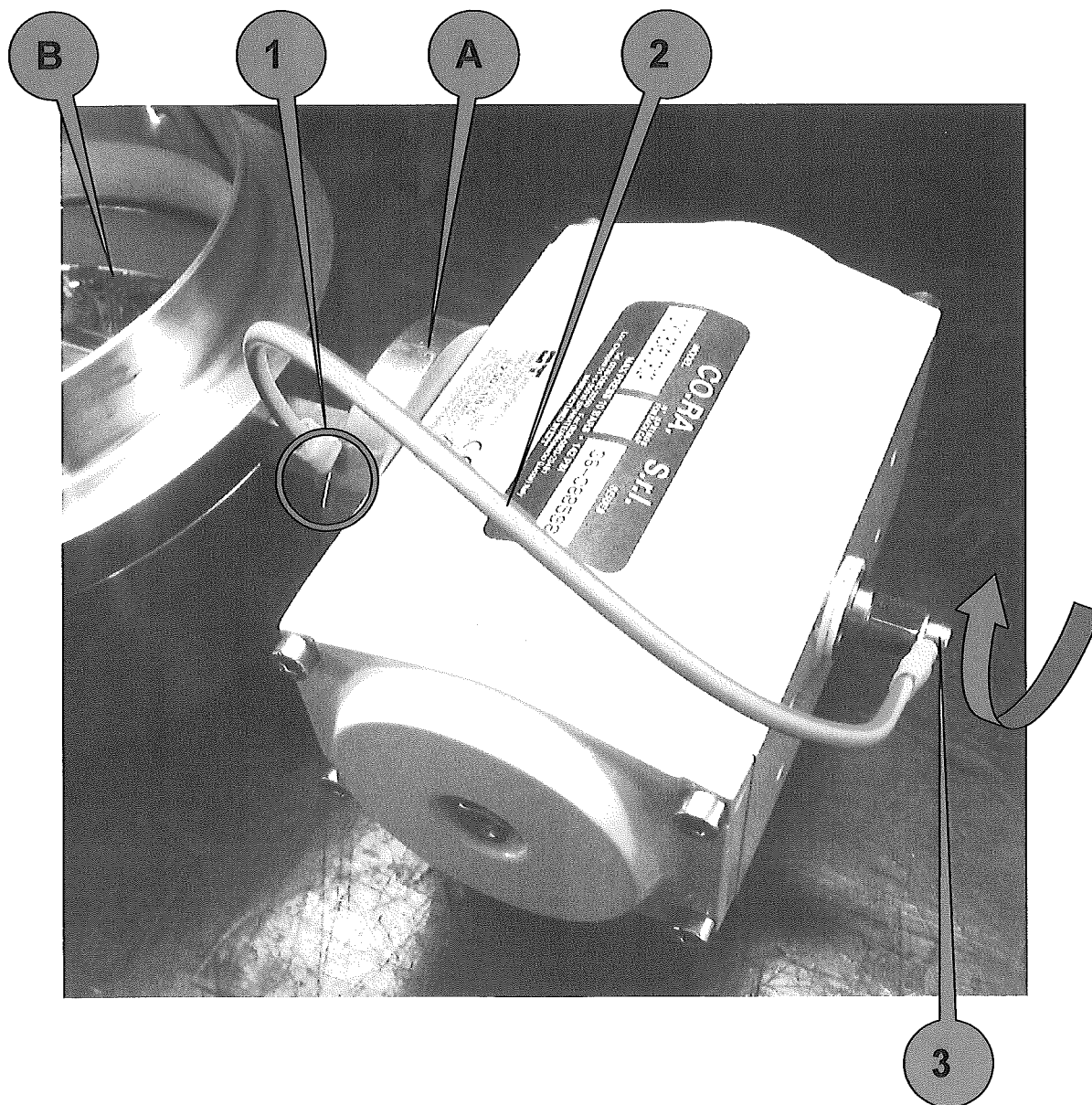
DESCRIZIONE: Rotary Valve		DISegn.	am.
Esplosa per parti di ricambio e certificati		DATA	28.12.01
		PER APPROVAZIONE	
		DATA	FIRMA
CO.RA S.r.l. - ALTOPASCIO (LU) Tel. 0583/25098 RA FAX 0583/25481		SCALA	1:3
DOVE NON DIVERSAMENTE INDICATO : MISURE ESPRESSE IN mm TOLLERANZE GENERALI UNI ISO 2768/1 - v		FOGLIO N. 1/1	
IL PRESENTE DISEGNO E' PROPRIETA' DELLA CO.RA S.r.l. - A TERMINI DI LEGGE OGNI DIRITTO PER IL SUO IMPEGNO E' RISERVATO		DIS.	SC2255
		REV.	5

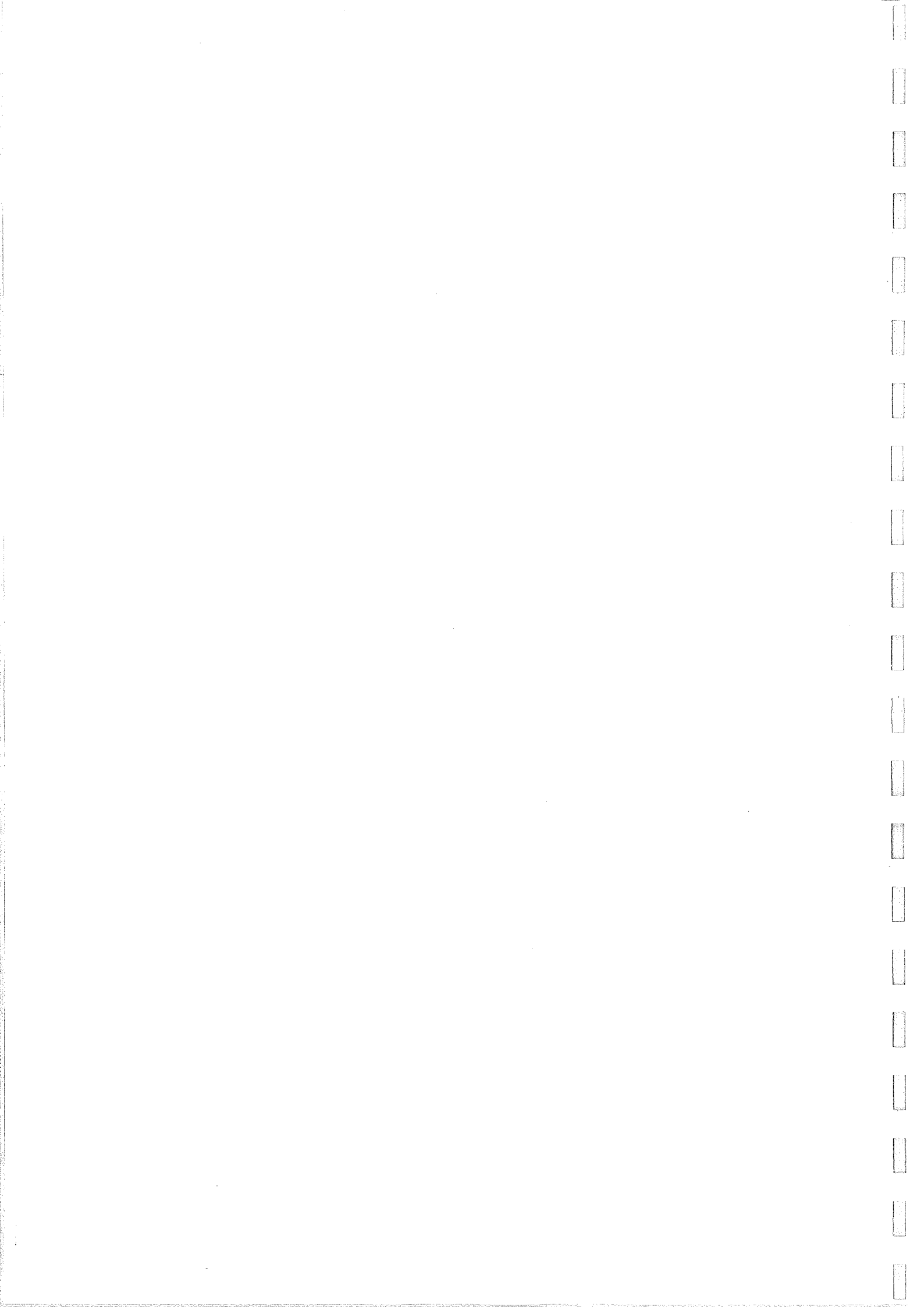
5	23.07.07	AGGIUNTO NOTE PER VERSIONI ATEX	C.A.
4	18/07/07	AGGIUNTO SPRING PLUNGER E MATERIALI	C.A.
3	24.05.06	CAMBIATO SUPPORTO CON ESAGONALE	C.A.
2	25.05.05	AGGIUNTI MATERIALI GUARNIZIONI POSSIBILI	S.A.
1	28/4 04	aggiunto iniezione punto di messa a terra	om.
REV	DATA	DESCRIZIONE	FIRMA

Montage der Aktuator-Erdung (die Anweisungen beziehen sich auf die Positionierung des Ventils wie in der Abbildung dargestellt)

90° Doppelt wirkender Aktuator: AP3-AP4-AP5

- 1) Stellen Sie sicher, dass der Butterfly-Aktuator geschlossen ist (siehe Abb.1)
- 2) Lösen und entfernen Sie die Klemmschraube vom Aktuator, Pos. 1 Abb.1.
- 3) Montieren Sie das Erdungskabel (Siehe Zeichnung Nr. 7890 für ND 200 und Zeichnung Nr. 7947 für ND 250), auf der Ø8 mm Ösenseite der gerade entfernten Schraube, Pos. 2 Abb.1.
- 4) Platzieren Sie das Erdungskabel wie in der Abbildung dargestellt.
- 5) Montieren Sie die M6 Schraube (T.C.E.I. M6x16) am Aktuator-Stift, Pos. 3 Abb.1.
- 6) Prüfen Sie, ob die Drehrichtung mit der auf der Abbildung übereinstimmt.
- 7) Kontrollieren Sie die Stromspannung mit einem Multimeter, indem Sie die Elektroden zwischen die Punkte "A" und "B" platzieren.







Installation, Operating & Maintenance Instructions

Additional Safety Information for Automax Supernova S, B, SN & SNA Actuators



TM

Flowserve Spa

Via Prealpi, 30
20032 Cormano (Milano) Italy

Tel: +39.02.663251

Fax: +39.02.6151863

Website: www.flowserve.com

TM indicates a trade mark of Flowserve

Information given in this leaflet is made in good faith and based upon specific testing but does not, however constitute a guarantee.

A Flowserve Company

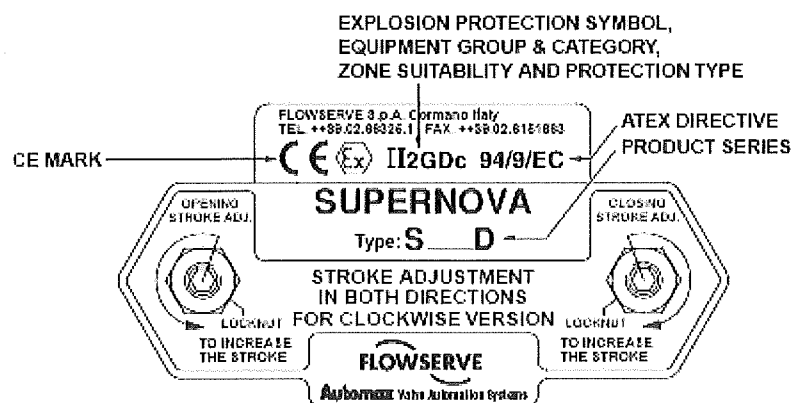
1 STORAGE AND PRESERVATION

When despatched, all actuators are prepared for storage. All protective packaging, end cap port plugs, pinion covers etc. should remain in position until the actuator is due to be installed.

Actuators should be stored in a clean, dry environment.

2 ACTUATOR MARKINGS

Each actuator has the following identification information on the product label attached to the side of the body:



In addition to the information on the product label the full product code, year of manufacture, serial number and maximum working pressure are printed on the back of the actuator.

ATEX Directive: If the product label carries the ATEX Directive number '94/9/EC' followed by the Explosion Protection Symbol and codes identifying the equipment group and category, the zone suitability and protection type beside the CE mark, the product complies with the ATEX Directive and The Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 1996.

Definition of product label marking above:

'II' = Equipment Group; '2' = Equipment Category; 'G' = Gas Zone suitability (Zones 1 & 2); 'D' = Dust Zone suitability (Zones 21 & 22); 'c' = type of protection i.e. constructional safety (prEN 13463-5).

Surface Temperature: As per EN 13463-1:2001(E) paragraph 14.2.g, the temperature class or maximum surface temperature cannot be marked on the product as it is dependant on the operating conditions.

The operational temperature range is as follows:

- (S) Standard -30°C to +80°C.
- (L) Low Temperature variant -50°C to +80°C.
- (H) High Temperature variant -30°C to +150°C.

NOTE: Under constant use the surface temperature of exposed parts may rise by a maximum 20°C above the operating media temperature.

3 HEALTH AND SAFETY

When installing or maintaining actuators:


- a) Conduct a risk assessment and eliminate or reduce hazards to an acceptable level.
- b) Work in accordance with Safe Systems of Work.
- c) Observe all site Health and Safety Rules in particular Permit to Work and Hot Work procedures.
- d) Wear all necessary Personal Protective Equipment.
- e) Never remove or maintain an actuator or joint unless the supply has been fully de-pressurised, drained and where necessary, purged of toxic / explosive / flammable media. Always operate the actuator to ensure that no trapped pressure exists.
- f) Never handle actuators that have been used on harmful substances unless they have been completely decontaminated and certified safe to handle.
- g) Never use an actuator on a duty, which exceeds its prescribed operating parameters. Refer to Flowserve Flow Control Technical Sales for further information.
- h) Never modify or alter actuators unless the manufacturer has been consulted and/or recommends such changes.
- i) Due to the large physical size and weight of some sizes of this product, always use correct lifting methods and equipment when installing, removing and maintaining the product, and that it is correctly supported in its final operating location.
- j) Due to the variety of duties on which this product can be employed, it is the end users responsibility to ensure the compatibility of the product with the specific application (i.e. air supply, torque, corrosion, which may effect it's suitability).
- k) Before equipment is installed in areas which may be subject to seismic activity or extreme climatic conditions consult Flowserve Flow Control Technical Sales.
- l) If the processes or environments that the products are used in are likely to cause temperatures (high or low) that may cause injury to personnel if touched, then adequate insulation/protection must be fitted.
- m) If the equipment is to be used on unstable gas duty, ensure that the operational parameters as indicated on the product label cannot be exceeded.
- n) This equipment should be protected by other devices to prevent over-pressurisation. (i.e. caused by external fire etc).
- o) This equipment must be installed in a system that is designed to prevent excessive forces acting on the mounting kit, switch box/ positioner, connections, etc.
- p) Care must be taken when removing the actuator or accessing the valve that the actuator does not unexpectedly operate due to the stored failsafe spring torque, causing personal injury.
- q) This equipment is not a safety device and must be controlled / guarded by other devices.

4 PRECAUTIONS FOR USE

Make sure air supply is clean and filtered before installation, to ANSI/ISA S7.0.01-1996 and does not exceed 10.0 bar.

All actuators are supplied with sufficient lubrication for a normal working life. For extreme life cycle applications, the use of lubricated air supply is recommended.


NOTE: For ATEX compliance, when used in explosive atmospheres Non Corrosive and/or Non Explosive gases or liquids **MUST** be used as an operating medium.

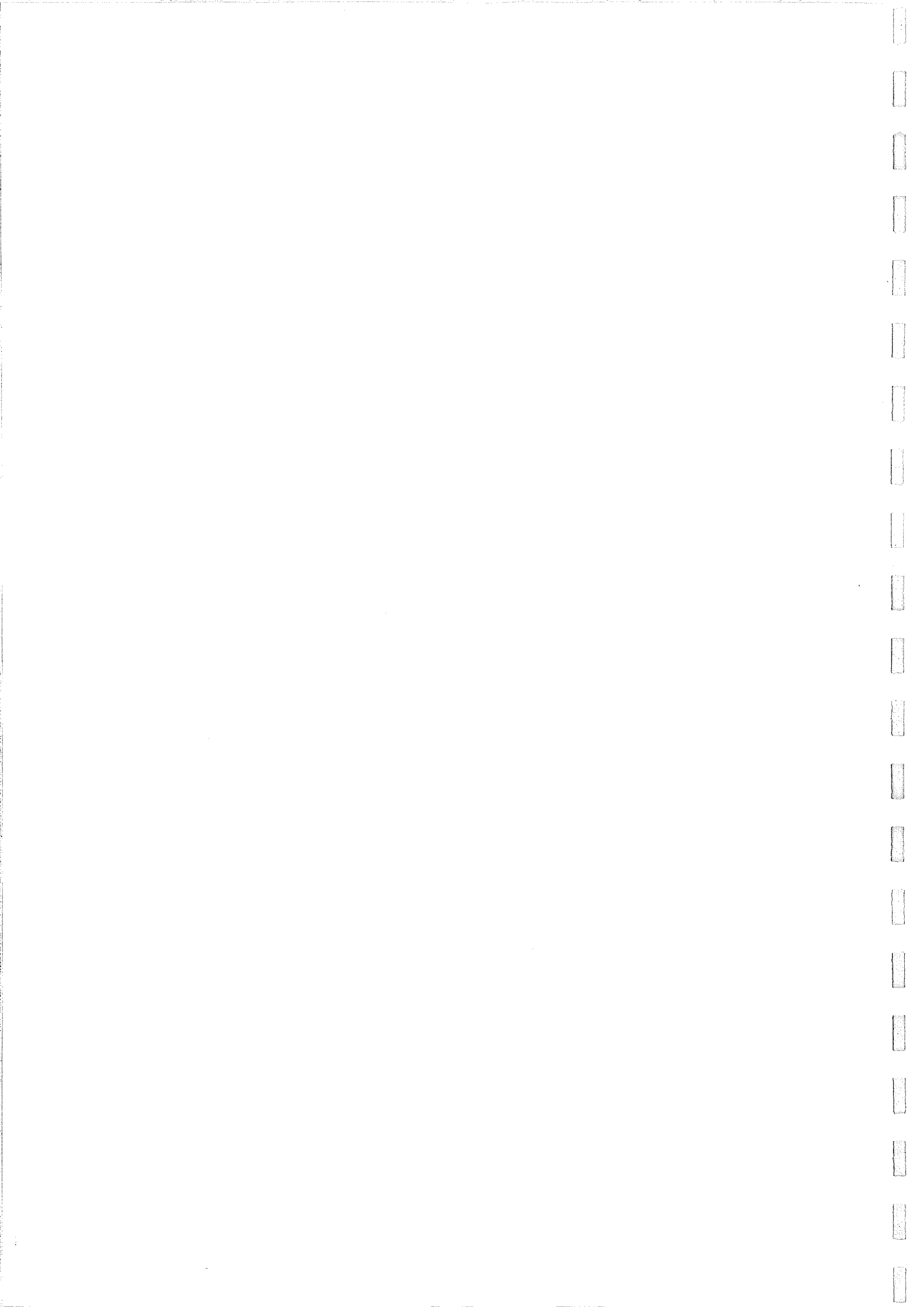
<p>DECLARATION OF CONFORMITY with the ATEX Directive 94/9/EC</p> 

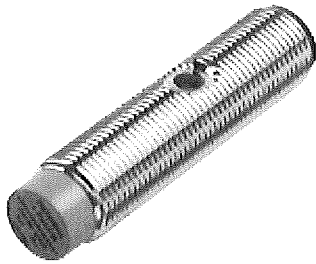
Herewith we, the manufacturer,

Flowserve Flow Control (UK) Ltd
Burrell Road, Haywards Heath,
West Sussex, RH16 1TL.
United Kingdom

Declare that the construction, manufacturing and testing of the pressure equipment is in conformance with ATEX directive 94/9/EC and The Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 1996.

Description of the equipment:	
Automax SuperNova Actuators: Series: S, B, SN & SNA. Size Range: 050, 063, 085, 100, 115, 125, 150, 175, 200, 250 & 300. Product Classification: Equipment Group II, Category 2 (non-mining). Temperature Class: Restricted by media temperature (-40°C min to 150°C max). Zone Classification: Suitable for Gas Zones 1 & 2, and Dust Zones 21 & 22.	
Control of Internal Production Compliance:	
BS EN ISO 9001:2000 (BSI Certificate of Registration FM 00707).	
Notified body retaining the Technical File:	
BSI, Maylands Avenue, Hemel Hempstead, Herts. HP2 4SQ (Notified Body reference number: 0086)	
Referenced harmonised standards used:	
BS EN 1127-1:1998	(Explosive Atmospheres – Explosion prevention and protection – Part 1 : Basic Concepts and methodology).
BS EN 13463 : Part 1 : 2001	(Non-electrical equipment for potentially explosive atmospheres – Part 1 : Basic methods and requirements).
BS EN 13463 : Part 5 : 2003	(Non-electrical equipment for potentially explosive atmospheres – Part 5 : Protection by constructional safety).
References to other technical standards, specifications and European Directives used:	
Pressure Equipment Directive 97/23/EC BS EN 1050 : 1997 (Safety of Machinery. Principles for Risk Assessment). BS EN 983 : 1996 (Safety of Machinery. Safety Requirements for Fluid Power Systems and their Components – Pneumatics).	
Authorised Person for the Manufacturer within the European Community:	
Name: R. S. Sherrard	Title : Operations Director
Signature : 	Date : 3rd June 2004





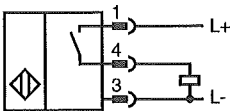
Model Number

NCN4-12GM40-E2-V1-3G-3D

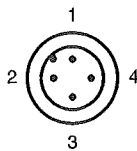
Features

- 4 mm not embeddable
- ATEX-approval for zone 2 and zone 22

Connection



Pinout



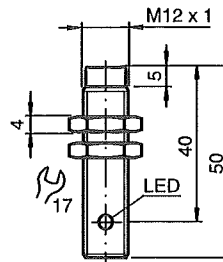
Wire colors in accordance with EN 60947-5-2

1	BN	(brown)
2	WH	(white)
3	BU	(blue)
4	BK	(black)

Accessories

BF 12
Mounting flange, 12 mm

Dimensions



Technical Data

General specifications

Switching element function		PNP	NO
Rated operating distance	s_n	4 mm	
Installation		not embeddable	
Output polarity		DC	
Assured operating distance	s_a	0 ... 3.24 mm	
Reduction factor r_{AI}		0.37	
Reduction factor r_{Cu}		0.36	
Reduction factor r_{303}		0.74	

Nominal ratings

Operating voltage	U_B	10 ... 30 V DC
Switching frequency	f	0 ... 1200 Hz
Hysteresis	H	1 ... 10 typ. 3 %
Reverse polarity protected		reverse polarity protected
Short-circuit protection		pulsing
Voltage drop	U_d	≤ 3 V
Operating current	I_L	0 ... 200 mA
No-load supply current	I_0	≤ 15 mA
Indication of the switching state		LED, yellow

Ambient conditions

Ambient temperature	-25 ... 70 °C (-13 ... 158 °F)
Storage temperature	-40 ... 85 °C (-40 ... 185 °F)

Mechanical specifications

Connection type	Device connector M12 x 1, 4-pin
Housing material	Stainless steel
Sensing face	PBT
Protection degree	IP67

General information

Use in the hazardous area	see instruction manuals
Category	3G; 3D

Compliance with standards and directives

Standard conformity	
Standards	EN 60947-5-2:2007 IEC 60947-5-2:2007

Approvals and certificates



UL approval	cULus Listed, General Purpose
CSA approval	cCSAus Listed, General Purpose
CCC approval	Products with a maximum operating voltage of ≤ 36 V do not bear a CCC marking because they do not require approval.

Release date: 2011-07-19 11:21 Date of issue: 2011-07-19 211259_eng.xml

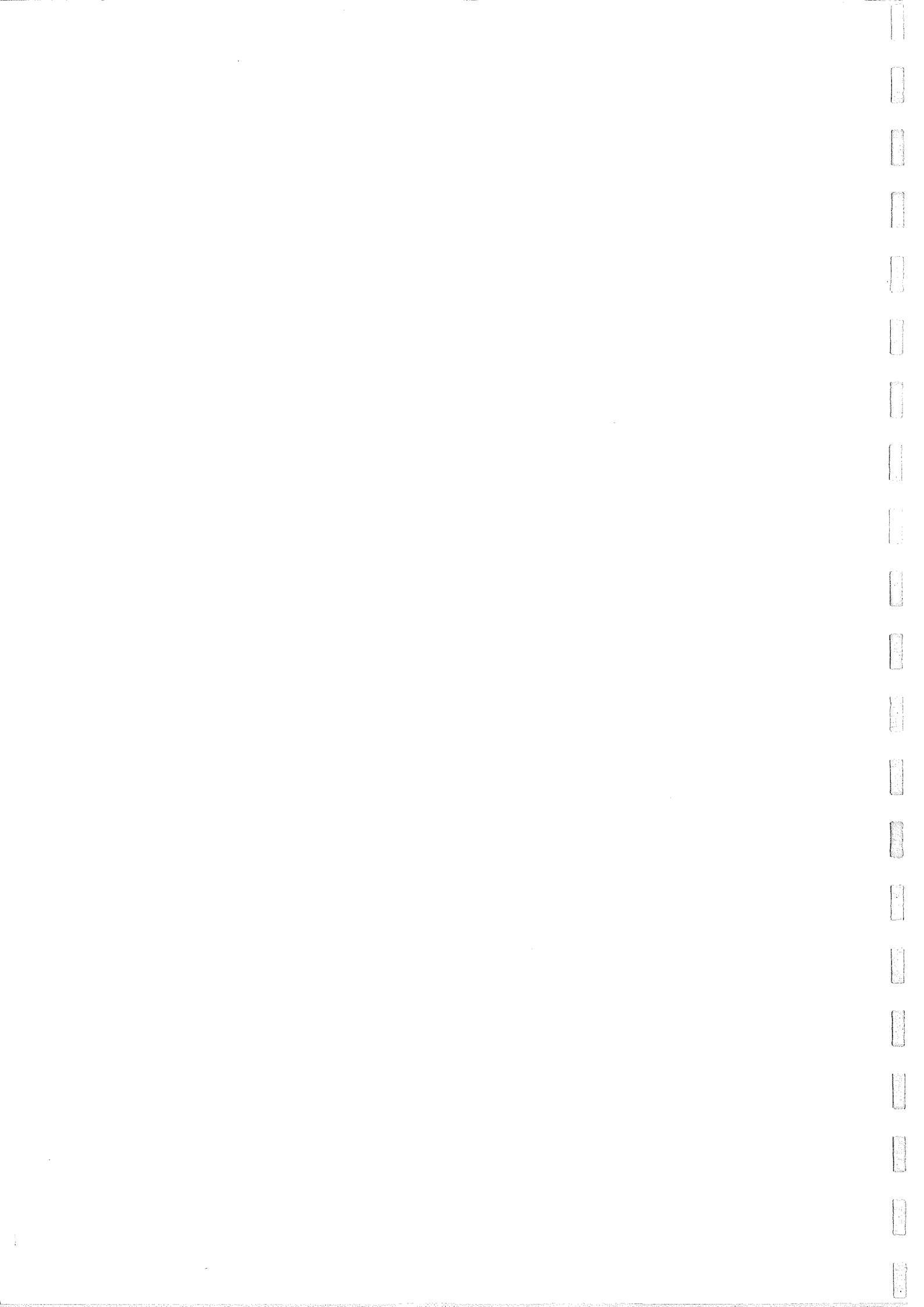
ATEX 3G (nA)

Instruction	Manual electrical apparatus for hazardous areas
Device category 3G (nA)	for use in hazardous areas with gas, vapour and mist
Directive conformity	94/9/EG
Standard conformity	EN 60079-0:2006, EN 60079-15:2005
CE symbol	Ignition protection category "n" Use is restricted to the following stated conditions CE
Ex-identification	Ex II 3G Ex nA IIC T6 X The Ex-significant identification is on the enclosed adhesive label
General	The apparatus has to be operated according to the appropriate data in the data sheet and in this instruction manual. The data stated in the data sheet are restricted by this operating instruction! The special conditions must be observed!
Installation, Commissioning	Laws and/or regulations and standards governing the use or intended usage goal must be observed. The adhesive label provided must be affixed in the immediate vicinity of the sensor! The surface to which the label is applied must be clean, flat and free from grease! The affixed adhesive label must be readable and durable, taking account of the possibility of chemical corrosion!
Maintenance	No changes can be made to apparatus, which are operated in hazardous areas. Repairs to these apparatus are not possible.
Special conditions	
Maximum operating current I_L	The maximum permissible load current must be restricted to the values given in the following list. High load currents and load short-circuits are not permitted.
Maximum operating voltage U_{Bmax}	The maximum permissible operating voltage U_{Bmax} is restricted to the values in the following list. Tolerances are not permissible.
Maximum permissible ambient temperature T_{Umax}	dependant of the load current I_L and the max. operating voltage U_{Bmax} . Information can be taken from the following list.
at $U_{Bmax}=30\text{ V}$, $I_L=200\text{ mA}$	43 °C (109.4 °F)
at $U_{Bmax}=30\text{ V}$, $I_L=100\text{ mA}$	50 °C (122 °F)
at $U_{Bmax}=30\text{ V}$, $I_L=50\text{ mA}$	53 °C (127.4 °F)
Plug connector	The plug connector must not be disconnected under voltage. The proximity switch is marked as follows: "DO NOT DISCONNECT UNDER VOLTAGE!" When the plug connector is disconnected the ingress of dirt into the inner areas (i.e. the areas, which are not accessible in the plugged-in condition) must be prevented.
Protection from mechanical danger	The sensor must not be exposed to ANY FORM of mechanical danger.
Protection from UV light	The sensor and the connection cable must be protected from damaging UV-radiation. This can be achieved when the sensor is used in internal areas.
Electrostatic charging	Electrostatic charges must be avoided on the mechanical housing components. Dangerous electrostatic charges on the mechanical housing components can be avoided by incorporating these in the equipotential bonding.

ATEX 3D (tD)

Instruction	Manual electrical apparatus for hazardous areas
Device category 3D Directive conformity Standard conformity	for use in hazardous areas with combustible dust 94/9/EG EN 61241-0:2006, EN 61241-1:2004 Protection via housing "tD" Use is restricted to the following stated conditions
CE symbol	
Ex-identification	 II 3D Ex tD A22 IP67 T80°C X The Ex-significant identification is on the enclosed adhesive label
General	The apparatus has to be operated according to the appropriate data in the data sheet and in this instruction manual. The maximum surface temperature has been determined in accordance with method A without a dust layer on the equipment. The data stated in the data sheet are restricted by this operating instruction! The special conditions must be adhered to!
Installation, Commissioning	Laws and/or regulations and standards governing the use or intended usage goal must be observed. The adhesive label provided must be affixed in the immediate vicinity of the sensor! The surface to which the label is applied must be clean, flat and free from grease! The affixed adhesive label must be readable and durable, taking account of the possibility of chemical corrosion!
Maintenance	No changes can be made to apparatus, which are operated in hazardous areas. Repairs to these apparatus are not possible.
Special conditions	
Maximum operating current I_L	The maximum permissible load current must be restricted to the values given in the following list. High load currents and load short-circuits are not permitted.
Maximum operating voltage U_{Bmax}	The maximum permissible operating voltage U_{Bmax} must be restricted to the values given in the following list. Tolerances are not permitted.
Maximum permissible ambient temperature T_{Umax}	dependant of the load current I_L and the max. operating voltage U_{Bmax} . Information can be taken from the following list.
at $U_{Bmax}=30\text{ V}$, $I_L=200\text{ mA}$	43 °C (109.4 °F)
at $U_{Bmax}=30\text{ V}$, $I_L=100\text{ mA}$	50 °C (122 °F)
at $U_{Bmax}=30\text{ V}$, $I_L=50\text{ mA}$	53 °C (127.4 °F)
Plug connector	The plug connector must not be withdrawn under voltage. The proximity switch is identified as follows: "WARNING - DO NOT SEPARATE WHEN ENERGIZED". With the plug connector disconnected, soiling of the internal area must be prevented. (i.e. the area that is inaccessible when the connector is inserted) The plug connection can only be separated using a tool. This is achieved by using the locking protection V1-Clip (Mounting accessory from Pepperl + Fuchs).
Protection from mechanical danger	The sensor must not be exposed to ANY FORM of mechanical danger.
Protection from UV light	The sensor and the connection cable must be protected from damaging UV-radiation. This can be achieved when the sensor is used in internal areas.
Electrostatic charging	Electrostatic charges must be avoided on the mechanical housing components. Dangerous electrostatic charges on the mechanical housing components can be avoided by incorporating these in the equipotential bonding.

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Use and Maintenance Manual

Sole Valve Atex



WORK ORDER	PRODUCT DESCRIPTION	CUSTOMER	ORDER No.
M/14/0245/EW	S.V. RCRC 200	COPERION K-TRON	P 163127
WRITTEN BY	CHECKED BY	APPROVED BY	
BARBARA BARDELLI	ALESSANDRO CECCANTI	SALVATORE LARDIERI	

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1 INTRODUCTION

1.1 PRELIMINARY OBSERVATION

This Use and Maintenance Manual should be read before handling, installing, using, maintaining or removing the **SOLE VALVE**. Therefore, this manual should be maintained complete and kept in a safe place. In case of frequently consultation, copies should be made available.

The handling, installation, use, maintenance or operational removal of the valve, with any tool, device, action or anything- not included in this manual- is considered incorrect. Consequently, the manufacturer declines all responsibility for any consequence that might be the result of any such actions on people or objects.

The handling, installation, use, maintenance or operational removal of the valve should always be carried out by qualified personnel and under suitable conditions for such a task. It is forbidden that children or unskilled personnel carry out these operations.

Unauthorized people are not allowed to stay near the valve when it is functioning, throughout its working life.

The removal of the safety systems or any other device supplied by the manufacturer to protect the operator is under the unique and solely responsibility of the purchaser or the valve user.

Any mechanical, electrical or operational modification (not included in this manual) to the logical control, to the circuits, to the accident prevention systems, without previous authorization of the manufacturer is forbidden.

Please note that valve handling, installation, use, maintenance or operational removal can be a source of danger, when they are not carried out in accordance with the instructions given in this manual, or without the due care and attention that such operations demand.

Please do not hesitate to contact us for any assistance that you may require. **Please note that lack of compliance with the instructions contained in this manual shall invalidate the warranty.**

For any further queries that you might have, do not hesitate to contact:
















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1.1.1 EXPLANATION OF USED TERMS

For a better understanding of this manual, we explain the following used terms.

- **DANGER AREA:** the area inside or near the valve which represent a hazard for safety and health of the exposed person in the area.
- **EXPOSED PERSON:** anyone who is totally or partly inside a danger area.
- **OPERATOR:** the person entrusted to operate, adjust and clean the machine.
- **QUALIFIED TECHNICIAN:** a qualified person who has been trained from you to carry out extraordinary maintenance or repairs which require particular knowledge of the machine and its operation, and of the safety guards and how they are activated.

Table 1-1 Symbols used throughout the manual

INFORMATION		General information
WARNING		General danger
		Electrical danger
		Crushing and cutting danger
PROHIBITION		General prohibition
		Do not carry out maintenance while machine running
		Do not stand or cross within distance of moving parts
OBLIGATION		Ear protection MUST be worn
		Helmet MUST be worn
		Protective gloves MUST be worn
		Protective overalls MUST be worn
		Safety shoes MUST be worn
		Eye protection MUST be worn

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1.2 WARRANTY

We guarantee the **SOLE VALVE** for any material and/or manufacturing fault and/or any defect for a twelve month period from the delivery date.

During the warranty period, we undertake to remove or solve, timely due, any fault or defect of the valve, provided that the valve has been correctly installed and used in accordance with the instructions given in this manual.

Defective parts under warranty will be repaired or replaced free of charge by the manufacturer. Transport and/or delivery costs, as well as any cost of the technician travel from and to the user's headquarters that might be incurred by the manufacturer, shall be paid by the customer, i.e. the purchaser.

This commitment excludes all other conditions of warranty established by law.

The warranty excludes all expendables and materials in relation to the valve and the electrical sections.

Attention!!!

The use of the valve with no original spare parts provokes the decay of the security and the warranty requirements.

1.3 USING THE INSTRUCTION MANUAL



This Instruction Manual is addressed to the users (operators, maintenance personnel, etc.)



The instructions must be known, available, understood and used.



Before the start-up the valve, please read the technical instructions in this manual and follow them carefully.



Keep this manual and all the attached publications (if present) in an accessible place which is known to all users (operators and maintenance personnel).

It is advisable to make a copy of this manual and keep it in a safe place.

2 TRANSPORT AND HANDLING



2.1 TRANSPORTATION MEANS

Packaging used by the Constructor is suitable for the type and size of **SOLE VALVE** delivered and will grant protection during transport until its delivery to the customer.

The type of packaging depends on the distance, customer's instructions and the period of time that the **SOLE VALVE** will have to remain in the packaging.

2.2 WEIGHT

DN	WW (Kg)	WR (Kg)	RR (Kg)	WCWC (Kg)	WCRC (Kg)	RCRC (Kg)
80	2	2.2	2.4	3.5	3.7	4
100	3.3	3.5	3.6	4	4	4.3
150	3.5	3.7	3.9	4.3	4.6	5
200	4.8	5.1	5.4	5.8	6.1	6.6
250	6.6	6.9	7.1	7.8	8.2	8.7
300	10	10.2	10.5	11.5	12.1	12.8
350	17	17	17	18	18	18
400	19	19	19	20	20	20

2.3 HANDLING

Handling of the **SOLE VALVE** must always be carried out by using lifting equipment that is suitable for its weight and size in order to prevent injury to people or damage to objects or to the valve itself due to vibrations, knocks, scraping, etc.

The handling of packaging, either manually or with lifting equipment, must be carried out exclusively by personnel who have been properly informed about the risks involved, in accordance with the laws in force in the country of use.

2.4 STORING

The storage of a **SOLE VALVE** should be in a dry, clean environment; resting on a clear rubber or silicone layer.

WARNING!!

For long term storage, the rotor must be opened (10°) to avoid damage to the gasket.



2.5 OVERALL DIMENSIONS

All dimensions are given in the **SOLE VALVE** layout (see Picture .2.2)

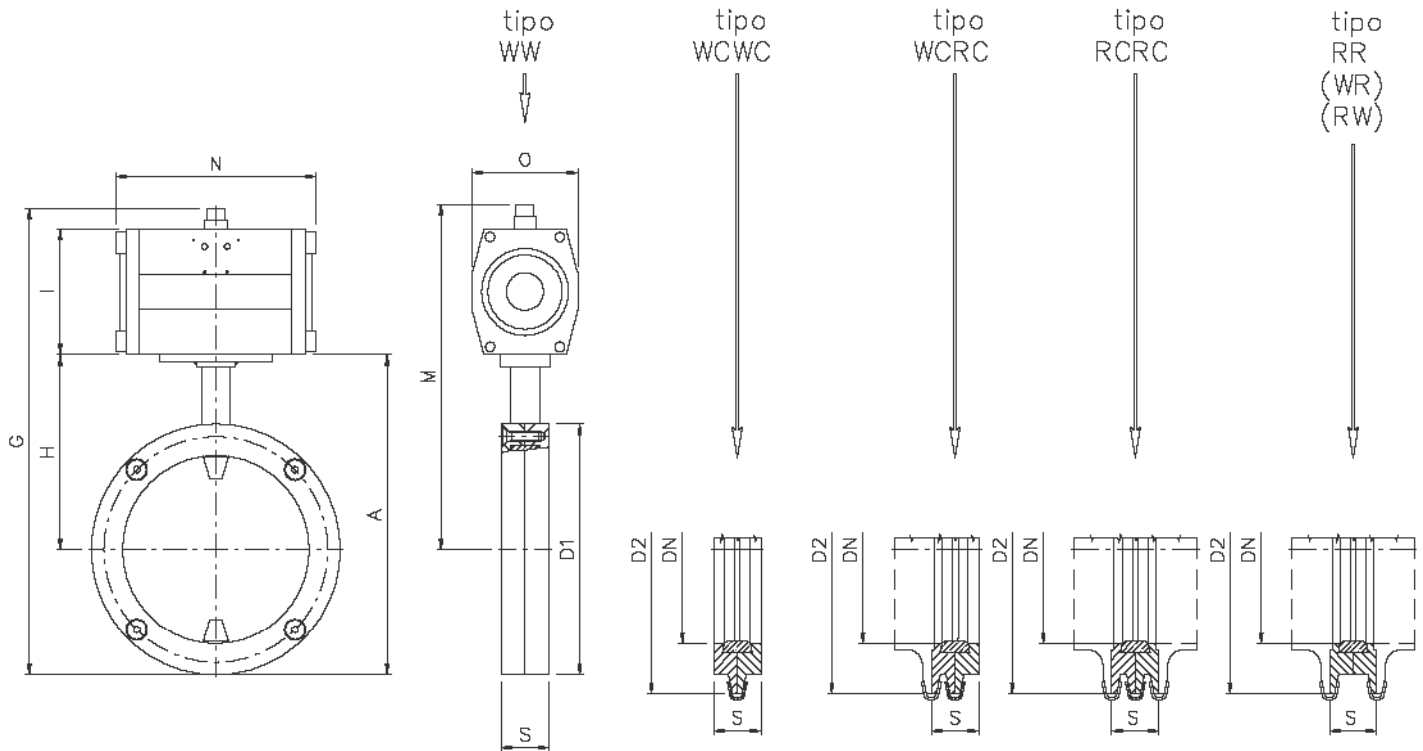


Fig. 2.2

DN	D1 (mm)	D2 (mm)	S (mm)	A (mm)	G (mm)	H (mm)	I (mm)	L (mm)	M (mm)	N (mm)	O (mm)	Att.
80	130	160	38	185	317	120	100	100	252	162	85	3 AD/RS
100	150	180	38	205	337	130	100	100	262	162	85	3 AD/RS
150	200	230	38	255	387	155	100	100	287	162	85	3 AD/RS
200	250	280	38	305	437	180	100	100	312	162	85	3 AD/RS
250	306	330	40	-	523	213	125	125	370	210	110	4 AD/RS
300	370	400	40	-	584	242	125	125	399	210	110	4 AD/RS
350	420	450	40	-	633	267	125	125	424	210	110	5 AD/RS
400	470	500	40	-	725	292	125	125	490	290	140	5 AD/RS

All data is subject to change without previous notice.

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3 VALVE DESCRIPTION

3.1 TECHNICAL FEATURES

Characteristics:

- ◆ Body in satin (polished on request) AISI 316L. (DIN 1.4404)
- ◆ Vane in polished AISI 316L. (DIN 1.4404)
- ◆ Easy to disassemble, inspect, clean, especially the versions with **QUICK RELEASE CLAMP**.
- ◆ Reduced weight and dimension.
- ◆ Materials: stainless steel and silicone
- ◆ Manufactured in accordance with G.M.P. regulations.
- ◆ Pressure and vacuum seal (when the valve is in closed position).
- ◆ No O-Ring (OR) seals on the shafts.
- ◆ High resistance to temperature.
- ◆ Interchangeable with **ROTARY VALVE®**.
- ◆ Air control: 4+6 bar (58+87 psi)
- ◆ Test, material and surface roughness certificate on request.
- ◆ Operating consumption at a pressure of 5.6 bar (80 psi):
 3AD= 1.68 Lt/m ; 4AD= 3.52 Lt/m; 5AD= 6.8 Lt/m
- ◆ Each valve wears the **CO.RA. S.r.l.** trade mark and identification batch number.

Example:

CO.RA® I/01/298/AG

Advantages:

- ◆ Smaller and lighter than traditional valve
- ◆ Minimum friction between rotor and seal thanks to reduced contact surface.
- ◆ No lubrication needed.
- ◆ Sterilisable in autoclave.

Applications:

- ◆ Loading and unloading of process machinery.
- ◆ Outlet valves for containers for powders, pastes and granules used in the pharmaceutical, food and cosmetics industries
- ◆ Sterile air control

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3.2 GENERAL DESCRIPTION

The **SOLE VALVE** is an aseptic butterfly valve for control of the bulk product flow.

It is built in stainless steel AISI 316L; the gasket is made of silicone according to the FDA 177.2600 standards.

SOLE VALVE type WW

Installed onto the outlet of a container or processing equipment with reduces cleaning and sanitizing needs. Removable by unscrewing the locking screws.

SOLE VALVE type WR (RW)

Installed onto the outlet of a container or processing equipment or without many cleaning and sanitizing needs. Recommendable when one of the machines works with granules or bulk transfer and has to be frequently replaced.

Disassembly by clamp allows a quick replacing of the receiving container.

SOLE VALVE type WCWC

Installed onto the outlet of a container or processing equipment in case of frequent cleaning and sanitizing operations. Its complete disassembly is immediate, by opening the clamp.

Components can be exposed to a careful cleaning and sanitizing. Afterwards reassembly can be performed without any tool.

SOLE VALVE type WCRC

Installed onto the outlet of a container or processing equipment in case of frequent cleaning and sanitizing operations. Its complete disassembly is immediate, by opening the clamp.

Components can be thoroughly cleaned and sanitized. Afterwards it is easily reassembled without any tool.

SOLE VALVE type RCRC

Installed onto the outlet of a container or processing equipment in case of frequent cleaning and sanitizing operations. It is also suitable for splitting the upper machine from the lower material receiving container.

This kind of connection is very helpful when it is necessary not to have bulk or granules dispersion during the discharge operations. Full and immediate disassembly by releasing clamp connection.

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3.3 PURPOSE

SOLE VALVE are designed constructed with hygiene in mind. Cleaning worries become a thing of the past when operators can quickly strip, thoroughly clean and reassemble a valve

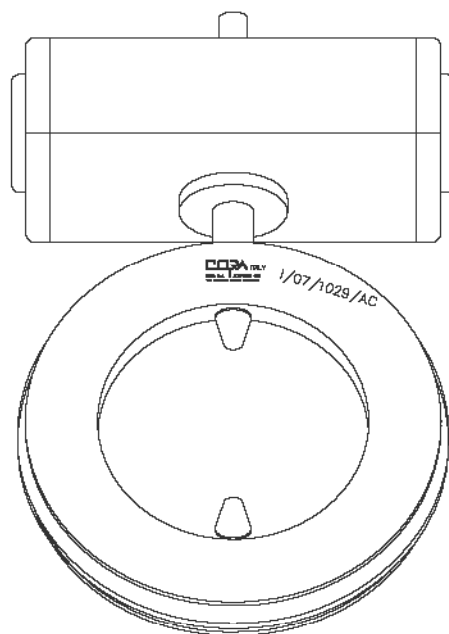
The **SOLE VALVE** range of valves set a standard in hygiene and cleans for the handling of

- ❖ Powders
- ❖ Granules
- ❖ Pastes
- ❖ Liquids
- ❖ Gases

Perform to feed:

- ❖ Mills
- ❖ Compressing machines
- ❖ Capsule fillers
- ❖ Micro-batchers
- ❖ Sieves.

The valve design meets processing requirements, allowing a quick and easy cleaning without any tool.



Picture.3.1

3.4 PNEUMATIC SYSTEM

The pneumatic diagram for the SOLE VALVE and the components list are under section 6 and section 7.

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ATTENTION!!

The operator's working area should be kept free from large and/or obstructing objects to ensure that nothing will interfere with the movement of the valve or prevent the operator from stopping it immediately in the event of an emergency.

The valve shall never be operated when its moving parts are not protected with the safety.

It is forbidden to modify any safety guards protecting the danger areas.

4.2 DANGER AREAS – RESIDUAL HAZARDS

Before disassembly, ensure disconnection from the electrical (if present) and pneumatic supply upstream and check that the valve and the system are not under pressure by disconnecting the compressed air supply.

Disassembling the actuator can be hazardous and may cause operation problems.

When the butterfly actuator is switched on, it kicks because of the opening force.

Consequently, ensure that the valve is properly secured to its support.

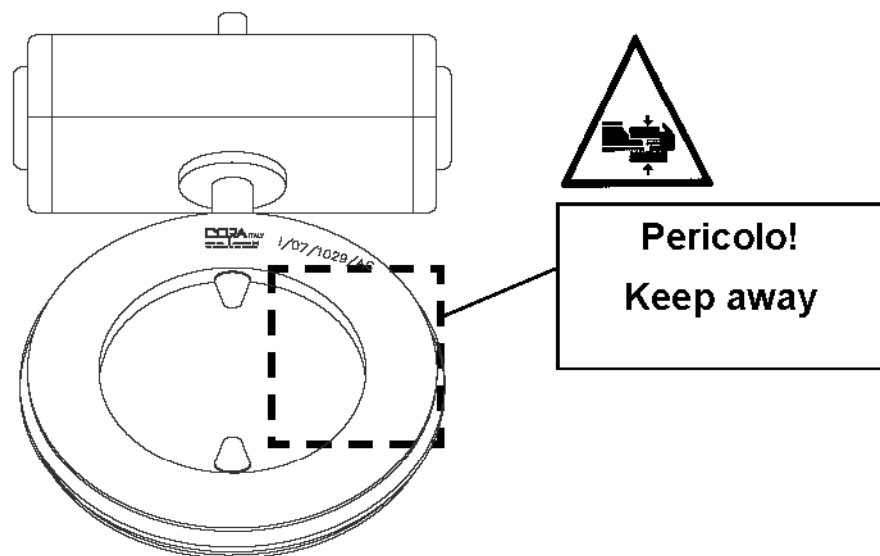
Keep hands and fingers off from the valve when switching it on.

If the valve is supplied with control panels, it is dangerous to open them, unless the pneumatic supply upstream is disconnected.

As well as those already described, a further dangerous point of the valve is the contact area between the rotor and the valve body.

Keep fingers and hands off from the rotor turning area.

Never get close to the rotor before disconnecting the pneumatic power upstream and ensuring that there is no compressed air in the pneumatic system by disconnecting the compressed air. In the case of presence of electrical components, disconnect the electrical supply upstream.



ATTENTION!!

N.B. Accidents can happen, if these warnings are not observed.

To prevent any accident, maximum care must be taken when the valve is in motion.

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ATTENTION!!

The SOLE VALVE is only designed to be part of machinery, systems, containers, etc., It has no other purpose apart from these applications.

In accordance with EU Directive 2006/42/CE and its subsequent modifications, the SOLE VALVE is designed to be assembled inside a machine and to be an integral part of that machine. On its own, it provides no protection against any of the hazards arising from its use and maintenance. It is forbidden to operate the SOLE VALVE, until the machine of which it will become an integral part has been declared in conformity with the provisions of Directive 2006/42/CE.

The installer of the SOLE VALVE is obliged to install it inside the appropriate line or system and to take all necessary actions to prevent or limit machine hazards, as provided under the laws in force.

The risks that should be avoided are included in, but not limited to, the following list:

- **Limbs crushing or trapping in moving parts.**
- **Exposure to material processed in the system in which the machine is mounted.**
- **Ergonomic risks, due to control panel incorrect position.**
- **Ergonomic risks during maintenance due to valve incorrect position.**

4.2.1 NOT ALLOWED USES

CO.RA. S.r.l. valves can only be used with material in granule and powder form. Other purposes not mentioned in this manual are prohibited.

4.3 SAFETY SYSTEMS

The **SOLE VALVE** shall be assembled in a system which is already fitted with an emergency pushbutton. By pushing the button, all valve operations will immediately stop. If the **SOLE VALVE** is assembled on a system without an emergency pushbutton, the customer shall install one immediately.

The **SOLE VALVE** is part of the equipment. Therefore, the customer shall make any modification required by the system to guarantee that the **SOLE VALVE** is correctly installed and it is in conformity with current safety regulations in the country of use, as well as with the specifications contained in this manual.

5 ASSEMBLING THE VALVE



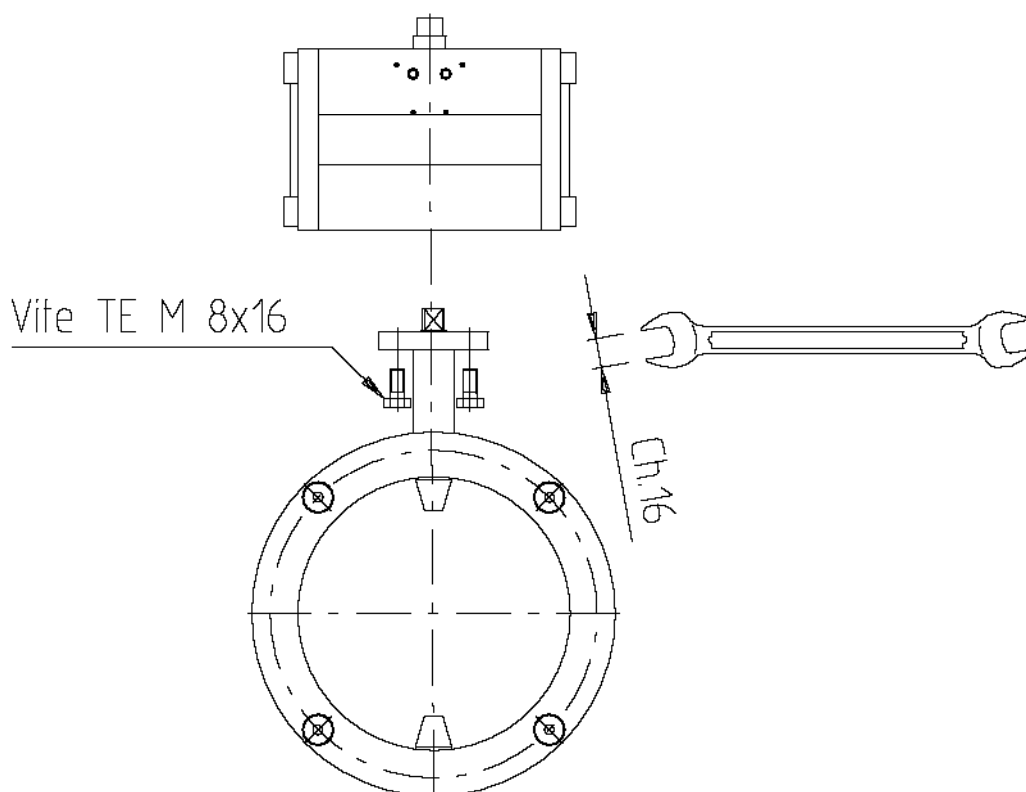
5.1 CHECKS AND PRELIMINARY OPERATIONS

The valve is always shipped in perfect working order after being tested at our factory.

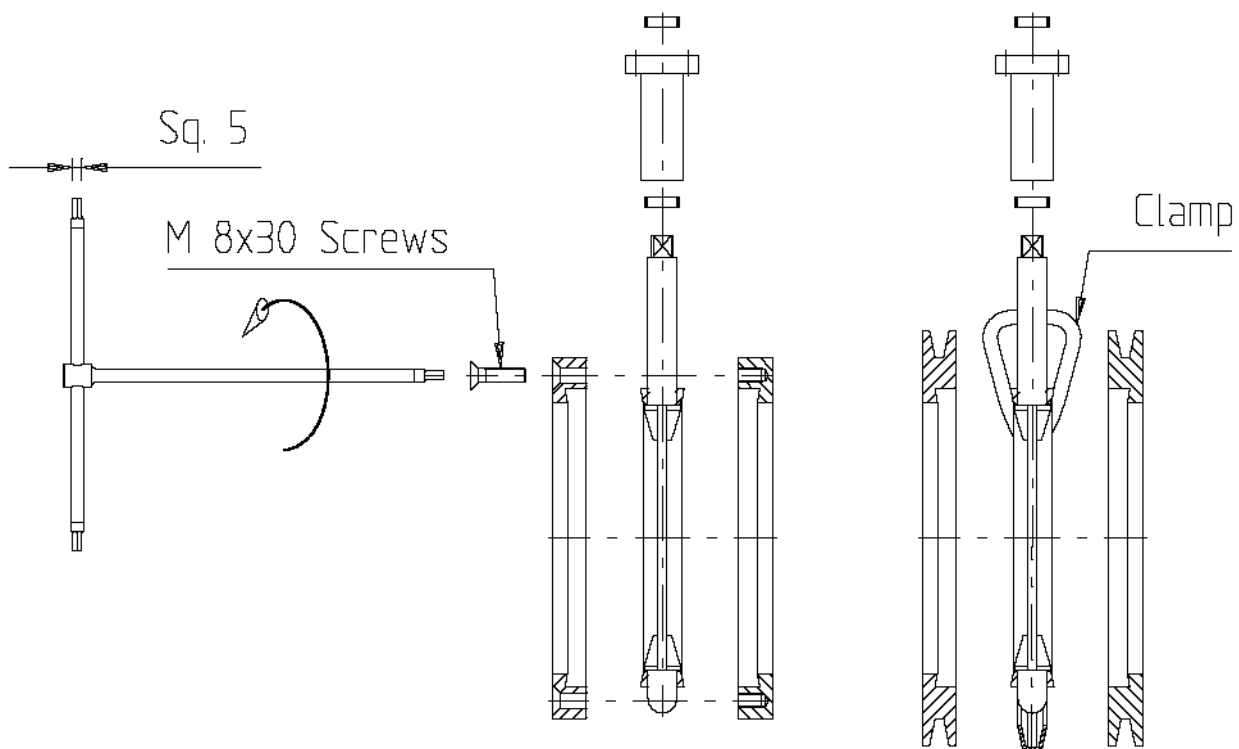
- ◆ When you receive the valve, open the packaging and check that the valve has not been damaged during transport. In case of damage, report to the carrier immediately.

5.2 VALVE DISASSEMBLY

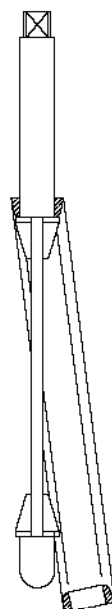
- To remove **ACTUATOR** unscrew 4 TE M 8x16 screws with monkey wrench (Sq. 16) Unscrew the 6 screw (4 for the light version) M 8x30 for unscrew the half-body version **WW WR RW RR**.



- Unscrew the 6 screws M 8x30 (4 for the light version) to disassemble the half-bodies in the **WW, WR, RW, RR** types
- Unscrew the clamp eye bolt in the **WC, WCRC, RCRC** types (for safety reason, the form of the clamp prevents the eye bolt from sliding off the threaded part).
- Extract the support and the vane with the gasket.



➤ Carefully extract the gasket.



We recommend to carry out this operation on a suitable table, covered with a clean rubber layer.

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5.3 VALVE INSTALLATION AND SAFETY CONDITIONS

Type WW between 2 flanges

The **SOLE VALVE** should be positioned between 2 flanges and secured by means of screws. Open the vane slightly to check that it opens easily. Leave the rotor slightly open. Tighten the flange screws in a clockwise direction. Test opening and closing.

Type WW, WR on piping/stub pipe (welding on half-body W)

Disassemble the valve. Extract vane and seal. Reassemble the half-bodies with support and connect them slowly to piping by means of spot welding in a crosswise direction. After cooling, remove the valve and reassemble all the components. Test opening and closing.

Type WW, WR with spigot type S on piping/stub pipe

Disassemble the valve. Extract vane and seal. Reassemble the half-bodies with support. Connect the spigot to piping slowly by crosswise spot welding. After cooling, disassemble the valve and reassemble all the components. Test opening and closing.

Type WCWC, WCRC on piping/stub pipe (welding on half-body WC)

Disassemble the valve. Extract vane and gasket. Reassemble the half-bodies with support and connect them to piping slowly by means of crosswise spot welding. After cooling, disassemble the valve and reassemble all the components. Test opening and closing.

Type WCWC, WCRC with spigot type S welded on piping/stub pipe

Disassemble the valve. Extract vane and seal. Reassemble the half-bodies with support. Connect the spigot to piping slowly by means of crosswise spot welding. After cooling, disassemble the valve and reassemble all the components. Test opening and closing.

Type RR and RCRC

Tighten the valve between flanges with relevant clamp. Test opening and closing.

Type RR and RCRC with clamp type B and MOUNTING FLANGE type MF

Connect MF slowly to piping by means of crosswise spot welding. After cooling connect valve to flange MF with relevant clamp. Test opening and closing.

Please, remember that welding operations are normally carried out at the manufacturer's facility.

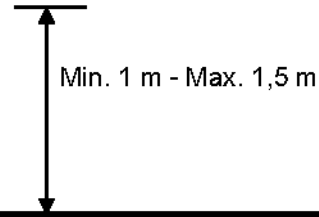
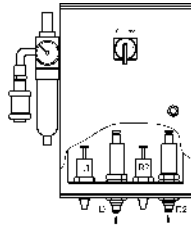
ATTENTION!!

WELDING OPERATIONS SHOULD BE CARRIED OUT ONLY BY SUITABLY TRAINED PERSONNEL. THEY ARE INFORMED ABOUT THE RISKS INVOLVED IN THESE OPERATIONS AND SUPPLIED WITH ADEQUATE TOOLS AND SAFETY CLOTHING ACCORDING TO THE REGULATIONS IN FORCE IN THE COUNTRY OF USE.

TAKE SUITABLE SAFETY MEASURES AGAINST HAZARDS OF USING MANUAL EQUIPMENT, IN ACCORDANCE WITH THE LAWS IN FORCE IN THE COUNTRY OF USE.

The valve and control panel (where present) should be accessible for start- up, checking and maintenance operations. The instructions regarding ergonomics should be considered when assembling the valve with other components. The control panel should be particularly positioned at not less than 1 m. and lower than 1.5 m. from floor.

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5.4 ALLOWED ENVIRONMENTAL CONDITIONS

The devices contained in valve systems with actuator and solenoid valve have a protection level of **IP65**. They are also suitable for use in normal environments. If the valve is used in special environments (e.g. with greater fire hazards), the user should provide the information necessary to choose the most suitable executions.

Operating temperature: min. +0°C - max. +40°C

Altitude: 1000 mt. a.s.l.

ATTENTION!!

The **SOLE VALVE** must be connected to the earthing circuit.

5.5 CONNECTING THE VALVE TO THE POWER SUPPLY

5.5.1 CONNECTION TO PNEUMATIC SUPPLY

For further information, refer to paragraphs 3.1 and the section 8 on ATTACHMENTS.

5.6 INFORMATION ABOUT VALVE NOISE

The level of equivalent continuous acoustic pressure measured at the working area is less than **70dB**.

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6 MAINTENANCE



6.1 GENERAL PROCEDURES

The **SOLE VALVE** has been designed to reduce maintenance operations to a minimum.

The procedures to follow should be always respected in order to grant long operating life and trouble-free operation performance:

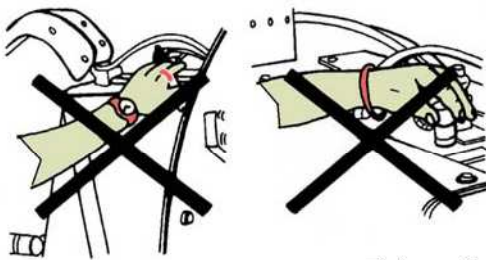
- keep the valve clean and in good condition
- avoid temporary or rushed repairs

The strict observances of regular maintenance procedures are extremely important. Any anomaly should be avoided. Time and equipment required for any maintenance operation should always be available and used properly.

ATTENTION!!

- All ordinary and extraordinary maintenance operations must be carried out, when the valve is shut off, with the switch on "0", and with the electrical supply (where present) or pneumatic supply shut off. Ensure that there is no compressed air left in the system by disconnecting the compressed air. Expose the appropriate tag to indicate that maintenance work is in progress.
- Remove items that could cause accidents (watch, bracelet, rings, etc.), as shown in picture 6.1.
- Wear suitable clothing (coveralls or a shirt with elasticized cuffs) or roll sleeves, as shown in picture 6.2.

Warning: Take suitable safety measures to prevent hazards of using manual equipment, in accordance to the laws in force in the country of use.



Picture. 6.1



Picture. 6.2

6.2 PREVENTIVE MAINTENANCE

The ordinary maintenance operations required are described in this paragraph. In order to prevent production from being unexpectedly interrupted and to extend the life of the valve, it is advisable to carry out these instructions properly. It is also very important to respect the safety regulations described in this manual.

6.2.1 MAINTENANCE AND PREVENTIVE CHECKS

At the end of every working day, position the selector switch "B" on the control panel to "0".

- Check wear and tear of bushings inside the pneumatic actuator support frequently.
- Check the butterfly valve seals and the pneumatic actuator seal kit.

- Ensure that the pressure reaches the manometer.
- Ensure that the solenoid valve is operating.
- Visually check the position of the cam positioner.

With the exception of normal maintenance, it is always advisable to contact the manufacturer if any anomaly occurs. Always call the manufacturer for replacements.

6.2.2 SUBSTITUTIONS SCHEDULE

Description	References		Substitution (*)
	See drawing § 8.1	Pos.	
Gaskets	SC2216 Rev. 4	8	600.000 cycles
Support bushing	SC2216 Rev. 4	10	3.500.000 cycles
Plunger	SC2216 Rev. 4	18	3.500.000 cycles

(*) Indicative value. Product reference: lactose

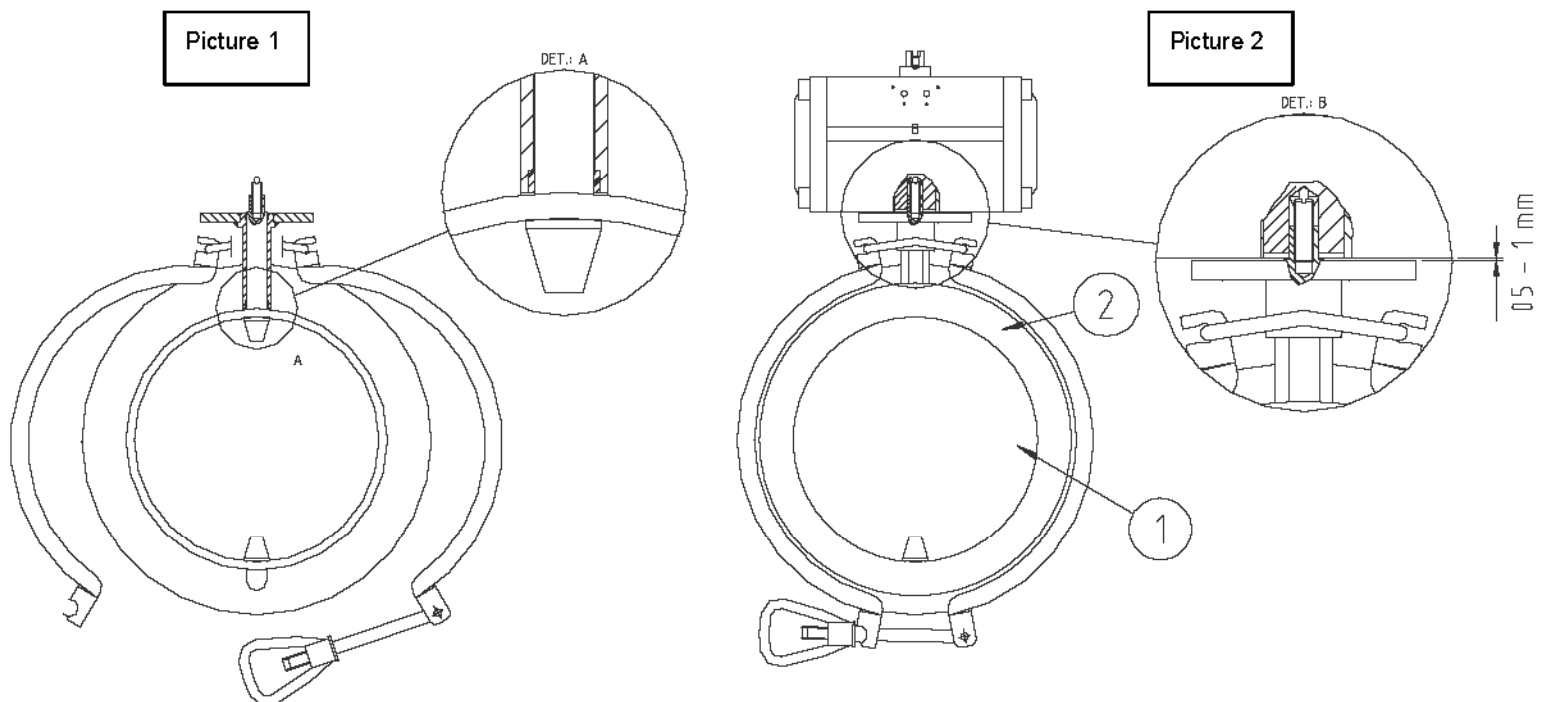
ATTENTION:

The use of the valve with no original spare parts provokes the decay of the security and the warranty requirements.

6.3 REGULATION

The valve has an earthing system made up of a spring-mounted pressure plate M8 screwed on the top of the vane square. This is useful to assure the electrical continuity in case of a dysfunctional situation.

The pressure plate has to be mounted on the rotor, as in the following pictures:



- Insert the supports on the vane, until they beat on the gasket (picture 1)
- Mount also the missing half body through the clamp (or screws if applicable)

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- Match the actuators to the supports until it's perceived that the pressure spring rejects the actuator. This has to be done when there is about 0.5-1 mm to the matching of the actuator with the support.
- Check the correct assembling with a Multimeter, measuring the resistance between point 1 and 2 (picture 2).

6.3.1 REGULAR CLEANING

Program cleaning interventions after every discharged product batch or anyway every 15.000 cycles.

To clean the valve, use a detergent compatible with stainless steel, silicone and the products for which the valve is used.

ATTENTION!!

To clean the valve, always use a wet cloth.

6.4 DISASSEMBLY FROM PRODUCTION

Although no toxic or dangerous materials are used in the construction of the valve. Disposal of all its parts must be according to the procedures and laws of the country in which it was installed.

7 SAFETY INSTRUCTIONS IN ACCORDANCE WITH THE DIRECTIVES 94/9/CE (ATEX)



7.1 INTRODUCTION

The safety instructions in this document integrate and substitute, where in conflict, those mentioned in the user and maintenance manual.

The safety instructions refer to the installation, use and maintenance of the **SOLE VALVE** explosion proof and destined to be used in potential explosive atmosphere.

ATTENTION!!

The current instructions are essential for the correspondence of the valve to the qualifications of the directives 94/9/EC and therefore have to be: known, available, included and used.

The authorised installation, inspection and maintenance personnel of the valve have to get an appropriate technical preparation in order to handle conditions of potential explosion and related risks.

Any valve use which does not conform to the indicated instructions given in the user and maintenance manual, as well as to this current integration, declines the safety qualifications and the protection against explosion danger.

The risks related to the use of the valve in the specific conditions mentioned in the users and maintenance manual and the current integration have been analysed: the analysis of the risks related to the interfacing with other components of the system and referred to the installer.

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7.2 INSTALLATION AREA

The essential safety qualifications against the risk of explosion in the classified areas are being described in the directives **94/9/EC** and **99/92/EC**.

The relative criteria to the classification of the areas are being indicated in the harmonised European standards **EN-60079-10** and **EN 1127-1**.

7.2.1 PRINTING AND GENERALS INFORMATION

CO.RA valves in accordance to the 94/9/EEC normative carry the following identification mark:

Category 1 with SI-P.T.F.E or VITON Gasket:



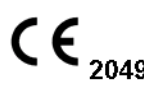

II 1D/2GD c 0°C Ta+40°C 85°C (T6)

	The symbol indicated is in compliance with attachment X of directive 94/9/CE and identifies that the product is in conformity with the essential safety and health requirements (r.e.s.s.) of said directory. 2049 registered number (4 figures) by the notified organism involved in guaranteeing the quality of the product.
	Specific symbol of the ATEX 94/9/CE directive, as per II attachment of the above mentioned directive.
II	Belonging group of the equipment in hand. Group II refers to the equipment in use NOT in mine.
1D/...	Internal passage: suitable to work in zones with presence of air/dusts mixtures which continuatively happen, for long periods or frequently during the normal working. Category of the device in relation to the process interface (in this case the process interface can be a zone 20, 21 or 22).
.../2GD	External environment: suitable to work in zones with presence of air/gas, vapours or fog or air/dusts mixtures which occasionally happen, during the normal working Category of the device in relation to the process interface (in this case the process interface can be a zone 1, 2, 21 or 22).
c	Type of protection through constructive security for the devices in category 2 or upper levels
0°C Ta+40°C	Working environment temperature between 0°C and+40 °C
85°C (T6)	Peak superficial temperature of the valves according to the use conditions foreseen in the working environment characterized by the previous temperatures.

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Category 2 with VITON gasket:

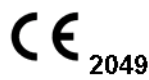

  **II 2GD/2GD c IIA 0°C Ta+40°C 85°C (T6)**

	The symbol indicated is in compliance with attachment X of directive 94/9/CE and identifies that the product is in conformity with the essential safety and health requirements (r.e.s.s.) of said directory. 2049 registered number (4 figures) by the notified organism involved in guaranteeing the quality of the product.
	Specific symbol of the ATEX 94/9/CE directive, as per II attachment of the above mentioned directive.
II	Belonging group of the equipment in hand. Group II refers to the equipment in use NOT in mine.
2GD/...	Internal passage: suitable to work in zones with presence of air/gas, vapours or fog or air/dusts mixtures which occasionally happen, during the normal working Category of the device in relation to the process interface (in this case the process interface can be a zone 1, 2, 21 or 22).
.../2GD	External environment: suitable to work in zones with presence of air/gas, vapours or fog or air/dusts mixtures which occasionally happen, during the normal working Category of the device in relation to the process interface (in this case the process interface can be a zone 1, 2, 21 or 22).
c	Type of protection through constructive security for the devices in category 2 or upper levels
IIA	Working suitability assured just for gas/ vapour of the IIA groups as per the CEI EN 50014 regulation
0°C Ta+40°C	Working environment temperature between 0°C and+40 °C
85°C (T6)	Peak superficial temperature of the valves according to the use conditions foreseen in the working environment characterized by the previous temperatures.

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Category 2 with SI-P.T.F.E. gasket:

	The symbol indicated is in compliance with attachment X of directive 94/9/CE and identifies that the product is in conformity with the essential safety and health requirements (r.e.s.s.) of said directory. 2049 registered number (4 figures) by the notified organism involved in guaranteeing the quality of the product.
	Specific symbol of the ATEX 94/9/CE directive, as per II attachment of the above mentioned directive.
II	Belonging group of the equipment in hand. Group II refers to the equipment in use NOT in mine.
2GD/...	Internal passage: suitable to work in zones with presence of air/gas, vapours or fog or air/dusts mixtures which occasionally happen, during the normal working Category of the device in relation to the process interface (in this case the process interface can be a zone 1, 2, 21 or 22).
.../2GD	External environment: suitable to work in zones with presence of air/gas, vapours or fog or air/dusts mixtures which occasionally happen, during the normal working Category of the device in relation to the process interface (in this case the process interface can be a zone 1, 2, 21 or 22).
c	Type of protection through constructive security for the devices in category 2 or upper levels
IIB	Working suitability assured just for gas/ vapour of the IIA and IIB groups as per the CEI EN 50014 regulation.
0°C Ta+40°C	Working environment temperature between 0°C and+40 °C
85°C (T6)	Peak superficial temperature of the valves according to the use conditions foreseen in the working environment characterized by the previous temperatures.

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ATTENTION!!

THE INSTALLATION OF THE VALVE ON THE PLANT, ESPECIALLY THE WELDING OPERATIONS, HAVE TO BE DONE IN ABSOLUTE ABSENCE OF POTENTIAL EXPLOSIVE ATMOSPHERE.

THE VALVE IS NOT ALLOWED TO BE USED WITH NON CONDUCTIVE LIQUIDS.

THE VALVE IS NOT ALLOWED TO BE INSTALLED IN SYSTEMS WHICH MAY GENERATE ADIABATIC COMPRESSION OR COLLISION WAVES.

Please note the following general precautions:

- Check earthing of the valve
- Make sure that the gasket is not worn
- Make sure that there is no deposit of powder
- Make sure that the bushings are not over worn

ATTENTION!!

THE ALLOWED PRESSURE IS BETWEEN 0.8 - 1.1 bar

Before making the valve work, after the installation and every maintenance intervention, it is necessary to check that there are no obstacles to movement and that opening/closure torque is correct and equal to the one declared; shall this not be the case, inspect the moving parts and eventually contact CO.RA S.r.l.

It is necessary to install a filter to avoid the trespassing of any object with a diameter bigger than 2 cm.

7.2.2 CLEANING OF THE VALVE

ATTENTION!

CLEAN THE VALVE EXCLUSIVELY WITH A HUMID CLOTH

Verify periodically (every batch) that there is no deposit on the inside of the valve.

7.2.3 TEMPERATURE CLASS

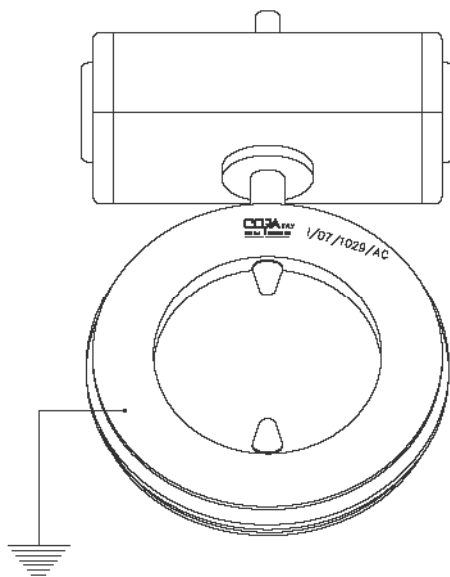
The temperature reference classes are **T6**. Find bellow the operational conditions:

Allowed variation of the surrounding temperature: $0^{\circ}\text{C} < T_{\text{amb}} < 40^{\circ}\text{C}$

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7.2.4 EARTHING

In picture 7.1 the earthing point to which the user has to attach the earthing wire is indicated. This wire should have an appropriate section. See also drawing SC2216 Rev.2.



ATTENTION!!

THE VALVE SHOULD ALWAYS HAVE EARTHING INDEPENDENTLY FROM ANY OTHER ORGAN ATTACHED TO IT.

THE LACK OF EARTHING OR INCORRECT EARTHING DECLINES THE SAFETY QUALIFICATIONS AND THE PROTECTION AGAINST EXPLOSION DANGER.

7.2.5 COMPATIBILITY BETWEEN LIQUID OR POWDER AND VALVE MATERIALS

The user should always use compatible materials with the used product with reference to the design conditions of the same valve.

ATTENTION!!

THE VALVE SHALL NOT BE USED WITH INCOMPATIBLE PRODUCTS WITH ITS COMPONENT MATERIALS, OR IN AN ENVIRONMENT WITH INCOMPATIBLE LIQUID PRESENCE UNDER ANY CIRCUMSTANCES.

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7.3 INTERFACE WITH ACTUATION SYSTEM

The features of the useable actuations are listed on the following table:

Actuation abbreviation	Max. angular velocity	Max. Peripheral Velocity	Feeding	
			Pneumatic	Electric
AP3	6.28 rad/s	0.62 m/s (With max. interceptor diameter 198mm)	5-6 Bar	
AP4	3.35 rad/s	0.50 m/s (With max. interceptor diameter 298mm)	5-6 Bar	
AP5	2.09 rad/s	0.41 m/s (With max. interceptor diameter 398mm)	5-6 Bar	
INOX Variance API65/180°	6.28 rad/s	0.62 m/s (With max. interceptor diameter 198mm)	5-6 Bar	
INOX Variance API85/180°	3.14 rad/s	0.62 m/s (With max. interceptor diameter 398mm)	5-6 Bar	
MPEX	50	1.0 m/s (With max. interceptor diameter 398mm)	5-6 Bar	
MEEEx	92	0.72 m/s (With max. interceptor diameter 148mm)		220-380 V

In case of the supplying of an actuation system as: a pneumatic or electric actuator; electrical or pneumatic motor, CO.RA. S.r.l., will provide the valuation and declaration of conformity of the supplied system.

In case of the assembling of an actuation system as: pneumatic or electrical actuator; pneumatic or electric motor from the final user other than the above mentioned actuation systems, the final user will have to install components that will not affect the possible trigger sources of the Valve in question, suitable for the category and marked according to the Atex 94/9/CE directive.

Attention!

The use of the valve with no original spare parts provokes the decay of the security and the warranty requirements.

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8 TECHNICAL ATTACHMENTS

8.1 ATTACHMENTS INDEX

- Att. I** Attachment 1 – Sole Valve
- Att. II** Explode drawing SC2216 Rev.6
- Att. III** CE conformity declaration GT Actuator series GTX,GTV,GTW.
- Att. IV** GT Actuators - Installation Operation & Maintenance Manual – GTX Series
- Att. V** Inductive proximity sensor P & F Mod. NCN4-12GM40-E2-V1-3G-3D
- Att. VI** Atex Certificate

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Tel. +39.0583.20.590 r.a. • Fax. +39.0583.20.481

Email: info@coraitaly.net • Web site: www.coraitaly.net



DICHIARAZIONE CE DI CONFORMITÀ Ai sensi della Direttiva 94/9/CE "Atex"		EC DECLARATION OF CONFORMITY According to Directive 94/9/EC "Atex"	
Il sottoscritto Salvatore Lardieri costruttore e legale rappresentante della : <i>The undersigned Salvatore Lardieri manufacturer and legal representative of:</i>		CO.RA s.r.l. loc. Chiappini, 51 55010 - Spianate - Altopascio (Lucca)	
Attesta, sotto la sua responsabilità, che il prodotto: Certificate, under his responsibility, that the product:			
Valvola Intercettazione Polveri: Tipo / <i>Interception Powder Valve: Type</i>		SOLE VALVE	
N° matricola <i>Serial Number</i>		S.V.M/14/0245/1	
<p>E' conforme ai requisiti essenziali di sicurezza e salute stabiliti dall'Allegato II della Direttiva 94/9/CE (Atex) ed è stato soggetto ad una procedura di valutazione della conformità per la categoria II 1D/2GD e II 2GD/2GD. <i>Is in compliance with the essential requisition about safety and health, established from the Attached II of the ATEX Directive 94/9/EC (Atex) and also has been subjected to a valuation of conformity for the category II 1D/2GD and II 2GD/2GD.</i></p> <p>Norme armonizzate applicate: / <i>Uniformed apply norms:</i> UNI EN 13463-1 Apparecchi non elettrici per atmosfere potenzialmente esplosive. Parte 1 metodo e requisiti di base / <i>Non-electrical equipment for use in potentially explosive atmospheres. Part 1: Basic method and requirements</i> UNI EN 13463-5 Apparecchi non elettrici per atmosfere potenzialmente esplosive .Parte 5: Protezione tramite sicurezza costruttiva "c" / <i>Non-electrical equipment for use in potentially explosive atmospheres Part 5: Protection by constructional safety "c"</i> EN 1127-1 Prevenzione dell'esplosione e protezione contro l'esplosione . parte 1: concetti fondamentali e metodologia / <i>Explosive atmospheres. Explosion prevention and protection. Part 1: Basic concepts and methodology</i> Linee guida GMP / <i>Good Manufacturing Practice (GMP),</i></p>			
<p>La presente dichiarazione CE di conformità include anche il soddisfacimento ai requisiti essenziali di sicurezza stabiliti alle Direttive Comunitarie: 2006/42/CE. <i>The present CE conformity declaration also includes the satisfactions to the essential safety requirements established from the Communitarian Directives: 2006/42/CE.</i></p>			
Il prodotto è idoneo per essere utilizzato in apparecchiature classificate: / <i>The product is used to classify equipment:</i>			
Categoria 1 Guarnizione in Viton: / Category 1 Viton Gasket		2049	II 1D/2GD c 0°C Ta+40°C 85°C (T6)
Categoria 1 Guarnizione in SI-P.T.F.E.: / Category 1 SI-P.T.F.E. Gasket:		2049	II 1D/2GD c 0°C Ta+40°C 85°C (T6)
Categoria 2 Guarnizione in Viton: / Category 2 Viton Gasket:		2049	II 2GD/2GD c IIA T6 °C 0°CTa+40°C
Categoria 2 Guarnizione in SI-P.T.F.E.: / Category 2 SI-P.T.F.E. Gasket:		2049	II 2GD/2GD c IIB T6 °C 0°CTa+40°C
<p>la marcatura è apposta sul prodotto. / <i>branded on product.</i> Le condizioni di installazione del prodotto sono riportate nel manuale di uso e manutenzione. / <i>Product's installation requirement are written on the Use and Maintenance Manual.</i></p>			
Organismo Notificato per l'Esame CE del Tipo: <i>Notified Organism for the CE Type examination:</i>		DNV-MODULO UNO S.c.a.r.l. N.B. N° 2049 Via Cuorgnè N° 21 – 10156 – Torino (Italy)	
Numero di certificato dell'Esame CE del Tipo: <i>Certificate number for EC Type Examination:</i>		DNV MUNO 0496.ATEX.07/3163	
Organismo Notificato per la Sorveglianza della produzione: <i>Notified Organism for the production surveillance:</i>		DNV-MODULO UNO S.c.a.r.l. N.B. N° 2049 Via Cuorgnè N° 21 – 10156 – Torino (Italy)	
Numero di attestato di conformità : <i>Conformity Certificate Number:</i>		DNV MUNO 0496.ATEX.07/3192	
Luogo e data/ Place and date	Nome e Cognome / Name and surname	Posizione / Position	Firma / Signature
Spianate, li 27/03/2014	Sig. / Mr. Salvatore Lardieri	Legale Rappresentante –Presidente Legal Representative – President	

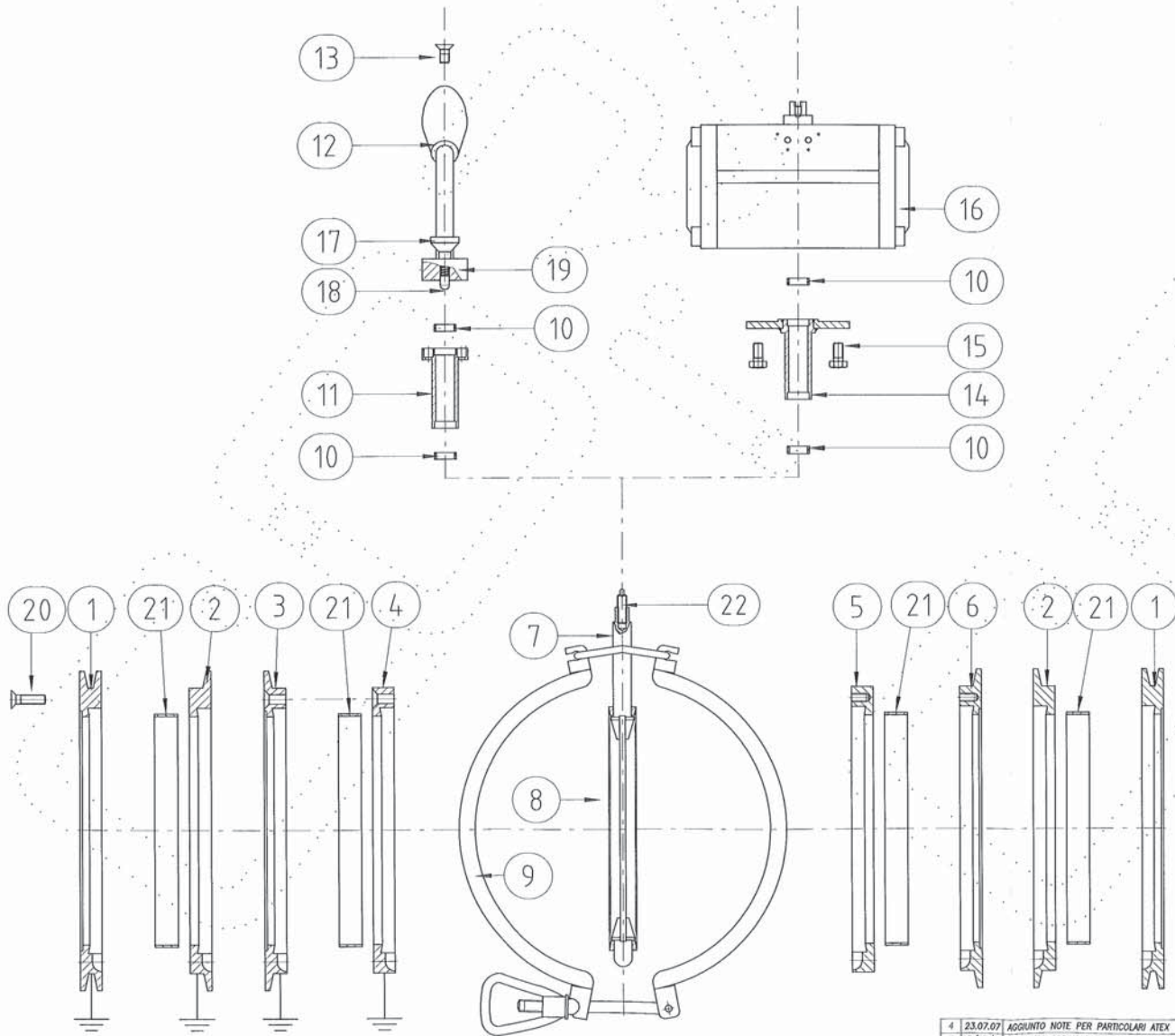
Compilato da LORENZO LAZZERINI

Mod.261 rev.0



COMM. M /14/0245N°1 Pz.

13 MAR. 2014



22	Spring plunger MB	For Atex 94/09/CE version	INOX
21	Spigot	Welded to halfbody	AISI 316L
20	Flated head screw M 8x30	For Sole Valve type WW, RR, WR, RW	INOX
19	Spring	For Sole Valve with lever Not supplied for Atex 94/09/CE version	INOX
18	Plunger	For Sole Valve with lever Not supplied for Atex 94/09/CE version	AISI 304
17	Lever locking pin	For Sole Valve with lever Not supplied for Atex 94/09/CE version	AISI 304
16	Actuator		Aluminium
15	Screw M 8x16	For Sole Valve with actuator	INOX
14	Actuator bracket	For Sole Valve with actuator	AISI 304
13	Flated head screw M 8x16	For Sole Valve with lever Not supplied for Atex 94/09/CE version	INOX
12	Lever	For Sole Valve with lever Not supplied for Atex 94/09/CE version	AISI 304
11	Handle bracket	For Sole Valve with lever Not supplied for Atex 94/09/CE version	AISI 304
10	Bushing		P.T.F.E.
9	Clamp type B	For Sole Valve type RCRC, WCRC, WCWC	AISI 304
8	Gasket	Choice for Atex 94/09/CE version : SI-P.T.F.E, Viton	Choice: Silicone, SI-P.T.F.E, Viton, EPDM, Coated B
7	Vane		AISI 316L
6	Halfbody type R f.f.	For Sole Valve type RR and WR	AISI 316L
5	Halfbody type W f.f.	For Sole Valve type WW and RW	AISI 316L
4	Halfbody type W f.p.	For Sole Valve type WW and WR	AISI 316L
3	Halfbody type R f.p.	For Sole Valve type RR and RW	AISI 316L
2	Halfbody type WC	For Sole Valve type WCRC and WCRC	AISI 316L
1	Halfbody type RC	For Sole Valve type RCRC and WCRC	AISI 316L
Pos	Descrizione	Note	Materiale



DESCRIZIONE: Sole Valve
Esploso per parti di ricambio e certificati

PER APPROVAZIONE
DATA 18/05/11 FIRMA Ceccanti A.

CO.RA ITALY
CO.RA S.p.A. ALTOPASCIO (LU)
Tel: 0503/20550 R.A. FAX: 0503/20481

DOVE NON DIVERSAMENTE INDICATO :
MISURE ESPRESSE IN mm
TOLLERANZE GENERALI UNI ISO 2768/1 - w

DISEGN. am.
DATA 31.10.01
SCALA 1:4
FOGLIO N. 1/1
DIS. SC2216 REV. 4

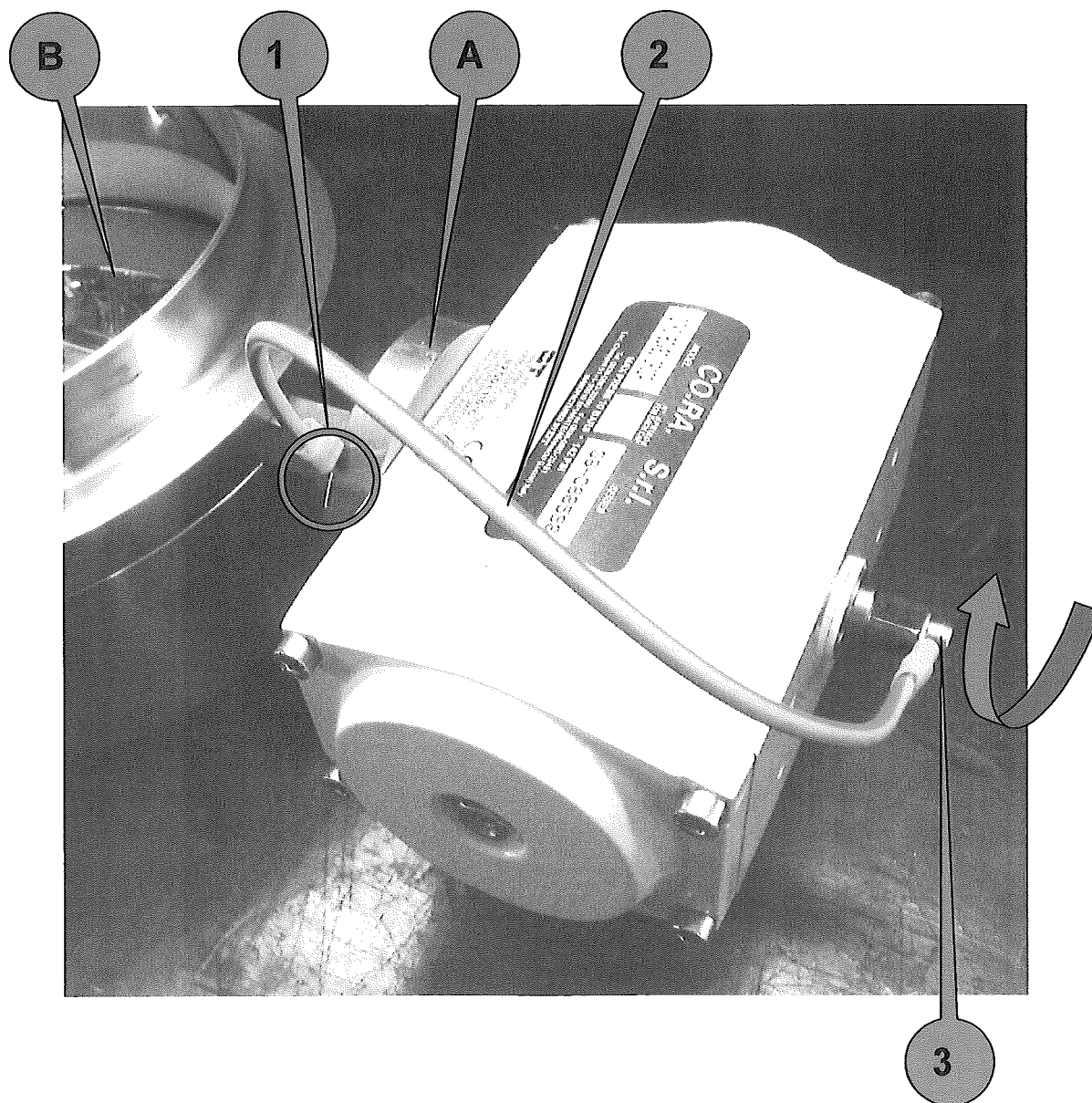
4	23.07.07	AGGIUNTO NOTE PER PARTICOLARI ATEX	C.A.
3	18/07/07	AGGIUNTO SPRING PLUNGER E AGGIORNATO MATERIALI	C.A.
2	25.05.05	ELENCATI MATERIALI QUARUNZIONI POSSIBILI	S.A.
1	21/1 04	aggiunta indicazione punto di messa a terra	am.
REV	DATA	DESCRIZIONE	FIRMA

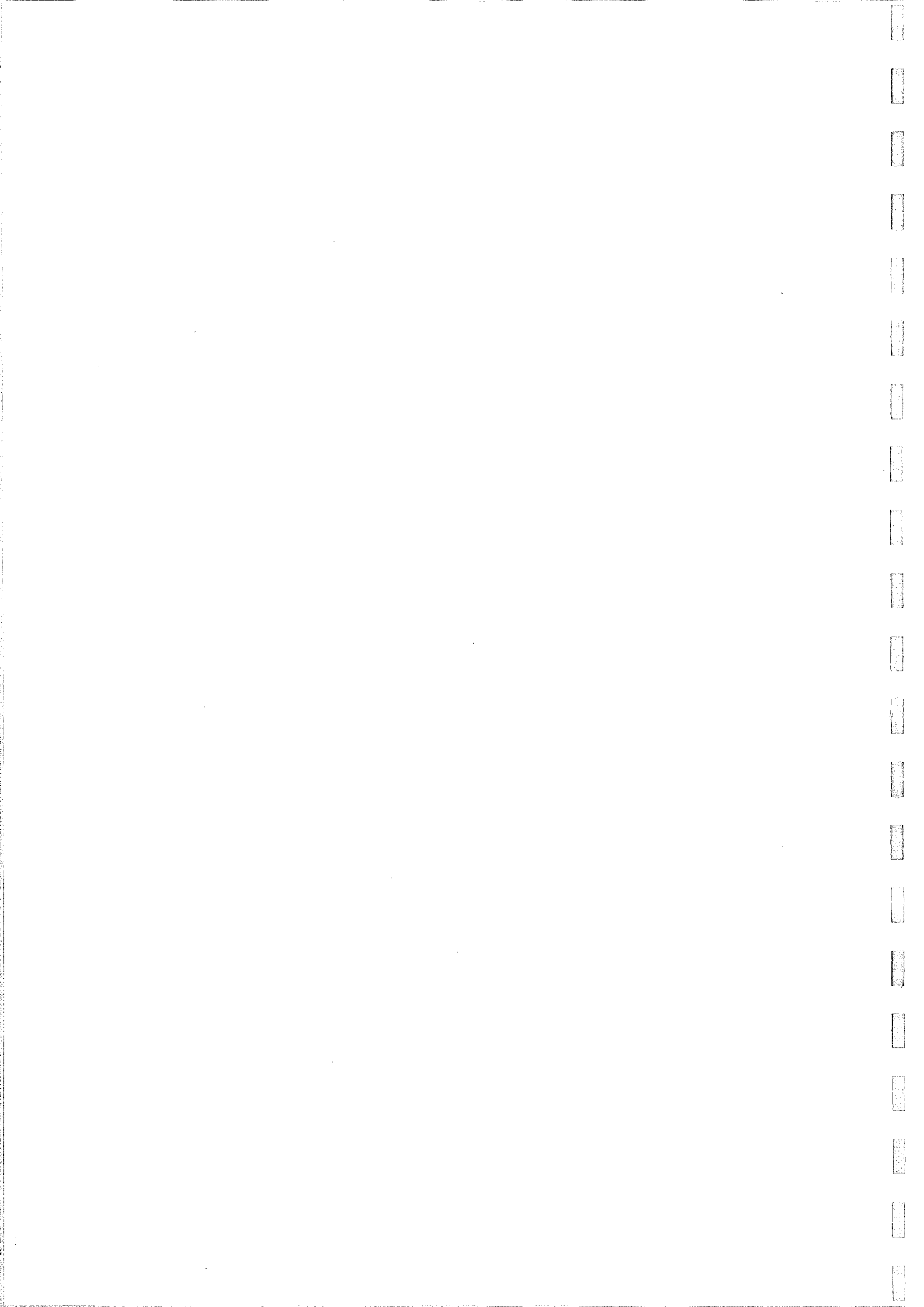
IL PRESENTE DISEGNO E' PROPRIETA' DELLA CO.RA. S.p.A. - A TERMINE DI LEGGE OGNI DIRITTO PER IL SUO IMPEGNO E' RISERVATO

Montage der Aktuator-Erdung (die Anweisungen beziehen sich auf die Positionierung des Ventils wie in der Abbildung dargestellt)

90° Doppelt wirkender Aktuator: AP3-AP4-AP5

- 1) Stellen Sie sicher, dass der Butterfly-Aktuator geschlossen ist (siehe Abb.1)
- 2) Lösen und entfernen Sie die Klemmschraube vom Aktuator, Pos. 1 Abb.1.
- 3) Montieren Sie das Erdungskabel (Siehe Zeichnung Nr. 7890 für ND 200 und Zeichnung Nr. 7947 für ND 250), auf der Ø8 mm Ösenseite der gerade entfernten Schraube, Pos. 2 Abb.1.
- 4) Platzieren Sie das Erdungskabel wie in der Abbildung dargestellt.
- 5) Montieren Sie die M6 Schraube (T.C.E.I. M6x16) am Aktuator-Stift, Pos. 3 Abb.1.
- 6) Prüfen Sie, ob die Drehrichtung mit der auf der Abbildung übereinstimmt.
- 7) Kontrollieren Sie die Stromspannung mit einem Multimeter, indem Sie die Elektroden zwischen die Punkte "A" und "B" platzieren.





Dichiarazione CE di conformità/ EC Declaration of Conformity

Dichiarazione del costruttore/Manufacturer's declaration

Il costruttore /We

GT Attuatori S.R.L

Dichiara che i seguenti attuatori pneumatici/ *Hereby declare that the following pneumatic actuators*

Serie GTX,GTV,GTW e GTK


A cui questa dichiarazione si riferisce è costruita in conformità alla seguente direttiva / *to which this declaration relates is manufactured in accordance with the provision of the following directive:*

ATEX 94/9/CE

La conformità è stata verificata osservando le seguenti Norme / *The conformity is verified by complying to the following Standard:*

UNI EN 1127-1 :2011 UNI EN 13463-1:2009

Gli attuatori pneumatici riportano la marcatura / *the pneumatic actuators bring the marking*

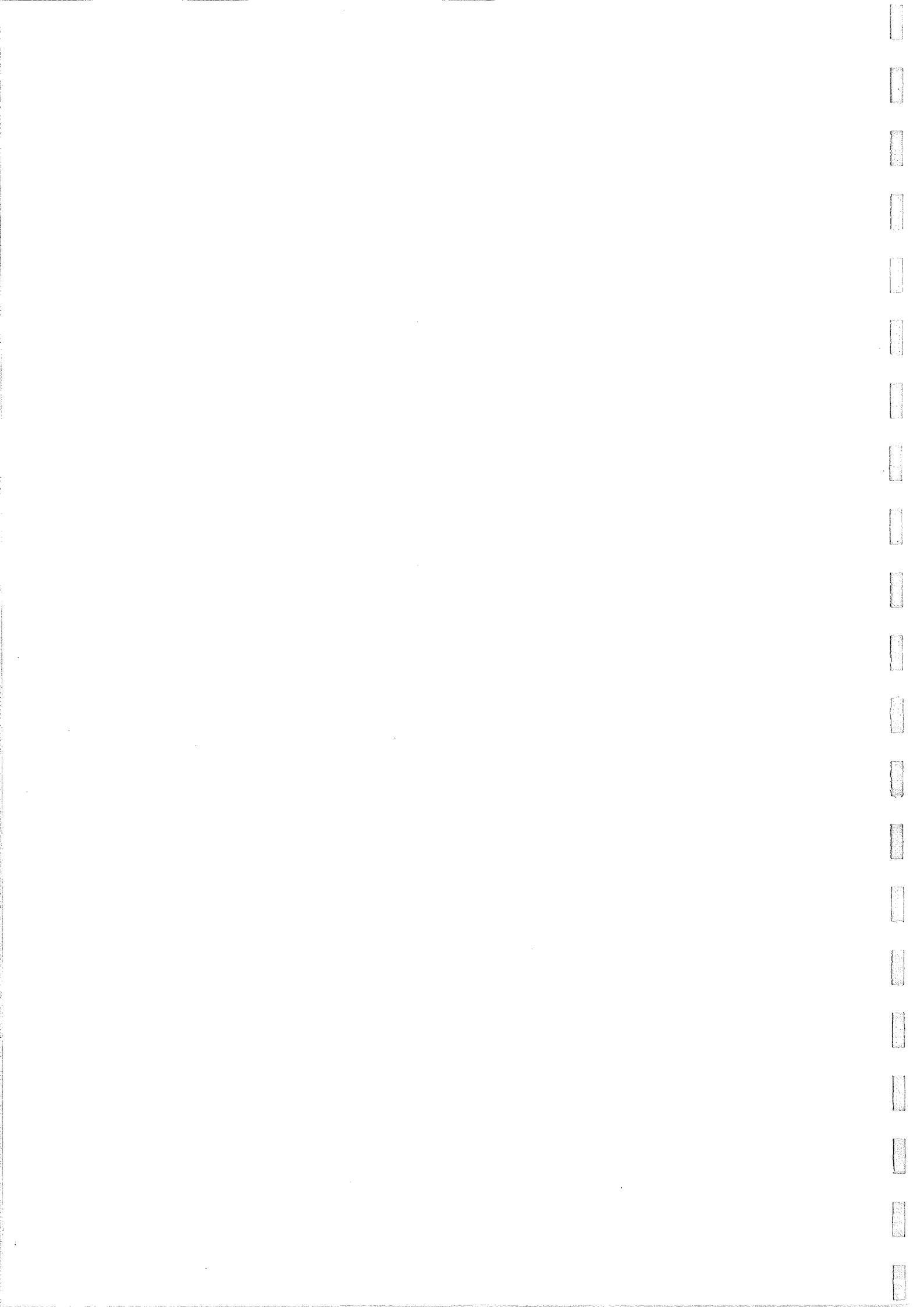
CE  **II 2 GD T5 T 100°C , II 2 G T3 o II 2G T2**

Cusago, 01 Febbraio 2012

Legale rappresentante

Stefano Scamarda





GT ATTUATORI
- PNEUMATIC ACTUATORS AND ACCESSORIES -

INSTALLATION OPERATION & MAINTENANCE MANUAL

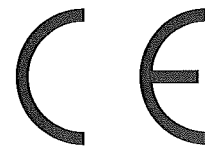
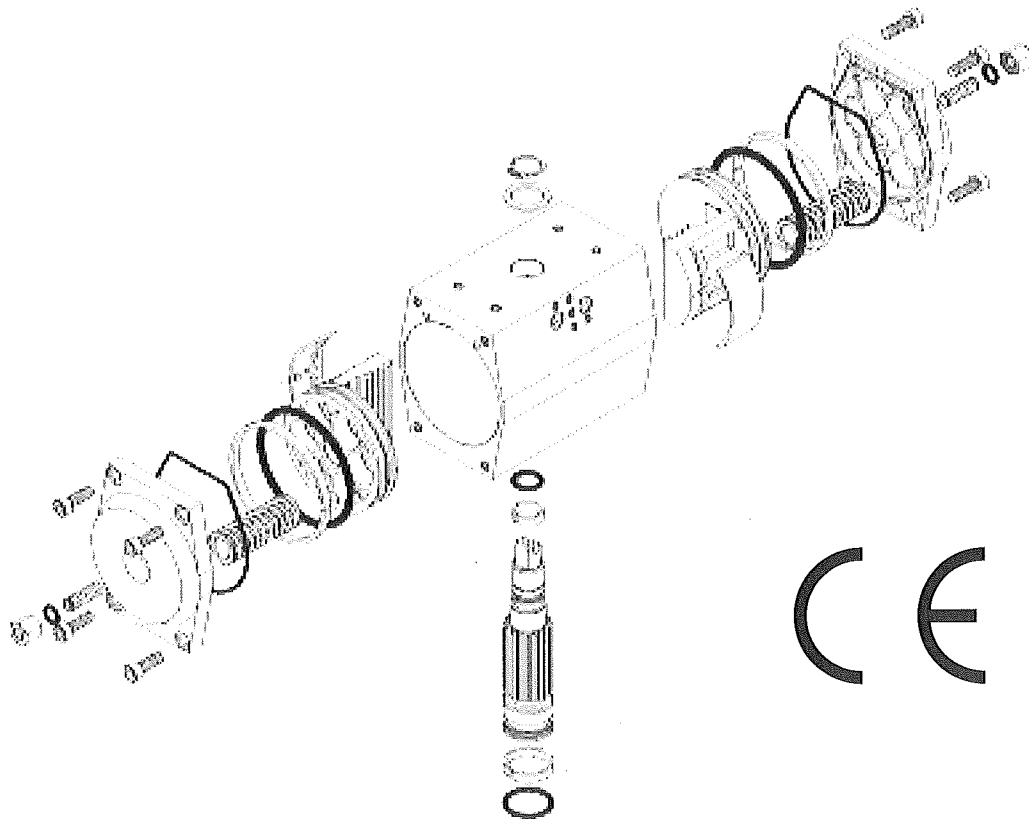


ISO 9001:2000 - Cert. n° 0210/3

RACK AND PINION PNEUMATIC ACTUATORS GTX SERIES



II 2GDc110°C Technical File Ref. n° 2003/01





ATTUATORI
- PNEUMATIC ACTUATORS AND ACCESSORIES -

INSTALLATION OPERATION & MAINTENANCE MANUAL

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1.0 INTRODUCTION

G.T. Attuatori offers a largest ranges of pneumatic rack and pinion actuators . Conceived for the installation on valves of control of the fluids, which ball valves, butterfly valves, etc.and have fed with pressed air.

The actuator are built to operate with a maximum pressure of 10 Bar., and tested for an operational least life of 1 million of manoeuvres.

The greasing performed during the assemblage guarantees a correct lubrication of the actuators for at least 500.000 manoeuvres.

GT actuators are designed to operate within the pressure range of 1.4 Bar (20 PSIG) to 10 Bar (142 PSIG) and are offered in two styles:

- DOUBLE ACTING: Available with rotation of 90°, 120° e 180° .
- SPRING RETURN: Available with rotation of 90°.

The double acting and spring return actuators can easily be field converted to the other configuration by insertion or removal of the unique patented G.T. Attuatori spring cartridges.

2.0 STORAGE

All G.T. Attuatori actuators are factory lubricated for life.

The actuator ports are plugged to prevent liquids or other materials from entering the actuator during shipment.

If the actuators are to be stored for a long period of time before installation, the units should be stroked periodically to prevent the seals from setting. (Note: the plugs must be removed in order to stroke actuators).

Storage should be indoors and the units should be protected against humidity and other harmful elements.

FIGURES
1A - 1B - 1C - 1D

Cut away top views of GT spring return actuators, for Fail Clock-Wise applications **Assembling type A** (fig.1A), and Fail Counter Clock-wise applications, **Assembling type C** (fig.1C).

Assembling type A = Fail Clock-wise application

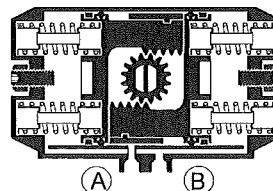


Figure 1A (Closed position)

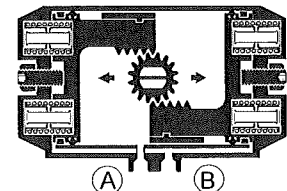


Figure 1B (Open position)

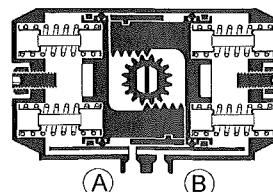


Figure 1C (Closed position)

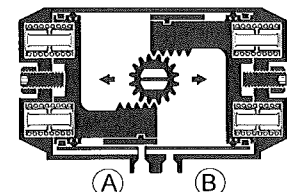




Figure 1D (Open position)

Assembling type C = Fail Counter Clock-Wise application

3.0 OPERATION CHARACTERISTICS

The  actuators have simple operational characteristics:

- Port  is connected to the interior cavity between the pistons
- Port  is connected to the end caps cavity directing the air flow into the end caps area.


AIR TO AIR ACTUATORS

In figure 1.a we see that by pressurizing port **B** and allowing air to exhaust through port **A** we have the normally **closed** position for the actuator.

If we exchange the pressurization from **B** to **A** and the exhaust from **A** to **B** (as shown in figures 1.B e 1.D), the pinion will rotate in the counter clockwise direction and we'll see the **open** position of the actuator.


SPRING RETURN ACTUATORS


In the case of SPRING RETURN actuators, with the pressurizing of port **B** and the port **A** connected to the exhaust, in the case of air failure spring return will satisfy the conditions shown in figures 1.A e 1.C.


Although the  actuators typically operate, counter clockwise to open and clockwise to close, it is possible to change this style of operation.

Figures 1.C e 1.D show the same spring return actuator with the piston orientation changed to convert the actuator from a fail clockwise to a fail counter clockwise unit (as described in Section 10.0: FCCW to FCW conversion).

4.0 ACTUATORS INSTALLATION

The  actuators are designed to be easy to install. The actuators come with one or more ISO 5211 (DIN 3337) standard bottom mounting pattern, selon the model, for direct assembling to the valves to be driven or to the coupling, when necessary.

On top face of  actuators there is a NAMUR standard mounting pattern for easy installation of accessories for position survey and/or control devices (Microswitches box, Positioners, etc).

The pinions of  actuators are the uniques on the market having, as standard, a **poligonal** bottom female key, that allow the assembling on valves stem, or coupling, with square key at 45° or at 90° indifferently.

On request, bottom pinion female key may be done at double D or cylindrical with one or two keyways:



Poligonal key



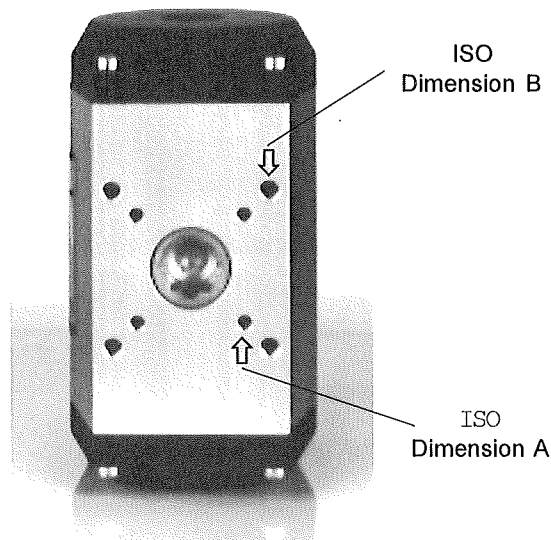
Double D key




Keyways key

The ports are NAMUR standard, for easy solenoid valve connection, on GTX.110 through GTX.255, while on GTX.52 through GTX.92, that have proprietary type ports, it is available a special mounting adapter plate for connection with NAMUR standard solenoid valves (See figure 9, pag. 12).

For these lower dimensions actuators, are available special solenoid valves, of G.T. Componenti production, for easy direct assembling on the actuator, as NAMUR standard ones, avoiding the adapter plate needing (See pag. 12).

**FIGURA 2**

Bottom view of the  actuator with ISO standard mounting dimensions.

TIPO	Dimens. A		Dimens. B	
	ISO Ø mm		ISO Ø mm.	
GTX. 52	F03	36	F05	50
GTX. 63	F05	50	F07	70
GTX. 75	F05	50	F07	70
GTX. 83	F05	50	F07	70
GTX. 92	F05	50	F07	70
GTX.110	F07	70	F10	102
GTX.118	F07	70	F10	102
GTX.127	F07	70	F10	102
GTX.143	F10	102	F12	125
GTX.160	F10	102	F12	125
GTX.190			F14	140
GTX.210			F14	140
GTX.254			F16	165
GTX.255			F16	165
GTX.300			F16	165

TABLE 1

ISO dimensions represents actuator mounting bolt circles

FOR ACTUATORS INSTALLATION PLEASE FOLLOW THESE STEPS:

4.1 - Insert valve stem directly into actuator pinion, or through the coupling if necessary, to check for proper fit.

NOTE.: If actuator is **DOUBLE ACTING** check to see if pinion is in the normal position, or rather in the position necessary to get the valve closed.

4.2 - Make sure valve is in normal position before proceeding. Figure 3 describes the correct normal position of all G.T. Componenti actuators (Including spring return types with FCW, **assembling A** and FCCW **assembling C**, applications).

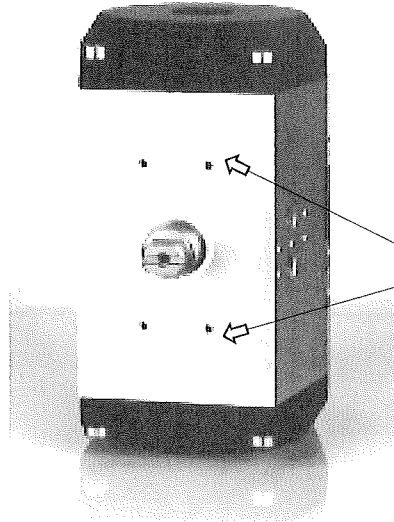
4.3 - Install mounting bracket on to valve and hand tighten all fasteners. **Be sure not to fully torque bolts until entire assembly is correctly aligned and installed.**

4.4 - Place coupling on valve stem, if necessary, and position actuator on mounting brackets. Align valve and actuator assembly so as to eliminate shear force on system.

Rotate the actuator to open direction (normally counter clockwise) as regards to the valve until to eliminate all torsional play in closing direction, just to get correct closing valve position in correspondence of actuator closing position (piston close to piston, see figures 1A and 1C), then tighten all assembly fasteners to appropriate torque specification given in table 3, pag. 9).

FIGURE 3

Top view of a **GT** actuator. Figure 3 shows an actuator in the normal position (closed) with the pinion flats and the indicator-drive milling perpendicular to the body.



Limit Switches and Positioner mounting area..

- 4.5 -** Actuate unit pneumatically several times to ensure that coupling is not binding. If unit does not function properly, disassemble fixture and actuator coupling, and repeat steps from **4.1** through **4.5**.
 If problem persist contact your local G.T. Attuatori representative.

- 4.6 -** After all mounting procedures are completed, it is necessary to set travel stops, to ensure proper rotation.

The **GT** travel stops allow for a range of about 95° to 85°. If a larger range is necessary consult directly G.T. Attuatori people for information on Extended final limit stops.

NOTE: Improper setting of travel stops can reduce the actuators life.

- 4.7 -** Rotate actuator and valve assembly to desired degree. (it is best to consult valve Installation & Maintenance sheet to determine the correct set point for the valve).

- 4.8 -** Loosen both sealing nuts. Torque travel stops until they contact the pistons. Be sure not to alter the valve and actuator position while setting the travel stops. Torque the sealing nuts until secure. Retest actuator to assure that there are no end cap air leaks.

5.0 DISASSEMBLY PROCEDURE

- 5.1 - Disconnect all electrical and air supplies from the actuator.

**CAUTION:
 NEVER DISASSEMBLE AN ACTUATOR THAT
 IS UNDER PRESSURE**

- 5.2 - Remove actuator from mounting bracket and coupling (when present).
 Disassemble accessories as: limit switches, microswitches box and positioner (if present), and place in clean environment.

- 5.3 - Remove the eight screws and remove end caps.

- 5.4 - Remove O-Rings from end caps.

NOTE: unless actuator has not been in service it will be better to replace the O-Ring set. (See table 2A at page 8)

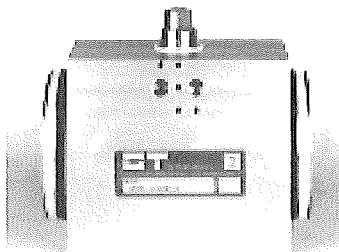


FIGURE 4

This figure shows the actuator pinion rotated until pistons disengage from pinion rack.

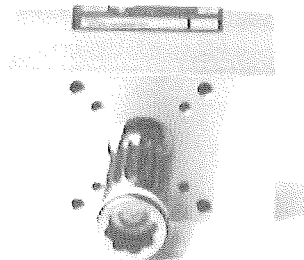


FIGURE 5

This figure demonstrates the removal of pinion through the bottom of the actuator.

- 5.5 - Rotate pinion in Counter Clockwise direction (NOTE: if unit is a FCCW, assembling C, rotation will be in opposite direction) until pistons are far enough from cylinder to be removed by hand.
 If pistons are too difficult to remove by hand, it is acceptable to use a pair of pliers to assist in removal of them. (NOTE: be sure not to scar the surface of pistons).
 Remove both pistons noting the orientation of them, so during reassembly the pistons will be replaced in the same orientation.

**CAUTION
 NEVER USE COMPRESSED AIR TO PULL OUT
 THE PISTONS FROM THE ACTUATOR BODY**



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5.6 - Remove snap ring and delrin washer from top of pinion. Place the actuator between two blocks of wood so that the pinion is free to be removed through the bottom of the actuator body.

Using a rubber mallet, lightly tap the top of the pinion. When the pinion is loose from the body remove the pinion through the bottom (See figure 5).

The O-Rings and guide kits contains the following items:

#	Q.ty	Description
1	2	O-Ring (Piston)
2	2	O-Ring (End Cap)
3	1	O-Ring (Shaft Upper)
4	1	O-Ring (Shaft Lower)
5	2	O-Ring (Travel Stops)

TABLE 2A : O-RINGS SET

#	Q.ty	Description
1	2	Piston Guide Skate
2	2	Piston Guide Ring
3	1	Shaft (Upper Guide)
4	1	Shaft (Lower Guide)
5	1	Shaft (Upper Washer)

TABLE 2B : SERIE GUIDE

6.0 ASSEMBLY PROCEDURE

6.1 - Inspect all wear surfaces for excessive wear or possible damage

CAUTION:
BE SURE THAT ALL PARTS ARE STILL WITHIN FACTORY SET TOLERANCES BEFORE ASSEMBLY

6.2 - Make sure all metallic parts are clean and free of any nicks or burrs.

6.3 - Lubricate the inside bore of the cylinder body, ORings seats, pistons and pinion wear surfaces with ESSO MULTI-PURPOSE GREASE E compatible grease, suitable for use from -30°C through + 140°C.

NOTE: All O-Rings should be replaced as a matter of service policy if the actuator has been in service..

6.4 - Install wear surface skates and bearings on pistons and pinion, and install O-Rings on pistons, pinions and end caps.

6.5 - Insert pinion into actuator body. Install pinion washer and snap ring (seeger).

6.6 - Insert pistons into cylinder body until the pistons begin to mesh with the pinion.

Make sure that the pistons are symmetrically placed inside the cylinder body.

In figure 4 we see that the pistons are at the mating position and are symmetrical. **This is very important).** Infact, if the pistons are not tracking properly remove and reinsert them.

NOTE: Be sure that tooth engagement is even on both pistons.

6.7 - Apply equal pressure on each piston until they are fully engaged with pinion.
 Rotate pinion until actuator is fully closed.

6.8 - Check the top of pinion for correct orientation. If the indicator-drive milling is perpendicular to the cylinder body then proceed to the next part 6.9.

If the pinion is incorrectly positioned , then proceed to part 6.8b.

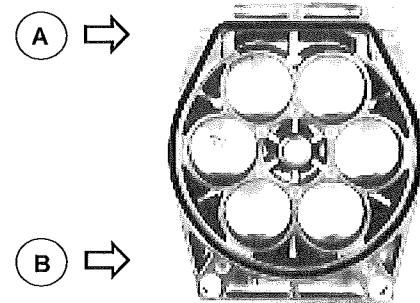
6.8b - Turn actuator up on its side. Rotate pinion counter clockwise until both pistons disengage from pinion. Rotate pinion with a wrench to correct position. Apply light pressure to pistons until pinion and pistons engage.

Close actuator and check for correct pinion orientation, as at section 6. (Repeat this step as many times as necessary to get the correct orientation).

FIGURE 6

The figure shows the internal view of an end cap, as it must be assembled on actuator body, with part A on the top and the part B on the bottom. Look at the O-Ring

Caution: with upturned end caps, the actuator cannot operate.



6.9 - In case of SPRING RETURN actuator insert cartridge springs. (For information on the loading of springs refer to section 7.0).

6.10 - Replace end caps, being sure to position them in correct way. (See Figure 6).

N.OTE: Torque screws in alternating order to ensure that the O-Ring seats properly.

6.11 - End cap screws should be torqued, in alternating order, to the factory standard. Refer to below table 3 for correct bolt torque specifications.

ACTUATORS MODEL	SCREWS	TORQUE in Nm.	NUT Adjustment Nm
GTX. 52 - 63	M 5	8	2
GTX. 75 - 83 - 92	M 6	12	3
GTX.110 - 118 - 127	M 8	15	4.5 (for 127 8 Nm)
GTX. 143 - 160	M10	20	8
GTX.190 - 210	M12	28	13
GTX.254 - 255 -300	M14	40	20 (for 300 30 Nm)

TABLE 3

End cap fasteners torque specifications.

CAUTION:
**NEVER GIVE COMPRESSED AIR TO THE ACTUATOR
 BEFORE TO CHECK VERY WELL
 IF PINION IS FIXED BY SNAP RING (SEEGER)
 AND END CAPS WELL CLOSED WITH TIGHTENED SCREWS**

6.12 - Pressurize right port on actuator body to test for air leaks. Leaks can occur around pinion and between end cap and body mating surfaces.

If an air leak is found near the end cap, remove end cap and check for proper O-Ring seating.
 If O-Ring appear to be in good condition, repeat the step 6.11.

Presurize left port on actuator to test for pinion air leaks. If an air leak develops near the pinion and body mating areas, remove the pinion from the body, as at point 5.6 taking well care that pistons do not change position inside the actuator body, during this operation.

Inspect upper and/or lower pinion O-Rings, selon where the leak is found


If O-Rings appear in good condition, verify for burrs into O-Ring grooves. Clean very well and reinsert O-Rings in their seats.


Insert pinion into actuator body in the same orientation as before, taking well care not to move pistons. If pistons are moved repeat steps from point 6.5. Install pinion washer and snap ring.

Begin test again as described in this section.

If the problem persist contact your local G.T. Attuatori representative.

7.0 CARTRIDGE SPRINGS INSTALLATION

The  actuators have the unique ability to be field converted from DOUBLE ACTING to a SPRING RETURN actuator type, or viceversa, by changing very easily the spring configuration inside the end caps. (NOTE: refer to table 3 on next page).


The  actuators can accept up to 6 cartridge springs in each end cap, also if very rarely they are less than 2.

The number of cartridge springs loaded into the actuator affects the amount of torque the actuator will be able to generate during the closing and opening portions of the cicle.

Review scctions **11**, **12** and **13** on actuator sizing, for correct procedures in selectint spring combinations.

7.1 - Drive the actuator in closed position (See figures 1 at pag. 3).

7.2 - Remove end caps.

7.3 - As it is not possible to see the rack position with pistons assembled into actuator body, refer to  mark present in one of springs seats of the piston, corresponding to which there is the rack on the other side of the piston. (See figure 7: that seat is numbered 1).

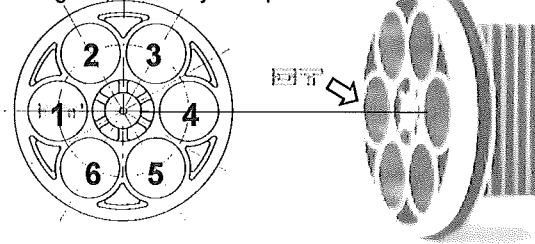
7.4 - Fixed the number of cartridge springs to put in **each** cap, insert them according to table 3 and fisure 7. (Example: Model GTXN.110x90.NP22A.K4 has 4 cartridge springs per end cap).

8.0 SOLENOID VALVES SPACIFICATIONS

G.T. Attuatori solenoid valves are designed for long life, with only one pair sealing of air compressed flow.

FIGURE 7

The figure shows the front view of a piston with the cartridge spring seats numbered, and the rack position.



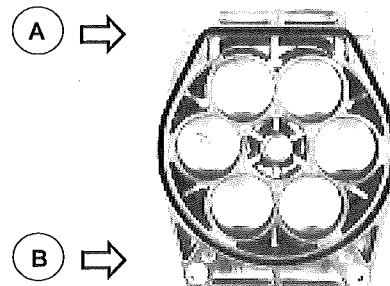
Total number of cartridge springs	1	2	3	4	5	6
Cartridge springs locations.	1	1 - 4	2 - 4 - 6	2-3-5-6	1-2-3-5-6	All positions.

TABLE 3
Cartridge springs orientation chart.

7.5 - When reassemble the end caps pay attention not to overturn them. Looking at the O-Ring, be sure to place end caps with (A) on the top and (B) on the bottom.

FIGURE 8

The figure shows the internal view of an end cap, as it must be assembled on actuator body, with part A on the top and the part B on the bottom. Look at the O-Ring



Caution: with upturned end caps, the actuator cannot operate.

The solenoid valves have Buna-N O-Rings to seal inlet and outlet ports. The plunger return is pneumatically performed by differential pressure, without springs.

G.T. Attuatori offers solenoid valves both with NAMUR standard mount, for direct mounting on actuators from GTX.110 through GTX.255, and proprietary type mount for direct mounting on actuators from GTX.52 through GTX.92.

Although G.T. Attuatori uses a proprietary mounting pattern for smaller actuators, G.T. Componenti also offers a special adapter plate to allow for a NAMUR standard pattern solenoid valves to be mounted on any GT actuator, as shown in figure 9.

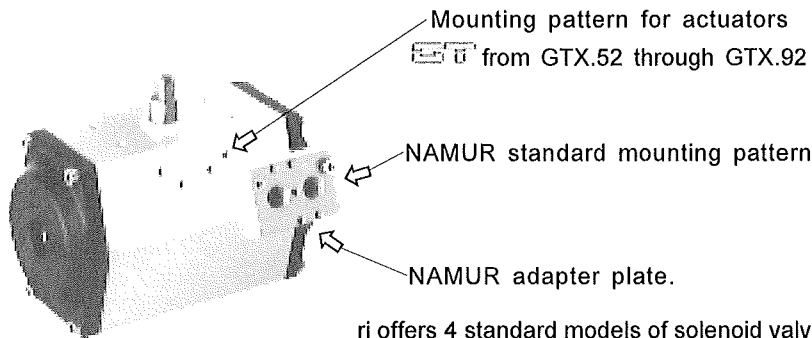
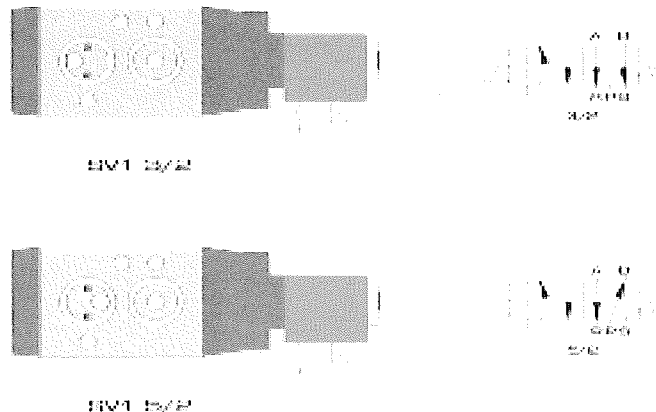


FIGURE 9
 GTXN.92x90 actuator with NAMUR adapter plate

ri offers 4 standard models of solenoid valves:

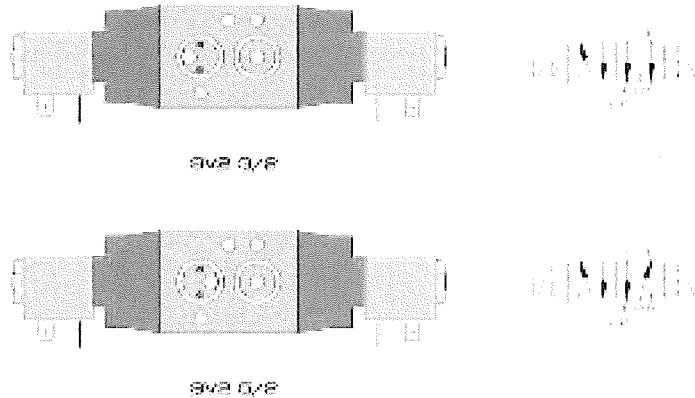
Voltages:	24 - 48 - 110 - 220	V / AC. (50-60Hz.)
	12 - 24 - 110	V / DC.
Consumption:	3.5 Watt (DC.)	5 VA (AC.)
Pressures:	Min. = 2.5 Bar	Max. = 10 Bar

- 1 - SV.1 Single Solenoid, ports 1/4" NPT Mounting on actuators with NAMUR adapter plate: from GTX.45 through GTX.92
 Direct mounting on actuators: from GTX.110 through GTX.300
 KV Factor = 9

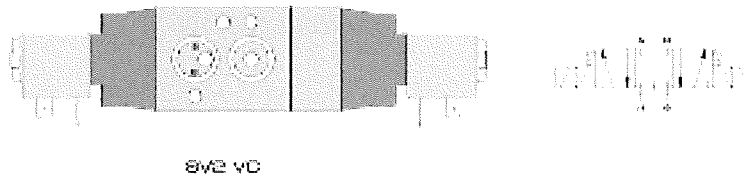


In addition to these 4 standard models of solenoid valves, with nylon fiberglass filled coils, G.T. Attuatori offers Epoxy Resin filled coils, for all standard voltages and also for other voltages, when request, always with same consumption data.

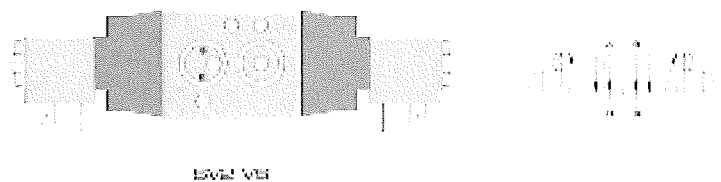
- 2- SV.2 Double Solenoid, ports 1/4" NPT Mounting on actuators with NAMUR adapter plate:
 from GTX.45 through GTX.92
 Direct mounting on actuators: from GTX.110 through GTX.300
 KV Factor = 9



- 3- SV.2-VC Double Solenoid, ports 1/4" NPT Mounting on actuators with NAMUR adapter plate:
 from GTX.45 through GTX.92
 Direct mounting on actuators: from GTX.110 through GTX.300
 KV Factor = 9



- 4- SV.2-VS Double Solenoid, ports 1/4" NPT Mounting on actuators with NAMUR adapter plate:
 from GTX.45 through GTX.92
 Direct mounting on actuators: from GTX.110 through GTX.300
 KV Factor = 9





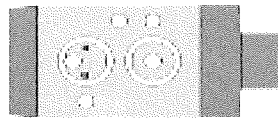
ATTUATORI

- PNEUMATIC ACTUATORS AND ACCESSORIES -

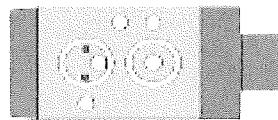
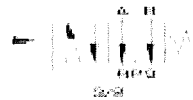
INSTALLATION OPERATION & MAINTENANCE MANUAL

G.T. Attuatori offers 2 standard models of Pneumatic command valves:

- 1- PV.1 Single pneumatic command port 1/8" GAS, ports 1/4" NPT
 Mounting on actuators with NAMUR adapter plate: from GTX.45 through GTX.92
 Direct mounting on actuators: from GTX.110 through GTX.300
 KV Factor = 9



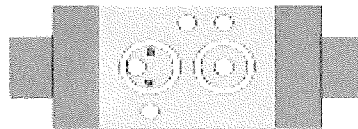
PV1 3/2



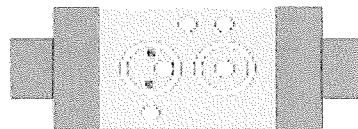
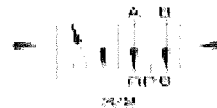
PV1 5/2



- 2- PV2 Double pneumatic command port 1/8" GAS , ports 1/4" NPT
 Mounting on actuators with NAMUR adapter plate: from GTX.45 through GTX.92
 Direct mounting on actuators: from GTX.110 through GTX.300
 KV Factor = 9



PV2 3/2



PV2 5/2



G.T. Attuatori also offers coils for low consumption (1.4 W - 2 VA), for Explosion Proof (EExm II T4) and Intrinsically safe (EEx ib IIc T6).

For more information require G.T. Attuatori for proper literature.

9.0 SOLENOID VALVES INSTALLATION

9.1 - Choose appropriate sized direct mounting solenoid valve.

If you are using a solenoid valve not designed to be direct mounted to actuator, assembly will require actuator to valve piping.

9.2 - Affix the solenoid valve to side of actuator with 2 M5x25 socket head screws, supplied with the solenoid valve, inserting in the middle suitable O-Rings into the port seats A and the Commutation Disk Pack into the port seats B.

Connect supply line to solenoid valve central port (**Supply**).

Pressurize line and check for possible leaks.

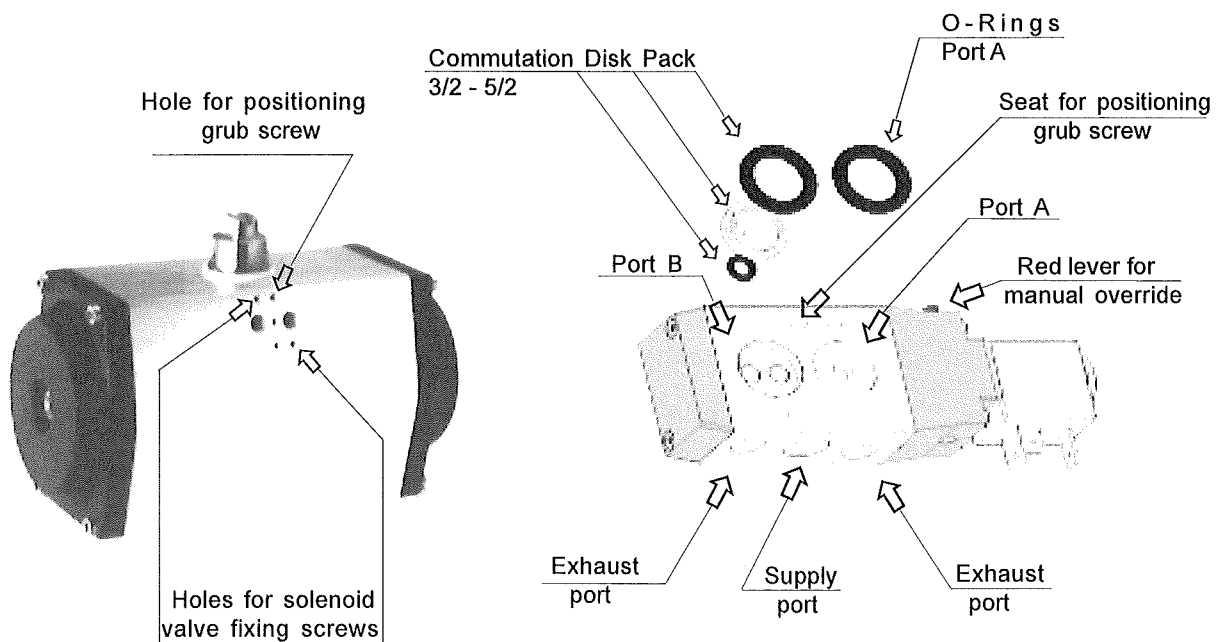




FIGURE 10
 Solenoid valve type: **SV1. NAMUR**

9.3 - G.T. Attuatori solenoid valves are equipped with manual override.

By rotating for 180°, on position ① little red lever, present on solenoid pilot base and normally on position ②, the solenoid valve is manual operated and then the actuator is operated too. Returning little red lever in position ②, everything will go back to starting position.

10.0 FCW TO FCCW CONVERSION

The  actuators typically comes from the factory as Fail Clock-wise (FCW) units, that is **Mounting A**, that allows infact FCW operation.

In the event that the need of the actuator changes from FCW to a Fail Counter Clock-wise (FCCW) actuator " " at is **Mounting C**,  actuators can easily be field converted to this configuration, following next steps:

- 1 - Remove end caps, pistons and the pinion as described in the disassembly procedure. (Section 5.0). Prior to reassembly rotate both pistons 180° along the long axis of the piston. (See figure 12). Upon rotation of pistons, reassembly can be accomplished by following the reassembly instruction in Section 6.0, Parts 6.1 to 6.12 of this manual.

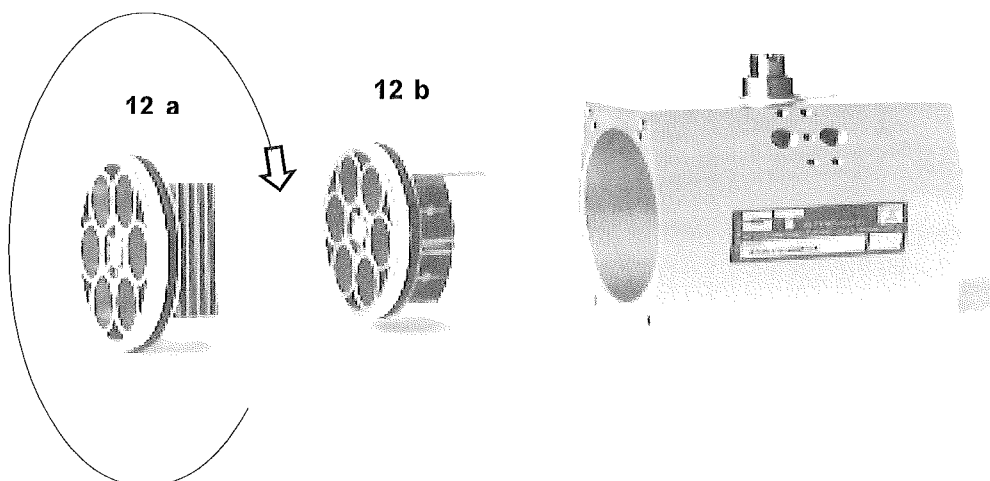


FIGURE 12

Rotate the piston shown in Fig. 12 a as in position shown in Fig. 12 b, to obtain the FCCW configuration (**Mounting C**)

REMEMBER: IN CASE OF SPRING RETURN TYPE, RE-INSERT CARTRIDGE SPRINGS BEFORE END CAPS ASSEMBLING ACCORDINGLY WITH TABLE 3, SPRING ORIENTATION CHART REPLACE CARTRIDGE SPRINGS IF NECESSARY

10.2 - After this procedure has been accomplished, you should be able to put air into the right air port and move the actuator to the normal position. (If the actuator is not already in the normal position)

When air is placed in the left port, the actuator now rotates in the clock-wise direction first and then in the counter clock-wise direction when returning in its normal position.

Logically, in the case of SPRING RETURN type, the return in normal position by counter clock-wise rotation will happen just when the air will be put to the exhaust from left air port.

11.0 ACTUATOR SIZING

Prior to actuate sizing it is important to get certain information. Key numbers to get are as follows:

- ◆ - Torque required to open the valve.
- ◆ - Torque required to close the valve.
- ◆ - Actuator air pressure.
- ◆ - Differential pressure of Valve/Damper.

Obtaining the above information allow you to properly and effectively size a **SPRING RETURN** actuator. (NOTE: **DOUBLE ACTING** actuators have a constant torque throughout their entire stroke).

When determining the air supply pressure it is important that you use the **minimum** air pressure that the actuator will experience and not the average air supply pressure.

If an actuator is supplied by a lower air pressure than it is sized for, failure or improper performances can occur.

12.0 AIR TO AIR ACTUATORS

- 12.1 - Select the largest torque (opening or closing torque) and, increase that number of 10%.
(NOTE: Adding 10% is done to ensure an acceptable factor of safety).

The data published in the sizing table indicates **average** capacity for that given pressure.

12.2 - Using above-mentioned sizing table, look in the column that corresponds to the supply pressure you have selected. Move down the chart until you have found a torque which is **larger** than the torque determined for your application.

After you have found the correct value, move across the table horizontally to determine the correct actuator.

13.0 SPRING RETURN ACTUATOR

13.1 - Increase both your valve closing torque and your valve opening torque by 20%. (Again this will provide an acceptable factor of safety).

**NOTE: THE VALVE CLOSING TORQUE CORRESPONDS TO
THE SPRINGS END COLUMN
AND THE VALVE OPENING TORQUE CORRESPONDS TO
THE ACTUATOR AIR PRESSURE COLUMN**



ATTUATORI
- PNEUMATIC ACTUATORS AND ACCESSORIES -

INSTALLATION OPERATION & MAINTENANCE MANUAL

EXAMPLE

Given information: Valve Opening Torque (VOT) = 85 Nm.
 Valve Closing Torque (VCT) = 80 Nm.
 Minimum pressure available = 5 Bar

20% increase of VOT = 90 x 1.2 = 102 Nm. total
 20% increase of VCT = 85 x 1.2 = 96 Nm. total

Type		SPRINGS 0°	5 Bar
GTXN.127x90	K2	51	195
	K3	76	150
	K4	102	105
	K5	127	60
	K6	153	15

NOTE: this table is an excerpt from the sizing chart provided by G.T. Componenti s.r.l.

To satisfy all conditions of this application, we compare the VOT to column marked SPRING 0°, and the VCT to column of 5 Bar. Since the GTXN.127x90.K4 satisfies both conditions we select this actuator.

14.0 ACTUATOR CYCLE TIME


14.1 Move down the SPRING 0° column and the actuator pressure column (remember to use the correct actuator air pressure column) until you find torque values, in the same row, that are larger than the two valve torque values.

Follow across that row to determine the actuator size and cartridge spring configuration.

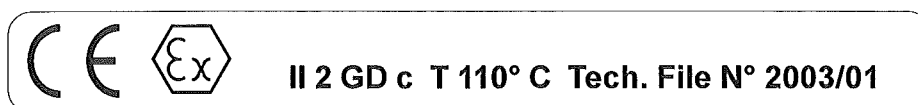
Note: Stroke time is equal for opening and closing strokes.
 Time shown is for entire go-and-back cycle.
 Cycle tested at 6 Bar and with 75% load of available torque.

TYPE	CYCLE TIME (Sec.)
GTX. 52x90	0.158
GTX. 63x90	0.214
GTX. 75x90	0.333
GTX. 83x90	0.429
GTX. 92x90	0.444
GTX.110x90	0.461
GTX.118x90	0.600
GTX.127x90	0.857
GTX.143x90	1.580
GTX.160x90	1.620
GTX.190x90	3.220
GTX.210x90	3.330
GTX.254x90	6.000
GTX.255x90	7.500
GTX.300x90	9.340



15.0 SAFETY INSTRUCTIONS

15.1 - Pneumatic actuators  of GTX series have been planned and manufactured in accordance with ATEX 94/9/CE Standard, Group II, category 2 GD, with reference to the Norm UNI EN 1127-1 and UNI EN 13463-1

15.2 - Marking



15.3 - Marking description

	Marking in conformity with applicable European Directives
	Marking in conformity with Directive 94/9/CE and to related technical norms
II	Group II (surface)
2	Device of category 2
GD	Explosive atmosphere with presence of gas, vapours, fogs and dusts
c	Manufacturing safety
T 110°C	Maximum surface temperature
Tech. File N° 2003/1	Technical brochure number

16.0 DANGEROUS AREAS

Dangerous area	Installation category in accordance with ATEX 94/9/CE Directive	
Gas, fogs, vapours and dusts	Zone 1/21	2 GD
Gas, fogs, vapours and dusts	Zone 2/22	3 GD

16.1 - Pneumatic actuator suitability to installation place.

In case of use in areas with explosion danger, must be verified that the actuator is suitable to zone classification and to inflammables peculiarity present on the plant.

Safety fundamental requirements against explosion risk into classified areas are fixed by European Directives 94/9/CE dated March 23, 1994 (for devices) and 1999/92/CE dated December 1999 (for plants).

16.2 - Places with presence of gas, inflammable fogs, vapours and dusts.

Classification standard of explosion risk areas are indicated by EN 60079-10 Norm (Classification of dangerous places for gas presence) and EN 550281-3 (Classification of dangerous places in which may be present combustible dusts).

Based on these technical and lawgiving instructions, pneumatic actuator choice must consider following factors:

- Plant type
- Zone classification: 0, 1, 2, 20, 21, 22 (for which are suitable devices respectively of category 1, 2, 3)
- Features of Inflammable substances present disguised as gases, vapours or fogs and layer of dust.
- Subgroup; IIA, IIB, IIC.
- Temperature class: T6 (defines gases ignition temperature)
- T (maximum surface temperature)

WARRANTY

The G.T. Attuatori guarantees own actuators for a period of one year starting from delivery date.

The guarantee cover possible defects of the material manufactured by G.T. Attuatori.

Because of the above mentioned guarantee the G.T. Attuatori undertake to make reparation or substitution, of those parts that will retain really defectives for own responsibility, to perform in own works and ex factory.

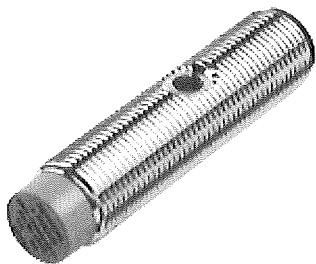
The guarantee decays in the following cases:

- Product utilization condition not suit as shown in the technical specifications.
- Product installation not properly done.
- Product utilization for different applications from those for which is prepared.

In any case, however, the guarantee implicates the repayment possibility.

The G.T. Attuatori doesn't recognize any other guarantee, worded or implicity except for above mentioned.

The G.T. Attuatori also excludes any other responsibility coming from damages, direct or indirect, of any type or kind coming from own products or from the use of the same.



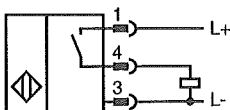
Model Number

NCN4-12GM40-E2-V1-3G-3D

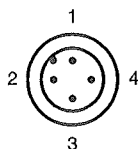
Features

- 4 mm not embeddable
- ATEX-approval for zone 2 and zone 22

Connection



Pinout



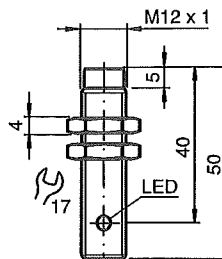
Wire colors in accordance with EN 60947-5-2

1	BN	(brown)
2	WH	(white)
3	BU	(blue)
4	BK	(black)

Accessories

BF 12
Mounting flange, 12 mm

Dimensions



Technical Data

General specifications

Switching element function		PNP	NO
Rated operating distance	s_n	4 mm	
Installation		not embeddable	
Output polarity		DC	
Assured operating distance	s_a	0 ... 3,24 mm	
Reduction factor r_{AI}		0.37	
Reduction factor r_{Cu}		0.36	
Reduction factor r_{303}		0.74	

Nominal ratings

Operating voltage	U_B	10 ... 30 V DC
Switching frequency	f	0 ... 1200 Hz
Hysteresis	H	1 ... 10 typ. 3 %
Reverse polarity protected		reverse polarity protected
Short-circuit protection		pulsing
Voltage drop	U_d	≤ 3 V
Operating current	I_L	0 ... 200 mA
No-load supply current	I_0	≤ 15 mA
Indication of the switching state		LED, yellow

Ambient conditions

Ambient temperature	-25 ... 70 °C (-13 ... 158 °F)
Storage temperature	-40 ... 85 °C (-40 ... 185 °F)

Mechanical specifications

Connection type	Device connector M12 x 1, 4-pin
Housing material	Stainless steel
Sensing face	PBT
Protection degree	IP67

General Information

Use in the hazardous area	see instruction manuals
Category	3G; 3D

Compliance with standards and directives

Standard conformity	
Standards	EN 60947-5-2:2007 IEC 60947-5-2:2007

Approvals and certificates

UL approval	cULus Listed, General Purpose
CSA approval	cCSAus Listed, General Purpose
CCC approval	Products with a maximum operating voltage of ≤ 36 V do not bear a CCC marking because they do not require approval.

Release date: 2011-07-19 11:21 Date of issue: 2011-07-19 211259_eng.xml



ATEX 3G (nA)

Instruction

Manual electrical apparatus for hazardous areas

Device category 3G (nA)

Directive conformity

Standard conformity

CE symbol

Ex-identification

General

Installation, Commissioning

Maintenance

Special conditions

Maximum operating current I_L Maximum operating voltage U_{Bmax} Maximum permissible ambient temperature T_{Umax} at $U_{Bmax}=30\text{ V}$, $I_L=200\text{ mA}$ at $U_{Bmax}=30\text{ V}$, $I_L=100\text{ mA}$ at $U_{Bmax}=30\text{ V}$, $I_L=50\text{ mA}$

Plug connector

Protection from mechanical danger

Protection from UV light

Electrostatic charging

for use in hazardous areas with gas, vapour and mist

94/9/EG

EN 60079-0:2006, EN 60079-15:2005

Ignition protection category "n"

Use is restricted to the following stated conditions

CE

⊕ II 3G Ex nA IIC T6 X

The Ex-significant identification is on the enclosed adhesive label

The apparatus has to be operated according to the appropriate data in the data sheet and in this instruction manual.

The data stated in the data sheet are restricted by this operating instruction! The special conditions must be observed!

Laws and/or regulations and standards governing the use or intended usage goal must be observed.

The adhesive label provided must be affixed in the immediate vicinity of the sensor! The surface to which the label is applied must be clean, flat and free from grease!

The affixed adhesive label must be readable and durable, taking account of the possibility of chemical corrosion!

No changes can be made to apparatus, which are operated in hazardous areas.

Repairs to these apparatus are not possible.

The maximum permissible load current must be restricted to the values given in the following list. High load currents and load short-circuits are not permitted.

The maximum permissible operating voltage U_{Bmax} is restricted to the values in the following list. Tolerances are not permissible.dependant of the load current I_L and the max. operating voltage U_{Bmax} . Information can be taken from the following list.

43 °C (109.4 °F)

50 °C (122 °F)

53 °C (127.4 °F)

The plug connector must not be disconnected under voltage. The proximity switch is marked as follows: "DO NOT DISCONNECT UNDER VOLTAGE!" When the plug connector is disconnected the ingress of dirt into the inner areas (i.e. the areas, which are not accessible in the plugged-in condition) must be prevented.

The sensor must not be exposed to **ANY FORM** of mechanical danger.

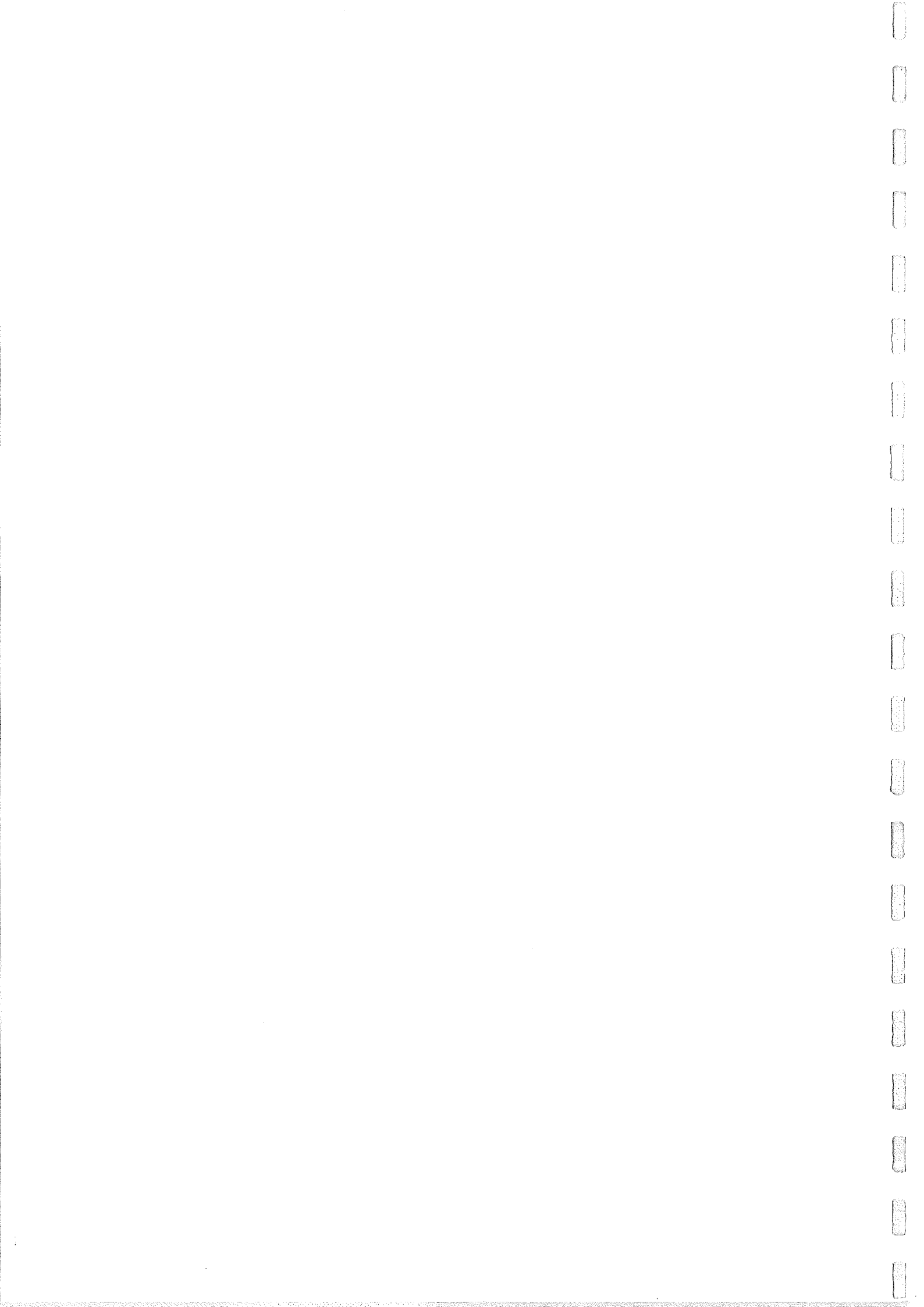
The sensor and the connection cable must be protected from damaging UV-radiation. This can be achieved when the sensor is used in internal areas.

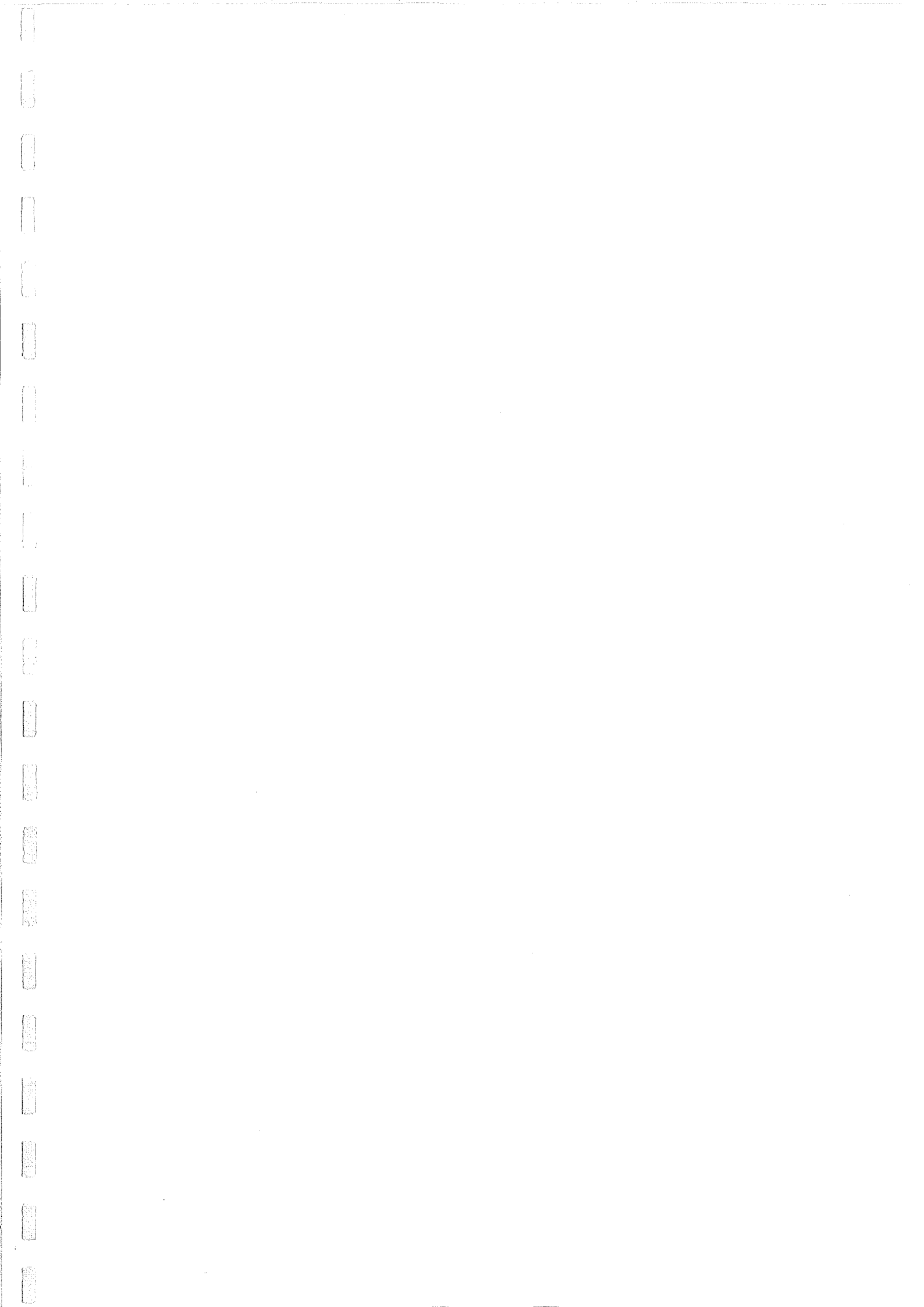
Electrostatic charges must be avoided on the mechanical housing components. Dangerous electrostatic charges on the mechanical housing components can be avoided by incorporating these in the equipotential bonding.

ATEX 3D (ID)

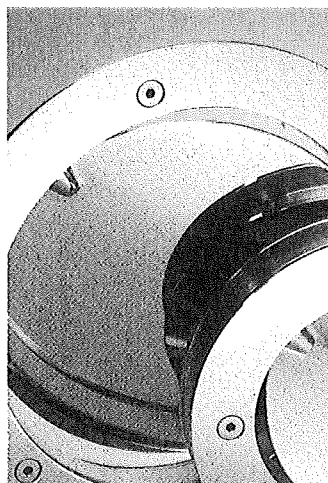
Instruction	Manual electrical apparatus for hazardous areas
Device category 3D	for use in hazardous areas with combustible dust
Directive conformity	94/9/EG
Standard conformity	EN 61241-0:2006, EN 61241-1:2004
	Protection via housing "ID"
	Use is restricted to the following stated conditions
CE symbol	CE
Ex-identification	Ⓔ II 3D Ex tD A22 IP67 T80°C X The Ex-significant identification is on the enclosed adhesive label
General	The apparatus has to be operated according to the appropriate data in the data sheet and in this instruction manual. The maximum surface temperature has been determined in accordance with method A without a dust layer on the equipment. The data stated in the data sheet are restricted by this operating instruction! The special conditions must be adhered to!
Installation, Commissioning	Laws and/or regulations and standards governing the use or intended usage goal must be observed. The adhesive label provided must be affixed in the immediate vicinity of the sensor! The surface to which the label is applied must be clean, flat and free from grease! The affixed adhesive label must be readable and durable, taking account of the possibility of chemical corrosion!
Maintenance	No changes can be made to apparatus, which are operated in hazardous areas. Repairs to these apparatus are not possible.
Special conditions	
Maximum operating current I_L	The maximum permissible load current must be restricted to the values given in the following list. High load currents and load short-circuits are not permitted.
Maximum operating voltage U_{Bmax}	The maximum permissible operating voltage U_{Bmax} must be restricted to the values given in the following list. Tolerances are not permitted.
Maximum permissible ambient temperature T_{Umax}	dependant of the load current I_L and the max. operating voltage U_{Bmax} . Information can be taken from the following list.
at $U_{Bmax}=30\text{ V}$, $I_L=200\text{ mA}$	43 °C (109.4 °F)
at $U_{Bmax}=30\text{ V}$, $I_L=100\text{ mA}$	50 °C (122 °F)
at $U_{Bmax}=30\text{ V}$, $I_L=50\text{ mA}$	53 °C (127.4 °F)
Plug connector	The plug connector must not be withdrawn under voltage. The proximity switch is identified as follows: "WARNING - DO NOT SEPARATE WHEN ENERGIZED". With the plug connector disconnected, soiling of the internal area must be prevented. (i.e. the area that is inaccessible when the connector is inserted) The plug connection can only be separated using a tool. This is achieved by using the locking protection V1-Clip (Mounting accessory from Pepperl + Fuchs).
Protection from mechanical danger	The sensor must not be exposed to ANY FORM of mechanical danger.
Protection from UV light	The sensor and the connection cable must be protected from damaging UV-radiation. This can be achieved when the sensor is used in internal areas.
Electrostatic charging	Electrostatic charges must be avoided on the mechanical housing components. Dangerous electrostatic charges on the mechanical housing components can be avoided by incorporating these in the equipotential bonding.

Release date: 2011-07-19 11:21 Date of issue: 2011-07-19 211259_eng.xml





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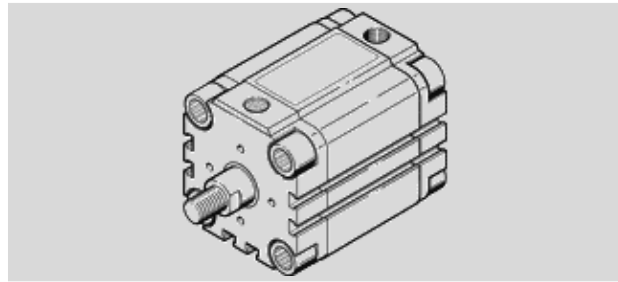
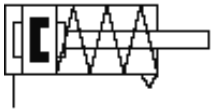
CO.RA. S.r.l. • Loc. Chiappini, 51 • I-55010 SPIANATE - ALTOPASCIO (Lucca) - Italien

Tel. +39.0583.20.590 (AWS) • Fax. +39.0583.20.481

E-Mail: info@coraitaly.net • Website: www.coraitaly.net

Data sheet: Compact cylinder AEVU-50-10-A-P-A – 157006

Function

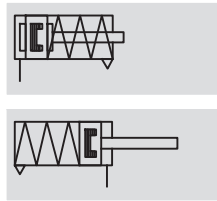


Feature	values
Stroke	10 mm
Piston diameter	50 mm
Cushioning	P: Flexible cushioning rings/plates at both ends
Assembly position	Any
Mode of operation	single-acting pushing action
Piston-rod end	Male thread
Design structure	Piston Piston rod
Position detection	For proximity sensor
Variants	Single-ended piston rod
Operating pressure	0.8 - 10 bar
Operating medium	Dried compressed air, lubricated or unlubricated
Corrosion resistance classification CRC	2
Ambient temperature	-20 - 80 °C
Impact energy in end positions	0.64 J
Theoretical force at 6 bar, advance stroke	1,128 N
Moving mass with 0 mm stroke	112 g
Additional weight per 10 mm stroke	72 g
Basic weight for 0 mm stroke	560 g
Additional mass factor per 10 mm of stroke	16 g
Mounting type	Optional with through hole with accessories
Pneumatic connection	G1/8
Materials information for collar screws	High alloy steel, non-corrosive
Materials information for cover	Wrought Aluminium alloy
Materials information for dynamic seals	TPE-U(PU) NBR
Materials information for piston rod	High alloy steel
Materials information for cylinder barrel	Wrought Aluminium alloy

Compact cylinders AEU/AEUZ

Technical data – Single-acting, basic version

Function

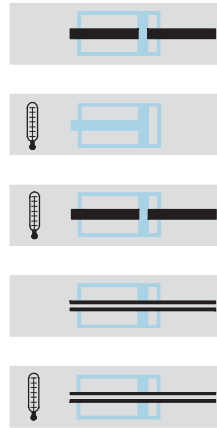


- Diameter
12 ... 100
- Stroke length
1 ... 25

www.festo.com

Wearing parts kits
→ 45

Variants



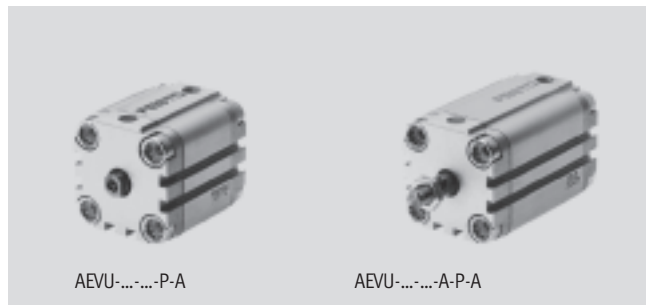
S2

S6

S26

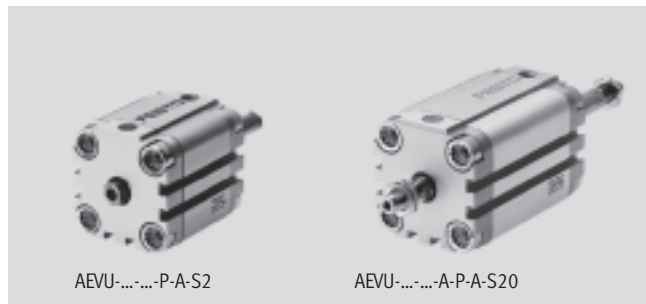
S20

S206



AEU-...-P-A

AEU-...-A-P-A



AEU-...-P-A-S2

AEU-...-A-P-A-S20

General technical data											
Piston Ø	12	16	20	25	32	40	50	63	80	100	
Pneumatic connection	M5	M5	M5	M5	G1/8	G1/8	G1/8	G1/8	G1/8	G1/8	G1/4
End of piston rod	Female thread	M3	M4	M5	M5	M6	M6	M8	M8	M10	M12
	Male thread	M6	M8	M10x1.25			M12x1.25		M16x1.5	M20x1.5	
Operating medium	Filtered compressed air, lubricated or unlubricated										
Constructional design	Piston										
	Piston rod										
Cushioning	Flexible cushioning rings/plates at both ends										
Position sensing	For proximity sensing										
Type of mounting	Via through-holes										
	Via female thread										
	Via accessories										
Mounting position	Any										

|| - Note: This product conforms to ISO 1179-1 and to ISO 228-1

Operating pressure [bar]											
Piston Ø	12	16	20	25	32	40	50	63	80	100	
Pushing variant AEUU											
Piston rod at one end	1.5 ... 10	1.3 ... 10	1.0 ... 10		0.8 ... 10			0.6 ... 10			
Through piston rod S2/S20	1.7 ... 10	1.5 ... 10	1.4 ... 10		1.2 ... 10			1.0 ... 10			
Pulling variant AEUZ											
Piston rod at one end	1.5 ... 10	1.3 ... 10	1.0 ... 10		0.8 ... 10						

Compact cylinders AEU/AEUVZ

Technical data – Single-acting, basic version

Ambient conditions		
Compact cylinder	Basic version	S6
Ambient temperature ¹⁾ [°C]	-20 ... +80	0 ... +120
Corrosion resistance class CRC ²⁾	2	2

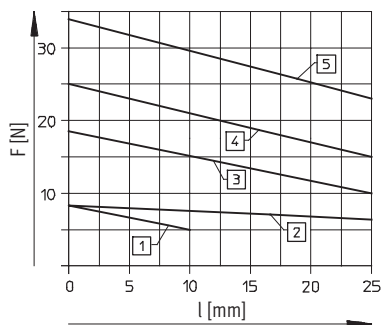
1) Note operating range of proximity sensors

2) Corrosion resistance class 2 according to Festo standard 940 070

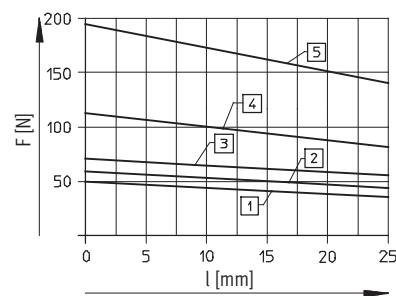
Components requiring moderate corrosion resistance. Externally visible parts with primarily decorative surface requirements which are in direct contact with a surrounding industrial atmosphere or media such as cooling or lubricating agents

Forces [N]											
Piston Ø	12	16	20	25	32	40	50	63	80	100	
Pushing variant AEU											
Theoretical force at 6 bar, advancing	59	111	171	269	450	704	1121	1799	2902	4516	
S2/S20	42	81	123	221	382	636	999	1679	2733	4222	
Pulling variant AEUZ											
Theoretical force at 6 bar, advancing	42	81	123	221	382	636	999	1679	2733	4222	

Spring return force F as a function of the stroke l



- 1) AEU/AEUVZ-12
- 2) AEU/AEUVZ-16
- 3) AEU/AEUVZ-20
- 4) AEU/AEUVZ-25
- 5) AEU/AEUVZ-32



- 1) AEU/AEUVZ-40
- 2) AEU/AEUVZ-50
- 3) AEU/AEUVZ-63
- 4) AEU/AEUVZ-80
- 5) AEU/AEUVZ-100

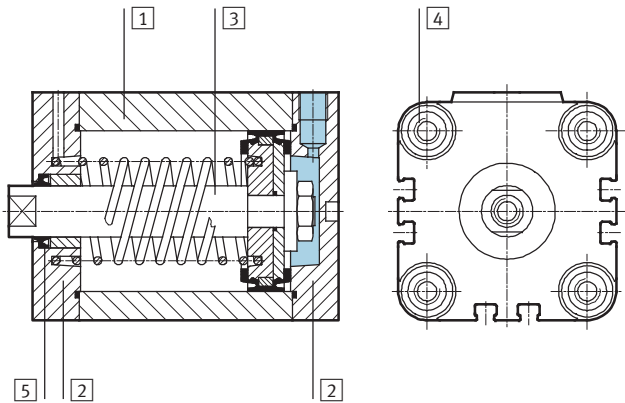
Weights [g]											
Piston Ø	12	16	20	25	32	40	50	63	80	100	
Product weight with 0 mm stroke	87	89	149	180	300	433	560	1059	1772	2797	
Additional weight per 10 mm stroke	15	15	23	28	40	59	72	107	168	177	
Moving load with 0 mm stroke											
Additional load per 10 mm stroke	8	12	20	26	49	63	112	134	307	614	
Additional load per 10 mm stroke	2	4	6	6	9	9	16	16	25	38	

Compact cylinders AEVU/AEVUZ

Technical data – Single-acting, basic version

Materials

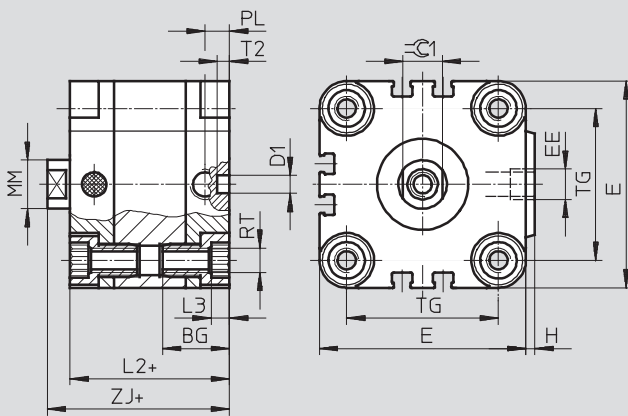
Sectional view



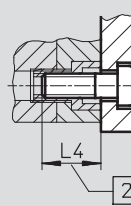
Compact cylinder	Basic version	S6
1 Cylinder barrel	Wrought aluminium alloy	Wrought aluminium alloy
2 End cap	Wrought aluminium alloy	Wrought aluminium alloy
3 Piston rod	∅ 12 ... 32	High-alloy stainless steel
	∅ 40 ... 100	High-alloy steel
4 Flange screws	∅ 12 ... 16	High-alloy stainless steel
	∅ 20 ... 100	Tempered steel
5 Dynamic seals	Polyurethane	Fluorocarbon rubber

Dimensions – Basic cylinder

Download CAD data → www.festo.com



- - Note
 To attach cylinder ∅ 12 and 16 mm from above, use only 2 screws diagonally or non-magnetic screws.
 + = plus stroke length



2 Minimum screw-in depth

∅ [mm]	BG	D1 ∅ H9	E	EE	H	L2	L3	L4	MM ∅	PL	RT	T2	TG	ZJ	∅C1
12	18.5	6	29	M5	1	38	3	16	6	8	M4	4	18	42.5	5
16	18.5	6	29	M5	1	38	3	16	8	8	M4	4	18	42.5	7
20	18.5	6	36	M5	1.5	38	4	18	10	8	M5	4	22	42.5	9
25	18.5	6	40	M5	1.5	39.5	4	18	10	8	M5	4	26	45	9
32	21.5	6	50	G $\frac{1}{8}$	2	44.5	5	20	12	8	M6	4	32	50.5	10
40	21.5	6	60	G $\frac{1}{8}$	2.5	45.5	5	20	12	8	M6	4	42	52	10
50	22	6	68	G $\frac{1}{8}$	3	45.5	6	20	16	8	M8	4	50	53	13
63	24.5	8	87	G $\frac{1}{8}$	4	50	8	25	16	8	M10	4	62	57.5	13
80	27.5	8	107	G $\frac{1}{8}$	4	56	8	25	20	8.5	M10	4	82	64	17
100	32.5	8	128	G $\frac{1}{4}$	5	66.5	8	25	25	10.5	M10	4	103	76.5	22

- - Note: This product conforms to ISO 1179-1 and to ISO 228-1

Compact cylinders AEVU/AEVUZ

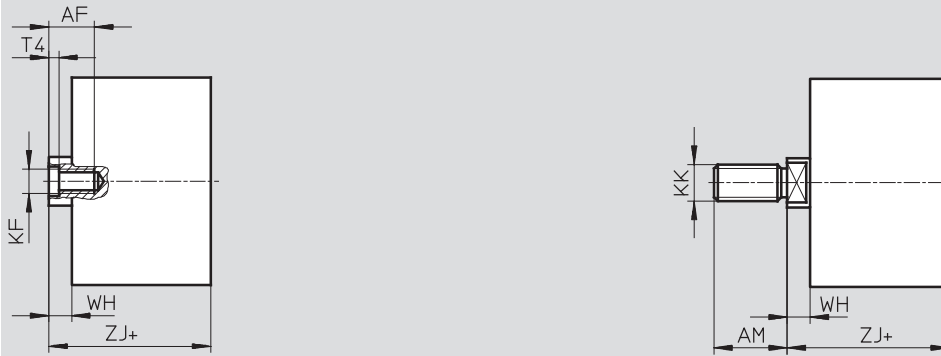
Technical data – Single-acting, basic version

FESTO

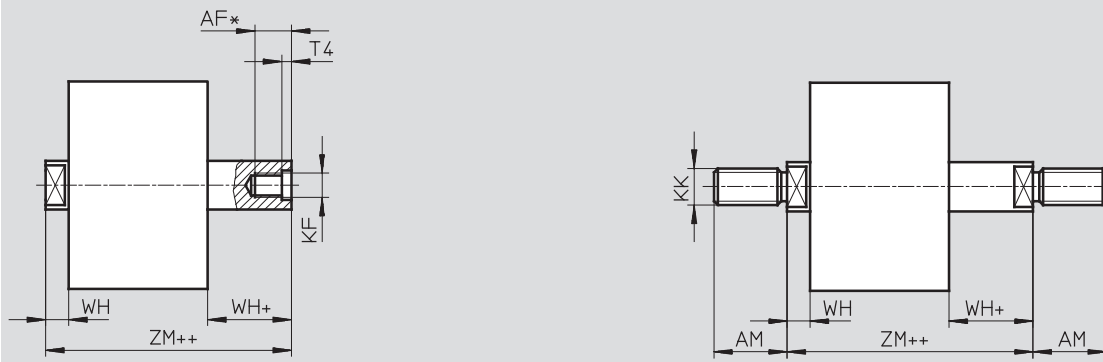
Dimensions – Pushing variants, AEVU

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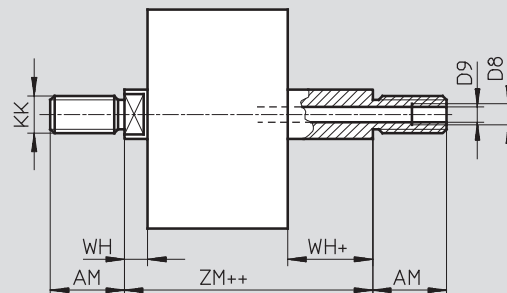
Basic version



S2 – Through piston rod



S20 – Through, hollow piston rod



+ = plus stroke length
++ = plus 2x stroke length

∅ [mm]	AF	AM	D8	D9 ∅	Kf	KK	T4	WH	ZJ	ZM
12	8	16	–	2.3	M3	M6	1.5	4.5	42.5	47
16	10	20	–	3.2	M4	M8	1.5	4.5	42.5	47
20 ²⁾	12	22	–	3.8	M5	M10x1.25	2	4.5	42.5	47
25 ²⁾	12	22	–	3.8	M5	M10x1.25	2	5.5	45	50.5
32 ²⁾	14	22	–	4.5	M6	M10x1.25	2.6	6	50.5	56.5
40 ²⁾	14	22	–	4.5	M6	M10x1.25	2.6	6.5	52	58.5
50 ²⁾	16	24	–	6	M8	M12x1.25	3.3	7.5	53	60.5
63 ²⁾	16	24	–	6	M8	M12x1.25	3.3	7.5	57.5	65
80 ²⁾	20 ¹⁾	32	G ³ / ₈	8	M10	M16x1.5	4.7	8	64	72
100 ²⁾	24 ¹⁾	40	G ³ / ₄	11.7	M12	M20x1.5	6.1	10	76.5	86.5

1) With a stroke < 5 mm, the maximum screw-in depth is reduced by 5 mm
2) Nut for piston rod thread included in scope of delivery

Compact cylinders AEVU/AEVUZ

Technical data – Single-acting, basic version

Dimensions – Pulling variants, AEVUZ

Download CAD data → www.festo.com



+ = plus stroke length
++ = plus 2x stroke length

∅ [mm]	AF	AM	KF	KK	T4	WH	ZJ
12	8	16	M3	M6	1.5	4.5	42.5
16	10	20	M4	M8	1.5	4.5	42.5
20 ¹⁾	12	22	M5	M10x1.25	2	4.5	42.5
25 ¹⁾	12	22	M5	M10x1.25	2	5.5	45
32 ¹⁾	14	22	M6	M10x1.25	2.6	6	50.5
40 ¹⁾	14	22	M6	M10x1.25	2.6	6.5	52
50 ¹⁾	16	24	M8	M12x1.25	3.3	7.5	53
63 ¹⁾	16	24	M8	M12x1.25	3.3	7.5	57.5
80 ¹⁾	20	32	M10	M16x1.5	4.7	8	64
100 ¹⁾	24	40	M12	M20x1.5	6.1	10	76.5

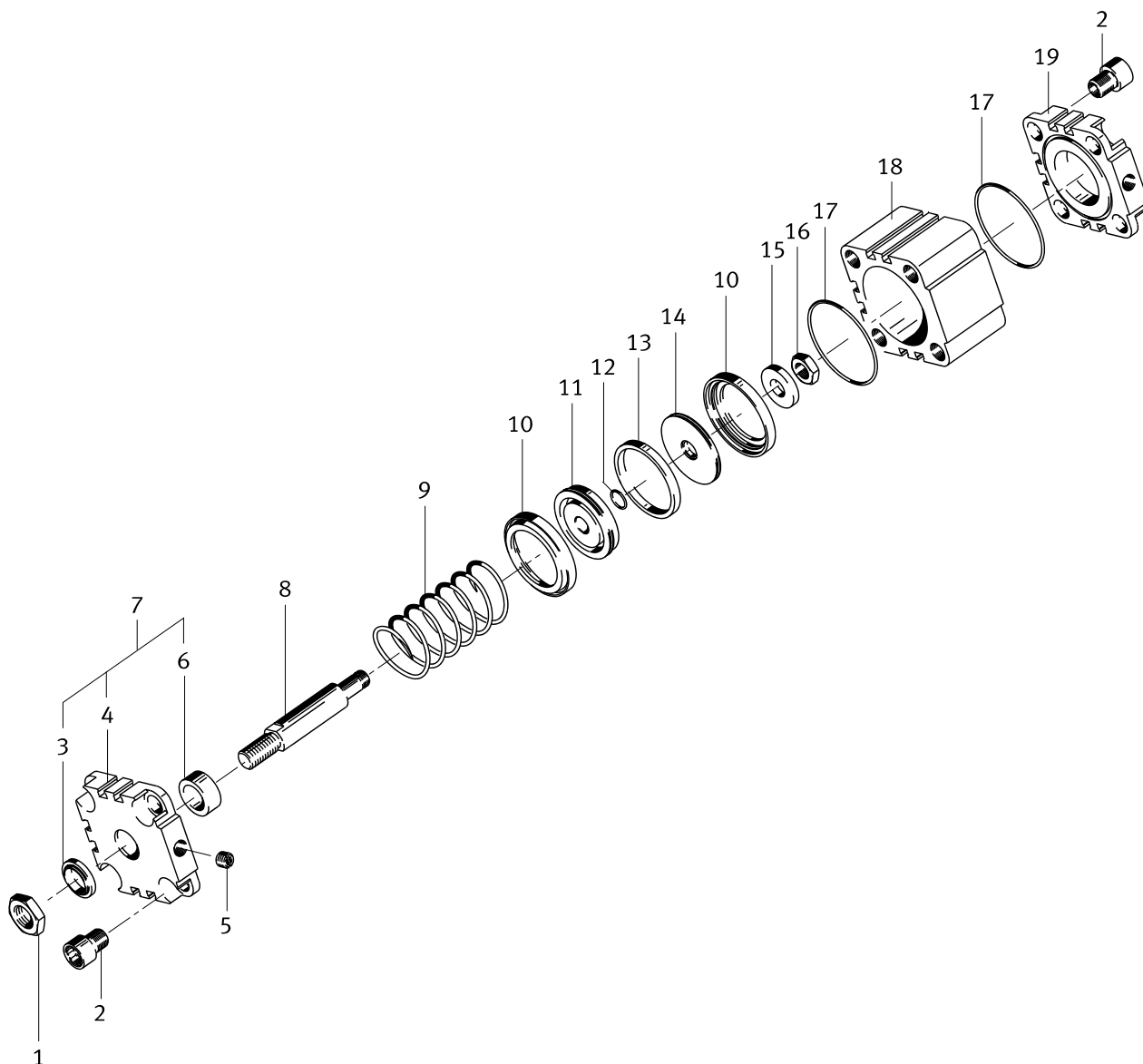
1) Nut for piston rod thread included in scope of delivery

Compact cylinders AEVU/AEVUZ


















Technical data – Single-acting, basic version



Ordering data – Pushing variants, basic version, AEVU						
Type	Piston Ø [mm]	Stroke [mm]	Piston rod with female thread		Piston rod with male thread	
			Part No.	Type	Part No.	Type
	12	5	156 930	AEVU-12-5-P-A	156 976	AEVU-12-5-A-P-A
		10	156 931	AEVU-12-10-P-A	156 977	AEVU-12-10-A-P-A
	16	5	156 935	AEVU-16-5-P-A	156 981	AEVU-16-5-A-P-A
		10	156 936	AEVU-16-10-P-A	156 982	AEVU-16-10-A-P-A
		15	156 937	AEVU-16-15-P-A	156 983	AEVU-16-15-A-P-A
		20	156 938	AEVU-16-20-P-A	156 984	AEVU-16-20-A-P-A
		25	156 939	AEVU-16-25-P-A	156 985	AEVU-16-25-A-P-A
	20	5	156 940	AEVU-20-5-P-A	156 986	AEVU-20-5-A-P-A
		10	156 941	AEVU-20-10-P-A	156 987	AEVU-20-10-A-P-A
		15	156 942	AEVU-20-15-P-A	156 988	AEVU-20-15-A-P-A
		20	156 943	AEVU-20-20-P-A	156 989	AEVU-20-20-A-P-A
		25	156 944	AEVU-20-25-P-A	156 990	AEVU-20-25-A-P-A
	25	5	156 945	AEVU-25-5-P-A	156 991	AEVU-25-5-A-P-A
		10	156 946	AEVU-25-10-P-A	156 992	AEVU-25-10-A-P-A
		15	156 947	AEVU-25-15-P-A	156 993	AEVU-25-15-A-P-A
		20	156 948	AEVU-25-20-P-A	156 994	AEVU-25-20-A-P-A
		25	156 949	AEVU-25-25-P-A	156 995	AEVU-25-25-A-P-A
	32	5	156 950	AEVU-32-5-P-A	156 996	AEVU-32-5-A-P-A
		10	156 951	AEVU-32-10-P-A	156 997	AEVU-32-10-A-P-A
		15	156 952	AEVU-32-15-P-A	156 998	AEVU-32-15-A-P-A
20		156 953	AEVU-32-20-P-A	156 999	AEVU-32-20-A-P-A	
25		156 954	AEVU-32-25-P-A	157 000	AEVU-32-25-A-P-A	
40	5	156 955	AEVU-40-5-P-A	157 001	AEVU-40-5-A-P-A	
	10	156 956	AEVU-40-10-P-A	157 002	AEVU-40-10-A-P-A	
	15	156 957	AEVU-40-15-P-A	157 003	AEVU-40-15-A-P-A	
	20	156 958	AEVU-40-20-P-A	157 004	AEVU-40-20-A-P-A	
	25	156 959	AEVU-40-25-P-A	157 005	AEVU-40-25-A-P-A	
50	10	156 960	AEVU-50-10-P-A	157 006	AEVU-50-10-A-P-A	
	15	156 961	AEVU-50-15-P-A	157 007	AEVU-50-15-A-P-A	
	20	156 962	AEVU-50-20-P-A	157 008	AEVU-50-20-A-P-A	
	25	156 963	AEVU-50-25-P-A	157 009	AEVU-50-25-A-P-A	
63	10	156 964	AEVU-63-10-P-A	157 010	AEVU-63-10-A-P-A	
	15	156 965	AEVU-63-15-P-A	157 011	AEVU-63-15-A-P-A	
	20	156 966	AEVU-63-20-P-A	157 012	AEVU-63-20-A-P-A	
	25	156 967	AEVU-63-25-P-A	157 013	AEVU-63-25-A-P-A	
80	10	156 968	AEVU-80-10-P-A	157 014	AEVU-80-10-A-P-A	
	15	156 969	AEVU-80-15-P-A	157 015	AEVU-80-15-A-P-A	
	20	156 970	AEVU-80-20-P-A	157 016	AEVU-80-20-A-P-A	
	25	156 971	AEVU-80-25-P-A	157 017	AEVU-80-25-A-P-A	
100	10	156 972	AEVU-100-10-P-A	157 018	AEVU-100-10-A-P-A	
	15	156 973	AEVU-100-15-P-A	157 019	AEVU-100-15-A-P-A	
	20	156 974	AEVU-100-20-P-A	157 020	AEVU-100-20-A-P-A	
	25	156 975	AEVU-100-25-P-A	157 021	AEVU-100-25-A-P-A	



157006 AEVU-50-10-A-P-A (Kompaktzylinder) – Serien \geq L7

Kompaktzylinder – AEVU-50-10-A-P-A (157006)						
Pos.	Teile-Nr.	Typ Artikelbenennung	Anz.	Einheit	Hinweis	Bestellung
999	121121	ADVU/AEVU- 50-A-PA Verschleißteilsatz	1	STK	Ersatzteile: 3, 10, 12, 17	
1	203968	DIN 439-B-M12X1,25-04 Sechskantmutter	1	STK		
2	361545	ADVU- 50- PA Bundschraube	8	STK	Schraubensicherung 247891 LOCTITE-243 verwenden Anziehdrehmoment 30 Nm	
3	338266	16X23,8X4,8 U21-PU Dichtabstreifer	1	STK	Bei Montage mit 684474 LUB-KC1 fetten	
4		ADVU- 50- -PA Lagerdeckel	-	STK	Einzel nicht lieferbar, siehe Position 7	
5	340116	G1/8-AEVU Filternippel	1	STK		
6		ADVU- 50- -PA Lager	1	STK	Einzel nicht lieferbar, siehe Position 7	
7	121053	ADVU- 50-PA Lagerdeckel	1	STK		
8	338312	ARA-16-X0024,5 Kolbenstange	1	STK	Bitte bei Bestellung Hublänge gemäß Typenschild angeben	
9	338261	AEVU- 50- -PA Druckfeder	1	STK		
10		ADVU- 50 Kolbendichtung	2	STK	Einzel nicht lieferbar, siehe Position 999 Bei Montage mit 684474 LUB-KC1 fetten	
11		AEVU- 50- -PA Magnetkolben	1	STK	Nicht lieferbar	
12		10X1,5-N-NBR75 O-Ring DIN3771	1	STK	Einzel nicht lieferbar, siehe Position 999 Bei Montage mit 684474 LUB-KC1 fetten	
13	338255	ADVU- 50- -PA Magnet	1	STK		
14		ADVU- 50- -PA Kolben	1	STK	Nicht lieferbar	
15	338413	DIN 7349-10,5 Scheibe	1	STK		
16	211437	DIN 439-B-M10X1,25-04 Sechskantmutter	1	STK	Schraubensicherung 247891 LOCTITE-243 verwenden Anziehdrehmoment 23 Nm	
17		50X1,5-N-NBR75 O-Ring DIN3771	2	STK	Einzel nicht lieferbar, siehe Position 999 Bei Montage mit 684474 LUB-KC1 fetten	
18		ADVU- 50- -PA Zylinderrohr	1	STK	Nicht lieferbar	
19	338432	ADVU- 50- PA Abschlussdeckel	1	STK		



- Reacts quickly thanks to minimal break-away force
- Meets the highest requirements for running characteristics, service life and load carrying ability
- Extensive range of accessories

Specified types in accordance with ATEX directive for potentially explosive atmospheres

→ www.festo.com/en/ex

Round cylinders DSNU/ESNU

Key features

At a glance

- Round cylinders with piston diameter from 32 to 63 mm
- The series is not repairable
- Piston rod and cylinder barrel made of stainless steel
- The cap is roller burnished onto the barrel
- Good running performance and long service life thanks to smooth, hard inner surface of cylinder barrel
- Three cushioning variants available
 - P cushioning
 - PPV cushioning
 - PPS cushioning

Wide choice of variants

DSNU-...

- Cylinder barrel made from stainless steel
- Bearing and end caps made from wrought aluminium alloy



DSNU/ESNU-...MA

- Bearing cap with flange thread
- Short end cap with axial air connection



DSNU-...MQ

- Bearing cap with flange thread
- Short end cap with lateral air connection



DSNU-...MH

- Direct mounting on the bearing cap
- Short end cap with lateral air connection



DSNU-...KP

- With clamping unit













Cushioning types

	P cushioning	PPS cushioning	PPV cushioning
Mode of operation	<ul style="list-style-type: none"> • The drive is equipped with polymer flexible end position cushioning 	<ul style="list-style-type: none"> • The drive is equipped with self-adjusting end position cushioning 	<ul style="list-style-type: none"> • The drive is equipped with adjustable end position cushioning
Application	<ul style="list-style-type: none"> • Small loads • Low speeds • Low impact energies 	<ul style="list-style-type: none"> • Small to medium loads • Low to medium speeds • Medium impact energies 	<ul style="list-style-type: none"> • Medium to high loads • High speeds • High impact energies
Advantages	<ul style="list-style-type: none"> • No adjustment required • Time-saving 	<ul style="list-style-type: none"> • No adjustment required • Time-saving • Powerful 	<ul style="list-style-type: none"> • Very powerful

Round cylinders DSNU/ESNU

Key features

Additional variants		
Symbol	Key features	Description
	S2 Through piston rod	For working at both ends with the same force in the forward and return stroke, for attaching external stops
	S6 Heat-resistant seals	Temperature resistance up to max. 120 °C
	S10 Constant motion (slow speed) at low piston speeds	Suitable for slow stroke movements at a constant, stick-slip-free speed over the full stroke of the cylinder. Seal contains silicone grease (not free of paint-wetting impairment substances)
	S11 Low friction	Special seals considerably reduce friction. This means a considerably lower response pressure. Seal contains silicone grease (not free of paint-wetting impairment substances)
	K2 Extended male piston rod thread	–
	K3 Female piston rod thread	–
	K5 Special piston rod thread	Metric standard thread to ISO
	K6 Shortened male piston rod thread	–
	K8 Extended piston rod	–
	R3 High corrosion protection	All external cylinder surfaces comply with corrosion resistance class 3 to Festo standard 940 070. The piston rod is made from corrosion and acid-resistant steel

Longer service life thanks to the bellows kit DADB



The bellows kit is a leak-free system. To prevent unwanted media being drawn in, the supply and exhaust air must be ducted via a pressure compensation hole in the connection part **1**.

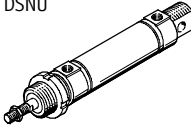
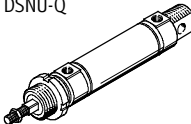
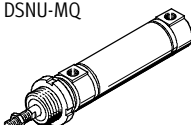
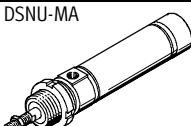
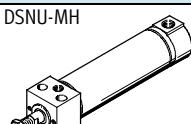
The kit protects the piston rod, seal and bearings from a wide range of media, for example:

- dust,
- chips,
- oil,
- grease,
- fuel.

Round cylinders DSNU

Product range overview

FESTO

Function	Version	Piston Ø [mm]	Stroke [mm]	Variable stroke ¹⁾ [mm]	Piston rod						
					Through S2	Extended K8	Male thread			Female thread K3	
							Extended K2	Shortened K6	Special thread K5		
Double- acting	Basic version with position sensing										
	DSNU	32, 40, 50, 63	25, 40, 50, 80, 100, 125, 160, 200, 250, 320	1 ... 500							
					■	■	■	■	■	■	
	DSNU – Standard cylinder with piston Ø 8 ... 25										
	Protected against rotation										
	DSNU-Q	32	-	5 ... 300							
			40, 50	-	5 ... 400	■	■	■	■	■	■
			63	-	5 ... 500						
	DSNU-Q – Standard cylinder with piston Ø 8 ... 25										
	Lateral air connection										
	DSNU-MQ	32, 40, 50, 63	-	1 ... 500							
					-	■	■	■	■	■	
	DSNU-MQ – Standard cylinder with piston Ø 8 ... 25										
	Axial air connection										
	DSNU-MA	32, 40, 50, 63	-	1 ... 500							
					-	■	■	■	■	■	
	DSNU-MA – Standard cylinder with piston Ø 8 ... 25										
	Direct mounting										
DSNU-MH	32, 40, 50, 63	-	1 ... 500								
				-	■	■	■	■	■		
DSNU-MH – Standard cylinder with piston Ø 8 ... 25											

1) Cylinders with position sensing require a minimum stroke of 10 mm to ensure reliable sensing

Round cylinders DSNU

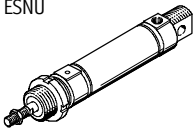
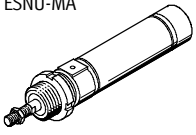
Product range overview

Version	Cushioning			Position sensing	Clamping unit	Heat-resistant seal	Slow speed (constant motion)	Low friction	Corrosion protection	Wiper seal	→ Page/ Internet
	Fixed	Adjustable	Self-adjusting								
	P	PPV	PPS								
Basic version with position sensing											
DSNU	■	■	■	■	■	■	■	■	■	■	11
DSNU – Standard cylinder with piston \varnothing 8 ... 25											dsnu
Protected against rotation											
DSNU-Q	■	■	-	■	■	■	■	■	■	-	18
DSNU-Q – Standard cylinder with piston \varnothing 8 ... 25											dsnu
Lateral air connection											
DSNU-MQ	■	■	■	■	■	■	-	-	■	■	11
DSNU-MQ – Standard cylinder with piston \varnothing 8 ... 25											dsnu
Axial air connection											
DSNU-MA	■	-	-	■	■	■	-	-	■	-	11
DSNU-MA – Standard cylinder with piston \varnothing 8 ... 25											dsnu
Direct mounting											
DSNU-MH	■	■	-	■	-	■	-	-	■	-	11
DSNU-MH – Standard cylinder with piston \varnothing 8 ... 25											dsnu

Round cylinders ESNU

Product range overview



Function	Version	Piston Ø [mm]	Stroke [mm]	Variable stroke ¹⁾ [mm]	Fixed cushioning P	Position sensing A
Single-acting	Basic version with position sensing					
	ESNU 	32, 40, 50, 63	10, 25, 50	1 ... 50	■	■
	ESNU – Standard cylinder with piston Ø 8 ... 25					
	Axial air connection					
ESNU-MA 	32, 40, 50, 63	–	1 ... 50	■	■	
ESNU-MA – Standard cylinder with piston Ø 8 ... 25						

1) Cylinders with position sensing require a minimum stroke of 10 mm to ensure reliable sensing

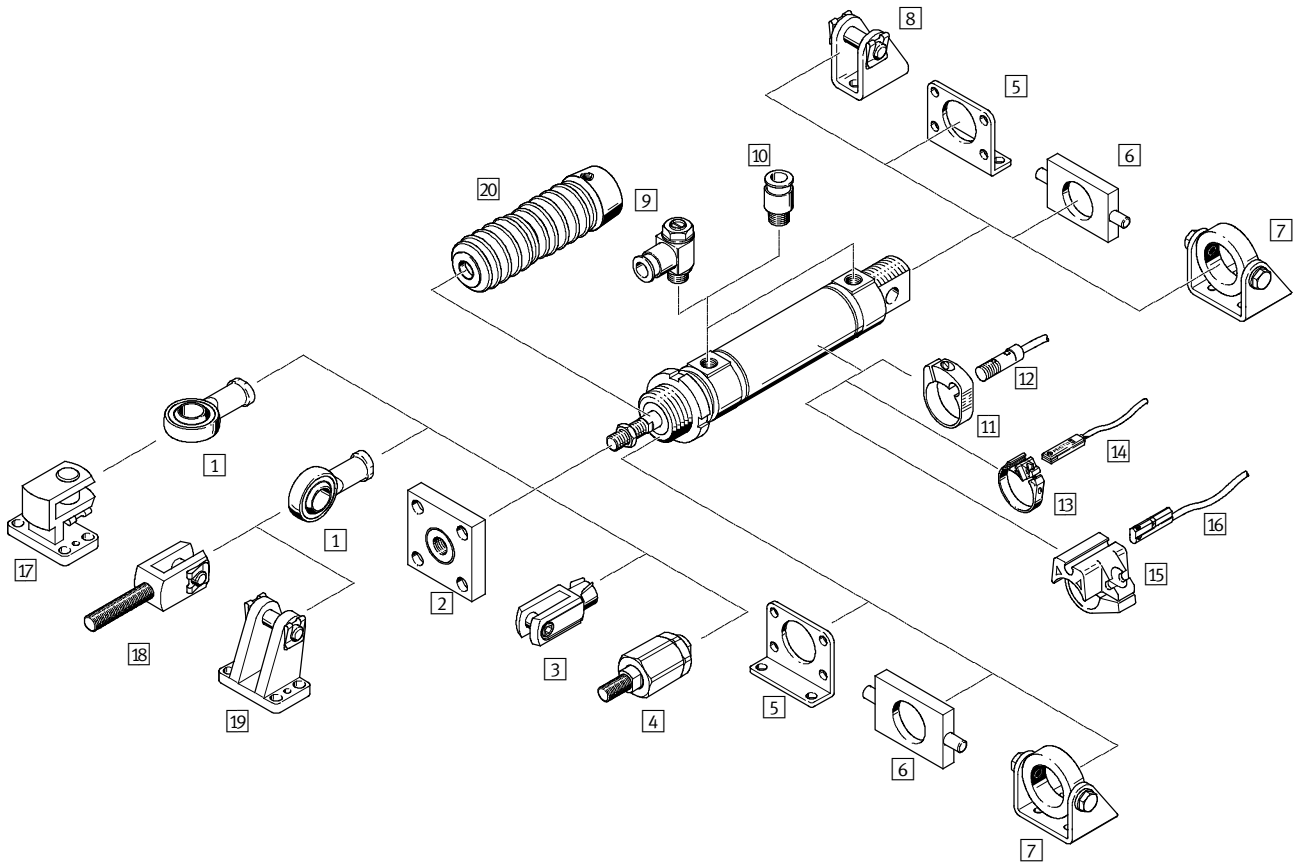
Round cylinders ESNU

Product range overview

Version	Piston rod					→ Page/Internet
	Extended	Male thread			Female thread	
		Extended	Shortened	Special thread		
	K8	K2	K6	K5	K3	
Basic version with position sensing						
ESNU	■	■	■	■	■	30
ESNU – Standard cylinder with piston \varnothing 8 ... 25						esnu
Axial air connection						
ESNU-MA	■	■	■	■	■	30
ESNU-MA – Standard cylinder with piston \varnothing 8 ... 25						esnu

Round cylinders DSNU/ESNU

Peripherals overview

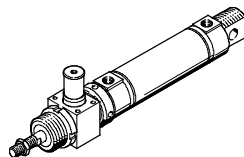
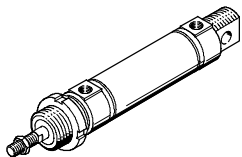
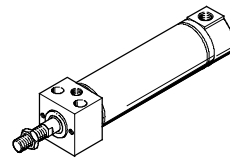
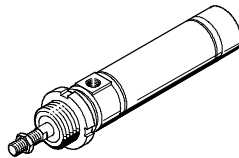
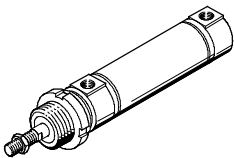


Variants

DSNU-MQ

DSNU-MA

DSNU-MH

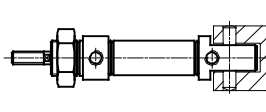
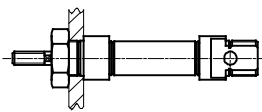
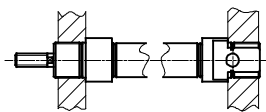


Mounting options

Mounting front and rear

Mounting via hex nut

Swivel mounting

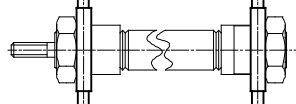
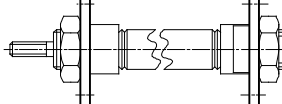
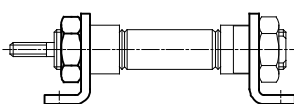
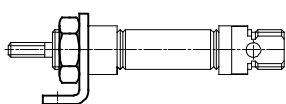


Foot mounting (for short strokes)

Foot mounting

Flange mounting

Swivel mounting




Round cylinders DSNU/ESNU

Peripherals overview

FESTO

Mounting attachments and accessories							
	DSNU/ESNU	DSNU/ESNU MA	DSNU MQ	MH	KP	DSNU-Q	→ Page/Internet
1	Rod eye SGS/CRSGS	■	■	■	■	■	39
2	Coupling piece KSG/KSZ	■	■	■	■	■	39
3	Rod clevis SG/CRSG	■	■	■	■	■	39
4	Self-aligning rod coupler FK	■	■	■	■	■	39
5	Foot mounting HBN/CRH	■	■	■	-	■	36
	Flange mounting FBN/CRFV	■	■	■	-	■	36
6	Swivel mounting ¹⁾ WBN	■	■	■	-	■	37
7	Swivel mounting ¹⁾ SBN	■	■	■	-	■	37
8	Clevis foot LBN/CRLBN	■	-	-	-	■	38
9	One-way flow control valve GRLA/GRLZ/CRGRLA	■	■	■	■	■	39
10	Push-in fitting QS	■	■	■	■	■	quick star
11	Mounting kit CRSMBR	■	■	■	■	■	44
12	Proximity sensor SMEO/SMT0/CRSMEO-4	■	■	■	■	■	44
13	Mounting kit SMBR-8	■	■	■	■	■	45
14	Proximity sensor SME/SMT-8	■	■	■	■	■	45
15	Mounting kit SMBR-10	■	■	■	■	■	46
16	Proximity sensor SME/SMT-10	■	■	■	■	■	46
17	Right-angle clevis foot LQG	■	■	■	■	■	38
18	Rod clevis SGA	■	■	■	■	■	39
19	Clevis foot LBG	■	■	■	■	■	38
20	Bellows kit ²⁾ DADB	■	■	■	-	-	38

-  - Note

1) Cannot be used on the bearing cap in combination with bellows kit DADB.

2) The bellows kit protects the cylinder (piston rod, seal and bearings) against a wide range of media and thus prevents premature wear.

It can only be used in combination with an extended piston rod (K8).

Round cylinders DSNU/ESNU

Type codes

FESTO

	DSNU	–	32	–	80	–	PPV	–	A	–	MQ
Type											
Double-acting											
DSNU	Round cylinder										
Single-acting											
ESNU	Round cylinder										
Piston Ø [mm]											
Stroke [mm]											
Cushioning											
P	Flexible cushioning rings/pads at both ends										
PPV	Pneumatic cushioning, adjustable at both ends										
PPS	Pneumatic cushioning, self-adjusting at both ends										
Position sensing											
A	Via proximity sensor										
Variant											
MQ	Lateral air connection										
MA	Axial air connection										
MH	With mounting flange on bearing cap										

Modular product system

Individually configurable

DSNU → 26

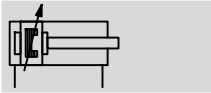
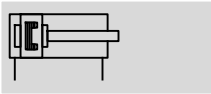
ESNU → 34

- Square piston rod (protection against rotation)
- Through piston rod (piston rod type)
- Extended male piston rod thread
- Male piston rod thread, shortened at one end
- Female piston rod thread (female thread)
- Special piston rod thread (special thread)
- Piston rod extended at front
- Clamping unit on the piston rod
- Heat-resistant seals for temperatures up to 120 °C (temperature resistance)
- Slow speed (constant motion at low piston rod speeds)
- Low friction
- All external cylinder surfaces conform to corrosion resistance class CRC 3 (corrosion protection)
- Dust protection (wiper seal)

Round cylinders DSNU

Technical data

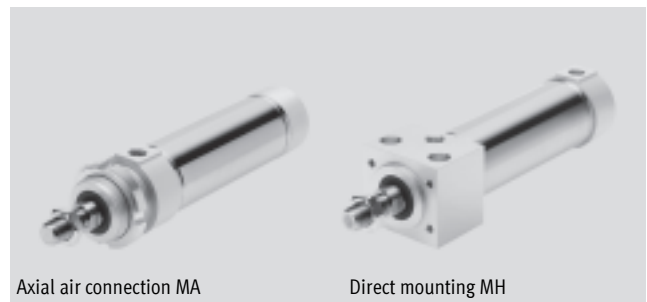
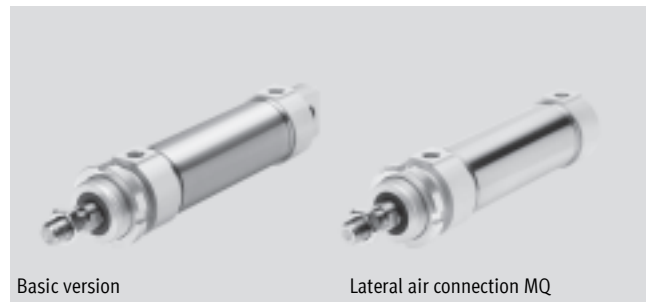
Function



⊘ - Diameter
32 ... 63 mm

┆ - Stroke length
1 ... 500 mm

Variants
→ 16



General technical data							
Piston Ø	32		40		50	63	
Pneumatic connection	G1/8		G1/4		G1/4		G3/8
Piston rod thread	M10x1.25		M12x1.25		M16x1.5		M16x1.5
Constructional design	Piston						
	Piston rod						
	Cylinder barrel						
Cushioning	P		Flexible cushioning rings/pads at both ends				
	PPV		Adjustable cushioning at both ends				
	PPS		Self-adjusting cushioning at both ends				
Cushioning length	PPV	[mm]	14	18	20	21	
		PPS	[mm]	14	18	20	21
Position sensing	Via proximity sensor						
Type of mounting	Direct mounting (MH variant only)						
	Via accessories						
Mounting position	Any						

Operating conditions								
Piston Ø	32		40		50	63		
Operating medium	Compressed air in accordance with ISO 8573-1:2010 [7:4:4]							
Note on operating/pilot medium	Operation with lubricated medium possible (in which case lubricated operation will always be required)							
Operating pressure [bar]	Basic version	1 ... 10						
		S10	0.5 ... 10		0.4 ... 10			
		S11	0.2 ... 10		-		0.2 ... 10	

Ambient conditions						
Round cylinder	Basic version	S6	S10	S11	R3	
Ambient temperature ¹⁾ [°C]	-20 ... +80	0 ... +120		+5 ... +80		-20 ... +80
Corrosion resistance class CRC ²⁾	2	2	2	2	3	
ATEX	Specified types → www.festo.com					

1) Note operating range of proximity sensors.
 2) Corrosion resistance class 2 as per Festo standard 940 070
 Components subject to moderate corrosion stress. Externally visible parts with primarily decorative surface requirements which are in direct contact with a normal industrial environment or media such as coolants or lubricating agents.
 Corrosion resistance class 3 as per Festo standard 940 070
 Components requiring higher corrosion resistance. External visible parts in direct contact with industrial atmospheres or media such as solvents and cleaning agents, with a predominantly functional requirement for the surface.

Round cylinders DSNU

Technical data

FESTO

Speed [mm/s]		32	40	50	63
Piston Ø		32	40	50	63
Speed with stick-slip-free operation, horizontal, without load, at 6 bar	S10	8 ... 100			5 ... 100
Minimum speed, advancing	S11	<1 ¹⁾			
Minimum speed, retracting	S11	<1 ¹⁾			

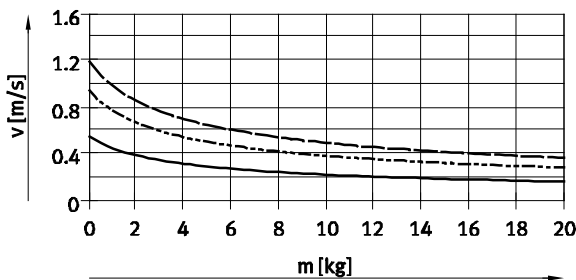
1) Measurements of less than 1 mm/s were not conducted.

Force [N] and impact energy [J]		32	40	50	63
Piston Ø		32	40	50	63
Theoretical force at 6 bar, advancing		483	753	1,178	1,870
Theoretical force at 6 bar, retracting		415	633	990	1,682
Impact energy at the end positions for P cushioning ¹⁾		0.40	0.70	1	1.3

1) The values are reduced by approx. 50% at an ambient temperature of 80 °C.

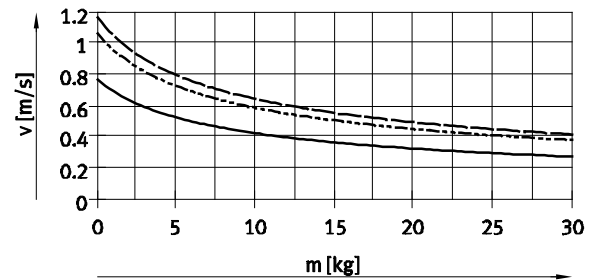
Mean piston velocity v as a function of applied load m in combination with PPS cushioning

Piston Ø 32



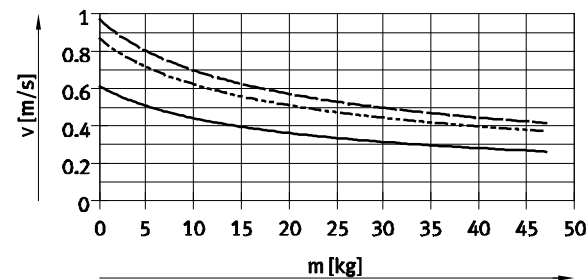
— DSNU-32-50
 - - - DSNU-32-100
 - · - DSNU-32-200

Piston Ø 40



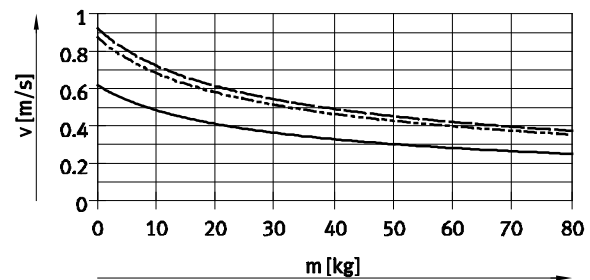
— DSNU-40-50
 - - - DSNU-40-100
 - · - DSNU-40-200

Piston Ø 50



— DSNU-50-50
 - - - DSNU-50-100
 - · - DSNU-50-200

Piston Ø 63



— DSNU-63-50
 - - - DSNU-63-100
 - · - DSNU-63-200

- · - Note
 Mean piston velocity
 = stroke/movement time

- · - Note

Design software for
 P cushioning
 → ProDrive

Additional graphs for
 PPS cushioning
 → www.festo.com

Design software for
 PPV cushioning
 → ProDrive

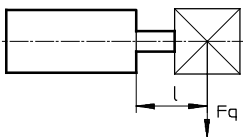
Round cylinders DSNU

Technical data

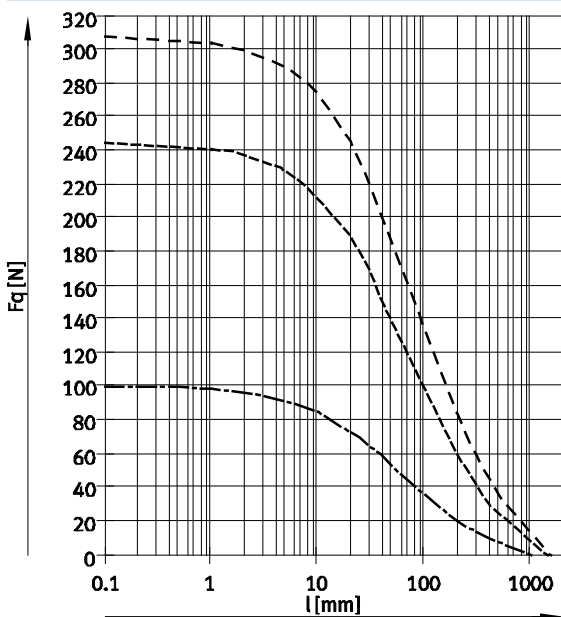
FESTO

Weight [g]				
Piston \varnothing	32	40	50	63
Product weight with 0 mm stroke	370.5	661	1,087	1,445
Additional weight per 10 mm stroke	15.5	24	40	44

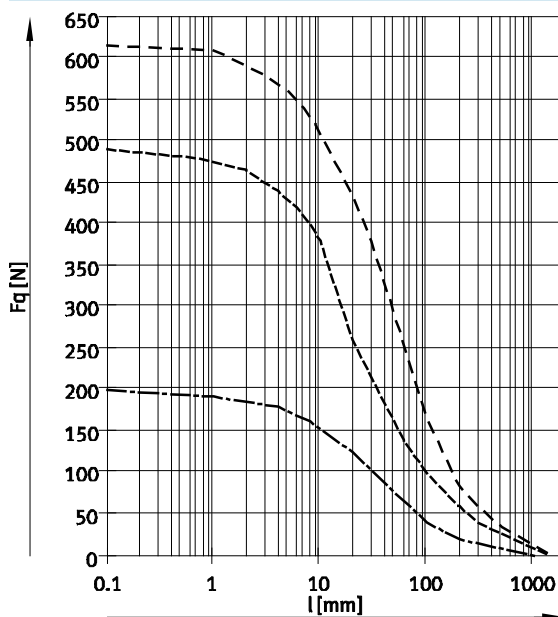
Max. lateral force F_q as a function of projection l



Basic version



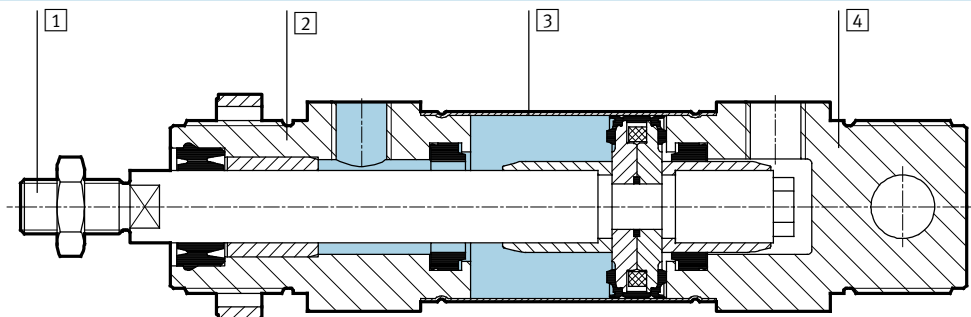
S2 – Through piston rod



- $\varnothing 32$
- $\varnothing 40$
- $\varnothing 50/63$

Materials

Sectional view



Round cylinder	Basic version	S6	S10	S11	R3
1 Piston rod	High-alloy steel				High-alloy stainless steel
2 Bearing cap	Anodised aluminium				
3 Cylinder barrel	High-alloy stainless steel				
4 End cap	Anodised aluminium				
– Seals	Polyurethane, nitrile rubber	Fluoro rubber	Fluoro rubber, polyurethane		Polyurethane, nitrile rubber
Note on materials	RoHS compliant				

Round cylinders DSNU

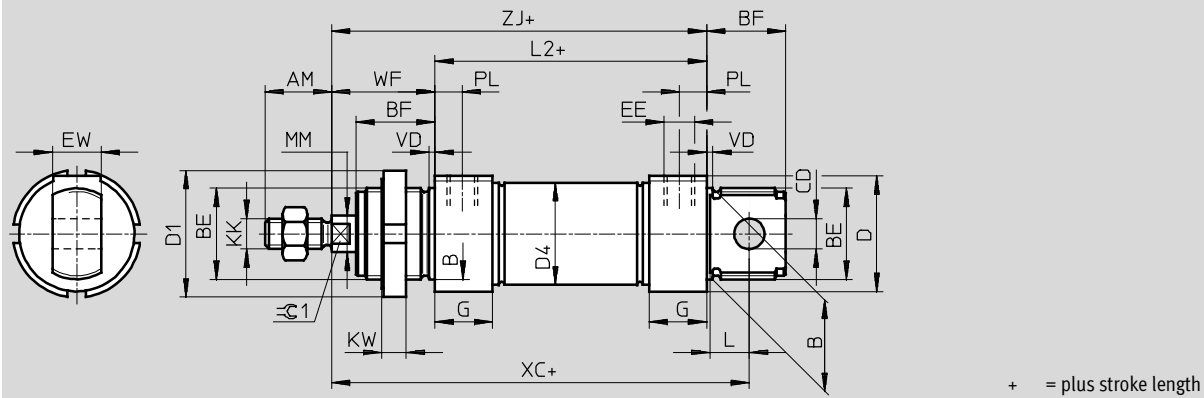
Technical data

FESTO

Dimensions

Download CAD data → www.festo.com

Basic version



∅	AM	B	BE	BF	CD	D	D1	D4	EE	EW	G
[mm]		∅ h9			∅ E10	∅	∅	∅			
32	22	30	M30x1.5	26	10	38	42	33.6	G $\frac{1}{8}$	16	19
40	24	38	M38x1.5	30	12	46	50	41.6	G $\frac{1}{4}$	18	25
50	32	45	M45x1.5	33	16	57	60	52.4		21	28
63						70		65.4	G $\frac{3}{8}$		

∅	KK	KW	L	L2	MM	PL	VD	WF	XC	ZJ	⊖C1
[mm]					∅				±1		
32	M10x1.25	8	13	69.5	12	9	2	34	117.5	103.5	10
40	M12x1.25		15	84.6	16	12		3	39	139.6	123.6
50	M16x1.5	10	16	86.2	20		13		44	147.2	130.2
63				94.2		45		156.2	139.2		

Round cylinders DSNU

Technical data

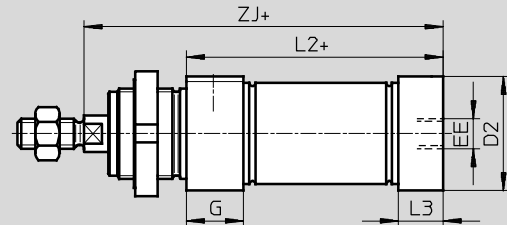
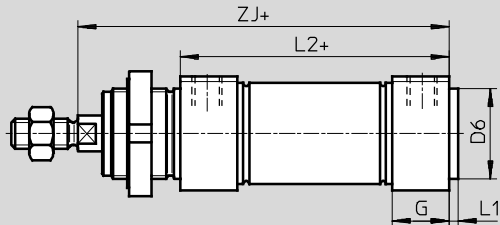
FESTO

Dimensions

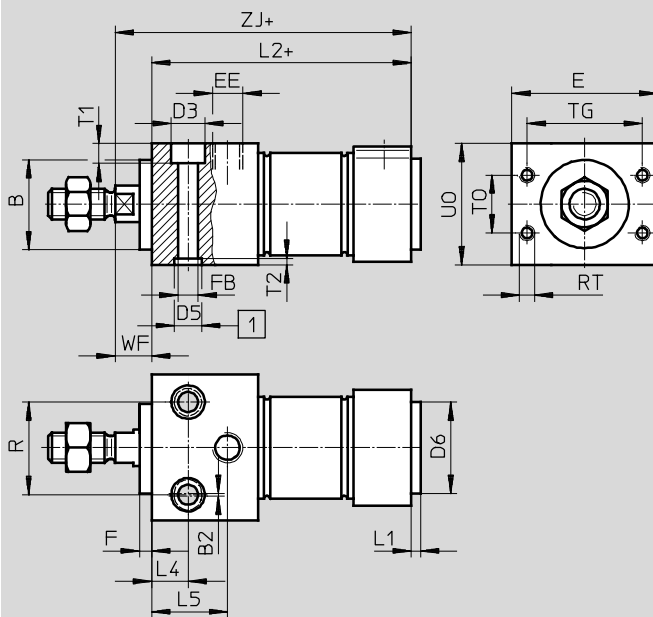
Download CAD data → www.festo.com

MQ – Lateral air connection

MA – Axial air connection



MH – Direct mounting



- 1 Centring holes
(2 centring sleeves included in scope of delivery)
- + = plus stroke length

∅ [mm]	B ∅ h9	B2	E	EE	G	F	FB ∅	D2 ∅	D3	D5 ∅	D6 ∅	L1	L2		
													-MQ	-MA	-MH
32	30	1	48	G $\frac{1}{8}$	19	4	6.6	34	11	9	30	3	69.5	65.5	85.5
40	38		54	G $\frac{1}{4}$	25		9	42	14	12	38	4	84.6	77.6	104.6
50	45	2	64	G $\frac{3}{8}$	28	4	11	53	18	15	45	4	86.2	86.2	109.2
63			72					66					66	18	15

∅ [mm]	L3	L4	L5	R	RT	T0	T1	T2	TG	U0	WF	ZJ		
												-MQ	-MA	-MH
32	15	12	25	30	M5	19	6.6	2.1	38	40	12	103.5	99.5	97.5
40	18	15	32	38		24	9	2.6	42	48		12	123.6	116.5
50	25		35	42	M6	32	4	11	3.1	50	58	15	130.2	130.2
63	28	36	44	M8	36	66				66	18		15	45

Round cylinders DSNU

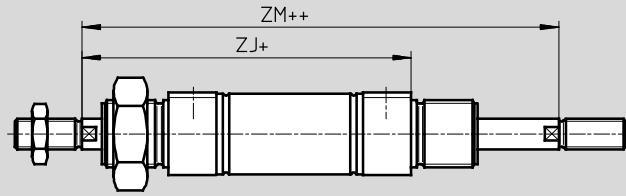
Technical data

FESTO

Dimensions

Download CAD data → www.festo.com

S2 – Through piston rod

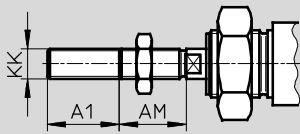


- - Note

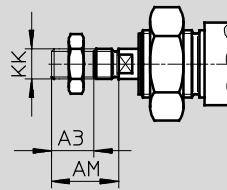
The thread types at both piston rod ends are identical. In combination with variant Q, the left-hand piston rod end is square, the right-hand piston rod end round.

+ = plus stroke length
++ = plus 2x stroke length

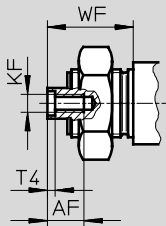
K2 – Extended male piston rod thread



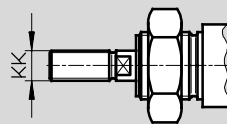
K6 – Shortened male piston rod thread



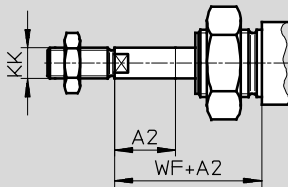
K3 – Female piston rod thread



K5 – Special piston rod thread



K8 – Extended piston rod



- - Note


If variant K8 is required in combination with S2, the piston rod will only be extended on one side.

∅ [mm]	A1 max.	A2 max.	A3 max.	AF	AM	KF	KK		T4	WF	ZJ			ZM
							Basic thread	Special thread ¹⁾			-MQ	-MA	-MH	
32	35	500	8	12	22	M6	M10x1.25	M10	2.6	34	103.5	99.5	97.5	137.5
40					24	M8	M12x1.25	M12	3.3	39	123.6	111.6	116.6	162.6
50	70		10	16	32	M10	M16x1.5	M16	4.7	44	130.2	130.2	124.2	174.2
63										45	139.2	139.2	132.2	184.2

1) The special threads are only available as male threads. The scope of delivery does not include a hex nut for the piston rod thread

Round cylinders DSNU

Technical data

Ordering data								
Type	Piston Ø [mm]	Stroke [mm]	P – Flexible cushioning rings/ pads at both ends		PPV – Pneumatic cushioning, adjustable at both ends		PPS – Pneumatic cushioning, self-adjusting at both ends	
			A – With position sensing		A – With position sensing		A – With position sensing	
			Part No.	Type	Part No.	Type	Part No.	Type
	32	25	195 980	DSNU-32-25-P-A	196 020	DSNU-32-25-PPV-A	559 295	DSNU-32-25-PPS-A
		40	195 981	DSNU-32-40-P-A	196 021	DSNU-32-40-PPV-A	559 296	DSNU-32-40-PPS-A
		50	195 982	DSNU-32-50-P-A	196 022	DSNU-32-50-PPV-A	559 297	DSNU-32-50-PPS-A
		80	195 983	DSNU-32-80-P-A	196 023	DSNU-32-80-PPV-A	559 298	DSNU-32-80-PPS-A
		100	195 984	DSNU-32-100-P-A	196 024	DSNU-32-100-PPV-A	559 299	DSNU-32-100-PPS-A
		125	195 985	DSNU-32-125-P-A	196 025	DSNU-32-125-PPV-A	559 300	DSNU-32-125-PPS-A
		160	195 986	DSNU-32-160-P-A	196 026	DSNU-32-160-PPV-A	559 301	DSNU-32-160-PPS-A
		200	195 987	DSNU-32-200-P-A	196 027	DSNU-32-200-PPV-A	559 302	DSNU-32-200-PPS-A
		250	195 988	DSNU-32-250-P-A	196 028	DSNU-32-250-PPV-A	559 303	DSNU-32-250-PPS-A
	320	195 989	DSNU-32-320-P-A	196 029	DSNU-32-320-PPV-A	559 304	DSNU-32-320-PPS-A	
	40	25	195 990	DSNU-40-25-P-A	196 030	DSNU-40-25-PPV-A	559 305	DSNU-40-25-PPS-A
		40	195 991	DSNU-40-40-P-A	196 031	DSNU-40-40-PPV-A	559 306	DSNU-40-40-PPS-A
		50	195 992	DSNU-40-50-P-A	196 032	DSNU-40-50-PPV-A	559 307	DSNU-40-50-PPS-A
		80	195 993	DSNU-40-80-P-A	196 033	DSNU-40-80-PPV-A	559 308	DSNU-40-80-PPS-A
		100	195 994	DSNU-40-100-P-A	196 034	DSNU-40-100-PPV-A	559 309	DSNU-40-100-PPS-A
		125	195 995	DSNU-40-125-P-A	196 035	DSNU-40-125-PPV-A	559 310	DSNU-40-125-PPS-A
		160	195 996	DSNU-40-160-P-A	196 036	DSNU-40-160-PPV-A	559 311	DSNU-40-160-PPS-A
		200	195 997	DSNU-40-200-P-A	196 037	DSNU-40-200-PPV-A	559 312	DSNU-40-200-PPS-A
		250	195 998	DSNU-40-250-P-A	196 038	DSNU-40-250-PPV-A	559 313	DSNU-40-250-PPS-A
		320	195 999	DSNU-40-320-P-A	196 039	DSNU-40-320-PPV-A	559 314	DSNU-40-320-PPS-A
		50	25	196 000	DSNU-50-25-P-A	196 040	DSNU-50-25-PPV-A	559 315
	40		196 001	DSNU-50-40-P-A	196 041	DSNU-50-40-PPV-A	559 316	DSNU-50-40-PPS-A
	50		196 002	DSNU-50-50-P-A	196 042	DSNU-50-50-PPV-A	559 317	DSNU-50-50-PPS-A
	80		196 003	DSNU-50-80-P-A	196 043	DSNU-50-80-PPV-A	559 318	DSNU-50-80-PPS-A
	100		196 004	DSNU-50-100-P-A	196 044	DSNU-50-100-PPV-A	559 319	DSNU-50-100-PPS-A
	125		196 005	DSNU-50-125-P-A	196 045	DSNU-50-125-PPV-A	559 320	DSNU-50-125-PPS-A
	160		196 006	DSNU-50-160-P-A	196 046	DSNU-50-160-PPV-A	559 321	DSNU-50-160-PPS-A
	200		196 007	DSNU-50-200-P-A	196 047	DSNU-50-200-PPV-A	559 322	DSNU-50-200-PPS-A
	250		196 008	DSNU-50-250-P-A	196 048	DSNU-50-250-PPV-A	559 323	DSNU-50-250-PPS-A
	320		196 009	DSNU-50-320-P-A	196 049	DSNU-50-320-PPV-A	559 324	DSNU-50-320-PPS-A
	63		25	196 010	DSNU-63-25-P-A	196 050	DSNU-63-25-PPV-A	559 325
		40	196 011	DSNU-63-40-P-A	196 051	DSNU-63-40-PPV-A	559 326	DSNU-63-40-PPS-A
50		196 012	DSNU-63-50-P-A	196 052	DSNU-63-50-PPV-A	559 327	DSNU-63-50-PPS-A	
80		196 013	DSNU-63-80-P-A	196 053	DSNU-63-80-PPV-A	559 328	DSNU-63-80-PPS-A	
100		196 014	DSNU-63-100-P-A	196 054	DSNU-63-100-PPV-A	559 329	DSNU-63-100-PPS-A	
125		196 015	DSNU-63-125-P-A	196 055	DSNU-63-125-PPV-A	559 330	DSNU-63-125-PPS-A	
160		196 016	DSNU-63-160-P-A	196 056	DSNU-63-160-PPV-A	559 331	DSNU-63-160-PPS-A	
200		196 017	DSNU-63-200-P-A	196 057	DSNU-63-200-PPV-A	559 332	DSNU-63-200-PPS-A	
250		196 018	DSNU-63-250-P-A	196 058	DSNU-63-250-PPV-A	559 333	DSNU-63-250-PPS-A	
320		196 019	DSNU-63-320-P-A	196 059	DSNU-63-320-PPV-A	559 334	DSNU-63-320-PPS-A	

 Note

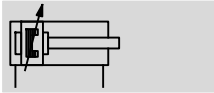
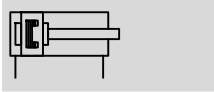
Variable strokes and additional variants can be configured and ordered through the DSNU modular product system → 26.

Round cylinders DSNU-Q, protected against rotation

FESTO

Technical data

Function



⌀ - Diameter
32 ... 63 mm

┆ - Stroke length
5 ... 500 mm



General technical data				
Piston ⌀	32	40	50	63
Pneumatic connection	G $\frac{1}{8}$	G $\frac{1}{4}$	G $\frac{1}{4}$	G $\frac{3}{8}$
Piston rod thread	M10x1.25	M12x1.25	M16x1.5	M16x1.5
Constructional design	Piston Protected against rotation with square piston rod			
Max. torque at the piston rod [Nm]	0.8	1.1	1.5	1.5
Cushioning	Flexible cushioning rings/pads at both ends Pneumatic cushioning, adjustable at both ends			
Cushioning length (PPV) [mm]	14	18	20	21
Position sensing	Via proximity sensor			
Type of mounting	Via accessories			
Mounting position	Any			

Operating conditions				
Piston ⌀	32	40	50	63
Operating medium	Compressed air in accordance with ISO 8573-1:2010 [7:4:4]			
Note on operating/ pilot medium	Operation with lubricated medium possible (in which case lubricated operation will always be required)			
Operating pressure [bar]	1 ... 10			

Ambient conditions		
Round cylinder	Basic version	R3
Ambient temperature ¹⁾ [°C]	-20 ... +80	
Corrosion resistance class CRC ²⁾	2	3

1) Note operating range of proximity sensors

2) Corrosion resistance class 2 as per Festo standard 940 070

Components subject to moderate corrosion stress. Externally visible parts with primarily decorative surface requirements which are in direct contact with a normal industrial environment or media such as coolants or lubricating agents.

Corrosion resistance class 3 as per Festo standard 940 070

Components requiring higher corrosion resistance. External visible parts in direct contact with industrial atmospheres or media such as solvents and cleaning agents, with a predominantly functional requirement for the surface.

Round cylinders DSNU-Q, protected against rotation

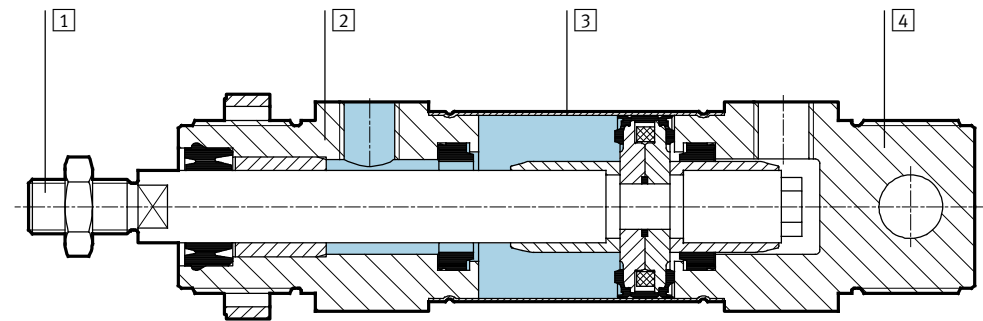
Technical data

Force [N] and impact energy [J]				
Piston Ø	32	40	50	63
Theoretical force at 6 bar, advancing	483	753	1,178	1,870
Theoretical force at 6 bar, retracting	415	633	990	1,682
Impact energy at the end positions	0.40	0.70	1	1.3

Weight [g]				
Piston Ø	32	40	50	63
Product weight with 0 mm stroke	370.5	661	1,087	1,445
Additional weight per 10 mm stroke	15.5	24	40	44

Materials

Sectional view

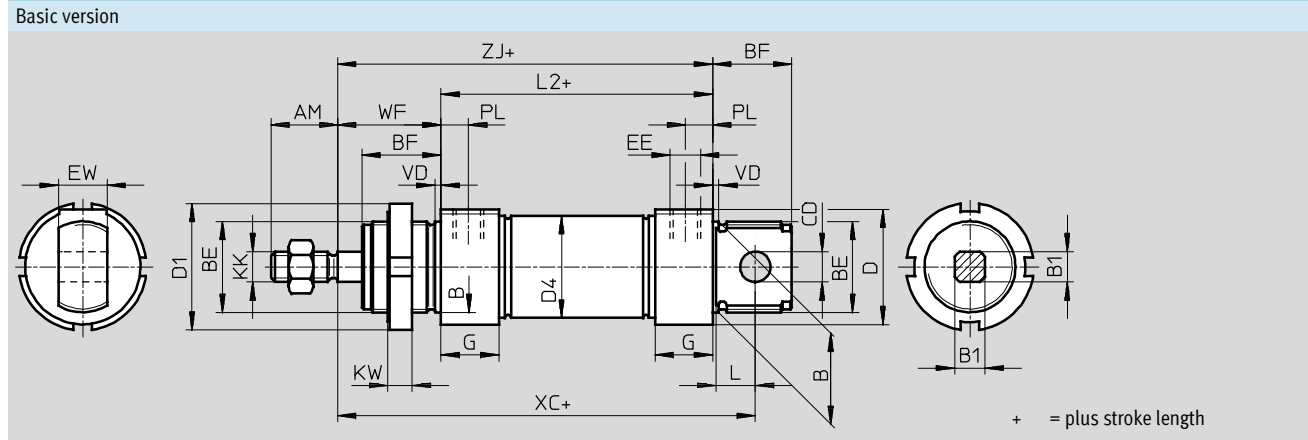


Round cylinder	Basic version	R3
1 Piston rod	High-alloy steel	High-alloy stainless steel
2 Bearing cap	Anodised aluminium	
3 Cylinder barrel	High-alloy stainless steel	
4 End cap	Anodised aluminium	
- Seals	Polyurethane, nitrile rubber	
Note on materials	RoHS compliant	

Round cylinders DSNU-Q, protected against rotation

Technical data

Dimensions Download CAD data → www.festo.com



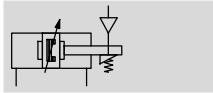
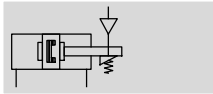
∅	AM	B	B1	BE	BF	CD	D	D1	D4	EE	EW
[mm]		∅ h9	□			∅ E10	∅	∅	∅		
32	22	30	10	M30x1.5	26	10	38	42	33.6	G1/8	16
40	24	38	12	M38x1.5	30	12	46	50	41.6	G1/4	18
50	32	45	16	M45x1.5	33	16	57	60	52.4	G1/4	21
63	32	45	16	M45x1.5	33	16	70	60	65.4	G3/8	21

∅	G	KK	KW	L	L2	PL	VD	WF	XC	ZJ
[mm]									±1	
32	19	M10x1.25	8	13	69.5	9	2	34	117.5	103.5
40	25	M12x1.25	10	15	84.6	12	3	39	139.6	123.6
50	25	M16x1.5	10	16	86.2	12	3	44	147.2	130.2
63	28	M16x1.5	10	16	94.2	13	3	45	156.2	139.2

Round cylinders DSNU-KP, with clamping unit

Technical data

Function



⌀ - Diameter
32 ... 63 mm

┆ - Stroke length
1 ... 500 mm

-  - Note

Additional measures are required for use in safety-related applications; in Europe, for example, the standards listed under the EC Machinery Directive must be observed. Without additional measures in accordance with statutory minimum requirements, the product is not suitable for use in safety-related sections of control systems.



General technical data								
Piston Ø	32		40		50		63	
Pneumatic connection	G $\frac{1}{8}$		G $\frac{1}{4}$		G $\frac{1}{4}$		G $\frac{3}{8}$	
Piston rod thread	M10x1.25		M12x1.25		M16x1.5		M16x1.5	
Constructional design	Piston							
	Piston rod							
	Cylinder barrel							
Cushioning	P		Flexible cushioning rings/pads at both ends					
	PPV		Pneumatic cushioning, adjustable at both ends					
	PPS		Cushioning, self-adjusting at both ends					
Cushioning length	PPV	[mm]	14	18	20	21		
	PPS	[mm]	14	18	20	21		
Position sensing	Via proximity sensor							
Type of mounting	Via through-holes							
	Via accessories							
Mounting position	Any							
Clamping unit holding force	[N]	600	1,000		1,400		2,000	
Axial play under load	[mm]	0.5			0.8			
Clamping unit pneumatic connection	M5		G $\frac{1}{8}$		G $\frac{1}{8}$		G $\frac{1}{8}$	

Operating conditions								
Piston Ø	32		40		50		63	
Operating medium	Compressed air in accordance with ISO 8573-1:2010 [7:4:4]							
Note on operating/pilot medium	Operation with lubricated medium possible (in which case lubricated operation will always be required)							
Operating pressure	[bar]	3 ... 10						

Ambient conditions		
Round cylinder	Basic version	R3
Ambient temperature ¹⁾	[°C]	-10 ... +80
Corrosion resistance class CRC ²⁾	2	3

1) Note operating range of proximity sensors

2) Corrosion resistance class 2 as per Festo standard 940 070

Components subject to moderate corrosion stress. Externally visible parts with primarily decorative surface requirements which are in direct contact with a normal industrial environment or media such as coolants or lubricating agents.

Corrosion resistance class 3 as per Festo standard 940 070

Components requiring higher corrosion resistance. External visible parts in direct contact with industrial atmospheres or media such as solvents and cleaning agents, with a predominantly functional requirement for the surface.

Round cylinders DSNU-KP, with clamping unit

Technical data

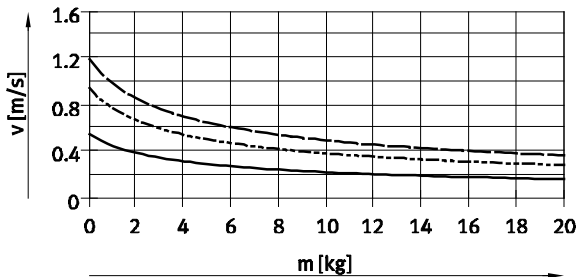
FESTO

Force [N] and impact energy [J]				
Piston \varnothing	32	40	50	63
Theoretical force at 6 bar, advancing	483	753	1,178	1,870
Theoretical force at 6 bar, retracting	415	633	990	1,682
Impact energy at the end positions ¹⁾	0.40	0.70	1	1.3

1) The values are reduced by approx. 50% at an ambient temperature of 80 °C.

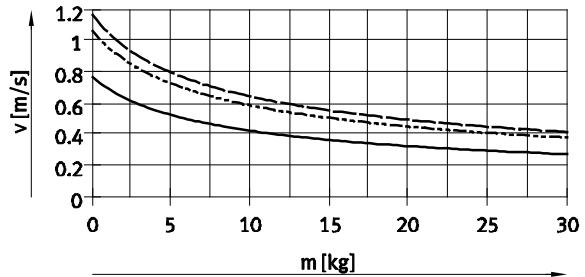
Mean piston velocity v as a function of applied load m in combination with PPS cushioning

Piston \varnothing 32



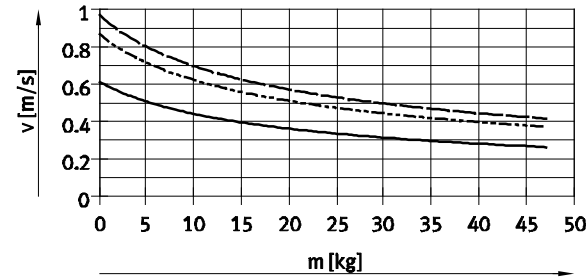
— DSNU-32-50
 - - - DSNU-32-100
 - · - DSNU-32-200

Piston \varnothing 40



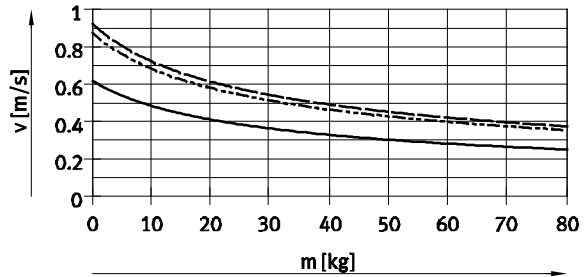
— DSNU-40-50
 - - - DSNU-40-100
 - · - DSNU-40-200

Piston \varnothing 50





— DSNU-50-50
 - - - DSNU-50-100
 - · - DSNU-50-200

Piston \varnothing 63



— DSNU-63-50
 - - - DSNU-63-100
 - · - DSNU-63-200

 Note
 Mean piston velocity
 = stroke/movement time

 Note

Design software for
 P cushioning
 → ProDrive

Additional graphs for
 PPS cushioning
 → www.festo.com

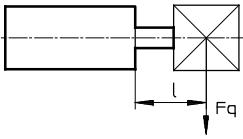
Design software for
 PPV cushioning
 → ProDrive

Weight [g]				
Piston \varnothing	32	40	50	63
Product weight with 0 mm stroke	711.5	1,287	2,059	2,556
Additional weight per 10 mm stroke	15.5	24	40	44

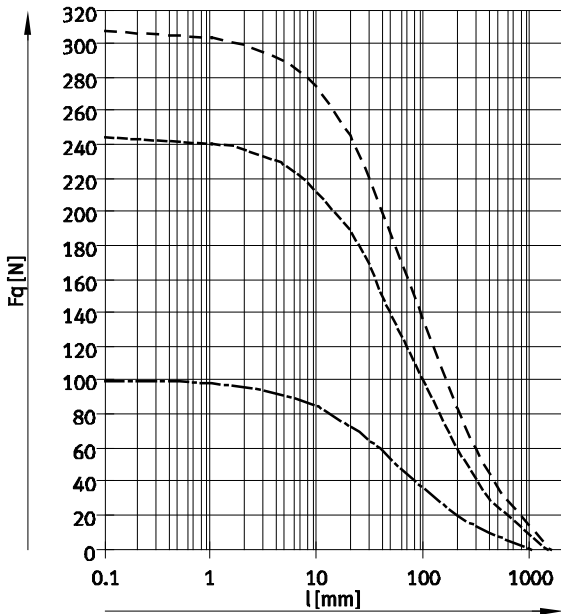
Round cylinders DSNU-KP, with clamping unit

Technical data

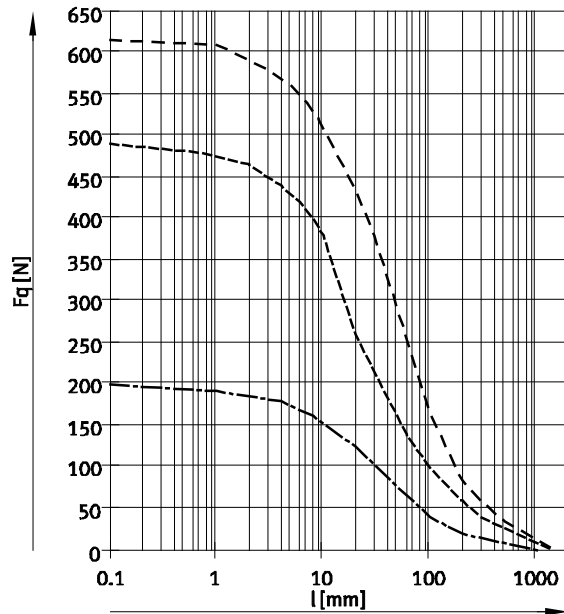
Max. lateral force F_q as a function of projection l



Basic version



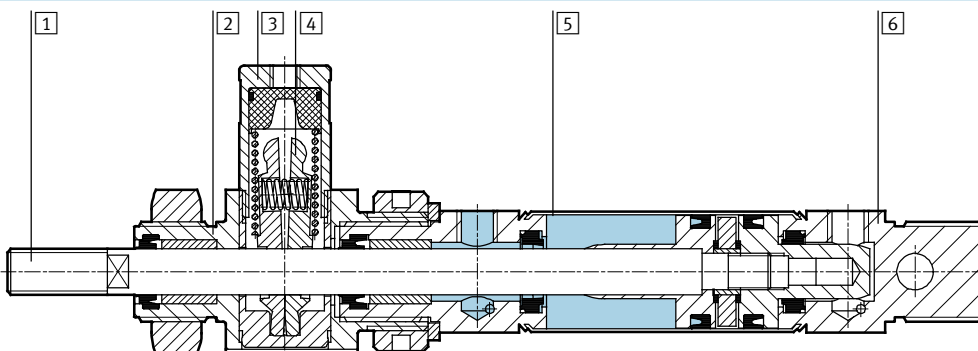
S2 – Through piston rod



- $\varnothing 32$
- $\varnothing 40$
- $\varnothing 50/63$

Materials

Sectional view



Round cylinder	Basic version	R3
1 Piston rod	High-alloy steel	High-alloy stainless steel
2 Bearing cap	Anodised aluminium	
3 Housing, clamping unit	Wrought aluminium alloy	
4 Clamping jaws	Brass	
5 Cylinder barrel	High-alloy stainless steel	
6 End cap	Anodised aluminium	
- Piston, clamping unit	Polyacetate	
- Spring	Spring steel	
- Seals	Polyurethane, nitrile rubber	
Note on materials	RoHS compliant	

Round cylinders DSNU-KP, with clamping unit

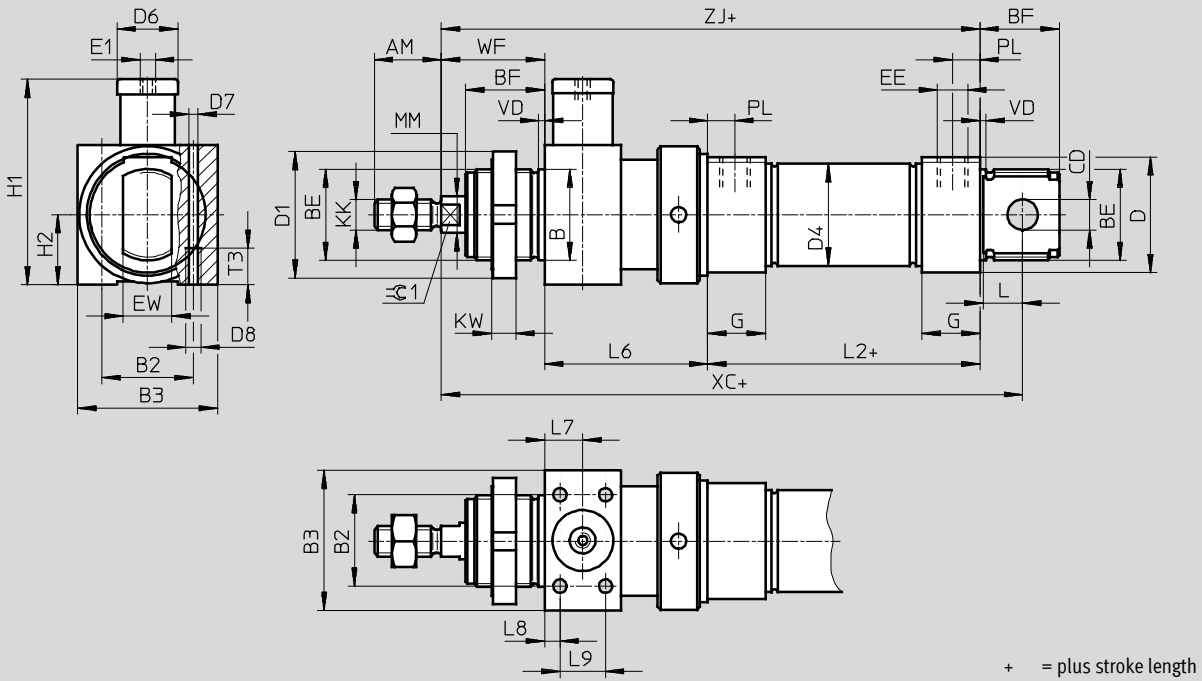
Technical data

FESTO

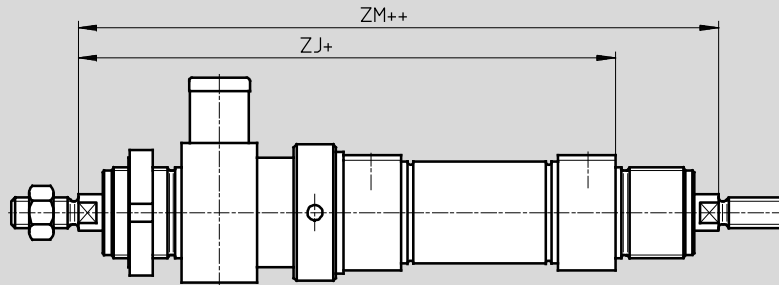
Dimensions

Download CAD data → www.festo.com

Basic version



S2 – Through piston rod



- Note

The thread types at both piston rod ends are identical. The clamping unit is mounted on only one side.

In combination with variant Q, the right-hand piston rod is square, the left-hand piston rod round.

The clamping unit is mounted on the left-hand, round piston rod.

+ = plus stroke length

++ = plus 2x stroke length

Round cylinders DSNU-KP, with clamping unit

Technical data

∅ [mm]	AM	B ∅ h9	B2	B3	BE	BF	CD ∅ E10	D ∅	D1 ∅	D4 ∅	D6	D7
32	22	30	30	46	M30x1.5	26	10	38	42	33.6	20	4.4
40	24	38	36	56	M38x1.5	30	12	46	50	41.6	24	6.8
50	32	45	50	65	M45x1.5	33	16	57	60	52.4	30	8.5
63			54	72	M45x1.5			70		65.4	38	

∅ [mm]	D8	E1	EE	EW	G	H1	H2	KK	KW	MM ∅	L	L2
32	M5	M5	G $\frac{1}{8}$	16	19	67.5	23	M10x1.25	8	12	13	69.5
40	M8	G $\frac{1}{8}$	G $\frac{1}{4}$	18	25	89	28	M12x1.25	10	16	15	84.6
50	M10	G $\frac{1}{8}$		21		107.5	32.5	M16x1.5		20	16	86.2
63		G $\frac{1}{8}$	G $\frac{3}{8}$	28	121.5	36	94.2					

∅ [mm]	L6 ±0.75	L7	L8	L9	T3	PL	VD	WF	XC ±1	ZJ	ZM	≈±1
32	55	12.5	5	15	12	9	2	34.5	173	159	191	10
40	69	17	7	20	18	12	3	40.5	210.1	194.1	230.1	13
50	78	20		26	20			45.5	226.7	209.7	250.7	17
63	86	24	8	32	21	13		46.5	243.7	226.7	268.7	

Round cylinders DSNU


Ordering data – Modular products

M Mandatory data					O Options →			
Module No.	Function	Piston Ø	Stroke	Cushioning	Position sensing	Cylinder end cap	Type of piston rod	Extended male thread
193 992	DSNU	32	1 ... 500	P	A	MQ	S2	...K2
193 993		40		PPV		MA		
193 994		50		PPS		MH		
193 995		63						
Order example								
193 994	DSNU	50	400	PPV	A	MQ		

Ordering table								
Size	32	40	50	63	Condi- tions	Code	Enter code	
M Module No.	193 992	193 993	193 994	193 995				
Function	Double-acting round cylinder						DSNU	DSNU
Piston Ø [mm]	32	40	50	63		-...		
Stroke [mm]	1 ... 500					-...		
Cushioning	Flexible cushioning rings/pads at both ends					-P		
	Pneumatic cushioning, adjustable at both ends				1	-PPV		
	Pneumatic cushioning, self-adjusting at both ends				15	-PPS		
O Position sensing	Via proximity sensor				2	-A		
Cylinder end cap	Lateral air connection, end cap				3	-MQ		
	Axial air connection, end cap				4	-MA		
	Mounting flange at front (direct mounting), bearing cap				5	-MH		
Type of piston rod	Through piston rod				6	-S2		
Extended male thread [mm]	Piston rod with extended male thread				7	-...K2		
	1 ... 35		1 ... 70					

- 1 **PPV** Not with MA
- 2 **A** Minimum stroke: 10 mm
- 3 **MQ** Not with S2, S10, S11
- 4 **MA** Not with S2, S10, S11, R8

- 5 **MH** Not with combination S6-R3
Not with KP, S10, S11, R8
- 6 **S2** Not with MQ, MA, S10, S11
- 7 **K2** Not with K3, K6
- 15 **PPS** Not with MA, MH, S6, S10, S11
and not with combination MQ-R3

 **Note**

The bellows kit DADB must not be used in combination with the variant MH.

The running characteristics change slightly when the bellows kit DADB is combined with the variant S10 or S11.

Transfer order code

DSNU - - - - - - - -

Round cylinders DSNU

Ordering data – Modular products

FESTO

→ <input type="checkbox"/> Options									
Shortened male thread	Female thread	Special thread	Extended piston rod	Clamping unit	Temperature resistance	Slow speed (constant motion)	Running characteristics	Corrosion protection	Wiper seal
...K6	K3	"..."K5	...K8	KP	S6	S10	S11	R3	R8
- 8K6	-	-	-	-	- S6	-	-	- R3	-

Ordering table							
Size	32	40	50	63	Condi- tions	Code	Enter code
<input type="checkbox"/> Shortened male thread	Piston rod with shortened male thread						
<input type="checkbox"/> [mm]	1 ... 8		1 ... 10		<input type="checkbox"/> 8	-...K6	
Female thread	Piston rod with female thread						
	(M6)	(M8)	(M10)		<input type="checkbox"/> 9	-K3	
Special thread	Piston rod with special thread						
	M10	M12	M16			-"..."K5	
Piston rod extended at one end	Extended piston rod at one end						
[mm]	1 ... 500						...K8
Clamping unit	Attached				<input type="checkbox"/> 10	-KP	
Temperature resistance	Heat-resistant seals for temperatures up to 120 °C				<input type="checkbox"/> 11	-S6	
Slow speed (constant motion)	Slow speed (constant motion at low piston speeds)				<input type="checkbox"/> 12	-S10	
Running characteristics	Low friction				<input type="checkbox"/> 13	-S11	
Corrosion protection	High corrosion protection				<input type="checkbox"/> 14	-R3	
Wiper seal	Metal wiper seal					-R8	

- K6** Not with K3
- K3** Not with K5
- KP** Not with S6, S10, S11, R3, R8

- S6** Not with S10, S11
- S10** Not with S11, R3, R8
- S11** Not with R3, R8
- R3** Not with R8

Transfer order code

- - - - - - - - - - -

Round cylinders DSNU-Q, protected against rotation


Ordering data – Modular products

M Mandatory data					O Options →				
Module No.	Function	Piston Ø	Stroke	Cushioning	Position sensing	Cylinder end cap	Protection against rotation	Type of piston rod	Extended male thread
193 992	DSNU	32	1 ... 500	P	A	MQ	Q	S2	...K2
193 993		40		PPV		MA			
193 994		50				MH			
193 995		63							
Order example									
193 992	DSNU	32	500	P	A	MA	Q		

Ordering table										
Size	32	40	50	63	Condi- tions	Code	Enter code			
M Module No.	193 992	193 993	193 994	193 995						
Function	Double-acting round cylinder						DSNU	DSNU		
Piston Ø [mm]	32	40	50	63		-...				
Stroke [mm]	1 ... 500					-...				
Cushioning	Flexible cushioning rings/pads at both ends					-P				
	Pneumatic cushioning, adjustable at both ends				1	-PPV				
O Position sensing	Via proximity sensor				2	-A				
Cylinder end cap	Lateral air connection, end cap				3	-MQ				
	Axial air connection, end cap				3	-MA				
	Mounting flange at front (direct mounting), bearing cap				4	-MH				
Protection against rotation	Square piston rod					-Q	-Q			
	Restricted stroke [mm]				5 ... 300	5 ... 400	5 ... 500			
Type of piston rod	Through piston rod					-S2				
Extended male thread	Piston rod with extended male thread									
	[mm]	1 ... 35		1 ... 70		5	-...K2			

- 1 PPV Not with MA
- 2 A Minimum stroke: 10 mm
- 3 MQ, MA Not with S2

- 4 MH Not with combinations: Q-R3, S6-R3
- Not with KP
- 5 K2 Not with K3, K6

 Note
The bellows kit DADB must not be used in combination with the variant Q.

Transfer order code

Round cylinders DSNU-Q, protected against rotation

Ordering data – Modular products

→ 0 Options						
Male thread shortened at one end	Female thread	Special thread	Extended piston rod	Clamping unit	Temperature resistance	Corrosion protection
...K6	K3	"..."K5	...K8	KP	S6	R3
-	- K3 -	-	-	- KP -	-	-

Ordering table							
Size	32	40	50	63	Condi- tions	Code	Enter code
↓ Shortened male thread	Piston rod with shortened male thread						
0 Shortened male thread [mm]	1 ... 8	1 ... 10			6	-...K6	
Female thread	Piston rod with female thread						
	(M6)	(M8)	(M10)		7	-K3	
Special thread	Piston rod with special thread						
	M10	M12	M16			-"...K5	
Piston rod extended at one end	Extended piston rod at one end						
[mm]	1 ... 500						...K8
Clamping unit	Attached					8	-KP
Temperature resistance	Heat-resistant seals for temperatures up to 120 °C						-S6
Corrosion protection	High corrosion protection						-R3

6 **K6** Not with K3
7 **K3** Not with K5

8 **KP** Only with S2
Not with S6, R3

Transfer order code

- [] - [] - [] - [] - [] - [] - []

Round cylinders ESNU

Technical data

FESTO

Function



Ø - Diameter
32 ... 63 mm

l - Stroke length
1 ... 50 mm

Additional variants

→ 33



Basic version



Axial air connection MA

General technical data				
Piston Ø	32	40	50	63
Pneumatic connection	G $\frac{1}{8}$	G $\frac{1}{4}$	G $\frac{1}{4}$	G $\frac{3}{8}$
Piston rod thread	M10x1.25	M12x1.25	M16x1.5	M16x1.5
Constructional design	Piston			
	Piston rod			
	Cylinder barrel			
Cushioning	Flexible cushioning rings/pads at both ends			
Position sensing	Via proximity sensor			
Type of mounting	Via accessories			
Mounting position	Any			

Operating conditions				
Piston Ø	32	40	50	63
Operating medium	Compressed air in accordance with ISO 8573-1:2010 [7:4:4]			
Note on operating/ pilot medium	Operation with lubricated medium possible (in which case lubricated operation will always be required)			
Operating pressure [bar]	1.2 ... 10			

Ambient conditions		
Round cylinder		
Ambient temperature ¹⁾ [°C]	-20 ... +80	
Corrosion resistance class CRC ²⁾	2	

1) Note operating range of proximity sensors.

2) Corrosion resistance class 2 as per Festo standard 940 070

Components subject to moderate corrosion stress. Externally visible parts with primarily decorative surface requirements which are in direct contact with a normal industrial environment or media such as coolants or lubricating agents.

Round cylinders ESNU

Technical data

FESTO

Force [N] and impact energy [J]				
Piston Ø	32	40	50	63
Theoretical force at 6 bar, advancing	442	688	1,071	1,763
Spring return force 10 mm stroke	36	60	95	95
Spring return force 25 mm stroke	30	50	82	82
Spring return force 50 mm stroke	20	30	60	60
Impact energy at the end positions ¹⁾	0.40	0.70	1	1.3

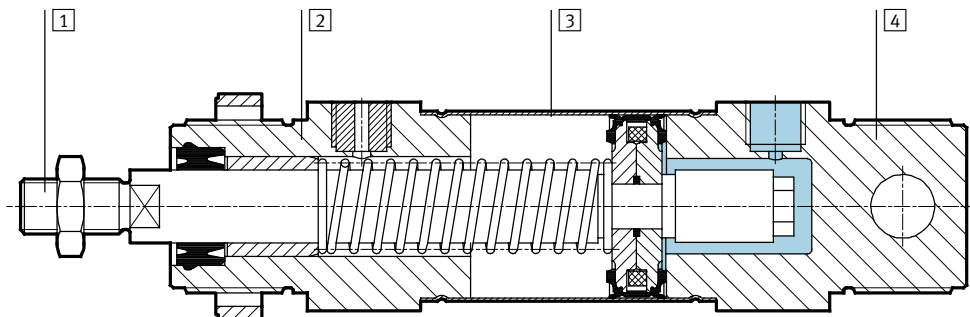
1) The values are reduced by approx. 50% at an ambient temperature of 80 °C.

Weight ESNU-... [g]				
Piston Ø	32	40	50	63
Product weight with 0 mm stroke	370.5	661	1,087	1,445
Additional weight per 10 mm stroke	15.5	24	40	44

Weight ESNU-...-MA [g]				
Piston Ø	32	40	50	63
Product weight with 0 mm stroke	330	585	1,013	1,369
Additional weight per 10 mm stroke	15.5	24	40	44

Materials

Sectional view



Round cylinder	
1	Piston rod High-alloy steel
2	Bearing cap Anodised aluminium
3	Cylinder barrel High-alloy stainless steel
4	End cap Anodised aluminium
-	Seals Polyurethane, nitrile rubber
-	Spring Spring steel
Note on materials RoHS compliant	

Round cylinders ESNU

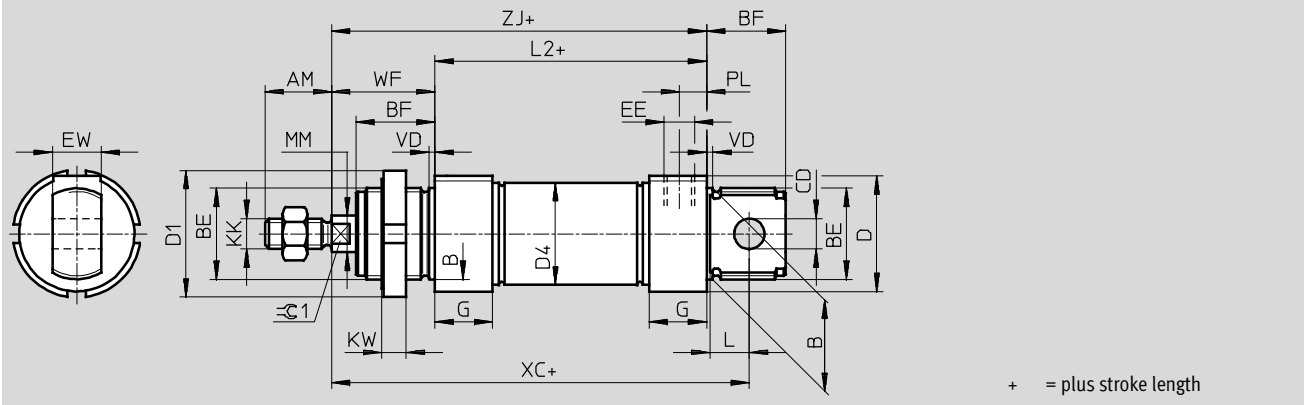
Technical data

FESTO

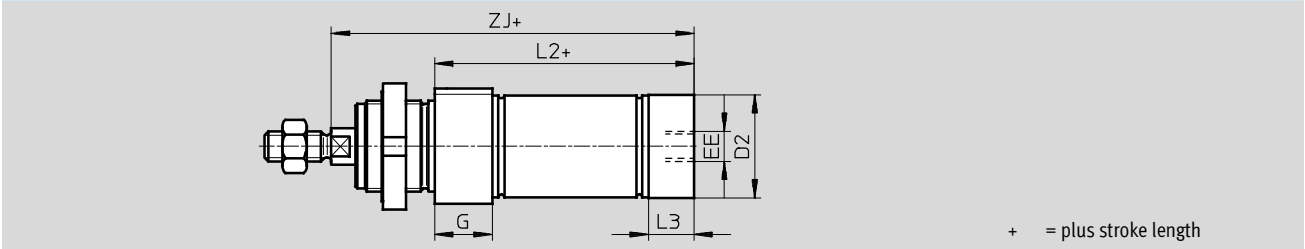
Dimensions

Download CAD data → www.festo.com

Basic version



MA – Axial air connection



∅	AM	B	BE	BF	CD	D	D1	D2	D4	EE	EW	G	KK
[mm]		∅ h9			∅ E10	∅	∅	∅	∅				
32	22	30	M30x1.5	26	10	38	42	34	33.6	G $\frac{1}{8}$	16	19	M10x1.25
40	24	38	M38x1.5	30	12	46	50	42	41.6	G $\frac{1}{4}$	18	25	M12x1.25
50	32	45	M45x1.5	33	16	57	60	53	52.4		21	28	M16x1.5
63						70	60	66	65.4	G $\frac{3}{8}$			

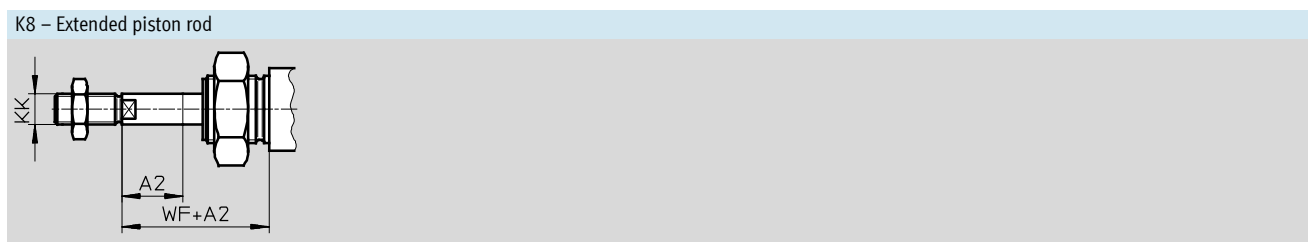
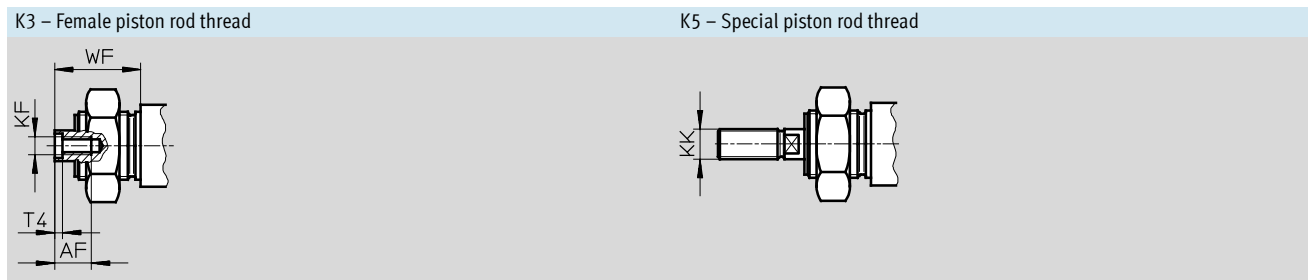
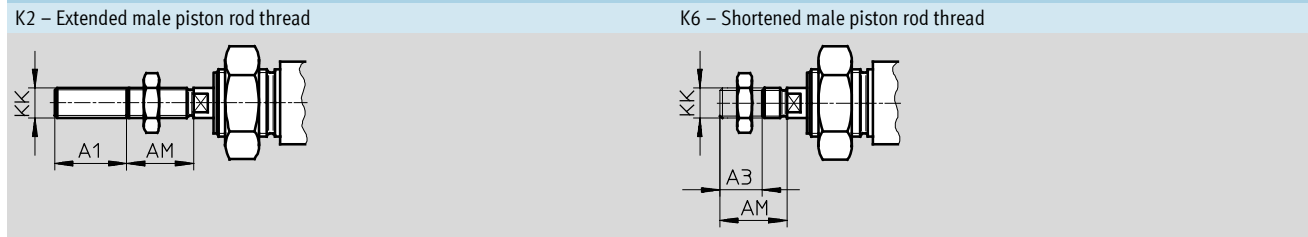
∅	KW	L	L2		L3	PL	MM	VD	WF	XC	ZJ		$\approx C1$
[mm]				-MA			∅			±1		-MA	
32	8	13	69.5	65.5	15	9	12	2	34	117.5	103.5	99.5	10
40	10	15	84.6	77.6	18	12	16	3	39	139.6	123.6	116.6	13
50		16	86.2	86.2	25		20		44	147.2	130.2	130.2	17
63		94.2	94.2	28	13	45	156.2		139.2	139.2			

Round cylinders ESNU

Technical data

FESTO

Dimensions Download CAD data → www.festo.com



∅ [mm]	A1 max.	A2 max.	A3 max.	AF	AM	KF	KK		T4	WF
							Basic thread	Special thread ¹⁾		
32	35	50	8	12	22	M6	M10x1.25	M10	2.6	34
40						M8	M12x1.25	M12	3.3	39
50			10	16	32	M10	M16x1.5	M16	4.7	44
63										45

1) The special threads are only available as male threads. The scope of delivery does not include a hex nut for the piston rod thread.

Ordering data						
Type	Piston ∅ [mm]	Stroke [mm]	Without position sensing		With position sensing	
			Part No.	Type	Part No.	Type
	32	10	195 870	ESNU-32-10-P	196 376	ESNU-32-10-P-A
		25	195 871	ESNU-32-25-P	196 377	ESNU-32-25-P-A
		50	195 872	ESNU-32-50-P	196 378	ESNU-32-50-P-A
	40	10	195 873	ESNU-40-10-P	196 379	ESNU-40-10-P-A
		25	195 874	ESNU-40-25-P	196 380	ESNU-40-25-P-A
		50	195 875	ESNU-40-50-P	196 381	ESNU-40-50-P-A
	50	10	195 876	ESNU-50-10-P	196 382	ESNU-50-10-P-A
		25	195 877	ESNU-50-25-P	196 383	ESNU-50-25-P-A
		50	195 878	ESNU-50-50-P	196 384	ESNU-50-50-P-A
	63	10	195 879	ESNU-63-10-P	196 385	ESNU-63-10-P-A
		25	195 880	ESNU-63-25-P	196 386	ESNU-63-25-P-A
		50	195 881	ESNU-63-50-P	196 387	ESNU-63-50-P-A

Round cylinders ESNU

Ordering data – Modular products



M Mandatory data					O Options →	
Module No.	Function	Piston Ø	Stroke	Cushioning	Position sensing	End cap
194 002	ESNU	32	1 ... 50	P	A	MA
194 003		40				
194 004		50				
194 005		63				
Order example						
194 002	ESNU	- 32	- 45	- P	- A	- MA

Ordering table							
Size	32	40	50	63	Condi- tions	Code	Enter code
M Module No.	194 002	194 003	194 004	194 005			
Function	Single-acting round cylinder					ESNU	ESNU
Piston Ø [mm]	32	40	50	63		-...	
Stroke [mm]	1 ... 50					-...	
Cushioning	Flexible cushioning rings/pads at both ends					-P	-P
O Position sensing	Via proximity sensor				1	-A	
↓ End cap	Axial air connection					-MA	

1 A Minimum stroke: 10 mm

Transfer order code

Round cylinders ESNU

Ordering data – Modular products



Options				
Extended male thread	Shortened male thread	Female thread	Special thread	Extended piston rod
...K2	...K6	K3	"..."K5	...K8
50K2	-	-	"M10"K5	30K8

Ordering table							
Size	32	40	50	63	Condi- tions	Code	Enter code
↓							
0	Extended male thread [mm]	Piston rod with extended male thread 1 ... 35			2	-...K2	
	Shortened male thread [mm]	Piston rod with shortened male thread 1 ... 8		1 ... 10		-...K6	
	Female thread	Piston rod with female thread (M6) (M8) (M10)			3	-K3	
	Special thread	Piston rod with special thread M10 M12 M16				-"...K5	
	Extended piston rod [mm]	Extended piston rod 1 ... 50				...K8	

- 2 **K2** Not with female thread K3, shortened male thread K6
- 3 **K3** Not with special thread K5, shortened male thread K6

Transfer order code

- - - -

Round cylinders DSNU/ESNU

Accessories



Foot mounting HBN/CRH

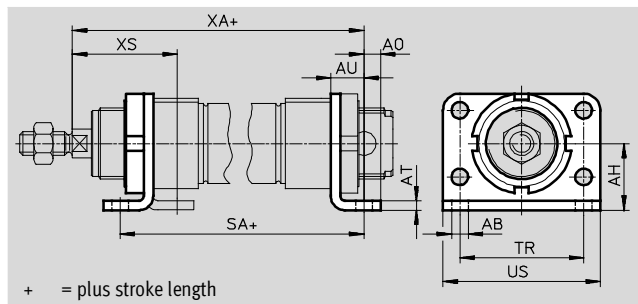
Material:

HBN: Galvanised steel

CRH: High-alloy stainless steel

Free of copper and PTFE

RoHS-compliant



Dimensions and ordering data

For \varnothing [mm]	AB \varnothing	AH	AO	AT	AU	SA		TR	US	XA		XS	
							-KP				-KP		-KP
32	7	28	7	4	14	97.5	151	52	66	117.5	171	44	-
40	9	33	10	5	20	124.6	192.1	60	80	138.6	206.1	49	-
50	9	40	10	6	20	126.2	202.7	70	90	150.2	226.7	58	-
63	9	45	10	6	20	134.2	218.7	76	96	159.2	243.7	59	-

For \varnothing [mm]	Basic version				High corrosion protection			
	CRC ¹⁾	Weight [g]	Part No.	Type	CRC ¹⁾	Weight [g]	Part No.	Type
32	2	247	195 851	HBN-32x2	4	237	162 951	CRH-32
40	2	446	195 852	HBN-40x2	4	341	162 952	CRH-40
50	2	666	195 853	HBN-50x2	4	559	162 953	CRH-50
63	2	816	195 854	HBN-63x2	4	680	162 954	CRH-63

Flange mounting FBN/CRFV

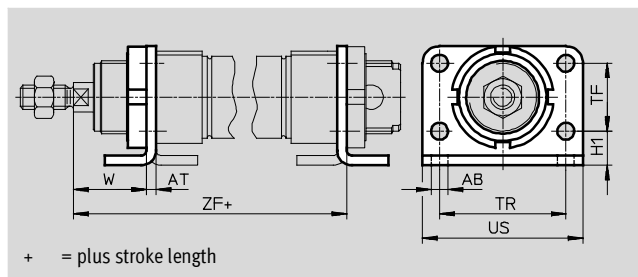
Material:

FBN: Galvanised steel

CRFV: High-alloy stainless steel

Free of copper and PTFE

RoHS-compliant



Dimensions and ordering data

For \varnothing [mm]	AB \varnothing	AT	H1	TF	TR	US	W	ZF	
									-KP
32	7	4	14	28	52	66	30	107.5	161
40	9	5	18	30	60	80	29	123.6	191.1
50	9	6	20	40	70	90	38	136.2	212.6
63	9	6	20	50	76	96	39	145.2	229.7

For \varnothing [mm]	Basic version				High corrosion protection			
	CRC ¹⁾	Weight [g]	Part No.	Type	CRC ¹⁾	Weight [g]	Part No.	Type
32	2	102	195 855	FBN-32	4	102	161 858	CRFV-32
40	2	190	195 856	FBN-40	4	190	161 859	CRFV-40
50	2	290	195 857	FBN-50	4	290	161 860	CRFV-50
63	2	365	195 858	FBN-63	4	365	161 861	CRFV-63

1) Corrosion resistance class 2 as per Festo standard 940 070

Components subject to moderate corrosion stress. Externally visible parts with primarily decorative surface requirements which are in direct contact with a normal industrial environment or media such as coolants or lubricating agents.

Corrosion resistance class 4 as per Festo standard 940 070

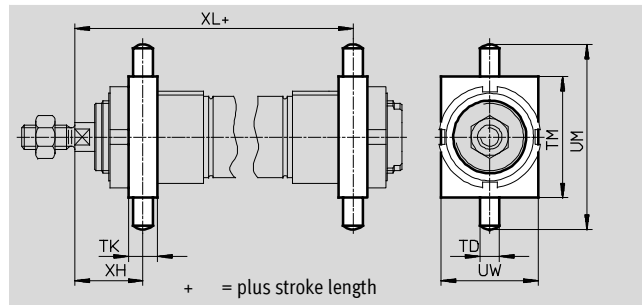
Components requiring higher corrosion resistance. Parts used with aggressive media, e.g. food or chemical industry. These applications should be supported with special tests with the media if required.

Round cylinders DSNU/ESNU

Accessories

Swivel mounting WBN

Material:
Galvanised steel
Free of copper and PTFE
RoHS-compliant
Cannot be used on the bearing cap in combination with bellows kit DADB.

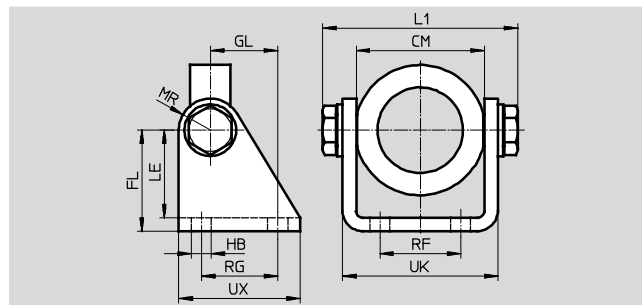


Dimensions and ordering data												
For \varnothing	TD	TK	TM	UM	UW	XH	XL		CRC ¹⁾	Weight	Part No.	Type
[mm]	\varnothing f8							-KP		[g]		
32	8	12	50	76	40	28	109.5	163	2	130	195 863	WBN-32
40	10	15	60	92	50	31.5	126.1	193.6	2	240	195 864	WBN-40
50	12	20	80	116	65	34	140.2	216.7	2	610	195 865	WBN-50/63
63	12	20	80	116	65	35	149.2	233.7	2	610	195 865	WBN-50/63

1) Corrosion resistance class 2 as per Festo standard 940 070
Components subject to moderate corrosion stress. Externally visible parts with primarily decorative surface requirements which are in direct contact with a surrounding industrial atmosphere or media such as cooling or lubricating agents.

Swivel mounting SBN

Material:
Mounting ring: Wrought aluminium alloy, anodised
Bearing: Bronze
Screws: Galvanised steel
Bracket: Steel
Cannot be used on the bearing cap in combination with bellows kit DADB.



Dimensions and ordering data															
For \varnothing	CM	FL	GL	HB	L1	LE	MR	RF	RG	UK	UX	CRC ¹⁾	Weight	Part No.	Type
[mm]					max.								[g]		
32	46.1+0.2	40	27	9	72.2	35	13	28	30	56.1	50	2	295	539 924	SBN-32
40	57.1+0.2	45	30	9	88.2	39	14	36	34	69.1	54	2	465	539 925	SBN-40
50/63	70.1+0.4	50	34	9	102.2	44	16	42	35	82.1	65	2	670	539 926	SBN-50/63

1) Corrosion resistance class 2 as per Festo standard 940 070
Components subject to moderate corrosion stress. Externally visible parts with primarily decorative surface requirements which are in direct contact with a surrounding industrial atmosphere or media such as cooling or lubricating agents.

Round cylinders DSNU/ESNU

Accessories

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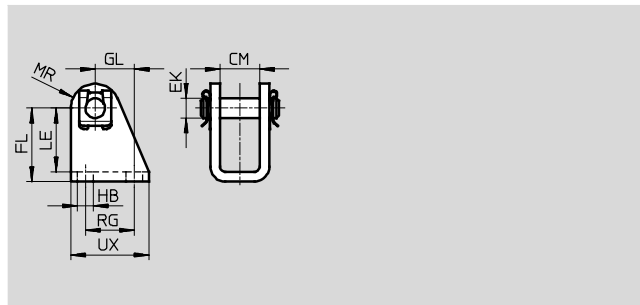
Clevis foot LBN/CRLBN

Material:

LBN: Galvanised steel

CRLBN: High-alloy stainless steel

Free of copper and PTFE



Dimensions and ordering data									
For \varnothing	CM	EK \varnothing	FL	GL	HB	LE	MR	RG	UX
[mm]									
32	16.1	10	35 +0.4/-0.2	18.5	6.6	31	11	24	35
40	18.1	12	40 +0.4/-0.2	24.5	9	35	13	30	45
50, 63	21.1	16	45 +0.5/-0.2	28	9	39	14	34	50

For \varnothing	Basic version				High corrosion protection			
	CRC ¹⁾	Weight [g]	Part No.	Type	CRC ¹⁾	Weight [g]	Part No.	Type
32	2	109	195 860	LBN-32	4	107	195 866	CRLBN-32
40	2	192	195 861	LBN-40	4	184	195 867	CRLBN-40
50, 63	2	302	195 862	LBN-50/63	4	289	195 868	CRLBN-50/63

1) Corrosion resistance class 2 as per Festo standard 940 070

Components subject to moderate corrosion stress. Externally visible parts with primarily decorative surface requirements which are in direct contact with a normal industrial environment or media such as coolants or lubricating agents.

Corrosion resistance class 4 as per Festo standard 940 070





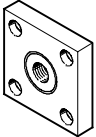
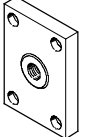
Components requiring higher corrosion resistance. Parts used with aggressive media, e.g. food or chemical industry. These applications should be supported with special tests with the media if required.



Ordering data – Mounting attachments				Technical data → Internet: clevis foot			
Designation	For \varnothing	Part No.	Type	Designation	For \varnothing	Part No.	Type
Clevis foot LBG				Right-angle clevis foot LQG			
	32	31 761	LBG-32		32	31 768	LQG-32
	40	31 762	LBG-40		40	31 769	LQG-40
	50	31 763	LBG-50		50	31 770	LQG-50
	63	31 764	LBG-63		63	31 771	LQG-63



Round cylinders DSNU/ESNU


Accessories

FESTO

Ordering data – Piston rod attachments				Technical data → Internet: piston rod attachment			
Designation	For Ø	Part No.	Type	Designation	For Ø	Part No.	Type
Rod eye SGS				Rod clevis SGA			
	32	9 261	SGS-M10x1,25		32	32 954	SGA-M10x1,25
	40	9 262	SGS-M12x1,25		40	10 767	SGA-M12x1,25
	50	9 263	SGS-M16x1,5		50	10 768	SGA-M16x1,5
	63				63		
Rod clevis SG				Self-aligning rod coupler FK			
	32	6 144	SG-M10x1,25		32	6 140	FK-M10x1,25
	40	6 145	SG-M12x1,25		40	6 141	FK-M12x1,25
	50	6 146	SG-M16x1,5		50	6 142	FK-M16x1,5
	63				63		
Coupling piece KSG				Coupling piece KSZ			
	32	32 963	KSG-M10x1,25		32	36 125	KSZ-M10x1,25
	40	32 964	KSG-M12x1,25		40	36 126	KSZ-M12x1,25
	50	32 965	KSG-M16x1,5		50	36 127	KSZ-M16x1,5
	63				63		

Ordering data – Piston rod attachments, corrosion-resistant				Technical data → Internet: crsg			
Designation	For Ø	Part No.	Type	Designation	For Ø	Part No.	Type
Rod eye CRSGS				Rod clevis CRSG			
	32	195 582	CRSGS-M10x1,25		32	13 569	CRSG-M10x1,25
	40	195 583	CRSGS-M12x1,25		40	13 570	CRSG-M12x1,25
	50	195 584	CRSGS-M16x1,5		50	13 571	CRSG-M16x1,5
	63				63		

Ordering data – One-way flow control valves				Technical data → Internet: grl					
	Connection		Material	Part No.	Type				
	Thread	For tubing O.D.							
For exhaust air									
	G ¹ / ₈	3	Metal design	193 142	GRLA- ¹ / ₈ -QS-3-D				
		4		193 143	GRLA- ¹ / ₈ -QS-4-D				
		6		193 144	GRLA- ¹ / ₈ -QS-6-D				
		8		193 145	GRLA- ¹ / ₈ -QS-8-D				
	G ¹ / ₄	6		193 146	GRLA- ¹ / ₄ -QS-6-D				
		8		193 147	GRLA- ¹ / ₄ -QS-8-D				
		10		193 148	GRLA- ¹ / ₄ -QS-10-D				
	G ³ / ₈	6		193 149	GRLA- ³ / ₈ -QS-6-D				
		8		193 150	GRLA- ³ / ₈ -QS-8-D				
		10		193 151	GRLA- ³ / ₈ -QS-10-D				
	For supply air								
		G ¹ / ₈		3	Metal design	193 156	GRLZ- ¹ / ₈ -QS-3-D		
4			193 157	GRLZ- ¹ / ₈ -QS-4-D					
6			193 158	GRLZ- ¹ / ₈ -QS-6-D					
8			193 159	GRLZ- ¹ / ₈ -QS-8-D					

Ordering data – One-way flow control valves, corrosion-resistant				Technical data → Internet: crgla			
	Connection		Material	Part No.	Type		
	Thread	For push-in fitting					
For exhaust air							
	G ¹ / ₈	CRQS/CRQSL/CRQST	Electrolytically polished stainless steel casting	161 404	CRGRLA- ¹ / ₈ -B		
	G ¹ / ₄			161 405	CRGRLA- ¹ / ₄ -B		
	G ³ / ₈			161 406	CRGRLA- ³ / ₈ -B		

Round cylinders DSNU/ESNU

Accessories

FESTO

Bellows kit DADB



General technical data						
Type DADB-S1-		32	40	50	63	
Max. cylinder stroke range ¹⁾	DSNU [mm]	10 ... 500	10 ... 500	10 ... 500	10 ... 500	10 ... 500
	ESNU ²⁾ [mm]	10 ... 50	10 ... 50	10 ... 50	10 ... 50	10 ... 50
Type of mounting	Via threaded pin					
Mounting position	Any					
Resistance to media	Dust, chips, oil, grease, fuel (→ Internet: media resistance)					
Ambient temperature ³⁾	[°C]	-10 ... +80				
Protection class	IP54					
Corrosion resistance class CRC ⁴⁾	3					

1) In combination with the bellows kit DADB.

2) Slight change in the spring return force.

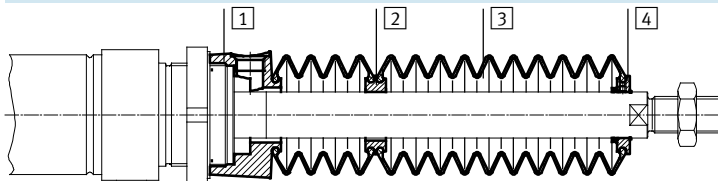
3) Note operating range of proximity sensors and cylinder.

4) Corrosion resistance class 3 as per Festo standard 940 070

Components with heavy corrosion exposure. Externally visible components in direct contact with normal industrial atmosphere or media such as solvents and cleaning agents, where the surface requirement is predominantly functional.

Materials

Sectional view



Bellows		
1	Connection	Polyamide
2	Intermediate piece	Polyamide
3	Bellows	Nitrile rubber
4	End piece	Polyamide
-	O-ring	Nitrile rubber
Note on materials		Free of copper and PTFE RoHS-compliant

Weight [g]				
Type DADB-S1- Stroke [mm]	32	40	50	63
10 ... 50	29	34	55	55
51 ... 125	41	49	75	75
126 ... 175	51	60	89	89
176 ... 250	66	78	113	113
251 ... 300	79	93	131	131
301 ... 350	92	108	149	149
351 ... 375	92	108	151	151
376 ... 425	104	122	169	169
426 ... 475	117	137	187	187
476 ... 500	117	137	189	189

Round cylinders DSNU/ESNU

Accessories

Travel velocity v as a function of tubing length l

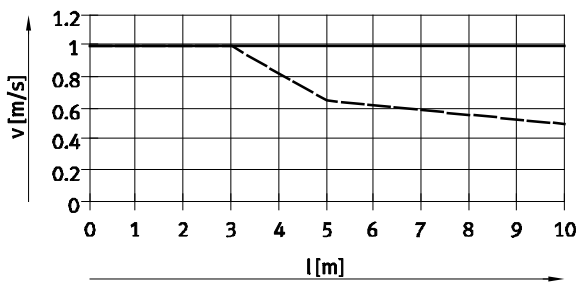


The bellows kit is a leak-free system. To prevent unwanted media being drawn in, the supply and exhaust air must be ducted via a pressure compensation hole in the connection

part **1**. The pressure generated in the bellows kit by the positioning motion is primarily defined by travel velocity

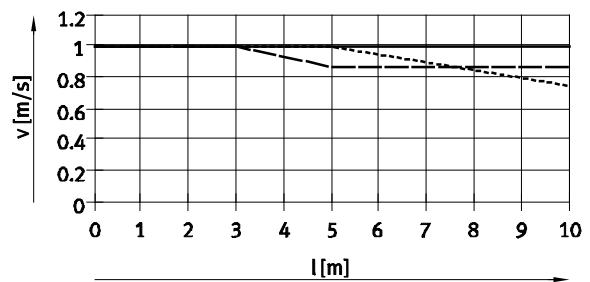
and tubing length. The recommended tubing length based on the travel velocity of the drive can be read from the graph.

Advancing



— Ø 32/50/63
- - - Ø 40

Returning



— Ø 32
- - - Ø 40
· · · Ø 50/63

Note

The push-in fittings opposite must be used for the pressure compensation hole.

Silencers can also be used as an alternative. This reduces the travel velocity slightly.

Tubing size and push-in fitting for pressure compensation hole

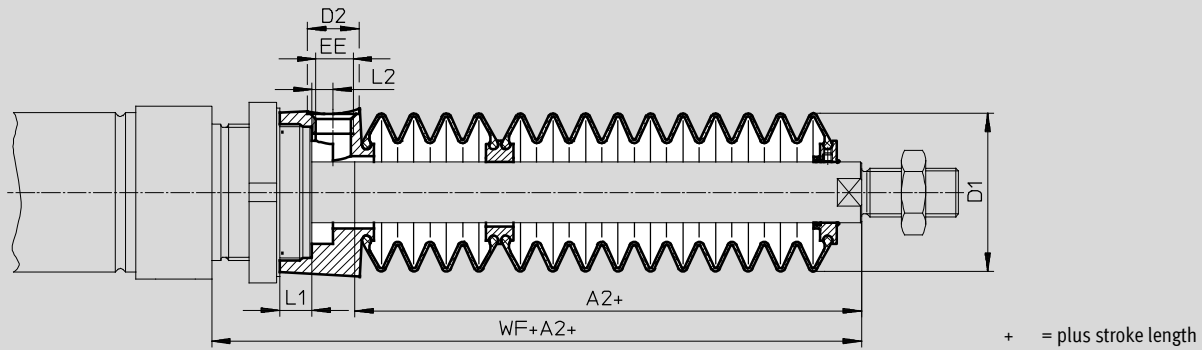
Ø [mm]	Tubing O.D. [mm]	Push-in fitting	
		Part No.	Type
32, 40	8	186 109	QS-G $\frac{1}{8}$ -8-I
		578 376	NPQH-DK-G18-Q8-P10
		578 362	NPQH-D-G18-S8-P10
50, 63	12	186 350	QS-G $\frac{1}{4}$ -12
		578 344	NPQH-D-G14-Q12-P10
		578 366	NPQH-D-G14-S12-P10

Round cylinders DSNU/ESNU

Accessories

Dimensions

Download CAD data → www.festo.com



Ø Stroke [mm]	32							40						
	A2 ¹⁾	D1 max.	D2	EE	L1	L2	WF+A2	A2 ¹⁾	D1 max.	D2	EE	L1	L2	WF+A2
10 ... 50	30	38	14	G1/8	12.9	5.4	64	29	46	14	G1/8	8.1	5.4	68
51 ... 125	48						82	44						83
126 ... 175	63						97	57						96
176 ... 250	82						116	73						112
251 ... 300	97						131	87						126
301 ... 350	113						147	101						140
351 ... 375	115						149	102						141
376 ... 425	131						165	116						155
426 ... 475	147						181	131						170
476 ... 500	149						183	132						171

Ø Stroke [mm]	50/63						
	A2 ¹⁾	D1 max.	D2	EE	L1	L2	WF+A2
10 ... 50	30	57	17	G1/4	10.65	7	74/75
51 ... 125	48						92/93
126 ... 175	58						102/103
176 ... 250	77						121/122
251 ... 300	88						132/133
301 ... 350	99						143/144
351 ... 375	106						150/151
376 ... 425	117						161/162
426 ... 475	128						172/173
476 ... 500	135						179/180

1) The dimension corresponds to the K8 value (extended piston rod) of the drive

Round cylinders DSNU/ESNU

Accessories

Ordering data – Bellows kit

An extended piston rod (order code K8) is absolutely necessary when using a bellows kit.
→ Ordering data – Modular products.

The necessary dimension for K8 as a function of piston diameter and cylinder stroke as well as the associated bellows kit is indicated in the following table:

Order example:


Selected standard cylinder:
DSNU-32-320-PPV-A-MQ-...
Dimension for the corresponding K8 value (see table):
113 mm
Complete type designation for the standard cylinder:
DSNU-32-320-PPV-A-MQ-...-113K8
Associated bellows kit:
DADB-S1-32-S301-350


Cylinder data			Bellows kit		Cylinder data			Bellows kit	
∅	Stroke	Dimension for K8	Part No.	Type	∅	Stroke	Dimension for K8	Part No.	Type
[mm]	[mm]	[mm]			[mm]	[mm]	[mm]		
32	10 ... 50	30	553 441	DADB-S1-32-S10-50	40	10 ... 50	29	553 461	DADB-S1-40-S10-50
	51 ... 125	48	553 443	DADB-S1-32-S51-125		51 ... 125	44	553 463	DADB-S1-40-S51-125
	126 ... 175	63	553 445	DADB-S1-32-S126-175		126 ... 175	57	553 465	DADB-S1-40-S126-175
	176 ... 250	82	553 447	DADB-S1-32-S176-250		176 ... 250	73	553 467	DADB-S1-40-S176-250
	251 ... 300	97	553 449	DADB-S1-32-S251-300		251 ... 300	87	553 469	DADB-S1-40-S251-300
	301 ... 350	113	553 451	DADB-S1-32-S301-350		301 ... 350	101	553 471	DADB-S1-40-S301-350
	351 ... 375	115	553 453	DADB-S1-32-S351-375		351 ... 375	102	553 473	DADB-S1-40-S351-375
	376 ... 425	131	553 455	DADB-S1-32-S376-425		376 ... 425	116	553 475	DADB-S1-40-S376-425
	426 ... 475	147	553 457	DADB-S1-32-S426-475		426 ... 475	131	553 477	DADB-S1-40-S426-475
	476 ... 500	149	553 459	DADB-S1-32-S476-500		476 ... 500	132	553 479	DADB-S1-40-S476-500
50	10 ... 50	30	553 481	DADB-S1-50-S10-50	63	10 ... 50	30	553 501	DADB-S1-63-S10-50
	51 ... 125	48	553 483	DADB-S1-50-S51-125		51 ... 125	48	553 503	DADB-S1-63-S51-125
	126 ... 175	58	553 485	DADB-S1-50-S126-175		126 ... 175	58	553 505	DADB-S1-63-S126-175
	176 ... 250	77	553 487	DADB-S1-50-S176-250		176 ... 250	77	553 507	DADB-S1-63-S176-250
	251 ... 300	88	553 489	DADB-S1-50-S251-300		251 ... 300	88	553 509	DADB-S1-63-S251-300
	301 ... 350	99	553 491	DADB-S1-50-S301-350		301 ... 350	99	553 511	DADB-S1-63-S301-350
	351 ... 375	106	553 493	DADB-S1-50-S351-375		351 ... 375	106	553 513	DADB-S1-63-S351-375
	376 ... 425	117	553 495	DADB-S1-50-S376-425		376 ... 425	117	553 515	DADB-S1-63-S376-425
	426 ... 475	128	553 497	DADB-S1-50-S426-475		426 ... 475	128	553 517	DADB-S1-63-S426-475
	476 ... 500	135	553 499	DADB-S1-50-S476-500		476 ... 500	135	553 519	DADB-S1-63-S476-500


Round cylinders DSNU/ESNU


Accessories

FESTO

Ordering data – Proximity sensors, round design, magneto-resistive							Technical data → Internet: smto	
	Assembly	Switching output	Electrical connection		Cable length [m]	Connection direction	Part No.	Type
			Cable	Plug M8				
N/O contact								
	Via accessories	PNP	3-wire	–	2.5	In-line	152 836	SMTO-4U-PS-K-LED-24
			–	3-pin	–	In-line	152 742	SMTO-4U-PS-S-LED-24
		NPN	3-wire	–	2.5	In-line	152 837	SMTO-4U-NS-K-LED-24
			–	3-pin	–	In-line	152 743	SMTO-4U-NS-S-LED-24

Ordering data – Proximity sensors, round design, magnetic reed							Technical data → Internet: smeo	
	Assembly	Electrical connection		Cable length [m]	Connection direction	Part No.	Type	
		Cable	Plug M8					
N/O contact								
	Via accessories	3-wire	–	2.5	In-line	36 198	SMEO-4U-K-LED-24	
			5	In-line	175 401	SMEO-4U-K5-LED-24		
		–	3-pin	–	In-line	151 526	SMEO-4U-S-LED-24-B	

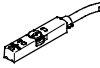
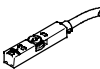
Ordering data – Proximity sensors, round design, magnetic reed, corrosion-resistant							Technical data → Internet: crsmeo	
	Assembly	Electrical connection		Cable length [m]	Connection direction	Part No.	Type	
		Cable	Plug M8					
N/O contact								
	Via accessories	3-wire	–	2.5	In-line	161 775	CRSMEO-4-K-LED-24	

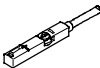

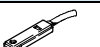
Ordering data – Mounting kits for proximity sensors SMEO/SMTO/CRSMEO						Technical data → Internet: crsmbr	
Designation	For Ø					Part No.	Type
Mounting kit CRSMBR, corrosion-resistant							
	32					163 888	CRSMBR-32
	40					163 889	CRSMBR-40
	50					163 890	CRSMBR-50
	63					163 891	CRSMBR-63


Round cylinders DSNU/ESNU

Accessories

FESTO

Ordering data – Proximity sensors for T-slot, magneto-resistive						Technical data → Internet: smt	
	Type of mounting	Switch output	Electrical connection	Cable length [m]	Part No.	Type	
N/O contact							
	Insertable in the slot from above, flush with cylinder profile, short design	PNP	Cable, 3-wire	2.5	574335	SMT-8M-A-PS-24V-E-2,5-OE	
			Plug M8x1, 3-pin	0.3	574334	SMT-8M-A-PS-24V-E-0,3-M8D	
			Plug M12x1, 3-pin	0.3	574337	SMT-8M-A-PS-24V-E-0,3-M12	
		NPN	Cable, 3-wire	2.5	574338	SMT-8M-A-NS-24V-E-2,5-OE	
			Plug M8x1, 3-pin	0.3	574339	SMT-8M-A-NS-24V-E-0,3-M8D	
N/C contact							
	Insertable in the slot from above, flush with cylinder profile, short design	PNP	Cable, 3-wire	7.5	574340	SMT-8M-A-PO-24V-E-7,5-OE	


Ordering data – Proximity sensors for T-slot, magnetic reed						Technical data → Internet: sme		
	Type of mounting	Switching output	Electrical connection	Cable length [m]	Part No.	Type		
N/O contact								
	Insertable in the slot from above, flush with the cylinder profile	Contacting	Cable, 3-wire	2.5	543 862	SME-8M-DS-24V-K-2,5-OE		
				5.0	543 863	SME-8M-DS-24V-K-5,0-OE		
			Plug M8x1, 3-pin	Cable, 2-wire	2.5	543 872	SME-8M-ZS-24V-K-2,5-OE	
				0.3	543 861	SME-8M-DS-24V-K-0,3-M8D		
	Insertable in the slot lengthwise, flush with the cylinder profile	Contacting	Cable, 3-wire	2.5	150 855	SME-8-K-LED-24		
			Plug M8x1, 3-pin	0.3	150 857	SME-8-S-LED-24		
N/C contact								
	Insertable in the slot lengthwise, flush with the cylinder profile	Contacting	Cable, 3-wire	7.5	160 251	SME-8-O-K-LED-24		



Ordering data – Mounting kits for proximity sensors SME/SMT-8					Technical data → Internet: smbr		
Designation	For Ø		Part No.	Type			
Mounting kit SMBR-8							
	32		175 097	SMBR-8-32			
	40		175 098	SMBR-8-40			
	50		175 099	SMBR-8-50			
	63		175 100	SMBR-8-63			

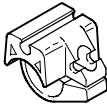
Round cylinders DSNU/ESNU



Accessories

FESTO

Ordering data – Proximity sensors for C-slot, magneto-resistive					Technical data → Internet: smt	
	Type of mounting	Switching output	Electrical connection, connection direction	Cable length [m]	Part No.	Type
N/O contact						
	Insertable in the slot from above	PNP	Cable, 3-wire, in-line	2.5	551 373	SMT-10M-PS-24V-E-2,5-L-OE
			Plug M8x1, 3-pin, in-line	0.3	551 375	SMT-10M-PS-24V-E-0,3-L-M8D
			Plug M8x1, 3-pin, lateral	0.3	551 376	SMT-10M-PS-24V-E-0,3-Q-M8D

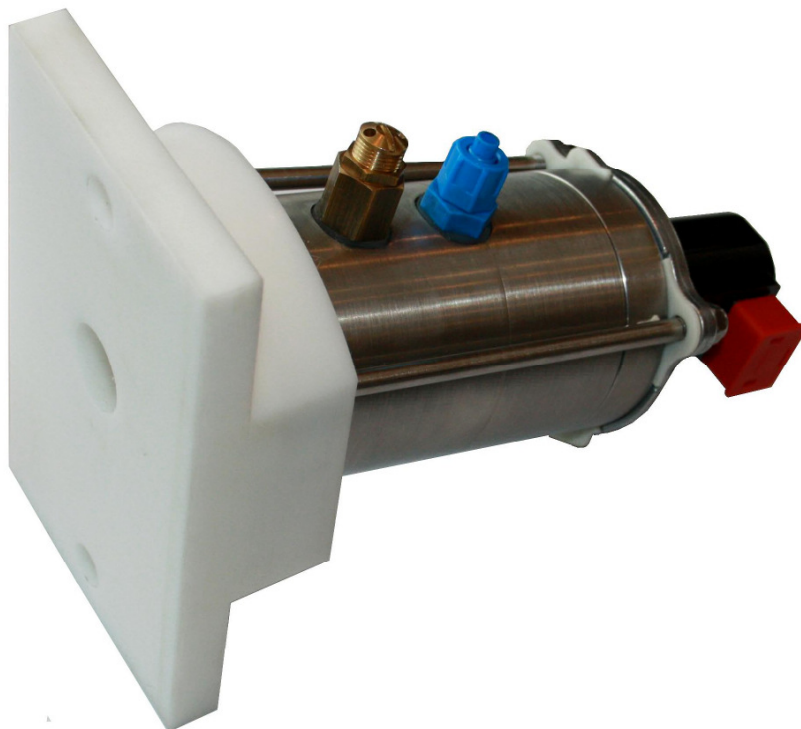
Ordering data – Proximity sensors for C-slot, magnetic reed					Technical data → Internet: sme	
	Type of mounting	Switching output	Electrical connection, connection direction	Cable length [m]	Part No.	Type
N/O contact						
	Insertable in the slot from above	Contacting	Plug M8x1, 3-pin, in-line	0.3	551 367	SME-10M-DS-24V-E-0,3-L-M8D
			Cable, 3-wire, in-line	2.5	551 365	SME-10M-DS-24V-E-2,5-L-OE
			Cable, 2-wire, in-line	2.5	551 369	SME-10M-ZS-24V-E-2,5-L-OE
	Insertable in the slot lengthwise	Contacting	Plug M8x1, 3-pin, in-line	0.3	173 212	SME-10-SL-LED-24
			Cable, 3-wire, in-line	2.5	173 210	SME-10-KL-LED-24

Ordering data – Mounting kits for proximity sensors SME/SMT-10				Technical data → Internet: smbr	
Designation	For Ø	Part No.	Type		
Mounting kit SMBR-10					
	32	175 105	SMBR-10-32		
	40	175 106	SMBR-10-40		
	50	175 107	SMBR-10-50		
	63	175 108	SMBR-10-63		

Ordering data – Connecting cables				Technical data → Internet: nebu	
	Electrical connection, left	Electrical connection, right	Cable length [m]	Part No.	Type
	Straight socket, M8x1, 3-pin	Cable, open end, 3-wire	2.5	541 333	NEBU-M8G3-K-2.5-LE3
			5	541 334	NEBU-M8G3-K-5-LE3
	Straight socket, M12x1, 5-pin	Cable, open end, 3-wire	2.5	541 363	NEBU-M12G5-K-2.5-LE3
			5	541 364	NEBU-M12G5-K-5-LE3
	Angled socket, M8x1, 3-pin	Cable, open end, 3-wire	2.5	541 338	NEBU-M8W3-K-2.5-LE3
			5	541 341	NEBU-M8W3-K-5-LE3
	Angled socket, M12x1, 5-pin	Cable, open end, 3-wire	2.5	541 367	NEBU-M12W5-K-2.5-LE3
			5	541 370	NEBU-M12W5-K-5-LE3

Operating manual for the Pneumatic hammer

MI-70



General information

1. Manufacturer's declaration

2. Safety

3. Regular testing

4. Manufacturer's details

5. Technical specifications

6. Description of the machine

7. Assembly

8. Installation

9. Maintenance, lubrication, repair

10. Noise exposure

11. Malfunctions

12. Spare parts
Pneumatic
Mechanical

13. Guarantee conditions

14. Copyright

15. Delivery schedule

Preface

Dear Customer,

Your pneumatic hammer may differ in some details from the illustrations in this booklet. However, this will have no effect on its use.

Some instructions for your safety

These operating instructions are absolutely necessary for safe operation.

Ensure that they are always **at hand**.

The pneumatic hammer must not be operated without the **qualified specialist personnel being instructed in the required manner**.

Read the general **accident prevention regulations provided by your professional association**. If you are not allowed to post them up in your business ask the responsible safety officers.

Obey the instructions for **proper use** on the following pages.

Changes

We reserve the right to make changes to the design, fittings and accessories in the interests of further development. Therefore, no claims may be derived from the information, illustrations and descriptions.

Errors and omissions excepted.

1. Manufacturer's declaration

Manufacturer of the pneumatic hammer:	MCTAG GmbH & Co. KG Steinberg 1 D-83564 Soyen	Tel.: +49 8071 904581 Fax: +49 8071 904580 E-mail: info@mctag.de	
Description:	Model: Weight: Operating pressure Air consumption	MI - 70 2.6 kg min. 0.7 - max. 3.0 bars 0.175 litres	at operating pressure (1 bar)

The pneumatic hammer has been developed, designed and manufactured in compliance with the provisions of the Council Machinery Directive dated 14th June 1989 to harmonise the legal regulations of the member states for machines (Directive 89/392/EEC)

A CE mark does not have to be affixed to the product. See also Article 4 Paragraph 2 of the Machinery Directive.

All measures that must be taken in accordance with the Machinery Directives cannot be confirmed because they can only be taken after installation in a machine. Efforts must be made to comply with the regulations so that the EC conformity declaration can be made by the manufacturer or owner of the whole plant and commissioning is possible.

2. Safety

Basic safety measures must always be observed during use and assembly to protect against the risk of injury and fire and to protect against electrical voltage. Read and observe these instructions and the operating manual before you operate the pneumatic hammer. Keep these safety instructions in a safe place.

2.1 SCOPE OF APPLICATION

RISKS FOR PEOPLE AND THE ENVIRONMENT



- There is the risk of fingers and hands being crushed should the plunger move unintentionally in the working area of the pneumatic hammer.
- Other risks exist if there are malfunctions and through the effects of noise.



PROTECTIVE MEASURES AND RULES OF CONDUCT



- Protect yourself from electric shocks: Avoid touching control components and supply lines. Avoid damaging the control unit, electrical components and power lines.
- Ensure that the compressed air supply has been turned off during assembly. An air pipe or hose that is under pressure and comes loose may cause injury.
- Have any damage repaired by an expert immediately. Turn the power supply off if there is obvious damage.
- Ensure that the pneumatic hammer is assembled properly.
- Ensure that the machine is connected to the electrical supply by a specialist in accordance with the regulations in force.
- Use the pneumatic hammer in accordance with the relevant regulations.
- While working do not place your hands in the impact area.
- Care: Keep the pneumatic hammer clean.
- Maintenance tips. Keep the electric pneumatic valve clean and dry.
- Turn the electrical and the air supply off for other maintenance and repair work on the machine.
- Check the pneumatic hammer regularly for damage: It must be repaired by a specialist before further use.
- Check that no parts are broken, that all other parts are perfect, correctly fitted and any other conditions that may affect the operation of the machine. Damaged protective devices and parts must be repaired properly or replaced.
- Parts may come loose due to vibration and cause damage to people and material. Mounting parts must be checked at regular intervals and tightened if necessary or secured in accordance with the Machinery Directive.
- For your own safety only use accessories offered in the operating manual or in the relevant brochures. Using other parts may result in your being injured.

2.2 WHAT TO DO IN THE EVENT OF A MALFUNCTION

- Any malfunctions, changes, unusual noises or leaks must be reported immediately to the line manager or someone authorised to give instructions.
- Malfunctions in the work flow must only be rectified if the power supply and the air supply have been turned off.

2.3 WHAT TO DO IN THE EVENT OF AN ACCIDENT, FIRST AID



- Save the injured person and administer first aid (stop bleeding, immobilise injured limbs, stop the person going into shock, put any severed limbs in a plastic bag to be taken away with the injured person), make the accident site safe. Inform first aiders.
- Contact an authorised insurance company doctor if the injured person is likely to be unfit for work as a result of the injury.
- Report any accident to your line manager or his deputy immediately.
- Record the first aid administered, for example in an accident book.

2.4 REPAIR, DISPOSAL

- Repair work may only be carried out by people authorised to do this.

3. Regular testing of the pneumatic hammer

For occupational safety reasons and to achieve satisfactory work results it is necessary to monitor the machines and to check them regularly to ensure that they are in a safe, flawless condition. It is useful to provide proof of this.

1. Mechanical equipment

1.1 Basic body, fixing flange, firing pins, safety pressure limiting valve, air connection, parts fitted to anchor and secure the machine, fixing screws.

2. Electrical equipment

Electro-pneumatic valve with 24 V DC or 230 V AC, 50 Hz, depending on the model.

Testing may be carried out by people who have sufficient knowledge because of their specialist training and experience and who are familiar with the guidelines and rules of engineering to such an extent that they can assess whether the equipment is safe to use.

4. Manufacturer's details

Manufacturer of the pneumatic hammer:	MCTAG GmbH & Co.KG Steinberg 1 D-83564 Soyen	Tel.: +49 8071 904581 Fax: +49 8071 904580 E-mail: info@mctag.de	
Description:	Model: Weight: Operating pressure Air consumption	MI - 70 2.6 kg min. 0.7 - max. 3.0 bars 0.175 litres	at operating pressure (1 bar)

5. Technical specifications

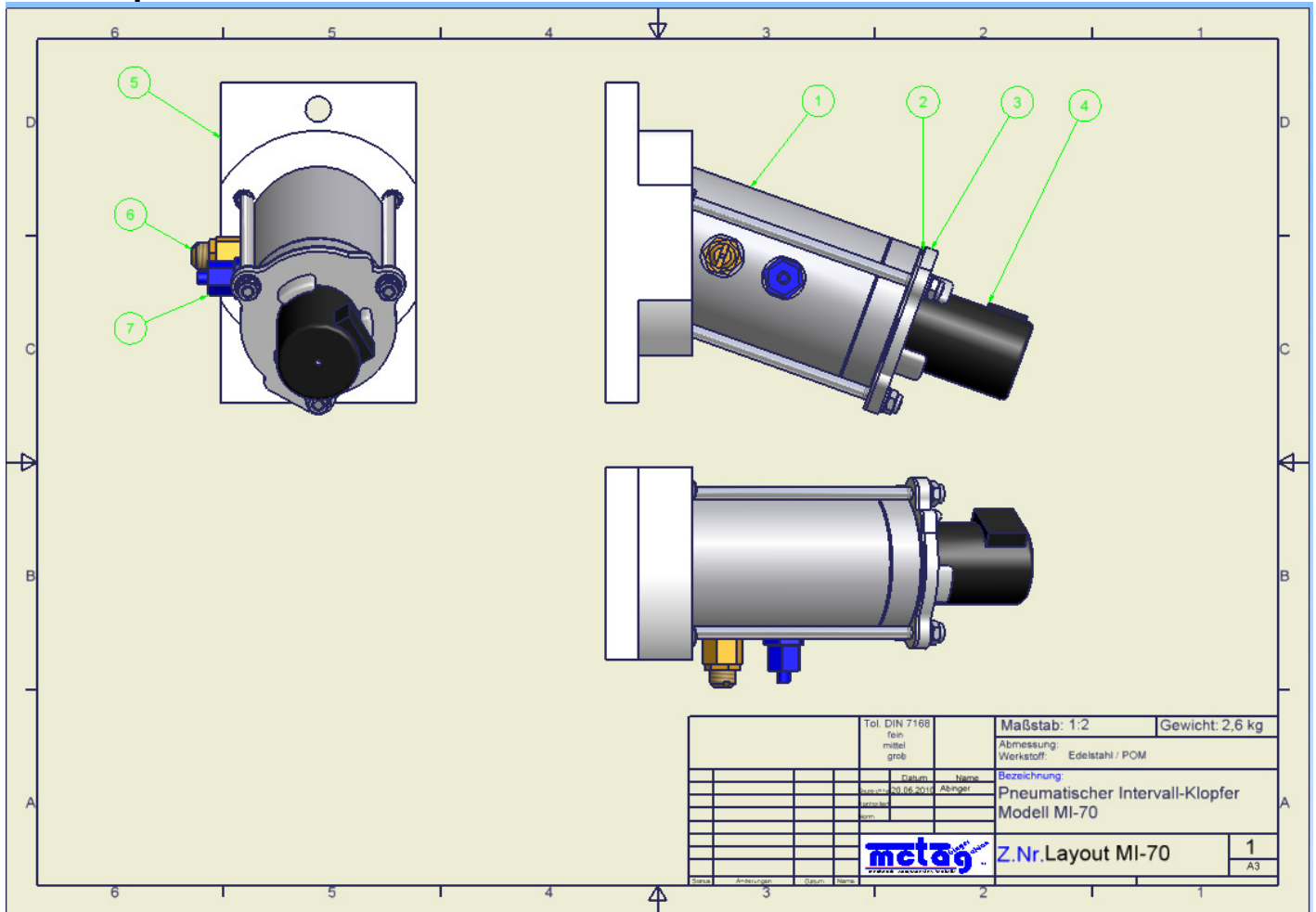
Max. operating pressure	3.0 BARS
Pressure limiting valve/ max. basic setting	3.5 to 4.0 BARS
Diameter	69 mm
Weight approx.	2.6 kg
Length	230 mm

Subject to technical changes.

The MI-70 pneumatic hammer is registered with the German Patent and Trademark Office and is protected by copyright.

6. Description of the appliance

Main components



1. Hammer housing (complete)
2. Plastic membrane
3. Membrane cover
4. Electro-pneumatic valve
5. Adapter flange
6. Safety pressure limiting valve
7. Air connection
8. Firing pins (not illustrated)

7. Assembly

The MI-70 pneumatic hammer must be fitted at an angle of at least 20° to the horizontal.
Only an MCTAG Gbr fitted adapter flange must be used to fit the pneumatic hammer.

Changes to the hammer housing or fitting other parts to it must only be done with the written approval of MCTAG GbR.

The maximum path travelled by the firing pin must be flush with the front side of the adapter flange.



The maximum operating pressure must not exceed 3.0 bars.

The pressure limiting valve is set to 3.5 – 4 bars and must not be changed under any circumstances.



The electricity must only be connected by a specialist qualified to do this.

Montage des Intervallklopfers, min. 20° bis zu 90°
Install or assemble the MI-70 pneumatic hammer at an angle of 20° - 90°

Option: Anschweißplatte
welded plate

MI-Aufnahme 20° POM
A.Nr. 1714

Druckluftanschluß Ø8/6 - Betriebsdruck 0,7 - max. 3 Bar
Druckbegrenzungsventil einstellbar 1-4 Bar

Magnetventil
A.Nr. 1500-7.1 24 Volt
A.Nr. 1500-7.2 230 Volt - 50 Hz.

Betriebsdruck / working pressure: 0,7 - max. 3 Bar
Betriebstemperatur / working temperature: max. 70° C
Schlagkraft (1 Bar) / punch power: ~ 4kg
Luftverbrauch/ Schlag (1Bar) / Air consumption/ punch : 0,175 Liter
empfohlene Ventilöffnungszeit / opentime valve: 50 m/sec

zum Betrieb mit völlig ölfreier und trockener Druckluft in Standardausführung geeignet !
Zur Einwandfreien selbstständigen Rückstellung des Schlagbolzens ist ein Einbauwinkel bzw. Montage des Intervallklopfers Modell MI-70 zur waagrechten von min. 20° bis zu 90° möglich.

The standard version is suitable for operating with completely oil-free, dry compressed air.
It is possible to install or assemble the MI-70 interval hammer at an angle of 20° - 90° so that the firing pin automatically resets properly.

Tol. DIN 7168 fein mittel grob		Maßstab: 1:2	Gewicht: ca. 3 kg
Abmessung Werkstoff: 1.4301 / 1.4305 / POM natur		Bezeichnung: Layout Intervallklopper MI-70	
Z.Nr.1701 / 1702		1 A3	

8. Installation

Customer instructions



The customer is responsible for the correct location of the machine. The customer bears full responsibility for a suitable installation site. Should problems arise later that are due to failure to observe these instructions the manufacturer may not be held responsible.

Corrosion prevention

To prevent corrosion on the machine the installation site must be dry and free from abrasive vapours:
No soldering, welding, painting, pickling or galvanising machines in the same room.

Danger area



Please note the following:
Always ensure that you do not linger in the danger area of the firing pin.

Safeguarding against falling

The pneumatic hammer must be secured in accordance with local regulations, particularly if it is fitted in places where there is a risk of danger to individuals from falling.

Ambient temperature

Ambient temperatures from -5° to 70° C

9. Maintenance, repair, lubrication

What you must do



Only perform the maintenance work described in the operating instructions. Our trained customer service department is responsible for further work.

Preparing for maintenance



Switch the machine off for all cleaning and maintenance work. Ensure that it cannot be switched on again accidentally. This will stop colleagues switching the machine on accidentally while the work is being carried out. The compressed air supply must be disconnected and it must not be possible to connect it again unintentionally.

Special maintenance work

Maintenance, repair and assembly work on electrical, pneumatic machines and accessories must only be carried out by trained specialists.



When working on the pneumatic hammer: Switch off and safeguard the machine or isolate the power cable by removing the mains fuse and attach warning notices. Otherwise there is the **risk of an accident**.

Wearing safety shoes with insulated soles offers additional protection.

Before pneumatic work depressurise any leads and pressure reservoirs. Otherwise there is the **risk of an accident**.

Important: Regular checks

Wear parts, cables, hose lines etc. must be checked and, if necessary, replaced at reasonable time intervals.

All leads, hoses and screw joints must be checked regularly for leaks and externally visible damage. Rectify any damage immediately.

All fixing elements must be checked at fixed intervals and tightened. They must be replaced if necessary.

After maintenance has been completed

Always tighten loose screw connections during maintenance and repair work.

When maintenance and repair work has been completed check that the machine is working properly and check all safety devices. The machine must only be operated again if it is in perfect condition.

Maintenance intervals

After about 1,000,000 hammer cycles or no later than every 12 months to be replaced by the manufacturer

or

under instruction by the manufacturer.

Maintenance

All bearings are designed to be maintenance-free.

10. Fault rectification

Malfunction	Cause	Troubleshooting	Troubleshooting
Not working	No compressed air	Check compressed air supply	Set operating pressure to max. 3.0 bars.
	Magnetic valve doesn't come on	Check the pressure	Make sure the electricity is on. Replace magnetic valve.
	Magnetic valve doesn't come on	Remove the magnetic valve	Close the valve opening briefly with your finger to test the pressure pulse.
	Working pressure too low	Initial installation – the membrane may still be a little inert on commissioning	Increase working pressure then lower pressure to about 1.0 bar.
	Installation position less than 20° to the horizontal	Compressed air pulse available. Piston not in initial position.	Change the installation position to at least 20°.
	Firing pin not inserted	Compressed air pulse available. No impact cycle.	Insert the firing pin properly with the bevel on the outside.
Punch power not sufficient	Installation position less than 20° to the horizontal	Compressed air pulse available. Piston not in initial position.	Change the installation position to at least 20°.
	Pressure too low	Check pressure	Set pressure to about 2.0 bars
Compressed air blowing out	Safety valve	Safety pressure valve Setting range 1-4 bars Readjust valve	Reduce working pressure or readjust safety valve.

11. Noise exposure

The pneumatic hammer is noisy when used.
This noise depends on various conditions that may affect you.

You should therefore

- install the machine in the location it is to be used in accordance with the operating instructions
- fit the baffle plate provided for assembly.

When measuring a noise level of less than 80 dB(A) has been determined.
Depending on the impact sequence the continuous sound pressure level may be different from this.

This value was determined

- as an equivalent continuous sound pressure level over a period of 5 minutes in direct succession with 2 impact cycles a minute
- with an existing equivalent continuous sound pressure level of 70 dB(A) (background noise);
- with a Class 2 noise level measuring unit;
- with the machine set to frequency weighting A, FAST time constant and Leq readings (equivalent continuous noise pressure level) after the machine has been calibrated.

Testing by introducing counter measures to reduce the noise level can, however, only be clarified and resolved at the operating site under actual conditions.

As a result, any necessary measures must therefore be taken by the operator.

12. Spare parts

INSTRUCTIONS FOR QUERIES AND ORDERING SPARE PARTS

In order to receive spare parts quickly or to make it easier to get information, please provide the following information when placing an order or asking a question:

1. Model
2. Manufacture number
3. Year of construction
4. Name or item number as per the spare parts list
5. Order quantity

PLEASE NOTE:

Claims may not be derived from the explanations in these operating instructions – particularly those of a design nature.

As we are constantly striving to improve our products, it is possible that your machine will have innovations or modifications that could not be included when these instructions were printed.

MCTAG GmbH & Co.KG

Steinberg 1

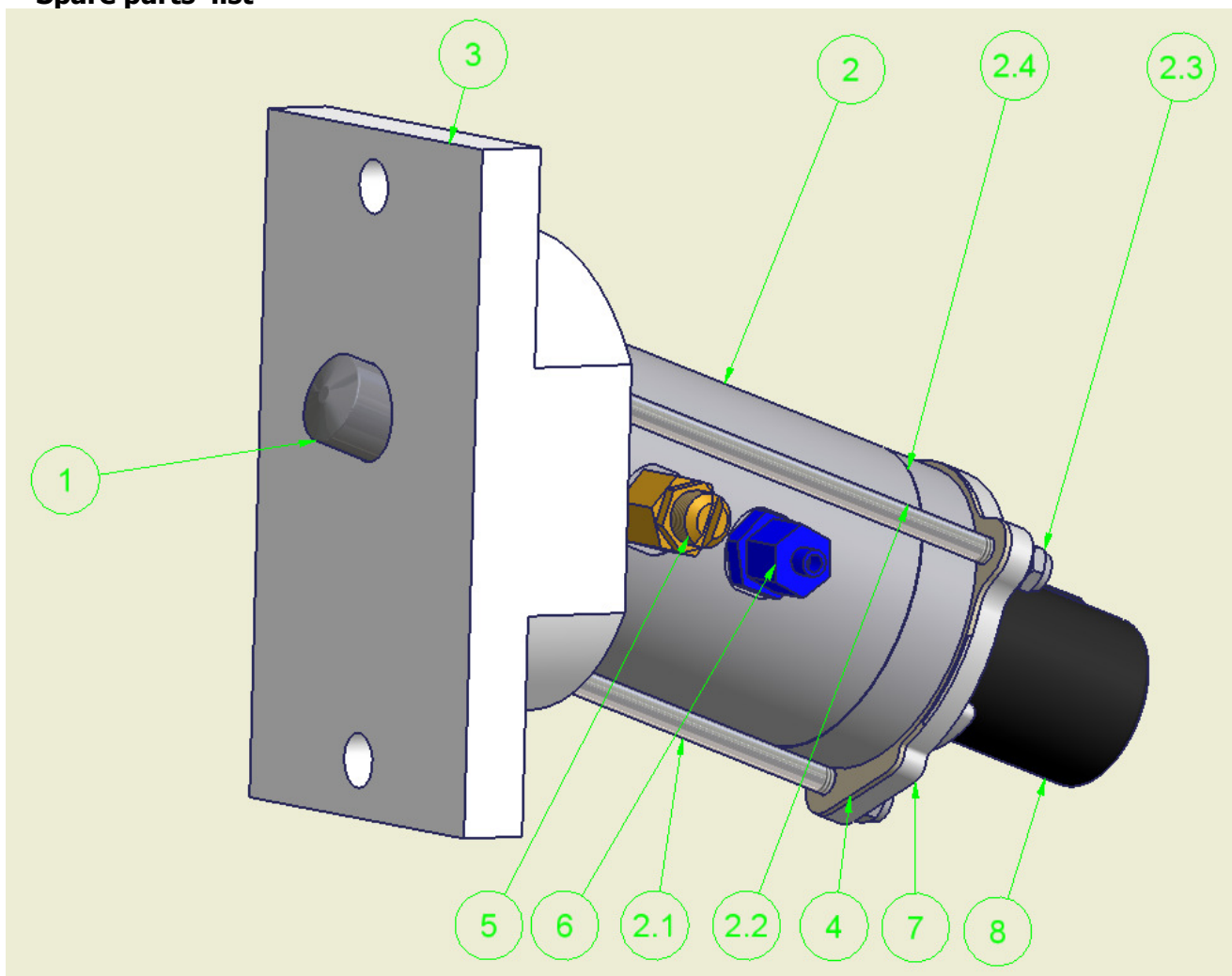
D-83564 Soyen

Tel. +49 8071 / 90 45 8195 0

Fax: +49 8071 / 90 85 45 99

E-mail: info@mctag.de

Spare parts' list



Item	Description	Quantity
1	Firing pin	1
2	Completely pre-assembled housing consisting of items 2.1 – 2.6 (Component can only be supplied complete as a spare part)	1
2.1	Stay bolt less than 20°	1
2.2	Stay bolt more than 20°	2
2.3	M6 hexagonal nut	1
2.4	Rear housing cover	1
2.5	Large O ring (not shown)	1
2.6	Small O ring (not shown)	2
2.7	Complete guide rod (not shown)	1
2.8	Firing pin bearing (not shown)	1
3	Plastic adapter flange	1
4	Plastic membrane	1
5	1/4" pressure limiting valve	1
6	1/4" pneumatic quick connector	1
7	Membrane cover	1
8.1	2/2 way electro-pneumatic valve – 24 volt	1
8.1	2/2 way electro-pneumatic valve – 230 volt/ 50 Hz	1

13. Guarantee conditions

The guarantee is no longer valid if:



Not all maintenance activities have been carried out in accordance with the operating instructions.

Modifications have been made to the control or connection components.

Changes to the hammer housing or fitting other parts to it must only be done with the written approval of MCTAG GmbH.

The hammer is removed by untrained personnel.

The machine is not used properly.

14. Copyright

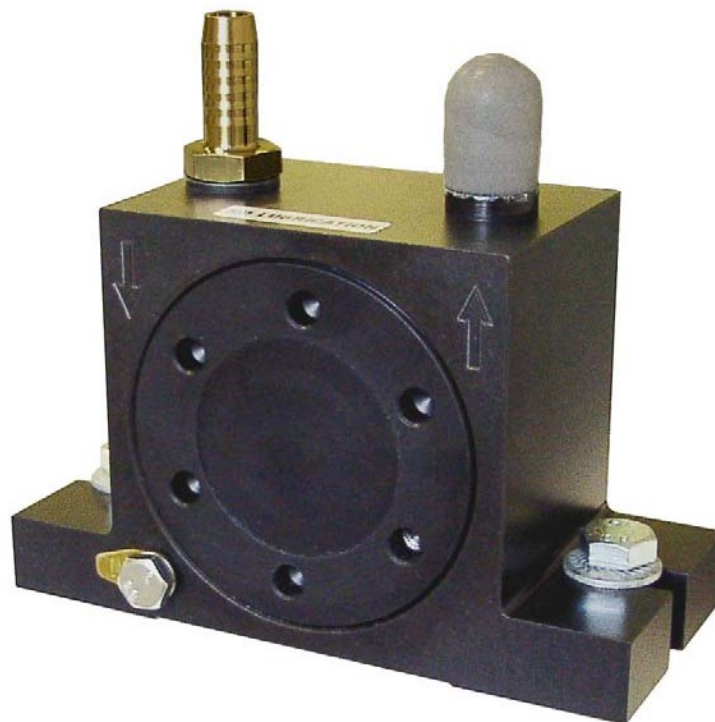
These operating instructions are protected by copyright and may not be copied or extracts of them reproduced or disclosed to third parties or competitor companies without the express, written approval of MCTAG GmbH & Co. KG, 83564 Soyen

15. Delivery schedule

Check the packaging for any transport damage. If the packaging is damaged check to see that the contents are complete as per the delivery note. Any damage must be countersigned by the carrier and notified immediately.

These operating instructions apply for:

NCT 1 E	NCT 29 E
NCT 2 E	NCT 29i E
NCT 3 E	NCT 55 E
NCT 4 E	NCT 108 E
NCT 4i E	NCT 108i E
NCT 5 E	NCT 126 E
NCT 10 E	NCT 250 E
NCT 10i E	NCT 250i E
NCT 15 E	



Important note:

Before use of the pneumatic turbine vibrators series NCT E read this operating instruction carefully and store afterwards.

Netter GmbH does not assume liability for damage to property and persons if the product has been technically modified or if the notes and regulations of these operating instructions have not been observed.

This documentation is copyrighted. All rights, e.g. for translation into other languages, reprinting and copying of these operating instructions or parts hereof remain strictly reserved.

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Scope of delivery:



Check the packaging for possible shipping damage.
If the package is damaged check the contents for completeness and possible damage. In case of damage inform the transport agent.
Compare the scope of supply with the delivery note.

1 General notes

Compressed air operated turbine vibrators of series NCT E from Netter are in compliance with regulation 94/9/EEC (ATEX product directive) equipment group II and are suitable for use in explosive environments category 2 (2G and 2D 85°C (T6)) of zones 1, 2, 21 and 22.

Furthermore, these explosion proof turbine vibrators comply with the EC-machine regulation 2006/42/EEC. Standards EN 292 part 1 and part 2, EN 1127-1 and EN 13463-1 have been especially observed.

The vibrators generate non-directed (rotary) vibrations.

General areas of application are: Loosening, moving, sorting, compacting and separating of bulk materials and reduction of friction.

NCT E vibrators are used to empty bunkers, to drive chutes, screens and vibrating tables.

The use in explosion endangered areas is possible when complying with valid regulations (among others 1999/92/EEC) and the corresponding operating instructions of the operating company.

Before using these vibrators the operator must make sure that the

introduction of vibration energy will not cause an explosion hazard.

The drive medium is clean (filtered) and preferably non-lubricated compressed air or nitrogen.






These turbine vibrators can be used outdoors, in or under water or other non-aggressive fluids, provided the compressed air is discharged into the atmosphere (see chapter 4 "Safety").

The frequency is determined by the operating pressure.

Special features:

- High rate of efficiency
- Infinitely variable
- Minimum air consumption
- Non-lubricated operation
- Dust and water tight
- Airborne noise measured in the open ≤ 85 dB(A) acc. to IEC
- Earthing screw on housing (Exception: stainless steel units)

In these operating instructions the following information and danger symbols are used.

	Notes on important processes		Warning of a danger source
	Important note on processes to be especially observed		Environmental waste disposal
	Important note on explosion protection		

2 Technical Data



Drive medium:

Clean ($\leq 5 \mu\text{m}$ filter), preferably non-lubricated compressed air or nitrogen.
Unfiltered compressed air will cause damage to the vibrators.

Operating pressure:

2 bar to 6 bar

The maximum operating pressure must not be exceeded.

Temperature:

-20°C to 60°C

Ambient temperatures must not exceed or fall below above given values.

Rotary speed:

The maximum rotary speeds must not be exceeded.

Type	Working moment [cmkg]	Permissible max. rotary speed [min ⁻¹]	Centrifugal force [N]	Air consumption [l/min]		Noise level [dB(A)]	
				from	to	from	to
NCT 1 E	0,0062	29.000	286	31	79	64	75
NCT 2 E	0,0124	21.500	314	33	82	65	72
NCT 3 E	0,016	21.500	406	45	115	69	79
NCT 4 E	0,023	18.000	408	46	117	65	71
NCT 4i E	0,046	13.500	460	51	162	65	74
NCT 5 E	0,049	17.000	777	119	261	68	85
NCT 10 E	0,096	13.000	890	119	262	73	82
NCT 10i E	0,192	9.500	950	116	332	73	77
NCT 15 E	0,160	14.000	1.720	229	600	76	85
NCT 29 E	0,282	10.500	1.704	227	592	68	77
NCT 29i E	0,564	8.000	1.980	223	608	64	80
NCT 55 E	0,545	9.000	2.421	465	1.158	77	85
NCT 108 E	1,081	7.000	2.905	455	1.226	73	84
NCT 108i E	2,161	5.000	2.963	489	1.234	66	77
NCT 126 E	1,262	7.500	3.893	630	1.687	71	83
NCT 250 E	2,502	5.500	4.151	625	1.845	71	82
NCT 250i E	5,000	4.000	4.387	1.250	1.844	70	74

These technical data are mathematically computed reference values and may vary from one application to the next.

Depending on the application the maximum speeds are reached at pressures between 2 bar and 6 bar.

The rotary speeds must be measured before starting operation, further data are available on request.

We recommend consultation of the application engineers of Netter GmbH. Subject to technical changes without prior notification.

Max. surface temp. (D) ⇒

Type designation ⇒

Serial number ⇒

NetterVibration Germany, 55252 Mainz-Kastel Tel.: +49 6134 2901-0		
Type	NCT 29 E	-20°C ≤ t _a ≤ 60°C
No.	71568	Year 2004
Doc. No. NV 2003 001 X		

⇐ Temperature class (G)

⇐ Max. ambient temp.

⇐ Year of manufacturing

⇐ Doc. No.



Note on NCT 1 E and NCT 2 E:

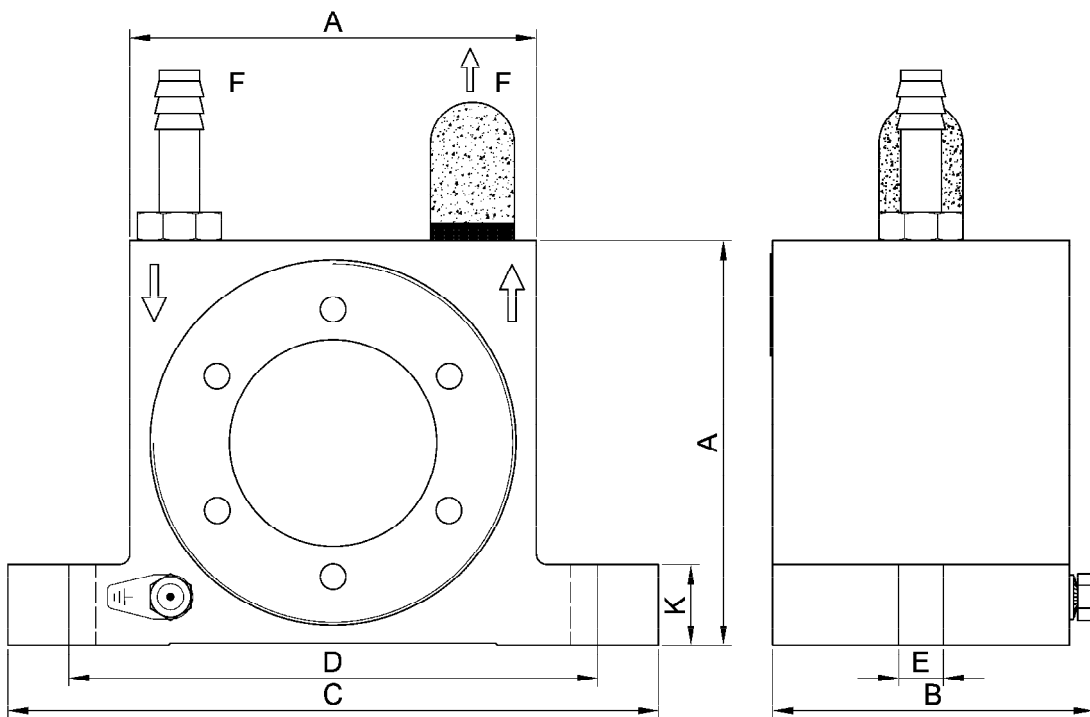
Due to their high rate of efficiency these two units reach very high rotary speeds. These high rotary speeds affect the lifetime of the bearings and increase the noise level. We therefore recommend to operate vibrators types NCT 1 E and NCT 2 E with a pressure of only 2-3 bar (max. 15.000 revolutions) or to use them solely in interval operation.

Noise level:

To a great extent the noise level is determined by the mounting surface (e.g. sheet metal) the vibrator is mounted to. Depending on the type (with silencer) and an air pressure of 6 bar the noise level is about 75-85 dB(A), it is less with lower air pressure. Sheet metal without noise insulation amplifies the noise level.

Duration of operation:

Long operating periods change the performance data (wear).

Dimensions:

Type	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F	K [mm]	Weight [kg]
NCT 1 E	40	31,5	70	56	6,5	G 1/8	10	0,165
NCT 2 E	40	31,5	70	56	6,5	G 1/8	10	0,162
NCT 3 E	50	36,5	86	68	7	G 1/8	12	0,230
NCT 4 E	50	36,5	86	68	7	G 1/8	12	0,240
NCT 4i E	50	36,5	86	68	7	G 1/8	12	0,250
NCT 5 E	65	47,5	113	90	9	G 1/4	16	0,550
NCT 10 E	65	47,5	113	90	9	G 1/4	16	0,570
NCT 10i E	65	47,5	113	90	9	G 1/4	16	0,610
NCT 15 E	80	60,5	128	104	9	G 1/4	16	1,045
NCT 29 E	80	60,5	128	104	9	G 1/4	16	1,090
NCT 29i E	80	60,5	128	104	9	G 1/4	16	1,180
NCT 55 E	100	77,5	160	130	13	G 3/8	20	2,125
NCT 108 E	100	77,5	160	130	13	G 3/8	20	2,250
NCT 108i E	100	77,5	160	130	13	G 3/8	20	2,500
NCT 126 E	120	90,5	194	152	17	G 3/8	25	3,585
NCT 250 E	120	90,5	194	152	17	G 3/8	25	3,820
NCT 250i E	120	90,5	194	152	17	G 3/8	25	4,290

3 Design and function

Vibrators of series NCT E generate circular vibrations, i.e. these vibrations are effective to all directions of a plane. Frequency and therefore also the centrifugal force are determined by the pressure of the drive medium.

Besides clean (filtered) and preferably non-lubricated compressed air, nitrogen is also suitable as a drive medium.

A turbine (2) with eccentrically arranged weights (3, 4) rotates in a housing. Depending on the type of unit the turbine (2) is delivered with various pressed in weights (e.g. with one

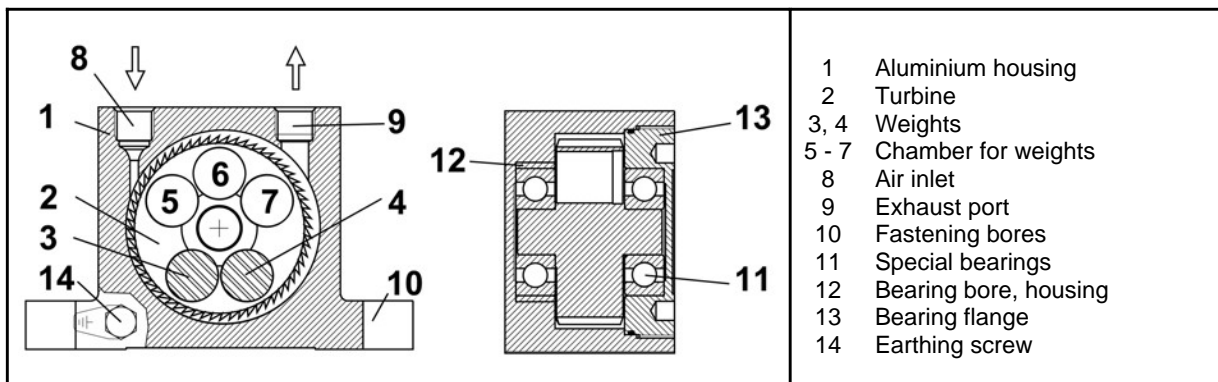
weight in chamber 6), making various working moments available.

Bearing flange (12) and the bearing bore in housing (13) retain the easily replaceable, permanently lubricated ball bearings (11), in which the turbine (2) runs.

Air inlet (8) and exhaust (9) are identified by arrows on the vibrator.

Two fastening bores (10) are provided for fastening.

NCT E vibrators with a hard coated aluminium housing have an additional earthing connection (14).



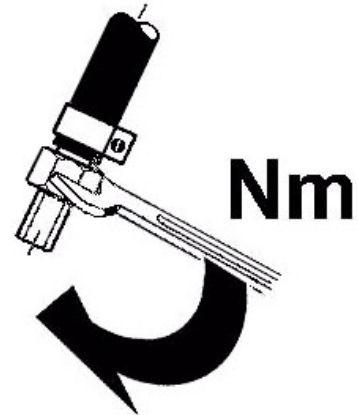
4 Safety



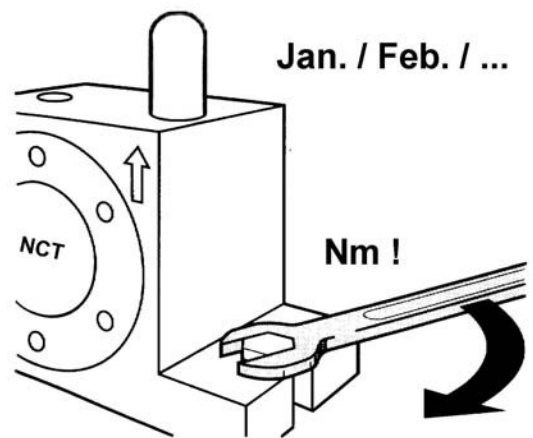
NCT E vibrators have been manufactured according to the current EC-regulations.
 Before using these vibrators the operator must make sure that the introduction of vibration energy will not cause an explosion hazard.
 Installation and operation has to comply with requirements of ATEX regulation for potentially explosive environments and the applicable safety regulations.



NCT E vibrators work with compressed air or nitrogen.
 Make sure the compressed air supply is switched off during installation.
 Disconnect the supply lines (quick coupling) before starting other work on vibrators and supply lines.
 Before starting operation all hoses must be tightly connected.
 A hose under pressure coming loose can cause severe injury.

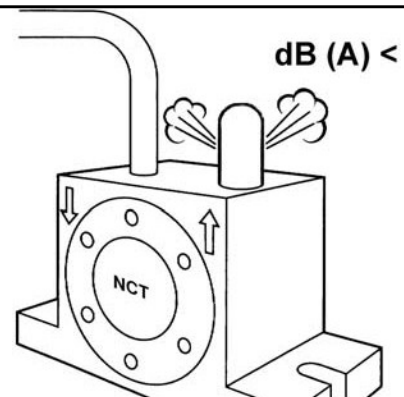


Vibrator as well as part of the structure may come loose because of vibration. Falling parts can cause damage to persons and material.
 Only the supplied lock washers must be used.
 Screw connections must be checked and, if necessary, retightened after 1 hour of operation and then at regular intervals (normally every month).
 For critical installation situations a suitable safety device is mandatory.



Silencer:

NCT E vibrators must strictly be operated with silencer.





Permissible operating conditions:

Operating pressure:
2 bar to 6 bar
The maximum operating pressure must not be exceeded.

Temperature:
-20°C to 60°C
Environmental temperatures must not exceed or fall below above given values.

Rotary speed:
The maximum rotary speeds must not be exceeded.

Type	Permissible max. rotary speed [min ⁻¹]	
NCT 1 E	29.000	Depending on the application the maximum speeds are reached at pressures between 2 bar and 6 bar. Rotary speeds must be checked and, if necessary, adjusted before starting operation, after an operating time of 30 minutes and then regularly once every month, further data available on request. We recommend consultation of the application engineers of Netter GmbH. Subject to technical changes without prior notification.
NCT 2 E	21.500	
NCT 3 E	21.500	
NCT 4 E	18.000	
NCT 4i E	13.500	
NCT 5 E	17.000	
NCT 10 E	13.000	
NCT 10i E	9.500	
NCT 15 E	14.000	
NCT 29 E	10.500	
NCT 29i E	8.000	
NCT 55 E	9.000	
NCT 108 E	7.000	
NCT 108i E	5.000	
NCT 126 E	7.500	
NCT 250 E	5.500	
NCT 250i E	4.000	



Technical changes to the equipment may affect the characteristics of these turbine vibrators or even damage the units and cause the rejection of any warranty claims.
The non-compliance with these operating instructions also leads to the rejection of any claims.

The condition of ball bearings must be checked at regular intervals.
The replacement of defective bearings or bearings of which the service life has expired, must solely be replaced by Netter Vibrationstechnik.

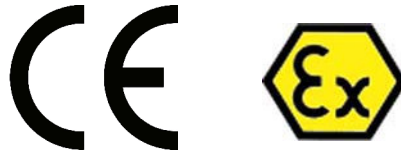


In explosion endangered zones the cover of NCT E vibrators must not be opened.

Connection to ground via the earthing connection on the housing foot and the mounting surface is mandatory.
On stainless steel units earthing is accomplished directly via the mounting surface, which requires that electric transition via this surface is assured (clean mounting surface without paint finish).



Compressed air supply and discharge lines (hoses) must be suitable for applications in explosion endangered rooms (electrically conductive, anti-static).



Declaration of conformity in compliance with ATEX Directive 94/9/EC

We herewith confirm, that the pneumatic turbine vibrators

Series NCT E

are in compliance with the following regulations:

**94/9/EG
2006/42/EG**

Used harmonised standards:

**DIN EN ISO 12100-1,
DIN EN ISO 12100-2,
EN 1127-1 and
EN 13463-1**

The sign X placed after the certificate number indicates, that the equipment is subject to special conditions for safe use specified in the enclosure to this certificate.

The marking of the pneumatic turbine vibrators includes additionally:

 II 2 G D 85°C (T6)

NetterVibration

i.A. **Werkmann**
(quality manager)



Annex to the declaration of conformity NCT E

Description:

Pneumatic turbine vibrators of the series NCT E generate rotary vibrations. The frequency and consequently the centrifugal force are determined by the pressure of the drive medium. In addition to clean (filtered), preferably unlubricated compressed air, nitrogen is also suitable.

A turbine with eccentrically located unbalances rotates inside a housing made of hard coated aluminium or stainless steel. Depending on the size of the vibrator different unbalances are mounted into the turbine.

Marking:

Netter Vibration, address....

Type:..... (depending on the version)

Maximum ambient temp. 60°C

Serial number

Year of manufacturing

 II 2 G D 85°C (T6)

Document number: NV 2003 001 X

Technical documentation No. NV 2003 001 modification 0 dated 6.6.2003

Special conditions for safe use :

- The turbine vibrator has to be fixed with the supplied safety washers. The safe fixing has to be checked regularly.
- Do not open the turbine vibrator within an area with explosive atmosphere.
- The user has to check regularly the frequency of the turbine vibrator. The turbine vibrator is not to be used with higher frequency as indicated.
- The user has to check regularly the condition of the bearings. The indicated lifetime may not be exceeded under any circumstance.

NetterVibration

i.A.

A. Werkmann
(quality manager)

5 Transport and Storage



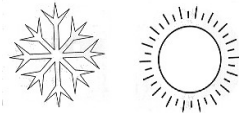
Check the packing for possible shipping damage. If damage to the packing is found check the content for completeness and possible damage. In case of damage inform the transport agent.

The units are packed ready for installation. The name plate is attached to the vibrator. If not specified differently attachments (lock washers, grommet, silencer) will be supplied loosely.

Special transport conditions are not specified. The units should be stored in their original packaging and in a dry and clean environment.



The storage temperature may be between -40°C and $+60^{\circ}\text{C}$. (This does not apply for operating temperature, compare with **chapter 4 SAFETY, "Permissible Operating Conditions"**).

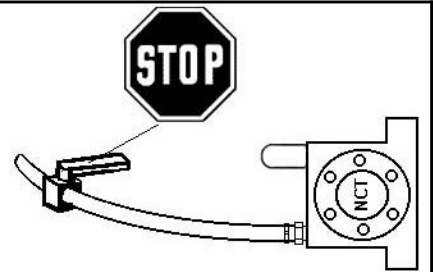


6 Assembly



During installation please comply strictly with the safety regulations in chapter 4 and the accident prevention instructions!

Make sure the compressed air supply is switched off during installation or when working on vibrator and air supply lines.



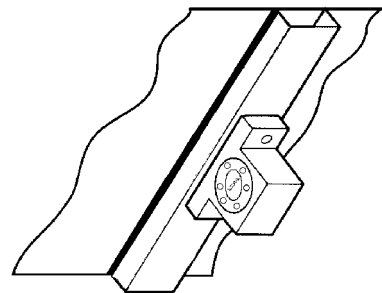
Mounting the vibrator:



The thoroughly chosen installation position must ensure that any impact contact between NCT E vibrators (aluminium housing) and corroded steel components is ruled out.



Turbine vibrators must be mounted to a clean and plane (flatness fault $\pm 0,1\text{mm}$) surface with two screws (for screw dimension and tightening torques please refer to the following table). It is highly recommended to mount the turbine vibrator to a stiffening section (U-section). This stiffening section must then be welded to the object. This enables an optimal distribution of the vibration energy.





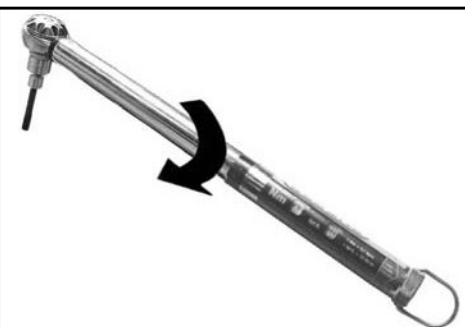
Connection to ground via the earthing connection on the housing foot and the mounting surface is mandatory.
On stainless steel units earthing is accomplished directly via the mounting surface, which requires that electric transition via this surface is assured (clean mounting surface without paint finish).



The screw connections must solely be secured using the supplied lock washers.



The tightening torques can be taken from the following table. Higher tightening torques may cause fracture of screws or tearing of threads.
Inadequate screw connections may cause loosening of units by vibration. This can cause damage to persons and material!



Recommended mean tightening torques for screws property class 8.8 (screws as supplied, without additionally lubrication):

Type	Thread	Tightening torque [Nm]
NCT 1 E, NCT 2 E, NCT 3 E, NCT 4 E, NCT 4i E	M 6	10,4
NCT 5 E, NCT 10 E, NCT 10i E, NCT 15 E, NCT 29 E, NCT 29i E	M 8	25,0
NCT 55 E, NCT 108 E, NCT 108i E	M 10	51,0
NCT 126 E, NCT 250 E, NCT 250i E	M 16	215,0

Always use a torque wrench.

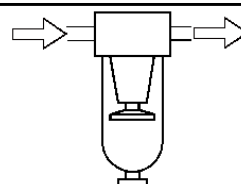


Retightening:

Screw connections must be checked and, if necessary, retightened after 1 hour of operation (after initial start-up) and then at regular intervals (normally every month).



When using compressed air as drive medium, it must be clean (filtered). The opening of the air inlet is smaller than the one for the air outlet. Both are marked with arrows on the front of the housing. The compressed air supply must be reliably fastened.



≤ 5 µm
filter recommended



Please observe already during installation:

The permissible temperature range must not be exceeded or fallen short of during operation, see **Chapt. 4 „Safety – Permitted Operating Conditions** .

Versions for other temperature ranges on request.

Air supply line:

The air resistance increases with the hose length. The nominal widths in the table apply for hose lengths of up to 3 m. Longer supply lines need bigger cross-sections.

Air discharge line:

Exhaust air can be discharged through a hose.

If the turbine vibrator is to achieve full power, the air discharge hose must have a bigger nominal width than the air supply hose. The free end should be fitted with a silencer.



Compressed air supply and discharge lines (hoses) must be suitable for applications in explosion endangered rooms (electrically conductive, anti-static).

Minimum cross-sections for valves and hoses:

Type	Connection threads	Hose size	Exhaust air (silencer)
NCT 1 E, NCT 2 E, NCT 3 E, NCT 4 E, NCT 4i E	1/8	NW 6	1/8
NCT 5 E, NCT 10 E, NCT 10i E	1/4"	NW 6	1/4"
NCT 15 E, NCT 29 E, NCT 29i E	1/4	NW 10	1/4
NCT 55 E, NCT 108 E, NCT 108i E, NCT 126 E, NCT 250 E, NCT 205i E	3/8"	NW 12	3/8"



NCT E vibrators can be operated with 2/2-way valves, because ventilation takes place through the vibrator.

Checklist for installation:

- 1) Mount the unit, secure the fastening screws, ensure correct earthing connection.
- 2) Install service unit (filter, if necessary regulator), valve, supply line, silencer.
- 3) If necessary discharge the exhaust air.
- 4) Are fastening screws secured with the supplied lock washers? Check! Has information on hose type, hose length and nominal width been observed?

7 Start-up / Operation



The desired or max. permissible frequency must be adjusted on an upstream pressure regulator. When adjusting you should always start at approx. 1.5 bar and slowly increase the pressure, until the maximum frequency is reached. Maximum frequency and maximum operating pressure must not be exceeded.
The frequency can be simply measured with a Sirometer (optionally available from Netter GmbH).



All turbine vibrators of series NCT E require clean, preferably non-lubricated compressed air or nitrogen.



Note on NCT 1 E and NCT 2 E:

Due to their high rate of efficiency these two units reach very high rotary speeds. These high rotary speeds affect the lifetime of the bearings and increase the noise level. We therefore recommend to operate vibrators types NCT 1 E and NCT 2 E with a pressure of only 2-3 bar (max. 15.000 revolutions) or to use them solely in interval operation.



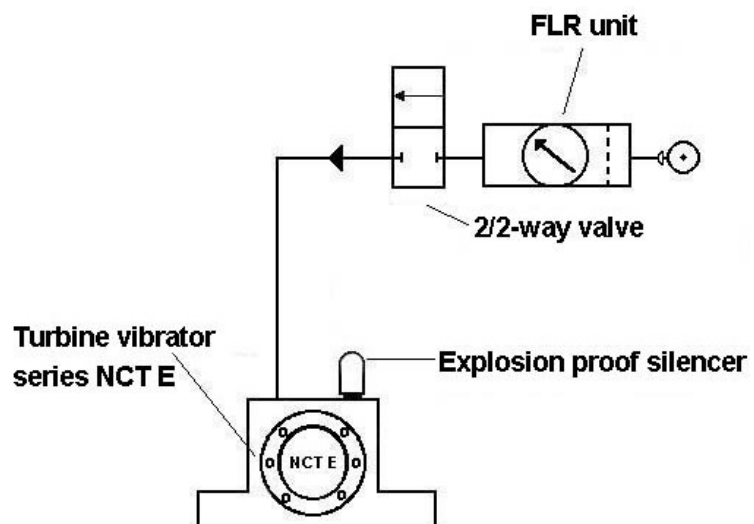
Connection to ground via the earthing connection on the housing foot and the mounting surface is mandatory.
On stainless steel units earthing is accomplished directly via the mounting surface, which requires that electric transition via this surface is assured (clean mounting surface without paint finish).



NCT E vibrators must strictly be operated with silencer.

Standard installation

Special plans on request



Checklist for start-up:

- 1) Check hose connections before opening the compressed air supply.
- 2) If necessary adjust the required frequency on the pressure regulator.
- 3) Rotary speeds must be checked and, if necessary, adjusted before starting operation, after an operating time of 30 minutes and then regularly once every month.



The fastening screws for the vibrator must be retightened or checked and the rotary speed must be measured after 1 operating hour. The maximum rotary speeds must not be exceeded (see chapter 4 "Permissible Operating Conditions").

8 Service / Maintenance



When servicing the unit please observe the safety regulations in chapter 4.

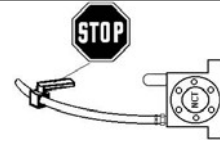


Retightening:

Screw connections must be checked and, if necessary, retightened after 1 hour of operation (after initial start-up) and then at regular intervals (normally every month). The specified torque must thereby be observed (see chapter 6).



Before starting inspection and service work shut off the compressed air supply and secure it against unintended activation!



Rotary speeds must be checked and, if necessary, adjusted before starting operation, after an operating time of 30 minutes and then regularly once every month.
Check fastening of vibrator, air connection incl. upstream service unit and silencer preferably at monthly intervals.

Filter:

Empty the filter when required, clean the filter insert (wash out).

Cleaning:

All turbine vibrators may be cleaned from outside with pressurized water. Then run the vibrator for a moment.

Silencer:

A blocked silencer causes a loss of power of the vibrator. In extreme cases this may also lead to stopping of the vibrator. You should therefore service the silencer at regular intervals and replace it if necessary. The maintenance intervals mainly depend on the purity of your drive medium.



The replacement of defective bearings or bearings of which the service life has expired, must solely be replaced by **NetterVibration**.
In zones with explosive gases the cover of NCT E vibrators must not be opened.
The max. rotary speeds listed in the table must not be exceeded.
Once the expected lifetime of the bearings is reached both bearings must be replaced.

Type	Max. speed [min ⁻¹]	Bearing lifetime [h]
NCT 1 E	29.000	1.909
NCT 2 E	21.500	1.938
NCT 3 E	21.500	1.933
NCT 4 E	18.000	2.157
NCT 4i E	13.500	2.033
NCT 5 E	17.000	2.173
NCT 10 E	13.000	1.821
NCT 10i E	9.500	2.058
NCT 15 E	14.000	2.278
NCT 29 E	10.500	2.188
NCT 29i E	8.000	1.841
NCT 55 E	9.000	2.471
NCT 108 E	7.000	1.842
NCT 108i E	5.000	2.431
NCT 126 E	7.500	1.960
NCT 250 E	5.500	2.206
NCT 250i E	4.000	2.568



The following maintenance work must be regularly performed by an authorized specialist:

- a) Inspection of screw connections
- b) Checking the rotary speed
- c) Checking the operating hours (lifetime of bearings)
- d) Inspection of earthing connection

Further maintenance and repair activities must only be performed by *NetterVibration*.

When servicing the unit please observe the safety regulations in chapter 4.

9 Troubleshooting



ATTENTION:
 Faults on explosion proof vibrators must only be repaired by authorized specialists.

Fault	possible cause	Remedy
Vibrator has insufficient power or does not start.	Connection mixed up.	Connect air inlet to port with smaller bore, see arrows.
	Design	a bigger unit may be required
	Pressure too low	Check pressure before vibrator. Start-up control for low pressure on request. Nominal width of hoses and valves is correct? Hoses kinked?
	Silencer blocked	Wash or replace
Power drop	Check pressure on unit?	Adjust operating pressure Attention: Observe max. rotary speed.
	Air line kinked?	Route compressed air supply line without kinks.
	Leak in air line?	Replace compressed air supply line.
	Silencer blocked	Wash or replace
Considerable power drop, loud bearing noise.	Wear, dirt, bearing damage	Have unit inspected at NetterVibration
Unusual increase of noise after a longer time of operation	Construction parts or screws have come loose (rattling)	Secure loose parts, retighten the screws

10 Spare Parts

When ordering spare parts please give the following details:

1. Type of unit
2. Description of spare part
3. Required quantity

Example: 1 Vyon silencer for NCT 29 E

11 Appendix

11.1 Accessories

The following accessories are available for turbine vibrators of series NCT E:

Description	Remark
Hose material and fittings	For supply and discharge of compressed air in various qualities and dimensions
3/2- or 2/2-way valves	For electric, pneumatic or manual control
Sirometer	To measure the rotary speed
Special designs:	Turbine vibrators are also available in special designs, e.g. for extreme temperature ranges and with stainless steel housing for applications in aggressive atmosphere. Information on request.

11.2 Disposal

Depending on the material, the parts must be disposed of according to regulations.

Material specifications:

All parts of these vibrators are suitable for recycling

- Housing ⇒ Aluminium
- Turbine ⇒ Aluminium
- Weights (turbine), nameplate ⇒ Brass, heavy metal
- Bearing flange ⇒ Aluminium

Special units: Material on request (e.g. stainless steel housing)



All units can be disposed off through Netter GmbH.
The valid disposal prices are available on request.

11.3 Enclosures

Enclosure(s):
Declaration of manufacturer



Further information available on request:
Brochure no. 23 (NCT), and more.

OPERATING AND MAINTENANCE INSTRUCTIONS

Aeration Pads



Read this document prior to operating the device.
This document contains all safety and warning notes.
Original operating instructions

1190023601-EN Rev. 1.0.0



Service

If you need assistance, please call your local service centre or

Coperion K-TRON Schweiz GmbH Tel. 0041 (0) 62 / 885 71 71
Lenzhardweg 43/45 Fax 0041 (0) 62 / 885 71 80
CH-5702 Niederlenz

Coperion K-Tron Pitman, Inc. Tel. 001 (0) 856 / 589 0500
590 Woodbury Glassboro Road Fax 001 (0) 856 / 589 81 13
Sewell, New Jersey 08080 USA

Coperion K-TRON Salina Tel. 001 (0) 785 / 825 16 11
606 N. Front St. Fax 001 (0) 785 / 825 8759
Salina, KS 67402-0017

Web: www.coperionktron.com

Before you call...

- ⇒ Do you have alarm displays? Are you able to eliminate the causes?
- ⇒ Have you modified part of the system, product or operating mode?
- ⇒ Have you tried to remedy the fault in accordance with the operating instructions?
- ⇒ Note the project or order number You will find these on the machine or in the system manual.
 - Example: 0403214

Using the manual:

- ⇒ This arrow identifies an individual action.
- 1. Numbers identify a sequence of actions which have to be executed step-by-step.
- ▲ This symbol identifies a general safety note.



Reference to another manual.



Important information.



This symbol indicates that tools are required for the following task.



Specifies where information or a situation must be checked.

If an error or omission is found, please contact:

documentation@coperionktron.com

Doc. No.: 1190023601-EN

Date: 2014/Feb/11

Original: 1190023601-EN

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1 General information

1.1 Target groups








Target group	Definition
Operator	Instructed person
Technician	Qualified technician with a special knowledge of ATEX and pneumatics.
Electrician	Qualified electrician with a special knowledge of ATEX.

1.2 Warnings



Warning	Risk stage	Consequences of non-adherence
	Directly hazardous situation	Death, serious injury
	Potentially risky situation	Death, serious injury
	Potentially risky situation	Minor injuries
	Potentially risky situation	Property damage

1.3 Symbols



1.3.1 General

Symbol	Meaning
	All instructions after this symbol must be adhered to.
	This symbol indicates a general safety note
	This arrow is used for indicating a single action.
1. , 2.	The numbers indicate a sequence of activities.
	Reference to another manual.
	Important information.
	This symbol indicates that a tool will be required for the following task.
	This symbol indicates that data or conditions must be checked.

1.3.2 Warning sign

Symbol	Meaning
	Ex-Protection Kindly follow the safety notes and warnings for devices meant for use in potentially explosive areas.
	Electrical hazard This sign indicates an electrical hazard.

1.3.3 Directional signs

Symbol	Meaning
	Ground icon Indicates that a ground/PE connection is required.
	Power icon Power off and disconnect air supply before working on the machine.

2 Safety

2.1 Proper use

- ▲ Only operate the device when it has been mounted and when all open links have been connected.
- ▲ Never convey materials which may cause a chemical reaction with the materials of the device.
- ▲ Only operate the device in accordance with the specified technical data.
- ▲ Any modifications and changes on safety devices are prohibited.
- ▲ Do not use the equipment in a manner not intended by the manufacturer.
- ▲ Never use the device to process explosive gas or air gas mix.
- ▲ When working with dusts that could result in an explosive atmosphere, ATEX-certified assemblies must be used.
- ▲ Do not convey moist product.

2.2 Special risks

⚠ DANGER



Danger of explosion!

- ▲ Special seals are to be used for ATEX-certified devices to make sure these are automatically grounded through the assembly of all the conducting components.
- ▲ Container with the Aeration Pads installed, must be grounded.
- ▲ Only use original Coperion K-Tron (Switzerland) LLC parts.

⚠ DANGER



Risk of death by electric shock

- ▲ The device may only be connected by qualified electricians.

2.3 General safety instructions

2.3.1 Responsibilities of the owner

- ▲ Ensure that only qualified and trained personnel work with the system.
- ▲ Establish personnel responsibilities for operation and maintenance.
- ▲ Ensure that the personnel has read and understood the operating instructions to all installation components, particularly this chapter "Safety notes".
- ▲ The operating company must have damaged or missing components replaced immediately.
- ▲ The intake of foreign materials (metal parts, stones) must be prevented by the operator.
- ▲ The plant owner is responsible for compliance with legally prescribed accident prevention and safety regulations.

2.3.2 Organizational measures

- ▲ Always keep the operating instructions near the equipment, within easy reach. Ensure that they are always complete and legible.
- ▲ Observe the safety notes for the connected equipment.
- ▲ In addition to the operating instructions, always comply with generally prescribed safety regulations governing accident prevention and environmental safety.

2.3.3 Safety-conscious work

- ▲ Read the operating instructions, in particular these safety notes, and follow these instructions.
- ▲ Ensure that only authorized personnel enter the working and danger area.
- ▲ Any changes (including changes in the operational behavior) which affect safety must be reported immediately to the responsible member of the staff.
- ▲ Always keep safety in mind while working.
- ▲ When operating any valve to check its action, be careful not to have hands near any open ports.
- ▲ Before any work is carried out on components, the main switch must be switched off and the device depressurized.

2.3.4 Safety devices

- ▲ Never operate the equipment when the housing is open.
- ▲ Do not modify the electrical safety devices, for example fuses. Increased risk of accident.
- ▲ Only use the specified fuse types when replacing fuses.
- ▲ Replace damaged cable joints and connections immediately.

2.3.5 Additional equipment

- ▲ Modifications to the equipment are prohibited.
- ▲ The operator is responsible for complying with all safety regulations related to interoperation with any additional equipment.

2.3.6 Customer service and repairs

- ▲ Have repairs to the equipment carried out
 - by the responsible Coperion K-Tron (Switzerland) LLC customer service
 - or
 - by specialised staff trained by Coperion K-Tron (Switzerland) LLC.

Customer service address is found on the project manual.

Only use original Coperion K-Tron (Switzerland) LLC parts.

2.3.7 Shut-down procedure

- ▲ The operator is responsible for the proper removal and disposal of the equipment from service.

3 Application

Simultaneously aerating and vibrating bulk material, the low profile Coperion K-Tron (Switzerland) LLC aeration pads provide an effective flow aid for use when discharging all types of granular or powdered materials.

3.1 Function

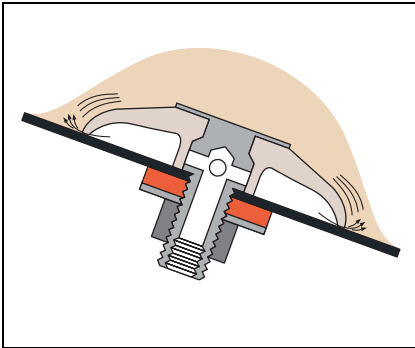


Fig. 3.1 Air on

Air is introduced into the silo or bin through the aeration pad to aerate and fluidize the material. As air flows under the rim of the diffuser, it causes it to vibrate, helping move material that has a tendency to bridge.

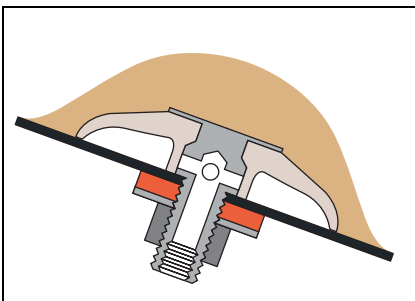


Fig. 3.2 Air off

When the air supply is switched off, the pressure of the material forces the specially designed diffuser against the side of the bin, preventing material from escaping under the diffuser and into the air supply line.

3.2 Components

- (1) Aeration Pad
- (2) Air Connection
- (3) Air distribution
- (4) Seal
- (5) Compression Washer
- (6) Nut
- (7) Silo or Bin Wall

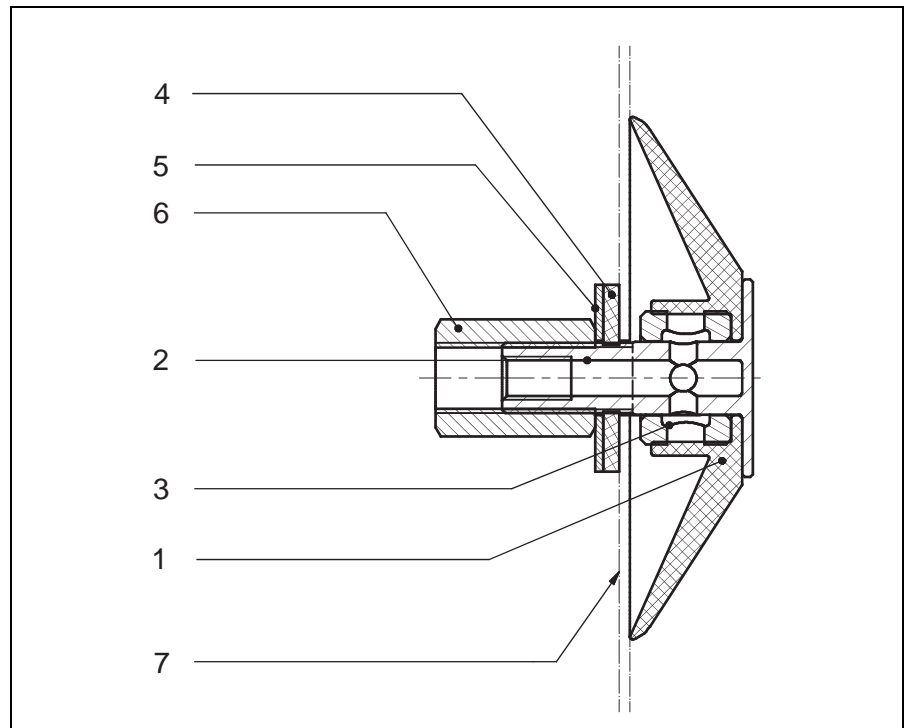


Fig. 3.3 Components of Aeration Pads

4 Technical data

Manufacturer	Coperion K-Tron (Switzerland) LLC
Designation	Aeration Pad
Part No	0000017828 Aeration Pad - Assembly from the inside 0000017829 Aeration Pad - Assembly from the outside
Max. pressure	6.9 bar [100 PSI]
Min. pressure	03 bar [4.4 PSI]
Max. temperature	205°C [401°F]

4.1 Air consumption table

Pressure	Air consumption
4,1 bar [60 PSI]	1557 l/min [55 ft ³ /min]
3,4 bar [50 PSI]	1133 l/min [40 ft ³ /min]
2,8 bar [40 PSI]	850 l/min [30 ft ³ /min]
2,1 bar [30 PSI]	566 l/min [20 ft ³ /min]
1,4 bar [20 PSI]	453 l/min [16 ft ³ /min]
1,0 bar [15 PSI]	368 l/min [13 ft ³ /min]
0,7 bar [10 PSI]	283 l/min [10 ft ³ /min]

4.2 Drawing Aeration Pad

4.2.1 Mounting from the inside

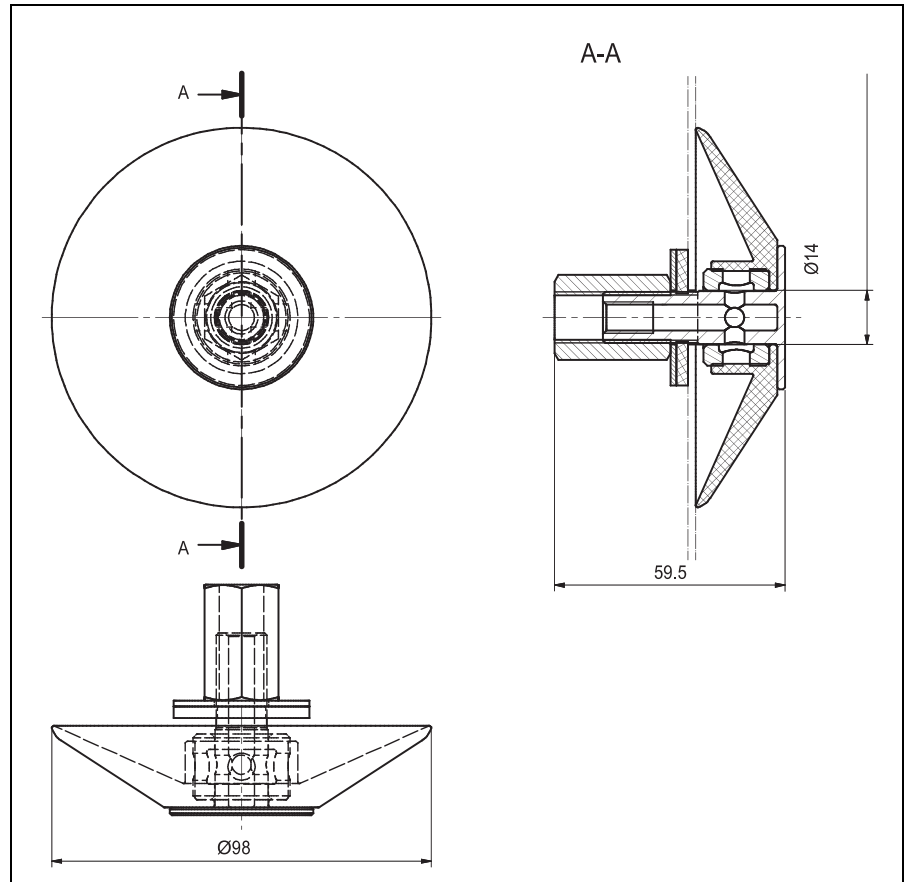


Fig. 4.1 Drawing Aeration Pad inside

4.2.2 Mounting from the outside

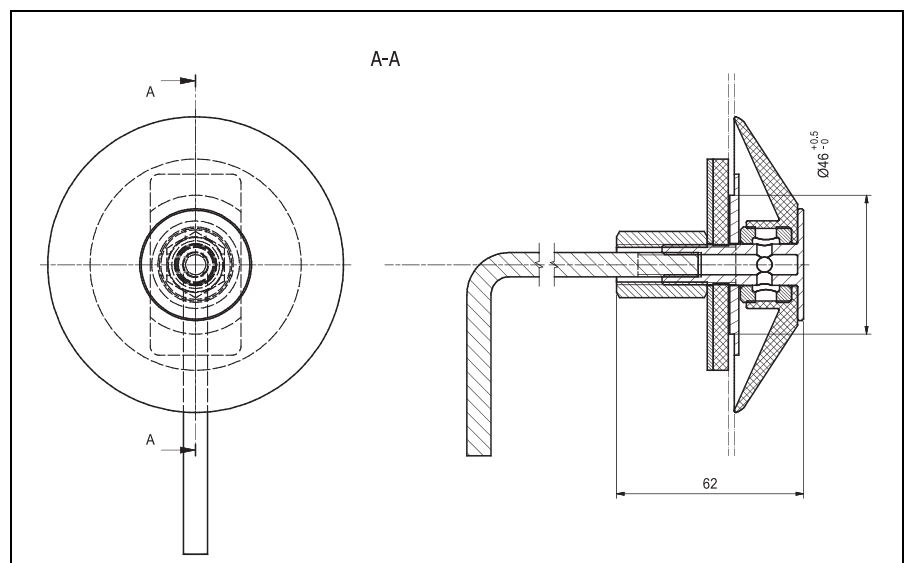


Fig. 4.2 Drawing Aeration Pad outside

5 Transport, storage and disposal

5.1 Transport



See delivery note for weight information.

5.1.1 Unpacking

1. Check whether the supplied goods are complete and check them for transport damage.
2. Report any damage immediately to shipper and to Coperion K-Tron (Switzerland) LLC.
3. Dispose of packaging material according to the local regulations.

5.2 Storage

NOTICE

Property damage caused by improper storage!

▲ The device must be properly stored.

- Seal all openings with blank flanges, blank stoppers or plastic covers.
- Ensure that the storage space meets the following requirements:
 - Dry
 - Frost-free

5.3 Disposal

▲ WARNING

Risk of injury and poisoning by the conveyed medium!

- ▲ Personal protective clothing is to be worn for all work on the device.
- ▲ The safety instructions for handling these materials must be adhered to.

Dispose of the device in accordance with the local regulations.



6 Installation

⚠ DANGER



Danger of explosion!

- ▲ Special seals are to be used for ATEX-certified devices to make sure these are automatically grounded through the assembly of all the conducting components.
- ▲ Container with the Aeration Pads installed, must be grounded.
- ▲ Only use original Coperion K-Tron (Switzerland) LLC parts.

6.1 Prepare the installation site



Ensure that the installation site meets the following conditions:

- The device must be freely accessible from all sides.
- There must be sufficient space for installing/removing the pipes, as well as maintenance and repair work.
- Clean (no oil, dust or other pollutants)

6.2 Installation instructions from outside

i

The installation tool is designed so that the Aeration pads can not fall into the container.

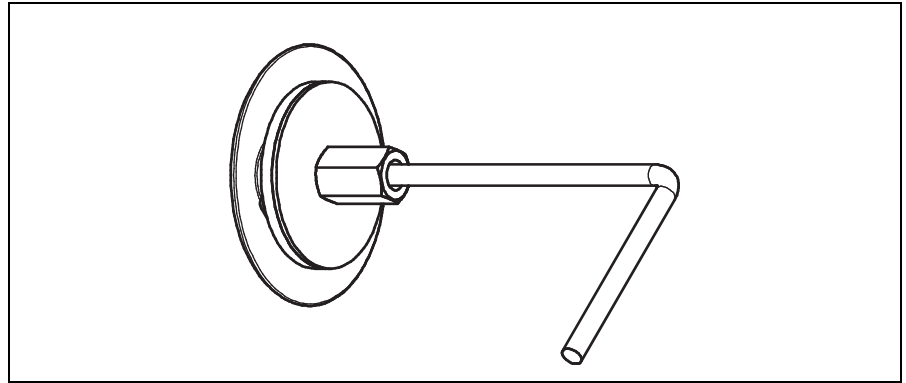


Fig. 6.1 Installation tool

Cut a 46 mm (1.81 in) diameter hole in the bin wall, remove sharp edges. Fit T-Bar into the threaded adaptor on the aeration pad with all washers, etc., as shown



Fig. 6.2 Step 1

Squeeze the rubber section through the hole in the bin.



Fig. 6.3 Step 2

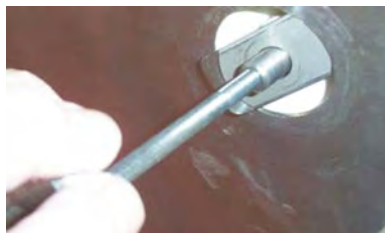


Fig. 6.4 Step 3

Pass the centralizing bar through the bin wall ensuring it is vertically mounted (see step 4) and the spigot is located within the hole.



Fig. 6.5 Step 4

Maintain a backwards pull on the T-Bar to ensure the centralizing bar remains located and vertical. Slide the sealing washer inwards and pass over the threaded boss.



Fig. 6.6 Step 5

When the sealing washer is in position with the threaded boss protruding, screw on the retaining nut.



Fig. 6.7 Step 6

Tighten the retaining nut and remove the T-Bar, connect the air supply and the aeration pad is ready to use.

6.3 Electrical connection

⚠ DANGER



Risk of death by electric shock

- ▲ The conveying device may only be connected by qualified electricians.
- ▲ Observe the local regulations.

-
1. Connect the conveying device in accordance with the electrical wiring diagram.
 2. Ground the conveying device carefully.



Connect the ground connection to a low-impedance equipotential bonding, see the grounding information on the device.



Provide a lockable main switch to disconnect the main power supply from the conveying device.



Carefully follow all wiring and shielding procedures as indicated on the provided wiring diagrams and operating instructions of the controls.

6.4 Compressed air connections

⚠ WARNING



Risk of bursting!

- ▲ In case of insufficient ventilation of the tank pressure rises in the tank at start up of the aeration pads.
- ▲ Ensure adequate ventilation container.



-
- The compressed air must be clean, dry and oil-free.
 - Maximum 6.9 bar [100 PSI].
 - The pneumatic links of the valve must be rigidly connected before the electrical links are connected.

7 Start-up

DANGER



Danger of explosion!

- ▲ When working with dusts that could result in an explosive atmosphere, ATEX-certified assemblies must be used.



For more information see system operating instructions and functional design in the systems project manual.

8 Operation

DANGER



Danger of explosion!

- ▲ When working with dusts that could result in an explosive atmosphere, ATEX-certified assemblies must be used.
- ▲ The device must be cleaned regularly of dirt and dust deposits.

8.1 Switching on/off

⇒ Switch the equipment on/off with the provided controls



For more information, see systems manual.

9 Cleaning



▲ WARNING

Risk of injury posed by unintentional switching on.

- ▲ Switch off the equipment before every intervention and secure it against unintentional restarting (see chapter 9.1).
- ▲ Depressurize the system.
Depressurize the compressed air accumulator by manually operating the discharge valve.

NOTICE

Damage to property caused by corrosive and toxic detergents.

- ▲ Follow the safety regulations for dealing with cleaning agents. After use dispose properly the cleaning agents.
- ▲ Use only cleaning agents with $5.0 < \text{pH} < 8.5$.
- ▲ Clean with non-toxic cleaning agents and disinfectants.
- ▲ Only use cleaning agents that not affect the used seal and filter materials (silicone / PTFE / Teflon / polyester fabric not included).
- ▲ Any residues of cleaning agent on parts with product contact are not allowed.
- ▲ Do not clean with high pressure cleaners, steam cleaner or compressed air.
- ▲ Not remove product adhesion with force.
- ▲ There must no moisture on electrical components.
- ▲ All parts must be dry cleaned before assembly.

9.1 Switching off the installation



1. Switch off the equipment at the main switch.
2. Secure the main switch with a lock.
3. Attach a danger sign to the main switch.
4. Switch off the air and vacuum supply and lock the switch.

9.2 Notes on cleaning

i

- Empty the unit before cleaning.
- Clean only with mild air stream.
- In case of external soiling, clean with a damp cloth and use normal industrial cleaners
- Use vacuum cleaner or soft brush for cleaning.
- Remove dust layers over 5 mm.

10 Maintenance



Close adherence to the inspection and maintenance intervals is absolutely necessary to ensure safe working conditions and explosion protection!



- Maintenance work may only be carried out by trained technicians.
- Only qualified electricians may work on the electrical equipment.

10.1 Maintenance intervals

Element	Checkpoints	Interval
Mechanics	<ul style="list-style-type: none"> • Eliminate dust accumulation more than 5 mm [0.2 in] through cleaning. • Check convey and vacuum line mechanical connections for tightness. • Check seal rings for damage • Check safety symbols at the equipment for legibility and completeness. 	⇒ Weekly
Pneumatics	<ul style="list-style-type: none"> • Check the compressed air settings. • Empty water-separator 	⇒ Daily ⇒ Monthly
Electric	<ul style="list-style-type: none"> • All electrical connections must be visually inspected. 	⇒ Daily

10.2 Safety instructions for maintenance

WARNING



Risk of injury posed by unintentional switching on.

- ▲ Switch off the equipment before every intervention and secure it against unintentional restarting (see chapter 10.3).
- ▲ Depressurize the system.

CAUTION



Risk posed by compressed air

- ▲ Depressurize the system.

10.3 Switching off the installation



1. Switch off the equipment at the main switch.
2. Secure the main switch with a lock.
3. Attach a danger sign to the main switch.
4. Switch off the air and vacuum supply and lock the switch.

11 Troubleshooting



- ⇒ Please observe the error messages which are displayed on the connected control device or host computer (see operating instructions for the relevant control device).
- ⇒ Document faults and call the local service center (customer service see project manual).

⚠ WARNING



Risk of injury posed by unintentional switching on.

- ▲ Switch off the device before every intervention and secure it against unintentional restarting.
- ▲ Depressurize the system.



1. Switch off the equipment at the main switch.
2. Secure the main switch with a lock.
3. Attach a danger sign to the main switch.
4. Switch off the air and vacuum supply and lock the switch.

11.1 Troubleshooting table

Error	Cause	Remedy
Fill valve is not working.	• Solenoid valve not energized	⇒ Check for the correct voltage (24 volts DC) to the solenoid valve from the control panel during the fill cycle (see wiring schematics).
	• Solenoid valve burned out	⇒ The coil may be burned out.
	• Dirt in the solenoid valve	⇒ Remove the valve core, and clean out any dirt, scale, or rust with compressed air. If the valve core is damaged or worn, replace it.
	• Not enough air	⇒ Check for the proper air supply of 5.5 to 6.9 bar [80 to 100 PSI] of clean, dry, compressed air to the solenoid valve. Also, check the air connections.

12 Explosion protection

12.1 Safety notes

12.1.1 General



- ▲ The explosion-protected device may only be used in zones designated in the declaration of conformity or in non-classified areas.
- ▲ For the maximum surface temperature of the device see the declaration of conformity.
- ▲ The device may only be used within the environmental temperature range indicated in the declaration of conformity.
- ▲ The intake of foreign materials (metal parts, stones) must be prevented by the operator.
- ▲ The plant owner has to ensure that the information on the rating plate of the individual drives have to agree with the conditions in the area of use on site.
- ▲ The plant owner has to ensure that the power supply agrees with the information on the rating plate of the individual drives.

12.1.2 Operation of the device in accordance with ATEX



The explosion protected device belongs to device group II.

- ▲ For the device category see marking on the device or declaration of conformity.

12.1.3 Standards and directives



- ▲ Observe and fulfill the following instructions, standards and directives when installing and erecting explosion-proof systems:

Standards 99/92/EG (ATEX 137)

12.2 Area of use in an explosive atmosphere

i

The owner is responsible for ensuring that the system is installed in the intended zone. The corresponding category is described in the declaration of conformity.

12.2.1 Explosion proof marking

The marking on the device shows the device category. The declaration of conformity shows the zone in which the device may be used.

12.2.2 Zones and device categories (gas)

Zone	Description	Devices of the category
Zone 0	An area in which an explosive atmosphere, i.e. a mixture of air and flammable gases, vapours or mists is either frequently or constantly present over an extended period.	1G
Zone 1	An area in which a dangerous mixture of air and flammable gases, vapours or mists sometimes forms during normal operation, constituting an explosive atmosphere.	2G
Zone 2	An area in which a dangerous mixture of air and flammable gases, vapours or mists constituting an explosive atmosphere usually does not exist or only for short periods.	3G

12.2.3 Zones and device categories (dust)

Zone	Description	Devices of the category
Zone 20	An area in which a dangerous, explosive atmosphere in the form of a cloud of flammable dust suspended in the air is either constantly present, or frequently or for long periods at a time.	1D
Zone 21	An area in which a dangerous, explosive atmosphere in the form of a cloud of flammable dust suspended in the air may form at times under normal operating conditions.	2D
Zone 22	An area in which a dangerous, explosive atmosphere in the form of a cloud of flammable dust suspended in the air may form at times under normal operating conditions.	3D

12.2.4 Dust deposits and glow temperature



- ▲ Observe the requirements of the standard IEC/EN 60079-14 Chapter 5.6.3.1 with regard to reduced glow temperature at dust deposits.

In case of dust deposits of up to 5 mm:

- Glow temperature of the material at a thickness of the layer of dust 5 mm: \geq max. surface temperature (T_{max}) + 75 K.
 $T_{max} = T_{5mm} - 75 \text{ }^{\circ}\text{C}$

In case of dust deposits greater than 5 mm to max. 50mm:

- The difference to be observed between the glow temperature of the material and the surface temperature (T_{max}) depends on how thick the dust layer is. The context is shown in Fig. 1 of the standard EN 60079-14 Chapter 5.3.3.2.1
- Avoid dust deposits > 5mm (see 9 Cleaning).

Dust deposits \geq 50 mm avoid or complete covered:

- Not allowed

12.3 Device categories within and outside the device

⚠ DANGER



Danger of explosion!

- ▲ Seals, O-rings, bellows, collars and sheet parts must be undamaged, clean and built in correctly.
- ▲ Always work carefully during mounting and maintenance.
- ▲ Replace defective parts immediately.

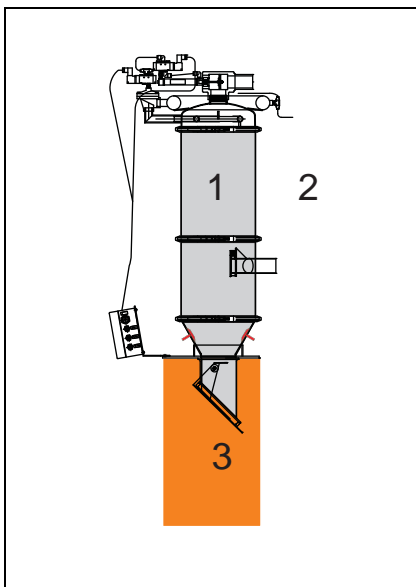


Fig. 12.1 Device categories inside/outside

The receiver has, in relation to ATEX three different zones / equipment categories as listed below and in the drawing showing:

- (1) Inside
- (2) Outside
- (3) Discharge area

Components at connections, such as seals, O-rings, bellow, packing and sheet parts, must separate the various device categories in side and outside securely from each other (see declaration of conformity).

Chapter 5:

Peripheral equipment

- Pressure reducer
- Tri Matic Ball Valve

Manual

Pressure Regulator Made of Stainless Steel Throughout REA



Safety advice

Depending on the technical circumstances and the time under and at which the pressure reducer is mounted, adjusted and commissioned, you must in each case take into account particular safety aspects!

If, for example, the pressure reducer works in an operational chemical plant, the potential hazards of commissioning have another dimension from that when is only being carried out for test purposes an a „dry“ part of the plant in the assembly room.

Since we do not know the circumstances at the time of the mounting/ adjustment/commissioning, you may find advice on hazards in the following descriptions which are not relevant to you.

Please observe (only) the advice which applies to your situation!

1.1 Personal protection

1.1.1 Safety advice for mounting

We wish to point out expressly that the mounting, the electrical installation and the adjustment of the pressure reducer and the accessories must be carried out only by trained specialist personnel having mechanical and electrical knowledge!

Switch off all the devices / machines / plant affected by mounting or repair. If appropriate, isolate the devices / machines / plant from the mains.

Check (for example in chemical plants) whether the switching off of devices / machines / plant will cause potential danger.

If appropriate, in the event of a fault in the pressure reducer (in a plant which is in operation) inform the shift forman / safety engineer or the works manager without delay about the fault, in order, for example, to avoid an outflow / overflow of chemicals or the discharge of gases in good time by means of suitable measures!

Before mounting or repair, remove the pressure from pneumatic / hydraulic devices / machines / plant.

Empty the conduit form medium.

If necessary, set up warning signs in order to prevent the inadvertent starting up of the devices / machines / plant.

Observe the respective relevant professional safety and accident prevention regulations when carrying out the mounting / repair work.

Check the correct functioning of the safety equipment (for example the emergency push off buttons / safety valves, etc.)!



1.1.2 Safety advice for adjustment and starting

As a result of the starting of a pressure reducer the flow of gases, steam, liquids, etc. may be enabled or interrupted.

Satisfy yourself that, as the result of the starting or the test adjustments of the pressure reducer, no potential hazards will be produced for the personnel or the environment!

If necessary, set up warning signs in order to prevent the inadvertent starting up or shutting down of the devices / machines / plant. By ending mounting check the correct function and the tightness of the valve.

Check the right function of all safety devices (for example emergency off push bottoms / safety valves, etc.)!

Carry out the starting and the adjustments only in accordance with the instructions described in this documentation.

1.1.3 Safety advice for maintaining / repairing

Do not carry out any maintenance / repairs if the pressure reducer will be under pressure.

Before disassembling a pressure reducer som essential points should be clarified!

- Will the pressure reducer to be disassembled be replaced by another immediately?
- If appropriate, does the production process of the plant needed to be stopped?
- Is it necessary to inform specific personnel about the disassembly?

If necessary, inform the shift foreman / safety engineer or the manager about the maintenance or repair without delay in order, for example, to avoid an outflow / overflow of chemicals or a discharge of gases in good time by means of suitable measures.

Switch off pilot pressure and the power supply and relieve the pressure in the pipes.

If necessary set up warning signs in order to prevent

- the inadvertent starting up of the devices / machines / plants in which the pressure reducer is mounted.
- the switching on of pilot medium supply, pilot power supply and/or the power supply of actuators and accessories.

In case of defect in the pressure reducer make contact to the supplier.

If you ascertain a damage of the pressure reducer, isolate the device from the mains. Please observe the safety advices.

Do not mount, start or adjust the pressure reducer if itself, the pipes or a mounted actuator will be damaged.

1.2 Device safety

The pressure reducers

- are quality products which are produced in accordance to the recognized industrial regulations.
- left the manufacturer's work in a perfect safety condition.

In order to maintain this condition, as installer / user you must carry out your task in accordance with the description in these instructions, technically correctly and with the greatest possible precision.

We assume, as a trained specialist you are having mechanical and electrical knowledge!

Satisfy yourself that the pressure reducers will be only be used within their admissible limiting value (see technical data).

The pressure reducers must be used only for a purpose corresponding to their construction!

The pressure reducers must be used within the values specified in the technical data.

The operating of the pressure reducers outside the nominal temperature range could destroy the sealings and the bearings.

The operating of the pressure reducers outside the nominal pressure range could destroy the inner parts and the body

Never remove a cap or an other component part if the pressure reducers will be under pressure.

Do not mount, start or adjust the pressure reducers if itself, the pipes or a mounted actuator will be damaged.

After the maintenance or repair check the right function of the pressure reducers and the tightness of the pipe connections.

2 Pressure reducer

2.1 General

Before mounting / disassembly the pressure reducer we assume that you have read the advices and warnings - safety advice -

If you have not read it until now, read these important advices now and turn back to this page.

2.2 Corresponding use

Pressure reducers will be used to reduce the medium pressure (inlet pressure) upstream of the pressure reducer to a reduced pressure (outlet pressure) downstream of pressure reducer.

It should only be used clean liquids and gases without doubts concerning the material resistance of the pressure reducer. Pollution or using outside the nominal pressure range and/or the nominal temperature range should causes damages on the pressure reducer especially on the diaphragm.

2.3 Operation

The adjustment of a pressure reducer should happen without media flow (no media consumption), the manometer shows the static pressure.

Increase of the outlet pressure:

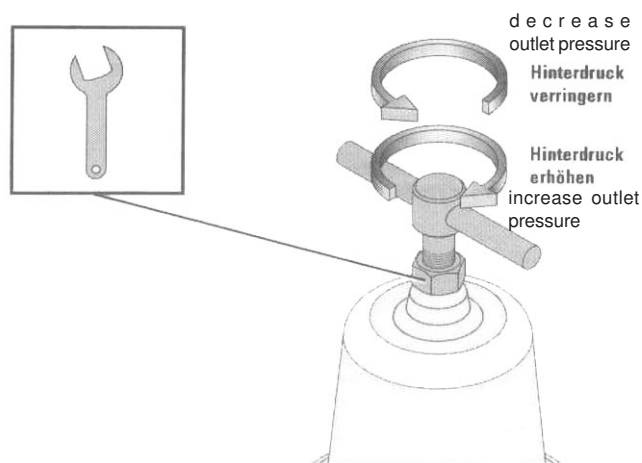
Turn the adjustment screw clockwise, until you will have reached the pressure as desired.

Decrease of the outlet pressure:

Turn the adjustment screw anti-clockwise. Consume some media to release the outlet pressure. Correct the adjustment until you will have reached the pressure as desired.

With the counter nut you can prevent the unintentional distort of the adjustment screw.

A decreasing pressure during medium consumption is a normal reaction.



2.4 Mounting / Disassembly

The mechanical installation are the same by all variants. It differs by the type of connection only.

Consider the flow direction of the medium, specified on the valve body. Pressure reducers should be install with released spring.

The position of installation will be as you desired, an installation in vertical pipes with standing up bonnet is preferred.

We recommended the installation of gate valves in front of and behind the pressure reducer to clean the pressure reducer without empty of the conduit.

Remove the hole packing material (e.g. caps and plugs). Take care that there will be no packing material or other pollution in the pressure reducer.

Before mounting the pressure reducer clean up the pipes.

Avoid strains on the body by non align pipes.

Screw a manometer into the manometer port. Not used ports must be closed by fit plugs.

Special Advice,- installation in boiler systems

Pressure reducer have to be installed in the upstream (cold water) of the system to avoid calcification. The distance to the check valve has to be far enough that the pressure reducer can not be reached by hot water even if the check valve is defective.

Please refer to DIN1988 and AD leaflet A3 DIN 4753

2.4.1 Mounting with threaded connection

Before lay on sealing compounds, check the hardly screwing by the pipes into the pressure reducer's body.

Lay on the correct sealing compounds on the pipes end. By using PTFE-ribbon or hemp sealings consider the screw direction. Don't use sealing compounds wich are not prescribed for your employment.

Screw the pipes into the threaded ends of th pressure reducer. Don't use the bonnet of the spring as a lever.

Strike up the pipes with pressure after that time the manufacturer of ther sealing compounds pretends for harden it.

Check the tightness of all connections.

2.4.2 Mounting with screw pipe connection

Before lay on sealing compounds, check the hardly screwing by the pipes into the pressure reducer's body.

Lay on the correct sealing compounds on the pipes end. By using PTFE-ribbon or hemp sealings observe the screw direction. Don't use sealing compounds which are not prescribed for your employment.

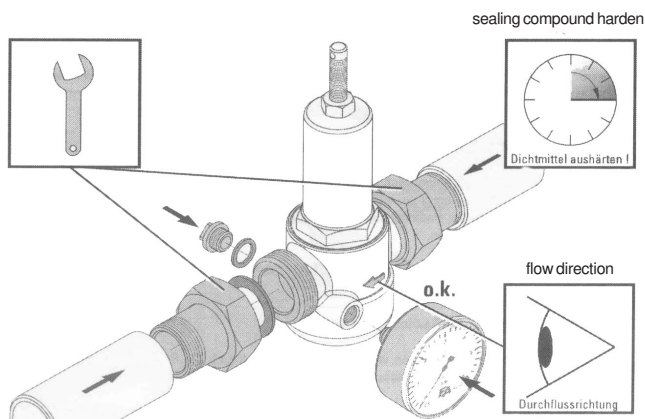
Put the screw caps onto the pipes and screw the screw pipe connections into the pipes.

Put the pressure reducer with the sealings between the screw pipe connections and tighten the screw caps.

Adjust the pressure reducer to the pipes. Tighten the screw caps.

Strike up the pipes with pressure after that time the manufacturer of the sealing compounds pretends for harden it.

Check the tightness of all connections



2.4.3 Mounting with welded connection

By welding the pressure reducer between the pipes you have to disassemble the pressure reducer first, to prevent the damage of the sealings.

2.4.3.1 Disassembly of the pressure reducer

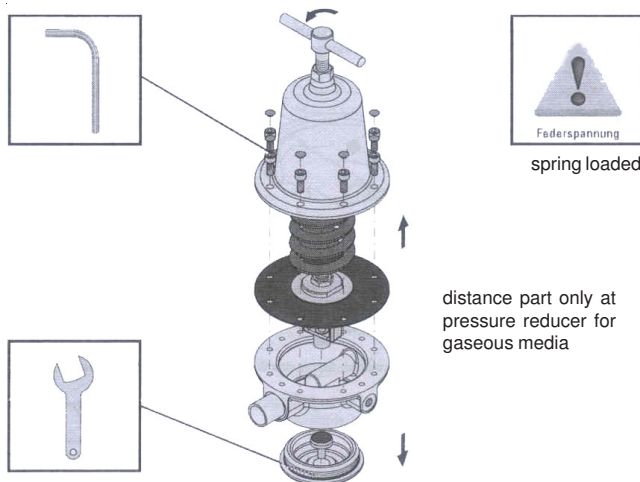
The disassembling and mounting of the pressure reducer should happen with great care in a clean environment. Pollution will reduce the safety and the duration of life of the pressure reducer.

If you will disassemble some pressure reducers, place marks on the parts that you will be able to join the correct parts by a subsequent mounting of the pressure reducers.

Clamp the pressure reducer between a vice carefully. By using guard plates you can prevent the damage of the end of the pressure reducer's body.

Before disassembling the pressure reducer you have to release the spring to prevent the fly around of the pieces. Heavy injuries of persons or damages of the pieces would be the result.

Turn the adjustment screw anti clockwise, until the spring will be totally released.



Pull off the caps from the screws and loosen them crosswise. Pull the screws out of the body of the pressure reducer.

Take off the bonnet of pressure reducer and take it by side carefully.

Take off all the inner parts of the pressure reducer and take them by side carefully.

Turn the body around and screw out the cap with a fit spanner.

2.4.3.2 Welding of the body between two pipes

By welding the body of the pressure reducer with the pipes observe appropriate demands and guide lines.

The safety demands by welding are depending on the place and the position of the point of weld. Welding the parts at a serviceable device/machine/Plant the potential of danger is as higher as welding the parts in a welding room.

If appropriate, inform the shift foreman/safety engineer or the works manager and the fire brigade of you factory.

By welding observe your own national guide lines about safety and prevention of accidents.

2.4.3.3 Mounting of the pressure reducer

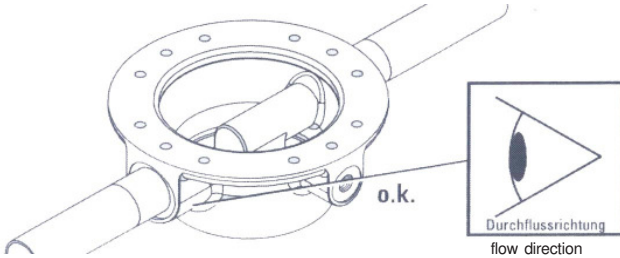
Before mounting the pressure reducer let the body cool down.

The mounting of the pressure reducer takes place just the other way round to the disassembly of the pressure reducer.

Take care about the correct placement of the sealing and that there will be no pollution on the sealing or the seat.

After mounting check the function of the pressure reducer.

Check the tightness of all the connections.



2.4.4 Mounting with flanged connection

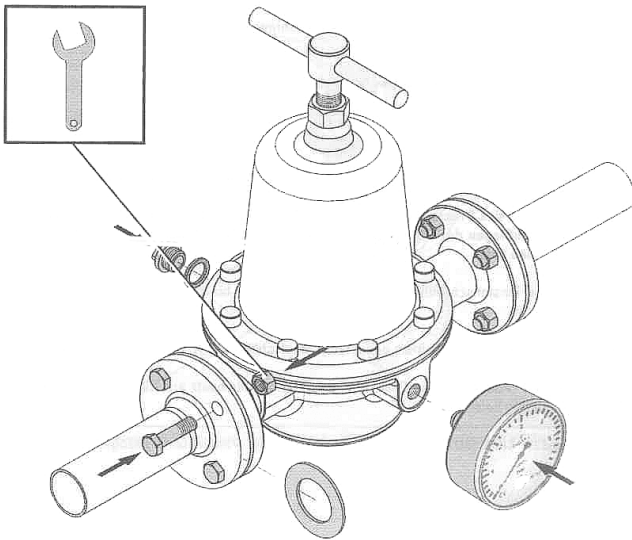
We assume, that you have mounted the flanges at the end of pipes and they are cooled down (e.g. welded flanges).

Push the body of the pressure reducer between the flanges by using the appropriate sealings.

Aligns the flange borings and put the fit screws through the holes.

Screw the fit nuts onto the screws and tighten it up crosswise. By doing this consider the maximum torque moment of the screws.

Check the tightness of all connections.



2.5 Maintenance

Before you maintain or shut down the pressure reducer you have to read - „Safety advice“ - .

If you have not read the safety advices until now, read these important advices now and turn back to this page.

On normal accounts the pressure reducer is maintenance free. In periodical turns you have to:

- 1 Check the function of the pressure reducer
- 2 Check or clean the mesh
- 3 Check the right outlet pressure
- 4 Check the tightness of all the connection

In case of a defect of the pressure reducer make a contact to the supplier.

If you determine that there is a damage to the pressure reducer switch off the device / machine / plant!. However before doing this, it is essential to refer to - „Safety advice“ - .

5.5.1 Cleaning of the mesh

Cut off the medium flow on both sides of the pressure reducer and release the pressure in the pressure reducer.

Keep ready some fit tanks to catch up leaking liquids.

Before disassembling the pressure reducer you have to release the spring to prevent the fly around of the pieces. Heavy injuries of persons or damages of the pieces would be the result.

Turn the adjustment screw anti clockwise until the spring is totally released.

Loosen the bonnet with a fit spanner or a pair of tongs.

Take off the bonnet of pressure reducer and take it by side carefully.

Take off all the inner parts of the pressure reducer and take them by side carefully.

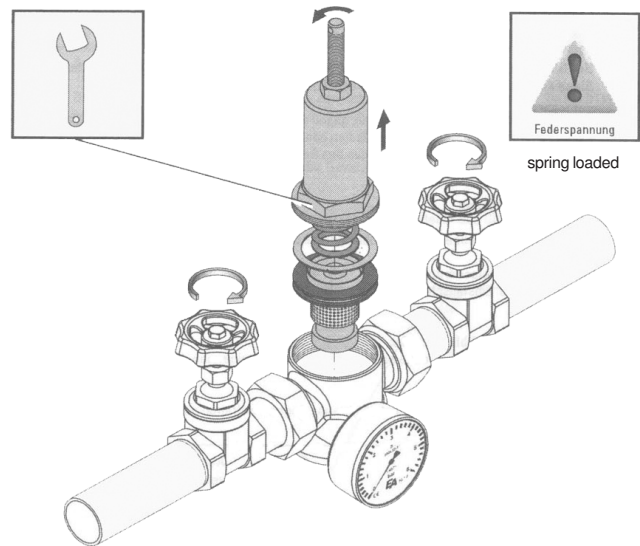
Now the mesh could be taken out of the body of the pressure transducer.

By mounting please consider:

- that the cam or peg will be placed exactly above the counter part at the body
- that the inner parts will not be braced by the placement into the body
- the correct placement of the sealings
- that there will be no pollution on the sealings

After mounting check the function of the pressure reducer.

Check the tightness of all connections.



**2/2 – Weg Edelstahlkugelhahn poliert
ISO 2852, DIN 32676
CLAMP-Anschluss**

**Stainless steel 2/2-way ball valve
polished
ISO 2852, DIN 32676
CLAMP-connection**



Technische Daten

Nennweite: ½" ¾" 1" 1 ½" 2"
Betriebsdruck: siehe Diagramm/ Tabelle
Temperaturbereich: -20°C bis +160°C
Material: V4A Stahl / AISI 316 / DIN 1.4404
Kugeldichtung: PTFE rein
Handhebel normal: V2A Stahl / AISI 304 / DIN 1.4307
Einbaulage: beliebig

Einsatzbereiche:
Chemische - und pharmazeutische Anwendungen

Norm:
ISO 2852, DIN 32676

Auf Anfrage:
- andere Normen
- andere Ausführungen

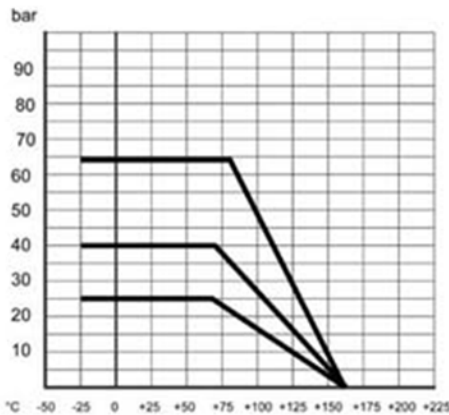
Technical datas

Diameter: ½" ¾" 1" 1 ½" 2"
Working pressure: voir diagramme/ table
Working temperature: de -20°C à +160°C
Material: Acier Inox / AISI 316 / DIN 1.4404
Ball seal: PTFE pur
Lever normal: Acier Inox / AISI 304 / DIN 1.4307
Mounting position: any

Range of applications:
Chemical and pharmaceutical applications

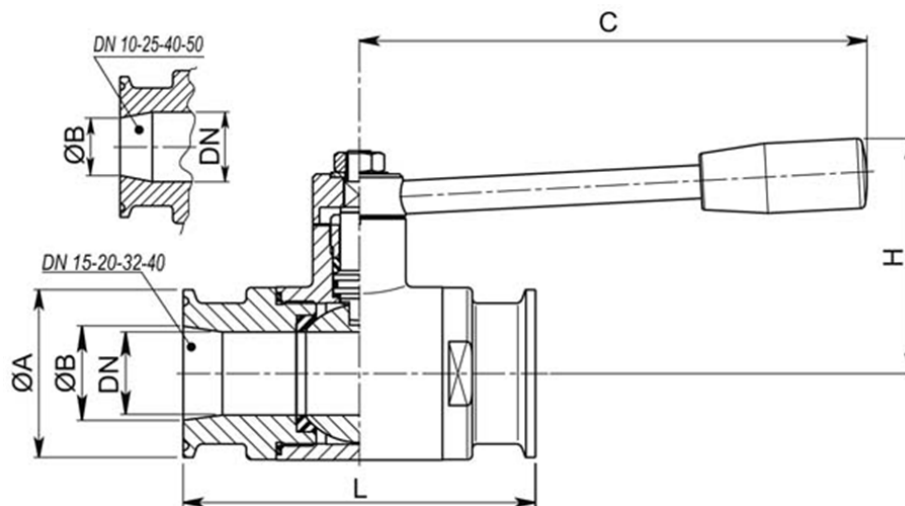
Norms:
ISO 2852, DIN 32676

On request:
- other norms
- other types



Druck- und Temperaturdiagramm
Diagram of pressure and temperature

PN Druckstufen siehe Tabelle unten
Pressure stage PN see table below



Bitte fragen Sie unsere aktuellen Preise an!

Do not hesitate to contact us for current prices!

TRI-BALL INOX CLAMP									
CLAMP	No. TRI-MATIC	Code	DN	L	ØA	ØB	C	H	PN
1/2"	1707851	100130 61210 DN10	10	88	25	9.7	110	50	64
3/4"	1707479	100130 61810 DN15	15	92	25	16	110	55	64
3/4" *	1707653	100130 61910 DN15	15	92	34	16	110	55	64
1"	1707163	100130 62410 DN20	20	102	50.5	22.2	110	60	64
1"	1707164	100130 62610 DN25	25	106	50.5	22.2	160	65	40
1 1/2"	1707853	100130 63210 DN32	32	112	50.5	34.8	160	70	40
1 1/2"	1707739	100130 63410 DN40	40	126	50.5	34.8	190	80	40
2"	1707845	100130 63610 DN40	40	126	64	47.4	190	80	40
2"	1707852	100130 63810 DN50	50	136	64	47.5	190	90	25

* DIN 32676

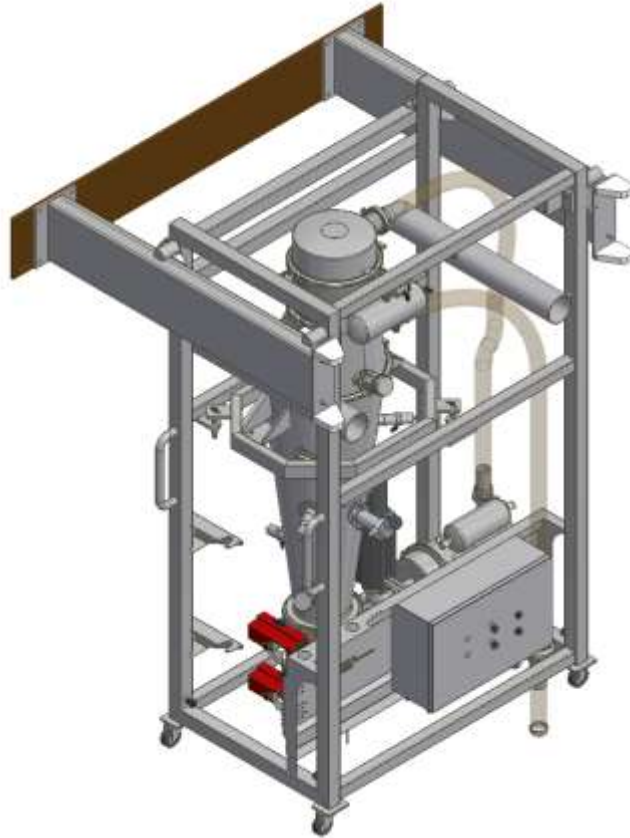
Weitere Dimensionen auf Anfrage / More dimensions on request

Chapter 6:

Operating

- Conveying System
- Hengstler Counter Tico 772

Operating Instructions for the SG.TBP.202.M.5235/C002
Conveyor System



Customer:



**Novartis Singapore Pharmaceutical
Manufacturing Pte Ltd.
10 Tuas Bay Lane
637461 Singapore
Singapore**

Supplier:



**K-Tron Schweiz AG
Lenzhardweg 43/45
CH - 5702 Niederlenz
Schweiz**

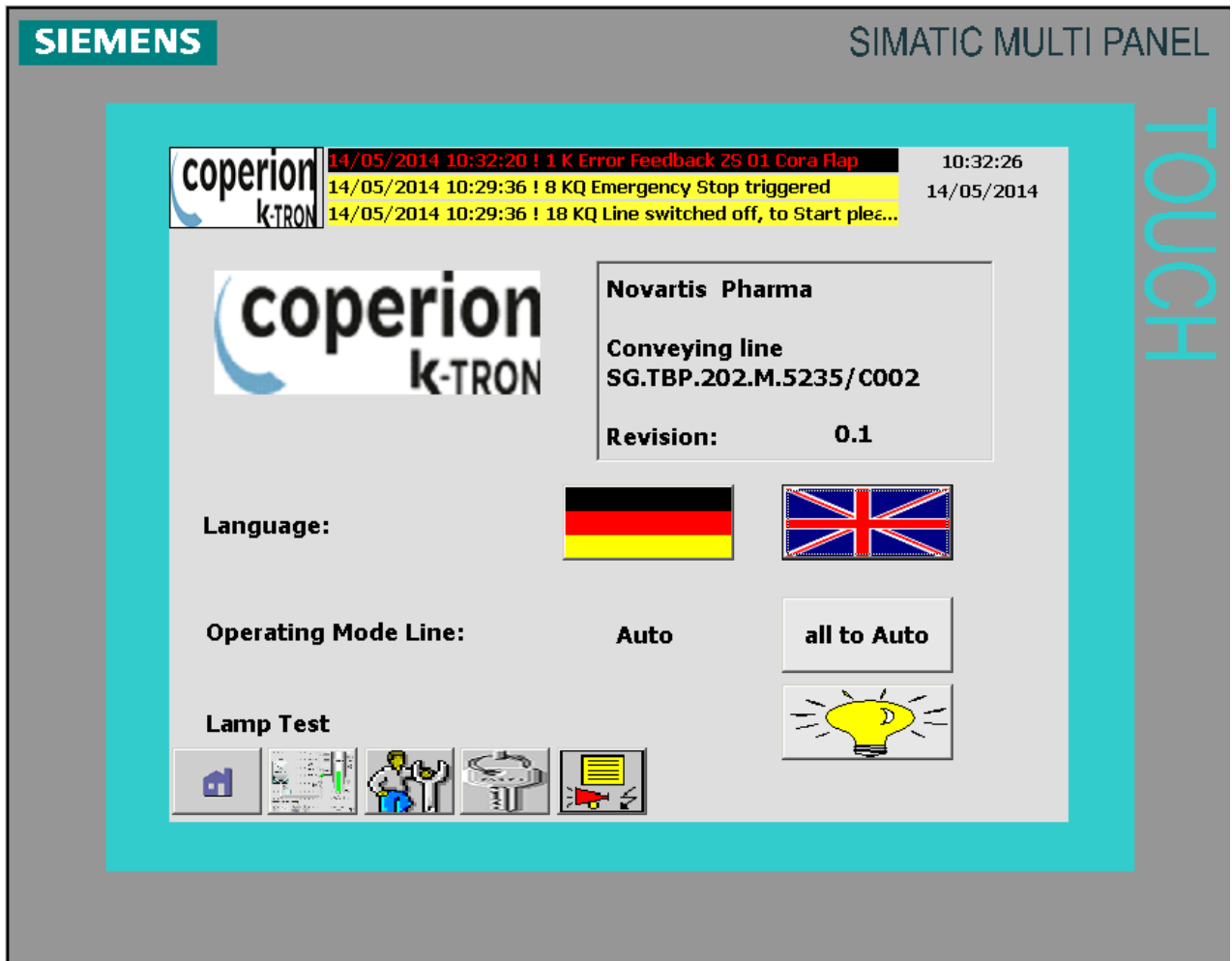
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1. Introduction

The display area is divided into two sections. It consists of a permanent button area on the Top in which the last alarm, the current date and time, as well as the current logged in user are shown. The communication to the controller is further indicated by a green flashing rectangle.

The remaining area is used for various screens.

1.1. Start screen




Start screen

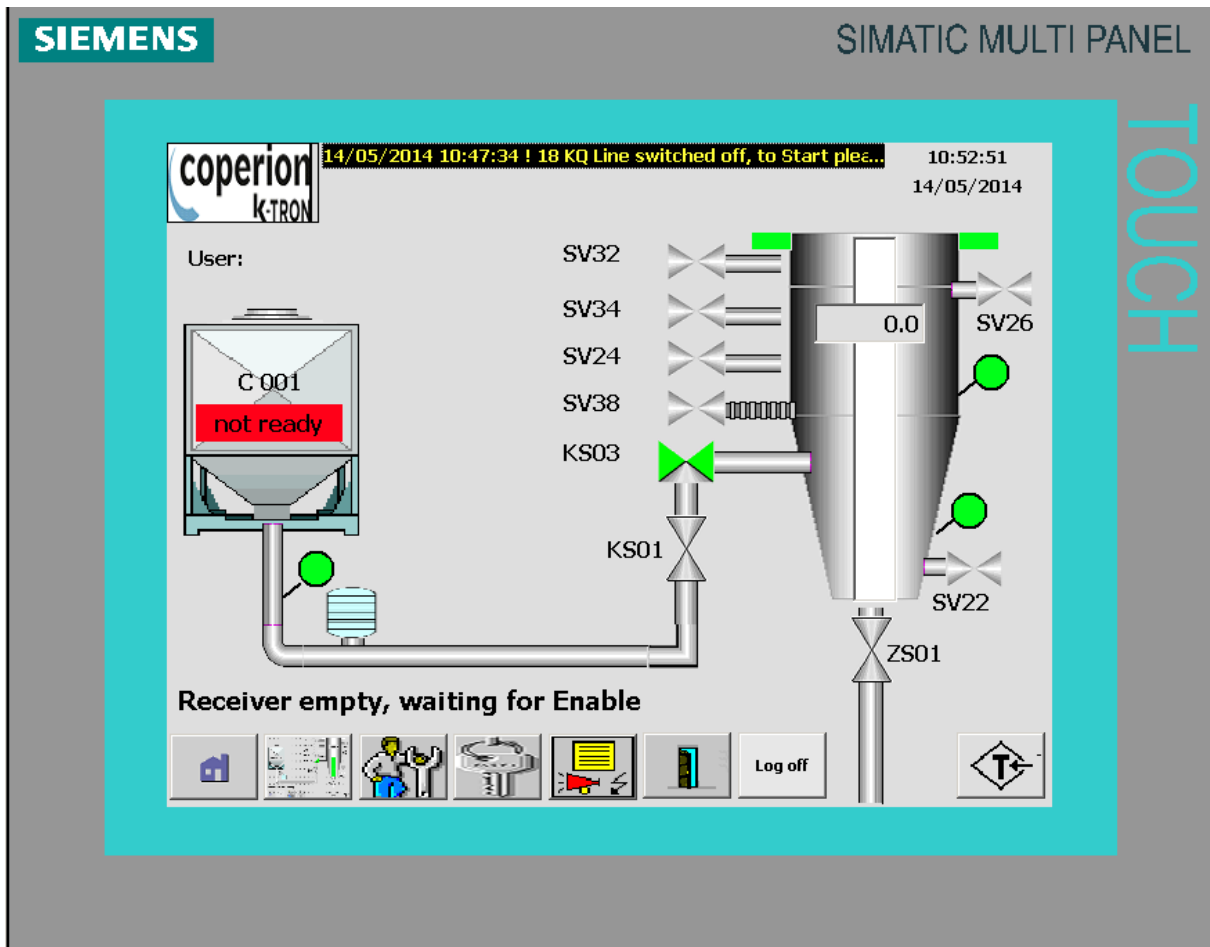
The start screen shows the operating mode of the system. As soon as an actuator is switched to manual mode, the display changes to "Manual".

The "All automatic" button can be used as a central switch to set the whole system back to automatic mode.

The "Lamp test" button activates all signal lamps in order to test their function.

The start screen can be called up at any time with the  key.

1.2. Overview




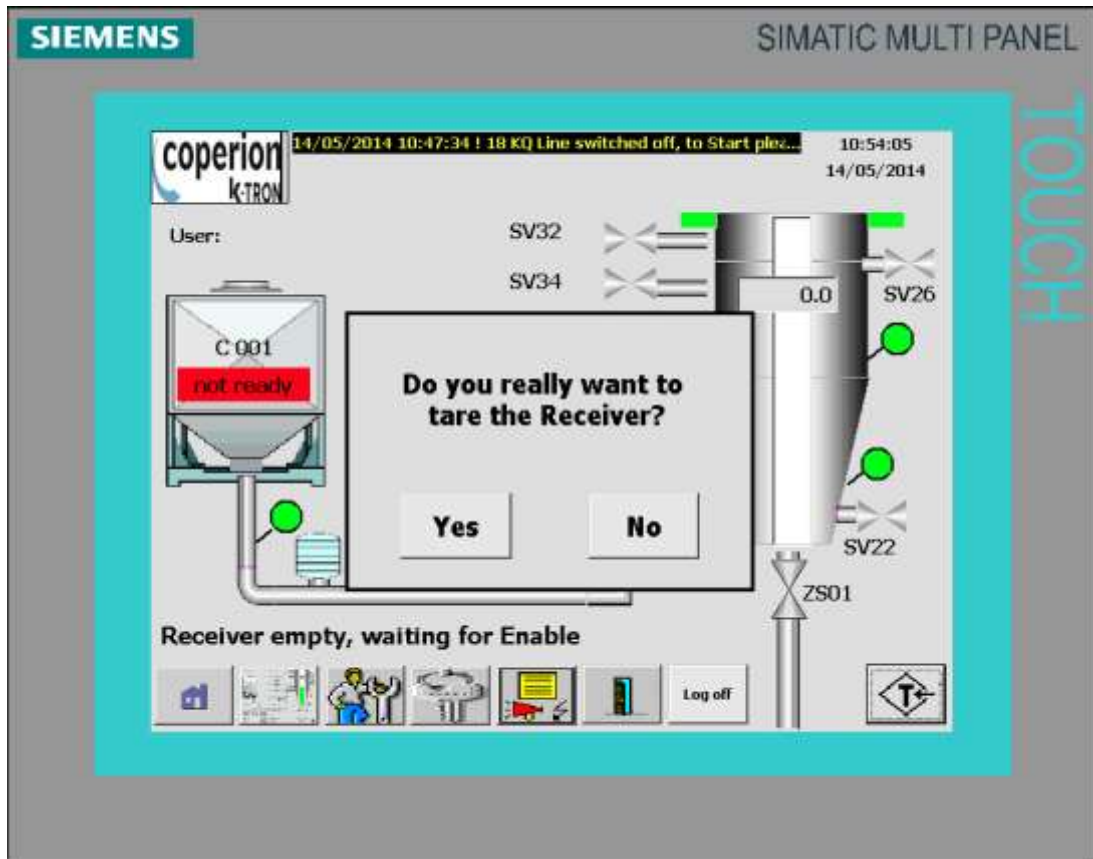
Overview

This provides a basic view of the system structure. The current status of the individual flaps, valves and filling level monitors is shown. The current step of the transport system is shown at the bottom edge.

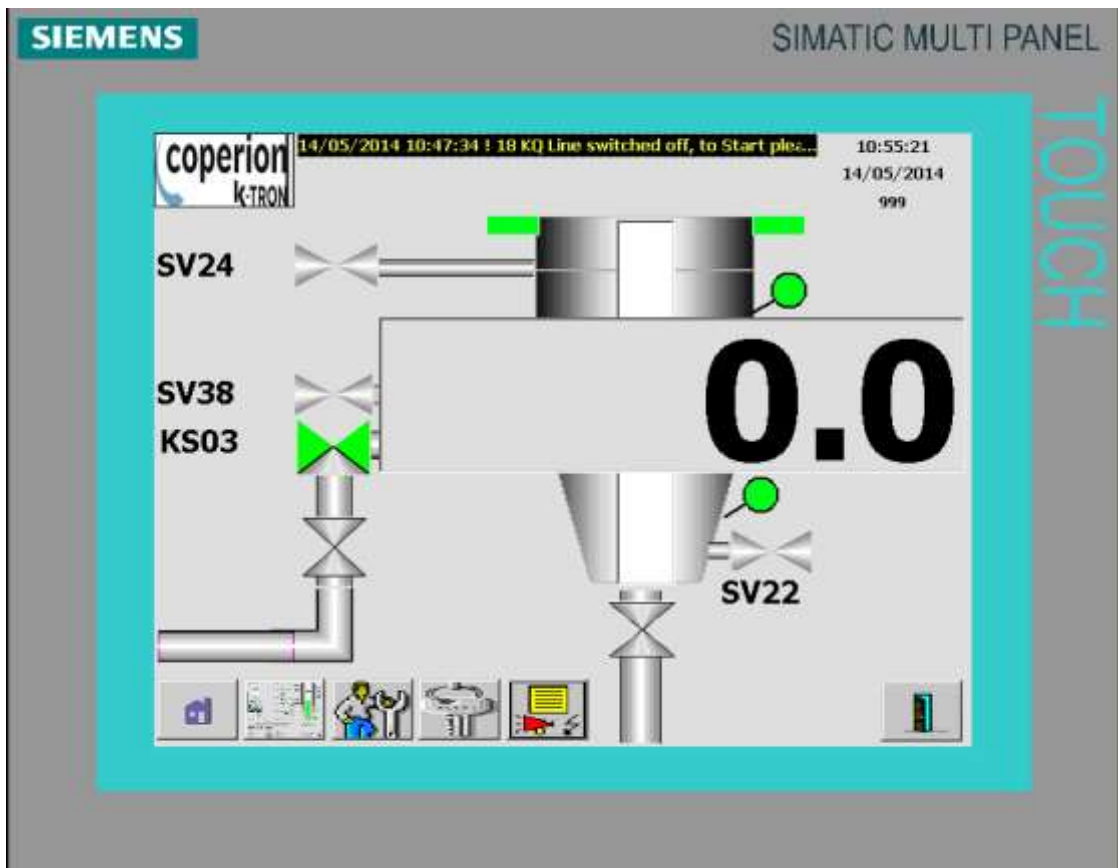
Furthermore the current user will be displayed at the upper right edge (User:) and on all screens at the upper left corner. To Log off a User simply press the “Log Off” Button.



The  key is used to set the tare for the transport system. A dialogue is shown to prevent wrong operation.

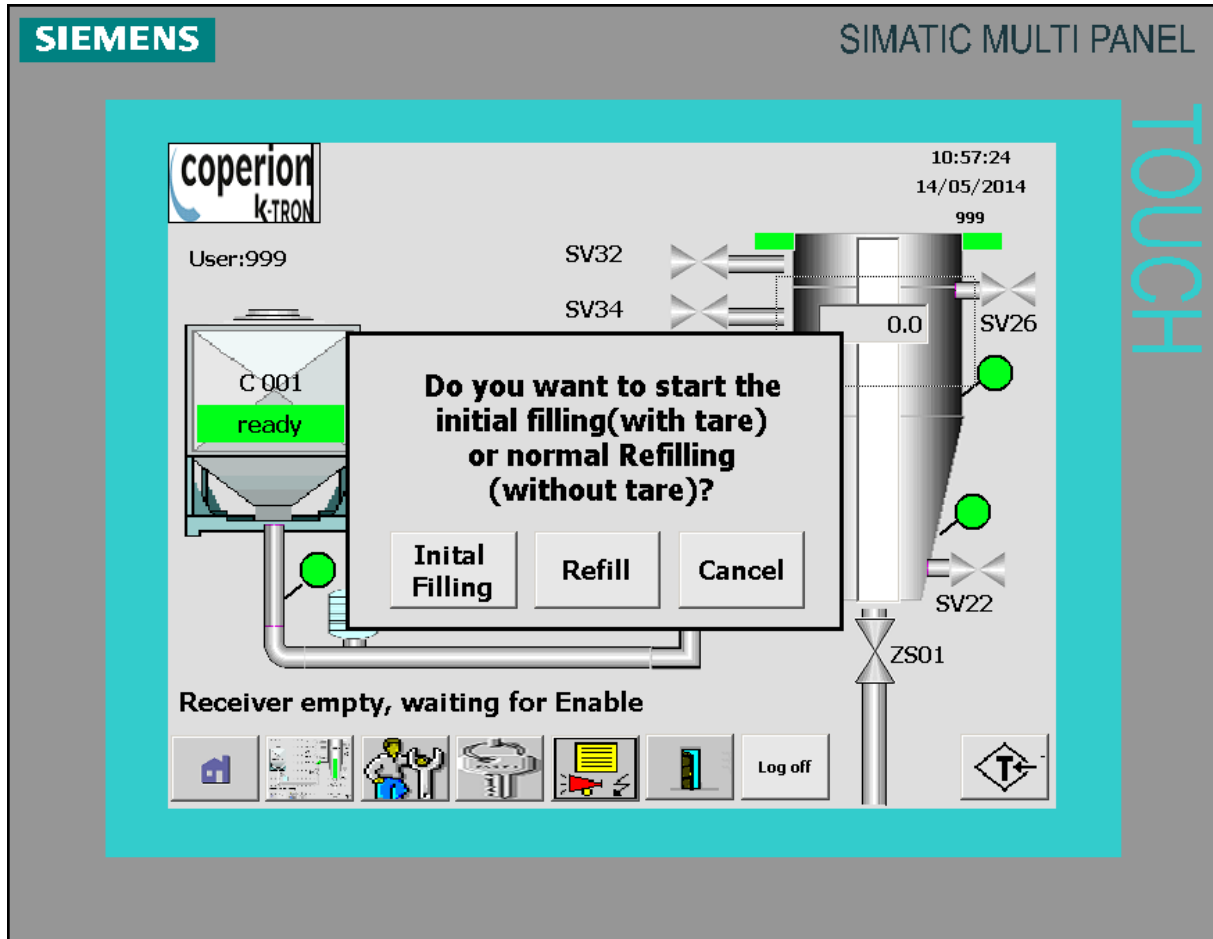


Touching the weight display in the transport system calls up a large screen view.

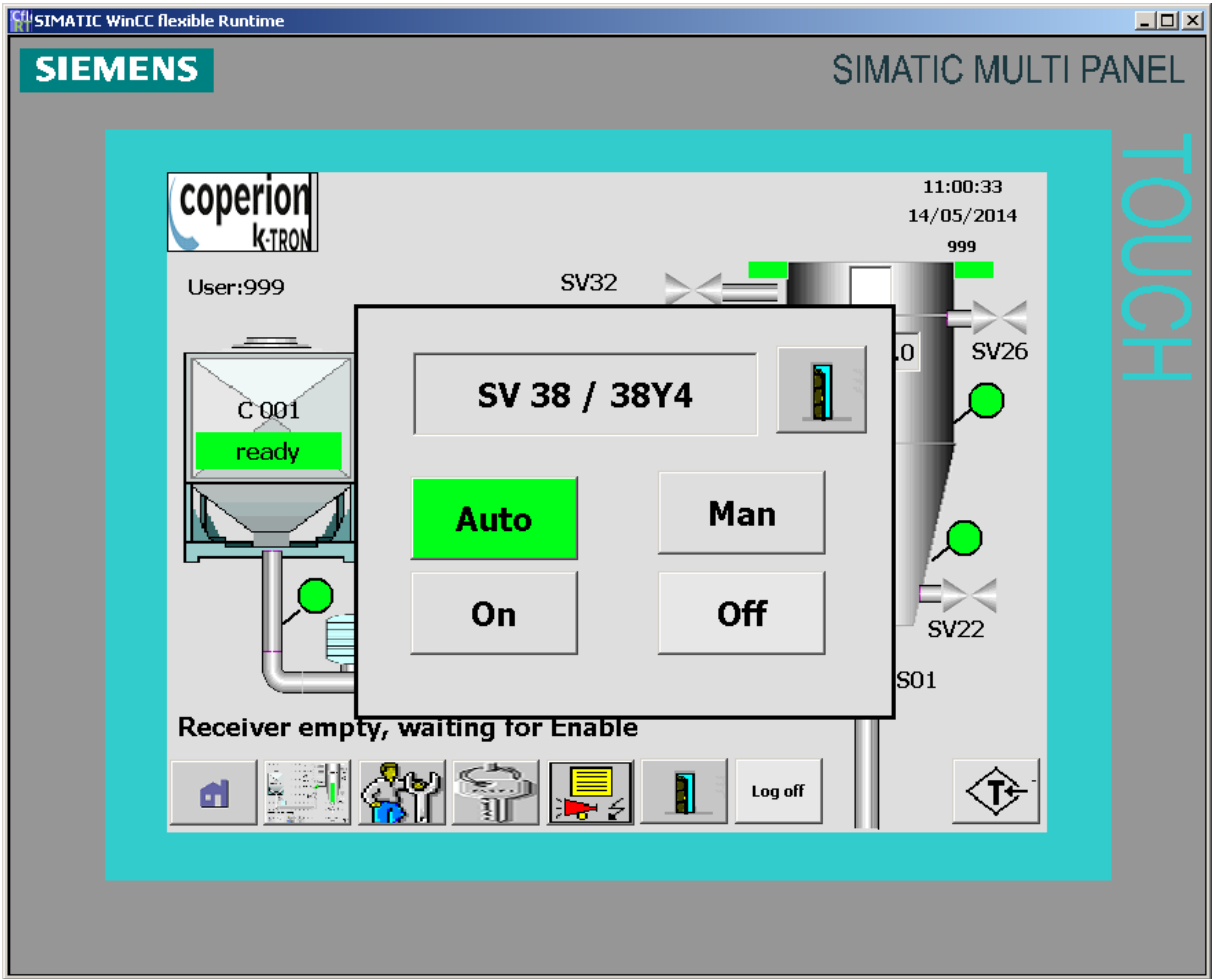



The dialogue shown below appears after switching on the system. It can be selected whether initial filling is to be performed or not.

"Initial filling" is used to fill the transport system for the first time before the start of production. All filling level monitors must report "Empty" and the transport system tare must be set for this purpose. Setting the tare is always automatic and independent of the current weight. The "initial filling" can be terminated at any time with the "System on/off" switch.

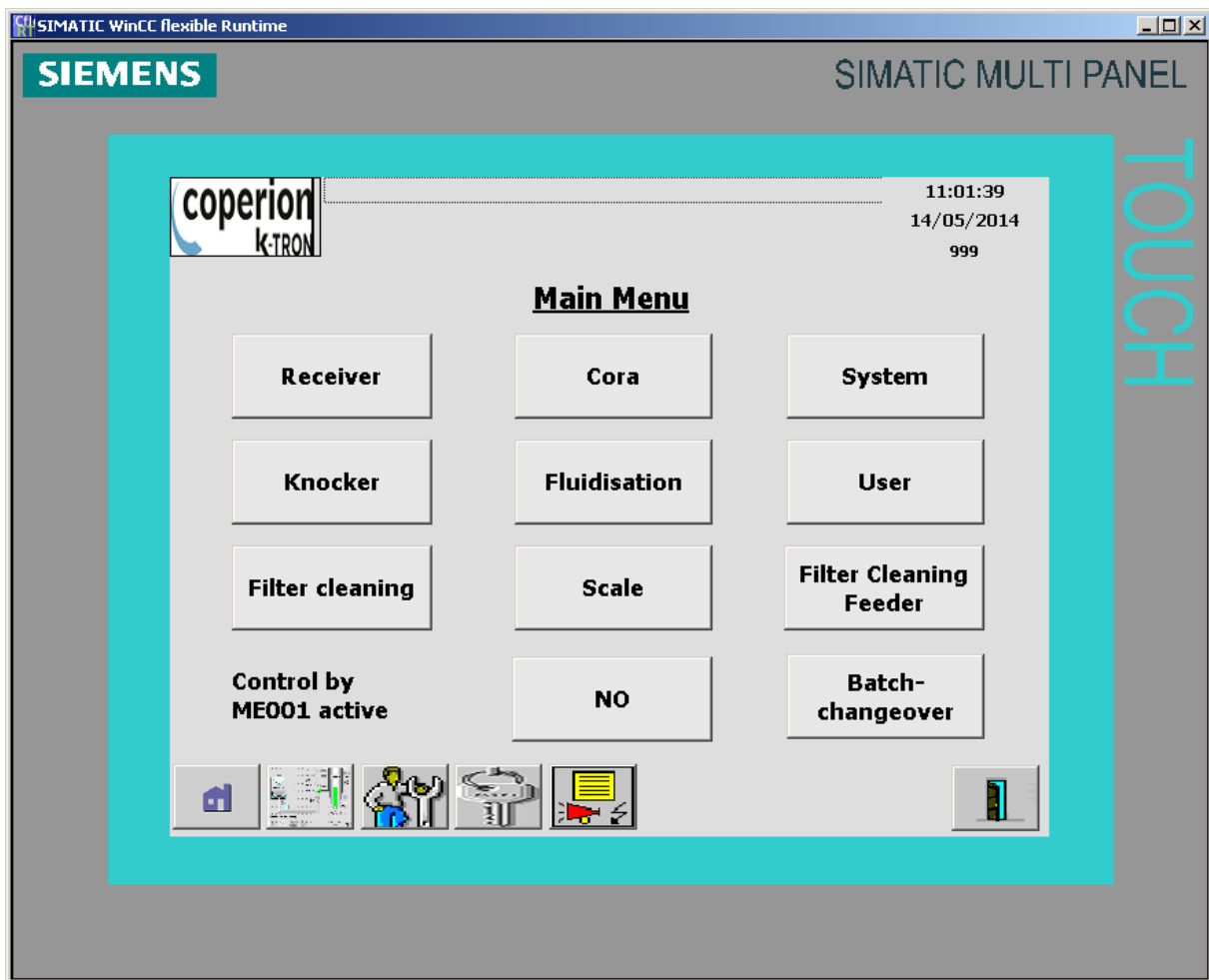


Touching a valve, flap or the transport system opens a pop-up window in which the respective actuator can be manually operated. All safety-related interlocks are also active during manual operation.




The overview is called up with the  button.

1.3. Settings




Submenu selection

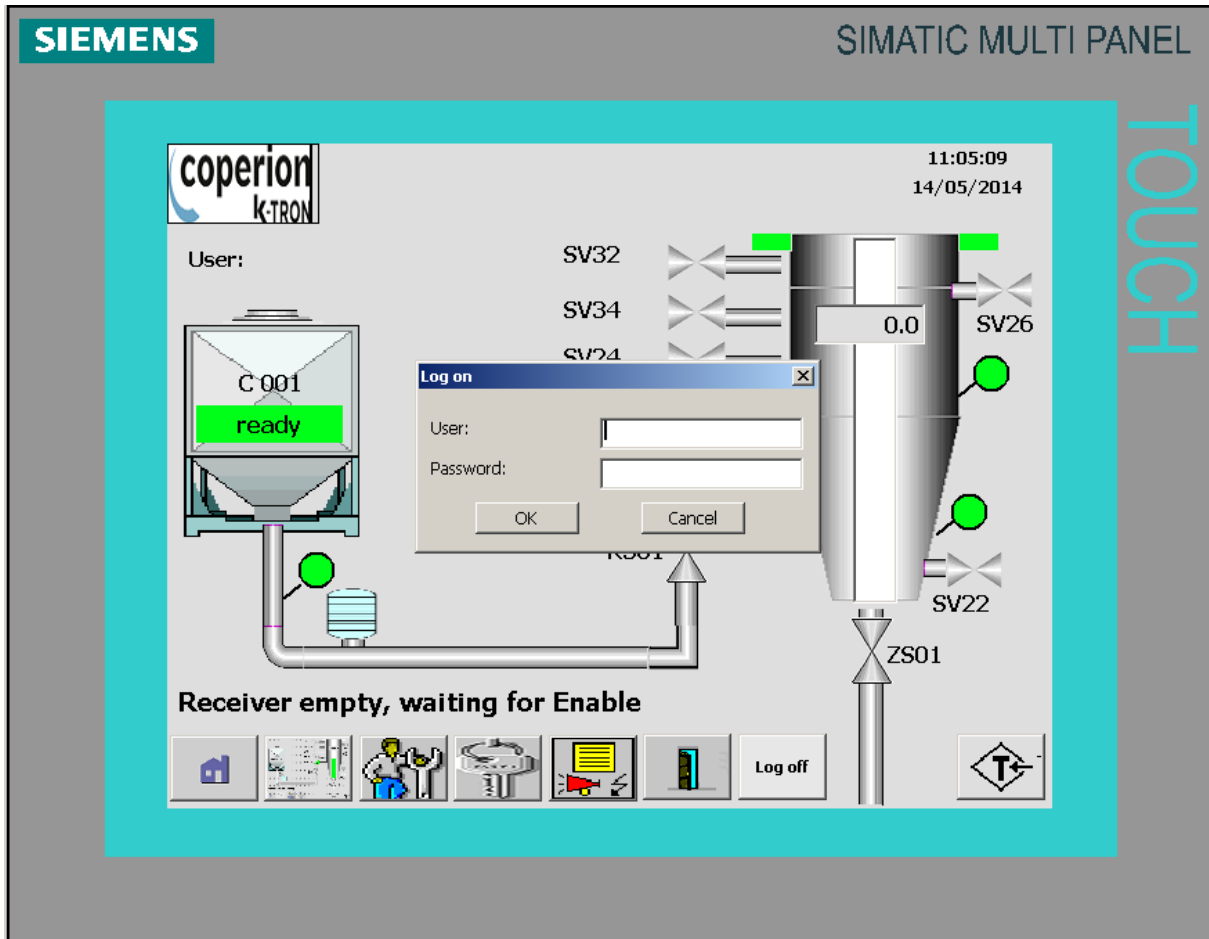


This screen is selected with the  button. It can be used to call up all submenus to perform the programming described in Chapter 2. The submenus are secured by a password. It is furthermore possible to preselect whether control of the system with the ME001 control system, in parallel to the digital signals, should be possible.

1.4. User logon



The  button initiates the logon dialogue for user change. The respective user can log on here with his user name and password.




The configuration of the individual users is performed in the user administration.


1.5. Alarm overview

The alarm overview shows all pending alarm and system messages. All alarms can be acknowledged



and deleted with the  key. Each key press initiates a collective acknowledgement. In addition, each message has to be confirmed at the display.



The  button leads to the alarm overview.

The screenshot shows the SIMATIC MULTI PANEL interface. At the top left is the SIEMENS logo, and at the top right is the text SIMATIC MULTI PANEL. On the right side, there is a vertical label TOUCH. The main content area is titled Alarm Messages and contains a list of messages with timestamps and descriptions. The messages are: 14/05/2014 10:48:00 ! 1 K Error Feedback ZS 01 Cora Flap (black background), 14/05/2014 10:47:34 ! 18 KQ Line switched off, to Start please switch on (yellow background), and 14/05/2014 10:47:33 ! 8 KQ Emergency Stop triggered (yellow background). At the bottom of the window, there is a navigation bar with several icons, including a home icon, a status icon, a person icon, a gear icon, a document icon, and a CLR key icon.

Timestamp	Message	Time
14/05/2014 10:48:00	! 1 K Error Feedback ZS 01 Cora Flap	10:49:30
14/05/2014 10:47:34	! 18 KQ Line switched off, to Start please switch on	14/05/2014
14/05/2014 10:47:33	! 8 KQ Emergency Stop triggered	

Alarm window

2. Programming

2.1. Menu Conveying

Parameters	Description
Max. conveying time	<p>Max. permitted transport time. In "time" filling mode, it is the transport time required to fill the receiver. No alarm is created when the maximum filling level has not been reached. In "level" filling mode, it is the time in which the maximum filling level (max. monitor) has to be reached to prevent an alarm.</p> <p>Range: 0..999s</p> <p>Default: 120s</p>
Max. discharge time	<p>Maximum permitted discharge time. In "filling" discharge mode, it is the time taken to discharge the material. In "LWF" discharge mode, an alarm is generated when discharging is not completed within this time.</p> <p>Range: 0..99s</p> <p>Default: 10s</p>
Line clearing	<p>Time to clear the transport line after transport. Requires a clearing valve or another option to interrupt the product flow.</p> <p>Range: 0..99s</p> <p>Default: 10s</p>
Close Time	<p>Period between the end of discharging and the possible start of a new transport cycle.</p> <p>Range: 0..99s</p> <p>Default: 3s</p>
Settle Time Level Probe	<p>Debouncing period max. monitor to suppress short-time faults due to in flying material.</p> <p>Range: 0..99s</p> <p>Default: 3s</p>
max. cycles Fill Mode	<p>Maximum number of transport cycles in "filling" discharge mode. An alarm is generated when this number is exceeded.</p> <p>Range: 0..99</p> <p>Default: 3</p>

Parameters	Description
Lag time Conveying probe	<p>Specifies the time the transport continues after the maximum probe has responded. Only effective in "probe" transport mode.</p> <p>Range: 0..99s</p> <p>Default: 10s</p>
Discharge mode	<p>Defines the discharging process of the receiver. The following operating modes are possible:</p> <ol style="list-style-type: none"> 1. "Fill": Material is discharged while the discharging time is shorter than the value entered for the max. discharge period until the container to be filled sends a "full" message. A new transport cycle is started once discharging has been completed. 2. "LWF": is used to fill one batch. The material is only discharged as long as the refilling signal for dosing is provided. An alarm is triggered when the max. discharge time has expired. <p>Default: "LWF":</p>
Conveying mode	<p>Defines the filling of the receiver. The following operating modes are possible:</p> <ol style="list-style-type: none"> 1. "Level": The receiver is filled up to the max. monitor. An alarm is triggered when this is not completed within the max. transport time. 2. "Time": The receiver is filled until the max. transport time has expired or the max. monitor has been reached. <p>Default: "Level":</p>
Use Level Probe	<p>Specifies whether a filling monitor is to be used or not, even if it is physically mounted. Only the "Time" filling mode can be used when no filling monitor is present.</p> <p>Range: Yes / No</p> <p>Default: Yes</p>

2.2. Knocker menu

Parameters	Description
Preselect Knocker	Specifies whether a knocker is used or not. Range: ON / OFF Default: OFF
Run time	Activation time of the knocker when the transport device is empty. Range: 0..999s Default: 30s
On time	Runtime of the knocker in cycle mode. Range: 0..99s Default: 5s
Pause Time	Duration of the break between two subsequent starts of the knocker in cycle mode. Range: 0..99s Default: 5s
On delay	Delay until knocker is switched on during discharging. Range: 0..99s Default: 5s

2.3. Filter cleaning menu

Parameters	Description
Filter type	Specifies whether a receiver with one (single) or two (dual) filter rows is to be used. Range: Single / Dual Default: Single
Filter cleaning during Discharge	Filter impulse cleaning during discharging Range: Yes / No Default: Yes

Parameters	Description
Filter cleaning during Conveying	Filter impulse cleaning during transport Range: Yes / No Default: No
Filter cleaning after Conveying	Filter impulse cleaning after transport Range: Yes / No Default: No
Filter cleaning during line clearing	Filter cleaning while the conveyor line is being cleaned. Range: Yes / No Default: No
Filter cleaning interval	Filter impulse cleaning during an interval defined by the interval time. Range: Yes / No Default: No
Interval time	Period between 2 filter impulse cleaning cycles when interval mode was selected Range: 0..999s Default: 600s
Lag time filter cleaning	Delay period until filter cleaning starts. Only when filter cleaning was selected during transport or clearing extraction. Range: 0..99s Default: 5s
Length cleaning pulse	Impulse length for filter cleaning. Range: 0..999ms Default: 300ms
Length pulse pause	Break between the filter cleaning impulses. Range: 0..99s Default: 3s
Number of pulses	Number of filter cleaning impulses Range: 0..99 Default: 3

Parameters	Description
Settings for vibrator filter plate	
Filter cleaning during Discharge	Filter impulse cleaning during discharging Range: Yes / No Default: Yes
Filter cleaning during Conveying	Filter impulse cleaning during transport Range: Yes / No Default: No
Filter cleaning after Conveying	Filter impulse cleaning after transport Range: Yes / No Default: No
Length Pulse	Pulse length for Vibrator filter plate. Range: 0..99s Default: 3s
Length pulse pause	Break between the filter cleaning impulses. Range: 0..99s Default: 3s
Number of pulses	Number of filter cleaning impulses Range: 0..99 Default: 3

2.4. Cora menu

Parameters	Description
Preselect flap KS 02	Specified whether the KS 02 flap is used or not. Range: ON / OFF Default: OFF
Reset statistics	Resets the statistics values

Parameters	Description
Number of samples	<p>Number of samples used for the statistics</p> <p>Range: 0..999999</p> <p>Display only</p>
Max. movements	<p>Maximum number of rotational movements during discharge from the entire sampling scope.</p> <p>Range: 0..999</p> <p>Display only</p>
Min. movements	<p>Minimum number of rotational movements during discharge from the entire sampling scope.</p> <p>Range: 0..999</p> <p>Display only</p>
Average movements	<p>Average number of rotational movements during discharge from the whole sample scope.</p> <p>Range: 0..999.9</p> <p>Display only</p>

2.5. Fluidisation menu

Parameters	Description
Preselect Fluidisation	Specifies whether fluidisation is used or not. Range: ON / OFF Default: OFF
Operating mode	Type of control of the fluidisation (cycles or continuous operation) Range: CYCLE / CONTINUOUS Default: CONTINUOUS
Run time	Period for which fluidisation is switched on Range: 0..999s Default: 30s
Cycle Operation on	Runtime of the fluidisation in cycle mode. Range: 0..99s Default: 5s
Cycle Operation off	Period between 2 subsequent starts of the fluidisation in cycle mode. Range: 0..99s Default: 5s
On delay	Delay until fluidising is switched on during discharging. Range: 0..99s Default: 5s

2.6. Scale menu

Parameters	Description
Gross Weight	<p>Specifies the total weight of the scale</p> <p>Range: 0..9999.9kg</p> <p>Display only</p>
Tare weight	<p>Specifies the correct tare value for the container.</p> <p>Range: 0..9999.9kg</p> <p>Default: 0.0kg</p>
Net weight	<p>Specifies the material in the container when the tare compensation is correct.</p> <p>Range: 0..9999.9kg</p> <p>Display only</p>
Span	<p>The incline is a correction factor to compensate for linear deviations of the scale.</p> <p>Range: 0..9.9999</p> <p>Default: 1.0000</p>
Capacity	<p>Specifies the capacity of the scale.</p> <p>Range: 0..9999.9kg</p> <p>Default: 600.0kg</p>
Filling by Weight/Level	<p>Specifies how the filling of the transport system is controlled.</p> <p>Range: Level / Weight</p> <p>Default: Level</p>
Filling level High	<p>Specifies the net weight at which the filling of the transport system is stopped when filling is controlled by weight. Only visible when filling is controlled by weight.</p> <p>Range: 0..99.9kg</p> <p>Default: 0kg</p>
Filling level Low	<p>Specifies the net weight at which the filling of the transport system is started when filling is controlled by weight. Only visible when filling is controlled by weight.</p> <p>Range: 0..99.9kg</p> <p>Default: 0kg</p>

Parameters	Description
Scale empty limit	Specifies the limit below which the net weight must be to trigger automatic tare compensation. Only active when initial filling is externally requested. Range: 0..99,9 Default: 0kg
Alarm limit weight low	Specifies the net weight at which the "weight low" alarm is triggered. Range: 0..99.9kg Default: 0kg
Alarm limit weight high	Specifies the net weight at which the "weight high" alarm is triggered. Range: 0..999.9kg Default: 0kg

2.7. Filter cleaning Feeder menu

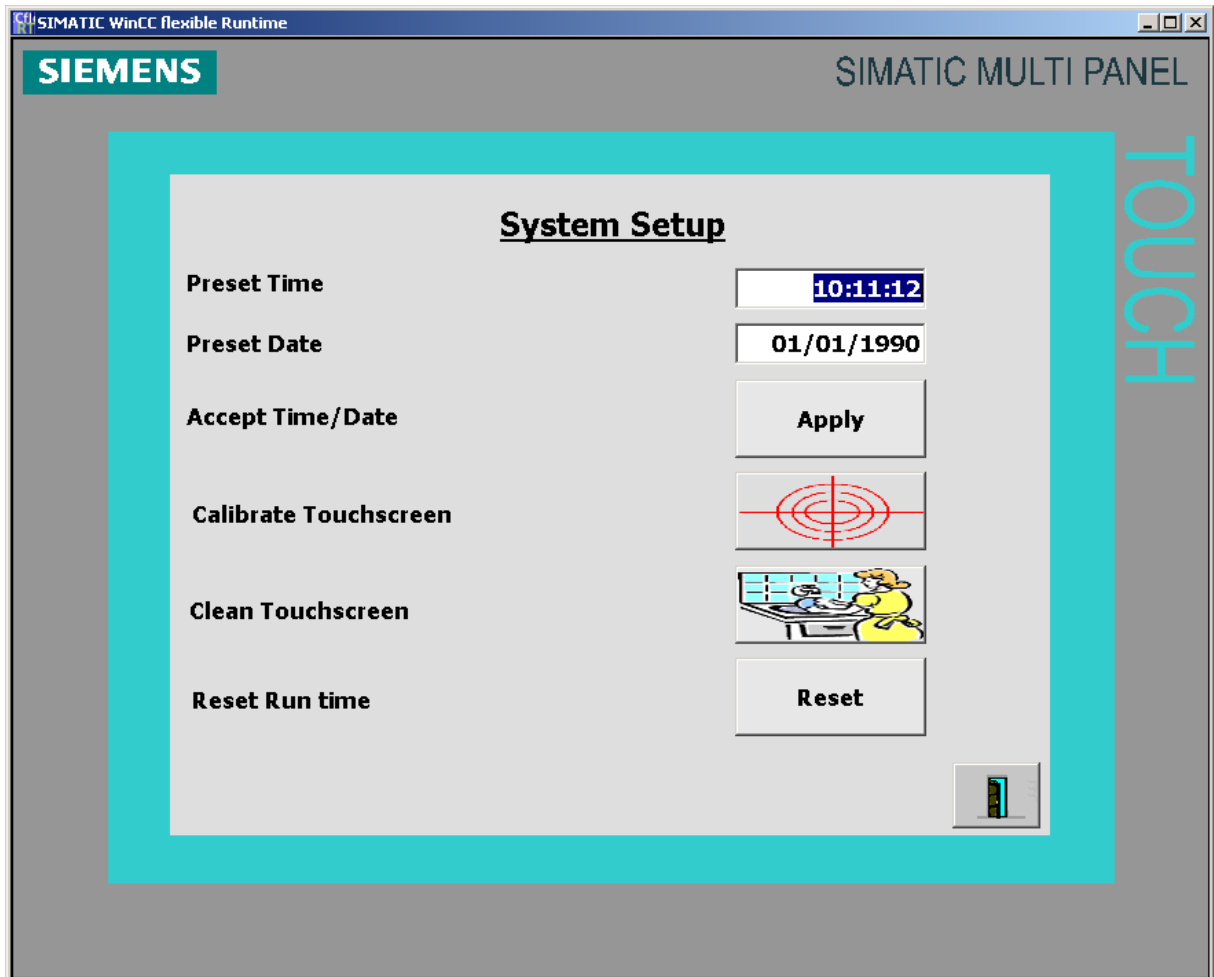
Parameters	Description
Filter cleaning during refilling	Filter impulse cleaning during refilling Range: Yes / No Default: Yes
Filter cleaning after refilling	Filter impulse cleaning after refilling Range: Yes / No Default: No
Lag time filter cleaning	Delay period until the filter cleaning is started. Range: 0..99s Default: 5s
Length cleaning pulse	Impulse length for filter cleaning. Range: 0..999ms

	Default: 300ms
Length pulse pause	Break between the filter cleaning impulses. Range: 0..99s Default: 3s
Number of pulses	Number of filter cleaning impulses Range: 0..99 Default: 3

2.8. Batch changeover menu

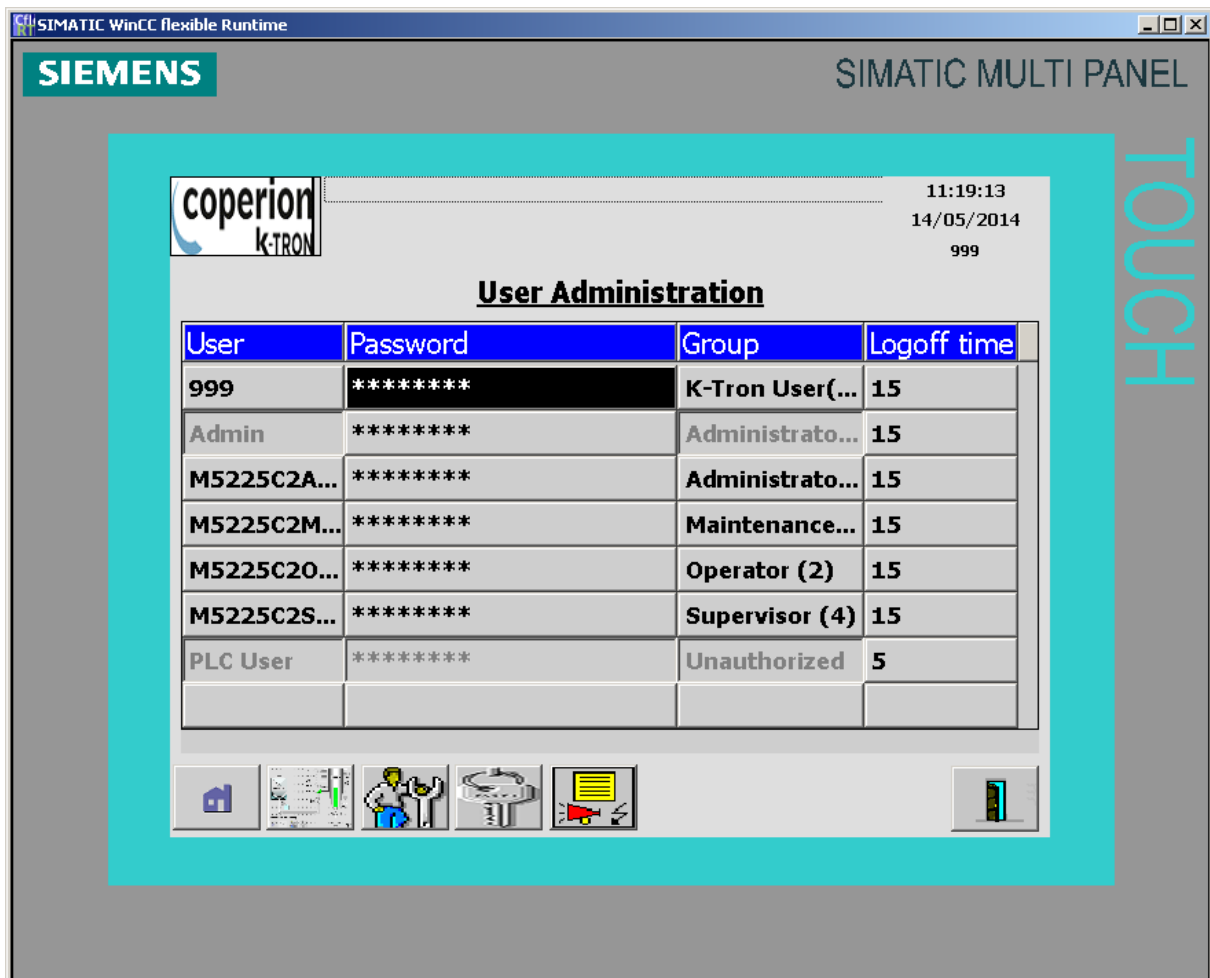
Parameters	Description
Empty Signal by weight or probe	Preselection of how the empty message to the ME001 controller is to be generated. When both options are selected, the message is triggered by the first event. Range: Scale / probe Default: Scale
Max. weight mode probe	Specification of the max. weight that may still be in the container when the empty message is generated by the probe. Range: 0.0..99.9 kg Default: 10 kg
Scale empty limit	Limit below which the net weight has to fall until the empty message is generated in scale mode. Range: 0.0..99.9 kg Default: 2 kg
lag time Batch changeover	Period for which emptying continues once the limit for the empty message has been reached. After this time has expired, a "container empty" message is sent to the ME001 controller. Range: 0..99s Default: 30s

2.9. System menu



Parameters	Description
Specify time of day	Enter the time of day to set the timer. Range: Time of day Default: 0:00:00
Specify date	Enter the date to set the timer. Range: Date Default: 01.01.1900
Accept time/date	Accept the present date and time. Pressing this key always leads to the acceptance of both values. It is therefore necessary to update both values.
Touch screen calibration	This can be used to recalibrate the touch screen
Clean the touch screen	An image is called up to help cleaning the touch screen.
Reset Run time	Resets the actual Run time of the System shown at the Display at the Solenoid box.

2.10. User menu



The users and user groups are registered in the engineering system and transferred to the operating panel. Users with "administrator" rights have unrestricted access to the user display and can administrate all users. Any other user has only restricted access to the user display and can only administrate his own issues.

Caution

Changes to the user display during runtime are immediately active. Changes to the runtime system are not updated in the engineering system.

When users and user groups are transferred from the engineering system to the operating panel, all changes made in the user display are overwritten.

Structure

User	Password	Group	Logoff time
Admin	*****	Group (9)	5
PLC User	*****	Group (1)	5
User 1	*****	Group (1)	5

The user interface shows in each line the user, his password, the user group he belongs to and his logoff time.

Note

The user display is empty when no user is logged in. Clicking on the user display shows the login dialog. After logging on, the content of the individual fields is shown.

User display for an administrator

User	Password	Group	Logoff time
Admin	*****	Group (9)	5
PLC User	*****	Group (1)	5
User 1	*****	Group (1)	5

When an administrator is logged on, the user display shows all users. The administrator can change the name and password of a user. The administrator can create new users and allocate them to an existing user group.

User display for a user

User	Password	Group	Logoff time
888	*****	Operator (2)	5

When no administrator is logged on, the user display only shows the user logged on. The user can change his password. The user can only change his name when he is logged on as an administrator.

2.10.1. Creating a new user

Clicking on an empty field, facilitates the creation of a new user. Here all relevant inputs can be done directly in the appropriate field. It is furthermore required that the group membership and the time for automatic logout should be specified.

3. Alarm messages

Alarm message	Cause	Remedy
Receiver max. Number of Cycles exceeded	Only active in emptying mode = "Filling" Max. number of filling cycles was exceeded without getting a "full" signal from the buffer funnel monitor	Check the filling cycle parameters Check the transport capacity Check the refilling limits
Receiver max. Discharge Time exceeded	Only active in emptying mode = "LWF" Emptying request pending or a longer period than the allowed emptying time.	Check emptying period parameter Check the refilling limits Check discharging device
Receiver max. Conveying Time exceeded	Only active when filling mode = "Level" The max. time for triggering the "full" monitor was exceeded.	Check max. transport time parameter Check transport capacity
Discharge request during conveying	The Receiver wasn't filled up again, when the next discharge request was triggered	Check the refilling limits of the Feeder Check transport capacity
Error Feedback KS02 Cora flap.	End position switches of the KS 02 discharge flap have caused a position fault.	Check the position switch Check the controller Check the PLC inputs and outputs
Error Feedback ZS01 Cora flap.	End position switches of the ZS 01 discharge flap have caused a position fault.	Check the position switch Check the controller Check the PLC inputs and outputs
Line started, but Frame not in Position.	The system was started but the frame of the transport system is not in position	Check the position switch Check the PLC inputs
Emergency-Stop triggered	Emergency-Stop was triggered	Check the safety relay Check the Emergency-Stop circuit Check the PLC input
Error level probe, bridging or Product deposits	Filling level monitor in the transport system have an illogical status	Check the filling level monitor Check for material adhesion in the container Bridge formation
Siwarex external power supply (24V)	Power supply to the Siwarex module has failed	Check power supply Check Siwarex
Siwarex ADC	Siwarex A/D converter at its limits	Check measuring value Check Siwarex

Alarm message	Cause	Remedy
Siwarex minimum voltage at sensing wires	Minimum voltage at the measuring lines from the load cells reached	Check the load cells Check cabling Check Siwarex
Siwarex Error Watchdog ¹	Fault detected by internal Siwarex watchdog	Check Siwarex
Siwarex Error EPROM ¹	Fault in the Siwarex EPROM	Check Siwarex
Siwarex Error EEPROM ¹	Fault in the Siwarex EEPROM	Check Siwarex
Scales weight below min level	The net weight of the container is above the max. limit	Check the alarm limit Check the tare weight Check the filling level
Scales weight above max level	The net weight of the container is below the min. limit	Check the alarm limit Check the tare weight Check the filling level
Communication fault to ME001	Ethernet connection to ME001 faulty	Check the module Check the cable Check the PLC

Note

Note: ¹: Actual Error Message comes from the Siwarex module; the message may differ from the stipulated message in the table

The alarms are not documented!

4. Settings

4.1 Conveyor menu

Parameters	Setting
Max. conveying time	600s
Max. discharge time	300s
Line clearing	3s
Close Time	3s
Settle Time Level Probe	3s
max. cycles Fill Mode	5
Lag time Conveing probe	10s
Discharge mode	“LWF”:
Conveying mode	“Level”:
Use Level Probe	Yes

4.2. Knocker menu

Parameters	Setting
Preselect Knocker	ON
Run time	10s
On time	500ms
Pause Time	5s
On delay	5s

4.3. Filter cleaning menu

Parameters	Setting
Filter type	Dual
Filter cleaning during Discharge	NO
Filter cleaning during Conveying	YES
Filter cleaning after Conveying	No
Filter cleaning during line clearing	No
Filter cleaning interval	No

Interval time	600s
Lag time filter cleaning	5s
Length cleaning pulse	200ms
Length pulse pause	5s
Number of pulses	2
Settings for vibrator filter plate	
Filter cleaning during Discharge	Yes
Filter cleaning during Conveying	No
Filter cleaning after Conveying	No
Length Pulse	5s
Length pulse pause	5s
Number of pulses	3

4.4. Cora menu

Parameters	Setting
KS 02 preselection flap	ON

4.5. Fluidisation menu

Parameters	Setting
Preselect Fluidisation	On
Operating mode	CYCLE
Run time	10s
Cycle Operation on	3s
Cycle Operation off	5s
On delay	5s

4.6. Menü Scale

Parameters	Setting
Tare weight	175.4kg
Span	1.0714
Capacity	600.0kg
Filling by weight/Level	Weight
Filling level High	30kg
Filling level Low	20kg
Scale empty limit	0.1kg
Alarm limit weight low	0.0kg
Alarm limit weight high	65kg

4.7. Filter cleaning and dosing menu

Parameters	Setting
Filter cleaning during refilling	No
Filter cleaning after refilling	Yes
Lag time filter cleaning	0s
Length cleaning pulse	200ms
Length pulse pause	3s
Number of pulses	1

4.8. Batch change menu

Parameters	Setting
Empty Signal by weight or probe	Probe
Max. weight mode probe	10kg
Scale empty limit	2kg
lag time Batch changeover	30s

User Manual
bidirectional
Multifunctional-Counter



English



Part-No. 2 772 083 english; 05/2011
Original language German
English translated from German

HENGSTLER

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1 General Information

1.1 Information about the Operating Instructions

These operating instructions provide important information about the handling of the multifunctional counter. To ensure safe operation it is vital that the safety information and instructions be strictly observed.

For Counters with interfaces Tico 773 and Tico 774 please see the amendment 0 773 001

The multifunctional counter has been designed for industrial use and for installation in machinery or industrial plants.

The manufacturer of the machine/plant in which the multifunctional counter is used has to ensure that the function of the counter is properly described in the Operating Instructions of the machine or plant, and that the description is in accordance with manufacturer's programming functions.

The manufacturer's safety rules shall be applicable.

In addition, the local regulations concerning the prevention of accidents and general safety information applicable to the machinery/plant shall be adhered to.

Before starting any work on the machine/plant, the operating instructions and in particular, the Safety chapter and the respective safety information must be fully read.

These operating instructions are an integral part of the product and must be maintained in the direct vicinity of the machine/plant and in a place that is readily accessible for the operating staff.

These operating instructions contain important information concerning the installation, connection and programming of the multifunctional counter.

General Information

Description of the programming sequence:

- Programming of the basic functions
- Programming of the function codes
- Programming of the user times
- Programming of the prescaler
- Programming of the presettings

Before starting to run the machine/plant, all functions that are not allowed to be changed by the operator have to be blocked.



The executed programming functions have to be documented.

1.2 Explanation of symbols

The warnings in these operating instructions are designated by symbols. Signal words at the beginning of the warnings indicate the severity of a safety hazard.

These notes have to be observed by all means, and all actions have to be taken with utmost care so as to prevent any accidents or damage or personal injury.



Danger!

This warning indicates a direct safety hazard, which may lead to serious injuries or even death if preventative action is not taken.



Warning!

This warning indicates a possible safety hazard, which may lead to serious injuries or even death if preventative action is not taken.

General Information



Caution!

This warning indicates a possible safety hazard, which may lead to minor damage or injuries if preventative action is not taken.



Note!

This symbol indicates a potentially hazardous situation, which may lead to damage to property or to the environment if preventative action is not taken.



Tips and recommendations

This symbol is used to point out to useful tips and recommendations and information ensuring efficient and trouble-free operation.

1.3 Limitation of Liability

The information and notes contained in these operating instructions were gathered in accordance with the applicable standards and regulations, the state-of-the-art, as well our long-standing experience and know-how.

The manufacturer shall not assume any liability for damage caused by:

- Non-adherence to the operating instructions
- Improper use
- Employment of unskilled or untrained personnel
- Makeshift changes or manipulation
- Opening of the multifunctional counter

As a result of special design versions, special ordering options or the latest technical developments, the actual scope of delivery may deviate from the scope described and illustrated here.

General Information

1.4 Copyright protection

The operating instructions must be treated confidentially and used exclusively by the personnel responsible for the setup, maintenance, repair and operation of the machine/plant. Disclosure of these operating instructions to any third parties shall not be permissible without the prior written consent of the manufacturer.



The data and information stated here, including text, drawings, images and other illustrations, are protected by copyrights and subject to industrial property rights. Any misuse of such information shall be subject to prosecution.

1.5 Guarantee conditions

Our guarantee conditions are available for download from our homepage at www.hengstler.com – DOWNLOAD – General Terms & Delivery Terms.

1.6 Customer Service

Our customer service is available to provide technical information and assistance for our customers. Detailed information on your responsible contact partner is given on our homepage (www.hengstler.com) under Contact and How to find us.

2 Safety

This section provides an overview of all the important safety-relevant aspects to ensure best possible protection of the operating personnel as well as safe and trouble-free operation. Non-adherence to the instructions given in this manual may result in considerable safety hazards.

2.1 Intended Use (Proper Use)

The multifunctional counter is exclusively designed and constructed for the intended use and purposes described here.

The multifunctional counter serves together with a corresponding sensor for the counting of piece numbers, lengths, flow rates, velocities and times, as well as for the controlling and monitoring of machinery and equipment by sending control signals.



Warning!

Safety hazards due to improper use / misuse!
Using the multifunctional counter for any purposes other than the ones described within the scope of intended use may cause hazardous situations. Claims for damages resulting from any kind of misuse shall be expressly excluded.

2.2 Assembly, connection, programming

These multifunctional counters are built and tested in accordance with IEC/EN 61010-1, Protection Class II – Safety Measures for Electronic Measuring Equipment. They have left the factory in a condition that is in compliance with all safety-relevant requirements. In order to maintain this condition and ensure operational safety, the User is requested to observe the safety notes and warnings given in these operating instructions!



Danger!

Risk of safety hazards due to incorrect/faulty assembly and connection.

- The max. operating voltages must not be exceeded!
- 12 – 24VDC and 24VAC multifunctional counters have to be operated at safety extra-low voltages (SELV) and under potential-compensated conditions in order to prevent hazardous shock currents.
- An external fuse has to be provided to protect the multifunctional counter (see Chapter 10, Technical Data).
- Installation and assembly shall be carried out by skilled and trained electricians only.
- Do not connect the multifunctional counter without making sure that it no longer carries any live voltages. Always separate it from the mains supply before connecting.
- Make sure that live terminals are properly protected against inadvertent contact.
- To ensure proper protection of terminals against hand contact, make sure that the live conductors are properly connected to the terminals.
- It's not allowed to use the multifunctional counter outside of the specified temperature range. If necessary appropriate precautions have to be applied

Safety

(e.g. air ventilation). • The rules and regulations set forth by the local electricity providers have to be observed.

- Do not establish any connections with non-allocated (NC) terminals.
- Multifunction counters may only be operated in a properly installed condition.
- If safe operation seems to be impaired, make the multifunctional counter inoperable and secure it against inadvertent operation.
- Scope of applications: industrial processes and controls. Overvoltage across the terminals must be limited to the values of overvoltage category II.
- The installation and wiring environment has considerable impact on the electromagnetic compatibility of the multifunctional counter. Therefore, electromagnetic compatibility of the entire plant has to be ensured during the installation.
- In areas presenting the risk of ESD (electrostatic discharge), make sure to use ESD-protected plugs and switches during the installation.
- If the functions "prescaler input", "preset input" and "key reset" are not allowed to be used by the machine/plant operator, access to these functions must be blocked for machine operators. Depending on the machine/plant design or concept, non-permissible input may impair the operational safety and function of the machine or plant.



Danger!

The manufacturer of the machines / plants has to ensure, that no risks result from this.

- The machine/plant manufacturer shall be responsible for the preparation of operating instructions / plant description including the following:

Safety

- Description of functions according to the programming of the multifunction counter;
- Description of the settings to be adjusted by the machine/plant operator;
- Information concerning the occupational safety requirements and possible hazards arising from the operation of the machine/plant.

2.3 Responsibilities of the machine/plant manufacturer and operator

Multifunctional counters are designed for installation in machines/plants. Therefore, the manufacturer and operator of the machine/plant are subject to the legal obligations concerning occupational safety and health.

Besides the safety notes given in these operating instructions, the relevant rules and regulations concerning safety and the prevention of accidents, and the applicable environmental requirements have to be met. In particular:

- The machine/plant manufacturer shall be obligated to ensure that all the requirements mentioned in section 2.2 be fulfilled during the assembly, connection and programming.
- The operator shall obtain all the required information about the applicable occupational safety rules. In addition, the operator shall be obligated to prepare a risk assessment of possible hazards that may arise due to the special working conditions at the place of installation of the machine/plant. This risk assessment shall be documented in the form of operating instructions for the machine/plant.
- Throughout the entire operating time of the machine/plant the operator shall be obligated to check if the operating instructions prepared are in accordance with the latest status of requirements and, if required, make the appropriate adjustments.

Safety

- The operator shall ensure that all staff members who are involved in the machine/plant operation have read and fully understood these instructions. Moreover, the operator shall be obligated to train the operating personnel at regular intervals and inform them about any potential hazards.
- The operator shall ensure that the operation and cleaning of the machine/plant is exclusively carried out by skilled and trained personnel.
- The operator shall ensure that all maintenance and repair work shall only be carried out by skilled and trained personnel.

2.4 Staff-related requirements



Warning:

Danger of personal injuries if handled by insufficiently qualified staff! Improper handling may cause severe personal injuries and damage to property.

- Actions requiring special skills have to be carried out only by the personnel designated in the appropriate sections of these instructions.
- Keep unqualified personnel away from hazard areas.

The following staff qualification requirements have been defined for the various scopes of activities:

- **Instructed personnel**
These persons have been instructed by the operator with regard to the tasks assigned and the potential hazards caused by improper handling.
- **Skilled personnel**
Due to their educational and professional skills, know-how and experience, as well as due to their knowledge of the relevant regulations, these persons are capable of executing their assigned tasks and recognize potential hazards independently.

Safety

- **Skilled and trained electricians**
Due to their educational and professional skills, know-how and experience, and due to their knowledge of the relevant regulations in the field of electrical engineering, these persons are capable of executing electrical work and recognizing potential hazards independently.

2.5 Special hazards

This section indicates certain residual risks, which may arise as a result of the risk assessment.

The safety information and warnings given here and in the following chapters of these instructions have to be observed in order to reduce any health hazards and avoid hazardous situations.



Electric current

Danger!

Lethal hazard of electric shock!

Any contact with hazardous live components presents a direct lethal hazard.

Damages of the insulation or individual components present a potential lethal hazard.

- In the event of any damage to the insulation, immediately disconnect the voltage supply and initiate the appropriate repair work.
- Any work on the electrical plant has to be carried out by skilled and trained electricians only.
- Before commencing your work on the electrical system, disconnect it from the main supply and check that it no longer carries any live voltages.

Safety

- Prior to conducting any maintenance, cleaning or repair work, disconnect the mains supply and secure it against inadvertent switching on.
- Do not short-circuit or make fuses inoperable.

2.6 Safety devices



Warning! Lethal hazard by non-functional safety devices! Safety devices are provided to ensure a maximum of operational safety.

The multifunctional counter itself does not include any installed safety devices.

These safety devices have to be attached externally.

Protect the electrical supply of the multifunctional counter by means of external fuses (see Chapter 10, Technical Data).

Whether or not additional safety devices (e.g. emergency-off buttons) have to be provided depends on the general design and construction of the machine or plant.

The machine/plant manufacturer shall be responsible for providing such additional safety devices in according with his own risk assessment.

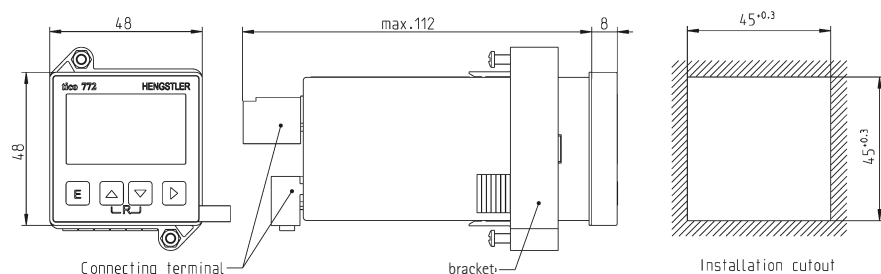
Safety

3 Setup and Operation

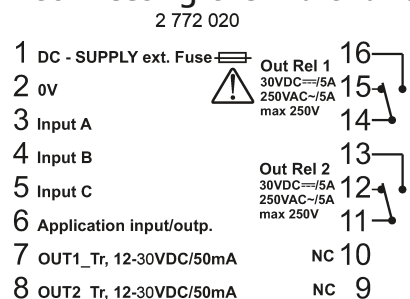
- 1 Display
- 2 Operating keys
- 3 Flat gasket
- 4 Bracket
- 5 Enclosure
- 6 Plug for DC or sensor supply;
Electronic inputs and outputs
- 7 Connection terminal AC supply and relay contacts
- 8 Circuit diagram



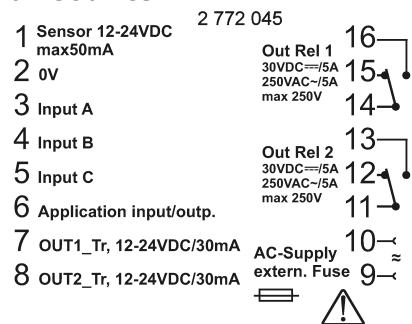
3.1 Dimension Sheet / Installation of Multifunction Counter



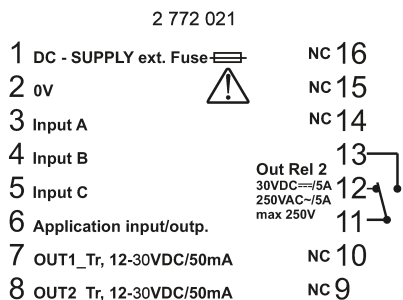
3.2 Connecting the Multifunctional Counter



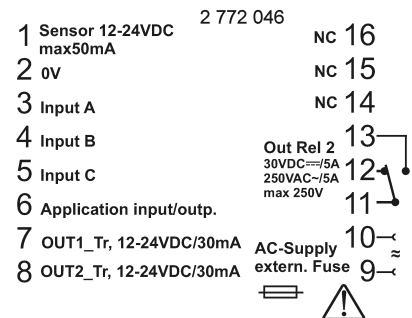
VDC 2 relays / 2 transistors



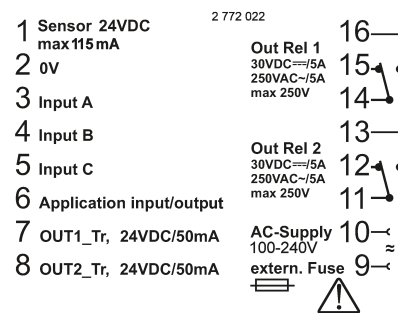
VAC Trafo 2 relays / 2 transistors



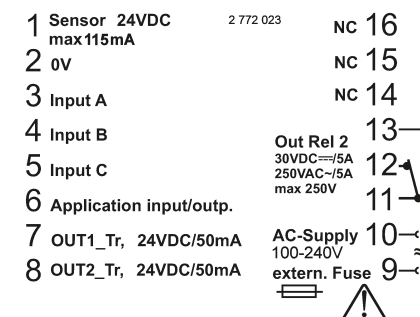
VDC 1 relay / 2 transistors



VAC transformer 1 relay / 2 transistors



VAC switching power supply
2 relays / 2 transistors



VAC switching power supply
1 relay / 2 transistors



The plug has to be disconnected from the counter before the cables are fastened by means of screws or screw-type terminals.



It is not allowed to contact the encoder to a direct current line voltage without protective circuit for EMC. For cable lengths > 30 m a protective circuit is always necessary!

When programming the input level to TTL an additional protective circuit is necessary.

We recommend the installation in a metallic environment.

Setup and Operation

Only valid for DC-Versions:

When switching on the device in PNP-Mode, a short signal is applied to inputs A,B,C and the application input.

To suppress the pulse in TTL-Mode each input has to be connected to a resistor of 10 kOhm/0,125W against 0V.

When switching on the device a short signal is applied to the application output.

This pulse, if needed, is possible to suppress by connecting a resistor of 10 kOhm / 0,225 W against 0 V to the application-output.

3.3 Display

After switching on, all segments and characters are illuminated for approx. 2 seconds; then the display changes over to the Display or Programming Mode.

The display is available in five different versions:

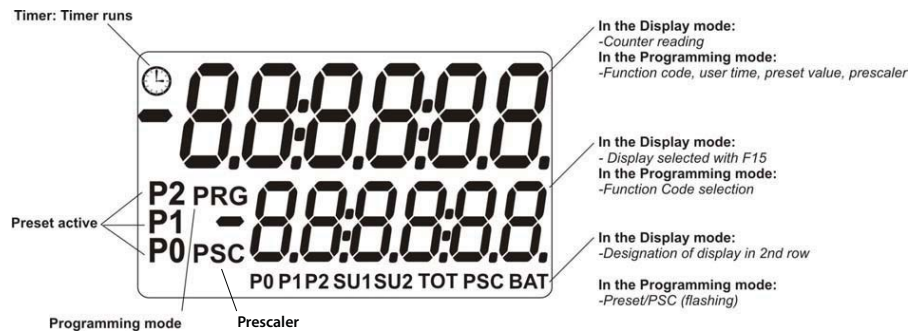
Reflectiv: black figures on bright reflecting background

Transflective positive: black figures on back lighted ground

Transmissive white: white figures on black ground

Transmissive red: red figures on black ground

Transmissive green: green figures on black ground



Setup and Operation

During the Programming of Function Codes

Enter - Key	UP - Key	Down - Key	SHIFT - Key

Programming

If pressed together with POWER ON (keep keys pressed and switch on the device)

+	Selects standard functions
+	Sets function codes
+	Selects ID data (Article code (ID No.), manufacturing date, serial number,...)
+	Sets User Times

During the Programming of Function Codes


+	Display of function code Switches between function code text and function code number
---	--

During Operation



+	Reset
+	Sets preset 0
+	Sets preset 1
+	Sets preset 2
+	Sets prescaler

Setup and Operation





Additional function for shift and batch counters

	Switches between total sum and partial sums and/or count value and totalizer or batch counter
---	---

Additional function for timers

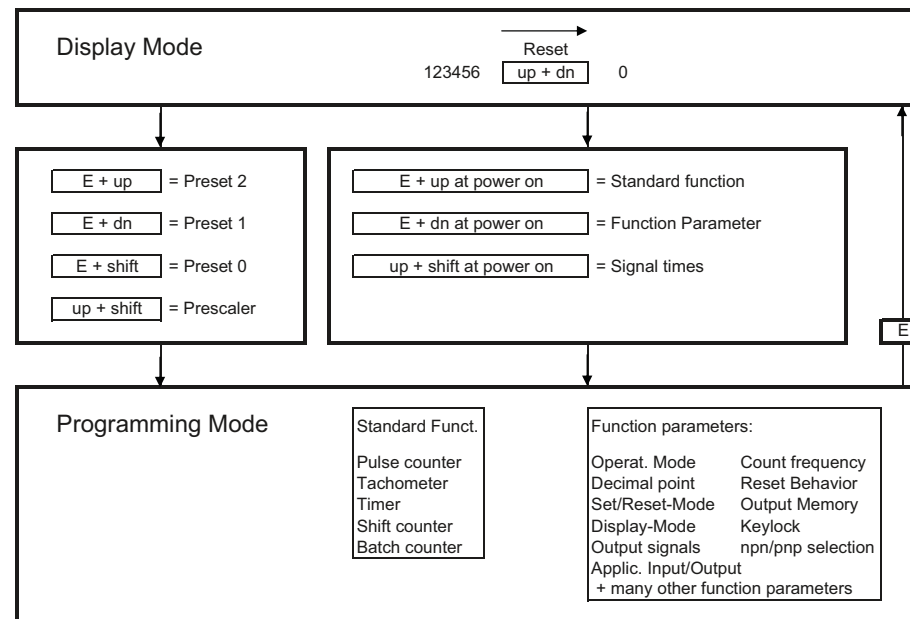
	Timer start (If enabled with function code F15)
	Timer stop (If enabled with function code F15)

Additional function backlight versions

	Go to the adjustment menu (pressing > 5 s)
 + 	Adjustment of the intensity (brighter or darker)
	Save and going back to display mode (Pressing within 15 s)

Setup and Operation

3.5 Overview of Operating Elements






Setup and Operation

3.6 Programming the Standard Function

The device described here is a multifunctional counter, which can be programmed for a variety of functions, i.e. pulse counter, tachometer, timer, shift counter or batch counter functions. The first step is to set the standard function (the factory setting of the device is the "pulse counter" setting).

Now continue with the programming of the function codes (Chapters 5-9) or User Times (Chapter 3.10)

<p>Programming mode</p>  <p>Keep pressed and switch voltage on simultaneously</p>	<p>Change function setting:</p>  <p>press</p>	<p>Save, return to counter operation</p>  <p>press</p>
---	--	---





Function code Fn, Display Row 1 **F U N C T I O N**

Function	No.	Display Row 2
Setting of Standard Function	0*	P U L S E Pulse counter
	1	T A C H O Tachometer
	2	T I M E R Timer
	3	S H I F T Shift Counter
	4	B A T C H Batch Counter

Setup and Operation

3.7 Programming the Function Codes

The function codes (system parameters) are used to program the function and behavior of the inputs and outputs, as well as the behavior of the device in its adjusted basic mode. The detailed selection options are described in Chapters 5 to 9.

<p>Programming mode</p>  <p>Keep pressed and switch voltage on simultaneously</p>	<p>Change function setting</p>  <p>press</p>	<p>Save and change to next function code</p>  <p>press</p>	<p>Save and change to counter operation</p>  <p>press</p>
---	---	---	--

Change between Text Display and Numerical Display



In the function code Programming Mode, the first row shows the name of the function code in the form of text (7-segment display). The second row shows the selectable option in a text form, too. By simultaneously pressing the Up and Down buttons, the display in the first row changes to a numerical display; after pressing these buttons once again, the display in the second row also changes to a numerical display. Pressing these buttons for a third time reverts both rows to the text display again.

Setup and Operation



Attention: With each change among text and numeric display, the currently activated function code will return to the factory setting and may have to be readjusted.

The factory setting is designated with an asterix *.

3.8 Programming the Preset Values

By simultaneously pressing the E + Up, E + Down or E + Shift key you can change to the Preset programming mode:

Use the shift key in the programming mode to change a setting position. The selected position will start to flash. Use the shift key again to move by one position to the right. Then use the UP or Down key to increment or decrement the position by 1.

Rule for the 6th position: The change from 9 to 0 or 0 to 9 is indicated by a changing prefix.

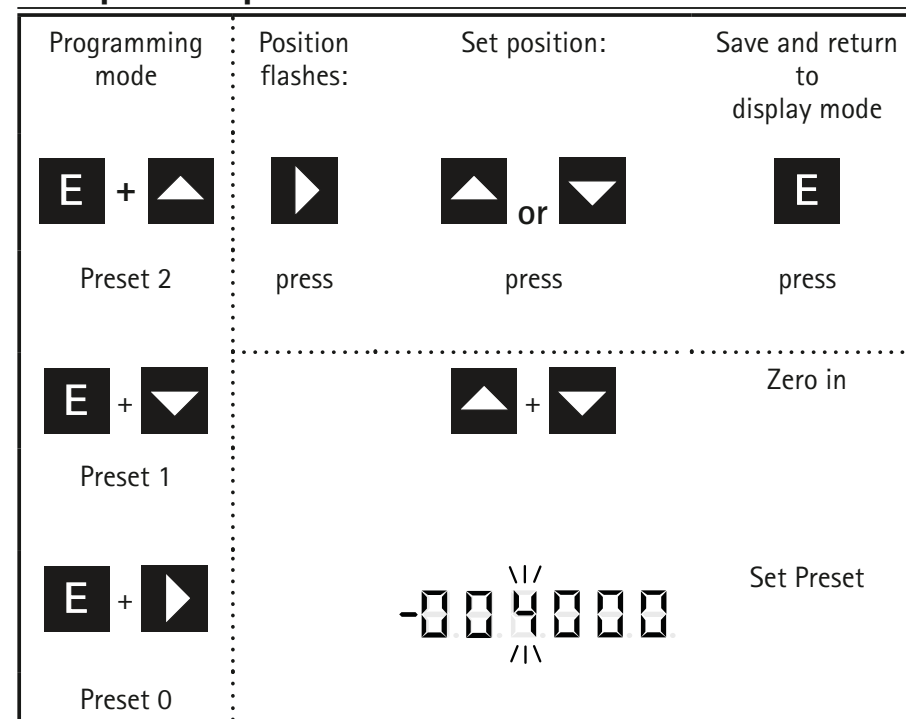
Use the E key to leave the programming mode and return to the display mode. Your entries will be saved.

On leaving the programming mode, the presets are tested for attainability and recalculated, if necessary, because not all the values may be attained at a prescaler value of >1. The presetting is then rounded to the next attainable value.

If no key is pressed for more than 16 seconds in the programming mode, the counter will automatically return to the display mode. In this case, however, no entries will be saved except the last value saved with the E-key.

Set the preset value to 0 by pressing Up and Down keys simultaneously.

Setup and Operation



Setup and Operation

3.9 Prescaler programming

By pressing the Up + Shift keys simultaneously you can change to the Prescaler Programming Mode.

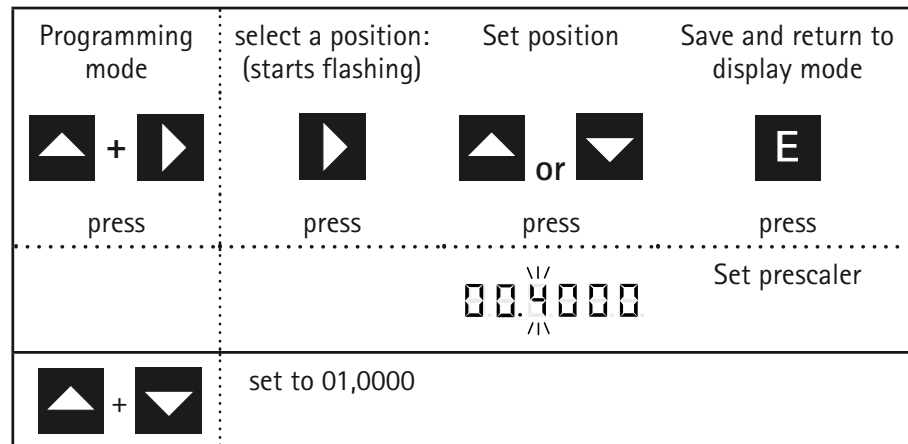
In the Programming mode, the position to be changed is selected by means of the shift key. The selected position will start flashing. Use the shift key again to move by one position to the right. Then use the UP or Down key to increment or decrement the position by 1. It is not possible to save a value of 00,0000. In this case the system will save 01,0000.

Use the E key to leave the programming mode and return to the display mode. Your entries will be saved.

On leaving the programming mode, all the presets are recalculated because not all the values may be attained with a prescaler value of >1. Therefore, the presets have to be checked and corrected as necessary after saving the prescaler.

If no key is pressed for more than 16 seconds in the programming mode, the counter will automatically return to the display mode. In this case, however, no entries will be saved except the last value saved with the E-key.

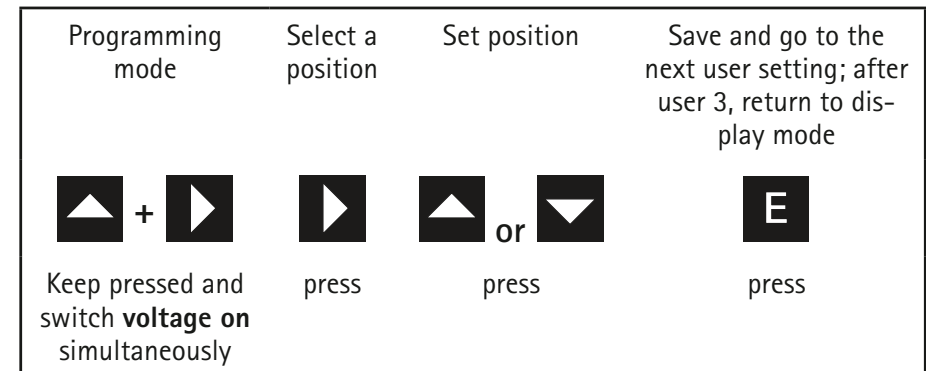
Press the Up and Down keys simultaneously to set the prescaler to 01,0000.






Setup and Operation

3.10 Programming the user times

For programming the signal time for monostable output signals, 9 fixed signal times between 0.02 s and 10 s are available. In addition, three different signal times between 0,01s and 599,99s can be set by the user. The outputs are deactivated if the setting is 0.00 s.






Function code Fn, Display-Row 1 






Function	No.	Display Row 2
Sets the Signal Times	0*	 Signal time 1
	1	 Signal time 2
	2	 Signal time 3

Setup and Operation

3.11 Output of ID data

This function is used to retrieve ID data, e.g. article numbers and various manufacturing data.

Output mode	Change to the next output	Return to counter operation
		
Keep pressed and switch voltage on simultaneously	press	press

Display row 1	Display row 2
	Article number
	Manufacturing date
	Serial number
	Software number
	Software release

Setup and Operation

3.12 Adjusting the intensity of the backlight





For counters that come with a backlight you have the possibility to adjust the intensity of their backlight.

To get into the menu of the adjustment, you have to press SHIFT for more than 5 seconds. The display then shows:



By pressing the UP or DOWN key the display gets brighter or darker.

If the E-button is pressed within 15 s, you go back to the normal counter display and the adjusted setting is saved. If the E-button is not pressed within 15 seconds, you will go back automatically to the normal counter menu without saving any made changes.

Go to the adjustment menu	Adjustment of the intensity	Save and going back to display mode
	 or 	
pressing > 5 s	press	Pressing within 15 s

General description of multifunctional counter

4 General description of multifunctional counter

The following description is applicable for all standard settings. Special descriptions can be found in the appropriate chapters of this manual.

Factory setting (Defaults)

Sets all the function codes to the factory settings, i.e. all codes designated with *.

Prescaler (pulse metering factor):

The "Prescaler" is a multiplier. Each input pulse is multiplied by the adjusted factor. The display shows integers only. After a reset the counter is completely reset to 0; this also includes the non-visible value of < 1.

At a prescaler of >1 not all the values are selectable. If invalid Preset values are selected, the counter will round them up to the next possible value.

Example: PSC 5 cannot select (reach) Preset value 7. In this case, the counter automatically changes the Preset value to 10).

If the Prescaler is changed, this may also affect the Preset values, which may have to be changed accordingly.

Adjusting range 0,0001 to 99,9999

The Prescaler is used, for example, to convert counter pulses into meaningful units, to adapt the units of measurements (e.g. cm-pulses to inch-pulses), or to compensate for worn out measuring wheels.

Formula: $PSC = \text{Desired/nominal display} / \text{number of pulses}$

Example: Flowmeter 173 pulses per 100 liters; display in liters

$PSC = 100 / 173 = 0,5780$

Example: 1 pulse per cm; display in inch

$PSC = 1 / 2,54 = 0,3937$

General description of multifunctional counter

**Attention: This is only valid for counters and tachometers.
For timers please refer to the special Timer Description.**

Display 2. row:

The display of the 2nd row can be programmed as follows:
P 2, P 1, P 0, Prescaler, Batch counter, totalizer or partial sums
(shift counter)

Counter and control inputs:

The counter is fitted with 3 counter and control inputs and, in addition, with an application input (see below). These inputs are assigned various counter or control functions by means of function code settings

Input logic:

The input logic can be programmed to NPN or PNP, each at the 8V-level or TTL level; see Technical Data for the switching threshold.

Reset/Set:

Manual setting via keys (lockable)

Electronic setting via control input (and/or application input)

Automatic programming after reaching the main Preselection

Programmable Power-On Reset

Depending on the function code the counter is:

1.) Reset: reset to 0

P 2 is the main Preset (preselect) value

During unidirectional counting the counter will add up.

or

2.) Set: reset to P 2

Signal 2 at 0

During unidirectional counting the counter will subtract.

For time counting, batch counting or shift counting, it is possible to reset partial sums or the total sum, batch counter or 2nd totalizer individually or at the same time via the application input.

General description of multifunctional counter

Independently the counter can be reset to Preset value 0 via the application input (see below).

Exception: Tachometers do not have a reset/set function

Static/dynamic reset:

Static reset: Reset over the entire pulse width of the reset pulse

Dynamic reset: Reset via the active edge; thereafter, counter operation is possible independently of the pulse width of the reset pulse.

Exception: Tachometers do not have a reset/set function

Teach input:

Using the Teach Input (application input) the counter status is imported in Preset 2.

Decimal Point:

The decimal point is only an optical reading assistance on the display and does not change the value. For example, for a value of 1 pulse per cm, the setting 0,00 makes it easier to read the value in m and cm.

Exception: This does not apply to tachometers and timers.
Please refer to the detailed Tachometer and Timer descriptions.

Input damping (Attenuation)

The inputs A and B are limited to 60 kHz.
The Application Input is limited to 6 kHz.

Following maximum input frequencies are not to be exceeded:

Phasediscriminator single evaluation: A and B each 30 kHz (TTL 15 kHz)

Phasediscriminator double evaluation: A and B each 30 kHz (TTL 15 kHz)

Phasediscriminator quadruple evaluation: A and B each 15 kHz (TTL 15 kHz)

Unidirectional counting and directional input: Input A 60 kHz (TTL 15 kHz)

Differential counting, summation (totalizing): Input A + B 60 kHz (TTL 15 kHz)

General description of multifunctional counter

When the application input is used as an additional count input, the above mentioned input frequencies have to be reduced by the frequency of the application input:

If mechanical contacts are triggered (i.e. relays, switches, Reed contacts, etc.), the input frequency has to be damped (attenuated) to 30 Hz, so as to filter out bounce pulses.

If damping to 30 Hz is selected, all inputs can be used at 30 Hz.

To reach these values the amplitude thresholds are to be hold.
(See technical data - chapter 10)

Signal

P 1 and P 2 are available as relay changeover contacts and electronic output signals (PNP).

P 0 is available as an electronic output signal across the application output (PNP).

If a signal is active, this will be shown on the LCD display.

Optionally, the multifunctional counter can be set to have the display flash if one or all the preset values are active.

This is also valid for Preset 0 (if no output has been assigned)

Signaltime:

1.) bistable: Cleared by electronic or manual reset.

P 0 + P 1 = bistable – additionally cleared by signal 2

Attention: Signal 2 must not be bistable for automatic reset.

2.) monostable: Up to 9 fixed signal times are available between 0,02s and 10s. In addition, user times can be programmed between 0,01s to 599,99s.

3.) Range signals: active as long as the counter reading is within the adjusted range.

Signals active on/off

During normal operation the relay is energized if the signal is active.

This behavior can also be inverted (also applicable to the transistor outputs).

General description of multifunctional counter

Application input/output:

Depending on the standard function, up to 11 (eleven) functions can be assigned to the application input/output. Note, however, that only one of these functions can be selected.

Further details are given in the Function Code Chapter.

Application – Set to preset 0

Programs the application input to act as a Set Input. The counter is set to Preset 0, independently of the reset via input C or the keyboard.

This function is not available for tachometers.

Application keylock:

All keyboard functions can be locked (latched) individually (Reset, P 0, P 1, P 2, Prescaler)

Lock mode: release after 10s, complete keylock or keylock depending on keylock input (application input)



Our advice! After setting up the system, lock (latch) all the keyboard functions that are not allowed to be changed by the user.

Pulse counter

5 Pulse Counter

5.1 Description of the Pulse Counter

(Supplementing the General Description in Chapter 4)

Counter mode:

The following counter modes can be selected:

Unidirectional counting, adding or subtracting;

Unidirectional counting with directional input;

Differential counting, summation (totalizing) or

phase discriminator (quad) with single, double or quadruple evaluation.

Output signals mode of operation:

1.) coincidence signal: The counter operates in the coincidence mode, i.e. output signals are activated after reaching the Preset value for the programmed period of time.

2.) Trail: P 2 and P 0 are under coincidence operation; they operate as described in item A.

P 1 is the trail. P 1 is not absolute to 0, but relative to P 2.

If the setting is F8=1, the following will apply:

Signal 1 is returned at P 2 – P 1

Example: P 2=1000, P 1=200, Signal 1 at 800;

If P 1 is negative: P 2=1000, P 1=(-200), Signal 1 at 1200

If the setting is F8=2, the following will be applicable:

Signal 1 is returned at P 2 + und – P 1

(Example: P 2=1000, P 1=200, Signal 1 at 800 or/and 1200)

3.) range signal: VW 1 and 2 are range signals:

Signal 1 is active at a counter reading < P 1 and

Signal 2 is active at a counter reading > P 2

Intermediate cut:

Depending on the application it may become necessary to isolate the main signal during the reset, e.g. when the first material lengths or certain lengths showing material defects have to be cut on length-cutting systems.

Pulse counter

Additional totalizer (summation counter)

The additional totalizer sums up all values, even if the main counter is continually reset. The shift key can be used to switch between the counter reading and the total sum. The totalizer can only be reset manually.

To do this, select the total sum from the first row; then press the reset keys.

Prescaler Output PSC-out:

The prescaler output is an application output.

With each increase of the counter reading the number of output pulses corresponds to the respective number of increments.

The pulse length of the prescaler output corresponds to a frequency of 500 Hz.

When using the prescaler output the max. count frequency is:

$$F_{\max} = 500 / \text{PSC.}$$

So it is possible that the maximum input frequency can not be reached.

Application counter input add / sub

The application input may be assigned to the Count Up or Count Down function.

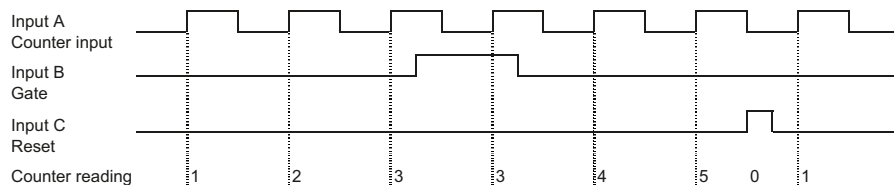
This is a counter input, which is available in addition to the counter mode adjusted with F1.

Application Latch/Reset

Latch/Reset is an application input. If the counter is reset via the application input, the counter reading is held constant. The counter continues to remain fully functional and operates in the background mode. During the next reset the current (updated) value will be shown on the display.

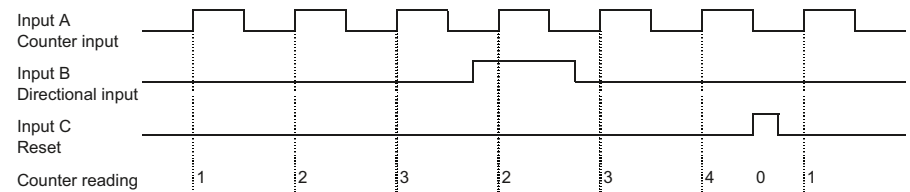
5.2 Signal diagrams input signals (PNP-Logic)

Unidirectional counting ($F1 = \text{C G r} = 0$)

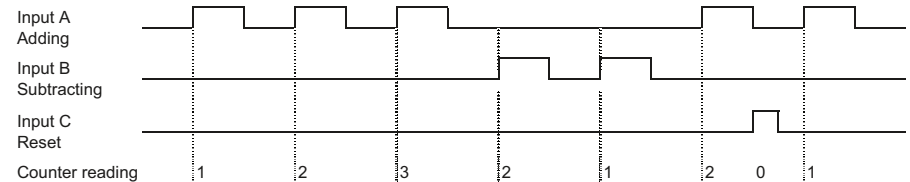


Pulse counter

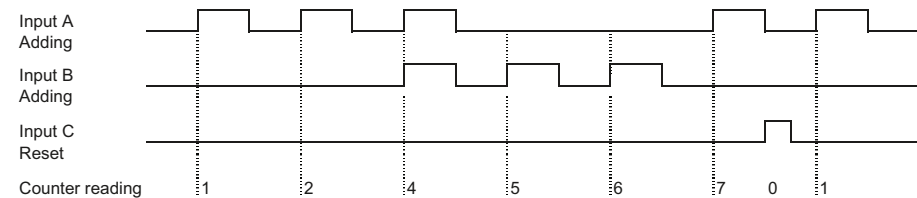
Directional input ($F1 = \text{C d r} = 1$)



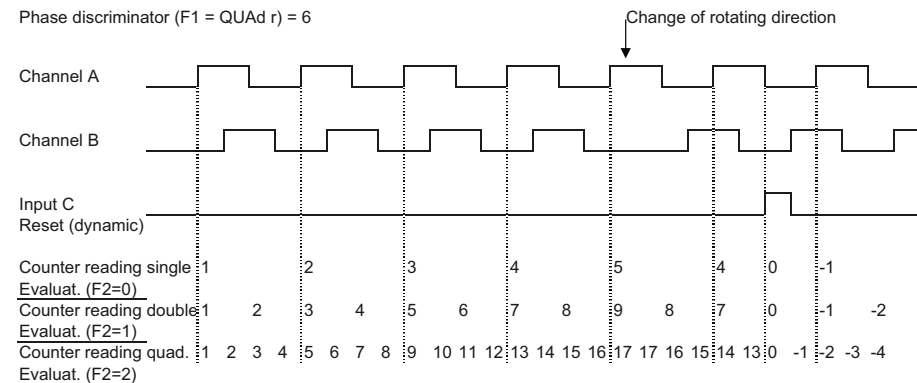
Differential input ($F1 = \text{A S r} = 3$)



Summation (totalizer) input ($F1 = \text{A A r} = 5$)



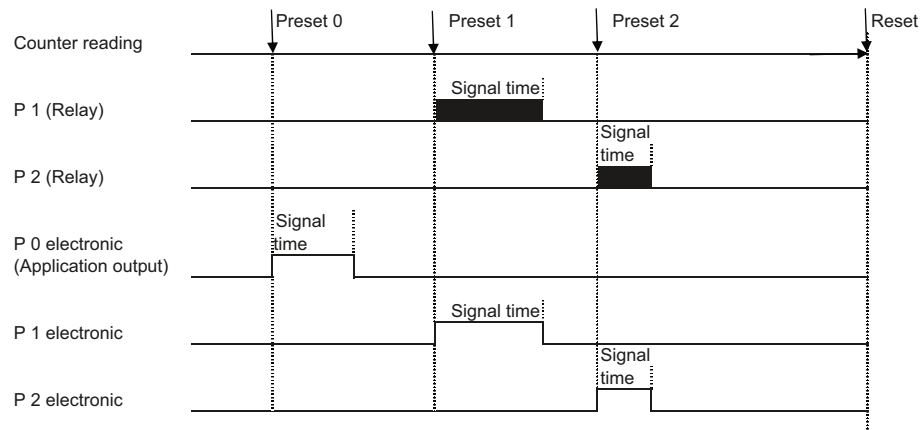
Phase discriminator ($F1 = \text{QUAd r} = 6$)



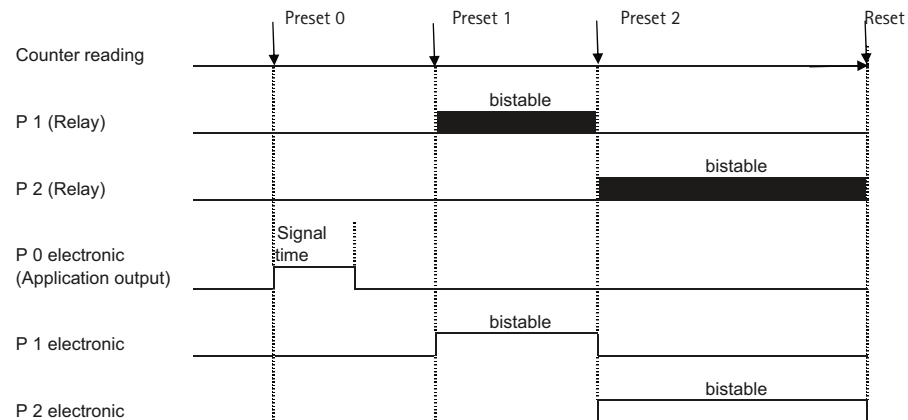
Pulse counter

5.3 Signal diagrams - Output signals

Output signals monostable
 Coincidence signals P 0 (F10), P 1 (F11), P 2 (F12) monostable

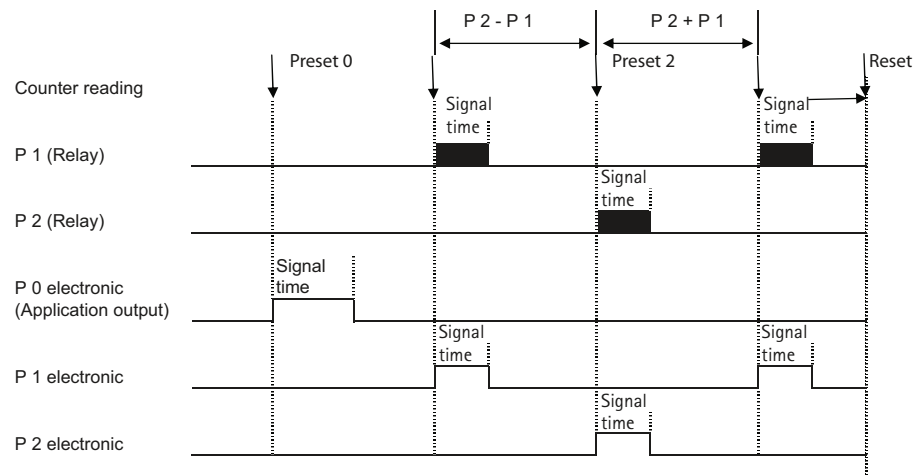


Output signals bistable
 Coincidence signal time P 0 (F10) monostable P 1 (F11), P 2 (F12) bistable

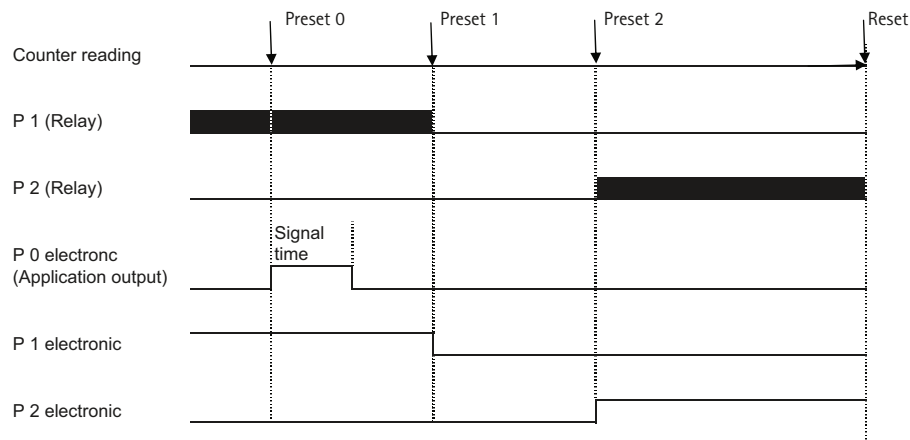


Pulse counter

Trail Preset
 P 0 (F10) Coincidence signal monostable, P 1 (F8+F11) trail signal, symmetrical,
 P 2 (F12) Coincidence signal monostable



Range signals
 P 0 (F10) Coincidence signal monostable P 1 + P 2 range signal



Pulse counter

5.4 Programming the counter function codes

Program- ming mode	Change function setting	Save and change to next func- tion	Return to display mode
	or		
Keep pressed and simultaneously turn Voltage On	press	press	press
Alternative display of function codes	+	The function codes are displayed as text in row 1. By pressing both keys simultane- ously you can change to the numeri- cal display (F 0 to F 35). After pressing these keys once again the number of the selectable options will be displayed in addition. This setting will be stored.	

Function code F0, Display Row 1: F0E5EE

Function	No.	Display Row 2
Factory Setting (Defaults)	0*	888876 No Function
	1	8884E5 All Function Codes are set to the values marked with *

Pulse counter

Function code F1, Display Row 1: COUNE8

Counter Mode	0*	Input A	Input B	Input C
	880888	Count. inpt.	Gate	Reset
1	88d888	Count.inpt.	Direction. Input	Reset
2	88d808	Count.inpt.	Direction. Input	Gate
3	885888	Adding	Subtracting	Reset
4	885808	Adding	Subtracting	Gate
5	888888	Adding	Adding	Reset
6	90A888	Channel A	Channel B	Reset
7	90A808	Channel A	Channel B	Gate

Function code F2, Display Row 1: 90A888

Edge Evaluation /Quadrat. evaluation	0*	888881	Single evaluation
	1	888882	Double evaluation
	2	888884	Quadruple evaluation

Pulse counter

Function code F3, Display Row 1: 10P200

PNP/NPN- Logic	0	0000H	NPN-8V-Level
	1*	0000H	PNP 8-V Level
	2	0000L	NPN TTL-Level
	3	0000L	PNP TTL-Level

Function code F4, Display Row 1: 10AEE

Input- damping (Attenu- ation)	0	00F09	30 Hz damping (e.g. for mechanical contacts)
	1*	H0F09	F max. (see chapter 4 and 10)

Function code F5, Display Row 1: 05000

Set / Re- set- Mode	0*	05000	Reset to 0
	1	05000	Automatic reset to 0 after reaching Preset 2
	2	50000	Set to Preset 2
	3	05000	Automatic set to Preset 2 after reaching 0

Pulse counter

Function code F6, Display Row 1: 0E5EE

dynam./ static Reset	0*	5EAE	Static reset (reset as long as the signal is applied)
	1	09A	Dynamic Reset (ready to count after reset (even if reset signal is applied for a longer time))

Function code F8, Display Row 1: 0E500

Mode Preset 1	0*	0E500	P 1 normal preset; absolute to the counter reading (coincidence signal)
	1	0E000	P 1 as a trail preset with prefix (relative to P 2)
	2	0E000	P 1 as a trail preset symmetric trail (relative to P 2)
	3	0A000	P 1 and P 2 as a range signal (Sign.1 < P 1, Sign.2 > P 2)

Function code F9, Display Row 1: 00E510

Output signal	0*	00E0A	Active On
	1	00E0F	Active Off

Pulse counter

Function code F10, Display Row 1: 5 1 0 8 8 0

Signal time P 0	0	8 8 5 8 8 8	Disabled / No output signal
	1	8 8 5 8 8 8	Bistable, reset with Preset 2 or Reset
	2	8 8 8 0 0 2	0,02 s
	3	8 8 8 0 0 5	0,05 s
	4*	8 8 8 0 1 0	0,10 s
	5	8 8 8 0 2 0	0,20 s
	6	8 8 8 0 5 0	0,50 s
	7	8 8 8 1 0 0	1,00 s
	8	8 8 8 2 0 0	2,00 s
	9	8 8 8 5 0 0	5,00 s
	10	8 8 1 0 0 0	10,00 s
	11	8 5 8 7 8 8	User setting 1 (0-599,99 s)
	12	8 5 8 7 8 2	User setting 2 (0-599,99 s)
	13	8 5 8 7 8 3	User setting 3 (0-599,99 s)

Pulse counter

Function code F11, Display Row 1: 5 1 0 8 8 8

Signal time P 1	0	8 8 5 8 8 8	Disabled / No output signal
	1	8 8 5 8 8 8	Bistable; Reset with Preset 2 or Reset
	2	8 8 8 0 0 2	0,02 s
	3	8 8 8 0 0 5	0,05 s
	4*	8 8 8 0 1 0	0,10 s
	5	8 8 8 0 2 0	0,20 s
	6	8 8 8 0 5 0	0,50 s
	7	8 8 8 1 0 0	1,00 s
	8	8 8 8 2 0 0	2,00 s
	9	8 8 8 5 0 0	5,00 s
	10	8 8 1 0 0 0	10,00 s
	11	8 5 8 7 8 1	User setting 1 (0-599,99 s)
	12	8 5 8 7 8 2	User setting 2 (0-599,99 s)
	13	8 5 8 7 8 3	User setting 3 (0-599,99 s)

Pulse counter

Function code F12, Display Row 1: 5008E2

Signal time P 2	0	885888	Disabled / No Output signal
	1	885E88	Bistable; Reset Cannot be used in conjunction with automatic Reset
	2	888002	0,02 s
	3	888005	0,05 s
	4*	888010	0,10 s
	5	888020	0,20 s
	6	888050	0,50 s
	7	888100	1,00 s
	8	888200	2,00 s
	9	888500	5,00 s
	10	8881000	10,00 s
	11	USE7881	User setting 1 (0-599,99 s)
	12	USE7882	User setting 2 (0-599,99 s)
	13	USE7883	User setting 3 (0-599,99 s)

Pulse counter

Function code F13, Display Row 1: 8P888E

Decimal point	0*	888880	No decimal point
	1	888800	1 decimal place
	2	888000	2 decimal places
	3	880000	3 decimal places
	4	800000	4 decimal places

Function code F14, Display Row 1: 8FLASH

Display flashes	0*	88888H	No flashing
	1	8888P0	Flashes as long as P 0 is active
	2	8888P1	Flashes as long as P 1 is active
	3	8888P2	Flashes as long as P 2 is active
	4	P0-1-2	Flashes as long as one P is active

Pulse counter

Function code F15, Display Row 1: 2.8888E

Display in 2nd row	0	8888P0	Preset 0
	1	8888P1	Preset 1
	2*	8888P2	Preset 2
	3	888P50	Prescaler
	4	888E00	Totalizer


Function code F16, Display Row 1: 00E0E5

Output at Reset (Interm. Cut)	0*	888800	Do not activate Preset 2 during Reset
	1	8888P2	Activate Preset 2 during Reset

Function code F17, Display Row 1: P000E5

Power On (Reset)	0*	0000E5	Restore counter value
	1	8880E5	Reset at Power On

Function code F18, Display Row 1: 00E0E0

Output signal Memory	0	8884E5	Restart signal time after power fail  output switches
	1*	888800	Do not restart signal time after power fail

Pulse counter

Function code F19, Display Row 1: Adde0E

Addtl. Totalizer	0	8884E5	Enabled
	1*	888800	Disabled

Function code F22, Display Row 1: AP010P

Applica. Input/Output	0	P5000E	Prescaler output
	1	P0000E	Output Preset 0
	2	d0000E	Directional output
	3*	C0E00P	Counter input - adding
	4	C0E00A	Counter input - subtracting
	5	0E5000	Reset input
	6	C0E000	Gate input
	7	L00000	Keylock input
	8	H0L000	Hold input (display lock)
	9	E0A00H	Teach input (count value becomes P 2)
	10	S0E000	Set input (Set to Preset 0)
	11	L0A0E5	Latch and Reset (Save display at Reset)

Pulse counter



Should you have a counter with interface, the additional function codes F24 – F27 are described in the separate manual for the interface version.

Function code F30, Display Row 1: **F E 5 0 0 0**

Lock Reset key	0*	8 0 0 0 0 0	Enable keyboard reset
	1	8 8 8 0 0 0	Keyboard reset locked / delayed

Function code F31, Display Row 1: **F 0 0 0 0 0**

Lock Preset 0	0*	8 0 0 0 0 0	P 0 Setting enabled
	1	8 8 8 0 0 0	P 0 Setting locked / delayed

Function code F32, Display Row 1: **F 1 0 0 0 0**

Lock Preset 1	0*	8 0 0 0 0 0	P 1 Setting enabled
	1	8 8 8 0 0 0	P 1 Setting locked / delayed

Pulse counter

Function code F33, Display Row 1: **F 2 0 0 0 0**

Lock Preset 2	0*	8 0 0 0 0 0	P 2 Setting enabled
	1	8 8 8 0 0 0	P 2 Setting locked / delayed

Function code F34, Display Row 1: **F 5 0 0 0 0**

Lock Prescaler setting	0*	8 0 0 0 0 0	PSC setting enabled
	1	8 8 8 0 0 0	PSC Setting locked / delayed

Function code F35, Display Row 1: **F 0 0 0 0 0**

Lock Mode	0*	1 0 0 5 0 0	10 seconds delay
	1	8 0 0 0 0 0	Completely locked
	2	1 0 0 0 0 0	Lock mode depends on keylock input

6 Tachometer

6.1 Tachometer Description

(Supplementing the General Description given in Chapter 4)

Operation:

A tachometer measures the period (PNP: time from one rising edge to the next one); NPN: time period from a falling edge to the next one), and converts and displays this time in 1/sec or 1/min.

Tachometer Mode of Operation:

The following modes of tachometer operation can be selected:

- Unidirectional counting;
- Unidirectional counting with directional input;
- Differential counting, summation (totalizing);
- Phase discrimination (quad) with single, double or quadruple evaluation;
- Indication of ratio A/B and
- Indication of percentage (A-B) /A in %

Decimal point

Tachometer mode of operation 0-4 (function code F1)

The decimal point only serves for better legibility and does not change the value.

Tachometer mode of operation 5 + 6 (function code F1)

The decimal point is included in the calculation and increases the resolution.

Output signals Mode of operation:

The tachometer uses the following limit values:

P 1 and 2 are limit (range) signals

Signal 1 is active at the displayed value of < P 1 and

Signal 2 is active at the displayed value of > P 2

Signal 0 is active at the displayed value of > P 0; (application output)

Tachometer

Display unit:

Programmable: 1/sec or 1/min

Using the setting 1/min and prescaler 60 the display will show 1/hour.

Min. input frequency:

Programmable 1 Hz or 0.1 Hz.

If two edges do not occur within 1 s or respectively 10s, a value of 0 will be displayed.

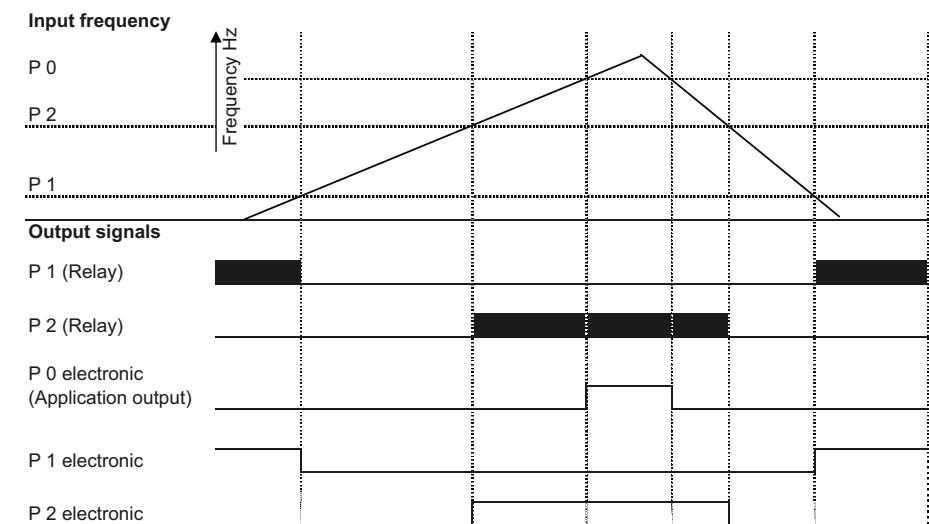
Startup suppression:

Programmable Yes/No

During the startup the lower limit signal is suppressed until the lower limit value is exceeded for the first time.







The startup suppression will become active again, if the minimum frequency is fallen below.

6.2 Signal diagram – Output signals



Tachometer

6.3 Programming the tachometer function codes

Programming mode	Change function setting	Save and change to next function	Return to display mode
E + 	 or 		E
Keep pressed and simultaneously turn Voltage On	press	press	press
Alternative display of Function code:	 + 	The function codes are displayed as text in row 1. By pressing both keys simultaneously you can change to the numerical display (F 0 to F 35). After pressing these keys once again the number of the selectable options will be displayed in addition. This setting will be stored.	

Function code F0, Display Row 1: F00000

Function	No.	Display Row 2	
Factory Setting (Defaults)	0*	000000	No function
	1	000455	All function codes are set to the values marked with *

Tachometer

Function code F1, Display Row 1: F00000

		Input A	Input B	Input C
Tacho mode of operation	0*	Count input	Gate	Hold (Display memory)
	1	Count input	Direct. input	Hold (Display memory)
	2	Adding	subtracting	Hold (Display memory)
	3	Adding	Adding	Hold (Display memory))
	4	Channel A	Channel B	Hold (Display memory)
	5	Channel A / Channel B		Hold (Display memory)
	6	(A-B) / A in % (Difference in % of A)		Hold (Display memory)

Tachometer

Function code F2, Display Row 1: **900000**

Edge Evaluation/Quadrat. evaluation	0*	888888	Single evaluation
	1	888882	Dual evaluation
	2	888884	Quadruple evaluation

Function code F3, Display Row 1: **100000**

PNP/NPN-Logic	0	000000	NPN 8 V-Level
	1*	000000	PNP 8 V-Level
	2	000000	NPN TTL-Level
	3	000000	PNP TTL-Level

Function code F4, Display Row 1: **100000**

Input damping (Attenuat)	0	000000	30 Hz attenuation (e.g. for mechanical contacts)
	1*	000000	F max. (see chapter 4 und 10)

Tachometer

Function code F5, Display Row 1: **000000**

Display Unit	0*	000000	Pulse per second (1/sec)
	1	000000	Pulse per minute (1/min)

Function code F6, Display Row 1: **100000**

Min. Input frequency	0*	000000	1 Hz (if no further pulse is received after 1s, the display will return to 0)
	1	000000	0,1 Hz (if no further pulse is received after 1s, the display will return to 0)

Function code F7, Display Row 1: **000000**

Startup-suppress.	0	000000	With startup suppression
	1*	000000	Without startup suppression

Function code F9, Display Row 1: **000000**

Output signal	0*	000000	Active On
	1	000000	Active Off

Tachometer

Function code F10, Display Row 1: **5108E0**

P 0 Addtl. Upper limit	0*	88586E	Disabled / no Output signal
	1	E886EE	Additional range signal > P 0

Function code F11, Display Row 1: **5108E1**

P 1 Lower limit	0*	88586E	Disabled / no Output signal
	1	E886EE	Range signal < P 1

Function code F12, Display Row 1: **5108E2**

P 2 Upper limit	0*	88586E	Disabled / no Output signal
	1	E886EE	Range signal > P 2

Tachometer

Function code F13, Display Row 1: **8P88E**

Decimal place	0*	888880	No decimal point
	1	8888.0	1 Decimal place
	2	888.00	2 Decimal places
	3	88.000	3 Decimal places
	4	8.0000	4 Decimal places

Function code F14, Display Row 1: **8FLASH**

Display flashes	0*	08FLASH	Do not flash
	1	8888P0	Flashes as long as P 0 active
	2	8888P1	Flashes as long as P 1 active
	3	8888P2	Flashes as long as P 2 active
	4	P0-1-2	Flashes if one preset is active

Tachometer

Function code F15, Display Row 1: **2.8888E**

Display in 2nd row	0	8888P0	Preset 0
	1	8888P1	Preset 1
	2*	8888P2	Preset 2
	3	888P50	Prescaler

Function code F22, Display Row 1: **APUINP**

Application Input/Output	0	P0800E	Output Preset 0
	1	d8r00E	Directional output
	2*	E8UP8A	Count input adding, or 2nd count input A
	3	E8dn8B	Count input subtracting, or 2nd counter input B
	4	0AEE88	Gate Input
	5	H0Ld88	Hold-Input (display memory)
	6	EEACh8	Teach Input (count value becomes P 2)
	7	L0c888	Keylock-Input

Tachometer



Should you have a counter with interface, the additional function codes F24 – F27 are described in the separate manual for the interface version.

Function code F31, Display Row 1: **P0880E**

Lock Pre-set 0 Setting	0*	80n80E	P 0 Setting enabled
	1	88880E	P 0 Setting locked / delayed

Function code F32, Display Row 1: **P1880E**

Lock Pre-set 1 Setting	0*	80n80E	P 1 Setting enabled
	1	88880E	P 1 Setting locked / delayed

Function code F33, Display Row 1: **P2880E**

Lock Pre-set 2 Setting	0*	80n80E	P 2 Setting enabled
	1	88880E	P 2 Setting locked / delayed

Tachometer

Function code F34, Display Row 1: P50000

Lock Prescaler Setting	0*	800000	PSC Setting enabled
.....			
	1	888000	PSC Setting locked / delayed

Function code F35, Display Row 1: 000000

Lock Mode	0*	100500	10 seconds delay
.....			
	1	880000	Completely locked
.....			
	2	100000	Lock mode depends on keylock Input

Timer

7 Timer

7.1 Timer Description

(Supplementing the General Description in Chapter 4)

Function:

The timer counts seconds, minutes or hours. Depending on the resolution (see below) the smallest units to be recorded are 0,1 ms. Combined with the prescaler (see below), quantities can be measured as a function of time.

Time formats:

4 time formats are available:
Seconds, minutes, hours and HH:MM:SS

Resolution:

By shifting the decimal place, a resolution of up to 4 decimal places can be programmed; the smallest resolution is 0,1 ms. The time format "seconds with four decimal places" shows 0.1 milliseconds. The time format "seconds with three decimal places" shows milliseconds. The time format "minutes with two decimal places" shows 1/100 minutes

Prescaler:

During the timer operation the prescaler has to be disabled or set to 01,0000. The prescaler can be used to record quantities, provided that the quantity per time unit is known. Example: A volume of 3 liters per second is supplied. Settings: Time format "seconds", prescaler 3,0000 Display: Supplied volume in liters as a function of time. The prescaler cannot be used with the time format HH:MM:SS as it is not active (effective) in this format.

Timer mode of operation:

The following modes of timer operation can be selected:

Cumulative measurement following the pulse-width measuring principle
(Cumulative measurement as long as input A is active)

Cumulative measurement following the cycle-duration principle
(Cumulative measurement from rising edge Input A to falling edge of Input A)

Cumulative measurement A=Run, B=Stop (cumulative measurement from rising edge Input A to rising edge Input B)

Single-pulse measurement following the pulse-width measurement principle (Measure as long as Input A is active)

Single-pulse measurement following the cycle-duration principle (Measurement from rising edge Input A to rising edge of Input A)

Single-pulse measurement A=Run, B=Stop (Cumulative measurement from rising edge Input A to rising edge Input B)

Manual Start / Stop via keyboard:

The Start / Stop function can be programmed via the keyboard.

Start: Press the UP button for 0.5s

Stop: Press the DOWN button.

Output signals –Function:

A coincidence signal: The timer operates in the "coincidence" mode, i.e. the output signals are enabled for the programmed period of time after reaching the selected preset value

B trail signal: P 2 and P 0 operate in the "coincidence" mode, i.e. the output signals are enabled for the programmed period of time when reaching the selected preset value. P 1 is a trail preset and not absolute to 0, but relative to P 2.

If the setting is F8=1, the following will apply:

Signal 1 is returned at P 2 – P 1

Example: P 2=1000, P 1=200, Signal 1 at 800;

If P1 is negative: P 2=1000, P 1=(-200), Signal 1 at 1200

If the setting is F8=2, the following will be applicable:

Signal 1 is returned at P 2 + und – P 1

(Example: P 2=1000, P 1=200, Signal 1 at 800 or/and 1200)

C range signal: P 1 and 2 are range signals:

Signal 1 is active at timer reading < P 1 and

Signal 2 is active at timer reading > P 2

D batch mode: The timer can also be programmed to act as a batch counter. In this case, P 2= main preset value; P 1= Batch preset.

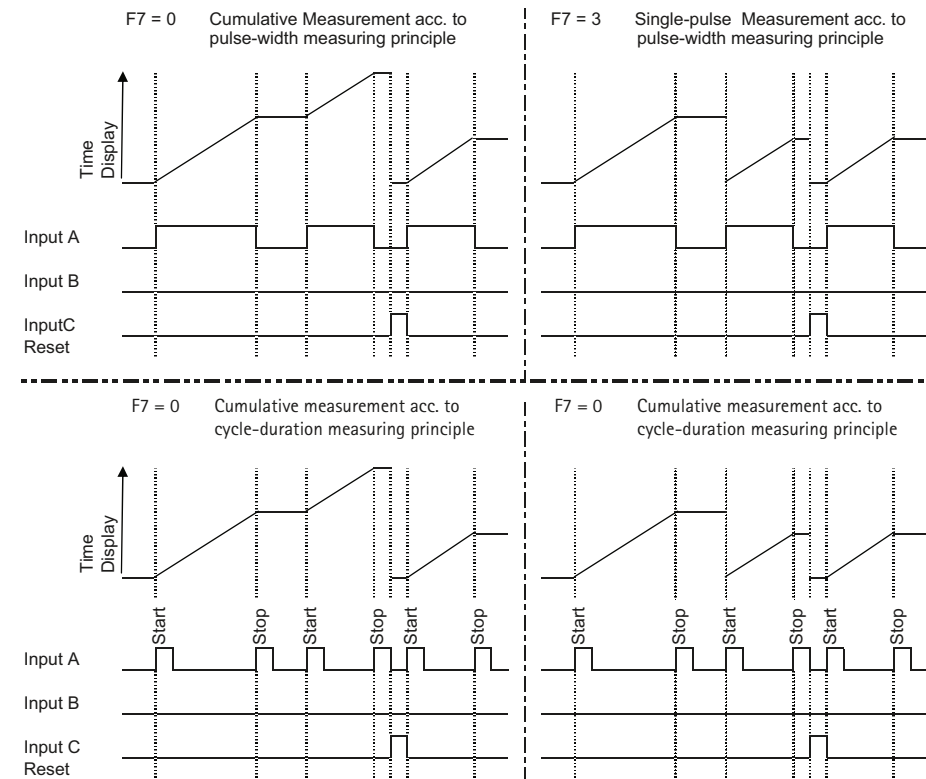
In the Batch mode of operation, only positive entries are possible for P1; negative entries will be stored as positive values.

This mode is ideal to default a process time and the number of process sequences (runs).

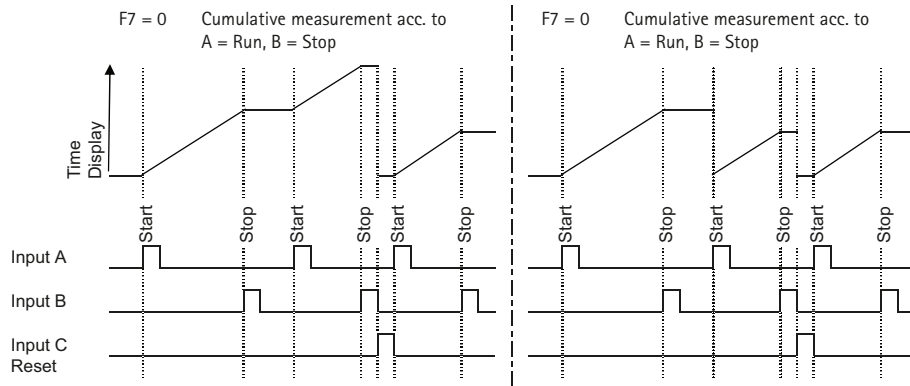
Additional totalizer:

The additional totalizer is used to sum up all the times (even after repeated resetting of the main counter). The totalizer is reset separately.

7.2 Signal Diagrams – Input signals



Timer



7.3 Signal Diagrams - Output signals

The output signals of the timer can be derived from the pulse counter (see 5.3) or, respectively, batch counter (see 9.2) functions.

Timer

7.4 Programming the Timer function codes

Program- ming mode	Change function setting	Save and change to next function	Return to display mode
E + ▼	▲ oder ▼	▶	E
Keep pressed and simultaneously turn Voltage On	press	press	press
Alternative display of function codes	▲ + ▼	The function codes are displayed as text in row 1. By pressing both keys simultane- ously you can change to the numerical display (F 0 to F 35). After pressing these keys once again the number of the selecta- ble options will be displayed in addition. This setting will be stored.	

Function code F0, Display Row 1: **F0 E E E E**

Function	No.	Display Row 2	
Factory Setting (Defaults)	0*	8.8.8.8.7.8	No function
	1	8.8.8.4.E.5	All function codes are set to the va- lues marked with *

Timer

Function code F1, Display Row 1: 0 0 0 0 0 0

Time unit	0*	5 5 5 5 0 0	Seconds
	1	0 0 0 0 5 5	Minutes
	2	0 0 0 0 5 5	Hours
	3	0 0 0 0 5 5	HH:MM:SS

Function code F2, Display Row 1: 5 5 5 0 0 0

Resolution	0*	0 0 0 0 0 0	No decimal point
	1	0 0 0 0 0 0	1 decimal place
	2	0 0 0 0 0 0	2 decimal places
	3	0 0 0 0 0 0	3 decimal places
	4	0 0 0 0 0 0	4 decimal places

Timer

Function code F3, Display Row 1: 1 0 0 0 0 0

PNP/NPN-Logic	0	0 0 0 0 0 0	NPN 8 V-Level
	1*	0 0 0 0 0 0	PNP 8 V-Level
	2	0 0 0 0 0 0	NPN TTL-Level
	3	0 0 0 0 0 0	PNP TTL-Level

Function code F4, Display Row 1: 1 0 0 0 0 0

Input damping (Attenuation)	0	0 0 0 0 0 0	30 Hz damping (attenuation) (e.g. for mechanical contacts)
	1*	0 0 0 0 0 0	F max. (see chapter 4 and 10)

Function code F5, Display Row 1: 5 5 0 0 0 0

Set / Re-set- Mode	0*	5 5 0 0 0 0	Reset to 0
	1	0 0 5 5 0 0	Automatic set to 0 after reaching Preset value 2
	2	5 5 0 0 0 0	Set to Preset 2
	3	0 0 5 5 0 0	Automatically sets to Preset 2 after reaching 0.

Timer

Function code F6, Display Row 1: **F E S E E 8 8**

dynam/ static Reset	0*	S E R E 8 8	Static Reset (as long as the signal is applied)
	1	D Y N 8 8 8	Dynamic Reset (ready to count after reset, even if reset signal is applied for a longer time)

Function code F7, Display Row 1: **E 8 N E 8 8**

Timer- Mode of Operation	0	C U 8 P U 8	Cumulative measurement - pulse-width (counts as long as Input A is active)
	1*	C U 8 P E 8	Cumulative measurement - cycle duration (counts from rising edge of start signal to rising edge of stop signal).
	2	C U 8 8 8 5	Cumulative measurement - A=Run B=Stop (counts from rising edge of start signal to rising edge of stop signal).
	3	S 8 8 P U 8	Single-pulse measurement - pulse-width (counts as long as Input A is active)
	4	S 8 8 P E 8	Single-pulse measurement - cycle duration (counts from rising edge of start signal to rising edge of stop signal).
	5	S 8 8 8 8 5	Single-pulse measurement - A=Run B=Stop (counts from rising edge of start signal to rising edge of stop signal)

Timer

Function code F8, Display Row 1: **P F E S 8 8**

Mode Preset 1	0*	P F E S 8 8	P 1 normal preset; absolute to counter reading (coincidence signal)
	1	E F A 8 U 8	P 1 is a trail preset with prefix (relative to P 2)
	2	E F A 8 U S	P 1 as a symmetric trail preset (relative to P 2)
	3	P A N G E 8	P 1 and P 2 are range signals (Sign.1<P1, Sign.2>P2)

Function code F9, Display Row 1: **O 8 E S 8 8**

Output signal	0*	A 8 E 8 O 8	Active On
	1	A 8 E 8 O F F	Active Off

Timer

Function code F10, Display Row 1: 5 0 0 0 0 0

Signal time P 0	0	0.000000	Disabled / No output signal
	1	0.000000	Bistable, reset with Preset 2 or Reset
	2	0.000002	0,02 s
	3	0.000005	0,05 s
	4*	0.000010	0,10 s
	5	0.000020	0,20 s
	6	0.000050	0,50 s
	7	0.000100	1,00 s
	8	0.000200	2,00 s
	9	0.000500	5,00 s
	10	0.001000	10,00 s
	11	0.500000	User setting 1 (0-599,99 s)
	12	0.500002	User setting 2 (0-599,99 s)
	13	0.500003	User setting 3 (0-599,99 s)

Timer

Function code F11, Display Row 1: 5 0 0 0 0 0

Signal time P 1	0	0.000000	Disabled / no output signal
	1	0.000000	Bistable, reset with Preset 2 or Reset
	2	0.000002	0,02 s
	3	0.000005	0,05 s
	4*	0.000010	0,10 s
	5	0.000020	0,20 s
	6	0.000050	0,50 s
	7	0.000100	1,00 s
	8	0.000200	2,00 s
	9	0.000500	5,00 s
	10	0.001000	10,00 s
	11	0.500000	User setting 1 (0-599,99 s)
	12	0.500002	User setting 2 (0-599,99 s)
	13	0.500003	User setting 3 (0-599,99 s)

Timer

Function code F12, Display Row 1: 5 0 0 0 0 0 2

Signal time P 2	0	8 8 8 8 8 8	Disabled / No output signal
	1	8 8 8 8 8 8	Bistable; Reset function cannot be used in connection with automatic Reset
	2	8 8 8 0 0 2	0,02 s
	3	8 8 8 0 0 5	0,05 s
	4*	8 8 8 0 1 0	0,10 s
	5	8 8 8 0 2 0	0,20 s
	6	8 8 8 0 5 0	0,50 s
	7	8 8 8 1 0 0	1,00 s
	8	8 8 8 2 0 0	2,00 s
	9	8 8 8 5 0 0	5,00 s
	10	8 8 1 0 0 0	10,00 s
	11	0 5 9 9 8 8	User setting 1 (0-599,99 s)
	12	0 5 9 9 8 8	User setting 2 (0-599,99 s)
	13	0 5 9 9 8 8	User setting 3 (0-599,99 s)

Timer

Function code F13, Display Row 1: 8 8 8 8 8 8

Stop after reaching the main Preset	0*	8 8 8 8 8 8	No Stop when main Preset is reached (P 2)
	1	8 8 8 4 8 8	Stop when main Preset is reached (P 2)

Function code F14, Display Row 1: 8 8 8 8 8 8

Display flashes	0*	0 8 8 8 8 8	no flashing
	1	8 8 8 8 P 0	Flashes as long as P 0 is active
	2	8 8 8 8 P 1	Flashes as long as P 1 is active
	3	8 8 8 8 P 2	Flashes as long as P 2 is active
	4	P 0 - 1 - 2	Flashes as long as 1 P is active

Function code F15, Display Row 1: 2 8 8 8 8 8

Display in 2nd Row	0	8 8 8 8 P 0	Preset 0
	1	8 8 8 8 P 1	Preset 1
	2*	8 8 8 8 P 2	Preset 2
	3	8 8 8 P 5 0	Prescaler
	4	8 8 8 8 8 8	Totalizer / Batchcounter

Timer


Function code F16, Display Row 1: **0A885E**

Start / Stop via Keyboard (manual)	0*	0A5A6E	Start / Stop locked via keys UP key=Start; DOWN key = Stop
	1	EAA6EE	Start / Stop enabled via keys UP key =Start; DOWN key =Stop

Function code F17, Display Row 1: **0000E5**

Power On Reset	0*	0000E5	Restore counter value
	1	8880E5	Reset at Power On

Function code F18, Display Row 1: **0000E0**

Output Signal Memory	0	8884E5	Restart signal time after power fail  output switches
	1*	888800	Do not restart signal time after power fail

Function code F19, Display Row 1: **0000E0**

Addtl. Totalizer	0	8884E5	Enabled
	1*	888800	Disabled

Timer

Function code F20, Display Row 1: **0000E0**

Prescaler	0*	0A5A6E	Prescaler not active
	1	EAA6EE	Prescaler active

Function code F21, Display Row 1: **0000E0**

Timer Type	0*	0000E0	Preset timer
	1	6AEE2H	Batch timer

Function code F22, Display Row 1: **0000E0**

Application Output	0	0000E0	Output Preset 0
	1*	000000	Run-Input
	2	5E0P00	Stop-Input
	3	0E5A0E	Reset counter and totalizer or batch counter
	4	0E5C0E	Reset – only counter

Timer

5 **RESBAE** Reset - only totalizer or batch counter

6 **Loe888** Keylock input

7 **Hold888** Hold input (display memory)

8 **EEACH8** Teach Input (count value becomes P 2)

9 **SE8888** Set Input (set to Preset 0)



Should you have a counter with interface, the additional function codes F24 - F27 are described in the separate manual for the interface version.

Function code F30, Display Row 1: **RESU88**

Lock Reset Key 0* **80nL88** Keyboard reset enabled

1 **888L88** Keyboard reset locked / delayed

Function code F31, Display Row 1: **PO88L88**

Lock Pre-set 0 Setting 0* **80nL88** P 0 Setting enabled

1 **888L88** P 0 Setting locked / delayed

Timer

Function code F32, Display Row 1: **P188L88**

Lock Pre-set 1 Setting 0* **80nL88** P 1 Setting enabled

1 **888L88** P 1 Setting locked / delayed

Function code F33, Display Row 1: **P288L88**

Lock Pre-set 2 Setting 0* **80nL88** P 2 Setting enabled

1 **888L88** P 2 Setting locked / delayed

Function code F34, Display Row 1: **P5C888**

Lock Prescaler Setting 0* **80nL88** PSC Setting enabled

1 **888L88** PSC Setting locked / delayed

Function code F35, Display Row 1: **0L8888**

Lock Mode 0* **108588** 10 seconds delay

1 **8L8888** Completely locked

2 **1n8L88** Lock mode depends on keylock input

Shift Counter

8 Shift Counter

8.1 Shift Counter Description

(Supplementing the general description under chapter 4)

Function:

2-shift counters enable the acquisition of 2 separate partial sums. Counter input A acts on partial sum 1, whereas counter input B acts on partial sum 2.

Both partial sums are counted positively; the total sum is calculated mathematically and corresponds to the summed-up total (or respectively, the difference) of the partial sums.

The total sum remains unchanged after resetting one of the partial sums.

Counter mode of operation:

The following counter modes of operation can be selected:
Difference counting and summation (totalizing)

Output signals – mode of operation:

The counter operates in the "coincidence" mode, i.e. the output signals are enabled for the programmed period of time after reaching the selected Preset value.

The total sum acts on Preset 0

Partial sum 1 acts on Preset 1

Partial sum 2 acts on Preset 2

Reset:

After a reset at input C, both partial sums and the total sum are reset.

When resetting via the application input it is possible to reset one or both of the partial sums or the total sum, depending on the selected programming.

When resetting via the keyboard, only the value shown on the display is reset.

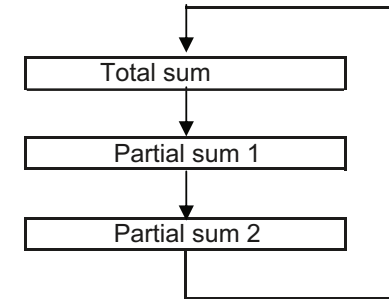
Totalizer:

The totalizer sums up all the input pulses, even if the partial sums and the total sum are reset. The totalizer can only be reset manually.

Shift Counter

8.2 Scrolling between Total Sum and Partial Sums

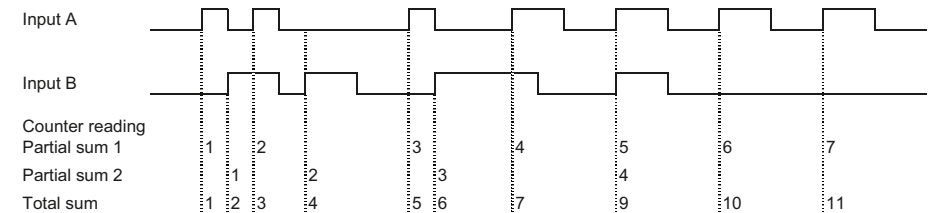
The Shift key is used to scroll between the total sum and partial sums 1 and 2.



If a partial sum is shown, SU1 or SU2 will appear flashing in the lower display bar.

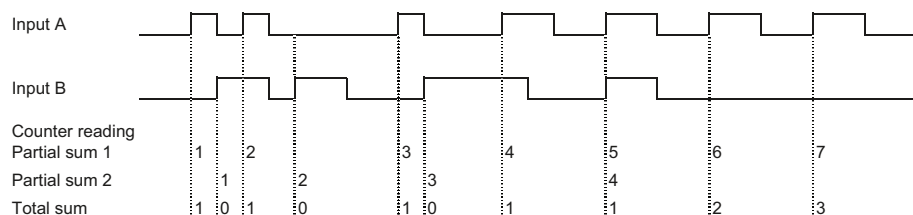
8.3 Signal diagrams – Inputs (PNP Logic)

Adding/Adding (F1= A A r)



Shift Counter

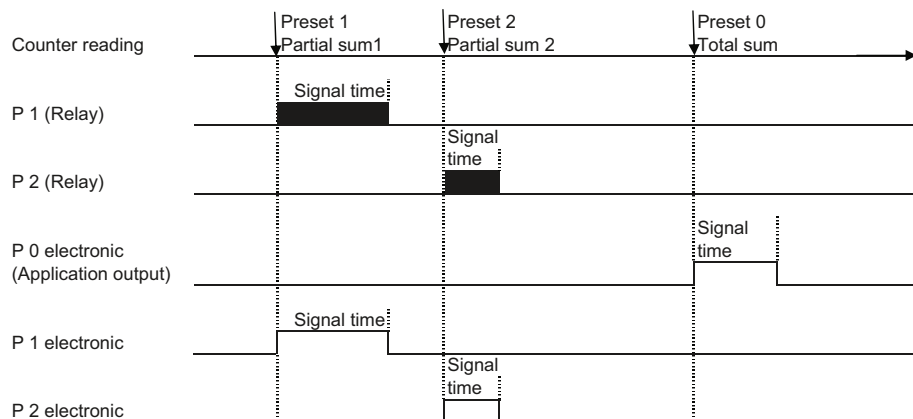
Adding/Subtracting (F1= A S r)



8.4 Signal Diagrams - Output signals

Output signals - monostable

Coincidence signals P 0/Total Sum (F10), P 1/Partial sum 1 (F11), P 2/Partial sum 2 (F12) monostable



Shift Counter

8.5 Programming the Shift Counter Function Codes

Programming mode	Change function setting	Save and change to next function	Return to display mode
E +	or		E
Keep pressed and simultaneously turn Voltage On	press	press	press
Alternative display of Function codes	+	The function codes are displayed as text in row 1. By pressing both keys simultaneously you can change to the numerical display (F 0 to F 35). After pressing these keys once again the number of the selectable options will be displayed in addition. This setting will be stored.	

Function code F0, Display Row 1: **F0E5EE**

Function	No.	Display Row 2
Factory Setting (Defaults)	0*	8.8.8.8.7.0 No function
	1	8.8.8.4.E.5 All function codes are set to the values marked with *

Shift Counter

Function code F1, Display Row 1: **C O U N T E R**

		Input A	Input B	Input C
Counter mode of Operation	0	A S F	Adding	Subtracting
	1*	A A F	Adding	Reset

Function code F3, Display Row 1: **I N P L O G**

PNP/ NPN-Logic	0	N P N H	NPN 8 V-Level
	1*	P N P H	PNP 8 V-Level
	2	N P N L	NPN TTL-Level
	3	P N P L	PNP TTL-Level

Function code F4, Display Row 1: **I n A t t e n**

Input Attenuat.	0	3 0 F F	30 Hz damping (attenuation); e.g. for mechanical contacts
	1*	H F F F	F max. (see chapter 4 and 10)

Shift Counter

Function code F5, Display Row 1: **P R E S E T**

With / without Preset	0	8 8 8 4 5	With Preset
	1*	8 8 8 8 0	Without Preset

Function code F6, Display Row 1: **R E S E T**

Dynamic/ static Reset	0*	5 E A E	Static reset (reset as long as signal is applied)
	1	d y n	Dynamic Reset (ready to count after reset, even if reset signal is applied for a longer time)

Function code F9, Display Row 1: **O u t P u t**

Output signal	0*	A E E 0 n	Active On
	1	A E E 0 f f	Active Off

Shift Counter

Function code F10, Display Row 1: 580820

Signal time P 0 Total Sum	0	885860	Disabled / no output signal
	1	885886	Bistable; reset with Reset
	2	888002	0,02 s
	3	888005	0,05 s
	4*	888010	0,10 s
	5	888020	0,20 s
	6	888050	0,50 s
	7	888100	1,00 s
	8	888200	2,00 s
	9	888500	5,00 s
	10	881000	10,00 s
	11	058781	User setting 1 (0-599,99 s)
	12	058782	User setting 2 (0-599,99 s)
	13	058783	User setting 3 (0-599,99 s)

Shift Counter

Function code F11, Display Row 1: 580821

Signal time P 1 Partial sum 1	0	885860	Disabled / no output signal
	1	885886	Bistable; reset with Reset
	2	888002	0,02 s
	3	888005	0,05 s
	4*	888010	0,10 s
	5	888020	0,20 s
	6	888050	0,50 s
	7	888100	1,00 s
	8	888200	2,00 s
	9	888500	5,00 s
	10	881000	10,00 s
	11	058781	User setting 1 (0-599,99 s)
	12	058782	User setting 2 (0-599,99 s)
	13	058783	User setting 3 (0-599,99 s)

Shift Counter

Function code F12, Display Row 1: 5808E2

Signal time P 2	0	885862	Disabled / no output signal
Partial sum 2	1	615E86	Bistable; reset with Reset
	2	888.002	0,02 s
	3	888.005	0,05 s
	4*	888.010	0,10 s
	5	888.020	0,20 s
	6	888.050	0,50 s
	7	888.100	1,00 s
	8	888.200	2,00 s
	9	888.500	5,00 s
	10	888.1000	10,00 s
	11	USE7.81	User-Einstellung 1 (0-599,99 s)
	12	USE7.82	User-Einstellung 2 (0-599,99 s)
	13	USE7.83	User-Einstellung 3 (0-599,99 s)

Shift Counter

Function code F13, Display Row 1: 8P88E

Decimal Point	0*	8888.0	No decimal point
	1	8888.00	1 decimal place
	2	888.000	2 decimal places
	3	88.0000	3 decimal places
	4	8.00000	4 decimal places

Function code F14, Display Row 1: 8FLASH

Display flashes	0*	8FLASH	No flashing
	1	8888.P0	Flashes as long as P 0 is active
	2	8888.P1	Flashes as long as P 1 is active
	3	8888.P2	Flashes as long as P 2 is active
	4	P0-1-2	Flashes as long as one Preset is active

Shift Counter


Function code F15, Display Row 1: 2.8888E

Display in 2nd Row	0	8888.00	Preset 0
	1	8888.01	Preset 1
	2*	8888.02	Preset 2
	3	888.050	Prescaler
	4	888.501	Partial sum 1
	5	888.502	Partial sum 2
	6	888.000	Totalizer

Function code F17, Display Row 1: P0000E5

Power-On Reset	0*	0000E5	Restores the counter value
	1	8880E5	Reset at Power On

Function code F18, Display Row 1: 000000

Output Signal Memory	0	888.000	Restart signal time after power fail  output switches
	1*	888.000	Do not restart signal time after power fail

Shift Counter

Function code F19, Display Row 1: A00000E

Addtl. Totalizer	0	888.000	Additional totalizer is enabled
	1*	888.000	No additional totalizer

Function code F22, Display Row 1: A00000E

Appli- cation Input/ Output	0	P0000E	Output Preset value 0
	1*	A2000E	2nd counter input partial sum 1
	2	62000E	2nd counter input partial sum 2
	3	0E5050	Reset of partial sum 1
	4	0E5052	Reset of partial sum 2
	5	0E5502	Reset of both partial sums
	6	0E5000	Reset of total sum
	7	H00000	Hold Input (display memory)
	9	000000	Keylock Input

Shift Counter



Should you have a counter with interface, the additional function codes F24 – F27 are described in the separate manual for the interface version.

Function code F30, Display Row 1: **F E S U**

Lock Reset key	0*	0 0 0 0	Keyboard reset enabled
.....			
	1	0 0 0 0	Keyboard reset locked / delayed

Function code F31, Display Row 1: **F 0 0 0**

Lock Preset 0	0*	0 0 0 0	P 0 Setting enabled
.....			
	1	0 0 0 0	P 0 Setting locked / delayed

Function code F32, Display Row 1: **F 1 0 0**

Lock Preset 1	0*	0 0 0 0	P 1 Setting enabled
.....			
	1	0 0 0 0	P 1 Setting locked / delayed

Shift Counter

Function code F33, Display Row 1: **F 2 0 0**

Lock Preset 2	0*	0 0 0 0	P 2 Setting enabled
.....			
	1	0 0 0 0	P 2 Setting locked / delayed

Function code F34, Display Row 1: **F 5 0 0**

Lock Prescaler Setting	0*	0 0 0 0	PSC Setting enabled
.....			
	1	0 0 0 0	PSC Setting locked / delayed

Function code F35, Display Row 1: **F 0 0 0 0**

Lock Mode	0*	1 0 0 5 0 0	10 seconds delay
.....			
	1	0 0 0 0 0 0	Completely locked
.....			
	2	1 0 0 0 0 0	Lock mode depends on keylock input

9 Batch Counter

9.1 Batch Counter Description

(Supplementing the general description in Chapter 4)

Function:

Preset 2 is the main Preset setting.

Preset 1 is the Batch Preset or, respectively, the preset value of the 2nd totalizer.

In the batch operation the batch counter counts how often the main Preset is activated.

Example of an application: during length cutting operations, for example, both the lengths (main preset) and number (batch preset) can be monitored.

In the Batch mode of operation, only positive entries are possible for P1; negative entries will be stored as positive values.

Counter mode of operation:

The following modes of operation can be adjusted for the counter:

- Unidirectional counting, adding or subtracting;
- Unidirectional counting with directional input;
- Difference counting, summation and phase discrimination (quad) with single, double or quadruple evaluation.

Output signals Mode of Operation:

The counter operates in the coincidence mode, i.e. the output signals are enabled for the programmed duration when the selected preset value is reached.

Prescaler Output PSC-out:

The Prescaler output is an application output.

With each increase of the counter reading the number of output pulses corresponds to the respective number of increments.

The pulse length of the prescaler output corresponds to a frequency of 500 Hz.

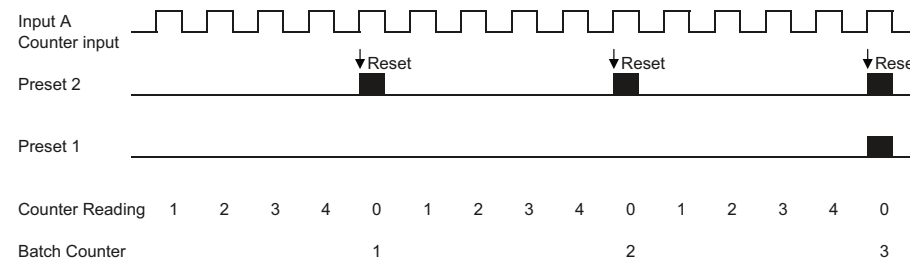
When using the prescaler output the max. input frequency is:

$$F_{max} = 500 / PSC.$$

So it is possible that the maximum input frequency can not be reached.

9.2 Signal Diagrams - Inputs and Outputs

Unidirectional count (F1 = C G r), Batch counter (F19 = bAtch),
Preset 2 (Main Preset = 5, Preset 1 (Batch Preset) = 3



9.3 Programming the Batch Counter Function Codes

Programming mode	Change function setting	Save and change to next function	Return to display mode
Keep pressed and simultaneously turn Voltage On	press	press	press
Alternative display of Function codes		The function codes are displayed as text in row 1. By pressing both keys simultaneously you can change to the numerical display (F 0 to F 35). After pressing these keys once again the number of the selectable options will be displayed in addition. This setting will be stored.	

Batch Counter

Function code F0, Display Row 1: F0E5EE

Function No. Display Row 2

Factory Setting (Defaults)	0*	8888n8	No function
	1	8884E5	All function codes are set to the values marked with *

Function code F1, Display Row 1: F1C0UNE8

Counter Mode of Operation

		Input A	Input B	Input C
0*	C00FF8	Count Input	Gate	Reset
1	C8dFF8	Count Input	Directional input	Reset
2	C8d008	Count Input	Directional input	Gate
3	A85FF8	Adding	Subtracting	Reset
4	A85008	Adding	Subtracting	Gate
5	A8AFF8	Adding	Adding	Reset
6	90A8FF	Channel A	Channel B	Reset
7	90A800	Channel A	Channel B	Gate

Batch Counter

Function code F2, Display Row 1: F20A8888

Edge Evaluation	0*	888881	Single evaluation
Quadrat. Evaluation	1	888882	Double evaluation
	2	888884	Quadruple evaluation

Function code F3, Display Row 1: F3NPL000

PNP/NPN-Logic	0	NPN8H8	NPN 8 V-Level
	1*	PNP8H8	PNP 8 V-Level
	2	NPN8L8	NPN TTL-Level
	3	PNP8L8	PNP TTL-Level

Function code F4, Display Row 1: F4n8AE8

Input damping (Attenuat)	0	L88FF9	30 Hz damping (e.g. for mechanical contacts)
	1*	H88FF9	F max. (see chapter 4 and 10)

Batch Counter

Function code F5, Display Row 1: 558000

Set / Re- set- Mode	0*	558000	Reset to 0
	1	558000	Automatic reset to 0 when Preset value 2 is reached
	2	558002	Sets to Preset value 2
	3	558002	Automatic set to Preset 2 after reaching 0

Function code F6, Display Row 1: 555555

Dynamic/ static Reset	0*	555555	Static Reset (reset as long signal is applied)
	1	555555	Dynamic Reset (ready to count after reset, even if reset signal is applied for a longer time)

Function code F9, Display Row 1: 000510

Output signal	0*	000510	Active On
	1	000510	Active Off

Batch Counter

Function code F10, Display Row 1: 510000

Signal time P 0	0	510000	Disabled / no output signal
	1	510000	Bistable; reset with Preset 2 or Reset
	2	510002	0,02 s
	3	510005	0,05 s
	4*	510010	0,10 s
	5	510020	0,20 s
	6	510050	0,50 s
	7	510100	1,00 s
	8	510200	2,00 s
	9	510500	5,00 s
	10	5101000	10,00 s
	11	510000	User-setting 1 (0-599,99 s)
	12	510002	User-setting 2 (0-599,99 s)
	13	510003	User-setting 3 (0-599,99 s)

Batch Counter

Function code F11, Display Row 1: 5108E1

Signal time P 1	0	885862	Disabled / no output signal
Batch-Preset	1	685E86	Bistable; reset with Reset
	2	888002	0,02 s
	3	888005	0,05 s
	4*	888010	0,10 s
	5	888020	0,20 s
	6	888050	0,50 s
	7	888100	1,00 s
	8	888200	2,00 s
	9	888500	5,00 s
	10	8881000	10,00 s
	11	05E081	User-setting 1 (0-599,99 s)
	12	05E082	User-setting 2 (0-599,99 s)
	13	05E083	User-setting 3 (0-599,99 s)






Batch Counter

Function code F12, Display Row 1: 5108E2






Signal time P 2	0	885862	Disabled / no output signal
	1	685E86	Bistable; reset with Reset Cannot be used in connection with automatic Reset
	2	888002	0,02 s
	3	888005	0,05 s
	4*	888010	0,10 s
	5	888020	0,20 s
	6	888050	0,50 s
	7	888100	1,00 s
	8	888200	2,00 s
	9	888500	5,00 s
	10	8881000	10,00 s
	11	05E081	User-setting 1 (0-599,99 s)
	12	05E082	User-setting 2 (0-599,99 s)
	13	05E083	User-setting 3 (0-599,99 s)

Batch Counter

Function code F13, Display Row 1: 






Decimal point	0*		No decimal point
	1		1 decimal place
	2		2 decimal places
	3		3 decimal places
	4		4 decimal places

Function code F14, Display Row 1: 




Display flashes	0*		No flashing
	1		Flashes as long as P 0 is active
	2		Flashes as long as P 1 is active
	3		Flashes as long as P 2 is active
	4		Flashes as long as one Preset is active

Batch Counter

Function code F15, Display Row 1: 

Display in 2nd row	0		Preset 0
	1		Preset 1
	2*		Preset 2
	3		Prescaler
	4		Batch counter or 2nd counter

Function code F16, Display Row 1: 

External Reset signal	0		Only resets the counter
	1		Only resets the batch counter
	2*		Resets all counters

Batch Counter

Function code F17, Display Row 1: P0000000

Power On Reset	0*	00000000	Restores the counter value
	1	00000000	Reset at Power On

Function code F18, Display Row 1: 00000000

Output signal-Memory	0	00000000	Restart signal time after power fail ⚠ output switches
	1*	00000000	Do not restart signal time after power fail

Function code F19, Display Row 1: 00000000

Batch-Counter or 2nd totalizer	0*	00000000	Batch counter
	1	00000000	2nd totalizer

Function code F22, Display Row 1: 00000000

Application input/output	0	00000000	Prescaler output
	1	00000000	Output Preset 0

Batch Counter

2	00000000	Directional count output
3*	00000000	Count input, adding
4	00000000	Count input, subtracting
5	00000000	Reset counter and Batch counter or 2nd totalizer
6	00000000	Resets only counter
7	00000000	Resets only Batch counter or 2nd totalizer
8	00000000	Gate input
9	00000000	Keylock input
10	00000000	Hold input (display memory)
11	00000000	Teach input Count value becomes P 2
12	00000000	Set-input (sets to Preset 0)

Batch Counter



Should you have a counter with interface, the additional function codes F24 – F27 are described in the separate manual for the interface version.

Function code F30, Display Row 1: **E5000**

Lock Re-set key	0*	00000	Keyboard reset enabled
	1	00000	Keyboard reset locked / delayed

Function code F31, Display Row 1: **P00000**

Lock Preset 0 Setting	0*	00000	P 0 Setting enabled
	1	00000	P 0 Setting locked / delayed

Function code F32, Display Row 1: **P10000**

Lock Preset 1 Setting	0*	00000	P 1 Setting enabled
	1	00000	P 1 Setting locked / delayed

Batch Counter

Function code F33, Display Row 1: **P20000**

Lock Preset 2 Setting	0*	00000	P 2 Setting enabled
	1	00000	P 2 Setting locked / delayed

Function code F34, Display Row 1: **P50000**

Lock Prescaler Setting	0*	00000	PSC Setting enabled
	1	00000	PSC Setting locked / delayed

Function code F35, Display Row 1: **000000**

Lock Mode	0*	100500	10 seconds delay
	1	000000	Completely locked
	2	100000	Lock mode depends on Keylock input


Technical Data

10 Technical Data

General

Display	LCD reflective, Transflective positiv: black figures on back lighted ground Transmissive negativ: white, red or green figures on black ground 2 lines, counter reading/presettings 6-digits; decimal point (up to 4 decimals)
Digit height	1st line 9.3 mm; 2nd line 7.2 mm
View angle	12 o'clock
Supply voltage	SELV: 12-30 VDC; protected against polarity reversal SELV: 24 VAC, 50/60 Hz, $\pm 10\%$ 115 VAC; 230 VAC, 50/60 Hz, $\pm 10\%$ 100-240 VAC; 50/60 Hz, $\pm 10\%$
Current consumption	12 ... 30 VDC < 200 mA, 12 - 30 VDC with backlight < 250 mA incl. sensor supply 24 VAC < 250 mA; including sensor supply 115/230 VAC < 50 mA; incl. sensor supply 100 - 240 VAC < 80 mA at 90 VAC; incl. sensor supply
Power consumption	< 5 W < 8 W switching power supply
Duty cycle	100%
Overload protection	external fuse DC: 0,16 AT (IEC 127); DC: 0,2 AT (UL 198) 24 VAC: 315 mA; 230 VAC: 32 mA; 115 VAC: 63 mA 100 - 240 VAC G-safety insert 630 mA/250V
Overload protection Relay output	external fuse 230 V, 2,5 A mT
Sensor supply	24/115/230 VAC AC-operation: 12-24 VDC (load dependent), max. 50 mA 90-260 VAC (switching power supply) AC-operation: 24VDC/-5%, max. 115 mA max. capacitive load = 470 μ F

Technical Data

Storage of values	NV-memory > 10 years
Electrical connections	Plug-in screw-type connections / Terminals
Cable cross-section	1...1.5 mm ² with wire-end sleeves
Amplitude threshold	< 2 V and > 8 V or < 1 V and > 4 V at TTL-level amplitude max. 40 VDC
Active edge	programmable positive for PNP-input, negativ for NPN-input
Input resistance	approx. 10 kOhm
Count frequency	max. 60 kHz (TTL 20 kHz): single-channel counting max. 60 kHz (TTL 20 kHz): Different. counting and totalizing channel (A+B together) max. 30 kHz (TTL 20 kHz): phase discriminator single or double evaluation max. 15 kHz (TTL 15 kHz): phase discriminator, quadruple evaluation
	 damped (attenuated) 30 Hz -> <i>Please pay attention to graphics on page 117</i>
Pulse form	any desired form (at max. frequency square 1:1)
Pulse duration min	17 ms (30 Hz); 8 μ s (60 kHz)
Prescaler	0,0001 - 99,9999
Reset	manual reset via keyboard external reset static or dynamic programmable pulse length min. 5 ms, automatic reset after reaching Preset 2, (No pulse losses at max. counter frequency due to automatic reset function). via application input (programmable) and programmable Power-On Reset
Set function	Setting to Preset 0 (independent of reset)
Display and Preset Range	- 999 999 up to + 999 999

Technical Data

Warning signal	Display flashes when preset 0, 1 or 2 are active
Signal times	0,01 s to 599,99 s or bistable programmable tolerance + 10ms active On or Off
Relay Output for P 1 and P 2	Change-over contact max. 250 VAC / 30 VDC / 5 A Change-over contact min. 5 VAC / 5 VDC / 10 mA delay < 10 ms
Transistor Output for P 1 and P 2	PNP-output 12 - 30 VDC max. 50 mA at DC-supply 12 - 24 VDC max. 30 mA at AC-supply (24/115/230 VAC) 24 VDC, max 50 mA at AC-supply with switching power supply
Application Output	PNP-output 12 - 30 VDC max. 20 mA at DC supply 12 - 24 VDC max. 20 mA at AC supply (24/115/230 VAC) 24 VDC max. 20 mA at AC-supply with switching power supply



**Only for trafo-power-supply:
Current load of the outputs (Sensor 12-24 VDC, Out 1, Out 2, Application-Output) is not allowed to exceed 65 mA in sum.**

Counter

Counter mode of operation Input A,B	Unidirectional; adding or subtracting; directional input; Differential operation, add / sub; Summation (Totalizing) add / add; Phase discriminator single, double or quadruple evaluation
Control Input	Reset; Gate
Preselect Mode	Absolute or trail, Range signal /limit values (sign. 1 < P1, sign. 2 > P 2)
Application In-put/Output	Output: Prescaler-out, Preset 0-out, Direction-out Input: addtl. counter input add / sub, Reset, Set, Gate, Keylock, Hold, Teach in

Technical Data

Batch Counter

Mode	Batch counter with Preset or 2nd totalizer with Preset
------	--

Shift Counter

Counter Mode of Operation	Differential counting add/sub, totalizing add/add
---------------------------	---

Tachometer

Measuring Principle	Period (cycle) measurement (1/Tau)
Time base	1/min or 1/s
Min. frequency	1 Hz or 0,1 Hz
Limit values pression	2 alarms with programmable startup sup +1 additional upper limit value on the application output
Tachometer mode of operation	Unidirectional add oder sub; directional input;Differential add / sub; totalizing add / add; Phase discriminator single, double or quadruple evaluation, A / B or (A-B) / A %
Application Input/Output	Output: Preselect 0-out, Direction-out Input: addtl. counter input add / sub, Keylock, Hold, Teach in
Accuracy of the tachometer function	Time base: ± 30 ppm Measuring principle: Periodic measurement Measuring time: min. 0,5s / max. 1s oder 10s Measuring resolution: 0,4µs(<30 ppm) Display resolution: 4 decimal places, 1 Digit = 100 ppm
Overall tolerance	= Shown resolution + tolerance of timebase = 130 ppm

Technical Data

Timer

Measuring Principle	Pulse-width or cycle duration measurement Start Inp. A + Stop Inp. B; Start/Stop key
Time base	Programmable in sec, min, h or hh.mm.ss
Resolution	1; 0,1; 0,01; 0,001; 0,0001
Function	Single-pulse or cumulative measurement
Application In-put/Output	Output: Preselect 0-out Input: addlt. Run, Stop, Reset, Set, Keylock, Hold, Teach in
Accuracy of the timer	Time base: ± 30 ppm Start / Stop-point in time: 16 μ s / 16 ms (not damped / damped) Resolution: 100 μ s = 100 ppm
Overall tolerance	= Shown resolution + tolerance of timebase = 130 ppm

Environmental conditions / Safety Rules

General design	EN 61010-1 / IEC 61010-1
Protection Class	II; EN 61010-1 / IEC 61010-1
Pollution degree	V 2, EN 50178
EMC - Interference immunity	EN 61326-1 industrial environment *
EMC - Emission	EN 61326-1 Class B *
Ambient temperature	0°... 50°C EN 60 068-2-1/2 0°... 45°C with block assembly 0°... 50°C in single row assembly
Storage temperature	- 20°... + 65°C EN 60 068-2-1/2
Climate	40°C / 93% rel hum. class 4K4H, EN 60 068-2-78 25 - 50°C / 93% rel hum., cyclic, EN 60 068-2-38

Technical Data

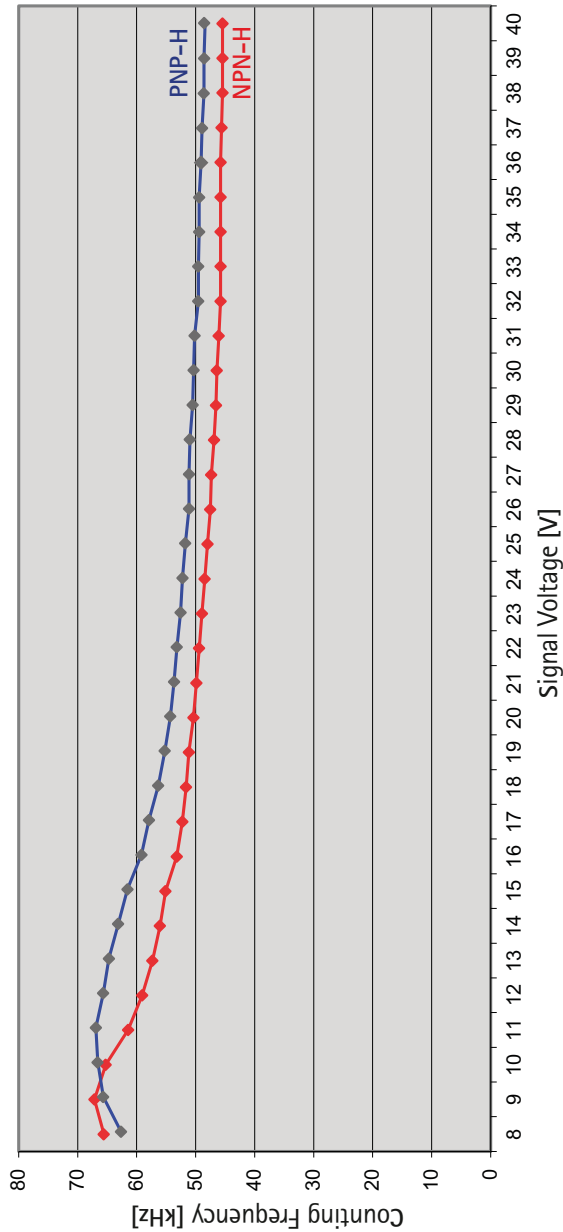
Degree of protection	IP 65 front side; EN 60529 IP 20 terminals
Vibration resistance	10 m/s ² (10 ... 150 Hz); EN 60 068-2-6
Shock resistance	100 m/s ² (18 ms); EN 60 068-2-27
Resistance to chemicals	Frontfoil acc. to DIN 42 115-2
Approvals	UL, CSA: E 338588
RoHS	compliant

Mechanical Data

Installation	Front-panel installation with tenter (frame) Front panel thickness max. 11 mm
Dimensions	48 mm x 48 mm x 118 mm, installation depth 110 mm DIN 43700
Front-panel cutout	45 mm x 45 mm + 0,3 mm
Weight	approx. 200 g

* For cable length > 30 m, for connection to a DC-supply-network and input level TTL an additional protection circuit is necessary.

Counting frequency according to signal voltage – Tico 77x



The counting frequencies were determined by using a signal generator with an output resistance of 50 Ω.

11 Transport, Packaging, Storage



Note! Damage may be caused by improper transport! Improper transport may cause considerable damage. Do not remove the packaging before assembly and installation.

The packaging offers ideal protection against mechanical damage and loss of single parts, such as the plugs or operating instructions. Therefore, do not take the multifunctional counter out of its packaging until you actually have to start your assembly and installation work.

Inspect the shipment for completeness and possible signs of transport damage immediately after receipt.

12 Maintenance and cleaning

The multifunctional counter does not require any maintenance.

The front side may be cleaned with commercially available household detergents.

For protection against pollution, a transparent, flexible protection cover is available as accessory (see chapter 17). With this protection cover, the counter display can be read and the buttons can be used.

Malfunctions

13 Malfunctions



Warning!

Danger of injuries due to improper fault correction! Improper fault correction may cause serious damage or personal injury.

The machine/plant manufacturer is responsible for the preparation of operating instructions or a description stating the potential errors and the appropriate corrective action, as well as potential hazards and the behavior in the event of malfunctions. This is dependent on the design concept and construction of the machine or plant.

The first step is to determine if the cause of an error or malfunction implies a possible fault of the multifunction counter.

Overview of Errors

Error	Possible cause	To be corrected by:
Display remains dark	Machine/plant not powered on	Operator
	Defective voltage supply	Qualified electrician
Value is not stored	Power-on reset is active (F17)	Skilled personnel
Counter/tachometer does not count	Defective signal generator; Counter does not receive any counting signals	Skilled personnel
	Adjusted to incorrect mode of operation (F1), Single-channel, directional input, differential counting, phase discriminator	Skilled personnel
	Incorrect adjustment of PNP/NPN logic and input level (F3)	Skilled personnel

Malfunctions

	High-level does not exceed the upper amplitude threshold; low-level does not fall below the lower amplitude threshold	Qualified electrician
	Continuous reset signal is applied	Qualified electrician
	Continuous gate signal is applied	Qualified electrician
Incorrect counting of counter/tachometer	Prescaler value is not correct	Skilled personnel
	Phase discriminator - edge evaluation not correctly adjusted (F2)	Skilled personnel
	Input frequency too high (F4)	Skilled personnel
Keyboard Reset not possible	Keys are locked (F30 + F35)	Skilled personnel
Presetting not possible	Keys are locked (F31, F32, F33 + F35)	Skilled personnel
Prescaler adjustment not possible	Keys are locked (F34+ F35)	Skilled personnel
Signal 0, 1 or 2 not received	Signal deactivated (F10, F11, F12)	Skilled personnel
	User signal time adjusted to 0,000	Skilled personnel

Spare Parts / Dismantling and Disposal

14 Spare Parts



Warning!

Danger due to faulty spare parts!

The use of incorrect or faulty spare parts may cause damage, malfunction or even total breakdown and safety hazards. Therefore, please make sure only to use the original spare parts provided by the manufacturer.

The multifunctional counter may only be opened by the manufacturer. Exclusively outer components are available as spare parts.

The order numbers are given in Chapter 17.

15 Dismantling and Disposal

After reaching the end of its useful life the multifunctional counter has to be disposed of or recycled according to the applicable environmental protection rules.

Ordering Information

16 Ordering Information

Display LCD	Relay	12-30 VDC	24 VAC	115 VAC	230 VAC	100-240 VAC
reflective	1	0 772 101	0 772 111	0 772 121	0 772 131	0 772 141
reflective	2	0 772 102	0 772 112	0 772 122	0 772 132	0 772 142
transflective positive	1	0 772 201	-	-	-	0 772 241
transflective positive	2	0 772 202	-	-	-	0 772 242
transmissive white	1	0 772 301	-	-	-	0 772 341
transmissive white	2	0 772 302	-	-	-	0 772 342
transmissive red	1	0 772 401	-	-	-	0 772 441
transmissive red	2	0 772 402	-	-	-	0 772 442
transmissive green	1	0 772 501	-	-	-	0 772 541
transmissive green	2	0 772 502	-	-	-	0 772 542

Reflective: black figures on bright reflecting background

Transflective positive: black figures on back lighted ground

Transmissive white: white figures on black ground

Transmissive red: red figures on black ground

Transmissive green: green figures on black ground

Accessories

17 Accessories

Adapter front panel

Order no.	Dimensions	Front panel cutout
1 405 675	60 x 75 mm	55 x 55 mm
1 405 676	72 x 72 mm	68 x 68 mm
1 405 679	125 x 60 mm	106 x 55 mm for installation of 2 counters 48 x 48
protection cover	2 772 052	
(tenter) frame	1 721 004	48 x 48 mm

Version: 1 200712 MG1



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Chapter 7:

Controller

- SITOP Siemens
- SIRIUS 3TK2826 Siemens
- S7-300 Siemens
- E+H Level Sensor FTM50
- Diaphragm Valves Filter Cleaning Mecair
- Pilot Valve Filter Cleaning Humphrey
- Festo Valve Unit
- ODE Solenoid Valves
- HBM Load Cells Z6
- HBM Terminal Box VKK2R-8 Ex

SITOP smart 2,5A
SITOP smart 5A
SITOP smart 10A











6EP1332-2BA10 6EP1334-2AA01-0AA0
6EP1333-2BA01 6EP1333-2AA01
6EP1334-2BA01 6EP1334-2AA01

Nr.: C98130-A7559-A1-12-6419

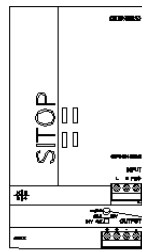
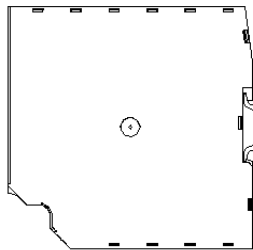
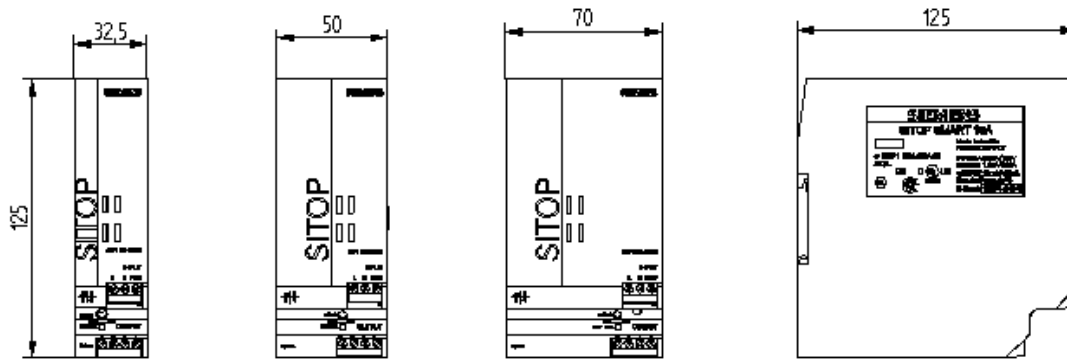


Betriebsanleitung

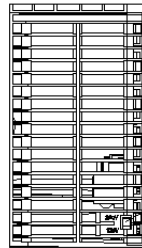
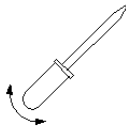
Operating instructions
Instructions d'utilisation
Istruzione per l'uso
Instrucciones de uso

 	<p><u>Warnhinweise / Gefahr durch elektrischen Schlag:</u> Beim Betrieb elektrischer Geräte stehen zwangsläufig bestimmte Teile dieser Geräte unter gefährlicher Spannung. Unsachgemäßer Umgang mit diesen Geräten kann deshalb zu Tod oder schweren Körperverletzungen sowie zu erheblichen Sachschäden führen. Nur entsprechend qualifiziertes Fachpersonal darf an diesem Gerät oder in dessen Nähe arbeiten. Der einwandfreie und sichere Betrieb dieses Gerätes setzt sachgemäßen Transport, fachgerechte Lagerung, Aufstellung und Montage voraus. Die Betätigung des Potentiometers ist nur mittels isoliertem Schraubendreher nach DIN 7437 zulässig, da unbeabsichtigt im Inneren des Gerätes Teile mit gefährlicher elektrischer Spannung berührt werden können. Elektrostatisch gefährdete Bauelemente (EGB). Nur geschultes Personal darf das Gerät öffnen!</p>
 	<p><u>Warning / Danger of electric shock:</u> Hazardous voltages are present in this electrical equipment during operation. Failure to properly maintain the equipment can result in death, severe personal injury or substantial property damage. Only qualified personnel is allowed to work on or around this equipment. The successful and safe operation of this equipment is dependent on proper handling, installation and operation. Potentiometer is only allowed to be actuated using an insulated screwdriver to DIN 7437, because accidental contact may be made with parts inside the equipment carrying dangerous electrical voltage. Electrostatically sensitive device (ESD). The device may only be opened by qualified personnel.</p>
 	<p><u>Marques d'avertissement / Danger décharge électrique:</u> Le fonctionnement d'un équipement électrique implique nécessairement la présence des tensions dangereuses sur certaines de ces parties. Toute utilisation et/ou intervention contraires aux règles de l'art peuvent donc conduire à la mort, à des lésions corporelles graves ou à des dommages matériels importants. Seulement des personnes qualifiées doivent travailler sur cet appareil ou dans son voisinage. Le fonctionnement correct et sûr de cet équipement présuppose un transport, un stockage, une installation et un montage conformes aux règles de l'art. L'actionnement du potentiomètre n'est autorisé qu'avec un tournevis isolé (DIN 7437) en raison du risque de contact accidentel avec des pièces sous tension dangereuse à l'intérieur de l'appareil. Composants sensibles aux décharges électrostatiques (DES). L'appareil ne doit être ouvert que par du personnel initié.</p>
 	<p><u>Pericolo / Pericolo di scossa elettrica:</u> Durante il funzionamento, alcune parti degli apparecchi elettrici si trovano inevitabilmente sotto tensione pericolosa. L'uso inappropriato di questi apparecchi può quindi causare la morte, gravi lesioni alle persone e ingenti danni materiali. Interventi sull'apparecchio o nelle sue vicinanze vanno eseguiti solo da personale qualificato. Premesse per un funzionamento corretto e sicuro dell'apparecchio sono trasporto, magazzinaggio, installazione e montaggio accurati. Per mettere in funzione il potenziometro va usato esclusivamente un cacciavite isolato sec. DIN 7437 in quanto all'interno dell'apparecchio possono verificarsi contatti accidentali con parti sotto tensione pericolosa. Componenti sensibili alle scariche elettrostatiche (ESD). L'apparecchio deve essere aperto solo da personale qualificato.</p>
 	<p><u>Instrucciones preventivas / Peligro por descarga eléctrica:</u> Durante el funcionamiento de los equipos eléctricos, determinadas partes de los mismos se encuentran forzosamente con tensión peligrosa. Por ello, cualquier manipulación incorrecta en ellos puede provocar la muerte o lesiones graves así como daños materiales considerables. En este equipo o en sus proximidades solo deberá trabajar personal adecuadamente calificado. El funcionamiento perfecto y seguro de este equipo presupone que haya sido transportado, almacenado, instalado y montado correctamente. Solo se permite ajustar el potenciómetro usando un destornillador aislado conforme a DIN 7437, ya que si no hay peligro de tocar accidentalmente piezas sometidas a tensión peligrosa situadas en el interior del aparato. Componentes sensibles a las cargas electroestáticas (ESD). Este equipo sólo debe ser abierto por personal calificado.</p>

Maßbild/ Montagehinweis
 Dimensional drawing/ Installation note
 Dimensions / montage
 Disegno Quotato / Indicazioni di montaggio
 Dimensiones / Indicaciones de montaje



Einstellbarkeit U_A
 Adjustment
 Réglage
 Regolazione
 Ajuste



Spannungsumschalter - Auslieferungszustand 230 V
 Voltage Selector - As delivered 230 V
 Commutateur de choix de tension - Réglage à la livraison 230 V
 Selettore di tensionamento - Al momento della fornitura 230 V
 Selector de la tensión - Ajuste de fábrica 230 V

Klemmen Terminals Bornes Morsetti Borne	Funktion Function Fonction Funzione Función	Anschlusswert Connected load Section Val. allacc. Sección	Bemerkung Remarks Observations Annotazione Observaciones
L1, N	Eingangsspannung AC 120/230 V Input voltage 120/230 V AC Tension d'entrée 120/230 V ca Tensione di ingresso AC 120/230 V Tensión de entrada 120/230 V AC	0,5...2,5 mm ² 22...12 AWG Kupferleitungen zugelassen für 65/75 °C	Schraubklemmen: Verwenden Sie einen Schraubendreher mit 3,5 mm Klingenbreite empfohlenes Anzugsmoment 0,5-0,7 Nm Screw-type terminals: Use a screwdriver with a blade width of 3.5 mm (0.14 in.) Recommended tightening torque 0.5 to 0.7 Nm (4.5 to 6.2 lb.in.)
PE	Schutzleiter Protective earth conductor Conducteur de protection Conduttore di protezione Conductor de protección	Copper wire rated 65/75 °C Conduites en cuivre agréé 65/75 °C	Bornes à vis: Utiliser un tournevis avec lame de 3,5 mm de large Couple de serrage recommandé 0,5-0,7 Nm Morsetti a vite: Impiegare un cacciavite con tagliente di 3,5 mm Coppia di serraggio consigliata 0,5-0,7 Nm
+, -	Ausgangsspannung DC 24 V Output voltage 24 V DC Tension de sortie 24 V cc Tensione di uscita DC 24 V Tensión de salida 24 V DC	utilizzare cavi certificato per 65/75 °C utilizar cable certificado para 65/75 °C	Bornes de tornillo: Usar un destornillador con hoja de 3,5 mm de ancho Par de apriete recomendado 0,5-0,7 Nm

	24 V/2,5 A	24 V/ 5 A	24 V/10 A
Gewicht ca. / Weight approx / Poids env. / Peso ca. / Peso aprox.	0,32 kg (0.71 lb)	0,5 kg (1.1 lb)	0,8 kg / 0,75 kg (1.76 lb / 1.65 lb)

Montagehinweise:

Das Gerät ist zwecks ordnungsgemäßer Entwärmung vertikal so zu montieren, dass die Eingangsklemmen und die Ausgangsklemmen unten sind. Unterhalb und oberhalb des Gerätes soll mindestens ein Freiraum von je 50 mm eingehalten werden. Der Anschluss der Versorgungsspannung (AC 120/230 V) muss gemäß IEC 60364 und EN 50178 ausgeführt werden. Eine Schutzeinrichtung (Sicherung) und Trenneinrichtung zum Freischalten der Stromversorgung muss vorgesehen werden.

Bei Ex - Anwendungen muss sichergestellt werden, dass nach Installation die Schutzart IP 54 erreicht wird.

⚠ Gefahr:

Vor Beginn der Installations- oder Instandhaltungsarbeiten ist der Hauptschalter der Anlage auszuschalten und gegen Wiedereinschalten zu sichern. Bei Nichtbeachtung kann das Berühren spannungsführender Teile Tod oder schwere Körperverletzung zur Folge haben.

Beschreibung und Aufbau:

Die SITOP-Stromversorgungen 24 V/2,5 A, 5 A, 10 A sind Einbaugeräte. Für die Installation der Geräte sind die einschlägigen DIN/VDE-Bestimmungen oder länderspezifischen Vorschriften zu beachten.

Primär getaktete Stromversorgungen zur Montage auf Normprofilschiene DIN EN 50022-35x15/7,5.

Zum Anschluss mit fester Verdrahtung an 1-phasiges Wechselstromnetz oder an 2 Außenleitern von Drehstromnetzen (TN-, TT- oder IT-Netz nach VDE 0100 T 300 / IEC 364-3) mit Nennspannungen 120/230 V, 50/60 Hz. Bei Betrieb an 2 Außenleiterspannungen ist eine geeignete Absicherung bei Klemme N notwendig.

Ausgangsspannung DC +24 V potentialfrei, kurzschluss- und leerlauffest.

Parallelschaltung von zwei gleichartigen Geräten zur Leistungserhöhung ist zulässig (Bedingung: Die Differenz der Ausgangsspannungen sollte < 0,2 % sein und die Leitungsimpedanzen zur Last sollten gleich sein).

Technische Daten:

Alle Angaben gelten, sofern nicht anders angegeben, bei Eingangsspannung AC 230 V und Umgebungstemp. +25 °C. Technische Änderungen jederzeit vorbehalten.

Typ:	24 V/2,5 A	24 V/5 A	24 V/5 A	24 V/10 A	24 V/10 A
Bestellnummer:	6EP1332-2BA10	6EP1333-2BA01	6EP1333-2AA01	6EP1334-2BA01	6EP1334-2AA01
Eingangsdaten:					
Eingangsnennspannung U _e :	AC 120/230 V				
Arbeitsspannungsbereich:	AC 85-132/170-264 V				
Netzfrequenzbereich:	47...63 Hz				
Netzausfallüberbrückung:	> 20 ms				
Eingangsnennstrom I _e :	1,1/0,65 A	2,1/1,15 A		4,1/2 A	4,1/2,4 A
Absicherung in der Netzzuleitung empfohlen (IEC 898):	3 A Char. C	6 A Char. C		10 A Char. C	
Ausgangsdaten:					
Ausgangsnennspannung U _a :	DC 24 V				
Restwelligkeit/Spikes:	< 150/240 mV _{ss}				
Einstellbereich:	DC 22,8...28 V				
Ausgangsnennstrom I _a :	2,5 A	5 A		10 A	
- Bereich bis 60 °C bei ≤ DC 24 V	0...I _a				
- Bereich bis 50 °C bei > DC 24 V	0...I _a				
- Bereich bis 45 °C bei ≤ DC 24 V	0...1,2xI _a				
- Bereich bis 35 °C bei > DC 24 V	0...1,2xI _a				
Einsatzpunkt Strombegrenzung:	typ. 3,3 A	typ. 6,5 A		typ. 13 A	
Dynamische Strombegrenzung:	3,75 A/5 sec	7,5 A/5 sec		15 A/5 sec	
Wirkungsgrad bei Volllast:	typ. 84 %	typ. 87 %	typ. 87 %	typ. 91 %	typ. 90 %
Umgebungsbedingungen:					
Lager-, Transporttemperatur:	-40 °C...+85 °C				
Umgebungstemperatur/Betrieb:	0 °C...+60 °C				
Schutzart:	IP 20				
Verschmutzungsgrad:	2				
Feuchtekategorie:	Klimaklasse 3K3 nach EN 60721, relative Luftfeuchtigkeit 5...95 %, ohne Betauung				
EMV Störaussendung:	EN 61000-6-3	EN 61000-6-3	EN 61000-6-4	EN 61000-6-3	EN 61000-6-4
EN 55022:	Klasse B				
EMV Störfestigkeit:	EN 61000-6-2, EN 61000-4-2/-3/-4/-5/-6/-11				
Sicherheit:					
Schutzklasse:	I				
Potentialtrennung primär/sekundär:	Ausgangsspannung SELV nach EN 60950 und EN 50178, Trafo nach EN 61558-2-17, Überspannungsschutz im Falle eines internen Fehlers U _a < 33 V (ab Version 2)				
Zulassungen:					
CE	CE-Konformität gemäß 2004/108 EWG und 2006/95 EWG				
UL/CSA	UL 508 (Listed, File E197259), CSA C22.2 No 14, No 60950-1-03				
Schiffbau	Germanischer Lloyd				
Directive 94/9/EG	Konformitätsaussage nach EN 60079-15: ATEX94/9/EC Kat.3;Eex, nA, II, T4 U				
C-Tick	AS/NZS 2064:1997				

Installation and assembling:

To ensure adequate cooling, the device must be installed vertically, with the input and output terminals at the bottom. Be sure to leave a minimum free space of 50 mm (2 in.) above and below the device. The supply voltage (120/230 V AC) must be connected in accordance with IEC 60364 and EN 50178. A protective device (fuse) and an insulating device for disconnecting the power supply must be provided.

In Ex - applications must be guaranteed that installation is according to protection class IP 54.

⚠ Danger:

The mains switch has to be switched off and prevented from being switched on again before installation or maintenance. If these rules are not adhered to, contact with live parts or improper use can result in death or severe personal injury.

Description and construction:

The SITOP 24 V/2.5 A, 5 A, 10 A power supplies are rail-mounted built-in units. The relevant DIN/VDE regulations or equivalent local regulations must be observed during installation.

Primary switched-mode power supply for mounting on a DIN EN 50022-35x15/7.5 standard.

For connection with firm wiring to single-phase AC system or to 2 phases of three-phase systems (TN, TT or IT systems in accordance with VDE 0100 T 300 / IEC 364-3) with rated voltages 120 V/230V, 50/60Hz. For operation with phase-to-phase voltage a suitable fuse protection must be provided at terminal N.

Output voltage +24 V DC, potential-free, protected against short-circuit and open-circuit conditions.

Parallel connection of two similar devices to increase the power is permitted (provided the difference of the output voltages is < 0,2 % and the line impedances are equal to the load).

Technical specifications:

Specifications valid for input voltage 230 V AC and ambient temperature +25 °C, unless otherwise stated. They are subject to change without prior notice.

Type:	24 V/2.5 A	24 V/5 A	24 V/5 A	24 V/10 A	24 V/10 A
Order no.:	6EP1332-2BA10	6EP1333-2BA01	6EP1333-2AA01	6EP1334-2BA01	6EP1334-2AA01
Input:					
Rated voltage V_{in} :	120/230 V AC				
Voltage range:	85-132/170-264 V AC				
Line frequency range:	47...63 Hz				
Mains buffering:	> 20 ms				
Rated current I_{in} :	1.1/0.65 A	2.1/1.15 A		4.1/2 A	4.1/2.4 A
Protection in the mains supply line:	3 A Char. C	6 A Char. C		10 A Char. C	
Output:					
Rated voltage V_{out} :	24 V DC				
Residual ripple/spikes:	< 150/240 mV _{pp}				
Setting range:	22,8...28 V DC				
Rated current I_{out} :	2.5 A	5 A		10 A	
- range up to 60 °C at ≤ 24 V DC	0... I_{out}				
- range up to 50 °C at > 24 V DC	0... I_{out}				
- range up to 45 °C at ≤ 24 V DC	0...1.2x I_{out}				
- range up to 35 °C at > 24 V DC	0...1.2x I_{out}				
Current limitation:	typ. 3.3 A	typ. 6.5 A		typ. 13 A	
Dynamic current limitation:	3.75 A/5 sec	7.5 A/5 sec		15 A/5 sec	
Efficiency at full load:	typ. 84 %	typ. 87 %	typ. 87 %	typ. 91 %	typ. 90 %
Environmental conditions:					
Transportation and storage temperature:	-40 °C...+85 °C				
Ambient temperature during operation:	0 °C...+60 °C				
Degree of protection:	IP 20				
Pollution degree environment:	2				
Humidity rating:	Climate category 3K3 acc. to EN 60721, relative air humidity 5...95 %, without condensation				
EMC interference emission:	EN 61000-6-3	EN 61000-6-3	EN 61000-6-4	EN 61000-6-3	EN 61000-6-4
EN 55022:	Class B				
EMC interference immunity:	EN 61000-6-2, EN 61000-4-2/-3/-4/-5/-6/-11				
Safety:					
Protection class:	I				
Galvanic insulation primary/secondary:	SELV output voltage acc. to EN 60950 and EN 50178, Transformer corresponds EN 61558-2-17, Protection against overvoltage at internal failure: V_{out} < 33 V (from Version 2)				
Certificates:					
CE	CE marking acc. to 2004/108 EEC and 2006/95 EEC				
UL/CSA	UL 508 (Listed, File E197259), CSA C22.2 No 14, No 60950-1-03				
Approval for Shipbuilding	Germanischer Lloyd				
Directive 94/9/EC	Conformity statement EN 60079-15: ATEX94/9/EC Kat.3;Eex, nA, II, T4 U				
C-Tick	AS/NZS 2064:1997				

Montage:

Pour un refroidissement conforme aux règles l'appareil doit être monté verticalement d'une telle façon que les bornes d'entrée et les bornes de sortie se trouvent en bas. Au-dessous et au-dessus de l'appareil on doit observer un espacement d'au moins 50 mm. Le raccordement de la tension d'alimentation (120/230 V ca) doit être réalisé conformément à IEC 60364 et EN 50178. Un dispositif de protection (fusible) et un dispositif de sectionnement permettant la mise hors tension doivent être prévus.

Dans des applications « Ex » il doit être assuré que l'installation soit selon IP54.

⚠ Attention:

Avant le début des travaux d'installation ou de maintenance, le disjoncteur principal doit être ouvert et assuré contre toute reffermeture intempestive. Le non-respect des consignes de sécurité peut avoir pour conséquence un contact avec une des parties sous tension et conduire à la mort ou à des lésions corporelles graves.

Description et constitution:

Les alimentations SITOP 24 V/2,5 A; 5 A; 10 A sont des appareils encastrables. L'installation de ces appareils doit se faire en conformité avec les normes et réglementations nationales. Alimentation à découpage pour l'encliquetage sur profilé chapeau normalisé EN 50022-35x15/7,5. Il s'agit d'un bloc d'alimentation avec cablage fixe d'entrée pour raccordement à un réseau monophasé ou sur 2 phases d'un réseau triphasé (schéma TN, TT ou IT selon CEI 364-3) de tension nominale 120 V/230 V, 50/60 Hz. Lorsque l'appareil est raccordé entre deux phases, le neutre doit être protégé de manière appropriée.

Tension de sortie +24 V cc, libre de potentiel, tenue aux courts-circuits et au fonctionnement à vide.

Un montage en parallèle de deux dispositifs du même type en vue d'augmentation de la performance est admissible (Condition: que la différence entre les tensions de sortie < 0,2 % et des impédances de ligne par rapport à la charge soit pareille).

Données techniques: Toutes les indications sont valables pour une tension d'entrée 230 V ca et température d'ambiance +25 °C sinon, il sera indiqué! Modifications techniques réservées!

Type:	24 V/2,5 A	24 V/5 A	24 V/5 A	24 V/10 A	24 V/10 A
Numéro de référence:	6EP1332-2BA10	6EP1333-2BA01	6EP1333-2AA01	6EP1334-2BA01	6EP1334-2AA01
Données d'entré:					
Tension nominale U_e :	120/230 V ca				
Gamme de tension :	85-132/170-264 V ca				
Gamme de fréquence de secteur:	47...63 Hz				
Temps de maintien:	> 20 ms				
Courant nominal I_e :	1,1/0,65 A	2,1/1,15 A		4,1/2 A	4,1/2,4 A
Protection de ligne de secteur:	3 A carac. C	6 A carac. C		10 A carac. C	
Données de sortie:					
Tension nominale U_a :	24 V cc				
Ondul. résiduelle / Pics de connex.	< 150/240 mV _{càc}				
Gamme de réglage:	22,8...28 V cc				
Courant nominal I_a :	2,5 A	5 A		10 A	
- jusqu'à 60 °C à \leq 24 V cc	0... I_a				
- jusqu'à 50 °C à $>$ 24 V cc	0... I_a				
- jusqu'à 45 °C à \leq 24 V cc	0...1,2 $\times I_a$				
- jusqu'à 35 °C à $>$ 24 V cc	0...1,2 $\times I_a$				
Protection de surcharge:	typ. 3,3 A	typ. 6,5 A		typ. 13 A	
Dynamique prot. de surcharge:	3,75 A/5 sec	7,5 A/5 sec		15 A/5 sec	
Rendement pleine charge:	typ. 84 %	typ. 87 %	typ. 87 %	typ. 91 %	typ. 90 %
Conditions ambiantes:					
Temp. de stockage et transport:	-40 °C...+85 °C				
Temp. ambiante en opération:	0 °C...+60 °C				
Degré de protection:	IP 20				
Degré de pollution:	2				
Classe d'humidité:	Classe climatique 3K3 selon EN 60721, humidité atmosphérique relative 5%...95 %, sans condensation				
Emission d'interférences:	EN 61000-6-3	EN 61000-6-3	EN 61000-6-4	EN 61000-6-3	EN 61000-6-4
EN 55022:	Classe B				
Résist. aux interférences:	EN 61000-6-2, EN 61000-4-2/-3/-4/-5/-6/-11				
Sécurité:					
Classe de protection:	I				
Coupage de puissance primaire/secondaire:	tension de sortie SELV selon EN 60950 et EN 50178, Transformateur correspond à EN 61558-2-17, Protection contre surtension à un défaut interne: $U_a < 33$ V (à partir de la version 2)				
Certificats:					
CE	conformité CE selon 2004/108 CEE et 2006/95 CEE				
UL/CSA	référéncé UL 508 (Listed, File E197259), CSA C22.2 No 14, No 60950-1-03				
Homologation pour navires	Germanischer Lloyd				
Directive 94/9/CE	Déclaration de conformité EN 60079-15: ATEX94/9/EC Kat.3;Eex, nA, II, T4 U				
C-Tick	AS/NZS 2064:1997				

Montaggio:

Per garantire la dissipazione del calore montare l'apparecchio verticalmente in modo che i morsetti d'ingresso e di uscita siano sul lato inferiore dell'apparecchio. Al di sotto e al di sopra dell'apparecchio dev'essere osservato uno spazio libero di almeno 50 mm. Il collegamento della tensione di alimentazione (AC 120/230 V) deve essere eseguito secondo IEC 60364 e EN 50178. Devono essere previsti un dispositivo di protezione (fusibile) e un dispositivo per isolare l'alimentatore.

Nelle applicazioni « Ex » dev'essere assicurato che l'installazione sia secondo IP54.

⚠ Attenzione:

Prima di iniziare lavori di installazione o di manutenzione disinserire l'interruttore principale e assicurarsi che non sia possibile una reinserzione. La mancata osservanza o l'uso inadeguato degli apparecchi potrà provocare la morte o gravi lesioni al contatto con le parti che si trovano sotto tensione.

Descrizione e montaggio:

Gli alimentatori SITOP 24V/2,5 A, 5 A, 10 A sono apparecchiature ad incasso. L'installazione deve essere effettuata osservando le rispettive norme DIN/VDE o le corrispondenti prescrizioni nazionali. Alimentatore con primario in switching per il montaggio su sbarra a profilo normalizzato EN 50022-35x15/7,5. Idoneo per il collegamento con cablaggio fisso a reti a corrente alternata monofase, bifase e trifase (reti TN, TT o IT secondo VDE 0100 T 300 / IEC 364-3) con una tensione nominale di 120/230 V, 50/60 Hz. In caso di alimentazione dell'apparecchio con tensione fase-fase si deve provvedere ad una protezione adeguata del morsetto N.

Tensione d'uscita DC +24 V, con separazione galvanica, Test di cortocircuito e marcia a vuoto.

E' ammissibile il collegamento in parallelo di due apparecchi dello stesso tipo allo scopo dell'aumento della potenza (condizione: la differenza tra le tensioni d'uscita deve essere < 0,2 % e le impedenze di linea devono essere uguali al carico).

Dati tecnici: Tutte le indicazioni sono valide - se non indicato in altro modo - per una tensione di entrata AC 230 V e temperatura ambiente +25 °C. Modificazioni tecnici riservati.

Tipo:	24 V/2,5 A	24 V/5 A	24 V/5 A	24 V/10 A	24 V/10 A
Numero del pezzo:	6EP1332-2BA10	6EP1333-2BA01	6EP1333-2AA01	6EP1334-2BA01	6EP1334-2AA01
Dati di entrata:					
Tensione nominale U _e :	AC 120/230 V				
Campo di tensione:	AC 85-132/170-264 V				
Gamma di frequenza di rete:	47...63 Hz				
Tamponam. con mancanza rete:	> 20 ms				
Corrente nominale I _e :	1,1/0,65 A	2,1/1,15 A		4,1/2 A	4,1/2,4 A
Protezione della linea di rete:	3 A caratte. C	6 A caratte. C		10 A caratte. C	
Dati di uscita:					
Tensione nominale di uscita U _a :	DC 24 V				
Residuo armonico / Picchi d'inserimento:	< 150/240 mV _{pp}				
Campo di regolazione:	DC 22,8...28 V				
Corrente nominale d'uscita I _a :	2,5 A	5 A		10 A	
- meno di 60 °C a ≤ DC 24 V	0...I _a				
- meno di 50 °C a > DC 24 V	0...I _a				
- meno di 45 °C a ≤ DC 24 V	0...1,2xI _a				
- meno di 35 °C a > DC 24 V	0...1,2xI _a				
Protezione contro i sovraccarichi:	tip. 3,3 A	tip. 6,5 A		tip. 13 A	
Dinamico protezione contro i sovraccarichi:	3,75 A/5 sec	7,5 A/5 sec		15 A/5 sec	
Rendimento pieno carico:	tip. 84 %	tip. 87 %	tip. 87 %	tip. 91 %	tip. 90 %
Condizioni ambientali:					
Temp. di magazzinaggio e trasporto:	-40 °C...+85 °C				
Temp. ambiente in funzione:	0 °C...+60 °C				
Tipo di protezione:	IP 20				
Grado d'inquinamento:	2				
Classe di umidità:	classe climatica 3K3 secondo EN 60721, umidità dell'aria relativa 5%...95 %, senza condensazione				
Trasmissione di ripartizione:	EN 61000-6-3	EN 61000-6-3	EN 61000-6-4	EN 61000-6-3	EN 61000-6-4
EN 55022:	Classe B				
Resistenza ai disturbi:	EN 61000-6-2, EN 61000-4-2/-3/-4/-5/-6/-11				
Sicurezza:					
Classe di protezione:	I				
Separazione di potenziale primaria/ secondaria:	tensione di uscita SELV secondo EN 60950 e EN 50178, Trasformatore corrisponde a EN 61558-2-17, Protezione contro sovratensione in caso di difetto interno: U _a < 33 V (a partire da versione 2)				
Omologazioni:					
CE	conformità CE secondo 2004/108 CEE e 2006/95 CEE				
UL/CSA	elencato UL 508 (Listed, File E197259), CSA C22.2 No 14, No 60950-1-03				
Costruzioni navali	Germanischer Lloyd				
Directive 94/9/CE	Dichiarazione di conformità dopo EN 60079-15: ATEX94/9/EC Kat.3;Eex, nA, II, T4 U				
C-Tick	AS/NZS 2064:1997				

Montaje: Por razones de una refrigeración en forma debida al aparato debe montarse en posición vertical de modo que los bornes de entrada y de salida sean situados en la parte inferior. Por abajo y por arriba del aparato, se debe dejar un espacio libre de 50mm como mínimo. Se conectará la tensión de alimentación (120/230 V AC) de acuerdo con IEC 60364 y EN 50178. Es preciso prever dispositivos de protección (fusibles) y seccionamiento para aislar la fuente de alimentación de la red.

En las aplicaciones « Ex » tiene que estar seguro que la instalación sea según IP54.

⚠ Atención: Antes de comenzar los trabajos de instalación o reparación es preciso desconectar el interruptor principal y protegerlo contra reconexiones accidentales. De no observarse estas instrucciones, el contacto con partes en tensión puede tener como consecuencia la muerte o lesiones corporales graves.

Descripción y estructura: La fuente de alimentación SITOP 24V/2A, 5A, 10A ha sido concebida como aparato en chasis (empotrable). La instalación del aparato deberá realizarse de acuerdo a las normas y reglamentaciones nacionales.

Fuente de alimentación conmutada conveniente para enganche por resorte en perfil tipo omega normalizado EN 50022-35x15/7,5. Sirve para conexión con cableado fijo a una red monofásica o a 2 conductores de fase de redes trifásicas (redes TN, TT o IT según VDE 0100,, p 300 / IEC 364-3) con tensión nominal de 120/230V, 50/60Hz. Si el equipo se conecta a 2 fases es necesario proteger el conductor neutro.

Tensión de salida +24V DC, libre de potencial, protegida contra cortocircuitos y funcionamiento en vacío.

La conexión en paralelo de aparatos de igual naturaleza para el aumento de potencia está permitida (Condición: diferencia de tensiones de salida < 0,2 % e impedancias de línea igual respecto a la carga).

Características técnicas: Mientras no se indique lo contrario, todos los datos son válidos para una tensión de entrada 230 V AC y una temperatura ambiente de +25 °C. Sujeto a cambios técnicos sin previo aviso.

Tipo:	24 V/2,5 A	24 V/5 A	24 V/5 A	24 V/10 A	24 V/10 A
Número de pieza	6EP1332-2BA10	6EP1333-2BA01	6EP1333-2AA01	6EP1334-2BA01	6EP1334-2AA01
Datos de entrada:					
Tensión nominal U _e :	120/230 V AC				
Rango de tensión:	85-132/170-264 V AC				
Rango de frecuencia:	47...63 Hz				
Superación de cortes de red:	> 20 ms				
Corriente nominal I _e :	1,1/0,65 A	2,1/1,15 A		4,1/2 A	4,1/2,4 A
Seguridad en la acometida de red:	3 A caract. C	6 A caract. C		10 A caract. C	
Datos de salida:					
Tensión nominal U _s :	24 V DC				
Ondulación residual / Picos de conexión:	< 150/240 mV _{pp}				
Zona de ajuste:	22,8...28 V DC				
Corriente nominal I _s :	2,5 A	5 A		10 A	
- hasta los 60 °C con ≤ 24 V DC	0...I _s				
- hasta los 50 °C con > 24 V DC	0...I _s				
- hasta los 45 °C con ≤ 24 V DC	0...1,2xI _s				
- hasta los 35 °C con > 24 V DC	0...1,2xI _s				
Limitación estática de corriente:	tip. 3,3 A	tip. 6,5 A		tip. 13 A	
Dinámica limitación estática de corriente:	3,75 A/5 sec	7,5 A/5 sec		15 A/5 sec	
Rendimiento a plena carga:	tip. 84 %	tip. 87 %	tip. 87 %	tip. 91 %	tip. 90 %
Condiciones ambientales:					
Temp. para almacenamiento y transporte:	-40 °C...+85 °C				
Temp. para funcionamiento:	0 °C...+60 °C				
Grado de protección:	IP 20				
Grado de la contaminación:	2				
Clase de la humedad:	Clase clima 3K3 según EN 60721, sin condensaciones, humedad relativa del aire 5...95 %				
Emisión de interferencias:	EN 61000-6-3	EN 61000-6-3	EN 61000-6-4	EN 61000-6-3	EN 61000-6-4
EN 55022:	Clase B				
Resist. a interferencias:	EN 61000-6-2, EN 61000-4-2/-3/-4/-5/-6/-11				
Seguridad:					
Clase de protección:	I				
Corte de potencial primario/secundario:	tensiones de salida SELV según EN 60950 y EN 50178, transformador corresponde a EN 61558-2-17, protección contra la sobretensión en caso de defecto interno: U _s < 33 V (a partir de la versión 2)				
Homologaciones:					
CE	De acuerdo con conformidad del CE (2004/108 EWG y 2006/95 EWG)				
UL/CSA	UL 508 (Listed, File E197259), CSA C22.2 No 14, No 60950-1-03				
Construcción naval	Germanischer Lloyd				
Directive 94/9/CE	Declaración de la conformidad después EN 60079-15: ATEX94/9/EC Kat.3;Eex, nA, II, T4 U				
C-Tick	AS/NZS 2064:1997				

Hinweis

Diese Betriebsanleitung enthält aus Gründen der Übersichtlichkeit nicht sämtliche Detailinformationen zu allen Typen des Produkts und kann auch nicht jeden denkbaren Fall der Aufstellung, des Betriebes oder der Instandhaltung berücksichtigen. Weiterführende Hinweise erhalten Sie über die örtliche Siemens-Niederlassung bzw. im Internet unter <http://www.siemens.de/sitop>. Technische Änderungen jederzeit vorbehalten. In Zweifelsfällen gilt der deutsche Text.

Note

These instructions cannot claim to cover all details of possible equipment variations, nor in particular can they provide for every possible example of installation, operation or maintenance. Further information is obtainable from your local Siemens office or in internet at <http://www.siemens.de/sitop>. Subject to change without prior notice. The German text applies in cases of doubt.

Note

Pour des raisons de clarté, cette notice ne contient pas toutes les informations de détail relatives à tous les types du produit et ne peut pas non plus tenir compte de tous les cas d'installation, d'exploitation et de maintenance imaginables. . Pour de plus amples informations, veuillez-vous adresser à votre agence Siemens ou consultez internet: <http://www.siemens.de/sitop>. Sous réserve de modifications techniques. En cas de divergences, le texte allemand fait foi.

Nota

Ai fini della chiarezza le presenti istruzioni di servizio non contengono tutte le informazioni dettagliate su tutti i tipi del prodotto e non possono nemmeno trattare tutti i casi di installazione, di esercizio o di manutenzione. Per ulteriori informazioni rivolgersi alla filiale Siemens di zona o consultare internet: <http://www.siemens.de/sitop>. Ci riserviamo eventuali modifiche tecniche. In caso di differenze o problemi è valido il testo tedesco.

Nota

Por razones de claridad, estas instrucciones no contienen todas las informaciones detalladas relativas a todos los tipos del producto ni pueden considerar todos los casos de instalación, de operación y de mantenimiento imaginables. Para más información, contacte con la sucursal local de Siemens o visite la Web <http://www.siemens.de/sitop>. Sujeto a cambios técnicos sin previo aviso. En casa de duda, prevalece el texto alemán.

Herausgegeben von SIMEA
Bereich IA SC
Siemensstraße 90
A - 1210 Wien

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Liefermöglichkeiten und technische Änderungen
vorbehalten

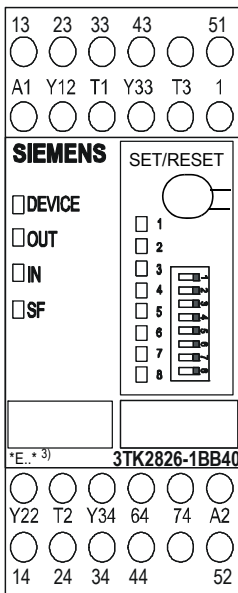
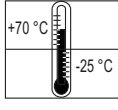
SIRIUS

DE	Sicherheitsschaltgerät
EN	Safety Relay
FR	Bloc logique de sécurité
ES	Módulo de seguridad
IT	Dispositivo di sicurezza
PT	Chaveador de segurança
BG	Защитен прекъсвач
DA	Sikkerhedsrelæ

ET	Kaitselüliti
FI	Turvakatkaisulaite
EL	Ρελέ ασφαλείας
GA	Rialaí Sábháilteachta
LV	Aizsardzības relejs
LT	Apsauginio išjungimo įrenginys
MT	Relay tas-Sigurta
NL	Veiligheidsschakeltoestel
PL	Przełącznik bezpieczeństwa

RO	Releu de siguranță
SV	Säkerhetsrelä
SK	Bezpečnostný spínací prístroj
SL	Varnostna stikalna naprava
CS	Bezpečnostní relé
HU	Biztonsági kapcsolókészülék
TR	Güvenlik kontrol cihazı
PY	Реле безопасности
中文	安全开关设备

3TK2826



DEVICE	siehe Handbuch 3TK2826 / see manual 3TK2826 / voir manuel 3TK2826 / ver manual 3TK2826 / vedere il manuale 3TK2826 / ver o manual 3TK2826 / виж наръчника 3TK2826 / se manual 3TK2826 / vt 3TK2826 käsiraamatut / katso käsikirja 3TK2826 / βλέπε εγχειρίδιο χρήσης 3TK2826 / féach lámhleabhar 3TK2826 / skatit rokasgrāmatu 3TK2826 / žr. vadovą 3TK2826 / ara l-manwal 3TK2826 / zie handboek 3TK2826 / patrz podręcznik 3TK2826 / vezi manual 3TK2826 / se handbok 3TK2826 / pozri príručku 3TK2826 / glejte priročnik 3TK2826 / viz manuál k 3TK2826 / lásd kézikönyv 3TK2826 / Bkz. El kitabı 3TK2826 / см. руководство 3TK2826 / 参见手册 3TK2826
OUT	
IN	
SF	

³⁾ Geräte-Erzeugnisstand / Product version / Numéro de version de l'appareil / Versión del dispositivo / Versione di prodotto dell'apparecchio / Status de produto dos aparelhos / Състояние на производство на уреда / Apparatets fremstillingstilstand / Seadme/toote tase / Laitteen tuotoversio / Κατάσταση προϊόντος συσκευής / Leagan táirge / Ierices aparatūras versija / Prietaiso-gaminio būklė / Veržjoni tal-prodott / Produkttilstånd / Stan urządzenia-wyrobu / Stare aparat produs / Instrument produkttilstånd / Výrobný stav prístrojov / Stanje proizvoda naprave / Výrobní stav přístroje / Berendezés-termékhelyzet / Cihaz versiyonu / Состояние изготовления устройств / 设备产品状态

Originalbetriebsanleitung	DE
Original Operating Instructions	EN
Instructions de service originales	FR
Instructivo original	ES
Istruzioni operative originali	IT
Instruções de Serviço Originais	PT
Оригинално ръководство за експлоатация	BG
Original brugsanvisning	DA
Originaal-kasutusjuhend	ET
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Treoracha Oibriúcháin Bunaigh	GA
Orīginālā lietošanas pamācība	LV
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Struzzjonijiet Originali	MT
Originele handleiding	NL
Oryginalna instrukcja obsługi	PL
Instrucțiuni originale de utilizare	RO
Originalbruksanvisning	SV
Originálny návod na obsluhu	SK
Originalno navodilo za obratovanje	SL
Originální návod k obsluze	CS
Eredeti üzemeltetési útmutató	HU
Orijinal İşletme Kılavuzu	TR
Оригинальное руководство по эксплуатации	PY
原始操作说明	中文

		U _e (V)	I _e (A)
13,14; 23,24; 33,34; 43,44	DC-13	24	4,0
13,14; 23,24; 33,34; 43,44	AC-15	230	4,0
51,52	DC-13	24	2
51,52	AC-15	230	3
64; 74	DC-13	24	0,5
63,64	DC-13	24	1
63,64	AC-15	230	1

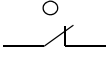
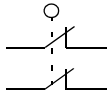
T _U	-25° ... +60° C
U _i	300 V
U _{imp}	4 kV
U _e	3TK2826-BB40: 24V DC (0,85 ... 1,2) 3TK2826-CW30: 24V - 240V AC (0,9 ... 1,1); 50 - 60 Hz
P _W /P _S	1,5 W


Technical Assistance: Telephone: +49 (911) 895-5900 (8°° - 17°° CET)
 Fax: +49 (911) 895-5907
 E-mail: technical-assistance@siemens.com
 Internet: www.siemens.com/industrial-controls/technical-assistance

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Technical Assistance
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 D-90766 Fürth

IEC 61508	3TK2826
PFHD	$7,8 \times 10^{-9}$ 1/h
T1*	20 a
SFF	> 90 %
HFT	1
T _f **	150 ms

DIN EN ISO 13849	3TK2826
DC	> 90 %
nOP	1000
dOP	365
hOP	24

























		
SIL (DIN EN / IEC 61508)	1	3
PL (DIN EN ISO 13849)	c	e
Kat. (DIN EN ISO 13849)	1	4

	13,14; 23,24 33,34 43,44 51,52 63,64 ¹⁾	I _k	
Fuse (gL/gG)		1000 A	4 A

¹⁾ 3TK2826-CW30

*T1 = Sicherheitslebenszyklus = Wiederholungsprüfung / *T1 = Safety lifecycle = Repeat test / *T1 = cycle de vie de sécurité = essai périodique / *T1 = Ciclo de vida de seguridad = Prueba de repetibilidad / *T1 = ciclo di vita di sicurezza = verifica periodica / *T1 = Ciclo de vida de segurança = Ensaio de repetição / *T1 = безопасен жизнен цикл = повторно изпитване / *T1 = Sikkerhedslivscyklus = gentaget kontrol / *T1 = turvaline elutsükkel = korduskatsetamine / *T1 = turvallisuden elinkaari = määraaikaistestaus / *T1 = κύκλος ζωής ασφαλείας = επαναληπτικός έλεγχος / *T1 = Saolré sábháilteachta = Déan tástáil arís / *T1 = drošības ekspluatācijas cikls = aktārtota pārbaude / *T1 = apsaugos buvimo ciklas = pakartotinis tikrinimas / *T1 = Ciklu tal-hajja tas-sigurtà = Irrepeti t-test / *T1 = veiligheidslevenscyclus = herhaalde controle / *T1 = okres bezpiecznego użytkowania = badanie powtórne / *T1 = Ciclu de viață în siguranță = Inspectie periodică / *T1 = säkerhetslivscykel = upprepningskontroll / *T1 = životný cyklus bezpečnosti = opakovaná kontrola / *T1 = Ciklus varne življenjske dobe = ponavljalni preskus / *T1 = životní cyklus bezpečnosti = opakovaná kontrola / *T1 = biztonsági élelciklus = vizsgálat ismétlése / *T1 = Güvenlik yaşam döngüsü = Tekrar kontrol / *T1 = Жизненный цикл безопасности = Повторная проверка / *T1 = 安全生命周期 = 重复检查

**T_f = Fehlerreaktionszeit / **T_f = Fault response time / **T_f = temps de réaction aux défauts / **T_f = Tiempo de reacción a fallas / **T_f = tempo di reazione agli errori / **T_f = Tempo de reação de erro / **T_f = реакционно време при грешка / **T_f = Fejlreaktionstid / **T_f = törke toimimisaeg / **T_f = vikavasteaika / **T_f = χρόνος απόκρισης σφάλματος / **T_f = Aga freagartha ar fhabht / **T_f = klūdas reakcijas laiks / **T_f = reakcijas ī gedimā laikas / **T_f = Hin ta' rispons waqt hsara / **T_f = reactietijd bij fout / **T_f = czas reakcji na błąd / **T_f = timp de răspuns la erori / **T_f = felreaktionstid / **T_f = čas reakcie na chybu / **T_f = Reakcijski čas v primeru napake / **T_f = doba reakce na chybu / **T_f = hiba-reakcióidő / **T_f = Hata reaksiyon süresi / **T_f = Время реагирования на ошибку / **T_f = 错误反应时间

DE	 GEFAHR	Gefährliche Spannung. Lebensgefahr oder schwere Verletzungsgefahr. Vor Beginn der Arbeiten Anlage und Gerät spannungsfrei schalten.
EN	 DANGER	Hazardous voltage. Will cause death or serious injury. Turn off and lock out all power supplying this device before working on this device.
FR	 DANGER	Tension dangereuse. Danger de mort ou risque de blessures graves. Mettre hors tension avant d'intervenir sur l'appareil.
ES	 PELIGRO	Tensión peligrosa. Puede causar la muerte o lesiones graves. Desconectar la alimentación eléctrica antes de trabajar en el equipo.
IT	 PERICOLO	Tensione pericolosa. Può provocare la morte o lesioni gravi. Scollegare l'alimentazione elettrica prima di eseguire interventi sull'apparecchiatura.
PT	 PERIGO	Tensão perigosa. Perigo de morte ou ferimentos graves. Desligue a alimentação eléctrica antes de iniciar os trabalhos no equipamento.
BG	 ОПАСНОСТ	Опасно напрежение. Опасност за живота или опасност от тежки наранявания. Преди започване на работа изключете напрежението на системата и уреда.
DA	 FARE	Farlig spænding. Livsfare eller fare for alvorlige kvæstelser. Gør anlæg og apparat spændingsfrie, inden arbejdet påbegyndes.
ET	 OHT	Ohtlik pinge. Eluht või tõsiste vigastuste oht. Enne tööde algust tuleb süsteemi ja seadme pinge välja lülitada.
FI	 VAARA	Vaarallinen jännite. Hengenvaara tai vakava loukkaantumisvaara. Ennen töiden aloittamista on laitteisto ja laite kytkettävä jännitteettömiksi.
EL	 ΚΙΝΔΥΝΟΣ	Επικίνδυνη τάση. Κίνδυνος-θάνατος ή κίνδυνος σοβαρού τραυματισμού. Πριν από την έναρξη των εργασιών διακόψτε την τάση της εγκατάστασης και της συσκευής.
GA	 CONTÚIRT	Voltas guaiseach. Gheofar bás nó féadfar a bheith gortaithe go tromchúiseach dá bharr. Múch an córas agus an gaireas agus dícheangail iad ón gcumhacht sula ndéanfar obair ar an ngaireas seo.
LV	 BĪSTAMI	Bīstams spriegums. Bīstami dzīvībai vai smagu ievainojumu risks. Pirms darbu sākšanas atvienojiet iekārtu un ierīci no sprieguma.
LT	 PAVOJUS	Pavojinga įtampa. Pavojus gyvybei arba sunkių sužalojimų pavojus. Prieš pradėdami darbus, išjunkite įrangos ir įrenginio įtampą.
MT	 PERIKLU	Vultaġġ Perikoluż. Periklu li wieħed jista' jkorri serjament jew jitlef haġtu. Qabel ma jinbenda x-xogħol kun żgur li titfi s-sistema li ttiprovdi l-enerġija biex tħaddem dan it-tagħmir.
NL	 GEVAAR	Gevaarlijke spanning. Levensgevaar of gevaar voor ernstige verwondingen. Vóór het begin van de werkzaamheden installatie en apparaat vrij van spanning schakelen.
PL	 NIEBEZPIECZEŃSTWO	Niebezpieczne napięcie. Zagrożenie życia lub niebezpieczeństwo ciężkich obrażeń. Przed rozpoczęciem wszelkich prac należy urządzenie i przyrząd odłączyć od sieci elektrycznej.
RO	 PERICOL	Tensiune periculoasă. Pericol de moarte sau pericol de rănire gravă. Înainte de începerea lucrărilor, instalația și aparatul se vor cupla fără a fi alimentate cu energie electrică.
SV	 FARA	Farlig spänning! Livsfara eller risk för allvarliga personskador. Innan arbeten påbörjas ska anläggningen och apparaten göras spänningsfria.
SK	 NEBEZPEČENSTVO	Nebezpečné napätie. Ohrozenie života alebo nebezpečenstvo vzniku ťažkého zranenia. Pred začiatkom prác odpojte zariadenie a prístroj od napätia.
SL	 NEVARNOST	Nevarna napetost. Življenjska nevarnost ali nevarnost hude poškodbe. Pred pričetkom opravil morate stroj in napravo preklopiti v stanje brez napetosti.
CS	 NEBEZPEČÍ	Nebezpečné napětí. Nebezpečí smrtelného nebo těžkého úrazu. Před zahájením práce zařízení a přístroj odpojte od přívodu napětí.
HU	 VESZÉLY	Veszélyes feszültség. Életveszély vagy súlyos sérülési veszélye. A munkák megkezdése előtt a berendezést és a készüléket áramtalanítani kell.
TR	 TEHLİKE	Tehlikeli gerilim. Ölüm tehlikesi veya ağır yaralanma tehlikesi. Çalışmalara başlamadan önce, sistemin ve cihazın gerilim beslemesini kapatınız.
PY	 ОПАСНО	Опасное напряжение. Опасность для жизни или возможность тяжелых травм. Перед началом работ отключить подачу питания к установке и к устройству.
中文	 危險	危险电压。将导致死亡或严重的人身伤害。 操作本设备前必须切断并锁定所有供电电源。

DE	VORSICHT	Installation, Inbetriebnahme und Wartung nur durch Fachpersonal, das die Sicherheitshinweise in der zugehörigen Originalbetriebsanleitung kennt und einhält! Um die Sicherheit des Systems zu gewährleisten, muss eine vollständige Funktionsprüfung (Validisierung) der Anlage (Gesamtsystem) durchgeführt und erfolgreich abgeschlossen werden. Halten Sie die vorgeschriebene Absicherung unbedingt ein, um ein sicheres Abschalten im Fehlerfall zu gewährleisten.
EN	CAUTION	Installation, commissioning and maintenance work should only be performed by specialist personnel who are familiar with and observe the safety instructions in the relevant original operating manual! In order to ensure the safety of the system, a complete function check (validation) of the equipment (overall system) must be carried out and completed successfully. It is absolutely imperative that you adhere to the specified protection measures in order to ensure safe shutdown in case of a fault.
FR	ATTENTION	Installation, mise en service, et maintenance uniquement par des personnes qualifiées connaissant et respectant les consignes de sécurité dans la documentation correspondante. Afin de garantir la sécurité du système, un test complet du fonctionnement de l'installation (système complet) doit être effectué avec succès. Respectez impérativement la protection prescrite. C'est le seul moyen d'assurer une coupure sûre en cas de panne.
ES	PRECAUCIÓN	La instalación, la puesta en marcha, la operación y el mantenimiento deben ser realizados únicamente por personal cualificado que conozca y respete las consignas de seguridad que figuran en las instrucciones de servicio correspondientes. Para garantizar la seguridad del sistema es obligatorio realizar una prueba funcional completa (validación) de la máquina o instalación (sistema completo) y terminarla correctamente. Respete los elementos de protección prescritos para garantizar una desconexión segura en caso de fallo.
IT	CAUTELA	L'installazione, la messa in servizio e la manutenzione devono essere eseguite solo da personale specializzato che conosca e rispetti le corrispondenti istruzioni operative originali! Per garantire la sicurezza del sistema, si deve eseguire una prova funzionale completa (validazione) dell'impianto (del sistema completo) e concluderla con successo. È assolutamente necessario rispettare le misure di protezione prescritte al fine di assicurare una disinserzione sicura in caso di guasto.
PT	CUIDADO	A instalação, colocação em funcionamento e manutenção apenas devem ser efetuadas por técnicos especializados, que conheçam e cumpram as indicações de segurança do manual de instruções original correspondente! Para garantir a segurança do sistema, a verificação completa do funcionamento (Validação) da instalação (sistema completo) deve ser efetuada e concluída com sucesso. Os fusíveis devem cumprir incondicionalmente as normas de segurança para garantir uma interrupção do circuito em caso de erro.
BG	 ВНИМАНИЕ	Инсталацията, пускането в експлоатация и техническото обслужване трябва да се извършва само от квалифициран персона, който познава и спазва указанията за безопасност в съответното оригинално ръководство за експлоатация! За да се гарантира безопасността на системата, трябва да се извърши цялостна проверка на функцията (валидиране) на съоръжението (цялостна система) и тя е приключила успешно. Непременно спазвайте предписаното обезопасяване, за да може в случайна повреда да се гарантира безопасното изключване.
DA	FORSIGTIG	Installation, ibrugtagning og service må kun udføres af kvalificeret personale, som kender og overholder sikkerhedshenvisningerne i den pågældende originale brugsanvisning! For at garantere systemets sikkerhed skal der udføres og afsluttes en vellykket fuldstændig funktionskontrol (validering) af anlægget (samlet anlæg). Den foreskrevne sikring skal absolut overholdes for at garantere en sikker slukning i fejltilfælde.
ET	ETTEVAATUST!	Paigaldamine, kasutuselevõtmise ja hoolduse lubatud ainult erialapersonalile, kes tunneb vastava originaalkasutusjuhendi ohutusnõuandeid ning peab neist kinni! Süsteemi turvalisuse tagamiseks tuleb teostada ja edukalt lõpule viia seadme (kogu süsteemi) täielik funktsiooni kontroll (valideerimine). Pidage kindlasti kinni ette nähtud kaitsest, et tagada vea korral turvaline väljalülitamine.
FI	HUOMIO	Asennuksen, käyttöönoton ja huollon saavat suorittaa vain ammattitaitoiset henkilöt, jotka tuntevat vastaavan alkuperäiskäyttöohjeen turvaohjeet ja noudattavat niitä! Järjestelmän turvallisuuden takaamiseksi on suoritettava ja vietävä menestyksellisesti päätökseen laitteiston (kokonaisjärjestelmän) täydellinen toimintatarkastus (kelpuutus). Määrättyä sulakesuojausta on ehdottomasti noudatettava turvallisen katkaisun takaamiseksi vikatapauksessa.
EL	ΠΡΟΣΟΧΗ	Η εγκατάσταση, η θέση σε λειτουργία και η συντήρηση επιτρέπεται να πραγματοποιούνται μόνο από εξειδικευμένο τεχνικό προσωπικό που γνωρίζει και τηρεί τις υποδείξεις ασφαλείας στις σχετικές πρωτότυπες οδηγίες χρήσης! Για την ασφάλεια του συστήματος πρέπει να πραγματοποιείται και να ολοκληρώνεται επιτυχώς πλήρης έλεγχος λειτουργίας (επαλήθευση) του συστήματος (ολόκληρου του συστήματος). Τηρείτε οπωσδήποτε το προβλεπόμενο όριο ασφαλείας ώστε να διασφαλίσετε σίγουρη απενεργοποίηση σε περίπτωση προβλήματος.
GA	RABHADH	Níor cheart ach do dhaoine speisialaithe a bhfuil taithí acu ar na treoracha sábháilteachta sa lámhleabhar oibríocháin bunaidh ábhartha, agus a thugann aird ar na treoracha sin, an tsuiteáil, an coimisiúnú agus an obair chothabhála a dhéanamh! D'fhonn sábháilteacht an chórais a áirithiú, ní mór seiceáil (fíorú) iomlán ar fheidhmeanna an trealaimh (córas foriomlán) a dhéanamh agus ní mór é a bheith curtha i gcrích go rathúil. Tá sé fíor-riachtanach cloí leis na bearta cosanta atá sonraithe d'fhonn múchadh slán a áirithiú i gcás lochta.
LV	UZMANĪBU	Instalāciju, pieņemšanu ekspluatācijā un tehnisko apkopi veic tikai kvalificēts personāls, kādam ir zināmi oriģinālās lietošanas instrukcijas drošības norādījumi un kāds ievēro oriģinālo lietošanas intrukciju! Lai garantētu sistēmas drošību, jāveic pilnā visas iekārtas (visas sistēmas) funkciju pārbaude (validācija). Lai nodrošinātu drošas izslēgšanas iespēju traucējumu gadījumā, noteikti veiciet visus paredzētos drošības pasākumus.

LT	ATSARGIAI	Įnstaliuoti, paruošti eksploatuoti ir atlikti techninę priežiūrą leidžiama tik specialistams, kurie išmano ir laikosi priklausančioje originalioje naudojimo instrukcijoje pateiktų saugos nurodymų! Siekiant užtikrinti sistemos saugumą, reikia atlikti ir sėkmingai užbaigti visišką įrenginio (visos sistemos) veikimo bandymą (tikrinimą). Būtinai laikykitės nustatytų apsaugos priemonių, kad būtų užtikrintas saugus išjungimas klaidos atveju.
MT	ATTENZJONI	Xogħol ta' installazzjoni, tħaddim u manutenzjoni għandu jsir biss minn personal speċjalizzat li huwa familjari u li josserva l-istruzzjonijiet tas-sikurezza fil-manwal ta' tħaddim originali relevanti! Sabiex tiġi żgurata s-sikurezza tas-sistema, għandu jsir kontroll (validazzjoni) tal-funzjoni sħiħa tal-apparat (sistema kollha) u s'sistema għandha tghaddi minn dan il-kontroll. Huma assolutament imperattivi li inti tikkonforma mal-miżuri ta' protezzjoni speċifikati sabiex jiġi żgurat shutdown bla periklu fil-każ ta' ħsara.
NL	VOORZICHTIG	Installatie, inbedrijfstelling en onderhoud alleen door vakpersoneel, dat de veiligheidsinstructies in de bijhorende originele gebruiksaanwijzing kent en naleeft! Om de veiligheid van het systeem te garanderen moet er een volledige functiecontrole (validering) van de installatie (hele systeem) uitgevoerd en deze succesvol afgesloten worden. Houd de voorgescreven beveiliging absoluut aan om veilig uitschakelen in het geval van een fout te garanderen.
PL	PRZESTROGA	Instalowanie, uruchomienie i konserwację może wykonywać tylko personel specjalistyczny zaznajomiony z przepisami bezpieczeństwa zawartymi w należącej do tego oryginalnej instrukcji obsługi i przestrzegający tych przepisów! W celu zapewnienia bezpieczeństwa systemu musi być przeprowadzona zakończona sukcesem całkowita kontrola funkcjonowania (walidacja) układu (całego systemu). W celu bezpiecznego wyłączenia w przypadku błędu należy bezwarunkowo przestrzegać zalecanego zabezpieczenia.
RO	ATENȚIE	Instalarea, darea în folosință și repararea se vor face numai de către personal specializat, care cunoaște și respectă instrucțiunile de siguranță conținute în instrucțiunile originale de utilizare! Pentru asigurarea siguranței sistemului este necesară parcurgerea și încheierea cu succes a unei verificări complete a funcționării (validare) instalației (sistemului complet). Respectați întocmai măsurile de siguranță prevăzute pentru a garanta deconectarea în condiții de siguranță în cazul unei defecțiuni.
SV	OBSERVERA	Installation, idrifttagning och underhåll får endast genomföras av fackpersonal som känner till och följer säkerhetsinformationen i tillhörande originalbruksanvisning! För att garantera att systemet arbetar säkert måste en fullständig funktionskontroll av anläggningen genomföras med önskat resultat. Följ den föreskrivna spärrarna för att möjliggöra säker avstängning om det skulle uppstå fel.
SK	 POZOR	Instalácii, uvedenie do prevádzky a údržbu môže vykonať len odborný personál, ktorý pozná a dodržiava bezpečnostné pokyny v príslušnom originálnom návode na obsluhu! Na zabezpečenie spoľahlivosti a bezpečnosti systému je potrebné vykonať a úspešne ukončiť kompletnú funkčnú skúšku (validácia) zariadenia (celkového systému). Bezpodmienečne dodržte predpísané postupy, aby ste zabezpečili bezpečné vypnutie v prípade poruchy.
SL	PREVIDNO	Namestitvev, zagon in vzdrževanje lahko izvaja le strokovno osebje, ki pozna in upošteva varnostna navodila in pripadajočih originalnih navodilih za uporabo! Za zagotavljanje varnosti sistema, mora biti opravljeno in uspešno zaključeno popolno preverjanje funkcij (validacija) naprave (celotnega sistema). Obvezno upoštevajte predpisano zavarovanje, da zagotovite varen izklop v primeru napake.
CS	POZOR	Instalaci, uvedení do provozu a údržbu smí provádět jen odborný personál, který zná a dodržuje bezpečnostní pokyny v příslušném originálním návodu k obsluze! K zajištění bezpečnosti systému se musí provést kompletní kontrola funkce (validace) zařízení (celého systému) a tato úspěšně zakončit. Bezpodmínečně dodržujte předepsané jistění k zaručení spolehlivého vypnutí v případě chyby.
HU	VIGYÁZAT	Telepítést, üzembe helyezést és karbantartást csak olyan szakszemélyzet végezhet, amely az eredeti kezelési utasítás biztonsági utasításait ismeri és betartja. A rendszerbiztonság biztosításáért az egész berendezés (teljes rendszer) teljes működéspróbáját (validálás) el kell végezni és azt eredményesen be kell fejezni. Okvetlenül tartsa be az előírt óvintézkedéseket, hogy azzal hiba esetén a biztonságos kikapcsolást biztosítsa.
TR	DİKKAT	Cihazın kurulumu, işletmeye alınması ve bakımı sadece cihaz ait orijinal işletme kılavuzunda açıklanan güvenlik talimatlarını bilen ve bu talimatlara uyan uzman personel tarafından yapılacaktır! Sistemin güvenliğinin sağlanması için tesisin (tüm sistemin) komple fonksiyon kontrolünün (validasyon) yapılması ve başarıyla tamamlanması şarttır. Arıza durumunda makinenin güvenli şekilde kapanması için şart koşulan sigorta değerlerine mutlaka uyunuz.
PY	ВНИМАНИЕ	Работы по установке, настройке и обслуживанию могут производиться только специалистами, которые ознакомились, прочли и поняли инструкции по безопасности из соответствующего руководства! Для обеспечения безопасности системы функциональные проверки должны быть проведены, успешно завершены и пройти приемку. Абсолютно необходимо соблюдение всех предписанных мер безопасности для обеспечения безопасного завершения работы в случае аварии.
中文	小心	仅允许那些了解并遵守所属原始操作说明中安全提示的专业人员执行安装、调试和保养工作！为了确保系统的安全，必须完整地检查设备（整个系统）的功能并确保所有功能均正常。 请务必遵守规定的安全规范，以便可以在出现故障时安全关闭。

DE	Hinweis	Dies ist ein Produkt für Umgebung A. In Haushaltsumgebung kann diese Gerät unerwünschte Funkstörungen verursachen. In Diesem Fall kann der Anwender verpflichtet sein, angemessene Maßnahmen durchzuführen.
EN	Note	This is a product for Environment A. In a household environment, this relay might cause undesirable radio frequency interference. In this case, the user might be obligated to undertake appropriate countermeasures.
FR	Remarque	Il s'agit d'un produit de classe A. Cet appareil peut causer des interférences radio en zone résidentielle. Dans ce cas, l'utilisateur peut être dans l'obligation de prendre les mesures appropriées.
ES	Nota	Este producto está concebido para un entorno A. En entornos residenciales este aparato puede causar perturbaciones radioeléctricas indeseadas. En este caso el usuario puede estar obligado a tomar las medidas adecuadas para paliarlas.

IT	Nota	Questo è un prodotto concepito per l'ambiente A. In ambiente domestico questo dispositivo potrebbe causare l'emissione indesiderata di radiodisturbi. In questo caso l'utilizzatore è tenuto ad attuare provvedimenti idonei.
PT	Indicação	Este é um produto para o ambiente classe A. Em ambiente doméstico, este aparelho pode causar interferências radioelétricas indesejadas. Neste caso, o usuário é responsável por tomar medidas adequadas.
BG	Указание	Това е продукт за обкръжение А. В домашно обкръжение този уред може да причини нежелани радио смущения. В такъв случай потребителя може да бъде длъжен да вземе подходящи мерки.
DA	Information	Dette er et produkt til omgivelserne A. I husholdningsomgivelser kan apparatet forårsage uønskede radioforstyrrelser. I dette tilfælde kan brugeren være forpligtet til at gennemføre egnede foranstaltninger.
ET	Märkus	See toode on mõeldud keskkonnale A. Kodumajapidamise keskkonnas võib see seade põhjustada soovimatuid raadiohäireid. Sellisel juhul võib kasutaja olla kohustatud rakendama vastavaid meetmeid.
FI	Huomautus	Tämä tuote on tarkoitettu ympäristöön A. Tämä laite voi aiheuttaa kotitalousympäristössä ei-haluttuja radiohäiriöitä. Tässä tapauksessa voi käyttäjä olla veloitettu suorittamaan sopivat toimenpiteet.
EL	Υπόδειξη	Το παρόν είναι ένα προϊόν για περιβάλλον Α. Σε οικιακό περιβάλλον η παρούσα συσκευή μπορεί να προκαλέσει ανεπιθύμητες παρεμβολές. Σε αυτήν την περίπτωση ο χρήστης ενδέχεται να πρέπει να λάβει κατάλληλα μέτρα.
GA	Nóta	Is le haghaidh Thimpeallacht A é an táirge seo. I dtimpeallacht tí, d'fhéadfadh an t-athsheachadán seo a bheith ina chúis le tranaíocht radaimhnicíochta neamh-inmhianaithe. Sa chás sin, d'fhéadfaí go mbeadh ar an úsáideoir frithbhearta cuí a ghlacadh.
LV	Norādījums	Šis norādījums ir paredzēts videi A. Mājas saimniecības vidē ierīce var izraisīt nevēlamus radio traucējumus. Šajā gadījumā lietotājam jāveic visi nepieciešamie pasākumi.
LT	Nurodymas	Šis produktas skirtas aplinkai A. Namų ūkyje aplinkoje šis prietaisas gali sukelti nepageidaujamus radijo trukdžius. Tokiu atveju naudotojas gali būti įpareigotas imtis tinkamų priemonių.
MT	Nota	Dan huwa prodott għal Ambjent A. F'ambjent domestiku, dan ir-relay jista' jikkawża interferenza fil-frekwenza tar-radju mhux mixtieqa. F'dak il-każ, l-utent jista' jkun obligat jieħu kontra-miżuri xierqa.
NL	Aanwijzing	Dit is een product voor omgeving A. In huishoudelijke omgevingen kan dit apparaat ongewenste radiostoringen veroorzaken. In dit geval kan de gebruiker verplicht zijn om adequate maatregelen te treffen.
PL	Wskazówka	Produkt ten jest przeznaczony dla środowiska typu A. W środowisku domowym urządzenie może wywoływać niepożądane zakłócenia. W tym przypadku użytkownik jest zobowiązany do podjęcia odpowiednich środków.
RO	Notă	Acesta este un produs destinat utilizării în medii de tip A. Utilizarea în mediul casnic a acestui produs poate conduce la interferențe radio nedorite. În acest caz, utilizatorul poate fi obligat să ia măsurile adecvate.
SV	Information	Detta är en produkt för omgivning A. I hushållsomgivning kan denna enhet orsaka oönskade radiostörningar. I detta fall kan användaren vara förpliktigad att genomföra lämpliga åtgärder.
SK	Upozornenie	Toto je produkt pre prostredie A. V prostredí domácnosti môže tento prístroj spôsobiť nežiaduce rádiové rušenie. V takom prípade môže byť používateľ povinný vykonať primerané opatrenia.
SL	Napotek	Izdelek za okolje A. V gospodinjstvem okolju lahko ta naprava povzroči neželene radijske motnje. V tem primeru lahko ima uporabnik dolžnost izvesti primerne ukrepe.
CS	Poznámka	Jedná se o výrobek do prostředí typu A. V prostředí domácnosti může tento přístroj způsobovat nežádoucí rádiové rušení. V tomto případě může být povinností uživatele, aby provedl přiměřená opatření.
HU	Figyelmeztetés	Ez az A. környezetre méretezett termék. Ez a berendezés háztartási környezetben működési zavarokat okozhat. Ilyen esetben a felhasználó kötelezve lehet, megfelelő intézkedések megtételére.
TR	Not	Bu ürün ortam A için öngörülmüştür. Cihaz, ev koşulları altında işletildiğinde istenmeyen radyo dalgası arızalarına neden olabilir. Kullanıcı bu durumda uygun önlemler almakla yükümlü olabilir.
RU	Примечание	Это устройство предназначено для применения в среде категории А. При применении в бытовых условиях это реле может стать причиной радиопомех. В этом случае пользователь должен применить соответствующие меры по предотвращению нежелательных помех.
中文	提示	这是适用于环境 A 的产品。若应用于家居环境下，该设备会引发意外的功能故障。这种情况下，用户有责任采取适当的措施。

DE	<p>Das Sicherheitsschaltgerät 3TK2826 können Sie in NOT-HALT Einrichtungen nach EN 418 und in Sicherheitsstromkreisen nach EN 60 204-1 verwenden, z. B. bei beweglichen Verdeckungen und Schutztüren bzw. bei berührungslos wirkenden Schutzeinrichtungen nach IEC 61496-1.</p> <p>Der erreichbare PL bzw. SIL ist von der ext. Beschaltung abhängig.</p> <p>Unter Berücksichtigung der Umgebungsbedingungen müssen die Geräte in Schaltschränke der Schutzart IP32, IP43 oder IP 54 eingebaut werden.</p> <p>Verschmutzungsgrad 3</p> <p>Weitere Informationen und Techn. Daten siehe Handbuch oder Produktdatenblatt 3TK2826 www.siemens.com/industrial-controls</p>	Klemmenbelegung	
		A1	L/+
		A2	N/-
		13,14; 23,24; 33,34; 43,44	Freigabekreis (FK) Relais, Schließer
		51,52	Meldekreis (MK), Relais, Öffner (Status FK)
		64 (nur 3TK2826-.BB40)	MK elektronisch 24 V DC; Rückführkreis-Fehler (RF)
		74 (nur 3TK2826-.BB40)	MK elektronisch 24 V DC; (Sensorstatus)
		63,64 (nur 3TK2826-.CW30)	MK Relais Schließer; Rückführkreis-Fehler (RF)
		T1,T2	Testausgänge
		T3	Sensorversorgung 24 V DC;
		1	Kaskadiereingang / betriebsmäßiges Schalten
		Y11,Y22	Sensoreingang Kanal 1, Kanal 2
		EN	<p>You can use the 3TK2826 safety relay in EMERGENCY STOP devices according to EN 418 and in safety circuits complying with EN 60204-1, e.g. for moving covers and protective doors or for electro-sensitive protective equipment conforming to IEC 61496-1.</p> <p>The PL or SIL that is obtainable depends on the external wiring.</p> <p>In view of the ambient conditions, relays with degrees of protection IP32, IP 43 or IP54 must be installed in the cabinets.</p> <p>Pollution degree 3</p> <p>For further information and technical data, see the manual or product data sheet 3TK2826 www.siemens.com/industrial-controls</p>
A1	L/+		
A2	N/-		
13,14; 23,24; 33,34; 43,44	Enabling circuit (EC) relay, normally-open, undelayed		
51,52	Signaling circuit (SC), relay, normally-closed (EC status)		
64 (only 3TK2826-.BB40)	SC solid-state 24 V DC; return circuit fault (RF)		
74 (only 3TK2826-.BB40)	SC solid-state 24 V DC; (sensor status)		
63,64 (only 3TK2826-.CW30)	SC, relay, normally-open; return circuit fault (RF)		
T1,T2	Test outputs		
T3	24 V DC sensor supply		
1	Cascading input/normal switching duty		
Y11,Y22	Sensor input channel 1, channel 2		
Y33	Start button (start after rising and falling edge)		
Y34	feedback circuit		
FR	<p>Le bloc logique de sécurité 3TK2826 est utilisable dans des dispositifs d'ARRÊT d'URGENCE selon EN 418 et dans des circuits de sécurité selon EN 60204-1, par exemple avec des protecteurs mobiles ou dans des équipements de protection électro-sensibles selon IEC 61496-1.</p> <p>Le niveau PL ou SIL réalisable dépende des circuits externes.</p> <p>Les appareils doivent être intégrés dans des armoires ayant le degré de protection IP32, IP43 ou IP54 selon les conditions d'environnement.</p> <p>Degré de pollution 3</p> <p>Pour de plus amples informations et pour les caractéristiques, voir manuel ou fiche du produit 3TK2826 www.siemens.com/industrial-controls</p>	Affectation des bornes	
		A1	L/+
		A2	N/-
		13,14; 23,24; 33,34; 43,44	Circuit de validation (CV) relais, NO, instantané
		51,52	Circuit de signalisation (CS), relais, NF (état CV)
		64 (uniquement 3TK2826-.BB40)	CS électronique 24 V CC ; défaut circuit de retour (RF)
		74 (uniquement 3TK2826-.BB40)	CS électronique 24 V CC ; (état du capteur)
		63,64 (uniquement 3TK2826-.CW30)	CS relais NO ; défaut circuit de retour (RF)
		T1,T2	Sorties test
		T3	Alimentation du capteur 24 V CC
		1	Entrée en cascade / manœuvre de service
		Y11,Y22	Entrée de capteur voie 1, voie 2
		Y33	Touche de démarrage (démarrage après front montant et front descendant)
Y34	circuit de réaction		

ES	<p>El módulo de seguridad 3TK2826 se puede usar en dispositivos de PARADA DE EMERGENCIA según EN 418 y en circuitos de seguridad según EN 60204-1, p.ej. en cubiertas y puertas de protección móviles o en dispositivos de protección electro-sensibles según IEC 61496-1.</p> <p>El nivel PL o SIL alcanzable depende de los circuitos externos.</p> <p>Para adaptarse a las condiciones ambientales los equipos deben alojarse en armarios/gabinetes con grado de protección IP32, IP43 o IP 54.</p> <p>Para más información y datos técnicos, consulte el manual o la ficha del producto 3TK2826 www.siemens.com/industrial-controls</p>	Asignación de bornes	
		A1	L/+
		A2	N/-
		13,14; 23,24; 33,34; 43,44	Circuito de habilitación (CH) a relés
		51,52	Circuito de señalización (CS), relés, NA (estado CH)
		64 (solo 3TK2826-BB40)	CS electrónico 24 V DC; falla en circuito de retorno (RF)
		74 (solo3TK2826-BB40)	CS electrónico 24 V DC; (estado de sensor)
		63,64 (solo 3TK2826-CW30)	CS relés NA; falla en circuito de retorno (RF)
		T1,T2	Salidas de prueba
		T3	Alimentación se sensores 24 V DC
		1	Entrada conexión en cascada / maniobras de servicio (funcionales)
		Y11,Y22	Entrada de sensor canal 1, canal 2
Y33	Botón de arranque (arranque tras flanco ascendente y descendente)		
Y34	circuito de retorno		
IT	<p>Il dispositivo di sicurezza 3TK2826 può essere impiegato in dispositivi di arresto di emergenza secondo EN 418 e in circuiti di sicurezza secondo EN 60204-1, ad es. in coperture mobili e porte di protezione o in dispositivi di protezione funzionanti senza contatto secondo IEC 61496-1.</p> <p>Il livello PL o SIL raggiungibile dipende dal circuito esterno. Tenendo conto delle condizioni ambientali, i dispositivi vanno installati in quadri elettrici con grado di protezione IP32, IP43 oppure IP 54.</p> <p>Grado di inquinamento 3</p> <p>Per ulteriori informazioni e dati tecnici vedere il manuale o il foglio dati del prodotto 3TK2826 www.siemens.com/industrial-controls</p>	Assegnazione dei morsetti	
		A1	L/+
		A2	N/-
		13,14; 23,24; 33,34; 43,44	Circuito di abilitazione (CA) relè, contatto di lavoro
		51,52	Circuito di segnalazione (CS), relè, contatto di riposo (stato CA)
		64 (solo 3TK2826-BB40)	CS elettronico 24 V DC; errore del circuito di retroazione (RF)
		74 (solo3TK2826-BB40)	CS elettronico 24 V DC; (stato del sensore)
		63,64 (solo 3TK2826-CW30)	CS relè contatto di lavoro, errore circuito di retroazione (RF)
		T1,T2	Uscite di test
		T3	Alimentazione sensori 24 V DC
		1	Ingresso in cascata / normale comando operativo
		Y11,Y22	Ingresso sensori canale 1, canale 2
Y33	Pulsante di avvio (avvio dopo fronte di salita e di discesa)		
Y34	circuito di retroazione		
PT	<p>O chaveador de segurança 3TK2826 pode ser usado em dispositivos de PARADA DE EMERGÊNCIA, conforme EN 418, e em circuitos de segurança, conforme EN 60204-1, por ex. em caso de proteções móveis e portas de proteção ou dispositivos de proteção sem contato, conforme IEC 61496-1.</p> <p>O PL ou SIL podem ser alcançados dependendo das conexões externas.</p> <p>Considerando as condições ambientais, os aparelhos devem ser montados nos armários elétricos da classe de proteção IP32, IP43 ou IP 54.</p> <p>Grau de contaminação 3</p> <p>Para mais informações e dados técnicos, consulte o manual ou a folha de dados do produto 3TK2826 www.siemens.com/industrial-controls</p>	Configuração dos terminais	
		A1	L/+
		A2	N/-
		13,14; 23,24; 33,34; 43,44	Circuito de liberação (FK) relé, contato de fechamento
		51,52	Circuito de sinalização (MK) relé, contato de abertura (estado FK)
		64 (apenas 3TK2826-BB40)	MK eletrônico 24 V DC; erro do circuito de retorno (RF)
		74 (apenas 3TK2826-BB40)	MK eletrônico 24 V DC; (estado do sensor)
		63,64 (apenas 3TK2826-CW30)	MK relé de contato de fechamento; erro do circuito de retorno (RF)
		T1,T2	Saídas de teste
		T3	Consumo do sensor 24 V DC
		1	Entrada em cascata/Ligação operacional
		Y11,Y22	Entrada do sensor Canal 1, Canal 2
Y33	Botão de início (Início após flanco ascendente e descendente)		
Y34	circuito de realimentação		

BG	<p>Вие можете да използвате защитния прекъсвач 3TK2826 в устройствата за АВАРИЙНО СПИРАНЕ съгласно EN 418 и в безопасни токови вериги съгласно EN 60204-1, напр. при подвижни покрития и защитни врати респ. при безконтактно действащи защитни устройства съгласно IEC 61496-1.</p> <p>PL респ. SIL, който може да се достигне зависи от външната инсталация.</p> <p>Като се вземат под внимание условията на обкръжаващата среда уредите трябва да бъдат монтирани в разпределителни шкафове с клас на защита IP32, IP43 или IP 54.</p> <p>Допълнителна информация и техническите характеристики можете да намерите в наръчника или техническия паспорт на продукта 3TK2826 www.siemens.com/industrial-controls</p>	Разпределение на клемите	
		A1	L/+
		A2	N/-
		13,14; 23,24; 33,34; 43,44	деблокираща верига (FK) реле, нормално отворен контакт
		51,52	съобщителна верига (МК), реле, нормално-затворен контакт (състояние FK)
		64 (само3TK2826-.BB40)	МК електронен 24 V DC; грешка на веригата на обратната връзка (RF)
		74 (само 3TK2826-.BB40)	МК електронен 24 V DC; (състояние на сензора)
		63,64 (само 3TK2826-.CW30)	МК реле нормално отворен контакт, грешка на веригата на обратната връзка (RF)
		T1,T2	Тестови изходи
		T3	Източник на захранване на сензора 24 V DC
		1	Каскадиращ вход / зависимо от експлоатацията включване
		Y11,Y22	Вход на сензора канал 1 канал 2
		Y33	Стартов бутон (старт след горен и долен фронт
Y34	верига на обратна връзка		
DA	<p>Sikkerhedskoblingsenheden 3TK2826 kan bruges i NØD-STOP-anordninger iht. EN 418 og i sikkerhedsstrømkredse iht. EN 60204-1, fx ved bevægelige skærme og beskyttelsesdøre eller ved berøringssløst virkende beskyttelsesanordninger iht. IEC 61496-1.</p> <p>Det opnåelige PL hhv. SIL er afhængigt af den ekst. disposition.</p> <p>Under hensyntagen til omgivelsesbetingelserne skal apparaterne indbygges i kontaktskabe med beskyttelsesklassen IP32, IP43 eller IP 54.</p> <p>Forureningsgrad 3</p> <p>For yderligere informationer og tekniske data se manual eller produktdatablad 3TK2826 www.siemens.com/industrial-controls</p>	Klemmebelægning	
		A1	L/+
		A2	N/-
		13,14; 23,24; 33,34; 43,44	Frigivelseskreds (FK) relæ, slutter
		51,52	Meldekreds (MK) relæ, bryder (status FK)
		64 (kun 3TK2826-.BB40)	МК електроник 24 V DC; fejl tilbageføringskreds (RF)
		74 (kun3TK2826-.BB40)	МК електроник 24 V DC; (sensorstatus)
		63,64 (kun 3TK2826-.CW30)	МК relæ slutter; fejl tilbageføringskreds (RF)
		T1,T2	Testudgange
		T3	Sensorforsning 24 V DC
		1	Kaskaderingsindgang / driftsmæssig kobling
		Y11,Y22	Sensorindgang kanal 1, kanal 2
		Y33	Starttast (start efter op- og nedadgående flanke)
Y34	tilbagekoblingsløjfe		
ET	<p>Elektrooniline ohutuslülitus 3TK2826 sobib vastavalt standardile DIN EN/IEC 60947-5-5 paigaldamiseks AVARIILÜLITITE vooluahelatesse ja vastavalt standardile DIN EN/IEC 60204-1 elektriõhusahelatesse, nt liikuvad katted, kaits-euksed ja standardile IEC 61496 vastavad puutevabad õhusseadmed-1.</p> <p>Saavutatav PL või SIL sõltub välisjuhtmestikust. Keskkon-natingimusi arvesse võttes tuleb seadmed paigaldada kaitseklassi IP32, IP43 või IP 54 lülituskappidesse.</p> <p>Määrdumise aste 3</p> <p>Rohkem informatsiooni ja tehnilisi andmeid vt käsiraama-tust või toote andmelehel 3TK2826 www.siemens.com/industrial-controls</p>	Klemmide asetis	
		A1	L/+
		A2	N/-
		13,14; 23,24; 33,34; 43,44	Vabastusahel (FK) relee, sulguv kontakt
		51,52	Teavitamisahel (MK), relee, avanev kontakt (FK olek)
		64 (ainult 3TK2826-.BB40)	МК elektrooniliselt 24 V DC; tagasisideahela viga (RF)
		74 (ainult 3TK2826-.BB40)	МК elektrooniliselt 24 V DC; (anduri olek)
		63,64 (ainult 3TK2826-.CW30)	МК relee sulguv kontakt; tagasisideahela viga (RF)
		T1,T2	Testväljundid
		T3	Anduri toide 24 V DC
		1	Kaskaadsisend / talitluslülitamine
		Y11,Y22	Anduri sisend kanal 1, kanal 2
		Y33	Käivitusnupp (käivitamine tõusva või langeva tsükli järel)
Y34	tagasisideahel		

FI	<p>Voit käyttää turvakatkaisulaitetta 3TK2826 standardin EN 418 mukaisissa HÄTÄ-PYSÄYTYS-laitteissa ja standardin EN 60204-1 mukaisissa turvapiireissä, esim. liikkuvissa suojuksissa ja suojaovissa tai standardin IEC 61496-1 mukaisissa kosketuksettomasti vaikuttavissa suoja-laitteissa.</p> <p>Saavutettavissa oleva suoritusaste PL tai turvallisuuden eheyden taso SIL riippuu ulkoisesta kytkennästä. Laitteet on ympäristöolot huomioon ottaen asennettava kytkentäkaappeihin, joiden koteloitiluokka on IP32, IP43 tai IP54.</p> <p>Likaantumistaso 3</p> <p>Katso lisätiedot ja tekniset tiedot käyttöoppaasta tai tuote-erittelystä 3TK2826 osoitteessa www.siemens.com/industrial-controls</p>	Liitinkaavio	
		A1	L/+
		A2	N/-
		13,14; 23,24; 33,34; 43,44	Laukaisupiiri (FK), rele, sulkija
		51,52	Merkinantopiiri (MK), rele, avaja (laukaisupiirin tila)
		64 (vain 3TK2826-.BB40)	Merkinantopiiri elektroninen 24 V DC; takaisinkytkentäpiirin vika (RF)
		74 (vain 3TK2826-.BB40)	Merkinantopiiri elektroninen 24 V DC; (anturin tila)
		63,64 (vain 3TK2826-.CW30)	Merkinantopiirin releen sulkija; takaisinkytkentäpiirin vika (RF)
		T1,T2	Testilähdöt
		T3	Anturin syöttö 24 V DC
		1	Kaskaditilo / käyttökytkentä
Y11,Y22	Anturitilo kanava 1, kanava 2		
Y33	Käynnistysnäppäin (käynnistys etu- ja takareunan jälkeen)		
Y34	takaisinkytkentäpiiri		
EL	<p>Το ρελέ ασφαλείας 3TK2826 μπορείτε να το χρησιμοποιείτε σε διατάξεις ΑΝΑΓΚΑΣΤΙΚΗΣ ΔΙΑΚΟΠΗΣ σύμφωνα με το EN 418 και σε ηλεκτρικά κυκλώματα ασφαλείας σύμφωνα με το EN 60204-1, π.χ. σε κινούμενα καλύμματα και θύρες προστασίας ή σε διατάξεις προστασίας που επενεργούν χωρίς επαφή σύμφωνα με το IEC 61496-1.</p> <p>Το δυνατό PL / SIL εξαρτάται από την εξωτ. καλωδίωση. Συνοπτολογίζοντας τις συνθήκες περιβάλλοντος οι συσκευές πρέπει να ενσωματώνονται σε πίνακες ελέγχουκατηγορίας προστασίας IP32, IP43 ή IP 54. Βαθμός ρυπάνσεως 3</p> <p>Για περισσότερες πληροφορίες και τεχν. χαρακτηριστικά βλ. Εγχειρίδιο χρήσης ή Δελτίο προϊόντος 3TK2826 www.siemens.com/industrial-controls</p>	Κατανομή ακροδεκτών	
		A1	L/+
		A2	N/-
		13,14; 23,24; 33,34; 43,44	Κύκλωμα έγκρισης λειτουργίας (FK) ρελέ, επαφή σύνδεσης
		51,52	Κύκλωμα αναγγελίας (MK), ρελέ, επαφή διακοπής (κατάσταση FK)
		64 (μόνο 3TK2826-.BB40)	MK ηλεκτρονικά 24 V DC, σφάλμα κυκλώματος επαναφοράς (RF)
		74 (μόνο 3TK2826-.BB40)	MK ηλεκτρονικά 24 V DC, (κατάσταση αισθητήρα)
		63,64 (μόνο 3TK2826-.CW30)	MK ρελέ επαφή σύνδεσης, σφάλμα κυκλώματος επαναφοράς (RF)
		T1,T2	Έξοδοι ελέγχου
		T3	Τροφοδοσία αισθητήρα 24 V DC
		1	Είσοδος διαδοχικής σύνδεσης / ενεργοποίηση σύμφωνα με τις ανάγκες λειτουργίας
Y11,Y22	Είσοδος αισθητήρα κανάλι 1, κανάλι 2		
Y33	Πλήκτρο Start (εκκίνηση μετά από σήμα ανόδου και καθόδου)		
Y34	κύκλωμα ανατροφοδότησης		
GA	<p>Féadfaidh tú an t-athsheachadán sábháilteachta 3TK2826 a úsáid i ngléis STAD PRÁINNEACH de réir EN 418 agus i gciorcaid sábháilteachta a chomhlíonann EN 60204-1, m.sh. chun cumhdaigh agus doirse cosanta a bhogadh agus le haghaidh trealamh cosanta leictre-iogair a chomhlíonann IEC 61496-1.</p> <p>Tá an PL nó an SIL a d'fhéadfaí a fháil ag brath ar an sreangú seachtrach.</p> <p>Ag brath ar na dálaí comhthimpeallacha, ní mór go mbeadh athsheachadán le méid cosanta IP32, IP 43 nó IP54 suiteáilte sna caibinéid.</p> <p>Méid truaillithe 3</p> <p>Le haghaidh tuilleadh faisnéise agus sonraí teicniúla, féach an lámhleabhar nó bileog sonraí an táirge 3TK2826 www.siemens.com/industrial-controls</p>	Sannadh teirminéal	
		A1	L/+
		A2	N/-
		13,14; 23,24; 33,34; 43,44	Ciorcad cumasúcháin (EC), athsheachadán, oscailte de ghnáth, neamh-mhoillithe
		51,52	Ciorcad comharthaíochta (SC), athsheachadán, dúnta de ghnáth (stádas EC), neamh-mhoillithe
		64 (3TK2826-.BB40 amháin)	SC soladstaide 24 V DC; fabht ciorcaid fhille (RF)
		74 (3TK2826-.BB40 amháin)	Ciorcad soladstaide 24 V DC; (stádas braiteora)
		63,64 (3TK2826-.CW30 amháin)	SC, athsheachadán, oscailte de ghnáth; fabht ciorcaid fhille (RF)
		T1,T2	Aschuir tástála
		T3	Soláthar braiteora 24 V DC
		1	Ionchur cascáidithe/gnáthdualgas lasccha
Y11,Y22	Ionchur braiteora cainéal 1, cainéal 2		
Y33	Cnaipe tosaithe (tosaigh tar éis ciumhais dhearfach agus ciumhais dhiúltach)		
Y34	ciorcad aisfhotha		

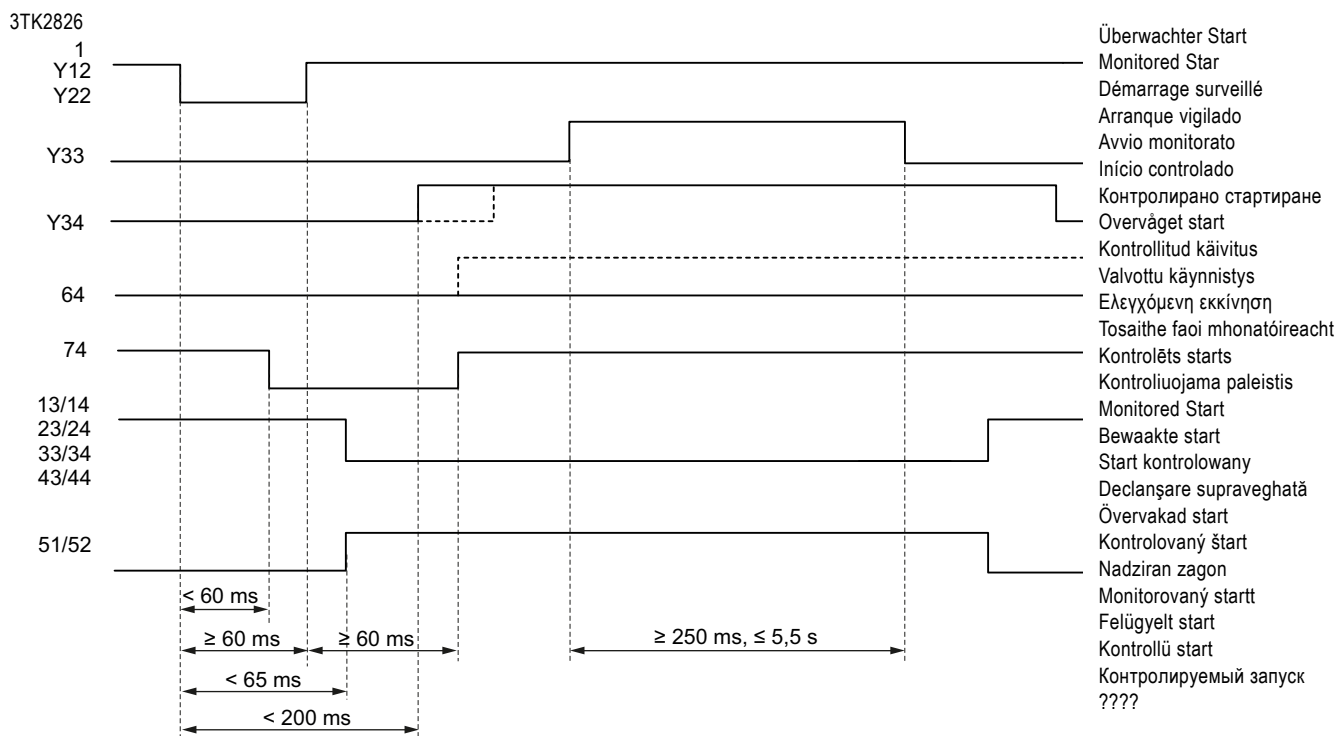
LV	<p>Drošības komutācijas ierīci 3TK2826 var izmantot ĀRKĀRTAS APTURĒŠANAS iekārtās saskaņā ar EN 418 un drošības strāvas ķēdēs saskaņā ar EN 60204-1, piemēram, piemēram, kustīgos vākos un aizsargdurvīs vai bezkontakta drošības ierīcēs saskaņā ar IEC 61496-1. Sasniedzamās vērtības PL, respektīvi, SIL ir atkarīgas no ext. komutācijas.</p> <p>Ņemot vērā apkārtējās vides apstākļus, ierīces ir iebūvējamas sadales skapjos ar aizsardzības pakāpi IP32, IP43 vai IP 54.</p> <p>Aizsērēšanas pakāpe 3</p> <p>Sīkāku informāciju un tehniskos datus skatīt rokasgrāmatā vai izstrādājuma informācijas lapā 3TK2826 www.siemens.com/industrial-controls</p>	Spaiļu aizgēšana	
		A1	L/+
		A2	N/-
		13,14; 23,24; 33,34; 43,44	Aktivācijas kontūrs (FK) relejs, slēgkontakts
		51,52	Signalizācijas kontūrs (MK), relejs, atvienojošs kontakts (statuss FK)
		64 (tikai 3TK2826-BB40)	MK elektronisks 24 V DC; atpakaļsaites kontūra kļūda (RF)
		74 (tikai 3TK2826-BB40)	MK elektronisks 24 V DC; (sensors statuss)
		63,64 (tikai 3TK2826-CW30)	MK relejs ar slēgkontakstu; atpakaļsaites kontūra kļūda (RF)
		T1,T2	Testa izejas
		T3	Sensorsa barošana 24 V DC
		1	Kaskadēšanas ieeja / darba pārslēgšana
		Y11,Y22	Sensorsa ieeja kanāls 1, kanāls 2
		Y33	Starta slēdzis (starts pēc flanga "uz augšu" un "uz leju")
		Y34	atpakaļgaitas kontūrs
LT	<p>Apsauginājuma ierīcē 3TK2826 galite naudoti AVA-RINIO SUSTABDYMO ierīcē pagal EN 418 ir apsauginēse elektros grandinēse pagal EN 60204-1, pvz., judamiems uždengimams, apsauginēms durims ir bkontakčiuose apsauginiuose ierīcēse pagal IEC 61496-1. Pasiekiamas PL arba SIL priklauso nuo išorinės laidų sistemos.</p> <p>Atsižvelgiant į aplinkos sąlygas, prietaisai turi būti įmontuojami į IP 32, IP 43 arba IP 54 saugumo klasės skirstomąsias spintas.</p> <p>Taršos lygis 3.</p> <p>Kitą informaciją ir techninius duomenis žr. žinyną arba gaminio duomenų lapą.</p> <p>3TK2826 www.siemens.com/industrial-controls</p>	Gnybtų priskyrimas	
		A1	L/+
		A2	N/-
		13,14; 23,24; 33,34; 43,44	Atblokavimo grandinė (FK), relė, sujungiamasis kontaktas
		51,52	Signalinė grandinė (MK), relė, atjungiamasis kontaktas (FK būseną)
		64 (tik 3TK2826-BB40)	Elektroninė 24 V DC signalinė grandinė (MK); grįžtamasis grandinės gedimas (RF)
		74 (tik 3TK2826-BB40)	Elektroninė 24 V DC signalinė grandinė (MK); (jautiklių būseną)
		63,64 (tik 3TK2826-CW30)	Relės sujungiamojo kontakto signalinė grandinė (MK); grįžtamasis grandinės gedimas (RF)
		T1,T2	Išėjimai testavimui
		T3	Jutiklių maitinimas 24 V DC
		1	Pakopinis įėjimas / darbinis įjungimas
		Y11,Y22	1 kanalo, 2 kanalo jutiklio įėjimas
		Y33	Paleidimo mygtukas (paleidimas po pakėlimo ir nuleidimo)
		Y34	grįžtamojo ryšio grandinė
MT	<p>Tista' tuża r-rilej tas-sigurtà elettroniku 3TK2826 f'apparat ta' WAQFIEN TA' EMERĠENZA skont EN 418 u f'ċirkuwiti tas-sigurtà li jikkonformaw ma' EN 60204-1. eż. għal għata li tiċċaqlaq, bibien ta' protezzjoni u apparat protettiv elettrosensittiv li jikkonformaw ma' IEC 61496-1.</p> <p>Il-PL jew SIL li jista' jinkiseb jiddependi mill-wajering estern. Minhabba l-kundizzjonijiet ambjentali, relays b'livelli ta' protezzjoni IP32, IP 43 jew IP54 għandhom jiġu installati f'armarji.</p> <p>Għal aktar informazzjoni u dejta teknika, ara l-manwal jew il-folja ta' tagħrif dwar il-prodott</p> <p>3TK2826 www.siemens.com/industrial-controls</p>	Assenjazzjoni tat-Terminal	
		A1	L/+
		A2	N/-
		13,14; 23,24; 33,34; 43,44	Rilej taċ-ċirkuwit attivatur (EC - enabling circuit), miftuħ-normalment
		51,52	Ċirkuwit sinjalatur (SC - signaling circuit), magħluq-normalment (stejtus KE)
		64 (3TK2826-BB40 biss)	SC stat solidu 24 V DC; ħsara fiċ-ċirkuwit ta' ritorn (RF- return circuit fault)
		74 (3TK2826-BB40 biss)	SC stat solidu 24 V DC; (status tas-senser)
		63,64 (3TK2826-CW30 biss)	SC, rilej, miftuħ normalment; ħsara fiċ-ċirkuwit ta' ritorn (RF- return circuit fault)
		T1,T2	Riżultati tat-test
		T3	Provvista tas-senser 24 V DC
		1	Kompitu ta' qlib input/normali cascading
		Y11,Y22	Input tas-senser kanal 1, kanal 2
		Y33	Buttuna tal-istartjar (bidu wara tarf jittla' u jinżel)
		Y34	ċirkuwit ta' feedback

NL	<p>Het veiligheidsschakeltoestel 3TK2826 kunt u gebruiken in NOODSTOP-inrichtingen volgens EN 418 en in veiligheidsstroomkringen volgens EN 60204-1, bijv. bij beweeglijke afdekkingen en veiligheidsdeuren of bij aanrakingsvrije beveiligingsinrichtingen volgens IEC 61496-1.</p> <p>De bereikbare PL resp. SIL is afhankelijk van de ext. bedrading.</p> <p>Afhankelijk van de omgevingsvoorwaarden moeten de apparaten in schakelkasten van de beschermingsklasse IP32, IP43 of IP 54 worden ingebouwd.</p> <p>Vervuilingsgraad 3</p> <p>Meer informatie en Techn. gegevens zie handboek of productinformatieblad</p> <p>3TK2826 www.siemens.com/industrial-controls</p>	Klembezetting	
		A1	L/+
		A2	N/-
		13,14; 23,24; 33,34; 43,44	Vrijgavecircuit (FK), relais, maakcontact
		51,52	Signaalcircuit (MK), relais, verbreekcontact (status FK)
		64 (alleen 3TK2826-BB40)	MK elektronisch 24 V DC; fout in retourcircuit (RF)
		74 (alleen 3TK2826-BB40)	MK elektronisch 24 V DC; (sensorstatus)
		63,64 (alleen 3TK2826-.CW30)	MK relais maakcontact; fout in retourcircuit (RF)
		T1,T2	Testuitgangen
		T3	Sensorvoeding 24 V DC
		1	Cascadeeringang / bedrijfsmatig schakelen
		Y11,Y22	Sensingang kanaal 1, kanaal 2
Y33	Startknop (start na opwaartse en neerwaartse flank)		
Y34	retourcircuitk		
PL	<p>Przełącznik bezpieczeństwa 3TK2826 można stosować w urządzeniach zatrzymania awaryjnego według EN 418 i w elektrycznych obwodach zabezpieczających według EN 60204-1, np. w przypadku ruchomych osłon i drzwi ochronnych bądź w przypadku bezdotykowych urządzeń ochronnych według IEC 61496-1.</p> <p>Osiągalne PL bądź SIL jest zależne od zewn. oprzewodowania.</p> <p>Urządzenia, z uwzględnieniem warunków środowiska, muszą być wbudowane do szaf sterowniczych ze stopniem ochrony IP32, IP43 lub IP 54.</p> <p>Stopień zanieczyszczenia 3</p> <p>Dalsze informacje i dane techniczne patrz podręcznik lub arkusz specyfikacji produktu</p> <p>3TK2826 www.siemens.com/industrial-controls</p>	Obłożenie zacisków	
		A1	L/+
		A2	N/-
		13,14; 23,24; 33,34; 43,44	Obwód zezwolenia (FK) przekaźnik, zestyk zwierny
		51,52	Obwód zgłoszenia (MK), przekaźnik, zestyk rozwierny (status FK)
		64 (tylko 3TK2826-BB40)	MK elektroniczny 24 V DC; błąd obwodu zwrotnego (RF)
		74 (tylko 3TK2826-BB40)	MK elektroniczny 24 V DC; (status czujnika)
		63,64 (tylko 3TK2826-.CW30)	MK przekaźnik, zestyk zwierny; błąd obwodu zwrotnego (RF)
		T1,T2	Wyjścia testowe
		T3	Zasilanie czujnika 24 V DC
		1	Wejście kaskadowe / połączenie eksploatacyjne
		Y11,Y22	Wejście czujnika: kanał 1, kanał 2
Y33	Przycisk startu (start po zboczu narastającym i malejącym)		
Y34	obwód powrotny		
RO	<p>Modulul multifuncțional 3TK2826 poate fi montat în dispozitivele pentru OPRIREA DE URGENȚĂ prevăzute în standardul EN 415 și în circuitele electrice de siguranță prevăzute în standardul EN 60204-1, de ex. la aparatoarele demontabile și ușile de protecție, resp. la dispozitivele de protecție cu reacție fără atingere, prevăzute în standardul IEC 61496-1.</p> <p>Nivelul de performanță (PL) respectiv nivelul de integritate a siguranței (SIL) realizabile depind de instalația electrică externă.</p> <p>În funcție de condițiile de mediu, aparatele trebuie să fie montate în cutii de distribuție cu grad de protecție IP32, IP43 sau IP 54.</p> <p>Nivel 3 de contaminare</p> <p>Pentru informații suplimentare și date tehnice se vor consulta manualul de utilizare sau fișa de produs 3TK2826 www.siemens.com/industrial-controls</p>	Alocarea terminalelor	
		A1	L/+
		A2	N/-
		13,14; 23,24; 33,34; 43,44	Circuit de deblocare (FK) releu, închizător
		51,52	Circuit de semnalizare (MK), releu, ruptor (stare FK)
		64 (numai 3TK2826-BB40)	MK electronic 24 V DC; erori circuit de retur (RF)
		74 (numai 3TK2826-BB40)	MK electronic 24 V DC; (stare senzori)
		63,64 (numai 3TK2826-.CW30)	MK releu închizător; erori circuit de retur (RF)
		T1,T2	leșiri de control
		T3	Alimentare senzori 24 V DC
		1	Intrare cascadare / comutare de serviciu
		Y11,Y22	Intrare senzori canal 1, canal 2
Y33	Buton de pornire (pornire după flanc ascendent și descendent)		
Y34	Circuit de retur		

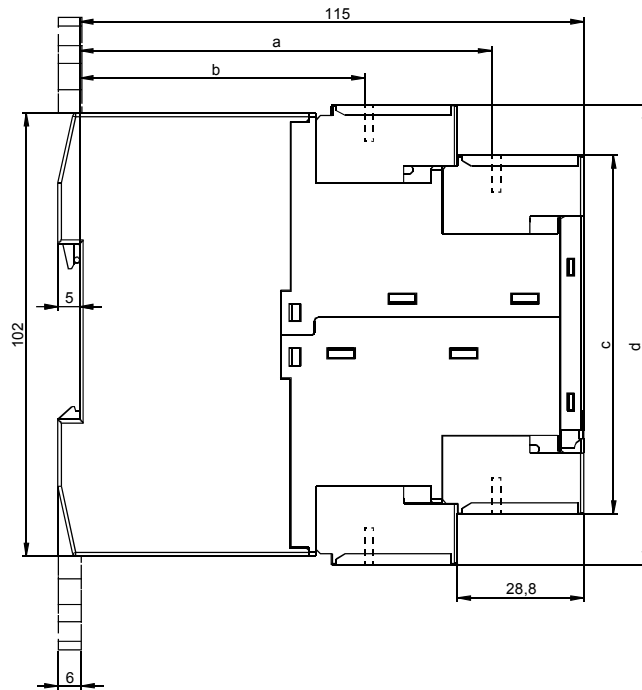
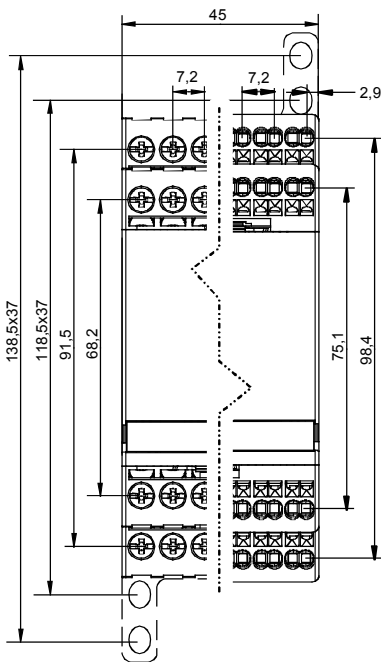
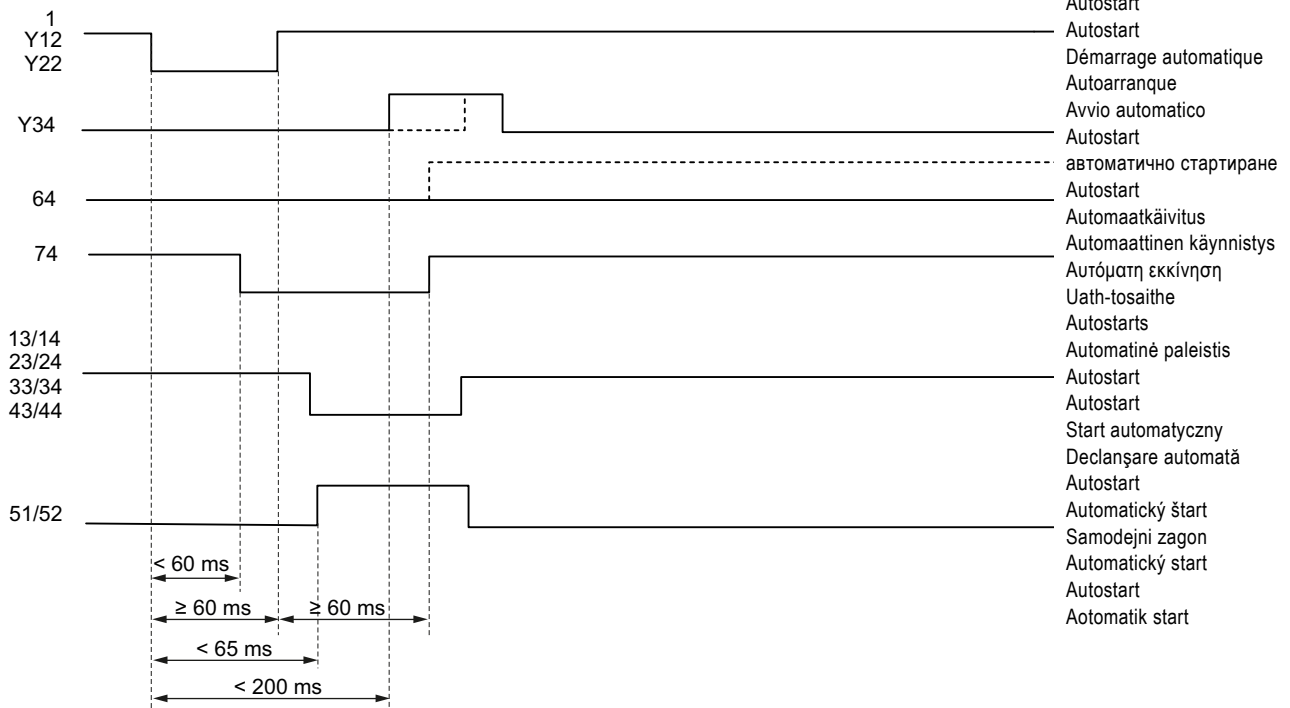
SV	<p>Säkerhetsbrytaren 3TK2826 kan du använda i NÖD-STOPP-anordningar enligt EN 418 och i säkerhetsströmkretsar enligt EN 60204-1, t.ex. vid rörliga skydd och skyddsörrar resp. vid beröringsfritt verkande skyddsanordningar enligt IEC 61496-1.</p> <p>Den PL eller SIL som uppnås är beroende av den ext. kopplingen.</p> <p>Med hänsyn till omgivande villkor måste enheterna monteras i kopplingskåp med skyddsklass IP32, IP43 eller IP 54. Föreningensgrad 3</p> <p>Ytterligare information och tekniska data, se handboken eller produktdatabladet</p> <p>3TK2826 www.siemens.com/industrial-controls</p>	Anslutningsbeläggning	
		A1	L/+
		A2	N/-
		13,14; 23,24; 33,34; 43,44	Frigivningskrets (FK) relä, slutare
		51,52	Signalkrets (MK), relä, öppnare (status FK)
		64 (endast 3TK2826-.BB40)	MK elektronisk 24 V DC; återföringskretsfel (RF)
		74 (endast 3TK2826-.BB40)	MK elektronisk 24 V DC; (sensorstatus)
		63,64 (endast 3TK2826-.CW30)	MK relä slutare; återföringskretsfel (RF)
		T1,T2	Testutgångar
		T3	Sensorförsörjning 24 V DC
		1	Kaskadingång / driftsmässig koppling
		Y11,Y22	Sensingång kanal 1, kanal 2
		Y33	Startknapp (start efter uppgående och nedåtgående flank)
Y34	återföringskrets		
SK	<p>Bezpečnostný spínací prístroj 3TK2826 môžete použiť v zariadeniach pre núdzové zastavenie podľa EN 418 a v bezpečnostných elektrických obvodoch podľa EN 60204-1, napr. pri pohyblivých krytoch a ochranných dverách resp. pri bezdotykovy účinkujúcich ochranných zariadeniach podľa IEC 61496-1.</p> <p>Dosiahnuteľné PL resp. SIL je závislé od ext. zapojenia. Pri zohľadnení vonkajších podmienok musia byť prístroje zabudované do rozvodných skríň s krytím IP32, IP43 alebo IP 54.</p> <p>Stupeň znečistenia 3</p> <p>Ďalšie informácie a technické parametre nájdete v príručke alebo liste údajov produktu</p> <p>3TK2826 www.siemens.com/industrial-controls</p>	Obsadenie svoriek	
		A1	L/+
		A2	N/-
		13,14; 23,24; 33,34; 43,44	uvolňovací obvod (FK) relé, zatvárací kontakt
		51,52	signálny obvod (MK), relé, otvárací kontakt (status FK)
		64 (len 3TK2826-.BB40)	signálny obvod elektronický 24 V DC; chyba spätného obvodu (RF)
		74 (len 3TK2826-.BB40)	signálny obvod elektronický 24 V DC; (status senzora)
		63,64 (len 3TK2826-.CW30)	signálny obvod relé zatvárací kontakt; chyba spätného obvodu (RF)
		T1,T2	kontrolné výstupy
		T3	napájanie senzora 24 V DC
		1	kaskádový vstup / prevádzkové spínanie
		Y11,Y22	vstup senzora kanal 1, kanal 2
		Y33	štartové tlačidlo (štart po nábehovej a zostupnej hrane impulzu)
Y34	spätný obvod		
SL	<p>Varnostna stikalno napravo 3TK2826 lahko uporabite v pripravah ZA IZKLOP V SILI v skladu z EN 418 in varnostnimi tokokrogovi v skladu z EN 60204-1, npr. pri premičnih pokrovi in zaščitnih vratih v skladu z IEC 61496-1.</p> <p>Dosežen PL oz. SIL je odvisen od zunanega dodatnega vezja.</p> <p>Ob upoštevanju okoljskih pogojev morajo naprave biti vgrajene v stikalnih omaricah zaščitne vrste IP32, IP43 ali IP 54. Stopnja onesnaženja 3</p> <p>Dodatne informacije in tehnične podatke glejte priročnik ali podatkovni list izdelka</p> <p>3TK2826 www.siemens.com/industrial-controls</p>	Zasedenost sponk	
		A1	L/+
		A2	N/-
		13,14; 23,24; 33,34; 43,44	Sprostitveni krog (FK) rele, izklopni kontakt
		51,52	Javljalni krog (MK), rele, vklopni kontakt (stanje FK)
		64 (samo 3TK2826-.BB40)	MK elektronski 24 V DC; napaka povratnega kroga (RF)
		74 (samo 3TK2826-.BB40)	MK elektronski 24 V DC; (stanje senzorja)
		63,64 (samo 3TK2826-.CW30)	MK rele izklopni kontakt; napaka povratnega kroga (RF)
		T1,T2	Testni izhodi
		T3	Napajanje senzorja 24 V DC
		1	Kaskadni vhod/obratovalno preklapljanje
		Y11,Y22	Vhod senzorja kanal 1, kanal 2
		Y33	Tipka za zagon (zagon po stranici navzgor in navzdol)
Y34	povratni krog		

CS	<p>Bezpečnostní relé 3TK2826 můžete použít v zařízeních pro nouzové vypnutí podle EN 418 a v bezpečnostních obvodech podle DIN 60204-1, např. u pohyblivých krytů, ochranných dveří, příp. u bezkontaktně fungujících ochranných zařízení podle IEC 61496-1.</p> <p>Dosažitelná úroveň PL, příp. SIL závisí na externím zapojení.</p> <p>Se zohledněním okolních podmínek se tyto přístroje musí zabudovat do rozvaděčů se stupněm krytí IP32, IP43 nebo IP 54.</p> <p>Stupeň znečištění 3</p> <p>Další informace a Technické údaje viz manuál nebo datový list výrobku</p> <p>3TK2826 www.siemens.com/industrial-controls</p>	Zapojení svorek	
		A1	L/+
		A2	N/-
		13,14; 23,24; 33,34; 43,44	Aktivační obvod (AO) relé, zapínací kontakt
		51,52	Signalizační obvod (SO), relé, rozpínací kontakt (stav AO)
		64 (jen 3TK2826-.BB40)	SO elektronický 24 V DC; chyba zpětnovazební smyčky (CHZ)
		74 (jen 3TK2826-.BB40)	SO elektronický 24 V DC; (stav snímače)
		63,64 (jen 3TK2826-.CW30)	SO relé zapínací kontakt; chyba zpětnovazební smyčky (CHZ)
		T1,T2	Testovací výstupy
		T3	Napájení snímačů 24 V DC
		1	Kaskádový vstup / provozní spínání
		Y11,Y22	Vstup snímače kanál 1, kanál 2
		Y33	Startovací tlačítko (start náběžnou a sestupnou hranou)
Y34	zpětnovazební smyčka		
HU	<p>A 3TK2826 biztonsági berendezést a DIN EN / IEC 60947-5-5-nak megfelelő VÉSZ-ÁLLJ berendezésekben és a DIN EN / IEC 60204-1-nak megfelelő biztonsági áramkörökben tudja használni, pl. mozgatható fedelek, védőajtók, illetve az IEC 61496-1-nek megfelelő érintés nélkül üzemelő védőberendezések használata esetén.</p> <p>Az elért LE, valamint SIL a külső rákapcsolástól függ.</p> <p>A berendezéseket a környezeti feltételek figyelembe vételével az IP32-es, IP43-as, vagy IP 54-es védelmi osztályú kapcsolószekrényekbe kell beépíteni.</p> <p>További információkat és műszaki adatokat a kézikönyvben, vagy a 3TK2826 termékadatlapon talál www.siemens.com/industrial-controls</p>	Csatlakozókiosztás	
		A1	L/+
		A2	N/-
		13,14; 23,24; 33,34; 43,44	Megszakító-hurok (FK) relé, záró
		51,52	Jelentés-hurok (MK), relé, nyitó (státusz FK)
		64 (csak 3TK2826-.BB40)	Jelentés-hurok (JH) elektronikus 24 V DC; visszacsatolóhurok-hiba (VH)
		74 (csak 3TK2826-.BB40)	Jelentés-hurok (JH) elektronikus 24 V DC; (érzékelő-állapot)
		63,64 (csak 3TK2826-.CW30)	MK relé záró; visszacsatolóhurok-hiba (RF)
		T1,T2	Tesztkimenetek
		T3	Érzékelő-ellátás 24 V DC
		1	Kaszád-bemenet / üzemszerű kapcsolás
		Y11,Y22	Érzékelő-bemenet 1. csatorna 2. csatorna
		Y33	Indító nyomógomb (indulás felső és alsó oldal)
Y34	visszacsatolóhurok		
TR	<p>Güvenlik kontrol cihazı 3TK2826'ı EN 418'e göre ACİL DURDURMA donanımlarında ve EN 60204-1'e göre güvenlik devrelerinde kullanabilirsiniz, örneğin hareketli muhafazalarda ve koruyucu kapılarda ya da IEC 61496-1'ya göre temassız olarak etkili koruma donanımlarında.</p> <p>Erişilebilen PL (performans seviyesi) ya da SIL (güvenlik seviyesi) harici devreye bağımlıdır.</p> <p>Cihazların, ortam koşulları dikkate alınmak şartıyla IP32, IP43 veya IP54 koruma türüne sahip kumanda dolaplarına monte edilmesi şarttır.</p> <p>Kirlenme derecesi 3</p> <p>Daha fazla bilgi ve teknik veri için el kitabına veya ürün bilgi formuna bakınız</p> <p>3TK2826 www.siemens.com/industrial-controls</p>	Terminal düzeni	
		A1	L/+
		A2	N/-
		13,14; 23,24; 33,34; 43,44	Onaylama devresi (FK) röle, kapatıcı kontak
		51,52	Bildirim devresi (MK), röle, açıcı kontak (durum FK)
		64 (sadece 3TK2826-.BB40)	MK elektronik 24 V DC; geri bildirim devresi hatası (RF)
		74 (sadece 3TK2826-.BB40)	MK elektronik 24 V DC; (sensör durumu)
		63,64 (sadece 3TK2826-.CW30)	MK röle kapatıcı kontak; geri bildirim devresi hatası (RF)
		T1,T2	Test çıkışları
		T3	Sensör beslemesi 24 V DC
		1	Kaskatlama girişi / İşletime uygun anahtarlama
		Y11,Y22	Sensör girişi Kanal 1, Kanal 2
		Y33	Start butonu (yükselen ve düşen kenardan sonra start)
Y34	geri bildirim devresi		

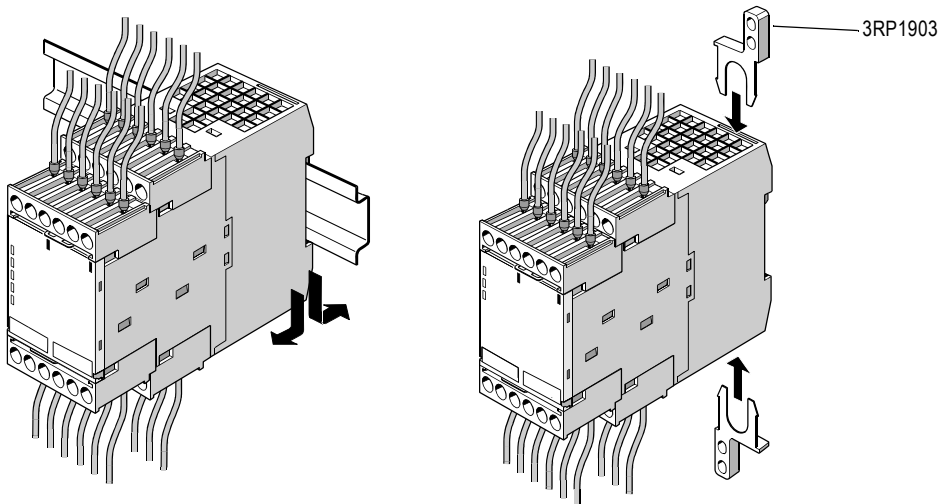
РУ	<p>Реле безопасности 3TK2826 может использоваться для устройств АВАРИЙНОЙ ОСТАНОВКИ согласно EN 418 цепей безопасности согласно EN 60204-1. Например для съемных кожухов, защитных дверей или электрочувствительных устройств безопасности, соответствующих IEC 61496-1.</p> <p>Возможны оба типа применения PL или SIL, в зависимости от схемы внешних подключений.</p> <p>В соответствии с с окружающими условиями, в шкафы должны быть установлены реле степеней защиты IP32, IP43 или IP54.</p> <p>степень загрязнения 3</p> <p>Для получения более подробной информации или технических данных смотрите лист тех.данных 3TK2826 www.siemens.com/industrial-controls</p>	Обозначение клемм	
		A1	L/+
		A2	N/-
		13,14; 23,24; 33,34; 43,44	Цепь отпирания (FK) реле, замыкающий контакт
		51,52	Сигнальная цепь (МК), реле, размыкающий контакт (статус FK)
		64 (только 3TK2826-.BB40)	МК электронная 24 В пост.тока; ошибка цепи обратной связи (RF)
		74 (только 3TK2826-.BB40)	МК электронная 24 В пост.тока; (статус датчика)
		63,64 (только 3TK2826-.CW30)	МК реле замыкающий контакт; ошибка цепи обратной связи (RF)
		T1,T2	Тестовые выходы
		T3	Питание датчика 24 В пост.тока
		1	Вход каскадирования / эксплуатационное коммутирование
		Y11,Y22	Вход датчика канал 1, канал 2
		Y33	Кнопка запуска (запуск после фронта вверх и вниз)
Y34	цель обратной связи		
中文	<p>您可在符合 EN 418 的紧急停机装置中和符合 EN 60204-1 的安全电路中使用安全开关设备 3TK2826, 例如移动护板、防护门和符合 IEC 61496-1 的免触摸防护装置。</p> <p>可达到的安全完整性等级 (SIL) 或者性能等级 (PL) 依赖于外部的电路。</p> <p>在考虑环境条件的情况下, 这些设备必须安装到防护等级为 IP32、IP32 或 IP54 的开关柜中。</p> <p>污染等级 3 触点扩展</p> <p>更多信息和技术数据, 请参见 www.siemens.com/industrial-controls 的手册或产品数据表</p>	端子分配	
		A1	L/+
		A2	N/-
		13,14; 23,24; 33,34; 43,44	继电器脱扣电路 (FK), 常开触点
		51,52	信号电路 (MK), 继电器, 常闭触点 (状态 FK)
		64 (仅 3TK2826-.BB40)	МК 电子 24 V DC; 反馈回路故障 (RF)
		74 (仅 3TK2826-.BB40)	МК 电子 24 V DC; (传感器状态)
		63,64 (仅 3TK2826-.CW30)	МК 继电器常开触点; 反馈回路故障 (RF)
		T1,T2	测试输出端
		T3	传感器电源 24 V DC
		1	级联输入端 / 反馈回路故障
		Y11,Y22	传感器输入端通道 1、通道 2
		Y33	启动键 (根据上下脉冲沿启动)
Y34	反馈回路		



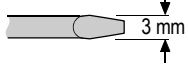
3TK2826



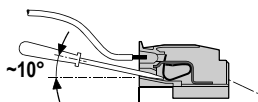
	3TK2825-1	3TK2825-2
a	94	—
b	65	—
c	82,6	84,4
d	105,9	107,7



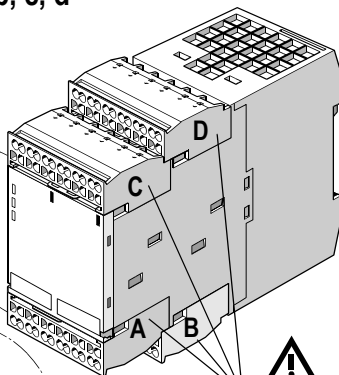
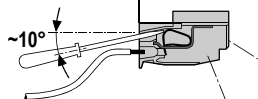
1
DIN ISO 2380-1A 0,5 x 3



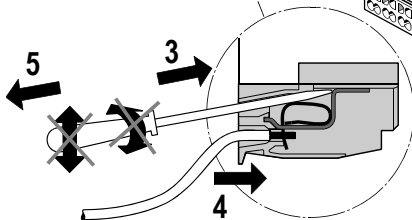
1. $U = 0\text{ V}$
2. a, b, c, d



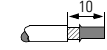
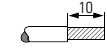


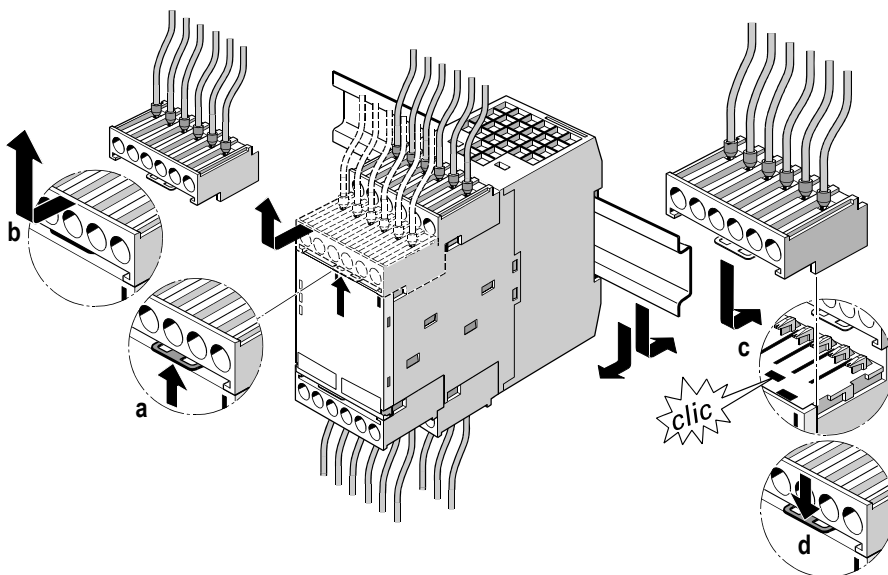
2



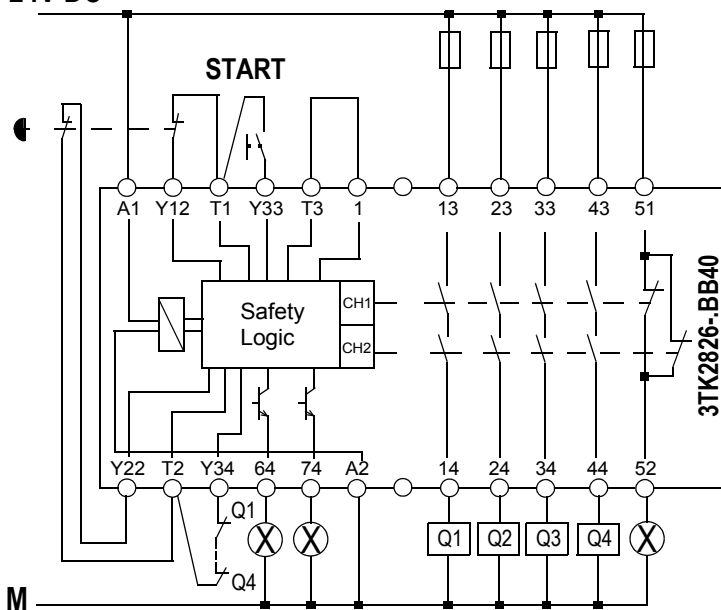
A, B, C, D:



	3TK2826-1...	3TK2826-2...
 Ø 5...6 mm / PZ2	0,8 ... 1,2 Nm 7 ... 10,3 lbf.in	—
	1 x 0,5 ... 4,0 mm ² 2 x 0,5 ... 2,5 mm ²	2 x 0,25 ... 1,5 mm ²
	2 x 0,5 ... 1,5 mm ² 1 x 0,5 ... 2,5 mm ²	2 x 0,25 ... 1,5 mm ²
	—	2 x 0,25 ... 1,5 mm ²
AWG	2 x 14...20	2 x 16...24

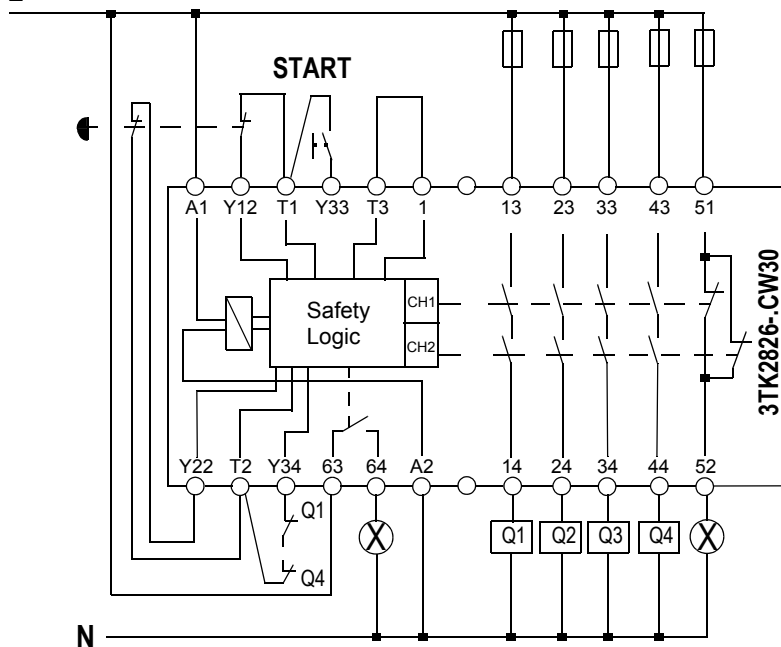


24V DC



- Überwacher Start (2-kanalig)
- Monitored Star (2-channel)
- Démarrage surveillé (2 canaux)
- Arranque vigilado (2 canales)
- Avvio monitorato (a 2 canali)
- Início controlado (2 canais)
- Контролирано стартиране (2-канално)
- Överväget start (2 kanaler)
- Kontrollitud käivitus (2-kanaliga)
- Valvottu käynnistys (2-kanavainen)
- Ελεγχόμενη εκκίνηση (2 καναλιών)
- Tosaithe faoi mhonatóireacht (2-chainéal)
- Kontrolēts starts (2 kanālu)
- Kontroliuojama paleistis (2 kanalu)
- Monitored Start (2 kanali)
- Bewaakte start (2-kanaals)
- Start kontrolowany (2 kanałowe)
- Declanșare supraveghată (bicanal)
- Övervakad start (2-kanals)
- Kontrolovaný štart(2-kanálové)
- Nadziran zagon (2-kanalno)
- Monitorovaný štartt (dvoukanálový)
- Felügyelt start (2-csatornás)
- Kontrollü start (2 kanallı)

L



- Überwacher Start (2-kanalig)
- Monitored Star (2-channel)
- Démarrage surveillé (2 canaux)
- Arranque vigilado (2 canales)
- Avvio monitorato (a 2 canali)
- Início controlado (2 canais)
- Контролирано стартиране (2-канално)
- Överväget start (2 kanaler)
- Kontrollitud käivitus (2-kanaliga)
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- Ελεγχόμενη εκκίνηση (2 καναλιών)
- Tosaithe faoi mhonatóireacht (2-chainéal)
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- Monitorovaný štartt (dvoukanálový)
- Felügyelt start (2-csatornás)
- Kontrollü start (2 kanallı)

DE	erklärt, dass das Produkt mit den im Anhang (EG-Konformitätserklärung) angegebenen Richtlinien und Normen übereinstimmt.	verantwortlich: I IA CE CP R&D
EN	explains that the product complies with the guidelines and standards given in the appendix (EC declaration of conformity)	Responsible: I IA CE CP R&D
FR	déclare que le produit est conforme aux directives et normes indiquées en annexe (déclaration CE de conformité)	responsable I IA CE CP R&D
ES	declara que el producto es conforme con las directivas y normas indicadas en el anexo (declaración de conformidad CE)	responsable: I IA CE CP R&D
IT	dichiara, che il prodotto è conforme alle direttive e norme elencate in appendice (dichiarazione di conformità CE)	responsabile: I IA CE CP R&D
PT	explica que o produto está em conformidade com as diretivas e normas apresentadas no anexo (declaração de conformidade CE)	responsável: I IA CE CP R&D
BG	декларира, че продуктът съответства на посочените в приложението (декларация за съответствие на EO) директиви и стандарти	отговорен: I IA CE CP R&D
DA	erklærer, at produktet stemmer overens med de direktiver og standarder, som er angivet i bilaget (EF-konformitetserklæring)	Ansvarlig: I IA CE CP R&D
ET	deklareerib, et toode vastab lisas (EÜ-vastavusdeklaratsioon) nimetatud direktiividele ja normidele	vastutav: I IA CE CP R&D
FI	vakuuttaa, että tuote on liitteessä (EY:n vaatimustenmukaisuusvakuutus) ilmoitettujen direktiivien ja standardien mukainen	Vastuullinen taho: I IA CE CP R&D
EL	δηλώνει ότι το προϊόν συμφώνει με τις οδηγίες και τα πρότυπα που αναφέρονται στο παράρτημα (δήλωση συμμόρφωσης EK)	υπεύθυνος: I IA CE CP R&D
GA	miníonn seo go bhfuil an táirge i gcomhréir leis na treoirlínte agus na caighdeáin san aguisín (dearbhú comhréireachta CE)	Responsible: I IA CE CP R&D
LV	apliecina, ka izstrādājums atbilst pielikumā (EK atbilstības deklarācija) norādīto direktīvu un normu prasībām	atbildīgs: I IA CE CP R&D
LT	pareiškia, kad produktas atitinka priede (EB atitikties deklaracijoje) nurodytas direktyvas ir standartus	atsakingas: I IA CE CP R&D
MT	jispjega li l-prodott jikkonforma mal-linji gwida u standards moghtija fl-appendiċi (dikjarazzjoni tal-konformità tal-KE)	Risponsabbli: I IA CE CP R&D
NL	verklaart dat het product in overeenstemming is met de in de bijlage (EG-conformiteitsverklaring) vermelde richtlijnen en normen	verantwoordelijk: I IA CE CP R&D
PL	oświadcza, że produkt jest zgodny z podanymi w załączniku (deklaracji zgodności WE) dyrektywami i normami	odpowiedzialny: I IA CE CP R&D
RO	declară, că produsul este conform cu directivele și normele din anexă (Declarația de conformitate CE)	responsabil: I IA CE CP R&D
SV	försäkrar att produkten överensstämmer med de i bilagan (EG-försäkran om överensstämmelse) angivna direktiven och normerna	ansvarig: I IA CE CP R&D
SK	prehlasuje, že výrobok sa zhoduje so smernicami a normami uvedenými v prílohe (prehlásenie o zhode ES)	zodpovedný: I IA CE CP R&D
SL	izjavlja, da je izdelek skladen z v prilogi (ES izjava o skladnosti) navedenimi smernicami in normami	odgovornost: I IA CE CP R&D
CS	prohlašuje, že se výrobek shoduje se směrnicemi a normami uvedenými v příloze (ES prohlášení o shodě)	odpovědný: I IA CE CP R&D
HU	kinyilvánítja, hogy a termék a függelékben (EU-megfelelőségi nyilatkozat) felsorolt irányelvekkel és normákkal összhangban van.	felelős: I IA CE CP R&D
TR	ürünün ekteki belgede (AB Uygunluk Beyanı) belirtilmiş olan direktif ve standartlara uygun olduğunu beyan eder	Sorumlu: I IA CE CP R&D
PY	объясняет, что изделие соответствует указанным в приложении (декларация о соответствии стандартам ЕС) директивам и нормам	ответственный: I IA CE CP R&D
中文	声明产品符合附录（欧盟一致性声明）内说明的准则和标准	负责部门: I IA CE CP R&D

SIEMENS

EG-Konformitätserklärung

EC-Declaration of Conformity
CE-Déclaration de conformité

Siemens AG / I IA CE CP

Wir

We/Nous (Name des Anbieters / supplier's name / nom du fournisseur)

**Werner-von-Siemens-Straße 48
D-92220 Amberg**

(Anschrift / address / adresse)

erklären in alleiniger Verantwortung, daß das (die) Produkt(e) / declare under our
sole responsibility that the product(s) / Déclarons sous notre seule responsabilité, que le(s) produit(s)

Diese Konformitätserklärung
entspricht der
DIN EN ISO/IEC 17050
"Konformitätsbewertung -
Konformitätserklärungen
von Anbietern".

This Declaration of Conformity is
suitable to the
DIN EN ISO/IEC 17050
"Conformity assessment-
Supplier's declaration of
Conformity".

Cette Déclaration de conformité
correspond à la
norme DIN EN ISO/IEC 17050
"Évaluation de la conformité -
déclarations de conformité du
fournisseurs".

Sicherheitsschaltgerät

Safety relay
Bloc logique de sécurité

**3TK2820.., 3TK2826.., 3TK2840.., 3TK2841.., 3TK2842..,
3TK2845.., 3TK2850.., 3TK2851.., 3TK3852.., 3TK2853..,
3TK2856.., 3TK2857...**

(Bezeichnung, Typ oder Modell, Los-, Chargen- oder Serien-Nr., möglichst Herkunft und Stückzahl
name, type or model, batch or serial number, possibly sources and number of items
nom, type ou modèle, N° de lot ou de série, si possible l'origine et quantité)

mit folgenden Europäischen Richtlinien übereinstimmt (übereinstimmen):
is (are) in conformity with the following directives: / Répond(ent) aux directives suivantes:

Maschinenrichtlinie Nr.: 2006/42/EG

Machinery Directive No.: 2006/42/EC
Directive Machine N°: 2006/42/CE

EMV Richtlinie Nr.: 2004/108/EG

EMC Directive No.: 2004/108/EC
Directive CEM N°: 2004/108/CE

Dies wird nachgewiesen durch die Einhaltung folgender Norm(en)

This is documented by the accordance with the following standard(s)
Justifié par le respect de la (des) norme(s) suivante(s)

DIN EN 60947-5-1: 2010, DIN EN 62061: 2005

**DIN EN ISO 13849-1: 2008; DIN EN ISO 13849-2: 2008,
DIN EN 61508-1 up to 7: 2002**

Benannte Stelle und Nummer der EG-Baumusterprüfbescheinigung

Notified Body and number of the EC-type-examination certificate
Organisme agréé et numéro du certificate de test CE

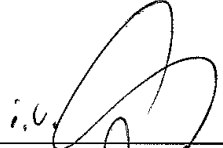
**TÜV SÜD Produkt Service GmbH Zertifizierstelle,
Ridlerstraße 65 80339 München ;
Z10 09 12 38717 023**

Datum des CE-Zeichens
Affixing date of CE-Mark
Année de déclaration du
marquage


2002

Amberg, 2012-01-19

(Ort und Datum
Place and date
Lieu et date)


I IA CE CP R&D EN/Hr. Knauer

(Name und Unterschrift oder gleichwertige Kennzeichen des Befugten und Dokumentenbevollmächtigten /
name and signature or equivalent marking of authorized person and authorized person for documentation /
Nom et signature ou signe équivalent de la personne autorisée et personne autorisée pour la documentation)


I IA CE CP R&D VI Hr. Schweiger

SIEMENS

SIMATIC

S7-300 CPU 31xC and CPU 31x: Technical specifications

Manual

Preface

Guide to the S7-300 documentation	1
Operator controls and indicators	2
Communication	3
PROFINET	4
Memory concept	5
Cycle and response times	6
General technical specifications	7
Technical specifications of CPU 31xC	8
Technical specifications of CPU 31x	9

This manual is part of the documentation package
with the order number: 6ES7398-8FA10-8BA0

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

⚠ DANGER
indicates that death or severe personal injury will result if proper precautions are not taken.
⚠ WARNING
indicates that death or severe personal injury may result if proper precautions are not taken.
⚠ CAUTION
with a safety alert symbol, indicates that minor personal injury can result if proper precautions are not taken.
CAUTION
without a safety alert symbol, indicates that property damage can result if proper precautions are not taken.
NOTICE
indicates that an unintended result or situation can occur if the corresponding information is not taken into account.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation for the specific task, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

⚠ WARNING
Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be adhered to. The information in the relevant documentation must be observed.

Trademarks

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Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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Preface

Purpose of this manual

This manual contains essential information about the following:

- Installation
- Communication
- Memory concept
- Cycle and response times
- Technical specifications of the CPUs.

Basic knowledge required

- In order to understand this manual, you require a general knowledge of automation engineering.
- You require knowledge of STEP 7 basic software.

Scope

The name CPU 31xC summarizes all compact CPUs, as table below shows:

CPU	Convention: CPU designations:	Order number	As of firmware version
CPU 312C	CPU 31xC	6ES7312-5BF04-0AB0	V3.3
CPU 313C		6ES7313-5BG04-0AB0	V3.3
CPU 313C-2 PtP		6ES7313-6BG04-0AB0	V3.3
CPU 313C-2 DP		6ES7313-6CG04-0AB0	V3.3
CPU 314C-2 PtP		6ES7314-6BH04-0AB0	V3.3
CPU 314C-2 DP		6ES7314-6CH04-0AB0	V3.3
CPU 314C-2 PN/DP		6ES7314-6EH04-0AB0	V3.3

The name CPU 31x summarizes all standard CPUs, as table below shows:

CPU	Convention: CPU designations:	Order number	As of firmware version
CPU 312	CPU 31x	6ES7312-1AE14-0AB0	V3.3
CPU 314		6ES7314-1AG14-0AB0	V3.3
CPU 315-2 DP		6ES7315-2AH14-0AB0	V3.3
CPU 315-2 PN/DP		6ES7315-2EH14-0AB0	V3.2
CPU 317-2 DP		6ES7317-2AK14-0AB0	V3.3
CPU 317-2 PN/DP		6ES7317-2EK14-0AB0	V3.2
CPU 319-3 PN/DP		6ES7318-3EL01-0AB0	V3.2

All CPUs with PROFINET properties are grouped under the designation CPU 31x PN/DP, as the following table shows:

CPU	Convention: CPU designations:	Order number	As of firmware version
CPU 314C-2 PN/DP	CPU 31x PN/DP	6ES7314-6EH04-0AB0	V3.3
CPU 315-2 PN/DP		6ES7315-2EH14-0AB0	V3.2
CPU 317-2 PN/DP		6ES7317-2EK14-0AB0	V3.2
CPU 319-3 PN/DP		6ES7318-3EL01-0AB0	V3.2

Note

A description of the special features of the failsafe CPUs of the S7 product range is available in the product information at the following Internet address (<http://support.automation.siemens.com/WW/view/en/11669702/133300>).

Note

We reserve the right to include a product Information containing the latest information on new modules or modules of a more recent version.

Changes in comparison to the previous version

The following table contains changes from the previous versions of the following documentation from the S7-300 documentation package:

- Technical specifications manual, version 06/2010
- Operating instructions for installation, version 06/2010

The CPU- 314C-2 PN/DP has been added in delivery stage V3.3. It has the same functionalities as the CPU 314C-2 DP and also has PROFINET functionalities such as those of the CPU 315-2 PN/DP.

In delivery stage V3.3, the functionality and performance of all C-CPU and the CPU 317-2 DP were improved compared to their predecessor versions.

Additional information was taken from the chapter "Information on converting to a CPU 31xC or CPU 31x". If you required more information, however, please refer to the FAQs on the Internet.

CPU	312	312C	313C	313C-2 DP	313C-2 PtP	314	314C-2 DP	314C-2 PtP	315-2 DP	317-2 DP
Encryption of blocks using S7-Block Privacy	X	X	X	X	X	X	X	X	X	X
Integration of a maintenance LED	X ^{1,2}	X ²	X ²	X ²	X ²	X ^{1,2}	X ²	X ²	X ^{1,2}	X ²
Configurable increase of control and monitoring performance	-	-	-	-	-	-	-	-	X	X
Improved operational limits for PT100 Analog input	-	-	X	-	-	-	X	X	-	-
Data set routing	-	-	-	X	-	-	X	-	X ¹	X
Configurable process image	X ¹	X	X	X	X	X ¹	X	X	X ¹	X
Expansion of the block number range	X ¹	X	X	X	X	X ¹	X	X	X ¹	X
Number of displayed diagnostic buffer entries can be configured in CPU RUN mode	X ¹	X	X	X	X	X ¹	X	X	X ¹	X
Reading out the service data	X ¹	X	X	X	X	X ¹	X	X	X ¹	X
Extension of SFC 12 with 2 new modes to trigger the OB 86 during enabling/disabling	-	-	-	X	-	-	X	-	X ¹	X
Copying of 512 bytes with SFC 81	X ¹	X	X	X	X	X ¹	X	X	X ¹	X

CPU	312	312C	313C	313C-2 DP	313C-2 PtP	314	314C-2 DP	314C-2 PtP	315-2 DP	317-2 DP
Increase										
Main memory	X ¹	X	X	X	X	X ¹	X	X	X ¹	X
Performance through shorter command processing times	X ¹	X	X	X	X	X ¹	X	X	X ¹	X
Status information that can be monitored by the status block, in STEP 7 V5.5 or higher	X ¹	X	X	X	X	X ¹	X	X	X ¹	X
Number of blocks that can be monitored by the status block (from 1 to 2)	X ¹	X	X	X	X	X ¹	X	X	X ¹	X
Number of breakpoints from 2 to 4	X ¹	X	X	X	X	X ¹	X	X	X ¹	X
Local data stack	X ¹	X	X	X	X	X ¹	X	X	X ¹	X
Number of block-related messages (Alarm_S) is uniformly limited to 300	X ¹	X	X	X	X	X ¹	X	X	X ¹	X
Number of the bit memories, timers and counters	X ¹	X	-	-	-	-	-	-	-	-
Standardization										
DB sizes: Max. 64 KB	X ^{1,3}	X	X	X	X	X ¹	X	X	X ¹	X ¹
Watchdog interrupts: OB 32 to OB 35	X ¹	X	X	X	X	X ¹	X	X	X ¹	X ¹
Global data communication of 8 GD circles	X ¹	X	X	X	X	X ¹	X	X	X ¹	X ¹
System function blocks for integrated technology functions:										
SFB 41 to 43	-	-	X ¹	X ¹	X ¹	-	X ¹	X ¹	-	-
SFB 44 and 46	-	-	-	-	-	-	X ¹	X ¹	-	-
SFB 47 to 49	-	X ¹	X ¹	X ¹	X ¹	-	X ¹	X ¹	-	-
SFB 60 to 62	-	-	-	-	X ¹	-	-	X ¹	-	-
SFB 63 to 65	-	-	-	-	-	-	-	X ¹	-	-
¹ This function was already made available to the CPU in an earlier version ² Available, but without function ³ Max. DB size 32 KB										

Standards and certifications

For information about standards and approvals, see the section "General technical specifications (Page 201)".

Recycling and disposal

Because they have ecologically compatible components, the devices described in this manual can be recycled. For environment-friendly recycling and disposal of your old equipment, contact a certified disposal facility for electronic scrap.

Service & Support on the Internet

In addition to our documentation, we offer a comprehensive knowledge base online on the Internet (<http://www.siemens.com/automation/service&support>).

There you will find:

- Our newsletter containing up-to-date information on your products
- The latest documents in the Siemens Service & Support (<http://www.siemens.com/automation/service&support>) search engine.
- A forum for global information exchange by users and specialists.
- Your local representative for automation and drives in our contact database
- Information about on-site services, repairs, spare parts, and lots more.
- Applications and tools for the optimized use of the SIMATIC S7. For example, Siemens also publishes DP and PN performance measurements on the Internet (<http://www.siemens.com/automation/pd>).

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Guide to the S7-300 documentation

1.1 Documentation classification

Documentation classification

The documentation listed below is part of the S7-300 documentation package.

You can also find this on the Internet and the corresponding entry ID.

Name of the documentation	Description
Manual CPU 31xC and CPU 31x: Technical specifications Entry ID: 12996906 http://support.automation.siemens.com/WW/view/en/12996906	Description of: <ul style="list-style-type: none"> • Operator controls and indicators • Communication • Memory concept • Cycle and response times • Technical specifications
Operating Instructions CPU 31xC and CPU 31x: Installation Entry ID: 13008499 http://support.automation.siemens.com/WW/view/en/13008499	Description of: <ul style="list-style-type: none"> • Configuring • Installing • Wiring • Addressing • Commissioning • Maintenance and the test functions • Diagnostics and troubleshooting
Operating Instructions CPU 31xC: Technological functions incl. CD Entry ID: 12429336 http://support.automation.siemens.com/WW/view/en/12429336	Description of the specific technological functions: <ul style="list-style-type: none"> • Positioning • Counting • Point-to-point connection • Rules The CD contains examples of the technological functions.

1.1 Documentation classification

Name of the documentation	Description
<p>Manual S7-300 Automation System: Module data Entry ID: 8859629 http://support.automation.siemens.com/WW/view/en/8859629</p>	<p>Descriptions and technical specifications of the following modules:</p> <ul style="list-style-type: none"> • Signal modules • Power supplies • Interface modules
<p>List Manual Instruction List of the S7-300 CPUs and ET- 200 CPUs Entry ID: 31977679 http://support.automation.siemens.com/WW/view/en/31977679</p>	<ul style="list-style-type: none"> • List of the instruction set of the CPUs and their execution times. • List of the executable blocks (OBs/SFCs/SFBs) and their execution times.

Additional information

You also require information from the following descriptions:

Name of the documentation	Description
<p>Getting Started S7-300 Automation System: Getting Started CPU 31x: Commissioning Entry ID: 15390497 http://support.automation.siemens.com/WW/view/en/15390497</p>	<p>Description of examples showing the various commissioning phases leading to a functional application.</p>
<p>Getting Started S7-300 Automation System: Getting Started CPU 31xC: Commissioning Entry ID: 48077635 http://support.automation.siemens.com/WW/view/en/48077635</p>	<p>Description of examples showing the various commissioning phases leading to a functional application.</p>
<p>Getting Started First steps in commissioning CPU 31xC: Positioning with analog output Entry ID: 48070939 http://support.automation.siemens.com/WW/view/en/48070939</p>	<p>Description of examples showing the various commissioning phases leading to a functional application.</p>
<p>Getting Started First steps in commissioning CPU 31xC: Positioning with digital output Entry ID: 48077520 http://support.automation.siemens.com/WW/view/en/48077520</p>	<p>Description of examples showing the various commissioning phases leading to a functional application.</p>

Name of the documentation	Description
<p>Getting Started First steps in commissioning CPU 31xC: Counting Entry ID: 48064324 http://support.automation.siemens.com/WW/view/en/48064324</p>	<p>Description of examples showing the various commissioning phases leading to a functional application.</p>
<p>Getting Started First steps in commissioning CPU 31xC: Point-to-point connection Entry ID: 48064280 http://support.automation.siemens.com/WW/view/en/48064280</p>	<p>Description of examples showing the various commissioning phases leading to a functional application.</p>
<p>Getting Started First steps in commissioning CPU 31xC: Rules Entry ID: 48077500 http://support.automation.siemens.com/WW/view/en/48077500</p>	<p>Description of examples showing the various commissioning phases leading to a functional application.</p>
<p>Getting Started CPU315-2 PN/DP, 317-2 PN/DP, 319-3 PN/DP: Configuring the PROFINET interface Entry ID: 48080216 http://support.automation.siemens.com/WW/view/en/48080216</p>	<p>Description of examples showing the various commissioning phases leading to a functional application.</p>
<p>Getting Started CPU 317-2 PN/DP: Configuring an ET 200S as PROFINET IO device Entry ID: 19290251 http://support.automation.siemens.com/WW/view/en/19290251</p>	<p>Description of examples showing the various commissioning phases leading to a functional application.</p>
<p>Reference Manual System and standard functions for S7-300/400, volume 1/2 Entry ID: 1214574 http://support.automation.siemens.com/WW/view/en/1214574</p>	<p>Overview of objects included in the operating systems for S7-300 and S7-400 CPUs:</p> <ul style="list-style-type: none"> • OBs • SFCs • SFBs • IEC functions • Diagnostics data • System status list (SSL) • Events <p>This manual is part of the STEP 7 reference information. You can also find the description in the STEP 7 Online Help.</p>

1.1 Documentation classification

Name of the documentation	Description
<p>Manual Programming with STEP 7 Entry ID: 18652056 http://support.automation.siemens.com/WW/view/en/18652056</p>	<p>This manual provides a complete overview of programming with the STEP 7 Standard Package. This manual is part of the STEP 7 Standard Package basic information. You can also find a description in the STEP 7 Online Help.</p>
<p>System Manual PROFINET System Description Entry ID: 19292127 http://support.automation.siemens.com/WW/view/en/19292127</p>	<p>Basic description of PROFINET:</p> <ul style="list-style-type: none"> • Network components • Data exchange and communication • PROFINET IO • Component Based Automation • Application example of PROFINET IO and Component Based Automation
<p>Programming manual From PROFIBUS DP to PROFINET IO Entry ID: 19289930 http://support.automation.siemens.com/WW/view/en/19289930</p>	<p>Guideline for the migration from PROFIBUS DP to PROFINET I/O.</p>
<p>Manual SIMATIC NET: Twisted Pair and Fiber-Optic Networks Entry ID: 8763736 http://support.automation.siemens.com/WW/view/en/8763736</p>	<p>Description of:</p> <ul style="list-style-type: none"> • Industrial Ethernet networks • Network configuration • Components • Guidelines for setting up networked automation systems in buildings, etc.
<p>Configuring Manual Configure SIMATIC iMap plants Entry ID: 22762190 http://support.automation.siemens.com/WW/view/en/22762190</p>	<p>Description of the SIMATIC iMap configuration software</p>
<p>Configuring Manual SIMATIC iMap STEP 7 AddOn, create PROFINET components Entry ID: 22762278 http://support.automation.siemens.com/WW/view/en/22762278</p>	<p>Descriptions and instructions for creating PROFINET components with STEP 7 and for using SIMATIC devices in Component Based Automation</p>

Name of the documentation	Description
Function Manual Isochronous mode Entry ID: 15218045 http://support.automation.siemens.com/WW/view/en/15218045	Description of the system property "Isochronous mode"
System Manual Communication with SIMATIC Entry ID: 1254686 http://support.automation.siemens.com/WW/view/en/1254686	Description of: <ul style="list-style-type: none"> • Basics • Services • Networks • Communication functions • Connecting PGs/OPs • Engineering and configuring in STEP 7

Service & support on the Internet

Information on the following topics can be found on the Internet
<http://www.siemens.com/automation/service>:

- Contacts for SIMATIC (<http://www.siemens.com/automation/partner>)
- Contacts for SIMATIC NET (<http://www.siemens.com/simatic-net>)
- Training (<http://www.sitrain.com>)

See also

Documentation package S7-300
<http://support.automation.siemens.com/WW/view/en/10805159/133300>)

1.2 Guide to the S7-300 documentation

Overview

The following tables contain a guide through the S7-300 documentation.

Ambient influence on the automation system

Information about ...	is available in the manual ...	In Section ...
What provisions do I have to make for automation system installation space?	<ul style="list-style-type: none"> CPU 31xC and CPU 31x: Installation 	Configuring – Component dimensions Mounting – Installing the mounting rail
How do environmental conditions influence the automation system?	<ul style="list-style-type: none"> CPU 31xC and CPU 31x: Installation 	Appendix

Isolation

Information about ...	is available in the manual ...	In Section ...
Which modules can I use if electrical isolation is required between sensors/actuators?	<ul style="list-style-type: none"> CPU 31xC and CPU 31x: Installation Module data 	Configuring – Electrical assembly, protective measures and grounding
Under what conditions do I have to isolate the modules electrically? How do I wire that?	<ul style="list-style-type: none"> CPU 31xC and CPU 31x: Installation 	Configuring – Electrical assembly, protective measures and grounding Wiring
Under which conditions do I have to isolate stations electrically? How do I wire that?	<ul style="list-style-type: none"> CPU 31xC and CPU 31x: Installation 	Configuring – Configuring subnets

Communication between sensors/actuators and the PLC

Information about ...	is available in the manual ...	In Section ...
Which module is suitable for my sensor/actuator?	<ul style="list-style-type: none"> CPU 31xC and CPU 31x: Technical specifications For your signal module 	Technical specifications
How many sensors/actuators can I connect to the module?	<ul style="list-style-type: none"> CPU 31xC and CPU 31x: Technical specifications For your signal module 	Technical specifications
How do I connect my sensors/actuators to the automation system, using the front connector?	<ul style="list-style-type: none"> CPU 31xC and CPU 31x: Installation 	Wiring – Wiring the front connector

Information about ...	is available in the manual ...	In Section ...
When do I need expansion modules (EM) and how do I connect them?	<ul style="list-style-type: none"> CPU 31xC and CPU 31x: Installation 	Configuring – Distribution of modules across multiple racks
How do I mount modules on racks / mounting rails?	<ul style="list-style-type: none"> CPU 31xC and CPU 31x: Installation 	Assembly – Installing modules on the mounting rail

The use of local and distributed IOs

Information about ...	is available in the manual ...	In Section ...
Which range of modules do I want to use?	<ul style="list-style-type: none"> Module data (for centralized IOs/ expansion devices) of the respective peripheral (for distributed IOs/ PROFIBUS DP) 	–

Configuration consisting of the central controller and expansion units

Information about ...	is available in the manual ...	In Section ...
Which rack / mounting rail is most suitable for my application?	<ul style="list-style-type: none"> CPU 31xC and CPU 31x: Installation 	Configuring
Which interface modules (IM) do I need to connect the expansion units to the central controller?	<ul style="list-style-type: none"> CPU 31xC and CPU 31x: Installation 	Configuring – Distribution of modules across multiple racks
What is the right power supply (PS) for my application?	<ul style="list-style-type: none"> CPU 31xC and CPU 31x: Installation 	Configuring

CPU performance

Information about ...	is available in the manual ...	In Section ...
Which memory concept is best suited to my application?	<ul style="list-style-type: none"> CPU 31xC and CPU 31x: Technical specifications 	Memory concept
How do I insert and remove Micro Memory Cards?	<ul style="list-style-type: none"> CPU 31xC and CPU 31x: Installation 	Commissioning – Commissioning modules – Removing / inserting a Micro Memory Card (MMC)
Which CPU meets my demands on performance?	<ul style="list-style-type: none"> S7-300 instruction list: CPU 31xC and CPU 31x 	–
Length of the CPU response / execution times	<ul style="list-style-type: none"> CPU 31xC and CPU 31x: Technical specifications 	–
Which technological functions are implemented?	<ul style="list-style-type: none"> Technological functions 	–
How can I use these technological functions?	<ul style="list-style-type: none"> Technological functions 	–

Communication

Information about ...	is available in the manual ...	In Section ...
Which principles do I have to take into account?	<ul style="list-style-type: none"> CPU 31xC and CPU 31x: Technical specifications Communication with SIMATIC PROFINET System Description 	Communication
Options and resources of the CPU	<ul style="list-style-type: none"> CPU 31xC and CPU 31x: Technical specifications 	Technical specifications
How to use communication processors (CPs) to optimize communication	<ul style="list-style-type: none"> CP Manual 	–
Which type of communication network is best suited to my application?	<ul style="list-style-type: none"> CPU 31xC and CPU 31x: Installation 	Configuring – Configuring subnets
How do I network the various components?	<ul style="list-style-type: none"> CPU 31xC and CPU 31x: Installation 	Configuring – Configuring subnets
What to take into account when configuring PROFINET networks	<ul style="list-style-type: none"> SIMATIC NET, twisted-pair and fiber-optic networks (6GK1970-1BA10-0AA0) 	Network configuration
	<ul style="list-style-type: none"> PROFINET System Description 	Installation and commissioning

Software

Information about ...	is available in the manual ...	In Section ...
Software requirements of my S7-300 system	<ul style="list-style-type: none"> CPU 31xC and CPU 31x: Technical specifications 	Technical specifications

Supplementary features

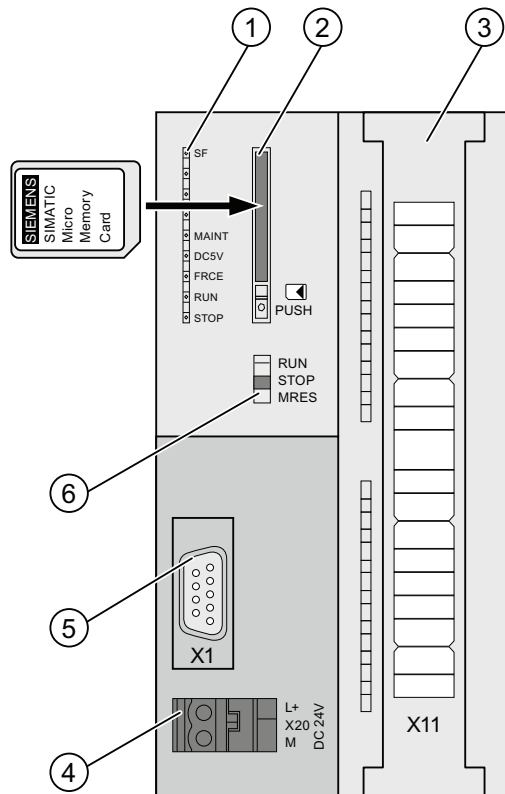
Information about ...	is available in ...
How can I implement operation and monitoring functions? (Human Machine Interface)	The relevant manual: <ul style="list-style-type: none"> For text-based displays For Operator Panels For WinCC
How to integrate process control modules	<ul style="list-style-type: none"> Respective PCS7 manual
What options are offered by redundant and fail-safe systems?	<ul style="list-style-type: none"> S7-400H – Fault-Tolerant Systems Failsafe systems
Information to be observed when migrating from PROFIBUS DP to PROFINET IO	<ul style="list-style-type: none"> From PROFIBUS DP to PROFINET IO

Operator controls and indicators

2.1 Operator controls and indicators of the compact CPUs (CPU 31xC)

2.1.1 Operator controls and indicators: CPU 312C

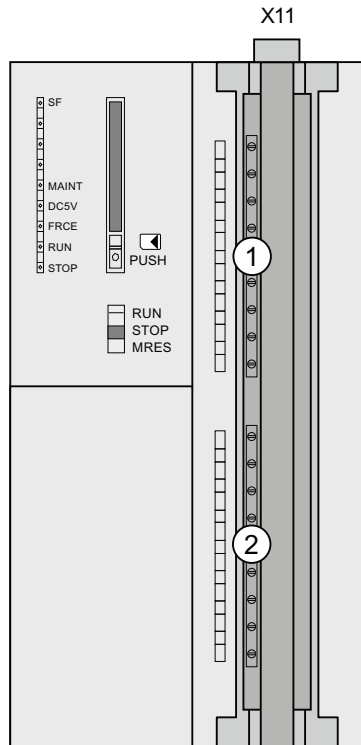
Operator controls and indicators of the CPU 312C



Number	Designation
①	Status and error indicators
②	Slot for the SIMATIC Micro Memory Card incl. the ejector
③	Terminals of the integrated inputs and outputs
④	Power supply connection
⑤	interface X1 (MPI)
⑥	Mode selector

2.1 Operator controls and indicators of the compact CPUs (CPU 31xC)

The figure below shows the integrated digital inputs/outputs of the CPU with open front doors.



- | Number | Designation |
|--------|---|
| ① | Digital inputs (PIN 2 to 10) |
| ② | Digital input (PIN 11) and digital outputs (PIN 14 to pin 19) |

Status and error indicators

LED designation	Color	Meaning
SF	red	Hardware fault or software error
MAINT	yellow	Maintenance demanded (without function)
DC5V	green	5 V power supply for CPU and S7-300 bus is OK
FRCE	yellow	LED is lit: Active force job LED flashes at 2 Hz: Node flash test function
RUN	green	CPU in RUN mode The LED flashes during start-up at a rate of 2 Hz, and in stop mode at 0.5 Hz
STOP	yellow	CPU in STOP, or HOLD or start-up The LED flashes at a rate of 0.5 Hz when a memory reset is requested, and at 2 Hz during the reset.

Slot for the SIMATIC Micro Memory Card

A SIMATIC Micro Memory Card is used as memory module. You can use an MMC as a load memory and as a portable data carrier.

Note

Since these CPUs do not have an integrated load memory, they require a SIMATIC Micro Memory Card for operation.

Mode selector

Use the mode selector to set the CPU operating mode.

Table 2- 1 Mode selector settings

Setting	Meaning	Explanations
RUN	RUN mode	The CPU executes the user program.
STOP	STOP mode	The CPU does not execute a user program.
MRES	Memory reset	Mode selector setting with pushbutton function for CPU memory reset. A CPU memory reset by means of the mode selector requires a specific sequence of operation.

Power supply connection

All CPUs are equipped with a 2-pin socket for power supply connection. For delivery, the connector with screw terminals is plugged into this inlet at the factory.

Properties of the CPU in relation to interfaces, integrated inputs/outputs and technological functions

Table 2- 2 Properties of the CPUs 312C in relation to interfaces, integrated inputs/outputs and technological functions

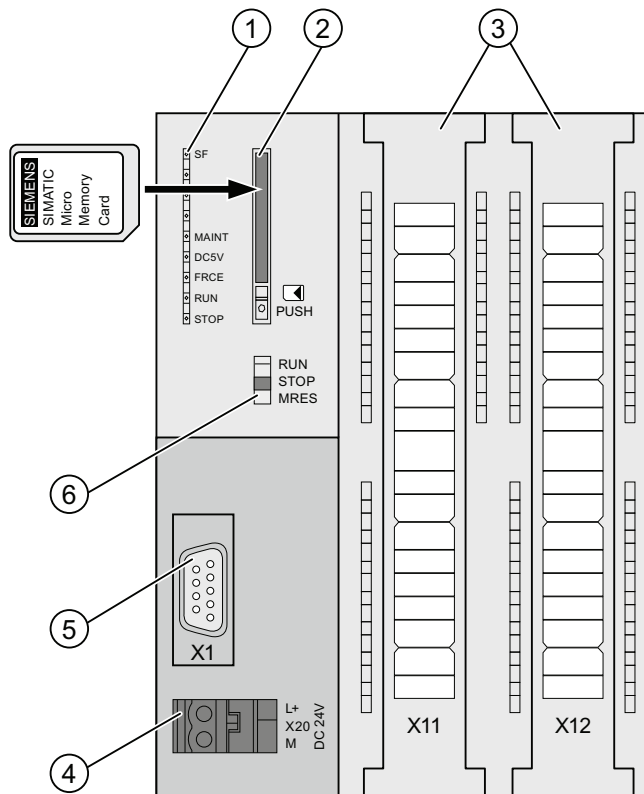
Item	CPU 312C
9-pin MPI interface (X1)	Yes
Digital inputs	10
Digital outputs	6
Technological functions	2 counters (See the technological functions manual terminal assignment (http://support.automation.siemens.com/WWW/view/en/26090032))

Reference

- CPU operating state: *STEP 7 online help*
- Information on CPU memory reset: *CPU 31xC and CPU 31x operating instructions, Commissioning, Commissioning Modules, Memory reset by means of Mode Selector of the CPU*
- Evaluation of the LEDs upon error or diagnostic event: *CPU 31xC and CPU 31x Operating Instructions, Test Functions, Diagnostics and Troubleshooting, Diagnostics with the Help of Status and Error LEDs*

2.1.2 Operator controls and indicators: CPU 313C

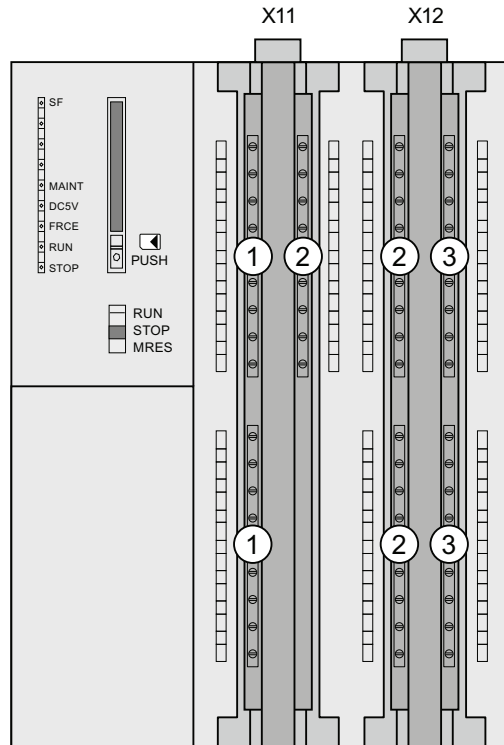
Operator controls and indicators of the CPU 313C



Number	Designation
①	Status and error indicators
②	Slot for the SIMATIC Micro Memory Card incl. the ejector
③	Terminals of the integrated inputs and outputs
④	Power supply connection
⑤	interface X1 (MPI)
⑥	Mode selector

2.1 Operator controls and indicators of the compact CPUs (CPU 31xC)

The figure below shows the integrated digital and analog inputs/outputs of the CPU with open front covers.



- | Number | Designation |
|--------|----------------------------------|
| ① | Analog inputs and analog outputs |
| ② | Digital inputs |
| ③ | Digital outputs |

Status and error indicators

LED designation	Color	Meaning
SF	red	Hardware fault or software error
MAINT	yellow	Maintenance demanded (without function)
DC5V	green	5 V power supply for CPU and S7-300 bus is OK
FRCE	yellow	LED is lit: Active force job LED flashes at 2 Hz: Node flash test function
RUN	green	CPU in RUN mode The LED flashes during start-up at a rate of 2 Hz, and in stop mode at 0.5 Hz
STOP	yellow	CPU in STOP, or HOLD or start-up The LED flashes at a rate of 0.5 Hz when a memory reset is requested, and at 2 Hz during the reset.

Slot for the SIMATIC Micro Memory Card

A SIMATIC Micro Memory Card is used as memory module. You can use an MMC as a load memory and as a portable data carrier.

Note

Since these CPUs do not have an integrated load memory, they require a SIMATIC Micro Memory Card for operation.

Mode selector

Use the mode selector to set the CPU operating mode.

Table 2- 3 Mode selector settings

Setting	Meaning	Explanations
RUN	RUN mode	The CPU executes the user program.
STOP	STOP mode	The CPU does not execute a user program.
MRES	Memory reset	Mode selector setting with pushbutton function for CPU memory reset. A CPU memory reset by means of the mode selector requires a specific sequence of operation.

Power supply connection

All CPUs are equipped with a 2-pin socket for power supply connection. For delivery, the connector with screw terminals is plugged into this inlet at the factory.

Properties of the CPU in relation to interfaces, integrated inputs/outputs and technological functions

Table 2- 4 Properties of the CPUs 313C in relation to interfaces, integrated inputs/outputs and technological functions

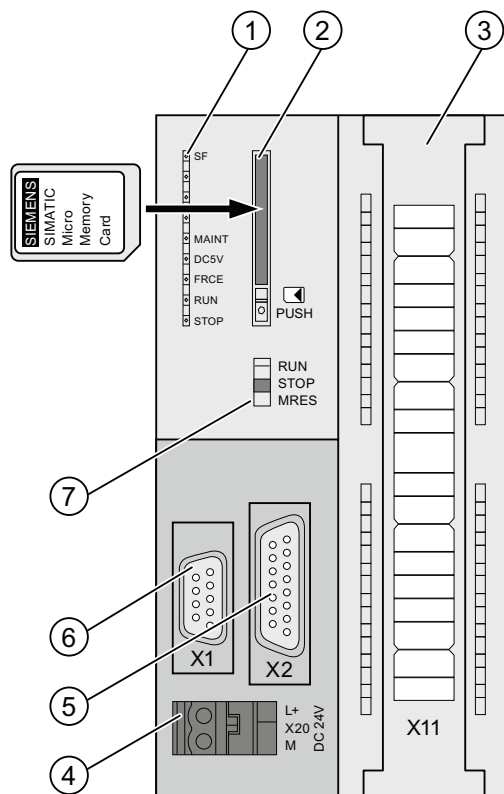
Item	CPU 313C
9-pin MPI interface (X1)	Yes
Digital inputs	24
Digital outputs	16
Analog inputs	4 + 1
Analog outputs	2
Technological functions	3 counters (See the technological functions manual terminal assignment (http://support.automation.siemens.com/WW/view/en/26090032))

Reference

- CPU operating state: *STEP 7 online help*
- Information on CPU memory reset: *CPU 31xC and CPU 31x operating instructions, Commissioning, Commissioning Modules, Memory reset by means of Mode Selector of the CPU*
- Evaluation of the LEDs upon error or diagnostic event: *CPU 31xC and CPU 31x Operating Instructions, Test Functions, Diagnostics and Troubleshooting, Diagnostics with the Help of Status and Error LEDs*

2.1.3 Operator controls and indicators: CPU 313C-2 PtP

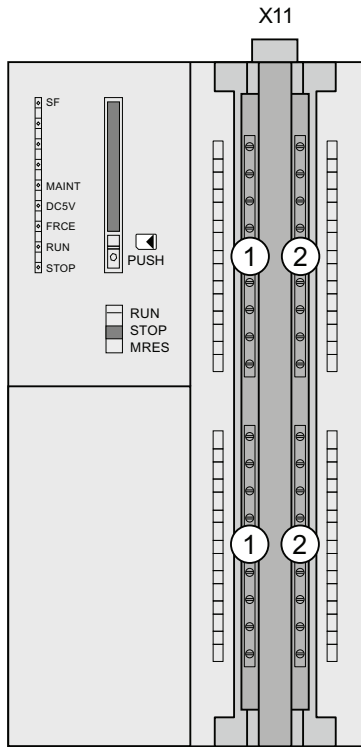
Operator controls and indicators of the CPU 313C-2 PtP



Number	Designation
①	Status and error indicators
②	Slot for the SIMATIC Micro Memory Card incl. the ejector
③	Terminals of the integrated inputs and outputs
④	Power supply connection
⑤	2. Interface X2 (PtP)
⑥	1. interface X1 (MPI)
⑦	Mode selector

2.1 Operator controls and indicators of the compact CPUs (CPU 31xC)

The figure below shows the integrated digital inputs/outputs of the CPU with open front doors.



- Numb** **Designation**
er
 ① Digital inputs
 ② Digital outputs

Status and error indicators

LED designation	Color	Meaning
SF	red	Hardware fault or software error
MAINT	yellow	Maintenance demanded (without function)
DC5V	green	5 V power supply for CPU and S7-300 bus is OK
FRCE	yellow	LED is lit: Active force job LED flashes at 2 Hz: Node flash test function
RUN	green	CPU in RUN mode The LED flashes during start-up at a rate of 2 Hz, and in stop mode at 0.5 Hz
STOP	yellow	CPU in STOP, or HOLD or start-up The LED flashes at a rate of 0.5 Hz when a memory reset is requested, and at 2 Hz during the reset.

Slot for the SIMATIC Micro Memory Card

A SIMATIC Micro Memory Card is used as memory module. You can use an MMC as a load memory and as a portable data carrier.

Note

Since these CPUs do not have an integrated load memory, they require a SIMATIC Micro Memory Card for operation.

Mode selector

Use the mode selector to set the CPU operating mode.

Table 2- 5 Mode selector settings

Setting	Meaning	Explanations
RUN	RUN mode	The CPU executes the user program.
STOP	STOP mode	The CPU does not execute a user program.
MRES	Memory reset	Mode selector setting with pushbutton function for CPU memory reset. A CPU memory reset by means of the mode selector requires a specific sequence of operation.

Power supply connection

All CPUs are equipped with a 2-pin socket for power supply connection. For delivery, the connector with screw terminals is plugged into this inlet at the factory.

Properties of the CPU in relation to interfaces, integrated inputs/outputs and technological functions

Table 2- 6 Properties of the CPUs 313C-2 PtP in relation to interfaces, integrated inputs/outputs and technological functions

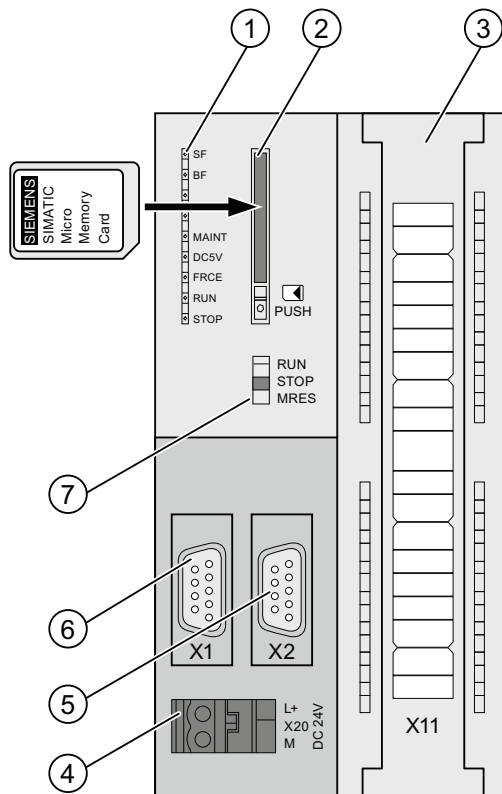
Item	CPU 313C-2 PtP
9-pin MPI interface (X1)	Yes
15-pin PtP interface (X2)	Yes
Digital inputs	16
Digital outputs	16
Technological functions	3 counters Point-to-point connection: <ul style="list-style-type: none"> • ASCII drivers • 3964(R) Protocol (See the technological functions manual terminal assignment (http://support.automation.siemens.com/WW/view/en/26090032))

Reference

- CPU operating state: *STEP 7 online help*
- Information on CPU memory reset: *CPU 31xC and CPU 31x operating instructions, Commissioning, Commissioning Modules, Memory reset by means of Mode Selector of the CPU*
- Evaluation of the LEDs upon error or diagnostic event: *CPU 31xC and CPU 31x Operating Instructions, Test Functions, Diagnostics and Troubleshooting, Diagnostics with the Help of Status and Error LEDs*

2.1.4 Operator controls and indicators: CPU 313C-2 DP

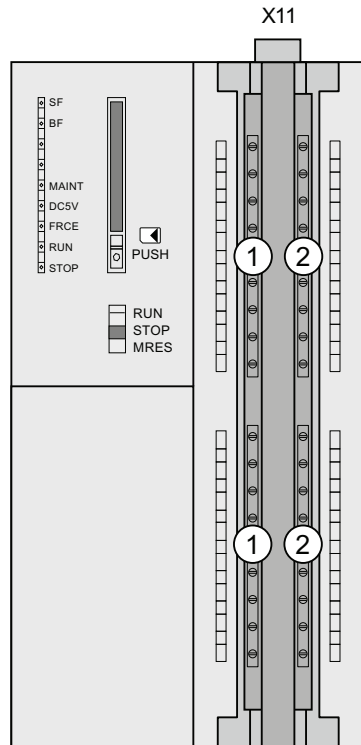
Operator controls and indicators of the CPU 313C-2 DP



Number	Designation
①	Status and error indicators
②	Slot for the SIMATIC Micro Memory Card incl. the ejector
③	Terminals of the integrated inputs and outputs
④	Power supply connection
⑤	2. interface X2 (DP)
⑥	1. interface X1 (MPI)
⑦	Mode selector

2.1 Operator controls and indicators of the compact CPUs (CPU 31xC)

The figure below shows the integrated digital inputs/outputs of the CPU with open front doors.



- | Number | Designation |
|--------|-----------------|
| ① | Digital inputs |
| ② | Digital outputs |

Status and error indicators

LED designation	Color	Meaning
SF	red	Hardware fault or software error
BF	red	Bus fault
MAINT	yellow	Maintenance demanded (without function)
DC5V	green	5 V power supply for CPU and S7-300 bus is OK
FRCE	yellow	LED is lit: Force job is active LED flashes at 2 Hz: Node flash test function
RUN	green	CPU in RUN mode The LED flashes during start-up at a rate of 2 Hz, and in stop mode at 0.5 Hz
STOP	yellow	CPU in STOP, or HOLD or start-up The LED flashes at a rate of 0.5 Hz when a memory reset is requested, and at 2 Hz during the reset.

Slot for the SIMATIC Micro Memory Card

A SIMATIC Micro Memory Card is used as memory module. You can use an MMC as a load memory and as a portable data carrier.

Note

Since these CPUs do not have an integrated load memory, they require a SIMATIC Micro Memory Card for operation.

Mode selector

Use the mode selector to set the CPU operating mode.

Table 2- 7 Mode selector settings

Setting	Meaning	Explanations
RUN	RUN mode	The CPU executes the user program.
STOP	STOP mode	The CPU does not execute a user program.
MRES	Memory reset	Mode selector setting with pushbutton function for CPU memory reset. A CPU memory reset by means of the mode selector requires a specific sequence of operation.

Power supply connection

All CPUs are equipped with a 2-pin socket for power supply connection. For delivery, the connector with screw terminals is plugged into this inlet at the factory.

Properties of the CPU in relation to interfaces, integrated inputs/outputs and technological functions

Table 2- 8 Properties of the CPU 313C-2 DP in relation to interfaces, integrated inputs/outputs and technological functions

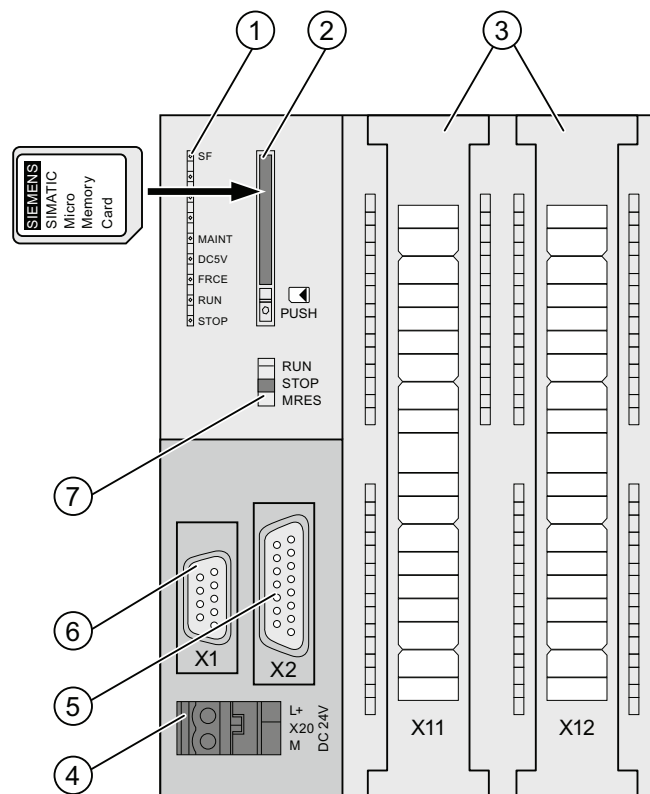
Item	CPU 313C-2 DP
9-pin MPI interface (X1)	Yes
9-pin DP interface (X2)	Yes
Digital inputs	16
Digital outputs	16
Technological functions	3 counters (See the technological functions manual terminal assignment (http://support.automation.siemens.com/WW/view/en/26090032))

Reference

- CPU operating state: *STEP 7 online help*
- Information on CPU memory reset: *CPU 31xC and CPU 31x operating instructions, Commissioning, Commissioning Modules, Memory reset by means of Mode Selector of the CPU*
- Evaluation of the LEDs upon error or diagnostic event: *CPU 31xC and CPU 31x Operating Instructions, Test Functions, Diagnostics and Troubleshooting, Diagnostics with the Help of Status and Error LEDs*

2.1.5 Operator controls and indicators: CPU 314C-2 PtP

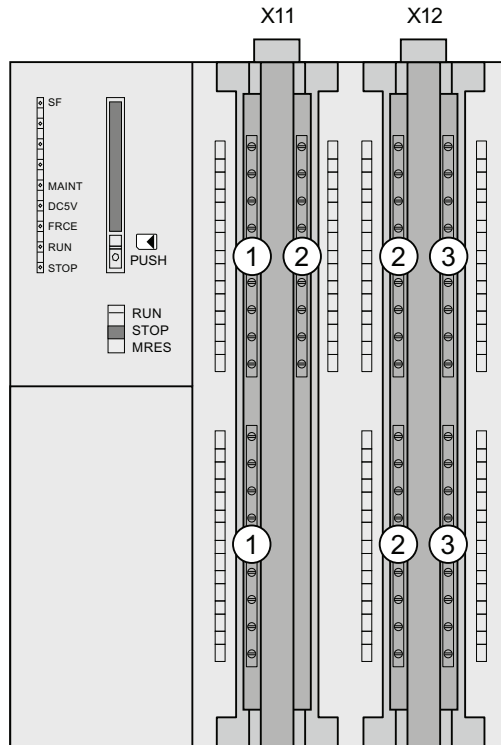
Operator controls and indicators of the CPU 314C-2 PtP



Number	Designation
①	Status and error indicators
②	Slot for the SIMATIC Micro Memory Card incl. the ejector
③	Terminals of the integrated inputs and outputs
④	Power supply connection
⑤	2. Interface X2 (PtP)
⑥	1. interface X1 (MPI)
⑦	Mode selector

2.1 Operator controls and indicators of the compact CPUs (CPU 31xC)

The figure below shows the integrated digital and analog inputs/outputs of the CPU with open front covers.



- | Number | Designation |
|--------|----------------------------------|
| ① | Analog inputs and analog outputs |
| ② | Digital inputs |
| ③ | Digital outputs |

Status and error indicators

LED designation	Color	Meaning
SF	red	Hardware fault or software error
MAINT	yellow	Maintenance demanded (without function)
DC5V	green	5 V power supply for CPU and S7-300 bus is OK
FRCE	yellow	LED is lit: Active force job LED flashes at 2 Hz: Node flash test function
RUN	green	CPU in RUN mode The LED flashes during start-up at a rate of 2 Hz, and in stop mode at 0.5 Hz
STOP	yellow	CPU in STOP, or HOLD or start-up The LED flashes at a rate of 0.5 Hz when a memory reset is requested, and at 2 Hz during the reset.

Slot for the SIMATIC Micro Memory Card

A SIMATIC Micro Memory Card is used as memory module. You can use an MMC as a load memory and as a portable data carrier.

Note

Since these CPUs do not have an integrated load memory, they require a SIMATIC Micro Memory Card for operation.

Mode selector

Use the mode selector to set the CPU operating mode.

Table 2- 9 Mode selector settings

Setting	Meaning	Explanations
RUN	RUN mode	The CPU executes the user program.
STOP	STOP mode	The CPU does not execute a user program.
MRES	Memory reset	Mode selector setting with pushbutton function for CPU memory reset. A CPU memory reset by means of the mode selector requires a specific sequence of operation.

Power supply connection

All CPUs are equipped with a 2-pin socket for power supply connection. For delivery, the connector with screw terminals is plugged into this inlet at the factory.

Properties of the CPU in relation to interfaces, integrated inputs/outputs and technological functions

Table 2- 10 Properties of the CPUs 314C-2 PtP in relation to interfaces, integrated inputs/outputs and technological functions

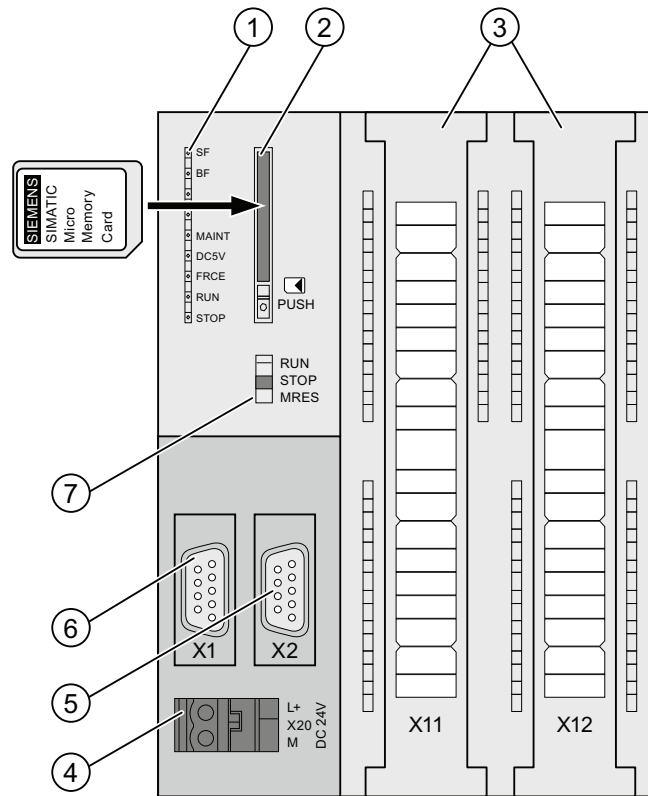
Item	CPU 314C-2 PtP
9-pin MPI interface (X1)	Yes
15-pin PtP interface (X2)	Yes
Digital inputs	24
Digital outputs	16
Analog inputs	4 + 1
Analog outputs	2
Technological functions	4 counters 1 channel for positioning Point-to-point connection: <ul style="list-style-type: none">• ASCII drivers• 3964(R) Protocol• RK 512 (See the technological functions manual terminal assignment (http://support.automation.siemens.com/WW/view/en/26090032))

Reference

- CPU operating state: *STEP 7 online help*
- Information on CPU memory reset: *CPU 31xC and CPU 31x operating instructions, Commissioning, Commissioning Modules, Memory reset by means of Mode Selector of the CPU*
- Evaluation of the LEDs upon error or diagnostic event: *CPU 31xC and CPU 31x Operating Instructions, Test Functions, Diagnostics and Troubleshooting, Diagnostics with the Help of Status and Error LEDs*

2.1.6 Operator controls and indicators: CPU 314C-2 DP

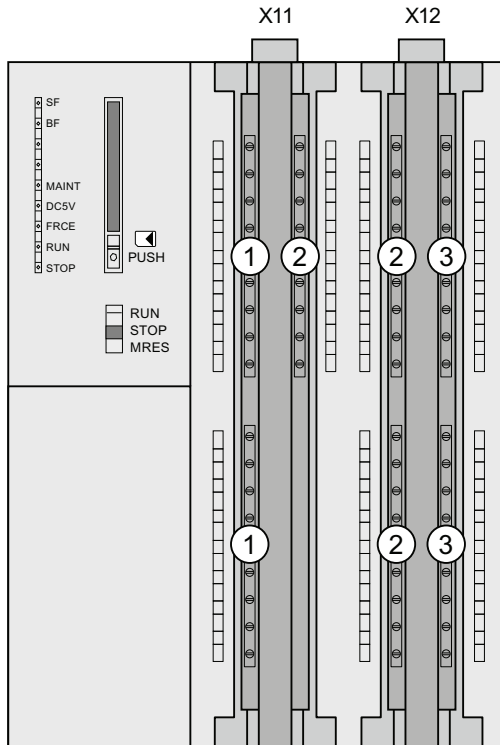
Operator controls and indicators of the CPU 314C-2 DP



Number	Designation
①	Status and error indicators
②	Slot for the SIMATIC Micro Memory Card incl. the ejector
③	Terminals of the integrated inputs and outputs
④	Power supply connection
⑤	2. interface X2 (DP)
⑥	1. interface X1 (MPI)
⑦	Mode selector

2.1 Operator controls and indicators of the compact CPUs (CPU 31xC)

The figure below shows the integrated digital and analog inputs/outputs of the CPU with open front covers.



- | Number | Designation |
|--------|----------------------------------|
| ① | Analog outputs and analog inputs |
| ② | Digital inputs |
| ③ | Digital outputs |

Status and error indicators

LED designation	Color	Meaning
SF	red	Hardware fault or software error
BF	red	Bus fault
MAINT	yellow	Maintenance demanded (without function)
DC5V	green	5 V power supply for CPU and S7-300 bus is OK
FRCE	yellow	LED is lit: Active force job LED flashes at 2 Hz: Node flash test function
RUN	green	CPU in RUN mode The LED flashes during start-up at a rate of 2 Hz, and in stop mode at 0.5 Hz
STOP	yellow	CPU in STOP, or HOLD or start-up The LED flashes at a rate of 0.5 Hz when a memory reset is requested, and at 2 Hz during the reset.

Slot for the SIMATIC Micro Memory Card

A SIMATIC Micro Memory Card is used as memory module. You can use an MMC as a load memory and as a portable data carrier.

Note

Since these CPUs do not have an integrated load memory, they require a SIMATIC Micro Memory Card for operation.

Mode selector

Use the mode selector to set the CPU operating mode.

Table 2- 11 Mode selector settings

Setting	Meaning	Explanations
RUN	RUN mode	The CPU executes the user program.
STOP	STOP mode	The CPU does not execute a user program.
MRES	Memory reset	Mode selector setting with pushbutton function for CPU memory reset. A CPU memory reset by means of the mode selector requires a specific sequence of operation.

Power supply connection

All CPUs are equipped with a 2-pin socket for power supply connection. For delivery, the connector with screw terminals is plugged into this inlet at the factory.

Properties of the CPU in relation to interfaces, integrated inputs/outputs and technological functions

Table 2- 12 Properties of the CPUs 314C-2 DP in relation to interfaces, integrated inputs/outputs and technological functions

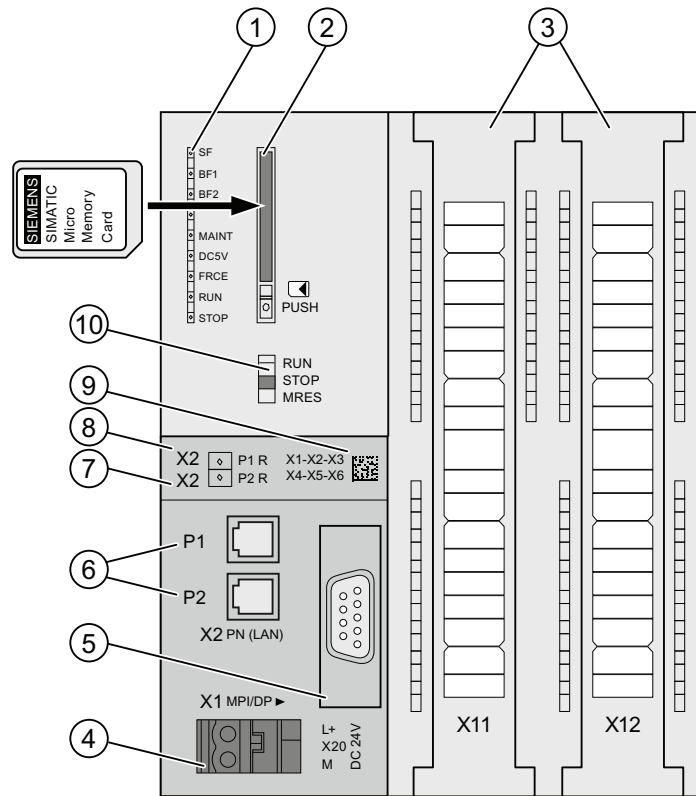
Item	CPU 314C-2 DP
9-pin MPI interface (X1)	Yes
9-pin DP interface (X2)	Yes
Digital inputs	24
Digital outputs	16
Analog inputs	4 + 1
Analog outputs	2
Technological functions	4 counters 1 channel for positioning (See the technological functions manual terminal assignment (http://support.automation.siemens.com/WW/view/en/26090032))

Reference

- CPU operating state: *STEP 7 online help*
- Information on CPU memory reset: *CPU 31xC and CPU 31x operating instructions, Commissioning, Commissioning Modules, Memory reset by means of Mode Selector of the CPU*
- Evaluation of the LEDs upon error or diagnostic event: *CPU 31xC and CPU 31x Operating Instructions, Test Functions, Diagnostics and Troubleshooting, Diagnostics with the Help of Status and Error LEDs*

2.1.7 Operator controls and indicators: CPU 314C-2 PN/DP

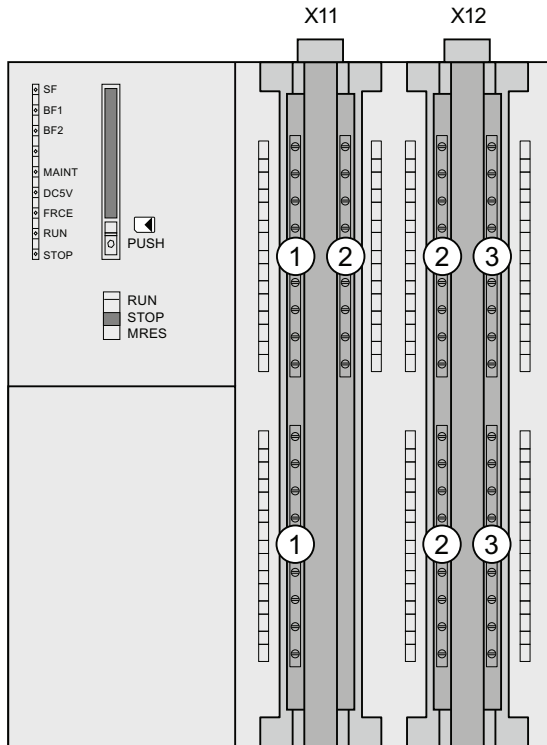
Operator controls and indicators: CPU 314C-2 PN/DP



Number	Description
①	Status and error indicators
②	Slot for the SIMATIC Micro Memory Card incl. the ejector
③	Terminals of the integrated inputs and outputs
④	Power supply connection
⑤	1. interface X1 (MPI/DP)
⑥	2. Interface X2 (PN), with dual-port switch
⑦	PROFINET Port 2 The Port 2 status is signaled using a dual-color LED (green/yellow): <ul style="list-style-type: none"> • LED lit green: LINK to a partner is active • LED changes to yellow: active data traffic (RX/TX) R: Ring port for setting up a ring topology with media redundancy
⑧	PROFINET Port 1 The Port 1 status is signaled using a dual-color LED (green/yellow): <ul style="list-style-type: none"> • LED lit green: LINK to a partner is active • LED changes to yellow: active data traffic (RX/TX) R: Ring port for setting up a ring topology with media redundancy
⑨	MAC address and 2D bar code
⑩	Mode selector

2.1 Operator controls and indicators of the compact CPUs (CPU 31xC)

The figure below shows the locations of the integrated digital and analog inputs/outputs of the CPU with open front covers.



- | Number | Designation |
|--------|----------------------------------|
| ① | Analog inputs and analog outputs |
| ② | Digital inputs |
| ③ | Digital outputs |

Status and error indicators

LED designation	Color	Meaning
SF	red	Hardware fault or software error
BF1	red	Bus error at the first interface (X1)
BF2	red	Bus error at the second interface (X2)
MAINT	yellow	Maintenance demanded status is pending
DC5V	green	5 V power supply for CPU and S7-300 bus is OK
FRCE	yellow	LED is lit: Active force job LED flashes at 2 Hz: Node flash test function
RUN	green	CPU in RUN mode The LED flashes during start-up at a rate of 2 Hz, and in stop mode at 0.5 Hz
STOP	yellow	CPU in STOP, or HOLD or start-up The LED flashes at a rate of 0.5 Hz when a memory reset is requested, and at 2 Hz during the reset.

Slot for the SIMATIC Micro Memory Card

A SIMATIC Micro Memory Card is used as memory module. You can use an MMC as a load memory and as a portable data carrier.

Note

Since these CPUs do not have an integrated load memory, they require a SIMATIC Micro Memory Card for operation.

Mode selector

Use the mode selector to set the CPU operating mode.

Table 2- 13 Mode selector settings

Setting	Meaning	Explanations
RUN	RUN mode	The CPU executes the user program.
STOP	STOP mode	The CPU does not execute a user program.
MRES	Memory reset	Mode selector setting with pushbutton function for CPU memory reset. A CPU memory reset by means of the mode selector requires a specific sequence of operation.

Power supply connection

All CPUs are equipped with a 2-pin socket for power supply connection. For delivery, the connector with screw terminals is plugged into this inlet at the factory.

Properties of the CPU in relation to interfaces, integrated inputs/outputs and technological functions

Table 2- 14 Properties of the CPUs 314C-2 PN/DP in relation to interfaces, integrated inputs/outputs and technological functions

Item	CPU 314C-2 PN/DP
9-pin MPI/DP interface (X1)	Yes
PN interface with 2-port switch (X2)	Yes
Digital inputs	24
Digital outputs	16
Analog inputs	4 + 1
Analog outputs	2
Technological functions	4 counters 1 channel for positioning (see the Technological functions manual terminal assignment (http://support.automation.siemens.com/WW/view/en/26090032))

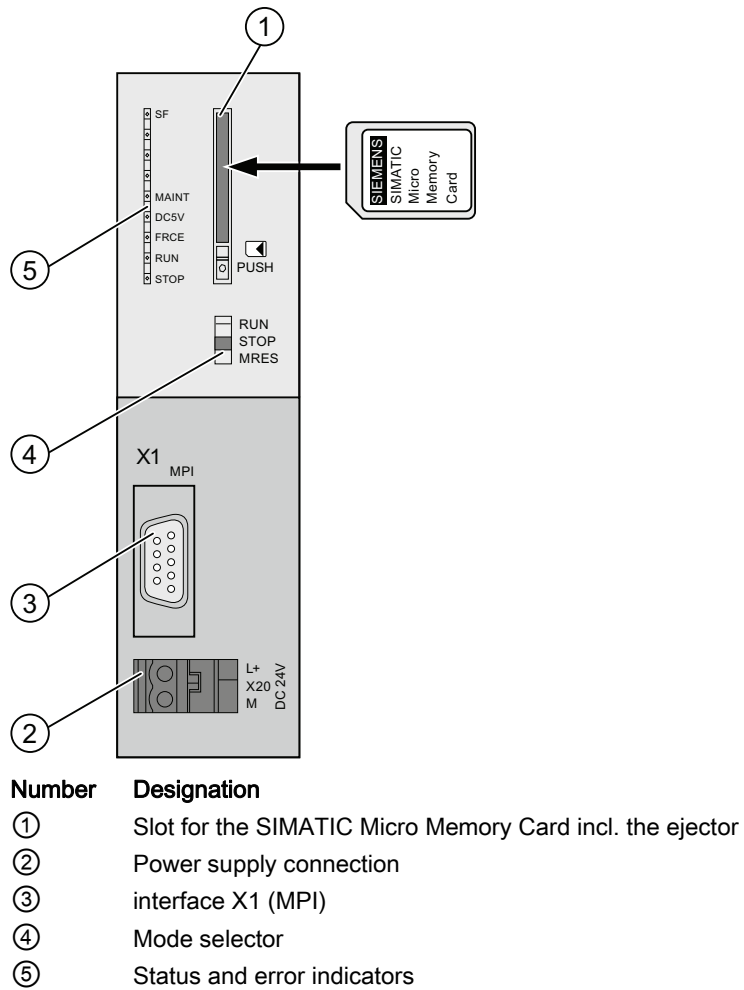
Reference

- CPU operating state: *STEP 7 online help*
- Information on CPU memory reset: *CPU 31xC and CPU 31x operating instructions, Commissioning, Commissioning Modules, Memory reset by means of Mode Selector of the CPU*
- Evaluation of the LEDs upon error or diagnostic event: *CPU 31xC and CPU 31x Operating Instructions, Test Functions, Diagnostics and Troubleshooting, Diagnostics with the Help of Status and Error LEDs*

2.2 Operator controls and indicators of the standard CPUs (CPU 31x)

2.2.1 Operator controls and indicators: CPU 312 and CPU 314

Operator controls and indicators of the CPU 312 and CPU 314



Status and error indicators

LED designation	Color	Meaning
SF	red	Hardware fault or software error
MAINT	yellow	Maintenance demanded (without function)
DC5V	green	5 V power supply for the CPU and S7-300 bus
FRCE	yellow	LED is lit: Active force job LED flashes at 2 Hz: Node flash test function
RUN	green	CPU in RUN The LED flashes during start-up at a rate of 2 Hz, and in stop mode at 0.5 Hz
STOP	yellow	CPU in STOP or HOLD, or STARTUP mode The LED flashes at a rate of 0.5 Hz when a memory reset is requested, and at 2 Hz during the reset.

Slot for the SIMATIC Micro Memory Card

A SIMATIC Micro Memory Card is used as memory module. You can use an MMC as a load memory and as a portable data carrier.

Note

Since these CPUs do not have an integrated load memory, they require a SIMATIC Micro Memory Card for operation.

Mode selector

The mode selector switch is used to set the CPU operating mode.

Table 2- 15 Mode selector settings

Setting	Meaning	Explanations
RUN	RUN mode	The CPU executes the user program.
STOP	STOP mode	The CPU does not execute a user program.
MRES	Memory reset	Mode selector setting with pushbutton function for CPU memory reset. A CPU memory reset by means of the mode selector requires a specific sequence of operation.

Power supply connection

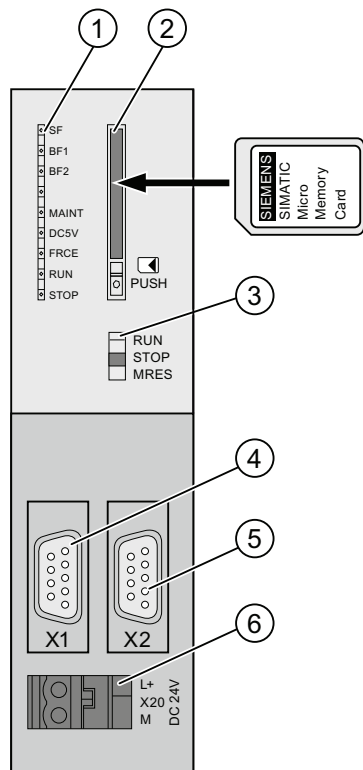
All CPUs are equipped with a 2-pin socket for power supply connection. For delivery, the connector with screw terminals is plugged into this inlet at the factory.

Reference

- CPU operating state: *STEP 7 online help*
- Information on CPU memory reset: *CPU 31xC and CPU 31x operating instructions, Commissioning, Commissioning Modules, Memory reset by means of Mode Selector of the CPU*
- Evaluation of the LEDs upon error or diagnostic event: *CPU 31xC and CPU 31x Operating Instructions, Test Functions, Diagnostics and Troubleshooting, Diagnostics with the Help of Status and Error LEDs*

2.2.2 Operator controls and indicators: CPU 315-2 DP and CPU 317-2 DP

Operator controls and indicators of CPU 315-2 DP and CPU 317-2 DP



Number	Description
①	Status and error indicators: CPU 315-2 DP has only one bus fault LED: BF CPU 317-2 DP has two bus fault LEDs: BF1 and BF 2
②	Slot for the SIMATIC Micro Memory Card incl. the ejector
③	Mode selector
④	1. Interface X1 (MPI for CPU 315-2 DP, MPI/DP for CPU 317-2 DP)
⑤	2. interface X2 (DP)
⑥	Power supply connection

Status and error indicators of the CPU 315-2 DP

LED designation	Color	Meaning
SF	red	Hardware fault or software error
BF	red	Bus error at the DP interface (X2)
MAINT	yellow	Maintenance demanded (without function)
DC5V	green	5 V power supply for the CPU and S7-300 bus
FRCE	yellow	LED is lit: Active force job LED flashes at 2 Hz: Node flash test function
RUN	green	CPU in RUN The LED flashes during start-up at a rate of 2 Hz, and in stop mode at 0.5 Hz
STOP	yellow	CPU in STOP or HOLD, or STARTUP mode The LED flashes at a rate of 0.5 Hz when a memory reset is requested, and at 2 Hz during the reset.

Status and error indicators of the CPU 317-2 DP

LED designation	Color	Meaning
SF	red	Hardware fault or software error
BF1	red	Bus error at the first interface (X1)
BF2	red	Bus error at the second interface (X2)
MAINT	yellow	Maintenance demanded (without function)
DC5V	green	5 V power supply for the CPU and S7-300 bus
FRCE	yellow	LED is lit: Active force job LED flashes at 2 Hz: Node flash test function
RUN	green	CPU in RUN The LED flashes during start-up at a rate of 2 Hz, and in stop mode at 0.5 Hz
STOP	yellow	CPU in STOP or HOLD, or STARTUP mode The LED flashes at a rate of 0.5 Hz when a memory reset is requested, and at 2 Hz during the reset.

Slot for the SIMATIC Micro Memory Card

A SIMATIC Micro Memory Card is used as memory module. You can use an MMC as a load memory and as a portable data carrier.

Note

Since these CPUs do not have an integrated load memory, they require a SIMATIC Micro Memory Card for operation.

Mode selector

Use the mode selector to set the CPU operating mode:

Table 2- 16 Mode selector settings

Setting	Meaning	Explanations
RUN	RUN mode	The CPU executes the user program.
STOP	STOP mode	The CPU does not execute a user program.
MRES	Memory reset	Mode selector setting with pushbutton function for CPU memory reset. A CPU memory reset by means of the mode selector requires a specific sequence of operation.

Power supply connection

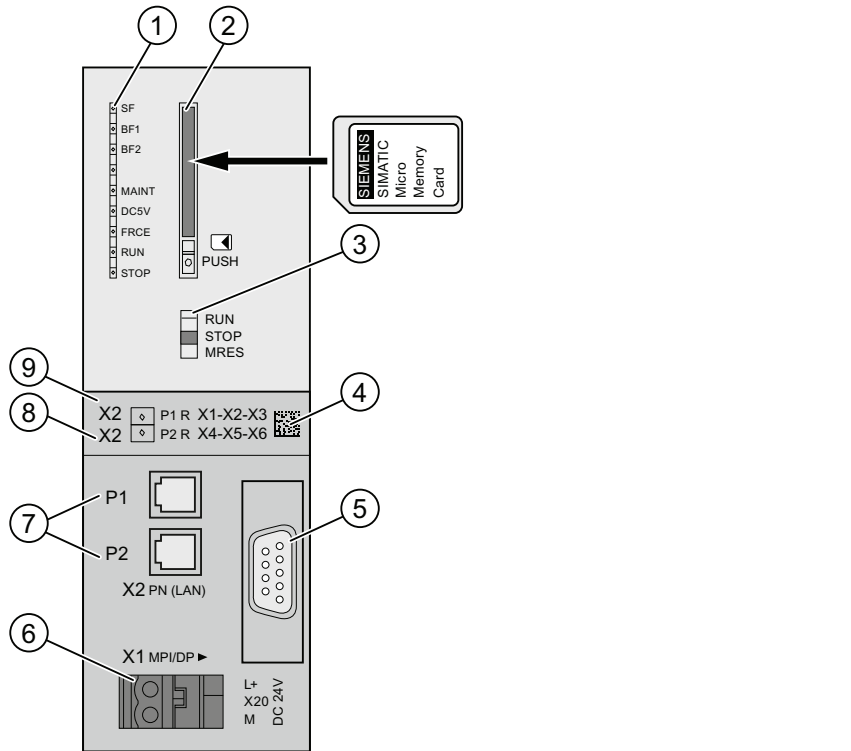
All CPUs are equipped with a 2-pin socket for power supply connection. For delivery, the connector with screw terminals is plugged into this inlet at the factory.

Reference

- CPU operating state: *STEP 7 online help*
- Information on CPU memory reset: *CPU 31xC and CPU 31x operating instructions, Commissioning, Commissioning Modules, Memory reset by means of Mode Selector of the CPU*
- Evaluation of the LEDs upon error or diagnostic event: *CPU 31xC and CPU 31x Operating Instructions, Test Functions, Diagnostics and Troubleshooting, Diagnostics with the Help of Status and Error LEDs*

2.2.3 Operator controls and indicators: CPU 315-2 PN/DP and CPU 317-2 PN/DP

Operator controls and indicators of CPU 315-2 PN/DP and CPU 317-2 PN/DP



Number	Description
①	Status and error indicators
②	Slot for the SIMATIC Micro Memory Card incl. the ejector
③	Mode selector
④	MAC address and 2D bar code
⑤	1. interface X1 (MPI/DP)
⑥	Power supply connection
⑦	2. Interface X2 (PN), with dual-port switch
⑧	PROFINET Port 2 The Port 2 status is signaled using a dual-color LED (green/yellow): <ul style="list-style-type: none"> • LED lit green: LINK to a partner is active • LED changes to yellow: active data traffic (RX/TX) R: Ring port for setting up a ring topology with media redundancy
⑨	PROFINET Port 1 The Port 1 status is signaled using a dual-color LED (green/yellow): <ul style="list-style-type: none"> • LED lit green: LINK to a partner is active • LED changes to yellow: active data traffic (RX/TX) R: Ring port for setting up a ring topology with media redundancy

Status and error indicators

LED designation	Color	Meaning
SF	red	Hardware fault or software error
BF1	red	Bus error at the first interface (X1)
BF2	red	Bus error at the second interface (X2)
LINK/RX/TX	green	Connection is active at the relevant port
	yellow	Receiving/transmitting data at the relevant port
MAINT	yellow	Maintenance demanded
DC5V	green	5 V power supply for the CPU and S7-300 bus
FRCE	yellow	LED is lit: Active force job LED flashes at 2 Hz: Node flash test function
RUN	green	CPU in RUN The LED flashes during start-up at a rate of 2 Hz, and in stop mode at 0.5 Hz
STOP	yellow	CPU in STOP or HOLD, or STARTUP mode The LED flashes at a rate of 0.5 Hz when a memory reset is requested, and at 2 Hz during the reset.

Slot for the SIMATIC Micro Memory Card

A SIMATIC Micro Memory Card is used as memory module. You can use an MMC as a load memory and as a portable data carrier.

Note

Since these CPUs do not have an integrated load memory, they require a SIMATIC Micro Memory Card for operation.

Mode selector

You can use the mode selector switch to set the current operating mode of the CPU.

Table 2- 17 Mode selector settings

Setting	Meaning	Explanations
RUN	RUN mode	The CPU executes the user program.
STOP	STOP mode	The CPU does not execute a user program.
MRES	Memory reset	Mode selector setting with pushbutton function for CPU memory reset. A CPU memory reset by means of the mode selector requires a specific sequence of operation.

Power supply connection

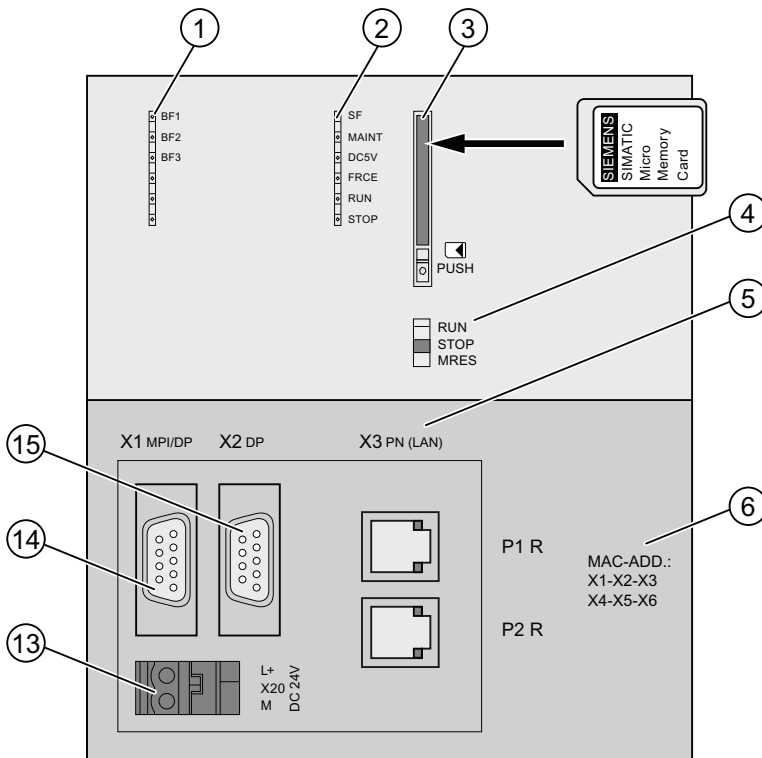
All CPUs are equipped with a 2-pin socket for power supply connection. For delivery, the connector with screw terminals is plugged into this inlet at the factory.

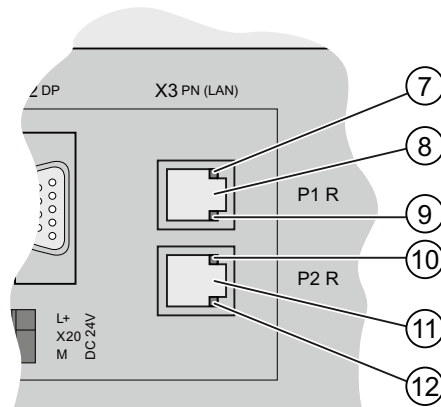
Reference

- CPU operating state: *STEP 7 online help*
- Information on CPU memory reset: *CPU 31xC and CPU 31x operating instructions, Commissioning, Commissioning Modules, Memory reset by means of Mode Selector of the CPU*
- Evaluation of the LEDs upon error or diagnostic event: *CPU 31xC and CPU 31x Operating Instructions, Test Functions, Diagnostics and Troubleshooting, Diagnostics with the Help of Status and Error LEDs*

2.2.4 Operator controls and indicators: CPU 319-3 PN/DP

Operator controls and indicators





Number	Designation
①	Bus error indicators
②	Status and error indicators
③	Slot for the SIMATIC Micro Memory Card incl. the ejector
④	Mode selector
⑤	3. Interface X3 (PN), with dual-port switch
⑥	MAC address
⑦	Green LED - Port 1 LED designation: LINK LED lit green: LINK to a partner is active
⑧	PROFINET- Port 1 R: Ring port for setting up a ring topology with media redundancy
⑨	Yellow LED - Port 1 LED designation: RX/TX LED lit yellow: active data traffic (RX/TX)
⑩	Green LED - Port 2 LED designation: LINK LED lit green: LINK to a partner is active
⑪	PROFINET- Port 2 R: Ring port for setting up a ring topology with media redundancy
⑫	Yellow LED - Port 2 LED designation: RX/TX LED lit yellow: active data traffic (RX/TX)
⑬	Power supply connection
⑭	1. interface X1 (MPI/DP)
⑮	2. interface X2 (DP)

Status and error indicators

LED designation	Color	Meaning
SF	red	Hardware fault or software error
BF1	red	Bus error at the first interface (X1)
BF2	red	Bus error at the second interface (X2)
BF3	red	Bus error at the third interface (X3)
LINK ¹	green	Connection is active at the relevant port of the third interface (X3)
RX/TX ¹	yellow	Receiving/transmitting data at the relevant port of the third interface (X3)
MAINT	yellow	Maintenance demanded
DC5V	green	5 V power supply for the CPU and S7-300 bus
FRCE	yellow	LED is lit: Active force job LED flashes at 2 Hz: Node flash test function
RUN	green	CPU in RUN The LED flashes during start-up at a rate of 2 Hz, and in stop mode at 0.5 Hz
STOP	yellow	CPU in STOP or HOLD, or STARTUP mode The LED flashes at a rate of 0.5 Hz when a memory reset is requested, and at 2 Hz during the reset.

¹ With the CPU 319-3 PN/DP, the LEDs are located directly at the RJ45 sockets and are not labeled.

Slot for the SIMATIC Micro Memory Card

A SIMATIC Micro Memory Card is used as memory module. You can use an MMC as a load memory and as a portable data carrier.

Note

Since these CPUs do not have an integrated load memory, they require a SIMATIC Micro Memory Card for operation.

Mode selector

You can use the mode selector switch to set the current operating mode of the CPU.

Table 2- 18 Mode selector settings

Setting	Meaning	Explanations
RUN	RUN mode	The CPU executes the user program.
STOP	STOP mode	The CPU does not execute a user program.
MRES	Memory reset	Mode selector setting with pushbutton function for CPU memory reset. A CPU memory reset by means of the mode selector requires a specific sequence of operation.

Power supply connection

All CPUs are equipped with a 2-pin socket for power supply connection. For delivery, the connector with screw terminals is plugged into this inlet at the factory.

Reference

- CPU operating state: *STEP 7 online help*
- Information on CPU memory reset: *CPU 31xC and CPU 31x operating instructions, Commissioning, Commissioning Modules, Memory reset by means of Mode Selector of the CPU*
- Evaluation of the LEDs upon error or diagnostic event: *CPU 31xC and CPU 31x Operating Instructions, Test Functions, Diagnostics and Troubleshooting, Diagnostics with the Help of Status and Error LEDs*

Communication

3.1 Interfaces

3.1.1 Multi-Point Interface (MPI)

Availability

All the CPUs described here are equipped with an MPI interface

A CPU equipped with an MPI/DP interface is configured and supplied as MPI interface.

Properties

The MPI (Multi-Point Interface) represents the CPU interface for PG/OP connections, or for communication on an MPI subnet.

The default baud rate of all CPUs is 187.5 kbps. You can also set 19.2 kbps for communication with an S7-200. Baud rates up to max. 12 Mbps are possible with the CPU 314C-2 PN/DP, CPU 315-2 PN/DP, CPU 317-2 and with the CPU 319-3 PN/DP.

The CPU automatically broadcasts its bus configuration via the MPI interface (the transmission rate, for example). A PG, for example, can thus receive the correct parameters and automatically connect to a MPI subnet.

Devices capable of MPI communication

- PG/PC
- OP/TP
- S7-300 / S7-400 with MPI interface
- S7-200 (only at 19.2 kbps)

NOTICE

You may only connect PGs to an MPI subnet which is in RUN.
Do not connect other stations (for example, OP, TP) to the MPI subnet while the system is running. Otherwise, transferred data might be corrupted as a result of interference, or global data packages may be lost.

Clock synchronization

The CPU's MPI interface supports clock synchronization. Detailed information is available in the *Manual CPU 31x and CPU 31x, Technical specifications, section Clock synchronization*.

3.1.2 PROFIBUS DP

Availability

CPUs with the "DP" have at least one DP interface.

The CPU 314C-2 PN/DP, CPU 315-2 PN/DP and the CPU 317-2 PN/DP feature one MPI/DP interface. The 317-2 DP and 319-3 PN/DP CPUs feature an MPI/DP interface plus an additional DP interface. The factory setting of the CPU's MPI/DP interface is MPI mode. You need to set DP mode in STEP 7 if you want to use the DP interface.

Operating modes for CPUs with two DP interfaces

Table 3- 1 Operating modes for CPUs with two DP interfaces

MPI/DP interface	PROFIBUS DP interface
<ul style="list-style-type: none"> • MPI • DP master • DP slave ¹ 	<ul style="list-style-type: none"> • not configured • DP master • DP slave ¹

¹ simultaneous operation of the DP slave on both interfaces is excluded

Properties

The PROFIBUS DP interface is mainly used to connect distributed I/O. PROFIBUS DP allows you to create large subnets, for example.

The PROFIBUS DP interface can be configured for operation in master or slave mode, and supports transmission rates up to 12 Mbps

The CPU broadcasts its bus parameters (transmission rate, for example) via the PROFIBUS DP interface when master mode is set. This functionality automatically provides the correct parameters for online operation of a programming device, for example. In your configuration you can specify to disable bus parameter broadcasting.

Note

(for DP interface in slave mode only)

When you disable the "Test, Commissioning, Routing" check box in the DP interface properties dialog box in STEP 7, the transmission rate settings of the master automatically override corresponding user-specific settings. This disables the routing function at this interface.

Devices capable of PROFIBUS DP communication

- PG/PC
- OP/TP
- DP slaves
- DP master
- Actuators/Sensors
- S7-300/S7-400 with PROFIBUS DP interface

Clock synchronization

Clock synchronization is possible via the CPU's PROFIBUS DP interface. Detailed information is available in the manual *CPU 31x and CPU 31x Manual, Technical specifications, Clock synchronization section*.

Reference

Additional information on the PROFIBUS can be found on the Internet (<http://www.profibus.com>).

3.1.3 PROFINET

CPUs with name suffix "PN" are equipped with a PROFINET interface.

The PROFINET interface on CPU31x PN/DP V3.1 or higher is equipped with an integrated dual-port switch.

Special features of PROFINET devices with integrated switch:

- System configuration in line topology is possible
- You can set up a ring topology using Ports 1 and 2 which are identified as ring ports (P1 R, P2 R)
- Connecting a programming device or an HMI device without additional switch

Compatibility with CPUs < V3.1

You can continue to use your existing CPU configuration even after replacing a CPU < V3.1 with a dual-port CPU.

The following rules apply:

- The Ethernet cable to the RJ45 connector must be inserted in **Port 1** of the new CPU.
Port 1 handles the port configuration of the PROFINET interface within the CPU configuration. Assuming you set up a fixed transmission mode and disabled Autonegotiation in the existing CPU configuration, then Port 1 continues to be used as terminal device port instead of being operated as switch port. The CPU interface continues to function, but as a switch, i.e. the forwarding of the Ethernet frames from one port to the other is ensured
- **Port 2** starts up with default parameters

Special features for migration with unchanged CPU configuration:

- **Port 2** cannot be analyzed because it starts up with default parameters without being assigned a separate diagnostics address

Note

To enable diagnostics and reconfiguration of Port 2 as well (e.g. configuration of interrelations, or of the transmission medium/duplex mode), you must replace the old with the new CPU in HW Config.

Connecting to Industrial Ethernet

You can use the integrated PROFINET interface of the CPU to establish a connection to Industrial Ethernet.

The integrated PROFINET interface of the CPU can be configured via an MPI or the PROFINET interface.

Devices which can be connected via PROFINET (PN)

- PROFINET IO Controller
- PROFINET IO Devices (e.g. IM 151-3 PN interface module in an ET 200S)
- PROFINET CBA components
- S7-300/S7-400 with PROFINET interface (e.g. CPU 317-2 PN/DP or CP 343-1)
- Active network components (a switch, for example)
- PG/PC with Ethernet card
- IE/PB link

Properties of the PROFINET interface

Properties	
IEEE standard	802.3
Connector design	2 X RJ45
	Dual-port switch (CPUs V3.1 or higher)
Transmission rate	Max. 100 Mbps
Media	Twisted Pair Cat5 (100 BASE-TX)
Media redundancy	in accordance with IEC 61158

Note

Networking PROFINET components

The use of switches, rather than hubs, for networking PROFINET components brings about a substantial improvement in decoupling bus traffic and improves runtime performance especially under higher bus load. PROFINET CBA with cyclic PROFINET interconnections requires the use of switches in order to maintain compliance with performance specifications. Full-duplex mode at 100 Mbit is mandatory for cyclic PROFINET interconnections.

PROFINET IO also requires the use of switches and 100 Mbit full-duplex mode. In the case of a PROFINET IO in IRT mode, all the PROFINET devices, including the switches, must be IRT-capable in the synchronization domain.

Addressing the ports

To diagnose the individual ports of a PROFINET interface, these ports must each have a separate diagnostics address. Addressing takes place in HW-Config.

For additional information, refer to the *PROFINET System Description* system manual.

To diagnose any detected problems in the user program, diagnostics messages (error and maintenance information) can be enabled using OB 82 (enable set in HW-Config) and then evaluated, for example, by means of SFB 54. There are also various data records (read-out using SFB 52) and system status lists (read-out using SFC 51) provided for more detailed diagnostics.

Diagnostics is also possible in *STEP 7* (e.g. communication diagnostics, network connection, Ethernet statistics, IP parameters).

Send clock and update time

Controllers and devices can be operated on a PROFINET IO subnet with a uniform send clock. If a device does not support the faster send clock times of a controller, the send clock is adapted to the possible send clock of the device. This means, for example, that devices operating with a send clock of 250 μ s as well as 1 ms can operate on a CPU 319-3 PN/DP (IO controller), which operates with a send clock of 250 μ s.

You can parameterize the update time of devices within a relatively wide range. This again depends on the send clock.

Update times for CPU 31x PN/DP

The following update times can be parameterized:

Real-time communication	Send clock	Update time
For RT:	250 µs	⇒ 250 µs to 128 ms
	500 µs	⇒ 500 µs to 256 ms
	1 ms	⇒ 1 ms to 512 ms
	2 ms	⇒ 2 ms to 512 ms
	4 ms	⇒ 4 ms to 512 ms
For IRT with "high flexibility" option:	250 µs	⇒ 250 µs to 128 ms
	500 µs	⇒ 500 µs to 256 ms
	1 ms	⇒ 1 ms to 512 ms
For IRT with "high performance" option:	250 µs	⇒ 250 µs to 4 ms
	500 µs	⇒ 500 µs to 8 ms
	1 ms	⇒ 1 ms to 16 ms
	2 ms	⇒ 2 ms to 32 ms
	4 ms	⇒ 4 ms to 64 ms

The minimum update time is determined by the number of devices used, by the volume of configured user data, and by the time slice for PROFINET IO communication. *STEP 7* automatically makes allowances for these dependencies in your system configuration.

Odd number of send clocks for IRT with "high performance" option:

In addition to the "even-numbered" send clocks (250 µs, 500 µs, 1 ms, 2 ms, 4 ms), you can set any multiple of 125 ms as "odd-numbered" send clock in the range from 250 µs and 4 ms for IRT with "high performance" option: 375 µs, 625 µs ... 3.875 ms

For "odd-numbered" send clocks, the following rule applies to all PROFINET IO devices:

- Update time = send clock
- IRT with "high performance" cannot be supplemented by means of RT devices

<p>NOTICE</p> <p>On CPUs with an integrated switch, memory resets/firmware updates/power-offs cause an interruption of communication.</p> <p>Note that the PROFINET interface and integrated switch are shut down during CPU memory reset and firmware updates, or after POWER OFF. At a CPU configured for operation in a line topology, communication is shut down to the following devices.</p>
--

Reference

- For instructions on how to configure the integrated PROFINET interface, refer to the *S7-300, CPU 31xC and CPU 31x Setup operating instructions*.
- For more information about PROFINET functionality, refer to the PROFINET System Description (<http://support.automation.siemens.com/WW/view/en/19292127>).
- For detailed information on Ethernet networks, network configuration and network components, refer to the *SIMATIC NET Manual: Twisted-pair and fiber-optic networks*, on the Internet (<http://support.automation.siemens.com/WW/view/en/8763736>).
- For detailed information on CBA, refer to the *Tutorial Component Based Automation, Commissioning Systems* on the Internet (<http://support.automation.siemens.com/WW/view/en/18403908>).
- Additional information about PROFINET can be found on the Internet (<http://www.profibus.com>).

3.1.3.1 Configuring the port properties

Configuring the port properties of the PROFINET interface in *STEP 7*

The PROFINET interfaces in our devices are preset to "automatic setting" (Autonegotiation). Verify that all devices connected to the PROFINET interface of CPU 31x PN/DP are also set to the "Autonegotiation" mode. This is the default setting of standard PROFINET/Ethernet components.

If you connect a device that does not support the "automatic setting" (Autonegotiation) mode to the PROFINET interface of CPU 31x PN/DP, or select a setting in addition to the "automatic setting" (Autonegotiation) mode, note the following:

- PROFINET IO and PROFINET CBA require operation at 100 Mbps full-duplex, i.e. if the PROFINET interface of CPU 31x PN/DP is used simultaneously for communication on PROFINET IO / CBA and Ethernet, the interface must be set to 100 Mbps full-duplex mode in addition to the "automatic setting" (Autonegotiation).
- If the PROFINET interface of CPU 31x PN/DP is used only for Ethernet communication, 10 Mbps or 100 Mbps full-duplex mode can be set in addition to the "automatic setting" (Autonegotiation). Setting half-duplex mode is not permitted in any situation.

Reason: If "Autonegotiation" is set and a switch that is permanently set to "10 Mbps half-duplex" is connected to the PROFINET interface of CPU 31x PN/DP, the CPU adapts its settings to the partner device settings, that is, communication is actually handled in "10 Mbps half-duplex" mode. However, since PROFINET IO and PROFINET CBA require operation with 100 Mbps full-duplex, this operating mode is not allowed.

Note

For additional information about configuring the ports of IO devices that are to carry out a prioritized startup, refer to the special notes in the *PROFINET System Description*.

Disabling the port of a PROFINET interface

You can disable a port of the PROFINET interface in HW Config of *STEP 7*. By default it is activated.

The CPU cannot be addressed at a disabled port of the PROFINET interface.

Take into account that no communication functions such as programming device/OP functions, open IE communication, or S7 communication are possible via a deactivated port.

Addressing the ports

To diagnose the individual ports of a PROFINET interface, these ports must each have a separate diagnostics address. The addressing is done in HW-Config.

For additional information, refer to the *PROFINET System Description*.

To diagnose any detected problems in the user program, diagnostics messages (error and maintenance information) can be enabled using OB 82 (enable set in HW-Config) and then evaluated, for example, by means of SFB 54. There are also various data records (read-out using SFB 52) and system status lists (read-out using SFC 51) provided for more detailed diagnostics.

Diagnostics is also possible in *STEP 7* (e.g. communication diagnostics, network connection, Ethernet statistics, IP parameters).

3.1.4 Point-to-point (PtP)

Availability

CPUs with the "PtP" name suffix have at least one PtP interface.

Properties

Using the PtP interface of your CPU, you can connect external devices with serial interface. You can operate such a system at transmission rates up to 19.2 kbps in full duplex mode (RS 422), and up to 38.4 kbps in half duplex mode (RS 485).

Baud rate

- Half duplex: 38,4 kbps
- Full duplex: 19,2 kbps

Drivers

PtP communication drivers installed in those CPUs:

- ASCII drivers
- 3964(R) Protocol
- RK 512 (CPU 314C-2 PtP only)

Devices capable of PtP communication

Devices equipped with a serial port, for example, barcode readers, printers, etc.

Reference

CPU 31xC: Technological functions manual

3.2 Communication services

3.2.1 Overview of communication services

Selecting the communication service

You need to decide on a communication service based on the required functionality. Your choice of communication service determines

- the available functionality
- whether an S7 connection is required or not
- the time of connecting

The user interfaces can vary considerably (SFC, SFB, etc.) and is also determined by the hardware used (SIMATIC CPU, PC, etc.).

Overview of communication services

The table below provides an overview of communication services offered by the CPUs.

Table 3-2 Communication services of the CPUs

Communication service	Functionality	Time at which the S7 connection is established ...	via MPI	via DP	via PtP	via PN
PG communication	Commissioning, test, diagnostics	From the PG, starting when the service is being used	X	X	–	X
OP communication	Operator control and monitoring	From the OP at POWER ON	X	X	–	X
S7 basic communication	Data exchange	Programmed to take place via blocks (SFC parameters)	X	X	–	–
S7 communication	Data exchange in server and client mode: Configuration of connection required	Via active peer at POWER ON	Only as server	Only as server	–	X
Global data communication	Cyclic data exchange (e.g. bit memories)	Does not require an S7 connection	X	–	–	–
Routing of PG functions (only for CPUs with DP or PROFINET interface)	E.g. testing, diagnostics across network boundaries	From the PG, starting when the service is being used	X	X	–	X
Point-to-point connection	Data exchange via serial interface	Does not require an S7 connection	–	–	X	–
PROFIBUS DP	Data exchange between master and slave	Does not require an S7 connection	–	X	–	–
PROFINET CBA	Data exchange by means of component-based communication	Does not require an S7 connection	–	–	–	X
PROFINET IO	Data exchange between IO controllers and the IO devices	Does not require an S7 connection	–	–	–	X
Web server	Diagnostics	Does not require an S7 connection	–	–	–	X
SNMP (Simple Network Management Protocol)	Standard protocol for network diagnostics and parameterization	Does not require an S7 connection	–	–	–	X
Open communication by means of TCP/IP	Data exchange via Industrial Ethernet with TCP/IP protocol (by means of loadable FBs)	Does not require an S7 connection, is programmed to take place via loadable FBs	–	–	–	X
Open communication by means of ISO-on-TCP	Data exchange via Industrial Ethernet with ISO-on-TCP protocol (by means of loadable FBs)	Does not require an S7 connection, is programmed to take place via loadable FBs	–	–	–	X
Open communication by means of UDP	Data exchange via Industrial Ethernet with UDP protocol (by means of loadable FBs)	Does not require an S7 connection, is programmed to take place via loadable FBs	–	–	–	X

Communication service	Functionality	Time at which the S7 connection is established ...	via MPI	via DP	via PtP	via PN
Data record routing	for example, parameterization and diagnostics of field devices on the PROFIBUS DP by an engineering system operated on an MPI or PROFINET interface (e.g. PDM)	Takes place when the parameterization tool accesses the field device	X	X	–	X
Clock synchronization	Broadcast frames	Does not require an S7 connection	X	X	–	–
	NTP protocol	Does not require an S7 connection	–	–	–	X

See also

Distribution and availability of S7 connection resources (Page 87)

Connection resources for routing (Page 89)

3.2.2 PG communication**Properties**

PG communication is used to exchange data between engineering stations (e.g. PG, PC) and SIMATIC modules with communications capability. This service is possible via MPI, PROFIBUS, and Industrial Ethernet subnets. Transition between subnets is also supported.

PG communication provides the functions needed to load programs and configuration data, run tests, and evaluate diagnostic information. These functions are integrated in the operating system of SIMATIC S7 modules.

A CPU can maintain several simultaneous online connections to one or multiple PGs.

3.2.3 OP communication

Properties

Using OP communication, you can exchange data between operator stations (e.g. OP, TP, WinCC) and SIMATIC modules which have communication functionality. This service is possible via MPI, PROFIBUS, and Industrial Ethernet subnets.

OP communication provides functions you require for operator control and monitoring. These functions are integrated in the operating system of SIMATIC S7 modules. A CPU can maintain several simultaneous connections to one or several OPs.

OP communication can be accelerated enormously by activating "prioritized OCM communication" in the CPU's properties dialog. The CPU must support this function (consult the technical specifications of the relevant CPU).

Note

Effects of "prioritized OCM communication"

- Consistency with user program data will be lost. Consistency must be ensured by means of the user program (refer to the "Data consistency (Page 79)" chapter).
 - The cycle time increases.
-

3.2.4 S7 basic communication

Properties

S7 basic communication is used to exchange data between S7 CPUs and the communication-capable SIMATIC modules within an S7 station (acknowledged data exchange). Data is exchanged via non-configured S7 connections. The service is available via the MPI subnet, or within the station to function modules (FM).

S7 basic communication provides the functions you require for data exchange. These functions are integrated into the CPU operating system. The user can utilize this service via the "System function" (SFC) user interface.

Reference

Additional information

- on SFCs can be found in the *instruction list*.
A detailed description is available in the *STEP 7 Online Help* or *System and Standard Functions Reference Manual*
- on communication is found in the *Communication with SIMATIC* manual

3.2.5 S7 communication

Properties

A CPU can always operate in server or client mode in S7 communication: We distinguish between

- connections configured at one end (for PUT/GET only)
- connections configured at both ends (for USEND, URCV, BSEND, BRCV, PUT, GET)

However, the available functionality depends on the CPU. A CP is therefore required in certain situations.

Table 3- 3 Client and server in S7 communication using connections configured at one end/both ends

CPU	Use in server mode for connections configured at one end	Use in server mode for connections configured at both ends	Use as client
31xC ≥ V1.0.0	Generally possible on MPI/DP interface without programming of user interface	Only possible with CP and loadable FBs	Only possible with CP and loadable FBs
31x ≥ V2.0.0	Generally possible on MPI/DP interface without programming of user interface	Only possible with CP and loadable FBs	Only possible with CP and loadable FBs
31x ≥ V2.2.0	Generally possible on MPI/DP/PN interface without programming of user interface	<ul style="list-style-type: none"> • Possible on PROFINET interface with loadable FBs or • with CP and loadable FBs 	<ul style="list-style-type: none"> • Possible on PROFINET interface with loadable FBs or • with CP and loadable FBs

The user interface is implemented using standard function blocks (FBs) from the standard library of STEP 7, under communication blocks.

Reference

For additional information on communication, refer to the *Communication with SIMATIC* manual.

3.2.6 Global data communication (MPI only)

Properties

Global data communication is used for cyclic exchange of global data via MPI subnets (for example, I, Q, M) between SIMATIC S7 CPUs (data exchange without acknowledgement). One CPU sends the data to all CPUs simultaneously in the MPI subnet. This function is integrated in the CPU operating system.

Reduction ratio

The reduction ratio specifies the cyclic intervals for GD communication. You can set the reduction ratio when you configure global data communication in STEP 7. For example, if you set a reduction ratio of 7, global data is transferred only with every 7th cycle. This reduces the CPU load.

Send and receive conditions

Conditions which should be satisfied for communication via GD circles:

- Mandatory for the sender of a GD package:
 $\text{Reduction ratio}_{\text{Transmitter}} \times \text{Cycle time}_{\text{Transmitter}} \geq 60 \text{ ms}$
- Mandatory for the receiver of a GD package:
 $\text{Reduction ratio}_{\text{Receiver}} \times \text{Cycle time}_{\text{Receiver}} < \text{Reduction ratio}_{\text{Transmitter}} \times \text{Cycle time}_{\text{Transmitter}}$

A GD package may be lost if you do not adhere to these conditions. The reasons being:

- The performance capability of the "smallest" CPU in the GD circle
- Global data is transmitted and received asynchronously by the transmitting and receiving stations

If in STEP 7 you set "Transmit after each CPU cycle" and the CPU has a short CPU cycle time (< 60 ms), the operating system might overwrite a GD package of the CPU before it is transmitted. The loss of global data is indicated in the status box of a GD circle if you set this function in STEP 7.

GD resources of the CPUs

Table 3- 4 GD resources of the CPUs

Parameters	All CPUs of the S7-300 product family
Number of GD circles per CPU	Max. 8
GD packages transmitted per GD circle	Max. 1
GD packages transmitted for all GD circles	Max. 8
GD packages received per GD circle	Max. 1
GD packages received for all GD circles	Max. 8
Data length per GD package	Max. 22 bytes
Consistency	Max. 22 bytes
Min. reduction ratio (default)	1 (8)

3.2.7 Routing

Properties

STEP 7 V5.1 + SP4 or higher allows you to access your S7 stations in all subnets with your PG/PC, for example, to

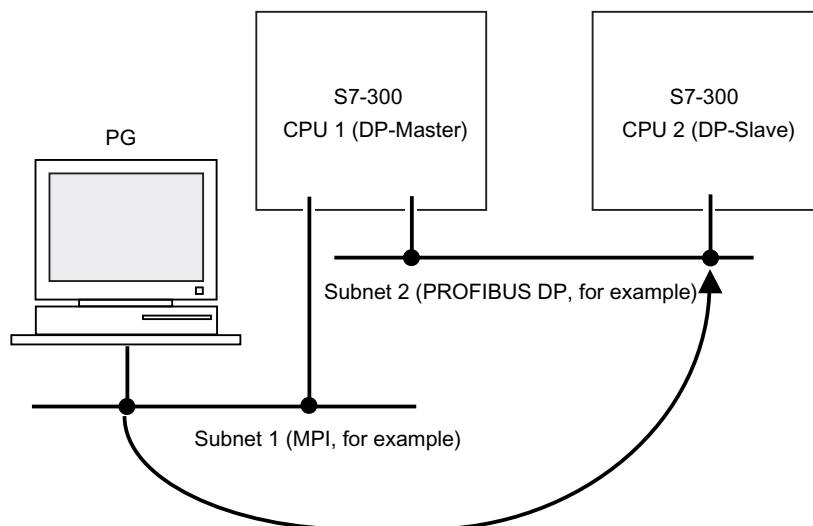
- download user programs
- download a hardware configuration
- perform test and diagnostic functions

Note

If the CPU is used as an intelligent DP slave, the routing function is only available when the DP interface is set active. In STEP 7, activate the Test, Commission Routing checkbox in the properties dialog of the DP interface. For detailed information, refer to the *Programming with STEP 7 manual*, or directly to the *STEP 7 Online Help*.

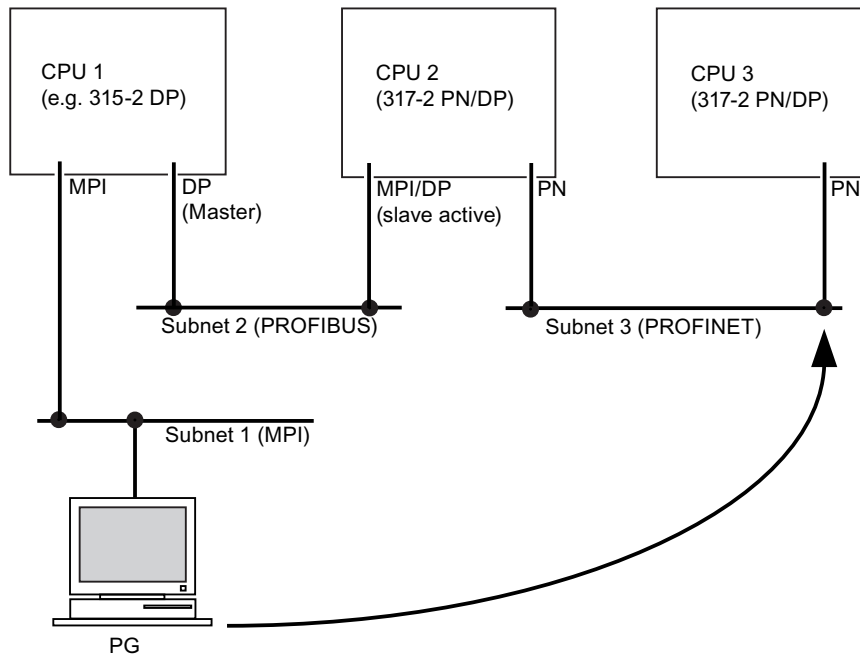
Routing gateways: MPI - DP

Gateways between subnets are located in the SIMATIC station that is equipped with interfaces to the respective subnets. The figure below shows CPU 1 (DP master) acting as gateway between subnet 1 and 2.



The figure below shows the MPI access to PROFINET via PROFIBUS. CPU 1 (e.g. 315-2 DP) is the gateway between subnet 1 and 2; CPU 2 is the gateway between subnet 2 and 3.

Routing gateways: MPI - DP - PROFINET



Number of connections for routing

The CPUs with DP interface provide a different number of connections for the routing function:

Table 3- 5 Number of routing connections for DP CPUs

CPU	As of firmware version	Number of connections for routing
31xC, CPU 31x	2.0	Max. 4
317-2 DP	3.3	Interface X1 configured as: <ul style="list-style-type: none"> • MPI: Max. 10 • DP master: Max. 24 • DP slave (active): Max. 14
		Interface X2 configured as: <ul style="list-style-type: none"> • DP master: Max. 24 • DP slave (active): Max. 14
31x-2 PN/DP	2.2	Interface X1 configured as: <ul style="list-style-type: none"> • MPI: Max. 10 • DP master: Max. 24 • DP slave (active): Max. 14
		Interface X2 configured as: <ul style="list-style-type: none"> • PROFINET: Max. 24

CPU	As of firmware version	Number of connections for routing
314C-2 PN/DP	3.3	Interface X1 configured as: <ul style="list-style-type: none"> • MPI: Max. 10 • DP master: Max. 24 • DP slave (active): Max. 14
		Interface X2 configured as: <ul style="list-style-type: none"> • PROFINET: Max. 24
319-3 PN/DP	2.4	Interface X1 configured as: <ul style="list-style-type: none"> • MPI: Max. 10 • DP master: Max. 24 • DP slave (active): Max. 14
		Interface X2 configured as: <ul style="list-style-type: none"> • DP master: Max. 24 • DP slave (active): Max. 14
		Interface X3 configured as: <ul style="list-style-type: none"> • PROFINET: Max. 48

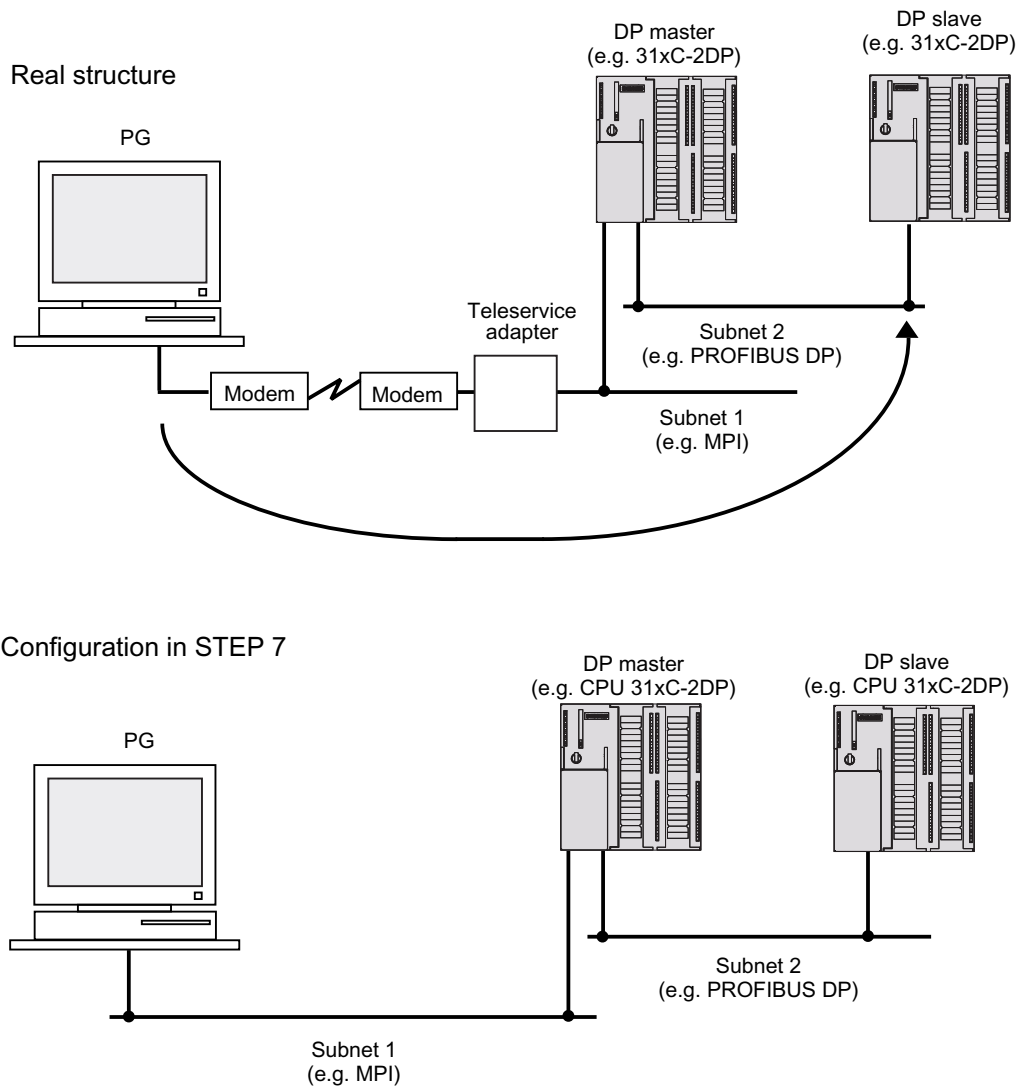
Requirements

- The station modules are "capable of routing" (CPUs or CPs)
- The network configuration does not exceed project limits
- The modules have loaded the configuration data containing the latest "knowledge" of the entire network configuration of the project.
Reason: All modules participating in the gateway must receive the routing information defining the paths to other subnets
- In your network configuration, the PG/PC you want to use to establish a connection via a gateway must be assigned to the network it is physically connected to
- The CPU must set to master mode
- Or if the CPU is configured as slave, the Test, Commissioning, Routing functionality must be enabled for DP slave by activating the checkbox in STEP 7 in the DP interface properties dialog box

Routing: Example of a TeleService application

The figure below shows the example of an application for remote maintenance of an S7 station using a PG. The connection to other subnets is here established via modem connection.

The lower section of the figure shows how easily this can be configured in STEP 7.



Reference

Additional information

- on configuring in STEP 7 can be found in the *Configuring Hardware and Connections in STEP 7* manual
- on communication is found in the *Communication with SIMATIC* manual
- on the TeleService adapter can be found on the Internet (<http://support.automation.siemens.com/WWW/view/en/20983182>).
- on SFCs can be found in the *instruction list*.
For a detailed description, refer to the *STEP 7 Online Help* or *System and Standard Functions Reference Manual*

3.2.8 Data record routing

Availability

The following CPUs support data record routing:

CPU	As of version
CPU 313C-2 DP	V3.3
CPU 314C-2 DP	V3.3
CPU 314C-2 PN/DP	V3.3
CPU 315-2 DP	V3.0
CPU 315-2 PN/DP	V3.1
CPU 317-2 DP	V3.3
CPU 317-2 PN/DP	V3.1
CPU 319-3 PN/DP	V2.7

Routing and data record routing

Routing is the transfer of data beyond network boundaries. You can send information from a transmitter to a receiver across several networks.

Data record routing is an extension of "normal routing" and is used, for example, by SIMATIC PDM if the programming device is not connected directly to the PROFIBUS DP subnet to which the target device is connected, but, for example, to the PROFINET interface of the CPU. The data sent by means of data record routing include the parameter assignments for the participating field devices (slaves) and device-specific information (e.g. setpoint values, limit values). The structure of the target address for data record routing depends on the data contents, i.e. the slave to which the data is sent.

With the programming device, data record routing can also be used to read a parameter set already existing on the field device, edit it and return it to the field device if the programming device is assigned to a different subnet than that of the target slave.

The field devices themselves do not have to support data record routing, since they do not forward the information received.

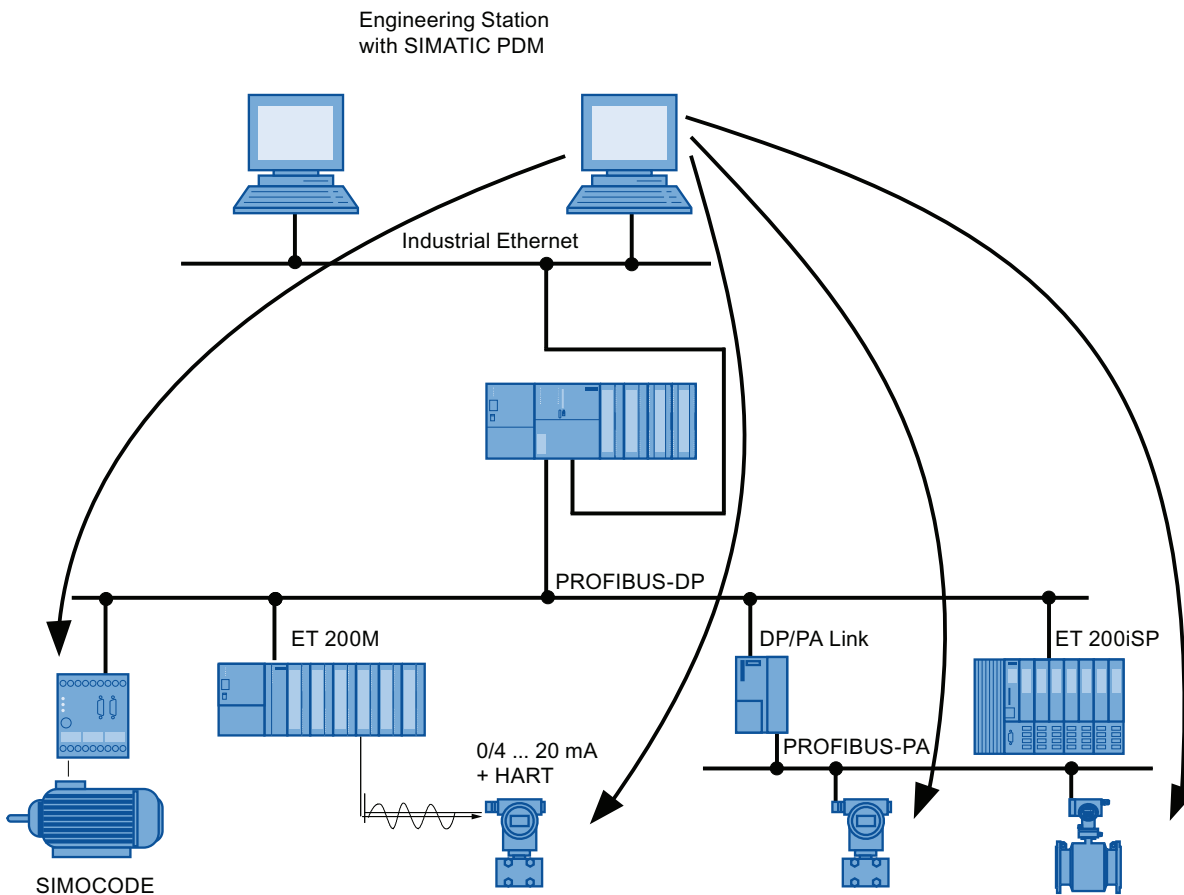


Figure 3-1 Data record routing

See also

You can find additional information on *SIMATIC PDM* in *The Process Device Manager* manual.

3.2.9 Clock synchronization

Introduction

The CPU interfaces support clock synchronization. The CPU can be programmed for operation as time master (with default synchronization intervals) or as time slave.

Default: No clock synchronization

Setting the synchronization mode

In HW Config, in the properties dialog, set the synchronization mode as follows:

- Within the AS (on the central I/O bus): Tab → Diagnostics / Clock (also for MPI on CPUs without DP interface)
- For the MPI/DP or DP interface: Tab → Clock
- For the PROFINET interface: Tab → Clock synchronization

Interfaces

Clock synchronization is supported at the following interfaces:

- MPI interface
You can configure the CPU as time master or time slave.
- DP interface
You can configure the CPU as time master or time slave.
- PROFINET interface
Clock synchronization by means of NTP method and client CPU.
- On the automation system in the central rack
You can configure the CPU as time master or time slave.

Note

The CPU cannot be time slave on more than one of these interfaces.

CPU as time slave

As a time slave, the CPU receives synchronization frames from exactly one time master and accepts this time as its own internal time of the CPU.

CPU as time master

As time master, the CPU broadcasts clock synchronization frames at programmed synchronization intervals to synchronize other stations on the connected subnet.

Requirement: The CPU clock is no longer in default state. The clock must have been set at least once.

Clock synchronization as **time master** starts:

- As soon as you initialize the time by means of SFC 0 "SET_CLK", or programming device function.
- Using another time master, if the CPU is also programmed via MPI/DP or PROFINET interface for operation as time slave.

Note

The real-time clock of the CPU is not set:

- in factory state
 - after reset to factory settings by means of the mode selector switch
 - after firmware updates
-

Example 1

A CPU already set up as time slave on the DP interface must be set up as time master at the MPI interface and/or on the automation system.

Clock synchronization via PROFINET

The CPU can be operated on the PROFINET interface as time-of-day client based on the NTP (Network Time Protocol) procedure.

Default: No clock synchronization based on NTP.

Activate the "Clock synchronization based on NTP" option to synchronize the CPU's clock via PROFINET. This option is available in the "Clock synchronization" properties of the PROFINET interface. You also need to enter the IP addresses of the NTP server and a synchronization interval.

Information on suitable NTP servers and on NTP is available, for example, under the entry ID: 17990844.

Note

The PROFINET interface cannot be operated as time-of-day server, that is, the CPU cannot synchronize any other clocks on PROFINET.

Example 2

A CPU already synchronized over NTP with a time master by means of clock synchronization via PROFINET interface (corresponds to time slave functionality) must be operated as time master at the DP interface and/or MPI interface, or on the automation system.

3.2.10 Point-to-point connection

Properties

A point-to-point connection permits you to exchange data via a serial interface. A point-to-point connection can be used to interconnect programmable controllers, computers or communication-capable third-party systems. Adaptation to the procedure of the communication peer is also possible.

Reference

Additional information

- on SFCs can be found in the *instruction list*.
A detailed description is available in the *STEP 7 Online Help* and in the *Technological Functions* manual
- on communication is found in the *Communication with SIMATIC* manual

3.2.11 Data consistency

Properties

A data area is consistent if it can be read from or written to the operating system as one block. Data exchanged collectively between the stations should belong together and originate from a single processing cycle, that is, be consistent. If the user program contains a programmed communication function, for example, access to shared data with XSEND/ XRCV, access to that data area can be coordinated by means of the "BUSY" parameter itself.

With PUT/GET functions

For S7 communication functions such as PUT/GET or write/read via OP communication, which do not require a block in the user program of the CPU (in server mode), the extent of the data consistency must be considered already during programming. The PUT/GET functions of S7 communication or reading/writing of variables via OP communication are executed at the CPU's cycle control point. To ensure a defined hardware interrupt response time, the communication variables are copied in blocks of up to 240 bytes consistently to/from the copied user memory in the cycle control point of the operating system. Data consistency is not ensured for larger data areas.

Operations with PUT/GET functions and "prioritized OCM communication"

The data consistency specified will be lost if you configure operations with "prioritized OCM communication" (refer to the "OP communication" (Page 68) chapter). Consequently, data consistency must be ensured by means of the user program.

Consistency is retained for:

- byte, word, Dword access such as L MDx
- SFC 14 "DPRD_DAT"
- SFC 15 "DPWR_DAT"
- SFC 81 "UBLKMOV" (for copying up to 512 bytes of data)

You should also be aware of the fact that, if "prioritized OCM communication" is configured, communication variables in blocks of max. 240 bytes are not copied consistently to/from work memory at the cycle control point. Instead, this data is copied during user program runtime.

Note

Where defined data consistency is required, the length of communication variables in the user program of the CPUs cannot exceed 240 bytes.

3.3 SNMP communication service

Availability

The SNMP V1, MIB-II communication service is available for CPUs with integrated PROFINET interface firmware 2.2 or higher.

Properties

SNMP (Simple Network Management Protocol) is a standard protocol for TCP/IP networks.

Reference

For additional information on the SNMP communication service and diagnostics with SNMP, refer to the *PROFINET system description* and to the *Operating Instructions S7-300 CPU 31xC and CPU 31x, Installation*.

3.4 Open communication via Industrial Ethernet

Requirements

- STEP 7 as of V5.4 + SP4

Functionality

The CPUs with integrated PROFINET interface as of firmware V2.3.0 or V2.4.0 support the functionality of open communication via Industrial Ethernet (in short: *open IE communication*)

The following services are available for open IE communication:

- Connection-oriented protocols
 - TCP according to RFC 793, connection type B#16#01, firmware V2.3.0 and higher
 - TCP according to RFC 793, connection type B#16#11, firmware V2.4.0 and higher
 - ISO-on-TCP according to RFC 1006, firmware V2.4.0 and higher
- Connectionless protocols
 - UDP according to RFC 768, firmware V2.4.0 and higher

Properties of the communication protocols

The following protocol types exist in data communication:

- Connection-oriented protocols:

Prior to data transmission, these protocols establish a (logical) connection to the communication peer and close it again, if necessary, after transmission is completed. Connection-oriented protocols are used when security is especially important in data transmission. Usually several logical connections can be established via a physical cable.

The FBs for open communication via Industrial Ethernet support the following connection-oriented protocols:

 - TCP according to RFC 793 (connection types B#16#01 and B#16#11)
 - ISO-on-TCP according to RFC 1006 (connection type B#16#12)
- Connectionless protocols:

These protocols operate without a connection. This means that no connections to a remote peer are established and terminated. Connectionless protocols transmit data to the remote peer without any acknowledgement; data transmission is, therefore, not secure.

FBs for open communication via Industrial Ethernet support the following connectionless protocol:

 - UDP according to RFC 768 (connection type B#16#13)

How can you use open IE communication?

To allow data to be exchanged with other communication peers, STEP 7 provides the following FBs and UDTs under "Communication Blocks" in the "Standard Library":

- Connection-oriented protocols: TCP, ISO-on-TCP
 - FB 63 "TSEND" for sending data
 - FB 64 "TRCV" for receiving data
 - FB 65 "TCON" for connecting
 - FB 66 "TDISCON" for disconnecting
 - UDT 65 "TCON_PAR" with the data structure for parameterizing the connection
- Connectionless protocol: UDP
 - FB 67 "TUSEND" for sending data
 - FB 68 "TURCV" for receiving data
 - FB 65 "TCON" for establishing the local communication access point
 - FB 66 "TDISCON" for resolving the local communication access point
 - UDT 65 "TCON_PAR" with the data structure for parameterizing the local communication access point
 - UDT 66 "TCON_ADR" with the data structure of the addressing parameters of the remote peer

Data blocks for parameterization

- Data blocks for parameterization of the TCP and ISO-on-TCP connections

To configure the connections with TCP and ISO-on-TCP, you need to create a DB that contains the data structure from UDT 65 "TCON_PAR". This data structure contains all parameters you need to establish the connection. You need such a data structure for each connection, and you can also organize it in a global data storage area.

The CONNECT parameter of the FB 65 "TCON" contains a reference to the address of the corresponding connection description (e.g. P#DB100.DBX0.0 Byte 64).

- Data blocks for the parameterization of the local communication access point with UDP

To assign parameters for the local communication access point, create a DB containing the data structure from the UDT 65 "TCON_PAR". This data structure contains the required parameters you need to establish the connection between the user program and the communication layer of the operating system

The CONNECT parameter of the FB 65 "TCON" contains a reference to the address of the corresponding connection description (e.g. P#DB100.DBX0.0 Byte 64).

Note

Setting up the connection description (UDT 65)

The communication interface has to be entered in the "local_device_id" parameter in UDT65 "TCON_PAR" (e.g. B#16#03: communication via the integrated IE interface of CPU 319-3 PN/DP).

Establishing a connection for communication

- Use with TCP and ISO-on-TCP

Both communication peers call FB 65 "TCON" to establish the connection. In the parameterization you define which communication peer is the activate and which one is the passive communication end point. To determine the number of possible connections, refer to your CPU's technical specifications.

The CPU automatically monitors and maintains the active connection.

If the connection is interrupted, for example due to an open circuit or by the remote communication peer, the active peer tries to reestablish the connection. You do not have to call FB 65 "TCON" again.

An active connection is terminated by calling the FB 66 "TDISCON" or when the CPU is in STOP mode. To reestablish the connection you have to call FB 65 "TCON" again.

- Use with UDP

Both communication peers call FB 65 "TCON" to set up their local communication access point. This establishes a connection between the user program and operating system's communication layer. No connection is established to the remote peer.

The local access point is used to send and receive UDP telegrams.

Disconnecting

- Use with TCP and ISO-on-TCP

FB 66 "TDISCON" disconnects a connection between CPU and communication peer.

- Use with UDP

FB 66 "TDISCON" disconnects the local communication access point, i.e. the connection between user program and communication layer of the operating system is interrupted.

Options for terminating the connection

The following events are available for causing interruptions of communication:

- You program the discontinuation of the connection with the FB 66 "TDISCON".
- The CPU goes from RUN to STOP.
- At Power Off/Power On

Communication diagnostics

In STEP 7 V5.4 SP5 and higher, you can select "Module state → Communication → Open communication over Industrial Ethernet" to read additional information about the configured connections.

Reference

For detailed information on the blocks described above, refer to the *STEP 7 Online Help*.

3.5 S7 connections

3.5.1 S7 connection as communication path

An S7 connection is established when S7 modules communicate with one another. This S7 connection is the communication path.

Note

S7 connections are not required for global data communication, point-to-point connection, communication by way of PROFIBUS DP, PROFINET CBA, PROFINET IO, TCP/IP, ISO on TCP, UDP, SNMP and web server.

Every connection requires S7 connection resources on the CPU for the entire duration of this connection.

Each S7-CPU provides a specific number of S7 connection resources which are used by various communication services (PG/OP communication, S7 communication, or S7 basic communication).

Connection points

An S7 connection between communication-capable modules is established between connection points. The S7 connection always has two connection points: The active and the passive connection point:

- The active connection point is assigned to the module that establishes the S7 connection.
- The passive connection point is assigned to the module that accepts the S7 connection.

Any module that is capable of communication can thus act as an S7 connection point. At the connection point, the established connection always occupies one S7 connection on the relevant module.

Transition point

If you use the routing functionality, the S7 connection between two communication-capable modules is established across a number of subnets. These subnets are interconnected via a gateway. The module that implements this gateway is known as a router. The router is thus the point through which an S7 connection passes.

Any CPU with a DP or PN interface can be the router for an S7 connection. You can establish a specific number of routing connections. This does not limit the quantity framework of S7 connections.

See also

Connection resources for routing (Page 89)

3.5.2 Allocation of S7 connections

There are several ways to allocate S7 connections on a communication-capable module:

- Reservation during configuration
- Allocating connections by means of programming
- Allocating connections during commissioning, testing and diagnostics
- Allocating connections for OCM services

Reservation during configuration

One connection resource each is automatically reserved on the CPU for PG and OP communication. Whenever you need more connection resources (for example, when connecting several OPs), configure this increase in the CPU properties dialog box in STEP 7.

Connections must also be configured (using NetPro) for the use of S7 communication. For this purpose, connection resources which are not allocated to PG/OP or other connections have to be available. The required S7 connections are then permanently allocated for S7 communication when the configuration is downloaded to the CPU.

Allocating connections by means of programming

In S7 basic communication and in open Industrial Ethernet communication with TCP/IP, the user program establishes the connection. The CPU's operating system initiates the connection. S7 basic communication uses the corresponding S7 connections. The open IE communication does not use any S7 connections. However, a maximum number of connections also applies for this type of communication:

- 8 connections with the CPU 314C-2 PN/DP
- 8 connections for CPUs 315-2 PN/DP
- 16 connections for CPUs 317-2 PN/DP
- 32 connections with the CPU 319-3 PN/DP

Allocating connections for commissioning, testing and diagnostics

An online function on the engineering station (PG/PC with STEP 7) allocates S7 connections for PG communication:

- If an S7 connection resource was reserved for PG communication in your CPU hardware configuration, it is assigned to the engineering station, i.e. it only needs to be allocated.
- If all reserved S7 connections for PG communication are allocated, the operating system automatically assigns a free S7 connection resource which has not yet been reserved. If no more connections are available, the engineering station cannot go online to communicate with the CPU.

Allocating connections for OCM services

An online function on the OCM station (OP/TP/... with *WinCC*) is used for allocating S7 connections for the OP communication:

- If an S7 connection resource was reserved for OP communication in your CPU hardware configuration, it is assigned to the OCM station, i.e. it only needs to be allocated.
- If all reserved S7 connection resources for OP communication are allocated, the operating system automatically assigns a free S7 connection resource which has not yet been reserved. If no more connection resources are available, the OCM station cannot go online to communicate with the CPU.

Time sequence for allocation of S7 connections

When you configure your project in STEP 7, parameterization blocks are generated which are read during startup of the modules. Thus the module's operating system reserves or allocates the relevant S7 connections. This means, for instance, that OPs cannot access a reserved S7 connection for PG communication. The CPU's S7 connections which were not reserved can be used as required. These S7 connections are allocated in the order they are requested.

Example

If there is only one free S7 connection left on the CPU, you can connect a PG to the bus. The PG can then communicate with the CPU. The S7 connection is only used, however, when the PG is communicating with the CPU. If you connect an OP to the bus while the PG is not communicating, the OP can establish a connection to the CPU. Since an OP maintains its communication link at all times, in contrast to the PG, you cannot subsequently establish another connection via the PG.

3.5.3 Distribution and availability of S7 connection resources

Distribution of connection resources

Table 3- 6 Distribution of connections

Communication service	Distribution
PG communication OP communication S7 basic communication	In order to avoid allocation of connection resources being dependent only on the chronological sequence in which various communication services log in, connection resources can be reserved for these services. For PG and OP communication respectively, at least one connection resource is reserved by default. In the table below, and in the technical specifications of the CPUs, you can find the configurable S7 connections and the default settings for each CPU. You "redistribute" connection resources by setting the relevant CPU parameters in STEP 7.
S7 communication Other connections (e.g. via CP 343-1 with data lengths of > 240 bytes)	Available connection resources which are not specially reserved for a service (PG/OP communication, S7 basic communication) are allocated for this.
Routing of PG functions (only for CPUs with DP/PN interface)	The CPUs provide a certain number of connections for routing. These connections are available in addition to the connection resources. The subsection below shows the number of connection resources.
Global data communication Point-to-point connection PROFIBUS DP PROFINET CBA PROFINET IO Web server	These communication services require no S7 connection resources.
Open communication by means of TCP/IP	This communication service requires no S7 connection resources.
Open communication by means of ISO-on-TCP	A CPU-specific number of internal resources is available for TCP/IP, ISO on TCP and UDP communication, or for local access points (UDP), independent of the S7-Connections (refer to Technical specifications of CPU 31x (Page 301) chapter and Technical Specifications of CPU 31x (Page 213) chapter).
Open communication by means of UDP	
SNMP	This communication service requires no S7 connection resources.

Availability of connection resources

Table 3- 7 Availability of connection resources

CPU	Total number of connection resources	Reserved for			Free S7 connections
		PG communication	OP communication	S7 basic communication	
312 312C	6	1 to 5, default 1	1 to 5, default 1	0 to 2, default 0	All non-reserved S7 connections are displayed as free connections.
313C 313C-2 PtP 313C-2 DP	8	1 to 7, default 1	1 to 7, default 1	0 to 4, default 0	
314 314C-2 PtP 314C-2 DP 314C-2 PN/DP	12	1 to 11, default 1	1 to 11, default 1	0 to 8, default 0	
315-2 DP 315-2 PN/DP	16	1 to 15, default 1	1 to 15, default 1	0 to 12, default 0	
317-2 DP 317-2 PN/DP	32	1 to 31, default 1	1 to 31, default 1	0 to 30, default 0	
319-3 PN/DP	32	1 to 31, default 1	1 to 31, default 1	0 to 30, default 0	

Note

When using a CPU 314C-2 PN/DP, you can configure up to 10 connection resources for S7 communication in NetPro: When using the CPU 315-2 PN/DP, you can configure up to 14 connection resources for S7 communication in NetPro: These connections are then no longer available as free connections.

For CPU 317-2 PN/DP and CPU 319-3 PN/DP, you can configure up to 16 connection resources for S7 communication in NetPro.

3.5.4 Connection resources for routing

Number of connection resources for routing

CPU with DP interface provide a different number of connection resources for the routing function:

Table 3- 8 Number of connection resources for routing (for DP/PN CPUs)

CPU	As of firmware version	Number of connections for routing
31xC, CPU 31x	2.0	Max. 4
317-2 DP	3.3	Interface X1 configured as: <ul style="list-style-type: none"> • MPI: Max. 10 • DP master: Max. 24 • DP slave (active): Max. 14
		Interface X2 configured as: <ul style="list-style-type: none"> • DP master: Max. 24 • DP slave (active): Max. 14
31x-2 PN/DP	2.2	Interface X1 configured as: <ul style="list-style-type: none"> • MPI: Max. 10 • DP master: Max. 24 • DP slave (active): Max. 14
		Interface X2 configured as: <ul style="list-style-type: none"> • PROFINET: Max. 24
314C-2 PN/DP	3.3	Interface X1 configured as: <ul style="list-style-type: none"> • MPI: Max. 10 • DP master: Max. 24 • DP slave (active): Max. 14
		Interface X2 configured as: <ul style="list-style-type: none"> • PROFINET: Max. 24
319-3 PN/DP	2.4	Interface X1 configured as: <ul style="list-style-type: none"> • MPI: Max. 10 • DP master: Max. 24 • DP slave (active): Max. 14
		Interface X2 configured as: <ul style="list-style-type: none"> • DP master: Max. 24 • DP slave (active): Max. 14
		Interface X3 configured as: <ul style="list-style-type: none"> • PROFINET: Max. 48

Example of a CPU 314C-2 DP

The CPU 314C-2 DP provides 12 connection resources (see Table 3-10):

- Reserve 2 connection resources for PG communication
- Reserve 3 connection resources for OP communication
- Reserve 1 connection resource for S7 basic communication

This leaves 6 connection resources available for other communication services, e.g. S7 communication, OP communication, etc.

In addition, 4 routing connections via the CPU are possible.

Example for a CPU 317-2 PN/DP / CPU 319-3 PN/DP

The CPU 317-2 PN/DP and CPU 319-3 PN/DP provide you with 32 connection resources (refer to Table 3-10):

- Reserve 4 connection resources for PG communication
- Reserve 6 connection resources for OP communication
- Reserve 2 connection resources for S7 basic communication
- In NetPro you configure 8 S7 connection resources for S7 communication via the integrated PROFINET interface

This leaves 12 S7 connections available for arbitrary communication services such as S7 communication, OP communication, etc.

However, only a maximum of 16 connection resources for S7 communication at the integrated PN interface can be configured in NetPro.

In addition, there are another 24 routing connections available for the CPU 317-2 PN/DP, and another 48 routing connections for the CPU 319-3 PN/DP, which do not affect the above described S7 connection resources.

However, take the interface-specific maximum numbers into account (refer to Table 3-11).

3.6 DPV1

New automation and process engineering tasks require the range of functions performed by the existing DP protocol to be extended. In addition to cyclical communication functions, acyclical access to non-S7 field devices is another important requirement of our customers and was implemented in the standard EN 50170. In the past, acyclical access was only possible to S7 slaves. The distributed I/O standard EN 50170 has been further developed. All changes concerning new DPV1 functions are included in IEC 61158/EN 50170, volume 2, PROFIBUS.

Definition DPV1

The term DPV1 is defined as a functional extension of the acyclical services (to include new interrupts, for example) provided by the DP protocol.

Availability

All CPUs with DP interface(s) and serving as DP masters feature the enhanced DPV1 functionality.

Note

If you want to use the CPU as an intelligent DP slave, it does not have DPV1 functionality.

Requirement for using the DPV1 functionality with DP slaves

For DPV1 slaves from other vendors, you will need a GSD file conforming to EN 50170, revision 3 or later.

Extended functions of DPV1

- Use of any DPV1 slaves from third-party manufacturers (in addition to the existing DPV0 and S7 slaves, of course).
- Selective handling of DPV1-specific interrupt events by new interrupt blocks.
- New standard-compliant SFBs for reading/writing data records (which, however, can also be used for centralized modules).
- User-friendly SFB for readout of diagnostics.

Interrupt blocks with DPV1 functionality

Table 3- 9 Interrupt blocks with DPV1 functionality

OB	Functionality
OB 40	Hardware interrupt
OB 55	Status interrupt
OB 56	Update interrupt
OB 57	Vendor-specific interrupt
OB 82	Diagnostic interrupt

Note

You can now also use the organization blocks OB40 and OB82 for DPV1 interrupts.

System blocks with DPV1 functionality

Table 3- 10 System function blocks with DPV1 functionality

SFB	Functionality
SFB 52	Read data record from DP slave/IO device or central module
SFB 53	Write data record to DP slave/IO device or central module
SFB 54	Read additional alarm information from a DP slave/IO device or a centralized module in the relevant OB
SFB 75	Send alarm to the DP master

Note

You can also use SFB 52 to SFB 54 for centralized I/O modules. SFB 52 to SFB 54 can also be used for PROFINET IO.

Reference

For additional information on the blocks above, refer to the Reference Manual *System Software for S7-300/400: System and Standard Software*, or directly to the *STEP 7Online Help*.

See also

PROFIBUS DP (Page 58)

3.7 Web server

Introduction

The web server allows you to monitor the CPU via the Internet or the intranet of your company. This permits evaluation and diagnostics over long distances. Messages and status information are visualized on HTML pages.

Web browser

You need a web browser to access the HTML pages of the CPU.

The following web browsers are suitable for communication with the CPU:

- Internet Explorer (as of V6.0)
- Mozilla Firefox (as of V1.5)
- Opera (as of V9.0)
- Netscape Navigator (as of V8.1)

Reading information via the web server

The following table lists the information that you can read from the CPU and the CPU firmware version that supports this function:

	CPU 314, as of firmware...	CPU 315, as of firmware...	CPU 317, as of firmware...	CPU 319, as of firmware...
Start page with general CPU information	V3.3	V2.5	V2.5	V2.5
Identification information	V3.3	V2.5	V2.5	V2.5
Content of the diagnostic buffer	V3.3	V2.5	V2.5	V2.5
Module information	V3.3	V3.1	V3.1	V2.7
Messages (without acknowledgment option)	V3.3	V2.5	V2.5	V2.5
Information about communication	V3.3	V2.5	V2.5	V2.5
• Important interface parameters	V3.3	V2.5	V2.5	V2.5
• Port statistics	V3.3	V2.5	V2.5	V2.5
• Display of the communication connections for open communication (OUC)	V3.3	V3.2.1	V3.2.1	V3.2.1
• Display of the communication resources	V3.3	V3.2.1	V3.2.1	V3.2.1
Topology	V3.3	V3.1	V3.1	V2.7
• Display of the actual topology	V3.3	V3.1	V3.1	V2.8
• Display of the target topology specified in configuration data	V3.3	V3.2.1	V3.2.1	V3.2.1
Status of the variables	V3.3	V2.5	V2.5	V2.5
Variable tables	V3.3	V2.5	V2.5	V2.5
User pages (CPU31x PN/DP ≥ V3.2.1, and STEP 7 V5.5)	V3.3	V3.2.1	V3.2.1	V3.2.1

On the following pages you will find detailed information on the HTML pages and explanations.

Web access to the CPU via PG/PC

Proceed as follows to access the web server:

1. Connect the client (PG/PC) to the CPU via the PROFINET interface.
2. Open the web browser.

Enter the IP address of the CPU in the "Address" field of the web browser in the format `http://a.b.c.d` or `https://a.b.c.d` (example: `http://192.168.3.141`).

The CPU start page opens. From the start page you can navigate to further information.

Note

Up to 5 http-/https connections are supported.

Web access to the CPU via HMI devices and PDA

The web server also supports the Windows Terminal Service. In addition to PGs and PCs, this functionality also supports the integration of thin client solutions for mobile devices (e.g. PDA, MOBIC T8) and of rugged local stations (e.g. SIMATIC MP370 with ThinClient/MP option) under Windows CE.

Proceed as follows to access the web server:

1. Connect the client (HMI device, PDA) with the CPU via the PROFINET interface.
2. Open the web browser.

Enter the IP address of the CPU in the "Address" field of the web browser in the format `http://a.b.c.d/basic`, or `https://a.b.c.d/basic` (example: `http://192.168.3.141/basic`).

The CPU start page opens. From the start page you can navigate to further information.

HMI devices operating with the Windows CE operating system V 5.x or earlier process CPU information in a browser specially developed for Windows CE. The information appears in a simplified format in this browser. The following figures show the detailed format in each case.

Note

Using SIMATIC Micro Memory Card together with Web server

The configuration data for the Web server is stored on the SIMATIC Micro Memory Card. We therefore recommend that you use a SIMATIC Micro Memory Card with at least 512 KB.

You can also use the web server without SIMATIC Micro Memory Card. The CPU must have been assigned an IP address to permit operation.

- The content of the diagnostic buffer is displayed in hexadecimal code.
 - Start page, identification and communication information, and variable status are displayed in plain text.
 - Following displays remain empty:
 - Module information
 - Messages
 - Topology
 - Variable tables
 - User pages
 - Automatic update of the pages is set by default until configured otherwise.
-

Security

The Web server provides the following security functions:

- Access via secure https transmission protocol
- User authorizations you can configure by means of user list

Safe-guard your CPUs that provide online access to the Web against intrusion by setting up a firewall.

3.7.1 Language settings

Introduction

The Web server provides messages and diagnostic information in the following languages:

- German (Germany)
- English (USA)
- French (France)
- Italian (Italy)
- Spanish (International Sort)
- Chinese (Simplified)
- Japanese

The two Asian languages can be combined as follows:

- Chinese with English
- Japanese with English

Requirements for the availability of the Asian languages

The following requirements have to be fulfilled for the Asian languages Chinese and Japanese:

- The corresponding language package is installed on the display device (e.g. PC).
- For CPU programming, STEP 7 for Asian languages (STEP 7, V5.5 or higher) is installed on the programming device.

Note

Asian languages are not supported for SIMATIC HMI devices with Windows CE operating system.

Requirements for multilingual output of text

The following two language settings must be made in STEP 7 to permit that the web server displays the different languages correctly:

- Set the regional language for the display devices in SIMATIC Manager
- Set the regional web language in the properties dialog of the CPU. For more information, refer to chapter: Settings in HW Config, "Web" tab (Page 97)

Set the regional language for the display devices in SIMATIC Manager

Select languages for display devices in SIMATIC Manager:

Options > Language for display devices

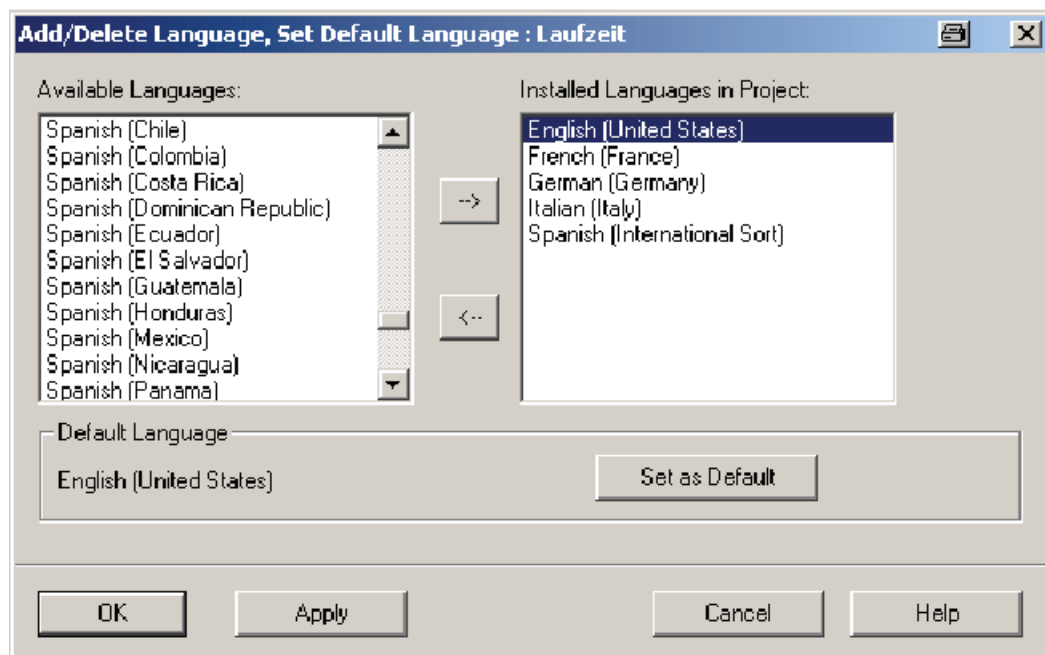


Figure 3-2 Example of the selection of a language for display devices

3.7.2 Settings in HW Config, "Web" tab

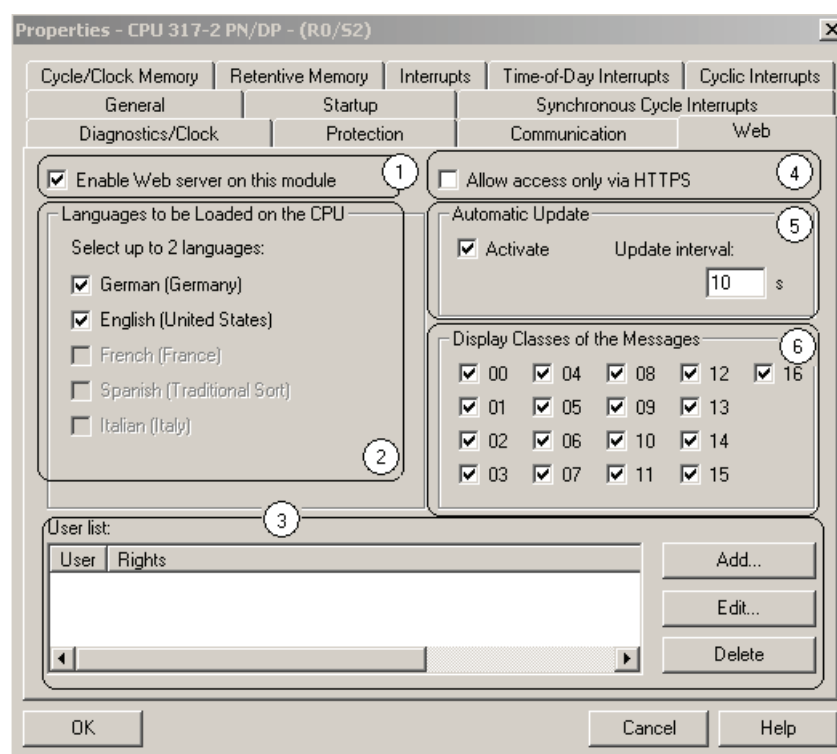
Requirements

You have opened the properties dialog of the CPU in HW Config.

Carry out the following settings in the "Web" tab to use the full functionality of the web server:

- Enable the web server
- Set the regional web language
- Adding entries to the user list
- HTTPS access activation
- Activating automatic updates
- Selecting the display classes of the messages

In order to enjoy the full functionality of the module information reports, message system, and topology of the project, you should also generate and load the "Report system errors" function.



① Activating the web server

The web server is deactivated in the basic configuration in HW Config. You activate the web server in HW Config.

In the property view of the CPU:

- Activate the "Enable Web server on this module" checkbox

② Setting the regional web language

Select up to two web languages from the languages installed for the display devices.

In the property view of the CPU:

- Activate the "Enable Web server on this module" checkbox
- Select up to two web languages.

Note

The program displays messages and diagnostics information in hexadecimal code if you enable the web server without selecting a language.

③ User list

The user list provides the following options:

- Creating users
- Specifying execution rights
- Assigning passwords.

This assignment restricts user access exclusively to the options linked permanently to the execution rights.

- If no users were configured in HW Config, read-only access is granted to all Web pages.
- If users are configured, users who are not logged on can access the Intro and Start pages only.
- Configured users who are logged on are allowed to access the Web pages in accordance with their access rights.
- If you configured a specific user with "everybody" login, other users who are not logged on **do not have to enter a password** in order to access pages released for the "everybody" group.

For example, if the user group "everybody" is granted access rights to "Read variables", the "Variable table" Web page is always displayed in the main menu bar without a password having been entered.

You can create a maximum of 20 users and "everybody" users.

④ Access via HTTPS only

https is used to encrypt communication between the browser and Web server. For error-free https access to the CPU, the following conditions must be met:

- The current time is set on the CPU
- The IP address of the CPU is set (example: https://192.168.3.141)
- A valid certificate is installed

If no certificate is installed, a warning recommends not to use the page. To view this page, you must explicitly "Add an exception".

A valid certificate (Certification Authority) is available for download from the "Intro" Web page, "Download certificate". Instructions for installing the certificate are available in the help system of your Web browser.

An encrypted connection is identified by means of a lock icon in the status bar of the Web page.

⑤ Activating automatic updates

The following web pages can be updated automatically:

- Start page
- Diagnostic buffer
- Module information
- Messages
- Information about communication
- Topology
- Status of the variables
- Variable table

To enable automatic updates, proceed as follows:

- Set the "Activate" check box at "Automatic update" in the properties dialog ("Web" tab) of the CPU.
- Enter the update interval

Note

Update time

The update interval set in HW Config is the shortest update time. Larger data volumes or multiple http/https connections increase the update time.

⑥ Display classes of the messages

All display classes of the messages are activated in the basic configuration in HW Config. The messages for the selected display classes are displayed later on the "Messages" web page. Messages for display classes that are not selected are shown as hexadecimal code and not as plain text.

How to configure the message classes:

- For "Report system error" in HW Config under **Options > Report System Error**
- For block-specific messages in STEP 7

Information about configuring message texts and classes can be found in STEP 7.

Note

Reducing the memory requirements of the Web SDBs

You can reduce the memory requirements of the Web SDBs by selecting only those display classes of the messages that are to be filled in the Web SDB.

3.7.3 Updating and storing information

Update status of the screen content

Automatic updating is deactivated in the basic configuration in HW Config. This means that the screen of the Web server outputs static information.

Refresh the Web pages manually using the <F5> function key, or the following icon:



Update status of printouts

Data output to the printer always indicates the latest CPU information. Therefore, it is possible that the printed information is more up to date than the contents on your screen.

To open a print preview of the Web page, click the following icon:



Filter settings have no effect on the printout, The printout of the "Messages" and "Module information" web pages always shows the complete content of the pages.

Disabling automatic updates for an individual web page

In order to temporarily disable automatic updates for a Web page, select the following icon:



Re-enable automatic updates again using the <F5> function key, or the following icon:



Saving messages and entries of the diagnostic buffer

You can save messages and diagnostics buffer entries to a csv file. Use the following icon to save the data:



A dialog opens in which you can specify the file name and target directory.

To prevent incorrect display of the data in Excel, do not open the csv file with double-click. Import the file in Excel by selecting the "Data" and "Import external data" menu commands.

3.7.4 Web pages

3.7.4.1 Start page with general CPU information

Connecting to the web server

To open a connection to the Web server, enter the IP address of the configured CPU in the address bar of the Web browser, e.g. <http://192.168.1.158> , or <https://192.168.1.158>. The connection is set up and the "Intro" page opens.

In this section, we'll show you some examples of the layout of different Web pages and explain their functions.

Intro

The screenshot below shows the first page (Intro) called by the Web server.



Figure 3-3 Intro

Click the ENTER link to go to the web server pages.

Note

Skipping the Intro Web page

Select the "Skip Intro" check box in order to skip the Intro. As of now, the Web server will take you directly to its start page. To display the intro at the start of the web server again, click the "Intro" link on the start page.

Start page

Before the log in, the Start page offers information as shown in the figure below. The CPU image with LEDs returns the actual CPU status at the time of data request.

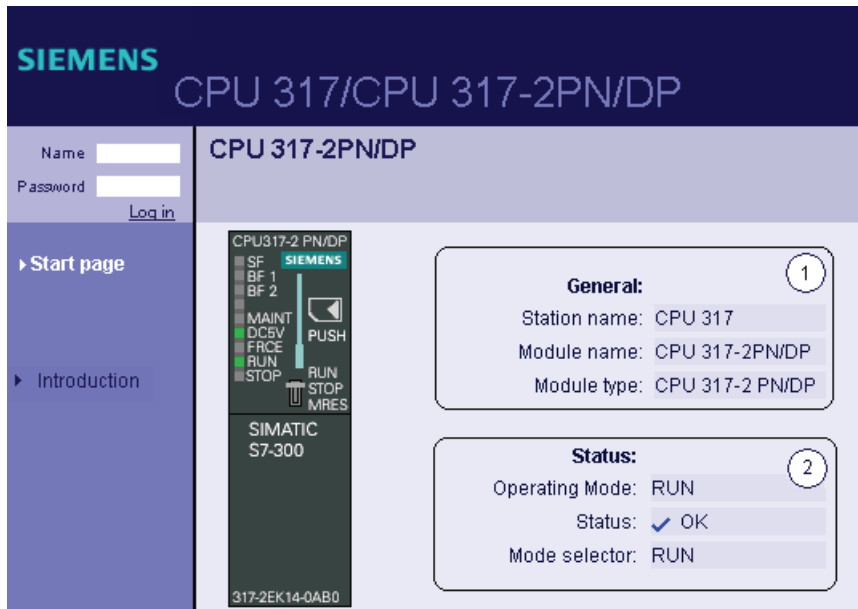


Figure 3-4 Start page before log in

Log in

You must be logged in in order to use the full functionality of the Web pages. Log in with a user name and password specified in the WEB configuration in HW Config. You now have corresponding authorizations to access the Web pages released for this user. (For more information, refer to chapter: Settings in HW Config, "Web" tab (Page 97)

① "General"

"General" contains information about the CPU with whose web server you are currently connected.

② "Status"

"Status" contains information about the CPU at the moment of the query.

Reference

Information on http/https connections, see chapter: Settings in HW Config, "Web" tab (Page 97)

3.7.4.2 Identification

Characteristics

The CPU parameters are available on the "Identification" Web page.



Figure 3-5 Identification

① "Identification"

The "Identification" info box contains the plant and location designation and the serial number. Plant and location designations can be configured in HW Config in the properties dialog box of the CPU, "General" tab.

② "Order number"

The "Order number" info box contains the order numbers for the hardware and firmware (if applicable).

③ "Version"

You can find the hardware, firmware and bootloader versions in the "Version" field.

3.7.4.3 Diagnostic buffer

Diagnostic buffer

The browser displays the content of the diagnostic buffer on the "Diagnostic buffer" web page.

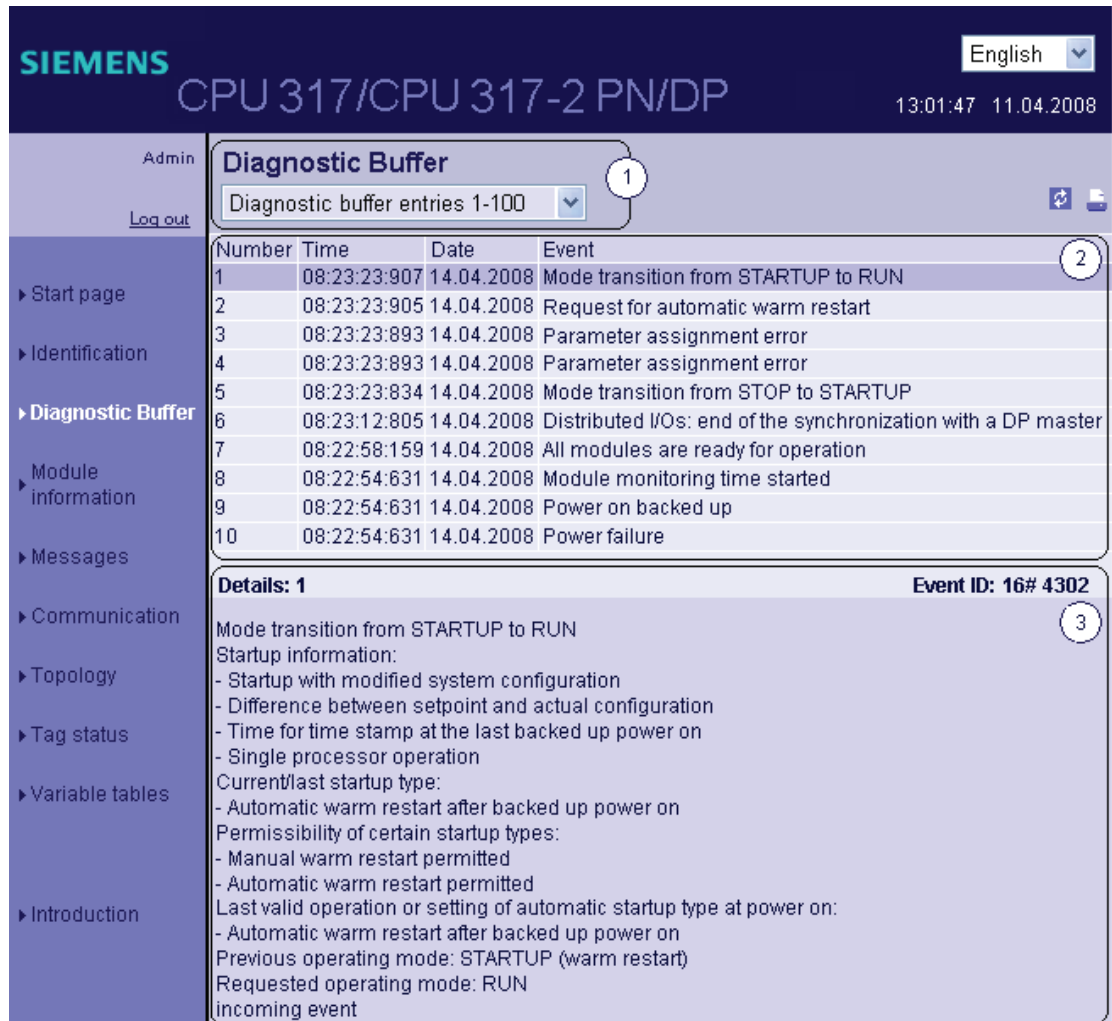


Figure 3-6 Diagnostic buffer

Requirements

The web server is activated, languages are set, and the project is compiled and downloaded in STEP 7.

① "Diagnostic buffer entries 1-100"

The diagnostic buffer can save up to 500 messages. Select an interval for the entries from the drop-down list box. Each interval comprises 100 entries.

In HW Config (CPU properties), you can set the parameters for PROFINET CPUs \geq V2.8 to display from 10 to 499 diagnostic buffer entries in RUN. In RUN, 10 entries are set as default.

② "Event"

The "Event" info box contains the diagnostic interrupts with date and time.

③ "Details"

This field outputs detailed information about a selected event.

Select the corresponding event from the ② "Event" info field.

Configuration

Configuration procedure:

1. Open the "Object properties" dialog box from the context menu of the corresponding CPU.
2. Select the "Web" tab, and then activate the "Enable Web server on this module" checkbox.
3. Select up to two languages for displaying plain text messages.
4. Save and compile the project and download the configuration to the CPU.

Special features when changing languages

You can change the language, e.g. from German to English, in the upper right corner. If you select a language you have not configured, the program returns a hexadecimal code instead of plain text information.

3.7.4.4 Module information

Requirements

- You have carried out the following settings in HW Config:
 - Web server activated
 - Language settings carried out
 - "Report system error" generated and activated
- You have compiled the project using STEP 7 HW Config, loaded the SDB container and the user program (in particular the user program blocks generated by "Report system error")
- The CPU is in RUN mode

Note

"Report system error"

- **Duration of the display:** Depending on the plant extension level, the "Report system error" display requires some time to create the initial evaluation of the state of all the configured I/O modules and I/O systems. During this time there is no concrete display of the status on the "Module information" web page. A "?" is displayed in the "Status" column.
 - **Dynamic response:** "Report system error" has to be called up cyclically at least every 100 ms.
Calling up can take place in OB 1, or if the cycle time amounts to more than 100 ms, in the watchdog interrupt OB 3x (≤ 100 ms) and in the restart OB 100.
 - **Diagnostics support:** In the "Report system error" dialog box, the "Diagnostic status DB" check box must be selected in the "Diagnostics support" tab and a DB number entered. This check box is normally selected as default with configured Web servers. During the migration of old project, it may however be necessary to select this check box.
-

Module information

The state of a station is indicated by means of symbols and comments on the "Module information" web page.

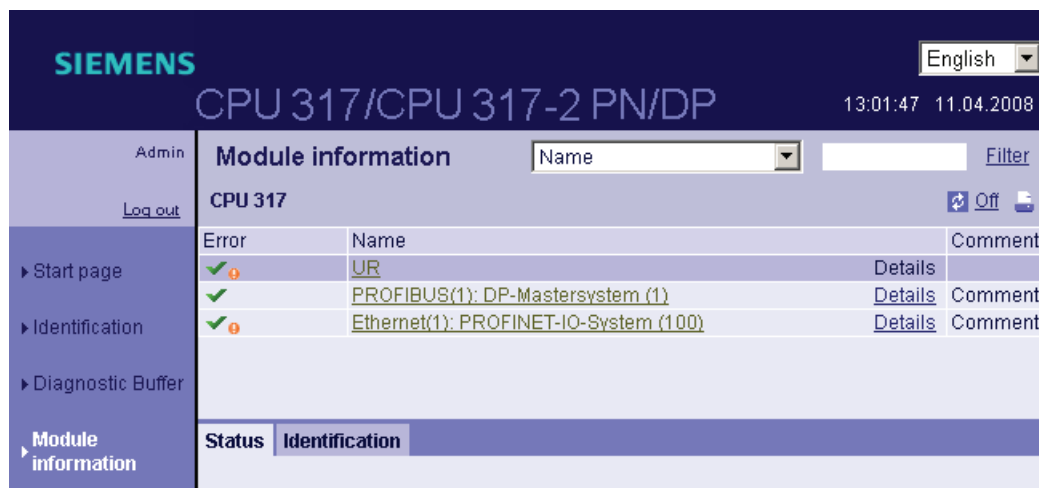





Figure 3-7 Module information - station

Meaning of the symbols in the "Symbol" column

Symbol	Color	Meaning
	green	Component is OK
	gray	Disabled PROFIBUS slaves or PROFINET devices Support conditions: <ul style="list-style-type: none"> • CPU31x PN/DP ≥ V3.2.1 and STEP 7 V5.5 + possible required HSP for the CPU • Enabling/disabling the PROFIBUS slaves and PROFINET IO devices using SFC12 mode 3/4 • In the "Report system errors" dialog, "Diagnostics support" tab, "Status enabled/disabled" area, the check mark must be set in the "Request device status enabled/disabled" check box after CPU startup and optionally in the "Output message on status transition" check box.
	black	Component cannot be accessed/Status cannot be determined <ul style="list-style-type: none"> • For example, "Status cannot be determined" is always displayed while the CPU is in STOP mode, or during startup evaluation of "Report system error" for all the configured I/O modules and I/O systems after a CPU restart. • However, this status can also be displayed temporarily during operation if a diagnostic interrupt burst occurs at all modules. • It is not possible to determine the status of modules on a subsystem that is connected to a CP.
	green	Maintenance required

Symbol	Color	Meaning
	yellow	Maintenance requested
	red	Error - component failed or faulty
	-	Error in a lower module level

Navigation to further module levels

The status of individual components/modules/submodules is displayed when you navigate to the further module levels:

- To higher module levels using the links in the display of the module levels ②
- To lower module levels using the links in the "Name" column

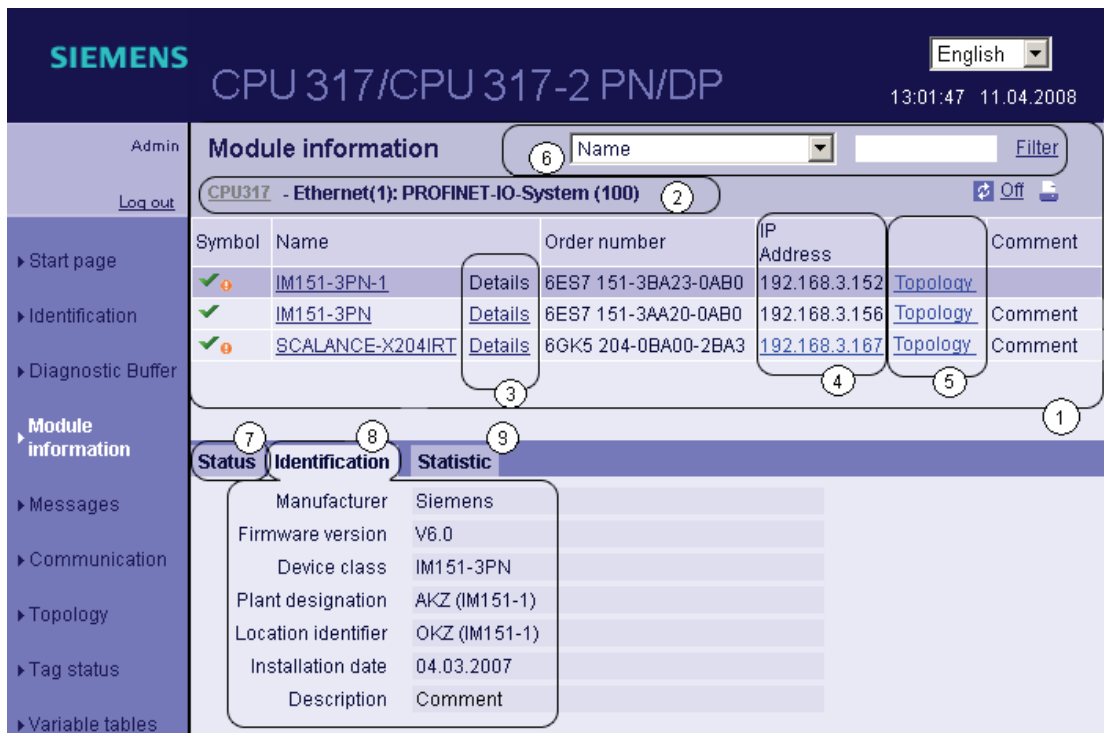


Figure 3-8 Module information - module

① "Module information"

Depending on the selected level, the table contains information about the rack, the DP master system, the PNIO master system, about the nodes, the individual modules, or also the modules or submodules of the station.

② "Display of the module levels"

The links are used to access the "Module information" of the higher module levels.

③ "Details"

Further information about the selected module is provided in the "Status" and "Identification" tabs via the "Details" link.

④ "IP address"

If a link is available, you can use it to access this Web server of the configured device you selected.

⑤ "Topology"

The two web pages, "Topology" and "Module information", are linked. A click on "Topology" of the selected module automatically takes you to this module in the graphic view of the target topology on the "Topology" Web page. The module appears in the visible area of the "Topology" web page and the device head of the selected module flashes for a few seconds.

⑥ "Filter"

You can search in the table by selecting specific criteria:

1. Select a parameter from the drop-down list box.
2. If applicable, enter the value of the selected parameter.
3. Click "Filter".

The filter criteria are also retained when you update a page.

To deactivate the filter settings, click "Filter" again.

⑦ "Status" tab

The tab contains information about the status of the selected module when a fault or message exists.

⑧ "Identification" tab

The tab contains data on the identification of the selected module.

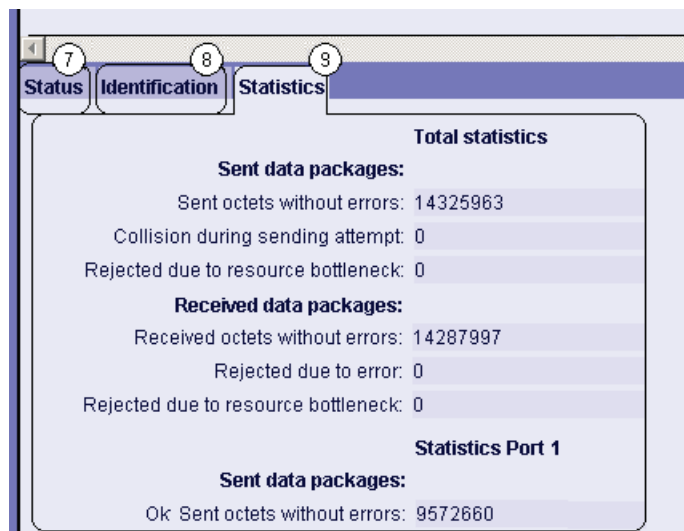
Note

This tab displays only the data configured offline. Online data of the modules is not included.

⑨ "Statistics" tab (CPU31x PN/DP ≥ V3.2.1 and STEP 7 V5.5)

The tab is displayed for PROFINET IO devices only. It contains the following information related to the communication statistics of the selected IO device.

- Overall statistics - Data packets sent
You can assess the quality of data transmission on the send line based on the key data in this info box.
- Overall statistics - Data packets received
The quality of the data transfer on the reception line can be determined from the key data in this info box.
- "Statistics port x - Data packets transmitted"
The quality of the data transfer on the send line can be determined from the key data in this info box.
- "Statistics port x - Data packets received"
The quality of the data transfer on the reception line can be determined from the key data in this info box.



Reference

Refer to the "Statistics" tab in the "Communication" (Page 114) chapter.

Example: Module information - module

The screenshot displays the Siemens SIMATIC Manager web interface for a CPU 317 system. The main content area shows a table of modules installed in the system. The table has columns for Slot, Symbol Name, Order number, I Addr., O Addr., and Comment. Slot 3 is highlighted, indicating a module removal event. Below the table, the 'Status' and 'Identification' sections provide details for the removed module.

Slot	Symbol Name	Order number	I Addr.	O Addr.	Comment
0	IM151-3PNHFV60-1	6ES7 151-3BA23-0AB0			
1	PM-E DC24V	6ES7 138-4CA01-0AA0	8171		...Modul PM-E (3)
2	4DI DC24V HF	6ES7 131-4BD01-0AB0	1.0		...Modul 4DI (3)
3	2DO DC24V/0,5A HF	6ES7 132-4BB01-0AB0		1.0	...Modul 2DO (3)

Status Identification

PN device 3 on PN system 100 Slot: 3: Module removed
 Name: IM151-3PN-1
 Module: 4DI DC24V HF
 I/O address: I36

Figure 3-9 Module information - module

Example: Module information - submodule

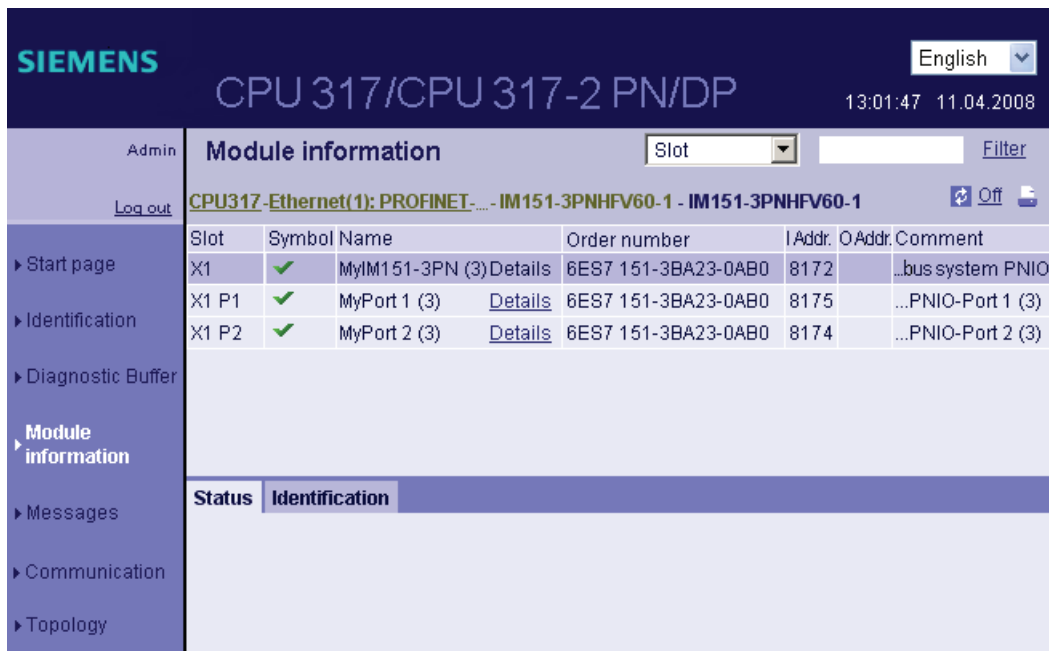


Figure 3-10 Module information - submodule

Reference

For additional information about "Module information" and about the topic "Configuring 'Report System Errors'", refer to the *STEP 7 Online Help*.

3.7.4.5 Messages

Requirements

The message texts were configured in the user-specific languages. For information about configuring message texts refer to STEP 7 and to the Service&Support pages (<http://support.automation.siemens.com/WW/view/en/23872245>).

Messages

The browser displays the content of the message buffer on the "Messages" web page. The messages cannot be acknowledged on the web server.

The screenshot shows the Siemens Messages web page for a CPU 317/CPU 317-2 PN/DP. The page header includes the Siemens logo, the device name, the language (English), and the time (13:01:47) and date (11.04.2008). The main content area is titled "Messages" and features a filter box (1) with a "MessageNr." dropdown and a "Filter" button. Below the filter is a table of messages (2) with the following data:

Message	Date	Time	Message text	Status	Acknowledg.
93	14.04.2008	08:23:24.644	PN device 5 on PN system....	incoming	not acknowledged
78	14.04.2008	08:23:24.796	PN device 4 on PN system....	incoming	not acknowledged
71	14.04.2008	08:23:24.948	PB slave 3, on PB system....	incoming	not acknowledged
70	14.04.2008	08:23:25.099	PB slave 1, on PB system....	incoming	not acknowledged
56	14.04.2008	08:23:25.251	PN device 3 on PN system....	incoming	not acknowledged
92	14.04.2008	08:23:25.402	PN device 2 on PN system....	incoming	not acknowledged
26	14.04.2008	08:23:25.553	PN device 1 on PN system....	incoming	not acknowledged

Below the table, there is a "Details on message number: 93" section (3) with the short description: "SCALANCE-X204IRT Order number: 6GK5 204-0BA00-2BA3".

Figure 3-11 Messages

① "Filter"

You can filter the table based on specific criteria.

1. Select a parameter from the drop-down list box.
2. If applicable, enter the value of the selected parameter.
3. Click "Filter".

The filter criteria remain active after automatic page updates.

To deactivate the filter settings, click "Filter" again.

Effects

- The filter settings are also retained when you update a page.
- Filter settings have no effect on the print-out. A printout always contains the entire content of the message buffer.

② "Messages"

Messages of the CPU are displayed in the info field ② in chronological order, including **date** and **time**.

The **message text** parameter is an entry which contains the message texts configured for the corresponding fault definitions.

Sorting

You can also view the individual parameters in ascending or descending order. Click in the column header of one of the parameters:

- Message number
- Date
- Time
- Message text
- Status
- Acknowledgment

The messages are returned in chronological order when you click the "Date" entry. Incoming and outgoing events are output at the **Status** parameter.

③ "Message number details"

You can view detailed message information in this info field. Select the corresponding message from the info field ②.

Special features when changing languages

You can change the language, e.g. from German to English, in the upper right corner. If you select a language or corresponding message texts you have not configured, the program returns a hexadecimal code instead of plain text information.

3.7.4.6 Communication

Overview

The "Communication" Web page provides more information about the following tabs:

- Parameters
- Statistics
- Resources
- Open User Communication

① "Parameters" tab

A summary of the information related to the integrated PROFINET interface of the CPU is available in the "Parameters" tab.

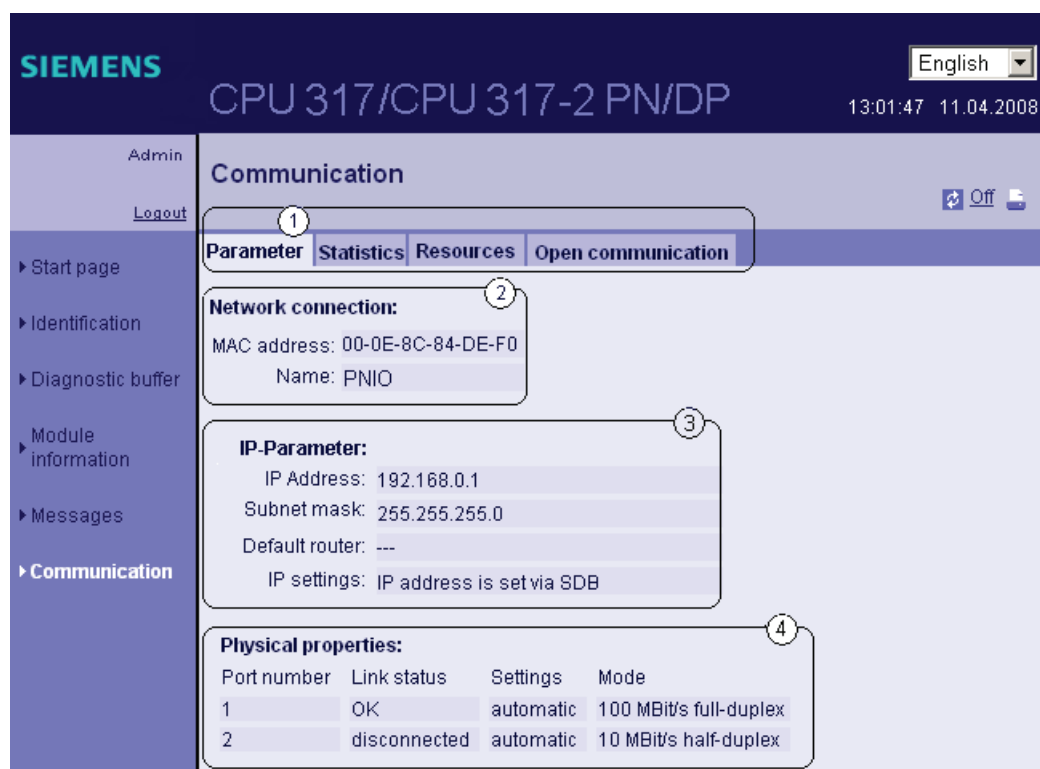


Figure 3-12 Parameters of the integrated PROFINET interface

② "Network connection"

This page displays information for the identification of the integrated PROFINET interface of the corresponding CPU.

③ "IP parameters"

Information about the configured IP address and number of the subnet to which the corresponding CPU is connected.

④ "Physical properties"

Information available in the "Physical properties" info field:

- Port number
- Link status
- Settings
- Mode

"Statistics" tab

Information about the quality of data transfers is available in the ① "Statistics" tab.

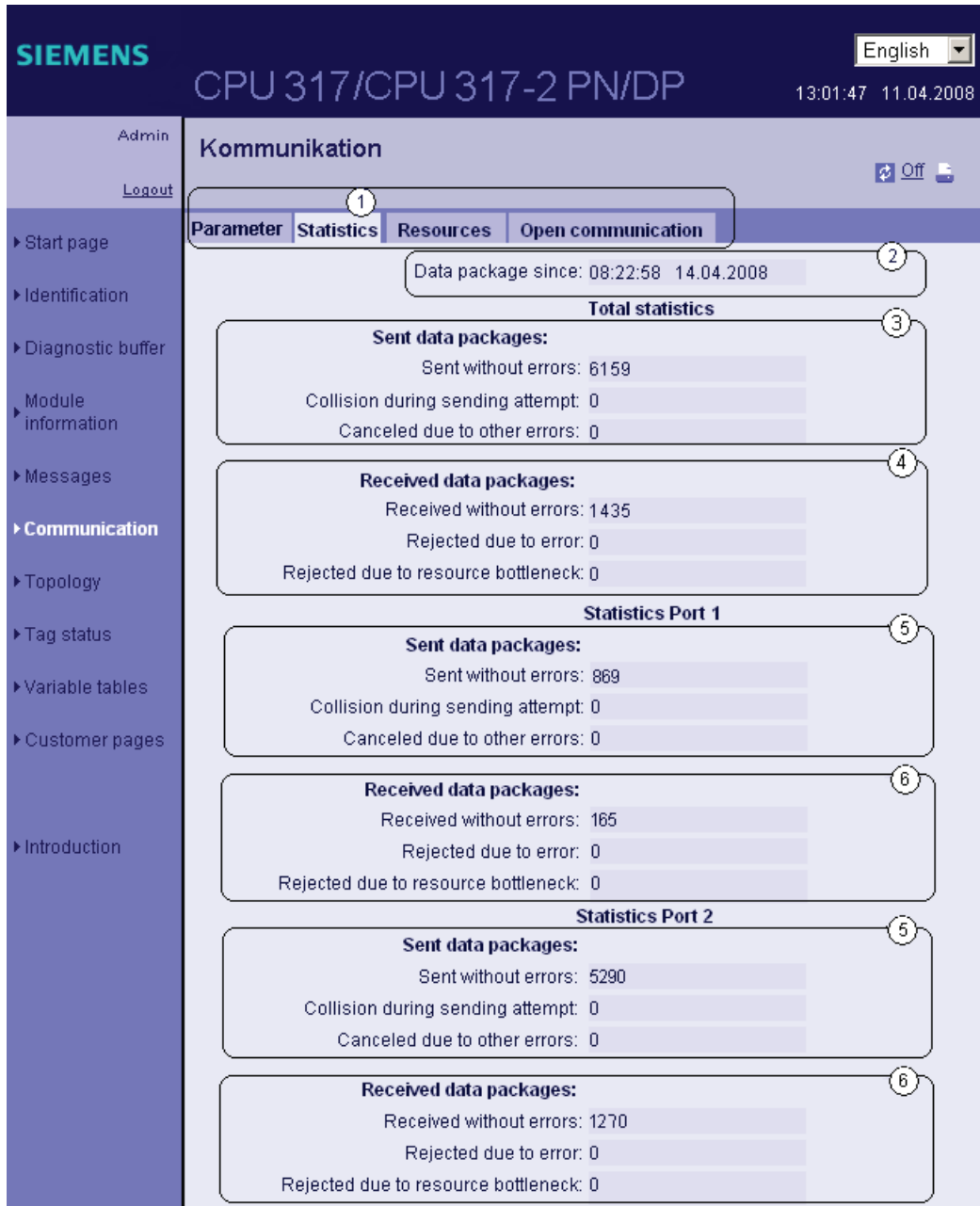


Figure 3-13 Data transfer key data

② "Data packets since"

This shows the time at which the first data packet was sent or received after the last Power on/memory reset.

③ "Overall statistics - Data packets sent"

The quality of the data transfer on the send line can be determined from the key data in this info box.

④ "Overall statistics - Data packets received"

The quality of the data transfer on the reception line can be determined from the key data in this info box.

⑤ "Statistics port x - Data packets transmitted"

The quality of the data transfer on the send line can be determined from the key data in this info box.

⑥ "Statistics port x - Data packets received"

The quality of the data transfer on the reception line can be determined from the key data in this info box.

① The "Resources" tab

For information about the load of connections on resources, refer to the "Resources" tab.

The screenshot displays the Siemens web interface for CPU 317/317-2 PN/DP. The top navigation bar includes 'Admin', 'Logout', and 'English'. The main title is 'Kommunikation'. A secondary navigation bar contains 'Parameter', 'Statistics', 'Resources', and 'Open communication'. The 'Resources' tab is active, showing connection statistics. Callout 1 points to the 'Resources' tab, callout 2 points to the 'Number of connections' summary box, and callout 3 points to the detailed connection table.

Connections:	reserved	assigned
PG communication	1	1
OP communication	1	0
S7 Basic communication	0	0
S7 communication	0	0
Other communication	--	0

② Number of connections

Provides information on the maximum number of connection resources currently not in use.

③ Connections

Provides information about the number of connections reserved or used for PG, OP, and S7 basic communication, S7 communication, and other communication functions.

"Open User Communication" tab

Information about the status of the communication links is available in the ① "Open User Communication" tab.

SIEMENS CPU 317/CPU 317-2 PN/DP 13:01:47 11.04.2008

Admin Log out

Communication

① **Open communication**

Status	ID	Remote IP	Type
✔ Connection has been set up	#16 0001	---	UDP
✘ Connection is being established a	#16 0002	192.168.3.148	TCP
✔ Connection has been established	#16 0003	192.168.3.148	ISO on TCP

②

Details: #16 0003

Local IP address: 192.168.3.147
 Local TSAP (hexadecimal): E0 02 AA
 Local TSAP (ASCII): ---

Remote IP address: 192.168.3.148
 Remote TSAP (hexadecimal): E0 02 AA
 Remote TSAP (ASCII): ---

Current connection establishment attempts: 0
 Successful connection establishment attempts: 1

Bytes sent: 94139340
 Bytes received: 60496560

Error message of last disconnection: ---
 Error message of last connection establishment attempts: ---

③

② Status information

Provides an overview of Open User Communication connections on Industrial Ethernet which are currently being set up and of those which are already active or configured.



The table contains the following information for each connection:

- "Status" column: Connection status, including the symbol
- "ID" column: Connection ID
- "Remote IP" column: Remote IP address
- "Type" column: Connection type

The possible connection states depend on the connection type. This dependency is shown in the following table:

Connection type	Possible connection states	Meaning
TCP, ISO on TCP	An active/passive connection is set up.	You called the TCON block to initiate the request for an active/passive connection.
	An active/passive connection is set up.	The connection initiated with the TCON block is set up.
UDP	Connection is configured	-

The following symbols are used to indicate the connection status:

Symbol	Color	Meaning
	green	<ul style="list-style-type: none"> • Connection is configured (for UDP) • An active/passive connection is set up (for TCP and ISO on TCP)
	red	<ul style="list-style-type: none"> • An active/passive connection is being set up (for TCP and ISO on TCP)

③ Details

Provides more information about the connection selected.

Reference

For information about the error messages possibly displayed due to cancellation or failed attempts to set up a connection, refer to the STEP 7 Online Help.

3.7.4.7 Topology

Topology of the PROFINET nodes

The "Topology" Web page provides information about the topological configuration and status of the PROFINET devices on your PROFINET IO system.

There are three tabs for the following views:

- Graphical view (target and actual topology)
- Tabular view (actual topology only)
- Status overview (excluding topological correlations)

The tabular view and status overview can be printed. Before printing, use the print preview of your browser and, if necessary, correct the format.

Target topology

In the Topology Editor of STEP 7, display of the configured topology of PROFINET devices set up on a PROFINET IO system, including corresponding status information. The display includes neighboring PROFINET devices, provided their topological layout is configured as well. However, a status view is not provided at this point.

The view identifies the topological assignment of PROFINET devices that have failed, the differences between the target and actual topology, and interchanged ports.

Note

The configured target topology is always displayed in the following scenarios:

- When the "Topology" web page is called via the navigation bar
- When you change from the overview of PROFINET IO devices on the "Module information" Web page to the "Topology" Web page by means of "Topology" link

If no target topology was configured, the actual topology is called by default.

Actual topology

Displays the actual topological layout of the "configured" PROFINET devices and the directly adjacent, non-configured PROFINET devices (display of the relations, provided these can be determined. However, the status of these adjacent PROFINET devices is not displayed).

Requirements

For error-free operation of the topology, the following conditions must be met:

- You completed the language settings.
- In the Topology Editor of STEP 7, you configured the topological interconnection of ports (requisite for the display of the target topology and corresponding topological target connections).
- You compiled the configuration data in HW Config.
- "Report system errors" is generated.
- The download of all project data is completed (configuration and program data).

Target and actual topology - graphical view

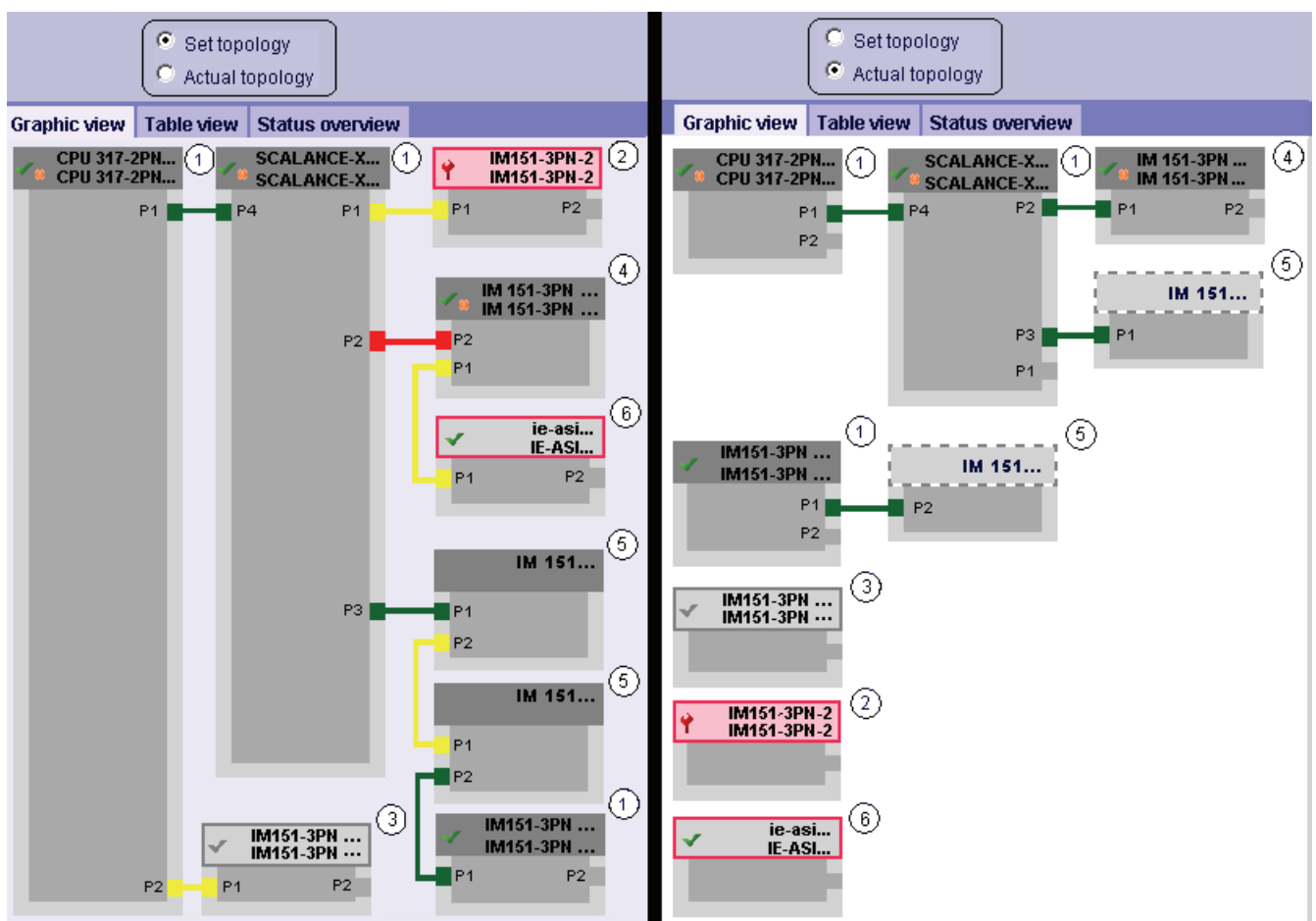


Figure 3-14 Graphical view - Target and actual topology

Meaning of the colored connections in the target/actual topology:

Connection	Meaning	
	Target topology	Actual topology
green	The current actual connection matches the configured target connection.	Connections detected
red	Mismatch between the current actual connection and the configured target connection (e.g., port interchanged).	-
yellow	Connection diagnostics not possible. Causes: <ul style="list-style-type: none"> • Malfunction of communication with a device (e.g. cable was removed) • Connection to a passive component • Connection to devices/PROFINET devices on a different IO controller or IO subsystem. 	-

① Configured and accessible PROFINET nodes

Configured and accessible PROFINET nodes are displayed in dark gray. Display the ports used to connect the PROFINET nodes of a station.

② Configured but inaccessible PROFINET nodes

Configured but inaccessible PROFINET nodes are indicated in pink color with red frame (e.g. device failure, cable disconnected)

③ Deactivated nodes

All disabled configured PROFINET nodes are indicated in light gray.

④ Interchanged ports

Interchanged ports are highlighted in red color in the target topology view. The actual topology view indicates the actually connected ports, while the target topology view displays the configured target connections.

⑤ PROFINET devices of a different PROFINET IO subsystem

- In the target topology:

A PROFINET device of a different PROFINET IO subsystem is identified by means of a green link (or red link for interchanged ports) if available on the bus and directly adjacent to an accessible configured PROFINET device ①.

A PROFINET device that cannot be accessed from a different PROFINET IO subsystem is identified by means of a yellow link.

The connection between two PROFINET devices which belong to a different PROFINET IO subsystem cannot be identified and is always indicated in yellow color.

- In the actual topology:

The PROFINET device of a different PROFINET IO subsystem is not displayed unless directly adjacent to a configured PROFINET device. This device is indicated by means of a light gray dashed line.

The status of PROFINET devices of a different PROFINET IO subsystem is **not** displayed in the device header.

⑥ Displaying faulty neighbor relationships


Nodes whose relation data could not be read completely or with error are highlighted in light gray with a red frame.

Note

Displaying faulty neighbor relationships

A firmware update of the affected component is required.

Views after changes to the configuration

- After having failed, this device remains at the same position in the "Target topology" view. This error state is indicated by means of a device header with red frame and a red wrench .
- After having failed, the device is displayed in the bottom area of the in the "Actual topology" view. This error state is indicated by means of a device header with red frame and a red wrench.

Link between the "Topology" and "Module information" Web pages

The two web pages, "Topology" and "Module information", are linked. A click on the header of a selected module in the topology view automatically takes you to this module on the "Module information" Web page.

See also the "Module information (Page 106)" chapter.

Topology - tabular view

The "Tabular view" always shows the "Actual topology".

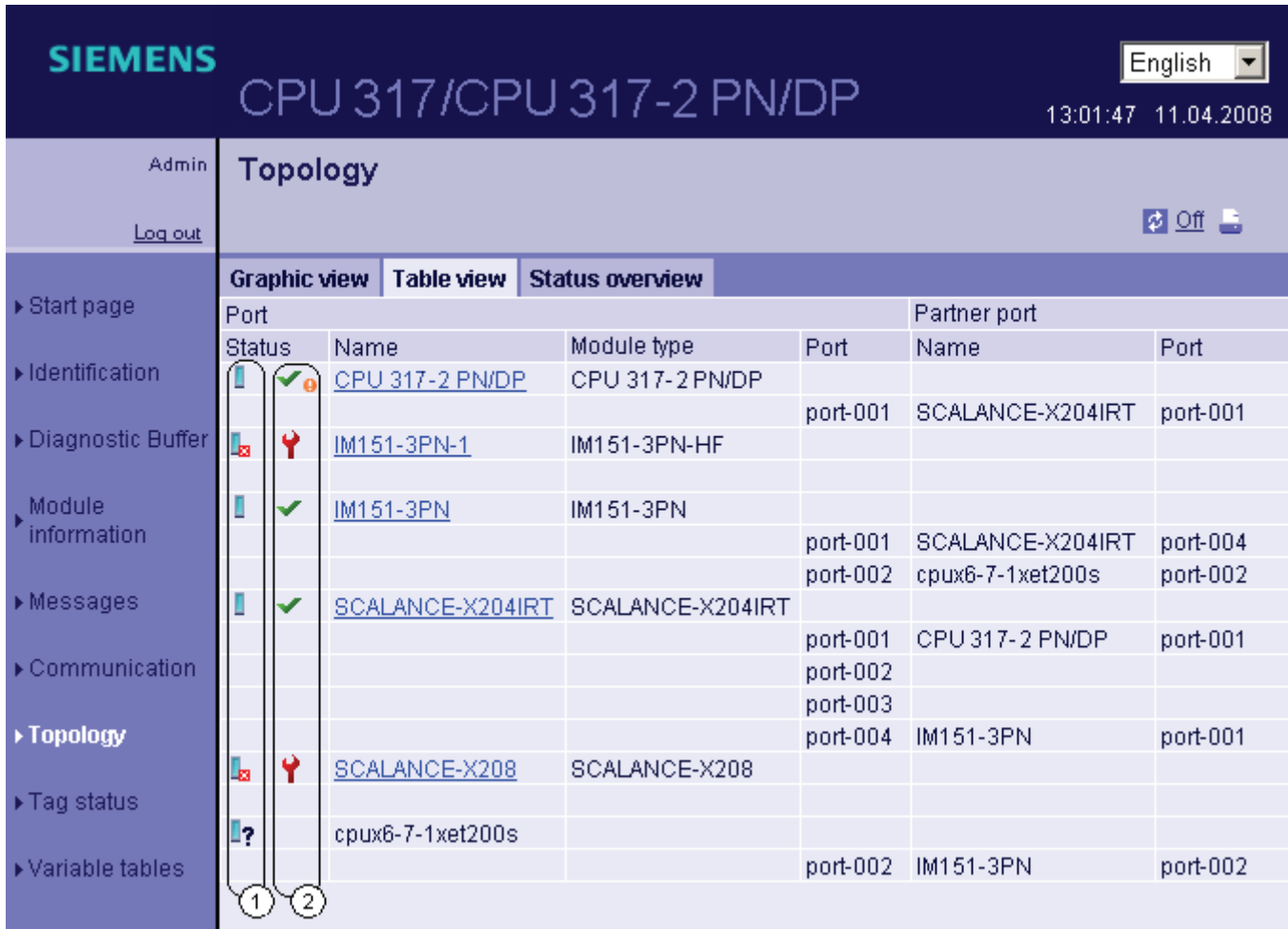









Figure 3-15 Topology - tabular view

① Meaning of the symbols relating to the status of the PROFINET nodes

Symbol	Meaning
	Configured and accessible PROFINET nodes
	Unconfigured and accessible PROFINET nodes
	Configured but inaccessible PROFINET nodes
	Nodes for which neighbor relations cannot be determined or for which the neighbor relationship could not be read out completely or only with errors

① Meaning of the symbols relating to the module status of the PROFINET nodes

Symbol	Color	Meaning
	green	Component is OK
	gray	Disabled PROFIBUS slaves or PROFINET devices Support conditions: <ul style="list-style-type: none"> • CPU31x PN/DP ≥ V3.2.1 and STEP 7 V5.5 + possibly required HSP for the CPU • Enabling/disabling the PROFIBUS slaves and PROFINET IO devices using SFC12 mode 3/4. • In the "Report system errors" dialog, "Diagnostics support" tab, "Status enabled/disabled" area, the check mark must be set in the "Request device status enabled/disabled" check box after CPU startup and optionally in the "Output message on status transition" check box.
	black	Component cannot be accessed/Status cannot be determined <ul style="list-style-type: none"> • For example, "Status cannot be determined" is always displayed while the CPU is in STOP mode, or during startup evaluation of "Report system error" for all the configured I/O modules and I/O systems after a CPU restart. • However, this status can also be displayed temporarily during operation if a diagnostic interrupt burst occurs at all modules. • It is not possible to determine the status of modules on a subsystem that is connected to a CP.
	green	Maintenance required
	yellow	Maintenance requested
	red	Error - component failed or faulty
	-	Error in a lower module level

Topology - status overview

The "Status overview" provides a clear presentation of all PROFINET IO devices/PROFINET devices (without connection relations) on one page. A quick error diagnostics is possible based on the symbols that show the module statuses.

The overview also provides a link of the modules to the "Module information (Page 106)" Web page.

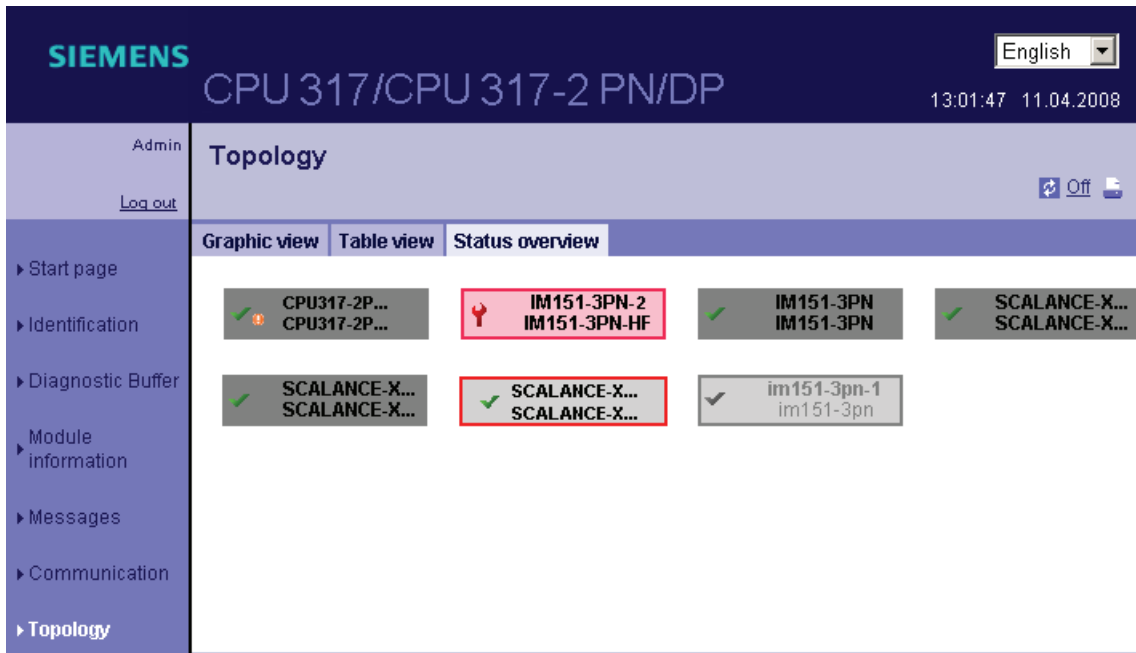


Figure 3-16 Topology - status overview

3.7.4.8 Status of the variables

Status of the variables

The browser outputs the variable status on the web page of the same name. You can monitor the status of up to 50 variables.

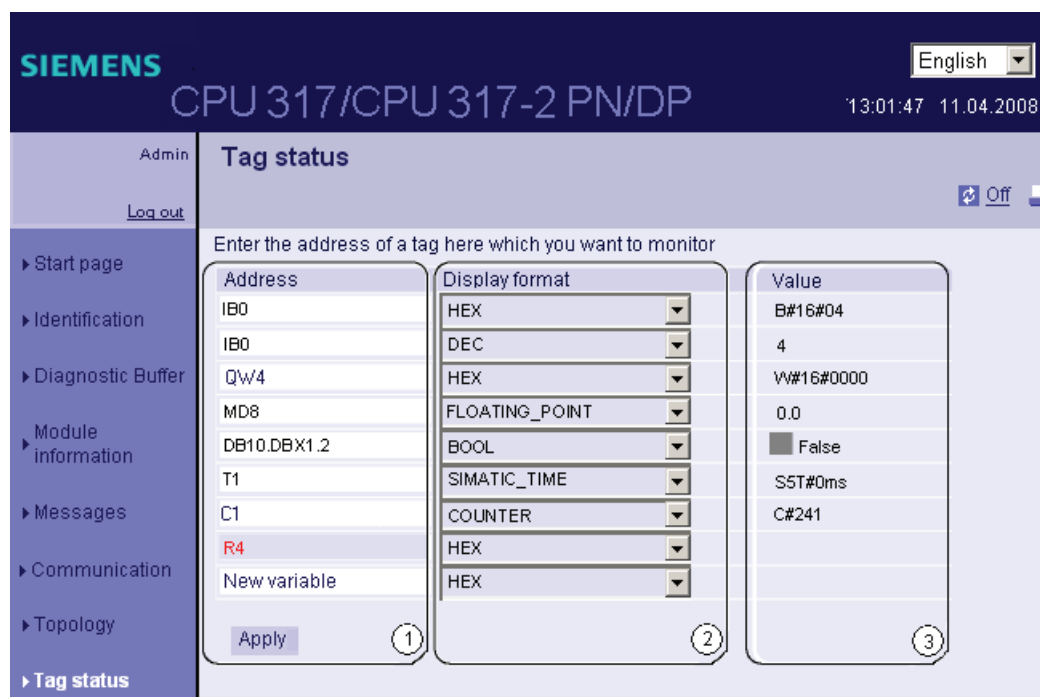


Figure 3-17 Status of the variables

① "Address"

In the "Address" text field, enter the address of the operand whose behavior you want to monitor. Invalid addresses entered are displayed in red font.

② "Display format"

Select the required display format of a variable in the drop-down list box. The variable is displayed in hexadecimal code if it cannot be displayed in the selected display format.

③ "Value"

Outputs the value of the corresponding operand in the selected format.

Special features when changing languages

You can change the language, e.g. from German to English, in the upper right corner. The German mnemonics differ compared to other languages. The syntax of operands you enter may therefore be invalid when you change languages. For example: ABxy instead of QBxy. The browser outputs a faulty syntax in red font.

3.7.4.9 Variable tables

Variable tables

The browser displays the content of the variable tables which support Web functionality on the Web page of the same name.
You can monitor up to 200 variables in each variable table.

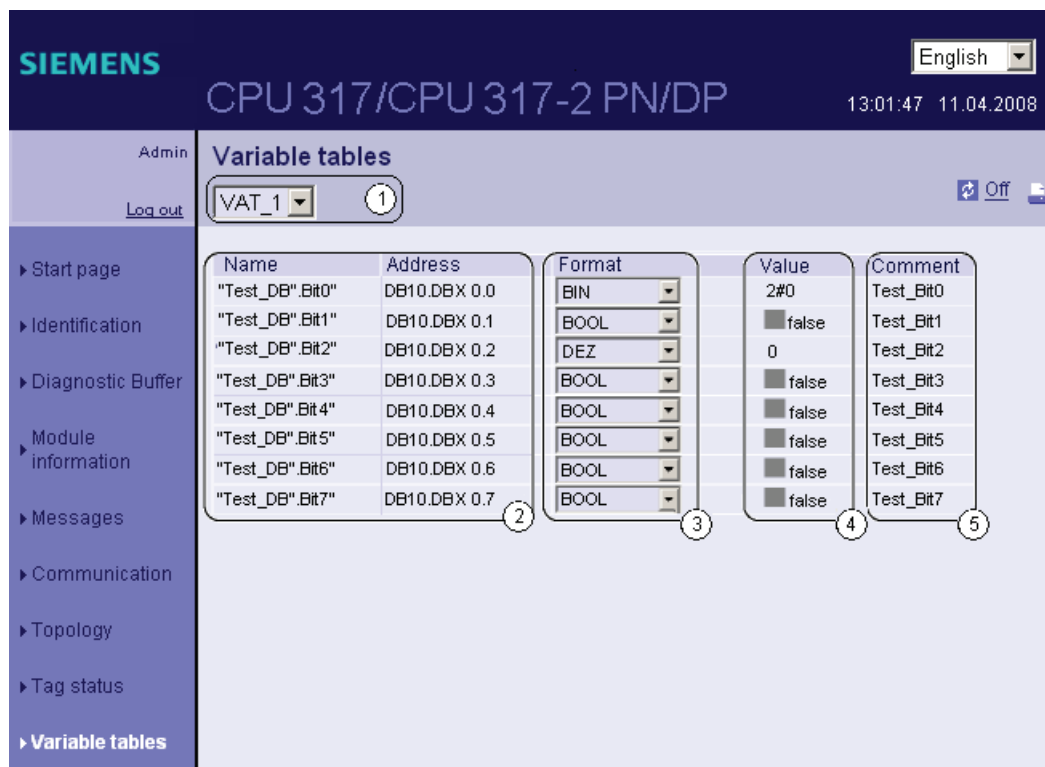


Figure 3-18 Variable tables

① Selection

Select one of the configured variable tables from this drop-down list box.

② "Name" and "Address"

This info field indicates the operand's name and address.

③ "Format"

Select the display format of the corresponding operand using the drop-down list boxes. The drop-down list box outputs a selection of all valid display formats.

④ "Value"

This column shows the values in the corresponding display format.

⑤ "Comment"

The comment you configured is shown in order to highlight the meaning of an operand.

Configuring variable tables for the web server

The web server lets you monitor up to 50 variable tables with up to 200 variables each. As the available CPU memory is shared by messages and variables, the actually available number of variable tables may be reduced.

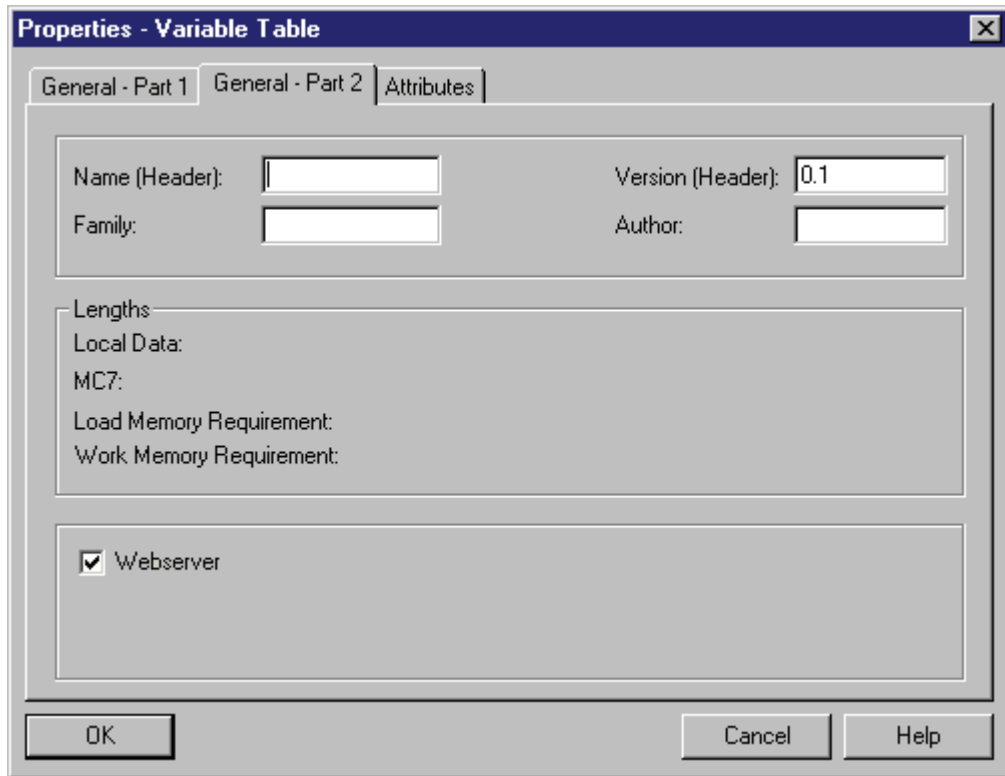
Example: There is sufficient memory space for approximately 400 configured messages and 50 variable tables with 100 variables each (including the symbol names, but without symbol comment).

The web browser only outputs partial variable tables if memory capacity is exceeded due to the number of configured messages and variables. You counteract this negative effect by reducing memory requirements for your messages and symbol comments. You should also use only one language to display information, if possible.

You should also configure your variable tables with as few variables as possible, with short names and comments, in order to ensure that the variable tables are displayed in full by the web server and will also be updated faster than tables containing a large number of variables (limited memory of the CPU).

Creating a variable table for the web server

1. Generate a variable table in STEP 7.
2. Open the properties dialog of the variable table and select the "General - Part 2" tab.
3. Activate the "Web server" checkbox.



4. Save and compile the project and download the configuration data to the CPU.

3.7.4.10 User pages

User pages

This Web page provides the link to your programmable user page.

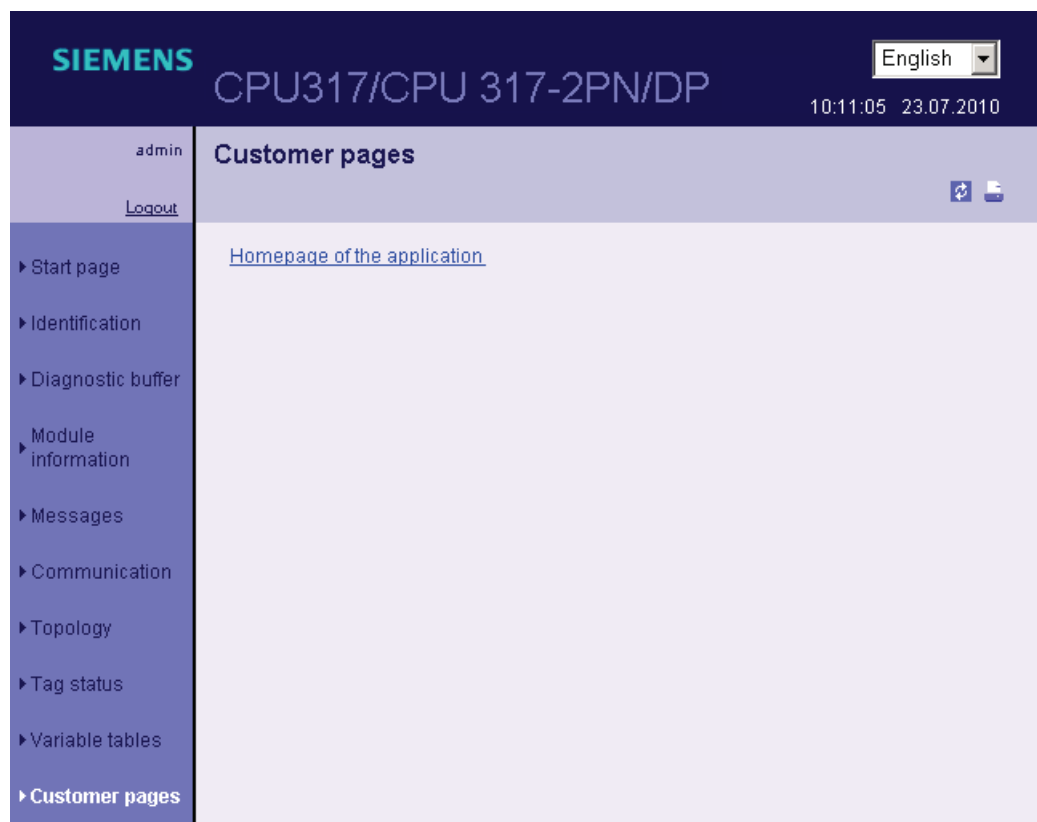


Figure 3-19 User pages

The Web server allows you to create user-specific HTML pages with CPU data content. Accordingly, create the user page in a Web Editor of your choice, using the symbols from the STEP 7 user program. The Web2PLC application included with your STEP 7 package converts the user page you created into data blocks. These DBs are downloaded to the CPU. System function SFC 99 "WWW" links the user program to the internal Web server on the CPU. At the first call of SFC 99 "WWW", the link to the user page is displayed on the CPU's Web page. A click on the link opens the user page in a new window.

No more than two user pages can be activated at any given time.

Requirements

- In your STEP 7 project, you have created the symbols for the I/O variables you want to use on your user page
- On the "Web" tab of the CPU properties dialog, you have at least:
 - activated the Web server
 - entered a user in the user list
 - assigned this (and other) user read/write authorizations (see chapter "Settings in HW Config, 'Web' tab" (Page 97))
- You completed all necessary communication settings (IP address parameter, subnet mask, etc.)
- You saved and downloaded the hardware configuration
- You created your user page in an HTML Editor of your choice:
 - Automatic HTML pages, if you want to **disable** control the page layout by means of the user program (requires at least one call of SFC 99)
 - Manual HTML pages, if you want to **enable** control the page layout by means of the user program (requires the cyclic call of SFC 99)
- You installed the Web2PLC application for STEP 7 included on your product CD (installation path: CD2: \Optional Components\S7 Web2PLC)

Creating dynamic user pages

To create dynamic user pages, use AWP commands (Advanced Web Programming) on your HTML user page. AWP commands represent a Siemens instruction set that can be used to access CPU information. For information on AWP commands, refer to the Web2PLC Online Help.

Procedure

1. In SIMATIC Manager, select the "Blocks" folder in the S7 program of the CPU and then select "S7-Web2PLC" from the shortcut menu. The S7-Web2PLC program starts.
2. Select **File > New project...** and enter a project name.
3. Select **File > Edit project settings ...** .
The project settings dialog opens.
4. On the "General" tab, specify the path to your HTML folder.
5. Specify the HTML file to start as user page and the application name.
6. On the "STEP 7" tab, specify the DB numbers (default is 333 and 334)
Confirm your entries with **OK**. The dialog for the STEP 7/Web project opens.
7. Open your user page in the HTML Editor. Using the AWP commands and symbolic names from STEP 7, reference the variables to be available on your user page. Consult the Web2PLC Online Help.
8. Once you have edited and saved the HTML page, return to your S7-Web2PLC project. Click the following buttons in succession:
 - "Export symbols"
 - "Generate DB source"
 - "Compile DB source"

The corresponding actions are carried out and a control DB ("Web DB"), including at least one fragment DB, will be created in the "Blocks" folder of the S7 program of the CPU.

9. Click the "Download to CPU" to download the DBs to the CPU.

Note

The CPU should be in STOP mode before you run this operation. If memory resources are exceeded during the download of WEB DBs in RUN mode, synchronization errors could develop when the user program accesses the control DB.

Reference

For more information and a description of the areas that you can modify, refer to the Web2PLC Online Help.

For additional information about the SFC 99 block, refer to the *STEP 7 Online Help*.

For more information on visualization with user-defined web pages on SIMATIC CPUs with PROFINET interface, refer to the Internet (<http://support.automation.siemens.com/WW/view/en/44212999>).

PROFINET

4.1 Communication via PROFINET

4.1.1 Introduction

What is PROFINET?

Within the framework of Totally Integrated Automation (TIA), PROFINET represents a consistent continuation of:

- PROFIBUS DP, the established fieldbus and
- Industrial Ethernet, the communication bus for the cell level

Experience gained from both systems was and is being integrated into PROFINET.

PROFINET is an Ethernet-based automation standard of PROFIBUS International (previously PROFIBUS user organization) and defines a multi-vendor communication, automation, and engineering model.

Objectives of PROFINET

The objectives of PROFINET are:

- Open Ethernet standard for automation based on Industrial Ethernet.
Although Industrial Ethernet and standard Ethernet components can be used together, the Industrial Ethernet devices are more rugged and therefore better suited for industrial environments (temperature, resistance, etc.)
- Use of TCP/IP and IT standards
- Automation with real-time Ethernet
- Seamless integration of fieldbus systems

Implementing PROFINET in SIMATIC

We have implemented PROFINET as follows:

- Communication between field devices is implemented in SIMATIC by way of **PROFINET IO**.
- Communication between controllers which operate as components in distributed systems is implemented in SIMATIC by means of **PROFINET CBA** (Component Based Automation).
- Installation engineering and network components are available as SIMATIC NET products.
- Established IT standards from the office environment (e.g. SNMP = Simple Network Management Protocol for network parameterization and diagnostics) are used for remote maintenance and network diagnostics.

Documentation from PROFIBUS International on the Internet

Abundant documentation related to PROFINET is available at the Internet URL (<http://www.profinet.com>) of PROFIBUS & PROFINET International (formerly the PROFIBUS User Organization, PNO).

Additional information can be found on the Internet (<http://www.siemens.com/profinet>).

What is PROFINET IO?

Within the framework of PROFINET, PROFINET IO is a communication concept for the implementation of modular, distributed applications.

PROFINET IO allows you to create automation solutions which are familiar to you from PROFIBUS.

PROFINET IO is implemented based on the PROFINET standard for programmable controllers.

The STEP 7 engineering tool supports engineering and configuring of an automation solution.

STEP 7 therefore provides the same application view, regardless of whether you are configuring PROFINET or PROFIBUS devices. Generally speaking, the programs for your PROFINET IO and PROFIBUS DP applications are identical, however, for PROFINET IO you must use the extended SFCs/SFBs and system status lists.

What is PROFINET CBA (Component Based Automation)?

Within the PROFINET system, PROFINET CBA (Component Based Automation) is an automation concept that focuses on the following:

- Implementation of modular applications
- Machine to machine communication

PROFINET CBA lets you create distributed automation solutions based on ready-to-use components and partial solutions. This concept meets demands for a higher degree of modularity in the field of mechanical and systems engineering through extensive distribution of intelligent processes.

Component Based Automation allows you to implement complete technological modules form operation as standardized components in large-scale systems.

You create the modular, intelligent components of PROFINET CBA using an engineering tool that could differ depending on the device manufacturer. Components that consist of SIMATIC devices are created in STEP 7 and interconnected using the SIMATIC iMAP tool.

Distinguishing features of PROFINET IO and PROFINET CBA

PROFINET IO and CBA represent two different views of automation devices on Industrial Ethernet.

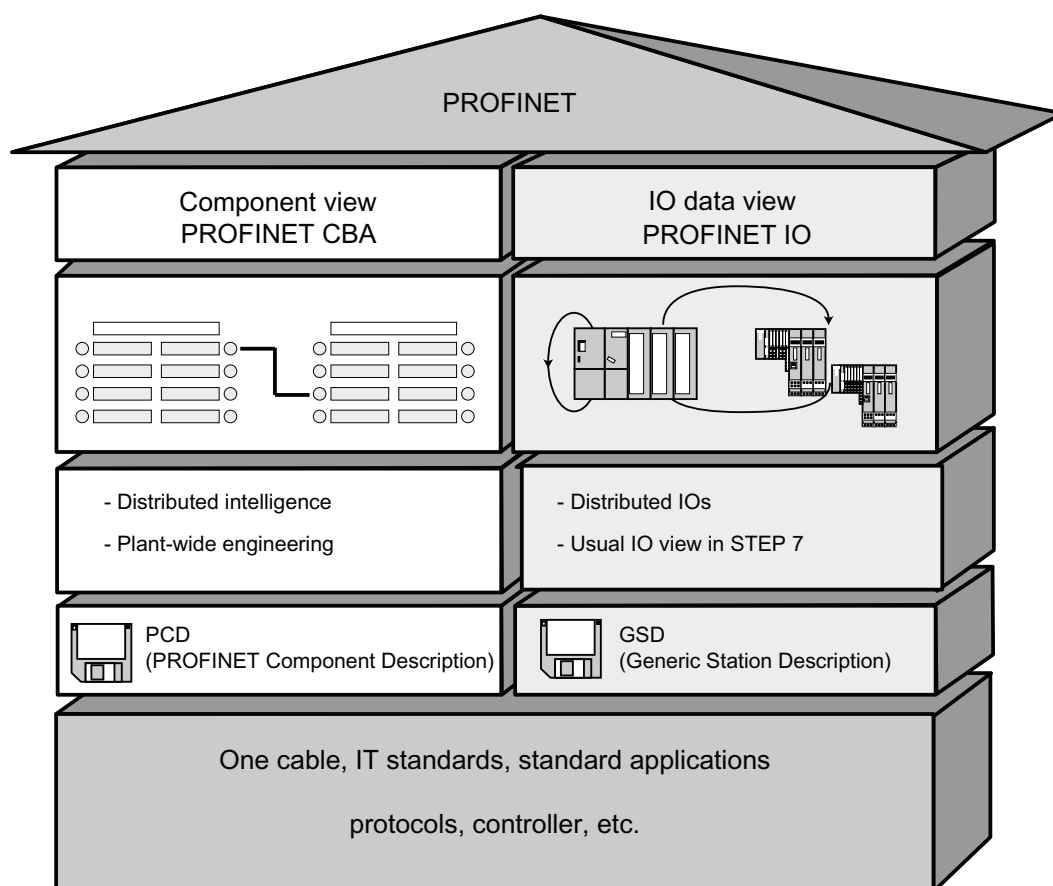


Figure 4-1 Distinguishing features of PROFINET IO and Component Based Automation

Component Based Automation divides the entire plant into various functions. These functions are configured and programmed.

PROFINET IO provides you with a view of the plant that is very similar to the PROFIBUS view. You continue to configure and program the individual programmable controllers.

Reference

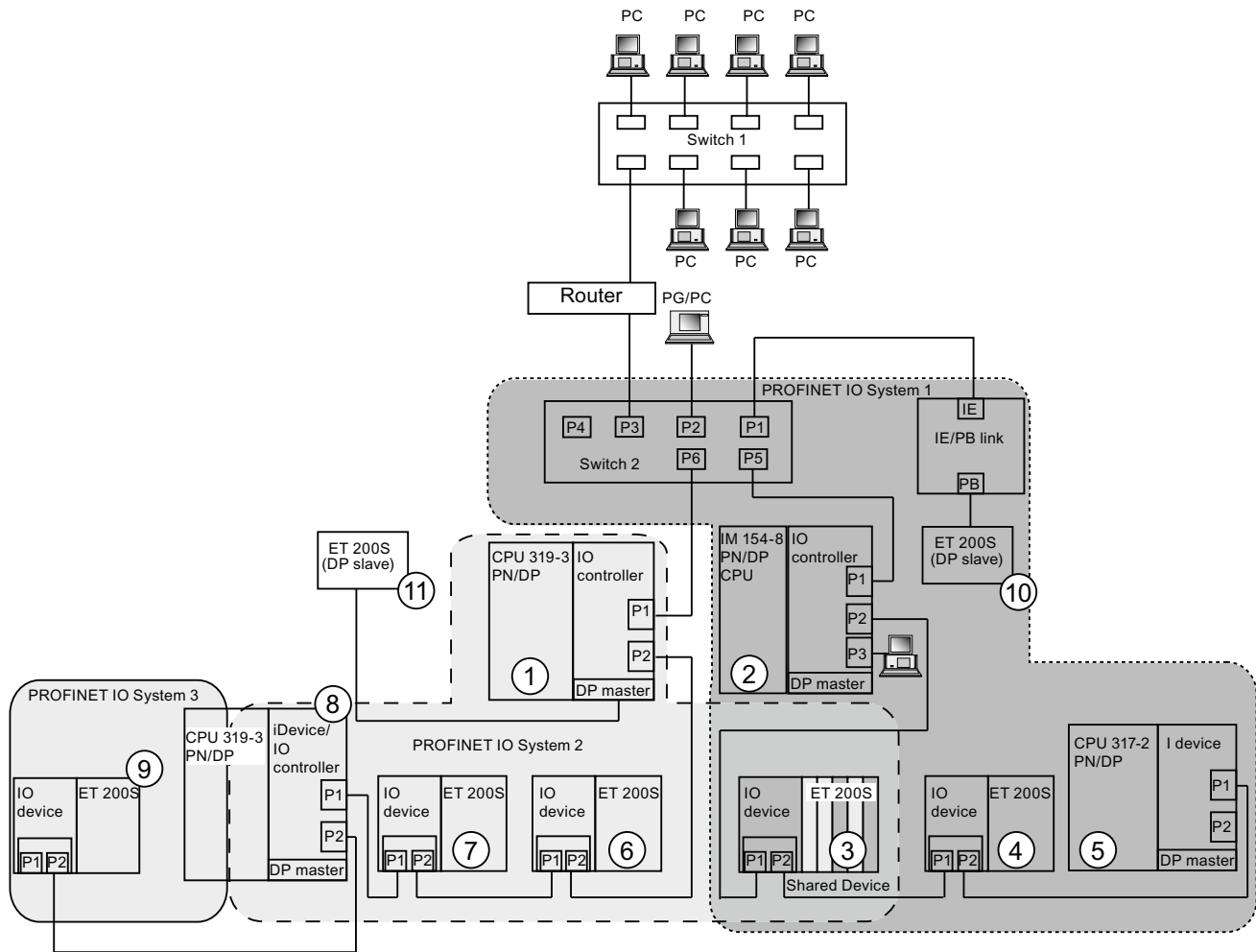
Further information

- on PROFINET IO and PROFINET CBA is available in the *PROFINET system description*. For differences and similarities between PROFIBUS DP and PROFINET IO, refer to the *From PROFIBUS DP to PROFINET IO* programming manual.
- For detailed information about PROFINET CBA, refer to the documentation on SIMATIC iMap and Component Based Automation.

4.1.2 PROFINET IO System

Functions of PROFINET IO

The following graphic shows the new functions in PROFINET IO:



The graphic shows	Examples of connection paths
The connection of company network and field level	You can access devices at the field level from PCs in your company network Example: <ul style="list-style-type: none"> • PC - Switch 1 - Router - Switch 2 - CPU 319-3 PN/DP ①.
Connections between the automation system and field level	You can also access other areas on the Industrial Ethernet from a programming device at the field level. Example: <ul style="list-style-type: none"> • PG - integrated switch IM 154-8 CPU ② - Switch 2 - integrated switch CPU 319-3 PN/DP ① - integrated switch IO Device ET 200 S ⑥ - on IO Device ET 200S ⑦.

The graphic shows	Examples of connection paths
<p>The IO controller of the CPU IM 154-8 CPU ② sets up PROFINET IO system 1 and directly controls devices on the Industrial Ethernet and PROFIBUS.</p>	<p>At this point, you can see the IO feature between the IO controller, intelligent device, and the IO devices on the Industrial Ethernet:</p> <ul style="list-style-type: none"> • IM 154-8 CPU ② acts as IO controller for the IO devices ET 200S ③ and ET 200S ④, for switch 2, and for the intelligent device CPU 317-2 PN/DP ⑤. • IO device ET 200S ③ is operated as shared device, which means that IM154-8 CPU ② operating as controller can access only the (sub)modules it has been assigned as controller for that IO device. • The IM 154-8 CPU ② is also the IO controller for ET 200S (DP slave) ⑩ by way of IE/PB Link.
<p>The CPU 319-3 PN/DP ① operates as IO controller for PROFINET system 2 and, at the same time, as DP master on the PROFIBUS. In addition to other IO devices, this IO controller is used to operate a CPU319-3 PN/DP ⑧ as intelligent device which, in turn, operates a PROFINET subsystem as IO controller.</p>	<p>Here you can see that a CPU can be both the IO controller for an IO device and the DP master for a DP slave:</p> <ul style="list-style-type: none"> • CPU 319-3 PN/DP ① is the IO controller for the IO devices ET 200S ⑥ and ET 200S ⑦, and for the intelligent device CPU 319-3 PN/DP ⑧. • Moreover, CPU319-3 PN/DP ① shares the IO device ET 200S ③ with IO controller IM 154-8 CPU ②, which means that the CPU319-3 PN/DP ① operating as controller can access only the (sub)modules it has been assigned as controller for that IO device. • CPU319-3 ⑧, which is operated as intelligent device on CPU319-3 PN/DP ①, also acts as IO controller and sets up its own PROFINET system 3 on which the IO device ET 200S ⑨ is operated. • The CPU 319-3 PN/DP ① is the DP master for one DP slave ⑪. The DP slave ⑪ is assigned locally CPU 319-3 PN/DP ① and is not visible on the Industrial Ethernet.

Further information

You will find further information about PROFINET in the documents listed below:

- In the System Description PROFINET
- In the *From PROFIBUS DP to PROFINET IO programming manual*. This manual also provides a clear overview of the new PROFINET blocks and system status lists.

4.1.3 Blocks for PROFINET IO

Content of this chapter

This chapter covers the following:

- Blocks designed for use with PROFINET
- Blocks designed for use with PROFIBUS DP
- Blocks designed for use with PROFINET IO and PROFIBUS DP

Compatibility of the new blocks

New blocks were implemented for PROFINET IO since PROFINET is capable of handling larger quantity frameworks, for example. The new blocks are also used for PROFIBUS.

Comparison of the system and standard functions of PROFINET IO and PROFIBUS DP

For CPUs with integrated PROFINET interface, the table below provides an overview of the following:

- System and standard functions for SIMATIC which you will have to replace with upgraded functions for migration from PROFIBUS DP to PROFINET IO
- New system and standard functions

Table 4- 1 System and standard functions which are new or have to be replaced

Blocks	PROFINET IO	PROFIBUS DP
SFC 5 (determine start address of a module)	No (replaced with: SFC 70)	Yes
SFC 12 (deactivation and activation of DP slaves/IO devices)	Yes CPU S7-300: FW V2.4 or higher	Yes
SFC13 (reading diagnostics data from a DP slave)	No Substitution: • Event-driven: SFB 54 • Status-driven: SFB 52	Yes
SFC 49 (determine the associated slot of a logical address)	No Substitution: SFC 71	Yes
SFC 58/59 (write/read record in I/O)	No Substitution: SFB 53/52	Yes Already replaced by SFB 53/52 in DPV1
SFC 70 (determine start address of a module)	Yes	Yes
SFC 71 (determine the associated slot of a logical address)	Yes	Yes

Blocks	PROFINET IO	PROFIBUS DP
SFC 102 (read predefined parameters - CPU S7-300 only)	No Substitution: SFB 81	Yes, for S7-300
SFB 52/53 (read/write data record)	Yes	Yes
SFB 54 (evaluate interrupt)	Yes	Yes
Receiving SFB 73 ((PROFenergy-) data records in the intelligent device from the higher-level controller)	Yes	No
providing SFB 74 ((PROFenergy-) data records in the intelligent device to the higher-level controller)	Yes	No
SFB 81 (read predefined parameters)	Yes	Yes
SFB 104 (assignment of the IP suite and/or device name by the user program)	Yes	No

The table below provides an overview of SIMATIC system and standard functions which must be emulated by other functions when migrating from PROFIBUS DP to PROFINET IO.

Table 4- 2 System and standard functions in PROFIBUS DP which can be emulated in PROFINET IO

Blocks	PROFINET IO	PROFIBUS DP
SFC 55 (write dynamic parameters)	No Emulate using SFB 53	Yes
SFC 56 (write predefined parameters)	No Emulate using SFB 81 and SFB 53	Yes
SFC 57 (assign module parameters)	No Emulate using SFB 81 and SFB 53	Yes

The following SIMATIC system and standard functions are not supported in PROFINET IO:

- SFC 7 (trigger hardware interrupt on DP master)
- SFC 11 (synchronize groups of DP slaves)
- SFC 72 (read data from communication peer within own S7 station)
- SFC 73 (write data to communication peer within own S7 station)
- SFC 74 (interrupt connection to a communication peer within own S7 station)
- SFC 103 (determine the bus topology in a DP master system)

Comparison of the organization blocks of PROFINET IO and PROFIBUS DP

The table below shows the changes to OB83 and OB86 in PROFINET IO compared to PROFIBUS DP.

Table 4- 3 OBs in PROFINET IO and PROFIBUS DP

Blocks	PROFINET IO	PROFIBUS DP
OB 83 (hot swapping of modules/submodules)	Also possible with S7-300, new error information	Not possible with S7-300 Slaves integrated via the GSD file report the removal/insertion of modules/submodules during operation in the form of a diagnostic interrupt and thus via OB 82. With S7 slaves, a station failure is reported and OB 86 is called when an insertion/removal interrupt is generated.
OB 83 (return-of-submodule interrupt for submodules of the transfer areas of an intelligent device)	Corresponding info about the submodules	Not relevant
OB 86 (station failure)	New error information	Unchanged
OB 86 (partial station failure/partial station recovery)	Possible if used as shared intelligent device	Not relevant

Detailed information

For detailed information about the individual blocks, refer to the *Reference Manual System Software S7-300/400 System and Standard Functions*.

4.2 Isochronous real-time communication

Synchronized communication protocol for cyclic exchange of IRT data between PROFINET devices. A reserved bandwidth is available in the send cycle for IRT IO data.

The reserved bandwidth ensures that IRT data can be transmitted at reserved, synchronized intervals, without transmission being sensitive to high network load caused by other applications (for example, TCP/IP communication, or additional real-time communication).

PROFINET with IRT can be operated with the two following options:

- IRT option "high flexibility"
Maximum flexibility in terms of system planning and extensions.
A topological configuration is **not** required.
- IRT option "high performance":
A topological configuration is required.

Note

IO controller as sync master for IRT communication with IRT option "high performance"

For a configuration of IRT communication with "high performance" option, it is advisable to operate the IO controller as sync master as well. Otherwise, IO devices with IRT and RT configuration could fail as a result of sync master failure.

Additional information

For more information about the configuration of PROFINET devices, refer to the STEP 7 Online Help and to the PROFINET System Description (<http://support.automation.siemens.com/WW/view/en/19292127>) manual.

4.3 Prioritized startup

Prioritized startup denotes a PROFINET functionality for acceleration of the startup of IO devices (distributed I/O) in a PROFINET IO system with RT and IRT communication.

The function reduces the time that configured IO devices require in order to return to cyclic user data exchange in the following scenarios:

- On recovery of the power supply (not for a CPU that is operated as intelligent device with prioritized startup)
- On station recovery
- On activation of IO devices

Note

Startup times

The startup time depends on the number and type of modules.

Note

Prioritized startup and media redundancy

You cannot add an IO device with prioritized startup to a ring topology with media redundancy.

Additional information

For additional information, refer to the STEP 7 Online Help and to the PROFINET System Description (<http://support.automation.siemens.com/WW/view/en/19292127>) manual.

4.4 Device replacement without removable medium/programming device

IO devices having this function can be replaced in a simple manner:

- A removable medium (such as SIMATIC Micro Memory Card) with stored device name is not required.
- The device name does not have to be assigned with the programming device.

The replacement IO device is now assigned a device name from the IO controller. It is no longer assigned using a removable medium or programming device. The IO controller uses the configured topology and the relations determined by the IO devices. The configured target topology must match the actual topology.

Before reusing IO devices that you already had in operation, reset these to factory settings.

Additional information

For additional information, refer to the STEP 7 Online Help and to the PROFINET System Description (<http://support.automation.siemens.com/WW/view/en/19292127>) manual.

4.5 IO devices changing at runtime

Functionality of a PROFINET device. If the IO controller and IO devices support this functionality, other devices can assign the "changing partner ports" function to the port of an IO device by means of configuration, so that communication with each of these interchanging IO devices is possible at a specific time via this port. No other but the changing device can be physically connected to the changing port that is currently to be used for communication.

Note

The CPU ports cannot be assigned the "changing partner ports" function unless you operate the CPU as intelligent device. The function not available for CPU operation as IO controller.

Additional information

For additional information, refer to the STEP 7 Online Help and to the PROFINET System Description (<http://support.automation.siemens.com/WW/view/en/19292127>) manual.

4.6 Isochronous mode

The process data, transmission cycles via PROFINET IO, and the user program are synchronized in order to achieve ultimate deterministic. The input and output data of the distributed IO devices in the system is acquired and output simultaneously. The isochronous PROFINET IO cycle form the corresponding clock generator.

Note

The following components cannot be operated in isochronous mode:

- Shared devices
 - Intelligent devices on the higher-level IO controller
-

Note**Restrictions of the send clocks for isochronous applications**

The isochronous mode is possible on CPU 319-3 PN/DP starting at a send clock $\geq 500 \mu\text{s}$ and on CPU 31x PN/DP starting at 1 ms. The size of the topology and length of user data could make it necessary to increase the application cycle factor or the send clock in order to meet time requirements.

Additional information

For additional information, refer to the STEP 7 Online Help and to the PROFINET System Description (<http://support.automation.siemens.com/WW/view/en/19292127>) manual.

4.7 I-Device

The "I-Device" (intelligent IO device) functionality of a CPU facilitates data exchange with an IO controller and operation of the CPU, for example, as intelligent preprocessing unit of sub processes. In its role as an IO device, the I-Device is integrated accordingly into a "higher-level" IO controller.

The functionality of the intelligent device ensures that the data is pre-processed in the user program on the CPU. The process data acquired from central or distributed locations (PROFINET IO or PROFIBUS DP) is preprocessed by the user program made available to a higher-level station via PROFINET IO device interface of the CPU.

Note**Isochronous mode**

Intelligent IO devices cannot be operated in isochronous mode on higher-level IO controllers

Combination of functions

A CPU operated as intelligent IO device on a "higher-level" IO controller is, in turn, capable of operating as sublevel IO controller that controls IO devices on a subnet.

An intelligent IO device can also be operated as shared device.

Application transfer area

The IO controller and intelligent IO device communicate via the configured submodules of this transfer area. With regard to the submodules, transmission of the user data remains consistent.

Additional information

For more information about the configuration of intelligent IO devices, refer to the STEP 7 Online Help and to the PROFINET System Description (<http://support.automation.siemens.com/WW/view/en/19292127>) manual.

4.8 Shared Device

The "Shared Device" functionality facilitates distribution of the submodules of an IO device to different IO controllers. An intelligent IO device can also be operated as shared device.

Prerequisite for using the "Shared Device" function is that the IO controller and shared device are located on the same Ethernet subnet.

The IO controllers can be located in the same or different STEP 7 projects. If they are located in the same STEP 7 project, a consistency check is initiated automatically.

Note

Shared devices cannot be operated in isochronous mode.

Note

Note that the power modules and electronic modules belonging to the same potential group of a shared IO device (e.g. ET 200S) must be assigned to the same IO controller in order to enable the diagnosis of load voltage failure.

Additional information

For more information about shared devices and their configuration, refer to the STEP 7 Online Help and to the PROFINET System Description (<http://support.automation.siemens.com/WW/view/en/19292127>) manual.

4.9 Media redundancy

Function for safeguarding network and system availability. Redundant transmission links (ring topology) ensure that an alternative communication path is made available upon transmission link failure.

The Media Redundancy Protocol (MRP) is a component of PROFINET standardization to IEC 61158 and can be activated for IO devices, switches, and CPUs V3.2.1 or higher.

Configuring a ring topology

To set up a ring topology with media redundancy, you must route both free ends of a line network topology to the same device. To form a ring topology, join the line topology at two ports (ring ports) of a device that is connected to the ring. Select and specify the ring ports when configuring the relevant device.

The ring ports of the module are identified by the suffix "R" appended to the port number.

Note

IRT communication/prioritized startup

Media redundancy is not supported for operation with IRT communication or prioritized startup.

Additional information

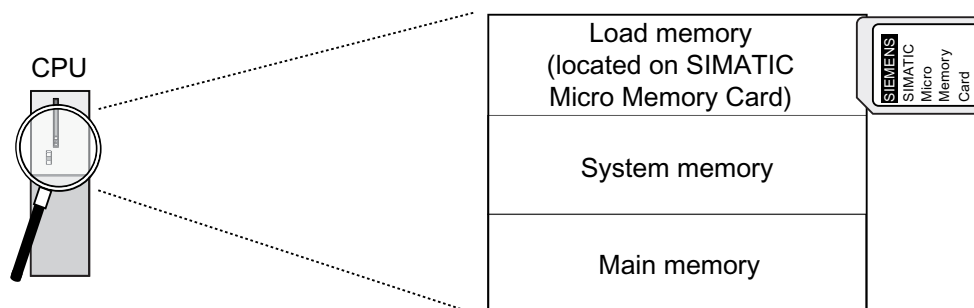
For additional information, refer to the STEP 7 Online Help and to the PROFINET System Description (<http://support.automation.siemens.com/WW/view/en/19292127>) manual.

Memory concept

5.1 Memory areas and retentivity

5.1.1 CPU memory areas

The three memory areas of your CPU



Load memory

The load memory is located on the SIMATIC Micro Memory Card. The size of the load memory corresponds exactly to the size of the SIMATIC Micro Memory Card. It is used to store code blocks, data blocks, and system data (configuration, connections, module parameters, etc.). Blocks that are identified as not relevant for execution are stored exclusively in the load memory. You can also store all the configuration data for your project on the SIMATIC Micro Memory Card.

Note

You must insert a SIMATIC Micro Memory Card into the CPU to enable loading of user programs and operation of the CPU.

System memory

The system memory is integrated in the CPU and cannot be expanded.

It contains

- the address areas for bit memories, timers, and counters
- the process images of the inputs and outputs
- local data

Main memory

The main memory is integrated in the CPU and cannot be extended. It is used to execute the code and process user program data. Programs only run in the main memory and system memory.

5.1.2 Retentivity of load memory, system memory, and main memory

Your CPU is equipped with a maintenance-free retentive memory, i.e. no back-up battery is required for its operation. Due to the retentivity, the content of the retentive memory is retained even during a POWER OFF and restart (warm restart).

Retentive data in the load memory

Your program in the load memory is always retentive: It is stored on the SIMATIC Micro Memory Card, where it is protected against power failures or memory resets

Retentive data in the system memory

In your configuration (Properties of CPU, Retentivity tab), specify which part of memory bits, timers and counters should be kept retentive and which of them are to be initialized with "0" on restart (warm restart).

The diagnostic buffer, MPI address (and baud rate), and runtime meter data are generally stored in the retentive memory area on the CPU. Retentivity of the MPI address and baud rate ensures that your CPU can continue to communicate, even after a power loss, memory reset, or loss of communication parameters (e.g. due to removal of the SIMATIC Micro Memory Card or deletion of communication parameters).

Retentive data in the main memory

The contents of retentive DBs are always retentive at restart and POWER ON/OFF. Retentive data blocks can be uploaded to the main memory in accordance with the maximum limit allowed by the main memory.

In the case of CPU versions V2.0.12 and higher, non-retentive DBs are also supported.

Non-retentive DBs are initialized from the load memory with their initial values at restart or POWER ON/OFF. Non-retentive data blocks and code blocks can be loaded in accordance with the maximum main memory limit.

The size of the retentive main memory (for retentive data blocks) of the CPU can be found in the chapters "Technical specifications of CPU 31x (Page 301)" and "Technical specifications of CPU 31xC (Page 213)".

See also

Properties of the SIMATIC Micro Memory Card (Page 158)

5.1.3 Retentivity of memory objects

Retentive behavior of the memory objects

The table below shows the retentive behavior of memory objects during specific operating state transitions.

Table 5- 1 Retentive behavior of the memory objects

Memory object	Operating state transition		
	POWER OFF / POWER ON	STOP → RUN	Memory reset
User program/data (load memory)	X	X	X
• Retentive behavior of DBs on CPUs with firmware < V2.0.12	X	X	–
• Retentive behavior of DBs on CPUs with firmware ≥ V2.0.12	Can be set in the properties of the DBs in STEP 7 V5.2 + SP1 or higher.		–
Bit memories, timers, and counters configured as retentive objects	X	X	–
Diagnostic buffer, runtime meter	X ¹	X	X
MPI address, baud rate of an MPI interface DP address, baud rate of an MPI/DP interface, if set as DP note in the parameter Note: After POWER OFF/ON and CPU memory reset, the parameters of a pure DP interface are not retained unless the parameter assignment (SDBs) was loaded	X	X	X
• IP suite/device name of the PROFINET interface	Depends on the type of assignment of the IP address parameters and of the device name	X	Depends on the type of assignment of the IP address parameters and of the device name
x = retentive; – = not retentive			

¹ Only the last 100 entries in the diagnostics buffer are retained after POWER OFF / POWER ON.

Reference

For more information about the assignment of IP address parameters and device names, refer to the S7-300 - Installation Operating Instructions, chapter: IP address parameters and device name.

Retentive behavior of a DB for CPUs with firmware < V2.0.12

For these CPUs, the contents of the DBs are always retentive at POWER ON/OFF or STOP-RUN.

Retentive behavior of a DB for CPUs with firmware ≥ V2.0.12

These CPUs support the generation of data blocks with "NON-Retain" (not retentive) property.

Data blocks assigned the "NON-Retain" property are reset to their initial values after every POWER OFF/ON and every STOP-RUN transition of the CPU.

You have two options of assigning the "NON-Retain" property to a data block:

- STEP 7 (V5.2 + SP1 or higher): Activate the NON-Retain function in the DB properties
- SFC 82 "Crea_DBL" (generation of a DB in load memory): ATTRIB parameter, set bit 2 to "1"

Table 5- 2 Retentive behavior of DBs for CPUs with firmware ≥ V2.0.12

At POWER ON/OFF or restart of the CPU, the DB should	
be reset to the initial values (non-retentive DB)	retain the actual values (retentive DB)
Reason: At POWER ON/OFF and restart (STOP-RUN) of the CPU, the actual values of the DB are non-retentive. The DB receives the initial values from the load memory.	Reason: At POWER OFF/ON and restart (STOP-RUN) of the CPU, the actual values of the DB are retained.
Requirement in STEP 7: <ul style="list-style-type: none"> • The "Non-Retain" checkbox is activated in the DB properties. or <ul style="list-style-type: none"> • A non-retentive DB was generated using SFC 82 "CREA_DBL" and the associated block attribute (ATTRIB → Bit NON_RETAIN). 	Requirement in STEP 7: <ul style="list-style-type: none"> • The "Non-Retain" checkbox is deactivated in the DB properties. or <ul style="list-style-type: none"> • a retentive DB was generated using SFC 82 "CREA_DBL".

The size of the retentive main memory (for retentive data blocks) of the CPU can be found in the chapters "Technical specifications of CPU 31x (Page 301)" and "Technical specifications of CPU 31xC (Page 213)".

5.1.4 Address areas of the system memory

The system memory of the S7-CPU is divided into address areas. By using corresponding instructions in your program, you can address the data directly in the relevant address area.

Address areas of the system memory

Table 5- 3 Address areas of the system memory

Address areas	Description
Process input image	At every start of an OB 1 cycle, the CPU reads the input values from the input modules and saves them in the process input image.
Process output image	During the cycle, the program calculates the values for the outputs and stores them in the process output image. At the end of the OB 1 cycle, the CPU writes the calculated output values to the output modules.
Bit memory	This area provides memory for saving the intermediate results of a program calculation.
Timers	Timers are available in this area.
Counters	Counters are available in this area.
Local data	Temporary data of a code block (OB, FB, FC) is saved to this memory area while the block is being processed.
Data blocks	See <i>Recipes and measured value archives</i>

Reference

To find out which address areas are possible for your CPU, refer to the *S7-300 instruction lists* and the chapters Technical specifications of the CPU 31x (Page 301) and Technical specifications of the CPU 31xC (Page 213).

Process input/output image

When the input (I) and output (O) address areas are addressed in the user program, the signal states of digital signal modules are not queried. Instead, a memory area in the CPU system memory is accessed. This memory area is the process image.

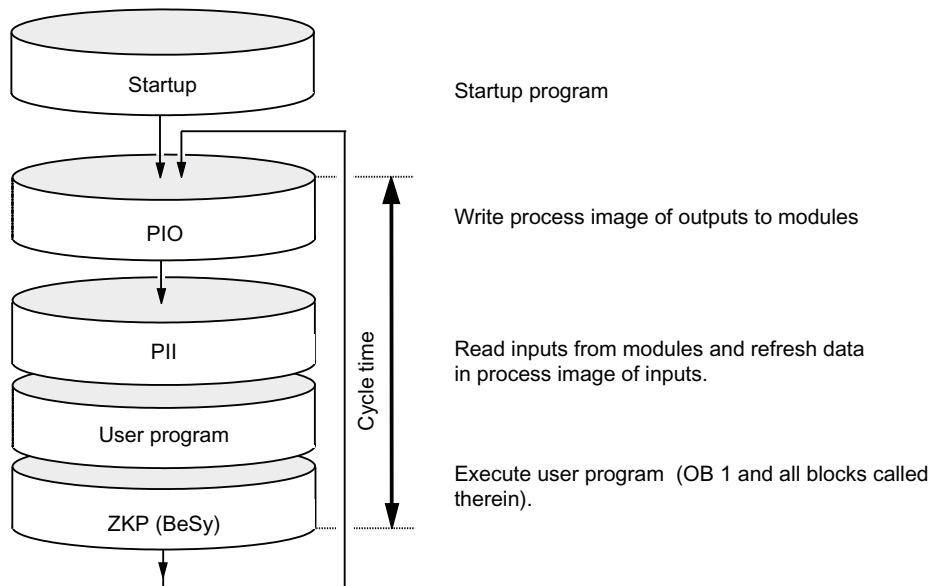
The process image has two sections: the process image of inputs, and the process image of outputs.

Advantages of the process image

Access to the process image, compared to direct access to the input/output modules, offers the advantage that a consistent image of process signals is made available to the CPU during cyclic program processing. If the signal state at an input module changes during program execution, the signal status in the process image is maintained until the process image is updated in the next cycle. Moreover, since the process image is stored in the CPU's system memory, access to the process image is significantly faster than direct access to the signal modules.

Process image update

The operating system updates the process image periodically. The figure below shows the sequence of this operation within a cycle.



Configurable process image of the CPUs

STEP 7 lets you define a user-specific size of the process image of the inputs/outputs for the following CPUs.

CPU	Firmware
CPU 312	V3.0 or higher
CPU 312C	V3.3 or higher
CPU 313C	V3.3 or higher
CPU 313C-2 DP	V3.3 or higher
CPU 313C-2 PtP	V3.3 or higher
CPU 314	V3.0 or higher
CPU 314C-2 DP	V3.3 or higher
CPU 314C-2 PtP	V3.3 or higher
CPU 314C-2 PN/DP	V3.3 or higher
CPU 315-2 DP	V3.0 or higher
CPU 315-2 PN/DP	V2.5 or higher
CPU 317-2 DP	V2.5 or higher
CPU 317-2 PN/DP	V2.3 or higher
CPU 319-3 PN/DP	V2.4 or higher

For information on the size of the process image of your CPU please refer to the technical specifications.

Please observe the following::

Note

Currently, the variable setting of the process image only affects its update at the cycle control point. This means that the process input image is updated up to the set PII size with the corresponding values of the input modules existing within this address area, or the values of the process output image up to the set POI limit are written to the output modules existing within this address area.

This set size of the process image is ignored with respect to STEP 7 commands used to access the process image (e.g.

A I100.0, L IW200, = Q20.0, T QD150, or also corresponding indirect addressing commands).

These commands output up to the maximum size of the process image, however they do not output any synchronous access errors (see technical specifications for size). Instead, they only access the permanently existing internal memory area of the process image. The same applies for the use of actual parameters of block call commands from the I/O area (area of the process image).

Particularly if these process image limits were changed, you should check to which extent your user program continues to access the process image in the area between the set and the maximum process image size. If access to this area continues, this may mean that changing inputs at the I/O module are no longer detected in the user program or that outputs actually are not written to the output module and no alarm is generated.

You should also note that certain CPs may only be addressed outside of the process image.

Local data

Local data store the following:

- The temporary variables of code blocks
- The start information of the organization blocks
- Transfer parameters
- Intermediate results

Temporary variables

When you create blocks, you can declare temporary variables (TEMP) which are only available during processing of the block and are then overwritten. These local data have a fixed length in each OB. Local data must be initialized prior to the first read access. Furthermore, each organization block requires 20 bytes of local data for its start information.

The CPU is equipped with a memory for storing temporary variables (local data) of blocks which are being processed. The size of this memory area depends on the CPU. It is distributed among the priority classes in partitions of equal size. Each priority class has its own local data area.

 CAUTION
--

<p>All temporary variables (TEMP) of an OB and its subordinate blocks are stored in local data. If you use complex nesting levels for block processing, this may cause an overflow of the local data area.</p>
--

<p>The CPUs will change to STOP mode if you exceed the permissible size of local data for a priority class.</p>

<p>Make allowances for local data required for synchronous error OBs. This is assigned to the respective triggering priority class.</p>

See also

Retentivity of load memory, system memory, and main memory (Page 150)

5.1.5 Properties of the SIMATIC Micro Memory Card

The SIMATIC Micro Memory Card as memory module for the CPU

The memory module used on your CPU is a SIMATIC Micro Memory Card. You can use MMCs as load memory or as portable data carrier.

Note

The SIMATIC Micro Memory Card must be inserted in the CPU to permit operation.

What is stored on the SIMATIC Micro Memory Card?

The following data can be stored on the SIMATIC Micro Memory Card:

- User program, i.e. all blocks (OBs, FCs, FCs, DBs) and system data
- Archives and recipes
- Configuration data (STEP 7 projects)
- Data for operating system update and backup

Note

You can either store user and configuration data or the operating system on the SIMATIC Micro Memory Card.

Properties of a SIMATIC Micro Memory Card

The SIMATIC Micro Memory Card ensures maintenance-free operation and retentivity for these CPUs.

 CAUTION
--

Data on a SIMATIC Micro Memory Card can be corrupted if you remove the card while it is being accessed for writing. In this case, you may have to delete the SIMATIC Micro Memory Card on your PG, or format the card in the CPU. Never remove a SIMATIC Micro Memory Card in RUN mode. Always remove it when power is off, or when the CPU is in STOP state, and when the PG is not writing to the card. When the CPU is in STOP mode and you cannot not determine whether or not a PG is writing to the card (e.g. load/delete block), disconnect the communication lines.
--

SIMATIC Micro Memory Card copy protection


Your SIMATIC Micro Memory Card has an internal serial number that implements an MMC copy protection on the user level. You can read this serial number from the SSL partial list 011C_H index 8 using SFC 51 RDSYSST. Program a STOP command in a know-how-protected block, for example, if the reference and actual serial number of your SIMATIC Micro Memory Card are not the same

Service life of a SIMATIC Micro Memory Card

The service life of a SIMATIC Micro Memory Card depends mainly on the following factors:

1. The number of delete or programming operations
2. External influences such as ambient temperature

At ambient temperatures up to 60 °C, a maximum of 100,000 delete/write operations can be performed on a SIMATIC Micro Memory Card.

 CAUTION
--

To prevent loss of data, do not exceed the maximum number of delete/write operations.

Reference

Additional information:

- on the *SSL partial list* can be found in the *CPU 31xC and CPU 31x instruction list*, or in the Reference Manual *System Software S7-300/400 System and Standard Functions*
- on resetting the CPU can be found in the *Operating Instructions CPU 31xC and CPU31x, Commissioning, Commissioning Modules, CPU Memory Reset by means of Mode Selector*

See also

Operator controls and indicators: CPU 313C-2 DP (Page 30)

Operator controls and indicators: CPU 312 and CPU 314 (Page 45)

Operator controls and indicators: CPU 315-2 DP and CPU 317-2 DP (Page 47)

Operator controls and indicators: CPU 315-2 PN/DP and CPU 317-2 PN/DP (Page 50)

Operator controls and indicators: CPU 319-3 PN/DP (Page 52)

5.2 Memory functions

5.2.1 General: Memory functions

Memory functions

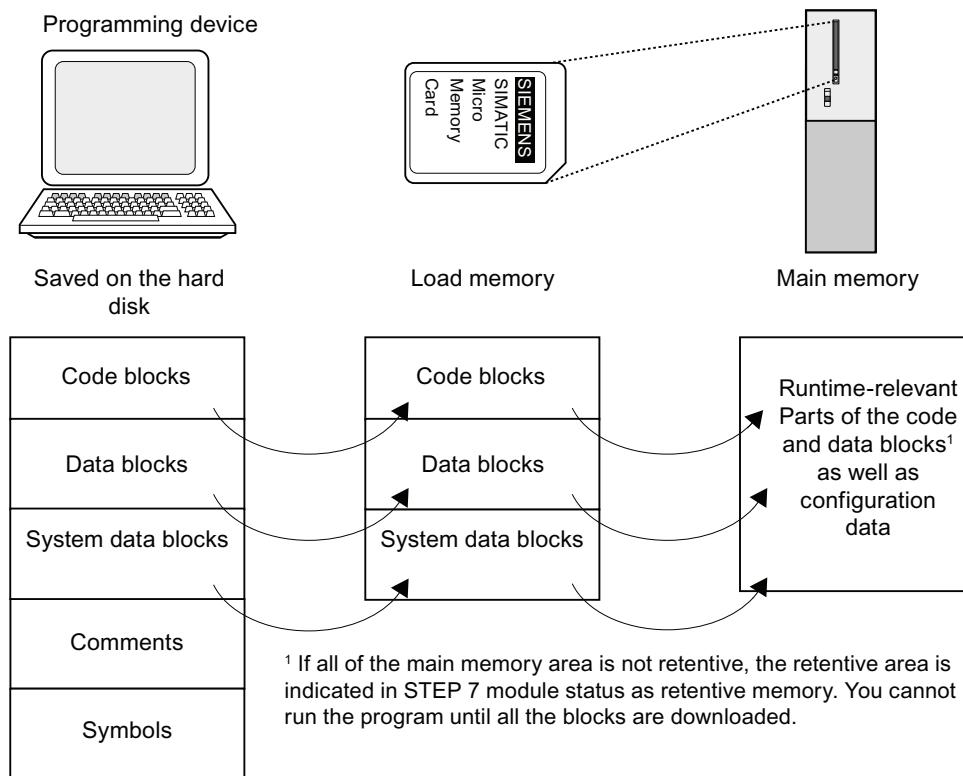
Memory functions are used to generate, modify or delete entire user programs or specific blocks. You can also ensure that your project data is retained by archiving it. If you created a new user program, use a PG/PC to download the complete program to the SIMATIC Micro Memory Card

5.2.2 Download of the user program to the SIMATIC Micro Memory Card in the CPU

Load user program

The entire user program is downloaded by means of the PG/PC to the CPU via the SIMATIC Micro Memory Card. The previous content of the Micro Memory Card is deleted in the process. Blocks use the load memory area as specified under "Load memory requirements" in "General block properties".

The figure shows the load and main memory of the CPU:



Note

This function is only permitted when the CPU is in STOP mode. The load memory is empty if the load operation could not be completed due to power loss or impermissible blocks.

5.2.3 Handling with blocks

5.2.3.1 Encryption of blocks

Important notes

Note**Supported blocks**

S7-Block Privacy can only be used to encrypt function blocks (FBs) and functions (FCs).

Once encrypted, the blocks can no longer be edited or monitored in STEP 7. The encryption also prevents execution of all test and commissioning functions, e.g. block status, or breakpoints.

Requirements

You can download encrypted blocks to the following CPUs: CPU31x V3.2.1 or higher

The "S7-Block Privacy" add-on packages supplied with STEP 7 must be installed. This is the only tool that you can use for strong encryption of the blocks.

General procedure

To encrypt the blocks, proceed as follows:

1. In STEP 7, right-click the block container and select "Block Privacy ...".
2. The S7BLP tool is launched.
3. Select the block (multiple selection is possible).
4. Right-click the block to be encoded and select "Encrypt Block...". The "Encrypt Block" dialog opens.
5. Select whether to include decompilation data in the encryption.

Note

All attempts to decompile the block will fail if you deactivate the check box!

6. Enter a key string with a length of at least 12 characters in both fields. Make sure you keep the key in a safe place. Click "OK" to launch the encryption.

Result: The block is encrypted. The following icons identify this status:



Decompilable encrypted block



Encrypted block that cannot be decompiled

Note

Command execution time

Usually, the command execution time is prolonged because encrypted blocks cannot be processed in fully optimized state. The final cycle time can only be determined with encrypted blocks.

Note

Prolonged runtimes during POWER ON/CPU memory reset/download

The CPU startup time, the time required for CPU memory reset, and the block download time can be prolonged significantly.

Additional information

For more information, refer to the STEP 7 Online Help, "S7-Block Privacy" section.

5.2.3.2 Reloading or transferring blocks

There are two ways to reload or overwrite user blocks:

- **Reloading blocks:** You have already created a user program and downloaded it to the SIMATIC Micro Memory Card in the CPU. You then want to add new blocks to the user program. In this case you do not need to download the entire user program to the SIMATIC Micro Memory Card again. Instead you only need to download the new blocks to the SIMATIC Micro Memory Card (this reduces the download times for highly complex programs).
- **Overwrite:** In this case, you make changes to blocks of your user program. In the next step you then overwrite the user program or only the changed blocks to the SIMATIC Micro Memory Card using the PG/PC.

 **WARNING**

When transferring blocks/a user program, all data stored under the same name on the SIMATIC Micro Memory Card is overwritten.

After loading runtime-relevant blocks, their content is transferred to the main memory and activated.

5.2.3.3 Uploading blocks

Uploading blocks

Unlike download operations, an upload operation is the transfer of specific blocks or a complete user program from the CPU to the PG/PC. The block content is here identical with that of the last download to the CPU. Runtime-relevant DBs are an exception, because their actual values are transferred. An upload of blocks or of the user program from the CPU in STEP 7 does not influence the assignment of CPU memory space.

5.2.3.4 Deleting blocks

Deleting blocks

When you delete a block, it is deleted from the load memory. In STEP 7, you can also delete blocks in the user program (DBs also with SFC 23 "DEL_DB"). Main memory used by this block is released.

5.2.3.5 Compressing blocks

Compressing blocks

When blocks are compressed, gaps between memory objects in the load memory/main memory as a result of load/delete operations are eliminated. The free memory space is made available as one block. Compressing is possible when the CPU is in RUN or in STOP mode.

5.2.3.6 Promming (RAM to ROM)

Promming (RAM to ROM)

Promming means that the actual values of the data blocks are transferred from the main memory to the load memory as new initial values of the DBs.

Note

This function is only permitted when the CPU is in STOP mode. The load memory will be empty if the function cannot be completed due to a power failure.

5.2.4 Memory reset and restart

Memory reset

After the insertion/removal of a Micro Memory Card, a memory reset restores defined conditions to permit a CPU restart (warm restart). A memory reset restructures the CPU's memory management. All blocks in the load memory are retained. All runtime-relevant blocks are transferred once again from the load memory to the main memory, in particular to initialize the data blocks in the main memory (restore initial values).

Restart (warm restart)

- All retentive DBs retain their actual value (non-retentive DBs are also supported by CPUs with firmware \geq V2.0.12. Non-retentive DBs receive their initial values).
- The values of all retentive M, C, T are retained.
- All non-retentive user data is initialized:
 - M, C, T, I, O with "0"
- All execution levels are initialized.
- The process images are deleted.

Reference

Also refer to *Memory reset using the CPU's mode selector* in the section *Commissioning* in the *CPU 31xC and CPU 31x Operating Instructions*.

5.2.5 Recipes

Introduction

A recipe represents a collection of user data. You can implement a simple recipe concept using non-runtime-relevant DBs. In this case, the recipes should have the same structure (length). One DB should exist per recipe.

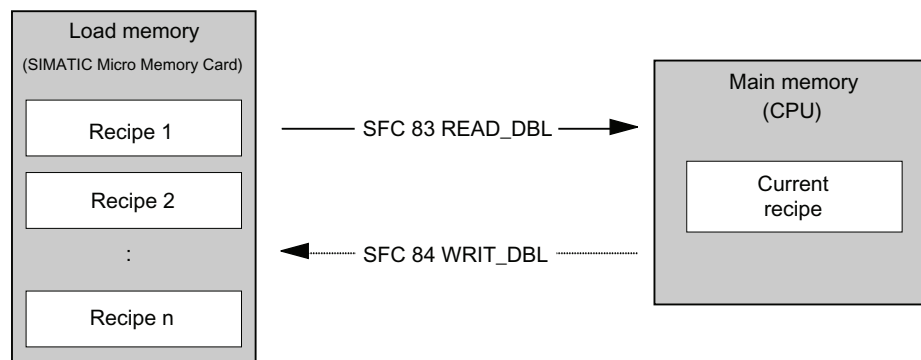
Processing sequence

Recipe is to be stored in the load memory:

- The various data records of recipes are created as non-runtime-relevant DBs in STEP 7 and then downloaded to the CPU. Therefore, recipes only occupy load memory space and no main memory space.

Working with recipe data:

- With SFC83 "READ_DBL", the user programs reads the data record of the current recipe from the DB in the load memory to a runtime-relevant DB in the main memory. As a result, the main memory only has to accommodate the data of one record. The user program can now access data of the current recipe. The figure below shows how to handle recipe data:



Saving a modified recipe:

- With SFC 84 "WRIT_DBL", the user program can write new or modified recipe data records generated during program execution to the load memory. This data written to the load memory is portable and is retained in case of a memory reset. You can backup modified data records (recipes) on the PG/PC by uploading and saving them as a single block.

Note

The active system functions SFC 82 to 84 (active access to the SIMATIC Micro Memory Card) have a strong influence on PG functions (e.g. block status, variable status, load, upload, open block). This typically reduces performance (compared to passive system functions) by the factor 10.

Note

To prevent loss of data, do not exceed the maximum number of delete/write operations. Also refer to the SIMATIC Micro Memory Card (MMC) section in the "Structure and Connections of a CPU" chapter.

 **CAUTION**

Data on a SIMATIC Micro Memory Card can be corrupted if you remove the card while it is being accessed for writing. In this case, you may have to delete the SIMATIC Micro Memory Card on your PG, or format the card in the CPU. Never remove a SIMATIC Micro Memory Card in RUN mode. Always remove it when power is off, or when the CPU is in STOP state, and when the PG is not writing to the card. When the CPU is in STOP mode and you cannot not determine whether or not a PG is writing to the card (e.g. load/delete block), disconnect the communication lines.

5.2.6 Measured value log files

Introduction

Measured values are generated when the CPU executes the user program. These values are to be logged and analyzed.

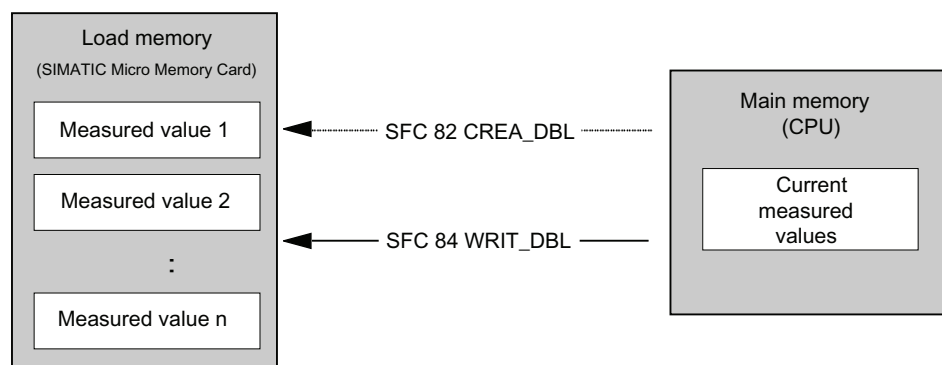
Processing sequence

Acquisition of measured values:

- The CPU writes all measured values to a DB (for alternating backup mode in several DBs) which is located in main memory.

Measured value logging:

- Before the data volume can exceed the main memory capacity, you can call SFC 84 "WRIT_DBL" in the user program to swap measured values from the DB to load memory. The figure below shows how to handle measured value log files:



- You can call SFC 82 "CREA_DBL" in the user program to generate new (additional) non-runtime-relevant DBs in load memory which do not require main memory space.

Reference

For detailed information on SFC 82, refer to the *System Software for S7-300/400, System and Standard Functions Reference Manual*, or directly to the STEP 7 Online Help.

Note

SFC 82 is terminated and an error message is generated if a DB already exists under the same number in load memory and/or main memory.

This data written to the load memory is portable and is retained in case of a memory reset.

Evaluation of measured values:

- Measured value DBs saved to the load memory can be uploaded and evaluated by other communication peers (e.g. PG, PC, etc.).
-

Note

The active system functions SFC 82 to 84 (active access to the SIMATIC Micro Memory Card) have a strong influence on PG functions (e.g. block status, variable status, load, upload, open block). This typically reduces performance (compared to passive system functions) by the factor 10.

Note

For CPUs with firmware V2.0.12 or higher, you can also generate non-retentive DBs using SFC 82 (parameter ATTRIB → NON_RETAIN bit.)

Note

To prevent loss of data, do not exceed the maximum number of delete/write operations. For additional information, refer to the technical specifications of the SIMATIC Micro Memory Card in the "General Technical Specifications" of your CPU.

CAUTION

Data on a SIMATIC Micro Memory Card can be corrupted if you remove the card while it is being accessed for writing. In this case, you may have to delete the SIMATIC Micro Memory Card on your PG, or format the card in the CPU. Never remove a SIMATIC Micro Memory Card in RUN mode. Always remove it when power is off, or when the CPU is in STOP state, and when the PG is not writing to the card. When the CPU is in STOP mode and you cannot not determine whether or not a PG is writing to the card (e.g. load/delete block), disconnect the communication lines.

5.2.7 Backup of project data to SIMATIC Micro Memory Card

Functional principles

Using the **Save project to Memory Card** and **Fetch project from Memory Card** functions, you can save all project data to a SIMATIC Micro Memory Card, and retrieve these at a later time. For this operation, the SIMATIC Micro Memory Card can be located in a CPU or in the MMC programming unit of a PG or PC.

Project data is compressed before it is saved to a SIMATIC Micro Memory Card, and uncompressed on retrieval.

Note

In addition to project data, you may also have to store your user data on the MMC. You should therefore select a SIMATIC Micro Memory Card with sufficient memory space.

A message warns you of insufficient memory capacity on your SIMATIC Micro Memory Card.

The volume of project data to be saved corresponds with the size of the project's archive file.

Note

For technical reasons, you can only transfer the entire contents (user program and project data) using the **Save project to memory card** function.

Cycle and response times

6.1 Overview

Overview

This section contains detailed information about the following topics:

- Cycle time
- Response time
- Interrupt response time
- Sample calculations

Reference: Cycle time

You can read out the cycle time of your user program using the PG. For additional information, refer to the *STEP 7 Online Help* or to the *Configuring Hardware and Connections in STEP 7* manual and in the *Programming with STEP 7* manual.

Reference: Execution time

Can be found in the *S7-300 Instruction List for S7-300 CPUs and IMs with integrated CPU*. This tabular list contains the execution times for all:

- STEP 7 instructions that the relevant CPU can execute
- The SFCs/SFBs integrated in the CPUs
- The IEC functions which can be called in STEP 7.

6.2 Cycle time

6.2.1 Overview: Cycle time

Introduction

This section explains what we mean by the term "cycle time", what it consists of, and how you can calculate it.

Definition of cycle time

The cycle time represents the time that an operating system needs to execute a program, that is, one OB 1 cycle, including all program sections and system activities interrupting this cycle.

This time is monitored.

Time slice model

Cyclic program processing, and therefore also user program processing, is based on time slices. To clarify these processes, let us assume that every time slice has a length of precisely 1 ms.

Process image

During cyclic program processing, the CPU requires a consistent image of the process signals. To ensure this, the process signals are read/written prior to program execution. Subsequently, during program processing the CPU does not access the signal modules directly when addressing the input (I) and output (O) address areas, but rather it accesses the CPU's system memory area containing the I/O process image.

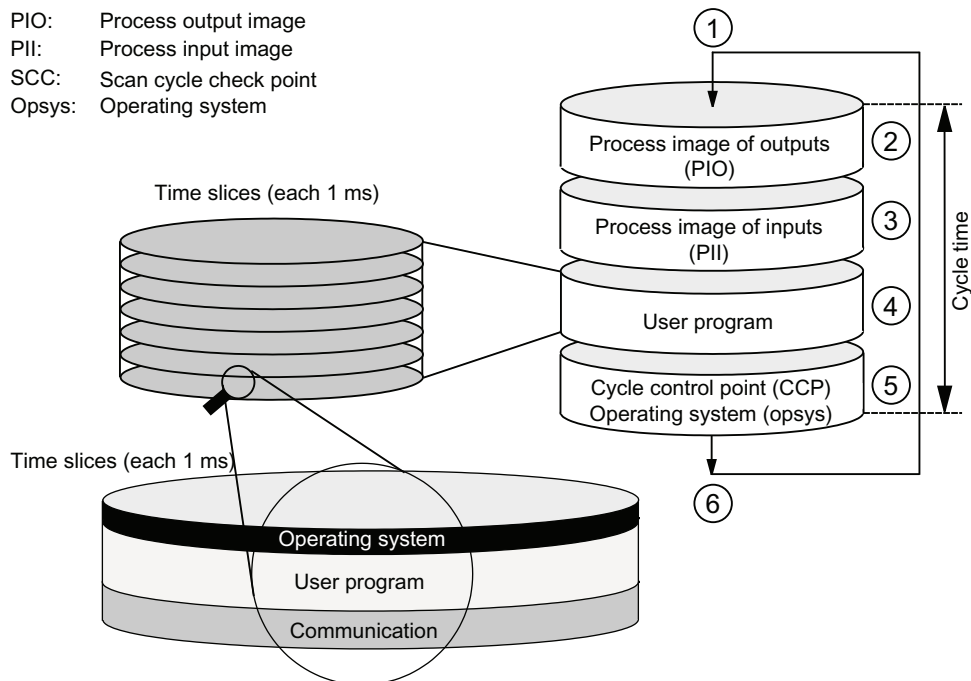
Sequence of cyclic program processing

The table and figure below show the phases in cyclic program processing.

Table 6- 1 Cyclic program processing

Phase	Sequence
1	The operating system initiates cycle time monitoring.
2	The CPU copies the values from the process output images to the output modules.
3	The CPU reads the status of the inputs at the input modules and updates the process input image.
4	The CPU processes the user program in time slices and executes the instructions specified in the program.
5	At the end of a cycle, the operating system executes pending tasks, e.g. loading and deleting of blocks.
6	The CPU then returns to the start of the cycle, and restarts cycle time monitoring.

PIO: Process output image
 PII: Process input image
 SCC: Scan cycle check point
 Opsys: Operating system



With the S7-300 CPUs, the data are accessed with an OP/TP (operator control and monitoring functions) exclusively at the cycle control point (for data consistency, see Technical Specifications). Program execution is not interrupted by the operator control and monitoring functions.

6.2.2 Calculating the cycle time

Introduction

The cycle time is derived from the sum of the following influencing factors.

Extending the cycle time

Always make allowances for the extension of the cycle time of a user program due to:

- Time-based interrupt processing
- Hardware interrupt processing
- Diagnostics and error processing
- Processing of synchronous cycle interrupts
- Communication with programming devices (PGs), Operator Panels (OPs), and via connected CPs (e.g. Ethernet, PROFIBUS DP)
- Test and startup functions such as status/controlling of variables or block status.
- Transfer and deletion of blocks, compressing of the user program memory
- Write/read access to the Micro Memory Card from the user program using SFC 82 to SFC 84
- S7 communication via integrated PROFINET interface
- PROFINET CBA communication via the PROFINET interface (system load, SFC call, updating at the cycle control point)
- PROFINET IO communication via the PROFINET interface (system load)
- Activating "prioritized OCM communication" in the properties dialog of the CPU

Influencing factors

The table below shows the factors influencing the cycle time.

Table 6- 2 Factors influencing cycle time

Factors	Comment
Transfer time for the process image output (PIQ) and the process image of the inputs (PII)	... See table "Data for calculating the typical transfer time for the process image"
User program execution time	... Is calculated from the execution times of the different instructions, see <i>S7-300 instruction list</i>
Operating system execution time at cycle control point	... See table "Typical operating system execution times at the cycle control point"
Extension of cycle time due to communication load	... You configure the maximum permitted communication load on the cycle as a percentage in STEP 7, see the <i>Programming with STEP 7</i> manual.
Load on cycle times due to interrupts	Interrupt requests can always stop user program execution. See table "Typical extended cycle time due to nested interrupts".

Process image update

The table below shows the time a CPU requires to update the process image (process image transfer time). The times specified might be prolonged as a result of interrupts or CPU communication. The transfer time for the process image update is calculated as follows:

Table 6- 3 Formula for calculating the typical transfer time for the process image (PI):

Base load (value from line K)	+ Number of bytes in PI in module rack 0 x (value from line A) + number of bytes in PI in module racks 1 to 3 x (value from line B) + Number of words in PI via DP x (value from line D) + Number of words in PI via PROFINET x (value from line P) = Transfer time for the process image
----------------------------------	--

Table 6- 4 CPU 31xC: Data for calculating the process image (PI) transfer time

Const.	Components	CPU						
		312C	313C	313C-2 DP	313C-2 PtP	314C-2 PtP	314C-2 DP	314C-2 PN/DP
K	Base load	170 µs	150 µs	150 µs		150 µs		
A	Per byte in rack 0	35 µs		35 µs		35 µs		
B	Per byte in racks 1 to 3	-	35 µs*	35 µs*		35 µs*		
D (DP only)	Per word in the DP area for the integrated DP interface	--		0.5 µs	-	-	0.5 µs	
P (PN only)	Per word in the PROFINET area for the integrated PROFINET interface	-		-		-		0.5 µs

* +40 µs je per rack

Table 6- 5 CPU 31x: Data for calculating the process image (PI) transfer time

Const.	Components	CPU				
		312	314	315	317	319
K	Base load	150 µs	120 µs	100 µs	70 µs	40 µs
A	Per byte in rack 0	20 µs			15 µs	
B	Per byte in racks 1 to 3	-	30 µs*		25 µs*	22 µs*
D (DP only)	Per word in the DP area for the integrated DP interface	-		0.5 µs		
P (PROFINET only)	Per word in the PROFINET area for the integrated PROFINET interface	-		0.5 µs		

* +40 µs je per rack

Extending the user program processing time

In addition to actually working through the user program, your CPU's operating system also runs a number of processes in parallel, such as timer management for the core operating system. These processes extend the processing time of the user program by up to 10 %.

Operating system processing time at the cycle control point

The table below shows the operating system processing times at the cycle control point of the CPUs. These times apply without:

- Testing and commissioning routines, e.g. status/controlling of variables or block status functions
- Transfer and deletion of blocks, compressing user program memory
- Communication
- Writing, reading of the SIMATIC Micro Memory Card with SFC 82 to 84

Table 6- 6 Typical operating system processing time at the cycle control point (CCP)

CPU	Cycle control in the cycle control point
312, 312C	250 µs
313C, 313C-2	180 µs
314, 314C-2, 314C-2 PN/DP	150 µs
315	140 µs
317	120 µs
319	90 µs

Extension of the cycle time as a result of nested interrupts

Enabled interrupts also extend cycle time. Details are found in the table below.

Table 6- 7 Typical extended cycle time due to nested interrupts

CPU	Interrupt type				
	Hardware interrupt	Diagnostic interrupt	Time-of-day interrupt	Time-delay interrupt	Cyclic interrupt
312C	300 µs	300 µs	400 µs	250 µs	250 µs
313C	250 µs	250 µs	300 µs	220 µs	200 µs
313C-2	250 µs	250 µs	300 µs	220 µs	200 µs
314C-2	250 µs	250 µs	300 µs	200 µs	170 µs
312	300 µs	300 µs	400 µs	200 µs	200 µs
314	250 µs	250 µs	300 µs	170 µs	150 µs
315	200 µs	200 µs	200 µs	150 µs	140 µs
317	160 µs	180 µs	150 µs	80 µs	80 µs
319	120 µs	100 µs	100 µs	50 µs	40 µs

The program runtime at interrupt level must be added to this time extension.

The corresponding times are added together if the program contains nested interrupts.

Extension of the cycle time due to errors

Table 6- 8 Typical cycle time extension as a result of errors

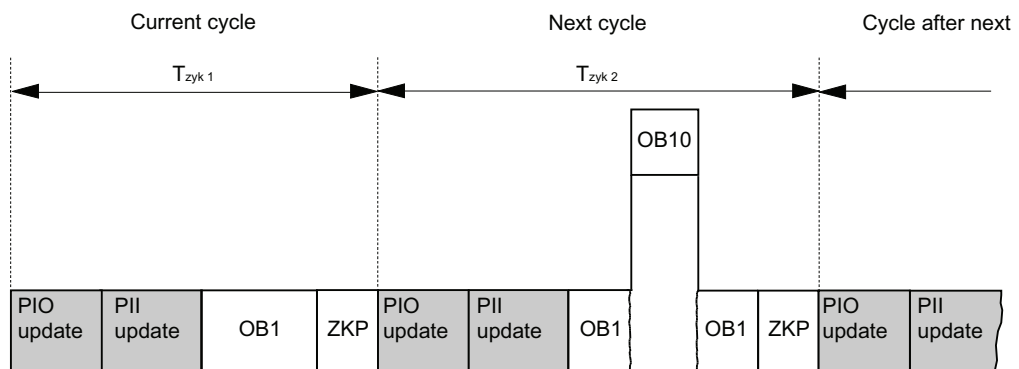
CPU	Type of error: Programming error / I/O access error
312C	220 μs
313C	180 μs
313C-2	180 μs
314C-2	150 μs
312	220 μs
314	150 μs
315	100 μs
317	60 μs
319	20 μs

You have to add the program execution time of the interrupt OB to this increase. The times required for multiple nested interrupt/error organization blocks are added accordingly.

6.2.3 Different cycle times

Overview

The cycle time (T_{cyc}) length is not the same in every cycle. The figure below shows different cycle times T_{cyc1} and T_{cyc2} . The cycle time T_{cyc2} is longer than T_{cyc1} , because the cyclically executed OB 1 is interrupted by a time-of-day interrupt OB (here: OB 10).



Block processing times may fluctuate

The execution times of blocks (e.g. OB 1) can vary for different reasons. They vary because of:

- Conditional instructions
- Conditional block calls
- Different program paths
- Loops, etc.

These influences lead to cycle times that differ in length.

Scan cycle monitoring time

The time is monitored for program execution in OB 1. This monitoring is performed using the so-called scan cycle monitoring time. By default, the monitoring time in STEP 7 is preset to 150 ms. You can use the CPU's parameter settings to modify this value in a range from 1 ms to 6 s.

If the processing of the main program exceeds the set scan cycle monitoring time, the CPU calls the OB 80 (error interrupt). If OB 80 is not available, the CPU changes to STOP mode.

The scan cycle monitoring time includes the entire processing time of OB 1. This time also includes the processing times for higher priority classes, that interrupt the main program (in the current cycle). Communications processes by the operating system also extend the runtime of the main program.

6.2.4 Communication load

Configured communication load for PG/OP communication, S7 communication and PROFINET CBA

The CPU operating system continuously provides a specified percentage of total CPU processing performance (time slice technology) for communication tasks. Processing performance not required for communication is made available to other processes.

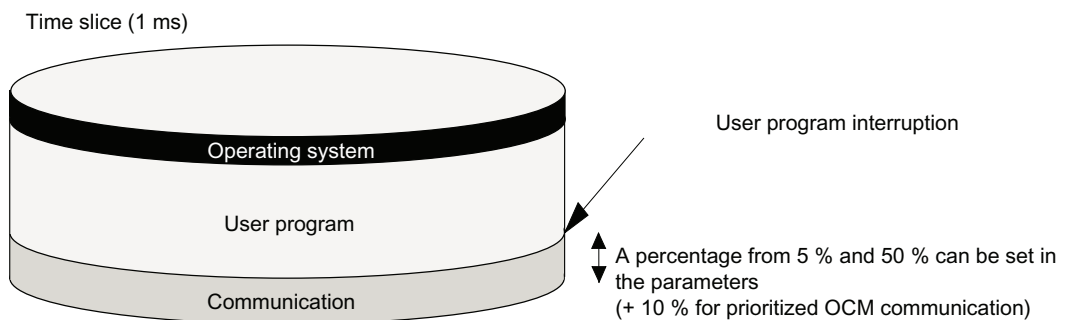
In the hardware configuration you can specify a communication load value between 5% and 50%. The default value is 20%.

Maximum load generated by communication functions increases by approx. 10% (e.g. from 50% to 60%) if "**prioritized OCM communication**" is activated.

Cycle time prolongation depends on the load caused by communication processes and can fluctuate.

To calculate the factor that determines maximum extension of the cycle time, you can use the following formula:

- **Prioritized OCM communication disabled:**
 $100 / (100 - \text{configured communication load in \%})$
- **Prioritized OCM communication enabled:**
 $100 / (100 - (\text{configured communication load in \%} + 10\%))$



Example: 20% communication load

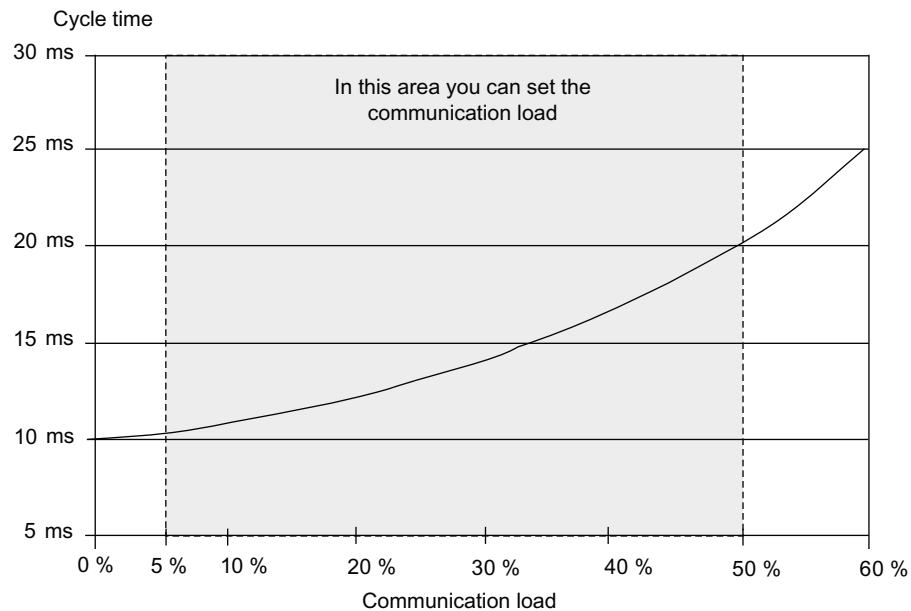
In your hardware configuration, you have specified a communication load of 20%. The calculated cycle time is 10 ms. Using the above formula, the cycle time is extended by the factor 1.25.

Example: 50% communication load

In your hardware configuration, you have specified a communication load of 50%. The calculated cycle time is 10 ms. Using the above formula, the cycle time is extended by the factor 2.

Dependency of actual cycle time on the communication load

The figure below describes the non-linear dependency of the actual cycle time on the communication load. In our example we have chosen a cycle time of 10 ms.



Influence on the actual cycle time

From the statistical viewpoint, asynchronous events such as interrupts occur more frequently within the OB 1 cycle when the cycle time is extended as a result of communication load. This further extends the OB 1 cycle. This extension depends on the number of events that occur per OB 1 cycle and the time required to process these events.

Note

Change the value of the "communication load" parameter to check runtime effects on the cycle time.

You must consider the communication load when setting the maximum cycle time, otherwise time errors may occur.

Tips

- Use the default setting whenever possible.
- Increase this value only if the CPU is used primarily for communication and if the user program is not time critical.
- In all other situations you should only reduce this value.

6.2.5 Cycle time extension as a result of test and commissioning functions

Runtimes

The runtimes of the testing and commissioning functions are operating system runtimes, so they are the same for every CPU. How the cycle time is extended as a result of active testing and commissioning functions is shown in the table below.

Table 6-9 Cycle time extension as a result of test and commissioning functions

Function	CPU 31x and CPU 31xC
Status variable	Negligible
Control variable	Negligible
Status block	Typ. 3 µs for each monitored line +3 x runtime of monitored block *
* The monitoring of larger blocks and the monitoring of loops can lead to a significant increase in the cycle time.	

Setting process and test mode through parameter assignment (for CPUs < V2.8)

For **process mode**, the maximum permissible cycle load due to communication is not only specified in "Cycle load due to communication". It must also be set via "Process mode ⇒ Maximum permitted increase of cycle time as a result of test functions". Thus, the parameterized time is monitored absolutely in process mode, and data acquisition is stopped if a timeout occurs. This is how STEP 7 stops data requests in loops before a loop ends, for example. When running in **test mode**, the complete loop is executed in every cycle. This can significantly increase cycle time.

Setting process and test mode in the LAD/FBD/STL editor (for CPUs ≥ V2.8)

With the CPUs ≥ V2.8, switching between process and test mode is carried out directly in the LAD/FBD/STL editor in the "Test/Mode" menu.

Loops in the test and process mode are handled differently in the Status block.

- **Process mode:** First loop iteration is displayed
- **Test mode:** Last loop iteration is displayed. Leads to a significant cycle time increase for many loop iterations.

In terms of function, there is also no difference between process mode and test mode.

Note

It is also possible to set breakpoints in test mode.

6.2.6 Cycle extension through Component Based Automation (CBA)

By default, the operating system of your CPU updates the PROFINET interface as well as the DP interconnections at the cycle control point. However, if you deactivated these automatic updates during configuration (e.g. to influence the time behavior of the CPU better), you must perform the update manually. This is done by calling the SFCs 112 to 114 at the appropriate times.

Reference

Information about the SFCs 112 to 114 is available in the *STEP 7 Online Help*.

Extending the OB1 cycle

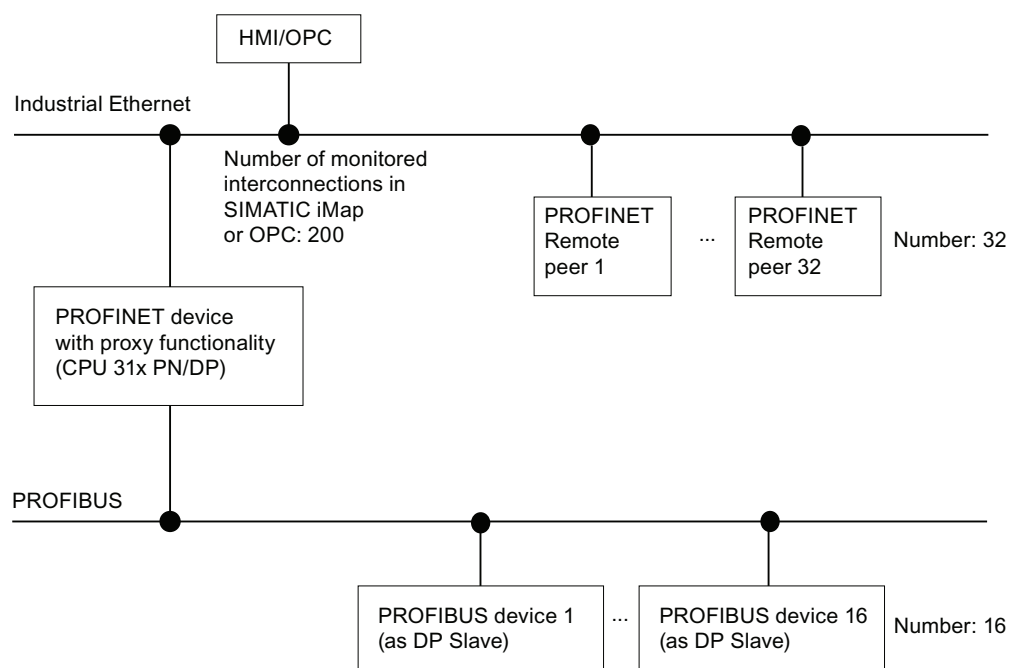
The OB1 cycle is extended by

- Increasing the number of PROFINET CBA interconnections
- Increasing the number of remote peers
- Increasing the data volume
- Increasing the transfer frequency

Note

The use of CBA with cyclical PROFINET CBA interconnections requires the use of switches to maintain the specified performance. 100 Mbps full-duplex operation is mandatory with cyclical PROFINET CBA interconnections.

The following graphic shows the configuration that was used for the measurements.



6.2 Cycle time

The above graphic shows incoming/outgoing remote connections	Number of connections for CPU 315, CPU 317 and CPU 314C-2 PN/DP	Quantity for CPU 319
Cyclic interconnection via Ethernet	200, scan cycle rate: every 10 ms	300, scan cycle rate: every 10 ms
Acyclic interconnection via Ethernet	100, scan cycle rate: every 500 ms	100, scan cycle rate: every 200 ms
Interconnections from the PROFINET device with proxy functionality to the PROFIBUS devices	16 x 4	16 x 4
Interconnections of PROFIBUS devices among each other	16 x 6	16 x 6

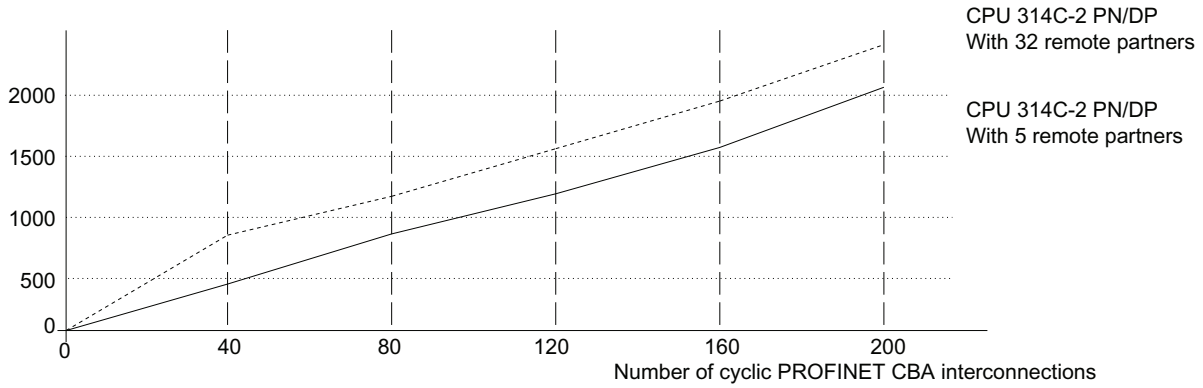
Additional marginal conditions

The maximum cycle load through communication is 20% in the measurement.

The following graphic shows that the OB 1 cycle is influenced by increasing the cyclic PROFINET CBA interconnections to remote peers on PROFINET:

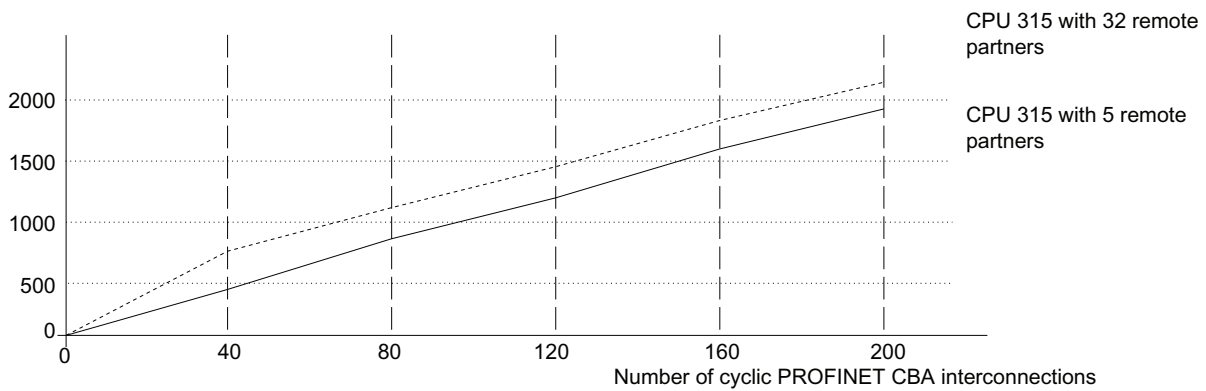
Additional cycle load of the OB1 cycle (CPU 314C-2 PN/DP) depending on number of cyclic CBA interconnections

Cycle time in μs



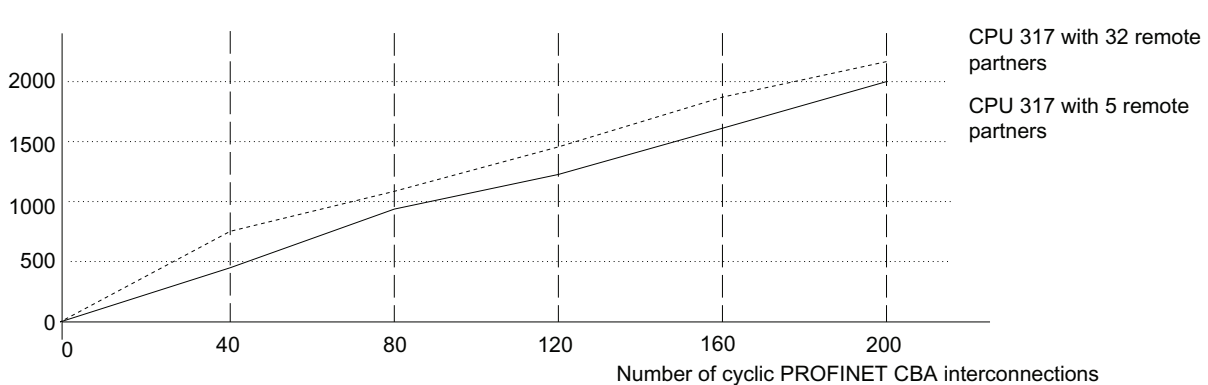
Additional cycle load of the OB1 cycle (CPU 315) depending on number of cyclic CBA interconnections

Cycle time in μs



Additional cycle load of the OB1 cycle (CPU 317) depending on number of cyclic CBA interconnections

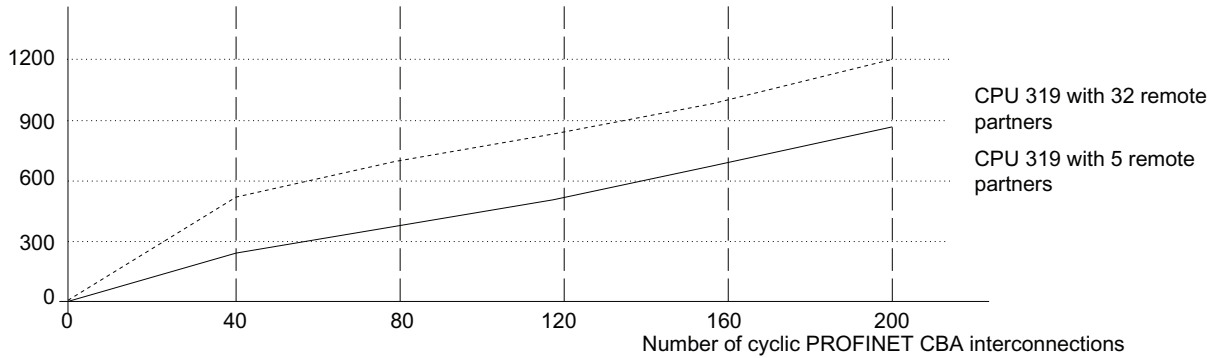
Cycle time in μs



6.2 Cycle time

Additional cycle load of the OB1 cycle (CPU 319) depending on number of cyclic CBA interconnections

Cycle time in μs



Base load through PROFIBUS devices

The 16 PROFIBUS devices with their interconnections among each other generate an **additional** base load of up to 1.0 ms.

Tips and notes

The upper graphic already includes the use of uniform values for the transfer frequency of all interconnections to a peer.

- The performance can drop by up to 50% if the values are distributed among different frequency levels.
- The use of data structures and arrays in an interconnection instead of many single interconnections with simple data structures increases the performance.

6.3 Response time

6.3.1 Overview: Response time

Definition of response time

The response time is the time from detecting an input signal to changing the output signal associated with it.

Fluctuation range

The actual response time lies between the shortest and the longest response time. You must always assume the longest response time when configuring your system.

The shortest and longest response times are contemplated below to give you an idea of the fluctuation range of the response time.

Factors

The response time depends on the cycle time and the following factors:

- Delay of the inputs and outputs of signal modules or integrated I/Os.
- Additional update times for PROFINET IO
- Additional DP cycle times on PROFIBUS DP
- Execution in the user program

Delay of inputs/outputs

Make allowances for the following module-specific delay times:

- | | |
|---|--|
| • For digital inputs: | The ON-delay time |
| • For digital inputs with interrupt function: | The ON-delay time + module internal pre-processing time |
| • For digital outputs: | The delay times of the module are negligible |
| • For relay outputs: | Typical delay times of 10 ms to 20 ms. The delay of relay outputs also depends on the temperature and voltage. |
| • For analog inputs: | cycle time for analog input |
| • For analog outputs: | response time at analog outputs |

The delay times can be found in the technical specifications of the signal modules *S7-300 Automation System Module Data*.

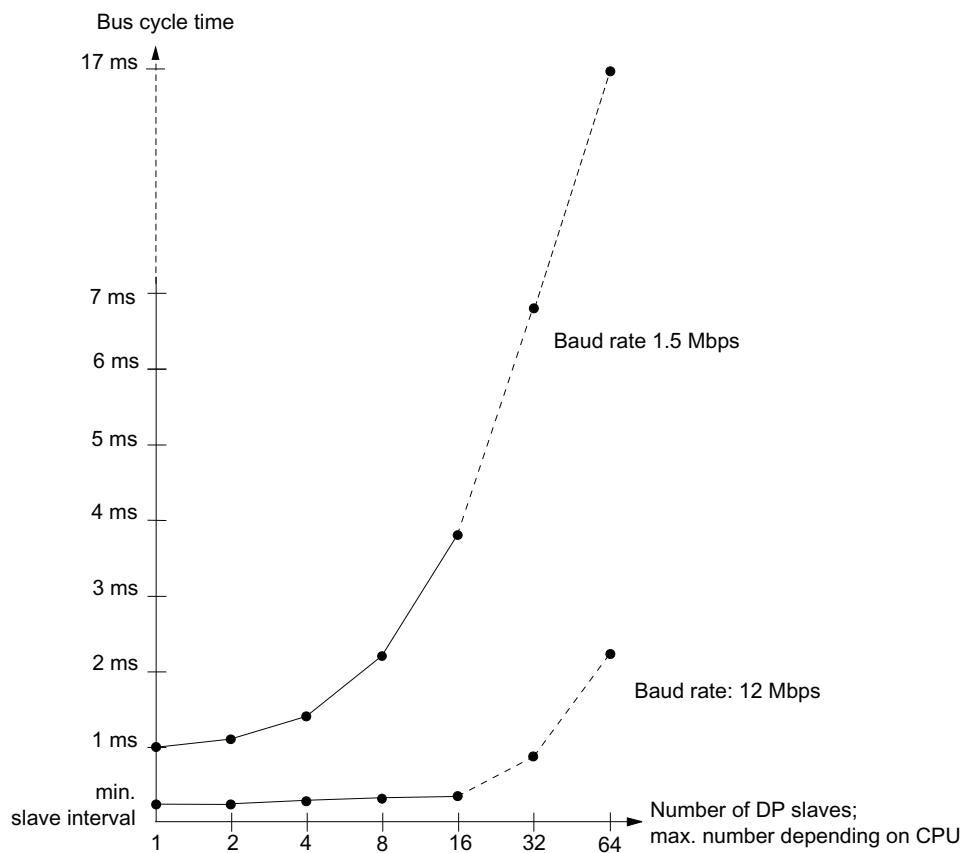
Update times for PROFINET IO

If you configured your PROFINET IO system in STEP 7, STEP 7 calculates the update time for PROFINET IO. You can then view the PROFINET IO update time on your PG.

DP cycle times in the PROFIBUS DP network

If you configured your PROFIBUS DP master system in STEP 7, STEP 7 calculates the typical DP cycle time to be expected. You can then view the DP cycle time of your configuration on the PG.

The figure below gives you an overview of the DP cycle time. In this example, we assume that the data of each DP slave has an average length of 4 bytes.

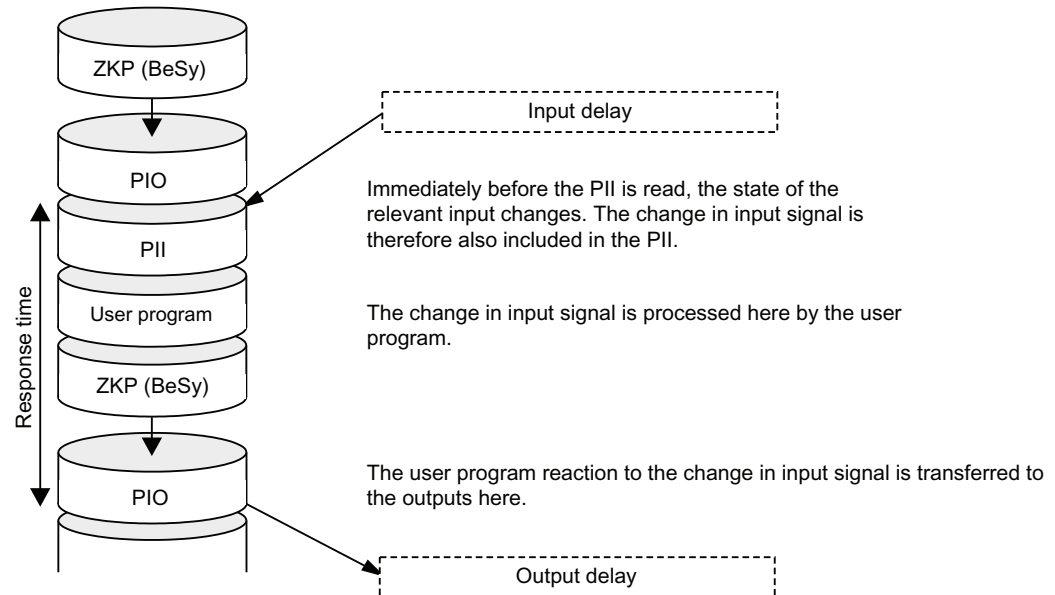


With multi-master operation on a PROFIBUS DP network, you must make allowances for the DP cycle time for each master. That is, you will have to calculate the times for each master separately and then add up the results.

6.3.2 Shortest response time

Conditions for the shortest response time

The figure below shows the conditions under which the shortest response time is achieved.



Calculation

The (shortest) response time is calculated as follows:

Table 6- 10 Formula: Shortest response time

	1 × process image transfer time for the inputs
+	1 × process image transfer time for the outputs
+	1 x program processing time
+	1 x operating system processing time at the SCCP
+	Delay of the inputs and outputs
=	Shortest response time

The result is equivalent to the sum of the cycle time plus the I/O delay times.

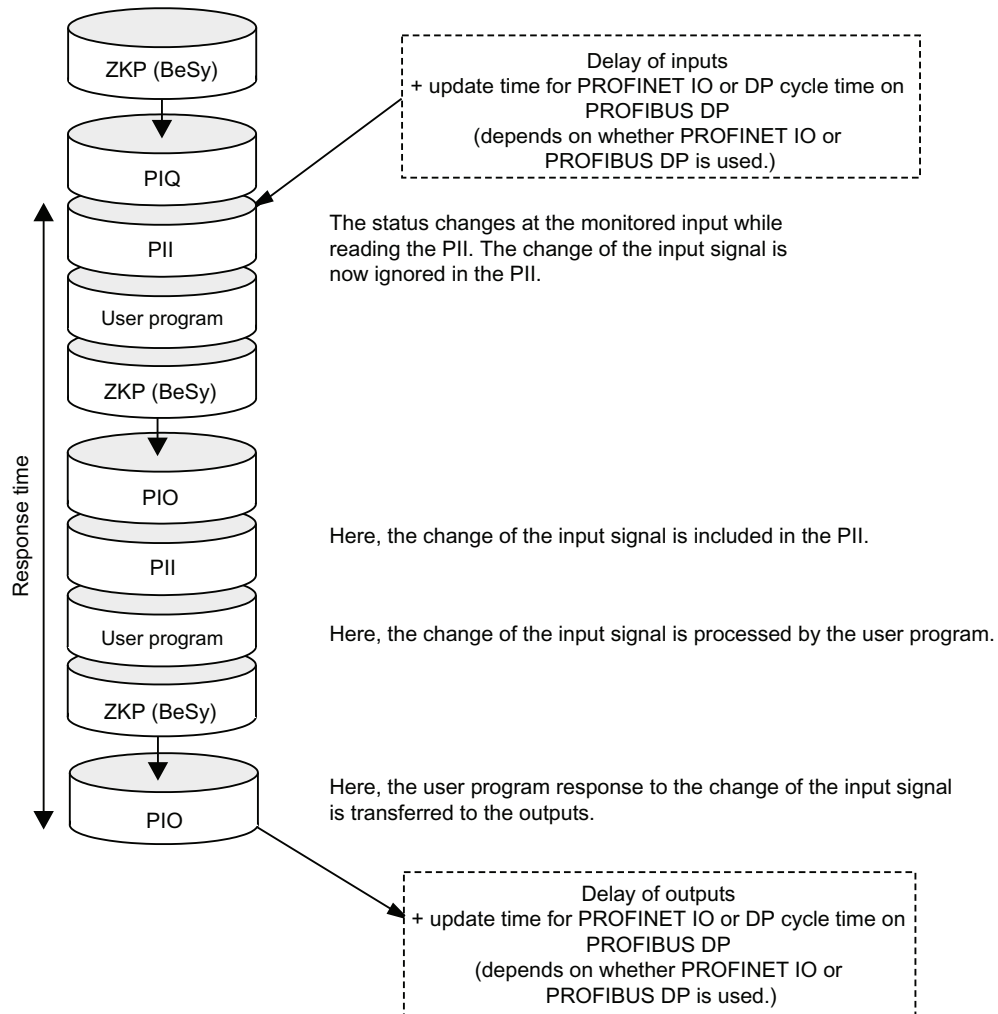
See also

Overview: Response time (Page 187)

6.3.3 Longest response time

Conditions for the longest response time

The figure below shows the conditions under which the longest response time is achieved.



Calculation

The (longest) response time is calculated as follows:

Table 6- 11 Formula: Longest response time

	2 × process image transfer time for the inputs
+	2 × process image transfer time for the outputs
+	2 x program processing time
+	2 x operating system processing time
+	2 x PROFINET IO update time (only if PROFINET IO is used)
+	2 x DP cycle time on PROFIBUS DP (only if PROFIBUS DP is used.)
+	Delay of the inputs and outputs
=	Longest response time

Equivalent to the sum of 2 x the cycle time and I/O delay time plus 2 x the PROFINET IO update time or 2 x times the DP cycle time on PROFIBUS DP.

See also

Overview: Response time (Page 187)

6.3.4 Reducing the response time using I/O accesses

Reducing the response time

To achieve faster response times, use direct access to the I/O (e.g. L PEB, T PAW, ...).

Faster response times can be achieved using hardware interrupts.

See also

Shortest response time (Page 189)

Longest response time (Page 190)

6.4 Calculating method for calculating the cycle/response time

Introduction

This section gives you an overview of how to calculate the cycle/response time.

Cycle time

1. Determine the user program runtime with the help of the *instruction list*.
2. Add 10% to the value of the user program runtime.
3. Calculate and add the transfer time for the process image (refer to Chapter Calculating the cycle time (Page 174)). Corresponding guide values are found in the table *Data for calculating the process image transfer time*.
4. Add the processing time at the cycle control point. Corresponding guide values are found in the table *Operating system processing time at the cycle control point*.
5. Include in your calculation the extensions as a result of test and commissioning functions, as well as cyclic PROFINET interconnections. You can find these values in the table *Cycle time extension due to test and commissioning functions*.

The final result is the **cycle time**.

Cycle time extension due to interrupts and communication and the shortest/longest response time

1. Multiply the cycle time by the following factor:

$$100 / (100 - \text{configured communication load in \%})$$
2. Use the instruction list to calculate the runtime of the program sections which process the interrupts. To do this, add the corresponding value from the table "Typical cycle time extension due to nested interrupts".
3. Multiply this value by the factor from step 1.
4. Add the value of the interrupt-processing program sequences to the theoretical cycle time, multiplied by the number of times that the interrupt will be triggered/probably will be triggered.

The result is an approximated **actual cycle time**. Note down the result.

Table 6- 12 Example of calculating the response time

Shortest response time	Longest response time
5. Now add the delays of the inputs and outputs.	5. Multiply the actual cycle time by factor 2.
	6. Now add the delays of the inputs/outputs, the DP cycle times on PROFIBUS-DP or the PROFINET IO update times.
6. The result you obtain is the shortest response time .	7. The result you obtain is the longest response time .

See also

Cycle extension through Component Based Automation (CBA) (Page 183)

6.5 Sample calculations for the cycle and response times

Example I

You have set up an S7300 and equipped it with following modules in rack 0:

- a CPU 314C-2 PN/DP
- 2 digital input modules SM 321; DI 32 x DC 24 V (each with 4 bytes in the PI)
⇒ 8 bytes in the process image
- 2 digital output modules SM 322; DO 32 x DC 24 V/0,5 A (each with 4 bytes in the PI)
⇒ 8 bytes in the process image

User program

- According to the instruction list, the user program runtime is 5 ms.
- There is no active communication.

Calculating the cycle time

The cycle time for the example results from the following times:

- User program execution time:
5 ms plus user program processing time extension of 10% ⇒ 5.5 ms
- Process image transfer time (refer to Calculating the cycle time (Page 174)):
Process image of inputs: $150 \mu\text{s} + 8 \text{ bytes} \times 35 \mu\text{s} = \text{approx. } 0.43 \text{ ms}$
Process image of outputs: $150 \mu\text{s} + 8 \text{ bytes} \times 35 \mu\text{s} = \text{approx. } 0.43 \text{ ms}$
- Operating system runtime at cycle control point: 0.15 ms

Cycle time = 5.5 ms + 0.43 ms + 0.43 ms + 0.15 ms = 6.51 ms

Calculation of the actual cycle time

- There is no active communication.
- There is no interrupt processing.

Hence, the **actual cycle time** is 6.51 ms.

Calculating the longest response time

Longest response time:

$6.51 \text{ ms} \times 2 = 13.02 \text{ ms}$.

- The delay of the inputs and outputs is negligible.
- Since neither PROFIBUS DP nor PROFINET IO are being used, you do not have to make allowances for any DP cycle times on PROFIBUS DP or for PROFINET IO update times.
- There is no interrupt processing.

Example II

You have configured an S7300 and equipped it with the following modules in 2 racks:

- a CPU 314C-2 PN/DP
Parameterization of the cycle load as a result of communication: 40 %
- 4 digital input modules SM 321; DI 32 x DC 24 V (each with 4 bytes in the PI)
⇒ 16 bytes in the process image
- 3 digital output modules SM 322; DO 16 x DC 24 V/0.5 A (each with 2 bytes in the PI)
⇒ 6 bytes in the process image
- 2 analog input modules SM 331; AI 8 x 12 Bit (not in the PI)
⇒ 0 bytes in the process image
- 2 analog output modules SM 332; AO 4 x 12 Bit (not in the PI)
⇒ 0 bytes in the process image

User program

- According to the instruction list, the user program runtime is 10.0 ms.

Calculating the cycle time

The cycle time for the example results from the following times:

- User program execution time:
 $10 \text{ ms} \text{ plus user program processing time extension of } 10 \% \Rightarrow 11.0 \text{ ms}$
- Process image transfer time (refer to Calculating the cycle time (Page 174)):
Process image of inputs: $150 \mu\text{s} + 16 \text{ bytes} \times 35 \mu\text{s} = \text{approx. } 0.71 \text{ ms}$
Process image of outputs: $150 \mu\text{s} + 6 \text{ bytes} \times 35 \mu\text{s} = \text{approx. } 0.36 \text{ ms}$
- Increased transfer time due to 2nd rack $40 \mu\text{s} = 0.04 \text{ ms}$
- Operating system runtime at cycle control point: 0.15 ms

The sum of the listed times is equivalent to the cycle time:

Cycle time = $11.0 \text{ ms} + 0.71 \text{ ms} + 0.36 \text{ ms} + 0.04 \text{ ms} + 0.15 \text{ ms} = 12.26 \text{ ms}$

Calculation of the actual cycle time

Taking into account the communication load of 40%:

$$12.26 \text{ ms} \times 100 / (100 - 40) = 20.43 \text{ ms}$$

Thus, considering the time slices, the **actual cycle time** is **20.43 ms**.

Calculating the longest response time

- Actual cycle time x 2 = 20.43 ms x 2 = 40.86 ms.
- Delay times of the inputs and outputs
 - The digital input module SM 321; DI 32 x DC 24 V has an input delay of not more than **4.8 ms** per channel.
 - The digital output module SM 322; DO 16 x DC 24 V/0.5 A has a **negligible** output delay.
 - The analog input module SM 331; AI 8 x 12 Bit was parameterized for an interference frequency suppression of 50 Hz. The result is a conversion time of 22 ms per channel. Since 8 channels are active, the result is a cycle time of **176 ms** for the analog input module.
 - The analog output module SM 332; AO 4 x 12 Bit was parameterized for the measuring range of 0 to 10 V. This results in a conversion time of 0.8 ms per channel. Since 4 channels are active, the result is a cycle time of 3.2 ms. A settling time of 0.1 ms for a resistive load must be added to this value. The result is a response time of **3.3 ms** for an analog output.
- Since neither PROFIBUS DP nor PROFINET IO are being used, you do not have to make allowances for any DP cycle times on PROFIBUS DP or for PROFINET IO update times.
- Response times plus delay times of the inputs and outputs:
 - **Scenario 1:** An output channel of the digital output module is set when a digital input signal is read in. The result is as follows:
Response time = 40.86 ms + 4.8 ms = 45.66 ms.
 - **Scenario 2:** An analog value is read in, and an analog value is output. The result is as follows:
Longest response time = 40.86 ms + 176 ms + 3.3 ms = 220.16 ms.

6.6 Interrupt response time

6.6.1 Overview: Interrupt response time

Definition of interrupt response time

The interrupt response time is the time from the first occurrence of an alarm signal to executing the first operation in the interrupt OB. General rule: Higher priority interrupts are handled first. This means that the interrupt response time is extended by the program execution time of the higher priority interrupt OBs and interrupt OBs with the same priority that occurred earlier and have not been processed yet (queue).

Calculation

The formulas below show how you can calculate the minimum and maximum interrupt response times.

Table 6- 13 Process and diagnostic interrupt response times

Calculation of the minimum interrupt response time	Calculation of the maximum interrupt response time
Minimum interrupt response time of the CPU + Minimum interrupt response time of the signal modules + PROFINET IO update time (only if PROFINET IO is used) + DP cycle time on PROFIBUS DP (only if PROFIBUS DP is used)	Maximum interrupt response time of the CPU + Maximum interrupt response time of the signal modules + 2 x PROFINET IO update time (only if PROFINET IO is used) + 2 x DP cycle time on PROFIBUS DP (only if PROFIBUS DP is used)
<hr/> = Shortest interrupt response time	<hr/> = Longest interrupt response time

Increasing the maximum interrupt response time with communication

The maximum interrupt response time is extended when the communication functions are active. The additional time is calculated using the following formula:

$$t_v: 200 \mu s + 1000 \mu s \times n\%$$

n = Setting of the cycle load as a result of communication

The result is added to the maximum interrupt response time.

Process/diagnostic interrupt response times of the CPUs

Table 6- 14 Process and diagnostic interrupt response times

CPU	Hardware interrupt response times			Diagnostic interrupt response times	
	external min.	external max.	Integrated I/O max.	min.	max.
CPU 312	0.3 ms	0.5 ms	-	0.4 ms	0.6 ms
CPU 312C	0.3 ms	0.5 ms	0.5 ms	0.4 ms	0.6 ms
CPU 313C	0.3 ms	0.5 ms	0.5 ms	0.4 ms	0.6 ms
CPU 313C-2	0.3 ms	0.5 ms	0.5 ms	0.4 ms	0.6 ms
CPU 314	0.3 ms	0.5 ms	-	0.4 ms	0.6 ms
CPU 314C-2	0.3 ms	0.5 ms	0.5 ms	0.4 ms	0.6 ms
CPU 314C-2 PN/DP	0.3 ms	0.5 ms	0.5 ms	0.4 ms	0.6 ms
CPU 315-2 DP CPU 315-2 PN/DP	0.3 ms	0.5 ms	-	0.4 ms	0.6 ms
CPU 317-2 DP CPU 317-2 PN/DP	0.2 ms	0.4 ms	-	0.2 ms	0.4 ms
CPU 319-3 PN/DP	0.2 ms	0.4 ms	-	0.2 ms	0.4 ms

Signal modules

The **hardware interrupt response time** of signal modules is determined by the following factors:

- Digital input modules

Hardware interrupt response time = internal interrupt processing time + input delay

You will find these times in the data sheet for the respective digital input module.

- Analog input modules

Hardware interrupt response time = internal interrupt processing time + conversion time

The internal interrupt processing time for analog input modules can be neglected. The conversion times can be found in the data sheet for the individual analog input modules.

The **diagnostic interrupt response time** of signal modules is equivalent to the period that expires between the time a signal module detects a diagnostic event and the time this signal module triggers the diagnostic interrupt. This short time can be neglected.

Hardware interrupt processing

Hardware interrupt processing begins when the hardware interrupt OB 40 is called. Higher-priority interrupts stop hardware interrupt processing. Direct access to I/O modules is executed during the execution time of the operation. After hardware interrupt processing has terminated, cyclic program execution continues or further interrupt OBs of equal or lower priority are called and processed.

6.6.2 Reproducibility of time-delay and watchdog interrupts

Definition of "reproducibility"

Time-delay interrupt:

The time between the call of the first instruction of the interrupt OBs up to the programmed time of interrupt.

Cyclic interrupt:

The fluctuation range of the interval between two successive calls, measured between the respective initial operations of the interrupt OB.

Reproducibility

The following times apply for the CPUs described in this manual, with the exception of CPU 319:

- Time-delay interrupt: $\pm 100 \mu\text{s}$
- Cyclic interrupt: $\pm 100 \mu\text{s}$

The following times apply in the case of CPU 319:

- Time-delay interrupt: $\pm 60 \mu\text{s}$
- Cyclic interrupt: $\pm 60 \mu\text{s}$

These times only apply if the interrupt can actually be executed at this time and if it is not delayed, for example, by higher-priority interrupts or queued interrupts of equal priority.

6.7 Example of interrupt response time calculation

Design

You have set up an S7-300, consisting of a CPU 314C-2 PN/DP and 4 digital modules, in the central rack. One digital input module is the SM 321; DI 16 x DC 24 V, with hardware and diagnostic interrupts.

You have enabled only the hardware interrupt in your CPU and SM parameterization. You decided not to use time-driven processing, diagnostics or error handling. You have set a cycle load of 20% due to communication.

You have parameterized an input delay of 0.5 ms for the digital input modules.

No activities are required at the cycle control point.

Calculation

In this example, the hardware interrupt response time is based on following time factors:

- Hardware interrupt response time of CPU 314C-2 PN/DP: 0.5 ms
- Extension due to communication according to the formula (refer to Overview: Interrupt response time (Page 196)):
 $200 \mu\text{s} + 1000 \mu\text{s} \times 20\% = 400 \mu\text{s} = 0.4 \text{ ms}$
- The hardware interrupt response time of the SM 321; DI 16 x DC 24 V:
 - Internal interrupt processing time: 0.25 ms
 - Input delay: 0.5 ms
- Since neither PROFIBUS DP nor PROFINET IO are being used, you do not have to make allowances for any DP cycle times on PROFIBUS DP or for PROFINET IO update times.

The hardware interrupt response time is equivalent to the sum of the listed time factors:

Process interrupt response time = 0.5 ms + 0.4 ms + 0.25 ms + 0.5 ms = **1.65 ms**.

This calculated hardware interrupt response time expires between the time a signal is received at the digital input and the first operation in OB 40.

General technical specifications

7.1 Standards and certifications

Introduction

Contents of general technical specifications:

- standards and test values satisfied by modules of the S7-300 automation system
- test criteria of S7-300 modules.

Note

Information about the nameplate

You will find the current identifiers and approvals on the rating plate of the respective product.

Safety information

 WARNING
--

Personal injury and damage to property may occur.

In potentially explosive environments, there is a risk of personal injury and damage to property if you remove S7-300 connectors in runtime.

In potentially explosive environments, always isolate the S7-300 before you remove any connectors.

 WARNING
--

Explosion hazard

If you replace components, compliance with Class I, DIV. 2 could be compromised.

 WARNING
--

This device is only appropriate for use in Class I, Div. 2, Group A, B, C, D, or in non-hazardous areas.

Test logos and their meaning

The section below describes the test logos attached to the module and explains their meaning.

CE Label



The S7-300 automation system satisfies requirements and safety-related objectives according to EC Directives listed below, and conforms with the harmonized European standards (EN) for programmable controllers announced in the Official Journals of the European Community:

- 2006/95/EC "Electrical Equipment Designed for Use within Certain Voltage Limits" (Low-Voltage Directive)
- 2004/108/EC "Electromagnetic Compatibility" (EMC Directive)
- 94/9/EC "Equipment and protective systems intended for use in potentially explosive atmospheres" (Explosion Protection Directive)

The EC declaration of conformity is held on file available to competent authorities at:

Siemens AG
Industry Sector
I IA AS R&D DH A
P.O. Box 1963
D-92209 Amberg

These files are also available for download on the Customer Support Internet pages, keyword "Declaration of Conformity".

UL approval



Underwriters Laboratories Inc., complying with

- UL 508 (Industrial Control Equipment)

CSA approval



Canadian Standards Association to

- C22.2 No. 142 (Process Control Equipment)

or

cULus approval



Underwriters Laboratories Inc., complying with

- UL 508 (Industrial Control Equipment)
- CSA C22.2 No. 142 (Process Control Equipment)

or

cULus HAZ. LOC approval



Underwriters Laboratories Inc., complying with

- UL 508 (Industrial Control Equipment)
- CSA C22.2 No. 142 (Process Control Equipment)
- UL 1604 (Hazardous Location)
- CSA C22.2 No. 213 (Hazardous Location)

APPROVED for use in
Class I, Division 2, Group A, B, C, D Tx;
Class I, Zone 2, Group IIC Tx

FM approval



Factory Mutual Research (FM) to
Approval Standard Class Number 3611, 3600, 3810
APPROVED for use in Class I, Division 2, Group A, B, C, D Tx;
Class I, Zone 2, Group IIC Tx

ATEX approval



In accordance with EN 60079-15 (Electrical Apparatus for Potentially Explosive Atmospheres; Type of Protection "n") and EN 60079-0 (Electrical apparatus for potentially explosive gas atmospheres - Part 0: General Requirements)



II 3 G Ex nA II T4..T6

WARNING

Personal injury and damage to property may occur.

In potentially explosive environments, there is a risk of personal injury and damage to property if you remove S7-300 connectors in runtime.

In potentially explosive environments, always isolate the S7-300 before you remove any connectors.

Tick mark for Australia and New Zealand



The S7-300 automation system meets requirements of standards to AS/NZS CISPR 16.

Note

The UL/CSA or cULus approvals for your product are specified by the identifiers on the rating plate.

IEC 61131

The S7-300 automation system satisfies requirements and criteria to IEC 61131-2 (Programmable Controllers, Part 2: Equipment requirements and tests).

Marine approval

Classification societies:

- ABS (American Bureau of Shipping)
- BV (Bureau Veritas)
- DNV (Det Norske Veritas)
- GL (Germanischer Lloyd)
- LRS (Lloyds Register of Shipping)
- Class NK (Nippon Kaiji Kyokai)

Use in industrial environments

SIMATIC products are designed for industrial applications.

Table 7- 1 Use in industrial environments

Field of application	Noise emission requirements	Noise immunity requirements
Industry	EN 61000-6-4: 2007	EN 61000-6-2: 2005

Use in residential areas

Note

The S7-300 is intended for use in industrial environments and can cause interference on radio/television reception if operated in residential areas.

To operate an S7-300 in a residential area, its RF emission must comply with Limit Value Class B to EN 55011.

Suitable measures for achieving RF interference level Class B include, for example:

- S7-300 installation in grounded switch cabinets / cubicles
- Use of noise filters in the supply lines

7.2 Electromagnetic compatibility

Definition

Electromagnetic compatibility (EMC) is the ability of an electrical installation to function satisfactorily in its electromagnetic environment without interfering with that environment.

The S7-300 modules also satisfy requirements of EMC legislation for the European domestic market. Compliance of the S7-300 system with specifications and directives on electric design is prerequisite.

Pulse-shaped disturbance

The table below shows the electromagnetic compatibility of S7 modules in areas subject to pulse-shaped interference.

Pulse-shaped disturbance	Test voltage	corresponds with degree of severity
Electrostatic discharge according to IEC 61000-4-2.	Air discharge: ± 8 kV	3
	Contact discharge: ± 4 kV	2
Bursts (fast transient interference in accordance with IEC 61000-4-4)	2 kV (power supply lines)	3
	2 kV (signal lines > 3 m)	3
	1 kV (signal lines < 3 m)	
High-energy single pulse (surge) to IEC 61000-4-5 External protective circuit required (see Lightning and overvoltage protection)		3
• asymmetric coupling	2 kV (power supply lines) DC with protective elements 2 kV (signal / data line only > 3 m), with protective elements as required	
• symmetric coupling	1 kV (power supply lines) DC with protective elements 1 kV (signal / data line only > 3 m), with protective elements as required	

Additional measures

When connecting an S7-300 system to the public network, always ensure compliance with Limit Value Class B to EN 55022.

Sinusoidal disturbance

The table below shows the electromagnetic compatibility of the S7-300 modules in areas subject to sinusoidal interference.

- RF radiation

RF radiation to IEC 61000-4-3 Electromagnetic RF field, amplitude-modulated		corresponds with degree of severity
80 to 1000 MHz; 1.4 to 2 GHz	2.0 GHz to 2.7 GHz	3, 2, 1
10 V/m	1 V/m	
80 % AM (1 kHz)		

- RF coupling

RF coupling to IEC 61000-4-6	corresponds with degree of severity
0.15 to 80 MHz	3
10 V _{rms} unmodulated	
80 % AM (1 kHz)	
150 Ω source impedance	

Emission of radio interference

Electromagnetic interference emission to EN 55016: Limit value class A (measured at a distance of 10 m).

Frequency	Emitted interference
30 MHz to 230 MHz	< 40 dB (μV/m)Q
230 MHz to 1000 MHz	< 47 dB (μV/m)Q

Noise emission via AC mains to EN 55016: Limit value class A, Group 1.

Frequency	Emitted interference
0.15 to 0.5 MHz	< 79 dB (μV/m)Q < 66 dB (μV/m)M
0.5 MHz to 5 MHz	< 73 dB (μV/m)Q < 60 dB (μV/m)M
5 MHz to 30 MHz	< 73 dB (μV/m)Q < 60 dB (μV/m)M

7.3 Transportation and storage conditions for modules

Introduction

The shipping and storage conditions of S7-300 modules surpass requirements to IEC 61131-2. The data below apply to modules shipped or put on shelf in their original packing.

The modules are compliant with climatic conditions to IEC 60721-3-3, Class 3K7 (storage), and with IEC 60721-3-2, Class 2K4 (shipping.)

Mechanical conditions are compliant with IEC 60721-3-2, Class 2M2.

Shipping and storage conditions for modules

Type of condition	Permissible range
Free fall (in shipping package)	≤1 m
Temperature	From -40 °C to +70 °C
Barometric pressure	1080 hPa to 660 hPa (corresponds with an altitude of -1000 m to 3500 m)
Relative humidity	10% to 95%, no condensation
Sinusoidal oscillation to IEC 60068-2-6	5 - 9 Hz: 3.5 mm 9 - 150 Hz: 9.8 m/s ²
Shock to IEC 60068-2-29	250 m/s ² , 6 ms, 1000 shocks

7.4 Mechanical and climatic environmental conditions for S7-300 operation

Operating conditions

S7-300 systems are designed for stationary use in weather-proof locations. The operating conditions surpass requirements to DIN IEC 60721-3-3.

- Class 3M3 (mechanical requirements)
- Class 3K3 (climatic requirements)

Use with additional measures

The S7-300 may not be used under the conditions outlined below without taking additional measures:

- At locations with a high degree of ionizing radiation
- In aggressive environments caused, for example, by
 - The development of dust
 - Corrosive vapors or gases
 - Strong electric or magnetic fields
- In installations requiring special monitoring, for example
 - Elevators
 - Electrical plants in potentially hazardous areas

An additional measure could be an installation of the S7-300 in a cabinet or housing.

Mechanical environmental conditions

The table below shows the mechanical environmental conditions in the form of sinusoidal oscillations.

Frequency band	Continuous	Infrequently
$10 \leq f \leq 58$ Hz	0,0375 mm amplitude	0.75 mm amplitude
$58 \leq f \leq 150$ Hz	0,5 g constant acceleration	1 g constant acceleration

Reducing vibrations

If your S7-300 modules are exposed to severe shock or vibration, take appropriate measures to reduce acceleration or the amplitude.

We recommend the installation of the S7-300 on damping materials (for example, rubber-bonded-to-metal mounting.)

Test of mechanical environmental conditions

The table below provides important information with respect to the type and scope of the test of ambient mechanical conditions.

Condition tested	Test Standard	Comment
Vibration	Vibration test to IEC 60068-2-6 (sinusoidal)	Type of oscillation: Frequency sweeps with a rate of change of 1 octave/minute. 5 Hz ≤ f ≤ 9 Hz, 3.5 mm constant amplitude 9 Hz ≤ f ≤ 150 Hz, 1 g constant acceleration Duration of oscillation: 10 frequency sweeps per axis at each of three vertically aligned axes
Shock	Shock, tested to IEC 60068-2-27	Type of shock: Half-sine Shock intensity: 15 g peak value, 11 ms duration Direction of shock: 3 shocks in each direction (+/-) at each of three vertically aligned axes

Climatic environmental conditions

The S7-300 may be operated on following environmental conditions:

Environmental conditions	Permissible range	Comments
Temperature: horizontal mounting position: vertical mounting position:	0°C to 60 °C 0°C to 40 °C	-
Relative humidity	from 10 to 95%	No condensation, corresponds to relative humidity (RH) Class 2 to IEC 61131, Part 2
Barometric pressure	1080 hPa to 795 hPa	Corresponds with an altitude of -1000 m to 2000 m
Concentration of pollutants	SO ₂ : < 0.5 ppm; RH < 60 %, no condensation H ₂ s: < 0.1 ppm; RH < 60 %, no condensation	Test: 10 ppm; 4 days Test: 1 ppm; 4 days
	ISA-S71.04 severity level G1; G2; G3	-

7.5 Specification of dielectric tests, protection class, degree of protection, and rated voltage of S7-300

Test voltage

Proof of dielectric strength must be provided in the type test at a test voltage to IEC 61131-2:

Circuits with rated voltage V_n to other circuits or ground.	Test voltage
< 50 V	500 VDC
< 150 V	2500 V DC
< 250 V	4000 V DC

Protection class

Protection class I to IEC 60536, i.e., a protective conductor must be connected to the mounting rail!

Protection against the ingress of foreign matter and water

- Degree of protection IP 20 to IEC 60529, i.e., protection against contact with standard probes.

No protection against the ingress of water.

7.6 Rated voltages of S7-300

Rated operating voltages

The S7-300 modules operate at different rated voltages. The table shows the rated voltages and corresponding tolerances.

Rated voltages	Tolerance
24 V DC	19.2 V DC to 28.8 V DC
120 VAC	93 VAC to 132 VAC
230 VAC	187 VAC to 264 VAC

Technical specifications of CPU 31xC

8.1 General technical specifications

8.1.1 Dimensions of CPU 31xC

Each CPU features the same height and depth, only the width differs.

- Height: 125 mm
- Depth: 115 mm, or 180 mm with opened front cover

Width of CPU

CPU	Width
CPU 312C	80 mm
CPU 313C	120 mm
CPU 313C-2 PtP	80 mm
CPU 313C-2 DP	80 mm
CPU 314C-2 PtP	120 mm
CPU 314C-2 DP	120 mm
CPU 314C2 PN/DP	120 mm

8.1.2 Technical specifications of the Micro Memory Card

Compatible SIMATIC Micro Memory Cards

The following memory modules are available:

Table 8- 1 Available SIMATIC Micro Memory Cards

Type of Micro Memory Card	Order number	Required for a firmware update via SIMATIC Micro Memory Card
64 KB	6ES7953-8LFxx-0AA0	-
128 KB	6ES7953-8LGxx-0AA0	-
512 KB	6ES7953-8LJxx-0AA0	-
2 MB	6ES7953-8LLxx-0AA0	Minimum requirement for CPUs without DP interface
4 MB	6ES7953-8LMxx-0AA0	Minimum requirements for CPUs with DP interface, but without PN interface
8 MB	6ES7953-8LPxx-0AA0	Minimum requirements for CPUs with DP and PN interface

Maximum number of loadable blocks on the SIMATIC Micro Memory Card

The number of blocks that can be stored on the SIMATIC Micro Memory Card depends on the capacity of the SIMATIC Micro Memory Card being used. The maximum number of blocks that can be loaded is therefore limited by the capacity of your SIMATIC Micro Memory Card (including blocks generated with the "CREATE DB" SFC).

Table 8- 2 Maximum number of loadable blocks on the SIMATIC Micro Memory Card

Size of SIMATIC Micro Memory Card	... Maximum number of blocks that can be loaded
64 KB	768
128 KB	1024
512 KB	2560
2 MB	The maximum number of blocks that can be loaded on a specific CPU is less than the number of blocks that can be stored on the SIMATIC Micro Memory Card. For information about the maximum number of blocks that can be loaded on a specific CPU, refer to the corresponding technical specification.
4 MB	
8 MB	

8.2 CPU 312C

Technical specifications

Table 8- 3 Technical specifications of CPU 312C

Technical specifications	
CPU and version	
• MLFB	6ES7312-5BF04-0AB0
• Hardware version	01
• Firmware version	V3.3
• Associated programming package	STEP 7 as of V5.5 + SP1 or STEP 7 as of V5.3 + SP2 with HSP 203
Memory	
Main memory	
• Integrated	64 KB
• Expandable	No
• Maximum size of non-volatile memory for retentive data blocks	64 KB
Load memory	
• Pluggable (MMC)	Yes
• Pluggable (MMC), max.	8 MB
• Minimum data retention on the Micro Memory Card (after the last programming action)	10 years
Backup	
• Available	Yes (ensured with Micro Memory Card - maintenance-free)
• Without battery	Yes (program and data)
Execution times	
• For bit operation, min.	0.1 μ s
• For word operations, min.	0.24 μ s
• For fixed-point arithmetic, min.	0.32 μ s
• Minimum for floating-point arithmetic	1.1 μ s
Timers/counters and their retentivity	
S7 counters	
• Number	256

Technical specifications	
Retentivity	
• Configurable	Yes
• Default	Z 0 to Z 7
Counting range	
• Low limit	0
• High limit	999
IEC counter	
• Available	Yes
• Type	SFB
• Number	Unlimited (limited only by main memory size)
S7 timers	
• Number	256
Retentivity	
• Configurable	Yes
• Default	No retentivity
Time setting range	
• Low limit	10 ms
• High limit	9990 s
IEC timer	
• Available	Yes
• Type	SFB
• Number	Unlimited (limited only by main memory size)
Data areas and their retentivity	
Bit memory	
• Number, max.	256 bytes
• Retentivity, available	Yes (from MB 0 to MB 255)
• Retentivity, default	From MB 0 to MB 15
• Number of clock memories	8 (1 memory byte)
Data blocks	
• Number, max.	1024 (in the number range 1 to 16000)
• Size, max.	64 kB
• Retentivity, configurable	Yes, via non-retain feature on the DB
• Retentivity, default	Yes
Local data	
• Per priority class, max.	32 KB (max. 2048 bytes per block)

Technical specifications	
Blocks	
• Number of blocks (total)	1024 (DBs, FCs, FBs) The maximum number of blocks that can be loaded may be reduced due to the Micro Memory Card you are using.
OB	See instruction list
• Size, max.	64 KB
• Number of free cycle OBs	1 (OB 1)
• Number of time-of-day interrupt OBs	1 (OB 10)
• Number of time-delay interrupt OBs	2 (OB 20, 21)
• Number of cyclic interrupt OBs	4 (OB 32, 33, 34, 35)
• Number of hardware interrupt OBs	1 (OB 40)
• Number of restart OBs	1 (OB 100)
• Number of asynchronous error OBs	4 (OB 80, 82, 85, 87)
• Number of synchronous error OBs	2 (OB 121, 122)
Nesting depth	
• Per priority class	16
• Additionally within an error OB	4
FB	See instruction list
• Number, max.	1024 (in the number range 0 to 7999)
• Size	64 KB
FC	See instruction list
• Number, max.	1024 (in the number range 0 to 7999)
• Size	64 KB
Address ranges (inputs/outputs)	
I/O address area	
• Inputs	1024 bytes (freely addressable)
• Outputs	1024 bytes (freely addressable)
Distributed	
• Inputs	-
• Outputs	-
I/O process image	
• Inputs	1024 bytes
• Outputs	1024 bytes
• Inputs, adjustable	1024 bytes

Technical specifications	
• Outputs, adjustable	1024 bytes
• Inputs, preset	128 bytes
• Outputs, preset	128 bytes
Digital channels	
• Integrated channels (DI)	10
• Integrated channels (DO)	6
• Inputs	266
• Outputs	262
• Inputs, of those central	266
• Outputs, of those central	262
Analog channels	
• Integrated channels (AI)	-
• Integrated channels (AO)	-
• Inputs	64
• Outputs	64
• Inputs, of those central	64
• Outputs, of those central	64
Hardware configuration	
• Racks, max.	1
• Modules per rack, max.	8
Number of DP masters	
• Integrated	-
• Via CP	4
Supported number of FMs and CPs (recommended)	
• FM	8
• CP, point-to-point	8
• CP, LAN	4
Time	
Clock	
• Software clock	Yes
• Buffered	No
• Can be synchronized	Yes
• Factory setting	DT#1994-01-01-00:00:00
• Behavior of the real-time clock after POWER ON	The clock continues at the time of day it had when power was switched off.

Technical specifications	
• Deviation per day, max.	10 s, typ.: 2 s
Runtime meter	
• Number	1
• Number/number range	0
• Range of values	0 to 2 ³¹ hours (using the SFC 101)
• Granularity	1 hour
• Retentive	Yes; must be manually restarted after every restart
Clock synchronization	
• supported	Yes
• On MPI, master	Yes
• On MPI, slave	Yes
• On the AS, master	Yes
• On the AS, slave	No
S7 signaling functions	
• Number of stations that can be logged on for reporting functions, max.	6 (depends on the number of connections configured for PG/OP and S7 basic communication)
• Process error diagnostic messages	Yes
• Simultaneously enabled interrupt S blocks, max.	300
Test and startup functions	
Status/modify	
• Status/modify variable	Yes
• Variables	Inputs, outputs, bit memories, DBs, timers, counters
• Maximum number of variables	30
• Status variables, max.	30
• Modify variables, max.	14
Forcing	
• Forcing	Yes
• Variables	Inputs, outputs
• Maximum number of tags	10
Status block	Yes, up to 2 at the same time
Single step	Yes
• Number of breakpoints	4

Technical specifications	
Diagnostic buffer	
• Available	Yes
• Maximum number of entries	500
• Configurable	No
• Of which are power-failure-proof	100, only the last 100 entries are retentive
• Maximum number of entries that can be read in RUN	499
• Number of entries that can be set in RUN	Yes, from 10 to 499
• Number of preset entries in RUN	10
Service data	
• Can be read out	Yes
Monitoring function	
• Status LEDs	Yes
Communication functions	
PG/OP communication	Yes
Prioritized OCM communication	
• Supported	No
Routing	
• Number of routing connections	0
• Data record routing	No
Global data communication	
• supported	Yes
• Number of GD circles, max.	8
• Number of GD packets, max.	8
• Number of GD packets, sender, max.	8
• Number of GD packets, receiver, max.	8
• Size of GD packets, max.	22 Byte
• Size of GD packets, of those consistent, max.	22 Byte
S7 basic communication	
• Supported	Yes
• User data per job, max.	76 Byte
• User data per job, consistent, max.	76 bytes (for X_SEND or X_RCV) 64 bytes (for X_PUT or X_GET as the server)
S7 communication	
• Supported	Yes
• As server	Yes

Technical specifications	
• As client	Yes, via CP and loadable FBs
• User data per job, max.	180 bytes (for PUT/GET)
• User data per job, consistent, max.	240 bytes as server
S5-compatible communication	
• Supported	Yes, via CP and loadable FCs
Number of connections	
• Total	6
Suitable for PG communication	
• PG communication, reserved	1
• PG communication, configurable, min.	1
• PG communication, configurable, max.	5
Suitable for OP communication	
• OP communication, reserved	1
• OP communication, configurable, min.	1
• OP communication, configurable, max.	5
Suitable for S7 basic communication	
• S7 basic communication, reserved	0
• S7 basic communication, configurable, min.	0
• S7 basic communication, configurable, max.	2
Connection system	
• Required front connector	1 X 40-pin
Interfaces	
1st interface	
Interface designation	X1
Type of interface	Integrated RS 485 interface
Hardware	RS 485
• electrically disconnected	No
• Interface power supply (15 V DC to 30 V DC), max.	200 mA
Functionality	
• MPI	Yes
• DP master	No
• DP slave	No
• Point-to-point connection	No
MPI	
Services	

Technical specifications	
• PG/OP communication	Yes
• Routing	No
• Global data communication	Yes
• S7 basic communication	Yes
• S7 communication	Yes (only server; connection configured at one end)
• S7 communication, as client	No, but via CP and loadable FBs
• S7 communication, as server	Yes
Transmission rate, max.	187,5 kbps
Programming	
Programming language	
• LAD	Yes
• FBD	Yes
• STL	Yes
• SCL	Yes
• GRAPH	Yes
• HiGraph®	Yes
Instruction set	See instruction list
• Nesting levels	8
Know-how protection	
• User program/password security	Yes
• Block encryption	Yes, using S7-Block Privacy
System functions (SFC)	See instruction list
System function blocks (SFB)	See instruction list
Integrated inputs/outputs	
Default addresses of the integrated	
• Digital inputs	124.0 to 125.1
• Digital outputs	124.0 to 124.5
Integrated functions	
• Number of counters	2 (see the Manual <i>Technological Functions</i>)
• Number of frequency meters	2 channels up to 10 kHz (see the Manual <i>Technological Functions</i>)
• Number of pulse outputs	2 pulse width modulations up to 2.5 kHz (see the Manual <i>Technological Functions</i>)
• Period measurement	2 channels (see the Manual <i>Technological Functions</i>)
• Open-loop positioning	No

Technical specifications	
• Integrated function blocks (rules)	No
Dimensions	
• Mounting dimensions W x H x D (mm)	80 x 125 x 130
• Weight	410 g
Voltages and currents	
• Power supply (rated value)	24 V DC
• Low limit of admissible range (DC)	19.2 V
• High limit of admissible range (DC)	28.8 V
• Current consumption (open-circuit), typically	90 mA
• Inrush current, typ.	5 A
• Current consumption (rated value)	570 mA
• I ² t	0.7 A ² s
• External protection of power supply lines (recommended)	MCB type C min. 2 A, MCB type B min. 4 A
• Power loss, typically	8 W

Reference

In the chapter *Technical specifications of the integrated I/O* you can find:

- the technical specifications of integrated I/Os under *Digital inputs of CPUs 31xC* and *Digital outputs of CPUs 31xC*.
- the block diagrams of the integrated I/Os under *Arrangement and use of integrated I/Os*.

8.3 CPU 313C

Technical specifications

Table 8- 4 Technical specifications of CPU 313C

Technical specifications	
CPU and version	
• MLFB	6ES7313-5BG04-0AB0
• Hardware version	01
• Firmware version	V3.3
• Associated programming package	STEP 7 as of V5.5 + SP1 or STEP 7 as of V5.3 + SP2 with HSP 203
Memory	
Main memory	
• Integrated	128 KB
• Expandable	No
• Maximum size of non-volatile memory for retentive data blocks	64 KB
Load memory	
• Pluggable (MMC)	Yes
• Pluggable (MMC), max.	8 MB
• Data retention on the Micro Memory Card (after the last programming action), min.	10 years
Backup	
• Available	Yes (ensured with Micro Memory Card - maintenance-free)
• Without battery	Yes (program and data)
Execution times	
• For bit operation, min.	0.07 μ s
• For word operations, min.	0.15 μ s
• For fixed-point arithmetic, min.	0.2 μ s
• Minimum for floating-point arithmetic	0.72 μ s
Timers/counters and their retentivity	
S7 counters	
• Number	256
Retentivity	
• Configurable	Yes
• Default	Z 0 to Z 7

Technical specifications	
Counting range	
• Low limit	0
• High limit	999
IEC counter	
• Available	Yes
• Type	SFB
• Number	Unlimited (limited only by main memory size)
S7 timers	
• Number	256
Retentivity	
• Configurable	Yes
• Default	No retentivity
Time setting range	
• Low limit	10 ms
• High limit	9990 s
IEC timer	
• Available	Yes
• Type	SFB
• Number	Unlimited (limited only by main memory size)
Data areas and their retentivity	
Bit memory	
• Number, max.	256 bytes
• Retentivity, available	Yes (from MB 0 to MB 255)
• Retentivity, default	From MB 0 to MB 15
• Number of clock memories	8 (1 memory byte)
Data blocks	
• Number, max.	Max. 1024 (In the number range 1 to 16000)
• Size, max.	64 KB
• Retentivity, configurable	Yes, via non-retain feature on the DB
• Retentivity, default	Yes
Local data	
• Per priority class, max.	32 KB, max. 2048 bytes per block
Blocks	

Technical specifications	
• Number of blocks (total)	1024 (DBs, FCs, FBs) The maximum number of blocks that can be loaded may be reduced due to the Micro Memory Card you are using.
OB	See instruction list
• Size, max.	64 KB
• Number of free cycle OBs	1 (OB 1)
• Number of time-of-day interrupt OBs	1 (OB 10)
• Number of time-delay interrupt OBs	2 (OB 20, 21)
• Number of cyclic interrupt OBs	4 (OB 32, 33, 34, 35)
• Number of hardware interrupt OBs	1 (OB 40)
• Number of restart OBs	1 (OB 100)
• Number of asynchronous error OBs	4 (OB 80, 82, 85, 87)
• Number of synchronous error OBs	2 (OB 121, 122)
Nesting depth	
• Per priority class	16
• Additionally within an error OB	4
FB	See instruction list
• Number, max.	1024 (in the number range 0 to 7999)
• Size	64 KB
FC	See instruction list
• Number, max.	1024 (in the number range 0 to 7999)
• Size	64 KB
Address ranges (inputs/outputs)	
I/O address area	
• Inputs	1024 bytes (freely addressable)
• Outputs	1024 bytes (freely addressable)
I/O process image	
• Inputs	1024 bytes
• Outputs	1024 bytes
• Inputs, adjustable	1024 bytes
• Outputs, adjustable	1024 bytes
• Inputs, preset	128 bytes
• Outputs, preset	128 bytes
Digital channels	

Technical specifications	
• Integrated channels (DI)	24
• Integrated channels (DO)	16
• Inputs	1016
• Outputs	1008
• Inputs, of those central	1016
• Outputs, of those central	1008
Analog channels	
• Integrated channels (AI)	5 (4 x current/voltage, 1 x resistance)
• Integrated channels (AO)	2
• Inputs	253
• Outputs	250
• Inputs, of those central	253
• Outputs, of those central	250
Hardware configuration	
• Racks, max.	4
• Modules per rack, max.	8; max. 7 in rack ER 3
Number of DP masters	
• Integrated	-
• Via CP	4
Number of usable FMs and CPs (recommended)	
• FM	8
• CP, point-to-point	8
• CP, LAN	6
Time	
Clock	
• Hardware clock (real-time)	Yes
• Buffered, can be synchronized	Yes
• Factory setting	DT#1994-01-01-00:00:00
• Buffered period	Typically 6 weeks (at an ambient temperature of 40 °C)
• Behavior of the real-time clock after POWER OFF ON	The clock continues running after POWER OFF
• Behavior of the clock on expiration of the buffered period	The clock continues at the time of day it had when power was switched off.
• Deviation per day, max.	10 s, typ.: 2 s

Technical specifications	
Runtime meter	
• Number	1
• Number/number range	0
• Range of values	0 to 2 ³¹ hours (if SFC 101 is used)
• Granularity	1 hour
• Retentive	Yes; must be manually restarted after every restart
Clock synchronization	
• Supported	Yes
• On MPI, master	Yes
• On MPI, slave	Yes
• On the AS, master	Yes
• On the AS, slave	No
S7 signaling functions	
• Number of stations that can be logged on for signaling functions, max.	8 (depends on the number of connections configured for PG/OP and S7 basic communication)
• Process error diagnostic messages	Yes
• Simultaneously enabled interrupt S blocks, max.	300
Test and startup functions	
Status/modify	
• Status/modify variable	Yes
• Variables	Inputs, outputs, bit memories, DBs, timers, counters
• Maximum number of variables	30
• Status variables, max.	30
• Modify variables, max.	14
Forcing	
• Forcing	Yes
• Variables	Inputs, outputs
• Maximum number of tags	10
• Status block	Yes, up to 2 at the same time
• Single step	Yes
• Number of breakpoints	4

Technical specifications	
Diagnostic buffer	
• Available	Yes
• Maximum number of entries	500
• Configurable	No
• of which are power-failure-proof	100; only the last 100 entries are retentive
• Maximum number of entries that can be read in RUN	499
• Number of entries that can be set in RUN	Yes, from 10 to 499
• Number of preset entries in RUN	10
Service data	
• Can be read out	Yes
Monitoring function	
• Status LEDs	Yes
Communication functions	
PG/OP communication	Yes
Prioritized OCM communication	
• Supported	No
Routing	
• Number of routing connections	0
• Data record routing	No
Global data communication	
• Supported	Yes
• Number of GD circles, max.	8
• Number of GD packets, max.	8
• Number of GD packets, sender, max.	8
• Number of GD packets, receiver, max.	8
• Size of GD packets, max.	22 bytes
• Size of GD packets, of those consistent, max.	22 bytes
S7 basic communication	
• Supported	Yes
• User data per job, max.	76 bytes
• User data per job, consistent, max.	76 bytes (for X_SEND or X_RCV) 64 bytes (for X_PUT or X_GET as the server)
S7 communication	
• Supported	Yes
• As server	Yes

Technical specifications	
• As client	Yes (via CP and loadable FBs)
• User data per job, max.	180 bytes (with PUT/GET)
• User data per job, consistent	240 bytes (as server)
S5-compatible communication	
• Supported	Yes (via CP and loadable FCs)
Number of connections	
• Total	8
Suitable for PG communication	
• PG communication, reserved	1
• PG communication, configurable, min.	1
• PG communication, configurable, max.	7
Suitable for OP communication	
• OP communication, reserved	1
• OP communication, configurable, min.	1
• OP communication, configurable, max.	7
Suitable for S7 basic communication	
• S7 basic communication, reserved	0
• S7 basic communication, configurable, min.	0
• S7 basic communication, configurable, max.	4
Connection system	
• Required front connector	2 X 40-pin
Interfaces	
1st interface	
Interface designation	X1
Type of interface	Integrated RS 485 interface
Hardware	RS 485
• electrically disconnected	No
• Interface power supply (15 V DC to 30 V DC), max.	200 mA
Functionality	
• MPI	Yes
• DP master	No
• DP slave	No
• Point-to-point connection	No

Technical specifications	
MPI	
Services	
• PG/OP communication	Yes
• Routing	No
• Global data communication	Yes
• S7 basic communication	Yes
• S7 communication	Yes (only server; connection configured at one end)
• S7 communication, as client	No (but via CP and loadable FBs)
• S7 communication, as server	Yes
Transmission rate, max.	187.5 kbps
Programming	
Programming language	
• LAD	Yes
• FBD	Yes
• STL	Yes
• SCL	Yes
• CFC	Yes
• GRAPH	Yes
• HiGraph®	Yes
Instruction set	See instruction list
• Nesting levels	8
Know-how protection	
• User program/password security	Yes
• Block encryption	Yes, using S7-Block Privacy
System functions (SFC)	See instruction list
System function blocks (SFB)	See instruction list
Integrated inputs/outputs	
Default addresses of the integrated	
Digital inputs	124.0 to 126.7
Digital outputs	124.0 to 125.7
Analog inputs	752 to 761
Analog outputs	752 to 755

Technical specifications	
Integrated functions	
• Number of counters	3 (see the manual <i>Technological Functions</i>)
• Number of frequency meters	3 up to 30 kHz (see the manual <i>Technological Functions</i>)
• Number of pulse outputs	3 channels for pulse width modulation up to 2.5 kHz (see the manual <i>Technological Functions</i>)
• Period measurement	3 channels (see the manual <i>Technological Functions</i>)
• Open-loop positioning	No
• Integrated function blocks (rules)	Yes, PID controller (see Manual <i>Technological Functions</i>)
Dimensions	
• Mounting dimensions W x H x D (mm)	120 x 125 x 130
• Weight	660 g
Voltages and currents	
• Power supply (rated value)	24 V DC
• Low limit of admissible range (DC)	19.2 V
• High limit of admissible range (DC)	28.8 V
• Current consumption (open-circuit), typically	150 mA
• Inrush current, typ.	5 A
• Current consumption (rated value)	650 mA
• I ² t	0.7 A ² s
• External protection of power supply lines (recommended)	MCB type C min. 2 A, MCB type B min. 4 A
• Power loss, typically	12 W

Reference

In the chapter *Technical specifications of the integrated I/O* you can find:

- the technical specifications of the integrated I/Os under *Digital inputs of CPUs 31xC*, *Digital outputs of CPUs 31xC*, *Analog inputs of CPUs 31xC* and *Analog outputs of CPUs 31xC*.
- the block diagrams of the integrated I/Os under *Arrangement and use of integrated I/Os*.

8.4 CPU 313C-2 PtP and CPU 313C-2 DP

Technical specifications

Table 8- 5 Technical specifications of the CPU 313C-2 PtP/ CPU 313C-2 DP

Technical specifications		
	CPU 313C-2 PtP	CPU 313C-2 DP
CPU and version	CPU 313C-2 PtP	CPU 313C-2 DP
• MLFB	6ES7313-6BG04-0AB0	6ES7313-6CG04-0AB0
• Hardware version	01	01
• Firmware version	V3.3	V3.3
• Associated programming package	STEP 7 as of V5.5 + SP1 or STEP 7 as of V5.3 + SP2 with HSP 204	STEP 7 as of V5.5 + SP1 or STEP 7 as of V5.3 + SP2 with HSP 203
Memory	CPU 313C-2 PtP	CPU 313C-2 DP
Main memory		
• Integrated	128 KB	
• Expandable	No	
• Maximum size of non-volatile memory for retentive data blocks	64 KB	
Load memory		
• Pluggable (MMC)	Yes	
• Pluggable (MMC), max.	8 MB	
• Data retention on the Micro Memory Card (after the last programming action), min.	10 years	
Backup		
• Available	Yes (ensured with Micro Memory Card - maintenance-free)	
• Without battery	Yes (program and data)	
Execution times	CPU 313C-2 PtP	CPU 313C-2 DP
• For bit operation, min.	0.07 µs	
• For word operations, min.	0.15 µs	
• For fixed-point arithmetic, min.	0.2 µs	
• Minimum for floating-point arithmetic	0.72 µs	
Timers/counters and their retentivity	CPU 313C-2 PtP	CPU 313C-2 DP
S7 counters		
• Number	256	

Technical specifications		
	CPU 313C-2 PtP	CPU 313C-2 DP
Retentivity		
• Configurable	Yes	
• Default	From C 0 to C 7	
Counting range		
• Low limit	0	
• High limit	999	
IEC counter		
• Available	Yes	
• Type	SFB	
• Number	Unlimited (limited only by main memory size)	
S7 timers		
• Number	256	
Retentivity		
• Configurable	Yes	
• Default	No retentivity	
Time setting range		
• Low limit	10 ms	
• High limit	9990 s	
IEC timer		
• Available	Yes	
• Type	SFB	
• Number	Unlimited (limited only by main memory size)	
Data areas and their retentivity		
	CPU 313C-2 PtP	CPU 313C-2 DP
Bit memory		
• Number, max.	256 bytes	
• Retentivity, available	Yes (MB 0 to MB 255)	
• Retentivity, default	MB 0 to MB15	
• Number of clock memories	8 (1 memory byte)	
Data blocks		
• Number, max.	1024 (in the number range 1 to 16000)	
• Size, max.	64 KB	
• Retentivity, configurable	Yes, via non-retain feature on the DB	
• Retentivity, default	Yes	

Technical specifications		
	CPU 313C-2 PtP	CPU 313C-2 DP
Local data		
• Per priority class, max.	32 kByte, Max. 2048 bytes per block	
Blocks		
• Number of blocks (total)	1024 (DBs, FCs, FBs) The maximum number of blocks that can be loaded may be reduced due to the Micro Memory Card you are using.	
OB		
• Size, max.	64 KB	
• Number of free cycle OBs	1 (OB 1)	
• Number of time-of-day interrupt OBs	1 (OB 10)	
• Number of time-delay interrupt OBs	2 (OB 20, 21)	
• Number of cyclic interrupt OBs	4 (OB 32, 33, 34, 35)	
• Number of hardware interrupt OBs	1 (OB 40)	
• Number of DPV1 interrupt OBs	-	3 (OB 55, 56, 57)
• Number of restart OBs	1 (OB 100)	
• Number of asynchronous error OBs	4 (OB 80, 82, 85, 87)	5 (OB 80, 82, 85, 86, 87)
• Number of synchronous error OBs	2 (OB 121, 122)	
Nesting depth		
• Per priority class	16	
• Additionally within an error OB	4	
FB		
• Number, max.	1024 (in the number range 0 to 7999)	
• Size	64 KB	
FC		
• Number, max.	1024 (in the number range 0 to 7999)	
• Size	64 KB	
Address ranges (inputs/outputs)		
I/O address area		
• Inputs	1024 bytes	2048 bytes
• Outputs	1024 bytes	2048 bytes
Distributed		
• Inputs	-	2030 bytes
• Outputs	-	2030 bytes

Technical specifications		
	CPU 313C-2 PtP	CPU 313C-2 DP
I/O process image		
• Inputs	1024 bytes	2048 bytes
• Outputs	1024 bytes	2048 bytes
• Inputs, adjustable	1024 bytes	2048 bytes
• Outputs, adjustable	1024 bytes	2048 bytes
• Inputs, preset	128 bytes	128 bytes
• Outputs, preset	128 bytes	128 bytes
Digital channels		
• Integrated channels (DI)	16	
• Integrated channels (DO)	16	
• Inputs	1008	16256
• Outputs	1008	16256
• Inputs, of those central	1008	1008
• Outputs, of those central	1008	1008
Analog channels		
• Integrated channels	-	-
• Integrated channels	-	-
• Inputs	248	1015
• Outputs	248	1015
• Inputs, of those central	248	248
• Outputs, of those central	248	248
Hardware configuration		
• Racks, max.	4	
• Modules per rack, max.	8; max. 7 in rack ER 3	
Number of DP masters		
• Integrated	No	1
• Via CP	4	4
Number of usable FMs and CPs (recommended)		
• FM	8	
• CP, point-to-point	8	
• CP, LAN	6	

Technical specifications		
	CPU 313C-2 PtP	CPU 313C-2 DP
Time	CPU 313C-2 PtP	CPU 313C-2 DP
Clock		
• Hardware clock (real-time)	Yes	
• Buffered, can be synchronized	Yes	
• Factory setting	DT#1994-01-01-00:00:00	
• Buffered period	Typically 6 weeks (at an ambient temperature of 40 °C)	
• Behavior of the real-time clock after POWER OFF POWER ON	The clock continues running after POWER OFF	
• Behavior after expiration of the buffered period	The clock continues at the time of day it had when power was switched off.	
• Deviation per day, max.	10 s, typ.: 2 s	
Runtime meter		
• Number	1	
• Number/number range	0	
• Range of values	0 to 2 ³¹ hours (using the SFC 101)	
• Granularity	1 hour	
• Retentive	Yes; must be manually restarted after every restart	
Clock synchronization		
• Supported	Yes	
• On MPI, master	Yes	Yes
• On MPI, slave	Yes	Yes
• On DP, master	-	Yes, DP slave must be time slave
• On DP, slave	-	Yes
• On the AS, master	Yes	Yes
• On the AS, slave	No	No
S7 signaling functions	CPU 313C-2 PtP	CPU 313C-2 DP
• Number of stations that can be logged on for signaling functions (e.g. OS)	8	
• Process error diagnostic messages	Yes	
• Simultaneously enabled interrupt S blocks, max.	300	

Technical specifications		
	CPU 313C-2 PtP	CPU 313C-2 DP
Test and startup functions	CPU 313C-2 PtP	CPU 313C-2 DP
Status/modify		
• Status/modify variable	Yes	
• Variable	Inputs, outputs, bit memories, DBs, timers, counters	
• Maximum number of variables	30	
• Status variables, max.	30	
• Modify variables, max.	14	
Forcing		
• Forcing	Yes	
• Variables	Inputs, outputs	
• Maximum number of tags	10	
Status block	Yes, up to 2 at the same time	
Single step	Yes	
• Number of breakpoints	4	
Diagnostic buffer		
• Available	Yes	
• Maximum number of entries (not configurable)	500	
• Configurable	No	
• Of which are power-failure-proof	100, only the last 100 entries are retentive	
• Maximum number of entries that can be read in RUN	499	
• Number of entries that can be set in RUN	Yes, from 10 to 499	
• Number of preset entries in RUN	10	
Service data		
• Can be read out	Yes	
Monitoring functions	CPU 313C-2 PtP	CPU 313C-2 DP
• Status LEDs	Yes	
Communication functions	CPU 313C-2 PtP	CPU 313C-2 DP
PG/OP communication	Yes	Yes
Prioritized OCM communication		
• Supported	No	
Routing	No	Yes
• Number of routing connections	-	Max. 4
• Data record routing	No	Yes

Technical specifications	
	CPU 313C-2 PtP
	CPU 313C-2 DP
Global data communication	
• Supported	Yes
• Number of GD circles, max.	8
• Number of GD packets, max.	8
• Number of GD packets, sender, max.	8
• Number of GD packets, receiver, max.	8
• Size of GD packets, max.	22 bytes
• Size of GD packets, of those consistent, max.	22 bytes
S7 basic communication	
• Supported	Yes
• User data per job, max.	76 bytes
• User data per job, consistent, max.	76 bytes (for X_SEND or X_RCV) 64 bytes (for X_PUT or X_GET as the server)
S7 communication	
• Supported	Yes
• As server	Yes
• As client	Yes, via CP and loadable FBs
• User data per job, max.	180 bytes for PUT/GET
• User data per job, consistent, max.	240 bytes (as server)
S5-compatible communication	
• Supported	Yes, via CP and loadable FCs
Number of connections	
• Total	8
Suitable for PG communication	
• PG communication, reserved	1
• PG communication, configurable, min.	1
• PG communication, configurable, max.	7
Suitable for OP communication	
• OP communication, reserved	1
• OP communication, configurable, min.	1
• OP communication, configurable, max.	7

Technical specifications		
	CPU 313C-2 PtP	CPU 313C-2 DP
Suitable for S7 basic communication	4	
• S7 basic communication, reserved	0	
• S7 basic communication, configurable, min.	0	
• S7 basic communication, configurable, max.	4	
Connection system		
• Required front connector	1 X 40-pin	
Interfaces	CPU 313C-2 PtP	CPU 313C-2 DP
1st interface		
Interface designation	X1	
Type of interface	Integrated RS 485 interface	
Hardware	RS 485	
• electrically disconnected	No	
• Interface power supply (15 V DC to 30 V DC), max.	200 mA	
Functionality		
• MPI	Yes	
• DP master	No	
• DP slave	No	
• Point-to-point connection	No	
MPI		
Services		
• PG/OP communication	Yes	
• Routing	No	Yes
• Global data communication	Yes	
• S7 basic communication	Yes	
• S7 communication	Yes (only server; connection configured at one end)	
• S7 communication, as client	No (but via CP and loadable FBs)	
• S7 communication, as server	Yes	
Transmission rate, max.	187.5 kbps	

Technical specifications		
	CPU 313C-2 PtP	CPU 313C-2 DP
2nd interface		
Interface designation	X2	
Type of interface	Integrated RS 422/485 interface	Integrated RS 485 interface
Hardware	RS 422/485	RS 485
• electrically disconnected	Yes	Yes
• Interface power supply (15 V DC to 30 V DC), max.	No	200 mA
Functionality		
• MPI	No	No
• DP master	No	Yes
• DP slave	No	Yes
• PROFINET IO controller	No	No
• PROFINET IO device	No	No
• PROFINET CBA	No	No
• Point-to-point connection	Yes	No
DP master		
Services		
• PG/OP communication	-	Yes
• Routing	-	Yes
• Global data communication	-	No
• S7 basic communication	-	Yes (intelligent blocks only)
• S7 communication	-	Yes (only server; connection configured at one end)
• S7 communication, as client	-	No
• S7 communication, as server	-	Yes
• Constant bus cycle time supported	-	Yes
• Isochronous mode	-	No
• SYNC/FREEZE	-	Yes
• Activate/deactivate DP slaves – Max. number of DP slaves that can be enabled / disabled simultaneously	-	Yes 8
• Direct data exchange (cross-traffic)	-	Yes, as subscriber
• DPV1	-	Yes
Transmission rate, max.	-	Up to 12 mbps

Technical specifications		
	CPU 313C-2 PtP	CPU 313C-2 DP
Number of DP slaves, max.	-	124
Address range		
• Inputs, max.	-	2 KB
• Outputs, max.	-	2 KB
User data per DP slave		
• Inputs, max.	-	244 bytes
• Outputs, max.	-	244 bytes
DP slave		
Services		
• PG/OP communication	-	Yes
• Routing	-	Yes (only if interface is active)
• Global data communication	-	No
• S7 basic communication	-	No
• S7 communication	-	Yes (only server; connection configured at one end)
• S7 communication, as client	-	No
• S7 communication, as server	-	Yes
• Direct data exchange (cross-traffic)	-	Yes
• DPV1	-	No
Transmission rate, max.	-	12 mbps
Automatic baud rate detection	-	Yes (only if interface is passive)
GSD file	-	The current GSD file is available for download at GSD file http://www.siemens.com/profibus-gsd
Transfer memory		
• Inputs, max.	-	244 bytes
• Outputs, max.	-	244 bytes
• Address areas, max.	-	32
• User data per address range, max.	-	32 bytes

Technical specifications		
	CPU 313C-2 PtP	CPU 313C-2 DP
Point-to-point connection		
• Transmission rates	38.4kbps half duplex 19.2 kbps full duplex	-
• Max. cable length	1200 m	-
• The user program can control the interface	Yes	-
• The interface can trigger an alarm or interrupt in the user program	Yes (message with break ID)	-
• Protocol driver	3964 (R); ASCII	-
Programming		
Programming language		
• LAD	Yes	
• FBD	Yes	
• STL	Yes	
• SCL	Yes	
• CFC	Yes	
• GRAPH	Yes	
• HiGraph®	Yes	
Instruction set		
• Nesting levels	8	
Know-how protection		
• User program/ password security	Yes	
• Block encryption	Yes, using S7-Block Privacy	
System functions (SFC)		
System function blocks (SFB)		
See instruction list		
Integrated inputs/outputs		
Default addresses of the integrated		
Digital inputs	124.0 to 125.7	
Digital outputs	124.0 to 125.7	

Technical specifications		
	CPU 313C-2 PtP	CPU 313C-2 DP
Integrated functions		
• Number of counters	3 (see the manual <i>Technological Functions</i>)	
• Number of frequency meters	3 channels up to 30 kHz (see the manual <i>Technological Functions</i>)	
• Number of pulse outputs	3, pulse width modulations up to 2.5 kHz (see the manual <i>Technological Functions</i>)	
• Period measurement	3 channels (see the manual <i>Technological Functions</i>)	
• Open-loop positioning	No	
• Integrated function blocks (rules)	PID controller (see the manual <i>Technological Functions</i>)	
Dimensions		
	CPU 313C-2 PtP	CPU 313C-2 DP
• Mounting dimensions W x H x D (mm)	80 x 125 x 130	
• Weight, approx.	500 g	
Voltages and currents		
	CPU 313C-2 PtP	CPU 313C-2 DP
• Power supply (rated value)	24 V DC	
• Low limit of admissible range (DC)	19.2 V	
• High limit of admissible range (DC)	28.8 V	
• Current consumption (open-circuit), typically	110 mA	
• Inrush current, typ.	5 A	
• Current consumption (rated value)	580 mA	800 mA
• I ² t	0.7 A ² s	
• External protection of power supply lines (recommended)	MCB type C: Min. 2 A MCB Type B: Min. 4 A	
• Power loss, typically	9 W	

Reference

In the chapter *Technical specifications of the integrated I/O* you can find:

- the technical specifications of integrated I/Os under *Digital inputs of CPUs 31xC* and *Digital outputs of CPUs 31xC*.
- the block diagrams of the integrated I/Os under *Arrangement and use of integrated I/Os*.

8.5 CPU 314C-2 PtP and CPU 314C-2 DP

Technical specifications

Table 8- 6 Technical specifications of CPU 314C-2 PtP and CPU 314C-2 DP

Technical specifications		
	CPU 314C-2 PtP	CPU 314C-2 DP
CPU and version	CPU 314C-2 PtP	CPU 314C-2 DP
• MLFB	6ES7314-6BH04-0AB0	6ES7314-6CH04-0AB0
• Hardware version	01	01
• Firmware version	V3.3	V3.3
• Associated programming package	STEP 7 as of V5.5 + SP1 or STEP 7 as of V5.3 + SP2 with HSP 204	STEP 7 as of V5.5 + SP1 or STEP 7 as of V5.3 + SP2 with HSP 203
Memory	CPU 314C-2 PtP	CPU 314C-2 DP
Main memory		
• Integrated	192 KB	
• Expandable	No	
• Maximum size of non-volatile memory for retentive data blocks	64 KB	
Load memory		
• Pluggable (MMC)	Yes	
• Pluggable (MMC), max.	8 MB	
• Data retention on the Micro Memory Card (after the last programming action), min.	10 years	
Backup		
• Available	Yes (ensured with SIMATIC Micro Memory Card - maintenance-free)	
• Without battery	Yes (program and data)	
Execution times	CPU 314C-2 PtP	CPU 314C-2 DP
• For bit operation, min.	0.06 µs	
• For word operations, min.	0.12 µs	
• For fixed-point arithmetic, min.	0.16 µs	
• Minimum for floating-point arithmetic	0.59 µs	

Technical specifications		
	CPU 314C-2 PtP	CPU 314C-2 DP
Timers/counters and their retentivity	CPU 314C-2 PtP	CPU 314C-2 DP
S7 counters		
• Number	256	
Retentivity		
• Configurable	Yes	
• Default	From C 0 to C 7	
Counting range		
• Low limit	0	
• High limit	999	
IEC counter		
• Available	Yes	
• Type	SFB	
• Number	Unlimited (limited only by main memory size)	
S7 timers		
• Number	256	
Retentivity		
• Configurable	Yes	
• Default	No retentivity	
Time setting range		
• Low limit	10 ms	
• High limit	9990 s	
IEC timer		
• Available	Yes	
• Type	SFB	
• Number	Unlimited (limited only by main memory size)	
Data areas and their retentivity	CPU 314C-2 PtP	CPU 314C-2 DP
Bit memory		
• Number, max.	256 bytes	
• Retentivity, available	Yes (MB 0 to MB 255)	
• Retentivity, default	MB 0 to MB 15	
• Number of clock memories	8 (1 memory byte)	

Technical specifications		
	CPU 314C-2 PtP	CPU 314C-2 DP
Data blocks		
• Number, max.	1024 (in the number range 1 to 16000)	
• Size, max.	64 KB	
• Retentivity, configurable	Yes, via non-retain feature on the DB	
• Retentivity, default	Yes	
Local data		
• Per priority class, max.	32 KB, max. 2048 bytes per block	
Blocks		
• Number of blocks (total)	1024 (DBs, FCs, FBs) The maximum number of blocks that can be loaded may be reduced if you are using another MMC.	
OB		
• Size, max.	64 KB	
• Number of free cycle OBs	1 (OB 1)	
• Number of time-of-day interrupt OBs	1 (OB 10)	
• Number of time-delay interrupt OBs	2 (OB 20, 21)	
• Number of cyclic interrupt OBs	4 (OB 32, 33, 34, 35)	
• Number of hardware interrupt OBs	1 (OB 40)	
• Number of DPV1 interrupt OBs	-	3 (OB 55, 56, 57)
• Number of restart OBs	1 (OB 100)	
• Number of asynchronous error OBs	4 (OB 80, 82, 85, 87)	5 (OB 80, 82, 85, 86, 87)
• Number of synchronous error OBs	2 (OB 121, 122)	
Nesting depth		
• Per priority class	16	
• Additionally within an error OB	4	
FB		
• Number, max.	1024 (in the number range 0 to 7999)	
• Size	64 KB	
FC		
• Number, max.	1024 (in the number range 0 to 7999)	
• Size	64 KB	

Technical specifications		
	CPU 314C-2 PtP	CPU 314C-2 DP
Address ranges (inputs/outputs)	CPU 314C-2 PtP	CPU 314C-2 DP
I/O address area		
• Inputs	1024 bytes (freely addressable)	2048 bytes (freely addressable)
• Outputs	1024 bytes (freely addressable)	2048 bytes (freely addressable)
Distributed		
• Inputs	-	2003 bytes
• Outputs	-	2010 bytes
I/O process image		
• Inputs	1024 bytes	2048 bytes
• Outputs	1024 bytes	2048 bytes
• Inputs, adjustable	1024 bytes	2048 bytes
• Outputs, adjustable	1024 bytes	2048 bytes
• Inputs, preset	128 bytes	
• Outputs, preset	128 bytes	
Digital channels		
• Integrated channels (DI)	24	
• Integrated channels (DO)	16	
• Inputs	1016	16048
• Outputs	1008	16096
• Inputs, of those central	1016	
• Outputs, of those central	1008	
Analog channels		
• Integrated channels (AI)	5 (4 x current/voltage, 1 x resistance)	
• Integrated channels (AO)	2	
• Inputs	253	1006
• Outputs	250	1007
• Inputs, of those central	253	
• Outputs, of those central	250	
Hardware configuration	CPU 314C-2 PtP	CPU 314C-2 DP
• Racks, max.	4	
• Modules per rack, max.	8; max. 7 in rack ER 3	

Technical specifications		
	CPU 314C-2 PtP	CPU 314C-2 DP
Number of DP masters		
• Integrated	-	1
• Via CP	4	4
Number of usable FMs and CPs (recommended)		
• FM	8	
• CP, point-to-point	8	
• CP, LAN	10	
Time		
CPU 314C-2 PtP		
CPU 314C-2 DP		
Clock		
• Hardware clock (real-time)	Yes	
• Buffered, can be synchronized	Yes	
• Factory setting	DT#1994-01-01-00:00:00	
• Buffered period	Typically 6 weeks (at an ambient temperature of 40 °C)	
• Behavior of the real-time clock after POWER ON	The clock continues running after POWER OFF	
• Behavior after expiration of the buffered period	The clock continues at the time of day it had when power was switched off.	
• Daily deviation	10 s, typ.: 2 s	
Runtime meter		
• Number	1	
• Number/number range	0	
• Range of values	0 to 2 ³¹ hours (if SFC 101 is used)	
• Granularity	1 hour	
• Retentive	Yes; must be manually restarted after every restart	
Clock synchronization		
• Supported	Yes	
• On MPI, master	Yes	
• On MPI, slave	Yes	
• On the AS, master	Yes	
• On the AS, slave	No	
• On DP, master	-	Yes, DP slave must be time slave
• On DP, slave	-	Yes

Technical specifications		
	CPU 314C-2 PtP	CPU 314C-2 DP
S7 signaling functions		
	CPU 314C-2 PtP	CPU 314C-2 DP
• Number of stations that can be logged on for signaling functions (e.g. OS)	12 (depends on the number of connections configured for PG/OP and S7 basic communication)	
• Process error diagnostic messages	Yes	
• Simultaneously enabled interrupt S blocks, max.	300	
Test and startup functions		
	CPU 314C-2 PtP	CPU 314C-2 DP
Status/modify		
• Status/modify variable	Yes	
• Variables	Inputs, outputs, bit memories, DBs, timers, counters	
• Maximum number of variables	30	
• Status variables, max.	30	
• Modify variables, max.	14	
Forcing		
• Forcing	Yes	
• Variables	Inputs, outputs	
• Maximum number of tags	10	
Status block	Yes, up to 2 at the same time	
Single step	Yes	
• Number of breakpoints	4	
Diagnostic buffer		
• Available	Yes	
• Maximum number of entries	500	
• Configurable	No	
• Of which are power-failure-proof	100, only the last 100 entries are retentive	
• Maximum number of entries that can be read in RUN	499	
• Number of entries that can be set in RUN	Yes, from 10 to 499	
• Number of preset entries in RUN	10	
Service data		
• Can be read out	Yes	
Monitoring function		
• Status LEDs	Yes	

Technical specifications		
	CPU 314C-2 PtP	CPU 314C-2 DP
Communication functions	CPU 314C-2 PtP	CPU 314C-2 DP
PG/OP communication	Yes	
Prioritized OCM communication		
• Supported	No	
Routing	No	Yes
• Number of routing connections	-	Max. 4
• Data record routing	No	Yes
Global data communication		
• Supported	Yes	
• Number of GD circles, max.	8	
• Number of GD packets, max.	8	
• Number of GD packets, sender, max.	8	
• Number of GD packets, receiver, max.	8	
• Number of GD packets, max.	22 bytes	
• Size of GD packets, of those consistent, max.	22 bytes	
S7 basic communication		
• Supported	Yes	
• User data per job, max.	76 bytes	
• User data per job, consistent, max.	76 bytes (for X_SEND or X_RCV) 64 bytes (for X_PUT or X_GET as the server)	
S7 communication		
• Supported	Yes	
• As server	Yes	
• As client	Yes (via CP and loadable FBs)	
• User data per job, max.	180 bytes (with PUT/GET)	
• User data per job, consistent, max.	240 bytes (as server)	
S5-compatible communication		
• Supported	Yes (via CP and loadable FCs)	
Number of connections		
• Total	12	
Suitable for PG communication		
• PG communication, reserved	1	
• PG communication, configurable, min.	1	
• PG communication, configurable, max.	11	

Technical specifications		
	CPU 314C-2 PtP	CPU 314C-2 DP
Suitable for OP communication	11	
• OP communication, reserved	1	
• OP communication, configurable, min.	1	
• OP communication, configurable, max.	11	
Suitable for S7 basic communication	8	
• S7 basic communication, reserved	0	
• S7 basic communication, configurable, min.	0	
• S7 basic communication, configurable, max.	8	
Connection system		
• Required front connector	2 X 40-pin	
Interfaces	CPU 314C-2 PtP	CPU 314C-2 DP
1st interface		
Interface designation	X1	
Type of interface	Integrated RS 485 interface	
Hardware	RS 485	
• Electrically isolated	No	
• Interface power supply (15 V DC to 30 V DC), max.	200 mA	
Functionality		
• MPI	Yes	
• DP master	No	
• DP slave	No	
• Point-to-point connection	No	
MPI		
Services		
• PG/OP communication	Yes	
• Routing	No	Yes
• Global data communication	Yes	
• S7 basic communication	Yes	
• S7 communication	Yes (only server; connection configured at one end)	
• S7 communication, as client	No (but via CP and loadable FBs)	
• S7 communication, as server	Yes	
• Transmission rate, max.	187.5 kbps	

Technical specifications		
	CPU 314C-2 PtP	CPU 314C-2 DP
2nd interface	CPU 314C-2 PtP	CPU 314C-2 DP
Interface designation	X2	
Type of interface	Integrated RS 422/485 interface	Integrated RS 485 interface
Hardware	RS 422/485	RS 485
• Electrically isolated	Yes	Yes
• Interface power supply (15 V DC to 30 V DC), max.	No	200 mA
Functionality		
• MPI	No	
• DP master	No	Yes
• DP slave	No	Yes
• PROFINET IO controller	No	
• PROFINET IO device	No	
• PROFINET CBA	No	
• Point-to-point connection	Yes	No
DP master		
Services		
• PG/OP communication	-	Yes
• Routing	-	Yes
• Global data communication	-	No
• S7 basic communication	-	Yes (intelligent blocks only)
• S7 communication	-	Yes (only server; connection configured at one end)
• S7 communication, as client	-	No
• S7 communication, as server	-	Yes
• Constant bus cycle time supported	-	Yes
• Isochronous mode	-	No
• SYNC/FREEZE	-	Yes
• Activate/deactivate DP slaves – Max. number of DP slaves that can be enabled / disabled simultaneously	-	Yes 8
• Direct data exchange (cross-traffic)	-	Yes, as subscriber
• DPV1	-	Yes

Technical specifications		
	CPU 314C-2 PtP	CPU 314C-2 DP
Transmission rate, max.	-	Up to 12 mbps
Number of DP slaves, max.	-	124
Address range		
• Inputs, max.	-	2 KB
• Outputs, max.	-	2 KB
User data per DP slave		
• Inputs, max.	-	244 bytes
• Outputs, max.	-	244 bytes
DP slave		
Services		
• PG/OP communication	-	Yes
• Routing	-	Yes (only if interface is active)
• Global data communication	-	No
• S7 basic communication	-	No
• S7 communication	-	Yes (only server; connection configured at one end)
• S7 communication, as client	-	No
• S7 communication, as server	-	Yes
• Direct data exchange (cross-traffic)	-	Yes
• DPV1	-	No
Transmission rate, max.	-	Up to 12 mbps
Automatic baud rate detection	-	Yes (only if interface is passive)
GSD file	-	The current GSD file is available for download at GSD file (http://www.siemens.com/profibus-gsd)
Transfer memory		
• Inputs, max.	-	244 bytes
• Outputs, max.	-	244 bytes
• Address areas, max.	-	32
• User data per address range, max.	-	32 bytes

Technical specifications		
	CPU 314C-2 PtP	CPU 314C-2 DP
Point-to-point connection		
• Transmission rates	38.4kbps half duplex 19.2kbps full duplex	-
• Max. cable length	1200 m	-
• The user program can control the interface	Yes	-
• The interface can trigger an alarm or interrupt in the user program	Yes (message with break ID)	-
• Protocol driver	3964 (R); ASCII and RK512	-
Programming		
Programming language		
• LAD	Yes	
• FBD	Yes	
• STL	Yes	
• SCL	Yes	
• CFC	Yes	
• GRAPH	Yes	
• HiGraph®	Yes	
Instruction set	See instruction list	
• Nesting levels	8	
Know-how protection		
• User program/ password security	Yes	
• Block encryption	Yes, using S7-Block Privacy	
System functions (SFC)	See instruction list	
System function blocks (SFB)	See instruction list	
Integrated inputs/outputs		
Default addresses of the integrated		
Digital inputs	124.0 to 126.7	
Digital outputs	124.0 to 125.7	
Analog inputs	752 to 761	
Analog outputs	752 to 755	

Technical specifications		
	CPU 314C-2 PtP	CPU 314C-2 DP
Integrated functions		
• Number of counters	4 (see the manual <i>Technological Functions</i>)	
• Number of frequency meters	4 channels up to 60 kHz (see the manual <i>Technological Functions</i>)	
• Number of pulse outputs	4, pulse width modulations up to 2.5 kHz (see the manual <i>Technological Functions</i>)	
• Period measurement	4 channels (see the manual <i>Technological Functions</i>)	
• Open-loop positioning	1 channel (see the manual <i>Technological Functions</i>)	
• Integrated function blocks (rules)	PID controller (see the manual <i>Technological Functions</i>)	
Dimensions		
	CPU 314C-2 PtP	CPU 314C-2 DP
• Mounting dimensions W x H x D (mm)	• 120 x 125 x 130	
• Weight, approx.	• 680 g	
Voltages and currents		
	CPU 314C-2 PtP	CPU 314C-2 DP
Power supply (rated value)	24 V DC	
• Low limit of admissible range (DC)	19.2 V	
• High limit of admissible range (DC)	28.8 V	
• Current consumption (open-circuit), typically	150 mA	
• Inrush current, typ.	5 A	
• Current consumption (rated value)	660 mA	880 mA
• I ² t	0.7 A ² s	
• External protection of power supply lines (recommended)	MCB type C min. 2 A, MCB type B min. 4 A	
• Power loss, typically	13 W	

Reference

In the chapter *Technical specifications of the integrated I/O* you can find:

- the technical specifications of integrated I/Os under *Digital inputs of CPUs 31xC* and *Digital outputs of CPUs 31xC*.
- the block diagrams of the integrated I/Os under *Arrangement and use of integrated I/Os*.

8.6 CPU 314C-2 PN/DP

Technical specifications

Table 8- 7 Technical specifications of the CPU 314C-2 PN/DP

Technical specifications	
CPU and version	
• MLFB	6ES7314-6EH04-0AB0
• Hardware version	01
• Firmware version	V3.3
• Associated programming package	STEP 7 as of V5.5 and HSP 191
Memory	
Main memory	
• Integrated	192 KB
• Expandable	No
• Maximum size of non-volatile memory for retentive data blocks	64 KB
Load memory	
• Pluggable (MMC)	Yes
• Pluggable (MMC), max.	8 MB
• Data retention on the Micro Memory Card (after the last programming action), min.	10 years
Backup	
• Available	Yes (ensured with Micro Memory Card - maintenance-free)
• Without battery	Yes (program and data)
Execution times	
• For bit operation, min.	0.06 μ s
• For word operations, min.	0.12 μ s
• For fixed-point arithmetic, min.	0.16 μ s
• Minimum for floating-point arithmetic	0.59 μ s
Timers/counters and their retentivity	
S7 counters	
• Number	256
Retentivity	
• Configurable	Yes
• Default	Z 0 to Z 7

Technical specifications	
Counting range	
• Low limit	0
• High limit	999
IEC counter	
• Available	Yes
• Type	SFB
• Number	Unlimited (limited only by main memory size)
S7 timers	
• Number	256
Retentivity	
• Configurable	Yes
• Default	No retentivity
Time setting range	
• Low limit	10 ms
• High limit	9990 s
IEC timer	
• Available	Yes
• Type	SFB
• Number	Unlimited (limited only by main memory size)
Data areas and their retentivity	
Bit memory	
• Number, max.	256 bytes
• Retentivity, available	Yes (from MB 0 to MB 255)
• Retentivity, default	MB 0 to MB 15
• Number of clock memories	8 (1 memory byte)
Data blocks	
• Number, max.	1024 (in the number range 1 to 16000)
• Size, max.	64 KB
• Retentivity, configurable	Yes, via non-retain feature on the DB
• Retentivity, default	Yes
Local data	
• Per priority class, max.	32 KB, max. 2048 KB per block

Technical specifications	
Blocks	
• Number of blocks (total)	1024 (DBs, FCs, FBs) The maximum number of blocks that can be loaded may be reduced due to the Micro Memory Card you are using.
OB	See instruction list
• Size, max.	64 KB
• Number of free cycle OBs	1 (OB 1)
• Number of time-of-day interrupt OBs	1 (OB 10)
• Number of time-delay interrupt OBs	2 (OB 20, 21)
• Number of cyclic interrupt OBs	4 (OB 32, 33, 34, 35)
• Number of hardware interrupt OBs	1 (OB 40)
• Number of DPV1 interrupt OBs	3 (OB 55, 56, 57)
• Number of isochronous interrupt OBs	1 (OB 61), only for PROFINET IO
• Number of restart OBs	1 (OB 100)
• Number of asynchronous error OBs	6 (OB 80, 82, 83, 85, 86, 87) (OB 83 for PROFINET IO)
• Number of synchronous error OBs	2 (OB 121, 122)
Nesting depth	
• Per priority class	16
• Additionally within an error OB	4
FB	See instruction list
• Number, max.	1024 (in the number range 0 to 7999)
• Size	64 KB
FC	See instruction list
• Number, max.	1024 (in the number range 0 to 7999)
• Size	64 KB
Address ranges (inputs/outputs)	
I/O address area	
• Inputs	2048 bytes (freely addressable)
• Outputs	2048 bytes (freely addressable)
Distributed	
• Inputs	2003 bytes
• Outputs	2010 bytes
I/O process image	
• Inputs	2048 bytes

Technical specifications	
• Outputs	2048 bytes
• Inputs, adjustable	2048 bytes
• Outputs, adjustable	2048 bytes
• Inputs, preset	256 bytes
• Outputs, preset	256 bytes
Process image partitions	
• Number of process image partitions	1
• Amount of user data in the process image partition for isochronous PROFINET IO, max.	1600 bytes
Digital channels	
• Integrated channels (DI)	24
• Integrated channels (DO)	16
• Inputs	16048
• Outputs	16096
• Inputs, of those central	1016
• Outputs, of those central	1008
Analog channels	
• Integrated channels (AI)	5 (4 x current/voltage, 1 x resistance)
• Integrated channels (AO)	2
• Inputs	1006
• Outputs	1007
• Inputs, of those central	253
• Outputs, of those central	250
Hardware configuration	
• Racks, max.	4
• Modules per rack, max.	8, max. 7 in rack 3
Number of DP masters	
• Integrated	1
• Via CP	4
Number of usable FMs and CPs (recommended)	
• FM	8
• CP, point-to-point	8
• CP, LAN	10

Technical specifications	
Time	
Clock	
• Hardware clock (real-time)	Yes
• Buffered, can be synchronized	Yes
• Factory setting	DT#1994-01-01-00:00:00
• Buffered period	Typically 6 weeks (at an ambient temperature of 40 °C)
• Behavior of the real-time clock after POWER ON	The clock continues running after POWER OFF.
• Behavior of the clock on expiration of the buffered period	The clock continues at the time of day it had when power was switched off.
• Daily deviation	10 s, typ. 2 s
Runtime meter	
• Number	1
• Number/number range	0
• Range of values	0 to 2 ³¹ hours (using the SFC 101)
• Granularity	1 hour
• Retentive	Yes; must be manually restarted after every restart
Clock synchronization	
• Supported	Yes
• On the AS, master	Yes
• On the AS, slave	Yes
• On MPI, master	Yes
• On MPI, slave	Yes
• On DP, master	Yes (DP slave must be time slave)
• On DP, slave	Yes
• On Ethernet via NTP	Yes (as client)
S7 signaling functions	
• Number of stations that can be logged on for signaling functions, max.	12 (depends on the number of connections configured for PG/OP and S7 basic communication)
• Process error diagnostic messages	Yes
• Simultaneously enabled interrupt S blocks, max.	300

Technical specifications	
Test and startup functions	
Status/modify	
• Status/modify variable	Yes
• Variables	Inputs, outputs, bit memories, DBs, timers, counters
• Maximum number of variables	30
• Status variables, max.	30
• Modify variables, max.	14
Forcing	
• Forcing	Yes
• Variables	Inputs/outputs
• Maximum number of tags	10
Maximum number of status blocks	Yes, up to 2 at the same time
Single step	
• Number of breakpoints	4
Diagnostic buffer	
• Available	Yes
• No. of entries, max.	500
• Configurable	No
• Of which are power-failure-proof	100, only the last 100 entries are retentive
• Maximum number of entries that can be read in RUN	499
• Number of entries that can be set in RUN	Yes (from 10 to 499)
• Number of preset entries in RUN	10
Service data	
• Can be read out	Yes
Monitoring function	
• Status LEDs	Yes
Communication functions	
PG/OP communication	Yes
Prioritized OCM communication	No
Routing	
• Number of routing connections	X1 as MPI: max. 10; X1 as DP master: max. 24 X1 as DP slave (active): max. 14 X2 as PROFINET: Max. 24
• Data record routing	Yes

Technical specifications	
Global data communication	
• Supported	Yes
• Number of GD circles, max.	8
• Number of GD packages, max.	8
• Number of GD packages, sender, max.	8
• Number of GD packages, receiver, max.	8
• Size of GD packages, max.	22 bytes
• Size of GD packages, of those consistent, max.	22 bytes
S7 basic communication	
• Supported	Yes
• User data per job, max.	76 bytes
• User data per job, consistent, max.	76 Bytes (for X-SEND/REC), 64 bytes (for X-PUT/GET as server)
S7 communication	
• Supported	Yes
• As server	Yes
• As client	Yes (via integrated PN interface and loadable FBs, or via CP and loadable FBs)
• User data per job, max.	See the STEP 7 Online Help, <i>Common parameters of SFBs/FBs and SFC/FC of the S7 communication</i>
S5-compatible communication	
• Supported	Yes (via CP and loadable FCs)
Web server	
• Supported	Yes
• Number of HTTP clients	5
• User-defined web pages	Yes
Open IE communication	
• Supported	Yes
• Number of connections/access points, total	8
• Local port number used at the system end	0, 20, 21, 23, 25, 80, 102, 135, 161, 8080, 34962, 34963, 34964, 65532, 65533, 65535
TCP/IP	
• Maximum number of connections	8
• Data length for connection type 01 _H , max.	1460 bytes
• Data length for connection type 11 _H , max.	32768 bytes

Technical specifications	
• Multiple passive connections per port (multiport), supported	Yes
ISO on TCP (RFC1006)	Yes (via integrated PROFINET interface and loadable FBs)
• Maximum number of connections	8
• Data length, max.	32768 bytes
UDP	Yes (via integrated PROFINET interface and loadable FBs)
• Maximum number of connections	8
• Data length, max.	1472 bytes
iPAR server	
• Supported	Yes
Number of connections	
• Total	12
Suitable for PG communication	
• PG communication, reserved	1
• PG communication, configurable, min.	1
• PG communication, configurable, max.	11
Suitable for OP communication	
• OP communication, reserved	1
• OP communication, configurable, min.	1
• OP communication, configurable, max.	11
Suitable for S7 basic communication	
• S7 basic communication, reserved	0
• S7 basic communication, configurable, min.	0
• S7 basic communication, configurable, max.	8
Suitable for S7 communication	
• S7 communication, reserved	0
• S7 communication, configurable, min.	0
• S7 communication, configurable, max.	10
Total number of instances, max.	32
PROFINET CBA (with communication load setpoint)	
• Reference setting for CPU communication	50 %
• Number of remote interconnecting partners	32
• Number of master/slave functions	30
• Total of all master/slave connections	1000

Technical specifications	
• Data length of all incoming master/slave connections, max.	4000 bytes
• Data length of all outgoing master/slave connections, max.	4000 bytes
• Number of device-internal and PROFIBUS interconnections	500
• Data length of the device-internal and PROFIBUS interconnections, max.	4000 bytes
• Data length per connection, max.	1400 bytes
Remote interconnections with acyclic transmission	
• Sampling rate: Sampling time, min.	500 ms
• Number of incoming interconnections	100
• Number of outgoing interconnections	100
• Data length of all incoming interconnections, max.	2000 bytes
• Data length of all outgoing interconnections, max.	2000 bytes
• Data length per connection (acyclic interconnections), max.	1400 bytes
Remote interconnections with cyclic transmission	
• Transmission frequency: Minimum transmission interval	10 ms
• Number of incoming interconnections	200
• Number of outgoing interconnections	200
• Data length of all incoming interconnections, max.	2000 bytes
• Data length of all outgoing interconnections, max.	2000 bytes
• Data length per connection (acyclic interconnections), max.	450 bytes
HMI variables via PROFINET (acyclic)	
• HMI variables update	500 ms
• Number of stations that can be logged on for HMI variables (PN OPC/iMAP)	3, 2xPN OPC/1x iMAP
• Number of HMI variables	200
• Data length of all HMI variables, max.	2000 bytes
PROFIBUS proxy functionality	
• Supported	Yes

Technical specifications	
• Number of coupled PROFIBUS devices	16
• Data length per connection, max.	240 bytes (slave dependent)
Interfaces	
1st interface	
Interface designation	X1
Type of interface	Integrated RS 485 interface
Hardware	RS 485
• electrically disconnected	Yes
• Interface power supply (15 V DC to 30 V DC), max.	200 mA
Functionality	
• MPI	Yes
• DP master	Yes
• DP slave	Yes
• PROFINET IO device	No
• PROFINET IO controller	No
• PROFINET CBA	No
• Open IE communication	No
• Web server	No
• Point-to-point connection	No
MPI	
Services	
• PG/OP communication	Yes
• Routing	Yes
• Global data communication	Yes
• S7 basic communication	Yes
• S7 communication	Yes (server only, connections configured at one end)
• S7 communication, as client	No (but via CP and loadable FBs)
• S7 communication, as server	Yes
Transmission rate, max.	12 Mbps
DP master	
Services	
• PG/OP communication	Yes
• Routing	Yes
• Global data communication	No

Technical specifications	
• S7 basic communication	Yes (only I blocks)
• S7 communication	Yes (server only, connections configured at one end)
• Constant bus cycle time supported	Yes
• Isochronous mode	No
• SYNC/FREEZE	Yes
• Activation/deactivation of DP slaves – Max. number of DP slaves that can be enabled / disabled simultaneously	Yes 8
• Direct data exchange (cross-traffic)	Yes (as subscriber)
• DPV1	Yes
Transmission rate, max.	12 Mbps
Number of DP slaves, max.	124
Address range	
• Inputs, max.	2 KB
• Outputs, max.	2 KB
User data per DP slave	
• Inputs, max.	244 bytes
• Outputs, max.	244 bytes
DP slave	
Services	
• PG/OP communication	Yes
• Routing	Yes (only if interface is active)
• Global data communication	No
• S7 basic communication	No
• S7 communication	Yes (only server; connection configured at one end)
• Direct data exchange (cross-traffic)	Yes
• DPV1	No
Transmission rate, max.	12 Mbps
Automatic baud rate detection	Yes (only if interface is passive)
Transfer memory	
• Inputs	244 bytes
• Outputs	244 bytes
• Address range, max.	32
• User data per address range, max.	32 bytes

Technical specifications	
GSD file	The current GSD file is available for download from the Internet (http://www.siemens.com/profibus-gsd).
2nd interface	
Interface designation	X2
Type of interface	PROFINET
Hardware	Ethernet RJ 45
• electrically disconnected	Yes
• Integrated switch	Yes
• Number of ports	2
• Automatic determination of the transmission rate	Yes (10/100 Mbps)
• Autonegotiation	Yes
• Autocrossing	Yes
Media redundancy	
• Supported	Yes
• Changeover time on line break, typically	200 ms (PROFINET MRP)
• Number of nodes on the ring, max.	50
Change of the IP address at runtime, supported	Yes
Keep Alive function, supported	Yes
Functionality	
• MPI	No
• DP master	No
• DP slave	No
• PROFINET IO controller	Yes, even simultaneously with IO device functionality
• PROFINET IO device	Yes, even simultaneously with IO controller functionality
• PROFINET CBA	Yes (acyclic and cyclic transmission)
• Open IE communication	Yes; via TCP/IP, ISO on TCP, UDP
• Web server – Number of HTTP clients	Yes 5
PROFINET IO controller	
Services	
• PG/OP communication	Yes
• Routing	Yes
• S7 communication	Yes, with loadable FBs, max. configurable connections: 10, Maximum number of instances: 32

Technical specifications	
• Open IE communication	Yes; via TCP/IP, ISO on TCP, UDP
Number of integrated PROFINET IO controllers	1
RT, supported	Yes
IRT, supported	Yes
Transmission rate, max.	100 Mbps
Maximum number of connectable IO devices	128
Number of connectable IO devices, for RT, max.	128
• of which in line, max.	128
Number of IO devices with IRT and "high flexibility" option	128
• of which in line, max.	61
Number of IO devices with IRT and "high performance" option, max.	64
• of which in line, max.	64
Shared Device, supported	Yes
Isochronous mode	Yes, OB61
Prioritized startup, supported	Yes
• Maximum number of IO devices with prioritized startup	32
Activating/deactivating of PROFINET IO Devices	Yes
• Number of IO devices that can be enabled / disabled simultaneously, max.	8
IO devices changing during runtime (partner ports), supported	Yes
• Number of IO devices per tool, max.	8
Device replacement without removable medium	Yes
Send clocks	250 µs, 500 µs, 1 ms 2 ms, 4 ms (not for IRT with "high flexibility" option)
Update time	
• Update times	The minimum update time also depends on the time slice set for PROFINET IO communication, the number of IO Devices used, and on the amount of configured user data.
With RT	
• for send clock of 250 µs	250 µs to 128 ms
• for send clock of 500 µs	500 µs to 256 ms
• for send clock of 1 ms	1 ms to 512 ms
• for send clock of 2 ms	2 ms to 512 ms
• for send clock of 4 ms	4 ms to 512 ms

Technical specifications	
For IRT with "high flexibility" option	
• for send clock of 250 µs	250 µs to 128 ms
• for send clock of 500 µs	500 µs to 256 ms
• for send clock of 1 ms	1 ms to 512 ms
For IRT with "high performance" option	
• for send clock of 250 µs	250 µs to 4 ms
• for send clock of 500 µs	500 µs to 8 ms
• for send clock of 1 ms	1 ms to 16 ms
• for send clock of 2 ms	2 ms to 32 ms
• for send clock of 4 ms	4 ms to 64 ms
For IRT with "high performance" option and parameter assignment for "odd-numbered" send clocks	Update time = "odd-numbered" send clock set (any multiple of 125 µs: 375 µs, 625 µs to 3.875 ms)
Address range	
• Inputs, max.	2048 bytes
• Outputs, max.	2048 bytes
User data per address range, max.	
• User data consistency, max.	1024 bytes
PROFINET IO device	
Services	
• PG/OP communication	Yes
• Routing	Yes
• S7 communication	Yes, with loadable FBs, max. configurable connections: 10, Maximum number of instances: 32
• Open IE communication	Yes; via TCP/IP, ISO on TCP, UDP
RT, supported	Yes
IRT, supported	Yes
PROFenergy, supported	Yes, prepared with SFB 73 / 74 for loadable PROFenergy standard FBs for intelligent IO devices
Shared Device, supported	Yes
• Number of IO controllers for shared devices, max.	2
Isochronous mode	No
Application transfer areas	Yes
IO devices transfer area	No

Technical specifications	
Transfer memory	
• Inputs, max.	1440 bytes, per controller for shared devices
• Outputs, max.	1440 bytes, per controller for shared devices
Submodules	
• Number, max.	64
• User data per submodule, max.	1024 bytes
Programming	
Programming language	
• LAD	Yes
• FBD	Yes
• STL	Yes
• SCL	Yes
• CFC	Yes
• GRAPH	Yes
• HiGraph®	Yes
Instruction set	
• Nesting levels	8
Know-how protection	
• User program/password security	Yes
• Encryption of blocks	Yes, using S7-Block Privacy
System functions (SFC)	
See instruction list	
System function blocks (SFB)	
See instruction list	
Integrated inputs/outputs	
Default addresses of the integrated	
Digital inputs	136 to 138
Digital outputs	136 to 137
Analog inputs	800 to 809
Analog outputs	800 to 803
Integrated functions	
• Number of counters	4 (see the Manual <i>Technological Functions</i>)
• Number of frequency meters	4 channels up to 60 kHz (see the Manual <i>Technological Functions</i>)
• Open-loop positioning	1 channel (see the Manual <i>Technological Functions</i>)
• Integrated function blocks (rules)	PID controller (see Manual <i>Technological Functions</i>)
• Number of pulse outputs	4 channels for pulse width modulation up to 2.5 kHz (see the Manual <i>Technological Functions</i>)

8.7 Technical specifications of the onboard I/O

Technical specifications	
Dimensions	
• Mounting dimensions W x H x D (mm)	120 x 125 x 130
• Weight	730 g
Voltages and currents	
Power supply (rated value)	24 V DC
• Low limit of admissible range (DC)	19.2 V
• High limit of admissible range (DC)	28.8 V
• Current consumption (open-circuit), typically	190 mA
• Current consumption (rated value)	850 mA
• Inrush current, typ.	5 A
• I ² t	0.7 A ² s
• External protection of power supply lines (recommended), min.	MCB switch, Type C, min. 2 A; MCB switch, Type B, min. 4 A
• Power loss, typically	16 W

Reference

In the chapter *Technical specifications of the integrated I/O* you can find:

- the technical specifications of integrated I/Os under *Digital inputs of CPUs 31xC* and *Digital outputs of CPUs 31xC*.
- the block diagrams of the integrated I/Os under *Arrangement and use of integrated I/Os*.

8.7 Technical specifications of the onboard I/O

8.7.1 Arrangement and usage of integrated inputs/outputs

Introduction

The integrated inputs/outputs of the 31xC CPUs can be used for technological functions or as standard I/Os.

The figures below illustrate the possible usage of I/Os integrated in the CPUs.

Reference

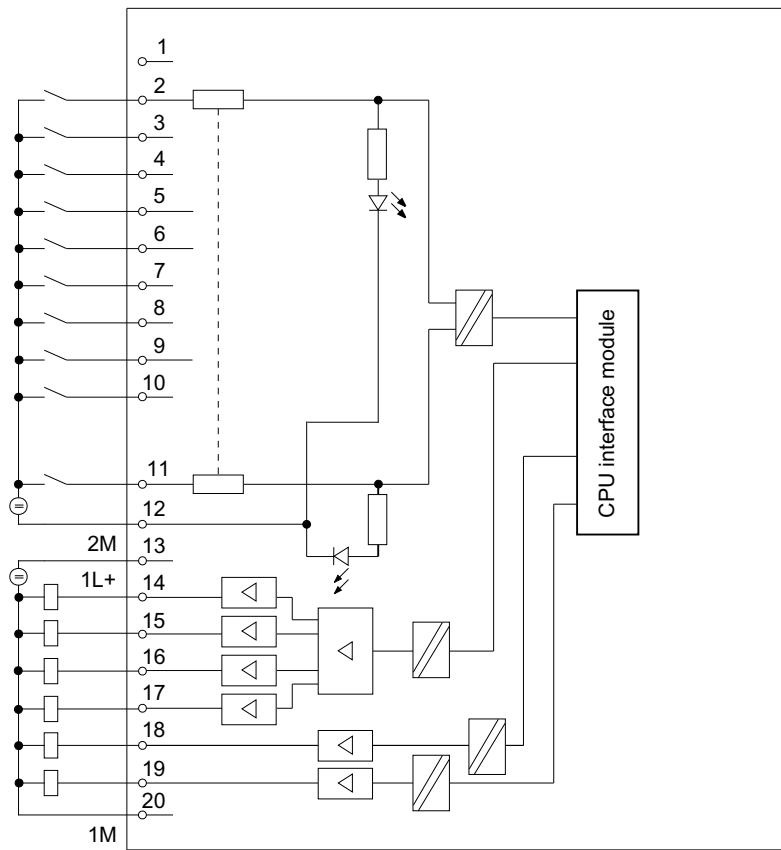
Additional information on integrated I/Os can be found in the Manual *Technical Functions*.

CPU 312C: Pin assignment of the integrated DI/DO (connector X11)

Standard	Interrupt input	Counting	X11	
			1 ⌀	
DI	X	Z0 (A)	2 ⌀	DI+0.0
DI	X	Z0 (B)	3 ⌀	DI+0.1
DI	X	Z0 (HW-Tor)	4 ⌀	DI+0.2
DI	X	Z1 (A)	5 ⌀	DI+0.3
DI	X	Z1 (B)	6 ⌀	DI+0.4
DI	X	Z1 (HW-Tor)	7 ⌀	DI+0.5
DI	X	Latch 0	8 ⌀	DI+0.6
DI	X	Latch 1	9 ⌀	DI+0.7
DI	X		10 ⌀	DI+1.0
	X		11 ⌀	DI+1.1
			12 ⌀	2M
			13 ⌀	1L+
DO		V0	14 ⌀	DO+0.0
DO		V1	15 ⌀	DO+0.1
DO			16 ⌀	DO+0.2
DO			17 ⌀	DO+0.3
DO			18 ⌀	DO+0.4
DO			19 ⌀	DO+0.5
			20 ⌀	1M

- Zn Counter n
- A, B Sensor signals
- Vn Comparator n
- X Pin can be used, provided it is not in use by technological functions
- HW-Tor Gate control
- Latch Save counter value

Block diagram of the integrated digital I/Os



CPU 313C, CPU 313C-2 DP/PtP, CPU 314C-2 DP/PtP, CPU 314C-2 PN/DP: DI/DO (connectors X11 and X12)

X11 of the CPU 313C-2 PtP, CPU 313C-2 DP
X12 of the CPU 313C, CPU 314C-2 PtP, CPU 314C-2 DP, CPU 314C-2 PN/DP

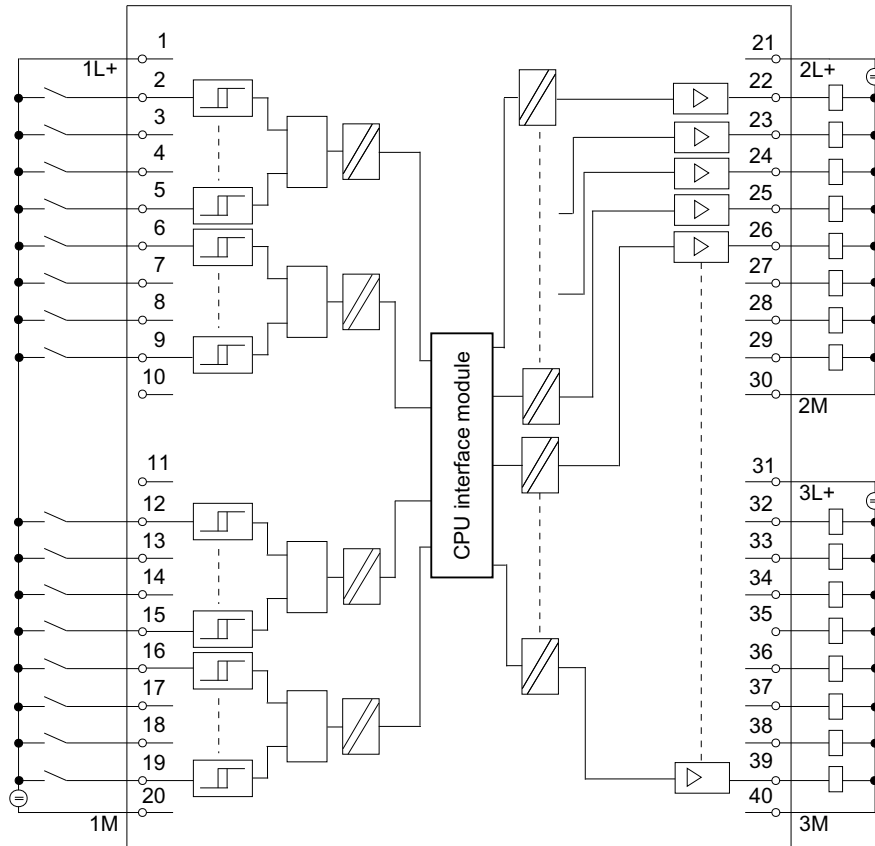
Standard DI	Interrupt input	Counting	Positioning 1)	Positioning 1)				digital	analog	Counting	Standard DO
				1 \emptyset	1L+	2L+	\emptyset 21				
X	X	Z0 (A)	A 0	2 \emptyset	DI+0.0	DO+0.0	\emptyset 22			V0	X
X	X	Z0 (B)	B 0	3 \emptyset	DI+0.1	DO+0.1	\emptyset 23			V1	X
X	X	Z0 (HW-Tor)	N 0	4 \emptyset	DI+0.2	DO+0.2	\emptyset 24			V2	X
X	X	Z1 (A)	Tast 0	5 \emptyset	DI+0.3	DO+0.3	\emptyset 25			V3 1)	X
X	X	Z1 (B)	Bero 0	6 \emptyset	DI+0.4	DO+0.4	\emptyset 26				X
X	X	Z1 (HW-Tor)		7 \emptyset	DI+0.5	DO+0.5	\emptyset 27				X
X	X	Z2 (A)		8 \emptyset	DI+0.6	DO+0.6	\emptyset 28		CONV_EN		X
X	X	Z2 (B)		9 \emptyset	DI+0.7	DO+0.7	\emptyset 29		CONV_DIR		X
				10 \emptyset		2M	\emptyset 30				
				11 \emptyset		3L+	\emptyset 31				
X	X	Z2 (HW-Tor)		12 \emptyset	DI+1.0	DO+1.0	\emptyset 32	R+			X
X	X	Z3 (A)		13 \emptyset	DI+1.1	DO+1.1	\emptyset 33	R-			X
X	X	Z3 (B)	1)	14 \emptyset	DI+1.2	DO+1.2	\emptyset 34	Rapid traverse			X
X	X	Z3 (HW-Tor)	1)	15 \emptyset	DI+1.3	DO+1.3	\emptyset 35	Slow-action			X
X	X	Z0 (Latch)		16 \emptyset	DI+1.4	DO+1.4	\emptyset 36				X
X	X	Z1 (Latch)		17 \emptyset	DI+1.5	DO+1.5	\emptyset 37				X
X	X	Z2 (Latch)		18 \emptyset	DI+1.6	DO+1.6	\emptyset 38				X
X	X	Z3 (Latch)	1)	19 \emptyset	DI+1.7	DO+1.7	\emptyset 39				X
				20 \emptyset	1M	3M	\emptyset 40				

- Zn Counter n
- A, B Encoder signals
- HW gate Gate Control
- Latch Save counter value
- Vn Comparator n
- Probe 0 Probe 0
- Bero 0 Reference point switch 0
- R+, R- Directional signal
- Rapid traverse Rapid traverse
- Slow-action Creep speed
- CONV_EN Enable power unit
- CONV_DIR Direction signal (only with control mode "voltage 0 to 10 V or current from 0 mA to 10 mA and direction signal")
- X Pin can be used, provided it is not in use by technological functions
- 1) CPU 314C-2 only

Reference

Additional information can be found in the Manual *Technical Functions* under *Counting, Frequency Measurement and Pulse Width Modulation*

Block diagram of the integrated digital I/Os of the CPUs 313C/313C-2/314C-2

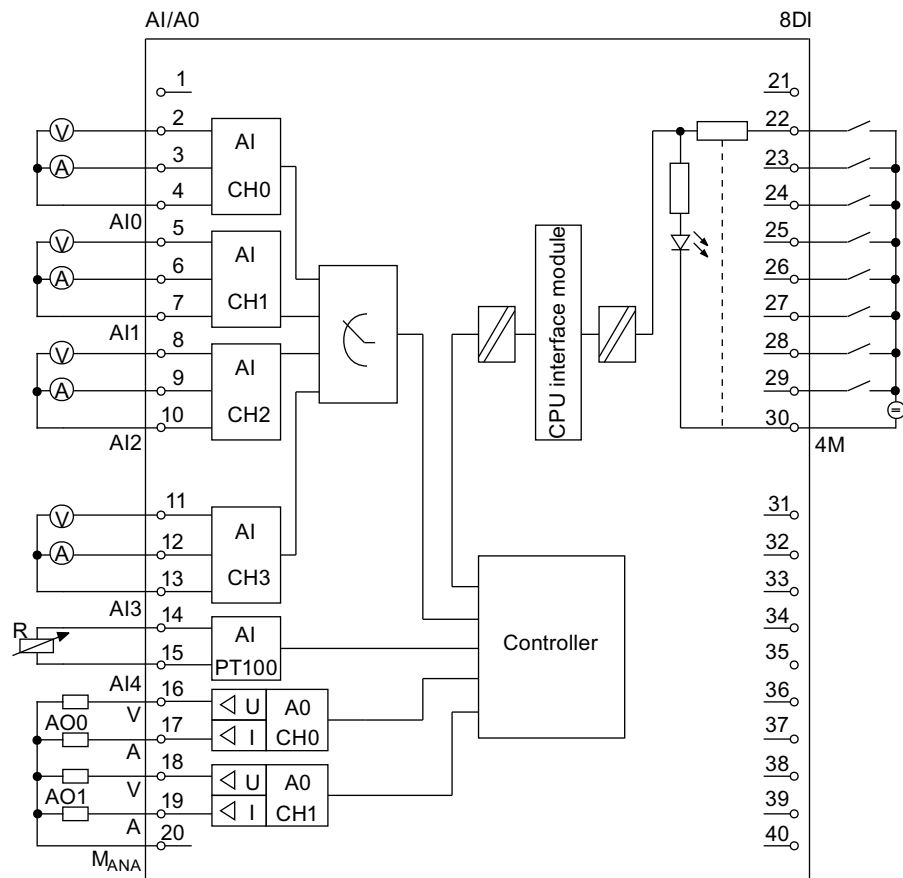


CPU 313C/314C-2: Pin-out of the integrated AI/AO and DI (connector X11)

Standard		Position	X11				Standard DI	Interrupt input
		1)	1		Ø 21			
AI (Ch0)	V		2 Ø		DI+2.0	Ø 22	X	X
	I		3 Ø	PEWx+0	DI+2.1	Ø 23	X	X
	C		4 Ø		DI+2.2	Ø 24	X	X
AI (Ch1)	V		5 Ø		DI+2.3	Ø 25	X	X
	I		6 Ø	PEWx+2	DI+2.4	Ø 26	X	X
	C		7 Ø		DI+2.5	Ø 27	X	X
AI (Ch2)	V		8 Ø		DI+2.6	Ø 28	X	X
	I		9 Ø	PEWx+4	DI+2.7	Ø 29	X	X
	C		10 Ø		4M	Ø 30		
AI (Ch3)	V		11 Ø			Ø 31		
	I		12 Ø	PEWx+6		Ø 32		
	C		13 Ø			Ø 33		
PT 100 (Ch4)			14 Ø	PEWx+8		Ø 34		
			15 Ø			Ø 35		
AO (Ch0)	V	Manipulated value 0	16 Ø	PAWx+0		Ø 36		
	A		17 Ø			Ø 37		
AO (Ch1)	V		18 Ø	PAWx+2		Ø 38		
	A		19 Ø			Ø 39		
			20 Ø	M _{ANA}		Ø 40		

1) only CPU 314C-2

Block diagram of integrated digital/analog I/Os of the CPUs 313C/314C-2



Simultaneous usage of technological functions and standard I/Os

Technological functions and standard I/Os can be used simultaneously with the appropriate hardware. For example, you can use all digital inputs not used for counting functions as standard DI.

Read access to inputs used by technological functions is possible. Write access to outputs used by technological functions is not possible.

See also

- CPU 312C (Page 215)
- CPU 313C (Page 224)
- CPU 313C-2 PtP and CPU 313C-2 DP (Page 233)
- CPU 314C-2 PtP and CPU 314C-2 DP (Page 245)
- CPU 314C-2 PN/DP (Page 257)

8.7.2 Analog I/O devices

Abbreviations used in the figures below

M	Ground connection
Mx+	Measuring line "+" (positive), for channel x
Mx-	Measuring line "-" (negative), for channel x
M _{ANA}	Reference potential of the analog measuring circuit
Al _{xU}	Voltage input "+" for channel x
Al _{xI}	Current input "+" for channel x
Al _{xC}	Common current and voltage input "-" for channel x
Al _x	Analog input channel x

Wiring of the current/voltage inputs

The figures below shows the wiring diagram of the current/voltage inputs operated with 2-/4-wire transducers.

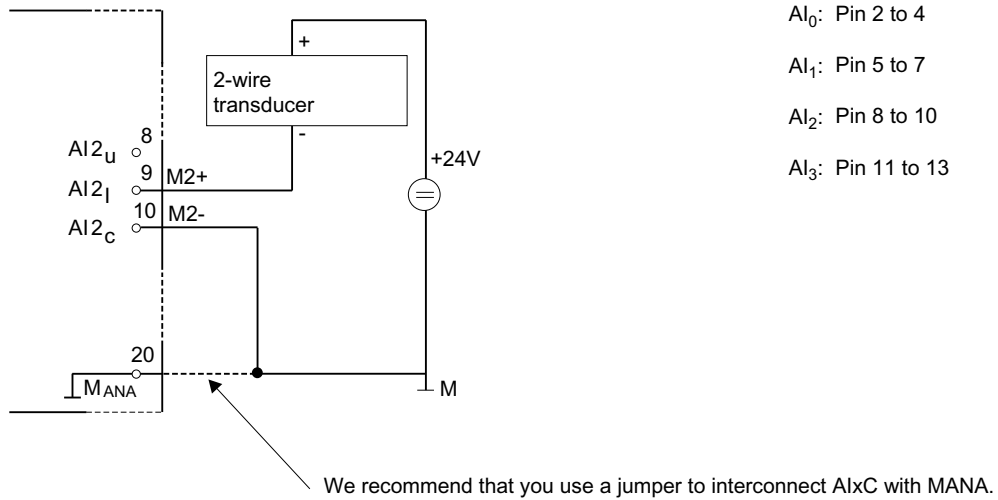


Figure 8-1 Connection of a 2-wire transducer to an analog current/voltage input of the CPU 313C/314C-2

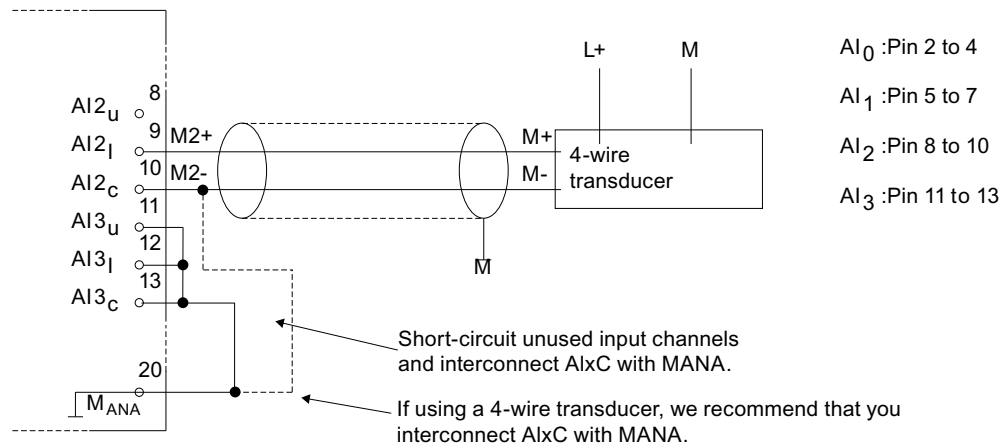


Figure 8-2 Connection of a 4-wire transducer to an analog current/voltage input of the CPU 313C/314C-2

Measuring principle

31xC CPUs use the measuring principle of actual value encoding. They operate with a sampling rate of 1 kHz. That is, a new value is available at the peripheral input word register once every millisecond and can then be read via the user program (e.g. L PEW). The "previous" value is read again if access times are shorter than 1 ms.

Integrated hardware low-pass filter

The analog input signals of channels 0 to 3 pass through integrated low-pass filters. They are attenuated according to the trend in the figure below.

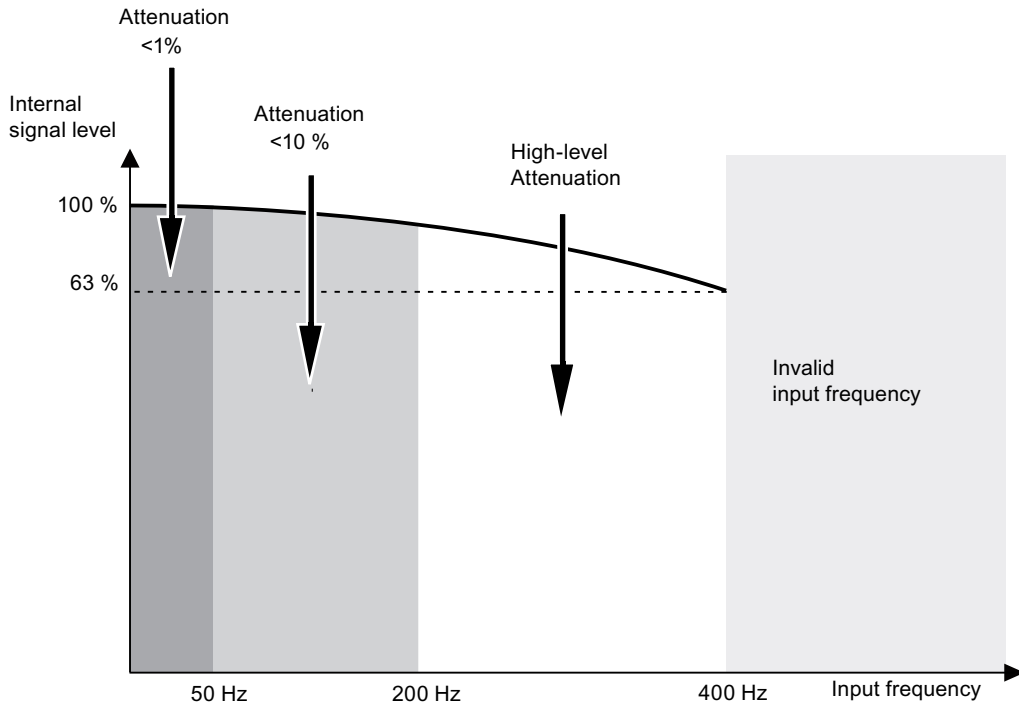


Figure 8-3 Low-pass characteristics of the integrated filter

Note

The maximum frequency of the input signal is 400 Hz.

Input filters (software filter)

The current/voltage inputs have a software filter for the input signals which can be parameterized with STEP 7. It filters the parameterized interference frequency (50/60 Hz) and multiples thereof.

The selected interference frequency suppression also determines the integration time. With an interference frequency suppression of 50 Hz the software filter generates the mean value based on the last 20 measurements and saves the result as a measured value.

You can suppress interference frequencies (50 Hz or 60 Hz) according to the parameters set in STEP 7. The interference frequency suppression will not work with a setting of 400 Hz (software filter deactivated).

The analog input signals of channels 0 to 3 pass through integrated low-pass filters.

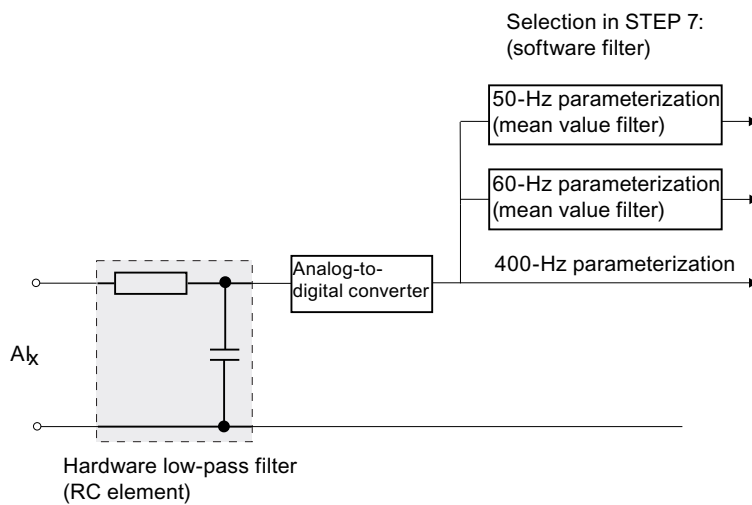


Figure 8-4 Principle of interference suppression with STEP 7

The two graphics below illustrate the principle of operation of 50 Hz and 60 Hz interference frequency suppression

Example of a 50 Hz interference suppression (integration time corresponds to 20 ms)

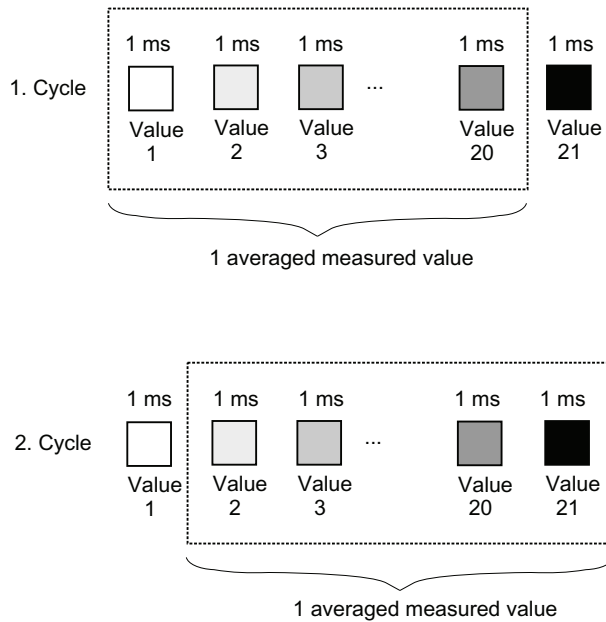


Figure 8-5 50 Hz interference frequency suppression

Example of a 60 Hz interference suppression (integration time corresponds to 16,7 ms)

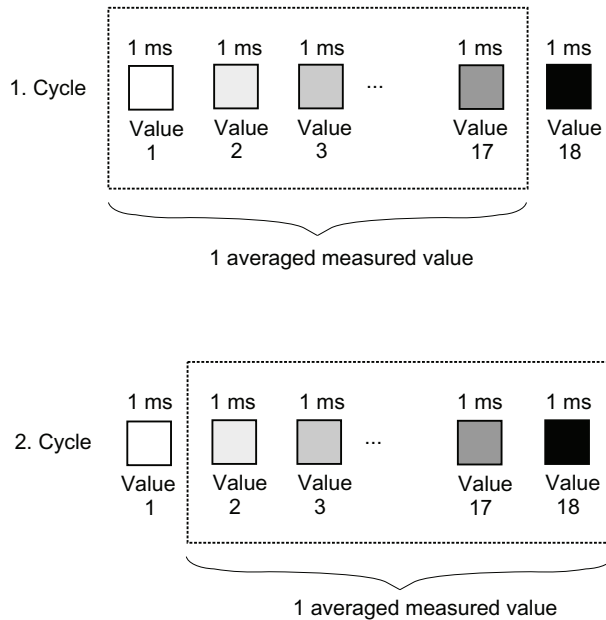


Figure 8-6 60 Hz interference frequency suppression

Note

If the interference frequency is not 50/60 Hz or a multiple thereof, the input signal must be filtered externally.

In this case, 400 Hz interference frequency suppression must be configured for the respective input. This is equivalent to a "deactivation" of the software filter.

Inputs not connected

The 3 inputs of a current/voltage analog output channel that is not connected should be bypasses and connected to M_{ANA} (pin 20 of the front connector). This ensures maximum interference immunity for these analog inputs.

Outputs not connected

In order to disconnect unused analog outputs from power, you must disable and leave them open during parameter assignment with STEP 7.

Reference

For detailed information (e.g. visualization and processing of analog values), refer to Chapter 4 of the *Module Data* Manual.

8.7.3 Parameterization

Introduction

You configure the integrated I/O of CPU 31xC with STEP 7. Always make these settings when the CPU is in STOP mode. The generated parameters are downloaded from the PG to the S7-300 and written to CPU memory .

You can also choose to change the parameters with SFC 55 in the user program (see the Reference Manual *System and Standard Functions*). Refer to the structure of record 1 for the respective parameters.

Parameters of standard DI

The table below gives you an overview of the parameters for standard digital inputs.

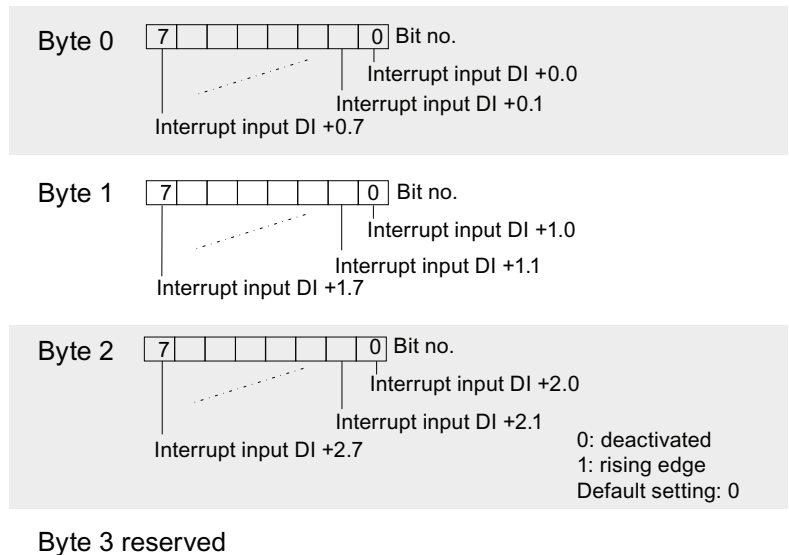
Table 8- 8 Parameters of standard DI

Parameters	Range of values	Default	Scope
Input delay (ms)	0,1/0,5/3/15	3	Channel group

The table below gives you an overview of the parameters when using digital inputs as interrupt inputs.

Table 8- 9 Parameters of the interrupt inputs

Parameters	Range of values	Default	Scope
Interrupt input	Disabled/rising edge	Disabled	Digital input
Interrupt input	Disabled/falling edge	Disabled	Digital input



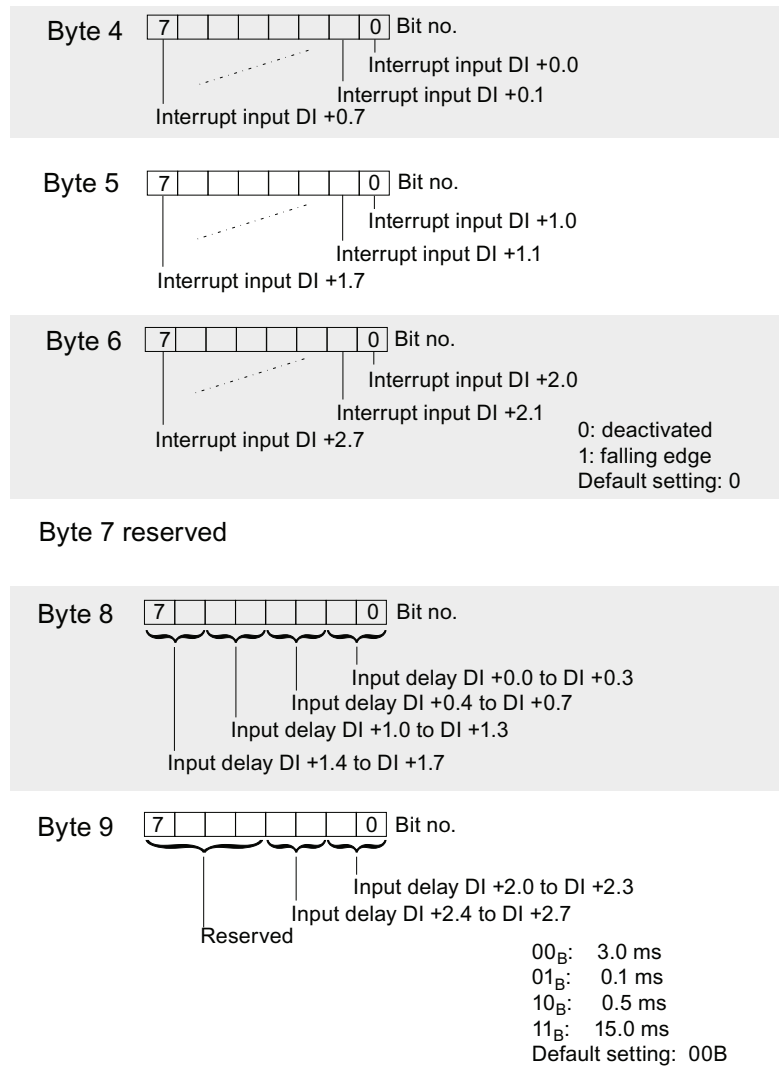


Figure 8-7 Structure of the data record 1 for standard DI and interrupt inputs (length of 10 bytes)

Parameters of standard DO

There are no parameters for standard digital outputs.

Parameters of standard AI

The table below gives you an overview of the parameters for standard analog inputs.

Table 8- 10 Parameters of standard AI

Parameters	Range of values	Default	Scope
Integration time (ms)	2,5/16,6/20	20	Channel
Interference frequency suppression (Hz) (channels 0 to 3)	400*/60/50	50	Channel
Measuring range (channels 0 to 3)	<ul style="list-style-type: none"> • Disabled • ± 20 mA • 0 ... 20 mA • 4 ... 20 mA • ± 10 V • 0 ... 10 V 	± 10 V	Channel
Measuring method (channels 0 to 3)	Deactivated/ U voltage/ I current	U voltage	Channel
Unit of measurement (channel 4)	Celsius/Fahrenheit/ Kelvin	Celsius	Channel
Measuring range (Pt 100 input; channel 4)	Deactivated/ Pt 100/600 Ω	600 Ω	Channel
Measuring method (Pt 100 input; channel 4)	Deactivated/ resistance/ thermal resistance	Resistance	Channel
* Software filter for the interference frequency suppression is deactivated when parameters are set to "400 Hz".			

Reference

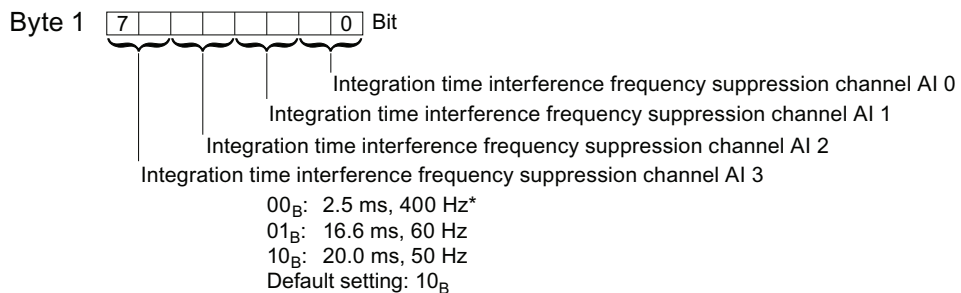
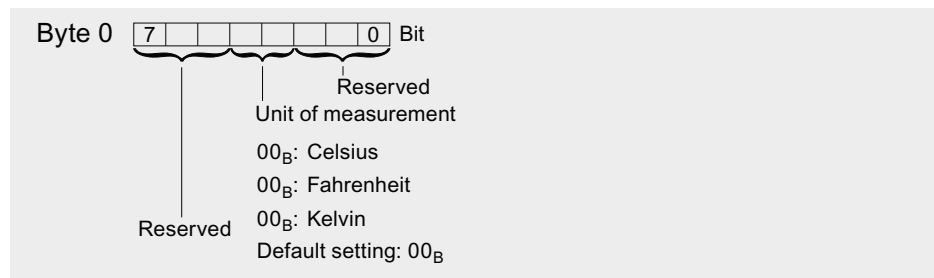
See also Chapter 4.3 in the *Module Data Reference Manual*.

Parameters of standard AO

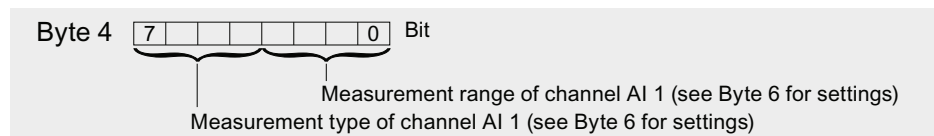
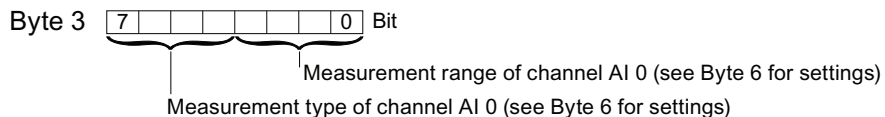
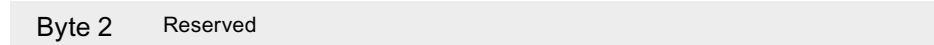
The table below gives you an overview of standard analog output parameters (see also Chapter 4.3 in the *Module Data Reference Manual*).

Table 8- 11 Parameters of standard AO

Parameters	Range of values	Default	Scope
Output range (channels 0 to 1)	<ul style="list-style-type: none"> • Disabled • ± 20 mA • 0 ... 20 mA • 4 ... 20 mA • ± 10 V • 0 ... 10 V 	± 10 V	Channel
Output type (channels 0 to 1)	Deactivated/ U voltage/ I current	U voltage	Channel



* Software filter for the interference frequency suppression is deactivated when parameters are set to "400 Hz".



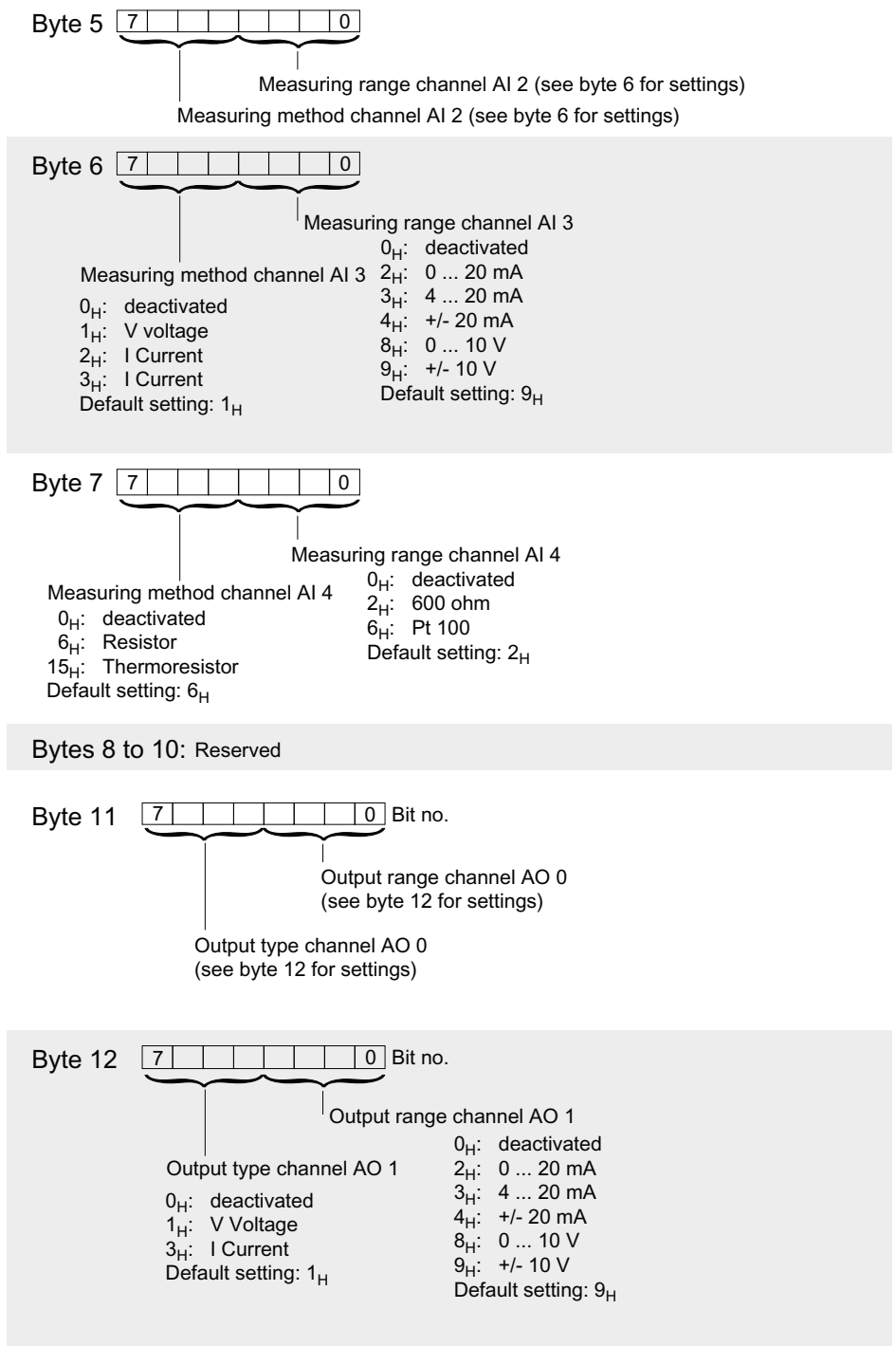


Figure 8-8 Structure of the data record 1 for standard AI/AO (length of 13 bytes)

Parameters for technological functions

The parameters for the respective function are found in the Manual *Technological Functions*.

8.7.4 Interrupts

Interrupt inputs

All digital inputs of the on-board I/O of the CPUs 31xC can be used as interrupt inputs.

You can specify the interrupt behavior for each individual input in your parameterization.

Options are:

- No interrupt
- Interrupt when edge is rising
- Interrupt when edge is falling
- Interrupt when edge is rising or falling

Note

Every channel will retain 1 event if the rate of incoming interrupts exceeds the handling capacity of OB40. Further events (interrupts) will be lost, without diagnostics or explicit message.

Start information for OB40

The table below shows the relevant temporary variables (TEMP) of OB40 for the interrupt inputs of 31xC CPUs. A description of the hardware interrupt OB 40 is found in the Reference Manual *System and Standard Functions*.

Table 8- 12 Start information for OB40, relating to the interrupt inputs of the integrated I/O

Byte	Variable	Data type		Description
6/7	OB40_MDL_ADDR	WORD	B#16#7C For the CPU 314C-2 PN/DP: :B#16#88	Address of the interrupt-triggering module (in this case: default addresses of the digital inputs)
8 or higher	OB40_POINT_ADDR	DWORD	See figure below	Displaying the interrupt-triggering integrated inputs

The following figure shows an example of the states for the interrupt-triggering integrated alarm inputs for the default addresses I124.0 to I126.7.

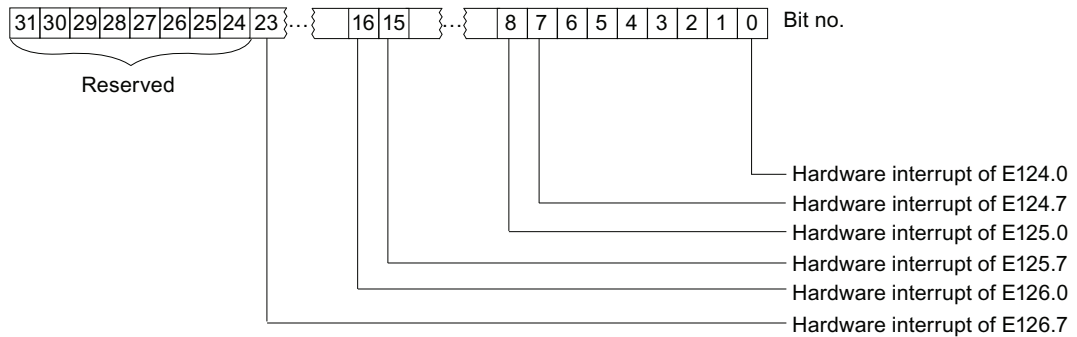


Figure 8-9 Example of the display of states of CPU 31xC interrupt inputs

8.7.5 Diagnostics

Standard I/O

Diagnostic is not available for integrated inputs/outputs used as standard I/O (see also the Reference Manual *Module Data*).

Technological functions

Diagnostics options for the respective technological function are found in the Manual *Technological Functions*.

8.7.6 Digital inputs

Introduction

This section specifies the technical specifications of the digital inputs for the CPUs 31xC.

The table includes the following CPUs:

- under CPU 313C-2, the CPUs 313C-2 DP and 313C-2 PtP
- Under CPU 314C-2, the CPU 314C-2 DP, CPU 314C-2 PtP and CPU 314C-2 PN/DP

Technical specifications

Table 8- 13 Technical specifications of digital inputs

Technical specifications					
	CPU 312C	CPU 313C	CPU 313C-2	CPU 314C-2	
Module-specific data					
Number of inputs	10	24	16	24	
• Inputs which can be used for technological functions	8	12	12	16	
Cable length					
• unshielded, max.	600 m; for technological functions: No				
• shielded, max.	1000 m; for technological function at max. counting frequency				
	100 m	100 m	100 m	50 m	
Voltage, currents, potentials					
Rated load voltage L+	24 V DC				
• Reverse polarity protection	Yes				
Number of simultaneously controlled inputs					
• Horizontal arrangement	– Up to 40 °C	10	24	16	24
	– Up to 60 °C	5	12	8	12
• Vertical arrangement	– Up to 40 °C	5	12	8	12
Isolation					
• Between channels and the backplane bus	Yes				
• Between channels	No				
Permissible potential difference					
• Between different circuits	75 V DC/60 V AC				
Isolation test voltage	600 V DC				
Current consumption					
• from load voltage L+ (no load), max.	–	80 mA	80 mA	80 mA	
Status, interrupts, diagnostics					
Status indication	Green LED per channel				
Interrupts	<ul style="list-style-type: none"> • Yes, if the corresponding channel is configured as interrupt input • For using technological functions, please refer to the <i>Technological Functions Manual</i>. 				
Diagnostic functions	<ul style="list-style-type: none"> • No diagnostics when operated as standard I/O • For using technological functions, please refer to the <i>Technological Functions Manual</i>. 				

8.7 Technical specifications of the onboard I/O

Technical specifications				
	CPU 312C	CPU 313C	CPU 313C-2	CPU 314C-2
Data for the selection of an encoder for standard DI	CPU 312C	CPU 313C	CPU 313C-2	CPU 314C-2
Input voltage				
• Rated value	24 V DC			
• For "1" signal	15 V to 30 V			
• For "0" signal	-3 V to 5 V			
Input current				
• with "1" signal, typ.	8 mA			
Input delay of standard inputs				
• Programmable	Yes (0.1 / 0.5 / 3 / 15 ms) You can reconfigure the input delay of the standard inputs during program runtime. Please note that your newly set filter time may only take effect after the previously set filter time has expired.			
• Rated value	3 ms			
For using technological functions: "Minimum pulse width/minimum pause between pulses at maximum counting frequency"	48 µs	16 µs	16 µs	8 µs
Input characteristics	to IEC 61131, Type 1			
Connection of 2-wire BEROs	Supported			
• Permitted quiescent current, max.	1.5 mA			

8.7.7 Digital outputs

Introduction

This chapter contains the technical specifications of the digital outputs for the CPUs 31xC.

The table includes the following CPUs:

- under CPU 313C-2, the CPUs 313C-2 DP and 313C-2 PtP
- Under CPU 314C-2, the CPU 314C-2 DP, CPU 314C-2 PtP and CPU 314C-2PN/DP

Fast digital outputs

Technological functions use fast digital outputs.

Technical specifications

Table 8- 14 Technical specifications of digital outputs

Technical specifications				
	CPU 312C	CPU 313C	CPU 313C-2	CPU 314C-2
Module-specific data	CPU 312C	CPU 313C	CPU 313C-2	CPU 314C-2
Number of outputs	6	16	16	16
• Of those as fast outputs	2	4	4	4
Notice: You cannot connect the fast outputs of your CPU in parallel.				
Cable length				
• unshielded, max.	600 m			
• shielded, max.	1000 m			
Voltage, currents, potentials	CPU 312C	CPU 313C	CPU 313C-2	CPU 314C-2
Rated load voltage L+	24 V DC			
• Reverse polarity protection	No			
Aggregate current of outputs (per group)				
• Horizontal installation, max.				
– Up to 40 °C	2.0 A	3.0 A	3.0 A	3.0 A
– Up to 60 °C	1.5 A	2.0 A	2.0 A	2.0 A
• Vertical installation, max.				
– Up to 40 °C	1.5 A	2.0 A	2.0 A	2.0 A
Isolation				
• Between channels and the backplane bus	Yes			
• Between channels	No	Yes	Yes	Yes
– In groups of	–	8	8	8
Permissible potential difference				
• Between different circuits	75 V DC/60 V AC			
Isolation test voltage	600 V DC			
Current consumption				
• From load voltage L+, max.	25 mA	50 mA	50 mA	50 mA
Status, interrupts, diagnostics	CPU 312C	CPU 313C	CPU 313C-2	CPU 314C-2
Status indication	Green LED per channel			
Interrupts	<ul style="list-style-type: none"> No interrupts when operated as standard I/O For using technological functions, please refer to the <i>Technological Functions</i> Manual. 			
Diagnostic functions	<ul style="list-style-type: none"> No diagnostics when operated as standard I/O For using technological functions, please refer to the <i>Technological Functions</i> Manual. 			

8.7 Technical specifications of the onboard I/O

Technical specifications				
	CPU 312C	CPU 313C	CPU 313C-2	CPU 314C-2
Data for the selection of an actuator for standard DO	CPU 312C	CPU 313C	CPU 313C-2	CPU 314C-2
Output voltage				
• with "1" signal, min.	L+ (-0.8 V)			
Output current				
• With "1" signal	0.5 A 5 mA to 0.6 A			
- Rated value				
- Permissible range				
• With "0" signal (residual current), max.	0.5 mA			
Load resistance range	48 Ω to 4 kΩ			
Lamp load, max.	5 W			
Triggering a digital input	Yes			
Wiring 2 outputs in parallel				
• For redundant control of a load	Supported			
• For performance increase	Not supported			
Triggering a digital input	Supported			
Switching frequency				
• With resistance load, max.	100 Hz			
• With inductive load to IEC 947-5, DC13	0.5 Hz			
• With lamp load, max.	100 Hz			
• High-speed outputs with resistive load, max.	2.5 kHz			
Limiting (internal) of inductive shutdown voltage, typically	(L+) -48 V			
Short-circuit protection of the output	Yes, electronic clamping			
• Response threshold, typ.	1 A			

8.7.8 Analog inputs

Introduction

This chapter contains the technical specifications of analog inputs for the CPUs 31xC.

The table includes the following CPUs:

- CPU 313C
- CPU 314C-2 DP
- CPU 314C-2 PtP
- CPU 314C-2 PN/DP

Technical specifications

Table 8- 15 Technical specifications of analog inputs

Technical specifications	
Module-specific data	
Number of inputs	4 channels current/voltage input 1 channel resistance input
Cable length	
• Shielded, max.	100 m
Voltage, currents, potentials	
Resistance input	
• Open-circuit voltage, typically	3.3 V
• Measuring current, typically	1.25 mA
Isolation	
• Between channels and the backplane bus	Yes
• Between channels	No
Permissible potential difference	
• Between inputs (AI _C) and M _{ANA} (U _{CM})	8.0 VDC
• Between M _{ANA} and M _{internal} (V _{ISO})	75 V DC/60 V AC
Isolation test voltage	600 VDC
Analog value generation	
Measuring principle	Actual value encoding (successive approximation)
Integration/conversion time/resolution (per channel)	
• Programmable	Yes
• Integration time in ms	16,6/20
• Permissible input frequency, max.	400 Hz
• Resolution (including overrange)	11 bits + sign
• Noise suppression for interference frequency f ₁	60/50 Hz
Time constant of the input filter	0.38 ms
Basic execution time	1 ms
Noise suppression, error limits	
Noise suppression for f = nx (f ₁ ± 1%), (f ₁ = interference frequency), n = 1, 2	
• Common-mode interference (U _{CM} < 1.0 V)	> 40 dB
• Series-mode interference (peak value of disturbance < rated value of input range)	> 30 dB
Crosstalk between inputs	> 60 dB
Operational limit (across temperature range, relative to input range)	

Technical specifications	
• Voltage/current	<1 %
• Resistance	<1 %
Basic error limit (operational limit at 25 °C, relative to input range)	
• Voltage/current – Linearity error during measurement of current and voltage (related to input range)	<0.8% ±0.06%
• Resistance – Linearity error during resistance measurement (related to input range)	<0.8% ±0.2%
Temperature error (relative to input range)	± 0.006 %/K
Repeat accuracy (in transient state at 25 °C, relative to input range)	±0.06%
Status, interrupts, diagnostics	
Interrupts	• No interrupts when operated as standard I/O
Diagnostic functions	• No diagnostics when operated as standard I/O • For using technological functions, please refer to the <i>Technological Functions Manual</i> .
Encoder selection data	
Input ranges (rated values)/input impedance	
• Voltage	± 10 V/100 kΩ 0 V to 10 V/100 kΩ
• Current	± 20 mA/100 Ω 0 mA to 20 mA/100 Ω 4 mA to 20 mA/100 Ω
• Resistance	0 Ω to 600 Ω/10 MΩ
• Resistance thermometer	Pt 100/10 MΩ
Permitted input voltage (destruction limit)	
• At voltage input, max.	30 V sustained
• For current input, max.	5 V sustained
Permitted input current (destruction limit)	
• At voltage input, max.	0.5 mA sustained
• For current input, max.	50 mA sustained
Connection of signal transmitters	
• For voltage measurement	Supported
• For current measurement – As 2-wire transducer – As 4-wire transducer	supported with external supply supported

Technical specifications	
<ul style="list-style-type: none"> • For resistance measurement - With 2-wire connection - With 3-wire connection - With 4-wire connection 	Possible, without compensation of the line resistances Not possible Not possible
Linearization of the characteristics curves	By software
<ul style="list-style-type: none"> • For resistance thermometers 	Pt 100
Temperature compensation	No
Technical unit of temperature measurement	Degrees Celsius (°C))Degrees Fahrenheit (°F) Kelvin (K)

8.7.9 Analog outputs

Introduction

This chapter contains the technical specifications of the analog outputs for the CPUs 31xC.

The table includes the following CPUs:

- CPU 313C
- CPU 314C-2 DP
- CPU 314C-2 PtP
- CPU 314C-2 PN/DP

Technical specifications

Table 8- 16 Technical specifications of analog outputs

Technical specifications	
Module-specific data	
Number of outputs	2
Cable length	
<ul style="list-style-type: none"> • Shielded, max. 	200 m
Potentials	
Isolation	
<ul style="list-style-type: none"> • Between channels and the backplane bus 	Yes
<ul style="list-style-type: none"> • Between channels 	No
Permissible potential difference	
<ul style="list-style-type: none"> • Between M_{ANA} and M_{internal} (V_{ISO}) 	75 V DC/60 V AC
Isolation test voltage	600 V DC

Technical specifications	
Analog value generation	
Resolution (including overrange)	11 bits + sign
Conversion time (per channel)	1 ms
Settling time	
• With resistive load	0.6 ms
• With capacitive load	1.0 ms
• With inductive load	0.5 ms
Noise suppression, error limits	
Crosstalk between outputs	> 60 dB
Operational limit (across temperature range, relative to output range)	
• Voltage/current	±1 %
Basic error limit (operational limit at 25 °C, relative to output range)	
• Voltage/current	±0.8%
Temperature error (relative to output range)	± 0.01%/K
Linearity error (relative to output range)	±0.15%
Repeat accuracy (in transient state at 25 °C, relative to output range)	±0.06%
Output ripple; range 0 Hz to 50 kHz (relative to output range)	± 0.1%
Status, interrupts, diagnostics	
Interrupts	<ul style="list-style-type: none"> • No interrupts when operated as standard I/O • For using technological functions, please refer to the <i>Technological Functions</i> Manual.
Diagnostic functions	<ul style="list-style-type: none"> • No diagnostics when operated as standard I/O • For using technological functions, please refer to the <i>Technological Functions</i> Manual.
Actuator selection data	
Output range (rated values)	
• Voltage	± 10 V 0 V to 10 V
• Current	± 20 mA 0 mA to 20 mA 4 mA to 20 mA
Load impedance (in the nominal range of the output)	
• At voltage outputs, min. – Capacitive load, max.	1 kΩ 0.1 μF
• At current outputs, max. – Inductive load	300 Ω 0.1 mH
Voltage output	
• Short-circuit protection	Yes

Technical specifications	
• Short-circuit current, typically:	55 mA
Current output	
• Open-circuit voltage, typically	14 V
Destruction limit against external voltages/currents	
• Voltage at the outputs against M _{ANA} , max.	16 V sustained
• Current, max.	50 mA sustained
Wiring the actuators	
• For voltage output - 2-wire connection - 4-wire connection (measuring line)	Supported, without compensation of the line resistances Not supported
• For current output - 2-wire connection	Supported

Technical specifications of CPU 31x

9.1 General technical specifications

9.1.1 Dimensions of CPU 31x

Each CPU features the same height and depth, only the width differs.

- Height: 125 mm
- Depth: 115 mm, or 180 mm with opened front cover.

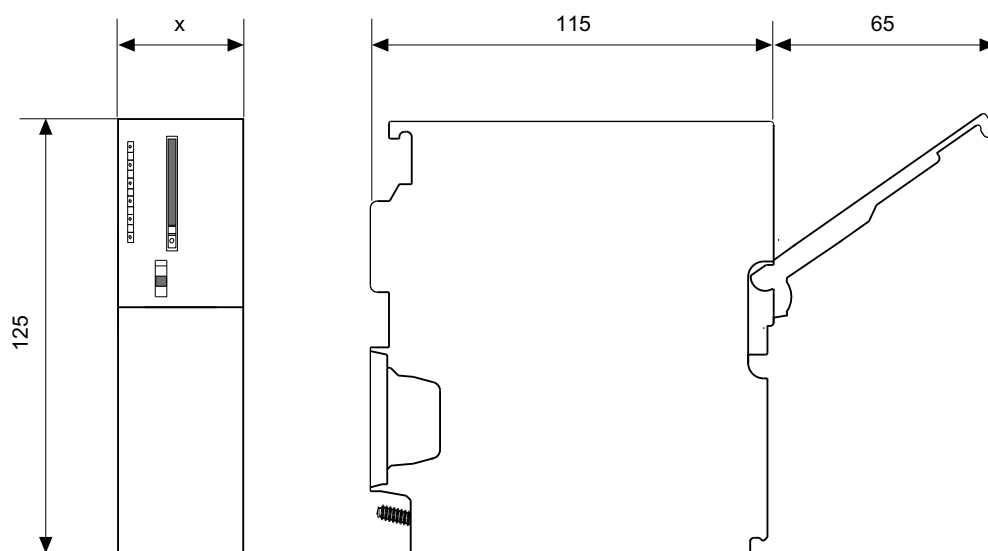


Figure 9-1 Dimensions of CPU 31x

Width of CPU

CPU	Width (x)
CPU 312	40 mm
CPU 314	40 mm
CPU 315-2 DP	40 mm
CPU 315-2 PN/DP	40 mm
CPU 317-2 DP	40 mm
CPU 317-2 PN/DP	40 mm
CPU 319	120 mm

9.1.2 Technical specifications of the SIMATIC Micro Memory Card

Compatible SIMATIC Micro Memory Cards

The following memory modules are available:

Table 9- 1 Available SIMATIC Micro Memory Cards

Type		Order number	Required for a firmware update via SIMATIC Micro Memory Card
Micro Memory Card	64 KB	6ES7953-8LFxx-0AA0	–
Micro Memory Card	128 KB	6ES7953-8LGxx-0AA0	–
Micro Memory Card	512 KB	6ES7953-8LJxx-0AA0	–
Micro Memory Card	2 MB	6ES7953-8LLxx-0AA0	Minimum requirement for CPUs without DP interface
Micro Memory Card	4 MB	6ES7953-8LMxx-0AA0	Minimum requirements for CPUs with DP interface, but without PN interface
Micro Memory Card	8 MB	6ES7953-8LPxx-0AA0	Minimum requirements for CPUs with DP and PN interface

Maximum number of loadable blocks on the SIMATIC Micro Memory Card

The number of blocks that can be stored on the SIMATIC Micro Memory Card depends on the capacity of the SIMATIC Micro Memory Card being used. The maximum number of blocks that can be loaded is therefore limited by the capacity of your SIMATIC Micro Memory Card (including blocks generated with the "CREATE DB" SFC)

Table 9- 2 Maximum number of loadable blocks on the SIMATIC Micro Memory Card

Size of SIMATIC Micro Memory Card	... Maximum number of blocks that can be loaded
64 KB	768
128 KB	1024
512 KB	2560
2 MB	The maximum number of blocks that can be loaded on a specific CPU is less than the number of blocks that can be stored on the SIMATIC Micro Memory Card. For information about the maximum number of blocks that can be loaded on a specific CPU, refer to the corresponding technical specification.
4 MB	
8 MB	

9.2 CPU 312

Technical specifications

Table 9- 3 Technical specifications of the CPU 312

Technical specifications	
CPU and version	
• MLFB	6ES7312-1AE14-0AB0
• Hardware version	01
• Firmware version	V3.3
• Associated programming package	STEP 7 as of V5.5 + SP1 or STEP 7 as of V5.2 + SP1 with HSP 218
Memory	
Main memory	
• Integrated	32 KB
• Expandable	No
• Maximum size of non-volatile memory for retentive data blocks,	32 KB
Load memory	
• Pluggable (MMC)	Yes
• Pluggable (MMC), max.	8 MB
• Data retention on the Micro Memory Card (after the last programming action), min.	10 years
Backup	
• Available	Yes (ensured with Micro Memory Card - maintenance-free)
• Without battery	Yes (program and data)
Execution times	
• for bit operation, min.	0.1 μ s
• for word operations, min.	0.24 μ s
• for fixed-point arithmetic, min.	0.32 μ s
• for floating-point arithmetic, min.	1.10 μ s
Timers/counters and their retentivity	
S7 counters	
• Number	256
Retentivity	
• Configurable	Yes
• Default	Z 0 to Z 7

Technical specifications	
Counting range	
• Low limit	0
• High limit	999
IEC counter	
• Available	Yes
• Type	SFB
• Number	Unlimited (limited only by main memory size)
S7 timers	
• Number	256
Retentivity	
• Configurable	Yes
• Default	No retentivity
Time setting range	
• Low limit	10 ms
• High limit	9990 s
IEC timer	
• Available	Yes
• Type	SFB
• Number	Unlimited (limited only by main memory size)
Data areas and their retentivity	
Bit memory	
• Number, max.	256 bytes
• Retentivity, available	Yes (MB 0 to MB 255)
• Retentivity, default	MB 0 to MB 15
• Number of clock memories	8 (1 memory byte)
Data blocks	
• Number, max.	1024 (in the number range 1 to 16000)
• Size, max.	32 KB
• Retentivity, configurable	Yes, via non-retain feature on the DB
• Retentivity, default	Yes
Local data	
• Per priority class, max.	32 KB per execution level, 2 KB per block

Technical specifications	
Blocks	
• Number of blocks (total)	1024 (DBs, FCs, FBs) The maximum number of blocks that can be loaded may be reduced due to the Micro Memory Card you are using.
OB	See instruction list
• Size, max.	32 KB
• Number of free cycle OBs	1 (OB 1)
• Number of time-of-day interrupt OBs	1 (OB 10)
• Number of time-delay interrupt OBs	2 (OB 20, 21)
• Number of cyclic interrupt OBs	4 (OB 32, 33, 34, 35)
• Number of hardware interrupt OBs	1 (OB 40)
• Number of restart OBs	1 (OB 100)
• Number of asynchronous error OBs	4 (OB 80, 82, 85, 87)
• Number of synchronous error OBs	2 (OB 121, 122)
Nesting depth	
• Per priority class	16
• Additionally within an error OB	4
FB	See instruction list
• Number, max.	1024 (in the number range 0 to 7999)
• Size	32 KB
FC	See instruction list
• Number, max.	1024 (in the number range 0 to 7999)
• Size	32 KB
Address ranges (inputs/outputs)	
I/O address area	
• Inputs	1024 bytes (freely addressable)
• Outputs	1024 bytes (freely addressable)
I/O process image	
• Inputs	1024 bytes
• Outputs	1024 bytes
• Inputs, adjustable	1024 bytes
• Outputs, adjustable	1024 bytes
• Inputs, preset	128 bytes
• Outputs, preset	128 bytes

Technical specifications	
Digital channels	
• Inputs	256
• Outputs	256
• Inputs, of those central	256
• Outputs, of those central	256
Analog channels	
• Inputs	64
• Outputs	64
• Inputs, of those central	64
• Outputs, of those central	64
Hardware configuration	
• Racks, max.	1
• Modules per rack, max.	8
Number of DP masters	
• Integrated	0
• Via CP	4
Number of usable FMs and CPs (recommended)	
• FM, max.	8
• CP, point-to-point	8
• CP, LAN	4
Time-of-day	
Clock	
• Software clock	Yes
• Buffered, can be synchronized	Buffered: No Can be synchronized: Yes
• Factory setting	DT#1994-01-01-00:00:00
• Behavior of the real-time clock after POWER ON	The clock continues at the time of day it had when power was switched off.
• Daily deviation	10 s, typ. 2 s
Runtime meter	
• Number	1
• Number/number range	0
• Range of values	0 to 2 ³¹ hours (if SFC 101 is used)
• Granularity	1 hour
• Retentive	Yes; must be manually restarted after every restart

Technical specifications	
Clock synchronization	
• supported	Yes
• On MPI, master	Yes
• On MPI, slave	Yes
• On the AS, master	Yes
• In AS, Slave	No
S7 signaling functions	
• Number of stations that can be logged on for signaling functions, max.	6 (depends on the number of connections configured for PG/OP and S7 basic communication)
• Process error diagnostic messages	Yes
• Simultaneously enabled interrupt S blocks, max.	300
Test and startup functions	
Status/modify variable	Yes
• Variables	Inputs, outputs, bit memories, DBs, timers, counters
• Maximum number of variables	30
• Status variables, max.	30
• Modify variables, max.	14
Forcing	
• Forcing	Yes
• Variables	Inputs, outputs
• Maximum number of tags	10
Status block	Yes (max. 2 blocks simultaneously)
Single step	Yes
• Number of breakpoints	4
Diagnostic buffer	
• Available	Yes
• Maximum number of entries	500
• Configurable	No
• of which are power-failure-proof	100, only the last 100 entries are retentive
• Maximum number of entries that can be read in RUN	499
• Number of entries that can be set in RUN	Yes (from 10 to 499)
• Number of preset entries in RUN	10

Technical specifications	
Service data	
• Can be read out	Yes
Monitoring function	
• Status LEDs	Yes
Communication functions	
PG/OP communication	Yes
Prioritized OCM communication	
• Supported	No
Routing	
• Number of routing connections	-
• Data record routing	No
Global data communication	
• Supported	Yes
• Number of GD circles, max.	8
• Number of GD packages, max.	8
• Number of GD packages, sender, max.	8
• Number of GD packages, receiver, max.	8
• Size of GD packages, max.	22 bytes
• Size of GD packages, of those consistent, max.	22 bytes
S7 basic communication	
• Supported	Yes
• User data per job, max.	76 bytes
• User data per job, consistent, max.	76 bytes (for X_SEND/RCV); 64 bytes (for X_PUT/GET as server)
S7 communication	
• Supported	Yes
• As server	Yes
• As client	Yes, via CP and loadable FBs
• User data per job, max.	180 bytes (for PUT/GET)
• User data per job, consistent, max.	240 bytes (as server)
S5-compatible communication	
• Supported	Yes (via CP and loadable FCs)
Maximum number of connections	
• Total	6

Technical specifications	
Suitable for PG communication	5
• PG communication, reserved	1
• PG communication, configurable, min.	1
• PG communication, configurable, max.	5
Suitable for OP communication	5
• OP communication, reserved	1
• OP communication, configurable, min.	1
• OP communication, configurable, max.	5
Suitable for S7 basic communication	2
• S7 basic communication, reserved	0
• S7 basic communication, configurable, min.	0
• S7 basic communication, configurable, max.	2
Interfaces	
1st interface	
Interface designation	X1
Type of interface	Integrated RS 485 interface
Hardware	RS 485
• electrically disconnected	No
• Interface power supply (15 V DC to 30 V DC), max.	200 mA
Functionality	
• MPI	Yes
• DP master	No
• DP slave	No
• Point-to-point connection	No
MPI	
Services	
• PG/OP communication	Yes
• Routing	No
• Global data communication	Yes
• S7 basic communication	Yes
• S7 communication	Yes (only server; connection configured at one end)
• S7 communication, as client	No
• S7 communication, as server	Yes
• Transmission rate, max.	187,5 kbps

Technical specifications	
Programming	
Programming language	
• LAD	Yes
• FBD	Yes
• STL	Yes
• SCL	Yes
• GRAPH	Yes
• HiGraph®	Yes
Instruction set	
• Nesting levels	8
Know-how protection	
• User program/password security	Yes
• Block encryption	Yes, using S7-Block Privacy
System functions (SFC)	
See instruction list	
System function blocks (SFB)	
See instruction list	
Dimensions	
• Mounting dimensions W x H x D (mm)	40 x 125 x 130
• Weight	270 g
Voltages and currents	
• Power supply (rated value)	24 V DC
• Low limit of admissible range (DC)	19.2 V
• High limit of admissible range (DC)	28.8 V
• Current consumption (open-circuit), typically	140 mA
• Inrush current, typ.	3.5 A
• Current consumption (rated value)	650 mA
• I ² t	1 A ² s
• External protection of power supply lines (recommended), min.	2 A
• Power loss, typically	4 W

9.3 CPU 314

Technical specifications of the CPU 314

Table 9- 4 Technical specifications of the CPU 314

Technical specifications	
CPU and version	
• MLFB	6ES7314-1AG14-0AB0
• Hardware version	01
• Firmware version	V3.3
• Associated programming package	STEP 7 as of V5.5 + SP1 or STEP 7 as of V5.2 + SP1 with HSP 218
Memory	
Main memory	
• Integrated	128 KB
• Expandable	No
• Maximum size of non-volatile memory for retentive data blocks	64 KB
Load memory	
• Pluggable (MMC)	Yes
• Pluggable (MMC), max.	8 MB
• Data retention on the Micro Memory Card (after the last programming action), min.	10 years
Backup	
• Available	Yes (ensured with Micro Memory Card - maintenance-free)
• Without battery	Yes (program and data)
Execution times	
• For bit operation, min.	0.06 μ s
• For word operations, min.	0.12 μ s
• For fixed-point arithmetic, min.	0.16 μ s
• Minimum for floating-point arithmetic	0.59 μ s
Timers/counters and their retentivity	
S7 counters	
• Number	256
Retentivity	
• Configurable	Yes
• Default	Z 0 to Z 7

Technical specifications	
Counting range	
• Low limit	0
• High limit	999
IEC counter	
• Available	Yes
• Type	SFB
• Number	Unlimited (limited only by main memory size)
S7 timers	
• Number	256
Retentivity	
• Configurable	Yes
• Default	No retentivity
Time setting range	
• Low limit	10 ms
• High limit	9990 s
IEC timer	
• Available	Yes
• Type	SFB
• Number	Unlimited (limited only by main memory size)
Data areas and their retentivity	
Bit memory	
• Number, max.	256 bytes
• Retentivity, available	Yes (MB 0 to MB 255)
• Retentivity, default	MB 0 to MB 15
• Number of clock memories	8 (1 memory byte)
Data blocks	
• Number, max.	1024 (in the number range 1 to 16000)
• Size, max.	64 KB
• Retentivity, configurable	Yes, via non-retain feature on the DB
• Retentivity, default	Yes
Local data	
• Per priority class, max.	32 KB per execution level, 2 KB per block

Technical specifications	
Blocks	
• Number of blocks (total)	1024 (DBs, FCs, FBs) The maximum number of blocks that can be loaded may be reduced due to the Micro Memory Card you are using.
OB	See instruction list
• Size, max.	64 KB
• Number of free cycle OBs	1 (OB 1)
• Number of time-of-day interrupt OBs	1 (OB 10)
• Number of time-delay interrupt OBs	2 (OB 20, 21)
• Number of cyclic interrupt OBs	4 (OB 32, 33, 34, 35)
• Number of hardware interrupt OBs	1 (OB 40)
• Number of restart OBs	1 (OB 100)
• Number of asynchronous error OBs	4 (OB 80, 82, 85,87)
• Number of synchronous error OBs	2 (OB 121, 122)
Nesting depth	
• Per priority class	16
• Additionally within an error OB	4
FB	See instruction list
• Number, max.	1024 (in the number range 0 to 7999)
• Size, max.	64 KB
FC	See instruction list
• Number, max.	1024 (in the number range 0 to 7999)
• Size, max.	64 KB
Address ranges (inputs/outputs)	
I/O address area	
• Inputs	1024 bytes
• Outputs	1024 bytes
I/O process image	
• Inputs	1024 bytes
• Outputs	1024 bytes
• Inputs, adjustable	1024 bytes
• Outputs, adjustable	1024 bytes
• Inputs, preset	128 bytes
• Outputs, preset	128 bytes

Technical specifications	
Digital channels	
• Inputs	1024
• Outputs	1024
• Inputs, of those central	1024
• Outputs, of those central	1024
Analog channels	
• Inputs	256
• Outputs	256
• Inputs, of those central	256
• Outputs, of those central	256
Hardware configuration	
• Racks, max.	4
• Modules per rack, max.	8
Number of DP masters	
• Integrated	0
• Via CP	4
Number of usable FMs and CPs (recommended)	
• FM, max.	8
• CP, point-to-point	8
• CP, LAN	10
Time-of-day	
Clock	
• Hardware clock (real-time)	Yes
• Buffered, can be synchronized	Yes
• Factory setting	DT#1994-01-01-00:00:00
• Buffered period	Typically 6 weeks (at an ambient temperature of 40 °C)
• Behavior of the real-time clock after POWER ON	The clock continues running after POWER OFF
• Behavior after expiration of the buffered period	The clock continues at the time of day it had when power was switched off.
• Deviation per day, max.	10 s, typ. 2 s
Runtime meter	
• Number	1
• Number/number range	0

Technical specifications	
• Range of values	0 to 2 ³¹ hours (using the SFC 101)
• Granularity	1 hour
• Retentive	Yes; must be manually restarted after every restart
Clock synchronization	
• Supported	Yes
• On MPI, master	Yes
• On MPI, slave	Yes
• On the AS, master	Yes
• On the AS, slave	No
S7 signaling functions	
• Number of stations that can be logged on for signaling functions (e.g. OS)	12 (depends on the number of connections configured for PG/OP and S7 basic communication)
• Process error diagnostic messages	Yes
• Simultaneously enabled interrupt S blocks, max.	300
Test and startup functions	
Status/modify	
• Status/modify variable	Yes
• Variables	Inputs, outputs, bit memories, DBs, timers, counters
• Maximum number of variables	30
• Status variables, max.	30
• Modify variables, max.	14
Forcing	
• Forcing	Yes
• Variables	Inputs/outputs
• Maximum number of tags	10
Status block	Yes (max. 2 blocks simultaneously)
Single step	Yes
• Number of breakpoints	4
Diagnostic buffer	
• Available	Yes
• Maximum number of entries	500
• Configurable	No

Technical specifications	
• Of which are power-failure-proof	100, only the last 100 entries are retentive
• Maximum number of entries that can be read in RUN	499
• Number of entries that can be set in RUN	Yes (from 10 to 499)
• Number of preset entries in RUN	10
Service data	
• Can be read out	Yes
Monitoring function	
• Status LEDs	Yes
Communication functions	
PG/OP communication	Yes
Prioritized OCM communication	
• supported	No
Routing	
• Number of routing connections	-
• Data record routing	No
Global data communication	
• Supported	Yes
• Number of GD circles, max.	8
• Number of GD packages, max.	8
• Number of GD packages, sender, max.	8
• Number of GD packages, receiver, max.	8
• Size of GD packages, max.	22 bytes
• Size of GD packages, of those consistent, max.	22 bytes
S7 basic communication	
• Supported	Yes
• User data per job, max.	76 bytes
• User data per job, consistent, max.	76 bytes (for X_SEND/RCV); 64 bytes (for X_PUT/GET as server)
S7 communication	
• Supported	Yes
• As server	Yes
• As client	Yes (via CP and loadable FBs)
• User data per job, max.	180 bytes (with PUT / GET)
• User data per job, consistent	240 bytes

Technical specifications	
S5-compatible communication	
• Supported	Yes (via CP and loadable FCs)
Number of connections	
• Total	12
Suitable for PG communication	
• PG communication, reserved	1
• PG communication, configurable, min.	1
• PG communication, configurable, max.	11
Suitable for OP communication	
• OP communication, reserved	1
• OP communication, configurable, min.	1
• OP communication, configurable, max.	11
Suitable for S7 basic communication	
• S7 basic communication, reserved	0
• S7 basic communication, configurable, min.	0
• S7 basic communication, configurable, max.	8
Interfaces	
1st interface	
Interface designation	X1
Type of interface	Integrated RS 485 interface
Hardware	RS 485
• electrically disconnected	No
• Interface power supply (15 V DC to 30 V DC), max.	200 mA
Functionality	
• MPI	Yes
• DP master	No
• DP slave	No
• Point-to-point connection	No
MPI	
Services	
• PG/OP communication	Yes
• Routing	No
• Global data communication	Yes
• S7 basic communication	Yes
• S7 communication	Yes (server only, connections configured at one end)

Technical specifications	
• S7 communication, as client	No
• S7 communication, as server	Yes
Transmission rate, max.	187,5 kbps
Programming	
Programming language	
• LAD	Yes
• FBD	Yes
• STL	Yes
• SCL	Yes
• CFC	Yes
• GRAPH	Yes
• HiGraph®	Yes
Instruction set	See instruction list
• Nesting levels	8
Know-how protection	
• User program/password security	Yes
• Block encryption	Yes, using S7-Block Privacy
System functions (SFC)	See instruction list
System function blocks (SFB)	See instruction list
Dimensions	
• Mounting dimensions W x H x D (mm)	40 x 125 x 130
• Weight	280 g
Voltages and currents	
• Power supply (rated value)	24 V DC
• Low limit of admissible range (DC)	19.2 V
• High limit of admissible range (DC)	28.8 V
• Current consumption (open-circuit), typically	140 mA
• Inrush current, typ.	3.5 A
• Current consumption (rated value)	650 mA
• I ² t	1 A ² s
• External protection of power supply lines (recommended), min.	2 A
• Power loss, typically	4 W

9.4 CPU 315-2 DP

Technical specifications

Table 9- 5 Technical specifications of the CPU 315-2 DP

Technical specifications	
CPU and version	
• MLFB	6ES7315-2AH14-0AB0
• Hardware version	01
• Firmware version	V3.3
• Associated programming package	STEP 7 as of V5.5 + SP1 or STEP 7 as of V5.2 + SP1 with HSP 218
Memory	
Main memory	
• Integrated	256 KB
• Expandable	No
• Maximum size of non-volatile memory for retentive data blocks	128 KB
Load memory	
• Pluggable (MMC)	Yes
• Pluggable (MMC), max.	8 MB
• Data retention on the Micro Memory Card (after the last programming action), min.	10 years
Backup	
• Available	Yes (ensured with Micro Memory Card - maintenance-free)
• Without battery	Yes (program and data)
Execution times	
• For bit operation, min.	0.05 μ s
• For word operations, min.	0.09 μ s
• For fixed-point arithmetic, min.	0.12 μ s
• Minimum for floating-point arithmetic	0.45 μ s
Timers/counters and their retentivity	
S7 counters	
• Number	256
Retentivity	
• Configurable	Yes
• Default	Z 0 to Z 7

Technical specifications	
Counting range	
• Low limit	0
• High limit	999
IEC counter	
• Available	Yes
• Type	SFB
• Number	Unlimited (limited only by main memory size)
S7 timers	
• Number	256
Retentivity	
• Configurable	Yes
• Default	No retentivity
Time setting range	
• Low limit	10 ms
• High limit	9990 s
IEC timer	
• Available	Yes
• Type	SFB
• Number	Unlimited (limited only by main memory size)
Data areas and their retentivity	
Bit memory	
• Number, max.	2048 bytes
• Retentivity, available	Yes (MB 0 to MB 2047)
• Retentivity, default	MB 0 to MB 15
• Number of clock memories	8 (1 memory byte)
Data blocks	
• Number, max.	1024 (in the number range 1 to 16000)
• Size, max.	64 KB
• Retentivity, configurable	Yes, via non-retain feature on the DB
• Retentivity, default	Yes
Local data	
• Per priority class, max.	32 KB per execution level, 2 KB per block

Technical specifications	
Blocks	
• Number of blocks (total)	1024 (DBs, FCs, FBs) The maximum number of blocks that can be loaded may be reduced due to the Micro Memory Card you are using.
OB	See instruction list
• Size	64 KB
• Number of free cycle OBs	1 (OB 1)
• Number of time-of-day interrupt OBs	1 (OB 10)
• Number of time-delay interrupt OBs	2 (OB 20, 21)
• Number of cyclic interrupt OBs	4 (OB 32, 33, 34, 35)
• Number of hardware interrupt OBs	1 (OB 40)
• Number of DPV1 interrupt OBs	3 (OB 55, 56, 57)
• Number of isochronous interrupt OBs	1 (OB 61)
• Number of restart OBs	1 (OB 100)
• Number of asynchronous error OBs	5 (OB 80, 82, 85, 86, 87)
• Number of synchronous error OBs	2 (OB 121, 122)
Nesting depth	
• Per priority class	16
• Additionally within an error OB	4
FB	See instruction list
• Number, max.	1024 (in the number range 0 to 7999)
• Size, max.	64 KB
FC	See instruction list
• Number, max.	1024 (in the number range 0 to 7999)
• Size, max.	64 KB
Address ranges (inputs/outputs)	
I/O address area	
• Inputs	2048 bytes (freely addressable)
• Outputs	2048 bytes (freely addressable)
Distributed	
• Inputs	2048 bytes
• Outputs	2048 bytes
I/O process image	
• Inputs	2048 bytes

Technical specifications	
• Outputs	2048 bytes
• Inputs, adjustable	2048 bytes
• Outputs, preset	2048 bytes
• Inputs, adjustable	128 bytes
• Outputs, preset	128 bytes
Process image partitions	
• Number of partial process images, max.	1
Digital channels	
• Inputs	16384
• Outputs	16384
• Inputs, of those central	1024
• Outputs, of those central	1024
Analog channels	
• Inputs	1024
• Outputs	1024
• Inputs, of those central	256
• Outputs, of those central	256
Hardware configuration	
• Racks, max.	4
• Modules per rack, max.	8
Number of DP masters	
• Integrated	1
• Via CP	4
Number of usable FMs and CPs (recommended)	
• FM	8
• CP, point-to-point	8
• CP, LAN	10
Time-of-day	
Clock	
• Hardware clock (real-time)	Yes
• Buffered, can be synchronized	Yes
• Buffered period	Typically 6 weeks (at an ambient temperature of 40 °C)
• Behavior of the real-time clock after POWER OFF ON	The clock continues running after POWER OFF

Technical specifications	
• Behavior after expiration of the buffered period	The clock continues at the time of day it had when power was switched off.
• Deviation per day, max.	10 s, typ. 2 s
Runtime meter	
• Number	1
• Number/number range	0
• Range of values	0 to 2 ³¹ hours (if SFC 101 is used)
• Granularity	1 hour
• Retentive	Yes; must be manually restarted after every restart
Clock synchronization	
• Supported	Yes
• On MPI, master	Yes
• On MPI, slave	Yes
• On DP, master	Yes (DP slave must be time slave)
• On DP, slave	Yes
• On the AS, master	Yes
• On the AS, slave	No
S7 signaling functions	
• Number of stations that can be logged on for signaling functions (e.g. OS)	16 (depends on the number of connections configured for PG/OP and S7 basic communication)
• Process error diagnostic messages	Yes
• Simultaneously enabled interrupt S blocks, max.	300
Test and startup functions	
Status/modify	
• Status/modify variable	Yes
• Variables	Inputs, outputs, bit memories, DBs, timers, counters
• Maximum number of variables	30
• Status variables, max.	30
• Modify variables, max.	14
Forcing	
• Forcing	Yes
• Variables	Inputs, outputs

Technical specifications	
• Maximum number of tags	10
Status block	Yes (max. 2 blocks simultaneously)
Single step	Yes
• Number of breakpoints	4
Diagnostic buffer	
• Available	Yes
• Maximum number of entries	500
• Configurable	No
• Of which are power-failure-proof	100, only the last 100 entries are retentive
• Maximum number of entries that can be read in RUN	499
• Number of entries that can be set in RUN	Yes (from 10 to 499)
• Number of preset entries in RUN	10
Service data	
• Can be read out	Yes
Monitoring function	
• Status LEDs	Yes
Communication functions	
PG/OP communication	Yes
Prioritized OCM communication	
• Supported	Yes
Routing	
• Number of routing connections, max.	4
• Data record routing	Yes
Global data communication	
• Supported	Yes
• Number of GD circles, max.	8
• Number of GD packages, max.	8
• Number of GD packages, sender, max.	8
• Number of GD packages, receiver, max.	8
• Size of GD packages, max.	22 bytes
• Size of GD packages, of those consistent, max.	22 bytes
S7 basic communication	
• Supported	Yes
• User data per job, max.	76 bytes

Technical specifications	
• User data per job, consistent, max.	76 bytes (for X_SEND/RCV); 64 bytes (for X_PUT/GET as server)
S7 communication	
• Supported	Yes
• As server	Yes
• As client	Yes (via CP and loadable FBs)
• User data per job, max.	180 bytes (for PUT/GET)
• User data per job, consistent, max.	240 bytes (as server)
S5-compatible communication	
• Supported	Yes (via CP and loadable FCs)
Number of connections	
• Total	16
Suitable for PG communication	
• PG communication, reserved	1
• PG communication, configurable, min.	1
• PG communication, configurable, max.	15
Suitable for OP communication	
• OP communication, reserved	1
• OP communication, configurable, min.	1
• OP communication, configurable, max.	15
Suitable for S7 basic communication	
• S7 basic communication, reserved	0
• S7 basic communication, configurable, min.	0
• S7 basic communication, configurable, max.	12
Interfaces	
1st interface	
Interface designation	X1
Type of interface	Integrated RS 485 interface
Hardware	
• electrically disconnected	No
• Interface power supply (15 V DC to 30 V DC), max.	200 mA
Functionality	
• MPI	Yes
• DP master	No
• DP slave	No

Technical specifications	
• Point-to-point connection	No
MPI	
Services	
• PG/OP communication	Yes
• Routing	Yes
• Global data communication	Yes
• S7 basic communication	Yes
• S7 communication	Yes (server only, connections configured at one end)
• S7 communication, as client	No
• S7 communication, as server	Yes
Transmission rate	187,5 kbps
2nd interface	
Interface designation	X2
Type of interface	Integrated RS 485 interface
Hardware	RS 485
• electrically disconnected	Yes
• Interface power supply (15 V DC to 30 V DC), max.	200 mA
Functionality	
• MPI	No
• DP master	Yes
• DP slave	Yes
• Point-to-point connection	No
DP master	
Services	
• PG/OP communication	Yes
• Routing	Yes
• Global data communication	No
• S7 basic communication	Yes (intelligent blocks only)
• S7 communication	Yes (server only, connections configured at one end)
• S7 communication, as client	No
• S7 communication, as server	Yes
• Constant bus cycle time supported	Yes
• Isochronous mode	Yes, OB61

Technical specifications	
• Direct data exchange (cross-traffic)	Yes (as subscriber)
• SYNC/FREEZE	Yes
• Enable/disable DP slaves – Max. number of DP slaves that can be enabled/ disabled simultaneously	Yes 8
• DPV1	Yes
Transmission rate, max.	12 Mbps
Number of DP slaves, max.	124
Address range	
• Inputs, max.	2048 bytes
• Outputs, max.	2048 bytes
User data per DP slave	
• Inputs, max.	244 bytes
• Outputs, max.	244 bytes
DP slave	
Services	
• PG/OP communication	Yes
• Routing	Yes (only if interface is active)
• Global data communication	No
• S7 basic communication	No
• S7 communication	Yes (only server; connection configured at one end)
• S7 communication, as client	No
• S7 communication, as server	Yes
• Direct data exchange (cross-traffic)	Yes
• DPV1	No
Transmission rate, max.	12 Mbps
Automatic baud rate detection	Yes (only if interface is passive)
GSD file	The current GSD file is available for download at GSD file (http://www.siemens.com/profibus-gsd)
Transfer memory	
• Inputs	244 bytes
• Outputs	244 bytes
• Address areas, max.	32
• User data per address range, max.	32 bytes

Technical specifications	
Programming	
Programming language	
• LAD	Yes
• FBD	Yes
• STL	Yes
• SCL	Yes
• CFC	Yes
• GRAPH	Yes
• HiGraph®	Yes
Instruction set	
• Nesting levels	8
Know-how protection	
• User program/password security	Yes
• Block encryption	Yes, using S7-Block Privacy
System functions (SFC)	
System function blocks (SFB)	
See instruction list	
See instruction list	
Dimensions	
• Mounting dimensions W x H x D (mm)	40 x 125 x 130
• Weight	290 g
Voltages and currents	
• Power supply (rated value)	24 V DC
• Low limit of admissible range (DC)	19.2 V
• High limit of admissible range (DC)	28.8 V
• Current consumption (open-circuit), typically	150 mA
• Inrush current, typ.	3.5 A
• Current consumption (rated value)	850 mA
• I²t	1 A²s
• External protection of power supply lines (recommended), min.	2 A
• Power loss, typically	4.5 W

9.5 CPU 315-2 PN/DP

Technical specifications

Table 9- 6 Technical specifications of the CPU 315-2 PN/DP

Technical specifications	
CPU and version	
• MLFB	6ES7315-2EH14-0AB0
• Hardware version	01
• Firmware version	V3.2.1
• Associated programming package	STEP 7 as of V5.5 + HSP 199
Memory	
Main memory	
• Integrated	384 KB
• Expandable	No
• Maximum size of non-volatile memory for retentive data blocks,	128 KB
Load memory	
• Pluggable (MMC)	Yes
• Pluggable (MMC), max.	8 MB
• Data retention on the Micro Memory Card (after the last programming action), min.	10 years
Backup	
• Available	Yes (ensured with Micro Memory Card - maintenance-free)
• Without battery	Yes (program and data)
Execution times	
• for bit operation, min.	0.05 μ s
• for word operations, min.	0.09 μ s
• For fixed-point arithmetic, min.	0.12 μ s
• For floating-point arithmetic, min.	0.45 μ s
Timers/counters and their retentivity	
S7 counters	
• Number	256
Retentivity	
• Configurable	Yes
• Default	Z 0 to Z 7

Technical specifications	
Counting range	
• Low limit	0
• High limit	999
IEC counter	
• Available	Yes
• Type	SFB
• Number	Unlimited (limited only by main memory size)
S7 timers	
• Number	256
Retentivity	
• Configurable	Yes
• Default	No retentivity
Time setting range	
• Low limit	10 ms
• High limit	9990 s
IEC timer	
• Available	Yes
• Type	SFB
• Number	Unlimited (limited only by main memory size)
Data areas and their retentivity	
Bit memory	
• Number, max.	2048 bytes
• Retentivity, available	Yes (from MB 0 to MB 2047)
• Retentivity, default	MB 0 to MB 15
• Number of clock memories	8 (1 memory byte)
Data blocks	
• Number, max.	1024 (in the number range 1 to 16000)
• Size, max.	64 KB
• Retentivity, configurable	Yes, via non-retain feature on the DB
• Retentivity, default	Yes
Local data	
• Per priority class, max.	32 KB per execution level, 2 KB per block

Technical specifications	
Blocks	
• Number of blocks (total)	1024 (DBs, FCs, FBs) The maximum number of blocks that can be loaded may be reduced due to the Micro Memory Card you are using.
OB	See instruction list
• Size, max.	64 KB
• Number of free cycle OBs	1 (OB 1)
• Number of time-of-day interrupt OBs	1 (OB 10)
• Number of time-delay interrupt OBs	2 (OB 20, 21)
• Number of cyclic interrupt OBs	4 (OB 32, 33, 34, 35)
• Number of hardware interrupt OBs	1 (OB 40)
• Number of DPV1 interrupt OBs	3 (OB 55, 56, 57)
• Number of isochronous interrupt OBs	1 (OB 61)
• Number of restart OBs	1 (OB 100)
• Number of asynchronous error OBs	6 (OB 80, 82, 83, 85, 86, 87) (OB83 for PROFINET IO)
• Number of synchronous error OBs	2 (OB 121, 122)
Nesting depth	
• Per priority class	16
• Additionally within an error OB	4
FB	See instruction list
• Number, max.	1024 (in the number range 0 to 7999)
• Size	64 KB
FC	See instruction list
• Number, max.	1024 (in the number range 0 to 7999)
• Size	64 KB
Address ranges (inputs/outputs)	
I/O address area	
• Inputs	2048 bytes
• Outputs	2048 bytes
Distributed	
• Inputs	2048 bytes
• Outputs	2048 bytes
I/O process image	
• Inputs	2048 bytes

Technical specifications	
• Outputs	2048 bytes
• Inputs, adjustable	2048 bytes
• Outputs, adjustable	2048 bytes
• Inputs, preset	128 bytes
• Outputs, preset	128 bytes
Process image partitions	
• Number of partial process images, max.	1
• Amount of user data in the process image partition for isochronous PROFINET IO, max.	1600 bytes
Digital channels	
• Inputs	16384
• Outputs	16384
• Inputs, of those central	1024
• Outputs, of those central	1024
Analog channels	
• Inputs	1024
• Outputs	1024
• Inputs, of those central	256
• Outputs, of those central	256
Hardware configuration	
• Racks, max.	4
• Modules per rack, max.	8
Number of DP masters	
• Integrated	1
• Via CP	4
Number of usable FMs and CPs (recommended)	
• FM	8
• CP, point-to-point	8
• CP, LAN	10
Time	
Clock	
• Hardware clock (real-time)	Yes
• Buffered, can be synchronized	Yes
• Factory setting	DT#1994-01-01-00:00:00

Technical specifications	
• Buffered period	Typically 6 weeks (at an ambient temperature of 40 °C)
• Behavior of the clock on expiration of the buffered period	The clock continues at the time of day it had when power was switched off.
• Behavior of the real-time clock after POWER ON	The clock continues running after POWER OFF.
• Deviation per day, max.	10 s, typ. 2 s
Runtime meter	
• Number	1
• Number/number range	0
• Range of values	0 to 2 ³¹ hours (using the SFC 101)
• Granularity	1 hour
• Retentive	Yes; must be manually restarted after every restart
Clock synchronization	
• supported	Yes
• On MPI, master	Yes
• On MPI, slave	Yes
• On DP, master	Yes (DP slave must be time slave)
• On DP, slave	Yes
• On the AS, master	Yes
• On the AS, slave	Yes
• On Ethernet via NTP	Yes (as client)
S7 signaling functions	
• Number of stations that can be logged on for signaling functions, max.	16 (depends on the number of connections configured for PG/OP and S7 basic communication)
• Process error diagnostic messages	Yes
• Simultaneously enabled interrupt S blocks, max.	300
Test and startup functions	
Status/modify	
• Status/modify variable	Yes
• Variables	Inputs, outputs, bit memories, DBs, timers, counters
• Maximum number of variables	30
• of those status variables, max.	30

Technical specifications	
• Modify variables, max.	14
Forcing	
• Forcing	Yes
• Variables	Inputs, outputs
• Maximum number of tags	10
Status block	Yes (max. 2 blocks simultaneously)
Single step	Yes
• Number of breakpoints	4
Diagnostic buffer	
• Available	Yes
• No. of entries, max.	500
• Configurable	No
• of which are power-failure-proof	100, only the last 100 entries are retentive
• Maximum number of entries that can be read in RUN	499
• Number of entries that can be set in RUN	Yes (from 10 to 499)
• Number of preset entries in RUN	10
Service data	
• Can be read out	Yes
Monitoring function	
• Status LEDs	Yes
Communication functions	
PG/OP communication	Yes
Prioritized OCM communication	
• Supported	Yes
Routing	
• Number of routing connections	X1 as MPI max. 10; X1 as DP master max. 24 X1 as DP slave (active) max. 14 X2 as PROFINET max. 24
• Data record routing	Yes
Global data communication	
• Supported	Yes
• Number of GD circles, max.	8
• Number of GD packets, max.	8
• Number of GD packets, sender, max.	8
• Number of GD packets, receiver, max.	8

Technical specifications	
• Size of GD packets, max.	22 bytes
• Size of GD packets, of those consistent, max.	22 bytes
S7 basic communication	
• Supported	Yes
• User data per job, max.	76 bytes
• User data per job, consistent, max.	76 Bytes (for X-SEND/REC), 64 bytes (for X-PUT/GET as server)
S7 communication	
• Supported	Yes
• As server	Yes
• As client	Yes (via integrated PN interface and loadable FBs, or via CP and loadable FBs)
• User data per job	See the STEP 7 Online Help, <i>Common parameters of SFBs/FBs and SFC/FC of the S7 communication</i>
S5-compatible communication	
• Supported	Yes (via CP and loadable FCs)
Web server	
• Supported	Yes
• Number of HTTP clients	5
• User-defined web pages	Yes
Open IE communication	
• Supported	Yes
• Maximum number of connections/access points	8
• Local port number used at the system end	0, 20, 21, 23, 25, 102, 135, 161, 8080, 34962, 34963, 34964, 65532, 65533, 65534, 65535
TCP/IP	
• Maximum number of connections	8
• Data length for connection type 01 _H , max.	1460 bytes
• Data length for connection type 11 _H , max.	32768 bytes
• Multiple passive connections per port (multiport), supported	Yes
ISO on TCP	
• Maximum number of connections	8
• Data length, max.	32768 bytes

Technical specifications	
UDP	Yes (via integrated PROFINET interface and loadable FBs)
• Maximum number of connections	8
• Data length, max.	1472 bytes
iPAR server	
• Supported	Yes
Number of connections	
• Total	16
Suitable for PG communication	
• PG communication, reserved	1
• PG communication, configurable, min.	1
• PG communication, configurable, max.	15
Suitable for OP communication	
• OP communication, reserved	1
• OP communication, configurable, min.	1
• OP communication, configurable, max.	15
Suitable for S7 basic communication	
• S7 basic communication, reserved	0
• S7 basic communication, configurable, min.	0
• S7 basic communication, configurable, max.	14
Suitable for S7 communication	
• S7 communication, reserved	0
• S7 communication, configurable, min.	0
• S7 communication, configurable, max.	14
Total number of instances, max.	32
PROFINET CBA (with communication load setpoint)	
• Reference setting for CPU communication	50 %
• Number of remote interconnecting partners	32
• Number of master/slave functions	30
• Total of all master/slave connections	1000
• Data length of all incoming master/slave connections, max.	4000 bytes
• Data length of all outgoing master/slave connections, max.	4000 bytes
• Number of device-internal and PROFIBUS interconnections	500

Technical specifications	
• Data length of the device-internal and PROFIBUS interconnections, max.	4000 bytes
• Data length per connection, max.	1400 bytes
Remote interconnections with acyclic transmission	
• Sampling rate: Sampling time, min.	500 ms
• Number of incoming interconnections	100
• Number of outgoing interconnections	100
• Data length of all incoming interconnections, max.	2000 bytes
• Data length of all outgoing interconnections, max.	2000 bytes
• Data length per connection (acyclic interconnections), max.	1400 bytes
Remote interconnections with cyclic transmission	
• Transmission frequency: Minimum transmission interval	10 ms
• Number of incoming interconnections	200
• Number of outgoing interconnections	200
• Data length of all incoming interconnections, max.	2000 bytes
• Data length of all outgoing interconnections, max.	2000 bytes
• Data length per connection (acyclic interconnections), max.	450 bytes
HMI variables via PROFINET (acyclic)	
• HMI variables update	500 ms
• Number of stations that can be logged on for HMI variables (PN OPC/iMAP)	3, 2xPN OPC/1x iMAP
• Number of HMI variables	200
• Data length of all HMI variables, max.	2000 bytes
PROFIBUS proxy functionality	
• Supported	Yes
• Number of coupled PROFIBUS devices	16
• Data length per connection, max.	240 bytes (slave dependent)
Interfaces	
1st interface	
Interface designation	X1
Type of interface	Integrated RS 485 interface

Technical specifications	
Hardware	RS 485
• electrically disconnected	Yes
• Interface power supply (15 V DC to 30 V DC), max.	200 mA
Functionality	
• MPI	Yes
• DP master	Yes
• DP slave	Yes
• Point-to-point connection	No
MPI	
Services	
• PG/OP communication	Yes
• Routing	Yes
• Global data communication	Yes
• S7 basic communication	Yes
• S7 communication	Yes (server only; connection configured at one end)
• S7 communication, as client	No (but via CP and loadable FBs)
• S7 communication, as server	Yes
Transmission rate, max.	12 Mbps
DP master	
Services	
• PG/OP communication	Yes
• Routing	Yes
• Global data communication	No
• S7 basic communication	Yes (intelligent blocks only)
• S7 communication	Yes (server only; connection configured at one end)
• Constant bus cycle time supported	Yes
• Isochronous mode	Yes, OB 61 (isochronous mode can be used only alternatively on PROFIBUS DP or PROFINET IO)
• SYNC/FREEZE	Yes
• Activation/deactivation of DP slaves – Max. number of DP slaves that can be enabled / disabled simultaneously	Yes 8
• Direct data exchange (cross-traffic)	Yes (as subscriber)
• DPV1	Yes

Technical specifications	
Transmission rate, max.	12 Mbps
Number of DP slaves, max.	124
Address range	
• Inputs, max.	2 KB
• Outputs, max.	2 KB
User data per DP slave	
• Inputs, max.	244 bytes
• Outputs, max.	244 bytes
DP slave	
Services	
• PG/OP communication	Yes
• Routing	Yes (only if interface is active)
• Global data communication	No
• S7 basic communication	No
• S7 communication	Yes (server only; connection configured at one end)
• Direct data exchange (cross-traffic)	Yes
• DPV1	No
Transmission rate, max.	12 Mbps
Automatic baud rate detection	Yes (only if interface is passive)
Transfer memory	
• Inputs	244 bytes
• Outputs	244 bytes
• Address range, max.	32
• User data per address range, max.	32 bytes
GSD file	The current GSD file is available for download from the Internet (http://www.siemens.com/profibus-gsd).
2nd interface	
Interface designation	X2
Type of interface	PROFINET
Hardware	Ethernet RJ 45
• electrically disconnected	Yes
• Integrated switch	Yes
• Number of ports	2
• Automatic determination of the transmission rate	Yes (10/100 Mbps)
• Autonegotiation	Yes

Technical specifications	
• Autocrossing	Yes
Media redundancy	
• Supported	Yes
• Changeover time on line break, typically	200 ms (PROFINET MRP)
• Number of nodes on the ring, max.	50
Change of the IP address at runtime, supported	Yes
Keep-alive function, supported	Yes
Functionality	
• MPI	No
• DP master	No
• DP slave	No
• PROFINET IO controller	Yes, even simultaneously with IO device functionality
• PROFINET IO device	Yes, even simultaneously with IO controller functionality
• PROFINET CBA	Yes (acyclic and cyclic transmission)
• Open IE communication	Yes; via TCP/IP, ISO on TCP, UDP
• Web server – Number of HTTP clients	Yes 5
PROFINET IO controller	
Services	
• PG/OP communication	Yes
• Routing	Yes
• S7 communication	Yes (with loadable FBs, max. configurable connections: 14; maximum number of instances: 32)
• Open IE communication	Yes; via TCP/IP, ISO on TCP, UDP
Number of integrated PROFINET IO controllers	1
RT, supported	Yes
IRT, supported	Yes
Transmission rate, max.	100 Mbps
Maximum number of connectable IO devices	128
Number of connectable IO devices, for RT, max.	128
• of which in line, max.	128
Number of IO devices with IRT and "high flexibility" option	128
• of which in line, max.	61
Number of IO devices with IRT and "high performance" option, max.	64

Technical specifications	
• of which in line, max.	64
Shared Device, supported	Yes
Isochronous mode	Yes (OB 61 - operation in isochronous mode is possible either on DP, or on PROFINET IO (not concurrently))
Prioritized startup, supported	Yes
• Maximum number of IO devices with prioritized startup	32
Activating/deactivating of PROFINET IO Devices	Yes
• Number of IO devices that can be enabled / disabled simultaneously, max.	8
IO devices changing during runtime (partner ports), supported	Yes
• Number of IO devices per tool, max.	8
Device replacement without removable medium	Yes
Send clocks	250 µs, 500 µs, 1 ms 2 ms, 4 ms (not for IRT with "high flexibility" option)
Update time	
• Update times	The minimum update time also depends on the time slice set for PROFINET IO communication, the number of IO Devices used, and on the amount of configured user data.
With RT	
• for send clock of 250 µs	250 µs to 128 ms
• for send clock of 500 µs	500 µs to 256 ms
• for send clock of 1 ms	1 ms to 512 ms
• for send clock of 2 ms	2 ms to 512 ms
• for send clock of 4 ms	4 ms to 512 ms
For IRT with "high flexibility" option	
• for send clock of 250 µs	250 µs to 128 ms
• for send clock of 500 µs	500 µs to 256 ms
• for send clock of 1 ms	1 ms to 512 ms
For IRT with "high performance" option	
• for send clock of 250 µs	250 µs to 4 ms
• for send clock of 500 µs	500 µs to 8 ms
• for send clock of 1 ms	1 ms to 16 ms
• for send clock of 2 ms	2 ms to 32 ms
• for send clock of 4 ms	4 ms to 64 ms

Technical specifications	
For IRT with "high performance" option and parameter assignment for "odd-numbered" send clocks	Update time = "odd-numbered" send clock set (any multiple of 125 µs: 375 µs, 625 µs to 3.875 ms)
Address range	
• Inputs, max.	2 KB
• Outputs, max.	2 KB
User data per address range, max.	
• User data consistency, max.	1024 bytes
PROFINET intelligent IO device	
Services	
• PG/OP communication	Yes
• S7 routing	Yes
• S7 communication	Yes (with loadable FBs, max. configurable connections: 14, maximum number of instances: 32)
• Open IE communication	Yes; via TCP/IP, ISO on TCP, UDP
RT, supported	Yes
IRT, supported	Yes
PROFenergy, supported	<i>Prepared with SFB 73 / 74 for loadable PROFenergy standard FBs for intelligent IO devices</i>
Shared Device, supported	Yes
• Number of IO controllers for shared devices, max.	2
Isochronous mode	No
Application transfer areas	Yes
IO devices transfer area	No
Transfer memory	
• Inputs, max.	1440 bytes, per controller for shared devices
• Outputs, max.	1440 bytes, per controller for shared devices
Submodules	
• Number, max.	64
• User data per submodule, max.	1024 bytes
Programming	
Programming language	
• LAD	Yes
• FBD	Yes
• STL	Yes
• SCL	Yes

Technical specifications	
• CFC	Yes
• GRAPH	Yes
• HiGraph®	Yes
Instruction set	See instruction list
• Nesting levels	8
Know-how protection	
• User program/password security	Yes
• Block encryption	Yes, using S7-Block Privacy
System functions (SFC)	See instruction list
System function blocks (SFB)	See instruction list
Dimensions	
• Mounting dimensions W x H x D (mm)	40 x 125 x 130
• Weight	340 g
Voltages and currents	
• Power supply (rated value)	24 V DC
• Low limit of admissible range (DC)	19.2 V
• High limit of admissible range (DC)	28.8 V
• Current consumption (open-circuit), typically	150 mA
• Current consumption (rated value)	750 mA
• Inrush current, typ.	4 A
• I ² t	1 A ² s
• External protection of power supply lines (recommended), min.	2 A
• Power loss, typically	4.65 W

9.6 CPU 317-2 DP

Technical specifications

Table 9- 7 Technical specifications of the CPU 317-2 DP

Technical specifications	
CPU and version	
• MLFB	6ES7317-2AK14-0AB0
• Hardware version	01
• Firmware version	V3.3
• Associated programming package	STEP 7 as of V5.5 + SP1 or STEP 7 as of V5.2 + SP1 with HSP 202
Memory	
Main memory	
• Integrated	1 MB
• Expandable	No
• Maximum size of non-volatile memory for retentive data blocks	256 KB
Load memory	
• Pluggable (MMC)	Yes
• Pluggable (MMC), max.	8 MB
• Data retention on the Micro Memory Card (after the last programming action), min.	10 years
Backup	
• Available	Yes (ensured with Micro Memory Card - maintenance-free)
• Without battery	Yes (program and data)
Execution times	
• For bit operation, min.	0.025 μ s
• For word operations, min.	0.03 μ s
• For fixed-point arithmetic, min.	0.04 μ s
• For floating-point arithmetic, min.	0.16 μ s
Timers/counters and their retentivity	
S7 counters	
• Number	512
Retentivity	
• Configurable	Yes
• Default	Z 0 to Z 7

Technical specifications	
Counting range	
• Low limit	0
• High limit	999
IEC counter	
• Available	Yes
• Type	SFB
• Number	Unlimited (limited only by main memory size)
S7 timers	
• Number	512
Retentivity	
• Configurable	Yes
• Default	No retentivity
Time setting range	
• Low limit	10 ms
• High limit	9990 s
IEC timer	
• Available	Yes
• Type	SFB
• Number	Unlimited (limited only by main memory size)
Data areas and their retentivity	
Bit memory	
• Number, max.	4096 bytes
• Retentivity, available	Yes (MB 0 to MB 4095)
• Retentivity, default	MB 0 to MB 15
• Number of clock memories	8 (1 memory byte)
Data blocks	
• Number, max.	2048 (in the number range 1 to 16000)
• Size, max.	64 KB
• Retentivity, configurable	Yes, via non-retain feature on the DB
• Retentivity, default	Yes
Local data	
• Per priority class, max.	32 KB per execution level, 2 KB per block

Technical specifications	
Blocks	
• Number of blocks (total)	2048 (DBs, FCs, FBs) The maximum number of blocks that can be loaded may be reduced due to the Micro Memory Card you are using.
OB	
• Size, max.	64 KB
• Number of free cycle OBs	1 (OB 1)
• Number of time-of-day interrupt OBs	1 (OB 10)
• Number of time-delay interrupt OBs	2 (OB 20, 21)
• Number of cyclic interrupt OBs	4 (OB 32, 33, 34, 35)
• Number of hardware interrupt OBs	1 (OB 40)
• Number of DPV1 interrupt OBs	3 (OB 55, 56, 57)
• Number of isochronous interrupt OBs	1 (OB 61)
• Number of restart OBs	1 (OB 100)
• Number of asynchronous error OBs	5 (OB 80, 82, 85, 86, 87)
• Number of synchronous error OBs	2 (OB 121, 122)
Nesting depth	
• Per priority class	16
• Additionally within an error OB	4
FB	
See instruction list	
• Number, max.	2048 (in the number range 0 to 7999)
• Size, max.	64 KB
FC	
See instruction list	
• Number, max.	2048 (in the number range 0 to 7999)
• Size, max.	64 KB
Address ranges (inputs/outputs)	
I/O address area	
• Inputs, max.	8192 bytes (freely addressable)
• Outputs, max.	8192 bytes (freely addressable)
Distributed	
• Inputs	8192 bytes
• Outputs	8192 bytes
I/O process image	
• Inputs	8192 bytes

Technical specifications	
• Outputs	8192 bytes
• Inputs, adjustable	8192 bytes
• Outputs, adjustable	8192 bytes
• Inputs, preset	256 bytes
• Outputs, preset	256 bytes
Process image partitions	
• Number of partial process images, max.	1
Digital channels	
• Inputs, max.	65636
• Outputs, max.	65636
• Inputs, of those central	1024
• Outputs, of those central	1024
Analog channels	
• Inputs, max.	4096
• Outputs, max.	4096
• Inputs, of those central, max.	256
• Outputs, of those central, max.	256
Hardware configuration	
• Racks, max.	4
• Modules per rack, max.	8
Number of DP masters	
• Integrated	2
• Via CP	4
Number of usable FMs and CPs (recommended)	
• FM	8
• CP, point-to-point	8
• CP, LAN	10
Time-of-day	
Clock	
• Hardware clock (real-time)	Yes
• Buffered, can be synchronized	Yes
• Factory setting	DT#1994-01-01-00:00:00
• Buffered period	Typically 6 weeks (at an ambient temperature of 40 °C)

Technical specifications	
• Behavior of the real-time clock after POWER ON	The clock continues running after POWER OFF
• Behavior after expiration of the buffered period	The clock continues at the time of day it had when power was switched off.
• Deviation per day, max.	10 s, typ. 2 s
Runtime meter	
• Number	4
• Number/number range	0 to 3
• Range of values	0 to 2 ³¹ hours (using the SFC 101)
• Granularity	1 hour
• Retentive	Yes; must be manually restarted after every restart
Clock synchronization	
• Supported	Yes
• On MPI, master	Yes
• On MPI, slave	Yes
• On DP, master	Yes (DP slave must be time slave)
• On DP, slave	Yes
• On the AS, master	Yes
• On the AS, slave	Yes
S7 signaling functions	
• Number of stations that can be logged on for signaling functions, max.	32 (depends on the number of connections configured for PG/OP and S7 basic communication)
• Process error diagnostic messages	Yes
• Simultaneously enabled interrupt S blocks, max.	300
Test and startup functions	
Status/modify	
• Status/modify variable	Yes
• Variables	Inputs, outputs, bit memories, DBs, timers, counters
• Maximum number of variables	30
• Status variables, max.	30
• Modify variables, max.	14

Technical specifications	
Forcing	
• Forcing	Yes
• Variables	Inputs, outputs
• Maximum number of tags	10
Status block	Yes (max. 2 blocks simultaneously)
Single step	
• Number of breakpoints	4
Diagnostic buffer	
• Available	Yes
• Maximum number of entries	500
• Configurable	No
• Of which are power-failure-proof	100, only the last 100 entries are retentive
• Maximum number of entries that can be read in RUN	499
• Number of entries that can be set in RUN	Yes (from 10 to 499)
• Number of preset entries in RUN	10
Service data	
• Can be read out	Yes
Monitoring function	
• Status LEDs	Yes
Communication functions	
PG/OP communication	Yes
Prioritized OCM communication	
• Supported	Yes
Routing	
• Number of routing connections	X1 as MPI max. 10 X1 as DP master max. 24 X1 as DP slave (active) max. 14 X2 as DP master max. 24 X2 as DP slave (active) max. 14
• Data record routing	Yes
Global data communication	
• Supported	Yes
• Number of GD circles, max.	8
• Number of GD packets, max.	8
• Number of GD packets, sender, max.	8
• Number of GD packets, receiver, max.	8

Technical specifications	
• Size of GD packets, max.	22 bytes
• Size of GD packets, of those consistent, max.	22 bytes
S7 basic communication	
• Supported	Yes
• User data per job, max.	76 bytes
• User data per job, consistent, max.	76 bytes (for X_SEND/RCV); 76 bytes (for X_PUT/GET as server)
S7 communication	
• Supported	Yes
• As server	Yes
• As client	Yes (via CP and loadable FBs)
• User data per job, max.	180 bytes (for PUT/GET)
• User data per job, consistent, max.	240 bytes (as server)
S5-compatible communication	
• Supported	Yes (via CP and loadable FCs)
Number of connections	
• Total	32
Suitable for PG communication	
• PG communication, reserved	1
• PG communication, configurable, min.	1
• PG communication, configurable, max.	31
Suitable for OP communication	
• OP communication, reserved	1
• OP communication, configurable, min.	1
• OP communication, configurable, max.	31
Suitable for S7 basic communication	
• S7 basic communication, reserved	0
• S7 basic communication, configurable, min.	0
• S7 basic communication, configurable, max.	30
Interfaces	
1st interface	
Interface designation	X1
Type of interface	Integrated RS 485 interface
Hardware	RS 485
• electrically disconnected	Yes

Technical specifications	
• Interface power supply (15 V DC to 30 V DC), max.	200 mA
Functionality	
• MPI	Yes
• DP master	Yes
• DP slave	Yes
• Point-to-point connection	No
MPI	
Services	
• PG/OP communication	Yes
• Routing	Yes
• Global data communication	Yes
• S7 basic communication	Yes
• S7 communication	Yes (server only; connection configured at one end)
• S7 communication, as client	No
• S7 communication, as server	Yes
Transmission rate, max.	12 Mbps
DP master	
Services	
• PG/OP communication	Yes
• Routing	Yes
• Global data communication	No
• S7 basic communication	Yes (intelligent blocks only)
• S7 communication	Yes (server only; connection configured at one end)
• Constant bus cycle time supported	Yes
• Isochronous mode	No
• SYNC/FREEZE	Yes
• Activate/deactivate DP slaves – Max. number of DP slaves that can be enabled / disabled simultaneously	Yes 8
• Direct data exchange (cross-traffic)	Yes (as subscriber)
• DPV1	Yes
Transmission rate, max.	12 Mbps
Number of DP slaves	124
Address range	

Technical specifications	
• Inputs, max.	8192 bytes
• Outputs, max.	8192 bytes
User data per DP slave	
• Inputs, max.	244 bytes
• Outputs, max.	244 bytes
DP slave (DP slave at both DP interfaces is excluded)	
Services	
• PG/OP communication	Yes
• Routing	Yes (only if interface is active)
• Global data communication	No
• S7 basic communication	No
• S7 communication	Yes (server only; connection configured at one end)
• Direct data exchange (cross-traffic)	Yes
• DPV1	No
Transmission rate, max.	12 Mbps
Automatic baud rate detection	Yes (only if interface is passive)
Transfer memory	
• Inputs	244 bytes
• Outputs	244 bytes
• Address range, max.	32
• User data per address range, max.	32 bytes
GSD file	The current GSD file is available for download from the Internet (http://www.siemens.com/profibus-gsd).
2nd interface	
Interface designation	X2
Type of interface	Integrated RS 485 interface
Hardware	RS 485
• electrically disconnected	Yes
• Interface power supply (15 V DC to 30 V DC), max.	200 mA
Functionality	
• MPI	No
• DP master	Yes
• DP slave	Yes
• Point-to-point connection	No

Technical specifications	
DP master	
Services	
• PG/OP communication	Yes
• Routing	Yes
• Global data communication	No
• S7 basic communication	Yes (intelligent blocks only)
• S7 communication	Yes (server only; connection configured at one end)
• S7 communication, as client	No
• S7 communication, as server	Yes
• Constant bus cycle time supported	Yes
• Isochronous mode	Yes (OB61)
• Direct data exchange (cross-traffic)	Yes (as subscriber)
• SYNC/FREEZE	Yes
• Activate/deactivate DP slaves – Max. number of DP slaves that can be enabled / disabled simultaneously	Yes 8
• DPV1	Yes
Transmission rate, max.	12 Mbps
Number of DP slaves, max.	124
Address range	
• Inputs, max.	8192 bytes
• Outputs, max.	8192 bytes
User data per DP slave	
• Inputs, max.	244 bytes
• Outputs, max.	244 bytes
DP slave (DP slave at both DP interfaces is excluded)	
Services	
• PG/OP communication	Yes
• Routing	Yes (only if interface is active)
• Global data communication	No
• S7 basic communication	No
• S7 communication	Yes (server only, connections configured at one end)
• S7 communication, as client	No
• S7 communication, as server	Yes

Technical specifications	
• Direct data exchange (cross-traffic)	Yes
• DPV1	No
Transmission rate, max.	12 Mbps
Automatic baud rate detection	Yes (only if interface is passive)
GSD file	The current GSD file is available for download from the Internet (http://www.siemens.com/profibus-gsd).
Transfer memory	
• Inputs	244 bytes
• Outputs	244 bytes
• Address range, max.	32
• User data per address range, max.	32 bytes
Programming	
Programming language	
• LAD	Yes
• FBD	Yes
• STL	Yes
• SCL	Yes
• CFC	Yes
• GRAPH	Yes
• HiGraph®	Yes
Instruction set	
• Nesting levels	8
Know-how protection	
• User program/password security	Yes
• Block encryption	Yes, using S7-Block Privacy
System functions (SFC)	
System function blocks (SFB)	
See instruction list	
See instruction list	
Dimensions	
• Mounting dimensions W x H x D (mm)	40 x 125 x 130
• Weight	360 g
Voltages and currents	
• Power supply (rated value)	24 V DC
• Low limit of admissible range (DC)	19.2 V
• High limit of admissible range (DC)	28.8 V
• Current consumption (open-circuit), typically	120 mA

Technical specifications	
• Current consumption (rated value)	870 mA
• Inrush current, typ.	4 A
• I ² t	1 A ² s
• External protection of power supply lines (recommended), min.	2 A
• Power loss, typically	4.5 W

9.7 CPU 317-2 PN/DP

Technical specifications

Table 9- 8 Technical specifications of the CPU 317-2 PN/DP

Technical specifications	
CPU and version	
• MLFB	6ES7317-2EK14-0AB0
• Hardware version	01
• Firmware version	V3.2.1
• Associated programming package	STEP 7 as of V5.5 + HSP 199
Memory	
Main memory	
• Integrated	1 MB
• Expandable	No
• Maximum size of non-volatile memory for retentive data blocks	256 KB
Load memory	
• Pluggable (MMC)	Yes
• Pluggable (MMC), max.	8 MB
• Data retention on the Micro Memory Card (after the last programming action), min.	10 years
Backup	
• Available	Yes (ensured with Micro Memory Card - maintenance-free)
• Without battery	Yes (program and data)

Technical specifications	
Execution times	
• For bit operation, min.	0.025 µs
• For word operations, min.	0.03 µs
• For fixed-point arithmetic, min.	0.04 µs
• For floating-point arithmetic, min.	0.16 µs
Timers/counters and their retentivity	
S7 counters	
• Number	512
Retentivity	
• Configurable	Yes
• Default	Z 0 to Z 7
Counting range	
• Low limit	0
• High limit	999
IEC counter	
• Available	Yes
• Type	SFB
• Number	Unlimited (limited only by main memory size)
S7 timers	
• Number	512
Retentivity	
• Configurable	Yes
• Default	No retentivity
Time setting range	
• Low limit	10 ms
• High limit	9990 s
IEC timer	
• Available	Yes
• Type	SFB
• Number	Unlimited (limited only by main memory size)
Data areas and their retentivity	
Bit memory	
• Number, max.	4096 bytes
• Retentivity, available	Yes (from MB 0 to MB 4095)
• Retentivity, default	MB 0 to MB 15

Technical specifications	
• Number of clock memories	8 (1 memory byte)
Data blocks	
• Number, max.	2048 (in the number range 1 to 16000)
• Size, max.	64 KB
• Retentivity, configurable	Yes, via non-retain feature on the DB
• Retentivity, default	Yes
Local data	
• Per priority class, max.	32 KB per execution level, 2 KB per block
Blocks	
• Number of blocks (total)	2048 (DBs, FCs, FBs) The maximum number of blocks that can be loaded may be reduced due to the Micro Memory Card you are using.
OB	
• Size, max.	64 KB
• Number of free cycle OBs	1 (OB 1)
• Number of time-of-day interrupt OBs	1 (OB 10)
• Number of time-delay interrupt OBs	2 (OB 20, 21)
• Number of cyclic interrupt OBs	4 (OB 32, 33, 34, 35)
• Number of hardware interrupt OBs	1 (OB 40)
• Number of DPV1 interrupt OBs	3 (OB 55, 56, 57)
• Number of isochronous interrupt OBs	1 (OB 61)
• Number of restart OBs	1 (OB100)
• Number of asynchronous error OBs	6 (OB 80, 82, 83, 85, 86, 87) (OB83 for PROFINET IO)
• Number of synchronous error OBs	2 (OB 121, 122)
Nesting depth	
• Per priority class	16
• Additionally within an error OB	4
FB	
• Number, max.	2048 (in the number range 0 to 7999)
• Size	64 KB
FC	
• Number, max.	2048 (in the number range 0 to 7999)

Technical specifications	
• Size	64 KB
Address ranges (inputs/outputs)	
I/O address area	
• Inputs	8192 bytes
• Outputs	8192 bytes
Distributed	
• Inputs	8192 bytes
• Outputs	8192 bytes
I/O process image	
• Inputs	8192 bytes
• Outputs	8192 bytes
• Inputs, adjustable	8192 bytes
• Outputs, adjustable	8192 bytes
• Inputs, preset	256 bytes
• Outputs, preset	256 bytes
Process image partitions	
• Number of partial process images, max.	1
• Amount of user data in the process image partition for isochronous PROFINET IO, max.	1600 bytes
Digital channels	
• Inputs	65536
• Outputs	65536
• Inputs, of those central	1024
• Outputs, of those central	1024
Analog channels	
• Inputs	4096
• Outputs	4096
• Inputs, of those central	256
• Outputs, of those central	256
Hardware configuration	
• Racks, max.	4
• Modules per rack, max.	8
Number of DP masters	
• Integrated	1
• Via CP	4

Technical specifications	
Number of usable FMs and CPs (recommended)	
• FM	8
• CP, point-to-point	8
• CP, LAN	10
Time-of-day	
Clock	
• Hardware clock (real-time)	Yes
• Buffered, can be synchronized	Yes
• Factory setting	DT#1994-01-01-00:00:00
• Buffered period	Typically 6 weeks (at an ambient temperature of 40 °C)
• Behavior of the clock on expiration of the buffered period	The clock continues at the time of day it had when power was switched off.
• Behavior of the real-time clock after POWER ON	The clock continues running after POWER OFF.
• Deviation per day, max.	10 s, typ. 2 s
Runtime meter	
• Number	4
• Number/number range	0 to 3
• Range of values	0 to 2 ³¹ hours (using the SFC 101)
• Granularity	1 hour
• Retentive	Yes; must be manually restarted after every restart
Clock synchronization	
• Supported	Yes
• On MPI, master	Yes
• On MPI, slave	Yes
• On DP, master	Yes (DP slave must be time slave)
• On DP, slave	Yes
• On the AS, master	Yes
• On the AS, slave	Yes
• On Ethernet via NTP	Yes (as client)
S7 signaling functions	
• Number of stations that can be logged on for signaling functions, max.	32 (depends on the number of connections configured for PG/OP and S7 basic communication)

Technical specifications	
• Process error diagnostic messages	Yes
• Simultaneously enabled interrupt S blocks, max.	300
Test and startup functions	
Status/modify	
• Status/modify variable	Yes
• Variables	Inputs, outputs, bit memories, DBs, timers, counters
• Maximum number of variables	30
• Status variables, max.	30
• Modify variables, max.	14
Forcing	
• Forcing	Yes
• Variables	Inputs, outputs
• Maximum number of tags	10
Status block	Yes (max. 2 blocks simultaneously)
Single step	Yes
• Number of breakpoints	4
Diagnostic buffer	
• Available	Yes
• No. of entries, max.	500
• Configurable	No
• Of which are power-failure-proof	100, only the last 100 entries are retentive
• Maximum number of entries that can be read in RUN	499
• Number of entries that can be set in RUN	Yes (from 10 to 499)
• Number of preset entries in RUN	10
Service data	
• Can be read out	Yes
Monitoring function	
• Status LEDs	Yes
Communication functions	
PG/OP communication	Yes
Prioritized OCM communication	
• Supported	Yes
Routing	Yes

Technical specifications	
• Number of routing connections	X1 as MPI max. 10; X1 as DP master max. 24 X1 as DP slave (active) max. 24 X2 as PROFINET max. 24
• Data record routing	Yes
Global data communication	
• Supported	Yes
• Number of GD circles, max.	8
• Number of GD packets, max.	8
• Number of GD packets, sender, max.	8
• Number of GD packets, receiver, max.	8
• Size of GD packets, max.	22 bytes
• Size of GD packets, of those consistent, max.	22 bytes
S7 basic communication	
• Supported	Yes
• User data per job, max.	76 bytes
• User data per job, consistent, max.	76 bytes (for X-SEND/REC); 64 bytes (for X-PUT/GET as server)
S7 communication	
• Supported	Yes
• As server	Yes
• As client	Yes (via integrated PN interface and loadable FBs, or via CP and loadable FBs)
• User data per job	See the STEP 7 Online Help, <i>Common parameters of SFBs/FBs and SFC/FC of the S7 communication</i>
S5-compatible communication	
• Supported	Yes (via CP and loadable FCs)
Web server	
• Supported	Yes
• Number of HTTP clients	5
• User-defined web pages	Yes
Open IE communication	
• Supported	Yes
• Maximum number of connections/access points	16
• Local port number used at the system end	0, 20, 21, 23, 25, 80, 102, 135, 161, 8080, 34962, 34963, 34964, 65532, 65533, 65534, 65535

Technical specifications	
TCP/IP	Yes (via integrated PROFINET interface and loadable FBs)
• Maximum number of connections	16
• Data length for connection type 01 _H , max.	1460 bytes
• Data length for connection type 11 _H , max.	32768 bytes
• Multiple passive connections per port (multiport), Supported	Yes
ISO on TCP	Yes (via integrated PROFINET interface and loadable FBs)
• Maximum number of connections	16
• Data length, max.	32768 bytes
UDP	Yes (via integrated PROFINET interface and loadable FBs)
• Maximum number of connections	16
• Data length, max.	1472 bytes
iPAR server	
• Supported	Yes
Number of connections	
• Total	32
Suitable for PG communication	31
• PG communication, reserved	1
• PG communication, configurable, min.	1
• PG communication, configurable, max.	31
Suitable for OP communication	31
• OP communication, reserved	1
• OP communication, configurable, min.	1
• OP communication, configurable, max.	31
Suitable for S7 basic communication	30
• S7 basic communication, reserved	0
• S7 basic communication, configurable, min.	0
• S7 basic communication, configurable, max.	30
Suitable for S7 communication	16
• S7 communication, reserved	0
• S7 communication, configurable, min.	0
• S7 communication, configurable, max.	16
Total number of instances, max.	32

Technical specifications	
PROFINET CBA (with communication load setpoint)	
• Reference setting for CPU communication	50 %
• Number of remote interconnecting partners	32
• Number of master/slave functions	30
• Total of all master/slave connections	1000
• Data length of all incoming master/slave connections, max.	4000 bytes
• Data length of all outgoing master/slave connections, max.	4000 bytes
• Number of device-internal and PROFIBUS interconnections	500
• Data length of the device-internal and PROFIBUS interconnections, max.	4000 bytes
• Data length per connection, max.	1400 bytes
Remote interconnections with acyclic transmission	
• Sampling rate: Sampling time, min.	500 ms
• Number of incoming interconnections	100
• Number of outgoing interconnections	100
• Data length of all incoming interconnections, max.	2000 bytes
• Data length of all outgoing interconnections, max.	2000 bytes
• Data length per connection (acyclic interconnections), max.	1400 bytes
Remote interconnections with cyclic transmission	
• Transmission frequency: Minimum transmission interval	10 ms
• Number of incoming interconnections	200
• Number of outgoing interconnections	200
• Data length of all incoming interconnections, max.	2000 bytes
• Data length of all outgoing interconnections, max.	2000 bytes
• Data length per connection (acyclic interconnections), max.	450 bytes
HMI variables via PROFINET (acyclic)	
• HMI variables update	500 ms

Technical specifications	
• Number of stations that can be logged on for HMI variables (PN OPC/iMAP)	3 (2 x PN OPC/1 x iMAP)
• Number of HMI variables	200
• Data length of all HMI variables, max.	2000 bytes
PROFIBUS proxy functionality	
• Supported	Yes
• Number of coupled PROFIBUS devices	16
• Data length per connection, max.	240 bytes (slave dependent)
Interfaces	
1st interface	
Interface designation	X1
Type of interface	Integrated RS 485 interface
Hardware	RS 485
• electrically disconnected	Yes
• Interface power supply (15 V DC to 30 V DC), max.	200 mA
Functionality	
• MPI	Yes
• DP master	Yes
• DP slave	Yes
• Point-to-point connection	No
• PROFINET	No
MPI	
Services	
• PG/OP communication	Yes
• Routing	Yes
• Global data communication	Yes
• S7 basic communication	Yes
• S7 communication	Yes (server only, connections configured at one end)
• S7 communication, as client	No (but via CP and loadable FBs)
• S7 communication, as server	Yes
Transmission rate, max.	12 Mbps
DP master	
Services	
• PG/OP communication	Yes
• Routing	Yes

Technical specifications	
• Global data communication	No
• S7 basic communication	Yes (intelligent blocks only)
• S7 communication	Yes (server only; connection configured at one end)
• Constant bus cycle time supported	Yes
• Isochronous mode	Yes (OB 61 - operation in isochronous mode is possible either on DP, or on PROFINET IO (not concurrently))
• SYNC/FREEZE	Yes
• Activate/deactivate DP slaves	Yes
• Max. number of DP slaves that can be enabled / disabled simultaneously	8
• Direct data exchange (cross-traffic)	Yes (as subscriber)
• DPV1	Yes
Transmission rate, max.	12 Mbps
Number of DP slaves, max.	124
Address range	
• Inputs, max.	8 KB
• Outputs, max.	8 KB
User data per DP slave	
• Inputs, max.	244 bytes
• Outputs, max.	244 bytes
DP slave	
Services	
• PG/OP communication	Yes
• Routing	Yes (only if interface is active)
• Global data communication	No
• S7 basic communication	No
• S7 communication	Yes (server only; connection configured at one end)
• Direct data exchange (cross-traffic)	Yes
• DPV1	No
Transmission rate, max.	12 Mbps
Automatic baud rate detection	Yes (only if interface is passive)
Transfer memory	
• Inputs	244 bytes
• Outputs	244 bytes

Technical specifications	
• Address areas, max.	32
• User data per address range, max.	32 bytes
GSD file	The current GSD file is available for download from the Internet (http://www.siemens.com/profibus-gsd).
2nd interface	
Interface designation	X2
Type of interface	PROFINET
Hardware	Ethernet RJ 45
• electrically disconnected	Yes
• Integrated switch	Yes
• Number of ports	2
• Automatic determination of the transmission rate	Yes (10/100 Mbps)
• Autonegotiation	Yes
• Autocrossing	Yes
Media redundancy	
• Supported	Yes
• Changeover time on line break, typically	200 ms (PROFINET MRP)
• Number of nodes on the ring, max.	50
Change of the IP address at runtime, supported	Yes
Keep-alive function, supported	Yes
Functionality	
• MPI	No
• DP master	No
• DP slave	No
• PROFINET IO controller	Yes, even simultaneously with IO device functionality
• PROFINET IO device	Yes, even simultaneously with IO controller functionality
• PROFINET CBA	Yes (acyclic and cyclic transmission)
• Open IE communication	Yes; via TCP/IP, ISO on TCP, UDP
• Web server – Number of HTTP clients	Yes 5
PROFINET IO controller	
Services	
• PG/OP communication	Yes
• Routing	Yes

Technical specifications	
• S7 communication	Yes (with loadable FBs, max. configurable connections: 16; maximum number of instances: 32)
• Open IE communication	Yes; via TCP/IP, ISO on TCP, UDP
Number of integrated PROFINET IO controllers	1
RT, supported	Yes
IRT, supported	Yes
Transmission rate, max.	100 Mbps
Maximum number of connectable IO devices	128
Number of connectable IO devices, for RT, max.	128
• of which in line, max.	128
Number of IO devices with IRT and "high flexibility" option	128
• of which in line, max.	61
Number of IO devices with IRT and "high performance" option, max.	64
• of which in line, max.	64
Shared Device, supported	Yes
Isochronous mode	Yes (OB 61, isochronous mode can be used only alternatively on PROFIBUS DP or PROFINET IO)
Prioritized startup, supported	Yes
• Maximum number of IO devices with prioritized startup	32
Activating/deactivating PROFINET IO devices	Yes
• Number of IO devices that can be enabled / disabled simultaneously, max.	8
IO devices changing during runtime (partner ports), supported	Yes
• Number of IO devices per tool, max.	8
Device replacement without removable medium	Yes
Send clocks	250 µs, 500 µs, 1 ms 2 ms, 4 ms (not for IRT with "high flexibility" option)
Update time	
• Update times	The minimum update time also depends on the time slice set for PROFINET IO communication, the number of IO Devices used, and on the amount of configured user data.
With RT	
• for send clock of 250 µs	250 µs to 128 ms
• for send clock of 500 µs	500 µs to 256 ms
• for send clock of 1 ms	1 ms to 512 ms

Technical specifications	
• for send clock of 2 ms	2 ms to 512 ms
• for send clock of 4 ms	4 ms to 512 ms
For IRT with "high flexibility" option	
• For send clock of 250 µs	250 µs to 128 ms
• For send clock of 500 µs	500 µs to 256 ms
• For send clock of 1 ms	1 ms to 512 ms
For IRT with "high performance" option	
• for send clock of 250 µs	250 µs to 4 ms
• for send clock of 500 µs	500 µs to 8 ms
• for send clock of 1 ms	1 ms to 16 ms
• for send clock of 2 ms	2 ms to 32 ms
• for send clock of 4 ms	4 ms to 64 ms
For IRT with "high performance" option and parameter assignment for "odd-numbered" send clocks	Update time = "odd-numbered" send clock set (any multiple of 125 µs: 375 µs, 625 µs to 3.875 ms)
Address range	
• Inputs, max.	8 KB
• Outputs, max.	8 KB
User data per address range, max.	
• User data consistency, max.	1024 bytes
PROFINET intelligent IO device	
Services	
• PG/OP communication	Yes
• S7 routing	Yes
• S7 communication	Yes (with loadable FBs, max. configurable connections: 16, maximum number of instances: 32)
• Open IE communication	Yes; via TCP/IP, ISO on TCP, UDP
RT, supported	Yes
IRT, supported	Yes
PROFenergy, supported	<i>Prepared with SFB 73 / 74 for loadable PROFenergy standard FBs for intelligent IO devices</i>
Shared Device, supported	Yes
• Number of IO controllers for shared devices, max.	2
Isochronous mode	No
Application transfer areas	Yes
IO devices transfer area	No

Technical specifications	
Transfer memory	
• Inputs, max.	1440 bytes; per controller for shared devices
• Outputs, max.	1440 bytes; per controller for shared devices
Submodules	
• Number, max.	64
• User data per submodule, max.	1024 bytes
Programming	
Programming language	
• LAD	Yes
• FBD	Yes
• STL	Yes
• SCL	Yes
• CFC	Yes
• GRAPH	Yes
• HiGraph®	Yes
Instruction set	
• Nesting levels	8
Know-how protection	
• User program/password security	Yes
• Block encryption	Yes, using S7-Block Privacy
System functions (SFC)	
System function blocks (SFB)	
See instruction list	
See instruction list	
Dimensions	
• Mounting dimensions W x H x D (mm)	40 x 125 x 130
• Weight	340 g
Voltages and currents	
• Power supply (rated value)	24 V DC
• Low limit of admissible range (DC)	19.2 V
• High limit of admissible range (DC)	28.8 V
• Current consumption (open-circuit), typically	150 mA
• Current consumption (rated value)	750 mA
• Inrush current, typ.	4 A
• I ² t	1 A ² s
• External protection of power supply lines (recommended), min.	2 A
• Power loss, typically	4.65 W

9.8 CPU 319-3 PN/DP

Technical specifications

Table 9- 9 Technical specifications of the CPU 319-3 PN/DP

Technical specifications	
CPU and version	
• MLFB	6ES7318-3EL01-0AB0
• Hardware version	01
• Firmware version	V3.2.1
• Associated programming package	STEP 7 V5.5 or higher
Memory	
Main memory	
• Integrated	2048 KB
• Expandable	No
• Maximum size of non-volatile memory for retentive data blocks,	700 KB
Load memory	
• Pluggable (MMC)	Yes
• Pluggable (MMC), max.	8 MB
• Data retention on the Micro Memory Card (after the last programming action), min.	10 years
Backup	
• Available	Yes (ensured with Micro Memory Card - maintenance-free)
• Without battery	Yes (program and data)
Execution times	
• For bit operations, min.	0.004 µs
• For word operations, min.	0.01 µs
• for fixed-point arithmetic, min.	0.01 µs
• for floating-point arithmetic, min.	0.04 µs
Timers/counters and their retentivity	
S7 counters	
• Number	2048
Retentivity	
• Configurable	Yes
• Default	Z 0 to Z 7

Technical specifications	
Counting range	
• Low limit	0
• High limit	999
IEC counter	
• Available	Yes
• Type	SFB
• Number	Unlimited (limited only by main memory size)
S7 timers	
• Number	2048
Retentivity	
• Configurable	Yes
• Default	No retentivity
Time setting range	
• Low limit	10 ms
• High limit	9990 s
IEC timer	
• Available	Yes
• Type	SFB
• Number	Unlimited (limited only by main memory size)
Data areas and their retentivity	
Bit memory	
• Number, max.	8192 bytes
• Retentivity, available	Yes (MB 0 to MB 8191)
• Retentivity, default	MB 0 to MB 15
• Number of clock memories	8 (1 memory byte)
Data blocks	
• Number, max.	4096 (in the number range 1 to 16000)
• Size, max.	64 KB
• Retentivity, configurable	Yes, via non-retain feature on the DB
• Retentivity, default	Yes
Local data	
• Per priority class, max.	32 KB per execution level, 2 KB per block

Technical specifications	
Blocks	
• Number of blocks (total)	4096 (DBs, FCs, FBs) The maximum number of blocks that can be loaded may be reduced due to the Micro Memory Card you are using.
OB	
• Size, max.	64 KB
• Number of free cycle OBs	1 (OB 1)
• Number of time-of-day interrupt OBs	1 (OB 10)
• Number of time-delay interrupt OBs	2 (OB 20, 21)
• Number of cyclic interrupt OBs	4 (OB 32, 33, 34, 35) (OB 35 as of 500 µs)
• Number of hardware interrupt OBs	1 (OB 40)
• Number of DPV1 interrupt OBs (only DP CPUs)	3 (OB 55, 56, 57)
• Number of isochronous interrupt OBs	1 (OB 61)
• Number of asynchronous error OBs	6 (OB 80, 82, 83, 85, 86, 87) (OB 83 only for PROFINET IO)
• Number of restart OBs	1 (OB 100)
• Number of synchronous error OBs	2 (OB 121, 122)
Nesting depth	
• Per priority class	16
• Additionally within an error OB	4
FB	
• Number, max.	4096 (number range from 0 to 7999)
• Size, max.	64 KB
FC	
• Number, max.	4096 (number range from 0 to 7999)
• Size, max.	64 KB
Address ranges (inputs/outputs)	
I/O address area	
• Inputs	8192 bytes
• Outputs	8192 bytes
Distributed	
• Inputs	8192 bytes
• Outputs	8192 bytes
I/O process image	

Technical specifications	
• Inputs	8192 bytes
• Outputs	8192 bytes
• Inputs, adjustable	8192 bytes
• Outputs, adjustable	8192 bytes
• Inputs, preset	256 bytes
• Outputs, preset	256 bytes
Process image partitions	
• Number of partial process images, max.	1
• Amount of user data in the process image partition for isochronous PROFINET IO, max.	1600 bytes
Digital channels	
• Inputs	65536
• Outputs	65536
• Inputs, of those central	1024
• Outputs, of those central	1024
Analog channels	
• Inputs	4096
• Outputs	4096
• Inputs, of those central	256
• Outputs, of those central	256
Hardware configuration	
• Racks, max.	4
• Modules per rack, max.	8
Number of DP masters	
• Integrated	2
• Via CP	4
Number of usable FMs and CPs (recommended)	
• FM	8
• CP, point-to-point	8
• CP, LAN	10
Time-of-day	
Clock	
• Hardware clock (real-time)	Yes
• Buffered, can be synchronized	Yes
• Factory setting	DT#1994-01-01-00:00:00

Technical specifications	
• Buffered period	Typically 6 weeks (at an ambient temperature of 40 °C)
• Behavior of the clock on expiration of the buffered period	The clock continues at the time of day it had when power was switched off.
• Behavior of the real-time clock after POWER ON	The clock continues running after POWER OFF.
• Deviation per day, max.	10 s, typ. 2 s
Runtime meter	
• Number	4
• Number/number range	0 to 3
• Range of values	0 to 2 ³¹ hours (using the SFC 101)
• Granularity	1 hour
• Retentive	Yes; must be manually restarted after every restart
Clock synchronization	
• supported	Yes
• On MPI, master	Yes
• On MPI, slave	Yes
• On DP, master	Yes (DP slave must be time slave)
• On DP, slave	Yes
• On the AS, master	Yes
• On the AS, slave	Yes
• On Ethernet via NTP	Yes (as client)
S7 signaling functions	
• Number of stations that can be logged on for signaling functions, max.	32 (depends on the number of connections configured for PG/OP and S7 basic communication)
• Process error diagnostic messages	Yes
• Simultaneously enabled interrupt S blocks, max.	300
Test and startup functions	
Status/modify	
• Status/modify variable	Yes
• Variables	Inputs, outputs, bit memories, DBs, timers, counters
• Maximum number of variables	30
• Status variables, max.	30

Technical specifications	
• Modify variables, max.	14
Forcing	
• Forcing	Yes
• Variables	Inputs, outputs
• Maximum number of tags	10
Status block	Yes (max. 2 blocks simultaneously)
Single step	Yes
• Number of breakpoints	4
Diagnostic buffer	
• Available	Yes
• No. of entries, max.	500
• Configurable	No
• of which are power-failure-proof	100, only the last 100 entries are retentive
• Maximum number of entries that can be read in RUN	499
• Number of entries that can be set in RUN	Yes (from 10 to 499)
• Number of preset entries in RUN	10
Service data	
• Can be read out	Yes
Monitoring functions	
• Status LEDs	Yes
Communication functions	
PG/OP communication	Yes
Prioritized OCM communication	
• supported	Yes
Routing	
• Number of routing connections	X1 as MPI: max. 10 X1 as DP master: max. 24 X1 as DP slave (active): max. 14 X2 as DP master: max. 24 X2 as DP slave (active): max. 14 X3 as PROFINET: Max. 48
• Data record routing	Yes
Global data communication	
• supported	Yes
• Number of GD circles, max.	8
• Number of GD packets, max.	8
• Number of GD packages, sender, max.	8

Technical specifications	
• Number of GD packets, receiver, max.	8
• Size of GD packets, max.	22 bytes
• Size of GD packets, of those consistent, max.	22 bytes
S7 basic communication	
• supported	Yes
• User data per job, max.	76 bytes
• User data per job, consistent, max.	76 bytes (for X_SEND or X_RCV) 64 bytes (for X_PUT or X_GET as server)
S7 communication	
• supported	Yes
• As server	Yes
• As client	Yes (via integrated PN interface and loadable FBs, or via CP and loadable FBs)
• User data per job, max.	See the STEP 7 Online Help, <i>Common parameters of SFBs/FBs and SFC/FC of the S7 communication</i>
S5-compatible communication	
• supported	Yes (via CP and loadable FCs)
Web server	
• supported	Yes
• Number of HTTP clients	5
• User-defined web pages	Yes
Open IE communication	
• supported	Yes
• Maximum number of connections/access points	32
• Local port number used at the system end	0, 20, 21, 23, 25, 80, 102, 135, 161, 8080, 34962, 34963, 34964, 65532, 65533, 65534, 65535
TCP/IP	
	Yes (via integrated PROFINET interface and loadable FBs)
• Maximum number of connections	32
• Data length for connection type 01H, max.	1460 bytes
• Data length for connection type 11H, max.	32768 bytes
• Multiple passive connections per port (multiport), supported	Yes
ISO on TCP	
	Yes (via integrated PROFINET interface and loadable FBs)
• Maximum number of connections	32
• Data length, max.	32768 bytes

Technical specifications	
UDP	Yes (via integrated PROFINET interface and loadable FBs)
• Maximum number of connections	32
• Data length, max.	1472 bytes
iPAR server	
• supported	Yes
Number of connections	
• Total	32
Suitable for PG communication	
• PG communication, reserved	1
• PG communication, configurable, min.	1
• PG communication, configurable, max.	31
Suitable for OP communication	
• OP communication, reserved	1
• OP communication, configurable, min.	1
• OP communication, configurable, max.	31
Suitable for S7 basic communication	
• S7 basic communication, reserved	0
• S7 basic communication, configurable, min.	0
• S7 basic communication, configurable, max.	30
Suitable for S7 communication	
• S7 communication, reserved	0
• S7 communication, configurable, min.	0
• S7 communication, configurable, max.	16
Total number of instances, max.	32
PROFINET CBA (with communication load setpoint)	
• Reference setting for the CPU communication load	20 %
• Number of remote interconnecting partners	32
• Number of master/slave functions	50
• Total of all master/slave connections	3000
• Data length of all incoming master/slave connections, max.	24000 bytes
• Data length of all outgoing master/slave connections, max.	24000 bytes

Technical specifications	
• Number of device-internal and PROFIBUS interconnections	1000
• Data length of the device-internal and PROFIBUS interconnections, max.	8000 bytes
• Data length per connection, max.	1400 bytes
Remote interconnections with acyclic transmission	
• Sampling rate: Sampling interval, min.	200 ms
• Number of incoming interconnections	100
• Number of outgoing interconnections	100
• Data length of all incoming interconnections, max.	3200 bytes
• Data length of all outgoing interconnections, max.	3200 bytes
• Data length per connection (acyclic interconnections), max.	1400 bytes
Remote interconnections with cyclic transmission	
• Transmission frequency: Minimum transmission interval	1 ms
• Number of incoming interconnections	300
• Number of outgoing interconnections	300
• Data length of all incoming interconnections, max.	4800 bytes
• Data length of all outgoing interconnections, max.	4800 bytes
• Data length per connection (acyclic interconnections), max.	450 bytes
HMI variables via PROFINET (acyclic)	
• HMI variables update	500 ms
• Number of stations that can be logged on for HMI variables (PN OPC/iMap)	3, (2 x PN OPC/1 x iMap)
• Number of HMI variables	600
• Data length of all HMI variables, max.	9600 bytes
PROFIBUS proxy functionality	
• supported	Yes
• Number of coupled PROFIBUS devices	32
• Data length per connection, max.	240 bytes (slave dependent)

Technical specifications	
Interfaces	
1st interface	
Interface designation	X1
Type of interface	Integrated RS 485 interface
Hardware	RS 485
<ul style="list-style-type: none"> electrically disconnected 	Yes
<ul style="list-style-type: none"> Interface power supply (15 VDC to 30 VDC), max. 	150 mA
Functionality	
<ul style="list-style-type: none"> MPI 	Yes
<ul style="list-style-type: none"> DP master 	Yes
<ul style="list-style-type: none"> DP slave 	Yes
<ul style="list-style-type: none"> Point-to-point connection 	No
<ul style="list-style-type: none"> PROFINET 	No
MPI	
Services	
<ul style="list-style-type: none"> PG/OP communication 	Yes
<ul style="list-style-type: none"> Routing 	Yes
<ul style="list-style-type: none"> Global data communication 	Yes
<ul style="list-style-type: none"> S7 basic communication 	Yes
<ul style="list-style-type: none"> S7 communication 	Yes (server only, connections configured at one end)
<ul style="list-style-type: none"> S7 communication, as client 	No (but via CP and loadable FBs)
<ul style="list-style-type: none"> S7 communication, as server 	Yes
Transmission rate, max.	12 Mbps
DP master	
Services	
<ul style="list-style-type: none"> PG/OP communication 	Yes
<ul style="list-style-type: none"> Routing 	Yes
<ul style="list-style-type: none"> Global data communication 	No
<ul style="list-style-type: none"> S7 basic communication 	Yes (only I blocks)
<ul style="list-style-type: none"> S7 communication 	Yes (server only; connection configured at one end)
<ul style="list-style-type: none"> Constant bus cycle time supported 	Yes
<ul style="list-style-type: none"> Isochronous mode 	No
<ul style="list-style-type: none"> SYNC/FREEZE 	Yes

Technical specifications	
<ul style="list-style-type: none"> • Activate/deactivate DP slaves <ul style="list-style-type: none"> – Max. number of DP slaves that can be enabled / disabled simultaneously 	Yes 8
<ul style="list-style-type: none"> • Direct data exchange (cross-traffic) 	Yes (as subscriber)
<ul style="list-style-type: none"> • DPV1 	Yes
Transmission rate, max.	12 Mbps
Number of DP slaves, max.	124
Address range	
<ul style="list-style-type: none"> • Inputs, max. 	8 KB
<ul style="list-style-type: none"> • Outputs, max. 	8 KB
User data per DP slave	
<ul style="list-style-type: none"> • Inputs, max. 	244 bytes
<ul style="list-style-type: none"> • Outputs, max. 	244 bytes
DP slave (DP slave at both DP interfaces is excluded)	
Services	
<ul style="list-style-type: none"> • PG/OP communication 	Yes
<ul style="list-style-type: none"> • Routing 	Yes (only if interface is active)
<ul style="list-style-type: none"> • Global data communication 	No
<ul style="list-style-type: none"> • S7 basic communication 	No
<ul style="list-style-type: none"> • S7 communication 	Yes (server only; connection configured at one end)
<ul style="list-style-type: none"> • Direct data exchange (cross-traffic) 	Yes
<ul style="list-style-type: none"> • DPV1 	No
Transmission rate, max.	12 Mbps
Automatic baud rate detection	Yes (only if interface is passive)
Transfer memory	
<ul style="list-style-type: none"> • Inputs 	244 bytes
<ul style="list-style-type: none"> • Outputs 	244 bytes
<ul style="list-style-type: none"> • Address range, max. 	32
<ul style="list-style-type: none"> • User data per address range, max. 	32 bytes
GSD file	The current GSD file is available for download from the Internet (http://www.siemens.com/profibus-gsd).
2nd interface	
Interface designation	X2
Type of interface	Integrated RS 485 interface
Hardware	RS 485
<ul style="list-style-type: none"> • electrically disconnected 	Yes

Technical specifications	
• Interface power supply (15 VDC to 30 VDC), max.	200 mA
Functionality	
• MPI	No
• DP master	Yes
• DP slave	Yes
• PROFINET IO controller	No
• PROFINET IO device	No
• PROFINET CBA	No
• Open IE communication	No
• Web server	No
DP master	
Services	
• PG/OP communication	Yes
• Routing	Yes
• Global data communication	No
• S7 basic communication	Yes (intelligent blocks only)
• S7 communication	Yes (server only; connection configured at one end)
• S7 communication, as client	No
• S7 communication, as server	Yes
• Constant bus cycle time supported	Yes
• Isochronous mode	Yes (OB 61 - operation in isochronous mode is possible either on DP, or on PROFINET IO (not concurrently))
• SYNC/FREEZE	Yes
• Activate/deactivate DP slaves – Max. number of DP slaves that can be enabled / disabled simultaneously	Yes 8
• Direct data exchange (cross-traffic)	Yes (as subscriber)
• DPV1	Yes
Transmission rate, max.	12 Mbps
Number of DP slaves	124
Address range	
• Inputs, max.	8 KB
• Outputs, max.	8 KB
User data per DP slave	

Technical specifications	
• Inputs, max.	244 bytes
• Outputs, max.	244 bytes
DP slave (DP slave at both DP interfaces is excluded)	
Services	
• PG/OP communication	Yes
• Routing	Yes (only if interface is active)
• Global data communication	No
• S7 basic communication	No
• S7 communication	Yes (server only; connection configured at one end)
• S7 communication, as client	No
• S7 communication, as server	Yes
• Direct data exchange (cross-traffic)	Yes
• DPV1	No
Transmission rate, max.	12 Mbps
Automatic baud rate detection	Yes (only if interface is passive)
GSD file	The current GSD file is available for download from the Internet (http://www.siemens.com/profibus-gsd).
Transfer memory	
• Inputs	244 bytes
• Outputs	244 bytes
• Address areas, max.	32
• User data per address range, max.	32 bytes
3rd interface	
Interface designation	X3
Type of interface	PROFINET
Hardware	RJ45 Ethernet
• electrically disconnected	Yes
• Integrated switch	Yes
• Number of ports	2
• Automatic determination of the transmission rate	Yes (10/100 Mbps)
• Autonegotiation	Yes
• Autocrossing	Yes
Media redundancy	
• supported	Yes

Technical specifications	
• Changeover time on line break, typically	200 ms (PROFINET MRP)
• Number of nodes on the ring, max.	50
Change of the IP address at runtime, supported	Yes
Keep-alive function, supported	Yes
Functionality	
• MPI	No
• DP master	No
• DP slave	No
• PROFINET IO controller	Yes, even simultaneously with IO device functionality
• PROFINET IO device	Yes, even simultaneously with IO controller functionality
• PROFINET CBA	Yes (acyclic and cyclic transmission)
• Open IE communication	Yes; via TCP/IP, ISO on TCP, UDP
• Web server	Yes
– Number of HTTP clients	5
PROFINET IO controller	
Services	
• PG/OP communication	Yes
• Routing	Yes
• S7 communication	Yes (with loadable FBs, max. configurable connections: 16; maximum number of instances: 32)
• Open IE communication	Yes; via TCP/IP, ISO on TCP, UDP
Number of integrated IO controllers	1
RT, supported	Yes
IRT, supported	Yes
Transmission rate, max.	100 Mbps
Maximum number of connectable IO devices	256
Number of connectable IO devices, for RT, max.	256
• of which in line, max.	256
Number of IO devices with IRT and "high flexibility" option	256
• of which in line, max.	61
Number of IO devices with IRT and "high performance" option, max.	64
• of which in line, max.	64
Shared Device, supported	Yes

Technical specifications	
Isochronous mode	Yes (OB 61 - operation in isochronous mode is possible either on DP, or on PROFINET IO (not concurrently))
Prioritized startup, supported	Yes
<ul style="list-style-type: none"> Maximum number of IO devices with prioritized startup 	32
Activating/deactivating of PROFINET IO Devices	Yes
<ul style="list-style-type: none"> Number of IO devices that can be enabled / disabled simultaneously, max. 	8
IO devices changing during runtime (partner ports), supported	Yes
<ul style="list-style-type: none"> Number of IO devices per tool, max. 	8
Device replacement without removable medium	Yes
Send clocks	250 µs, 500 µs, 1 ms 2 ms, 4 ms (not for IRT with "high flexibility" option)
Update time	
<ul style="list-style-type: none"> Update times 	The minimum update time also depends on the time slice set for PROFINET IO communication, the number of IO Devices used, and on the amount of configured user data.
With RT	
<ul style="list-style-type: none"> for send clock of 250 µs 	250 µs to 128 ms
<ul style="list-style-type: none"> for send clock of 500 µs 	500 µs to 256 ms
<ul style="list-style-type: none"> for send clock of 1 ms 	1 ms to 512 ms
<ul style="list-style-type: none"> for send clock of 2 ms 	2 ms to 512 ms
<ul style="list-style-type: none"> for send clock of 4 ms 	4 ms to 512 ms
For IRT with "high flexibility" option	
<ul style="list-style-type: none"> for send clock of 250 µs 	250 µs to 128 ms
<ul style="list-style-type: none"> for send clock of 500 µs 	500 µs to 256 ms
<ul style="list-style-type: none"> for send clock of 1 ms 	1 ms to 512 ms
For IRT with "high performance" option	
<ul style="list-style-type: none"> for send clock of 250 µs 	250 µs to 4 ms
<ul style="list-style-type: none"> for send clock of 500 µs 	500 µs to 8 ms
<ul style="list-style-type: none"> for send clock of 1 ms 	1 ms to 16 ms
<ul style="list-style-type: none"> for send clock of 2 ms 	2 ms to 32 ms
<ul style="list-style-type: none"> for send clock of 4 ms 	4 ms to 64 ms
For IRT with "high performance" option and parameter assignment for "odd-numbered" send clocks	Update time = "odd-numbered" send clock set (any multiple of 125 µs: 375 µs, 625 µs to 3.875 ms)

Technical specifications	
Address range	
• Inputs, max.	8192 bytes
• Outputs, max.	8192 bytes
User data per address range, max.	
• User data consistency, max.	1024 bytes
PROFINET IO device	
Services	
• PG/OP communication	Yes
• Routing	Yes
• S7 communication	Yes (with loadable FBs, max. configurable connections: 16, maximum number of instances: 32)
• Open IE communication	Yes; via TCP/IP, ISO on TCP, UDP
RT, supported	Yes
IRT, supported	Yes
PROFenergy, supported	<i>Prepared with SFB 73 / 74 for loadable PROFenergy standard FBs for intelligent IO devices</i>
Shared Device, supported	Yes
• Number of IO controllers for shared devices, max.	2
Isochronous mode	No
Application transfer areas	Yes
IO devices transfer area	No
Transfer memory	
• Inputs, max.	1440 bytes; per controller for shared devices
• Outputs, max.	1440 bytes; per controller for shared devices
Submodules	
• Number, max.	64
• User data per submodule, max.	1024 bytes
Programming	
Programming language	
• LAD	Yes
• FBD	Yes
• STL	Yes
• SCL	Yes
• CFC	Yes
• GRAPH	Yes

Technical specifications	
• HiGraph®	Yes
Instruction set	See instruction list
• Nesting levels	8
Know-how protection	
• User program protection / password protection	Yes
• Encryption of blocks	Yes, using S7-Block Privacy
System functions (SFC)	See instruction list
System function blocks (SFB)	See instruction list
Dimensions	
• Mounting dimensions W x H x D (mm)	120 x 125 x 130
• Weight	1250 g
Voltages and currents	
• Power supply (rated value)	24 VDC
• Low limit of admissible range (DC)	19.2 V
• High limit of admissible range (DC)	28.8 V
• Current consumption (open-circuit), typically	500 mA
• Inrush current, typ.	4 A
• Current consumption (rated value)	1250 mA
• I ² t	1.2 A ² s
• External protection of power supply lines, min.	2 A
• Power loss, typically	14 W

Glossary

Accumulator

Accumulators represent CPU register and are used as buffer memory for download, transfer, comparison, calculation and conversion operations.

Address

An address is the identifier of a specific address or address area. Examples: Input I 12.1; Flag Word MW 25; Data Block DB 3.

Analog module

Analog modules convert process values (e.g. temperature) into digital values which can be processed in the CPU, or they convert digital values into analog manipulated variables.

Application

An application is a program that runs directly on the MS-DOS / Windows operating system. Applications on the programming device are for example STEP 7.

ASIC

ASIC is the acronym for Application Specific Integrated Circuits.

PROFINET ASICs are components with a wide range of functions for the development of your own devices. They implement the requirements of the PROFINET standard in a circuit and allow extremely high packing densities and performance.

Because PROFINET is an open standard, SIMATIC NET offers PROFINET ASICs for the development of your old devices under the name ERTEC .

Backplane bus

The backplane bus is a serial data bus. It supplies power to the modules and is also used by the modules to communicate with each other. Bus connectors interconnect the modules.

Backup memory

Backup memory ensures buffering of the memory areas of a CPU without backup battery. It backs up a configurable number of timers, counters, memory and data bytes,retentive timers, counters, memory bits and data bytes.

Bit memory

Bit memories are part of the CPU's system memory. They store intermediate results of calculations. They can be accessed in bit, word or dword operations.

See System memory

Bus

A bus is a communication medium connecting several nodes. Data can be transferred via serial or parallel circuits, that is, via electrical conductors or fiber optic.

Bus segment

A bus segment is a self-contained section of a serial bus system. Bus segments are interconnected by way of repeaters, for example, in PROFIBUS DP.

Central module

→ CPU

Changing IO devices during operation (changing partner ports)

Functionality of a PROFINET device.

A PROFINET device that supports this function can communicate during operation with changing communication partners at the same port.

Clock memory

flag bit which can be used to generate clock pulses in the user program (1 byte per flag bit).

Note

When operating with S7-300 CPUs, make sure that the byte of the clock memory bit is not overwritten in the user program!

Coaxial cable

A coaxial cable, also known as "coax", is a metal conductor system used in HF transmission circuits, for example, as radio and TV antenna cable, and in modern networks demanding high data transmission rates. The inner conductor of a coaxial cable is sheathed by a tube-like outer conductor. These conductors are separated by plastic insulation. In contrast to other cables, this type of cable provides a high degree of immunity to interference and EMC compatibility.

Code block

A SIMATIC S7 code block contains part of the **STEP 7** user program. (in contrast to a DB: this contains only data.)

Communication processor

Communication processors are modules used for point-to-point and bus topologies.

Component Based Automation

→ *PROFINET CBA*

Compress

The PG online function "Compress" is used to rearrange all valid blocks in CPU RAM in a contiguous area of load memory, starting at the lowest address. This eliminates fragmentation which occurs when blocks are deleted or edited.

Configuration

Assignment of modules to module racks/slots and (e.g. for signal modules) addresses.

Consistent data

Data which belongs together in terms of content and must not be separated is known as consistent data.

For example, the values of analog modules must always be handled as a whole, that is, the value of an analog module must not be corrupted as a result of read access at two different points of time.

Counters

Counters are part of CPU system memory. The content of "Counter cells" can be modified by **STEP 7** instructions (for example, up/down count.)

See also System memory

CP

→ *Communication processor*

CPU

Central processing unit = CPU of the S7 automation system with a control and arithmetic unit, memory, operating system, and interface for programming device.

Cycle control point

The cycle control point is the section of the CPU program processing in which the process image is updated.

Cycle time

The cycle time represents the time a CPU requires for one execution of the user program.

Cyclic interrupt

→ *Interrupt, cyclic interrupt*

Data block

Data blocks (DB) are data areas in the user program which contain user data. There are global data blocks which can be accessed by all code blocks, and instance data blocks which are assigned to a specific FB call.

Data exchange broadcast

→ *Direct data exchange*

Data exchange traffic

→ *Direct data exchange*

Data set routing

Functionality of a module with several network connections. Modules that support this function are able to pass on data of an engineering system (for example parameter data generated by SIMATIC PDM) from a subnetwork such as Ethernet to a field device at the PROFIBUS DP.

Data, static

Static data can only be used within a function block. These data are saved in an instance data block that belongs to a function block. Data stored in an instance data block are retained until the next function block call.

Data, temporary

Temporary data represent local data of a block. They are stored in the L-stack when the block is executed. After the block has been processed, these data are no longer available.

DB

→ *Data block*

DCP

DCP (Discovery and Basic Configuration Protocol). Enables the assignment of device parameters (e.g. the IP address) using manufacturer-specific configuration/programming tools.

Default router

The default router is the router that is used when data must be forwarded to a partner located within the same subnet.

In STEP 7, the default router is named *Router*. STEP 7 assigns the local IP address to the default router.

Detecting the network topology

LLDP (Link Layer Discovery Protocol) is a protocol that is used to detect the closest neighbors. It enables a device to send information about itself and to save information received from neighboring devices in the LLDP MIB. This information can be looked up via the SNMP. This information allows a network management system to determine the network topology.

Determinism

→ *Real Time*

Device

Within the context of PROFINET, "device" is the generic term for:

- Automation systems,
- Field devices (e.g. PLC, PC)
- Active network components (for example, distributed I/O, valve blocks, drives),
- hydraulic devices and
- pneumatic devices.

The main characteristic of a device is its integration in PROFINET communication over Ethernet or PROFIBUS.

The following device types are distinguished based on their attachment to the bus:

- PROFINET devices
- PROFIBUS devices

Device Name

Before an IO device can be addressed by an IO controller, it must have a device name. In PROFINET, this method was selected because it is simpler to work with names than with complex IP addresses.

The assignment of a device name for a concrete IO device can be compared with setting the PROFIBUS address of a DP slave.

When it ships, an IO device does not have a device name. An IO device can only be addressed by an IO controller, for example for the transfer of project engineering data (including the IP address) during startup or for user data exchange in cyclic operation, after it has been assigned a device name with the PG/PC .

Device replacement without removable medium/programming device

It is easy to replace IO devices that support this function:

- A removable medium (such as a SIMATIC Micro Memory Card) with stored device name is not required.
- The device name does not have to be assigned with the programming device.
- A replaced IO device that has already been put into operation must be reset to factory settings using the "Reset to factory settings" function.

The replaced IO device is assigned the device name by the IO controller and no longer from a removable media or programming device. The IO controller uses the configured topology and the neighboring relationships determined by the IO devices to this purpose. The configured target topology must coincide accordingly with the actual topology.

Diagnostic buffer

The diagnostics buffer represents a buffered memory area in the CPU. It stores diagnostic events in the order of their occurrence.

Diagnostic interrupt

Modules capable of diagnostics operations report detected system errors to the CPU by means of diagnostic interrupts.

Diagnostics

→ *System diagnostics*

Direct data exchange

Direct data exchange is a special communication relationship between PROFIBUS DP nodes. Direct data exchange is characterized by PROFIBUS DP nodes that "listen" on the bus and know which data a DP slave returns to its DP master.

DP master

A master which behaves in accordance with EN 50170, Part 3 is known as a DP master.

DP slave

A slave operated on PROFIBUS with PROFIBUS DP protocol and in accordance with EN 50170, Part 3 is referred to as DP slave.

DPV1

The designation DPV1 means extension of the functionality of the acyclical services (to include new interrupts, for example) provided by the DP protocol. The DPV1 functionality has been incorporated into IEC 61158/EN 50170, volume 2, PROFIBUS.

Electrically isolated

The reference potentials of the control and load circuit of isolated I/O modules are electrically isolated, for example, by means of optocouplers, relays or transformers. Input/output circuits may be grouped.

Equipotential bonding

Electrical connection (equipotential bonding conductor) which eliminates potential difference between electrical equipment and external conductive bodies by drawing potential to the same or near the same level, in order to prevent disturbing or dangerous voltages between these bodies.

Error display

One of the possible reactions of the operating system to a runtime error is to output an error message. Additional reactions: Error reaction in the user program, CPU in STOP.

Error handling via OB

After the operating system has detected a specific error (e.g. access error with **STEP 7**), it calls a dedicated block (Error OB) that determines additional CPU actions.

Error response

Reaction to a runtime error. Reactions of the operating system: It sets the automation system to STOP, indicates the error, or calls an OB in which the user can program a reaction.

ERTEC

→ *ASIC*

Fast Ethernet

Fast Ethernet describes the standard with which data is transmitted at 100 Mbps. Fast Ethernet uses the 100 Base-T standard.

FB

→ *Function block*

FC

→ *Function*

FEPRM

→ *Memory Card (MC)*

Flash EPROM

FEPRMs can retain data in the event of power loss, same as electrically erasable EEPROMs. However, they can be erased within a considerably shorter time (FEPRM = Flash Erasable Programmable Read Only Memory). They are used on Memory Cards.

Force

The Force function can be used to assign the variables of a user program or CPU (also: inputs and outputs) constant values.

In this context, please note the limitations listed in the *Overview of the test functions section in the chapter entitled Test functions, Diagnostics and Troubleshooting in the S7-300 Installation manual.*

Function

According to IEC 1131-3, a function (FC) is a code block without static data. A function allows parameters to be passed in the user program. Functions are therefore suitable for programming frequently occurring complex functions, e.g. calculations.

Function block

According to IEC 1131-3, a function block (FB) is a code block with static data. A function block allows parameters to be transferred to the user program. Function blocks are therefore suitable for programming frequently recurring, complex functions, e.g., rules, mode selection.

Functional ground

Grounding which has the sole purpose of safeguarding the intended function of electrical equipment. With functional grounding you short-circuit interference voltage which would otherwise have an unacceptable impact on equipment.

GD circuit

A GD circuit comprises a number of CPUs sharing data by means of global data communication, and is used as follows:

- A CPU broadcasts a GD packet to the other CPUs.
- A CPU sends and receives a GD packet from another CPU.

A GD circuit is identified by a GD circuit number.

GD element

A GD element is generated by assigning shared global data. It is identified by a unique global data ID in the global data table.

GD packet

A GD packet can consist of one or several GD elements transmitted in a single message frame.

Global data

Global data can be addressed from any code block (FC, FB, OB). In particular, this refers to bit memories M, inputs I, outputs Q, timers, counters and data blocks DB. Global data can be accessed via absolute or symbolic addressing.

Global data communication

Global data communication is a procedure that is used to transfer global data between CPUs (without SFCs/SFBs).

Ground

The conductive earth whose electrical potential can be set equal to zero at any point.

Ground potential can be different from zero in the area of grounding electrodes. The term reference ground is frequently used to describe this situation.

Grounding means, to connect an electrically conductive component via an equipotential grounding system to a grounding electrode (one or more conductive components with highly conductive contact to earth).

Chassis ground is the totality of all the interconnected passive parts of a piece of equipment on which dangerous fault-voltage cannot occur.

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GSD file

The properties of a PROFINET device are described in a GSD file (General Station Description) that contains all the information required for configuration.

As with PROFIBUS, you can link a PROFINET device in STEP 7 by means of a GSD file.

In PROFINET IO, the GSD file is in XML format. The structure of the GSD file conforms to ISO 15734, which is the world-wide standard for device descriptions.

In PROFIBUS, the GSD file is in ASCII format.

Hardware interrupt

A hardware interrupt is triggered by interrupt-triggering modules as a result of a specific event in the process. The hardware interrupt is reported to the CPU. The assigned organization block will be processed according to interrupt priority.

HART

English: **H**ighway **A**ddressable **R**emote **T**ransducer

I-Device

The "I-Device" (intelligent IO device) functionality of a CPU facilitates data exchange with an IO controller and operation of the CPU, for example, as intelligent preprocessing unit of sub processes. Accordingly, the intelligent device is integrated into a "higher-level" IO controller, acting as IO device.

The functionality of the intelligent device ensures that the data is pre-processed in the user program on the CPU. The process values acquired from central or distributed locations (PROFINET IO or PROFIBUS DP) are pre-processed in the user program and provided to a higher-level station via PROFINET IO device interface of the CPU.

Industrial Ethernet

Industrial Ethernet (formerly SINEC H1) is a technology that allows data to be transmitted free of interference in an industrial environment.

Due to the openness of PROFINET, you can use standard Ethernet components. We recommend, however, that you install PROFINET as Industrial Ethernet.

Instance data block

The **STEP 7** user program assigns an automatically generated DB to every call of a function block. The instance data block stores the values of input, output and in/out parameters, as well as local block data.

Interface, MPI-compatible

→ *MPI*

Interrupt

The CPU's operating system distinguishes between different priority classes for user program execution. These priority classes include interrupts, e.g. process interrupts. When an interrupt is triggered, the operating system automatically calls an assigned OB. In this OB the user can program the desired response (e.g. in an FB).

Interrupt, cyclic interrupt

A cyclic interrupt is generated periodically by the CPU in a configurable time pattern. A corresponding OB will be processed.

Interrupt, diagnostic

→ *Diagnostic interrupt*

Interrupt, hardware

→ *Hardware interrupt*

Interrupt, status

A status interrupt can be generated by a DPV1 slave or a PNIO device respectively. At the DPV1 master or the PNIO controller respectively the receipt of the interrupt causes the OB 55 to be called up.

For detailed information on OB 56, refer to the *Reference Manual System Software for S7-300/400: System and Standard Functions*.

Interrupt, time-delay

The delay interrupt belongs to one of the priority classes in SIMATIC S7 program processing. It is generated on expiration of a time started in the user program. A corresponding OB will be processed.

Interrupt, time-delay

→ *Interrupt, time-delay*

Interrupt, time-of-day

The time-of-day interrupt belongs to one of the priority classes in SIMATIC S7 program processing. It is generated at a specific date (or daily) and time-of-day (e.g. 9:50 or hourly, or every minute). A corresponding OB will be processed.

Interrupt, update

An update interrupt can be generated by a DPV1 slave or a PNIO device respectively. At the DPV1 master or the PNIO controller respectively the receipt of the interrupt causes the OB 56 to be called up.

For detailed information on OB 56, refer to the *Reference Manual System Software for S7-300/400: System and Standard Functions*.

Interrupt, vendor-specific

A vendor-specific interrupt can be generated by a DPV1 slave or a PNIO device respectively. At the DPV1 master or the PNIO controller respectively, receipt of the interrupt causes the OB 57 to be called.

For detailed information on OB 57, refer to the *Reference Manual System Software for S7-300/400: System and Standard Functions*.

IP address

To allow a PROFINET device to be addressed as a node on Industrial Ethernet, this device also requires an IP address that is unique within the network. The IP address is made up of 4 decimal numbers with a range of values from 0 through 255. The decimal numbers are separated by a period.

The IP address is made up of

- The address of the (subnet) network and
- The address of the node (generally called the host or network node).

IRT

→ *Isochronous Real Time communications*

Isochronous mode

In order to maximize deterministic performance, the process data, the transmission cycle via PROFIBUS DP or PROFINET IO, as well as the user program are synchronized. The input and output data of the distributed IO devices in the system is acquired and output simultaneously. The isochronous PROFIBUS DP cycle/PROFINET IO cycle acts as the corresponding clock generator.

Isochronous Real Time communications

Synchronized transmission procedure for the cyclic exchange of IO data between PROFINET devices.

A reserved bandwidth within the send clock is available for the IRT / IO data. The reserved bandwidth guarantees that the IRT data can also be transferred even during another high network load (for example TCP/IP communication or additional real time communication) at reserved, synchronized intervals.

LAN

Local Area Network; interconnects multiple computers within a company. The geographical topology of a LAN is limited to the local premises and is only available to the operating company or institution.

LLDP

LLDP (Link Layer Discovery Protocol) is a protocol that is used to detect the closest neighbors. It enables a device to send information about itself and to save information received from neighboring devices in the LLDP MIB. This information can be looked up via the SNMP. This information allows a network management system to determine the network topology.

Load memory

This memory contains objects generated by the programming device. Load memory is implemented by means of a plug-in Micro Memory Card of different memory capacities. The SIMATIC Micro Memory Card must be inserted to allow CPU operation.

Load power supply

Power supply to the signal / function modules and the process I/O connected to them.

Local data

→ *Data, temporary*

MAC address

Each PROFINET device is assigned a worldwide unique device identifier in the factory. This 6-byte long device identifier is the MAC address.

The MAC address is divided up as follows:

- 3 bytes vendor identifier and
- 3 bytes device identifier (consecutive number).

The MAC address is normally printed on the front of the device.

Example: 08-00-06-6B-80-C0

Main memory

The main memory is integrated in the CPU and cannot be extended. It is used to run the code and process user program data. Programs only run in the main memory and system memory.

Master

When a master has the token, it can send data to other nodes and request data from other nodes (= active node).

Media redundancy

Function that ensures network and system availability. Redundant transmission links (ring topology) ensure that an alternative communication path is made available if a transmission link fails.

Memory Card (MC)

Memory Cards are memory media for CPUs and CPs. They are implemented in the form of RAM or FEPRAM. An MC differs from a Micro Memory Card only in its dimensions (MC is approximately the size of a credit card).

Micro Memory Card (MMC)

Micro Memory Cards are memory media for CPUs and CPs. Their only difference to the Memory Card is the smaller size.

Module parameters

Module parameters are values which can be used to configure module behavior. A distinction is made between static and dynamic module parameters.

MPI

The multipoint interface (MPI) represents the programming device interface of SIMATIC S7. It enables multiple nodes (PGs, text-based displays, OPs) to be operated simultaneously by one or more CPUs. Each node is identified by its unique (MPI) address.

MPI address

→ *MPI*

NCM PC

→ *SIMATIC NCM PC*

Nesting depth

A block can be called from another by means of a block call. Nesting depth is referred to as the number of simultaneously called code blocks.

Network

A network consists of one or more interconnected subnets with any number of nodes. Several networks can exist alongside each other.

Network

A network is a larger communication system that allows data exchange between a large number of nodes.

All the subnets together form a network.

Non-isolated

The reference potential of the control and on-load power circuits of non-isolated I/O modules is electrically interconnected.

NTP

The Network Time Protocol (NTP) is a standard for synchronizing clocks in automation systems via Industrial Ethernet. NTP uses the UDP wireless network protocol.

OB

→ *Organization blocks*

OB priority

The CPU operating system distinguishes between different priority classes, for example, cyclic program processing, hardware interrupt controlled program processing. Each priority class is assigned organization blocks (OBs) in which the S7 user can program a response. The OBs are assigned different default priority classes. These determine the order in which OBs are executed or interrupt each other when they appear simultaneously.

Operating state

SIMATIC S7 automation systems know the following operating states: STOP, START, RUN.

Operating system

The CPU operating system organizes all the CPU functions and processes which are not associated with a specific control task.

Organization blocks

Organization blocks (OBs) form the interface between the CPU operating system and the user program. The order in which the user program is executed is defined in the organization blocks.

Parameters

1. Variable of a **STEP 7** code block
2. Variable for declaring module response (one or several per module). All modules have a suitable basic factory setting which can be customized in **STEP 7**. There are static and dynamic parameters.

Parameters, dynamic

Unlike static parameters, you can change dynamic module parameters during runtime by calling an SFC in the user program, e.g. limit values of an analog signal input module.

Parameters, static

Unlike dynamic parameters, static parameters of modules cannot be changed by the user program. You can only modify these parameters by editing your configuration in **STEP 7**, for example, modification of the input delay parameters of a digital signal input module.

PC station

→ *SIMATIC PC station*

PG

→ *Programming device*

PLC

→ *Programmable logic controller*

PLC

A PLC in the context of SIMATIC S7 --> is a programmable logic controller.

PNO

Technical committee that defines and additionally develops the PROFIBUS and PROFINET standards with the following homepage: <http://www.profinet.com>.

Prioritized startup

The term prioritized startup denotes the PROFINET functionality for accelerating the startup of IO devices operated on a PROFINET IO system with RT and IRT communication.

The function reduces the time that configured IO devices require in order to return to cyclic user data exchange in the following scenarios:

- After the power supply has returned
- After a station has come back online
- After the activation of IO devices

Priority class

The S7 CPU operating system provides up to 26 priority classes (or "Program execution levels"). Specific OBs are assigned to these classes. The priority classes determine which OBs interrupt other OBs. Multiple OBs of the same priority class do not interrupt each other. In this case, they are executed sequentially.

Process image

The process image is part of CPU system memory. At the start of cyclic program execution, the signal states at the input modules are written to the process image of the inputs. At the end of cyclic program execution, the signal status of the process image of the outputs is transferred to the output modules.

Process-Related Function

→ *PROFINET components*

Product version

The product version identifies differences between products which have the same order number. The product version is incremented when forward-compatible functions are enhanced, after production-related modifications (use of new parts/components) and for bug fixes.

PROFIBUS

Process Field Bus - European field bus standard.

PROFIBUS device

A PROFIBUS device has at least one PROFIBUS connection to an electric interface (RS485), or to an optoelectronic interface (polymer optical fiber, POF).

A PROFIBUS device cannot take part directly in PROFINET communication but must be included over a PROFIBUS master with a PROFINET port or an Industrial Ethernet/PROFIBUS link (IE/PB Link) with proxy functionality.

PROFIBUS DP

A PROFIBUS with the DP protocol that complies with EN 50170. DP stands for distributed peripheral (IO) = fast, real-time, cyclic data exchange. From the perspective of the user program, the distributed IOs are addressed in exactly the same way as the central IOs.

PROFINET

Within the framework of Totally Integrated Automation (TIA), PROFINET represents a consistent continuation of:

- PROFIBUS DP, the established fieldbus and
- Industrial Ethernet, the communication bus for the cell level

Experience gained from both systems was and is being integrated into PROFINET.

PROFINET is an Ethernet-based automation standard of PROFIBUS International (previously PROFIBUS user organization) and defines a multi-vendor communication, automation, and engineering model.

PROFINET ASIC

→ *ASIC*

PROFINET CBA

Within the PROFINET system, PROFINET CBA (Component Based Automation) is an automation concept that focuses on the following:

- Implementation of modular applications
- Machine to machine communication

PROFINET CBA lets you create distributed automation solutions based on ready-to-use components and partial solutions. This concept meets demands for a higher degree of modularity in the field of mechanical and systems engineering through extensive distribution of intelligent processes.

Component Based Automation allows you to implement complete technological modules form operation as standardized components in large-scale systems.

You create the modular, intelligent components of PROFINET CBA using an engineering tool that could differ depending on the device manufacturer. Components that consist of SIMATIC devices are created in STEP 7 and interconnected using the SIMATIC IMAP tool.

PROFINET components

A PROFINET component includes the entire data of the hardware configuration, the parameters of the modules, and the corresponding user program. The PROFINET component is made up as follows:

- Technological Function
The (optional) technological (software) function includes the interface to other PROFINET components in the form of interconnectable inputs and outputs.
- Device
The device is the representation of the physical programmable controller or field device including the I/O, sensors and actuators, mechanical parts, and the device firmware.

PROFINET device

A PROFINET device always has at least one Industrial Ethernet port. PROFINET devices also support optional operation as proxy acting as representative that safeguards Ethernet communication between PROFIBUS devices (PROFIBUS-Slaves) connected to a PROFIBUS interface and additional PROFINET devices on the Ethernet.

PROFINET IO

Within the framework of PROFINET, PROFINET IO is a communication concept for the implementation of modular, distributed applications.

PROFINET IO allows you to create automation solutions which are familiar to you from PROFIBUS.

PROFINET IO is implemented based on the PROFINET standard for programmable controllers.

The STEP 7 engineering tool supports engineering and configuring of an automation solution.

STEP 7 therefore provides the same application view, regardless of whether you are configuring PROFINET or PROFIBUS devices. Generally speaking, the programs for your PROFINET IO and PROFIBUS DP applications are identical, however, for PROFINET IO you must use the extended SFCs/SFBs and system status lists.

PROFINET IO controller

Device used to address the connected IO devices. This means that the IO controller exchanges input and output signals with assigned field devices. The IO controller is often the controller on which the automation program runs.

PROFINET IO device

A distributed field device that is assigned to one of the IO controllers (e.g. remote IO, valve terminals, frequency converters, switches)

PROFINET IO Supervisor

Programming device, PC or HMI device used for commissioning and diagnostics.

PROFINET IO system

PROFINET IO controller with assigned PROFINET IO devices.

Programmable logic controller

Programmable controllers (PLCs) are electronic controllers whose function is stored as a program in the control unit. The structure and wiring of the device does not therefore depend on the controller's function. A programmable logic controller is structured like a computer. It consists of a CPU with memory, input/output modules and an internal bus system. The IOs and the programming language are oriented to control engineering needs.

Programming device

Programming devices are essentially compact and portable PCs which are suitable for industrial applications. They are identified by a special hardware and software for programmable logic controllers.

Proxy

The PROFINET device with proxy functionality is the substitute for a PROFIBUS device on Ethernet. The proxy functionality allows a PROFIBUS device to communicate not only with its master but also with all nodes on PROFINET.

You can integrate existing PROFIBUS systems into PROFINET communication, for example with the help of an IE/PB Link or a CPU 31x PN/DP. The IE/PB Link then handles communication over PROFINET as a substitute for the PROFIBUS components.

RAM

RAM (Random Access Memory) is a semiconductor read/write memory.

Real Time

Real time means that a system processes external events within a defined time.

Determinism means that a system reacts in a predictable (deterministic) manner.

In industrial networks, both these requirements are important. PROFINET meets these requirements. PROFINET is implemented as a deterministic real-time network as follows:

- The transfer of time-critical data between different stations over a network within a defined interval is guaranteed.
To achieve this, PROFINET provides an optimized communication channel for real-time communication : Real Time (RT).
- An exact prediction of the time at which the data transfer takes place is possible.
- It is ensured that problem-free communication using other standard protocols, for example industrial communication for PG/PC can take place within the same network.

Real Time

→ *Real Time*

Reduction ratio

The reduction rate determines the send/receive frequency for GD packets on the basis of the CPU cycle.

Reference ground

→ *Ground*

Reference potential

Voltages of participating circuits are referenced to this potential when they are viewed and/or measured.

Restart

On CPU start-up (e.g. after is switched from STOP to RUN mode via selector switch or with POWER ON), OB100 (restart) is initially executed, prior to cyclic program execution (OB1). On restart, the input process image is read in and the **STEP 7** user program is executed, starting at the first instruction in OB1.

Retentivity

A memory area is considered retentive if its contents are retained even after a power loss and transitions from STOP to RUN. The non-retentive area of memory flag bits, timers and counters is reset following a power failure and a transition from the STOP mode to the RUN mode.

Retentive can be the:

- Bit memory
- S7 timers
- S7 counters
- Data areas

Router

A router interconnects two subnets. A router works in a similar way to a switch. With a router, however, you can also specify which communication nodes may communicate via the router and which may not. The communication nodes on various sides of a router can only communicate with one another if you have explicitly enabled communication between these nodes via the router. Real-time data cannot be exchanged beyond subnet boundaries.

RT

→ *Real Time*

Runtime error

Errors occurred in the PLC (that is, not in the process itself) during user program execution.

Segment

→ *Bus segment*

SFB

→ *System function block*

SFC

→ *System function*

Shared Device

The "Shared Device" functionality makes it possible to distribute the submodules of an IO devices to different IO controllers.

Signal module

Signal modules (SM) form the interface between the process and the PLC. There are digital input and output modules (input/output module, digital) and analog input and output modules. (Input/output module, analog)

SIMATIC

The term denotes Siemens AG products and systems for industrial automation.

SIMATIC NCM PC

SIMATIC NCM PC is a version of STEP 7 tailored to PC configuration. For PC stations, it offers the full range of functions of STEP 7.

SIMATIC NCM PC is the central tool with which you configure the communication services for your PC station. The configuration data generated with this tool must be downloaded to the PC station or exported. This makes the PC station ready for communication.

SIMATIC NET

Siemens Industrial Communication division for Networks and Network Components.

SIMATIC PC station

A "PC station" is a PC with communication modules and software components within a SIMATIC automation solution.

Slave

A slave can only exchange data after being requested to do so by the master.

SNMP

SNMP (Simple Network Management Protocol) makes use of the wireless UDP transport protocol. It consists of two network components, similar to the client/server model. The SNMP Manager monitors the network nodes, and the SNMP agents collect the various network-specific information in the individual network nodes and places it in a structured form in the MIB (Management Information Base). This information allows a network management system to run detailed network diagnostics.

SSL

→ *System status list*

STARTUP

A START-UP routine is executed at the transition from STOP to RUN mode. Can be triggered by means of the mode selector switch, or after power on, or by an operator action on the programming device. An S7-300 performs a restart.

STEP 7

STEP 7 is an engineering system and contains programming software for the creation of user programs for SIMATIC S7 controllers.

Subnet mask

The bits set in the subnet mask decides the part of the IP address that contains the address of the subnet/network.

In general:

- The network address is obtained by an AND operation on the IP address and subnet mask.
- The node address is obtained by an AND NOT operation on the IP address and subnet mask.

Subnetwork

All the devices interconnected by switches are nodes of the same network or subnet. All the devices in a subnet can communicate directly with each other.

All devices in the same subnet have the same subnet mask.

A subnet is physically restricted by a router.

Substitute

→ *Proxy*

Substitute value

Substitute values are configurable values which output modules transfer to the process when the CPU switches to STOP mode.

In the event of an I/O access error, a substitute value can be written to the accumulator instead of the input value which could not be read (SFC 44).

Switch

In contrast to PROFIBUS DP, Industrial Ethernet is made up of point-to-point links: Each communication node is connected directly to one other communication node.

Multiple communication nodes are interconnected at the port of an active network component, that is, at the switch. Other communication nodes (including switches) can then be connected to the other ports of the switch. The connection between a communication node and the switch remains a point-to-point link.

The task of a switch is therefore to regenerate and distribute received signals. The switch "learns" the Ethernet address(es) of a connected PROFINET device or other switches and forwards only the signals intended for the connected PROFINET device or connected switch.

A switch has a certain number of ports. At each port, connect a maximum of one PROFINET device or a further switch.

Two switch models are available in PROFINET IO systems: as external switch with enclosure, or as component of an S7 CPU or S7 CP, or of a distributed I/O system ET 200, e.g., as in the S7 CPU 317-2 PN/DP.

In our SCALANCE X device family you will find switches with electrical and optical ports or with a combination of both variants. The SCALANCE X202-2IRT, for example, has 2 electrical ports and 2 optical ports and supports IRT communication.

With STEP 7, you can configure and perform diagnostics on and address switches from the SCALANCE X device family as PROFINET IO devices.

System diagnostics

System diagnostics refers to the detection, evaluation, and signaling of errors that occur within the PLC, for example programming errors or module failures. System errors can be indicated by LEDs or in **STEP 7**.

System function

A system function (SFC) is a function that is integrated in the operating system of the CPU and can be called in the STEP 7 user program, when necessary.

System function block

A system function block (SFB) is a function block integrated in the CPU operating system that can be called in the STEP 7 user program when required.

System memory

System memory is an integrated RAM memory in the CPU. System memory contains the address areas (e.g. timers, counters, bit memories) and data areas that are required internally by the operating system (for example, communication buffers).

System status list

The system status list contains data that describes the current status of a SIMATIC S7. You can always use this list to obtain an overview of the following points:

- Status of the SIMATIC S7 extension.
- The current CPU configuration and configurable signal modules.
- The current states and processes in the CPU and in configurable signal modules.

Terminating resistor

The terminating resistor is used to avoid reflections on data links.

Timer

→ *Timers*

Timers

Timers are part of CPU system memory. The content of timer cells is automatically updated by the operating system, asynchronously to the user program. **STEP 7** instructions are used to define the precise function of the timer cell (for example, on-delay) and to initiate their execution (for example, start).

TOD interrupt

→ *Interrupt, time-of-day*

Token

Allows access to the bus for a limited time.

Topology

Network structure. Commonly used structures:

- Linear bus topology
- Ring topology
- Star topology
- Tree topology

Topology configuration

All the interconnected ports of the PROFINET devices in STEP 7 projects and their relationships to each other.

Transmission rate

Data transfer rate (in bps)

Twisted-pair

Fast Ethernet via twisted-pair cables is based on the IEEE 802.3u standard (100 Base-TX). The transmission medium is a shielded 2x2 twisted-pair cable with an impedance of 100 Ω (AWG 22). The transmission characteristics of this cable must meet the requirements of category 5.

The maximum length of the connection between the terminal and the network component must not exceed 100 m. The connections are implemented according to the 100 Base-TX standard with the RJ-45 connector system.

UDT

User Defined Type: User-defined data type with any design.

Ungrounded

Having no direct electrical connection to ground

Update time

Within this interval new data are supplied to an IO device / IO controller in the PROFINET IO system by the IO controller / IO device. The send cycle can be configured separately for each IO device and determines the interval at which data are sent from the IO controller to the IO device (outputs) as well as data from the IO device to the IO controller (inputs).

User program

In SIMATIC, we distinguish between the operating systems of the CPU and user programs. The user program contains all instructions, declarations and data for signal processing through which a system or process can be controlled. It is assigned to a programmable module (for example CPU, FM) and can be structured in smaller units (blocks).

Varistor

Voltage-dependent resistor

WAN

A network beyond LAN boundaries which allows, for example, intercontinental communication. Legal rights do not belong to the user but to the provider of the communication network.

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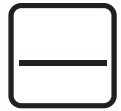
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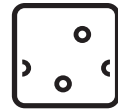
Pressure



Flow



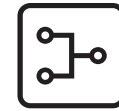
Temperature



Liquid
Analysis



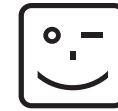
Registration



Systems
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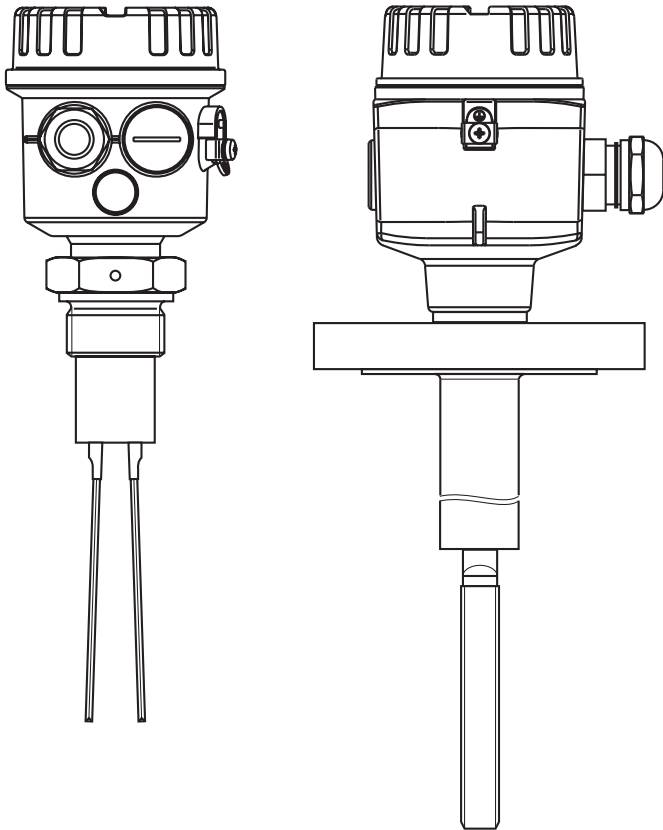
Services



Solutions

Operating Instructions

Soliphant M FTM50, FTM51



de - Füllstandgrenzschalter

en - Level Limit Switch

fr - Détecteur de niveau

es - Detector de nivel

it - Interruttore di livello

nl - Niveauschakelaar

KA229F/00/a6/06.07
71036024

Endress+Hauser 

People for Process Automation

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Achtung!

= verboten;
führt zu fehlerhaftem Betrieb
oder Zerstörung.



Caution!

= forbidden;
leads to incorrect operation
or destruction.



Attention!

= interdit; peut provoquer
des dysfonctionnements
ou la destruction.

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Atención!

= Prohibido; peligro de mal funcionamiento o de destrucción.



Attenzione!

= Vietato; pericolo di malfunzionamento o di distruzione.



Opgelet!

= verboden; leidt tot foutieve werking of storing.

de - Sicherheitshinweise

Der Soliphant M FTM50, FTM51 ist ein Füllstandgrenzschalter für Schüttgüter.

Bei unsachgemäßem Einsatz können Gefahren von ihm ausgehen.

Das Gerät darf **nur von qualifiziertem und autorisiertem Fachpersonal** unter strenger Beachtung dieser Betriebsanleitung, der einschlägigen Normen, der gesetzlichen Vorschriften und der Zertifikate (je nach Anwendung) eingebaut, angeschlossen, in Betrieb genommen und gewartet werden.

In der Gebäudeinstallation ist ein Netzschalter für das Gerät leicht erreichbar in dessen Nähe zu installieren.

Er ist als Trennvorrichtung für das Gerät zu kennzeichnen.

en - Notes on Safety

The Soliphant M FTM50, FTM51 is designed for level limit detection in bulk solids.

If used incorrectly it is possible that application-related dangers may arise.

The level limit switch may be installed, connected, commissioned, operated and maintained **by qualified and authorised personnel only**, under strict observance of these operating instructions, any relevant standards, legal requirements, and, where appropriate, the certificate. Install an easily accessible power switch in the proximity of the device.

Mark the power switch as a disconnecter for the device.

fr - Conseils de sécurité

Le Soliphant M FTM50, FTM51 doit être exclusivement utilisé comme détecteur de niveau pour produits solides.

Il peut être source de danger en cas d'utilisation non conforme aux prescriptions.

L'appareil ne doit être installé, raccordé, mis en service et entretenu **que par un personnel qualifié et autorisé**, qui tiendra compte des indications contenues dans la présente mise en service, des normes en vigueur et des certificats disponibles (selon l'application).

Installer un interrupteur à proximité immédiate de l'appareil en veillant à ce qu'il soit facilement accessible.

Il est à identifier comme interrupteur du détecteur.

es - Notas sobre seguridad

El detector de nivel Soliphant M FTM50, FTM51 ha sido diseñado para la detección de límite en sólidos a granel.

Su empleo inapropiado puede resultar peligroso.

El equipo deberá ser montado, conectado, instalado y mantenido

única y exclusivamente por personal cualificado y autorizado, bajo rigurosa

observación de las presentes instrucciones de servicio, de las normativas y

legislaciones vigentes,

así como de los certificados (dependiendo de la aplicación).

Instalar un interruptor de fácil acceso en las proximidades del equipo.

Identificar el interruptor como desconector del equipo.

it - Note sulla sicurezza

Il Soliphant M FTM50, FTM51 e particolarmente studiato per l'impiego come sogliadi livello in solidi grossi.

Un'installazione non corretta può determinare pericolo.

Lo strumento può essere montato **solamente da personale qualificato ed autorizzato**.

La messa in esercizio e la manutenzione devono rispettare le indicazioni di collegamento, le norme e i certificati di seguito riportati.

Installare un interuttore per l'alimentazione in prossimità del dispositivo.

Marcare l'interuttore come disconnessione del dispositivo.

nl - Veiligheidsinstructies

Gebruik de Soliphant M FTM50, FTM51 alleen als niveauschakelaar voor vaste stoffen.

Indien niet correct gebruikt kunnen gevaarlijke situaties ontstaan.

Het instrument **alleen door gekwalificeerd en geautoriseerd personeel** laten inbouwen, aansluiten, in bedrijf nemen en onderhouden.

Neem de instructies in deze Inbedrijfstellingsvoorschriften, de desbetreffende normen, de wettelijke voorschriften en eventuele certificaten in acht.

Installeer een makkelijk bereikbare voedingschakelaar in de nabijheid van het instrument.

Kenmerk de voedingschakelaar specifiek voor het instrument.

de - Handhabung

Am Gehäuse, Flansch oder Verlängerungsrohr anfassen.

en - Handling

Hold by housing, flange or extension tube.

fr - Manipulation

Tenir par le boîtier, la bride ou le tube prolongateur.

es - Modo de empleo

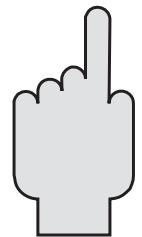
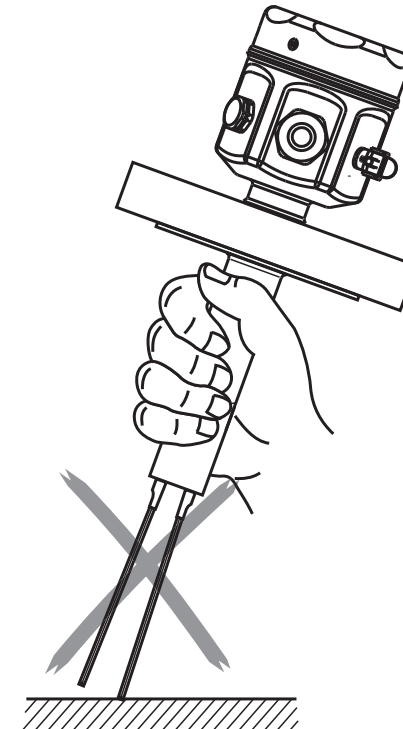
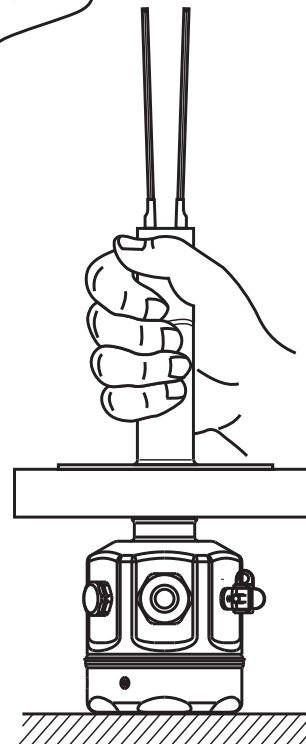
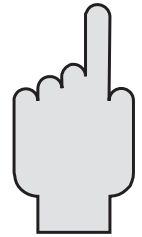
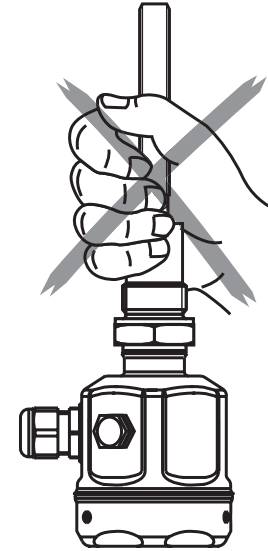
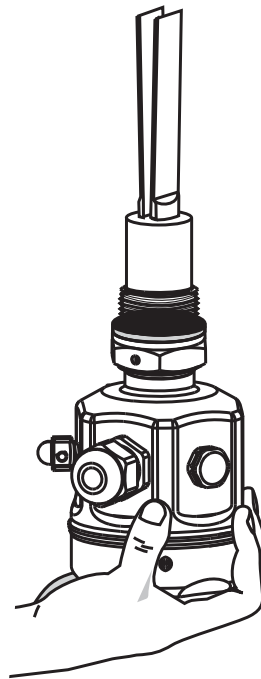
Coger por el cabezal, brida o tubo de extensión.

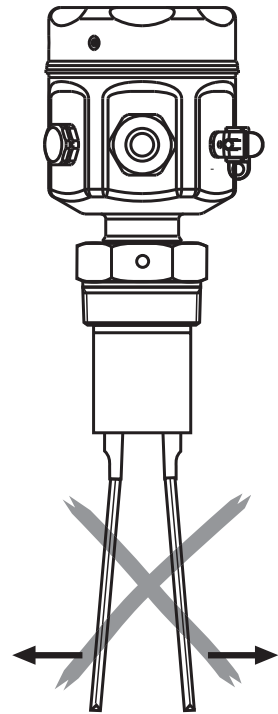
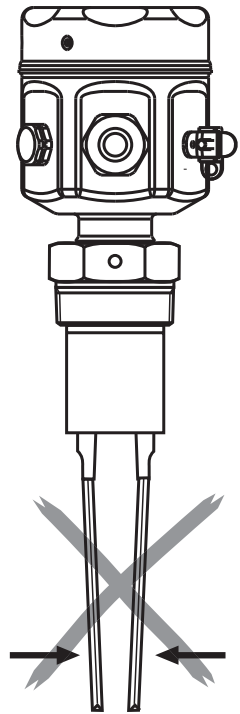
it - Accorgimenti

Afferrare la custodia, per la flangia o per il tubo di estensione.

nl - Behandeling

Vastpakken via behuizing, flens of verlengbuis.





de - **Nicht** verbiegen
Nicht kürzen
Nicht verlängern

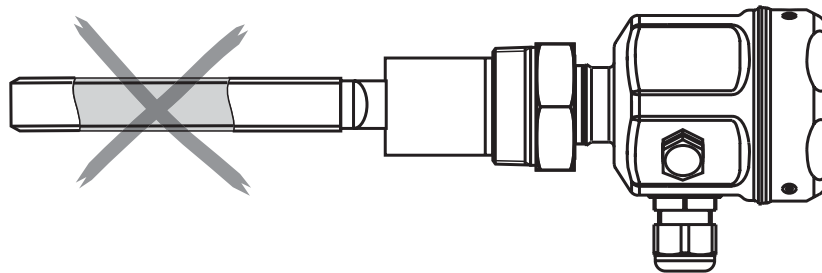
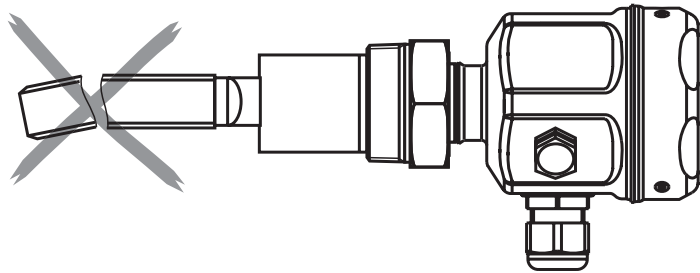
en - Do **not** bend
Do **not** shorten
Do **not** lengthen

fr - **Ne pas** déformer
Ne pas raccourcir
Ne pas rallonger

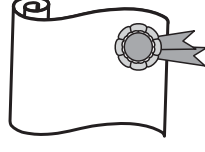
es - **No** torcer
No acortar
No alargar

it - **Non** stringere o allargare
Non accorciare o allungare
Non piegare

nl - **Niet** verbuigen
Niet inkorten
Niet verlengen



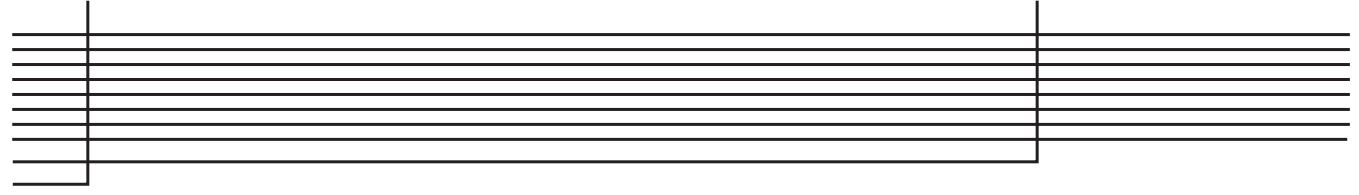
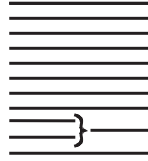
- de - Geräte-Identifikation
- en - Device Identification
- fr - Identification de l'appareil
- es - Identificación del equipo
- it - Identificazione dello strumento
- nl - Instrument-identificatie



ENDRESS+HAUSER
SOLIPHANT M

Order Code

FTM50-#####



A	* ¹	CSA General Purpose, CSA C US
C		FM DIP-AIS Cl. II, III, Div. 1, Gr. E-G +
D		CSA DIP Cl. II, III, Div. 1+2, Gr. E-G
E		IEC Ex iaD A20
F		FM IS Cl. I, II, III, Div. 1, Gr. A-G + NI +
G		CSA IS Cl. I, II, III, Div. 1+2, Gr. A-G
H		IEC Ex tD [iaD] A21
S		FM XP-AIS Cl. I, Div. 1, Gr. A-D +
T		CSA XP Cl. I, Div. 1+2, Gr. A-D
X		TIIS Ex d IIC T3
Z		TIIS Ex ia IIC T3
8		NEPSI Ex ia IIC T6
Y		NEPSI Ex d [ia] IIC T6
1	* ²	NEPSI DIP
2		ATEX II 1 D, 1/2 GD, 1/3 GD Ex ia IIC T6
3		ATEX II 1/2 D Ex tD
4		ATEX II 3 D, ATEX II 3 G EEx nA/nL/nC
5		ATEX II 1/3 D Ex tD
6		ATEX II 1 D, ATEX II 1/2 G Ex de [ia] IIC T6
7		ATEX II 1 D, ATEX II 1/2 G Ex d [ia] IIC T6
		ATEX II 1 D, II 1 G Ex ia T6 (XA)
AF		2", 150 lbs, RF, ANSI B16.5
AG		3", 150 lbs, RF, ANSI B16.5
AH		4", 150 lbs, RF, ANSI B16.5
B3		DN50, PN25/40 A, EN1092-1 (DIN2527 B)
BS		DN80, PN10/16 A, EN1092-1 (DIN2527 B)
BT		DN100, PN10/16 A, EN1092-1 (DIN2527 B)
GG		EN10226, R 1½
GJ		ANSI, NPT 1½, d = 1.67"
GK		ANSI, NPT 1¼, d = 1.38"

GX	ANSI, NPT 1½, d = 1.38" --> ISA
KF	10K 50, RF, JIS B2220
KG	10K 80, RF, JIS B2220
KH	10K 100, RF, JIS B2220
TD	Tri-Clamp ISO2852, DN40-51 (2")
YY	*2
A	PTFE>316L; Gabel beschichtet / fork coated / Fourche revêtué / Horquilla revestida / Rebbi rivestiti / Vork bekleed
B	PTFE>316L; komplett beschichtet / completely coated / entièrement revêtué / completamente revestida / completamente rivestiti / Compleet bekleed
C	ETFE>316L; komplett beschichtet / completely coated / entièrement revêtué / completamente revestida / completamente rivestiti / Compleet bekleed
2	316L; Ra ≤ 3.2 µm/80 grit, *1
5	316L; Ra ≤ 0.8 µm/180 grit; Gabel poliert / fork polished / Fourche polie / Horquilla pulida / Rebbi lucidati / Vork gepolijst
7	316L; Ra ≤ 0.8 µm/180 grit;
9	*2 Gabel + Rohr poliert / fork + tube polished / Fourche + tube polie / Horquilla y tubo pulidos / Rebbi + tubo lucidati / Vork + buis gepolijst
A	155 mm/6 in; min. 10 g/l (0.7 lbs)
K	100 mm/4 in; min. 50 g/l (3 lbs)
Y	*2
1	FEM51; 19...253 V AC
2	FEM52; PNP, 10... 55 V DC
4	FEM54; DPDT, 19...253 V AC / 55 V DC
5	FEM55; 8/16 mA, 11... 36 V DC
7	FEM57; PFM
8	FEM58; NAMUR + Prüftaster / test button / Touche test / Botón de prueba / Pulsante di test / Testtoet
9	*2
A	Kompakt / compact / compacto / compatta / compact
D	6 m > *3
E	20 ft > *3
G	6 m, verstärkt / armoured / renforcé / armado / corazzato / versterkt > *3

H	20 ft, verstärkt / armoured / renforcé / armado / corazzato / versterkt > * ³
Y	* ²
H	T13, Aluminium, IP66/68 NEMA4X, getrennter Anschlussraum / separate connection compartment / compartment de raccordement séparé / Compartimiento de conexión separado / Vano di connessione separato / Gescheiden aansluitruimte
Y	* ²
1	F16, Polyester, IP66/67 NEMA4X + Klarsichtdeckel / Transparent cover / Couvercle transparent / Cubierta transparente / Copertura trasparente / doorzichtig dekseel
3	F17, Aluminium, IP66/67 NEMA4X
5	F13, Aluminium, IP66/68 NEMA4X
7	F15, 316L, IP66/67 NEMA4X
2	M20
3	NPT ½
4	G ½
7	NPT ¾
9	* ²
A	* ¹
G	Glasdeckel / Glass cover / Couvercle en verre / Cubierta de cristal / Copertura di vetro / doorzichtig dekseel
R	SIL, * ⁴ ,
S	Glasdeckel / Glass cover / Couvercle en verre / Cubierta de cristal / Copertura di vetro / doorzichtig dekseel
Y	SIL, * ⁴ * ²
A	* ¹
C	EN10204-3.1, * ⁵
D	Temperaturdistanzstück / temperature spacer / Élément de refroidissement / Tramo disipador detemperatura / Distanziale per temperatura / Temperatuurreductiestuk ≤ 150 °C (≤ 300 °F)
E	Temperaturdistanzstück / temperature spacer / Élément de refroidissement / Tramo disipador detemperatura / Distanziale per temperatura / Temperatuurreductiestuk ≤ 150 °C (≤ 300 °F), EN10204-3.1, * ⁵
F	Hochtemperatur / high temperature / Haute température / Alta temperatura / Temperatura elevata / Hoge temperatuur ≤ 280 °C (≤ 540 °F)

H Hochttemperatur / high temperature / Haute température /
Alta temperatura / Temperatura elevada / Hoge temperatuur
≤ 280 °C (≤ 540 °F), EN10204-3.1, *⁵

J Hochttemperatur / high temperature / Haute température /
Alta temperatura / Temperatura elevada / Hoge temperatuur
≤ 230 °C (≤ 450 °F)

K Hochttemperatur / high temperature / Haute température /
Alta temperatura / Temperatura elevada / Hoge temperatuur
≤ 230 °C (≤ 450 °F), EN10204-3.1, *⁵

Y *²

*¹ ohne / without / sans / sin / senza / zonder

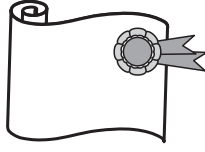
*² andere / others / autres / otros / altri / andere

*³ Separatgehäuse / separate housing / Boîtier séparé /
Cabezal separado / Custodia separata / Separate behuizing

*⁴ Konformitätserklärung / declaration of conformity /
Déclaration de conformité / Declaración de conformidad /
Dichiarazione di conformità / Conformiteitsverklaring

*⁵ Material (mediumberührt), Abnahmeprüfzeugnis /
material (wetted parts), inspection certificate /
Matériau (en contact avec le produit), certificat matière /
Material (piezas mojadas), certificado de recepción /
Materiale (a contatto con il prodotto), certificato di collaudo /
Materiaal (in aanraking met medium), afnamecertificaat

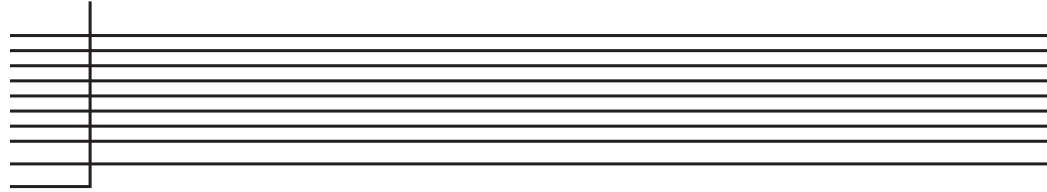
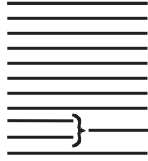
- de - Geräte-Identifikation
- en - Device Identification
- fr - Identification de l'appareil
- es - Identificación del equipo
- it - Identificazione dello strumento
- nl - Instrument-identificatie



ENDRESS+HAUSER
SOLIPHANT M

Order Code

FTM51-#####



A	*1	CSA General Purpose, CSA C US
C		FM DIP-AIS Cl. II, III, Div. 1, Gr. E-G +
D		CSA DIP Cl. II, III, Div. 1+2, Gr. E-G
E		IEC Ex iaD A20
F		FM IS Cl. I, II, III, Div. 1, Gr. A-G + NI +
G		CSA IS Cl. I, II, III, Div. 1+2, Gr. A-G
H		IEC Ex tD [iaD] A21
S		FM XP-AIS Cl. I, Div. 1, Gr. A-D +
T		CSA XP Cl. I, Div. 1+2, Gr. A-D
X		TIIS Ex d [ia] IIC T4
Z		TIIS Ex ia IIC T3
8		NEPSI Ex ia IIC T6
Y		NEPSI Ex d [ia] IIC T6
1	*2	NEPSI DIP A20 Ta, T4
2		ATEX II 1 D, 1/2 GD, 1/3 GD Ex ia IIC T6
3		ATEX II 1/2 D Ex tD
4		ATEX II 3 D, ATEX II 3 G EEx nA/nL/nC
5		ATEX II 1/3 D Ex tD
6		ATEX II 1 D, ATEX II 1/2 G Ex de [ia] IIC T6
7		ATEX II 1 D, ATEX II 1/2 G Ex d [ia] IIC T6
		ATEX II 1 D, II 1 G Ex ia T6 (XA)
AF		2", 150 lbs, RF, ANSI B16.5
AG		3", 150 lbs, RF, ANSI B16.5
AH		4", 150 lbs, RF, ANSI B16.5
B3		DN50, PN25/40 A, EN1092-1 (DIN2527 B)
BS		DN80, PN10/16 A, EN1092-1 (DIN2527 B)
BT		DN100, PN10/16 A, EN1092-1 (DIN2527 B)
GG		EN10226, R 1½
GJ		ANSI, NPT 1½, d = 1.67"
GK		ANSI, NPT 1¼, d = 1.38"

GX	ANSI, NPT 1½, d = 1.38" --> ISA
KF	10K 50, RF, JIS B2220
KG	10K 80, RF, JIS B2220
KH	10K 100, RF, JIS B2220
TD	Tri-Clamp ISO2852, DN40-51 (2")
YY	*2
A	PTFE>316L; Gabel beschichtet / fork coated / Fourche revêtue / Horquilla revestida / Rebbi rivestiti / Vork bekleed PTFE>316L; komplett beschichtet / completely coated / Entièrement revêtue / completamente revestida / completamente rivestiti / Compleet bekleed
B	ETFE>316L; komplett beschichtet / completely coated / Entièrement revêtue / completamente revestida / completamente rivestiti / Compleet bekleed
C	komplett beschichtet / completely coated / Entièrement revêtue / completamente revestida / completamente rivestiti / Compleet bekleed
2	316L; Ra ≤ 3.2 µm/80 grit, *1
5	316L; Ra ≤ 0.8 µm/180 grit; Gabel poliert / fork polished / Fourche polie / Horquilla pulida / Rebbi lucidati / Vork gepolijst
7	316L; Ra ≤ 0.8 µm/180 grit; Gabel + Rohr poliert / fork + tube polished / Fourche + tube polis / Horquilla y tubo pulidos / Rebbi + tubo lucidati / Vork + buis gepolijst
9	*2
L mm; min. 10 g/l (0.7 lbs)
M mm; min. 50 g/l (3 lbs)
P in; min. 10 g/l (0.7 lbs)
Q in; min. 50 g/l (3 lbs)
S mm; min. 10 g/l (0.7 lbs), *6
T mm; min. 50 g/l (3 lbs), *6
U in; min. 10 g/l (0.7 lbs), *6
V in; min. 50 g/l (3 lbs), *6
Y	*2
1	FEM51; 19...253 V AC
2	FEM52; PNP, 10... 55 V DC
4	FEM54; DPDT, 19...253 V AC / 55 V DC
5	FEM55; 8/16 mA, 11... 36 V DC
7	FEM57; PFM
8	FEM58; NAMUR + Prüfaster / test button / Touche test / Botón de prueba / Pulsante di test / Testtoet
9	*2

A	Kompakt / compact / compacto / compatta / compact
D	6 m > * ³
E	20 ft > * ³
G	6 m, verstärkt / armoured / renforcé / armado / corazzato / versterkt > * ³
H	20 ft, verstärkt / armoured / renforcé / armado / corazzato / versterkt > * ³
Y	* ²
H	T13, Aluminium, IP66/68 NEMA4X, getrennter Anschlussraum / separate connection compartment / compartment de raccordement séparé / Compartimiento de conexión separado / Vano di connessione separato / Gescheiden aansluitruimte * ²
Y	* ²
1	F16, Polyester, IP66/67 NEMA4X + Klarsichtdeckel / Transparent cover / Couvercle transparent / Cubierta transparente / Copertura trasparente / doorzichtig deksel
3	F17, Aluminium, IP66/67 NEMA4X
5	F13, Aluminium, IP66/68 NEMA4X
7	F15, 316L, IP66/67 NEMA4X
2	M20
3	NPT 1/2
4	G 1/2
7	NPT 3/4
9	* ²
A	* ¹
G	Glasdeckel / Glass cover / Couvercle en verre / Cubierta de cristal / Copertura di vetro / doorzichtig deksel
R	SIL, * ⁴ ,
S	Glasdeckel / Glass cover / Couvercle en verre / Cubierta de cristal / Copertura di vetro / doorzichtig deksel
Y	SIL, * ⁴ * ²
A	* ¹
C	EN10204-3.1, * ⁵
D	Temperaturdistanzstück / temperature spacer / Élément de refroidissement / Tramo dissipador detemperatura / Distanziale per temperatura / Temperatureuureductiestuk ≤ 150 °C (≤ 300 °F)
E	Temperaturdistanzstück / temperature spacer / Élément de refroidissement / Tramo dissipador detemperatura /

F Distanziale per temperatura / Temperatureurreductiestuk
 ≤ 150 °C (≤ 300 °F), EN10204-3.1, *⁵
 Hochttemperatur / high temperature / Haute température /
 Alta temperatura / Temperatura elevata / Hoge temperatuur
 ≤ 280 °C (≤ 540 °F)

H Hochttemperatur / high temperature / Haute température /
 Alta temperatura / Temperatura elevata / Hoge temperatuur
 ≤ 280 °C (≤ 540 °F), EN10204-3.1, *⁵

J Hochttemperatur / high temperature / Haute température /
 Alta temperatura / Temperatura elevata / Hoge temperatuur
 ≤ 230 °C (≤ 450 °F)

K Hochttemperatur / high temperature / Haute température /
 Alta temperatura / Temperatura elevata / Hoge temperatuur
 ≤ 230 °C (≤ 450 °F), EN10204-3.1, *⁵

Y *²

*¹ ohne / without / sans / sin / senza / zonder

*² andere / others / autres / otros / altri / andere

*³ Separatgehäuse / separate housing / Boîtier séparé /
 Cabezal separado / Custodia separata / Separate behuizing

*⁴ Konformitätserklärung / declaration of conformity /
 Déclaration de conformité / Declaración de conformidad /
 Dichiarazione di conformità / Conformiteitsverklaring

*⁵ Material (mediumberührt), Abnahmeprüfzeugnis /
 material (wetted parts), inspection certificate /
 Matériau (en contact avec le produit), certificat matière /
 Material (piezas mojadas), certificado de recepción /
 Materiale (a contatto con il prodotto), certificato di collaudo /
 Materiaal (in aanraking met medium), afnamecertificaat

*⁶ Oberflächenveredelung / surface refinement /
 Finition de surface / Refinamiento de superficie /
 Finitura di superficie / Oppervlak veredeling

de - Einbauhinweise

en - Mounting Notes

fr - Conseils pour le montage

es - Recomendaciones de montaje

it - Note al montaggio

nl - Inbouwtips

*

Schutzdach/protective roof/
Déflecteur/tejado protector/
tettuccio protettivo/Beschermdakje

**

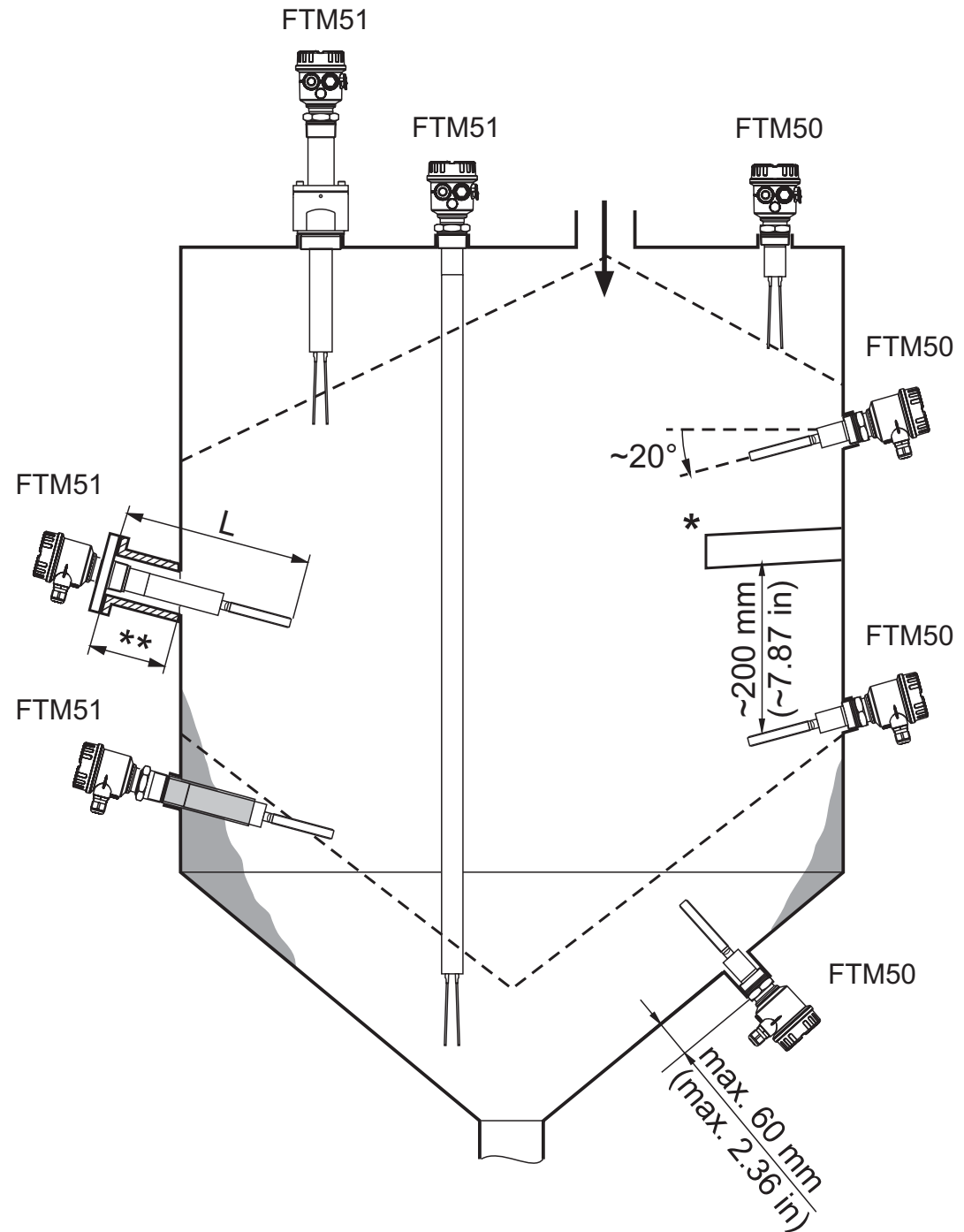
Stutzenlänge/nozzle length/
Longueur du piquage/
longitud de la tubuladura/
lunghezza tronchetto/tubelure lengte

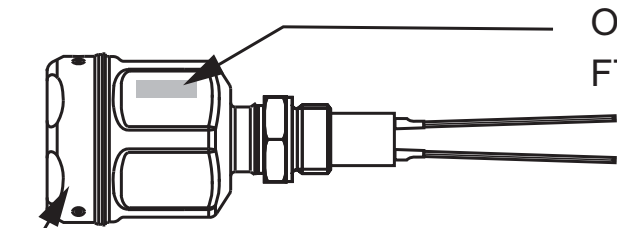
max.: L – 200 mm (7.87 in)

Standardgabel / standard fork /
fourche standard / horquilla estándar /
forcella standard / standaardvork

max.: L – 145 mm (5.71 in)

Kurzgabel / short fork /
fourche courte / horquilla corta /
forcella corta / korte vork

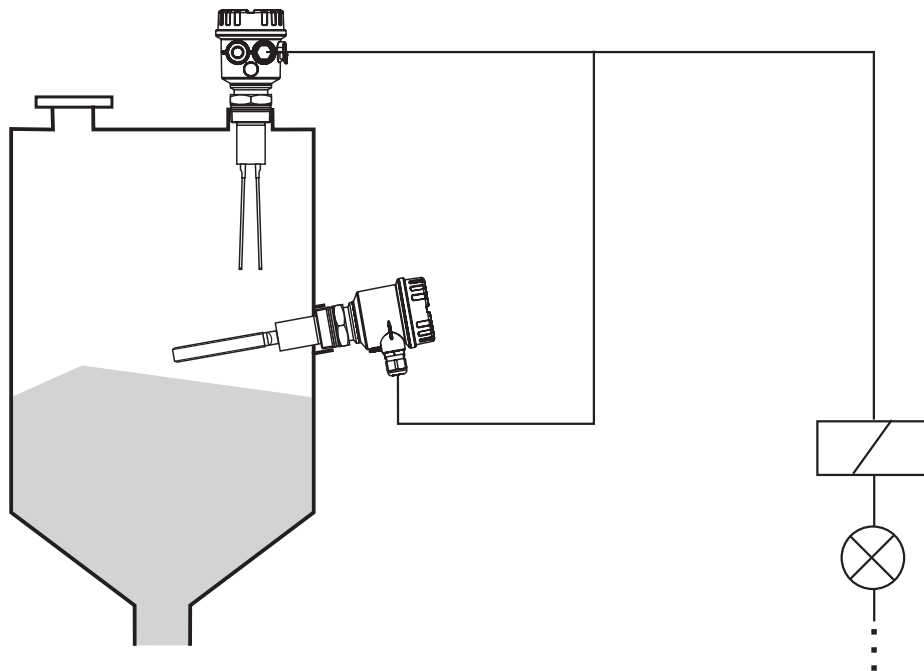




Order code:
FTM5# - # # # # # # # # # #

Elektronikeinsätze
Electronic inserts
Electronique
Electrónica
Inserti elettronici
Elektronica-insert

FEM51
FEM52
FEM54



de - Messeinrichtung
für direkten Anschluss

en - Measuring system
for direct connection

**fr - Ensemble de détection
de niveau**
pour raccordement direct

es - Sistema de medida
para conexión directa

it - Sistema di misura
per connessione diretta

nl - Meetopstelling
voor directe aansluiting

de - Messeinrichtung

für Anschluss über Schaltgerät

en - Measuring system

for connection via switching unit

**fr - Ensemble de détection
de niveau**

pour raccordement via
transmetteur

es - Sistema de medida

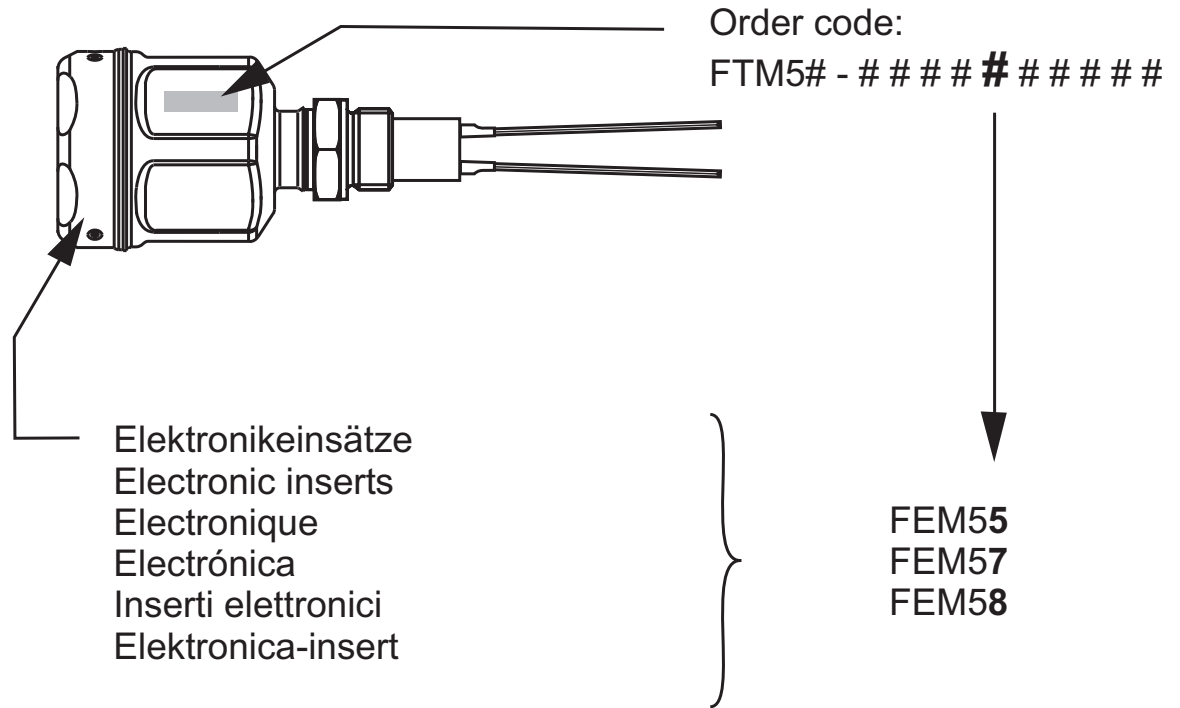
para conexión con transmisores
remotos

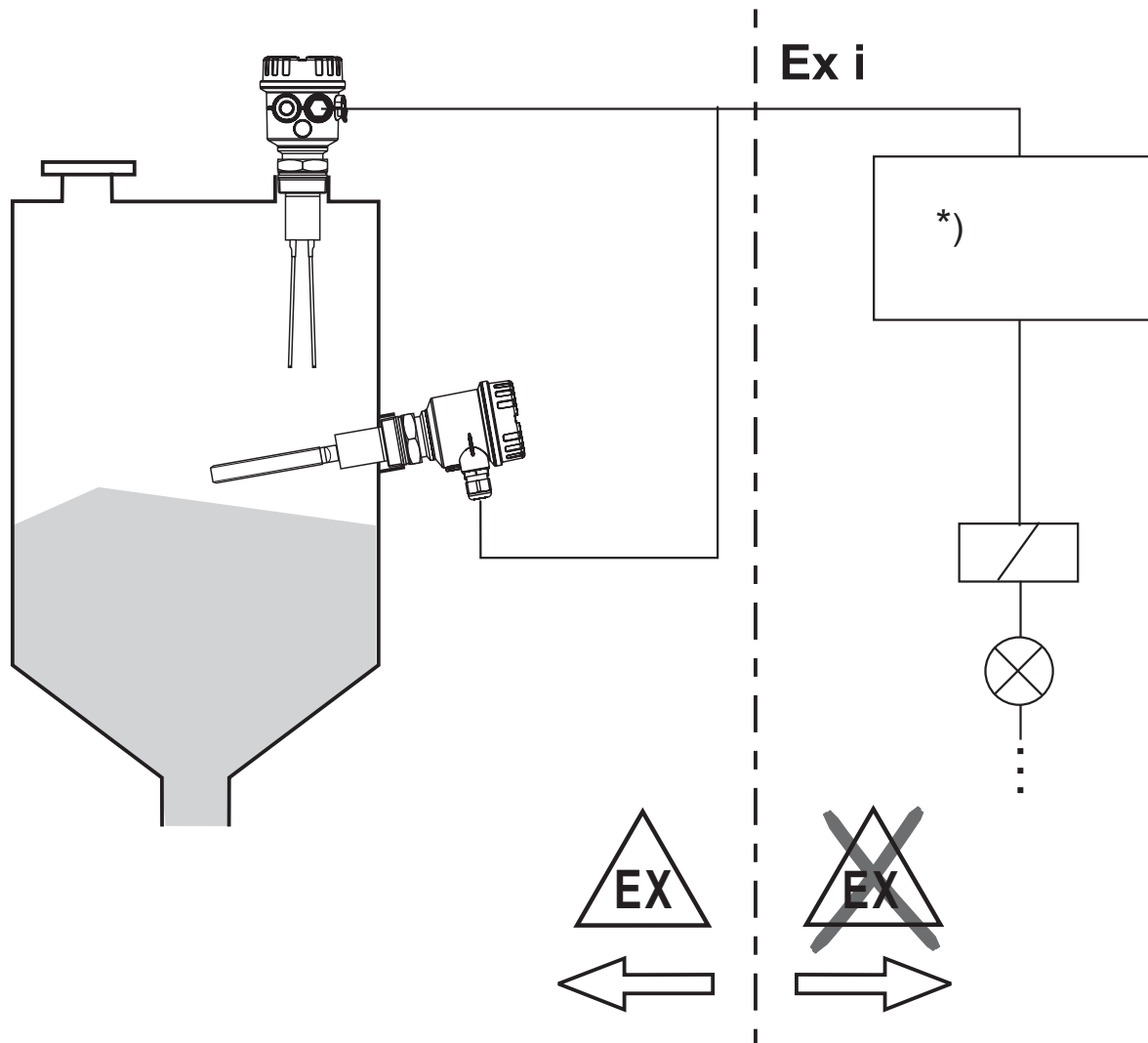
it - Sistema di misura

per connessione mediante
unità di commutazione

nl - Meetopstelling

voor aansluiting aan een
schakelversterker





*) Schaltgerät, SPS, Trennverstärker, Segmentkoppler
 Switching unit, PLC, isolating amplifier, Segment coupler
 Transmetteur, API, convertisseur/ séparateur, Coupleur de segments
 Interruttore, PLC, amplificador aislado, Acoplador segmento
 Unità di commutazione, PLC, barriera di separazione, Segment coupler
 Schakelversterker, PLC, scheidingsversterker, segmentkoppeling

- de - Messeinrichtung**
für Anschluss über Schaltgerät
- en - Measuring system**
for connection via switching unit
- fr - Ensemble de détection de niveau**
pour raccordement via transmetteur
- es - Sistema de medida**
para conexión con transmisores remotos
- it - Sistema di misura**
per connessione mediante unità di commutazione
- nl - Meetopstelling**
voor aansluiting aan een schakelversterker

de - Auswahl der Gabellänge

Abhängig vom Schüttgewicht

en - Selection of the fork length

depending on the bulk density

fr - Sélection de la longueur de fourche

Exemple d'implantation en fonction de la densité de solides

es - Selección de la longitud de la horquilla

Ejemplos de montaje dependiendo de la densidad del sólido

it - Selezione della lunghezza della forcella

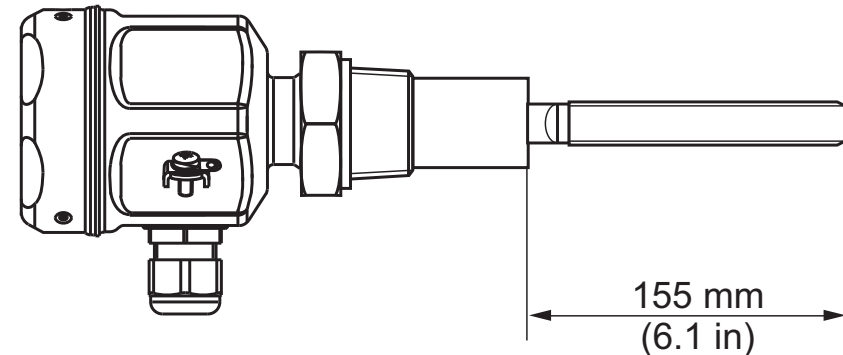
Esempi di montaggio in funzione della densità

nl - Keuze van de vorklengte

Afhankelijk van het stortgewicht

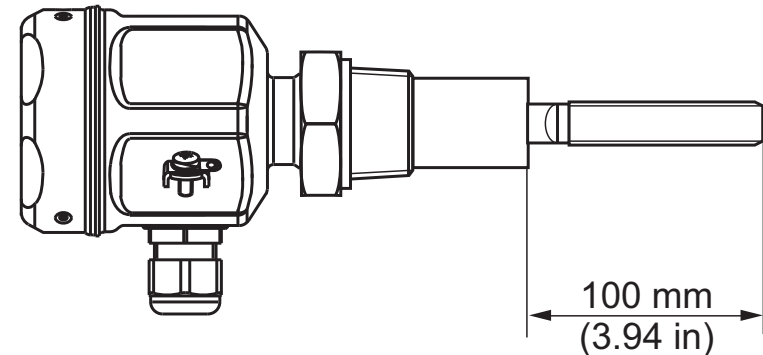
Schüttgewicht bei Standardgabel / bulk density with standard fork /
Densité avec fourche standard / Densidad del sólido con horquilla estándar /
densità prodotto con forcella standard / Stortgoed met standaard vork

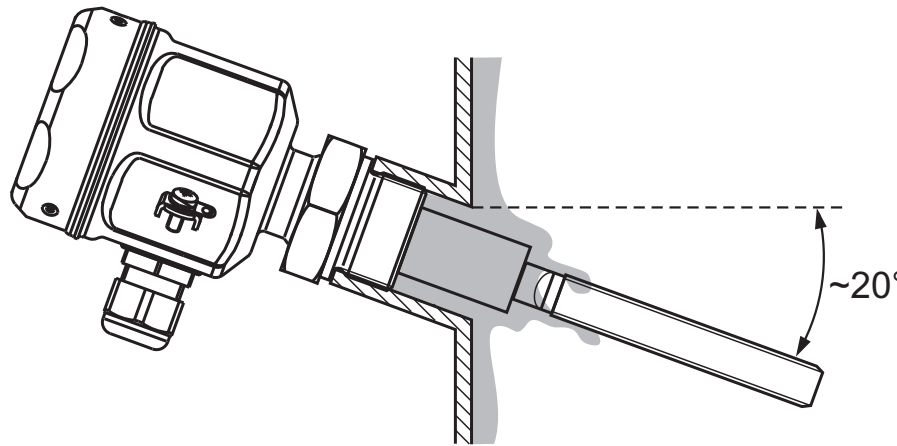
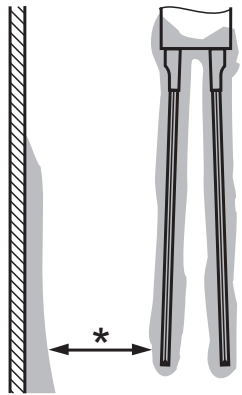
≥ 10 g/l (≥ 0.7 lbs)



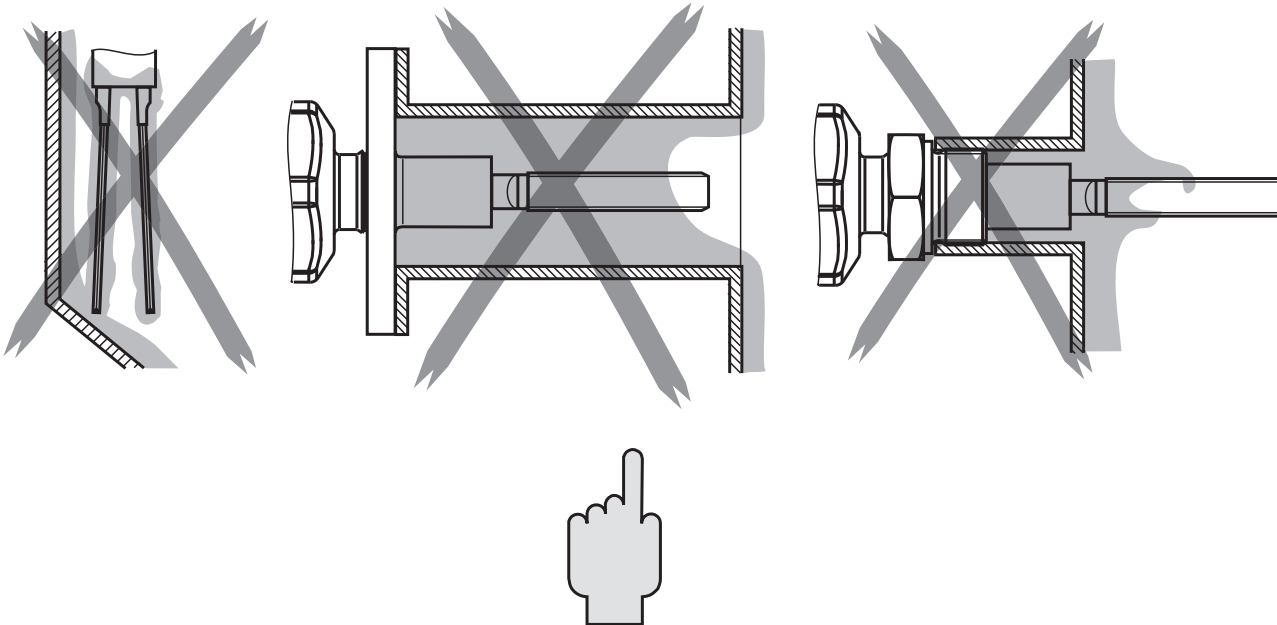
Schüttgewicht bei Kurzgabel / bulk density with short fork /
Densité avec fourche courte / Densidad del sólido con horquilla corta /
densità prodotto con forcella corta / Stortgoed met korte vork

≥ 50 g/l (≥ 3 lbs)





* Abstand! / Distance! / Distance! / ¡Distancia! / Distanza! / Afstand!



- de** - Ansatzbildung berücksichtigen.
Schwinggabel darf Ansatz am Behälter nicht berühren.
- en** - Consider build-up.
Fork may not come into contact with build-up on tank.
- fr** - Tenir compte du colmatage.
La fourche ne doit pas entrer en contact avec le dépôt sur le réservoir.
- es** - Tener en cuenta las adherencias.
Las horquillas no deben estar en contacto con las adherencias del producto.
- it** - Tenere conto dei depositi.
La forcella non deve entrare in contatto con i depositi sulle pareti.
- nl** - Rekening houden met aangroei.
Trilvork mag de aangroei van de silo niet raken.

de - Schwinggabel ausrichten:
Markierung oben oder unten

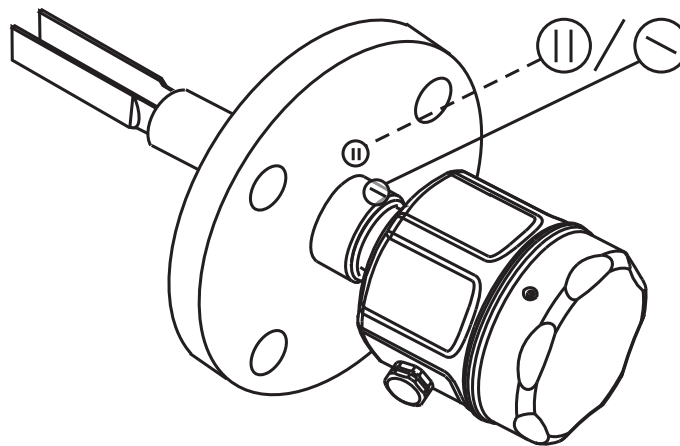
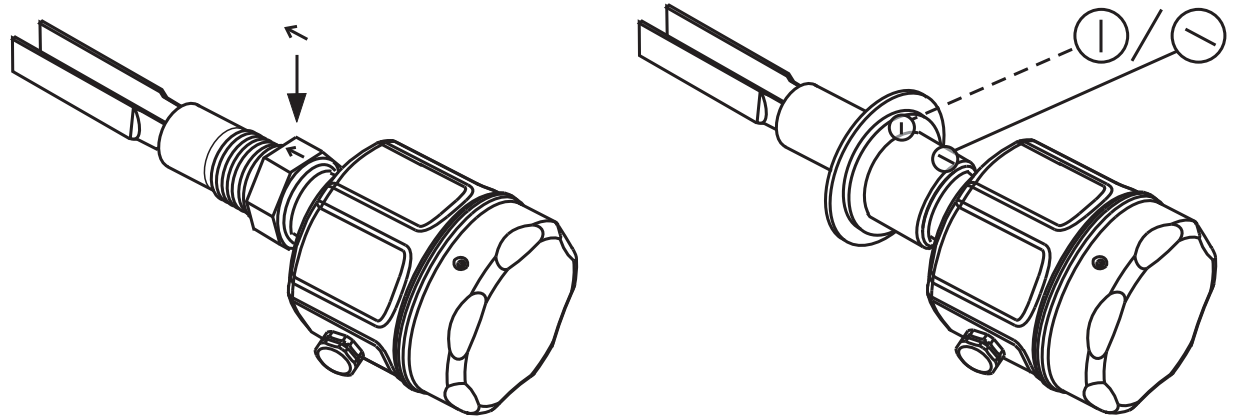
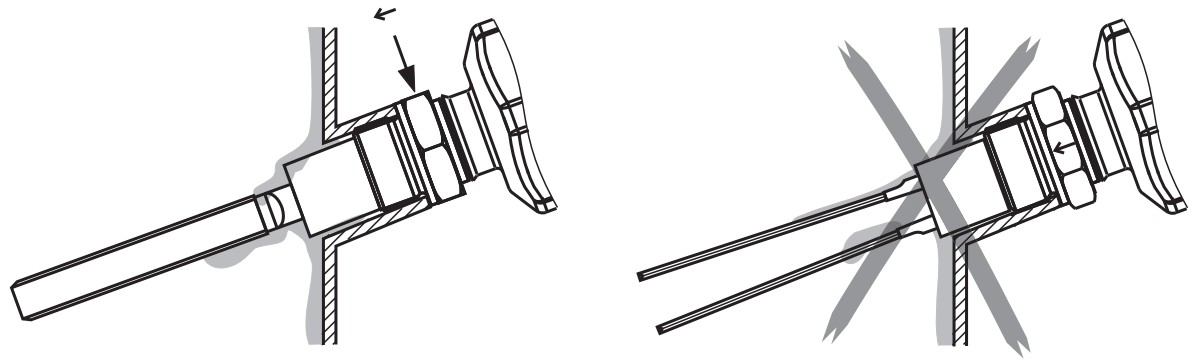
en - Orientation of fork tines:
Marking above or below

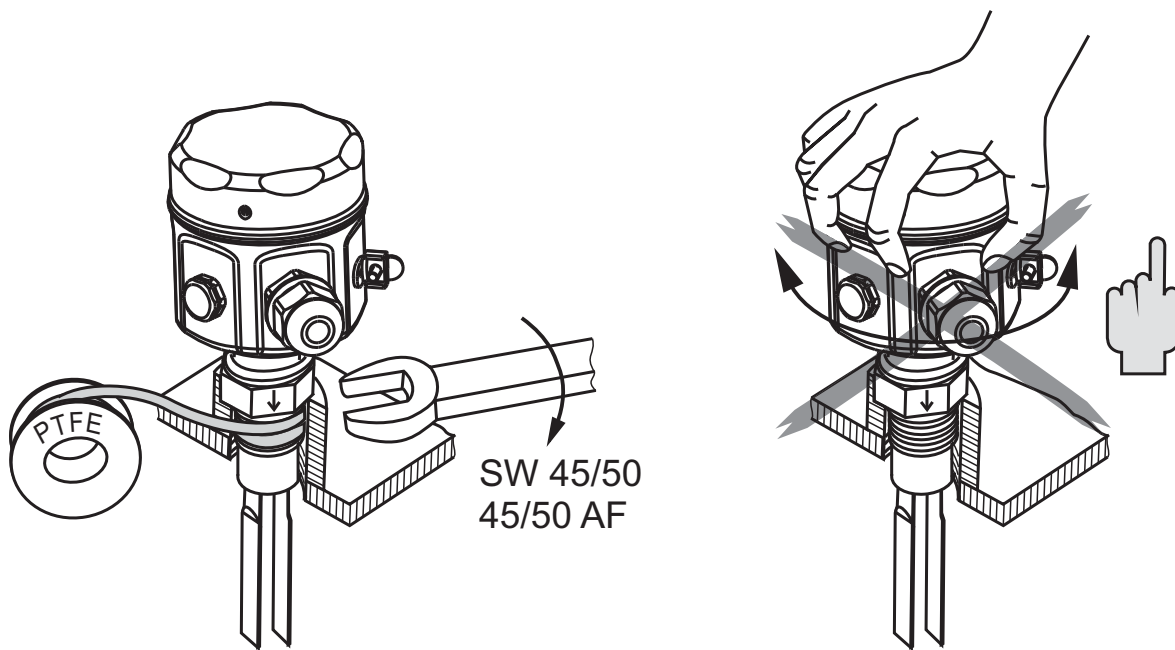
fr - Orientation des lames vibrantes:
Repères en haut ou en bas

es - Orientación de la horquilla:
Marca arriba o abajo

it - Allineamento della forcella:
Marcatura in alto o in basso

nl - Vork uitrichten:
Markering boven of onder





de - Soliphant einschrauben.
Nicht am Gehäuse drehen.

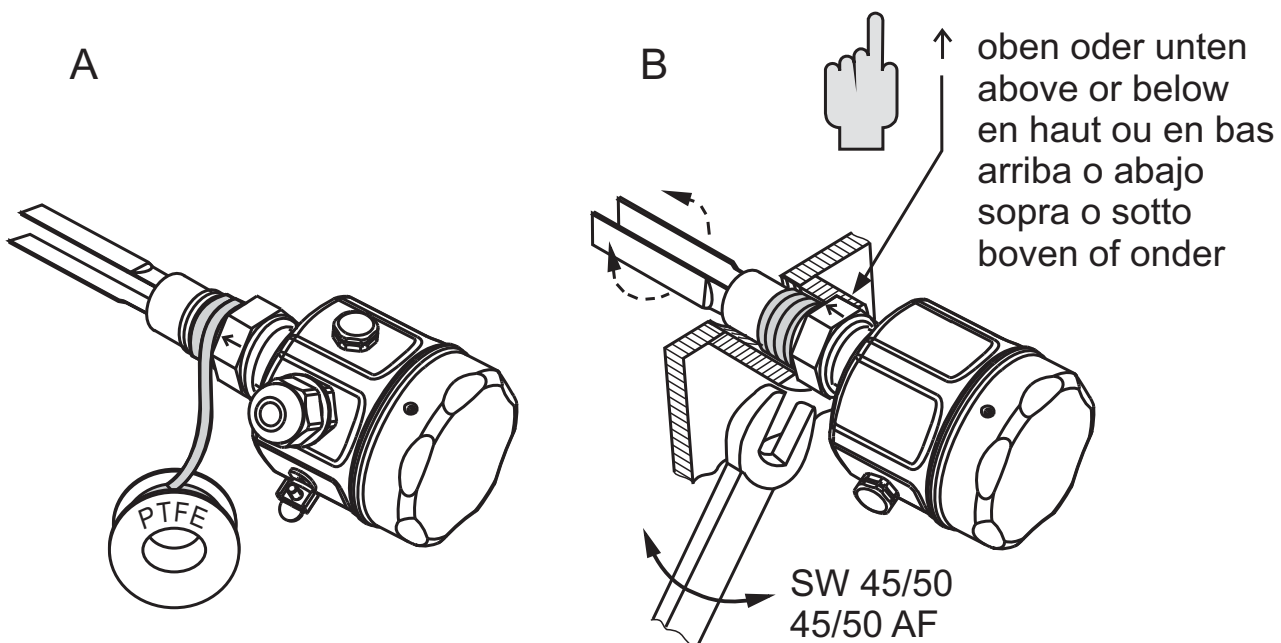
en - Screw Soliphant into process connection.
Don't use housing to turn.

fr - Visser le Soliphant.
Ne pas se servir du boîtier.

es - Roscar el Soliphant a la conexión a proceso.
No girar el cabezal.

it - Avvitare il Soliphant all'attacco di processo.
 Allo scopo **non** utilizzare la custodia.

nl - Schroef de Soliphant in de procesaansluiting.
 Draai hierbij **niet** aan de behuizing.



SW 45, 45 AF:
 1½ NPT, ø 36 mm (1.42 in)
 1¼ NPT, ø 36 mm (1.42 in)

SW 50, 50 AF:
 1½ NPT, ø 43 mm (1.69 in)
 R 1½, ø 43 mm (1.69 in)

de - Kabeleinführung ausrichten

en - Cable gland orientation

fr - Orientation de l'entrée de câble

es - Ajuste del prensaestopa

it - Posizionamento del passacavo

nl - Kabelinvoer uitrichten

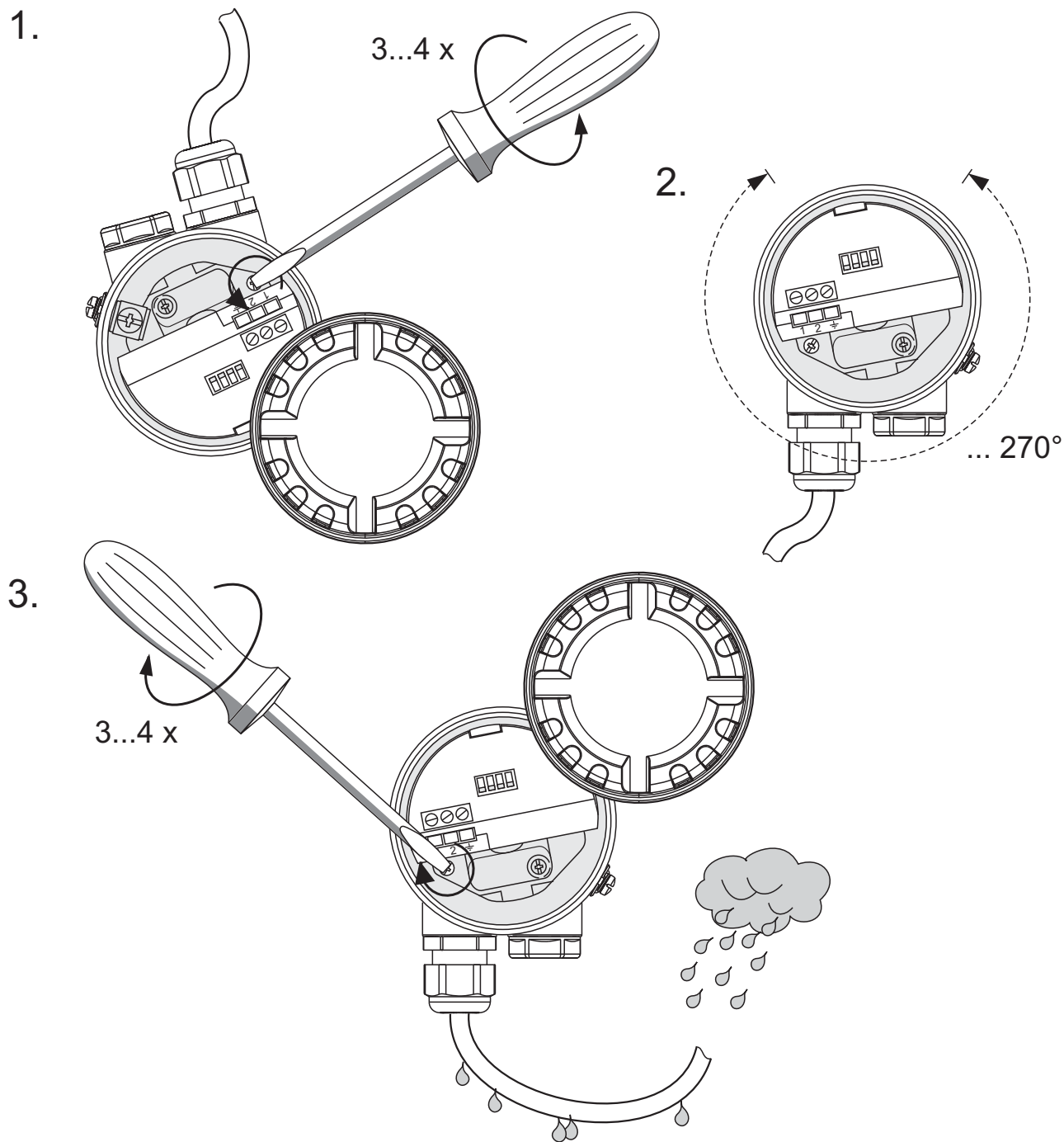
Anzugsdrehmoment /
Torque /
Couple de serrage /
Esfuerzo de torsión /
Coppia di torsione /
Aandraaimoment

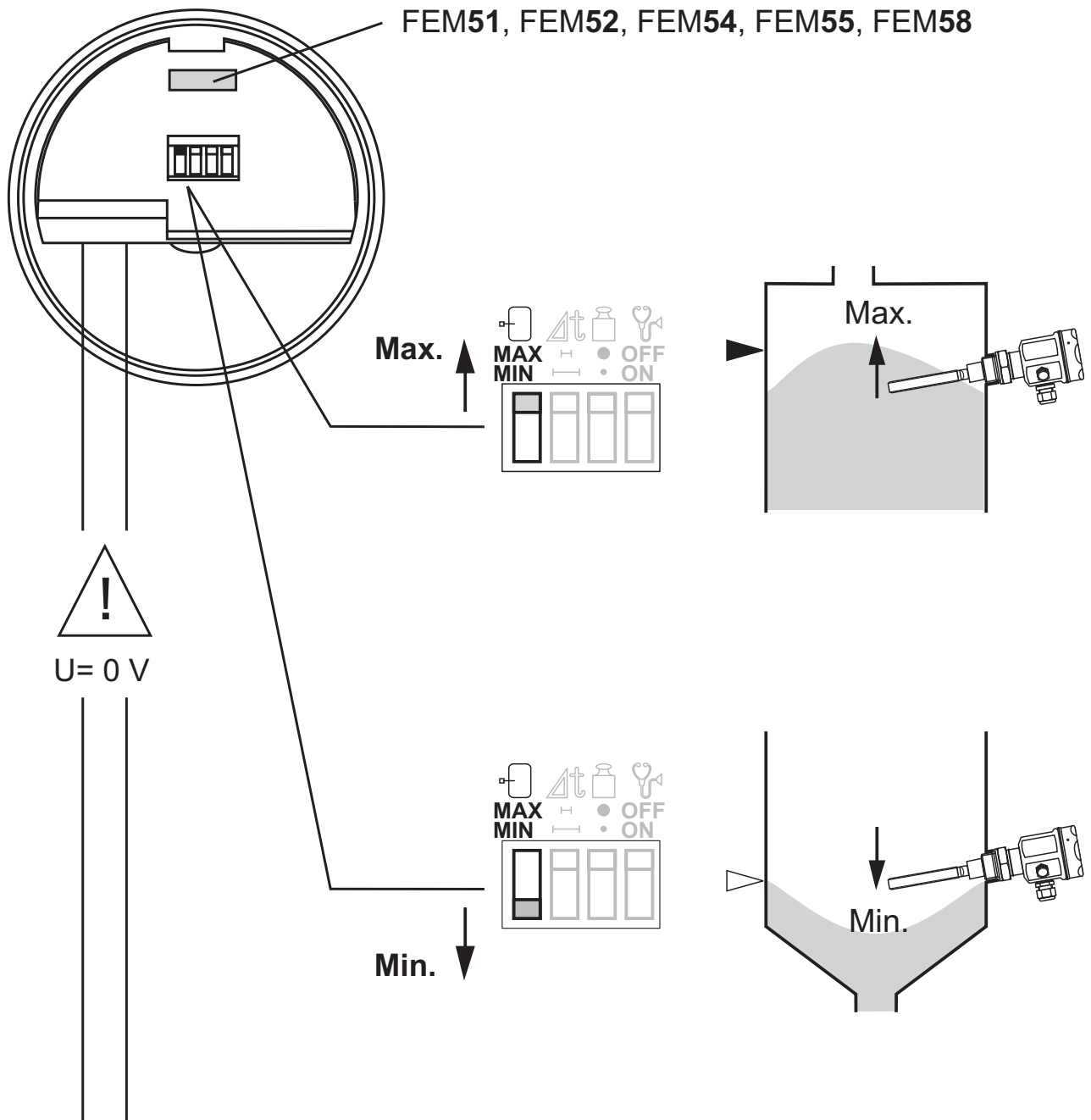
F16:

0.6 Nm (0.4425 lbf ft)

F15, F17, F13, T13:

0.9 Nm (0.6638 lbf ft)





de - Sicherheitsschaltung

MIN/MAX

en - Fail-safe mode

MIN/MAX

fr - Sécurité

MIN/MAX

es - Conmutador de seguridad

MIN/MAX

it - Selezione della modalità di sicurezza

MIN/MAX

nl - Veiligheidsschakeling

MIN/MAX



SIL2:



de - Selbsttest

FEM57

(Funktion siehe Seite 44, 45
und Schaltgerät)

en - Self test

FEM57

(see page 44, 45 and switching
unit for sequence)

fr - Auto-test

FEM57

(voir page 44, 45 et transmetteur)

es - Prueba automática

FEM57

(ver pág. 44, 45 e interruptor
para secuencia)

it - Prova automatica

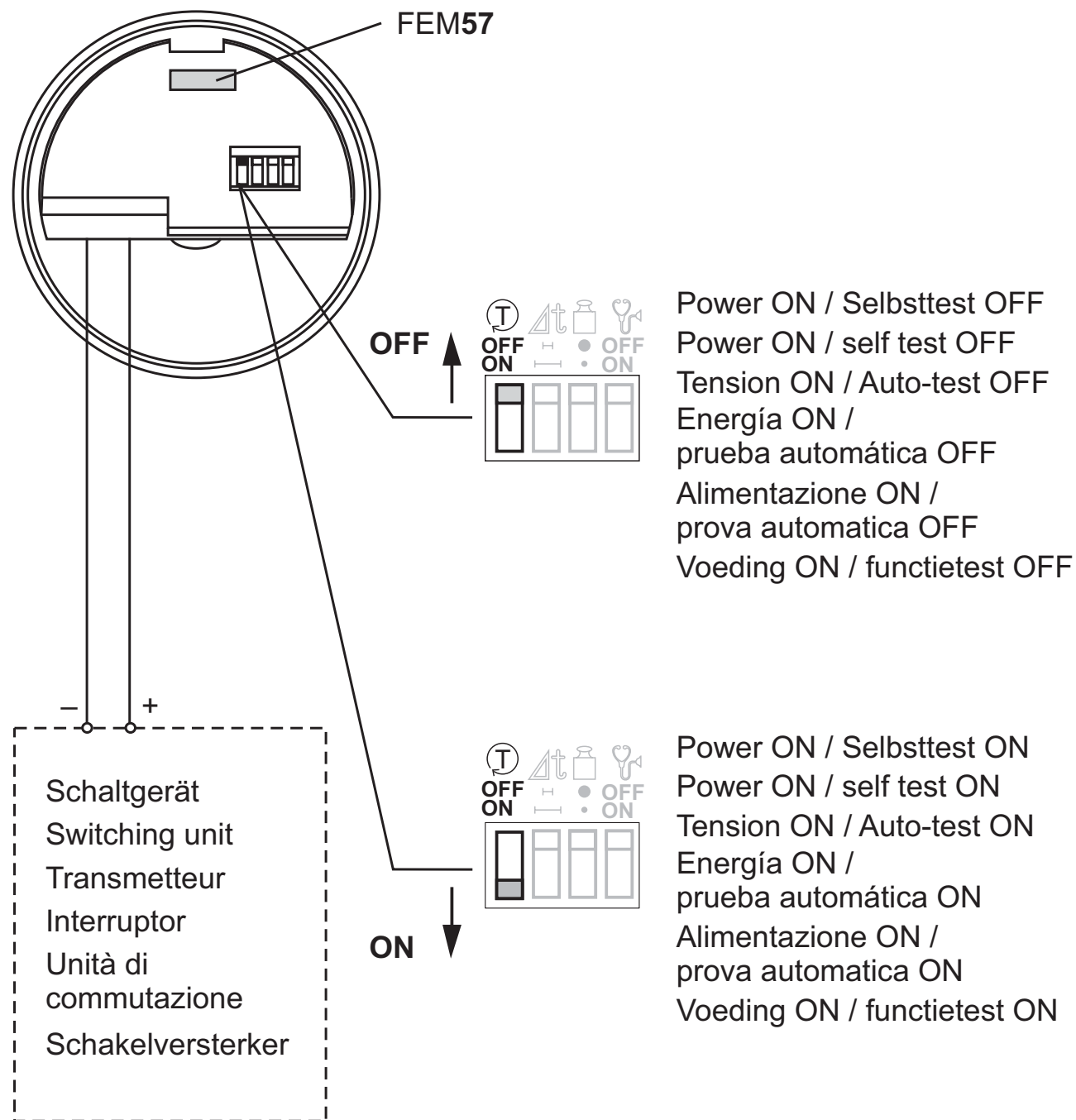
FEM57

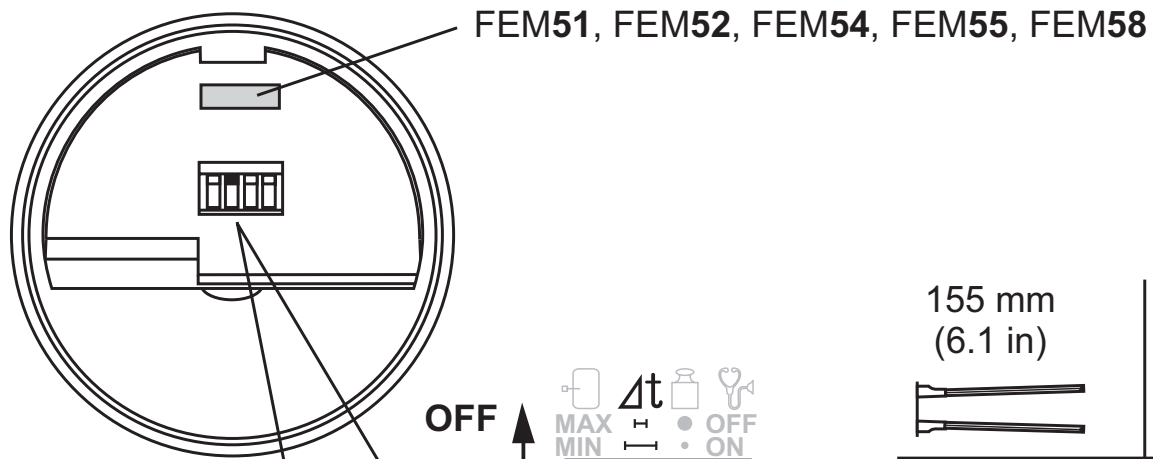
(vds. pag. 44, 45 e unità
di commutazione)

nl - Functietest

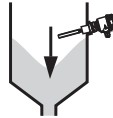
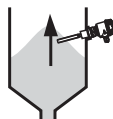
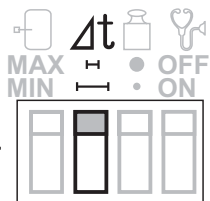
FEM57

(zie voor functie pag 44, 45
en schakelversterker)





OFF



155 mm
(6.1 in)



0.5 s

100 mm
(3.94 in)

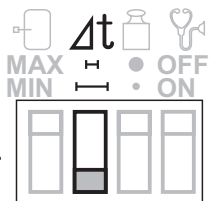


0.5 s

150 °C (300 °F):
1.5 s

230 °C (450 °F),
280 °C (540 °F):
2 s

ON



155 mm
(6.1 in)



5.0 s

100 mm
(3.94 in)



5.0 s

5.0 s

5.0 s

- de** - Schaltverzögerung
- en** - Switching delay
- fr** - Temporisation de la commutation
- es** - Retraso en la conmutación
- it** - Tempo di commutazione
- nl** - Schakelvertraging



SIL2:



de - Dichteinstellung.
Schüttgewicht gemessen in g/l.
Für **Standardgabel**.

en - Solids density.
Bulk density measured in g/l.
For **standard fork**.

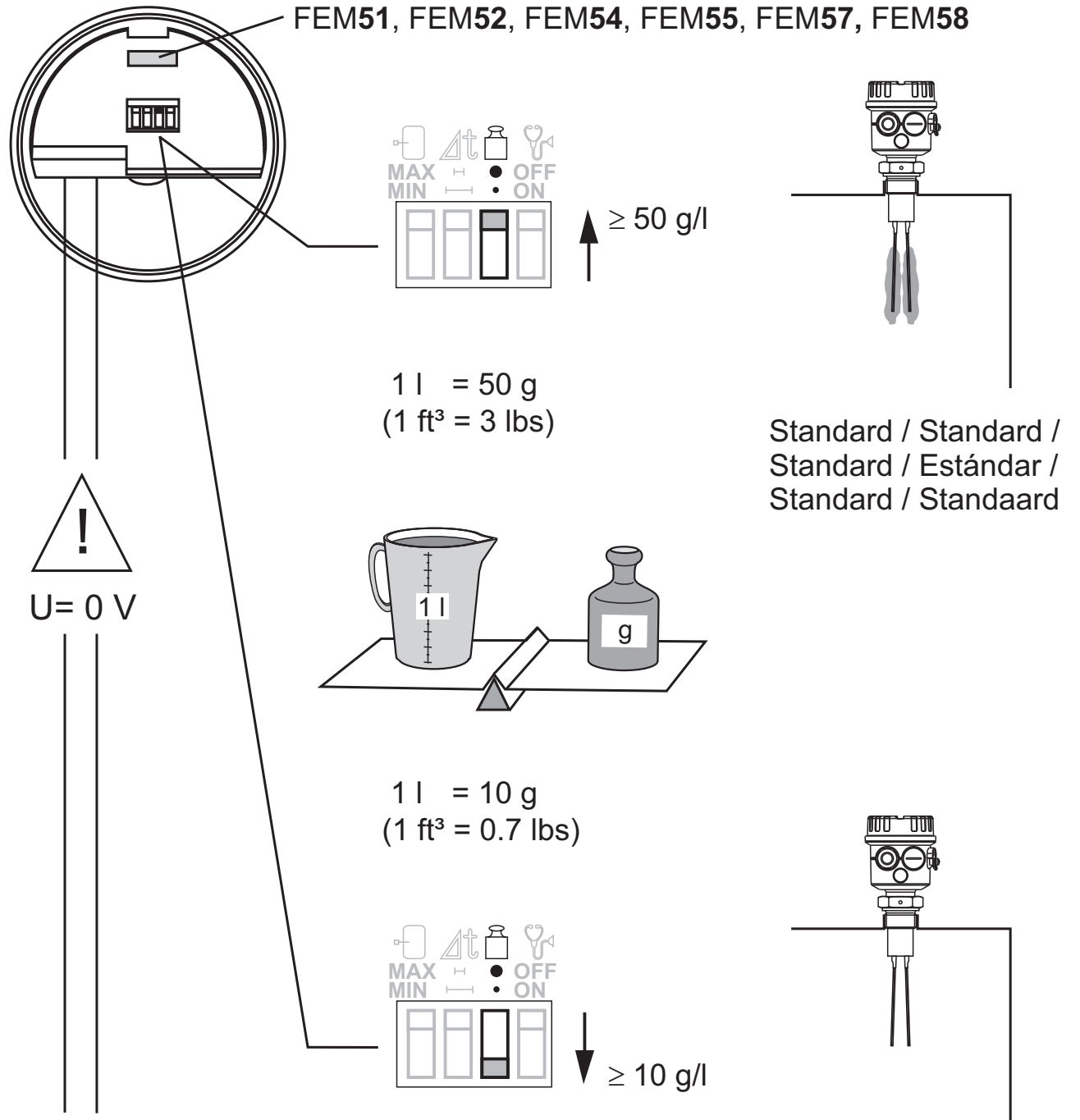
fr - Densité du produit.
Densité mesurée en g/l.
Pour **fourche standard**.

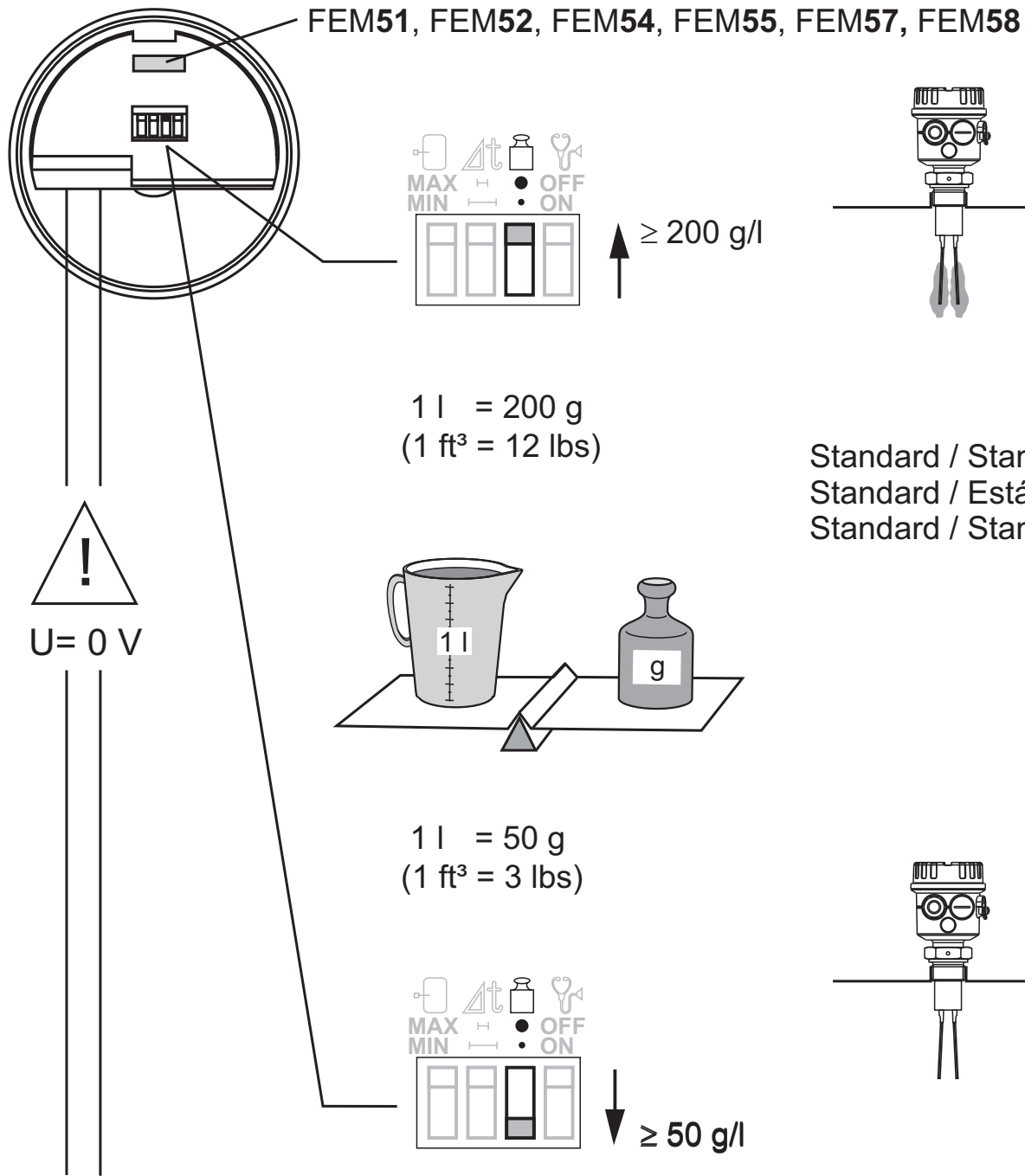
es - Densidad de los sólidos.
Densidad del sólido medida en g/l.
Para la **horquilla estándar**.

it - Densità del solido.
Densità del solido misurata in g/l.
Par la **forcella standard**.

nl - Stortgewicht.
Stortgewicht gemeten in g/l.
Voor **standaardvork**.

Sedimentation / Sedimentation /
Sédimentation / Sedimentación /
Sedimentazione / Sediment





de - Dichteeinstellung.
Schüttgewicht gemessen in g/l.
Für **Kurzgabel**.

en - Solids density.
Bulk density measured in g/l.
For **short fork**.

fr - Densité du produit.
Densité mesurée en g/l.
Pour **fourche courte**.

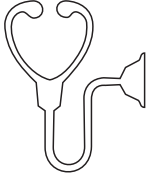
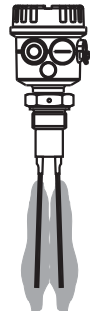
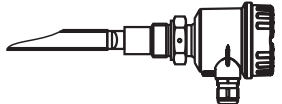






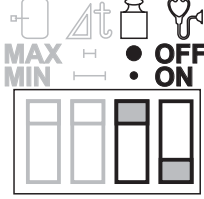









es - Densidad de los sólidos.
Densidad del sólido medida en g/l.
Para la **horquilla corta**.

it - Densità del solido.
Densità del solido misurata in g/l.
Par la **forcella corta**.

nl - Stortgewicht.
Stortgewicht gemeten in g/l.
Voor **korte vork**.

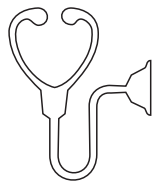


de - Diagnose
 en - Diagnosis
 fr - Diagnostic
 es - Diagnóstico
 it - Diagnosi
 nl - Diagnose

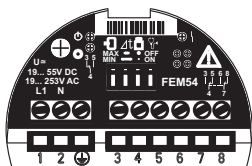
	<p>Ansatz / Build-up / Colmatage / Adherencias / Depositi / Aangroei</p> 	<p>Abrasion / Abrasion / Abrasion / Abrasión / Abrasione / Abrassieve slijtage</p> 
		
		
		 
		 
		

Hinweise zur Symbolik /
 References to the symbolism /
 Symboles utilisés /
 Significado de los símbolos /
 Riferimento dei simboli /
 Verwijzing via symbolen

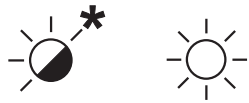
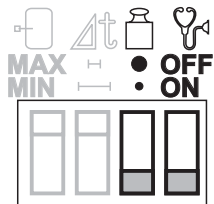
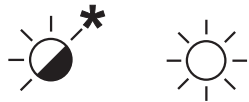
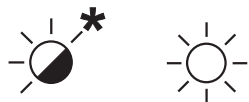
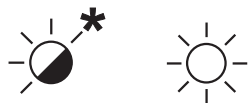
→  32



elektronische Störung /
 electronic error /
 défaut électronique /
 error electrónico /
 errore elettronico /
 elektronische fout



Rote LED-Signale (Störung) /
 Red LED signals (error) /
 Signaux de DEL rouge (défaut) /
 Señales rojas del LED (error) /
 Segnali rossi del LED (errore) /
 Rode LED signalen (fout)



Elektronikeinsatz FEL58
 (NAMUR) /
 Electronic insert FEL58
 (NAMUR) /
 Electronique FEL58
 (NAMUR) /
 Electrónica FEL58
 (NAMUR) /
 Inserto elettronico FEL58
 (NAMUR) /
 Elektronica-insert FEL58
 (NAMUR)

de - Hinweise zur Symbolik

en - References to the symbolism

fr - Symboles utilisés

es - Significado de los símbolos

it - Riferimento dei simboli

nl - Verwijzing via symbolen

Leuchtdioden / LEDs / DEL / LEDs / LED / LED's



Betrieb / Stand-by / Fonctionnement /
Reposo / Attesa / stand-by



Schaltzustand (FEM57: Bedeckung) /
Switching status (FEM57: Covering) /
Etat de commutation (FEM57: Recouvrement) /
Estado conexión (FEM57: Cubierto) /
Stato di commutazione (FEM57: Copertura) /
schakelstand (FEM57: bedekking)



Störung, Alarm / Fault, alarm / Défait, alarme /
Fallo, alarma / Guasto, allarme / storing, alarm



leuchtet / on / allumée / iluminado / on / aan



blinkt / flashes / clignote / parpadea / lampeggia / knippert



aus / off / éteinte / apagado / off / uit



Füllstand / level / Niveau / Nivel / livello / Niveau



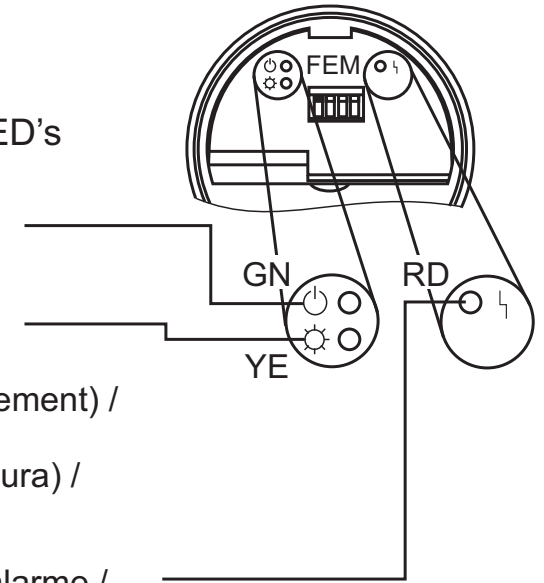
Ausgangssignal / Output signal / Signal de sortie /
Señal de salida / Segnale uscita / uitgangssignaal

I_L

Laststrom (durchgeschaltet) / load current (switched through) /
Courant de charge (passant) / corriente de carga (a través de conmutador) /
corrente di carico (commutazione) / belastingstroom (schakelstroom)

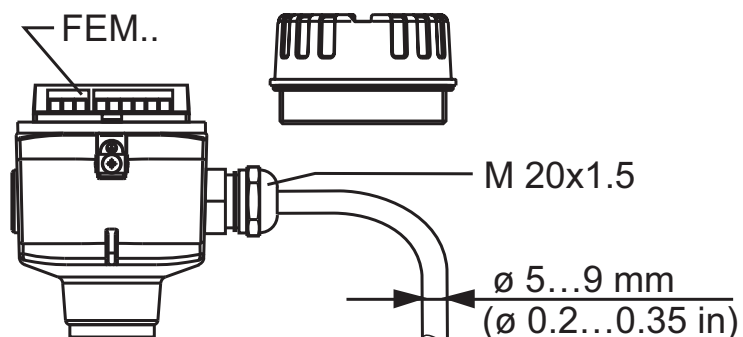
I_R

Reststrom (gesperrt) / residual current (blocked) /
Courant repos (non passant) / corriente residual (bloqueada) /
corrente residua (bloccata) / reststroom (geblokkeerd)



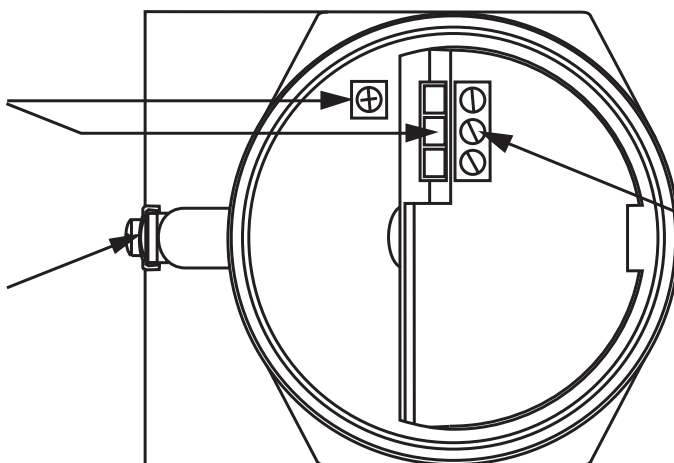


Nationale Normen und Vorschriften beachten!
Note national regulations!
Respecter les lois et règles locales en vigueur!
Considere reglamentaciones nacionales
Osservare le norme nazionali!
Nationale voorschriften in acht nemen!



max. 2,5 mm²
(max. AWG 14)

max. 4 mm²
(max. AWG 12)

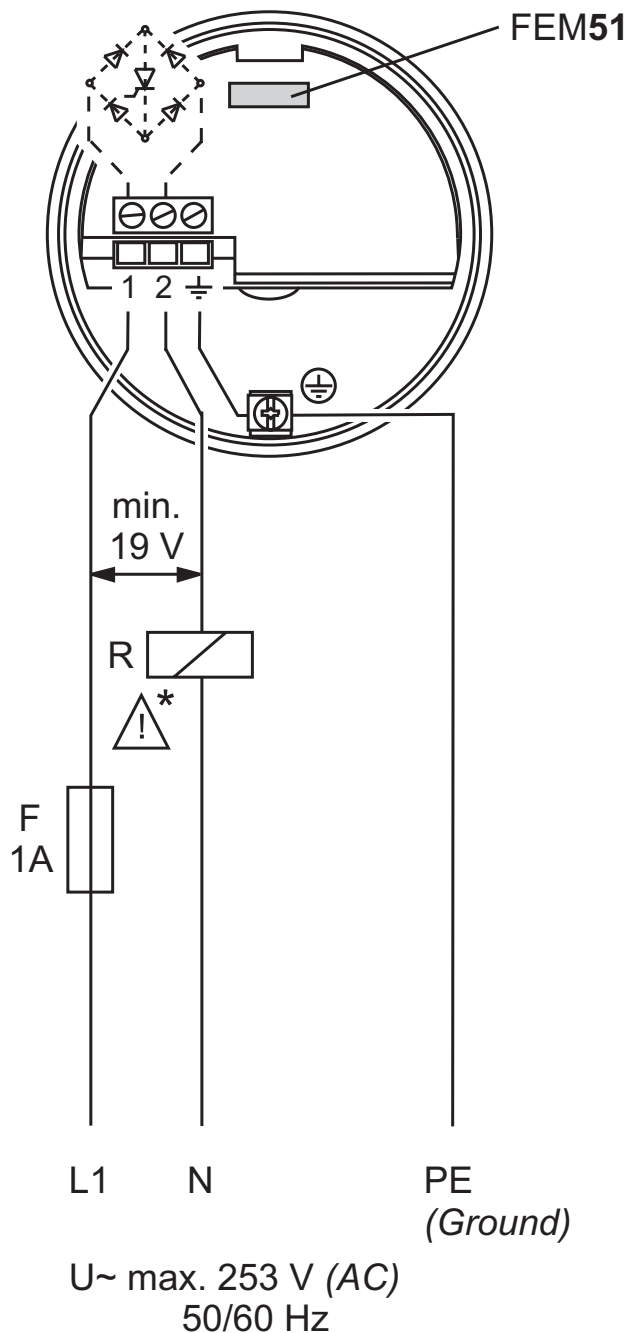


3 mm

$t \geq T_{amb} + 15 \text{ K}$

de - Anschluss
en - Connections
fr - Raccordement
es - Conexiones
it - Collegamenti elettrici
nl - Aansluiting

- de** - Anschluss FEM51
Zweileiter-
Wechselstromanschluss
- en** - Connections FEM51
Two-wire AC connection
- fr** - Raccordement FEM51
Raccordement 2 fils
courant alternatif
- es** - Conexiones FEM51
Conexión a corriente alterna
a dos hilos
- it** - Collegamenti elettrici FEM51
Collegamento bifilare
con corrente alternata
- nl** - Aansluiting FEM51
2-draads
wisselspanningsaansluiting



* Externe Last R **muss** angeschlossen werden

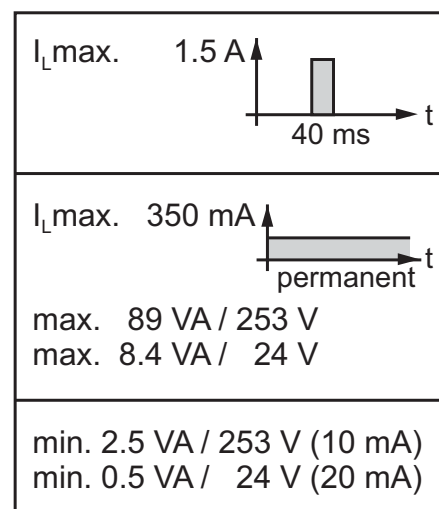
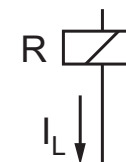
External load R **must** be connected


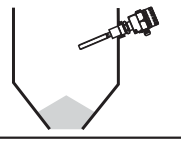



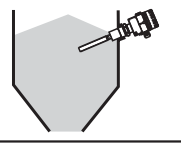



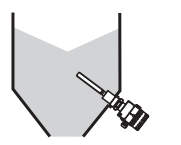



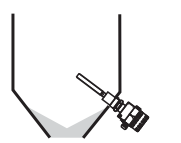



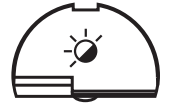






Charge externe R **doit** être raccordée

La carga externa R **debe** estar conectada

Il carico esterno R **deve** essere connesso

Externe belasting R **moet** aangesloten worden



		 FEM51	GN	YE	RD
MAX		1 $\xrightarrow{I_L}$ 2 ΔU			
		1 $\xrightarrow{I_R}$ 2			
MIN		1 $\xrightarrow{I_L}$ 2 ΔU			
		1 $\xrightarrow{I_R}$ 2			
*1		1 $\xrightarrow{I_L / I_R}$ 2			
*2		1 $\xrightarrow{I_R}$ 2			

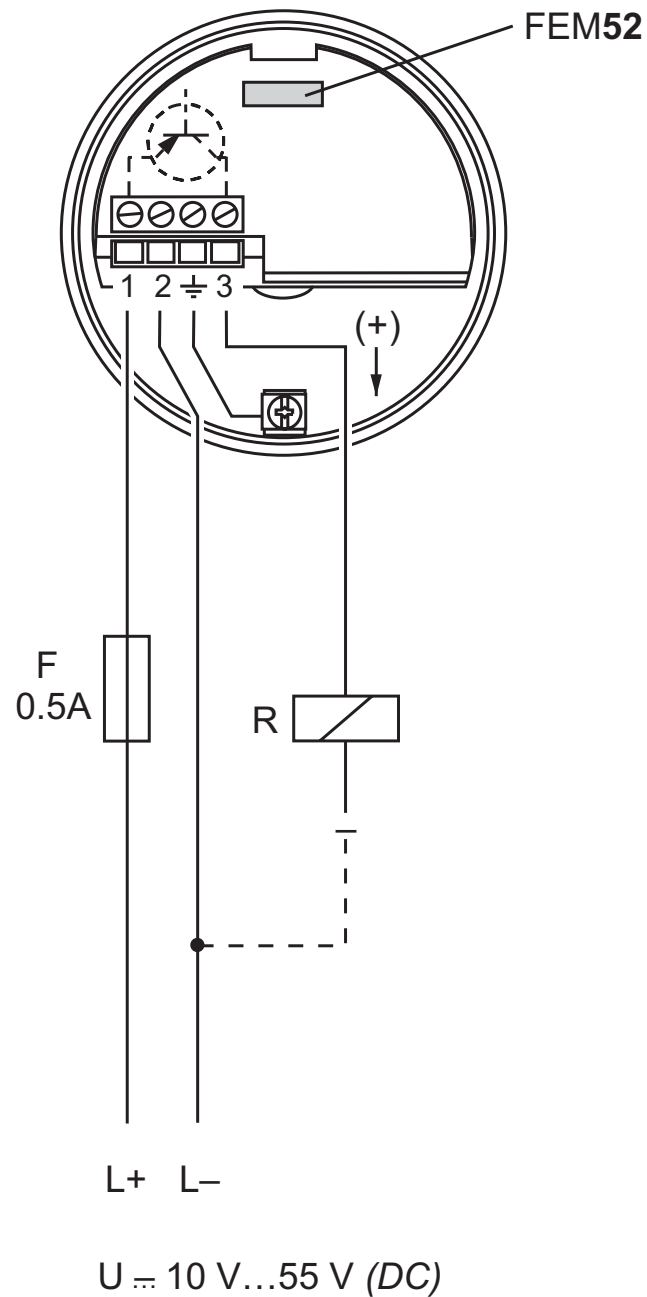
de - Funktion FEM51
en - Function FEM51
fr - Fonction FEM51
es - Funcionamiento FEM51
it - Funzione FEM51
nl - Functie FEM51

*1 Wartungsbedarf /
 Maintenance required /
 Maintenance requise /
 Requiere Mantenimiento /
 Richiesta manutenzione /
 Onderhoud gewensd

*2 Geräteausfall /
 Instrument failure /
 Panne d'appareil /
 Error de instrumento /
 Strumento guasto /
 Instrumentfout

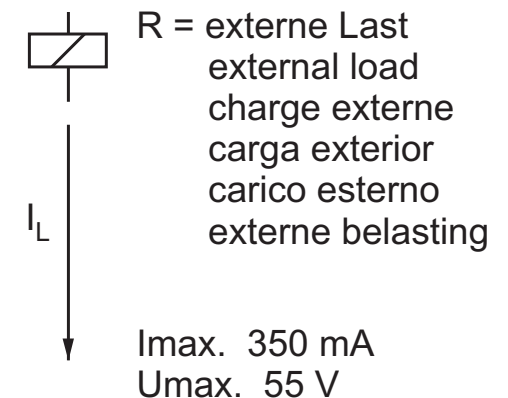
$\Delta U_{FEM51} = \max. 12 V$

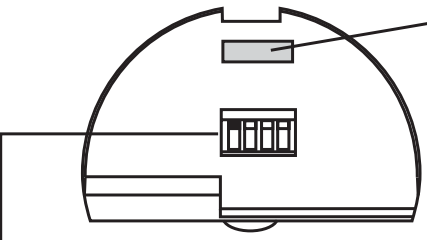

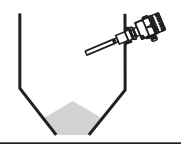



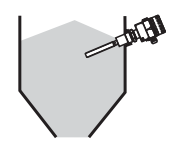



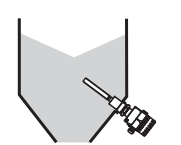



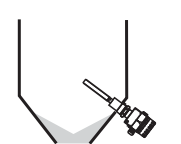



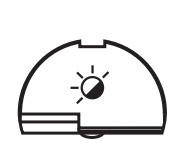



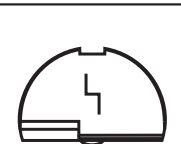



- de** - Anschluss FEM52
Gleichstromanschluss (DC PNP)
- en** - Connections FEM52
DC connection (DC PNP)
- fr** - Raccordement FEM52
Courant continu (DC PNP)
- es** - Conexiones FEM52
Alimentación CC (DC PNP)
- it** - Collegamenti elettrici FEM52
Collegamento CC (DC PNP)
- nl** - Aansluiting FEM52
Gelijkspanningsaansluiting
(DC PNP)



auch für DI-Module
also for DI modules
également pour des modules DI
también para módulos DI
anche per moduli DI
ook voor de DI module

EN 61131-2



		 FEM52	GN	YE	RD
MAX		L^+ 1 $\xrightarrow{I_L}$ 3 ΔU			
		1 $\xrightarrow{I_R}$ 3			
MIN		L^+ 1 $\xrightarrow{I_L}$ 3 ΔU			
		1 $\xrightarrow{I_R}$ 3			
*1		1 $\xrightarrow{I_L / I_R}$ 3			
*2		1 $\xrightarrow{I_R}$ 3			

de - Funktion FEM52

en - Function FEM52

fr - Fonction FEM52

es - Funcionamiento FEM52

it - Funzione FEM52

nl - Functie FEM52

*1 Wartungsbedarf /
Maintenance required /
Maintenance requise /
Requiere Mantenimiento /
Richiesta manutenzione /
Onderhoud gewensd

*2 Geräteausfall /
Instrument failure /
Panne d'appareil /
Error de instrumento /
Strumento guasto /
Instrumentfout

$\Delta U_{FEM52} = \max. 3 V$

de - Anschluss FEM54

Allstromanschluss

Relaisausgang

en - Connections FEM54

Universal connection

Relay output

fr - Raccordement FEM54

Tous courants

Sorties relais

es - Conexiones FEM54

Conexión universal

Salida por relé

it - Collegamenti elettrici FEM54

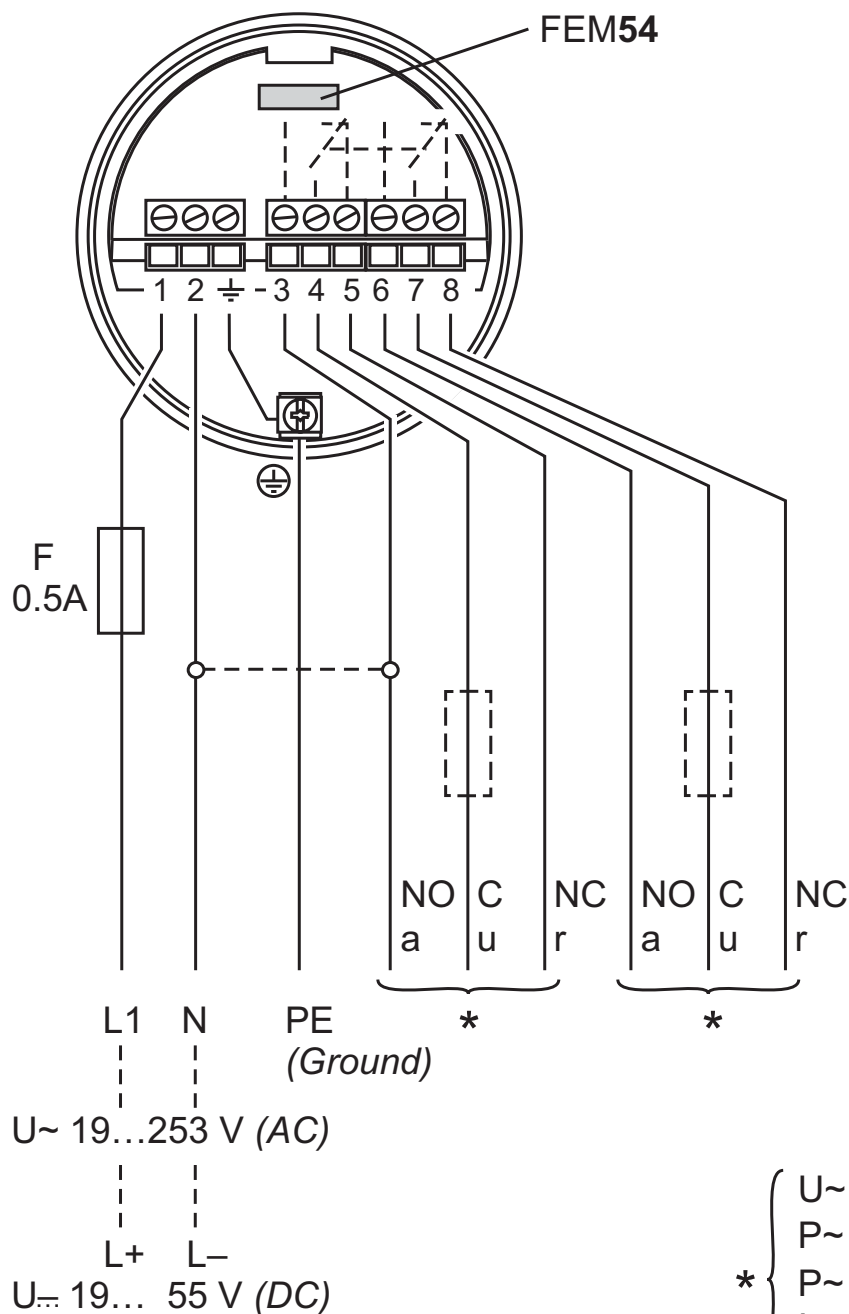
Collegamento corrente universale

Uscita relè

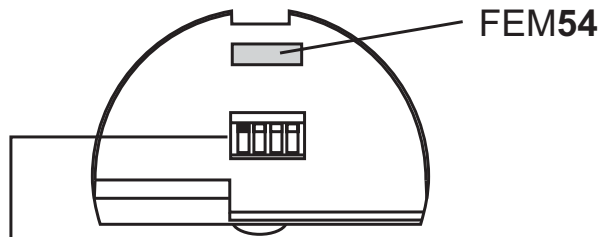
nl - Aansluiting FEM54

Universele spanningsaansluiting

Relaisuitgang



$\left\{ \begin{array}{l} U_{\sim} \text{ max. } 253 \text{ V, } I_{\sim} \text{ max. } 6 \text{ A} \\ P_{\sim} \text{ max. } 1500 \text{ VA, } \cos \varphi = 1 \\ * \left\{ \begin{array}{l} P_{\dots} \text{ max. } 750 \text{ VA, } \cos \varphi > 0.7 \\ I_{\dots} \text{ max. } 6 \text{ A, } U_{\dots} < 30 \text{ V} \\ I_{\dots} \text{ max. } 0.2 \text{ A, } U_{\dots} < 125 \text{ V} \end{array} \right. \end{array} \right.$



		FEM54	GN	YE	RD
MAX					
MIN					
*1					
*2					

- de** - Funktion FEM54
- en** - Function FEM54
- fr** - Fonction FEM54
- es** - Funcionamiento FEM54
- it** - Funzione FEM54
- nl** - Functie FEM54

*1 Wartungsbedarf /
 Maintenance required /
 Maintenance requise /
 Requiere Mantenimiento /
 Richiesta manutenzione /
 Onderhoud gewensd

*2 Geräteausfall /
 Instrument failure /
 Panne d'appareil /
 Error de instrumento /
 Strumento guasto /
 Instrumentfout

de - Anschluss FEM55
Ausgang 8/16 mA

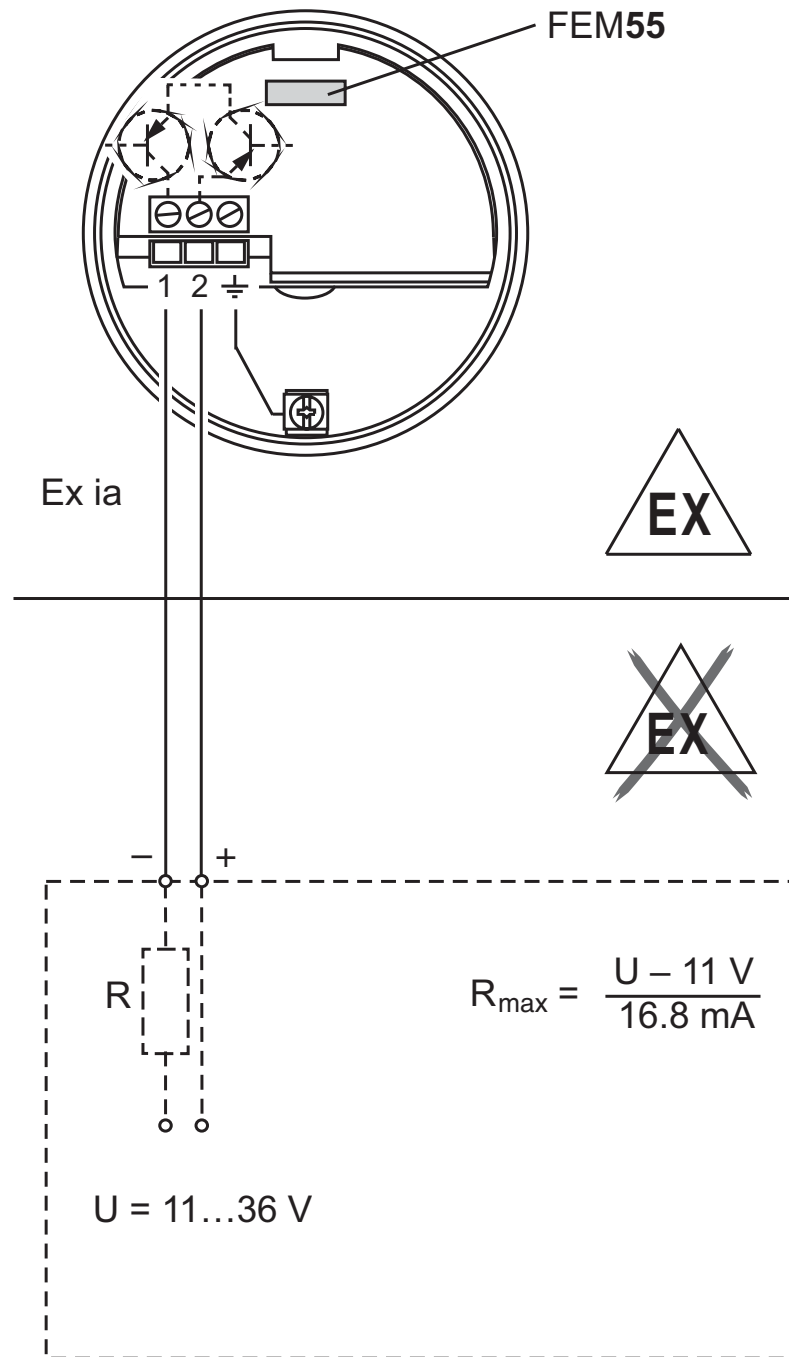
en - Connections FEM55
Output 8/16 mA

fr - Raccordement FEM55
Sortie 8/16 mA

es - Conexiones FEM55
Salida 8/16 mA

it - Collegamenti elettrici FEM55
Uscita 8/16 mA

nl - Aansluiting FEM55
Uitgang 8/16 mA



z.B. SPS, AI-Module
e. g. PLC, AI modules
p. e. API, modules AI
por ej. PLC, módulos AI
p. e. PLC, AI modules
bijv. PLC, AI-module

4...20 mA
EN 61131-2

		FEM55			GN	YE	RD
MAX		+ 2	~16 mA → 1				
		+ 2	~8 mA → 1				
MIN		+ 2	~16 mA → 1				
		+ 2	~8 mA → 1				
*1		+ 2	8/16 mA → 1				
		 *3	3.6 mA				
*2		+ 2	3.6 mA → 1				

de - Funktion FEM55

en - Function FEM55

fr - Fonction FEM55

es - Funcionamiento FEM55

it - Funzione FEM55

nl - Functie FEM55

*1 Wartungsbedarf /
Maintenance required /
Maintenance requise /
Requiere Mantenimiento /
Richiesta manutenzione /
Onderhoud gewensd

*2 Geräteausfall /
Instrument failure /
Panne d'appareil /
Error de instrumento /
Strumento guasto /
Instrumentfout

*3 →

de - Anschluss FEM57

Ausgang PFM
150 Hz / 50 Hz

en - Connections FEM57

PFM output
150 Hz / 50 Hz

fr - Raccordement FEM57

Sortie PFM
150 Hz / 50 Hz

es - Conexiones FEM57

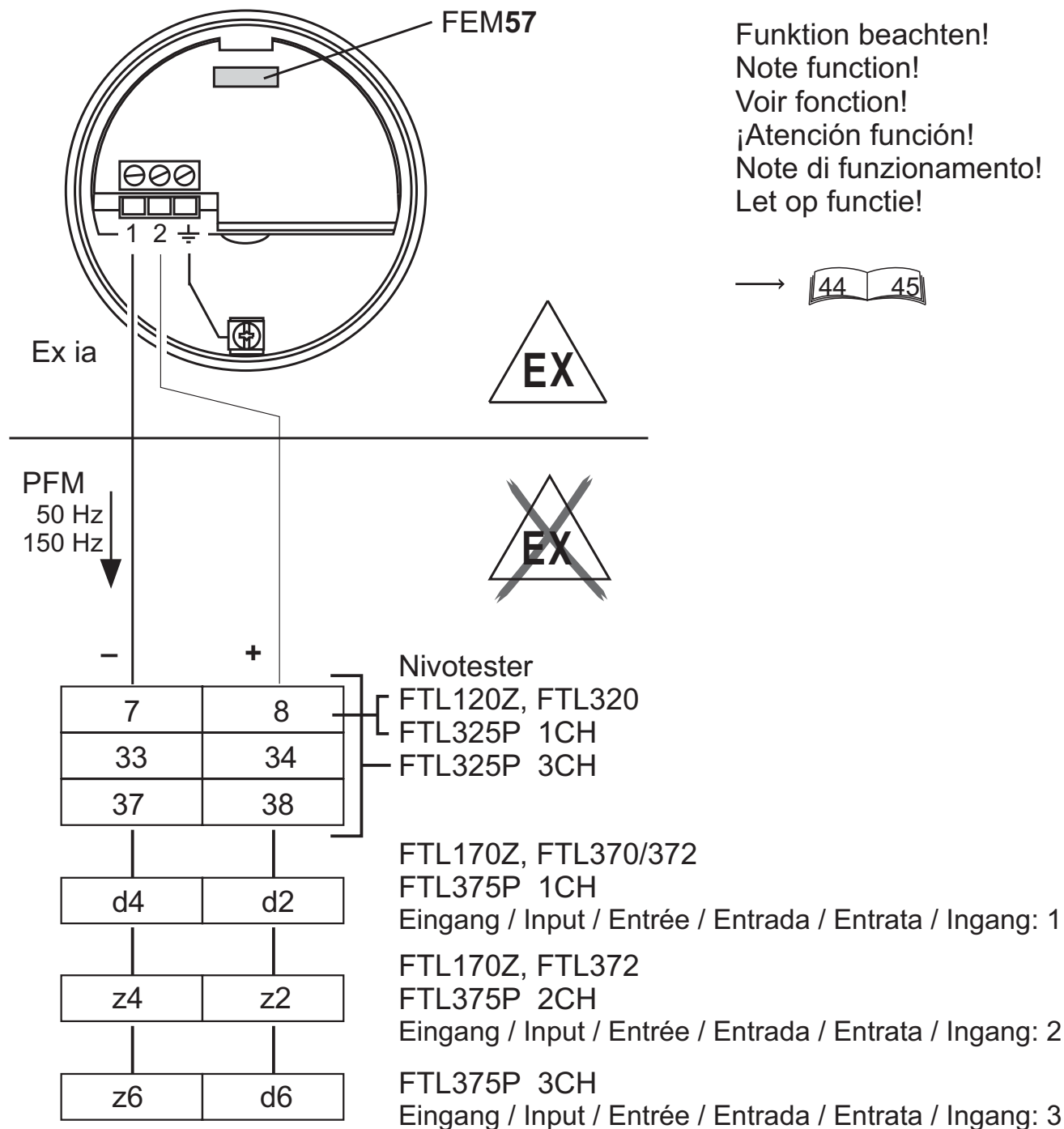
Salida PFM
150 Hz / 50 Hz

it - Collegamenti elettrici FEM57

PFM uscita
150 Hz / 50 Hz

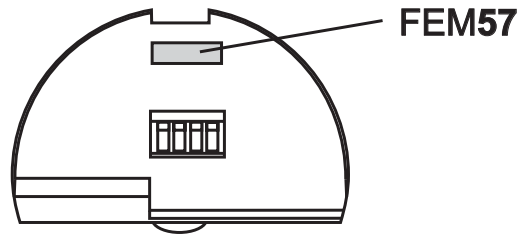
nl - Aansluiting FEM57

PFM uitgang
150 Hz / 50 Hz



Funktion beachten!
Note function!
Voir fonction!
¡Atención función!
Note di funzionamento!
Let op functie!





FEM57

GN YE RD

		150 Hz 			
		50 Hz 			
*1		150 Hz 			
		*3 0 Hz 			
*2		0 Hz 			

de - Funktion FEM57

en - Function FEM57

fr - Fonction FEM57

es - Funcionamiento FEM57

it - Funzione FEM57

nl - Functie FEM57

*1 Wartungsbedarf /
Maintenance required /
Maintenance requise /
Requiere Mantenimiento /
Richiesta manutenzione /
Onderhoud gewensd

*2 Geräteausfall /
Instrument failure /
Panne d'appareil /
Error de instrumento /
Strumento guasto /
Instrumentfout

*3 →

Einschaltverhalten /
Switch-on behaviour /
Comportement à la mise sous tension /
Comportamiento del cambio de estado /
Comportamento accensione /
Schakelstatus

→

de - Einschaltverhalten
Selbsttest (OFF)

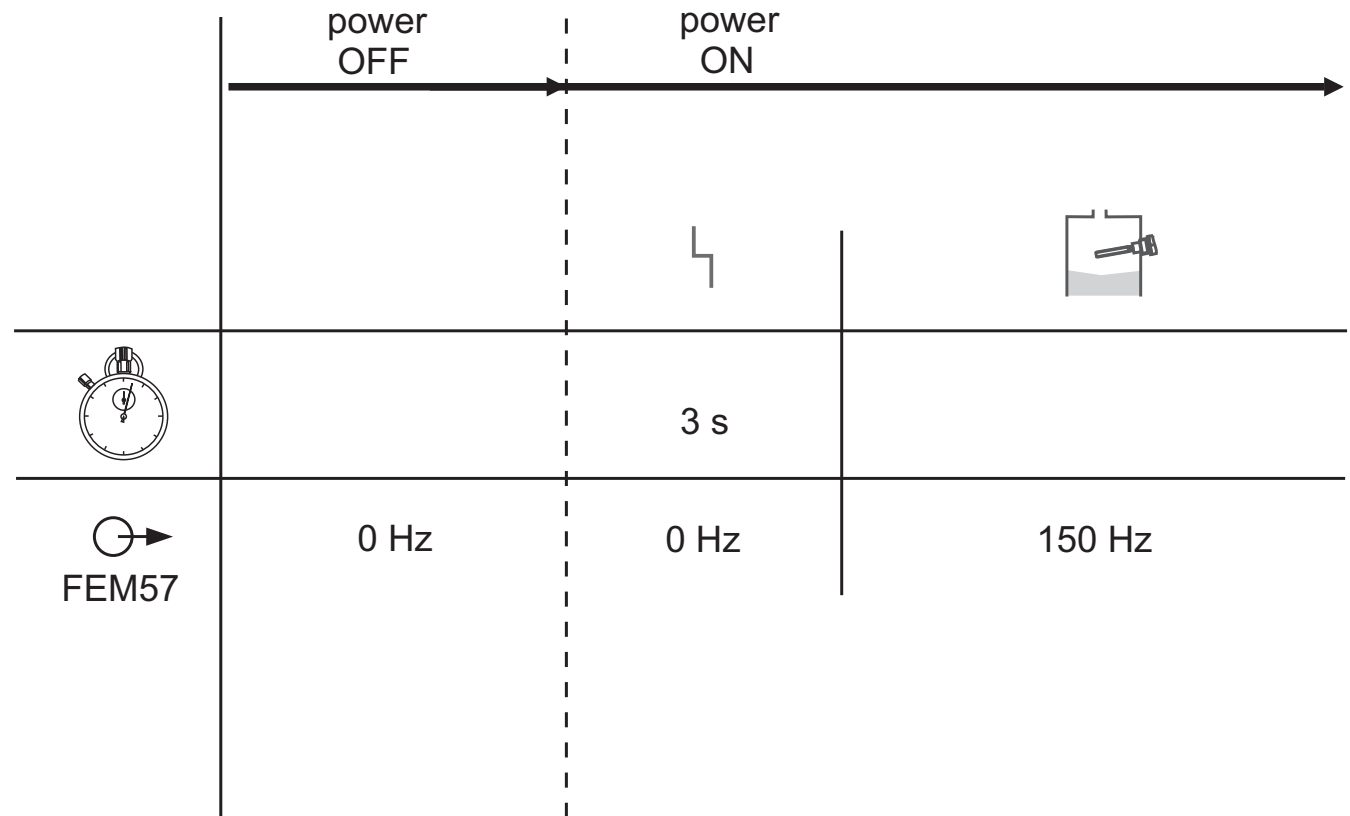
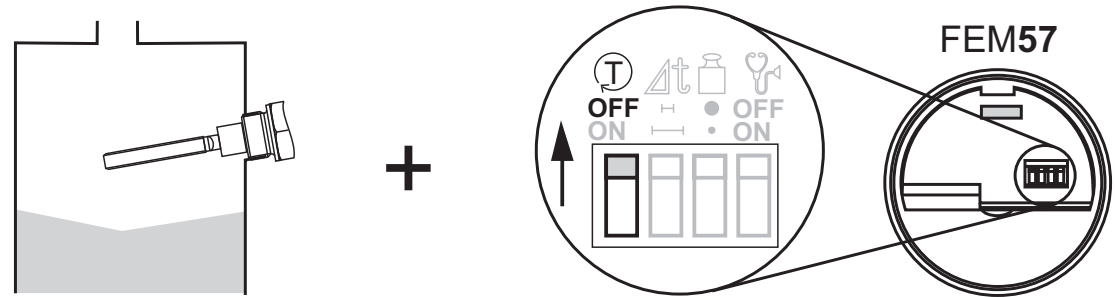
en - Switch-on behaviour
Auto-test (OFF)

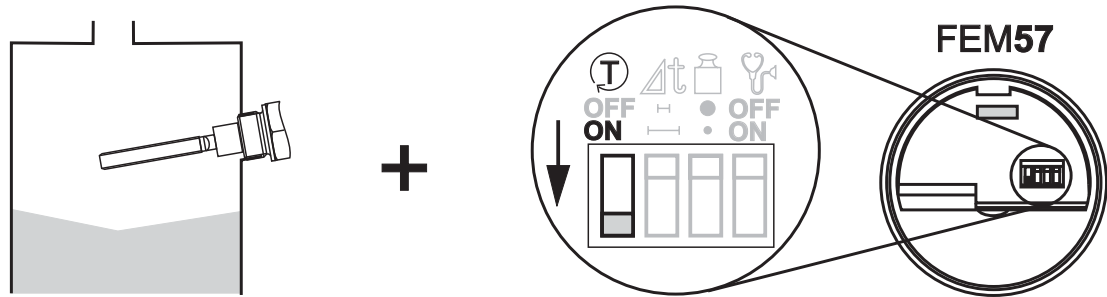
fr - Comportement à la mise
sous tension
Auto-test (OFF)

es - Comportamiento del cambio
de estado
Prueba automática (OFF)

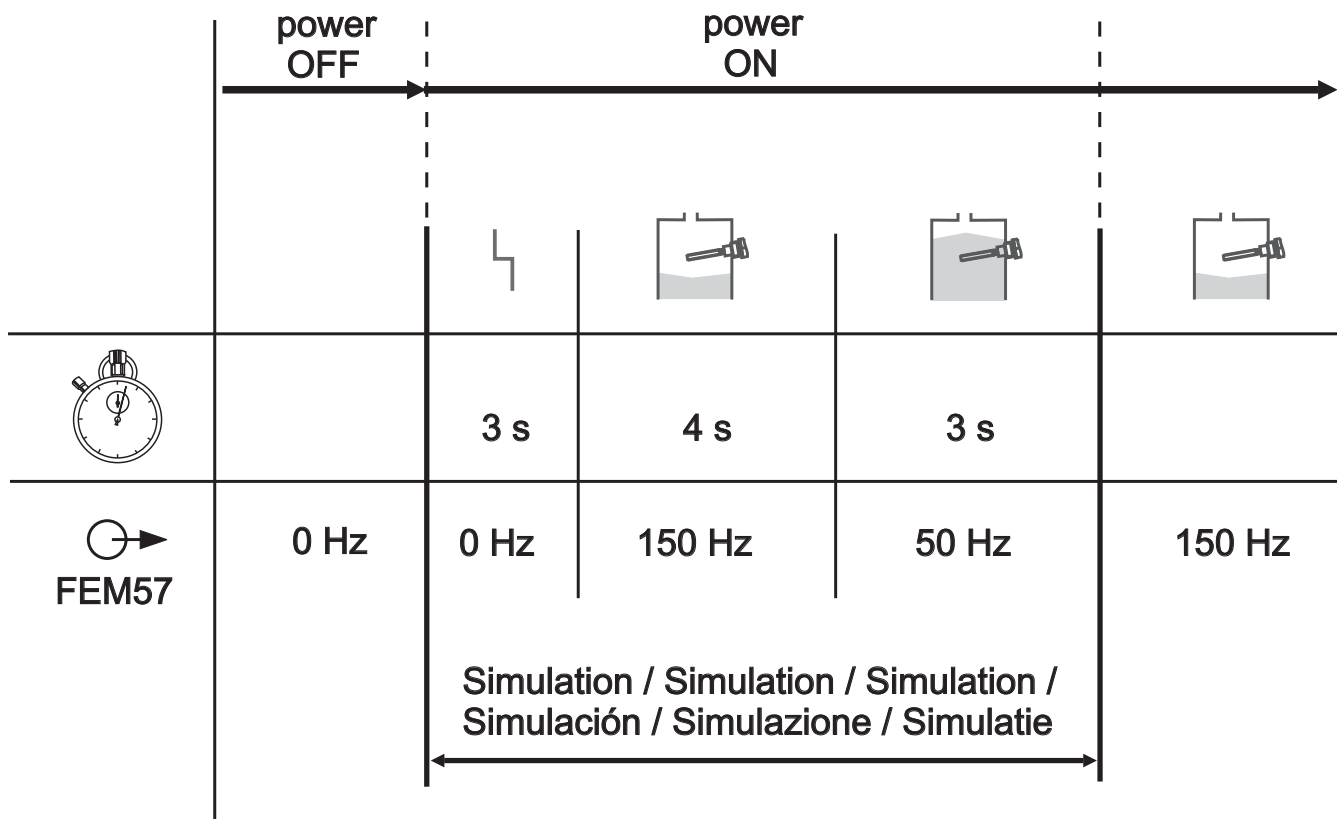
it - Comportamento in fase di
accensione
Prova automatica (OFF)

nl - Inschakelgedrag
Functietest (OFF)





- de** - Einschaltverhalten
Selbsttest (ON)
- en** - Switch-on behaviour
Auto-test (ON)
- fr** - Comportement à la mise
sous tension
Auto-test (ON)
- es** - Comportamiento del cambio
de estado
Prueba automática (ON)
- it** - Comportamento in fase di
accensione
Prova automatica (ON)
- nl** - Inschakelgedrag
Functietest (ON)



de - Anschluss FEM58
NAMUR-Ausgang H-L
> 2,2 mA / < 1,0 mA

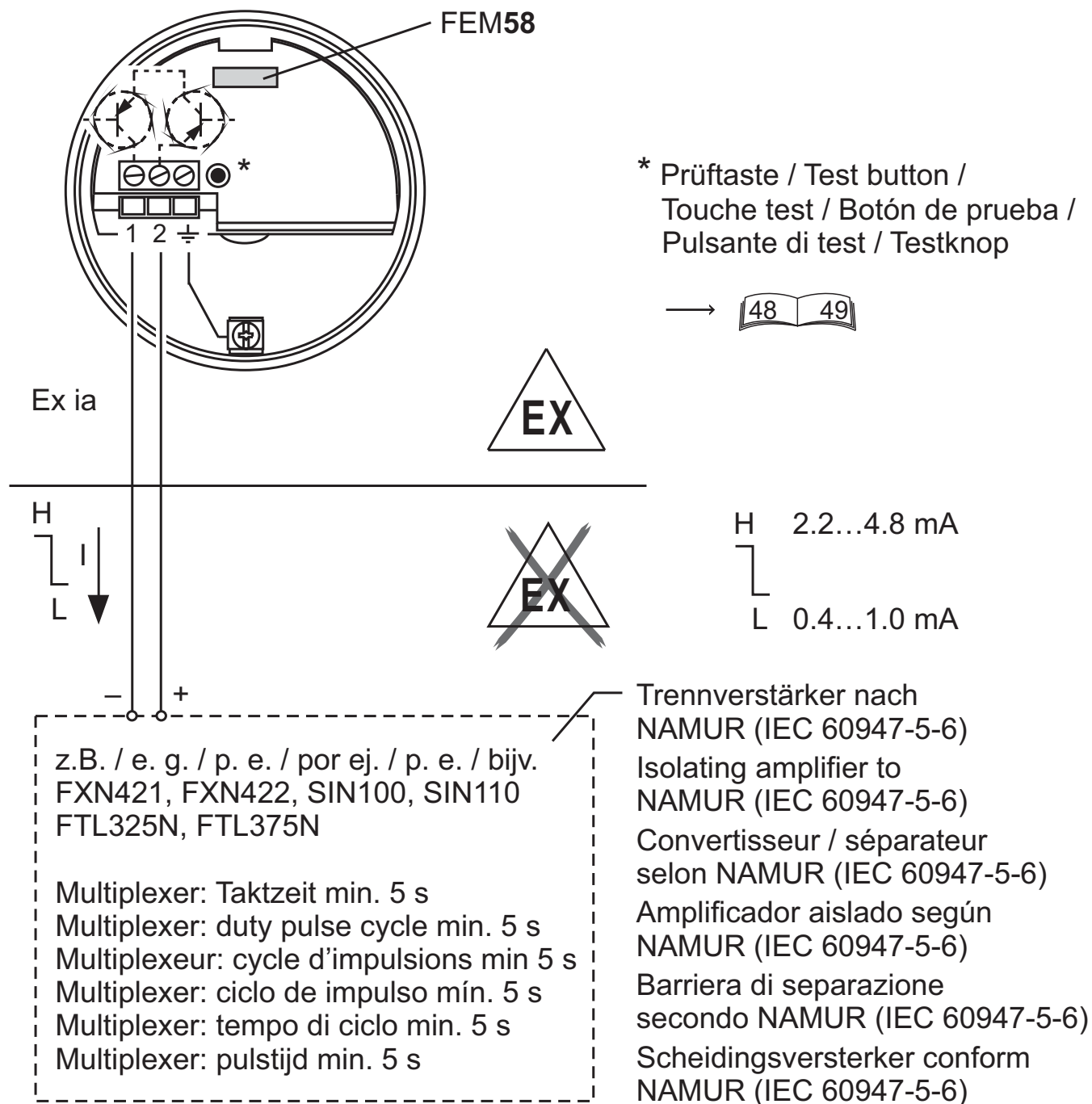
en - Connections FEM58
NAMUR output H-L
> 2.2 mA / < 1.0 mA

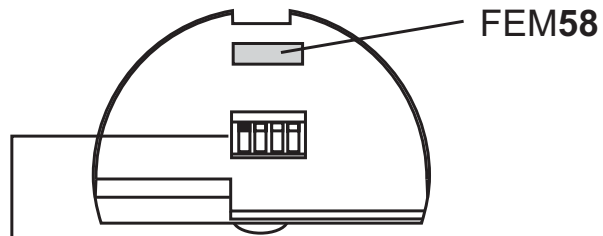
fr - Raccordement FEM58
Sortie NAMUR H-L
> 2,2 mA / < 1,0 mA

es - Conexiones FEM58
Salida NAMUR H-L
> 2,2 mA / < 1,0 mA

it - Collegamenti elettrici FEM58
NAMUR uscita H-L
> 2,2 mA / < 1,0 mA

nl - Aansluiting FEM58
NAMUR uitgang H-L
> 2,2 mA / < 1,0 mA





FEM58 GN YE RD

MAX		+ 2.2 ... 4.8 mA → 1			
		+ 0.4 ... 1.0 mA → 1			
MIN		+ 2.2 ... 4.8 mA → 1			
		+ 0.4 ... 1.0 mA → 1			
*1		+ 0.4 ... 4.8 mA → 1			
*2		+ 0.4 ... 1.0 mA → 1			

de - Funktion FEM58

en - Function FEM58

fr - Fonction FEM58

es - Funcionamiento FEM58

it - Funzione FEM58

nl - Functie FEM58

*1 *Wartungsbedarf /
Maintenance required /
Maintenance requise /
Requiere Mantenimiento /
Richiesta manutenzione /
Onderhoud gewensd*

*2 *Geräteausfall /
Instrument failure /
Panne d'appareil /
Error de instrumento /
Strumento guasto /
Instrumentfout*

de - Funktion Prüftaste FEM58
Sicherheitschaltung MAX

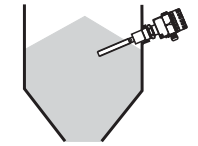
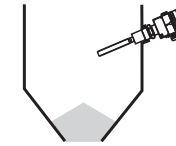
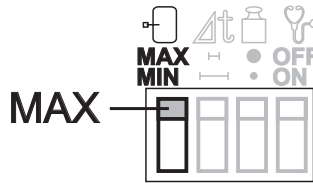
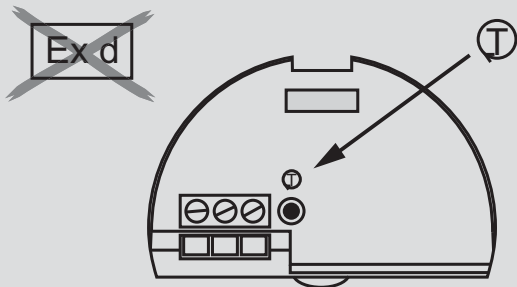
en - Function test button FEM58
Fail-safe mode MAX

fr - Fonction touche test FEM58
Sécurité MAX

es - Funcionamiento
boton de prueba FEM58
Conmutador de seguridad MAX

it - Funzione pulsante test FEM58
Selezione della modalità
di sicurezza MAX

nl - Functie testknop FEM58
Veiligheidsschakeling MAX



1. Normaler Betrieb /
Normal operation /
Fonctionnement normal /
Funcionamiento normal /
Funzionamento normale /
Normaal bedrijf

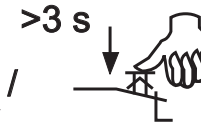
GN YE RD

 1 Hz
 + 2.2... 4.8 mA → 1

GN YE RD

 1 Hz
 + 0.4... 1.0 mA → 1

2. Prüftaste drücken /
Press test button /
Appuyer sur la touche test /
Pulse el botón de prueba /
Premere il pulsante test /
Testknop indrukken



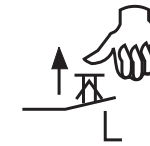
GN YE RD

 + 0 mA → 1

GN YE RD

 + 0 mA → 1

3. Prüftaste loslassen,
nach ~3 s normaler Betrieb /
Release the test button,
after ~3 s normal operation /
Relâcher la touche test,
après ~3 s fonctionnement normal /
Deje de presionar el botón de prueba,
después de ~3 s funcionamiento normal /
Rilasciare il pulsante test,
dopo ~3 s funzionamento normale /
De testknop loslaten,
na ~3 s normaal bedrijf

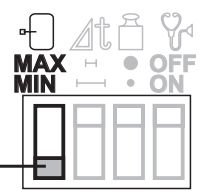
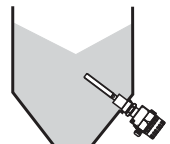
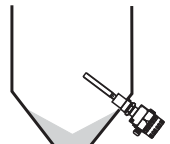


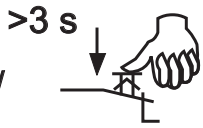







GN YE RD

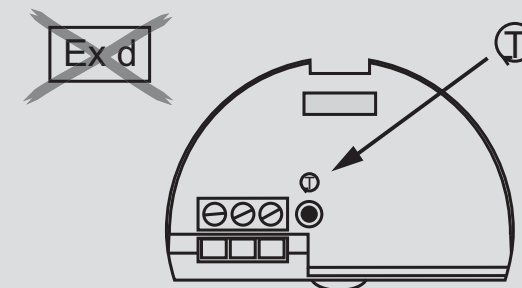
 1 Hz
 + 2.2... 4.8 mA → 1

GN YE RD

 1 Hz
 + 0.4... 1.0 mA → 1

 <p>MIN</p>		
<p>1. Normaler Betrieb / Normal operation / Fonctionnement normal / Funcionamiento normal / Funzionamento normale / Normaal bedrijf</p>	<p>GN YE RD  1 Hz + 2.2... 2 4.8 mA → 1</p>	<p>GN YE RD  1 Hz + 0.4... 2 1.0 mA → 1</p>
<p>2. Prüftaste drücken / Press test button / Appuyer sur la touche test / Pulse el botón de prueba / Premere il pulsante test / Testknop indrukken</p>  <p>>3 s</p>	<p>GN YE RD  + 0 mA 2 - - - - -> 1</p>	<p>GN YE RD  + 0 mA 2 - - - - -> 1</p>
<p>3. Prüftaste loslassen, nach ~3 s normaler Betrieb / Release the test button, after ~3 s normal operation / Relâcher la touche test, après ~3 s fonctionnement normal / Deje de presionar el botón de prueba, después de ~3 s funcionamiento normal / Rilasciare il pulsante test, dopo ~3 s funzionamento normale / De testknop loslaten, na ~3 s normaal bedrijf</p> 	<p>GN YE RD  1 Hz + 2.2... 2 4.8 mA → 1</p>	<p>GN YE RD  1 Hz + 0.4... 2 1.0 mA → 1</p>

- de** - Funktion Prüftaste FEM58
Sicherheitschaltung MIN
- en** - Function test button FEM58
Fail-safe mode MIN
- fr** - Fonction touche test FEM58
Sécurité MIN
- es** - Funcionamiento
boton de prueba FEM58
Conmutador de seguridad MIN
- it** - Funzione pulsante test FEM58
Selezione della modalità
di sicurezza MIN
- nl** - Functie testknop FEM58
Veiligheidsschakeling MIN



de - Sedimentation

Der Schaltpunkt wird durch wasserähnliche Flüssigkeiten nicht beeinflusst

en - Sedimentation

The switchpoint is not influenced by liquids similar to water

fr - Sédimentation

Le point de commutation ne subit pas l'influence de liquides similaires à l'eau

es - Sedimentación

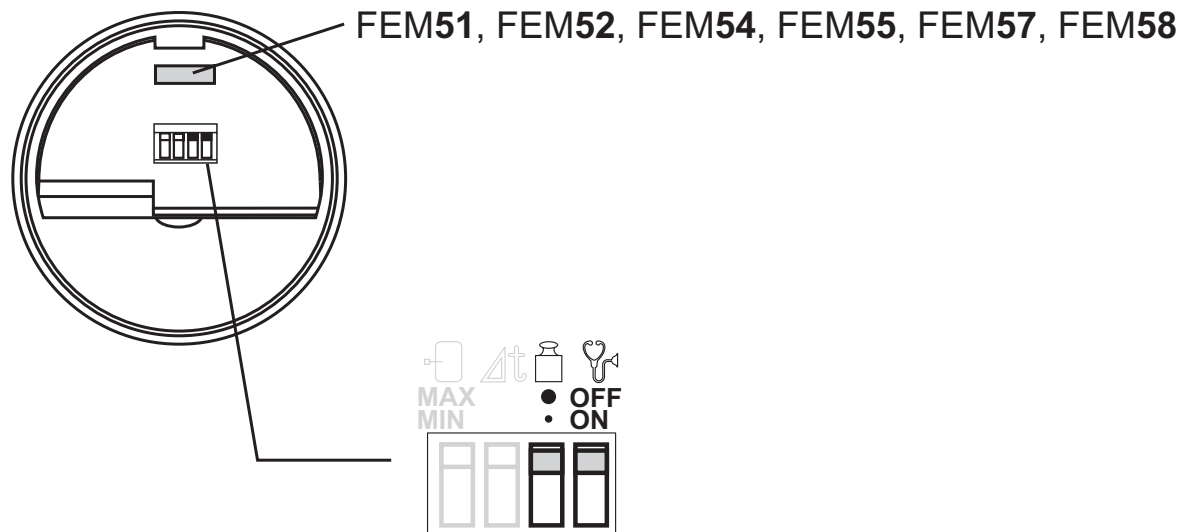
Los líquidos similares al agua no afectan al punto de conmutación

it - Sedimentazione

Il punto di commutazione non è influenzato da liquidi simili all'acqua

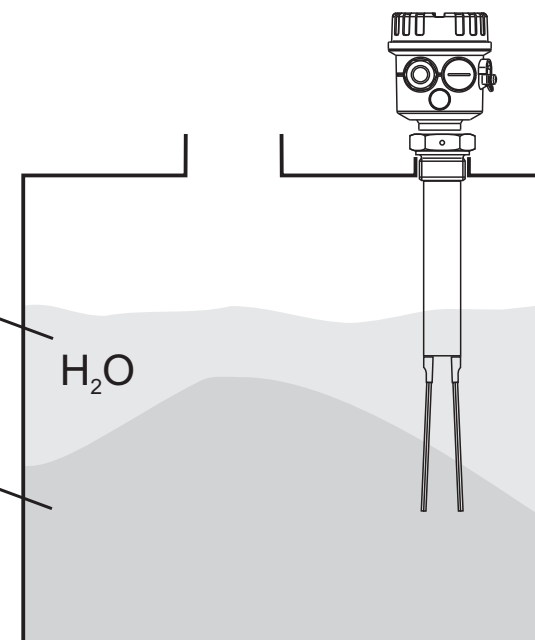
nl - Sediment

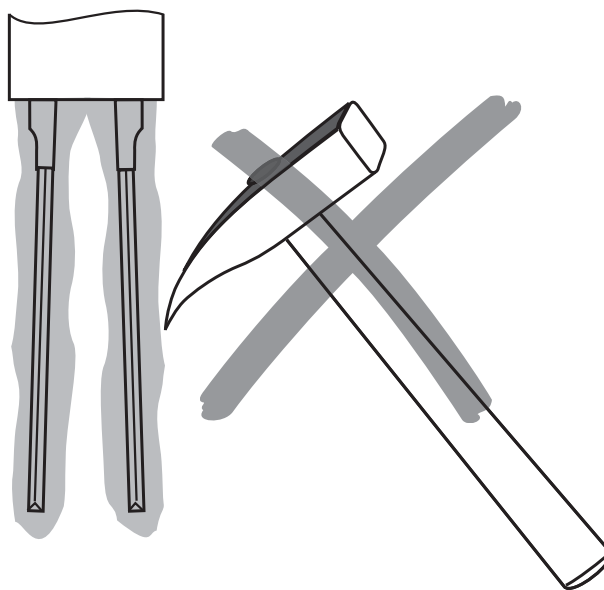
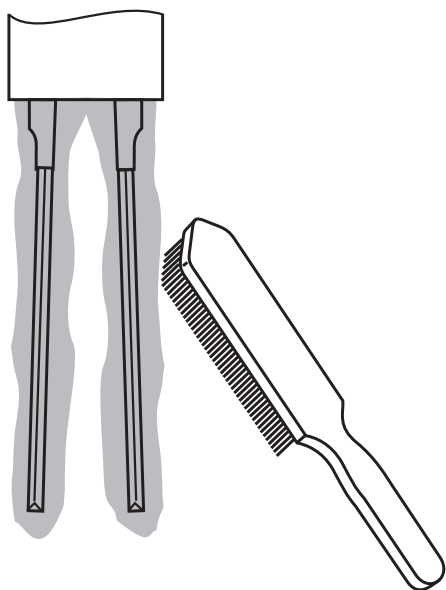
Het schakelpunt wordt niet beïnvloedt door waterachtige producten



Wasser / Water / Eau /
Agua / Acqua / Water

Feststoff unter Wasser /
Solids under water /
Solide sous eau /
Sólidos bajo agua /
Solidi in acqua /
Vaste stoffen onder water





de - Wartung

Dicke Krusten entfernen

en - Maintenance

Removal of thick encrustation

fr - Maintenance

Enlever les dépôts et incrustations

es - Mantenimiento

Eliminación de adherencias

it - Manutenzione

Rimozione di depositi consistenti

nl - Onderhoud

Aangroei verwijderen

Nicht besteigen!

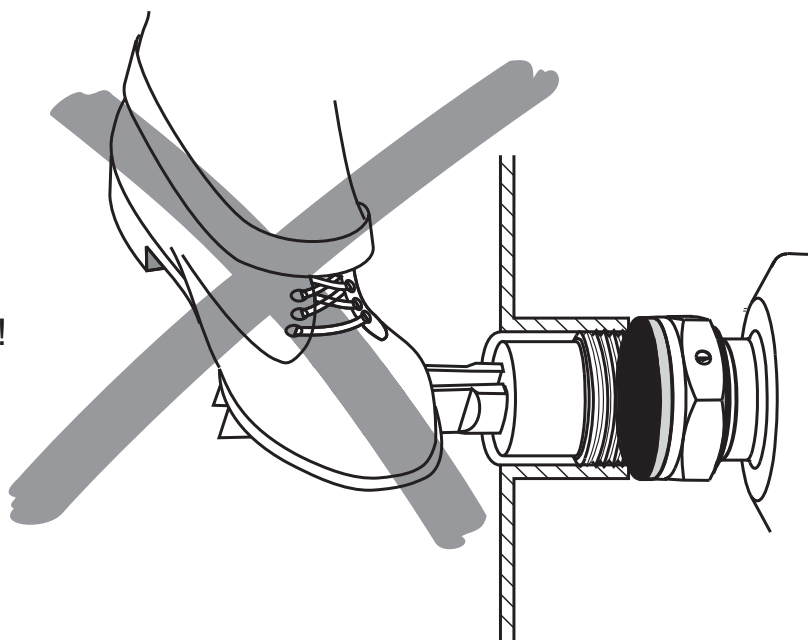
Don't use as a step!

Ne pas marcher
sur les lames vibrantes!

No usar como peldaño!

Non usare come scalino!

Niet op staan!



de - Technische Daten

Umgebungstemperatur T_a

Prozesstemperatur T_p

Max. Betriebsdruck MWP

en - Technical Data

Ambient temperature T_a

Process temperature T_p

Max. working pressure MWP

fr - Caractéristiques techniques

Température ambiante T_a

Température de process T_p

Pression de service max. MWP

es - Datos técnicos

Temperatura ambiente T_a

Temperatura de proceso T_p

Presión de trabajo MWP máx.

it - Dati tecnici

Temperatura ambiente T_a

Temperatura di servizio T_p

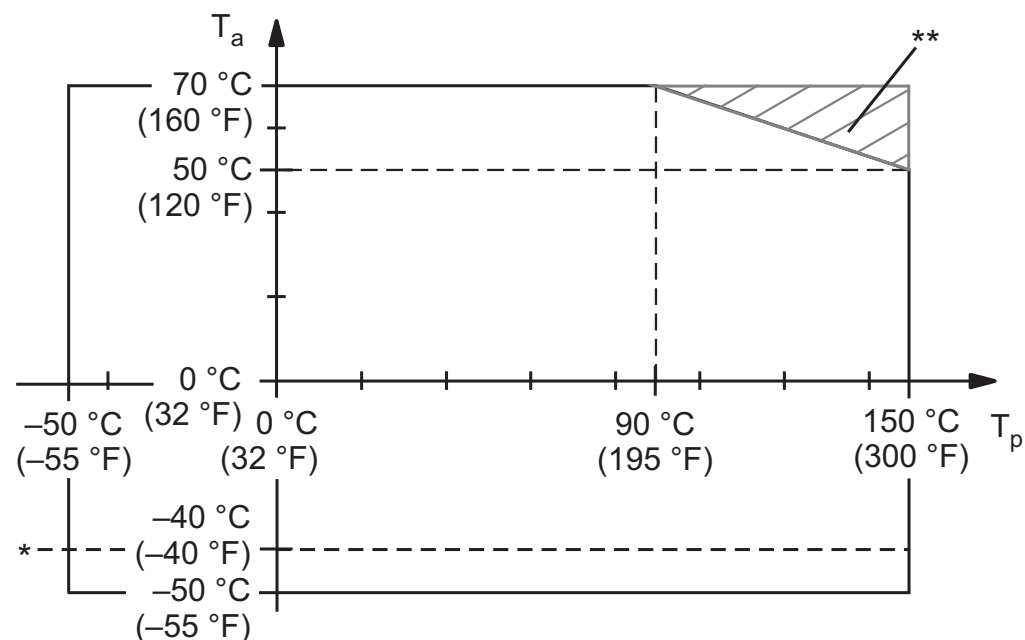
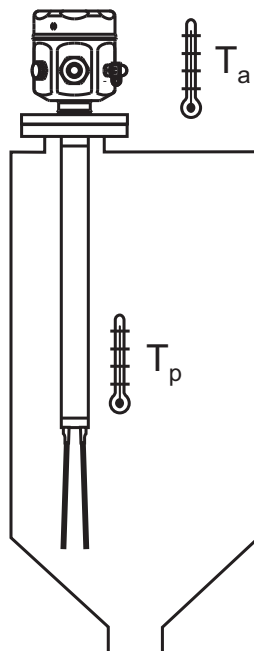
Massima pressione di lavoro MWP

nl - Technische gegevens

Omgevingstemperatuur T_a

Procestemperatuur T_p

Maximale werkdruk MWP



* bei F16-Gehäuse / for F16 housing / pour boîtier F16 / para cabezal F16 / per testa F16 / voor F16 behuizing

** mit Temperaturdistanzstück / with temperature spacer / avec élément de refroidissement / con tramo dissipador de temperatura / con distanziale di temperatura / met temperatuurreductiestuk

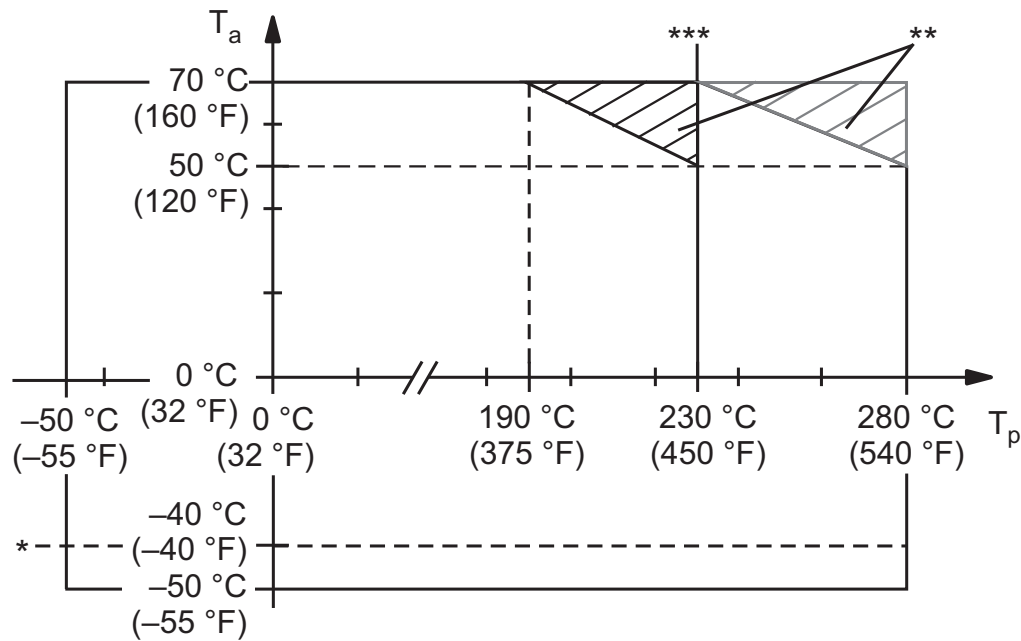
MWP = 25 bar (360 psi)



Prozessanschluss / Process connection /
Raccord process / Conexión a proceso /
Connessione al processo / Procesaansluiting

Schüttgewicht / Bulk density / Densité /
Densidad del sólido / Densità solidi / Stortgewicht





* bei F16-Gehäuse / for F16 housing / pour boîtier F16 / para cabezal F16 / per testa F16 / voor F16 behuizing

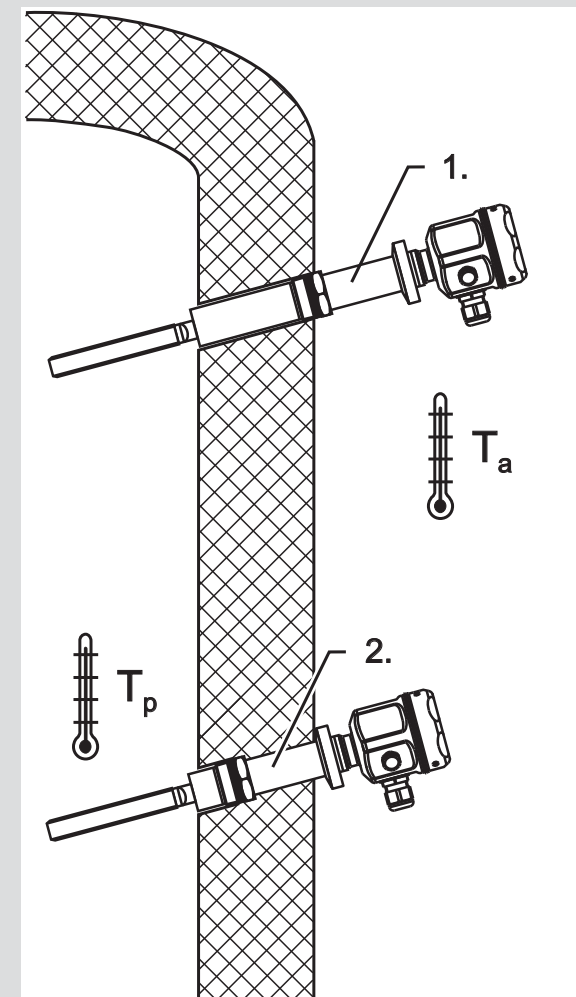
** mit Temperaturdistanzstück außerhalb der Isolation / with temperature spacer outside insulation / avec élément de refroidissement hors de l'isolation / con tramo disipador de temperatura fuera del aislamiento / con distanziale di temperatura all'esterno dell'isolamento / met temperatuurreductiestuk buiten de isolatie

*** Antihafbeschichtung / Antistick coating / Revêtement anti-adhésif / Revestimiento antiadhesivo / Rivestimento antiaderente / Antihechtcoating bis / up to / jusqu'à / hasta / sino a / tot : max. 230 °C (max. 450 °F)

1. außerhalb der Isolation / outside insulation / hors de l'isolation / fuera del aislamiento / all'esterno dell'isolamento / buiten de isolatie

2. innerhalb der Isolation / within insulation / dans l'isolation / dentro del aislamiento / all'interno dell'isolamento / binnen de isolatie

de - Hochtemperatur
en - High temperature
fr - Haute température
es - Alta temperatura
it - Temperatura elevata
nl - Hoge temperatuur



de - Zubehör

Schutzhaube
für F13, F17 Gehäuse
71040497

en - Accessories

Protection cover
for F13 and F17 housing
71040497

fr - Accessoires

Capot de protection
pour boîtier F13 et F17
71040497

es - Accesorios

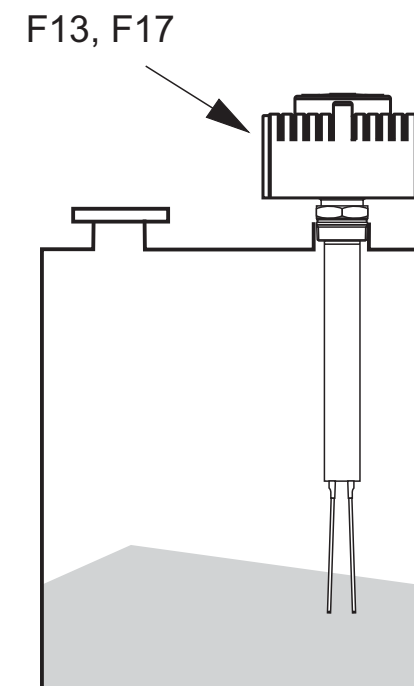
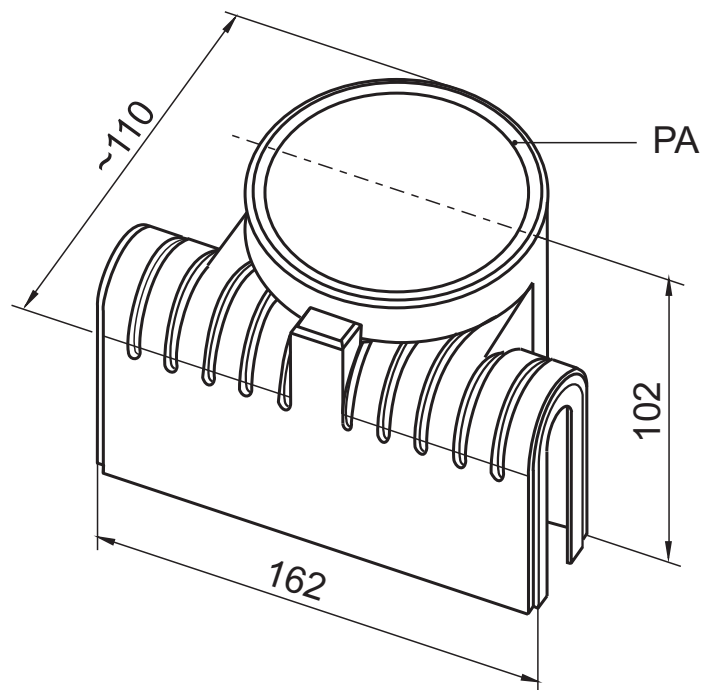
Cubierta protectora
para carcasa F13 y F17
71040497

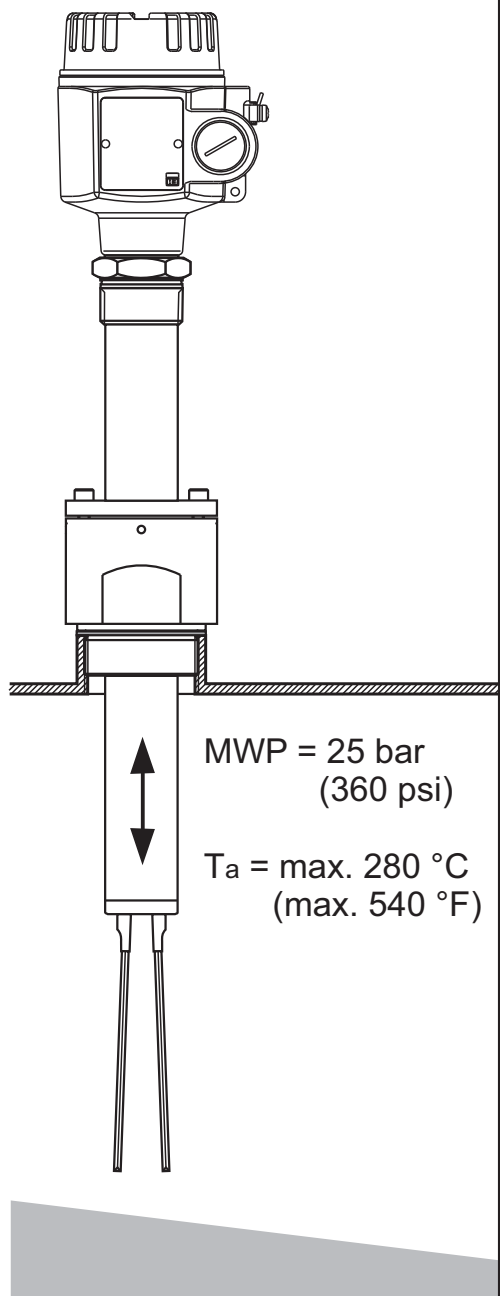
it - Accessori

Custodia di protezione
per alloggiamenti F13 e F17
71040497

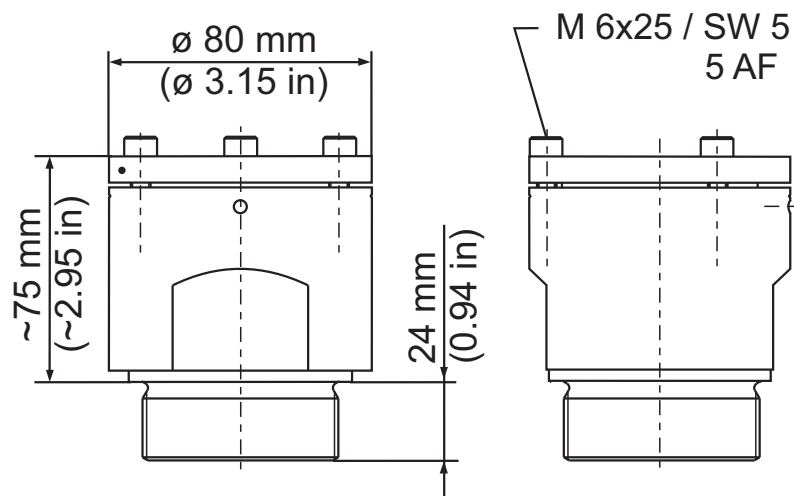
nl - Toebehoren

Beschermkap
voor F13- en F17-behuizing
71040497

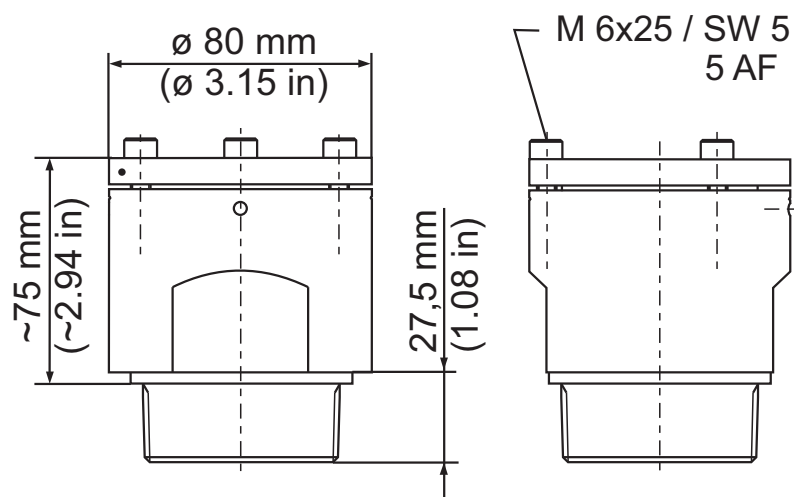




G 2
DIN ISO 228/I (316L)
52024631



2 NPT
ANSI B 1.20.1 (316L)
52024630



de - Schiebemuffe, druckbeaufschlagt für FTM51 mit Werkstoffausprägung A, 2, 5

en - Sliding sleeve, pressurised for FTM51 with material version A, 2, 5

fr - Manchon coulissant, pressurisé pour FTM51 avec catégorie de matériaux A, 2, 5

es - Manguito deslizante, presurizado para FTM51 con variante de material A, 2, 5

it - Manicotto scorrevole, per impieghi in pressione, per FTM51 materiale con resistenza al carico A, 2, 5

nl - Schuifmof, druckbestendig voor FTM51 met materiaal ingestansd A, 2, 5

de - Fehlersuche

Ursache	Schaltet nicht	Schaltet falsch	Fehlschaltung, sporadisch	Anzeige Wartungsbedarf	Anzeige Geräteausfall
Keine Versorgungsspannung	Versorgungsspannung prüfen				
Verpolung	Anschlussbelegung prüfen				
Kurzschluss Ausgang				Anschlussbelegung prüfen	
Signalleitung defekt	Signalleitung prüfen				
Falsche Sicherheitsschaltung gewählt		MAX für Überfüllsicherung, MIN für Leerlaufschutz einstellen			
Extreme Funkstörung			geschirmte Anschlussleitung verwenden		
Wasser im Gehäuse			Deckel und Kabeldurchführungen reinigen und fest zuschrauben		
FEM51: Haltestrom des verwendeten Relais zu gering		Geeignetes Relais verwenden oder optional MVT 2Y1278 anfordern			
Schüttgewicht zu gering	Auf niedriges Schüttgewicht konfigurieren		Auf niedriges Schüttgewicht konfigurieren		
extreme Fremdvibrationen			Schaltverzögerung auf 5 s einstellen		
Ansatzbildung			Auf hohes Schüttgewicht konfigurieren	Ansatz entfernen	
Elektronikeinsatz defekt					Elektronikeinsatz austauschen
Abrasion					Sensor austauschen
Keine Verbindung zum Sensor					Sensor austauschen

en - Trouble-shooting

Cause	Does not switch	Switches incorrectly	Sporadic faulty switching	Display of maintenance	Display of instrument failure
No supply voltage	Check supply voltage				
Reversal of polarity	Check terminal assignment				
Short circuit of output				Check terminal assignment	
Faulty signal line	Check signal line				
Wrong fail-safe mode selected		Set MAX for overfill protection, MIN for dry running protection			
Extreme radio interference			Use screened cable		
Water in housing			clean cover and cable entries and tighten them securely		
FEM51: Holding current of the used relay too low		Use suitable relay or request MVT 2Y1278 optionally			
Bulk density too low	Adjust to lower bulk density		Adjust to lower bulk density		
Extreme external vibrations			Adjust switching delay to 5 s		
Build-up			Adjust to higher bulk density	Remove build-up	
Faulty electronic insert					Exchange electronic insert
Abrasion					Exchange sensor
No connection to sensor					Exchange sensor

fr - Recherche de défauts

Cause	Ne commute pas	Commute mal	Commute mal de façon sporadique	Affichage maintenance requise	Affichage panne d'appareil
Pas de tension d'alimentation	Vérifier la tension d'alimentation				
Inversion de polarité	Vérifier l'occupation des broches				
Court-circuit sortie				Vérifier l'occupation des broches	
Câble signal défectueux	Vérifier le câble signal				
Mauvaise sécurité choisie		Régler MAX pour sécurité anti-débordement MIN pour marche à vide			
Parasitage externe			Utiliser un câble blindé		
Eau dans le boîtier			Nettoyer et bien serrer le couvercle et les entrées de câble		
FEM51 : Courant de maintien du relais utilisé trop faible		Utiliser un relais approprié ou demander en option MVT 2Y1278			
Densité trop faible	Configurer pour densité faible		Configurer pour densité faible		
Vibrations externes			Régler la temporisation de la commutation sur 5 s		
Colmatage			Configurer pour densité élevée	Supprimer le dépôt	
Electronique défectueuse					Remplacer l'électronique
Abrasion					Remplacer la sonde
Pas de liaison à la sonde					Remplacer la sonde

es - Identificación de fallos

Causa	No conmuta	Conmuta incorrectamente	Fallo de conmutación esporádico	Indicación de mantenimiento	Indicación de errores del instrumento
Sin alimentación	Comprobar la alimentación				
Inversión de la polaridad	Compruebe la asignación de los terminales				
Cortocircuito de salida				Compruebe la asignación de los terminales	
Señal de línea defectuosa	Comprobar señal de línea				
Error en el modo selección a prueba de fallos		Seleccionar MAX para la protección de rebose / seleccionar MIN para proteger las bombas			
Interferencia de radio extrema			Usar cable apantallado		
Agua en el cabezal			Limpiar la tapa y el prensaestopas y ciérrelos bien		
FEM51: la corriente de mantenimiento del relé es muy baja		Utilizar el relé adecuado o pedir opcionalmente MVT 2Y1278			
Densidad del sólido demasiado baja	Ajustar a la densidad del sólido más baja		Ajustar a la densidad del sólido más baja		
Vibraciones externas extremas			Ajustar el tiempo de conmutación a 5 seg.		
Adherencia			Ajustar a la densidad del sólido más alta	Quitar la adherencia	
Electrónica defectuosa					Cambiar la electrónica
Abrasión					Cambiar el sensor
Sin conexión al sensor					Cambiar el sensor

it - Individuazione e eliminazione delle anomalie

Causa	Non commuta	Commutazione errata	Sporadica commutazione errata	Richiesta manutenzione	Strumento guasto
No alimentazione	Verificare alimentazione				
Inversione di polarità	Verificare assegnazione terminali				
Cortocircuito in uscita				Verificare assegnazione terminali	
Errore segnale di linea	Verificare segnale di linea				
Incorretto errore-modo sicurezza selezionato		Settaggio MAX per protezione antitrascinamento / Settaggio MIN per protezione funzionamento a secco			
Elevate interferenze radio			Usare cavo schermato		
Acqua nella custodia			Pulire la chiusura e le entrate cavi, sigillarli in modo sicuro		
FEM51: presa di corrente del relè usato troppo bassa		Usare relè adatto o richiedere modulo MVT2Y1278			
Densità solido troppo bassa	Settare alla densità solido più bassa		Settare alla densità solido più bassa		
Elevate vibrazioni esterne			Settare il ritardo di commutazione a 5 s		
Incrostazioni			Settare alla maggior densità solido	Rimuovere incrostazioni	
Guasto all'inserito elettronico					Sostituire inserto elettronico
Abrasione					Sostituire sensore
No connessione al sensore					Sostituire sensore

nl - Fout zoeken

Oorzaak	Schakelt niet	Schakelt niet correct	Sporadisch fout schakelen	Onderhoudsadvies	Advies instrumentenfout
Geen voedingsspanning	Kontroleer voedingsspanning				
Polariteit omgedraaid	Kontroleer aansluitklemmen				
Kortsluiting van de uitgang				Kontroleer aansluitklemmen	
Foutieve signaalverbinding	Kontroleer signaalverbinding				
Foutieve fail-safe keuze		Stel MAX in voor overvulbeveiliging/ MIN voor droogloopbeveiliging			
Externe stoorinvloed			Gebruik afgeschermd kabel		
Water in behuizing			deksel en wartels controleren, reinigen en goed vast draaien		
FEM 51: houdstroom van het gebruikte relais te laag		Gebruik een passend relais of optioneel MVT 2Y1278 aanvragen			
Stortgewicht te laag	Instellen op lager stortgewicht		Instellen op lager stortgewicht		
Extremes externe trilling			Stel schakelvertraging in op 5 s		
Aangroei			Instellen op hoger stortgewicht	Aangroei verwijderen	
Elektronica insert defect					Elektronica insert vervangen
Abrassieve slijtage					Sensor vervangen
Geen verbinding met de sensor					Sensor vervangen

de - Ersatzteile

Elektronikeinsätze

en - Spare parts

Electronic inserts

fr - Pièces de rechange

Electroniques

es - Repuestos

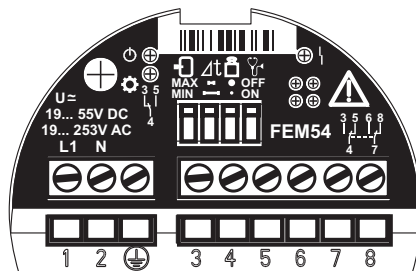
Electrónicas

it - Ricambi

Inserti elettronici

nl - Reserve-onderdelen

Elektronica inserts



FEM51	52026497
FEM52	52026498
FEM54	52026499
FEM55	52026500
FEM57	52026501
FEM58	52026502

Installationsregel: Bei der Installation ist zu beachten, dass die Elektronik-einsätze FEM57 und FEM58, die mit nichteigensicheren Stromkreisen gespeist wurden, grundsätzlich **nicht** mehr mit eigensicheren Stromkreisen zusammengeschaltet werden dürfen.

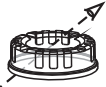



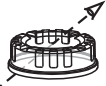
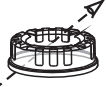
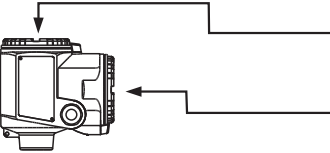
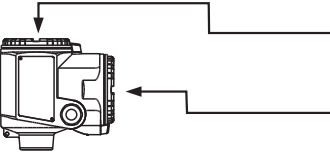
Installation specification: During installation, please keep in mind that the electronic inserts FEM57 and FEM58 which are powered by non-intrinsically-safe circuits may **no** longer be interconnected with intrinsically-safe circuits.

Directive d'installation : Lors de l'installation, tenir compte du fait que les électroniques FEM57 et FEM58, alimentées par des circuits sans sécurité intrinsèque **ne** doivent plus être connectées à des circuits à sécurité intrinsèque.

Especificación de la instalación: Durante la instalación tenga en cuenta que las electrónicas FEM57 y FEM58 que se alimentan con circuitos que no son de seguridad intrínseca **no** deben conectarse a lazos de seguridad intrínseca.

Specifiche di installazione: Durante l'installazione, tenere in considerazione che gli inserti elettronici FEM57 e FEM58, che sono alimentati da circuiti non a sicurezza intrinseca, **non** possono rimanere a lungo interconnessi con circuiti a sicurezza intrinseca

Installatie specificaties: S.v.p. er op letten dat de elektronica inserts FEM57 en FEM58 die gevoed zijn door niet intrinsiekveilige circuits, **niet** meer gebruikt mogen worden in intrinsiekveilige circuits.

Gehäuse / Deckelmaterial Housing / Cover material Boîtier / Matériau couvercle Cabezal / Material de la cubierta Testa / Materiale di copertura Behuizing / Materiaal van de deksel	Dichtungen / Seals / Joints / Juntas / Guarnizioni / Dichtingen	Teilenummer / Part number / Référence / Número de parte / Codice / Onderdeel Nr.
F16 / PA12	EPDM *	52025790
F13, F17 / Alu  	EPDM *	52027693
F13, F17 / Alu 	EPDM *	52002699
F13 / Alu 	EPDM *	52002698
F15 / 316L	VMQ/PTFE	52027000
F15 / 316L Order Code FTM5# - # # # # # # # # ↓ D, 2, 3, 4	VMQ/PTFE	52027708
F15 / 316L 	VMQ/PTFE	52027002
F15 / 316L  Order Code FTM5# - # # # # # # # # ↓ D, 2, 3, 4	VMQ/PTFE	52027709
T13 / Alu 	EPDM *	52006903
T13 / Alu 	EPDM *	52007103

de - Gehäusedeckel,
Dichtungen

en - Housing covers,
seals

fr - Couvercles de boîtier,
joints

es - Cubiertas del cabezal,
juntas

it - Coperture custodia,
guarnizioni

nl - Behuizing deksels,
dichtingen

* Nur geeignete Schmiermittel
verwenden /
Only use suitable lubricants /
Utiliser exclusivement des
lubrifiants appropriés /
Usar sólo lubricantes apropiados /
Utilizzare solo lubrificanti adatti /
Alleen geschikte smeermiddelen
gebruiken

de - Ersatzteilsensoren

en - Replacement sensors

fr - Capteurs de rechange

es - Sensores de recambio

it - Sensori parte di ricambio

nl - Reserversensors

Die Ersatzteilsensoren FTM50X, FTM51X können über den Endress+Hauser Service bestellt werden! /

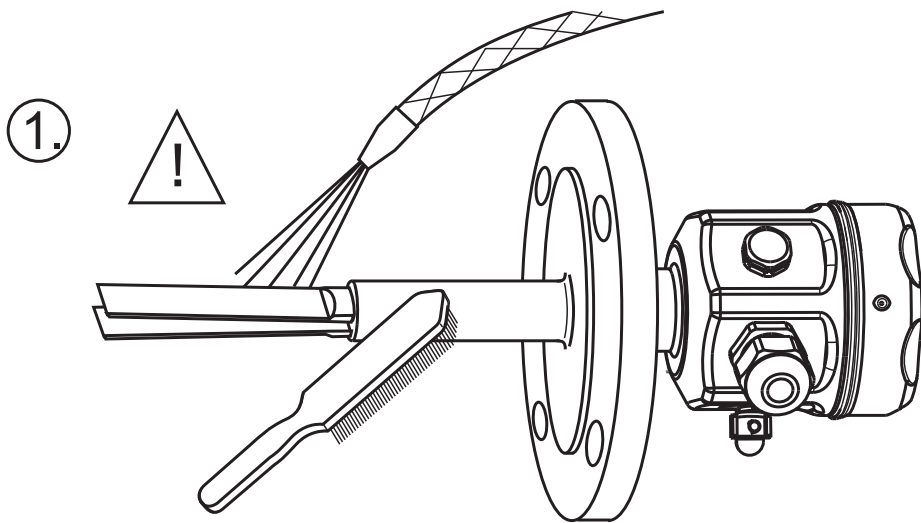
The FTM50X and FTM51X replacement sensors can be ordered through Endress+Hauser Service! /

Les capteurs de rechange FTM50X, FTM51X peuvent être commandés auprès d'Endress+Hauser ! /

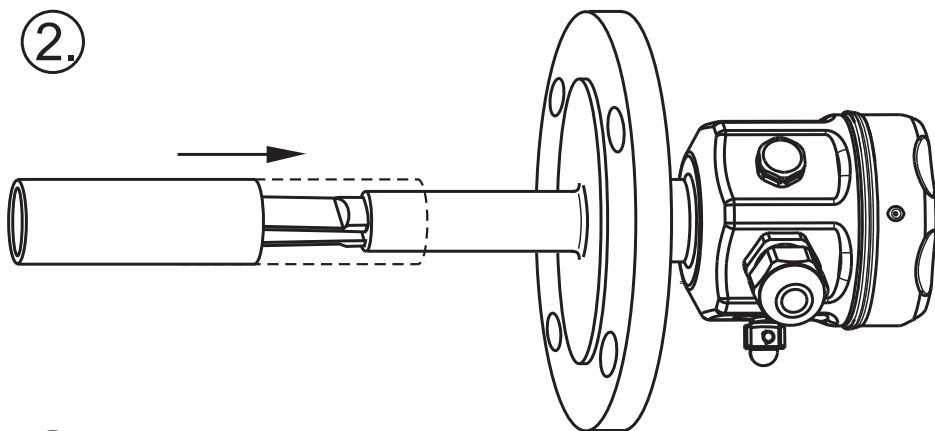
¡Los sensores de recambio FTM50X, FTM51X se pueden pedir a través del Endress+Hauser Service! /

I sensori parte di ricambio FTM50X, FTM51X possono essere ordinati all'Organizzazione commerciale Endress+Hauser! /

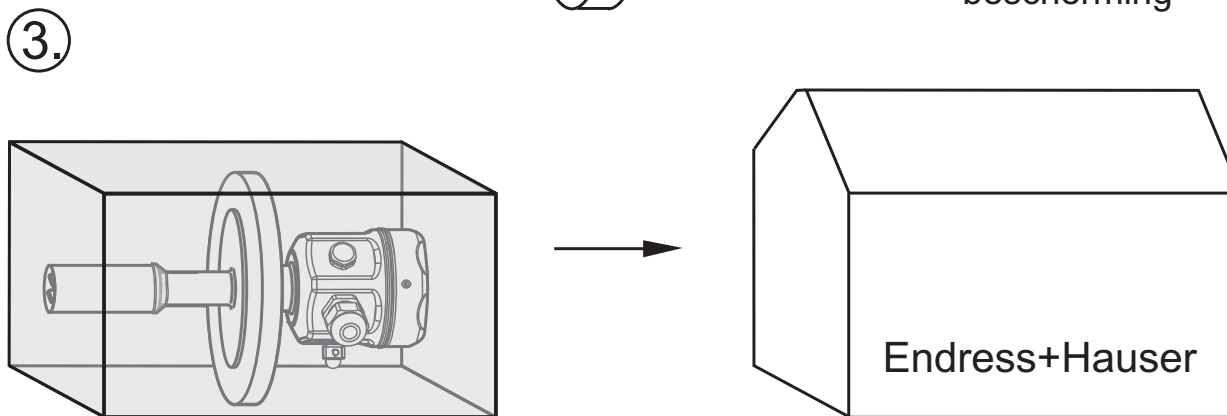
De Reserversensors FTM50X, FTM51X kunnen via de Endress+Hauser Service worden besteld!



säubern
clean
nettoyer
limpio
pulire
reinigen



Transportschutz
Transport protection
Protection de
transport
Protección para el
transporte
Protezione trasporto
Transport
bescherming



de - Reparatur

bei Endress+Hauser

en - Repair

at Endress+Hauser

fr - Réparations

chez Endress+Hauser

es - Reparaciones

en Endress+Hauser

it - Riparare

presso la Endress+Hauser

nl - Reparatie

bij Endress+Hauser

**de - Ergänzende
Dokumentation**

**en - Supplementary
Documentation**

**fr - Documentation
complémentaire**

**es - Documentación
suplementaria**

**it - Documentazione
supplementare**

**nl - Aanvullende
documentatie**

Technische Information / Technical Information / Information technique /
Información técnica / Informazioni tecniche / Technische Informatie

TI392F Soliphant M FTM50, FTM51, FTM52

Betriebsanleitung / Operating Instruction / Manuel de mise en service /
Instrucciones de funcionamiento / Istruzioni operative / Inbedrijfstellingsvoorschrift

KA239F Soliphant M FTM51

Schiebemuffe, druckbeaufschlagt / Sliding Sleeve, pressurised /
Manchon coulissant, pressurisé / Manguito deslizante, presurizado /
Manicotto scorrevole, per impieghi in pressione / Schuifmof, drukbestendig

KA264F Soliphant M FTM50, FTM51, FTM52

Separatgehäuse: Montage- und Kürzungsanleitung
(Gehäuseseitig) /
Separate housing: Instructions for mounting and shortening
(On the housing side) /
Boîtier séparé : Instructions de montage et de raccourcissement
(Côté boîtier) /
Cabezal separado: Instrucciones para el montaje y acortamiento
(Lado del cabezal) /
Custodia separata: Istruzioni di montaggio e accorciamento del cavo
(Lato custodia) /
Separate behuizing: Montage- en inkortbeschrijving
(Zijde behuizing)

KA265F Soliphant M FTM50, FTM51, FTM52

Separatgehäuse und Panzerschlauch: Montage- und Kürzungsanleitung
(Gehäuseseitig) /

Separate housing and armored tube: Instructions for mounting and shortening
(On the housing side) /

Boîtier séparé et flexible blindé : Instructions de montage et de raccourcissement
(Côté boîtier) /

Cabezal separado y tubo flexible blindado: Instrucciones para el montaje y
acortamiento (Lado del cabezal) /

Custodia separata e tubo armato: Istruzioni di montaggio e accorciamento del
cavo (Lato custodia) /

Separate behuizing en pantserslang: Montage- en inkortbeschrijving
(Zijde behuizing)

KA273F Soliphant M FTM50, FTM51, FTM52

Separatgehäuse: Demontage und Montage des Sensors /

Separate housing: Demounting and mounting of the sensor /

Boîtier séparé : Démontage et montage du capteur /

Cabezal separado: Desmontaje y montaje del sensor /

Custodia separata: Smontaggio e montaggio del sensore /

Separate behuizing: demontage en montage van de sensor

Sicherheitshinweise / Notes on Safety / Conseils de sécurité /
Notas sobre seguridad / Note sulla sicurezza / Veiligheidsinstructies

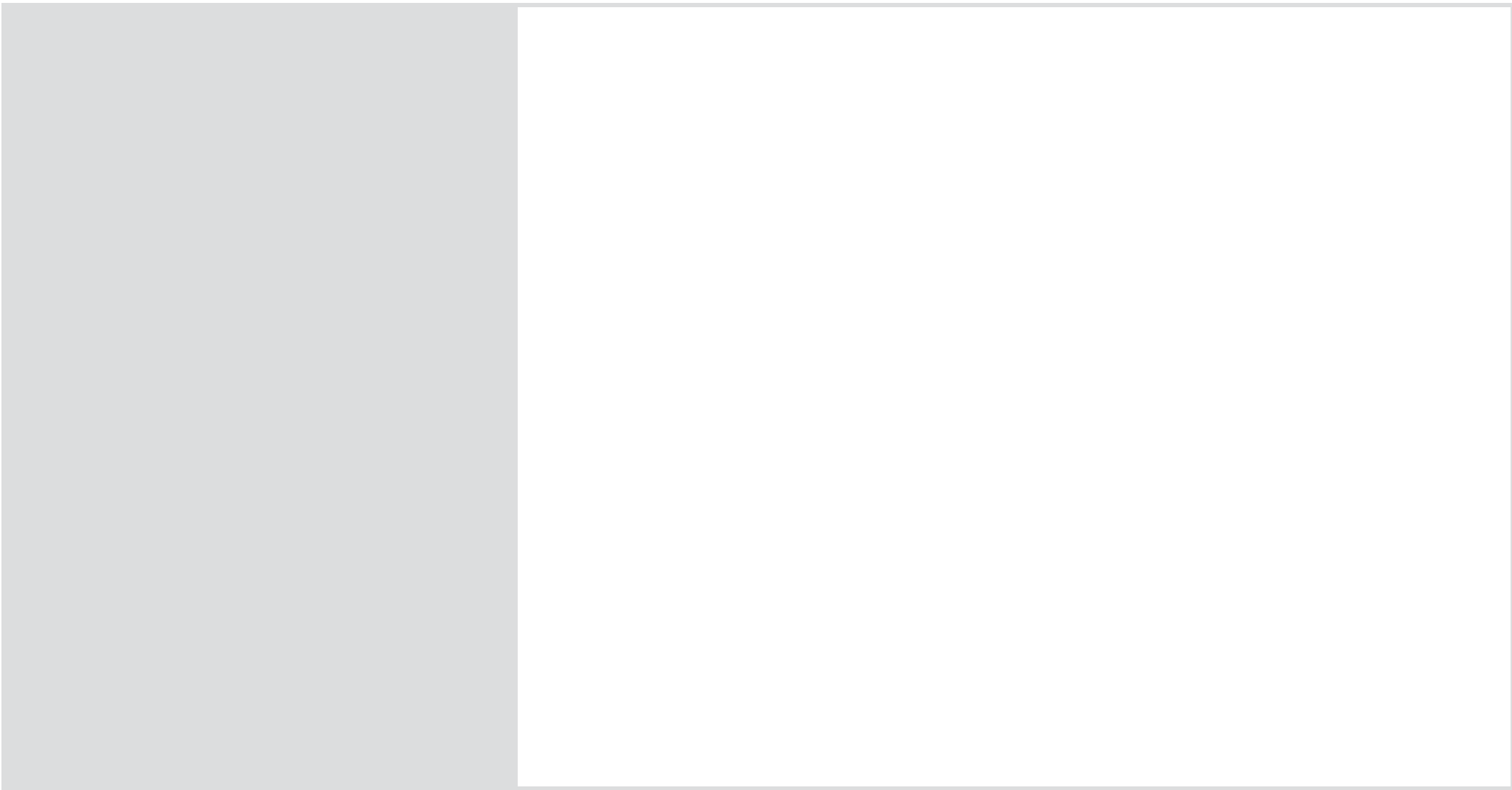
XA305F	CE Ex	ATEX II 1 D, II 1/2 GD, II 1/3 GD	Ex ia IIC T6
XA319F	CE Ex	ATEX II 1 D, II 1 G	Ex ia IIC T6 (X)
XA306F	CE Ex	ATEX II 1 D, ATEX II 1/2 G	Ex d/de [ia] IIC T6
XA307F	CE Ex	ATEX II 1/2 D, II 1/3 D	Ex tD
XA331F	CE Ex	ATEX II 3 D, ATEX II 3 G	EEx nA/nL/nC
XA393F	NEPSI	DIP	
XA394F	NEPSI	Ex ia	
XA395F	NEPSI	Ex d [ia]	
XA391F	IEC Ex,	Ex ia	
XA392F	IEC Ex,	Ex tD	

Zertifikate / Certificates / Certificats /
Certificados / Certificati / Certificaten

ZD218F	Soliphant M	FM
ZD219F	Soliphant M	CSA

Funktionale Sicherheit / Functional Safety / Sécurité fonctionnelle /
Seguridad funcional / Sicurezza funzionale / Functionele veiligheid

SD203F	Soliphant M + FEM51
SD204F	Soliphant M + FEM52
SD205F	Soliphant M + FEM54
SD208F	Soliphant M + FEM55
SD207F	Soliphant M + FEM57 + Nivotester FTL325P
SD206F	Soliphant M + FEM58



www.endress.com/worldwide





Level



Pressure



Flow



Temperature



Liquid
Analysis



Registration



Systems
Components



Services



Solutions

Safety Instructions

Solphant M FTM50, FTM51, FTM52

II 1/2 D Ex tD A20/21 IP6X T+23K,
 II 1/3 D Ex tD A20/22 IP6X T+23K (FTM50, FTM51)
 II 1/2 D Ex tD [iaD] A20/21 IP6X T+23K,
 II 1/3 D Ex tD [iaD] A20/22 IP6X T+23K (FTM52)
 KEMA 05 ATEX 2066



XA307F-C

de - Sicherheitshinweise für elektrische Betriebsmittel für explosionsgefährdete Bereiche gemäß Richtlinie 94/9/EG (ATEX) → Seite 5

en - Safety instructions for electrical apparatus for explosion-hazardous areas according to Directive 94/9/EC (ATEX) → Page 9

fr - Conseils de sécurité pour matériels électriques destinés aux zones explosibles et selon Directive 94/9/CE (ATEX) → Page 13

bg - Правила за техниката на безопасност за електрически средства за производство във взривоопасни зони. Ако не разбирате езика на това ръководство има възможност да си поръчате при нас едно ръководство, преведено на езика на Вашата страна.

Заявление за съответствие с EG

Производителят Endress+Hauser декларира с това заявление за съответствие и с предявяването на сертификата CE, че този продукт отговаря на изискванията на съответните европейски директиви. Прилаганите директиви, норми и документи са указани в заявлението за съответствие.

cs - Bezpečnostní pokyny pro elektrické přístroje v místech s nebezpečím výbuchu. Pokud nemáte možnost přečíst si tento návod, můžete si u nás objednat návod přeložený do svého jazyka.

Prohlášení o shodě s ES

Společnost Endress+Hauser prohlašuje prostřednictvím tohoto prohlášení a použitím značky CE, že tento výrobek vyhovuje příslušným evropským směrnicím. Zmíněné směrnice, normy a dokumenty jsou uvedeny v Prohlášení o shodě.

da - Sikkerhedsforskrifter for elektriske apparater certificeret til brug i eksplosionsfarlige områder. Hvis du ikke forstår denne manual, kan en oversat kopi af den på dit eget sprog bestilles fra os.

EF-overensstemmelseserklæring

Med denne overensstemmelseserklæring og tilføjjelsen af CE-mærket sikrer producenten Endress+Hauser, at produktet er i overensstemmelse med relevante europæiske direktiver. Dokumentation for overensstemmelsen gives i de anførte direktiver, standarder og dokumenter.

el - Οδηγίες ασφαλείας ηλεκτρικών συσκευών για επικίνδυνες για έκρηξη περιοχές. Σε περίπτωση που δεν μπορείτε να διαβάσετε αυτές τις οδηγίες, τότε μπορείτε να παραγγείλετε ένα αντίτυπο μεταφρασμένο στη γλώσσα σας.

Δήλωση πιστότητας ΕΚ

Με αυτή τη δήλωση πιστότητας και την τοποθέτηση του σήματος CE ο κατασκευαστής Endress+Hauser δηλώνει, ότι αυτό το προϊόν συμμορφώνεται με τις ευρωπαϊκές οδηγίες που πρέπει να εφαρμοστούν. Οι οδηγίες, τα ορόσηπα και τα έγγραφα που εφαρμόστηκαν αναφέρονται στη δήλωση πιστότητας.

es - Instrucciones de seguridad de aparatos eléctricos homologados para su utilización en áreas expuestas a riesgos de deflagración. Si no entiende este manual, puede pedir un ejemplar en su idioma.

Declaración de conformidad CE

Por la presente declaración y la inclusión de la marca CE, el fabricante Endress+Hauser, declara que el producto cumple con las directivas europeas pertinentes. Las directivas, normas y documentos de aplicación se indican en la declaración de conformidad.

et - Ohutusjuhised plahvatusohtlikus keskkonnas kasutatavate elektriseadmete kohta. Kui Te ei saa käesolevast juhendist aru, võite meilt tellida Teie riigikeelde tõlgitud juhendi.

EL vastavusdeklaratsioon

Tootja Endress+Hauser kinnitab juurdelisatud vastavusdeklaratsiooni esitamise ja CE-märgise kandmisega tootele, et käesolev toode vastab kohaldatavate Euroopa Liidu direktiivide nõuetele. Kohaldatavad direktiivid, standardid ja dokumendid on ära toodud vastavusdeklaratsioonis.

fi - Turvallisuusohjeita sähkölaitteille, jotka on vahvistettu käytettäväksi räjähdysvaarallisilla alueilla. Jos et ymmärrä tätä käsikirjaa, voit tilata meiltä käännetyn omalla kansallisella kielelläsi.

EU-vaatimustenmukaisuustodistus

Valmistaja Endress+Hauser vakuuttaa täällä vaatimustenmukaisuustodistuksella ja CE-merkin kiinnittämisellä, että tämä tuote täyttää sovellettavien EU-direktiivien määräykset. Sovellettavat direktiivit, normit ja dokumentit on merkitty vaatimustenmukaisuustodistukseen.

hu - Biztonsági információk robbanásveszélyes területre való elektromos eszközökhöz. Amennyiben nem tudja elolvasni ezt az útmutatót, akkor megrendelheti az Ön anyanyelvére lefordítva.

EK-megfelelőségi nyilatkozat

Az Endress+Hauser mint gyártó jelen megfeleléségi nyilatkozattal és a CE-jelzés felhelyezésével kijelenti, hogy ez a termék megfelel az alkalmazandó európai irányelveknek. Az alkalmazott irányelvek, szabványok és dokumentumok a megfeleléségi nyilatkozatban fel vannak tüntetve.

it - Istruzioni di sicurezza per apparecchiature elettriche certificate per l'utilizzo in aree con pericolo di esplosione. Se il presente manuale non risulta comprensibile potete ordinarne una copia tradotta nella vostra lingua.

Dichiarazione di conformità CE

Con questa dichiarazione e con l'applicazione del marchio CE, il costruttore Endress+Hauser, assicura che il prodotto è conforme alle direttive europee vigenti. Prova della conformità è fornita dall'osservanza delle direttive, delle norme e dei documenti elencati.

lt - Elektros įrenginio saugumo nurodymai, susiję su sprogimo zonomis. Jeigu negalite perskaityti šios instrukcijos, kreipkitės į mus, kad užsisakytumėte į mūsų gimtąją kalbą išverstą instrukciją.

EB atitikties deklaracija

Gamintojas Endress+Hauser šia atitikties deklaracija ir CE ženkliniu patvirtina, kad gaminys atitinka taikytinas ES direktyvas. Taikomos direktyvos, normos ir dokumentai yra pateikiami atitikties deklaracijoje.

lv - Drošības norādījumi elektrisko darba instrumentu lietošanai apgabalos, kas pakļauti sprādzienbīstamībai. Ja Jums nav iespēju izlasīt šos norādījumus, Jūs varat pasūtīt pie mums tulkojumu Jūsu valsts valodā.

ES atbilstības apliecinājums

Ražotājs Endress+Hauser ar šo atbilstības apliecinājumu un CE zīmola lietojumu apstiprina, ka produkts izgatavots saskaņā ar atbilstošajām Eiropas vadlīnijām. Piemērotās vadlīnijas, normas un dokumenti atrunāti atbilstības apliecinājumā.

nl - Veiligheidsinstructies voor elektrisch materieel in explosiegevaarlijke omgeving. Wanneer u deze handleiding niet kunt lezen, kunt u een in uw landstaal vertaalde handleiding bij ons bestellen.

EG Conformiteitsverklaring

De leverancier Endress+Hauser waarborgt met deze verklaring en het aanbrengen van het CE-teken, dat dit product overeenstemt met de geldende Europese richtlijnen. De geldende richtlijnen, normen en documenten zijn aangegeven in de conformiteitsverklaring.

pl - Wskazówki dot. bezpieczeństwa dla urządzeń elektrycznych stosowanych w obszarze zagrożonym wybuchem. Jeśli niniejsza instrukcja napisana jest w języku, którym się nie posługujesz, możesz zamówić u nas przetłumaczony dokument.

Deklaracja zgodności WE

Producent Endress+Hauser w niniejszej deklaracji zgodności wraz z nadaniem znaku CE oświadcza, że produkt ten jest zgodny z obowiązującą Europejską Dyrektywą. Zastosowane wytyczne, normy oraz dokumenty podane są w deklaracji zgodności.

pt - Instruções de segurança para dispositivos eléctricos certificados para utilização em áreas de risco de incêndio. Se não compreender este manual, pode encomendar-nos directamente uma cópia na sua língua.

Declaração de conformidade CE

Com esta declaração de conformidade e a aplicação da marca CE, o fabricante Endress+Hauser, garante que o produto obedece às directivas europeias a aplicar. As directivas, normas e documentos são apresentadas na declaração de conformidade.

ro - Indicații de siguranță pentru mijloacele de producție electrice pentru zonele periculoase de explozie. Dacă nu puteți citi aceste instrucțiuni, atunci puteți comanda la noi instrucțiunile traduse în limba țării dumneavoastră.

Declarație de conformitate CE

Producătorul Endress+Hauser declară prin declarația de conformitate alăturată și prin aplicarea semnului CE că acest produs corespunde directivelor europene aplicabile. Directivele, normele aplicate și documentele sunt menționate în declarația de conformitate.

sk - Bezpečnostné pokyny pre elektrické zariadenie prevádzkované v priestoroch s nebezpečenstvom výbuchu. Ak nemáte možnosť prečítať si tento návod, môžete si u nás objednať návod preložený do svojho jazyka.

Vyhášení o konformite s ES

Společnost Endress+Hauser vyhlasuje prostřednictvím tohto vyhlásenia o konformite a použitím značky CE, že tento výrobok vyhovuje príslušným európskym smerniciam. Zmieňované smernice, normy a dokumenty sú uvedené vo Vyhlásení o konformite.

sl - Varnostni napotki glede električne opreme, namenjene za uporabo v eksplozivnih območjih. Če teh navodil ne morete razumeti, lahko pri nas naročite prevod v vaš jezik.

Pojasnilo glede potrdila o skladnosti EU

Proizvajalec Endress+Hauser s to izjavo o skladnosti in navedbo oznake CE izjavlja, da je ta izdelek skladen s predpisanimi evropskimi smernicami. Upoštewane smernice, standardi in dokumenti so navedeni v izjavi o skladnosti.

sv - Säkerhetsföreskrifter för elektrisk utrustning certifierad för användning i explosionsfarliga områden. Om du inte förstår denna manual, kan en översatt kopia på ditt eget språk beställas från oss.

EG-försäkran om överensstämmelse

Endress+Hauser försäkras med vidstående försäkran om överensstämmelse och med CE-märkningen att denna produkt överensstämmer med de tillämpbara europeiska riktlinjerna. De tillämpade europeiska riktlinjerna, normerna och dokumenten anges i försäkran om överensstämmelse.

EG 05 010-b

EG-Konformitätserklärung EC Declaration of Conformity Déclaration CE de Conformité

Endress+Hauser GmbH+Co. KG, Hauptstraße 1, 79689 Maulburg

erklärt in alleiniger Verantwortung, dass das Produkt
declares in sole responsibility, that the product
déclare sous sa seule responsabilité que le produit

SOLIPHANT M Füllstandgrenzschalter

FTM 50, FTM 51, FTM 52



Level



Pressure



Flow



Temperature



Liquid Analysis



Registration



Systems Components



Services



Solutions

mit den Vorschriften folgender Europäischer Richtlinien übereinstimmt:
conforms with the regulations of the following European Directives:
est conforme aux prescriptions et directives Européennes suivantes:

EMV-Richtlinie 89/336/EWG

Ex-Richtlinie 94/9/EG

Angewandte harmonisierte Normen oder normative Dokumente:

Applied harmonised standards or normative documents:

Normes harmonisées ou documents normatifs appliqués:

EN 61326	(2004)	EN 61241-0	(2006)
EN 61010-1	(2001)	EN 61241-1	(2004)
		EN 61241-11	(2006)

EG-Baumusterprüfbescheinigung Nr:

KEMA 05 ATEX 2066

EC-Type Examination Certificate No:

Numéro de l'attestation d'examen CE de type:

Benannte Stelle:

TÜV Hannover/Nr. 0044

Notified body performing the QA surveillance:

Organisme notifié de contrôle du système de qualité:

Erstmalige Anbringung des CE-Zeichens:

2005

CE-mark first affixed:

Année de mise en conformité CE:

Maulburg, 08.02.2007

Endress + Hauser GmbH + Co. KG

i. V.

Leiter Zertifizierung
Certification Manager
Manager de Certification

Endress+Hauser

People for Process Automation

Soliphant M

FTM50, FTM51, FTM52

deutsch

Zugehörige Dokumentation Dieses Dokument ist fester Bestandteil der folgenden Betriebsanleitungen:
KA229F/00, KA230F/00

Es gilt die mitgelieferte, dem Gerätetyp entsprechende Betriebsanleitung.

Ergänzende Dokumentation Explosionsschutz-Broschüre:
SD001F/11

Kennzeichnung Erläuterungen der Kennzeichnung und Zündschutzart finden Sie in der Explosionsschutz-Broschüre.

Kompaktversion

Kennzeichnung nach Richtlinie 94/9/EG



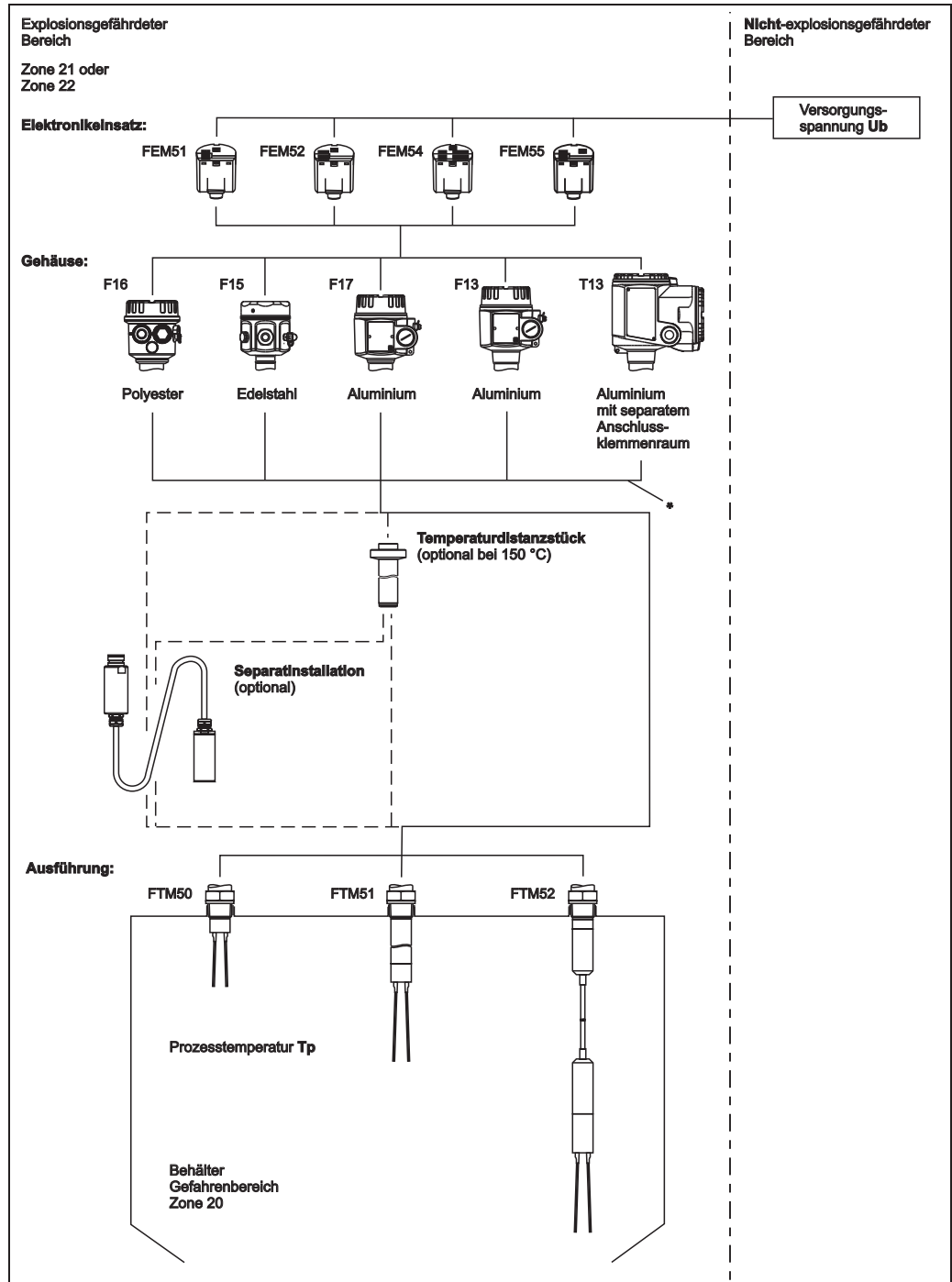
FTM50/51	II	1/2	D	Ex tD A20/21 IP6X T+23K
	II	1/3	D	Ex tD A20/22 IP6X T+23K
FTM52	II	1/2	D	Ex tD [iaD] A20/21 IP6X T+23K
	II	1/3	D	Ex tD [iaD] A20/22 IP6X T+23K

Version mit Separatgehäuse

Kennzeichnung nach Richtlinie 94/9/EG



Gehäuse	II	2 (1)	D	Ex tD [iaD] A21 IP6X T+23K
	II	3 (1)	D	Ex tD [iaD] A22 IP6X T+23K
Sensor	II	1/2	D	Ex iaD 20/21 IP6X T+10K
	II	1/3	D	Ex iaD 20/22 IP6X T+10K



Xa307de01

* eigensicherer Sensorstromkreis

- Kunststoff-Gehäuses F16 nur in Zone 22 ohne leitfähige Stäube verwenden.

Kompaktversion

	Kategorie	Typ
	II 1/2 D Ex tD A20/21 IP6X T+23K II 1/3 D Ex tD A20/22 IP6X T+23K	FTM50, FTM51
	II 1/2 D Ex tD [iaD] A20/21 IP6X T+23K II 1/3 D Ex tD [iaD] A20/22 IP6X T+23K	FTM52

Version mit Separatgehäuse

	Kategorie	Typ
Gehäuse	II 2 (1) D Ex tD [iaD] A21 IP6X T+23K II 3 (1) D Ex tD [iaD] A22 IP6X T+23K	FTM50, FTM51, FTM52
Sensor	II 1/2 D Ex iaD 20/21 IP6X T+10K II 1/3 D Ex iaD 20/22 IP6X T+10K	FTM50, FTM51, FTM52

Elektrische Anschlusswerte:

Elektronikeinsatz	Spannungsversorgung Ub	Relaisstromkreis
FEM51	19...253 V AC	–
FEM52	10... 55 V DC	–
FEM54	19...253 V AC	253 V AC / 6 A 1500 VA / $\cos \varphi = 1$ 750 VA / $\cos \varphi > 0,7$
	19... 55 V DC	30 V DC / 6 A 125 V DC / 0,2 A
FEM55	11... 36 V DC	–

Zulässige
Umgebungstemperaturen:

Typ	Prozesstemperaturbereich Tp	max. Oberflächentemperatur Zone 20 (im Fehlerfall)	max. Oberflächentemperatur (Gehäuse)
FTM50, FTM51	-50 °C...+150 °C -50 °C...+230 °C/+280 °C	150 °C +23K 230 °C/280 °C +23K	-50 °C...+ 70 °C +23K
FEM52	-40 °C...+ 80 °C	80 °C +23K	-40 °C...+ 70 °C +23K

Sicherheitshinweise:
Installation

- Installations- und Sicherheitshinweise der Betriebsanleitung beachten.
- Gemäß Herstellerangaben und den gültigen Normen und Regeln installieren (z.B. IEC 60079-14).
- Max. Erwärmung der Geräteoberfläche in Zone 20 unter Fehlerbedingung: $\leq 23\text{K}$ (gemessen bei Einschüttung mit einer Schichtdicke $> 50\text{ mm}$).
- Max. Erwärmung der Geräteoberfläche in Zone 21 bzw. Zone 22 unter Fehlerbedingung: $\leq 23\text{K}$.
- Verlängerungsrohr des Soliphant M FTM51 abstützen, wenn dynamische Belastung zu erwarten ist.
- Geräte nur in solchen Messstoffen einsetzen, gegen die die mediumsberührten Materialien hinreichend beständig sind (siehe Technische Information TI392F).
- Nach Montage und Anschluss des Sensors muss sichergestellt werden, dass für das Gehäuse mindestens die Schutzart IP65 nach EN 60529 erreicht wird (Deckel fest zudrehen, Kabeleinführung fachgerecht montieren).
- Prozessanschlussdichtung verwenden, die der Temperaturanforderung und Materialverträglichkeit entspricht.
- Beim Anschluss der Kabel auf installationsseitig vorhandene Zugentlastung achten.
- Das Verbindungskabel vom Separatgehäuse zum Standaufnehmer vor Zug und Reibung schützen (z.B. wegen elektrostatischer Aufladung durch Medienströme).

Soliphant M

FTM50, FTM51, FTM52

english

Associated Documentation

This document is an integral part of the following Operating Instructions:
KA229F/00, KA230F/00

The Operating Instructions which are supplied and correspond to the device type apply.

Supplementary Documentation

Explosion-protection brochure:
SD001F/11

Designation

Explanation of the labelling and type of protection can be found in the explosion protection brochure.

Compact version

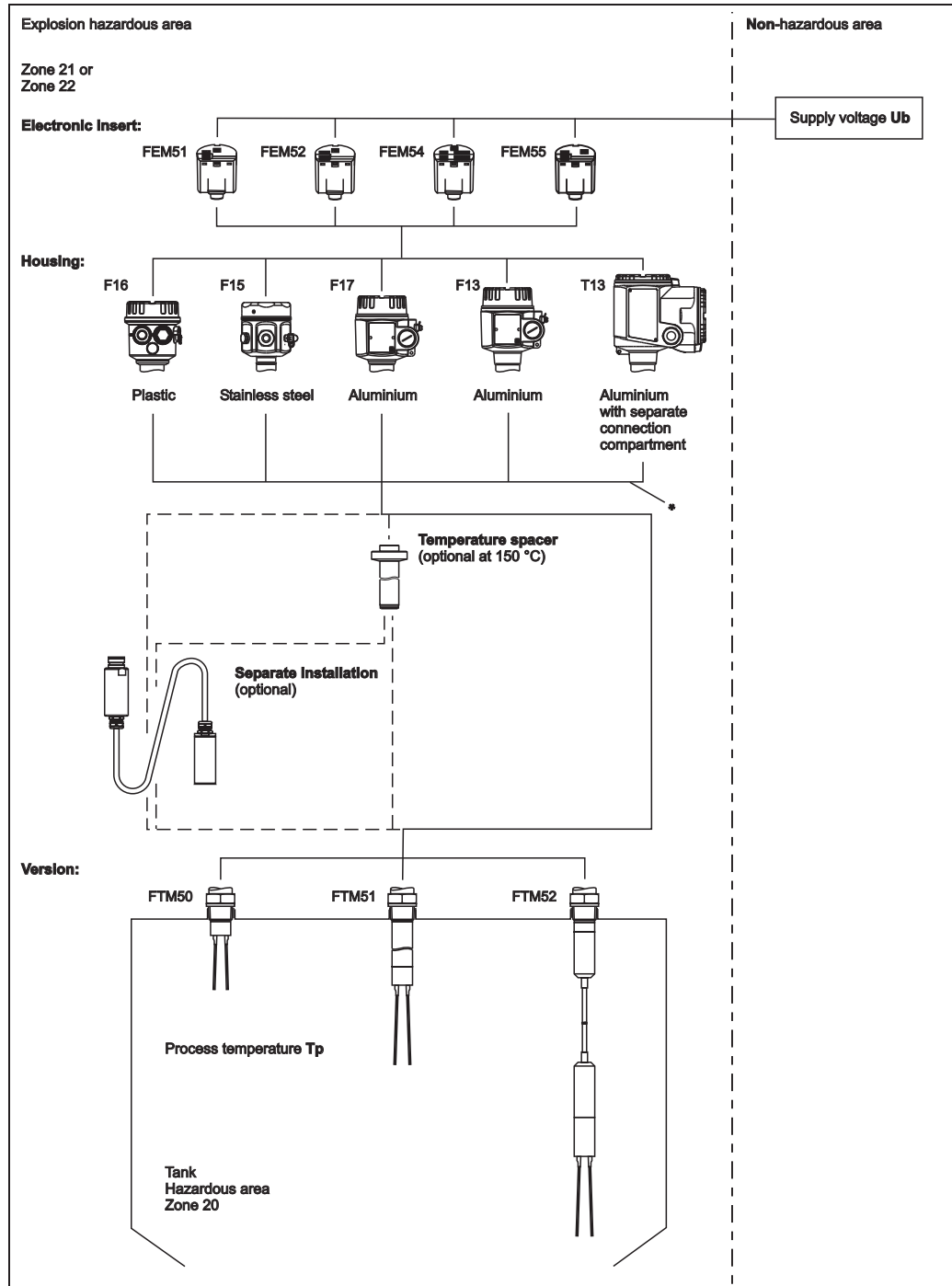
Designation according to Directive 94/9/EC

	CE 0044	Ex					
FTM50/51	II	1/2	D	Ex tD	A20/21	IP6X	T+23K
	II	1/3	D	Ex tD	A20/22	IP6X	T+23K
FTM52	II	1/2	D	Ex tD [iaD]	A20/21	IP6X	T+23K
	II	1/3	D	Ex tD [iaD]	A20/22	IP6X	T+23K

Version with separate housing

Designation according to Directive 94/9/EC

	CE 0044	Ex					
Housing	II	2 (1)	D	Ex tD [iaD]	A21	IP6X	T+23K
	II	3 (1)	D	Ex tD [iaD]	A22	IP6X	T+23K
Sensor	II	1/2	D	Ex iaD	20/21	IP6X	T+10K
	II	1/3	D	Ex iaD	20/22	IP6X	T+10K



XA307en01

* *Intrinsically safe sensor circuit*

- Only use plastic F16 housing in Zone 22 without conductive dusts.

Compact version

	Category	Type
	II 1/2 D Ex tD A20/21 IP6X T+23K II 1/3 D Ex tD A20/22 IP6X T+23K	FTM50, FTM51
	II 1/2 D Ex tD [iaD] A20/21 IP6X T+23K II 1/3 D Ex tD [iaD] A20/22 IP6X T+23K	FTM52

Version with separate housing

	Category	Type
Housing	II 2 (1) D Ex tD [iaD] A21 IP6X T+23K II 3 (1) D Ex tD [iaD] A22 IP6X T+23K	FTM50, FTM51, FTM52
Sensor	II 1/2 D Ex iaD 20/21 IP6X T+10K II 1/3 D Ex iaD 20/22 IP6X T+10K	FTM50, FTM51, FTM52

Electrical connection data:

Electronic insert	Supply voltage U_b	Relay circuit
FEM51	19...253 V AC	—
FEM52	10... 55 V DC	—
FEM54	19...253 V AC	253 V AC / 6 A 1500 VA / $\cos \varphi = 1$ 750 VA / $\cos \varphi > 0.7$
	19... 55 V DC	30 V DC / 6 A 125 V DC / 0.2 A
FEM55	11... 36 V DC	—

Permitted ambient temperatures:

Type	Process temperature range T_p	Maximum surface temperature Zone 20 (in fault condition)	Maximum surface temperature (Housing)
FTM50, FTM51	-50 °C...+150 °C -50 °C...+230 °C/+280 °C	150 °C +23K 230 °C/280 °C +23K	-50 °C...+ 70 °C +23K
FEM52	-40 °C...+ 80 °C	80 °C +23K	-40 °C...+ 70 °C +23K

Safety instructions:
Installation

- Comply with the installation and safety instructions in the Operating Instructions.
- Install the device according to the manufacturer's instructions and any other valid standards and regulations (e.g. IEC 60079-14).
- Max. heat-up of device surface in Zone 20 under error conditions: $\leq 23K$ (measured with deposited material with a layer > 50 mm in thickness).
- Max. heat-up of device surface in Zone 21 or Zone 22 under error conditions: $\leq 23K$.
- Support extension tube of Soliphant M FTM51 if a dynamic load is expected.
- Only install the devices in media for which the wetted materials have sufficient durability (see Technical Information TI392F).
- Once the sensor has been mounted and connected, ensure that at least IP65 protection as per EN 60529 is provided for the housing (screw cover tightly, mount cable entry correctly).
- Use a process connection seal that meets the materials compatibility and temperature requirements.
- When connecting the cables, ensure there is adequate strain relief at place of installation.
- Protect the connecting cable between the separate housing and the level sensor from tension and friction (e.g. due to electrostatic charge from medium flow).

Soliphant M

FTM50, FTM51, FTM52

français

Documentation correspondante

Le présent document fait partie intégrante du manuel de mise en service suivant :
KA229F/00, KA230F/00

C'est le manuel de mise en service fourni, correspondant au type d'appareil, qui est valable.

Documentation complémentaire



Brochure sur la protection contre les explosions :
SD001F/11

Marquage

Une explication du marquage et du mode de protection figure dans la brochure sur la protection contre les explosions.



Version compacte

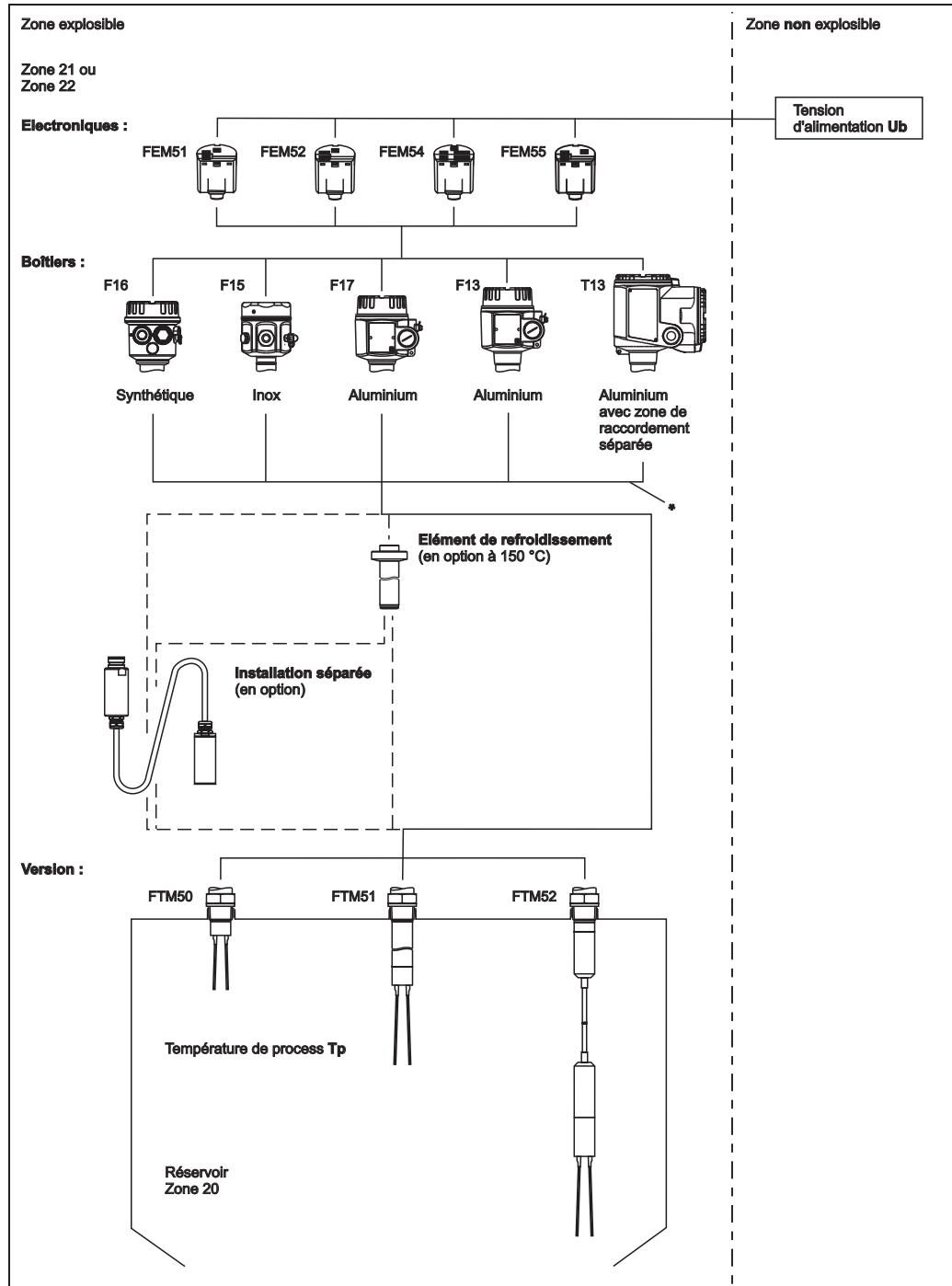
Marquage selon directive 94/9/CE

			
FTM50/51	II	1/2 D	Ex tD A20/21 IP6X T+23K
	II	1/3 D	Ex tD A20/22 IP6X T+23K
FTM52	II	1/2 D	Ex tD [iaD] A20/21 IP6X T+23K
	II	1/3 D	Ex tD [iaD] A20/22 IP6X T+23K

Version avec boîtier séparé

Marquage selon directive 94/9/CE

			
Boîtier	II	2 (1) D	Ex tD [iaD] A21 IP6X T+23K
	II	3 (1) D	Ex tD [iaD] A22 IP6X T+23K
Capteur	II	1/2 D	Ex iaD 20/21 IP6X T+10K
	II	1/3 D	Ex iaD 20/22 IP6X T+10K



XA307F-C1

* circuit de capteur à sécurité intrinsèque

- Utiliser le boîtier synthétique F16 seulement en zone 22 sans poussières conductrices.

Version compacte

	Catégorie	Type
	II 1/2 D Ex tD A20/21 IP6X T+23K II 1/3 D Ex tD A20/22 IP6X T+23K	FTM50, FTM51
	II 1/2 D Ex tD [iaD] A20/21 IP6X T+23K II 1/3 D Ex tD [iaD] A20/22 IP6X T+23K	FTM52

Version avec boîtier séparé

	Catégorie	Type
Boîtier	II 2 (1) D Ex tD [iaD] A21 IP6X T+23K II 3 (1) D Ex tD [iaD] A22 IP6X T+23K	FTM50, FTM51, FTM52
Capteur	II 1/2 D Ex iaD 20/21 IP6X T+10K II 1/3 D Ex iaD 20/22 IP6X T+10K	FTM50, FTM51, FTM52

Valeurs de raccordement électriques :

Electronique	Tension d'alimentation U_b	Circuit relais
FEM51	19...253 V AC	—
FEM52	10... 55 V DC	—
FEM54	19...253 V AC	253 V AC / 6 A 1500 VA / $\cos \varphi = 1$ 750 VA / $\cos \varphi > 0,7$
	19... 55 V DC	30 V DC / 6 A 125 V DC / 0,2 A
FEM55	11... 36 V DC	—

Températures ambiantes admissibles :

Type	Gamme de températures de process T_p	Température de surface max. Zone 20 (en cas de défaut)	Température de surface max. (Boîtier)
FTM50, FTM51	-50 °C...+150 °C -50 °C...+230 °C/+280 °C	150 °C +23K 230 °C/280 °C +23K	-50 °C...+ 70 °C +23K
FEM52	-40 °C...+ 80 °C	80 °C +23K	-40 °C...+ 70 °C +23K

Conseils de sécurité :
Installation

- Tenir compte des conseils d'installation et de sécurité du manuel de mise en service.
- Installer d'après les instructions du fabricant et les normes et règles en vigueur (par ex. CEI 60079-14).
- Réchauffement max. de la surface d'appareil en zone 20 en condition de défaut : $\leq 23K$ (mesuré avec enfouissement sous couche d'épaisseur > 50 mm).
- Réchauffement max. de la surface d'appareil en zone 21 ou zone 22 en condition de défaut : $\leq 23K$.
- Arrimer le tube prolongateur du Soliphant M FTM51 si une contrainte dynamique est à prévoir.
- Utiliser les appareils seulement dans les produits pour lesquels les matériaux en contact avec ceux-ci offrent une compatibilité suffisante (voir Information technique TI392F).
- Après montage et raccordement du capteur, il faut s'assurer que la protection IP 65 selon EN 60529 au moins est atteinte pour le boîtier (visser fermement le couvercle, monter correctement l'entrée de câble).
- Utiliser un joint de raccord process qui satisfait aux exigences de température et à la compatibilité avec le produit.
- Lors du raccordement des câbles, veiller à la présence d'une décharge de traction côté installation.
- Protéger le câble de raccordement du boîtier séparé au capteur contre les contraintes et les frottements (par ex. à cause du chargement électrostatique dû aux flux de produit).

www.endress.com/worldwide

Endress+Hauser 

People for Process Automation





Diaphragm Valves

DESCRIPTION

200 Series

The **200 SERIES** is a range of diaphragm valve suitable for Dust collector applications, in particular for reverse pulse jet filter cleaning of filter bags, cartridges, envelope filters, ceramic filters and sintered metal fibre filters. The 200 Series valve has the inlet port at 90° to the outlet port. The 200 Series range comprises 7 models, from 3/4" to 3", all with threaded female gas connections. The 1 1/2" model is available in the single and double diaphragm versions, while the 2", 2 1/2" and 3" are all double diaphragm valves. The special design assures an extremely fast opening time, high flow rates and easy installation. The valves are constructed in die-cast aluminium and have an anodised protection treatment which protect them from corrosive and environmental agents. Bolts and screws are in stainless steel. The 200 Series is available in the following versions:

- **VNP**, with integrated solenoid pilot
- **VEM**, with remote pneumatic connection.

Upon request: Integral pilot valves with ATEX Certification: • ATEX II 3 D (94/9/CE) for the above approved model the correct code to use is VEM+PV 24V/DCX (solenoid coil is 24V-DC/12W and Din connector in conformity to the ATEX Directive 94/9/CE) (PLG9-ATEX). Remote pilot valves meet the requirements of: • ATEX II 2 GD when mounted with PXA Pilot or CXD Enclosure (94/9/CE)



GENERAL CHARACTERISTICS	
Fluids	Filtered air and oil free
Diaphragm	Standard NBR: -20°C / +120°C
	Optional Viton: -30°C / +200°C
	Nitrile: -40°C / +120°C
Pressure range	From 0,5 to 7,5 bar

CONSTRUCTIVE FEATURES - VALVE	
Cover	Die-cast aluminium (Anodised)
Body	Die-cast aluminium (Anodised)
Pilot Base	Brass (Chromed)
Pilot	Stainless Steel
Diaphragm	NBR
Bolts and screws	Stainless steel
Diaphragm Backing disk	Stainless steel
Diaphragm spring	Stainless steel

TYPE	Port size Ø	N° Diaph.	Pressure range (bar)		Weight Kg.	Coil	Kv	Cv
			min.	max				
VNP206	3/4"	1	0,5	7,5	0,55	YES	10	11,6
VNP208	1"	1	0,5	7,5	0,65	YES	21	24,4
VNP212	1 1/2"	1	0,5	7,5	1,4	YES	37	43,0
VNP214	1 1/2"	2	0,5	7,5	1,5	YES	44	51,2
VNP216	2"	2	0,5	7,5	2,5	YES	78	90,7
VNP220	2 1/2"	2	0,6	7,5	3,3	YES	96	112
VNP224	3"	2	0,6	5	7,55	YES	308	358
VEM206	3/4"	1	0,5	7,5	0,25	NO	10	11,6
VEM208	1"	1	0,5	7,5	0,35	NO	21	24,4
VEM212	1 1/2"	1	0,5	7,5	1,1	NO	37	43,0
VEM214	1 1/2"	2	0,5	7,5	1,2	NO	44	51,2
VEM216	2"	2	0,5	7,5	2,2	NO	78	90,7
VEM220	2 1/2"	2	0,6	7,5	3	NO	96	112
VEM224	3"	2	0,6	5	7,2	NO	308	358

ELECTRICAL CHARACTERISTICS - SOLENOID	
Coil insulation	Class H
Din Socket Connector	Pg9 Connection
Din Socket Standard	EN175301 - 803 / A/ISO 4400
Din Socket Optional	94/9/CE ATEX II 3GD T6
Isolation class Din socket	VDE 0110 - 1/89
Electrical protection	IP65 EN60529
Voltage Range	12V DC (-5%, +20%) 12W
	24V DC (-5%, +20%) 12W
	48 V DC (-10%, +20%) 9W
	110 V DC (-10%, +20%) 12W
	24V 50/60Hz (-10%, +20%) 16/12 VA
	48 V 50/60 Hz (-10%, +20%) 16/12 VA
	110/127 V 50/60 Hz (-10%, +20%) 19/14 VA
	220/240 V 50/60 Hz (-10%, +20%) 19/14 VA
Ambient temperature	-20°C / +60°C

HOW TO ORDER:

VEM/VNP 2 08 110/50

VNP: with integral pilot
VEM: without pilot

2: "200 SERIES"

VALVE CONNECTION DIAMETER:

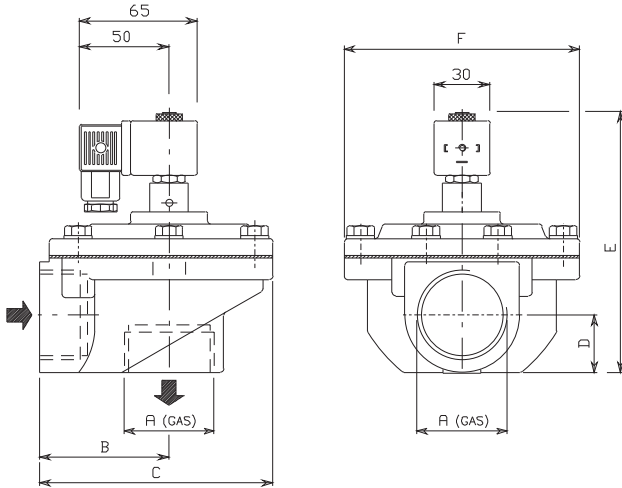
- 06 = 3/4"
- 08 = 1"
- 12 = 1 1/2" (single diaphragm)
- 14 = 1 1/2" (double diaphragm)
- 16 = 2"
- 20 = 2 1/2"
- 24 = 3"

Voltage and frequency required.

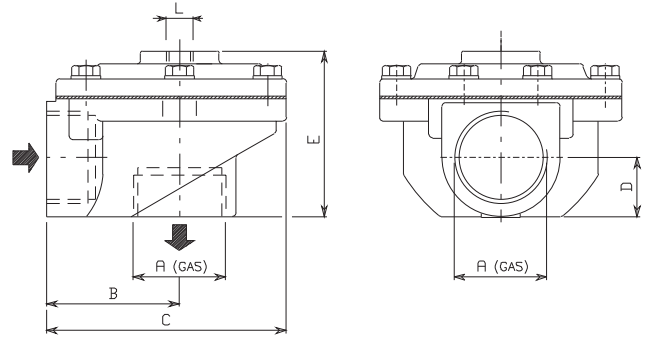
DIMENSIONS

200 Series

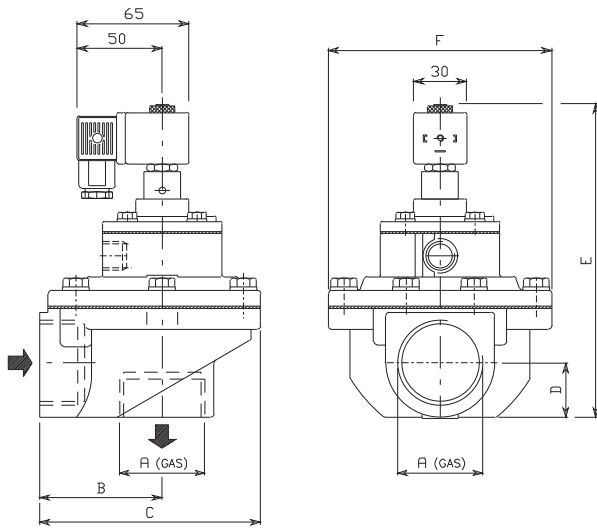
VNP 206 - 208 - 212



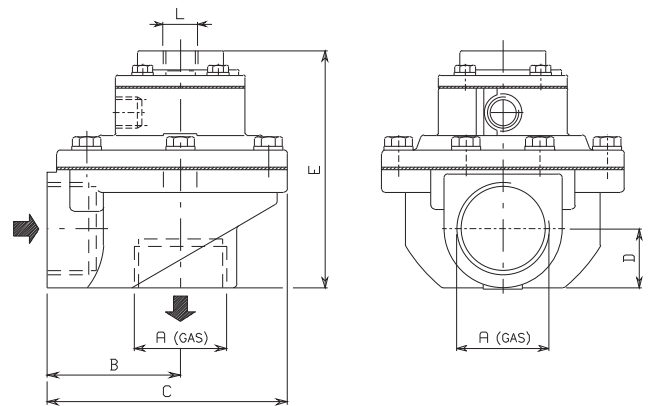
VEM 206 - 208 - 212



VNP 214 - 216 - 220 - 224



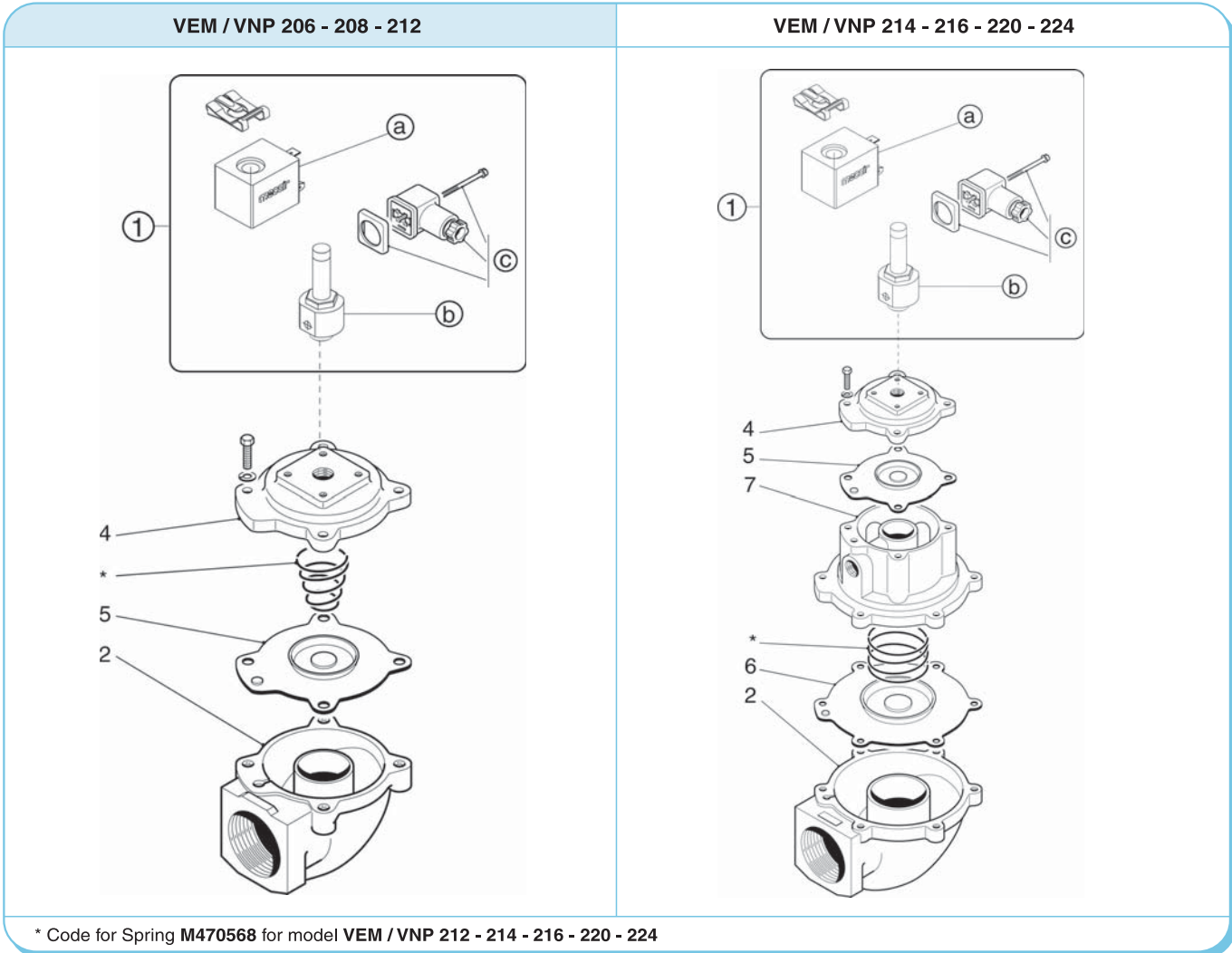
VEM 214 - 216 - 220 - 224



MODEL	Ø A	B	C	D	E	F	Weight Kg.	MODEL	E	Ø L	Weight Kg.	Pressure range (bar)		Diaph. N°
												min	max	
VNP 206	3/4"	41	75	18	119	60	0,55	VEM 206	59	1/4"	0,25	0,5	7,5	1
VNP 208	1"	52	90	23	123	74	0,65	VEM 208	63	1/4"	0,35	0,5	7,5	1
VNP 212	1 1/2"	72	130	31	153	135	1,40	VEM 212	93	1/4"	1,10	0,5	7,5	1
VNP 214	1 1/2"	72	130	31	186	135	1,50	VEM 214	126	1/4"	1,20	0,5	7,5	2
VNP 216	2"	90	165	35	206	160	2,50	VEM 216	146	1/4"	2,20	0,5	7,5	2
VNP 220	2 1/2"	116	199	47	226	190	3,30	VEM 220	166	1/4"	3,00	0,6	7,5	2
VNP 224	3"	145	275	92	285	265	7,55	VEM 224	225	1/4"	7,3	0,6	5	2

SPARE PARTS

200 Series



* Code for Spring **M470568** for model **VEM / VNP 212 - 214 - 216 - 220 - 224**

STANDARD Version

OPTIONAL Version

Standard	POS	DESCRIPTION	CODE
	1	a) Solenoid (*) b) Pilot group complete with base and ferrule c) Din Connector PG9EN175301-803 IP65	a) SB3 - ../.. (*) b) CP1/4 c) PLG9

(*) Specify Voltage and Frequency

Optional	POS	DESCRIPTION	CODE
	1	Solenoid (*) b) Pilot group complete with base and ferrule c) Din Connector (3GD IP65 T6)	a) SB3 - 24/DCX b) CP1/4 c) PLG9 - ATEX

Version in conformity to European Directive 94/9/CE ATEX (cod. PV-24/DCX)

POS	DESCRIPTION	CODE							
		VEM/VNP206	VEM/VNP208	VEM/VNP212	VEM/VNP214	VEM/VNP216	VEM/VNP220	VEM/VNP224	
1	Pilot group complete with solenoid (*) and din connector	PV - ../.. (*)	PV - ../.. (*)	PV - ../.. (*)	PV - ../.. (*)	PV - ../.. (*)	PV - ../.. (*)	PV - ../.. (*)	
1+4	Pilot group complete with solenoid (*), din connector, top cover and screws	PVM06 - ../.. (*)	PVM08 - ../.. (*)	PVM12 - ../.. (*)	PVM06 - ../.. (*)	PVM06 - ../.. (*)	PVM06 - ../.. (*)	PVM08 - ../.. (*)	
2	Valve Body	M300201	M300204	M300211	M300211	M300218	M300222	M300237	
7	Intermediate cover (Double diaphragm)	-	-	-	M310098	M310100	M310101	M310102	
4	Top Cover	M310082	M310086	M310092	M310082	M310082	M310082	M310086	
5	Diaphragm	DB 16	DB 18	DB 112	DB 16	DB 16	DB 16	DB 18	
6	Diaphragm (Secondary)	-	-	-	DB 114	DB 116	DB 120	DB 124	

(*) Specify Voltage and Frequency

INSTRUCTIONS AND MAINTENANCE

200 Series

1) - INSTALLATION INSTRUCTIONS

VALVE INLET : Mount valve inlet to tank stub pipe and ensure correctly connected. Valve reference "IN"
VALVE OUTLET: To be connected to blowpipe within the filter. Valve reference "OUT"

SEALING OF BLOWPIPE:

Suited to a threaded blowpipe only - The pipe must not enter entirely into the valve body, but must be blocked with a counter nut to properly fix the blowpipe to the valve outlet.

FLUID:

COMPRESSED AIR - Ensure air supply is clean and dry. (We recommend the installation of compressed air filter units to be installed directly before the pressure vessel, in order to ensure clean and dry is supplied to the diaphragm valve). Operating pressure min/max. 0.5 ÷ 7.5 bar.

AIR INLET PIPE TO HEADER TANK/PRESSURE VESSEL:

Ø min. 1" for tanks with a 1" valve or 1 1/2".

COMPRESSOR:

With the appropriate compressor size being utilised, this ensures the tank can be refilled from 0-2 bar in a few seconds.

PROTECTION FROM RAIN:

Always ensure a small roof/lid is installed on top of the valves and/or electronic controllers as this protects the valves and controllers from exposure to harsh environmental conditions.

ELECTRICAL ON TIMES AND PULSE TIMES:

Average pulse times range from 100ms depending on size of the valves being used.

2) - START UP

Before commencing to pulse the valves and to pressurise the tank/pressure vessel, it is important to eliminate all particulate, including dirt, rust, metal shavings, and other types of particulate, which may eventually enter the piping. The draining of any condensation or liquid within the tank/pressure vessel is also important and should be performed prior to pressurising the system. The drain valve should always be installed and should be used prior to start up. Minimum Ø of the drain valve socket is 1/4". If during the start phase, there is insufficient air in the airline, and you are unable to adequately fill the tank/pressure vessel, (the valves may remain slightly open), it is necessary to close the air inlet valve to the tank, wait for the pressure to reach 6-7 bar and then re-open the valve quickly. This will ensure that the tank fills quickly also providing significant pressure which ensures the valves remain properly closed.

3) - SPARE PART RECOMMENDATION

- 3.1 - FOR START UP - Minimum quantity of 5% of the supply (min. 1 piece)
 - Pilot Group (pos.1), complete with pilot body, solenoid coil, din connector.
- 3.2 - FOR THE FIRST TWO YEARS OF OPERATION - Minimum quantity of 10% of the supply (min. 2 pieces)
 - Pilot Group (pos.1), complete with pilot body, solenoid coil, din connector.
 - Diaphragms (pos.5 and/or 6)

4) - MAINTENANCE AND REPAIRS

- 4.1 - COMMON PROCESS FOR ALL CONTROLS, MAINTENANCE AND REPAIRS TO BE CONDUCTED:
 - Before conducting any maintenance activity on the system ensure that the components are fully isolated from pressure and power supplies.
 - Replacement or controls relating to diaphragms (pos.5), in reinstalling/re-positioning the diaphragm ensure that the diaphragm bleed is in the correct position lined up with the valve body position. The bleed should fit into the valve body eyelet.
 - Secure the bolts on the top cover to the valve body without over tightening. We recommend the use of a torque wrench to properly secure the bolts: 1,6 Kgm for M6 (3/4" - 1"), 3,8 Kgm for M8 (1 1/2") and 7 Kgm for M10 (2" - 2 1/2" - 3").
 - Substitution of or controls relating to the solenoid pilot: Prior to removing the solenoid pilot, ensure power supply is disconnected. Remove carefully din socket and then remove solenoid coil.
- 4.2 - PERIODICAL MAINTENANCE - Annually check: diaphragm and pilot inspection should be conducted annually:
 - In the case of VNP/VXP models, check the integrity of the electrical connections and the din socket connection to be properly fixed to the solenoid coil
 - In the case of VEM models, check the integrity of all pneumatic connections including pneumatic piping and all pneumatic connections
- 4.3 - MALFUNCTION / TROUBLE SHOOTING: - Proceed with controls and checks below:

DEFECT / FAULT	CONTROL / CHECKS
The valve does not open or vibrates	<ul style="list-style-type: none"> - Verify integrity of the solenoid or that the wires are not damaged - Verify that the electrical connections are properly connected to the valve and that the wiring has been performed correctly - Verify that the outlets from the electronic controller are free from disturbances and within the specified tolerances of +/-10% of the nominal value
The valve remains opens or loses air continuously	<ul style="list-style-type: none"> - Check that the bolts of the top cover are properly secured, in case of diaphragm substitution - Remove the top cover and verify that there are no particulate underneath the diaphragm

DESCRIPTION

300 Series

The **300 SERIES** is a range of diaphragm valve suitable for Dust collector applications, in particular for reverse pulse jet filter cleaning of filter bags, cartridges, envelope filters, ceramic filters and sintered metal fibre filters. The 300 Series valve has the inlet port at 90° to the outlet port. These valves allow a very quick connection, by fitting directly to unthreaded pipes. These valves are available in three models: 3/4", 1", 1 1/2". The 1 1/2" model is available in the single and double diaphragm version. The valves are constructed in die-cast aluminium and have an anodised protection treatment which protects them from corrosive and environmental agents. Bolts and screws are in stainless steel. The 300 Series is available in the following versions:

- VNP, with integrated solenoid pilot
- VEM, with remote pneumatic connection.

Important: The installation of these valves should only be for pneumatic connection and not for mechanical fixing. We suggest that the pipe should butt up to the internal lip of the valve.

Upon request: Integral pilot valves with ATEX Certification: • ATEX II 3 D (94/9/CE) for the above approved model the correct code to use is VEM+PV 24V/DCX (solenoid coil is 24V-DC/12W and Din connector in conformity to the ATEX Directive 94/9/CE) (PLG9-ATEX). Remote pilot valves meet the requirements of: • ATEX II 2 GD when mounted with PXA Pilot or CXD Enclosure (94/9/CE).



GENERAL CHARACTERISTICS

Fluids	Filtered air and oil free
Diaphragm	Standard NBR: -20°C / +120°C
	Optional Viton: -30°C / +200°C
	Nitrile: -40°C / +120°C
Pressure range	From 0,5 to 7,5 bar

CONSTRUCTIVE FEATURES - VALVE

Cover	Die-cast aluminium (Anodised)
Body	Die-cast aluminium (Anodised)
Pilot Base	Brass (Chromed)
Pilot	Stainless Steel
Diaphragm	NBR
Bolts and screws	Stainless steel
Diaphragm Backing disk	Stainless steel
Diaphragm spring	Stainless steel

ELECTRICAL CHARACTERISTICS - SOLENOID

Coil insulation	Class H
Din Socket Connector	Pg9 Connection
Din Socket Standard	EN175301 - 803 / A/ISO 4400
Din Socket Optional	94/9/CE ATEX II 3GD T6
Isolation class Din socket	VDE 0110 - 1/89
Electrical protection	IP65 EN60529
Voltage Range	12V DC (-5%, +20%) 12W
	24V DC (-5%, +20%) 12W
	48 V DC (-10%, +20%) 9W
	110 V DC (-10%, +20%) 12W
	24V 50/60Hz (-10%, +20%) 16/12 VA
	48 V 50/60 Hz (-10%, +20%) 16/12 VA
	110/127 V 50/60 Hz (-10%, +20%) 19/14 VA
	220/240 V 50/60 Hz (-10%, +20%) 19/14 VA
Ambient temperature	-20°C / +60°C

TYPE	Port size Ø	N° Diaph.	Pressure range (bar)		Weight Kg.	Coil	Kv	Cv
			min.	max				
VNP306	3/4"	1	0,5	7,5	0,9	YES	10	11,6
VNP308	1"	1	0,5	7,5	1,2	YES	21	24,4
VNP312	1 1/2"	1	0,5	7,5	2,2	YES	37	43,0
VNP314	1 1/2"	2	0,5	7,5	2,3	YES	47	54,6
VEM306	3/4"	1	0,5	7,5	0,6	NO	10	11,6
VEM308	1"	1	0,5	7,5	0,9	NO	21	24,4
VEM312*	1 1/2"	1	0,5	7,5	1,9	NO	37	43,0
VEM314	1 1/2"	2	0,5	7,5	2	NO	47	54,6

HOW TO ORDER:

VEM/VNP 3 06 110/50

VNP: with integral pilot
VEM: without pilot

3: "300 SERIES"

VALVE CONNECTION DIAMETER:

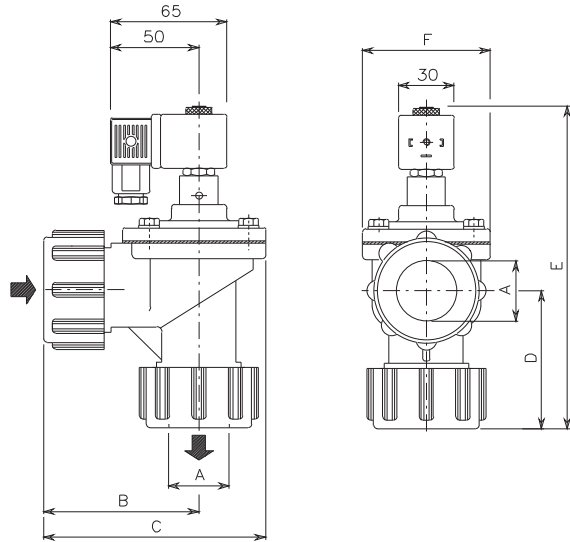
- 06 = 3/4"
- 08 = 1"
- 12 = 1 1/2" (single diaphragm)
- 14 = 1 1/2" (double diaphragm)

Voltage and frequency required.

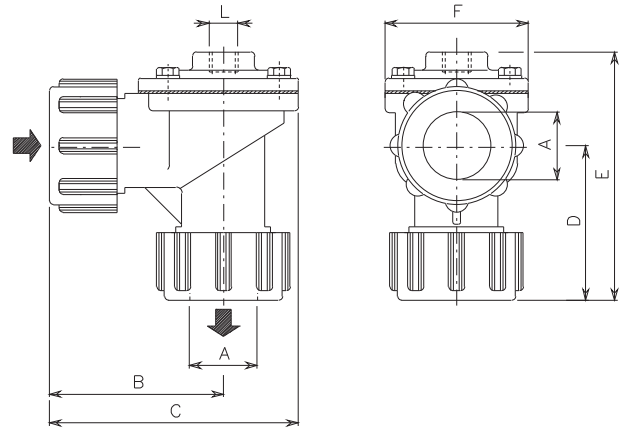
DIMENSIONS

300 Series

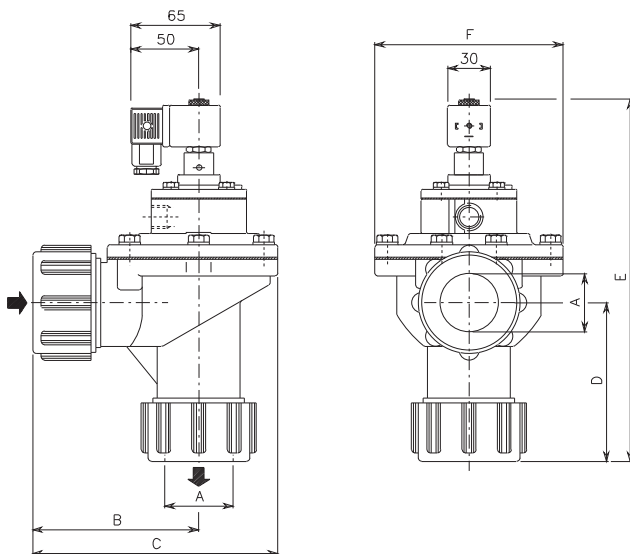
VNP 306 - 308 - 312



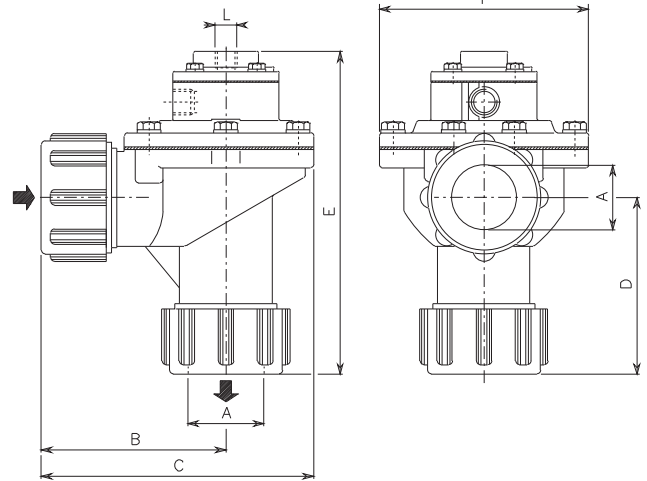
VEM 306 - 308 - 312



VNP 314



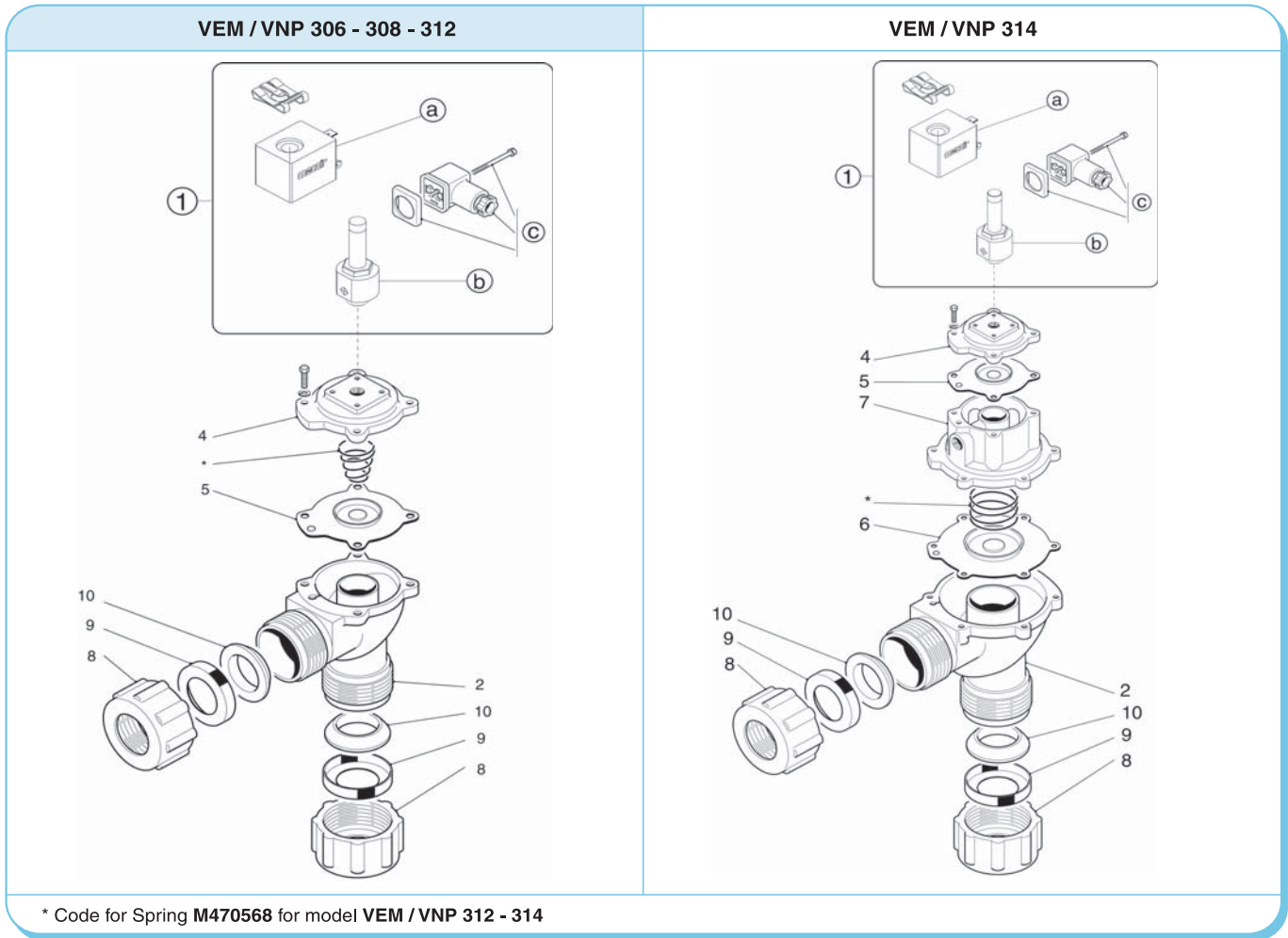
VEM 314



MODEL	Ø A	B	C	D	E	F	Weight Kg.	MODEL	E	Ø L	Weight Kg.	Pressure range (bar)		Diaph. N°
												min	max	
VNP 306	3/4"	77	108	67	167	60	0,90	VEM 306	107	1/4"	0,60	0,5	7,5	1
VNP 308	1"	90	128	80	183	74	1,20	VEM 308	123	1/4"	0,90	0,5	7,5	1
VNP 312	1 1/2"	114	176	99	220	135	2,20	VEM 312	160	1/4"	1,90	0,5	7,5	1
VNP 314	1 1/2"	114	176	99	252	135	2,30	VEM 314	192	1/4"	2	0,5	7,5	2

SPARE PARTS

300 Series



* Code for Spring **M470568** for model **VEM / VNP 312 - 314**

STANDARD Version

POS	DESCRIPTION	CODE
1	a) Solenoid (*)	a) SB3 - ../.. (*)
	b) Pilot group complete with base and ferrule	b) CP1/4
	c) Din Connector PG9EN175301-803 IP65	c) PLG9

(*) Specify Voltage and Frequency

OPTIONAL Version

POS	DESCRIPTION	CODE
1	a) Solenoid	a) SB3 - 24/DCX
	b) Pilot group complete with base and ferrule	b) CP1/4
	c) Din Connector (3GD IP65 T6)	c) PLG9 - ATEX

Version in conformity to European Directive 94/9/CE ATEX (cod. PV-24/DCX)

POS	DESCRIPTION	CODE			
		VEM/VNP306	VEM/VNP308	VEM/VNP312	VEM/VNP314
1	Pilot group complete with solenoid(*) and din connector	PV - ../.. (*)	PV - ../.. (*)	PV - ../.. (*)	PV - ../.. (*)
1+4	Pilot group complete with solenoid(*) and din connector, top cover and screws	PVM06 - ../.. (*)	PVM08 - ../.. (*)	PVM12 - ../.. (*)	PVM06 - ../.. (*)
2	Valve Body	M300203	M300206	M300213	M300213
7	Intermediate cover (Double diaphragm)	-	-	-	M310098
4	Top Cover	M310082	M310086	M310092	M310082
5	Diaphragm	DB 16	DB 18	DB 112	DB 16
6	Diaphragm (Secondary)	-	-	-	DB 114
8	Dresser Nut	M550022	M550024	M550026	M550026
9	Dress nut insert	M620013	M620014	M620015	M620015
10	Conic seal for dresser nut	M330202	M330203	M330204	M330204

(*) Specify Voltage and Frequency

INSTRUCTIONS AND MAINTENANCE

1) - INSTALLATION INSTRUCTIONS

VALVE INLET: Mount valve inlet to tank stub pipe and ensure correctly connected. Valve reference "IN".

VALVE OUTLET: To be connected to blowpipe within the filter. Valve reference "OUT".

SEALING OF BLOWPIPE:

Suited to an unthreaded blowpipe only - The blowpipe must enter into the valve body and secured with the dresser nut.

FLUID:

COMPRESSED AIR - Ensure air supply is clean and dry. (We recommend the installation of compressed air filter units to be installed directly before the pressure vessel, in order to ensure clean and dry is supplied to the diaphragm valve). Operating pressure min/max. 0.5 ÷ 7.5 bar.

AIR INLET PIPE TO HEADER TANK/PRESSURE VESSEL:

Minimum Ø 1" for tanks with a 3/4", 1" o da 1 1/2".

COMPRESSOR:

With the appropriate compressor size being utilised, this ensures the tank can be refilled from 0-2 bar in a few seconds.

PROTECTION FROM RAIN:

Always ensure a small roof/lid is installed on top of the valves and/or electronic controllers as this protects the valves and controllers from exposure to harsh environmental conditions.

ELECTRICAL ON TIMES AND PULSE TIMES:

Average pulse times range from 100ms - 250ms depending on size of the valves being used.

2) - START UP

Before commencing to pulse the valves and to pressurise the tank/pressure vessel, it is important to eliminate all particulate, including dirt, rust, metal shavings, and other types of particulate, which may eventually enter the piping. The draining of any condensation or liquid within the tank/pressure vessel is also important and should be performed prior to pressurising the system. The drain valve should always be installed and should be used prior to start up. Minimum Ø of the drain valve socket is 1/4". If during the start phase, there is insufficient air in the airline, and you are unable to adequately fill the tank/pressure vessel, (the valves may remain slightly open), it is necessary to close the air inlet valve to the tank, wait for the pressure to reach 6 ÷ 7 bar and then re-open the valve quickly. This will ensure that the tank fills quickly also providing significant pressure which ensures the valves remain properly closed.

3) - SPARE PART RECOMMENDATION

3.1 - FOR START UP - Minimum quantity of 5% of the supply (min. 1 piece).

- Pilot Group (pos.1), complete with pilot body, solenoid coil, din connector.

3.2 - FOR THE FIRST TWO YEARS OF OPERATION - Minimum quantity of 10% of the supply (min. 2 pieces).

- Pilot Group (pos.1), complete with pilot body, solenoid coil, din connector.

- Diaphragms (pos.5 and/or 6)

4) - MAINTENANCE AND REPAIRS

4.1 - COMMON PROCESS FOR ALL CONTROLS, MAINTENANCE AND REPAIRS TO BE CONDUCTED:

- Before conducting any maintenance activity on the system ensure that the components are fully isolated from pressure and power supplies
- Replacement or controls relating to diaphragms (pos.5), in reinstalling/re-positioning the diaphragm ensure that the diaphragm bleed is in the correct position lined up with the valve body position. The bleed should fit into the valve body eyelet.
- Secure the bolts on the top cover to the valve body without over tightening. We recommend the use of a torque wrench to properly secure the bolts: o 1,6 kgm for M6 (3/4" - 1"), 3,8 kgm for M8 (1 1/2") and 7 kgm for M10 (1" - 2 1/2" - 3").
- Substitution of or controls relating to the solenoid pilot: and Prior to removing the solenoid pilot, ensure power supply is disconnected. Remove carefully din socket and then remove solenoid coil.

4.2 - PERIODICAL MAINTENANCE - Annually check: Diaphragm and pilot inspection should be conducted annually:

- In the case of VNP/VXP models, check the integrity of the electrical connections and the din socket connection to be properly fixed to the solenoid coil.
- In the case of VEM models, check the integrity of all pneumatic connections including pneumatic piping and all pneumatic connections.

4.3 - MALFUNCTION / TROUBLE SHOOTING: - Proceed with controls and checks below:

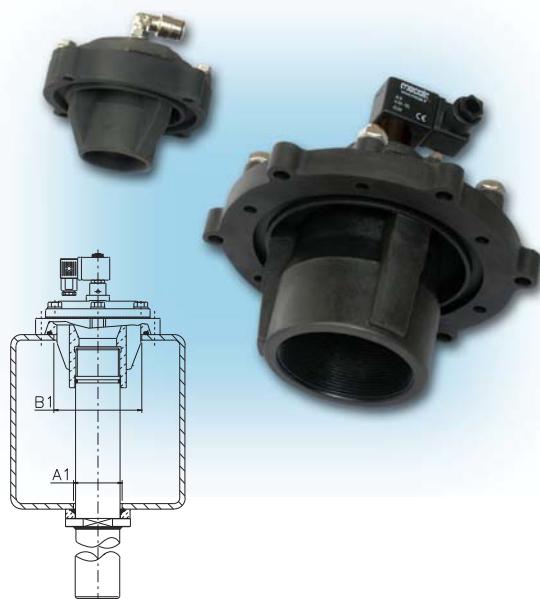
DEFECT / FAULT	CONTROL / CHECKS
The valve does not open or vibrates	<ul style="list-style-type: none"> - Verify integrity of the solenoid or that the wires are not damaged - Verify that the electrical connections are properly connected to the valve and that the wiring has been performed correctly - Verify that the outlets from the electronic controller are free from disturbances and within the specified tolerances of +/-10% of the nominal value
The valve remains opens or loses air continuously	<ul style="list-style-type: none"> - Check that the bolts of the top cover are properly secured, in case of diaphragm substitution - Remove the top cover and verify that there are no particulate underneath the diaphragm

DESCRIPTION

400 Series

The **400 SERIES** valves are suitable for low pressure systems (0.5 ÷ 1.5 bar), and high pressure systems (0.5 ÷ 7.5bar). The Series 400 is a range of diaphragm valve suitable for Dust collector applications, in particular for reverse pulse jet filter cleaning of filter bags, cartridges, envelope filters, ceramic filters and sintered metal fibre filters. These valves have been designed to be installed flat surfaces or square/rectangular tanks. They are called "full immersion" because they draw the compressed air directly from the tank, with higher pneumatic performance. Upon request they can be supplied complete with the blow tube and counter flange. The valve is fixed to the tank with a special counter flange and fixing screws. The 2, 2 1/2" and 3" are all double diaphragm valves; the 1 1/2" model can be single or double diaphragm valve. The valves are constructed in die-cast aluminium and have an anodised protection treatment which protect them from corrosive and environmental agents. Bolts and screws are in stainless steel. The 400 Series is available in the following versions:

- VNP, with integrated solenoid pilot
- VEM, with remote pneumatic connection.



GENERAL CHARACTERISTICS	
Fluids	Filtered air and oil free
Diaphragm	Standard NBR: -20°C / +120°C
	Optional Viton: -30°C / +200°C
	Nitrile: -40°C / +120°C
Pressure range	From 0,5 to 1,5 bar

CONSTRUCTIVE FEATURES - VALVE	
Cover	Die-cast aluminium (Anodised)
Body	Die-cast aluminium (Anodised)
Pilot Base	Brass (Chromed)
Pilot	Stainless Steel
Diaphragm	NBR
Bolts and screws	Stainless steel
Diaphragm Backing disk	Stainless steel
Diaphragm spring	Stainless steel

TYPE	Port size Ø	N° Diaph.	Pressure range (bar)		Weight Kg.	Coil	Kv	Cv
			min.	max				
VNP408	1"	1	0,5	7,5	0,7	YES	26,3	30,6
VNP412	1 1/2"	1	0,5	7,5	1,4	YES	56,2	65,3
VNP414	1 1/2"	2	0,5	7,5	1,45	YES	61,3	71,3
VNP416	2"	2	0,5	7,5	2,3	YES	110	128
VNP420	2 1/2"	2	0,5	7,5	3,3	YES	210	240
VNP424	3"	2	0,5	7,5	3,3	YES	260	300
VEM408	1"	1	0,5	7,5	0,4	NO	26,3	30,6
VEM412*	1 1/2"	1	0,5	7,5	1,1	NO	56,2	65,3
VEM414	1 1/2"	2	0,5	7,5	1,6	NO	61,3	71,3
VEM416	2"	2	0,5	7,5	2	NO	110	128
VEM420	2 1/2"	2	0,5	7,5	3	NO	210	240
VEM424	3"	2	0,5	7,5	3	NO	260	300

ELECTRICAL CHARACTERISTICS - SOLENOID	
Coil insulation	Class H
Din Socket Connector	Pg9 Connection
Din Socket Standard	EN175301 - 803 / A/ISO 4400
Din Socket Optional	94/9/CE ATEX II 3GD T6
Isolation class Din socket	VDE 0110 - 1/89
Electrical protection	IP65 EN60529
Voltage Range	12V DC (-5%, +20%) 12W
	24V DC (-5%, +20%) 12W
	48 V DC (-10%, +20%) 9W
	110 V DC (-10%, +20%) 12W
	24V 50/60Hz (-10%, +20%) 16/12 VA
	48 V 50/60 Hz (-10%, +20%) 16/12 VA
Ambient temperature	110/127 V 50/60 Hz (-10%, +20%) 19/14 VA
	220/240 V 50/60 Hz (-10%, +20%) 19/14 VA
Ambient temperature	-20°C / +60°C

HOW TO ORDER:

VEM/VNP 4 08 110/50

VNP: with integral pilot
VEM: without pilot

4: "400 SERIES"

VALVE CONNECTOR DIAMETER

- 08 = 1"
- 12 = 1 1/2" (single diaphragm)
- 14 = 1 1/2" (double diaphragm)
- 16 = 2"
- 20 = 2 1/2"
- 24 = 3"

Voltage and frequency required.

DIMENSIONS

400 Series

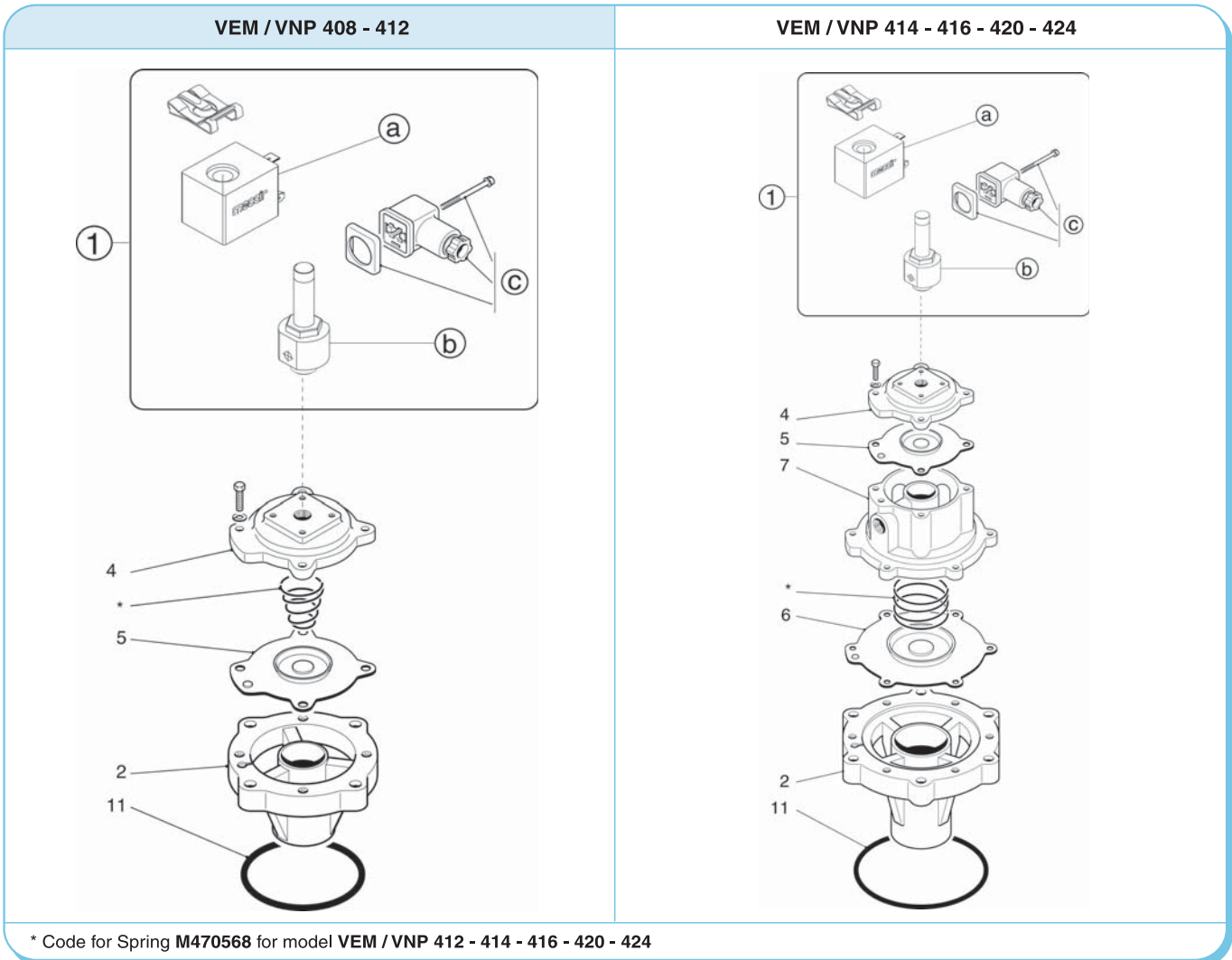
<p>VNP 408 - 412</p>	<p>VEM 408 - 412</p>
<p>VNP 414 - 416 - 420 - 424</p>	<p>VEM 414 - 416 - 420 - 424</p>
<p>VNP 408 - 412</p>	<p>VNP 414 - 416 - 420 - 424</p>

Note: Fix the valve body to the tank using the appropriate eyelets in the valve body

MODEL	Ø A	B	C	D	E	F	G	I	H Ø	N°	M	Weight Kg.	MODEL	E	Ø L	A1	B1	Weight Kg.	N° Diaph.	O-Ring
VNP 408	1"	63	94	114	136	32	18	25	7	4	10	0,7	VEM 408	76	1/4"	36	64	0,4	1	M330370
VNP 412	1 1/2"	94	140	160	155	58	18	39	11	6	14	1,1	VEM 412	95	1/4"	50	95	1,4	1	M330341
VNP 414	1 1/2"	94	140	160	188	58	18	39	11	6	14	1,9	VEM 414	128	1/4"	50	95	1,6	2	M330341
VNP 416	2"	105	175	195	210	62	18	45	11	6	14	2,3	VEM 416	150	1/4"	63	107	2	2	M330342
VNP 420	2 1/2"	128	200	220	228	80	20	40	11	6	14	3,3	VEM 420	168	1/4"	78	130	3	2	M330343
VNP 424	3"	128	200	220	228	80	20	50	11	6	14	3,3	VEM 424	168	1/4"	90	130	3	2	M330343

SPARE PARTS

400 Series



STANDARD Version

OPTIONAL Version

Standard	POS	DESCRIPTION	CODE
	1	a) Solenoid (*) b) Pilot group complete with base and ferrule c) Din Connector PG9EN175301-803 IP65	a) SB3 - ../* (*) b) CP1/4 c) PLG9

(*) Specify Voltage and Frequency

Optional	POS	DESCRIPTION	CODE
	1	a) Solenoid (*) b) Pilot group complete with base and ferrule c) Din Connector (3GD IP65 T6)	a) SB3 - 24/DCX b) CP1/4 c) PLG9 - ATEX

Version in conformity to European Directive 94/9/CE ATEX (cod. PV-24/DCX)

POS	DESCRIPTION	CODE					
		VEM/VNP408	VEM/VNP412	VEM/VNP414	VEM/VNP416	VEM/VNP420	VEM/VNP424
1	Pilot group complete with solenoid (*) and din connector	PV - ../* (*)	PV - ../* (*)	PV - ../* (*)	PV - ../* (*)	PV - ../* (*)	PV - ../* (*)
1+4	Pilot group complete with solenoid (*), din connector, top cover and screws	PVM08 - ../* (*)	PVM12 - ../* (*)	PVM06 - ../* (*)	PVM06 - ../* (*)	PVM06 - ../* (*)	PVM06 - ../* (*)
2	Valve Body	M300207	M300214	M300214	M300220	M300235	M300239
7	Intermediate cover (Double diaphragm)	-	-	M3100098	M310100	M310101	M310101
4	Top Cover	M310086	M310092	M310082	M310082	M310082	M310082
5	Diaphragm	DB 18	DB 112	DB 16	DB 16	DB 16	DB 16
6	Diaphragm (Secondary)	-	-	DB 114	DB 116	DB 120	DB 120
11	O-Rings	M330370	M330341	M330341	M330342	M330343	M330343

(*) Specify Voltage and Frequency

INSTRUCTIONS AND MAINTENANCE

1) - INSTALLATION INSTRUCTIONS

VALVE INLET: Valve body mounted directly on tank, ensuring fixing bolts are used to secure valve body on tank.

VALVE OUTLET: Valve body connected via the outlet pipe on the opposite end with appropriate counter flange.

SECURING OF OUTLET PIPE:

Note: Please ensure that the valve is properly fixed to the tank with the outlet pipe, counter flanges and fixing bolts for the valve body to the tank. The fixing of the valve body via the outlet pipe should be performed in accordance to the following torque dimensions: 10kgm for the 1" valve, 18 kgm for the 1 1/2" and 30 kgm for the 2" valve.

FLUID:

COMPRESSED AIR - Ensure air supply is clean and dry. (We recommend the installation of compressed air filter units to be installed directly before the pressure vessel, in order to ensure clean and dry is supplied to the diaphragm valve). Operating pressure min/max. 0.5 ÷ 7.5 bar.

AIR INLET PIPE TO HEADER TANK/PRESSURE VESSEL:

Minimum Ø 1" for tanks with a 1" valve or 1 1/2" valves.

We always recommend to use air inlet pipe to tank to be the same size as the diameter of valve being used, or the next available size down. This ensures that the air supply to the tank is sufficient to allow the tank to refill in as short a time as possible. With the correct volume of air in the tank, this ensures the correct and efficient functioning of the diaphragm valve without any waste of compressed air.

COMPRESSOR:

With the appropriate compressor size being utilised, this ensures the tank can be refilled from 0-2 bar in a few seconds.

PROTECTION FROM RAIN:

Always ensure a small roof/lid is installed on top of the valves and/or electronic controllers as this protects the valves and controllers from exposure to harsh environmental conditions.

ELECTRICAL ON TIMES AND PULSE TIMES:

Average pulse times range from 100 ms - 250 ms depending on size of the valves being used.

2) - START UP

Before commencing to pulse the valves and to pressurise the tank/pressure vessel, it is important to eliminate all particulate, including dirt, rust, metal shavings, and other types of particulate, which may eventually enter the piping. The draining of any condensation or liquid within the tank/pressure vessel is also important and should be performed prior to pressurising the system. The drain valve should always be installed and should be used prior to start up. Minimum Ø of the drain valve socket is 1/4". If during the start phase, there is insufficient air in the airline, and you are unable to adequately fill the tank/pressure vessel, (the valves may remain slightly open), it is necessary to close the air inlet valve to the tank, wait for the pressure to reach 6-7 bar and then re-open the valve quickly. This will ensure that the tank fills quickly also providing significant pressure which ensures the valves remain properly closed.

3) - SPARE PART RECOMMENDATION

- 3.1 - FOR START UP - Minimum quantity of 5% of the supply (min. 1 piece).
 - Pilot Group (pos.1), complete with pilot body, solenoid coil, din connector.
- 3.2 - FOR THE FIRST TWO YEARS OF OPERATION - Minimum quantity of 10% of the supply (min. 2 pieces).
 - Pilot Group (pos.1), complete with pilot body, solenoid coil, din connector.
 - Diaphragms (pos.5 and/or 6)

4) - MAINTENANCE AND REPAIRS

- 4.1 - COMMON PROCESSOR FOR ALL CONTROLS, MAINTENANCE AND REPAIRS TO BE CONDUCTED:
 - Before conducting any maintenance activity on the system ensure that the components are fully isolated from pressure and power supplies.
 - Replacement or controls relating to diaphragms (pos.5), in reinstalling/re-positioning the diaphragm ensure that the diaphragm bleed is in the correct position lined up with the valve body position. The bleed should fit into the valve body eyelet.
 - Secure the bolts on the top cover to the valve body without over tightening. We recommend the use of a torque wrench to properly secure the bolts: 1,6 kgm for M6 (3/4" - 1"), 3,8 kgm for M8 (1 1/2") and 7 kgm for M10 (2" - 2 1/2" - 3").
 - Substitution of or controls relating to the solenoid pilot: Prior to removing the solenoid pilot, ensure power supply is disconnected. Remove carefully din socket and then remove solenoid coil.
- 4.2 - PERIODICAL MAINTENANCE - Annually check:
 - In the case of VNP/VXP models, check the integrity of the electrical connections and the din socket connection to be properly fixed to the solenoid coil.
 - In the case of VEM models, check the integrity of all pneumatic connections including pneumatic piping and all pneumatic connections.
- 4.3 - MALFUNCTION / TROUBLE SHOOTING: - Proceed with controls and checks below:

DEFECT / FAULT	CONTROL / CHECKS
The valve does not open or vibrates	<ul style="list-style-type: none"> - Verify integrity of the solenoid or that the wires are not damaged. - Verify that the electrical connections are properly connected to the valve and that the wiring has been performed correctly. - Verify that the outlets from the electronic controller are free from disturbances and within the specified tolerances of +/-10% of the nominal value.
The valve remains opens or loses air continuously	<ul style="list-style-type: none"> - Check that the bolts of the top cover are properly secured, in case of diaphragm substitution. - Remove the top cover and verify that there are no particulate underneath the diaphragm.

DESCRIPTION

600 / 700 Series

The **600 and 700 SERIES** is a range of high performance diaphragm valves, suitable for Dust collector applications, in particular for reverse pulse jet filter cleaning of filter bags, cartridges, envelope filters, ceramic filters and sintered metal fibre filters. These valves, due to their inlet port larger than the outlet port, create a Venturi effect by causing a high flow rate at the outlet. The inlet is provided with a square flange designed for the coupling with a counter flange (optional) and stub pipe which are welded directly to the tank. The outlet is equipped with a quick connection fitting for the blow tube. The valves are constructed in die-cast aluminium and have an anodised protection treatment which protect them from corrosive and environmental agents. Bolts and screws are in stainless steel. The 600 and 700 Series are available in the following versions:

- VNP, with integrated solenoid pilot
- VEM, with remote pneumatic connection.



GENERAL CHARACTERISTICS		
Fluids	Filtered air and oil free	
Diaphragm	Standard NBR: -20°C / +120°C Optional Viton: -30°C / +200°C Nitrile: -40°C / +120°C	
	Pressure range	From 0,5 to 7,5 bar

CONSTRUCTIVE FEATURES - VALVE	
Cover	Die-cast aluminium (Anodised)
Body	Die-cast aluminium (Anodised)
Pilot Base	Brass (Chromed)
Pilot	Stainless Steel
Diaphragm	NBR
Bolts and screws	Stainless steel
Diaphragm Backing disk	Stainless steel
Diaphragm spring	Stainless steel

TYPE	Port Size Ø		N° Diaph.	Pressure Range (bar)		Weight Kg.	Coil	Kv	Cv
	IN	OUT		min.	max				
VNP608	2"	1"	1	0,5	7,5	0,55	YES	10	11,6
VNP708	2"	1 1/2"	1	0,5	7,5	0,65	YES	21	24,4
VNP614	2 1/2"	1 1/2"	2	0,5	7,5	1,4	YES	37	43,0
VNP714	2 1/2"	2"	2	0,5	7,5	1,5	YES	44	51,2
VNP616	3"	2"	2	0,5	7,5	2,5	YES	78	90,7
VNP716	3"	2 1/2"	2	0,6	7,5	3,3	YES	96	112
VNP720	3 1/2"	3"	2	0,6	5	7,55	YES	308	358
VEM608	2"	1"	1	0,5	7,5	0,25	NO	10	11,6
VEM708	2"	1 1/2"	1	0,5	7,5	0,35	NO	21	24,4
VEM614	2 1/2"	1 1/2"	2	0,5	7,5	1,1	NO	37	43,0
VEM714	2 1/2"	2"	2	0,5	7,5	1,2	NO	44	51,2
VEM616	3"	2"	2	0,5	7,5	2,2	NO	78	90,7
VEM716	3"	2 1/2"	2	0,6	7,5	3	NO	96	112
VEM720	3 1/2"	3"	2	0,6	5	7,2	NO	308	358

ELECTRICAL CHARACTERISTICS - SOLENOID	
Coil insulation	Class H
Din Socket Connector	Pg9 Connection
Din Socket Standard	EN175301 - 803 / A/ISO 4400
Din Socket Optional	94/9/CE ATEX II 3GD T6
Isolation class Din socket	VDE 0110 - 1/89
Electrical protection	IP65 EN60529
Voltage Range	12V DC (-5%, +20%) 12W
	24V DC (-5%, +20%) 12W
	48 V DC (-10%, +20%) 9W
	110 V DC (-10%, +20%) 12W
	24V 50/60Hz (-10%, +20%) 16/12 VA
	48 V 50/60 Hz (-10%, +20%) 16/12 VA
Ambient temperature	110/127 V 50/60 Hz (-10%, +20%) 19/14 VA
	220/240 V 50/60 Hz (-10%, +20%) 19/14 VA
Ambient temperature	-20°C / +60°C

HOW TO ORDER:

VEM/VNP 6 08 110/50

VNP: with integral pilot
VEM: without pilot

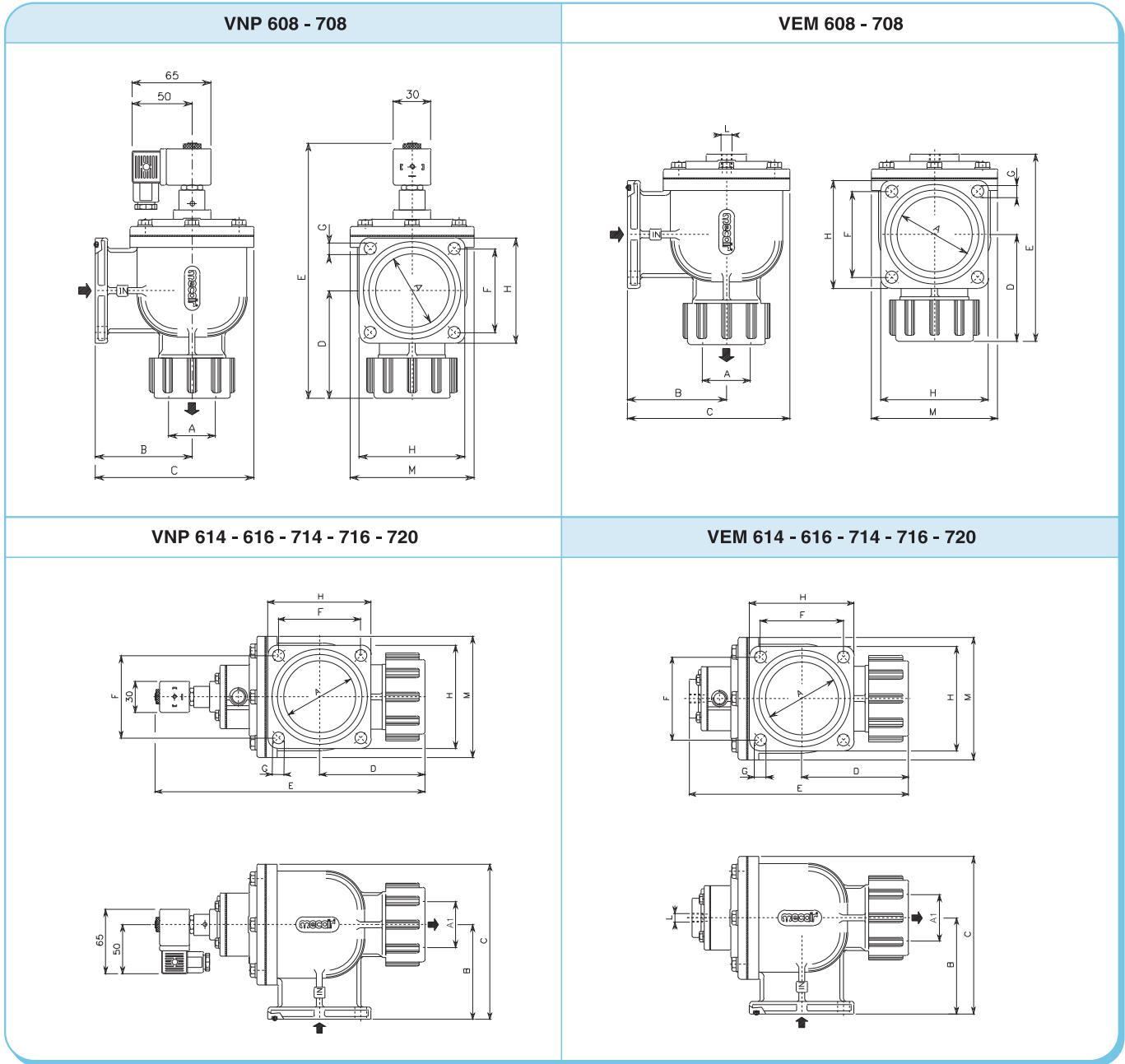
6: 600 SERIES
7: 700 SERIES

VALVE CONNECTOR DIAMETER
• 08 = 1" - 1 1/2"
• 14 = 1 1/2" - 2"
• 16 = 2" - 2 1/2"
• 20 = 3"

Voltage and frequency required.

DIMENSIONS

600 / 700 Series

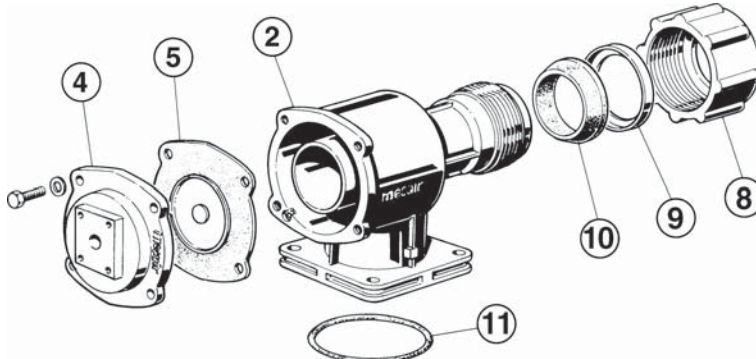
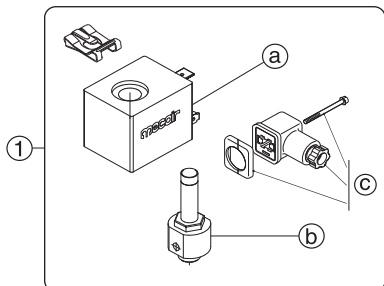


MODEL	Ø A	Ø A1	B	C	D	E	F	G	Ø H	M	Weight Kg.	MODEL	E	Ø L	Weight Kg.	N° Diaph.	O-Ring
VNP 608	2"	1"	81	125	110	225	60	9	83	90	1,5	VEM 608	180	1/4"	1,2	1	OR6250
VNP 614	2 1/2"	1 1/2"	96	160	130	305	72	11,5	95	140	2,2	VEM 614	245	1/4"	1,9	2	OR178
VNP 616	3"	2"	110	185	140	330	85	13,5	110	165	2,8	VEM 616	270	1/4"	2,5	2	OR6350
VNP 708	2"	1 1/2"	81	125	110	255	60	11,5	83	90	1,5	VEM 708	180	1/4"	1,2	1	OR6250
VNP 714	2 1/2"	2"	96	160	130	305	72	13,5	95	140	2,2	VEM 714	245	1/4"	1,9	2	OR178
VNP 716	3"	2 1/2"	110	185	140	330	85	13,5	110	165	2,8	VEM 716	270	1/4"	2,5	2	OR6350
VNP 720	3 1/2"	3"	125	215	165	360	94	13,5	120	190	3,7	VEM 720	300	1/4"	3,4	2	OR189

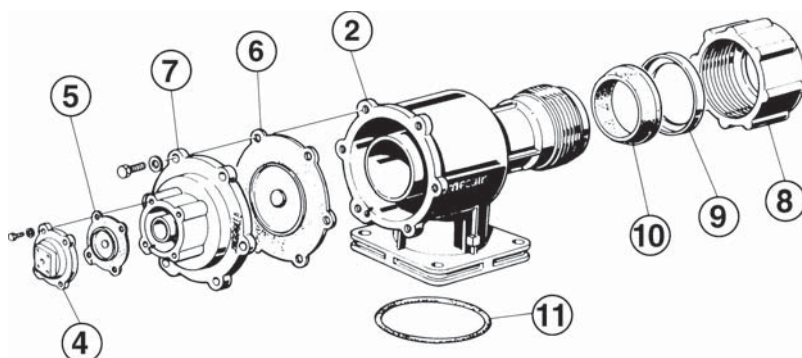
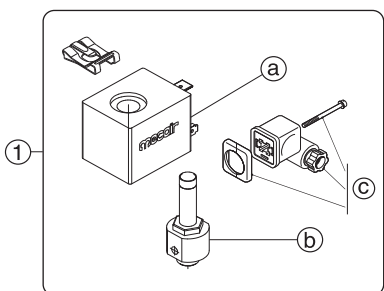
SPARE PARTS

600 / 700 Series

VEM / VNP 608 - 708



VEM / VNP 614 - 714 - 616 - 716 - 720



* Code for Spring M470568 for model VEM / VNP 612 - 712 - 614 - 714 - 616 - 716 - 720

STANDARD Version

OPTIONAL Version

Standard	POS	DESCRIPTION	CODE
	1	a) Solenoid (*) b) Pilot group complete with base and ferrule c) Din Connector PG9EN175301-803 IP65	a) SB3 - ../.. (*) b) CP1/4 c) PLG9

Optional	POS	DESCRIPTION	CODE
	1	a) Solenoid b) Pilot group complete with base and ferrule c) Din Connector (3GD IP65 T6)	a) SB3 - 24/DCX b) CP1/4 c) PLG9 - ATEX

(*) Specify Voltage and Frequency

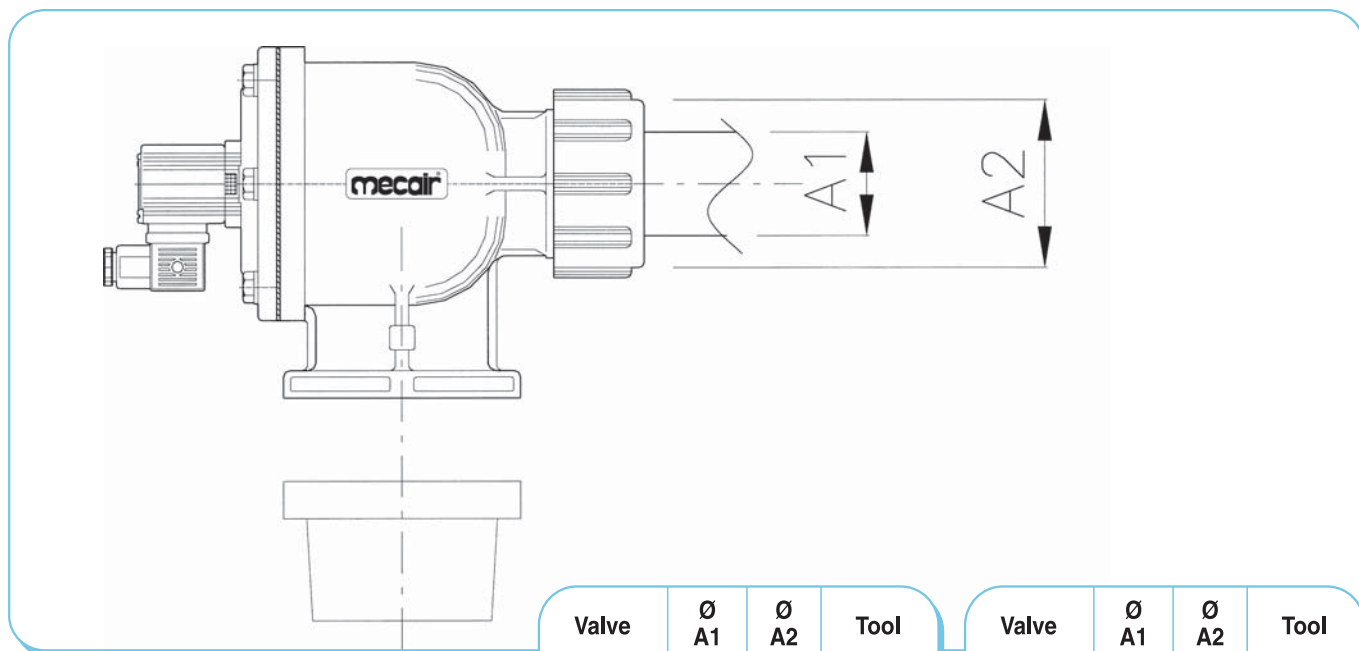
Version in conformity to European Directive 94/9/CE ATEX (cod. PV-24/DCX)

POS	DESCRIPTION	CODE						
		VEM/VNP608	VEM/VNP708	VEM/VNP614	VEM/VNP714	VEM/VNP616	VEM/VNP716	VEM/VNP720
1	Pilot group complete with solenoid (*) and din connector	PV - ../.. (*)	PV - ../.. (*)	PV - ../.. (*)	PV - ../.. (*)	PV - ../.. (*)	PV - ../.. (*)	PV - ../.. (*)
1+4	Pilot group complete with solenoid (*), din connector, top cover and screws	PVF08 - ../.. (*)	PVF08 - ../.. (*)	PVM06 - ../.. (*)	PVM06 - ../.. (*)	PVM06 - ../.. (*)	PVM06 - ../.. (*)	PVM06 - ../.. (*)
2	Valve Body	M300273	M300274	M300272	M300275	M300279	M300276	M300278
7	Intermediate cover (Double diaphragm)	-	-	M310098	M310098	M310100	M310100	M310101
4	Top Cover	M310142	M310142	M310082	M310082	M310082	M310082	M310082
5	Diaphragm	DB18M	DB18M	DB16	DB16	DB16	DB16	DB16
6	Diaphragm (Secondary)	-	-	DB114	DB114	DB116	DB116	DB120
8	Dresser Nut	M550024	M550026	M550026	M550018	M550018	M550020	M550031
9	Dresser Nut Insert	M620014	M620015	M620015	M620023	M620023	M620033	M620032
10	Conic Seal for Dresser Nut	M330203	M330204	M330204	M330292	M330292	M330310	M330305
11	O-Ring for flanged valve	M330018	M330018	M330019	M330019	M330311	M330311	M330270

(*) Specify Voltage and Frequency

FLANGED VALVE WITH INCREASED FLOW RATE

600 / 700 Series



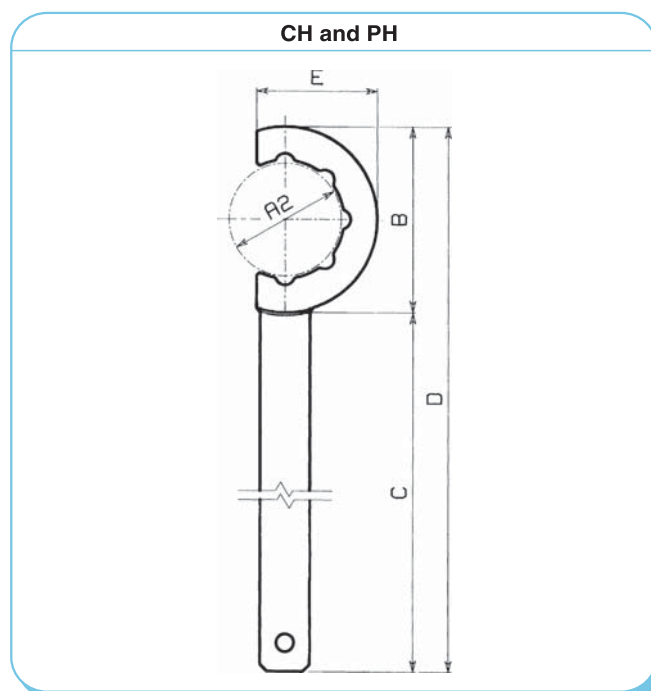
Valve	Ø A1	Ø A2	Tool
608	1"	61	CH08
612	1 1/2"	82	CH14
614	1 1/2"	82	CH14
616	2"	95	CH16
620	2 1/2"	115	CH20

Valve	Ø A1	Ø A2	Tool
708	1 1/2"	82	CH14
712	2"	95	CH16
714	2"	95	CH16
716	2 1/2"	115	CH20
720	3"	128	CH24

MOUNTING TOOL "CH"

MODEL	Ø A1	Ø A2	Ø B	C	D	E	Weight Kg
CH08	1"	61	100	250	350	68	0,44
CH14	1 1/2"	82	130	300	430	85	0,7
CH16	2"	95	150	350	500	100	0,78
CH20	2 1/2"	115	170	350	520	110	0,8

MODEL	Ø A1	Ø A2	Ø B	C	D	E	Weight Kg
CH14	1 1/2"	82	130	300	430	85	0,7
CH16	2"	95	150	350	500	100	0,78
CH20	2 1/2"	115	170	350	520	110	0,8
CH24	3"	128	190	350	540	120	0,9



INSTRUCTIONS AND MAINTENANCE

600 / 700 Series

1) - INSTALLATION INSTRUCTIONS

VALVE INLET: Mount valve inlet to flange or flanged pipe - Valve reference Flange "IN".
VALVE OUTLET: To be connected to blowpipe within the filter. Quick Fit connection "OUT".

SEALING OF BLOWPIPE:

Suited to an unthreaded blowpipe only - The blowpipe must enter into the valve body and secured with the dresser nut.

FLUID:

COMPRESSED AIR - Ensure air supply is clean and dry. (We recommend the installation of compressed air filter units to be installed directly before the pressure vessel, in order to ensure clean and dry is supplied to the diaphragm valve). Operating pressure min/max. 0,5 ÷ 7,5 bar.

AIR INLET PIPE TO HEADER TANK/PRESSURE VESSEL:

Minimum Ø 1" for tanks with a 1" valve or 1 1/2" valves.

COMPRESSOR:

With the appropriate compressor size being utilised, this ensures the tank can be refilled from 0-2 bar in a few seconds.

PROTECTION FROM RAIN:

Always ensure a small roof/lid is installed on top of the valves and/or electronic controllers as this protects the valves and controllers from exposure to harsh environmental conditions.

ELECTRICAL ON TIMES AND PULSE TIMES:

Average pulse times range from 100ms - 250ms depending on size of the valves being used.

2) - START UP

Before commencing to pulse the valves and to pressurise the tank/pressure vessel, it is important to eliminate all particulate, including dirt, rust, metal shavings, and other types of particulate, which may eventually enter the piping. The draining of any condensation or liquid within the tank/pressure vessel is also important and should be performed prior to pressurising the system. The drain valve should always be installed and should be used prior to start up. Minimum Ø of the drain valve socket is 1/4". If during the start phase, there is insufficient air in the airline, and you are unable to adequately fill the tank/pressure vessel, (the valves may remain slightly open), it is necessary to close the air inlet valve to the tank, wait for the pressure to reach 6 - 7 bar and then re-open the valve quickly. This will ensure that the tank fills quickly also providing significant pressure which ensures the valves remain properly closed.

3) - SPARE PART RECOMMENDATION

- 3.1 - **FOR START UP** - Minimum quantity of 5% of the supply (min. 1 piece).
 - Pilot Group (pos.1), complete with pilot body, solenoid coil, din connector.
- 3.2 - **FOR THE FIRST TWO YEARS OF OPERATION** - Minimum quantity of 10% of the supply (min. 2 pieces).
 - Pilot Group (pos.1), complete with pilot body, solenoid coil, din connector.
 - Diaphragms (pos.5 and/or 6).

4) - MAINTENANCE AND REPAIRS

4.1 - COMMON PROCESS FOR ALL CONTROLS MAINTENANCE AND REPAIRS TO BE CONDUCTED:

- Before conducting any maintenance activity on the system ensure that the components are fully isolated from pressure and power supplies
- Replacement or controls relating to diaphragms (pos.5), in reinstalling/re-positioning the diaphragm ensure that the diaphragm bleed is in the correct position lined up with the valve body position. The bleed should fit into the valve body eyelet.
- Secure the bolts on the top cover to the valve body without over tightening. We recommend the use of a torque wrench to properly secure the bolts: **1,6 kgm** for **M6** (3/4" - 1"), **3,8 kgm** for **M8** (1 1/2") and **7 kgm** for **M10** (2" - 2 1/2" - 3").
- Substitution of or controls relating to the solenoid pilot: Prior to removing the solenoid pilot, ensure power supply is disconnected. Remove carefully din socket and then remove solenoid coil.

4.2 - PERIODICAL MAINTENANCE - Annually check:

- In the case of **VNP/VXP** models, check the integrity of the electrical connections and the din socket connection to be properly fixed to the solenoid coil.
- In the case of **VEM** models, check the integrity of all pneumatic connections including pneumatic piping and all pneumatic connections.

4.3 - MALFUNCTION / TROUBLE SHOOTING: - Proceed with controls and checks below:

DEFECT / FAULT	CONTROL / CHECKS
The valve does not open or vibrates	<ul style="list-style-type: none"> - Verify integrity of the solenoid or that the wires are not damaged. - Verify that the electrical connections are properly connected to the valve and that the wiring has been performed correctly. - Verify that the outlets from the electronic controller are free from disturbances and within the specified tolerances of +/-10% of the nominal value.
The valve remains opens or loses air continuously	<ul style="list-style-type: none"> - Check that the bolts of the top cover are properly secured, in case of diaphragm substitution. - Remove the top cover and verify that there are no particulate underneath the diaphragm.

DESCRIPTION

The **200 SERIES** in Stainless Steel is a range of diaphragm valve suitable for Dust collector applications, in particular for reverse pulse jet filter cleaning of filter bags, cartridges, envelope filters, ceramic filters and sintered metal fibre filters. The 200 Series valve has the inlet port at 90° to the outlet port. The range includes two models, which comprises a 1" valve and the 1 1/2" size valve. Both models have a single diaphragm. The inlet and outlet ports have threaded female gas connections. The 200 Series valves in Stainless Steel, are manufactured in AISI316L. These valves are particularly appropriate for installation in aggressive environments where there is risk of corrosion. Chemical processes, off-shore refineries and plants, and in nuclear environments are just some typical applications where the series 200 valve in stainless steel can be mounted. With a special diaphragm which has FDA Accreditation/Approval, the stainless steel valve can also be installed in special environments including, pharmaceutical, food and grain, wheat and flour, and in any other environment where food grade or medical is required. The Series 200 in Stainless Steel is available in 2 versions:

- VXP, with solenoid pilot mounted on board
- VXM, which can be utilised with a remote pneumatic connection

200 Series AISI



- only 1" valve using a CSN or CXD Enclosure, or alternatively for both models, 1" and 1 1/2" valves, with explosion proof pilot mounted on board. Explosion proof pilot with ATEX Certification is also available in stainless steel - AISI316L.

GENERAL CHARACTERISTICS	
Fluids	Filtered air and oil free
Diaphragm	Standard NBR: -20°C / +120°C
	Optional Viton: -30°C / +200°C
	Nitrile: -40°C / +120°C
	FDA PTFE/Gylon: -260°C / +260°C
	EPDM: -40°C / +160°C
Pressure range	From 0,5 to 7,5 bar

CONSTRUCTIVE FEATURES - VALVE	
Cover	AISI 316L
Body	AISI 316L
Pilot	Stainless steel
Spring	Stainless steel
Bolts and screws	Stainless steel
Diaphragm Backing disk	Stainless steel

TYPE	Port size Ø	N° Diaph.	Pressure range (bar)		Weight Kg.	Coil	Kv	Cv
			min.	max				
VXP208	1"	1	0,5	7,5	1,13	YES	21	24,4
VXP212	1 1/2"	1	0,5	7,5	2,67	YES	37	43,0
VXM208	1"	1	0,5	7,5	0,85	NO	21	24,4
VXM212	1 1/2"	1	0,5	7,5	2,39	NO	37	43,0

ELECTRICAL CHARACTERISTICS - SOLENOID	
Coil insulation	Class H
Din Socket Connector	Pg9 Connection
Din Socket Standard	EN175301 - 803 / A/ISO 4400
Din Socket Optional	94/9/CE ATEX II 2GD T4 IP67
Isolation class Din socket	VDE 0110 - 1/89
Electrical protection	IP65 EN60529
	24V AC - 50Hz
	24V AC - 60Hz
Voltage Range	110/220V AC - 50/60Hz
	24/110V DC
Power absorption	19 VA / AC
	15 W / DC
Ambient temperature	-20°C / +60°C

HOW TO ORDER:

VXM/VXP 2 08 110/50

VNP: with integral pilot
VEM: without pilot

2: "200 SERIES"

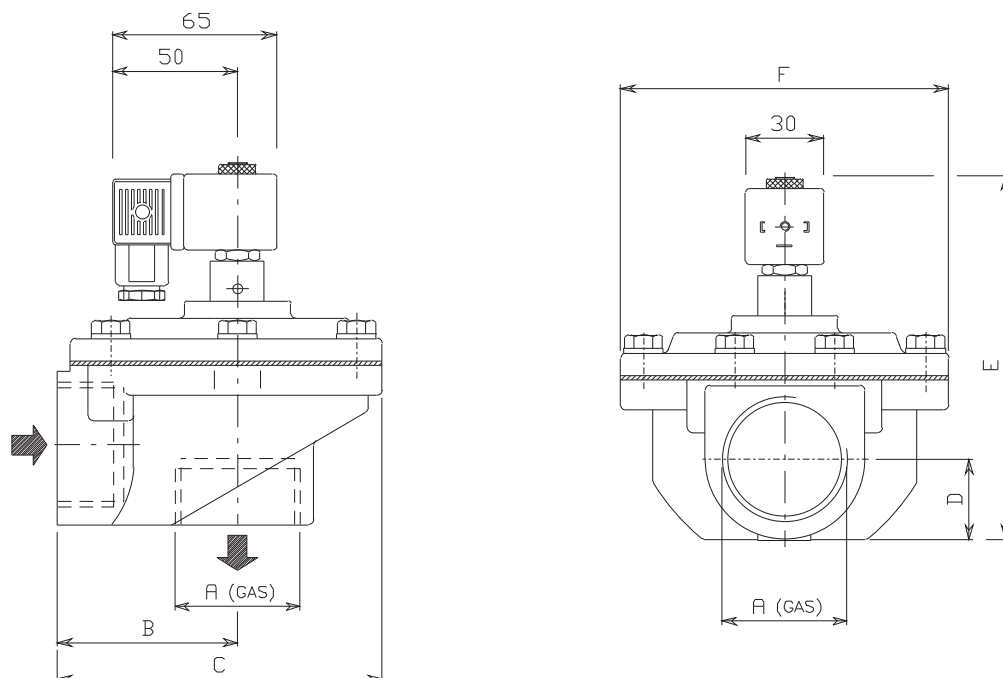
VALVE CONNECTION DIAMETER:
• 08 = 1"
• 12 = 1 1/2"

Voltage and frequency required.

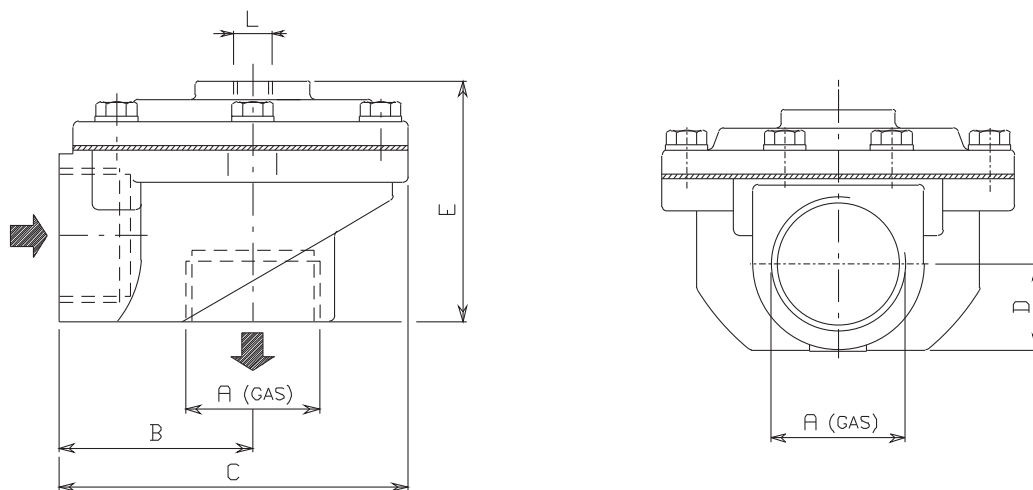
DIMENSIONS

200 Series AISI

VXP 208 - 212



VXM 208 - 212



MODEL	Ø A	B	C	D	E	F	Weight Kg.	MODEL	E	Ø L	Weight Kg.	Pressure range (bar)		N° Diaph.
												min	max	
VXP 208	1"	52	90	23	135	74	1,13	VXM 208	60	1/4"	0,85	0,5	7,5	1
VXP 212	1 1/2"	72	130	31	60	135	2,67	VXM 212	85	1/4"	2,39	0,5	7,5	1

SPARE PARTS

200 Series AISI

VXP 208 - 212	VXM 208 - 212
<p>* Code for Spring M470568 only for model VXM / VXP 212</p>	

STANDARD Version

Standard	POS	DESCRIPTION	CODE
	1	a) Solenoid (*) b) Pilot group complete with fixing screws c) Din Connector PG9 EN175301-803 IP65	a) SB3 - .. (*) b) ESL8V c) PLG9

(*) Specify Voltage and Frequency

POS	DESCRIPTION	CODE	
		VXM / VXP208	VXM / VXP212
1	(B) Pilot group complete with fixing screws	ESL8V	ESL8V
4	Top Cover	M310090	M310096
5	Diaphragm	DB181	DB1121
2	Valve Body	M300209	M300216

(*) Specify Voltage and Frequency

INSTRUCTIONS AND MAINTENANCE

200 Series AISI

1) - INSTALLATION INSTRUCTIONS

VALVE INLET: Mount valve inlet to tank stub pipe and ensure correctly connected. Valve reference "IN".

VALVE OUTLET: To be connected to blowpipe within the filter. Valve reference "OUT".

SEALING OF BLOWPIPE:

Suited to a threaded blowpipe only - The pipe must not enter entirely into the valve body, but must be blocked with a counter nut to properly fix the blowpipe to the valve outlet.

FLUID:

COMPRESSED AIR - Ensure air supply is clean and dry. (We recommend the installation of compressed air filter units to be installed directly before the pressure vessel, in order to ensure clean and dry is supplied to the diaphragm valve). Operating pressure min/max. 0.5 ÷ 7.5 bar.

AIR INLET PIPE TO HEADER TANK/PRESSURE VESSEL:

Minimum Ø 1" for tanks with a 1" valve or 1 1/2" valves.

COMPRESSOR:

With the appropriate compressor size being utilised, this ensures the tank can be refilled from 0-2 bar in a few seconds.

PROTECTION FROM RAIN:

Always ensure a small roof/lid is installed on top of the valves and/or electronic controllers as this protects the valves and controllers from exposure to harsh environmental conditions.

ELECTRICAL ON TIMES AND PULSE TIMES:

Average pulse times range from 100ms - 250ms depending on size of the valves being used.

2) - START UP

Before commencing to pulse the valves and to pressurise the tank/pressure vessel, it is important to eliminate all particulate, including dirt, rust, metal shavings, and other types of particulate, which may eventually enter the piping. The draining of any condensation or liquid within the tank/pressure vessel is also important and should be performed prior to pressurising the system. The drain valve should always be installed and should be used prior to start up. Minimum Ø of the drain valve socket is 1/4". If during the start phase, there is insufficient air in the airline, and you are unable to adequately fill the tank/pressure vessel, (the valves may remain slightly open), it is necessary to close the air inlet valve to the tank, wait for the pressure to reach 6-7 bar and then re-open the valve quickly. This will ensure that the tank fills quickly also providing significant pressure which ensures the valves remain properly closed.

3) - SPARE PART RECOMMENDATION

- 3.1 - **FOR START UP** - Minimum quantity of 5% of the supply (min. 1 piece).
 - Pilot Group (pos.1), complete with pilot body, solenoid coil, din connector.
- 3.2 - **FOR THE FIRST TWO YEARS OF OPERATION** - Minimum quantity of 10% of the supply (min. 2 pieces).
 - Pilot Group (pos.1), complete with pilot body, solenoid coil, din connector.
 - Diaphragms (pos.5) for single diaphragm valves.

4) - MAINTENANCE AND REPAIRS

4.1 - COMMON PROCESS FOR ALL CONTROLS, MAINTENANCE AND REPAIRS TO BE CONDUCTED:

- Before conducting any maintenance activity on the system ensure that the components are fully isolated from pressure and power supplies.
- Replacement or controls relating to diaphragms (pos.5), in reinstalling/re-positioning the diaphragm ensure that the diaphragm bleed is in the correct position lined up with the valve body position. The bleed should fit into the valve body eyelet.
- Secure the bolts on the top cover to the valve body without over tightening. We recommend the use of a torque wrench to properly secure the bolts: 1,6 kgm for M6 (3/4" - 1"), 3,8 kgm for M8 (1 1/2") and 7 kgm for M10 (2" - 2 1/2" - 3").
- Substitution of or controls relating to the solenoid pilot: Prior to removing the solenoid pilot, ensure power supply is disconnected. Remove carefully din socket and then remove solenoid coil.

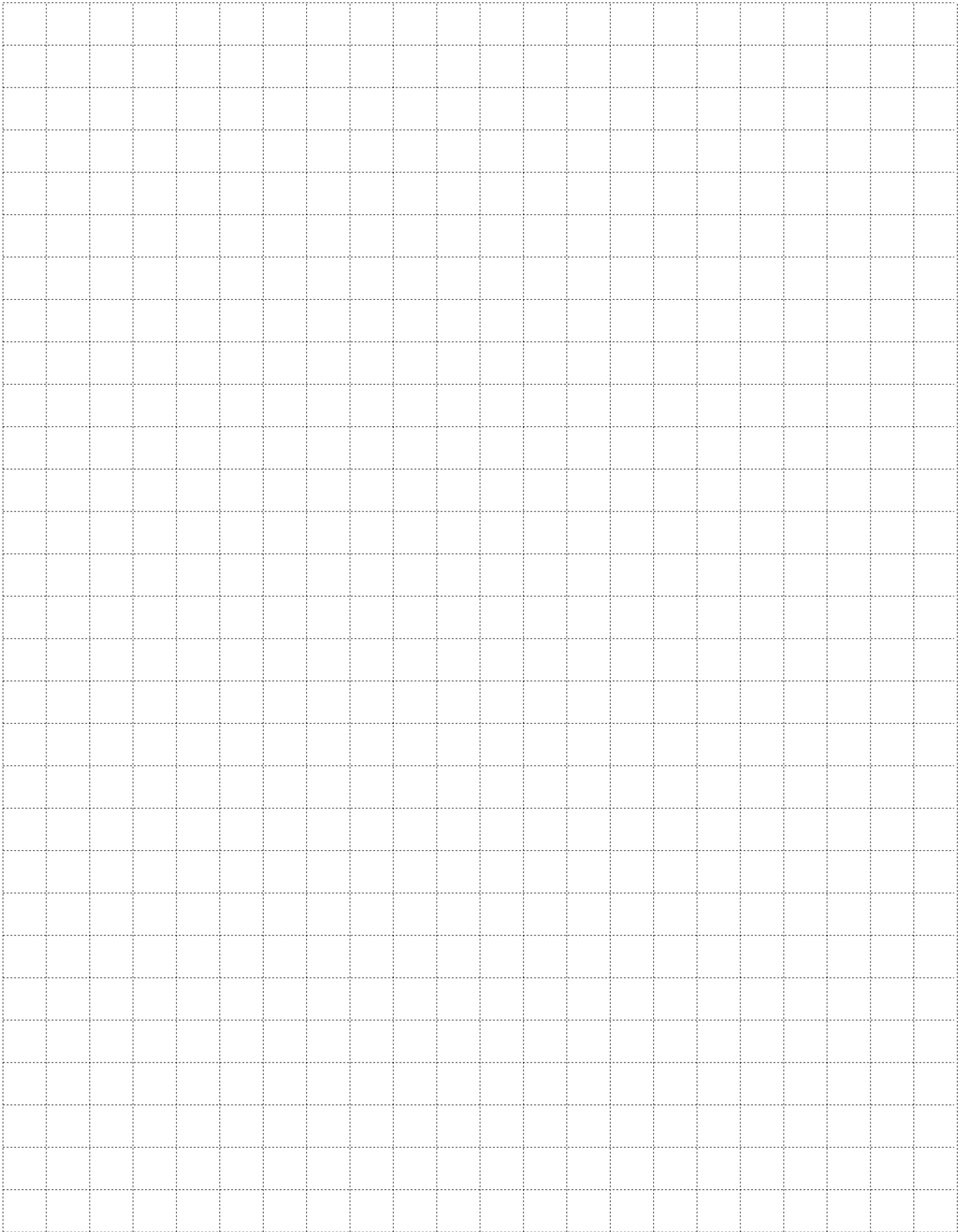
4.2 - PERIODICAL MAINTENANCE - Annually check: diaphragm and pilot inspection should be conducted annually

- In the case of VNP/VXP models, check the integrity of the electrical connections and the din socket connection to be properly fixed to the solenoid coil.
- In the case of VEM models, check the integrity of all pneumatic connections including pneumatic piping and all pneumatic connections.

4.3 - MALFUNCTION / TROUBLE SHOOTING: - Proceed with controls and checks below:

DEFECT / FAULT	CONTROL / CHECKS
The valve does not open or vibrates	<ul style="list-style-type: none"> - Verify integrity of the solenoid or that the wires are not damaged. - Verify that the electrical connections are properly connected to the valve and that the wiring has been performed correctly. - Verify that the outlets from the electronic controller are free from disturbances and within the specified tolerances of +/-10% of the nominal value.
The valve remains opens or loses air continuously	<ul style="list-style-type: none"> - Check that the bolts of the top cover are properly secured, in case of diaphragm substitution. - Remove the top cover and verify that there are no particulate underneath the diaphragm.

Note:

A large rectangular area filled with a grid of small squares, intended for handwritten notes. The grid lines are thin and light gray.



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Actual Size

Humphrey®

Build on Our Experience.

Corrosion Resistant
316 Stainless Steel

Chemical-/Temperature-
Tolerant Viton®

SS250A Air Valve

Need a Valve That Can Last?

Then you need Humphrey's **SS250A Air Valve**, featuring our exclusive double diaphragm design in 2-way and 3-way models only. Its stainless steel body is perfect for use where corrosion, chemical, and temperature resistance are a primary consideration.

Features:

- Simple and Reliable
- Versatile
- Pressure operated
- Spring and pressure returned
- No O-rings
- No sliding seals
- No lubrication required
- No sticking
- Tolerates clean/dry or dirty/wet air
- Short stroke (.060")
- Fast response
- 1/4-inch NPT
- Full 1/4-inch orifice
- High air flow
- Compact size
- Mounts in any position

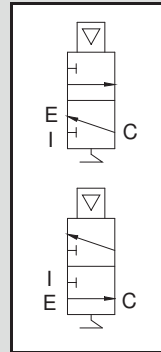
Applications:

- Exterior environments compatible with valve materials, specs and design
- Offshore
- Onshore
- Process control
- Instrumentation
- Panel work
- Non-lubricated or lubricated applications
- Ships
- Trucks
- Other vehicles
- Clean rooms
- Processing
- Washdown areas
- Infrequent and/or rapid cycling applications

Specifications

MEDIA:
 Air or inert gasses
PRESSURE RANGE:
 Normally closed..... 0-125 PSIG
 Normally open.....0-60 PSIG
 Optimum cycle life..... to 60 PSIG
TEMPERATURE RANGE:
 0°F to 400°F (-17.7°C to 204°C)
AIR FLOW (SCFM to atmosphere):
 Multiply PSIG x 0.6
OPERATING SPEEDS:
 To 600 CPM
WEIGHT.....11.5 OZ

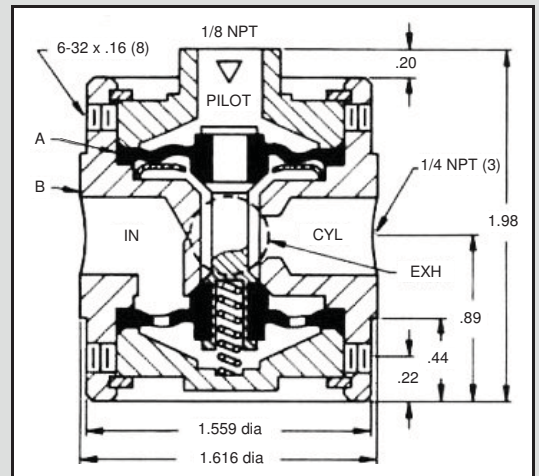
2-/3-Way



Normally Closed-
 Connect pressure source to "IN."
 For 2-Way, plug "EXH" port.

Normally Open-
 Connect pressure source to "EXH."
 ("IN" port becomes exhaust.)
 For 2-Way, plug "IN" port.

Response and Fill/Exhaust Times (seconds) at 100 PSIG/72°F								
SS250A	Length of Pilot Line .170 I. D.				10 Inch ³ Chamber		100 Inch ³ Chamber	
	5'	10'	20'	30'	Fill 0-80	Exhaust 100-20	Fill 0-80	Exhaust 100-20
Open	.011	.021	.046	.072	.038	.076	.330	.720
Close	.018	.035	.072	.118				



Minimum Pilot Pressure Requirements (PSIG)				
Valved Pressure	15	60	100	120
Normally Closed	18	40	75	100
Normally Open	20	57	NA	NA

Materials:

- A. Viton® "A" 70 ± 5 durometer Shore "A" scale
- B. 316 Stainless Steel, except 302 Stainless Steel (passivated) spring and PH-7Mo Stainless Steel retaining rings

Mounting Base:

Part No. 8-20A Order separately.
 2.250" sq. w/four .218 dia. holes on 1.593 centers.
 Attach to valve over 1.559 dia.
 Flat black painted mild steel w/four zinc plated #6-32 screws.

Find us on the web at www.humphrey-products.com.

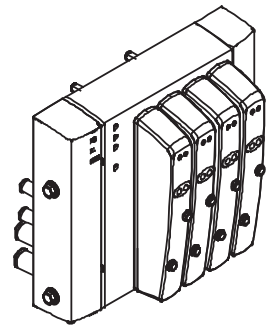
CDVI-DN Valve Terminal (Type 15) DeviceNet

FESTO

Description Electronics

Valve terminal with
direct fieldbus
connection
Fieldbus protocol:
- DeviceNet

CDVI-DN type



Description

539 045
en 0805a
[720 999]

Contents and general safety instructions

Original de
Edition en 0805a
Designation P.BE-CDVI-DN-EN
Order-no. 539 045

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Intended use

The CDVI valve terminal with direct fieldbus connection described in this manual is intended exclusively for use as station on the DeviceNet fieldbus.

This CDVI valve terminal has been certified by the ODVA.



The valve terminal may be used only as follows:

- As intended in an industrial environment
- In original condition without unauthorized alterations. Only the conversions or modifications described in the documentation supplied with the product are permitted.
- In perfect technical condition

The limit values specified for pressures, temperatures, electrical data, torques etc. should be observed.

If conventional accessory components such as sensors and actuators are connected, the specified limits for pressures, temperatures, electrical data, torques etc. should be observed.

Comply with the regulations of the trade associations and the German Technical Control Board (TÜV) and the VDE conditions or corresponding national conditions.

Observe the measures in section 1.4.4 when implementing an emergency stop function.



Warning

If the valve terminal is to be used as explosion-proof equipment, make sure:

- Electrical connections are **not** disconnected under voltage.
- The completely installed valve terminal with all the plugs, adapters and protective caps used complies **at least** with protection class IP65.

Target group

This manual is intended exclusively for technicians trained in control and automation technology who have experience in installing, commissioning, programming and diagnosing stations on the DeviceNet.

Service

Please consult your local Festo repair service if you have any technical problems.

Notes on this manual

This manual contains specific information on installing, commissioning, programming and diagnosing CDVI valve terminals with direct connection for DeviceNet.



Information on the pneumatics can be found in the “Pneumatics manual, P.BE-CDVI-....”

Important user instructions

Danger categories

This manual contains instructions on the possible dangers which may occur if the product is incorrectly used. These instructions are indicated with a signal word (Warning, Caution etc), printed on a shaded background and additionally indicated with a pictogram. A distinction is made between the following danger warnings:



Warning

... means that failure to observe this instruction may result in serious personal injury or material damage.



Caution

... means that failure to observe this instruction may result in personal injury or material damage.



Note

... means that failure to observe this instruction may result in material damage.



Electrostatically sensitive devices: inappropriate handling can cause damage to components.

Identification of specific information

The following pictograms indicate text passages which contain specific information.

Pictograms



Information:
Recommendations, tips and references to other sources of information



Accessories:
Details on necessary or useful accessories for the product



Environment:
Information on the environment-friendly usage of the products

Text designations

- The bullet point indicates activities which may be carried out in any sequence.
- 1. Digits indicate activities which must be carried out in the specified sequence.
- Arrowheads indicate general lists.

The following product-specific terms and abbreviations are used in this manual:

Term/abbreviation	Definition
CDVI-DN	Clean design valve terminal with direct fieldbus connection for DeviceNet
CP	Compact performance
CP cable	Special cable for coupling the various CP modules
CP connection	Socket or plug on the CP modules which enable the modules to be connected with the CP cable
CP modules	Collective term for the various modules that can be integrated in a CP system.
CP system	System consisting of CDVI-DN and CP modules
Dual expansion block	Expansion block which helps control two solenoid coils per valve position
I	Digital input
I/Os	Digital inputs and outputs
I/O modules	Collective term for the CP modules which provide digital inputs and outputs (CP input modules and CP output modules)
Load voltage	Power supply of the valves
Manifold block	Block with 4 or 8 valve positions. Each CDVI-DN has exactly one manifold block.
Mono expansion block	Expansion block which helps control one solenoid coil per valve position
O	Digital output
Operating voltage	Power supply for the electronics
PLC/IPC	Programmable logic controller/industrial PC

Tab. 0/1: Terms and abbreviations

Installation

Chapter 1

Installation

1. Installation

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1.1 General installation instructions



Warning

Uncontrolled movements of the connected actuators and uncontrolled movements of loose tubing may cause personal injury or material damage.

- Before any conversion work on the CDVI-DN, switch off the following:
 - Compressed air supply
 - Power supply
- Make sure no control signals from the higher-order controller are present at the solenoid coils.



Note

Observe the CDVI assembly instructions in the “CDVI pneumatics manual” (CP.BE-CDVI-...) in chapter 2.

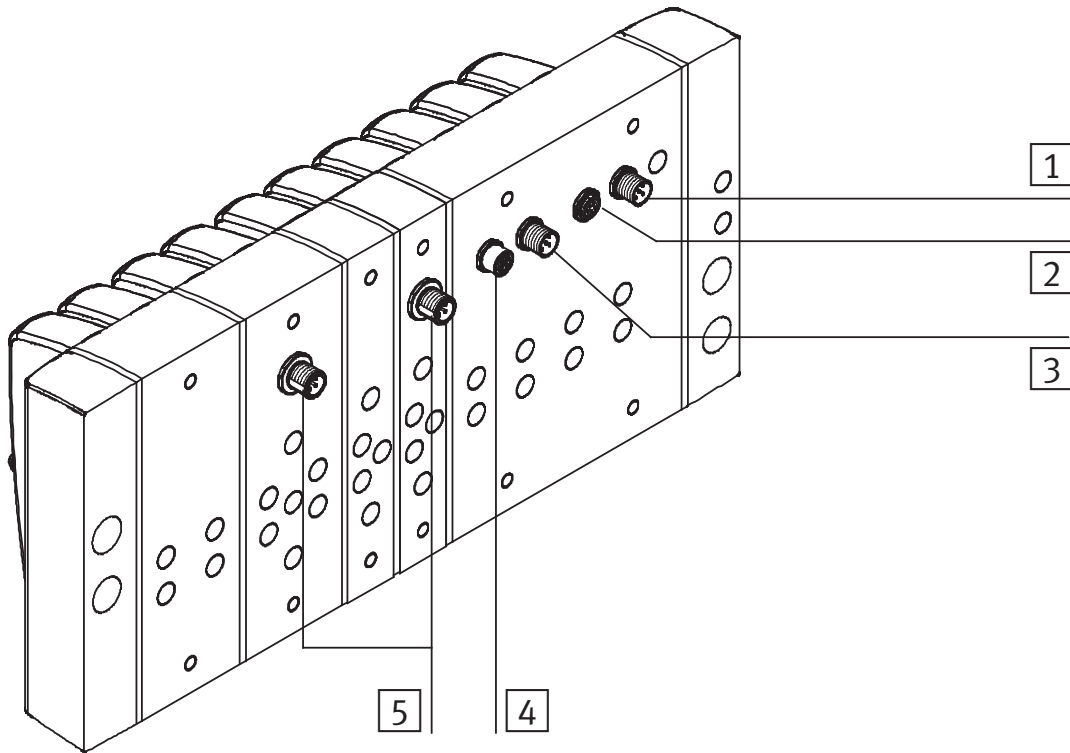
The CDVI-DN contains electrostatically sensitive devices.

- Do not therefore touch any electronic components.
- Observe the handling specifications for electrostatically sensitive devices.

They will help you avoid damage to the electronics.

1. Installation

Electrical connections



1 Power supply (plug, M12)

2 CP extension (M9)

3 Fieldbus input (plug, M12)

4 Fieldbus output (socket, M12)

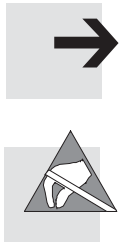
5 Auxiliary power supply on expansion block (plug, M12)

Fig. 1/1: Electrical connections of the CDVI-DN

1. Installation

1.2 Setting the CDVI-DN

1.2.1 Removing and mounting the left-hand end plate



Note

The CDVI-DN contains electrostatically sensitive devices.

- Do not therefore touch any electronic components.
- Observe the handling specifications for electrostatically sensitive devices.

They will help you avoid damage to the electronics.

You must remove the left-hand end plate in order to set the CDVI-DN.

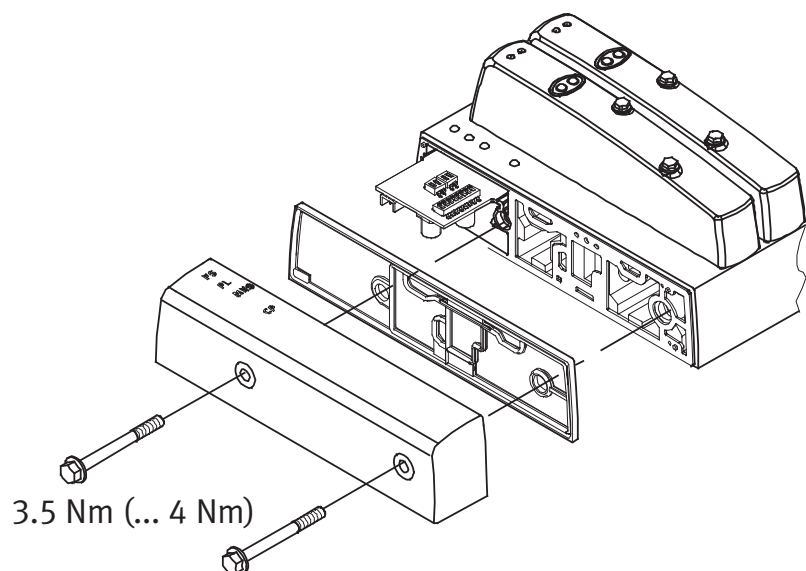


Fig. 1/2: Removing/mounting the left-hand end plate

1. Installation

Removing

1. Switch off all power supplies (electric voltage, compressed air).
2. Loosen each of the two mounting screws on the left-hand end plate by approximately one turn.
3. Now unscrew the two mounting screws completely to avoid twisting or squeezing the separator plate (seal).
4. Pull off the left end plate.

Mounting

1. Place the separator plate (seal) on the manifold block. The separator plate must be fitted correctly on the guide sleeves of the manifold block.
2. Position the left end plate too.
3. Tighten the two mounting screws alternately. Torque: 3.5 Nm (... 4 Nm)



Note

- Make sure the separator plate (seal) is not squeezed on one side as a result of uneven tightening of the cover screws.

The requirements of the IP protection class cannot be fulfilled if a seal is squeezed.

1. Installation

1.2.2 Setting the DIL switches

You will see several DIL switches after removing the left end plate in accordance with chapter 1.2.1:

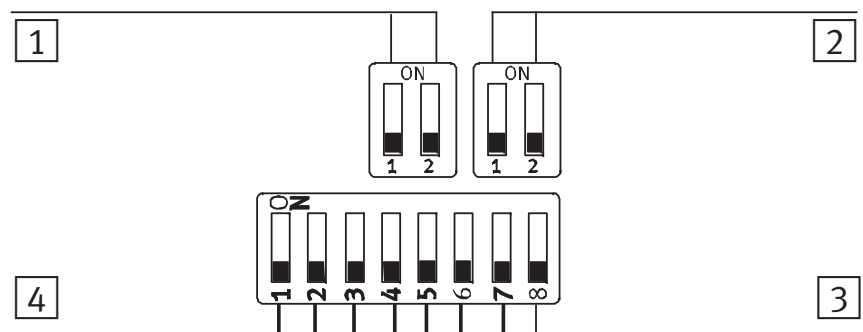


Fig. 1/3: DIL switches

You can set the following parameters with the DIL switches:

- 1 Extension of the CP system
- 2 Setting the address assignment
- 3 Setting the baud rate
- 4 Setting the station number (slave address)

1. Installation

Setting: extension of the CP system 1

Further CP modules can be connected to the CDVI-DN. You can set the extension of the CP system with the switch elements 1 and 2 of the dual DIL switch in accordance with the following table.

Extension	Outputs	Inputs	DIL switch positions
CDVI-DN with 4 / 8 valve positions (+ expansion blocks) without CP extension	8 / 16 / 24 O	8 I (status byte)	
CDVI-DN with: – CP input module	8 / 16 / 24 O	8 I (status byte) + 16 I	
CDVI-DN with: – CP.. valve terminal or – CP output module	8 / 16 / 24 O + 16 O	8 I (status byte)	
CDVI-DN with: – CP.. valve terminal / CP output module and – CP input module	8 / 16 / 24 O + 16 O	8 I (status byte) + 16 I	

Tab. 1/1: Setting the extension of the CP system

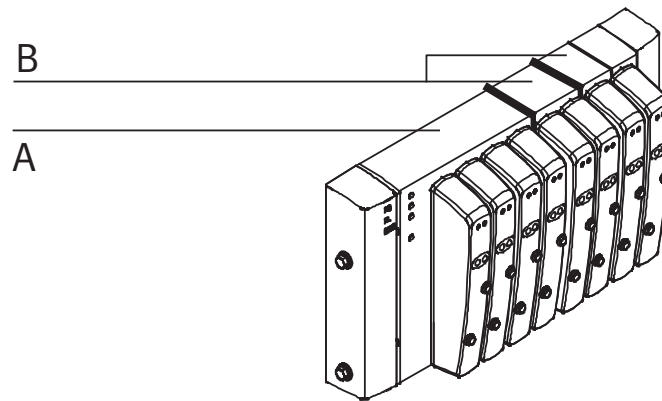


The CP system occupies a different number of inputs and outputs or station numbers, depending on the extension set. Additional information can be found in section 1.5.

1. Installation



Note: Expansion blocks



A Manifold block

B Single or double expansion blocks

If you extend the manifold block (with 4 or 8 valve positions) by single or double extension blocks, these extension blocks will be automatically identified.

Setting the address assignment 2

Set the address assignment as illustrated in the following:




Address assignment	DIL switch positions
Automatic address assignment of the CDVI (modular EDS)	
Addressing to maximum expansion of the CDVI	

Tab. 1/2: Setting the address assignment

1. Installation

Setting the baud rate 3

Set the baud rate as illustrated in the following:

125 kBaud	250 kBaud	500 kBaud
		

Tab. 1/3: Setting the baud rate



Criteria for selecting the permitted baud rate can be found in section 1.3.2.

Setting the station number (slave address) 4

You can set the fieldbus station number (binary coded) with the eightfold DIL switch.

- 1 Setting the station number (eightfold DIL, switch elements 1-6)

1

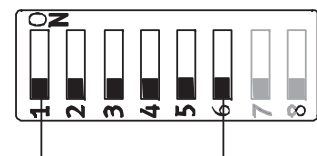


Fig. 1/4: Setting the station number (eightfold DIL switch)



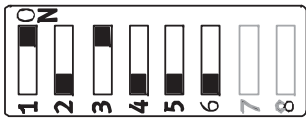
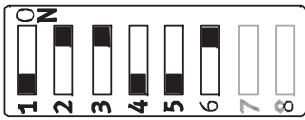
Note

Station numbers may be assigned only once per fieldbus line.

1. Installation

The following station numbers are permitted:

Protocol	Address designation	Permissible station numbers
DeviceNet	Station number	0; ...; 63

Station number set: 05	Station number set: 38
 $2^0 + 2^2 =$ $1 + 4 =$ 5	 $2^1 + 2^2 + 2^5 =$ $2 + 4 + 32 =$ 38

Tab. 1/4: Examples of set station numbers



Recommendation:

Assign the station numbers in ascending order. Assign the station numbers in accordance with the machine structure of your system.

1. Installation

Overview for the setting of station numbers:

Station no.	1	2	3	4	5	6	7	8	Station no.	1	2	3	4	5	6	7	8
0	OFF	OFF	OFF	OFF	OFF	OFF			16	OFF	OFF	OFF	OFF	ON	OFF		
1	ON	OFF	OFF	OFF	OFF	OFF			17	ON	OFF	OFF	OFF	ON	OFF		
2	OFF	ON	OFF	OFF	OFF	OFF			18	OFF	ON	OFF	OFF	ON	OFF		
3	ON	ON	OFF	OFF	OFF	OFF			19	ON	ON	OFF	OFF	ON	OFF		
4	OFF	OFF	ON	OFF	OFF	OFF			20	OFF	OFF	ON	OFF	ON	OFF		
5	ON	OFF	ON	OFF	OFF	OFF			21	ON	OFF	ON	OFF	ON	OFF		
6	OFF	ON	ON	OFF	OFF	OFF			22	OFF	ON	ON	OFF	ON	OFF		
7	ON	ON	ON	OFF	OFF	OFF			23	ON	ON	ON	OFF	ON	OFF		
8	OFF	OFF	OFF	ON	OFF	OFF			24	OFF	OFF	OFF	ON	ON	OFF		
9	ON	OFF	OFF	ON	OFF	OFF			25	ON	OFF	OFF	ON	ON	OFF		
10	OFF	ON	OFF	ON	OFF	OFF			26	OFF	ON	OFF	ON	ON	OFF		
11	ON	ON	OFF	ON	OFF	OFF			27	ON	ON	OFF	ON	ON	OFF		
12	OFF	OFF	ON	ON	OFF	OFF			28	OFF	OFF	ON	ON	ON	OFF		
13	ON	OFF	ON	ON	OFF	OFF			29	ON	OFF	ON	ON	ON	OFF		
14	OFF	ON	ON	ON	OFF	OFF			30	OFF	ON	ON	ON	ON	OFF		
15	ON	ON	ON	ON	OFF	OFF			31	ON	ON	ON	ON	ON	OFF		

Tab. 1/5: Setting of station numbers 0-31: position of the DIL switch elements

1. Installation

Station no.	1	2	3	4	5	6	7	8	Station no.	1	2	3	4	5	6	7	8
32	OFF	OFF	OFF	OFF	OFF	ON			48	OFF	OFF	OFF	OFF	ON	ON		
33	ON	OFF	OFF	OFF	OFF	ON			49	ON	OFF	OFF	OFF	ON	ON		
34	OFF	ON	OFF	OFF	OFF	ON			50	OFF	ON	OFF	OFF	ON	ON		
35	ON	ON	OFF	OFF	OFF	ON			51	ON	ON	OFF	OFF	ON	ON		
36	OFF	OFF	ON	OFF	OFF	ON			52	OFF	OFF	ON	OFF	ON	ON		
37	ON	OFF	ON	OFF	OFF	ON			53	ON	OFF	ON	OFF	ON	ON		
38	OFF	ON	ON	OFF	OFF	ON			54	OFF	ON	ON	OFF	ON	ON		
39	ON	ON	ON	OFF	OFF	ON			55	ON	ON	ON	OFF	ON	ON		
40	OFF	OFF	OFF	ON	OFF	ON			56	OFF	OFF	OFF	ON	ON	ON		
41	ON	OFF	OFF	ON	OFF	ON			57	ON	OFF	OFF	ON	ON	ON		
42	OFF	ON	OFF	ON	OFF	ON			58	OFF	ON	OFF	ON	ON	ON		
43	ON	ON	OFF	ON	OFF	ON			59	ON	ON	OFF	ON	ON	ON		
44	OFF	OFF	ON	ON	OFF	ON			60	OFF	OFF	ON	ON	ON	ON		
45	ON	OFF	ON	ON	OFF	ON			61	ON	OFF	ON	ON	ON	ON		
46	OFF	ON	ON	ON	OFF	ON			62	OFF	ON	ON	ON	ON	ON		
47	ON	ON	ON	ON	OFF	ON			63	ON	ON	ON	ON	ON	ON		

Tab. 1/6: Setting of station numbers 32-63: position of the DIL switch elements

1. Installation

1.3 Connecting to the fieldbus

1.3.1 Fieldbus cable



Note

Faulty installations or high transmission rates may cause data transmission errors as a result of signal reflections and attenuations.

Transmission errors can be caused by:

- Missing or incorrect terminating resistor.
- Incorrect screened connection.
- Branch lines of excess length.
- Transmission over long distances.
- Inappropriate cables.

Observe the cable specifications. Refer to the manual for your control system for information on the type of cable to be used.

Use a twisted, screened 5-wire cable as fieldbus line. The bus interface is supplied with power via the fieldbus line.



Pre-assembled bus cables are available from several manufacturers.

Make sure the cables and plugs are suitable for the ambient conditions (e.g. cleaning agents used) and comply with the required IP protection class.



Note

If the valve terminal is mounted into a moving part of a machine, the fieldbus cable on the moving part must be provided with strain relief. Please observe also the relevant regulations in EN 60204 part 1.

1. Installation

1.3.2 Fieldbus baud rate and fieldbus length

The maximum permitted fieldbus length depends on the baud rate used. Tab. 1/7 shows the reference values.

Baud rate	Maximum main bus length	Branch line length	
		Maximum	Cumulative
125 kBaud	500 m	6 m	156 m
250 kBaud	250 m		78 m
500 kBaud	100 m		39 m

Tab. 1/7: Maximum fieldbus and branch line lengths depending on the baud rate (as per ODVA specification V 2.0)

The maximum permitted length of a branch line depends on the total length of the branch lines and on the baud rate.



Details can be found in the manuals for the your control system or scanner.



Note

- Refer to the manuals for your control system or bus interface in order to ascertain which T-adaptor and maximum branch line length are permitted for your controller.
- Also take into account the sum of the branch line lengths when calculating the maximum permitted length of the fieldbus cable.



Information on setting the baud rate can be found in section 1.2.2.

1. Installation

1.3.3 Power supply for the DeviceNet

Avoid long distances between the power supply and the CDVI-DN.



Caution

- Make sure the polarity is correct when you connect the fieldbus interface and the power supply for the bus interface/internal logics.
- Connect the screen (pin 1).



Note

Bus stations have different tolerances in respect of the power supply, depending on the manufacturer. Observe this when planning the bus length and placing the power supply unit.

The following tolerance of the DeviceNet bus interface supply (pin 2) applies to the CDVI:

$$V_{\max} = 30 \text{ V}$$

$$V_{\min} = 11 \text{ V}$$



Recommendation:

Place the power supply unit approximately at the centre of the bus.

1. Installation

1.3.4 Pin allocation of the DeviceNet



Note

Make sure you check the pin allocation of your scanner with the relevant documentation.



The bus connection is established at “Bus in”. Use a 5-pin M12 socket from Festo for this purpose (type:FBSD-GD-9-5POL).

The fieldbus is continued at “Bus out”. Use a plug of type FBS-M12-5GS-PG9 for this purpose.

For the position of these connections, see also Fig. 1/1.

The following table shows the connection between the wire colour, signal and pin allocation:

Wire colour ^{*)}	Signal	PIN
Blank	Screen	Pin 1
Red	24 V DC bus	Pin 2
Black	0 V bus	Pin 3
White	CAN_H	Pin 4
Blue	CAN_L	Pin 5

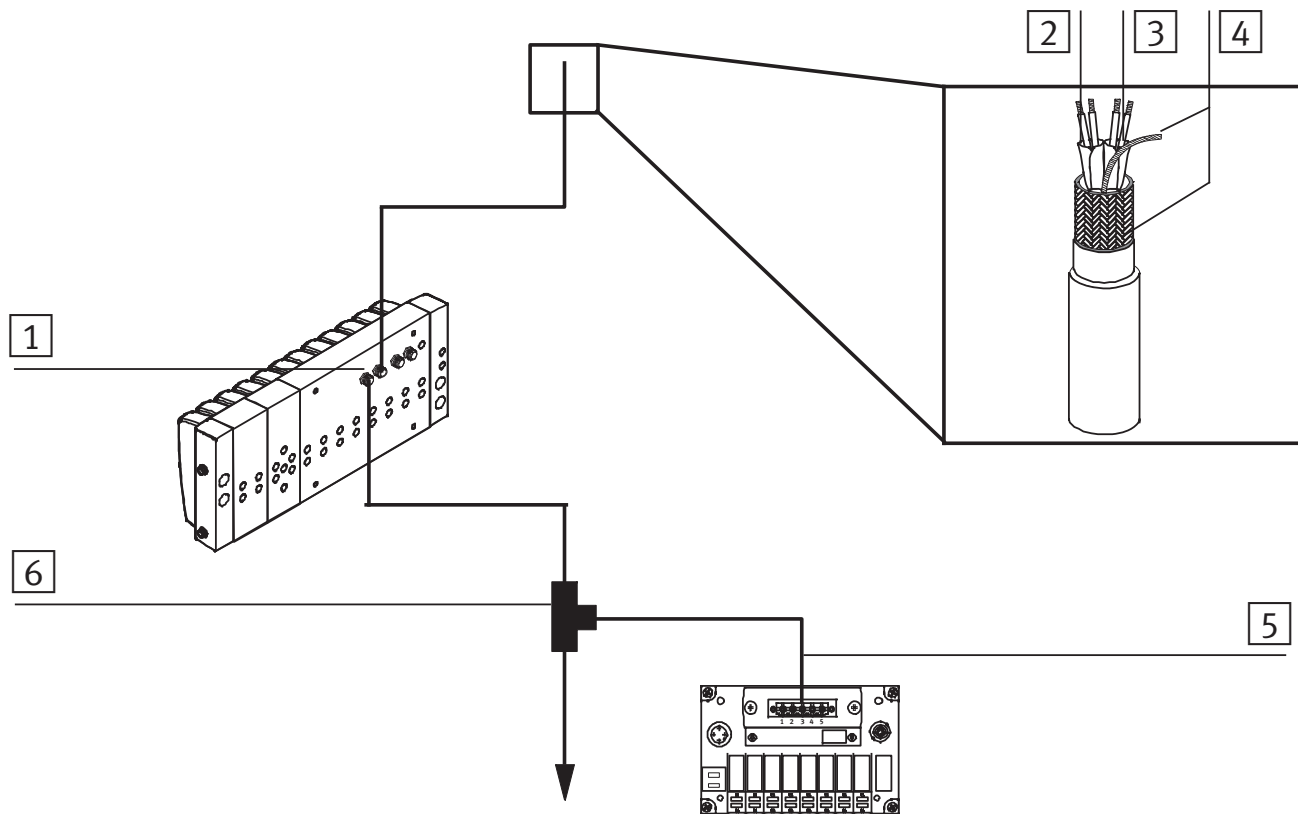
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^{*)} typical for DeviceNet cables

Tab. 1/8: Pin allocation of the DeviceNet

1. Installation

1.3.5 Connection example



1 Micro Style connections

2 Fieldbus

3 Power supply

4 Screen

5 Branch line

6 T-adaptor

Fig. 1/5: Connection example

1. Installation

1.3.6 Bus terminal with terminating resistors



Note

Fit a bus terminal to both ends of a bus segment. This also applies if the bus interface is at the beginning of the bus cable.

If the CDVI valve terminal is at the end of the fieldbus system, a bus terminal is required there.

If you use a T-adapter, we recommend installing the terminating resistor at the free output of the T-adapter.



Recommendation:

Mount a terminating resistor (120 Ω , 0.25 W) between the connections for CAN_H (pin 4) and CAN_L (pin 5) for the bus terminal.

1. Installation

1.4 Power supply

1.4.1 Calculation of the current consumption

- Calculate the current consumption before selecting the power supply units, cables and fuses:

Current consumption	Sums
Electronics and sensors (pin 1)	
CDVI-DN	<u>100</u> mA
In the CP extension:	
Valve terminal ¹⁾ or CP output module ¹⁾	<u> </u> mA
CP input module ¹⁾	<u> </u> mA
Sensors ¹⁾ on the CP input module <u> </u> x <u> </u> mA	<u> </u> mA
Sum of pin 1	= <u> </u> mA
Valves and outputs (pin 2)	
CDVI-DN: all solenoid coils energised simultaneously ^{2) 3)} <u> </u> x <u>120</u> mA	<u> </u> mA
In the CP extension:	
all solenoid coils energised simultaneously ^{2) 3)} <u> </u> x <u> </u> mA	<u> </u> mA
All digital outputs ^{1) 4)} <u> </u> x <u> </u> mA	<u> </u> mA
Sum of pin 2	= <u> </u> mA
Total	= <u> </u> mA
1) Refer to the technical data for the relevant product. 2) The valves have one or two solenoid coils depending on the valve type. 3) When switching on, with LEDs. 4) If not with their own load voltage supply.	

Tab. 1/9: Current consumption calculation

1. Installation

1.4.2 Selecting the cables

- Calculate the required cable cross section and the maximum permitted line length.
- Avoid long distances between the power supply unit and the valve terminal. Long cables reduce the voltage supplied by the power supply unit.



Make sure the cables and sockets meet the ambient conditions (e.g. cleaning agents used) and fulfil the requirements of IP protection class.

1.4.3 Selecting the power supply unit



Warning

- Use only **PELV circuits** as per IEC/DIN EN 60204-1 for the electric power supply (protective extra-low voltage, PELV).
Also observe the general requirements for PELV circuits laid down in IEC/DIN EN 60204-1.
- Use only **power sources** that guarantee reliable electrical isolation of the operating voltage as per IEC/DIN EN 60204-1.

Protection against electric shock (protection against direct and indirect contact) is guaranteed in accordance with IEC/DIN EN 60204-1 by using PELV circuits (electrical equipment of machines, general requirements).

Recommendation:

- Use controlled power supply units.
- Before selecting the power supply units, calculate the total current requirement in accordance with section 1.4.1.

1. Installation

1.4.4 Connecting the power supply of the valve terminal



Use only a 5-pin M12 socket (A-coded; see Appendix: Accessories) for the power supply of the manifold block and connect it only to the power supply (see also Fig. 1/1).



Note

All power supply connections are protected against reverse polarity, or the 0 V load voltage of the valves at the manifold blocks and expansion blocks with electric power supply are additionally protected with a fuse.

Pin allocation of the power supply connection

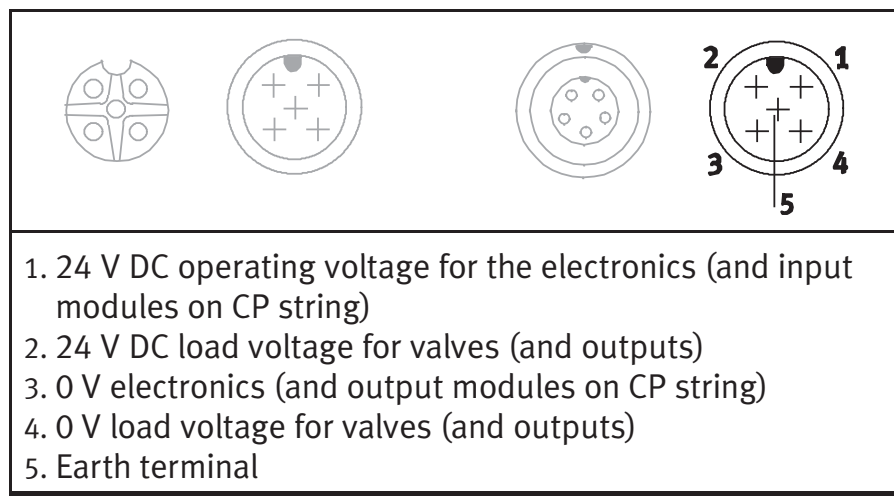


Fig. 1/6: Pin allocation of the power supply connection on the manifold block

1. Installation

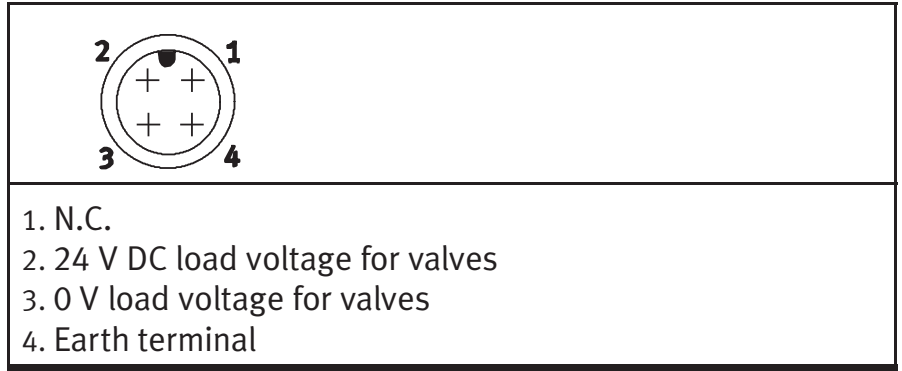


Fig. 1/7: Pin allocation of the power supply connection on the expansion block



Note

In the event of an extension of the CDVI-DN with a CP valve terminal of the first generation (without auxiliary power supply):

- Place a bridge between pins 3 and 4.

However, there will no longer be any galvanic isolation between the electronic voltage and the load voltage (valves).

1. Installation

Mounting the connector socket

- 1 Cable
- 2 Strain relief
- 3 Housing
- 4 Connecting part

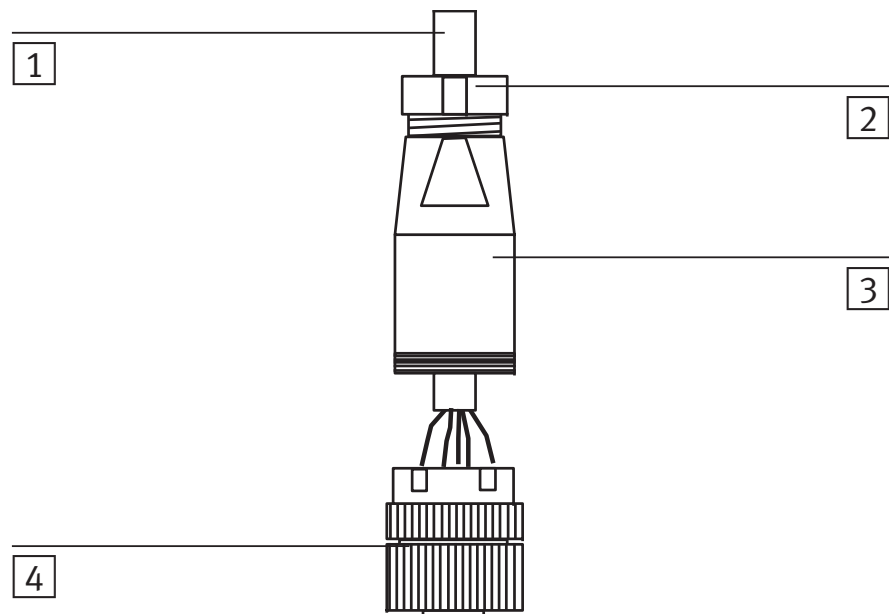


Fig. 1/8: Individual plug parts and cable bushing

Preparing

Once you have selected appropriate cables, connect them as follows (Fig. 1/8):

1. To open the plug, loosen the central knurled nut.
2. Open the strain relief on the rear part of the housing. Then pass the cable through.
3. Remove 5 mm of insulation from the end of the conductors and fit wire end sleeves on the stranded wires.
4. Connect the ends of the conductors.
5. Replace the connector part on the housing of the plug. Pull back the cable until there are no loops inside the housing.
6. Tighten the strain relief.

1. Installation



Warning

If the valve terminal is supplied with load voltage via an output of a “safety I/O module”, switch-on test pulses of the “safety I/O module” may cause unexpected reactions of the valve terminal.

- Make sure any switch-on test pulses are reliably suppressed or switched off.

Observe the following for the connection of the 24 V load voltage (pin 2):

- Observe the tolerance (21.6 V ... 26.4 V DC). Check the 24 V load voltage of the valves while the system is in operation.



Caution

Excessive voltages or short circuits can cause functional damage on the CP.-SC-DN, whereby actuators can no longer be controlled.

- Protect the load voltage of the solenoid coils with external fuses.

To ascertain the amperage of the fuses, first calculate the maximum current consumption in accordance with section 1.4.1.

1. Installation



Note

Check your EMERGENCY STOP concept to ascertain which measures are necessary for your machine/system in order to switch the system into a safe state in the event of EMERGENCY STOP:

- Switching off the load voltage for the valves and output modules in the secondary circuit of the power supply unit
- Switching off the compressed air supply for the valve terminal

Due to energy stored in the input circuitry of valve terminals, there may be a delayed reaction of the valves after switching off the load voltage.

Take this into consideration, for example as follows:

- By using an input signal in the controller to check whether the load voltage has been switched off.
- By blocking the control signal for the valves by locking the output signal with the “Load voltage” input signal.

Potential equalisation

Earth the CDVI valve terminal:

- At the power supply connection (pin 5).
- And on the housing (with cable lug on a spacer bolt on conductive surface).



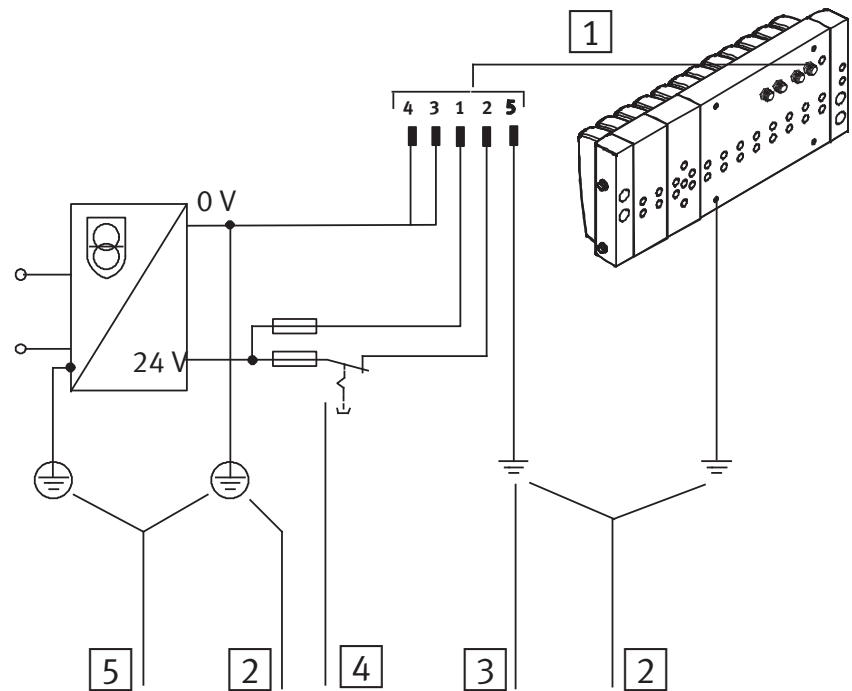
Note

- By means of low-impedance connections, make sure the housing of the valve terminal and the earth terminal at pin 5 have the same potential and that there are no compensating currents.

In this way, you will avoid interference from electromagnetic sources.

1. Installation

Connection without galvanic isolation:

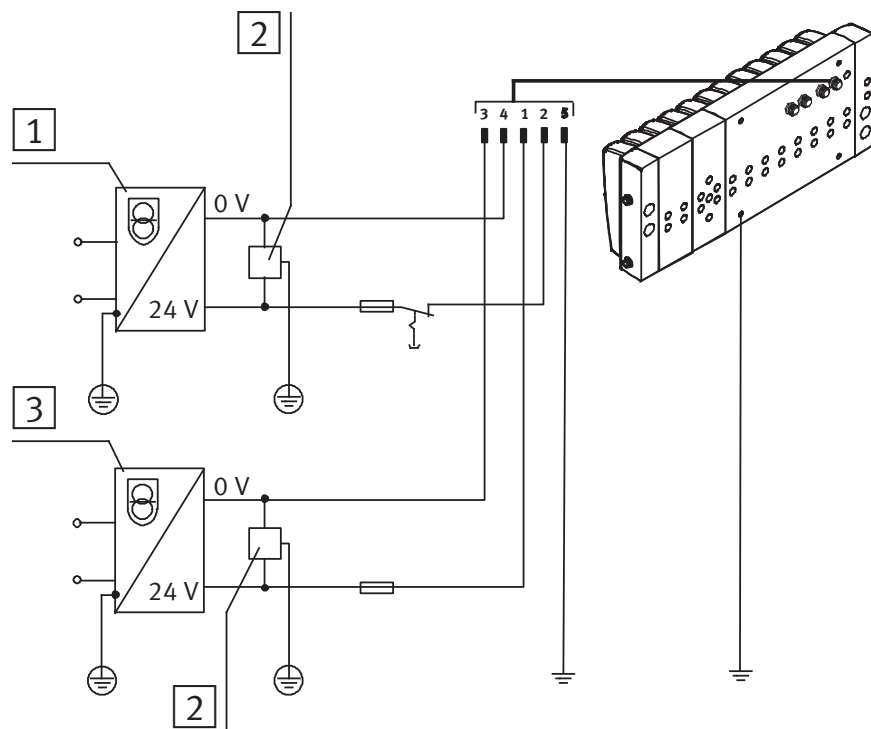


- 1 Connection for power supply
- 2 Potential equalisation
- 3 Earth terminal at pin 5
- 4 Load voltage which can be switched off separately and external fuses
- 5 Protective earth (PE)

Fig. 1/9: Connection example for power supply with one PELV power supply unit

1. Installation

Connection with galvanic isolation of operating and load voltage:



- 1 Power supply unit for load voltage (valves and outputs)
- 2 Isolation monitoring device
- 3 Power supply unit for operating voltage (electronics and sensors)

Fig. 1/10: Connection example for power supply with two PELV power supply units

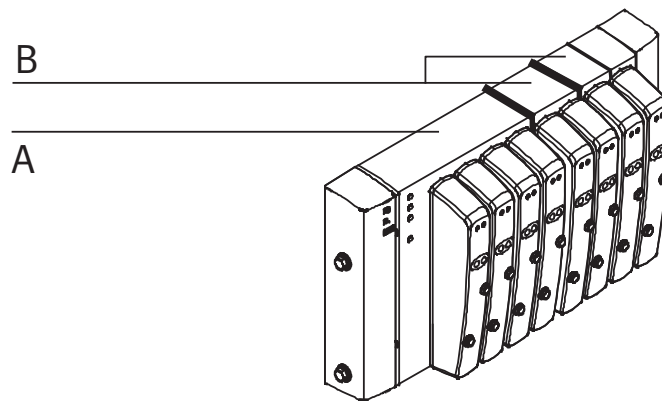


Note

Galvanic isolation will no longer be possible if you loop the voltage through to further I/O modules without galvanic isolation.

1.5 Extending the CDVI

1.5.1 Inserting expansion blocks



A Manifold block

B Single or double expansion blocks

The manifold block of the CDVI can be extended with:

- Single expansion blocks
- Double expansion blocks

with or without auxiliary power supply as dual or mono expansion block. A combination of dual and mono expansion blocks is allowed (until the address limit is reached).



Only valves which are to the right of the expansion block with auxiliary power supply are supplied by it with electric power. Up to nine power zones can be implemented by using extension modules with electric power supply.

The following combinations are possible at the most:

- Manifold block with 4 valve positions + 4 dual expansion blocks
- Manifold block with 8 valve positions + 4 dual expansion blocks
- Manifold block with 4 valve positions + 8 mono expansion blocks
- Manifold block with 8 valve positions + 8 mono expansion blocks

1. Installation



Advanced diagnostics (supplied load voltage) are only possible with new manifold blocks or new expansion blocks with additional electric power supply. These new blocks are distinguished by the 16-pole electrical connection (old = 12-pole) and the designation printed on the PCB. Advanced diagnostics are not possible if old blocks are combined with new ones.

1.5.2 CP extension connection

You can connect further CP modules to the VDVI-DN via the CP extension connection.



Fig. 1/11: CP extension connection



Note

Modules which you connect to the CP extension connection are recognized only if the DIL switches are set correctly.

Information on setting the DIL switches can be found in section 1.2.2.

You can connect the following CP modules to the CP extension connection:

- CP input module with 8 or 16 inputs, either with M12 plugs (sockets assigned twice) or M8 plugs (sockets assigned once)
- CP input module (IP 20) with 16 inputs

1. Installation

- CP output module with 8 outputs. Power supply of the electronics via the CP extension connection. Load voltage: separately via an M18 plug.
- CP output module with 4 outputs. Power supply of the electronics and load via the CP string.
- CPV valve terminals with widths of 10, 14 and 18 mm. Available with 4, 6 or 8 valve sub-bases.
- CPV valve terminals with widths of 10 and 14 mm. Available with max. 8 valve sub-bases (each with 2 coils) or with max. 16 valve sub-bases (each with 1 coil).



Note

The CDVI-DN can be extended by no more than:

- **One** CP input module and
- **One** CP valve terminal or **one** CP output module.



Caution

Data transmission faults if the maximum permitted signal line length is exceeded

The total signal line length between the CDVI-DN and the last CP module must not exceed 10 m.

The CP connecting cables must have special electrical properties. Therefore make sure you use Festo CP connecting cables.



Pre-assembled CP connecting cables are available from Festo. They are available in various lengths and designs. An overview can be found in Appendix A.



Note

Use blanking plugs to seal unused connections (important for protection class IP).

Possible extensions are illustrated in the following diagram:

1. Installation

Extension with CP modules			Position of the DIL switches
CDVI-DN	O module or valve terminal (DIL2)	I module (DIL1)	DIL1: I module DIL2: O module or valve terminal
Total line length of the CP system: maximum 10 m			
<p>1 CDVI-DN</p> <p>2 CP connecting cable 0.5 m, 2 m, 5 m, 8 m</p> <p>3 CP input module with 16 inputs (8 x M12, 16 x M8 plug)</p> <p>4 CP output module with 8 outputs (8 x M12 plug)</p> <p>5 CPV or CPA valve terminal</p>			

Fig. 1/12: Extension options of the CDVI-DN

Startup

Chapter 2

Contents

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2.1.1	Switching on the operating voltages	2-3
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2. Startup

2.1 Preparing the CDVI valve terminal for startup

2.1.1 Switching on the operating voltages

**Note**

Please observe the switch-on instructions in the manual for your PLC.

- Before switching it on, make sure the details regarding the fieldbus configuration are complete and correct.

Observe the following points before switching on the power supply:

Common supply

Set up the common power supply of the control system and all fieldbus stations via a central power supply unit or a central switch.

Separate supply

If the control system and the fieldbus stations have separate power supplies, they should be switched on in the following sequence:

1. Switch on the operating voltage supply for all fieldbus stations.
2. Switch on the operating voltage supply for the controller.

2. Startup

2.1.2 Address assignment of the CDVI-DN

The CDVI-DN occupies 8, 16 or 24 addresses, irrespective of the number of solenoid coils equipped on it.



Note

You can prevent address shifts by extending the valve terminal between the last valve position and the right end plate.



Caution

The addresses may be shifted by replacing an expansion block with an expansion block of a different type.

For example, the address assignment of the valve positions is shifted two addresses to the right

by removing a double dual expansion block and replacing it with a double mono expansion block.

The following diagrams show the addressing sequence, depending on the base block:

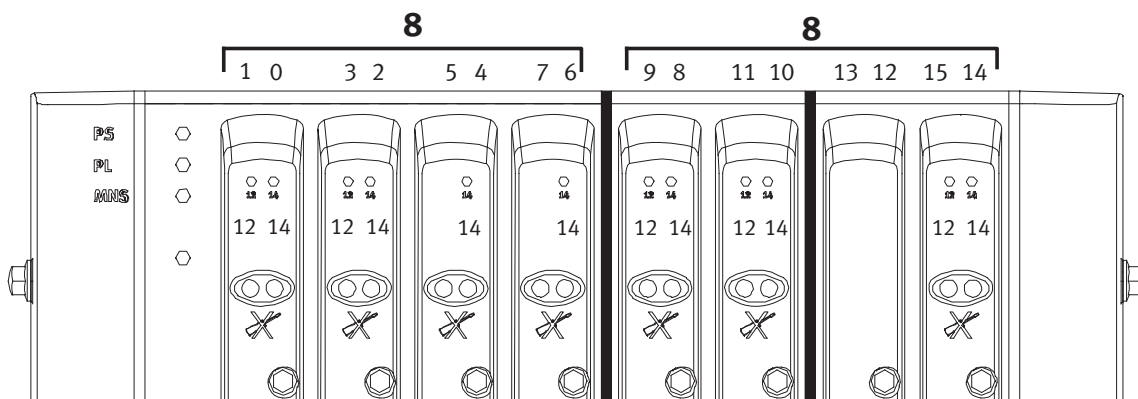


Fig. 2/1: Addressing of manifold block with 4 valve positions

2. Startup

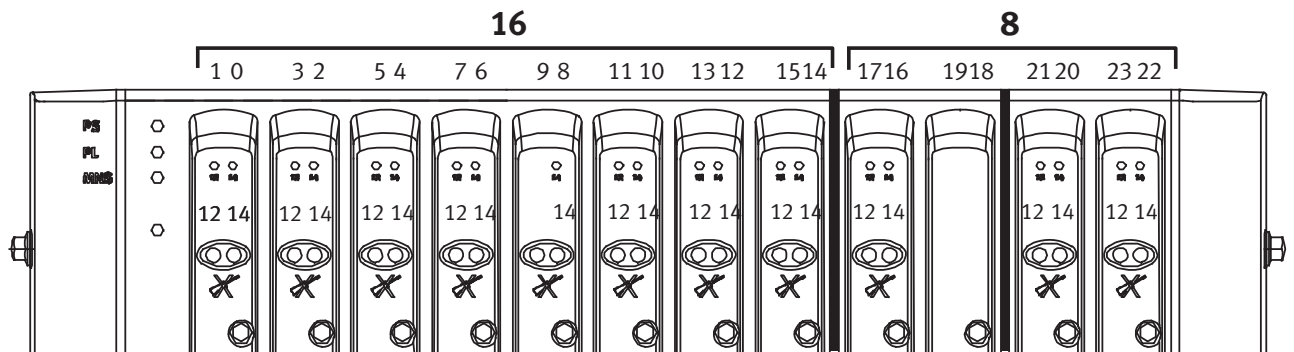
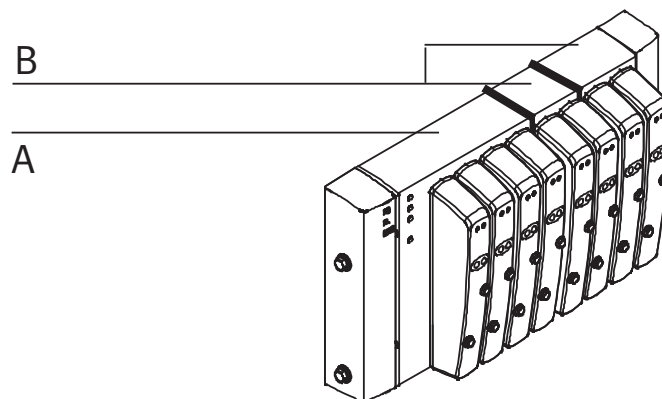


Fig. 2/2: Addressing of manifold block with 8 valve positions

- A valve position on the CDVI valve terminal always occupies two addresses on the manifold block even if it is only equipped with a blanking plate.
- The extensions occupy a maximum of eight addresses (regardless of which expansion blocks are used). No more than eight mono expansion blocks or four dual expansion blocks can be mounted on a manifold block. Mixed components are allowed.



A Manifold block: 8 or 16 addresses

B Expansion blocks: maximum 8 addresses

2. Startup

- If a valve position is equipped with a valve which has two pilot solenoids, the following assignment applies:
 - Pilot solenoid 14 occupies the less significant address.
 - Pilot solenoid 12 occupies the higher-value address.
- In the event of valves with only one pilot solenoid, the higher-value address remains unused.
- Addresses are therefore assigned on the CDVI valve terminal from left to right, however from right (14) to left (12) on the individual valve terminals.

2.2 Startup on the DeviceNet



Note

- The Festo valve terminal of type CDVI-DN can be used at all DeviceNet masters.
- This chapter describes the configuration and startup by the example of Allen-Bradley controllers.

2.2.1 General remarks

The following special features should be observed when using the CDVI valve terminal on the DeviceNet:

- The I/O addresses of all identified DeviceNet stations can be assigned freely as M-file addresses or as discrete I/Os in the scan list.
- The address assignment of a network station is usually made in ascending sequence.
- The input and output addresses can be assigned independently of each other.



Note

Assign the I/O addresses of the network stations so that sufficient reserve is available for subsequent extensions.

The following sections contain general instructions for the configuration of a valve terminal on the DeviceNet.



Detailed information can be found in the documentation or help function of your configuration program.

2. Startup

2.2.2 Configuring DeviceNet station properties (EDS)

When starting up a new DeviceNet station for the first time, you must inform your configuration program about certain properties of the station. The properties of the various stations are managed by the configuration program usually in a list or library, e. g. “EDS library” (EDS for electronic data sheets).

Installing an EDS file

Internet

Current EDS files and picture files (icons) can be found in the Internet under the following address:

- www.festo.com/fieldbus/
File name: festo_dn.exe

You will require the following files for the CDVI-DN:

File type	File name
EDS files	CDVI-DN.EDS
ICO file (icon)	CDVI-DN.ICO
BMP file (bitmap)	CDVI-DN.BMP

EDS file

The EDS files contain all the necessary information about the valve terminal of type CDVI-DN. You can install this file with your configuration program.

ICO/BMP file

You can assign the bitmap file or icon file to the valve terminal, depending on the configuration program used. The valve terminal is then displayed accordingly in the configuration program.



Notes on how to install an EDS file and an ICO or BMP file can be found in the manual or in the help function for your configuration program.

2. Startup

2.2.3 Supplementary notes: Modular EDS

Modular EDS provides a virtual slot system (“rack”) in which the components of the CP system sit in virtual “slots” and can be configured individually. As a result, there are no gaps in the I/O mapping - only I/Os which actually exist are taken into account.

The components of a CP system always have this sequence within the rack:

1. CDVI-DN manifold block
2. CDVI-DN expansion blocks
3. CP output module or valve terminal
4. CP input module

Example of a rack:


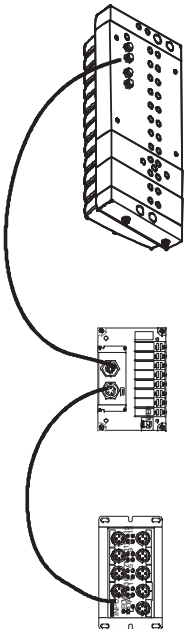




Slot	Icon	Assignment	Addresses	
0		DeviceNet adapter	8 I	
I		CDVI-DN manifold block with 4 / 8 valve positions	8 / 16	
II		CDVI-DN expansion blocks	8	
III		Valve terminal (or CP output module)	16	
IV		CP input module	16	

Fig. 2/3: Example of a rack in modular EDS

2. Startup

2.2.4 General instructions for parametrisation at the DeviceNet

The following steps are required for parameterisation, depending on the configuration program, after the station properties have been configured (e. g. by installing the EDS file).

1. Insert the station in the project/network (online or offline). If the station is inserted offline, for example, it is selected from the station list and added to the network.
2. Assign the station to a scanner. A network may contain several scanners. The station must be assigned to a scanner.
3. Define the I/O parameters of the station. The following details are required here:
 - Number of I/O bytes to be transferred. For the CDVI-DN, the number depends on the connected extensions (see section 1.5):
 - 1...3 input bytes occupied
 - 1...5 output bytes occupiedTab. 2/1 shows the assignment.
 - Specification of the communication type. The following applies to the CDVI-DN:
 - “Polled communication”
 - or
 - “Change of state / cyclic”
 - Assign the I/O addresses of the station to the PLC operands.
 - Assign the status byte to the PLC operands.
4. Load the configuration into the scanner.

2. Startup

Extension of the valve terminal	Number of input/output addresses	Number of I/O bytes (IB / OB)
CDVI-DN without CP extension	8/16/24 O 8 I	1/2/3 OB 1 IB
CDVI-DN with: – CP input module	8/16/24 O 8 I + 16 I	1/2/3 OB 1 IB + 2 IB
CDVI-DN with: – CP.. valve terminal or – CP output module	8/16/24 O + 16 O 8 I	1/2/3 OB + 2 OB 1 IB
CDVI-DN with: – CP.. valve terminal / CP output module and – CP input module	8/16/24 O + 16 O 8 I + 16 I	1/2/3 OB + 2 OB 1 IB + 2 IB

Tab. 2/1: Number of assigned I/O bytes depending on the extension of the CDVI-DN

2. Startup

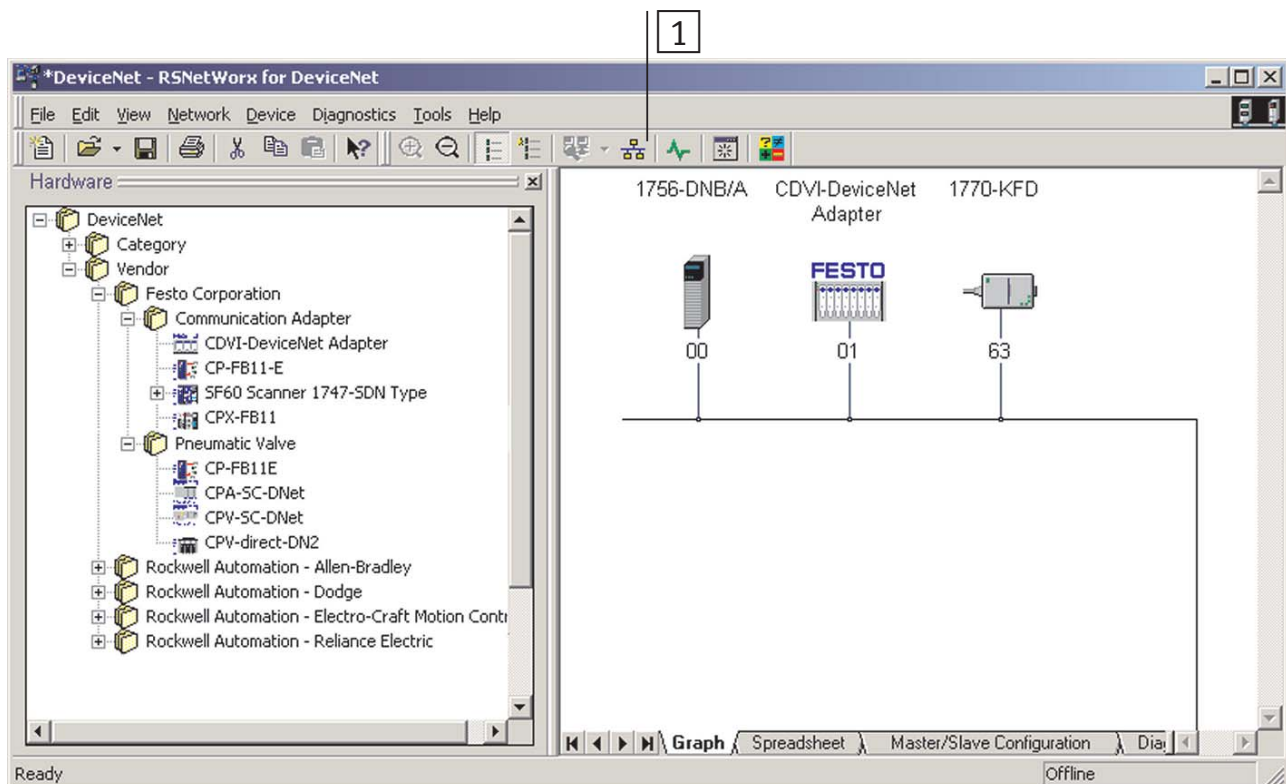
2.2.5 Parametrisation with RSNetWorx: EDS

This section gives instructions for parametrisation with RSNetWorx for DeviceNet version 4.01.00 from Rockwell. All steps specified refer to the example of the Allen-Bradley scanner 1756-SDN. They apply accordingly to other masters.

a) Inserting a station in the project/network

RSNetWorx for DeviceNet contains an EDS assistant which will help you install the EDS file(s). You can find the CDVI in the “Hardware” list after installing the EDS file(s).

You can insert stations in the network on the right-hand side by pulling them with the mouse or by clicking the “Bus scan” button.



1 “Bus scan” button

Fig. 2/4: Hardware list and network in RSNetWorx

2. Startup

b) Only with modular EDS: checking the configuration

Double-click on the CDVI-DN icon in the network (Fig. 2/4). A dialogue window appears with the name of the valve terminal in the heading.

Click on “Module Configuration”.

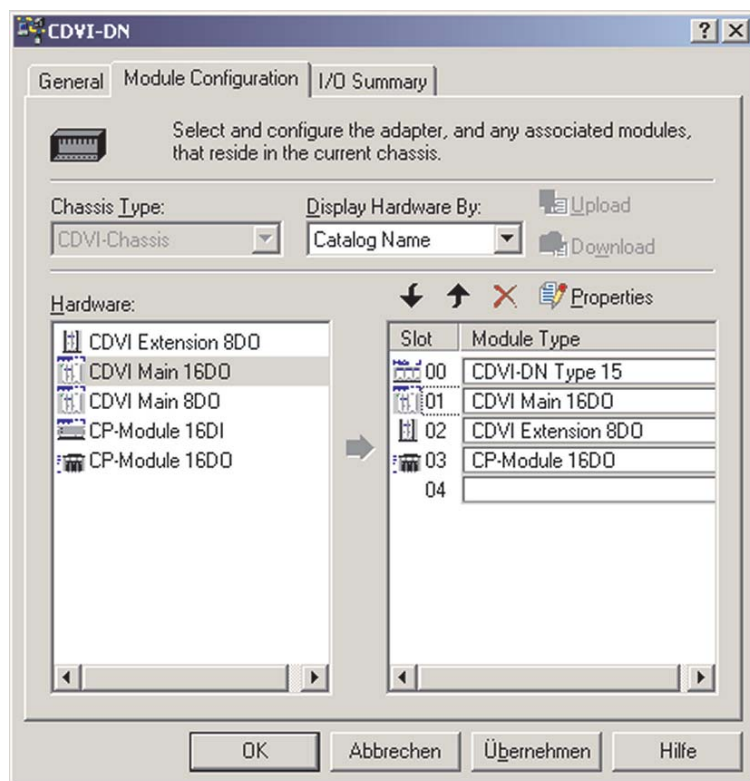


Fig. 2/5: RSNetWorx: Module Configuration

You can see possible hardware modules of your CDVI-DN system in the “Hardware” field.

Identified modules and their slot are listed on the right.

2. Startup

Double-click on the name of a module to the right of “Slot.”
A dialogue window appears with the heading “Slot ‘.’ - CDVI...”:

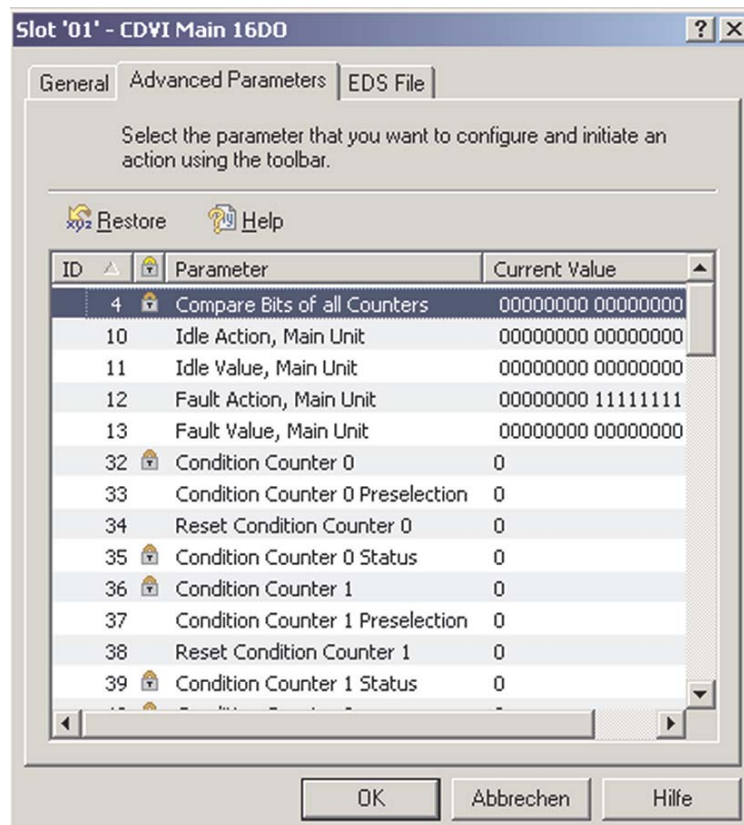


Fig. 2/6: RSNetWorx: Advanced Parameters

You can make various settings under “Advanced Parameters”, which are described in the following sections.

2. Startup

Click on “I/O Summary”.

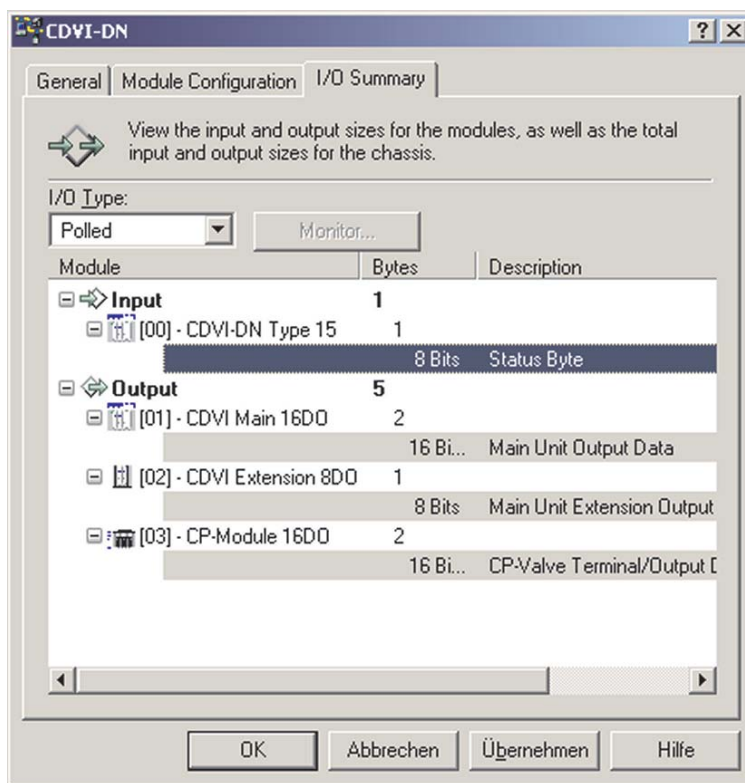


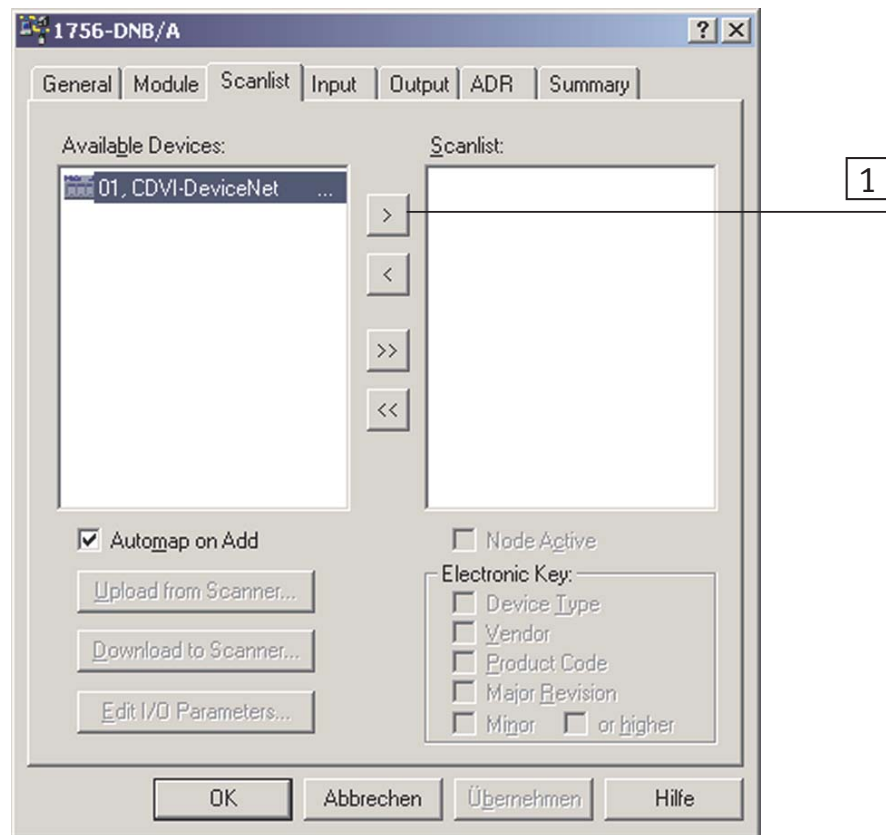
Fig. 2/7: RSNetWorx: I/O Summary

You are provided here with an overview of the configuration of the input and output addresses of your CP system.

2. Startup

c) Assigning the station to a scanner

1. Double-click on the desired scanner in the network.
A dialogue window appears.
2. Select the “Scanlist” tab and assign the available stations to the scanner:



1 Button for assigning the station

Fig. 2/8: “Scanlist” tab (example)

d) Parametrising stations

1. Double-click on a station in the “Scanlist” (Fig. 2/8). A dialogue window appears.
2. Only with conventional EDS: define the I/O parameters of the station. Confirm with OK.

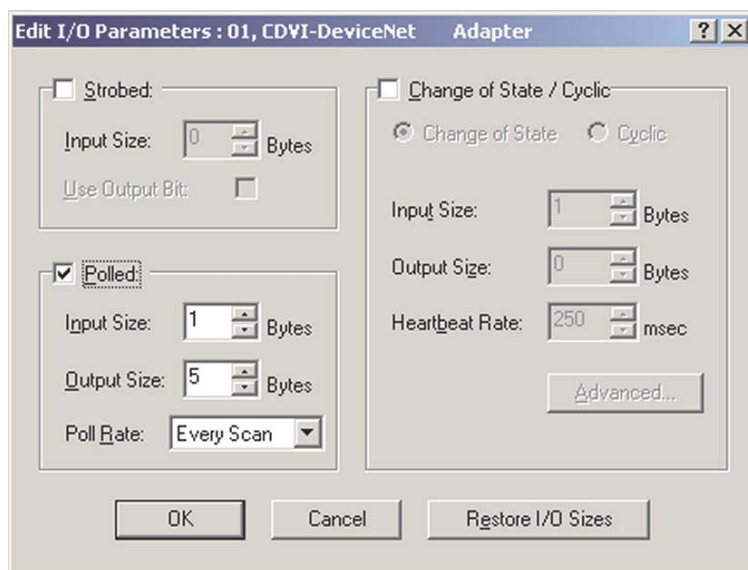


Fig. 2/9: Mask for defining the I/O parameters of the station



Hinweis

Fieldbus communication is interrupted through a strobed connection.

- Make sure that the communication type "strobed" is **not** selected in the mask above.

Configuration example:

- Communication type: “Polled”
- 1 input byte for diagnostics (diagnostic byte)
- 5 output bytes for the CDVI-DN and an output module in the extension

Observe the overview in Tab. 2/1.

2. Startup

e) Assigning I/O addresses of the station

You can use the “Output” and “Input” tabs to assign the I/O addresses of the node to the PLC operands:

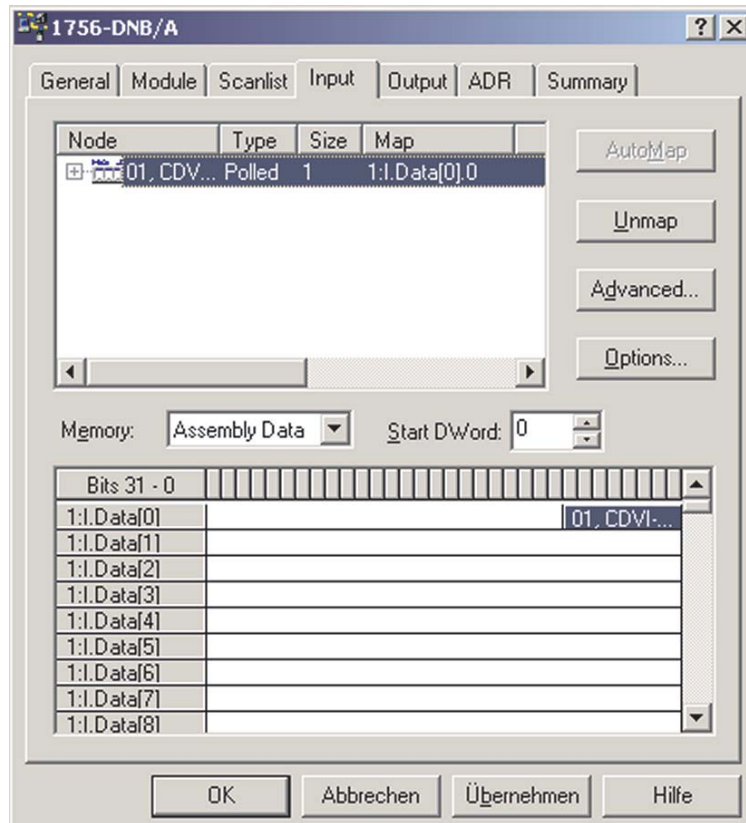


Fig. 2/10: Address assignment of the input of the 1-byte diagnostic information (“Polled”)

The CDVI-DN uses a “polled” connection to transmit the diagnostic information and the physical input data.

2. Startup

The physical output data are transmitted via the “polled” or “change of state” communication connection. In this example “polled”:

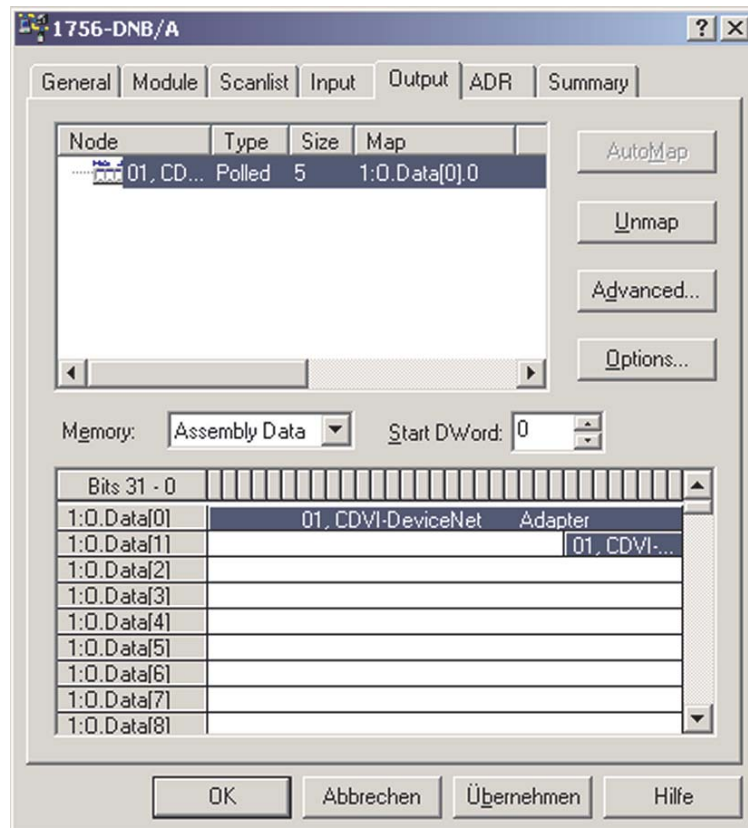


Fig. 2/11: Address assignment of the output (example)

Loading the configuration into the scanner.

Finally, load the configuration data into the scanner. Further information can be found in the documentation for your scanner.

2. Startup

2.2.6 Device-specific parametrisation

The CDVI-DN supports various device parameters which you can use to set the reaction of the valve control and several status messages. The parameters are set by selecting “Device Parameters” in the network configurator.

The table in Tab. 2/4 shows an example of how to address the solenoid coils.

Program-controlled access to the PLC is made by “explicit message” programming. The addresses of the DeviceNet objects required for this purpose can be found in Appendix B.

Reaction of the outputs in fault mode

The bus stations assume fault mode if there is a fault in the communication via DeviceNet. These faults may be caused by:

- Physical interruption of the network.
- Interference to data telegrams.

In fault mode, the outputs for valve control and for the output modules can assume one of the following states:

- Reset output
- Set output
- Freeze current status of output

The status to be assumed can be determined separately for each output. The default setting is “Reset output”.

2. Startup

The valves of the CDVI-DN and the outputs of the modules in the CP extension are set with separate parameters:

“Fault Action, Main Unit” parameter

You can use this parameter to define for each output whether it is to freeze the current status in fault mode or assume a certain output status (0/1).

Parameter value	Meaning
0	The output is set to a certain output status (0 or 1). The output status is defined with the parameter “Fault Value, Main Unit”.
1	The status of the output is frozen.

Tab. 2/2:

“Fault Value, Main Unit” parameter

You can use this parameter to define the output status (0 or 1) which each output is to assume in fault mode.

Parameter value	Meaning
0	Output is reset
1	Output is set

Tab. 2/3:

The set parameter value is only taken into account if the relevant output is set to 0 in the Fault Action parameter.

“Fault Action, Main Unit Extension” parameter

The same function as above with “Main Unit,” but for the output module in the extension.

“Fault Value, Main Unit Extension” parameter

The same function as above with “Main Unit,” but for the output module in the extension.

Reaction of the outputs in idle mode

Idle mode is assumed by the stations when this is requested by the master or scanner. In this status, the following applies:

- Inputs are transmitted.
- Outputs of the stations are no longer updated.

In idle mode, the outputs for valve control and for the output module can assume one of the following statuses:

- Reset output
- Set output
- Freeze current status of output

The status to be assumed can be determined separately for each output. The default setting is “Reset output”.

The valves of the CDVI-DN and the outputs of the modules in the CP extension are set with separate parameters:

2. Startup

“Idle Action, Main Unit” parameter

You can use this parameter to define for each output whether it is to freeze the current status in idle mode or whether it is to assume a certain output status (0/1).

Parameter value	Meaning
0	The output is set to a certain output status (0 or 1). The output status is defined with the “Idle Value, Main Unit” parameter.
1	The status of the output is frozen.

“Idle Action, Main Unit” parameter

You can use this parameter to define which output value (0 or 1) each output is to assume in idle mode.

Parameter value	Meaning
0	Output is reset
1	Output is set

The set parameter value is only taken into account if the relevant output is set to 0 in the Fault Action parameter.

“Idle Action, Main Unit Extension” parameter

The same function as above with “Main Unit,” but for the output module in the CP extension.

“Idle Value, Main Unit Extension” parameter

The same function as above with “Main Unit,” but for the output module in the CP extension.

2. Startup

The following table shows an example of with which bit you can address the valve coils:

Address	Unit	Bit	Assigned valve
0	Word	0	1st valve/coil 14
1		1	1st valve/coil 12
2		2	2nd valve/coil 14
3		3	2nd valve/coil 12
4		4	3rd valve/coil 14
5		5	3rd valve/coil 12
6		6	4th valve/coil 14
7		7	4th valve/coil 12
8		8	5th valve/coil 14
9		9	5th valve/coil 12
10		10	6th valve/coil 14
11		11	6th valve/coil 12
12		12	7th valve/coil 14
13		13	7th valve/coil 12
14		14	8th valve/coil 14
15		15	8th valve/coil 12
16	Byte	0	9th valve/coil 14
17		1	9th valve/coil 12
18		2	10th valve/coil 14
19		3	10th valve/coil 12
20		4	11th valve/coil 14
21		5	11th valve/coil 12
22		6	12th valve/coil 14
23		7	12th valve/coil 12

Tab. 2/4: Assignment of the bits to the solenoid coils

2. Startup

“Idle Action Main Unit” parametrisation example

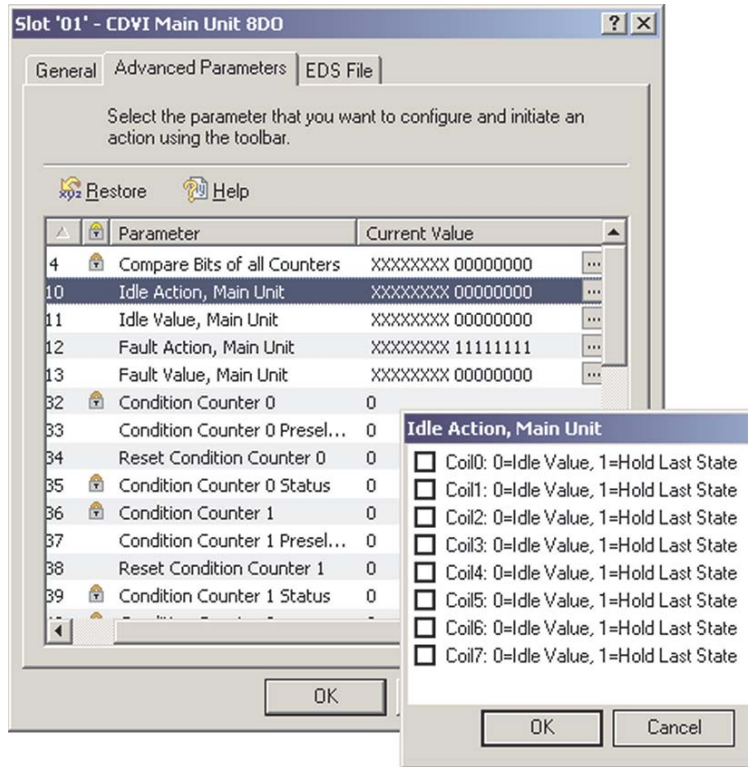


Fig. 2/12: Parametrisation example with RSNetWorx

Condition counter for the valve function

The switching cycle counter is used for the preventive maintenance of wearing parts, necessary adjustments depending on movements etc.

One counter is available for each solenoid coil. The values are provided in 32-bit format. You can have the actual value compared automatically with a specified nominal value.

The following table shows the elements of the condition counter:

Name	Format
“Condition counter value” ^{*)}	Unsigned double integer
“Condition counter preselection” ^{*)}	Unsigned double integer
“Reset condition counter”	Unsigned short integer
“Condition counter status”	Unsigned short integer
*) saved remanently in the CDVI-DN	

You can set and read out these parameters via the device parameters of your network configuration software.

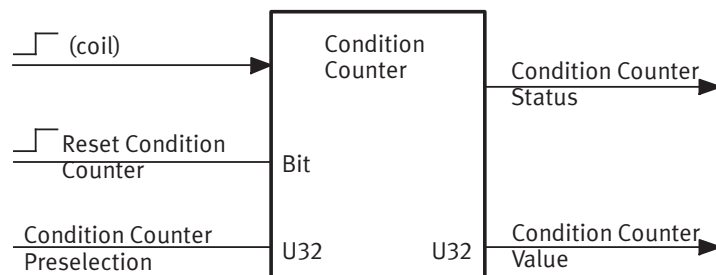


Fig. 2/13: Mode of operation of the condition counter

The switching cycle counters automatically count the number of times the valves are actuated. You can use the “Reset Condition Counter” parameter to reset the counter value (“condition counter value”) at any time. The reset parameter

2. Startup

is positive edge orientated, only the transition from value “0” to value “1” resets the “condition counter value.”

You can use the “Condition Counter Preselection” parameter to define a limit value for each counter. The “Condition Counter Status” parameter is set if this limit value is exceeded.

In addition to the individual “condition counter status,” all comparison results are summarised in the “Status Condition Counter” parameter.

The compare function is deactivated by the value “0” in “Condition Counter Preselection” (default setting).

Example

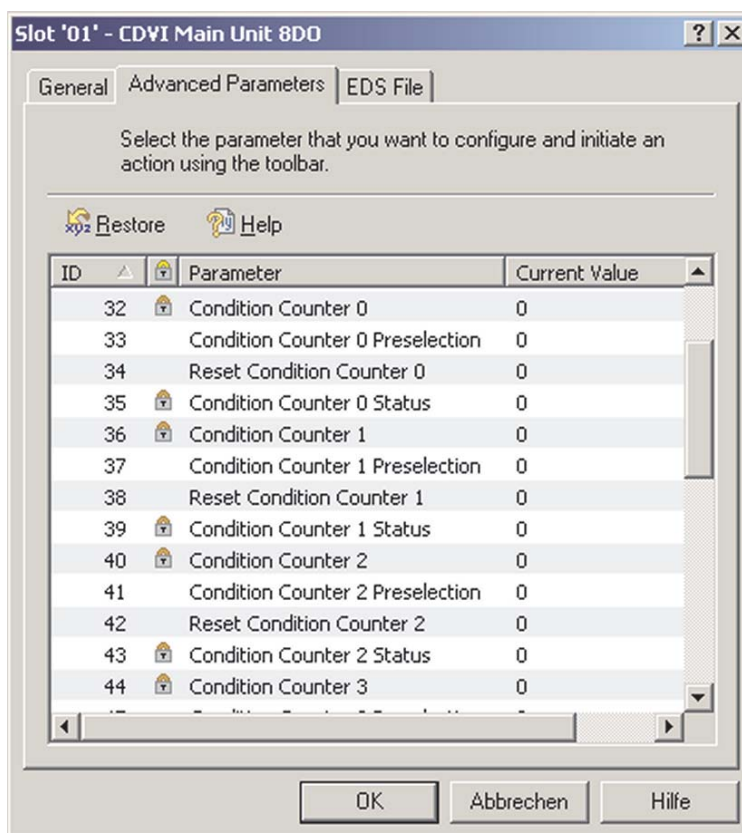


Fig. 2/14: Example of the parametrisation of the “condition counter” with RSNWorx

2. Startup

2.2.7 Explicit message

The parameters specified in chapter 2.2.6 can also be read and written by the PLC. To do so, communicate via “Explicit Message.” Refer to the manual for your controller for information on programming this data transmission.

The following object descriptions are required to address the CDVI-DN:

Object class	Attribute	Object name	Type
8 _d	3 _d	Discrete Input Point Object	Boolean
9 _d	3 _d	Discrete Output Point Object	Boolean
100 _d	3...8	Festo Discrete Output Object	UINT
101 _d	3	Festo Discrete Input Object	UINT
102 _d	1...6	Festo Diagnostics Object	(Various)



Detailed object descriptions can be found in Appendix B.

Diagnostics

Chapter 3

Contents

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3.1.2	Indication of errors by the LEDs	3-5
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3. Diagnostics

3.1 Diagnostics by means of LEDs

- 1** **PS** "Power system"
PS operating voltage electronics
- PL** "Power load"
PS valve load voltage
- MNS** "Module / network status"
- CP** "Compact performance"
CP CP extension modules
- 2** Status display of the solenoid coils

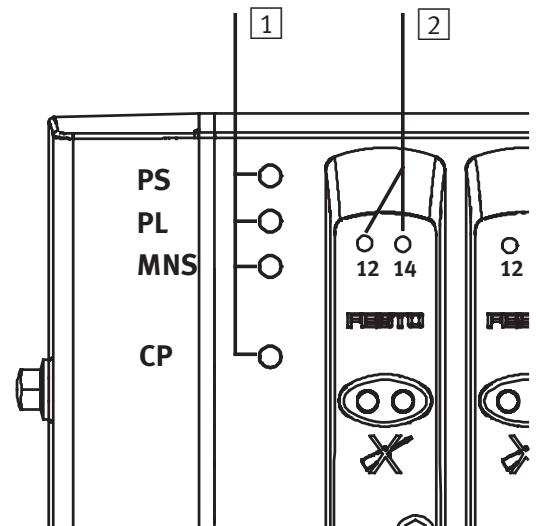







Fig. 3/1: LEDs of the CDVI-DN

3. Diagnostics

3.1.1 Standard operating status

In the standard operating status the LEDs are lit up in green.

( lit up;  flashing;  off)

LED	Colour	Operating status	Error handling
PS 	Green Lit up	Power supply for electronics OK	None
PL 	Green Lit up	Power supply for valves and CP outputs OK	None
MNS 	Green Lit up	CDVI-DN is assigned to a master.	None
CP 	Green Lit up	CP extension OK (if it exists)	None
CP 	Off	Without CP extension	None





Tab. 3/1: LEDs in standard operating status

3. Diagnostics

3.1.2 Indication of errors by the LEDs

Error diagnosis with the PS and PL LEDs






The PS (power system) and PL (power load) LEDs indicate faults to the power supply.

LED	Colour	Operating status	Error handling
PS 	Off	Operating voltage for electronics not applied	<ul style="list-style-type: none"> Check power supply of electronics (pin 1).
PS 	Green, flashing	Operating voltage for electronics < 20.4 V	<ul style="list-style-type: none"> Check power supply of electronics (pin 1). Switch power off and on again.
PL 	Off	Load voltage (for valves and CP outputs) not applied	<ul style="list-style-type: none"> Check power supply for valves (pin 2).
PL 	Green, flashing	Load voltage (for valves and CP outputs) ¹⁾ < 21.6 V	
¹⁾ The green PL-LED on the manifold block flashes (common error message, load undervoltage/voltage failure) in the event of undervoltage or a voltage failure at the expansion block. These diagnostics options are possible only with new basic blocks and new expansion blocks with additional power supply with advanced functions.			

Tab. 3/2: Error diagnosis with PS and PL LEDs

3. Diagnostics

Error diagnosis with the MNS LED (DeviceNet)

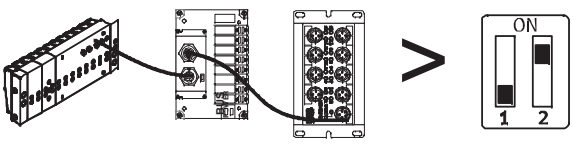
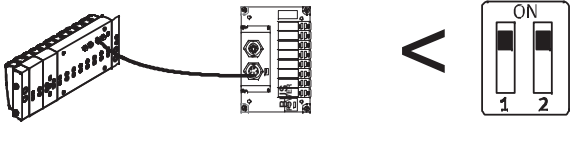
LED	Colour	Operating status	Error handling
MNS 	Off	<ul style="list-style-type: none"> – Operating voltage for electronics not applied – Dup_MAC_ID-Test^{*)} has not yet been concluded 	<ul style="list-style-type: none"> • Check operating voltage supply (pin 1). • Wait for end of test. If the LED remains off: <ul style="list-style-type: none"> • Station number possibly assigned twice; correct station numbers.
MNS 	Green, Flashing	<ul style="list-style-type: none"> – CDVI-DN is not assigned to any master. – Dup_MAC_ID-Test has been concluded, but CDVI-DN has no connection to the fieldbus. 	<ul style="list-style-type: none"> • Check configuration. • Master is possibly not in RUN mode: check master status.
MNS 	Red, Flashing	<ul style="list-style-type: none"> – Connection time-out or – Malfunction of the master 	<ul style="list-style-type: none"> • Find out and eliminate cause of time-out. • Check master status.
MNS 	Red Lit up	<ul style="list-style-type: none"> – Communication fault – Hardware fault which cannot be rectified 	<ul style="list-style-type: none"> • Check the baud rate setting and the connection to the network. • Replace CDVI-DN; servicing required.
MNS 	Red-green Flashing	<ul style="list-style-type: none"> – Specific communication fault 	<ul style="list-style-type: none"> • Check fieldbus. • Check master status.
^{*)} Test algorithm which ensures that no station numbers on the network are assigned twice. The test is usually carried out automatically when the network connection is set up.			

Tab. 3/3: Fault diagnosis with MNS LED

3. Diagnostics

Fault diagnosis with the CP LED

A deviation of the actual CP extension of your CDVI-DN from the CP extension set on the DIL switch can cause problems when starting the system. Refer here to section 1.2.2. The following table shows the reaction.

Extension of the CDVI-DN (examples)	Deviation	Reaction
	Extension greater than the DIL switch setting	<ul style="list-style-type: none"> - System starts. - LED CP lights up in red. Superfluous, non-configured module is ignored.
	Extension smaller than the DIL switch setting. Module is missing.	<ul style="list-style-type: none"> - System starts. - LED CP lights up in red. The missing module is identified automatically if it is added later on.

Tab. 3/4: Reaction in the event of a deviation between the CP extension and the DIL switch setting





Note

- Make a new nominal-actual comparison in the event of any deviations.

3. Diagnostics

3.1.3 LEDs as status indicators of the solenoid coils

There is a yellow LED for each solenoid coil (see Fig. 3/1).
This LED indicates the switching status of the solenoid coil.

LED	Colour	Solenoid coil	Meaning
	Off	<ul style="list-style-type: none">– Normal position– Switching position	Signal not applied (logical “0”) Signal applied (logical “1”) but: <ul style="list-style-type: none">– Load voltage of valves lies below the permitted tolerance range (< 21.6 V DC)
	Yellow Lit up	<ul style="list-style-type: none">– Switching position– Normal position	Signal applied (logical “1”) Signal applied (logical “1”) but: <ul style="list-style-type: none">– Compressed air supply not OK or– Pilot exhaust blocked or– Servicing required

Tab. 3/5: LEDs for status indication of the solenoid coils

3.2 Reaction to malfunctions in the control system

The reaction of the outputs to control or communication malfunctions can be set by means of the parameters

- “Fault Value” and “Fault Action”
- “Idle Value” and “Idle Action”

The default setting is “Reset output”.

Further information on parametrisation can be found in section 2.2.6.



Note

Please observe the following if the outputs are reset in the event of a PLC stop or field bus interruption or malfunction:

- Monostable valves move to normal position.
- Bistable valves remain in the current position.
- Mid-position valves move to the mid position (depending on the valve type: pressurized, exhausted or blocked).

3. Diagnostics

3.3 Diagnostics at the DeviceNet

The following bus diagnostics are available:

- Diagnostics with the DeviceNet scanner
- Diagnostics with the software Configurator (e.g. RSNetWorx, see section 3.3.1)

3.3.1 Diagnostics with the software configurator

1. Make sure the node is online at the DeviceNet.
2. Double click on the icon of the valve terminal in the software configurator (e.g. RSNetWorx).
3. Click on the “Configuration Settings” tab.
4. Double click on the “Status Byte” parameter line. Detailed information are shown (see Fig. 3/2).

3. Diagnostics

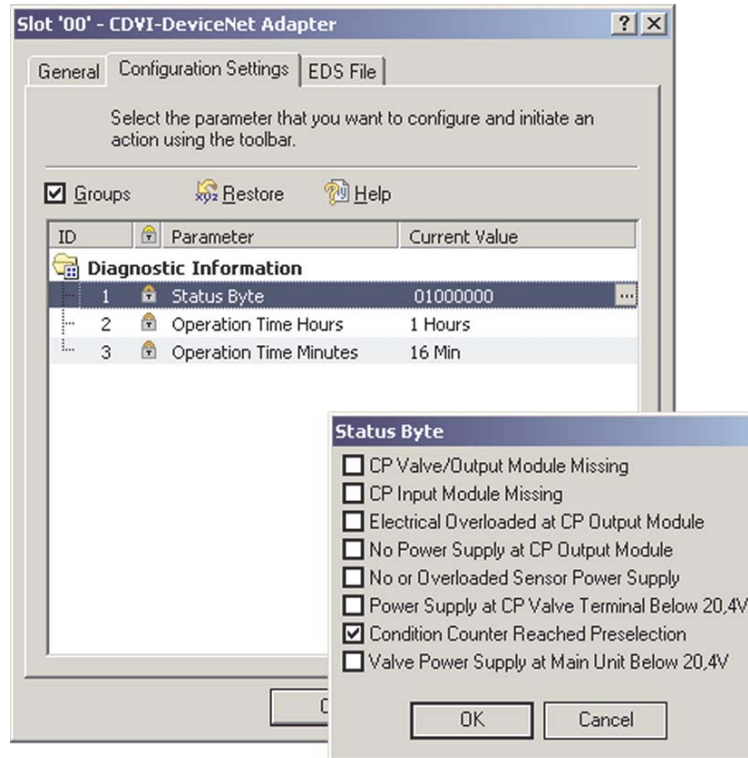


Fig. 3/2: Display of detailed information on diagnostics

3. Diagnostics

The following table shows the structure of the diagnostic information (status byte / diagnostic byte):

Bit	Applies to	Comment in the EDS file	Explanation
0	CP extension: – CP.. valve terminal – CP output module	CP valve / output module missing	CP connection interrupted
1	– CP input module in the extension	CP input module missing	CP connection interrupted
2	– CP output module in the extension	Electrical overload at CP output module	Short circuit or overload at output module (see section 3.4.1)
3	– CP output module in the extension	No power supply at CP output module	Load voltage failure at output module
4	– CP input module in the extension	No or overloaded sensor power supply	Failure of operating voltage at input module or sensors, short circuit/ overload in sensor supply (see section 3.4.2)
5	– CP.. valve terminal	Power supply at CP valve terminal below 20.4 V	Valve power supply < 20.4 V
6	– CDVI manifold block – CDVI extension block	Condition counter reached preselection	At least one valve counter has exceeded the limit value.
7	– CDVI manifold block	Valve power supply at main unit below 21.6 V	Valve power supply < 21.6 V

Tab. 3/6: Explanation of the diagnostic information (status byte)

Additional information can be found in Appendix B.1.8.

3.4 Short circuit/overload



Detailed information on CP input and output modules can be found in the “CP Modules Electronics” manual.

3.4.1 CP output module

If there is a short circuit or overload:

- All digital outputs of a CP output module are switched off.
- The green LED “Diag” on the output module flashes quickly.
- Bit 2 (short circuit/overload) in the device status byte is set to logical “1”.



Note

The outputs cannot be used again until the short circuit or overload has been eliminated and the error deleted.

Deleting an error

You can delete the error by resetting all outputs. The following alternatives are available for this purpose:

Alternatives	Explanation
<ul style="list-style-type: none">• Set all outputs of the output module to logical “0” (RESET) or• Briefly interrupt the CP connection at the CP output module or• Briefly interrupt the operating voltage of the CP system.	<ul style="list-style-type: none">– Manually or automatically in the program– Outputs on the output module are reset automatically.– All outputs on the CP system are reset automatically.

3. Diagnostics

The outputs can be reused afterwards. The outputs are switched off again if the short circuit/overload still prevails.

3.4.2 Sensor supply at an input module

If there is a short circuit, overload or voltage fault in the sensor supply:

- The sensor supply for all inputs of the module is switched off.
- If the green LED “Diag” on the input module is flashing quickly,
- the error bit V_{sen} (bit 4 in the DeviceNet status byte) is set to logical “1.”



Note

The inputs cannot be used again until the short circuit or overload has been eliminated and the error deleted.

Deleting the error/short circuit/overload

You can delete the error in one of the following ways:

- Briefly interrupt the CP connection at the CP input module
- or
- Briefly interrupt the operating voltage of the CP system on the CDVI-DN.

The inputs can then be queried again. The error is indicated again if the short circuit/overload still exists.

With module CP-E16-M8-Z:

The short circuit/overload is automatically reset and the voltage switched on again.

Technical data and accessories

Appendix A

A. Technical data and accessories

Contents

A.	Technical data and accessories	A-1
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A. Technical data and accessories

A.1 Technical data

General information	
Temperature range: – Operation – Storage/transport	- 5°C ... + 50°C -20°C ... + 40°C
Relative air humidity	95 %, non condensing
Recommended shelf life	Max. 18 months
Protection class	– IP66 and IP67 (EN 60529) – Type 4 as per NEMA250 (hosedown test, test no. 5.7)
Protection against electric shock (protection against direct and indirect contact as per EN 60204-1/IEC 204)	By means of PELV power supply unit (protected extra low voltage)
Valves	See description of pneumatics type P.BE-CDVI-...

Operating voltage of electronics	
Pin 1 of power supply connection – Nominal value – Tolerance	24 V DC (protected against incorrect polarity, internally fused, automatic restart, galvanically isolated from the power supply of the valves, provided PIN3 and PIN4 are not bridged, see page 1-21) 20.4 ... 26.4 V (- 15% / + 10%)
Current consumption – Nominal value	Max. 100 mA + current consumption of sensors (and modules; see section 1.4.1)
Residual ripple	4 V _{pp} (within tolerance)

A. Technical data and accessories

Load voltage of solenoid valves	
Pin 2 power supply connection for manifold block and expansion block with auxiliary power supply – Nominal value – Tolerance	24 V DC (protected against incorrect polarity, internally fused, automatic restart, galvanically isolated from the power supply of the valves, provided PIN3 and PIN4 are not bridged, see page 1-21) 21.6 ... 26.4 V (+/- 10%)
Current consumption	Sum of all switched-on solenoid valves (CDVI + CP extension); see section 1.4.1 and the relevant pneumatics manuals
Minimum power supply requirement	0.4 V/ms voltage increase time until the high current phase is reached
Residual ripple	4 Vpp (within tolerance)

Operating voltage of DeviceNet bus interface	
Micro Style connection: pin 2 – Nominal value – Tolerance	24 V DC (protected against incorrect polarity, external fuse required) 11 ... 30 V
Galvanic isolation	Bus interface opto-decoupled

Electromagnetic compatibility	
– Interference emission – Interference immunity	See declaration of conformity (www.festo.com) See declaration of conformity (www.festo.com)



Technical data for the pneumatics can be found in the “Pneumatics manual, P.BE-CDVI-...”

A.2 Accessories

→ www.festo.com/catalogue



Note

When using plugs or cables from other manufacturers, make sure the properties of the plugs and cables meet the requirements of your application (in particular IP protection class, resistance to cleaning agents, clean design requirements).

A. Technical data and accessories

DeviceNet objects

Appendix B

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B. DeviceNet objects

B.1 DeviceNet objects

This chapter describes the representation of the CDVI-DN within the DeviceNet Object model. Some information is in English in order for the original terms of the DeviceNet specification to be used unambiguously.

B.1.1 DeviceNet object model

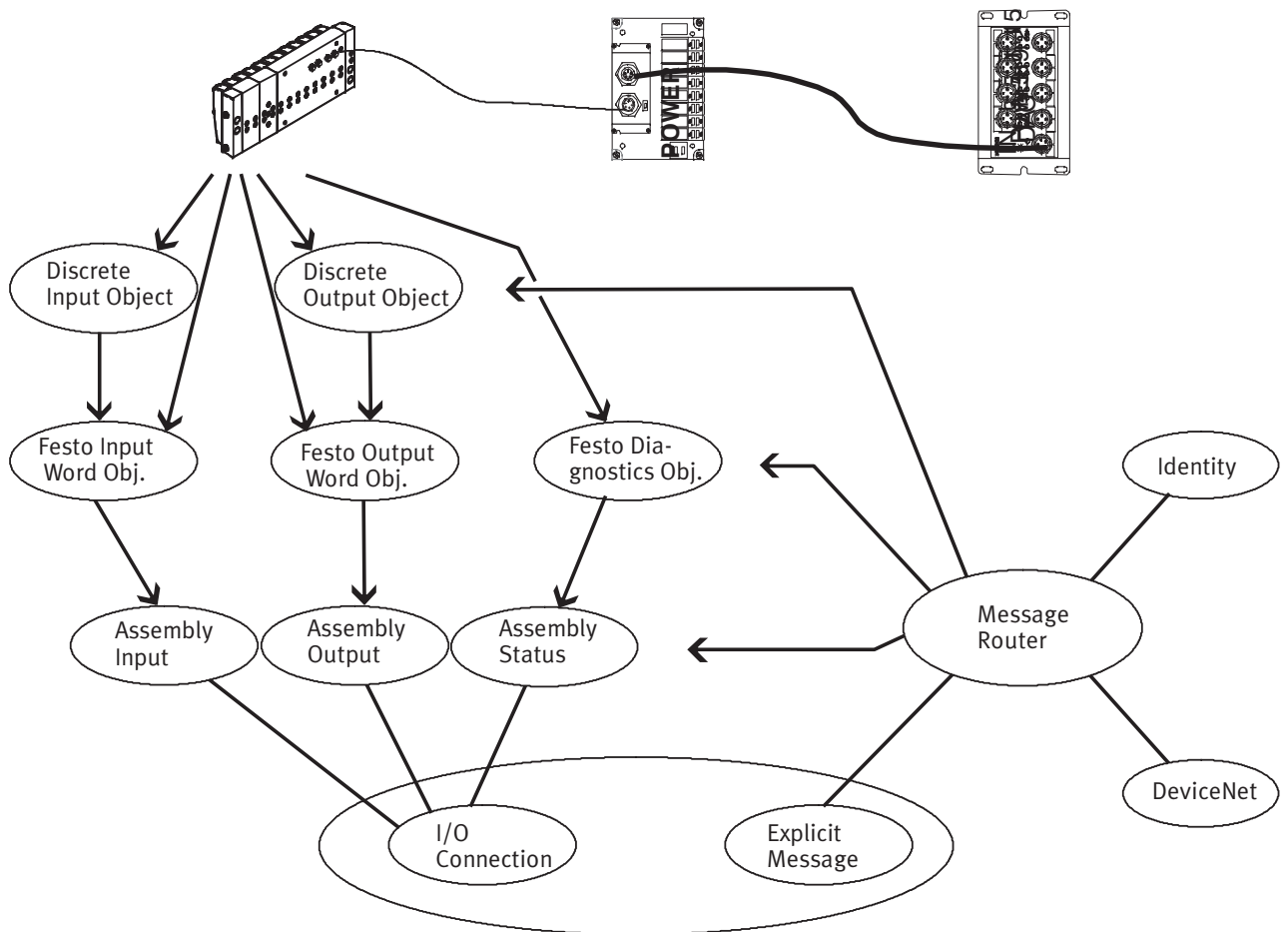


Fig. B/1: The DeviceNet object model

B. DeviceNet objects

B.1.2 Overview

Basic data:

information	Description
Vendor name	Festo Corporation
Device type	12 _D 0C _H
Product code	5141 _D 1415 _H
Major revision / minor revision	2 1
Input size / output size	Depending on the string extension set with DIL switches (see Tab. 2/1)
Product name	CDVI-DN

DeviceNet object classes

The following DeviceNet object classes are supported:

Object class	Attributes	Name	Type
8 _d	3 _d	Discrete Input Point Object	BOOL
9 _d	3 _d	Discrete Output Point Object	BOOL
100 _d	1...5	Festo Output Word Object	UINT
101 _d	1	Festo Input Word Object	UINT
102 _d	1...6	Festo Diagnostic Object	(Various)

B. DeviceNet objects

B.1.3 Discrete Input Point Object: class code 8d

Attribute ID	Access	Name	Type	Description
3	Get	Value	BOOL	Input value of the input (0/1)

B.1.4 Discrete Output Point Object: class code 9d

Attribute ID	Access	Name	Type	Description
3	Get/Set	Value	BOOL	Output value of the output (0/1)

B. DeviceNet objects

B.1.5 Festo Discrete Output Object: class code 100d

Each instance has 16 bits.

Attributes	Access	Name	Type	Description
3	Get/Set	Output value	INT	Value of the output (0/1)
5	Get/Set	Fault Action	INT	Parameter value: 0 = the status of the output is defined by the "Fault Value" (0/1) 1 = the status of the output is frozen
6	Get/Set	Fault Value	INT	Defines the status of the output in fault mode if Fault Action is set to 0.
7	Get/Set	Idle Action	INT	Parameter value: 0 = the status of the output is defined by the "Idle Value" (0/1) 1 = the status of the output is frozen
8	Get/Set	Idle Value	INT	Defines the status of the output in idle mode, if Idle Action is set to 0.

B.1.6 Festo Discrete Input Object: class code 101d

Instance 1: for a CP input module

Attributes	Access	Name	Type	Description
3	Get	Input value	INT	Input value of the input module (0/1)

B. DeviceNet objects

B.1.7 Festo Diagnostics Object: class code 102d

Instance 1 ...32

An instance is assigned to each solenoid coil of the manifold block:

- Least significant solenoid coil: instance 1
- Most significant solenoid coil: instance 24

Attributes	Access	Name	Type	Description
1	Get	Condition Counter Value	UDINT	Counter value of the condition counter
2	Get/Set	Condition Counter Preselection	UDINT	Limit value of the condition counter
5	Get/Set	Reset Condition Counter	USINT	Resets the condition counter: sets the value to “1”. The value is set to “0” again after the reset.
6	Get	Condition Counter Status	USINT	Becomes “1” when the limit value of the condition counter is reached

Instance 33 ...48

An instance is assigned to each output in the CP extension:

- Least significant solenoid coil: instance 33
- Most significant solenoid coil: instance 48

Attribute	Access	Name	Type	Description
1	Get	Condition Counter Value	UDINT	Counter value of the condition counter

B. DeviceNet objects

instance 49

Attribute	Access	Name	Type	Description
1	Get	Status/Compare Bit compact	UDINT	Status/Compare bits of all counters of the CDVI-DN. Least significant bit corresponds to counter 1, most significant bit corresponds to counter 24.
2	Get	Diagnostic Byte	BYTE	Diagnostic status

B. DeviceNet objects

B.1.8 Structure of the status byte (diagnostic bytes)

The status byte provides information about the identifiable errors of the CDVI-DN and the modules in the CP extension.

Module	Bit 7 V_{load}	Bit 6 CM	Bit 5 V_{tol}	Bit 4 V_{sen}	Bit 3 V_{off}	Bit 2 SC/O	Bit 1 I mod.	Bit 0 O mod.
CDVI-DN								
Valve terminal on CP string								
CP input module								
CP output module								
<ul style="list-style-type: none"> – O module: CP connection interrupted at output module – I module: CP connection interrupted at input module – SC/O: Short circuit/overload at output module (see section 3.4.1) – V_{off}: load voltage failure at output module – V_{sen}: failure of operating voltage at input module or sensors, short circuit/overload in sensor supply (see section 3.4.2) – V_{tol}: load voltage in expansion block < 21.6 V – CM: condition monitoring. At least one valve counter has exceeded the limit value. – V_{load}: Load voltage in manifold block < 21.6 V 								



Further information can be found in section 3.3.

B. DeviceNet objects

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Chapter C

C. Index

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Solenoid valve 2/2 way N.C. With pilot control

21WA3K0B130

÷

21WA4K0B130

PRESENTATION:

S.V. with pilot control for interception of fluids compatible with the construction materials.

A minimum operational pressure of 0,2 bar is required.

The materials used and the tests carried out ensure maximum reliability and duration.

USE: Automation
Heating

PIPES: G 3/8 - G 1/2

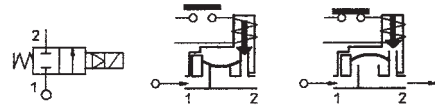
COILS: 8W - Ø 13
 BDA -BDS - BSA 155°C (class F)
 BDP 160°C (high temperature)
 BDF 180°C (class H)
 SDH 180°C (class H)

Max. allowable pressure (PS) 20 bar
 Environment temperature:
 with class **F** or high temperature coils - 10°C + 60°C
 with class **H** coil - 10°C + 80°C



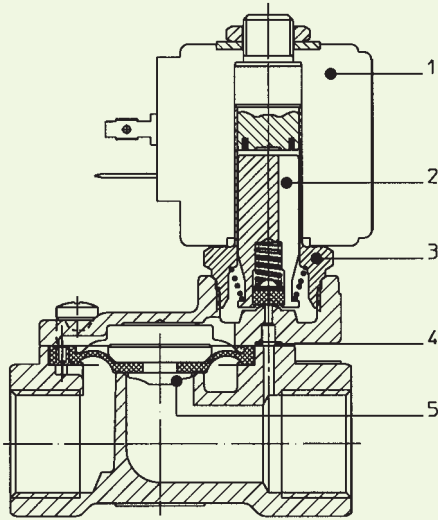
Gaskets	Temperature		Medium
B =NBR (nitrile rubber)	- 10°C	+ 90°C	Air, inert gas, water
V =FKM (fluoroelastomer)	- 10°C	+140°C	mineral oils (2°E),gasoline gas oil

For seals other than NBR replace the letter "**B**" with the ones corresponding to the other seals. E.I. 21WA3K0V130.



Pipe ISO 228/1	Code	Max viscosity		Ø mm	Kv (l/mn)	Power (watt)	Pressure		
		cSt	°E				min bar	M.O.P.D. AC bar DC bar	
G 3/8	21WA3KOV130	12	~ 2	13	60	8	0,2	16	16
G 1/2	21WA4KOV130				70				

The "ODE " reserves the right to carry out technical and aesthetic modifications without prior notification.



MATERIALS:

Body Brass - UNI EN 12165 CW617N
Armature tube Stainless steel AISI series 300
Fixed core Stainless steel AISI series 400
Plunger Stainless steel AISI series 400
Phase displacement ring Copper - Cu 99,9%
Spring Stainless steel AISI series 300
Seal Standard: B=NBR
 On request: V=FKM
Orifice Brass - UNI EN 12165 CW617N

On request:

Connector Pg 9 or Pg 11
Connector conformity ISO 4400

FEATURES:

Electrical conformity IEC 335
Protection degree IP 65 EN 60529 (DIN 40050)
 with coil fitted by connector.

SPARE PARTS:

- 1. Coil:**
See coils list
- 2. Complete plunger:**
Code R450886/B
- 3. Complete armature tube:**
Code R450606
- 4. Gasket O-Ring:**
Code R990300/B
- 5. Complete diaphragm:**
Code R452186/B

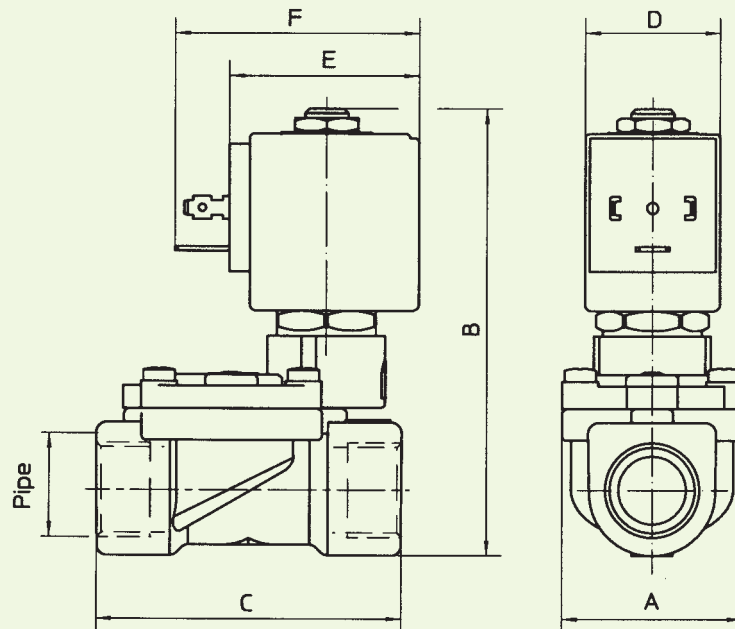
KIT:

KT130K**B**30-A=2+3

MAINTENANCE KIT:

KTGWA3K0**B**13=2+4+5

DIMENSIONS:



Type	Pipe ISO 228/1	A mm	B mm	C mm
21WA3K0 B 130	G 3/8	40	97	60
21WA4K0 B 130	G 1/2			66

COIL W ---	POWER ABSORPTION		TYPE	DIMENSIONS		
	Inrush VA~	Hold VA~		D mm	E mm	F mm
8 W	25	14,5	B	30	42	54
			S	32		



COILS 30 mm x Ø 13 mm

BDA08012AS

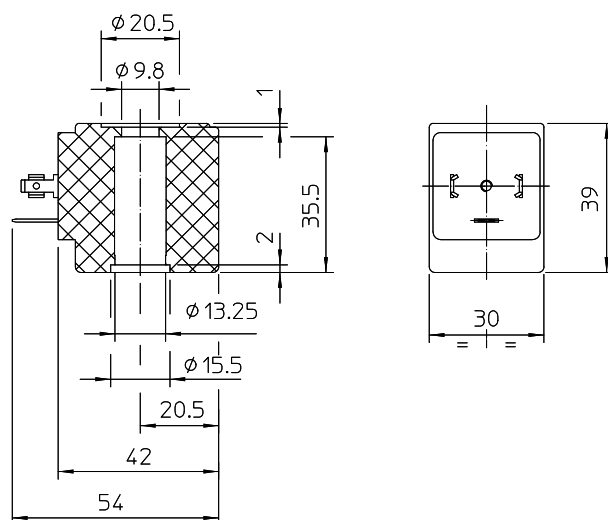
÷

BDV08224DU

COIL

BDA Molding material: PA - Black polyamide - class F (155°C)
BDF Molding material: PPS - Black polyphenylsulfide - class (180°C)
BDP Molding material: PA - Black polyarylamide - high temperature (160°C)
BDS Molding material: PA - Black polyamide with anti-humidity impregnation class F(155°C)
BDV Molding material: PET - Black polyethylene - class H (180°C)
Winding: In class H
Electrical connections: With connector EN 175301-803 paragraph 5.3.1
 Protection degree DIN 40050 = IP65

MOULDING AND BOBBIN ARE MADE BY 100% VIRGIN MATERIAL



MATERIAL ON STOCK:

Code	Power	Voltages	ED	Approvals
BDA08012AS	8 W	V 12/50Hz	100%	CE
BDA08012CS	8 W	V 12 DC	100%	CE
BDA08024CS	8 W	V 24 DC	100%	CE - (1)
BDA08024DS	8 W	V 24/50-60Hz	100%	CE
BDA08110CS	8 W	V 110 DC	100%	CE
BDA08110DS	8 W	V 110/50-60Hz	100%	CE
BDA08223DS	8 W	V 220-230/50-60Hz	100%	CE - (1)
BDA08380DS	8 W	V 380/50-60Hz	100%	CE
BDA16024ES	16 W	V 24/50Hz	50%(2)	CE
BDF08012CU	11 W	V 12 DC	100%	CE - UL - CSA
BDF08024BU	8 W	V 24/60Hz	100%	CE - UL
BDF08024CU	11 W	V 24 DC	100%	CE - UL - CSA

The "ODE" reserves the right to carry out technical and aesthetic modifications without prior notification.



Code	Power	Voltages	ED	Approvals
BDP08223DS	8 W	V 220-230/50-60Hz	100%	CE
BDS08223DS	8 W	V 220-230/50-60Hz	100%	CE
BDV08024CU	11 W	V 24 DC	100%	CE - UL
BDV08110AW	8 W	V 110/50Hz V 120/60Hz	100%	CE - UL - CSA
BDV08110BW	8 W	V 110/60Hz	100%	CE - UL - CSA
BDV08112DU	8 W	V 110-120/50-60Hz	100%	CE - UL
BDV08220BW	8 W	V 220/60Hz	100%	CE - UL - CSA
BDV08224DU	8 W	V 220-240/50-60Hz	100%	CE - UL

NOMINAL VOLTAGES DC + 10% -5%
TOLERANCES: AC + 10% -15%

- 1) Available also with **VDE** approval (I.e. code: BDA08024CV).
 (2) Standard cycle time 1 minute, for different requirements please contact our commercial offices.
 Other voltages and power absorptions available on demand and for quantities.



COILS 30 mm x Ø 13 mm with cable

BSA08223DS
÷
BVA08230AS

COIL

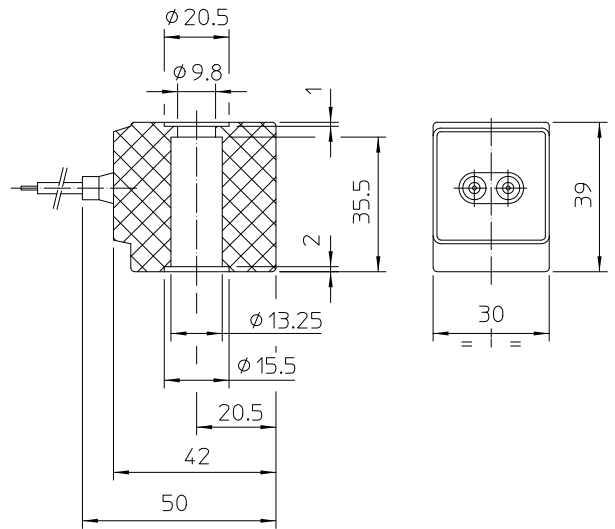
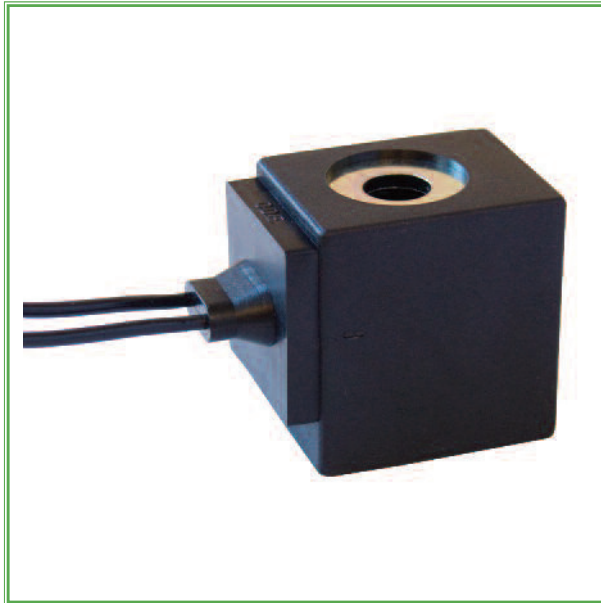
BSA with cm 100 cable
BVA with cm 50 cable

Molding material: PA - Black Polyamide - class F (155°C)

Winding: In class H

Electrical connections: Cables

MOULDING AND BOBBIN ARE MADE BY 100% VIRGIN MATERIAL.



MATERIAL ON STOCK:

Code	Power	Voltages	ED	Approvals
BSA08223DS	8 W	V 220-230/50-60Hz	100%	CE
BSA08230AS	8 W	V 230/50Hz	100%	CE
BVA08223DS	8 W	V 220-230/50-60Hz	100%	CE
BVA08230AS	8 W	V 230/50Hz	100%	CE

NOMINAL VOLTAGE DC + 10% - 5%
TOLERANCES: AC +10% - 15%

Other voltages and power absorptions available on demand and for quantities.

The "ODE" reserves the right to carry out technical and aesthetic modifications without prior notification.



LATCHING COILS 30 mm x Ø 13 mm

**BDA
LATCHING COILS**

COIL **BDA** Molding material: PA - Black polyamide - class F (155°C)

Winding: In class H

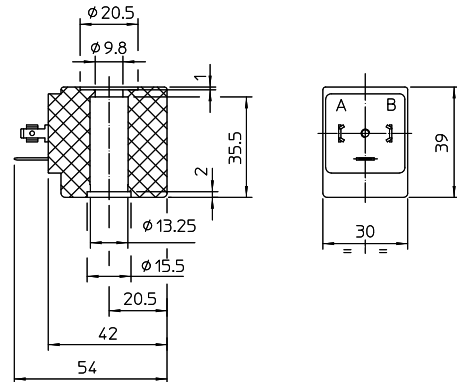
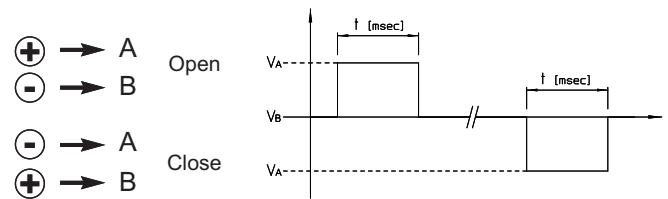
Electrical connections: With connector EN 175301-803 paragraph 5.3.1
Protection degree DIN 40050 = IP65

MOULDING AND BOBBIN ARE MADE BY 100% VIRGIN MATERIAL.

TECHNICAL OPERATING DATA:

- Impulse feed from 4,5 to 24 Volts for a period lasting from 20 to 100 ms.

NOTE: To ensure correct operation the fluid should be filtered to eliminate all traces of impurity subject to magnetic attraction, which would inevitably deposit on the cores of the solenoid valve, which are always magnetized, causing the formation of oxide as well as contact problem.



MATERIAL ON STOCK

Code	Power	Voltages
BDA1X004LS	1,5 W	V 4,5
BDA2X006LS	2,5 W	V 6
BDA05009LS	5 W	V 9
BDA1X006LS	1,5 W	V 6
BDA2X009LS	2,5 W	V 9
BDA05012LS	5 W	V 12
BDA1X009LS	1,5 W	V 9
BDA2X012LS	2,5 W	V 12
BDA10024LS	10 W	V 24
BDA1X012LS	1,5 W	V 12
BDA05024LS	5 W	V 24

**NOMINAL VOLTAGE
TOLERANCES::**

DC + 10% -5%

The "ODE" reserves the right to carry out technical and aesthetic modifications without prior notification.

Montageanleitung

Mounting instructions

Notice de montage

Wägezellen

Load cells

Pesons

Z6...



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Sicherheitshinweise

Wo bei Bruch Menschen und Sachen zu Schaden kommen können, müssen vom Anwender entsprechende Sicherheitsmaßnahmen (z.B. Absturzsicherungen, Überlastsicherungen usw.) getroffen werden. Der einwandfreie und sichere Betrieb von Wägezellen setzt sachgemäßen Transport, fachgerechte Lagerung, Aufstellung und Montage sowie sorgfältige Bedienung und Instandhaltung voraus.

Die einschlägigen Unfallverhütungsvorschriften sind unbedingt zu beachten. Berücksichtigen Sie insbesondere die in den technischen Daten genannten Grenzlaster.

Bestimmungsgemäßer Gebrauch

Die Wägezellen Z6... sind für wägetechnische Anwendungen konzipiert. Jeder darüber hinausgehende Gebrauch gilt als **nicht** bestimmungsgemäß.

Zur Gewährleistung eines sicheren Betriebes dürfen die Wägezellen nur nach den Angaben in der Montageanleitung verwendet werden. Bei der Verwendung sind zusätzlich die für den jeweiligen Anwendungsfall erforderlichen Rechts- und Sicherheitsvorschriften zu beachten. Sinngemäß gilt dies auch bei Verwendung von Zubehör.

Die Wägezellen Z6... können als Maschinenelemente (z.B. bei Behälterverwiegungen) eingesetzt werden. Beachten Sie in diesen Fällen, dass die Wägezellen zugunsten einer hohen Messempfindlichkeit nicht mit den in Maschinenkonstruktionen üblichen Sicherheitsfaktoren konstruiert sind. Die Wägezellen sind keine Sicherheitselemente im Sinne des bestimmungsgemäßen Gebrauchs. Gestalten Sie die das Messsignal verarbeitende Elektronik so, dass bei Ausfall des Messsignals keine Folgeschäden auftreten können.

Allgemeine Gefahren bei Nichtbeachten der Sicherheitshinweise

Die Wägezellen entsprechen dem Stand der Technik und sind betriebssicher. Von den Wägezellen können Restgefahren ausgehen, wenn sie von ungeschultem Personal unsachgemäß eingesetzt und bedient werden.

Jede Person, die mit Aufstellung, Inbetriebnahme, Wartung oder Reparatur einer Wägezelle beauftragt ist, muss die Montageanleitung und insbesondere die sicherheitstechnischen Hinweise gelesen und verstanden haben.

Restgefahren


Der Leistungs- und Lieferumfang der Wägezellen deckt nur einen Teilbereich der Wägetechnik ab. Sicherheitstechnische Belange der Wägetechnik sind zusätzlich vom Anlagenplaner/Ausrüster/Betreiber so zu planen, zu realisieren und zu verantworten, dass Restgefahren minimiert werden. Jeweils existierende Vorschriften sind zu beachten. Auf Restgefahren im Zusammenhang mit der Wägetechnik ist hinzuweisen.

In dieser Anleitung wird auf Restgefahren mit Symbolen hingewiesen (s.u.):


Symbol:  **VORSICHT**
Bedeutung: **Möglicherweise gefährliche Situation**

Weist auf eine **mögliche** gefährliche Situation hin, die – wenn die Sicherheitsbestimmungen nicht beachtet werden – Sachschaden, leichte oder mittlere Körperverletzung zur Folge **haben könnte**.

Symbole für Anwendungshinweise und nützliche Informationen:

Symbol:  **HINWEIS**

Weist darauf hin, dass wichtige Informationen über das Produkt oder über die Handhabung des Produktes gegeben werden.

Symbol: 

Bedeutung: **CE-Kennzeichnung**

Mit der CE-Kennzeichnung garantiert der Hersteller, dass sein Produkt den Anforderungen der relevanten EG-Richtlinien entspricht.

Umgebungsbedingungen

Beachten Sie in Ihrem Anwendungsfeld, dass Säuren und alle Stoffe die (Chlor-) Ionen freisetzen, auch nichtrostende Stähle und deren Schweißnähte angreifen. Die dadurch evtl. auftretende Korrosion kann zum Ausfall der Wägezelle führen. In diesem Fall sind von der Betreiberseite entsprechende Schutzmaßnahmen vorzusehen.

Verbot von eigenmächtigen Umbauten und Veränderungen

Die Wägezellen dürfen ohne unsere ausdrückliche Zustimmung weder konstruktiv noch sicherheitstechnisch verändert werden. Jede Veränderung schließt eine Haftung unsererseits für daraus resultierende Schäden aus.

Qualifiziertes Personal

Die Wägezellen sind nur von qualifiziertem Personal ausschließlich entsprechend der technischen Daten in Zusammenhang mit den nachstehend ausgeführten Sicherheitsbestimmungen und Vorschriften einzusetzen. Hierbei sind zusätzlich die für den jeweiligen Anwendungsfall erforderlichen Rechts- und Sicherheitsvorschriften zu beachten. Sinngemäß gilt dies auch bei Verwendung von Zubehör.

Qualifiziertes Personal sind Personen, die mit Aufstellung, Montage, Inbetriebsetzung und Betrieb des Produktes vertraut sind und die über die ihrer Tätigkeit entsprechende Qualifikationen verfügen.

Unfallverhütung

Obwohl die angegebene Nennlast im Zerstörungsbereich ein Mehrfaches vom Messbereichsendwert beträgt, müssen die einschlägigen Unfallverhütungsvorschriften der Berufsgenossenschaften berücksichtigt werden. Berücksichtigen Sie insbesondere die in Kapitel 5 angegebenen

- Grenzlasten
- max. Längskräfte
- max. Querkkräfte.

Option Explosionsschutzausführung

- Bei der Installation sind die einschlägigen Errichtungsbestimmungen unbedingt zu beachten.
- Die Installationsbedingungen, die in der Konformitätsbescheinigung und/oder Baumusterbescheinigung aufgeführt sind, müssen eingehalten werden.

1 Montagehinweise

Bei der Montage der Wägezellen sind folgende Punkte zu beachten:

- Die Wägezellen – speziell der dünnwandige Faltenbalg – müssen schonend gehandhabt werden.
- Die Wägezelle darf nicht überlastet werden, auch nicht kurzzeitig. Insbesondere bei den kleinen Nennlasten sind beim Hantieren und Montieren die zulässigen Grenzwerte schnell erreicht.
- Der Wägezellensitz muss waagrecht, vollflächig plan und wie auch die Wägezelle-Montagefläche, absolut sauber sein.
- Staub, Schmutz und andere Fremdkörper dürfen sich nicht so ansammeln, dass sie die Beweglichkeit der Wägezelle beeinträchtigen und so den Messwert verfälschen. Mit einem Abdeckblech können die Wägezellen gegen äußere mechanische Einwirkungen geschützt werden.
- Jede Wägezelle sollte schon bei oder unmittelbar nach dem Einbau durch eine Kupferlitze (ca. 50 mm²) überbrückt sein, damit keine Schweißströme über die Wägezelle fließen können.

Die Wägezellen werden wie ein Kragbalken an den Montagebohrungen fest eingespannt, die Last wird am anderen Ende aufgebracht. Die empfohlenen Schrauben und Anzugsmomente entnehmen Sie der nachfolgenden Tabelle:

Nennlasten	Gewinde	Min.-Festigkeitsklasse	Anzugsmoment ^{*)}
5...200 kg	M8	10.9	34 N·m
500 kg	M10	12.9	76 N·m
1 t	M12	10.9	115 N·m

^{*)} Richtwert für die angegebene Festigkeitsklasse. Zur Auslegung von Schrauben beachten Sie bitte entsprechende Informationen der Schraubenhersteller

2 Lasteinleitung

Lasten sollen möglichst genau in Messrichtung wirken. Torsionsmomente, außermittige Belastungen sowie Quer- bzw. Seitenkräfte verursachen Messfehler und können die Wägezelle bleibend schädigen. Solche Störeinflüsse müssen z.B. durch Querlenker oder Führungsrollen abgefangen werden, wobei diese Elemente keinerlei Last bzw. Kraftkomponenten in Messrichtung aufnehmen dürfen (Kraftnebenschluss, der wiederum zu Messfehlern führt).

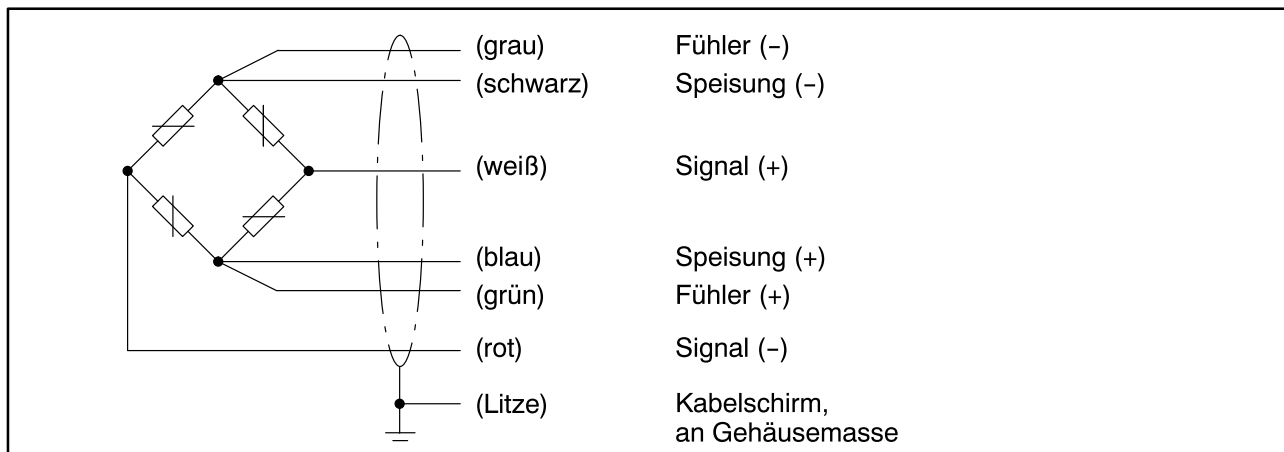
Um Fehlereinflüsse durch die Lasteinleitung zu minimieren bietet HBM je nach Einbausituation verschiedene Lasteinleitungen an:

- Pendellager ZPL
- Gelenkösen ZGWR
- Kraftrückführung ZRR (für Nennlasten 5 kg... 200 kg)
- Gummi-Metall-Lager ZEL
- Kegelspitze/-pfanne ZK
- Pendel-Lastfuß ZFP (für Nennlasten 5 kg...200 kg)
- Pendel-Lastfuß ZKP (für Nennlasten 5 kg...200 kg)
- Grundplatte / Montagesatz ZPU
 - Z6/ZPU/200KG (für Nennlasten 5 kg...200 kg)
 - Z6/ZPU/500KG (für Nennlast 500 kg)

3 Anschließen

Wägezellen mit DMS-System können angeschlossen werden an:

- Trägerfrequenz-Messverstärker oder
 - Gleichspannungs-Messverstärker, die für DMS-Messsysteme geeignet sind
- Die Wägezellen sind in Sechsheiter-Technik ausgeführt, die Anschlussbelegung ist in der nachstehenden Abbildung dargestellt.



Elektrische und magnetische Felder verursachen oft eine Einkopplung von Störspannungen in den Messkreis. Deshalb:

- verwenden Sie nur abgeschirmte kapazitätsarme Messkabel (HBM-Kabel erfüllen diese Bedingungen)
- legen Sie die Messkabel nicht parallel zu Starkstrom- und Steuerleitungen. Falls das nicht möglich ist, schützen Sie das Messkabel z.B. durch Stahlpanzerrohre
- meiden Sie Streufelder von Trafos, Motoren und Schützen

3.1 Parallelschaltung

Wägezellen schalten Sie elektrisch parallel, indem Sie die gleichfarbigen Adern der Wägezellenanschlusskabel miteinander verbinden. Dafür stehen vorzugsweise die Klemmenkästen **VKK...** oder im Ex-Bereich **VKEEX** aus dem HBM-Programm zur Verfügung. Das Ausgangssignal ist dann der Mittelwert der einzelnen Ausgangssignale.



VORSICHT

Die Überlastung einer einzelnen Wägezelle kann dann nicht am Ausgangssignal erkannt werden.

3.2 Anschluss in Vierleiter-Technik

Bei Anschluss an Verstärker mit Vierleiter-Technik sind die Adern bl und gn sowie sw und gr miteinander zu verbinden. Folgende Abweichungen treten bei ungekürztem Kabel (3 m) auf: Kennwert $-0,2\%$ und TKC $-0,01\%/10\text{ K}$.

3.3 Kabelverlängerungen

Verlängerungskabel müssen abgeschirmt und kapazitätsarm sein. Wir empfehlen die Verwendung von HBM-Kabeln, die diese Voraussetzungen erfüllen.

HBM-Verlängerungskabel, 6-adrig:

- KAB8/00-2/2/2 (Meterware Best.-Nr. 4-3301.0071 = grau oder 4-3301.0082 = blau)
- CABA1 (Kabelrolle Best.-Nr. CABA1/20 = 20 m oder CABA1/100 = 100 m lang)

Bei Kabelverlängerungen ist auf eine einwandfreie Verbindung mit geringsten Übergangswiderständen und gute Isolation zu achten.

Bei Anwendung der Sechsheiter-Technik werden die Einflüsse durch Widerstandsänderungen der Verlängerungskabel ausgeglichen. Verlängern Sie das Kabel in Vierleiter-Technik, kann die Kennwertabweichung durch Justieren am Messverstärker beseitigt werden. Temperatureinflüsse werden jedoch nur bei Betrieb in Sechsheiter-Technik ausgeglichen.

Das Anschlusskabel der Wägezelle ist so zu verlegen, dass eventuell am Kabel entstandenes Kondenswasser oder Feuchtigkeit abtropfen kann. Es darf nicht zur Wägezelle geleitet werden. Außerdem ist dafür zu sorgen, dass keine Feuchtigkeit am offenen Kabelende eindringen kann.

4 Technische Daten

Typ		Z6FD1	Z6FC3	Z6FC3MI	Z6FC4	Z6FC6
Genauigkeitsklasse nach OIML R 60 Anzahl der Teilungswerte (n_{LC})		D1 1000	C3 3000	C3/MI7.5 3000	C4 4000	C6 6000
Nennlast (E_{max})	kg	5; 10; 20; 50; 100; 200; 500	10; 20; 50; 100; 200; 500	50; 100; 200	20; 50; 100; 200; 500	50; 100; 200;
	t	1	1	-	-	-
Mindestteilungswert (v_{min})	% v. E_{max}	0,0360	0,0090	0,0066		
Rückkehr des Mindestvorlastsignales (D_{DR}) Nennkennwert (C_n)	mV/V	-	-	$0,5 \cdot E_{max} / 7500$ 2	-	
Kennwerttoleranz bei Lasteinleitung in angegebener Richtung	%	+1;-0,1	$\pm 0,05^{1)}$			
Temperaturkoef. des Kennwertes (TK_C) ²⁾	% von $C_n / 10$ K	$\pm 0,0500$	$\pm 0,0080$	$\pm 0,0080$	$\pm 0,0070$	$\pm 0,0040$
Temperaturkoef. des Nullsignals (TK_0)		$\pm 0,0500$	$\pm 0,0125$	$\pm 0,0093$	$\pm 0,0093$	$\pm 0,0093$
Relative Umkehrspanne (d_{hy}) ²⁾	% v. C_n	$\pm 0,0500$	$\pm 0,0170$	$\pm 0,0066$	$\pm 0,0130$	$\pm 0,0080$
Linearitätsabweichung (d_{lin}) ²⁾		$\pm 0,0500$	$\pm 0,0180$	$\pm 0,0180$	$\pm 0,0150$	$\pm 0,0110$
Belastungskriechen (d_{cr}) über 30 min.		$\pm 0,0490$	$\pm 0,0166$	$\pm 0,0098$	$\pm 0,0125$	$\pm 0,0083$
Eingangswiderstand (R_{LC}) Ausgangswiderstand (R_0)	Ω	350...480 356 $\pm 0,2$ 356 $\pm 0,12$				
Referenzspannung (U_{ref}) Nennbereich der Versorgungsspanng. (B_U)	V	5 0,5...12				
Isolationswiderstand (R_{is})	G Ω	> 5				
Nennbereich der Umgebungstemperatur (B_T) Gebrauchstemperaturbereich (B_{tu}) Lagerungstemperaturbereich (B_{tl})	$^{\circ}C$	-10...+40 -30...+70 -50...+85				
Grenzlast (E_L) Bruchlast (E_d)	% v. E_{max}	150 ≥ 300				

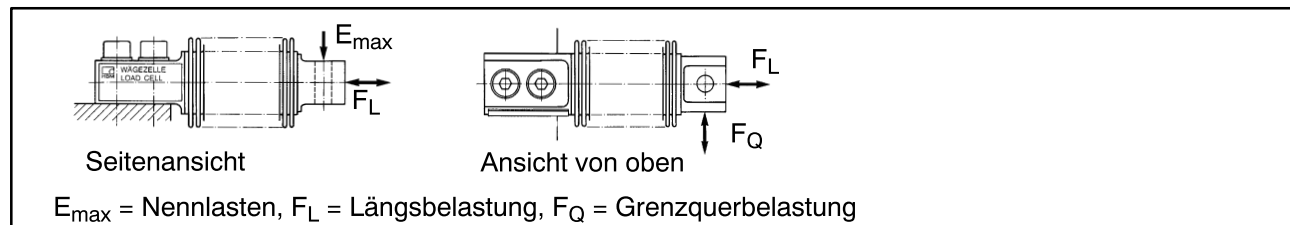
1) Bei Wägezelle Z6FC3/10KG: $\pm 0,1$ %

2) Die Werte für die Linearitätsabweichung (d_{lin}), Relative Umkehrspanne (d_{hy}) und den Temperaturgang des Kennwertes (TK_C) sind Richtwerte. Die Summe dieser Werte liegt innerhalb der Summenfehlergrenze nach OIML R60.

5 Technische Daten (Fortsetzung)

Nennlast	kg	5	10	20	50	100	200	500	1000
Relative zulässige Schwingbeanspruchung (F_{srel})		100	100	100	100	100	100	70	100
Relative statische Grenzquerbelastung (F_Q)	% v. E_{max}	200	400	400	400	300	200	100	200
Maximal zul. Längsbelastung (F_L)		200	200	200	200	200	200	200	200
Nennmessweg, (s_{nom}) ca.	mm	0,24	0,3	0,29	0,27	0,31	0,39	0,6	0,55
Gewicht, (G) ca.	kg	0,5	0,5	0,5	0,5	0,5	0,5	0,5	2,3
Schutzart (IP) nach EN60529 (IEC529)		IP 68 (verschärfte Prüfbed.: 1 m Wassersäule; 100 h)							
Material									
Messkörper		nichtrostender Stahl ^{*)}							
Faltenbalg		nichtrostender Stahl ^{*)}							
Kabeleinführung		nichtrostender Stahl ^{*)} / Viton [®]							
Kabelmantel		PVC							

^{*)} nach EN 10088-1



Bei zusammengesetzter Belastung darf die Summe aus F_Q und F_L den kleineren der beiden Werte nicht überschreiten (siehe obenstehende Tabelle), wobei zusätzlich noch die einfache Nennlast F_N wirken darf.

Optionen:

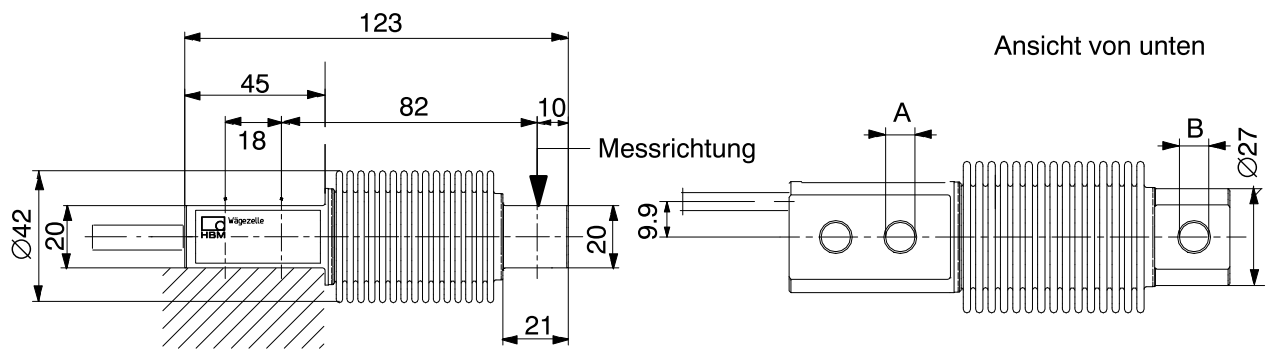
Ex-Schutz-Ausführung nach ATEX:

- II 2 G EEx ia IIC T4 bzw. T6 (Zone 1)^{**)}
- II 3 G EEx nA II T6 (Zone 2)
- II 2 D IP68 T80 °C (Zone 21)^{**)}
- II 3 D IP68 T80 °C (Zone 22 für nichtleitenden Staub)

^{**)} mit EG-Baumusterprüfbescheinigung

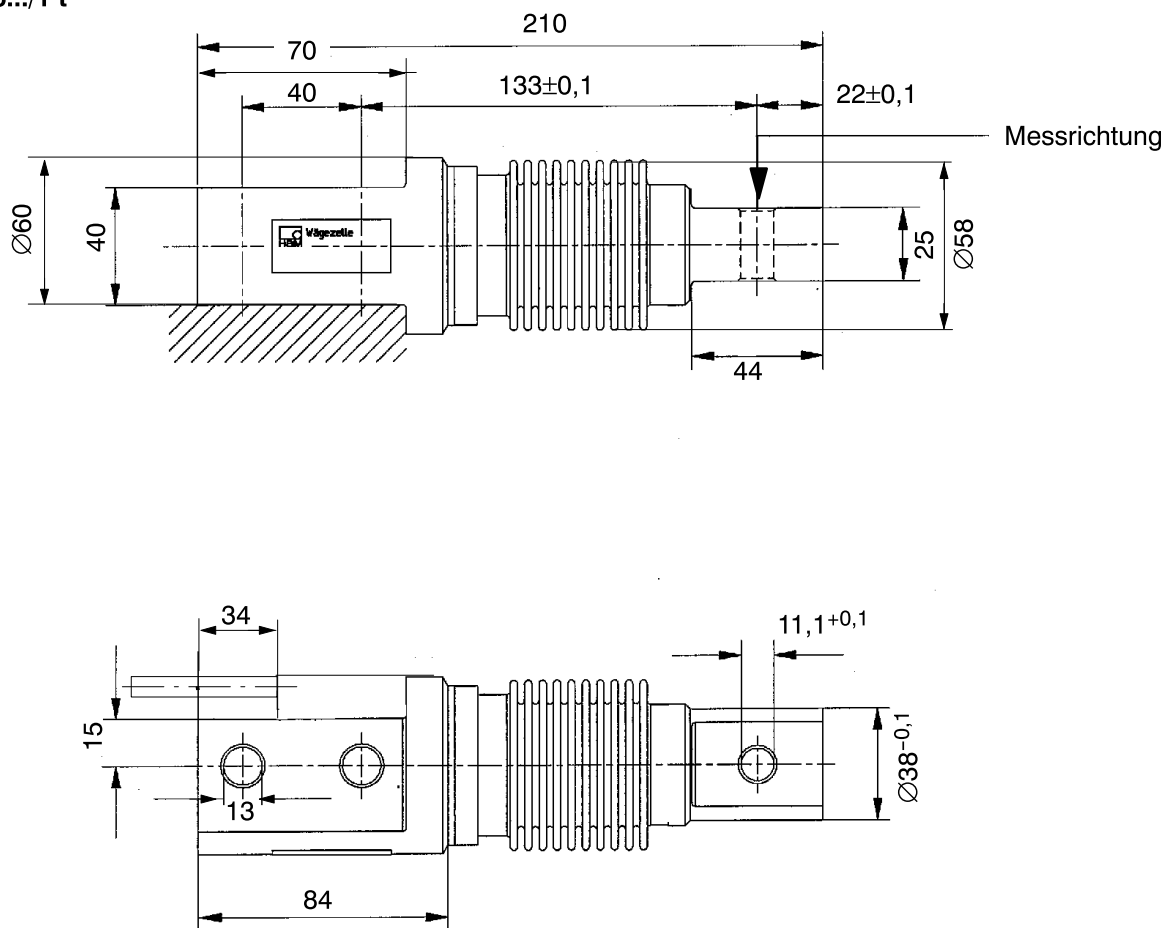
6 Abmessungen (mm)

Z6.../ 5kg...500 kg



	A	B
5...200 kg	8.2	8.2
500 kg	10.5	11.1

Z6.../1 t

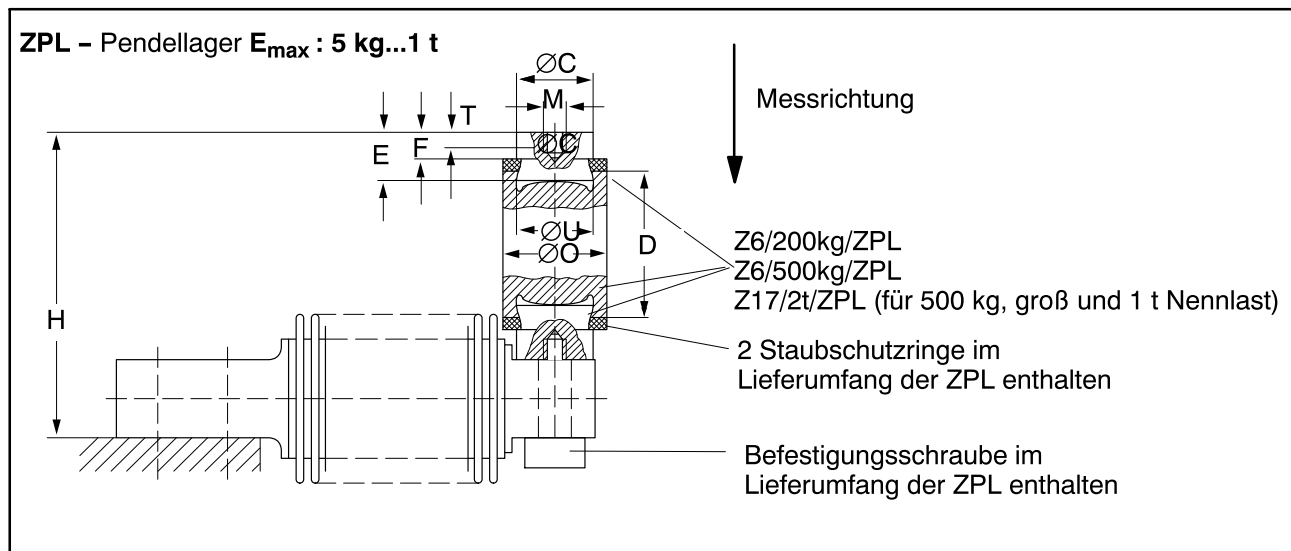


7 Zubehör (in mm)



HINWEIS

Alle Einbauhilfen sind aus nichtrostendem Material gefertigt. Die Gummiteile des ZEL sind aus Chloroprene-Kautschuk.

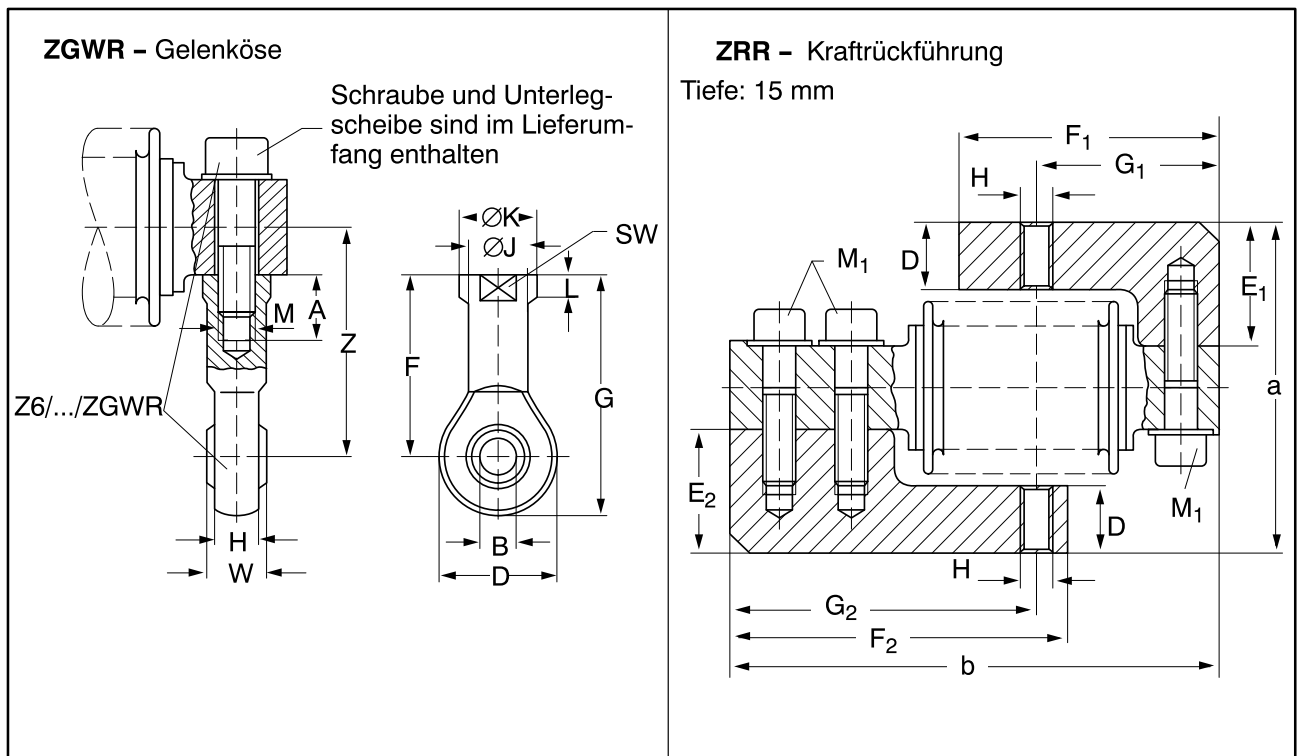


E_{\max}	ZPL	$\varnothing C$	D	H	M	$\varnothing O$	T	E	F	$\varnothing U$
5 kg...200 kg	Z6/200KG/ZPL	20 _{-0,2}	45	89 ^{+0,6} -0,8	M8	30	6,5	17	9	20 ^{D10}
500 kg	Z6/500KG/ZPL	20 _{-0,2}	45	89 ^{+0,6} -0,8	M8	30	6,5	17	9	20 ^{D10}
1 t	Z17/2T/ZPL	30 _{-0,1}	60	126,5	M10	46	8	22	14	30 ^{D10}

E_{\max}	ZPL	F_R^* (% der aufgebrachten Last)	s_{\max}^{**} (mm)
5 kg...200 kg	Z6/200KG/ZPL	2,8	3,5
500 kg	Z6/1T/ZPL	2,8	3,5
1 t	Z6/1T/ZPL	2	7,5

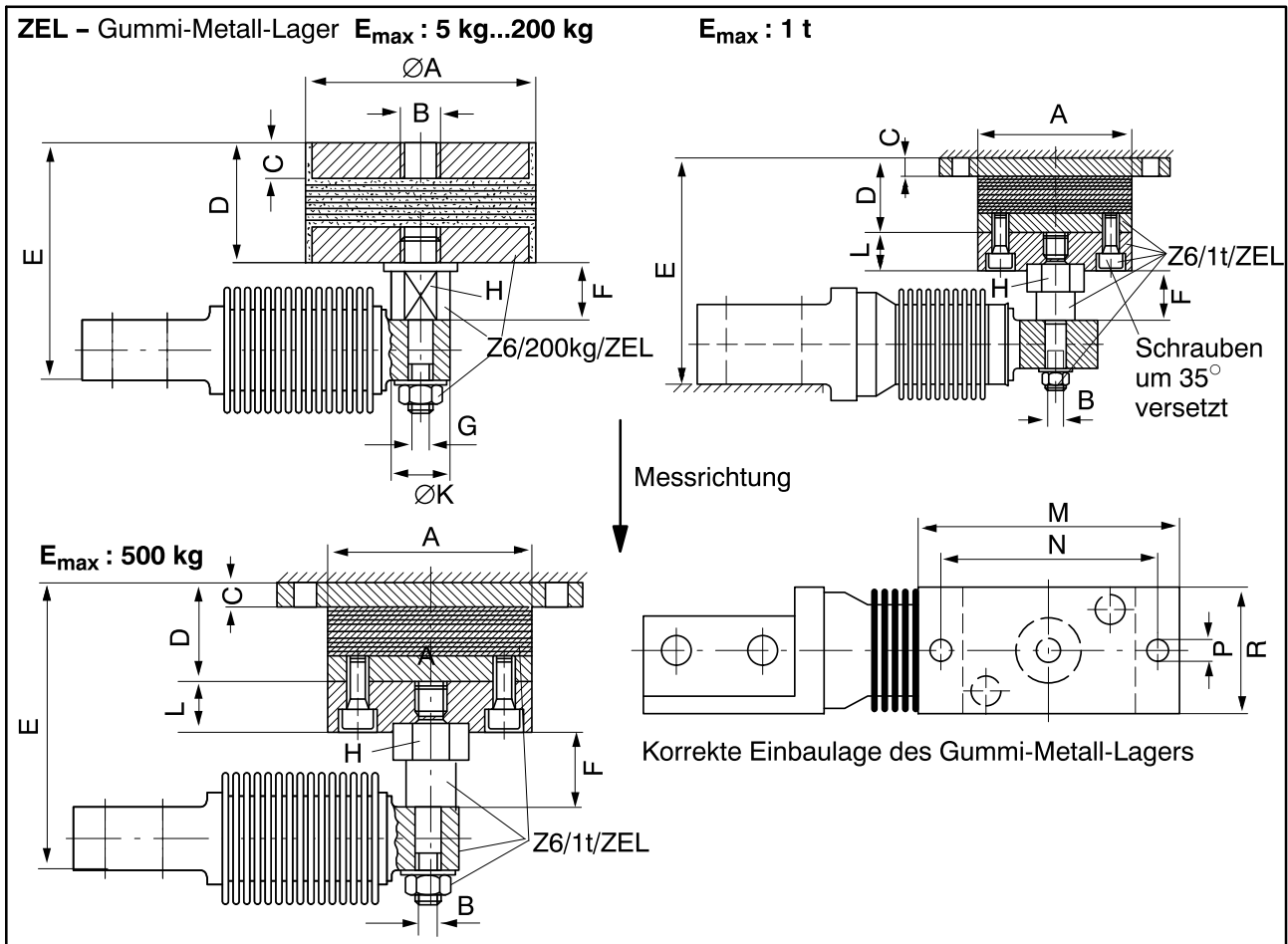
* F_R Rückstellkraft in N, bei 1 mm seitlicher Verschiebung

** s_{\max} Maximal zulässige seitliche Verschiebung bei Belastung mit Nennlast



E_{max}	ZGWR	A	B	D	F	G	H	$\varnothing J$	$\varnothing K$	L	M	S W	W	Z
5... 200kg	Z6/200KG/ZGWR	16	8 ^{H7}	24	36	48	9	12,5	16	5	M8	14	12	46
500kg	Z6/1T/ZGWR	20	10 ^{H7}	28	43	57	10,5	15	19	6,5	M10	17	14	53
1 t	Z6/1T/ZGWR	20	10 ^{H7}	28	43	57	10,5	15	19	6,5	M10	17	14	55,5

E_{max}	ZRR	a	b	D	E_1	E_2	F_1	F_2	G_1	G_2	H	M_1	M_2
5... 200kg	Z6/200KG/ZRR	80 ±1,1	123	16	30	30	65	85	46	77	M8	M8x30	M8x30

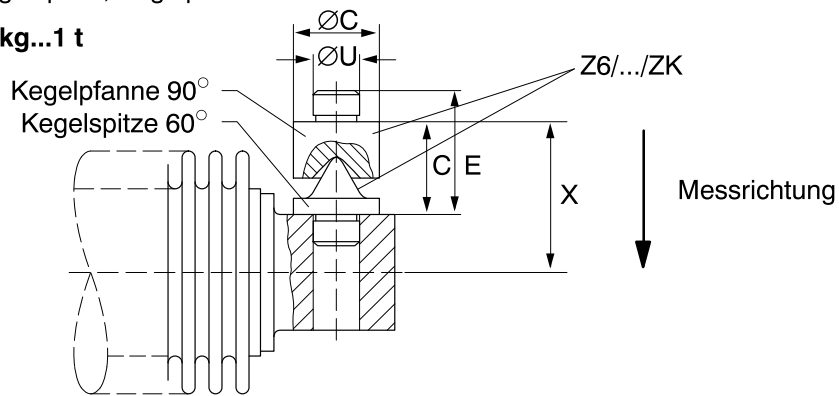


E_{max}	ZEL	A	B	C	D	E	F	G	H	K	L
5...200kg	Z6/200KG/ZEL	75	M12	12	40	$79 \pm 1,3$	18,5	M8	SW17	19	-
500kg	Z6/1T/ZEL	80	M10	10	39	$105^{+2,1}_{-2,2}$	26	-	SW27	-	20
1 t	Z6/1T/ZEL	80	M10	10	39	$117^{+2,1}_{-2,2}$	26	-	SW27	-	20

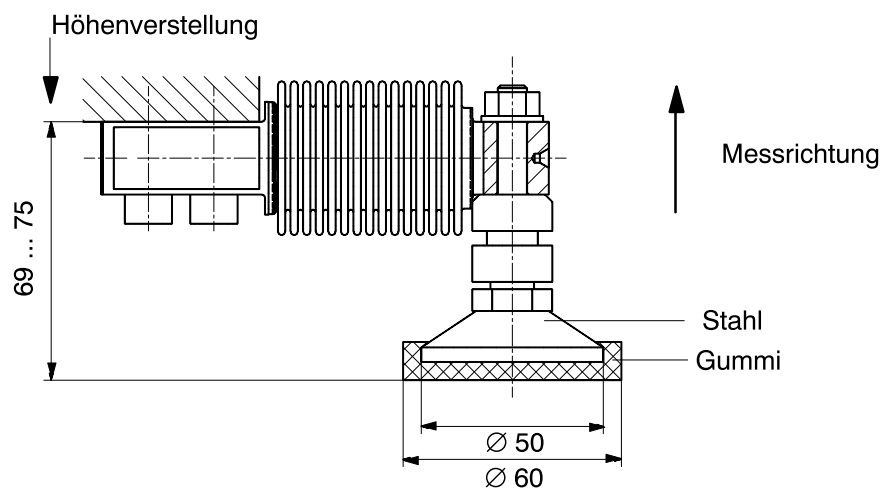
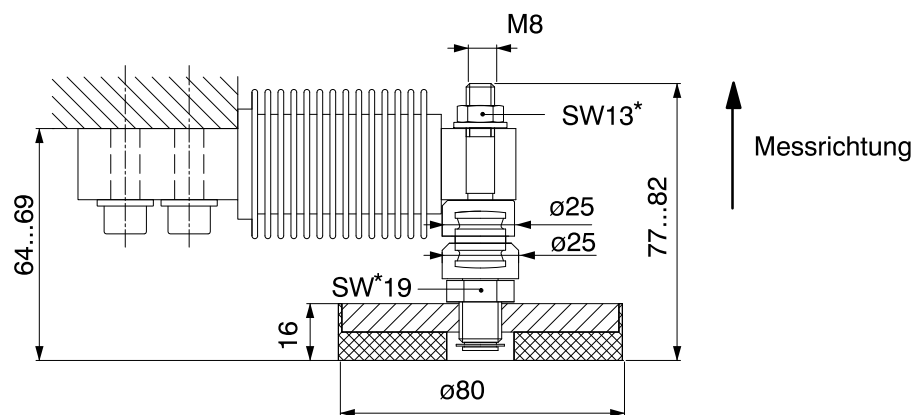
E_{max}	ZEL	M	N	P	R	F_R^* (in N, der aufgebrachten Last)	s_{max}^{**} (mm)
5...200kg	Z6/200KG/ZEL	-	-	-	-	163	3
500kg	Z6/1T/ZEL	120	100	9	60	400	4,5
1 t	Z6/1T/ZEL	120	100	9	60	400	4,5

* F_R Rückstellkraft bei 1 mm seitlicher Verschiebung

** s_{max} Maximal zulässige seitliche Verschiebung bei Belastung mit Nennlast

ZK – Kegelspitze, Kegelpfanne**E_{max}: 5 kg...1 t**

E_{max}	ZK	Ø C	D	E	Ø U	X
5...200 kg	Z6/200KG/ZK	15	16	21	8,1 _{-0,05}	26
500 kg/1 t	Z6/1T/ZK	18	24	32	11 _{-0,05}	34/36,5

ZFP – Pendel-Lastfuß**Z6/ZFP/200KG****ZKP – Pendel-Lastfuß****Z6/ZKP/200KG**

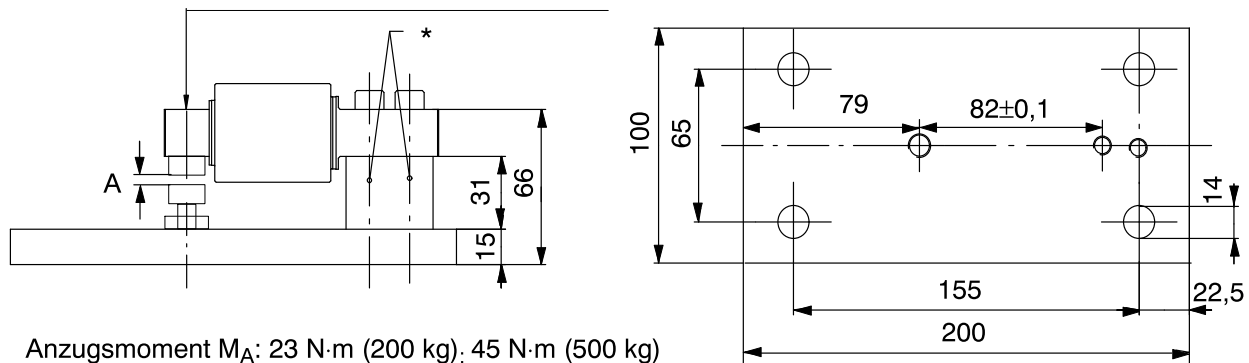
* Anzugsdrehmoment: 30 N·m

Grundplatte / Montagesatz

(rostbeständig) für Nennlasten 5 kg (Z6/ZPU/200KG) ... 500 kg (Z6/ZPU/500KG)

Lasteinleitung über:

(Z6/...KG/ZPL; Z6/...KG/ZEL ; Z6/...KG/ZK) Ansicht von unten

**Einstellung der Spaltbreite des Überlastanschlages**

Die Schraubenlänge des Überlastanschlages ist auf die Anwendung eines ZEL oder ZPL ausgelegt. Bei optimaler Spaltbreite ist eine ausreichende Einschraublänge (> 10 mm) in der Grundplatte gegeben. Für andere Lasteinleitungsteile ist evtl. eine andere Schraubenlänge zu wählen (z.B bei Z6/...KG/ZK: M10x35; DIN 931).

- Spaltbreite des Überlastanschlages mittels einer Fühlerlehre einstellen
- Höheneinstellung fixieren, indem die Schraube mit der beigelegten Mutter gekontert wird.

Nennlast [kg]	Spalt A (Überlastanschlag) [mm]	Grenzlast
50	$\approx 0,35^*$	200 kg
100	$\approx 0,40^*$	400 kg
200	$\approx 0,50^*$	800 kg
500	$\approx 0,85^*$	2,5 t

* In Abhängigkeit der Einbausituation kann die Spaltenbreite des Überlastanschlages variieren. Die Funktion des Überlastanschlages muss nach dem Einbau und vor Inbetriebnahme überprüft werden. **Bei mit Nennlast belasteter Wägezelle sollte eine Spaltbreite von 0,05 mm vorhanden sein.**

Content

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7 Accessories (in mm; 1 mm = 0,03937 inches)	30

Safety instructions

In cases where a breakage may cause injury to persons or damage to equipment, the user must take appropriate safety measures (such as fall protection, overload protection, etc.). Safe and trouble-free operation of the load cells requires proper transportation, correct storage, assembly and mounting as well as careful operation and maintenance.

It is essential to comply with the relevant accident prevention regulations. In particular you should take into account the limit loads quoted in the specifications.

Use in accordance with the regulations

Z6... type load cells have been designed for weighing applications. Use for any additional purpose shall be deemed to be **not** in accordance with the regulations.

To ensure safe operation, the load cells should only be used as described in the Mounting Instructions. It is also essential to observe the appropriate legal and safety regulations for the application concerned during use. The same applies to the use of accessories.

The Z6... load cells can be used as machine components (e.g. with tank weighing). Please note in these cases that, in order to provide a high sensitivity, the load cells have not been designed with the safety factors normally applied in machine design. The load cell is not a safety element within the meaning of its use in accordance with the regulations. The measuring signal processing electronics has to be designed in such a way that with a measuring signal failure no damages can occur.

General dangers due to non-observance of the safety instructions

The Z6... load cells correspond to the state of the art and are fail-safe. The load cells can give rise to residual dangers if they are inappropriately installed and operated by untrained personnel.

Everyone involved with the installation, commissioning, maintenance or repair of a load cell must have read and understood the Mounting Instructions and in particular the technical safety instructions.

Residual dangers

The scope of supply and performance of the load cells covers only a small part of weighing technology. In addition, equipment planners, installers and operators should plan, implement and respond to the safety engineering considerations of weighing technology in such a way as to minimize residual dangers. Prevailing regulations must be complied with at all times. There must be reference to the residual dangers connected with weighing technology.


In these mounting instructions residual dangers are pointed out using the following symbols:

Symbol:  **CAUTION**

Meaning: **Potentially dangerous situation**

Warns of a **potentially** dangerous situation in which failure to comply with safety requirements **could** result in damage to property or some form of physical injury.

Symbols indicating application notes and useful information:

Symbol:  **NOTE**

Means that important information about the product or its handling is being given.

Symbol: **CE**

Meaning: **CE mark**

The CE mark enables the manufacturer to guarantee that the product complies with the requirements of the relevant EC directives.

Environmental conditions

In the context of your application, please note that acids and all materials which release (chlorine) ions will attack all grades of stainless steel and their welding seams. This may result in corrosion which can lead to the failure of the load cell. In such cases the operator must take appropriate safety measures.

Prohibition of own conversions and modifications

The load cells must not be modified from the design or safety engineering point of view except with our express agreement. Any modification shall exclude all liability on our part for any damage resulting therefrom.

Qualified personnel

These load cells are only to be installed by qualified personnel strictly in accordance with the specifications and with the safety rules and regulations which follow. It is also essential to observe the appropriate legal and safety regulations for the application concerned. The same applies to the use of accessories.

Qualified personnel means persons entrusted with the installation, fitting, commissioning and operation of the product who possess the appropriate qualifications for their function.

Accident prevention

Although the specified maximum capacity in the destructive range is several times the full scale value, the relevant accident prevention regulations from the trade associations must be complied with. Take into consideration the values specified in particular in chapter 5 for

- limit loads,
- max. longitudinal forces,
- max. transverse forces.

Option: Explosion proof version

- Users must comply with all relevant erection regulations during installation.
- The installation conditions listed in the certificate of conformity and/or type examination certificate must be complied with.

1 Notes on mounting

The following must be considered during the assembly of load cells:

- The load cell and especially the thin-walled bellows must be handled with care.
- Do not overload the load cell, not even for a short time. When handling and mounting load cells with small rated capacities, in particular, you will reach permissible limit values quickly.
- The load cell seating must be horizontal, flat over the whole surface and, like the load cell base, absolutely clean.
- Dust, dirt and other particles are not to accumulate such that they affect the load cell's mobility and thus falsify the measured value. Use a cover plate to protect the load cell from external mechanical influences.
- Every load cell should be shunted by a stranded copper cable (approx. 50 mm²) during or immediately after installation to prevent any welding currents from flowing through the load cell.

The load cells are fixed at the mounting bores like a cantilever beam, the load is applied at the other end. For the recommended screws and tightening torques refer to the table below:

Max. capacity	Thread	Min. property class	Tightening torque ^{*)}
5...200 kg	M8	10.9	34 N·m
500 kg	M10	12.9	76 N·m
1 t	M12	10.9	115 N·m

*) Recommended value for the stated property class. For screw dimensioning please refer to the appropriate information given by the screw manufacturers.

2 Load introduction

Loads should be introduced as closely as possible in the direction of measurement. Torsional moments, off-center loads and transverse or lateral forces cause measurement errors and are liable to damage the load cell. These adverse influences must be avoided, e.g. by using stay rods or guide rolls.

These elements must not absorb any load or force components in the direction of measurement (force shunt resulting in measurement errors).

HBM offers different load-introduction components suiting various mounting situations in order to minimize the adverse effects due to load introduction:

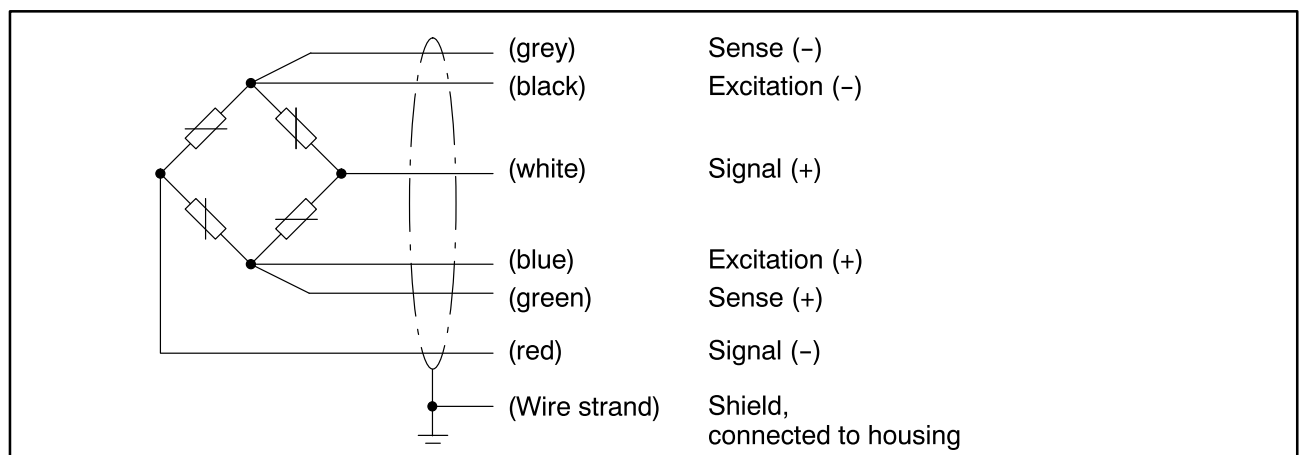
- ZPL Pendulum bearing
- ZGWR Knuckle eyes
- ZRR Fold-back arm (for 200 kg max. capacity)
- ZEL Rubber-metal bearing bearing
- ZK Cone/conical pan
- ZFP Loading foot (for max. capacities 5 kg...200 kg)
- ZKP Loading foot (for max. capacities 5 kg...200 kg)
- ZPU Base plate / Mounting kit
 - Z6/ZPU/200KG (for max. capacities 5 kg...200 kg)
 - Z6/ZPU/500KG (for 500 kg max. capacity)

3 Connection

Load cells with a strain gage measuring system can be connected to:

- carrier-frequency measuring amplifiers, or
- DC measuring amplifiers suitable for strain gage measuring systems.

The load cells are connected using the six-wire circuit. The wiring assignment is shown in the following diagram.



Electric and magnetic fields often induce interference voltages in the measurement circuit. Therefore:

- use shielded, low-capacitance measurement cables only (HBM cables fulfill these conditions),
- do not route the measurement cables parallel to power lines and control circuits. If this is not possible, protect the measurement cable with steel conduit for example.
- avoid stray fields from transformers, motors and contact switches.

3.1 Parallel connection

Load cells can be wired in parallel by joining the load cell cable core ends of the same color. In this case, HBM provides junction boxes of the **VKK...** series, and for use in potentially explosive areas, **VKEEX** junction boxes. The output signal is then the average of the individual output signals.



CAUTION

Overloading of an individual load cell cannot then be detected from the output signal.

3.2 Connection using the four-wire circuit

Upon connection to amplifiers using the four-wire circuit, the cores bl (blue) and gn (green) should be connected, as should bk (black) and gr (gray). The following deviations occur in the case of cable of original length (3 m): Sensitivity -0.2% and temperature coefficient $-0.01\%/10\text{ K}$.

3.3 Cable extension

Extension cables must be shielded and of low capacitance. We recommend the use of HBM cables, which satisfy these requirements.

HBM extension cables, 6 wires:

- KAB8/00-2/2/2 (sold by the meter, order-no. 4-3301.0071 = grey or 4-3301.0082 = blue)
- CABA1 (cable roll, order-no. CABA1/20 = 20 m or CABA1/100 = 100 m in length)

With cable extensions it is important to ensure a good connection with minimum contact resistance and good insulation.

When using the six-wire circuit, the effects of resistance changes in the extension cable are compensated. If you extend the cable using the four-wire circuit, the sensitivity deviation can be eliminated by adjusting the amplifier. However, temperature effects can only be compensated when operating with the six-wire circuit.

Route the load cell connection cable so that any condensed water or dampness forming on the cable can drip off. It must not be able to reach the load cell. In addition ensure that no dampness can penetrate the open ends of the cable.

4 Specifications

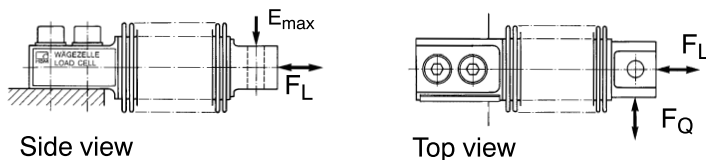
Type		Z6FD1	Z6FC3	Z6FC3MI	Z6FC4	Z6FC6
Accuracy class according to OIML R 60		D1	C3	C3/MI7.5	C4	C6
Maximum number of load cell verification intervals (n_{LC})		1000	3000	3000	4000	6000
Max. capacity (E_{max})	kg	5; 10; 20; 50; 100; 200; 500	10; 20; 50; 100; 200; 500	50; 100; 200	20; 50; 100; 200; 500	50; 100; 200
	t	1	1	-	-	-
Min. load cell verificat. interval (v_{min})	% of E_{max}	0.0360	0.0090	0.0066		
Min. dead load output return (D_{DR})		-	-	$0.5 \cdot E_{max}/7500$	-	-
Sensitivity (C_n)	mV/V	2				
Sensitivity tolerance with load application in the specified direction	%	+1; -0.1	$\pm 0.05^1)$			
Temperature effect on sensitivity (TK_C) ²⁾	% of $C_n/10$ K	± 0.0500	± 0.0080	± 0.0080	± 0.0070	± 0.0040
		± 0.0500	± 0.0125	± 0.0093	± 0.0093	± 0.0093
Hysteresis error (d_{hy}) ²⁾	% of C_n	± 0.0500	± 0.0170	± 0.0066	± 0.0130	± 0.0080
		± 0.0500	± 0.0180	± 0.0180	± 0.0150	± 0.0110
		± 0.0490	± 0.0166	± 0.0098	± 0.0125	± 0.0083
Input resistance (R_{LC})	Ω	350...480				
Output resistance (R_O)		356 ± 0.2	356 ± 0.12			
Reference excitation voltage (U_{ref})	V	5				
Nominal (rated) range of excit. voltage (B_U)		0.5...12				
Insulation resistance (R_{is})	G Ω	> 5				
Nominal (rated) temperature range (B_T)	$^{\circ}C$ [$^{\circ}F$]	-10...+40 [14...+104]				
Service temperature range (B_{tu})		-30...+70 [-22...+158]				
Storage temperature range (B_{tl})		-50...+85 [-58...+185]				
Safe load limit (E_L)	% of E_{max}	150				
Breaking load (E_d)		≥ 300				

1) With load cell Z6FC3/10kg: ± 0.1 %

2) The data for linearity error (d_{lin}), hysteresis (d_{hy}) and temperature effect (TK_C) on sensitivity are typical values. The sum of these data meets the requirements of OIML R60.

5 Specifications (Continued)

Max. capacity	kg	5	10	20	50	100	200	500	1000
Permissible dynamic load (F_{srel})	% of	100	100	100	100	100	100	70	100
Rel. static safe load limit (F_Q)	E_{ma}	200	400	400	400	300	200	100	200
Max. perm. longitud. load (F_L)	x	200	200	200	200	200	200	200	200
Nominal (rated) displacement at E_{max} (s_{nom}), approx.	mm	0.24	0.3	0.29	0.27	0.31	0.39	0.6	0.55
Weight (G), approx.	kg	0.5	0.5	0.5	0.5	0.5	0.5	0.5	2.3
Degree of protection per EN60529 (IEC529)		IP 68 (more rigorous test conditions: 100 h at 1 m water column)							
Material		stainless steel							
Measuring body		stainless steel							
Metal bellows		stainless steel / Viton®							
Cable entrance		PVC							
Cable sheath		PVC							



E_{max} = Max. capacities, F_L = Longitudinal force, F_Q = Transverse force limit

With combined loading, the sum of F_Q and F_L must not exceed the lower value (see table above), with the max. capacity E_{max} permitted to act additionally.

Options:

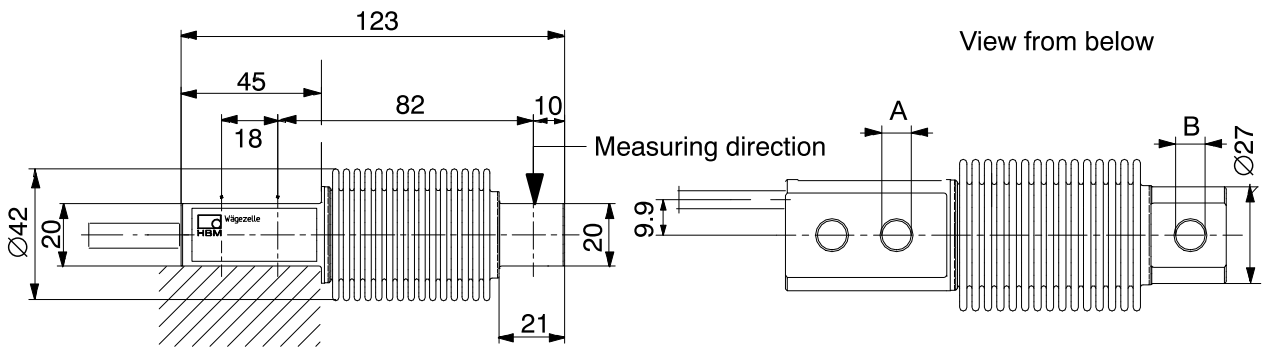
Explosion-proof versions according to ATEX 95

- II 2 G EEx ia IIC T4 resp. T6 (Zone 1) *)
- II 3 G EEx nA II T6 (Zone 2)
- II 2 D IP68 – T80 °C (Zone 21) *)
- II 3 D IP68 – T80 °C (Zone 22, for non-conductive dust)

*) with EC-type examination certificate

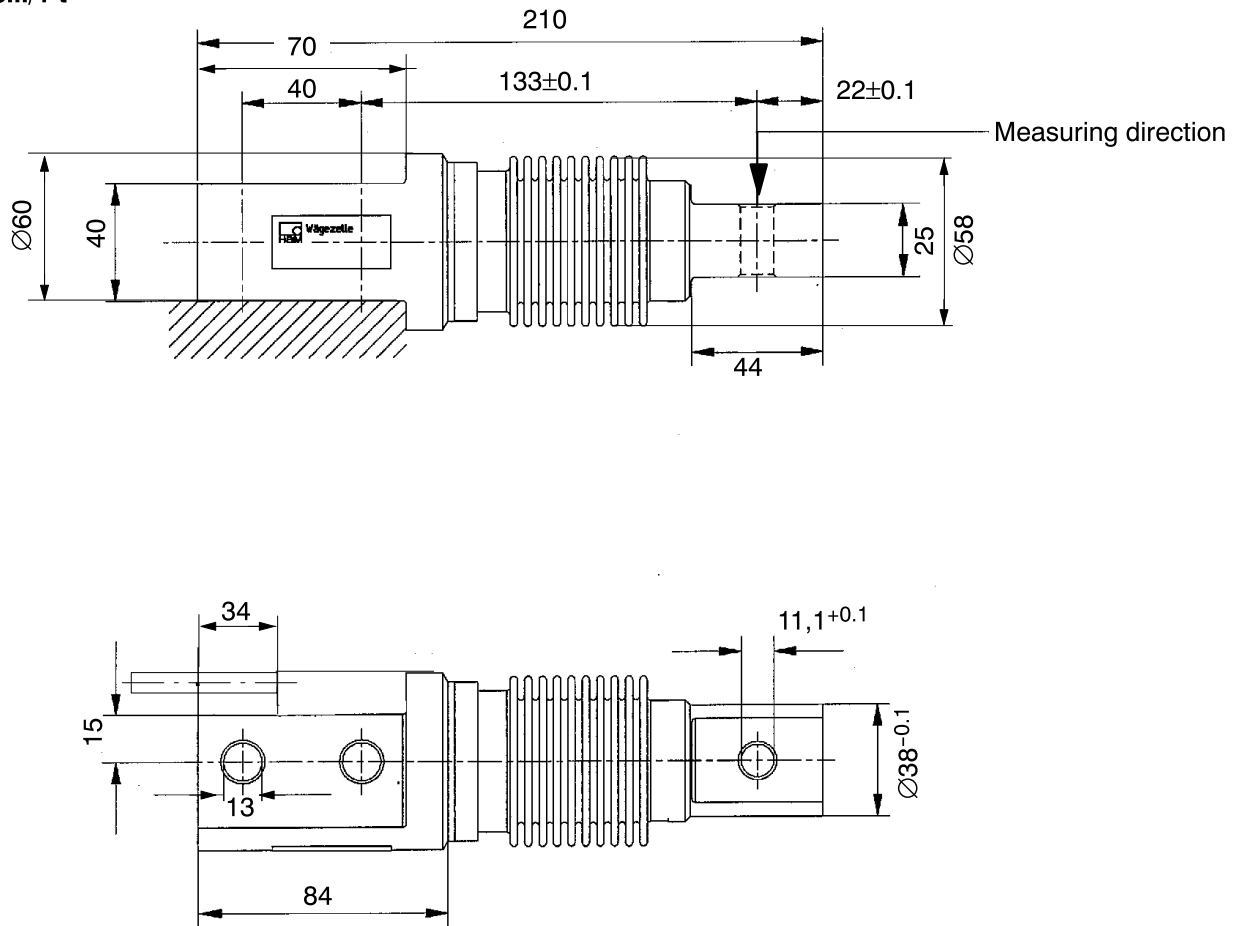
6 Dimensions (in mm; 1 mm = 0,03937 inches)

Z6.../ 5kg...500 kg



	A	B
5...200 kg	8.2	8.2
500 kg	10.5	11.1

Z6.../1 t

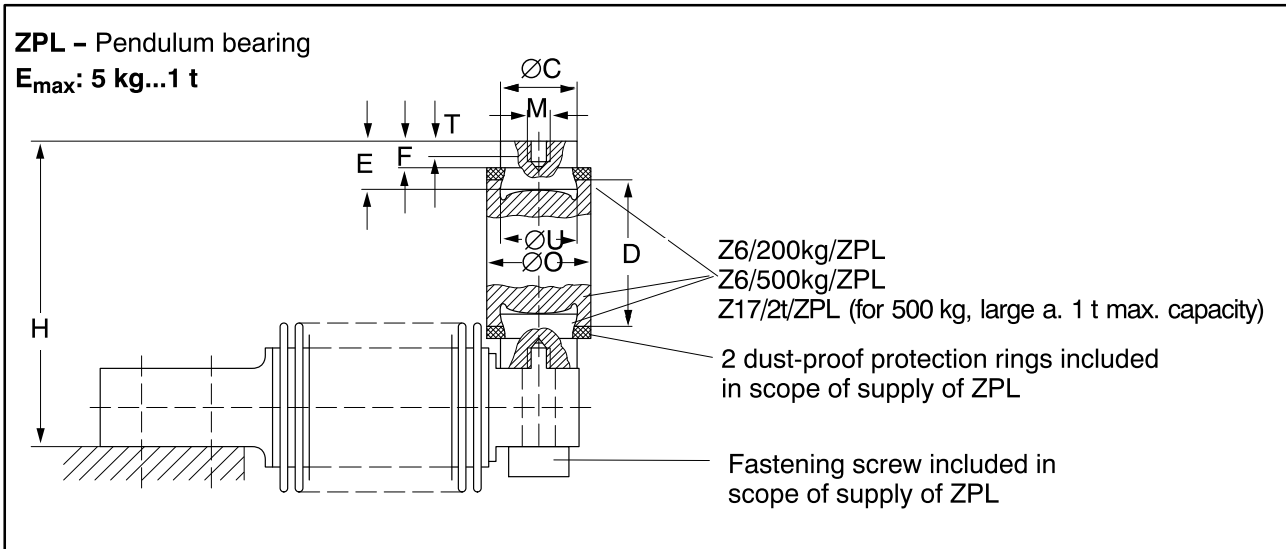


7 Accessories (in mm; 1 mm = 0,03937 inches)



NOTE

All mounting accessories are made from stainless material. The ZEL rubber parts are made from chloroprene caoutchouc.

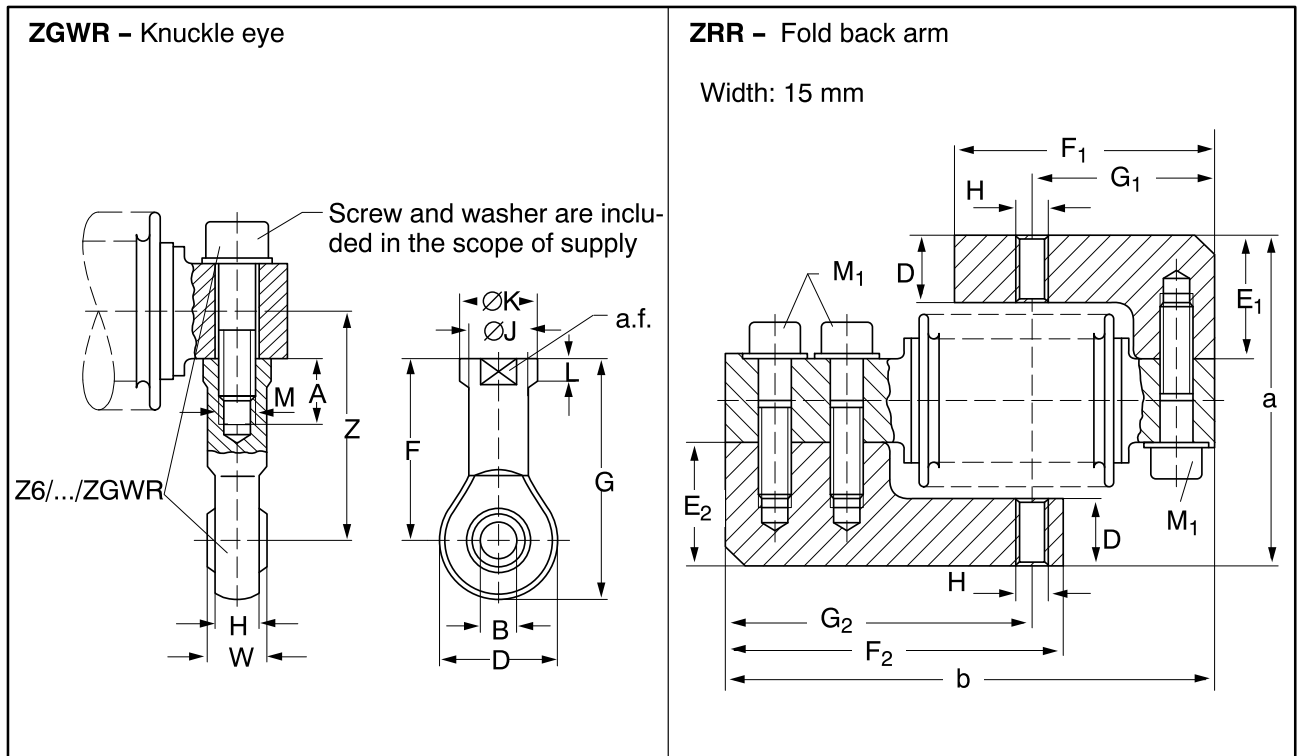


E_{max}	ZPL	$\varnothing C$	D	H	M	$\varnothing O$	T	E	F	$\varnothing U$
5 kg...200 kg	Z6/200KG/ZPL	20 _{-0.2}	45	89 ^{+0.6} -0.8	M8	30	6.5	17	9	20 ^{D10}
500 kg	Z6/500KG/ZPL	20 _{-0.2}	45	89 ^{+0.6} -0.8	M8	30	6.5	17	9	20 ^{D10}
1 t	Z17/2T/ZPL	30 _{-0.1}	60	126.5	M10	46	8	22	14	30 ^{D10}

E_{max}	ZPL	F_R^* (% of applied load)	s_{max}^{**} (mm)
5 kg...200 kg	Z6/200KG/ZPL	2.8	3.5
500 kg	Z6/1T/ZPL	2.8	3.5
1 t	Z6/1T/ZPL	2	7.5

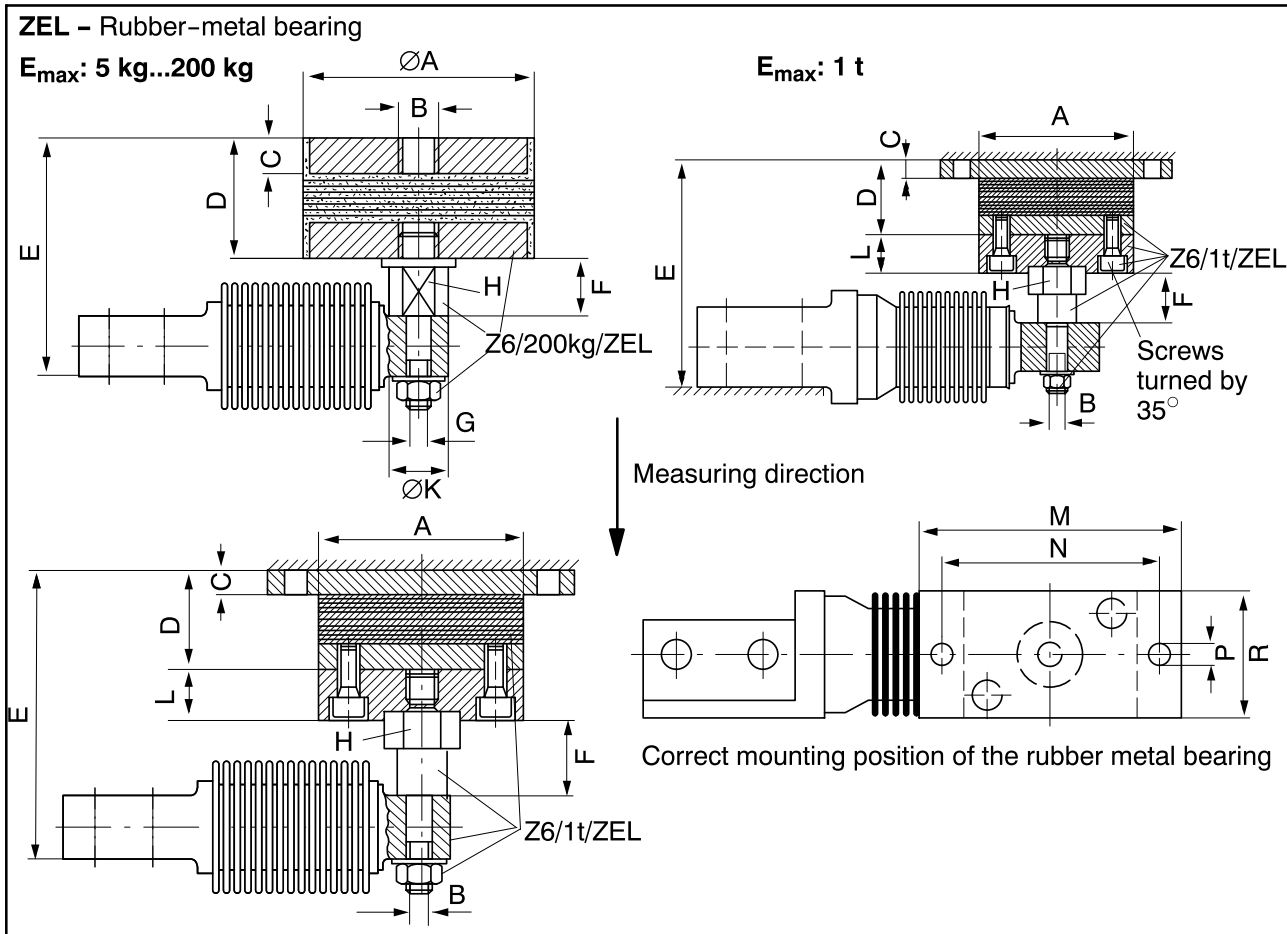
* F_R Restoring force in N for $s=1$ mm

** s_{max} Max. lateral displacement at max. capacity



E _{max}	ZGWR	A	B	D	F	G	H	J	K	L	M	a.f.	W	Z
5... 200kg	Z6/200KG/ZGWR	16	8 ^{H7}	24	36	48	9	12.5	16	5	M8	14	12	46
500kg	Z6/1T/ZGWR	20	10 ^{H7}	28	43	57	10.5	15	19	6.5	M10	17	14	53
1 t	Z6/1T/ZGWR	20	10 ^{H7}	28	43	57	10.5	15	19	6.5	M10	17	14	55.5

E _{max}	ZRR	a	b	D	E ₁	E ₂	F ₁	F ₂	G ₁	G ₂	H	M ₁
5... 200kg	Z6/200KG/ZRR	80 ±1.1	123	16	30	30	65	85	46	77	M8	M8x30

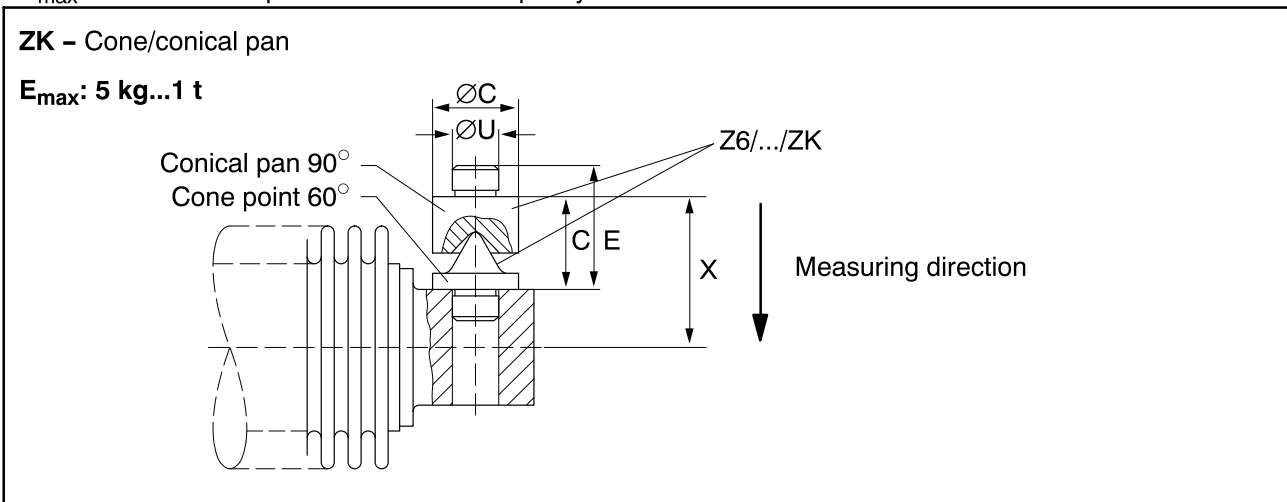


E _{max}	ZEL	A	B	C	D	E	F	G	H	K	L
5...200kg	Z6/200KG/ZEL	75	M12	12	40	79± 1.3	18.5	M8	a.f. 17	19	-
500kg	Z6/1T/ZEL	80	M10	10	39	105 ^{+2.1} _{-2.2}	26	-	a.f. 27	-	20
1 t	Z6/1T/ZEL	80	M10	10	39	117 ^{+2.1} _{-2.2}	26	-	a.f. 27	-	20

E _{max}	ZEL	M	N	P	R	F _R * (in N, of applied load)	s _{max} ** (mm)
5...200kg	Z6/200KG/ZEL	-	-	-	-	163	3
500kg	Z6/1T/ZEL	120	100	9	60	400	4.5
1 t	Z6/1T/ZEL	120	100	9	60	400	4.5

*F_R Restoring force for s=1 mm

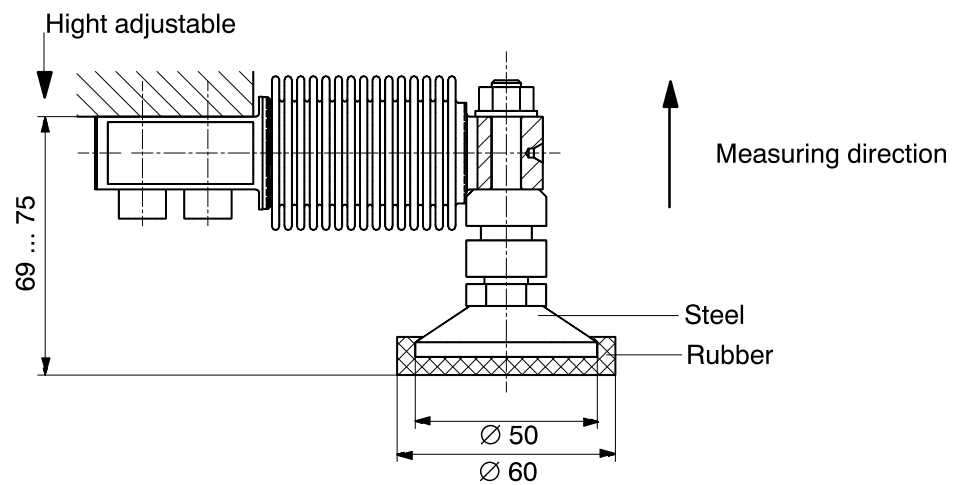
**s_{max} Max. lateral displacement at max. capacity



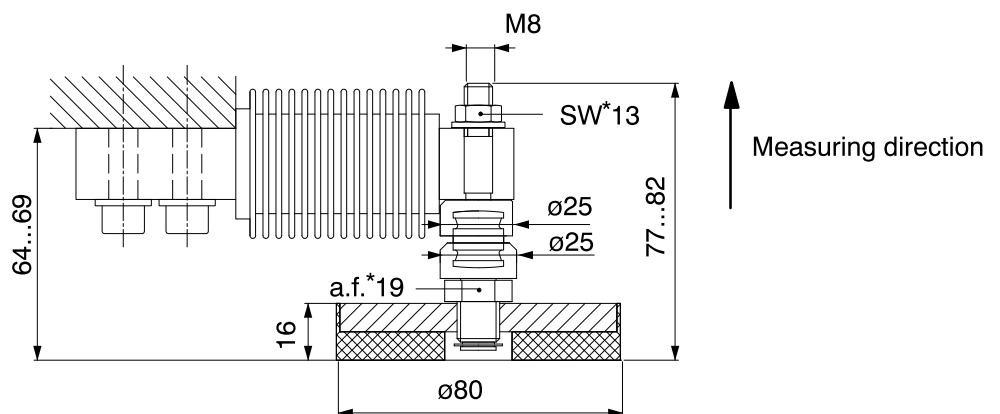
E_{max}	ZK	$\varnothing C$	D	E	$\varnothing U$	X
5...200 kg	Z6/200KG/ZK	15	16	21	8.1 _{-0.05}	26
500 kg/1 t	Z6/1T/ZK	18	24	32	11 _{-0.05}	34/36.5

ZFP - Loading foot

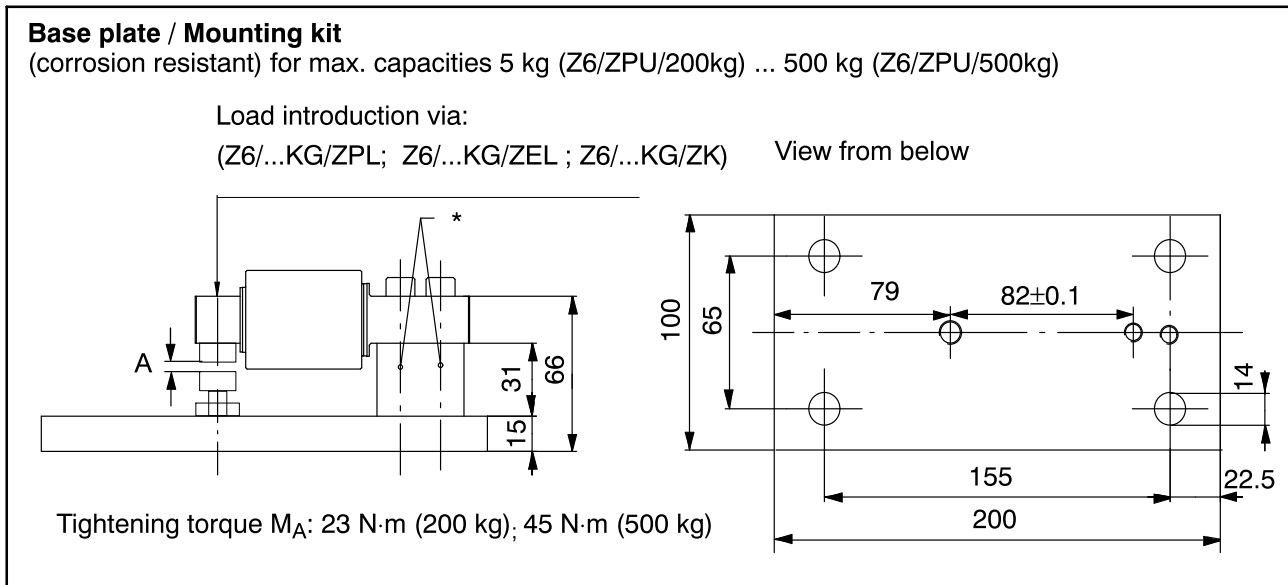
Z6/ZFP/200KG

**ZKP - Loading foot**

Z6/ZKP/200KG



*) Tightening torque: 30 N·m



Setting the gap width for the overload stop

The screw length of the overload stop is designed for the application of a ZEL or ZPL. For an opt. gap width, a sufficient screw-in length (> 10 mm) into the base plate is provided. For other load introduct. components it may be necessary to select a different screw length (e.g. for Z6/...KG/ZK: M10x35; DIN 931).

- Use a feeler gage to set the gap width of the overload stop
- Fix height adjustment in position by locking the screw with the nut provided.

Max. capacity [kg]	Gap A (overload stop) [mm]	Safe limit load
50	$\approx 0.35^*$	200 kg
100	$\approx 0.40^*$	400 kg
200	$\approx 0.50^*$	800 kg
500	$\approx 0.85^*$	2.5 t

* Depending on the installation situation the gap can vary. The function of the overload stop needs to be checked after installation and before start-up. **For a load cell loaded at max. capacity, there should be a gap width of 0.05 mm.**

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Consignes de sécurité

Dans les cas de rupture susceptibles de provoquer des dommages corporels et matériels, l'utilisateur se doit de prendre les mesures de sécurité qui s'imposent (p. ex. protection contre la chute, butée de surcharge, etc.). Le transport, le stockage, la mise en place et le montage conformément aux règles de l'art ainsi que l'utilisation et l'entretien minutieux des pesons sont des conditions requises pour permettre leur fonctionnement parfait et sûr.

Les règles de prévention des accidents applicables doivent impérativement être observées. Respectez tout particulièrement les charges limites indiquées dans les caractéristiques techniques.

Utilisation conforme

Les pesons de la série Z6... sont développés spécialement pour les applications de pesage. Toute utilisation divergente est considérée comme **non** conforme.

Pour garantir un fonctionnement en toute sécurité de ce peson, celui-ci doit être utilisé conformément aux instructions de la notice de montage. De plus, il convient de respecter les règlements et consignes de sécurité pour chaque utilisation particulière. Ceci est également valable pour l'utilisation des accessoires.

Les pesons Z6... peuvent être mis en œuvre en tant qu'éléments de machine (pour le pesage de cuves, par exemple). Tenir compte dans ce cas que les capteurs, en raison de leur haute sensibilité, ne disposent pas des mêmes facteurs de sécurité que les constructions usuelles de machines. Les pesons ne constituent pas des éléments de sécurité au sens de l'utilisation conforme. Configurez l'électronique pour le traitement des signaux de mesure de telle sorte qu'en cas de perte du signal de mesure aucun dommage n'en résulte.

Risques généraux en cas de non-respect des consignes de sécurité

Les pesons Z6... correspondent au niveau technologique actuel et garantissent la sécurité du fonctionnement. Néanmoins, les pesons peuvent présenter des dangers résiduels en cas d'utilisation non conforme par du personnel non qualifié.

Toute personne chargée de l'installation, de la mise en service, de la maintenance ou de la réparation du peson doit impérativement avoir lu et compris la notice de montage et, notamment, les indications relatives à la sécurité.

Dangers résiduels

Les performances et l'étendue de la livraison de ces pesons ne couvrent qu'une partie des techniques de pesage. La sécurité dans ce domaine doit être conçue, mise en œuvre et prise en charge par l'ingénieur, le constructeur et l'opérateur de manière à minimiser les dangers résiduels. Les dispositions en vigueur doivent être respectées. Il convient de souligner les dangers résiduels liés aux techniques de pesage.

Dans la présente notice de montage, les dangers résiduels sont signalés à l'aide des symboles suivants :



Symbole : **ATTENTION**

Signification : **Situation éventuellement dangereuse**

Signale un risque **potentiel** qui – si les dispositions relatives à la sécurité ne sont pas respectées – **pourrait avoir** pour conséquence des dégâts matériels et/ou des blessures corporelles de gravité minimale ou moyenne.

Des symboles qui indiquent des notices d'application et des informations utiles :



Symbole : **REMARQUE**

Signale que des informations importantes sont fournies concernant le produit ou sa manipulation.

Symbole : **CE**

Signification : **Label CE**

Par le label CE, le fabricant garantit que son produit satisfait aux conditions des principales directives CE.

Conditions de l'ambiance

N'oubliez pas que, dans votre champ d'application, les acides et toutes les matières qui libèrent des ions (chlore) attaquent également les aciers inoxydables et leurs cordons de soudure. Ainsi la corrosion éventuellement apparaissant peut entraîner la défaillance du peson. D'où la nécessité pour l'exploitant de prévoir des mesures de protection correspondantes.

Interdiction de toutes transformations et modifications sans autorisation

Il est interdit de modifier la conception ou la sécurité des pesons sans accord explicite de notre part. Toute modification annule notre responsabilité pour les dégâts qui pourraient en résulter.

Personnel qualifié

Ces pesons doivent uniquement être mis en place et manipulés par du personnel qualifié et conformément aux caractéristiques techniques et aux consignes de sécurité décrites ci-après. De plus, il convient de respecter les règlements et les consignes de sécurité valables pour chaque utilisation particulière. Ceci est également valable pour l'utilisation des accessoires.

Sont considérées comme personnel qualifié les personnes familiarisées avec l'installation, le montage, la mise en service et l'exploitation du produit et disposant des qualifications nécessaires.

Prévention des accidents

Bien que la charge nominale dans la plage de destruction donnée soit un multiple de la pleine échelle, il convient de respecter les règlements pour la prévention des accidents du travail. Tenir compte en particulier des indications faites au chapitre 5 portant sur

- les charges limites,
- les forces latérales maximales et
- les forces transversales maximales.

Version (optionnelle) à protection "Ex"

- A l'installation de cette version, impérativement respecter les prescriptions et dispositions afférentes.
- Les conditions d'installation, telles qu'énoncées dans la Déclaration de Conformité et/ou telles que définies par le Certificat d'examen de type, doivent également être respectées.

1 Instructions de montage

Lors de l'assemblage des pesons, les points suivants doivent être considérés:

- Manipuler avec toutes les précautions d'usage le peson lui-même et son soufflet, dont les parois sont très minces.
- Ne jamais surcharger le peson, même pour une brève durée. Pour les pesons à faible charge nominale, en particulier, les charges limites admises sont très vite atteintes lors des essais ou du montage de l'appareil.
- Le siège du peson doit être horizontal, absolument plan et – tout comme la surface d'assemblage du peson – d'une propreté parfaite.
- Poussière, souillures et autres corps étrangers ne doivent pas s'accumuler de manière à entraver la mobilité du peson et donc d'en falsifier les résultats de mesure. Judicieusement installée, une tôle de protection suffit généralement à protéger le peson contre des influences mécaniques externes.
- Au montage ou immédiatement après le montage du peson, celui-ci est à ponter à l'aide d'une tresse de cuivre d'une section d'environ 50 mm², de sorte à le protéger contre des éventuels courants transitoires.

Les pesons sont mis en place à force dans les trous de montage, la charge étant appliquée à l'autre extrémité. Les boulons de fixation ainsi que les couples de serrage afférents sont indiqués par le tableau ci-dessous.

Pesons	Pas	Classe de résistance min.	Couple de serrage*)
5...200 kg	M8	10.9	34 N·m
500 kg	M10	12.9	76 N·m
1 t	M12	10.9	115 N·m

*) Valeurs indicatives pour la classe de résistance spécifiée pour déterminer définitivement les catégories de boulons à employer, tenir compte des informations spécifiques données par leur fabricant.

2 Application des charges

Les charges ne doivent être appliquées dans la mesure du possible que dans l'axe de mesure du peson. Des moments de torsion, des charges décentrées, ainsi que des forces latérales ou transversales entraînent des imprécisions de mesure et peuvent de surcroît endommager ou même détruire le capteur. De telles influences parasites doivent être inhibées, par l'emploi de raidisseurs par exemple, de stabilisateurs ou de galets de guidage, étant bien entendu que ces éléments ne doivent en aucun cas soulager les charges appliquées dans l'axe de mesure (shunt, qui entraîne des imprécisions de mesure).

Afin de minimiser ces influences dues à l'application des charges, HBM offre divers systèmes, répondant à la plupart des conditions de montage et des applications envisagées:

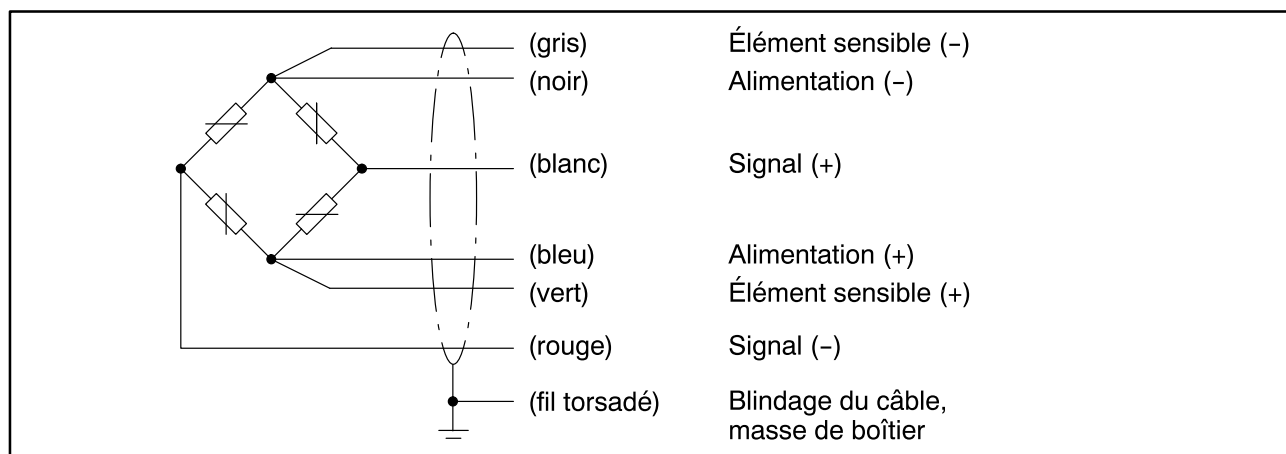
- Palier oscillant ZPL
- Anneau à rotule ZGWR
- Retour de prise d'effort ZRR (pour portées de 5 kg...200 kg)
- Palier élastomère ZEL
- Pointeau et coupelle ZK
- Pied de pesage ZFP (pour portées de 5 kg... 200 kg)
- Pied de pesage ZKP (pour portées de 5 kg... 200 kg)
- Plaque de base / Kit d'assemblage ZPU
 - Z6/ZPU/200KG (pour portées de 5 kg...200 kg)
 - Z6/ZPU/500KG (pour portée de 500 kg)

3 Raccordement

Les pesons avec un système de mesure à jauges peuvent être raccordés:

- à des amplificateurs à fréquence porteuse ou
- à des amplificateurs à tension continue convenant aux systèmes de mesure à jauges d'extensométrie

Les pesons sont réalisés en technique à six conducteurs, le plan de raccordement étant illustré sur la figure ci-après.



Les champs électriques et magnétiques provoquent souvent le couplage de tensions parasites dans le circuit de mesure. C'est la raison pour laquelle:

- vous devez utiliser uniquement des câbles de mesure blindés de faible capacité (les câbles HBM satisfont à ces conditions)
- vous ne devez pas poser les câbles de mesure en parallèle avec des câbles de commande et d'énergie. Si cela n'est pas possible, protégez le câble de mesure, p. ex. à l'aide de tubes d'acier blindés
- évitez les champs de dispersion des transformateurs, moteurs et vannes

3.1 Branchement électrique en parallèle

Pour mettre électriquement en parallèle des pesons, reliez les extrémités de conducteur de même couleur des câbles de raccordement des pesons. Les boîtes de bornes **VKK...** ou en zone Ex **VKEEX** de la gamme HBM sont tout spécialement disponibles à cette fin. Le signal de sortie correspond alors à la valeur moyenne des différents signaux de sortie.



ATTENTION

La surcharge d'un seul peson ne peut alors pas être détectée au niveau du signal de sortie.

3.2 Raccordement en technique quatre conducteurs

En cas de raccordement à des amplificateurs en technique à quatre conducteurs, les fils bleu et vert ainsi que noir et gris doivent être reliés. Les écarts suivants se produisent pour un câble non raccourci (3 m) : sensibilité $-0,2\%$ et influence de température sur la sensibilité $-0,01\%/10\text{ K}$.

3.3 Prolongations de câble

Les câbles prolongateurs (rallonges) doivent être blindés et de faible capacité. Nous recommandons l'utilisation des câbles HBM qui satisfont à ces conditions requises.

HBM Rallonges 6 brins

- KAB8/00-2/2/2 (fourni au mètre, réf. 4-3301.0071 = gris, ou 4-3301.0082 = bleu)
- CABA1 (fourni en rouleau, réf. CABA1/20 = 20 m, ou CABA1/100 = 100 m)

Pour les prolongations de câble, il faut veiller à une parfaite connexion avec des résistances de transition minimales et à une bonne isolation.

L'utilisation de la technique à six conducteurs permet de compenser les influences dues à des variations de résistance des câbles de rallonge. Si vous prolongez le câble selon la technique à quatre conducteurs, l'écart de la sensibilité peut être éliminé en ajustant l'amplificateur de mesure. Les influences de température ne sont toutefois compensées que lors d'un fonctionnement selon la technique à six conducteurs.

Le câble de raccordement du peson doit être posé de manière à ce que l'eau de condensation ou l'humidité éventuellement générée sur le câble puisse s'égoutter. Il ne doit pas être conduit au peson. De plus, il convient de s'assurer que l'humidité ne peut pas pénétrer au niveau de l'extrémité de câble nue.

4 Caractéristiques techniques

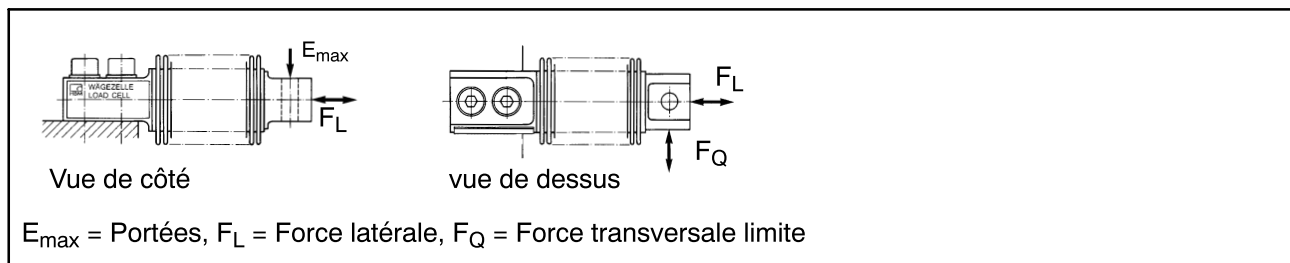
Type		Z6FD1	Z6FC3	Z6FC3MI	Z6FC4	Z6FC6
Classe de précision selon OIML R 60		D1	C3	C3/MI7.5	C4	C6
Nombre d'échelons de vérification (n_{LC})		1000	3000	3000	4000	6000
Portée (E_{max})	kg	5; 10; 20; 50; 100; 200; 500	10; 20; 50; 100; 200; 500	50; 100; 500	20; 50; 100; 200; 500	50; 100; 200;
	t	1	1	-	-	-
Valeur minimum d'un échelon (v_{min})	% d. E_{max}	0,0360	0,0090	0,0066		
Retour du signal de sortie à la charge morte minimale (D_{DR})		-	-	$0,5 \cdot E_{max} / 7500$	-	
Sensibilité (C_n)	mV/V	2				
Tolérance de sensibilité lors de l'application de la charge dans la direction spécifiée	%	+1;-0,1	$\pm 0,05^{1)}$			
Coefficient de température de la sensibilité (TK_C) ²⁾	% de C_n	$\pm 0,0500$	$\pm 0,0080$	$\pm 0,0080$	$\pm 0,0070$	$\pm 0,0040$
Coefficient de temp. du signal zéro (TK_0)	/10K	$\pm 0,0500$	$\pm 0,0125$	$\pm 0,0093$	$\pm 0,0093$	$\pm 0,0093$
Erreur relative de réversibilité (d_{hy}) ²⁾	% de C_n	$\pm 0,0500$	$\pm 0,0170$	$\pm 0,0066$	$\pm 0,0130$	$\pm 0,0080$
Ecart de linéarité (d_{lin}) ²⁾		$\pm 0,0500$	$\pm 0,0180$	$\pm 0,0180$	$\pm 0,0150$	$\pm 0,0110$
Fluage sous charge (d_{cr}) sur 30 minutes		$\pm 0,0490$	$\pm 0,0166$	$\pm 0,0098$	$\pm 0,0125$	$\pm 0,0083$
Résistance en entrée (R_{LC})	Ω	350...480				
Résistance en sortie (R_0)		$356 \pm 0,2$	$356 \pm 0,12$			
Tension de référence (U_{ref})	V	5				
Plage nom. de la tens. d'alimentation (B_U)		0,5...12				
Résistance d'isolation (R_{is})	G Ω	> 5				
Plage nom. de température ambiante (B_T)	°C	-10...+40				
Plage utile de température (B_{tu})		-30...+70				
Plage de température de stockage (B_{tl})		-50...+85				
Charge limite (E_L)	% d. E_{max}	150				
Charge de rupture (E_d)		≥ 300				

1) Avec peson Z6FC3/10KG: $\pm 0,1$ %

2) Les valeurs d'Ecart de linéarité (d_{lin}), d'Erreur relative de réversibilité (d_{hy}) et du Coefficient de température de la sensibilité (TK_C) ne sont données qu'à titre indicatif. La somme de ces valeurs se situe à l'intérieur des seuils d'erreurs groupées selon OIML R 60.

5 Caractéristiques techniques (Continuation)

Portée (E_{max})	kg	5	10	20	50	100	200	500	1000
Contrainte ondulée relative adm. (F_{srel})		100	100	100	100	100	100	70	100
Charge transv. stat. relative (F_Q)	% d. E_{max}	200	400	400	400	300	200	100	200
Charge latéral max. admise (F_L)		200	200	200	200	200	200	200	200
Déplacement nominal (s_{nom}), env.	mm	0,24	0,3	0,29	0,27	0,31	0,39	0,6	0,5
Poids (G), env.	kg	0,5	0,5	0,5	0,5	0,5	0,5	0,5	2,3
Degré de protection selon EN 60529 (CEI 529)		IP 68 (Conditions de test plus sévères : 1 m de colonne d'eau ; 100 h)							
Matériau									
Élément de mesure		Acier inoxydable							
Soufflet		Acier inoxydable							
Entrée de câble		Acier inoxydable / Viton®							
Gaine de câble		PVC							



En cas de charges multiples, la somme $F_Q + F_L$ ne doit pas excéder la plus petite de ces deux valeurs (voir tableau ci-dessus), la portée FN pouvant elle-même agir en supplément.

Options :

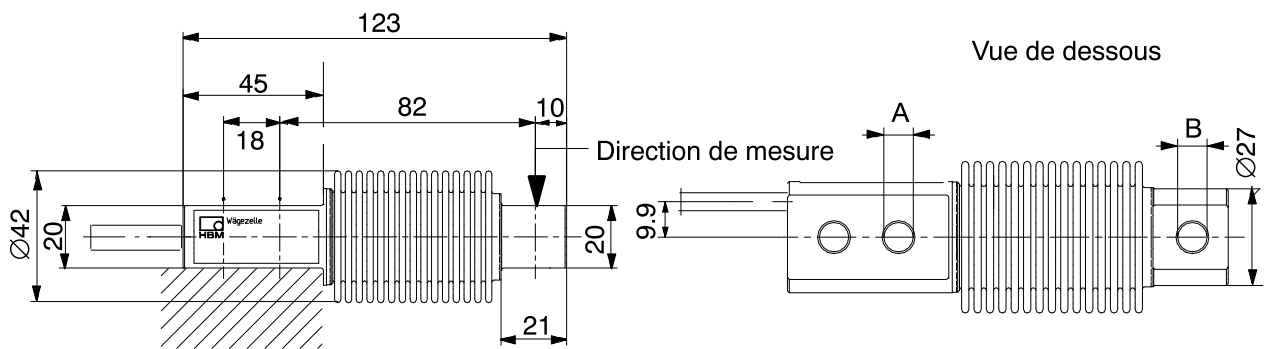
Versions antidéflagrants selon ATEX 95:

- II 2 G EEx ia IIC T4 ou T6 (Zone 1)^{*)}
- II 3 G EEx nA II T6 (Zone 2)
- II 2 D IP68 T80 °C (Zone 21)^{*)}
- II 3 D IP68 T80 °C (pour poussière non conductrice Zone 22)

^{*)} avec certificat d'examen CE de type

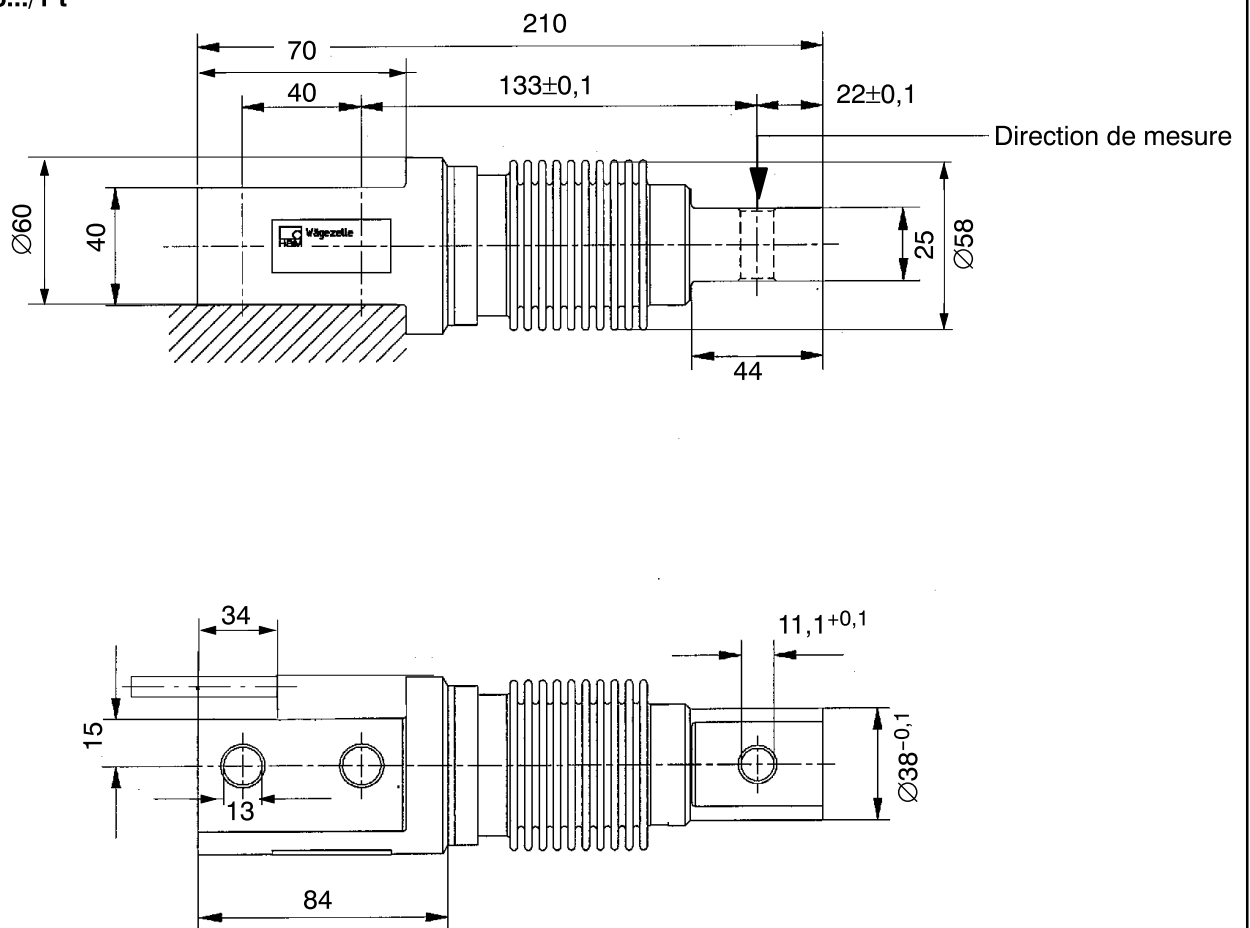
6 Dimensions (en mm)

Z6.../ 5kg...500 kg



	A	B
5...200 kg	8.2	8.2
500 kg	10.5	11.1

Z6.../1 t

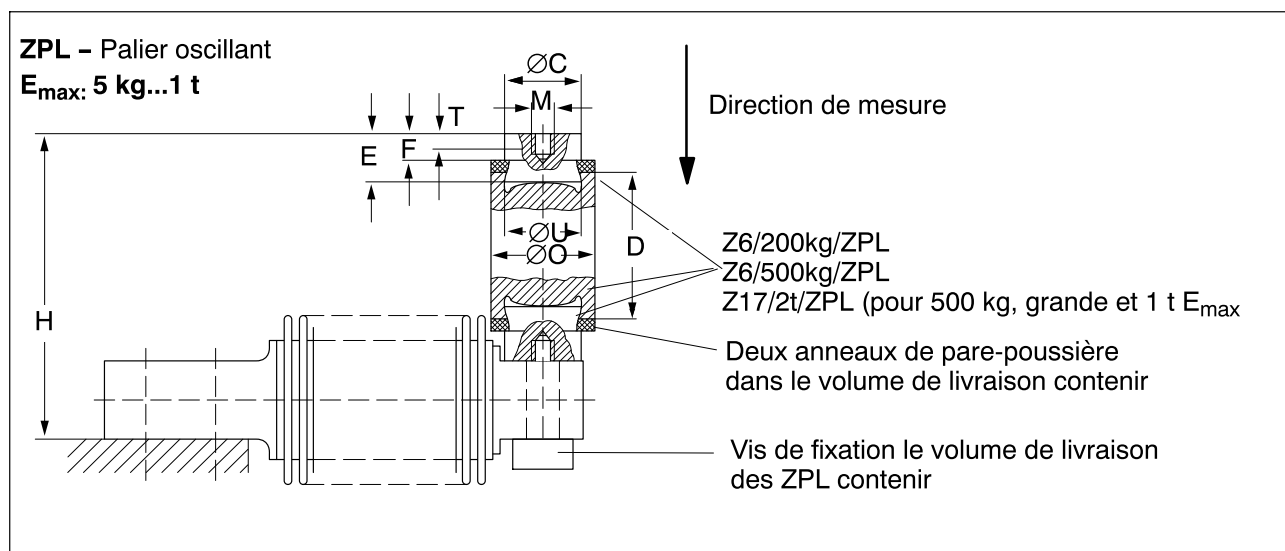


7 Accessoires (en mm)



REMARQUE

Tous les accessoires de montage sont réalisés avec un matériau inoxydable. Les pièces en caoutchouc du ZEL sont en caoutchouc au chlore.

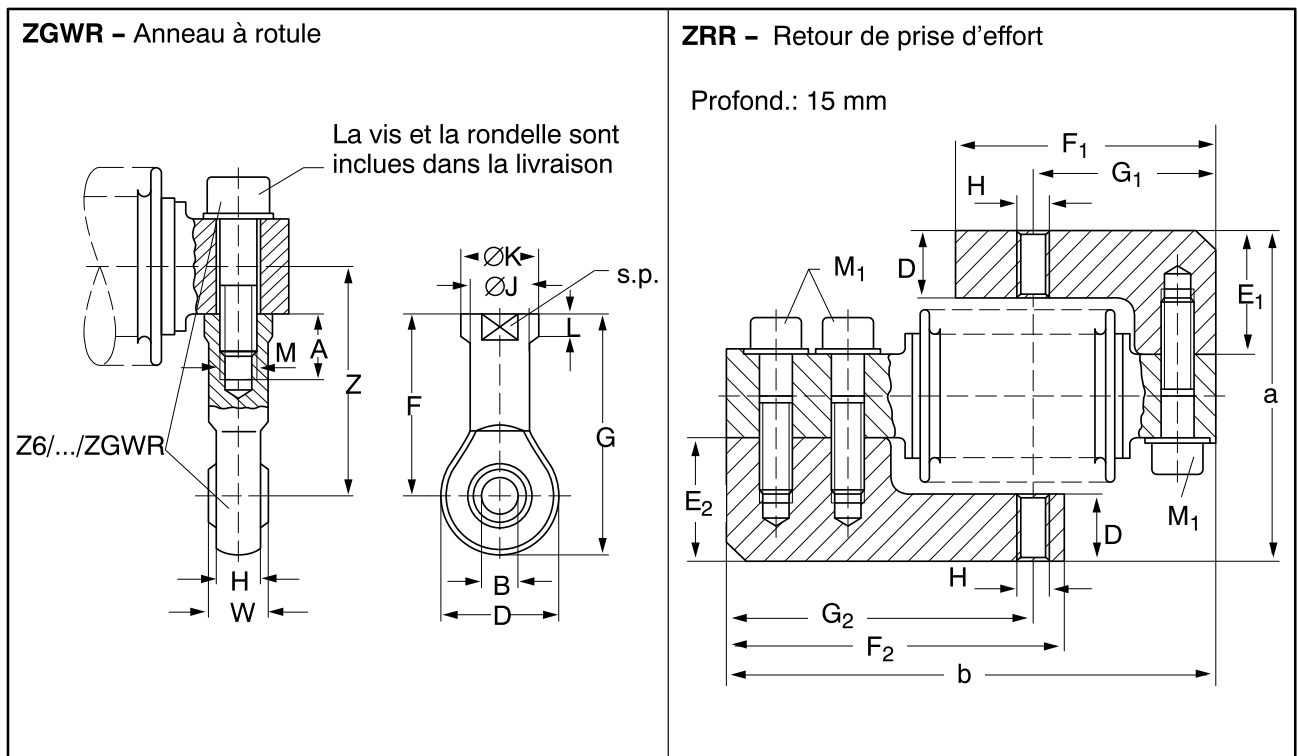


E_{max}	ZPL	$\varnothing C$	D	H	M	O	T	E	F_1	$\varnothing U$
5 kg...200 kg	Z6/200KG/ZPL	20 _{-0,2}	45	89 ^{+0,6} _{-0,8}	M8	30	6,5	17	9	20 ^{D10}
500 kg	Z6/500KG/ZPL	20 _{-0,2}	45	89 ^{+0,6} _{-0,8}	M8	30	6,5	17	9	20 ^{D10}
1 t	Z17/2T/ZPL	30 _{-0,1}	60	126,5	M10	46	8	22	14	30 ^{D10}

E_{max}	ZPL	F_R^* (% de la charge appliquée)	s_{max}^{**} (mm)
5 kg...200 kg	Z6/200KG/ZPL	2,8	3,5
500 kg	Z6/1T/ZPL	2,8	3,5
1 t	Z6/1T/ZPL	2	7,5

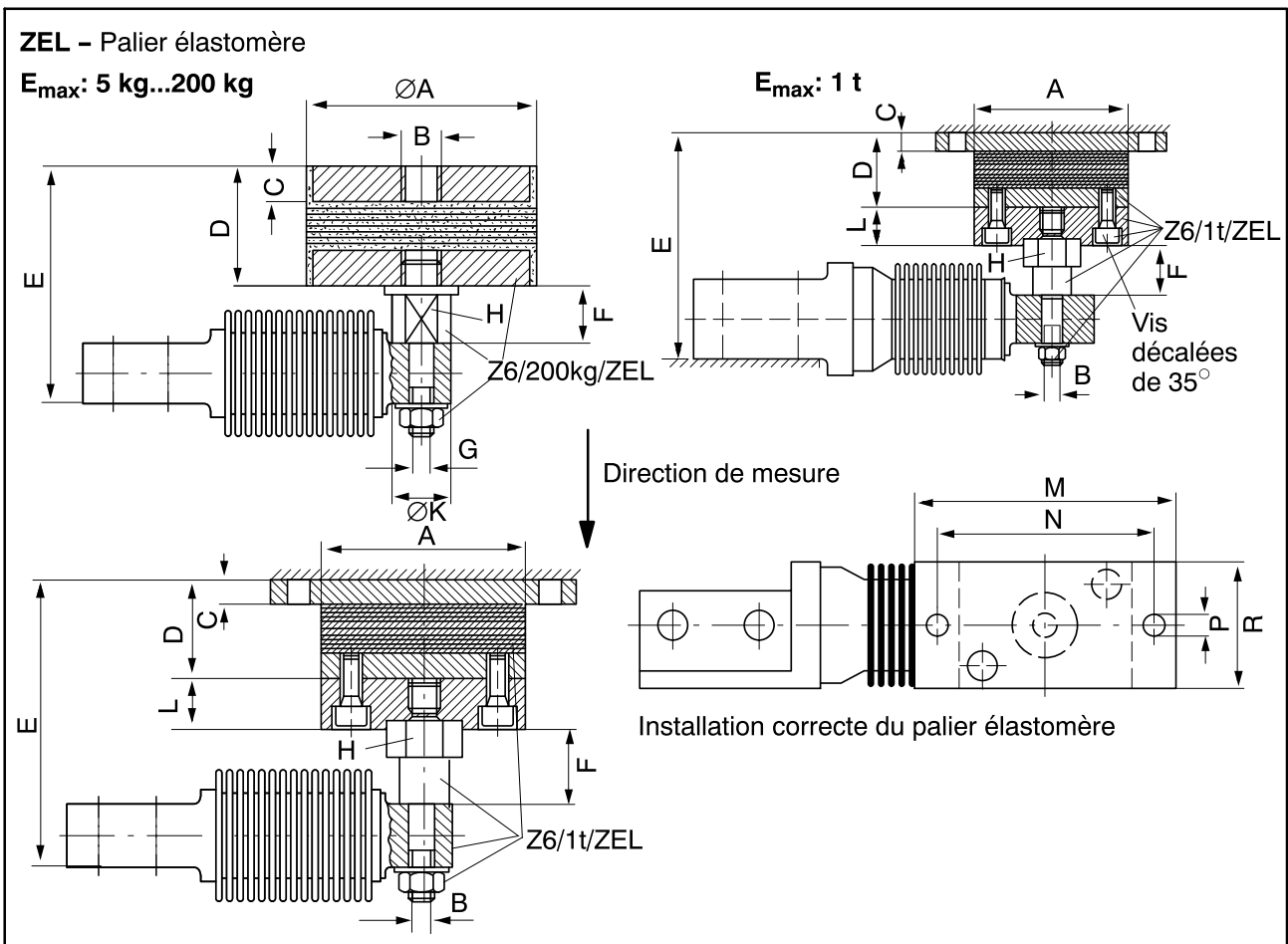
* F_R Force de rappel en N pour $s=1$ mm

** s_{max} Déplacement latéral max. pour introduction de la charge nominale



E_{max}	ZGWR	A	B	D	F	G	H	J	K	L	M	s.p.	W	Z
5... 200kg	Z6/200KG/ZGWR	16	8 ^{H7}	24	36	48	9	12,5	16	5	M8	14	12	46
500kg	Z6/1T/ZGWR	20	10 ^{H7}	28	43	57	10,5	15	19	6,5	M10	17	14	53
1 t	Z6/1T/ZGWR	20	10 ^{H7}	28	43	57	10,5	15	19	6,5	M10	17	14	55,5

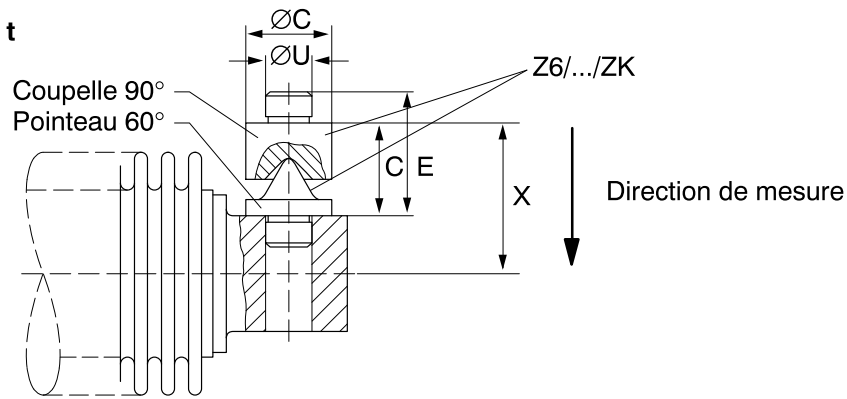
E_{max}	ZRR	a	b	D	E_1	E_2	F_1	F_2	G_1	G_2	H	M_1
5... 200kg	Z6/200KG/ZRR	80 ±1,1	123	16	30	30	65	85	46	77	M8	M8x30



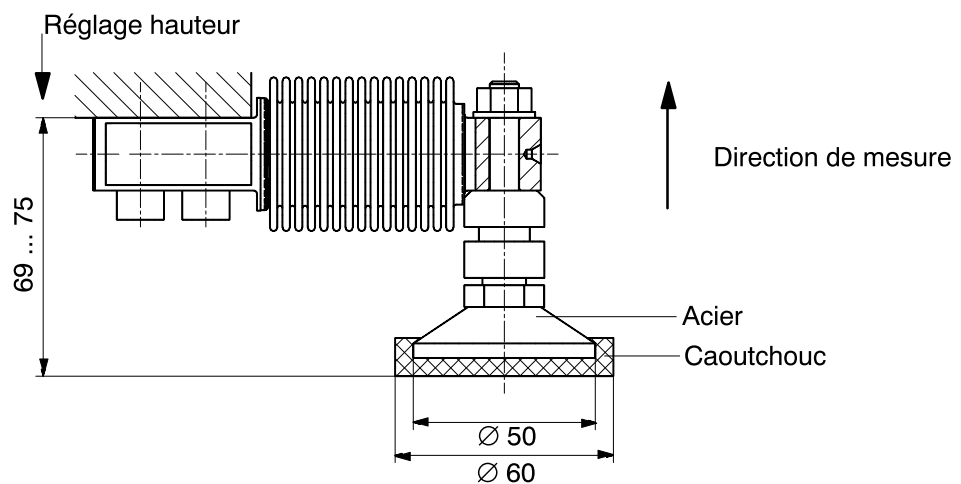
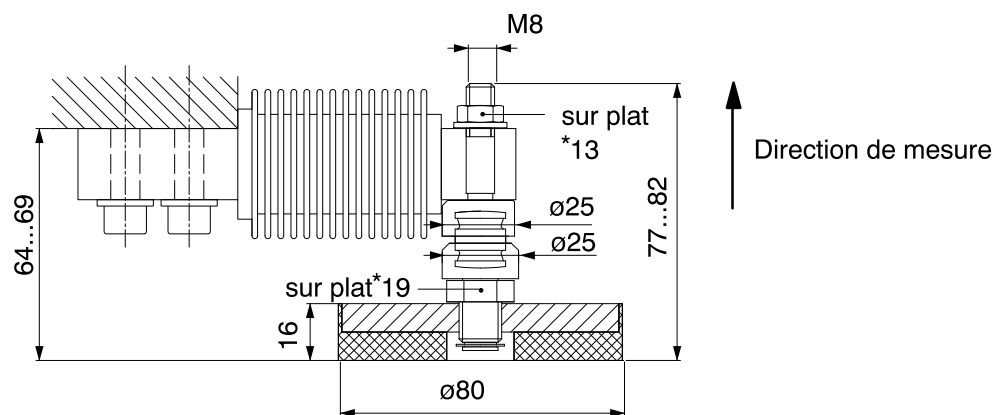
E _{max}	ZEL	A	B	C	D	E	F	G	H	K	L
5...200kg	Z6/200KG/ZEL	75	M12	12	40	79 ± 1.3	18.5	M8	s.p. 17	19	-
500kg	Z6/1T/ZEL	80	M10	10	39	105 ^{+2.1} _{-2.2}	26	-	s.p. 27	-	20
1 t	Z6/1T/ZEL	80	M10	10	39	117 ^{+2.1} _{-2.2}	26	-	s.p. 27	-	20
E _{max}	ZEL	M	N	P	R	F _R * (in N, de la charge appliquée)	S _{max} ** (mm)				
5...200kg	Z6/200KG/ZEL	-	-	-	-	163	3				
500kg	Z6/1T/ZEL	120	100	9	60	400	4.5				
1 t	Z6/1T/ZEL	120	100	9	60	400	4.5				

*F_R Force de rappel pour s=1 mm

**S_{max} Déplacement latéral maximal pour introduction de la charge nominale

ZK – Copelle/Pointeau**E_{max}: 5 kg...1 t**

E_{max}	ZK	Ø C	D	E	Ø U	X
5...200 kg	Z6/200KG/ZK	15	16	21	8,1 _{-0,05}	26
500 kg/1 t	Z6/1T/ZK	18	24	32	11 _{-0,05}	53/55,5

ZFP – Pied de pesage**Z6/ZFP/200KG****ZKP – Pied de pesage****Z6/ZKP/200KG**

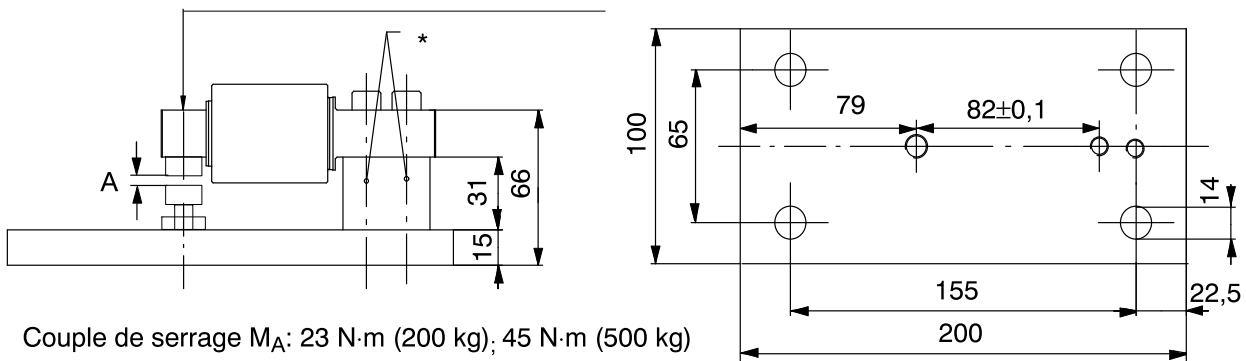
*) Couple de serrage: 30 N·m

Plaque de base / Kit d'assemblage

(résistant à l'oxydation) pour portée 5 kg (Z6/ZPU/200KG) ... 500 kg (Z6/ZPU/500KG)

Introduction de la charge par:

(Z6/...KG/ZPL; Z6/...KG/ZEL ; Z6/...KG/ZK) Vue de dessous

* Couple de serrage M_A : 23 N·m (200 kg); 45 N·m (500 kg)**Réglage de l'interstice sur la butée de surcharge**

La longueur du boulon de la butée de surcharge est conçue pour faire face à la mise en œuvre d'un ZEL ou d'un ZPL. L'interstice étant réglé de façon optimale, on est assuré de disposer d'une longueur de vissage suffisante (> 10 mm) dans la plaque de base. Pour d'autres pièces d'introduction de charge, il faudra éventuellement choisir une autre long. de vissage (par exemple pour Z6/...KG/ZK : M10x35, DIN 931).

- Régler l'interstice de la butée de surcharge au moyen d'une cale d'épaisseur.
- Fixer à la hauteur réglée, en contrant le boulon au moyen de l'écrou fourni avec le kit.

Portée [kg]	Interstice A (butée de surcharge) [mm]	Charge max.
50	$\approx 0,35^*$	200 kg
100	$\approx 0,40^*$	400 kg
200	$\approx 0,50^*$	800 kg
500	$\approx 0,85^*$	2,5 t

* La largeur de l'interstice de la butée de surcharge peut varier selon la situation de montage. Un contrôle fonctionnel de la butée de surcharge doit être accompli après le montage, au plus tard avant sa mise en service. **Pour les pesons chargés à leur portée max., l'interstice doit être de 0.05 mm.**

Änderungen vorbehalten.
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measurement with confidence

Operating manual

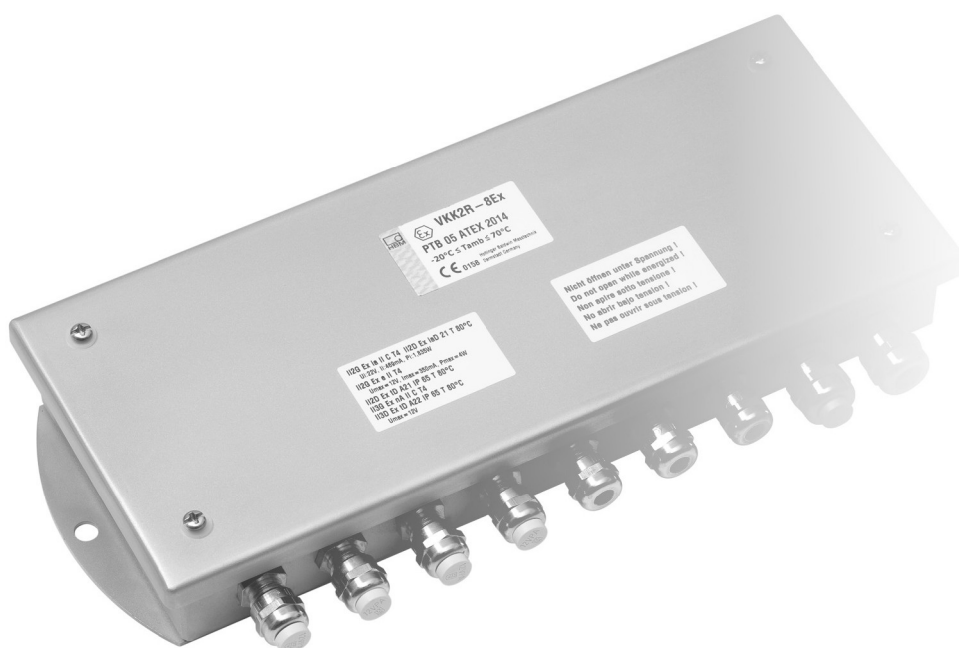
Bedienungsanleitung

Junction box
Klemmenkasten



VKK2R-8 Ex ANALOG

PTB05 ATEX 2014



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Safety instructions

Use in accordance with the regulations

This junction box is passive equipment for use in potentially explosive atmospheres for connection of up to 8 strain gage load cells with a **bridge resistance** $\geq 348 \Omega$ and the appropriate amplifier/evaluation device.

In the interests of safety, the junction box should only be operated as described in the Installation Instructions. It is also essential to observe the appropriate legal and safety regulations for the application concerned during use. The same applies to the use of accessories.

It is essential to comply with the respective national laws and safety regulations for the use of transducers in potentially explosive atmospheres.

The junction box is not a safety element within the meaning of its use as intended. For safe and trouble-free operation, this junction box must not only be correctly transported, stored, sited and installed but must also be carefully operated and maintained.

Notes on production and operation

1. The junction box must be integrated into the potential equalization on site.
2. Either intrinsically safe or non-intrinsically safe electrical circuits may be connected only, combination is not permissible.
3. If the junction box is operated with non-intrinsically safe electrical circuits, subsequent use in type of protection intrinsic safety is not permissible.

See EC-type examination certificate [PTB 05 ATEX 2014](#).

Maintenance and repairs

The provisions of EN60079 17 must be complied with for maintenance and repairs or inspections. Those components on which the ignition protection class depends must be primarily checked within the framework of maintenance.

The housings may only be opened without additional measures for maintenance in the "intrinsic safety" type of protection. If connected intrinsically safe circuits are affected by maintenance work, it must be ensured that no dangerous remote effects can occur. The housing must not be opened while voltage is applied if non intrinsically safe circuits are present.

The condition of the seals must be checked. When replacing cable glands and sealing plugs, ensure sealing is correct.

General dangers of failing to follow the safety instructions

The junction box corresponds to the state of the art and is fail-safe. Junction boxes can give rise to remaining dangers if they are inappropriately installed and operated by untrained personnel.

Everyone involved with the installation, commissioning, maintenance or repair of a junction box must have read and understood the Installation Instructions and in particular the technical safety instructions.



Symbol:

NOTE

Means that important information about the product or its handling is being given.

Remaining dangers

The scope of supply and performance of the junction box covers only a small area of connection technique. In addition, equipment planners, installers and operators should plan, implement and respond to the safety engineering considerations of the connection technique in such a way as to minimize remaining dangers. Prevailing regulations must be complied with at all times. There must be reference to the remaining dangers associated with the connection technique. In these Installation Instructions remaining dangers are pointed out using the following symbols:



Symbol:

CAUTION

Meaning: **Potentially dangerous situation**

Warns of a **potentially** dangerous situation in which failure to comply with safety requirements **could** lead to damage to property and slight or moderate physical injury.

Qualified personnel

The junction box must only be installed by qualified personnel, strictly in accordance with the specifications and with the safety requirements and regulations listed below. It is also essential to observe the appropriate legal and safety regulations for the application concerned. The same applies to the use of accessories.

Qualified personnel means persons entrusted with the installation, assembly, commissioning and operation of the product who possess the appropriate qualifications for their function.

Conditions on site

Do not allow the junction box to become dirty or damp.

Maintenance

The junction box provides degree of protection IP65 (dust tight, protected against water jets). Make regular checks to ensure the tightness and efficiency of the rubber lid seal and the screw fittings.

Do not open while energized, except in the case of intrinsically safe supply!

Material-related application limitations

Note that, in your application field, certain materials, alone or in combination with other materials may attack stainless steels and their weld seams, as well as plastics. If this is the case, the operator must take appropriate protective measures. The additional protective measures must be checked regularly for their effectiveness.

Prevention of accidents

The prevailing accident prevention regulations must be observed.

Unauthorized conversions and modifications are prohibited

Neither the design of the device nor any technical safety aspects may be modified without the express permission of Hottinger Baldwin Messtechnik GmbH. Any modification excludes Hottinger Baldwin Messtechnik GmbH from any and all liability for any damage resulting therefrom.

It is strictly forbidden to carry out any repairs and soldering work on the motherboards or to replace any components. Repairs may only be carried out by persons authorized thereto by Hottinger Baldwin Messtechnik GmbH.

- During installation and when connecting the cables, take action to prevent electrostatic discharge as this may damage the connected electronics.
- All the interconnecting cables must be shielded cables. The screen must be connected extensively to ground on both sides.

1 Special features

Device group II, device category 2 or device category 3

- Parallel connection of max. eight load cells in a 6-wire circuit
- HBM's shielding design provides EMC-proofing under EN 45 501
- Corner load balancing via the integrated resistor network in the load cell output
- Degree of protection IP65 to EN 60 529

The junction box also allows the screen to be connected conventionally by means of the screen strands. With this method, EMC-proofing under EN 45 501 is restricted, which can lead to measurement errors when there are electromagnetic interference fields.

2 Range of application

The junction box can be used in different zones:

The **maximum permissible ambient temperature is 70 °C [158 °F]**.

Zone 1: **II 2 G Ex ia II C T4** type of protection "**Intrinsic safety**"
Intrinsically safe circuits with the following maximum values can be connected:

U_i: 22 V I_i: 469 mA P_i: 1.835 W.

or: **II 2 G Ex e II T4** – type of protection **Increased safety**

Max. excitation voltage **U_{max}=12 V**;

Max. excitation current **I_{max}=350 mA**,

Max. power **P_{max}=4 W**,

Cross section 1.5 mm² or 2.5 mm² resp. (see chapt. 5 Connection).

Zone 21 or Zone 22 (dust/air mixtures with **conductive** dust):

II 2 D Ex iaD A21 T 80 °C type of protection "**Intrinsic safety**"

Intrinsically safe circuits with the following maximum values can be connected:

U_i: 22 V I_i: 469 mA P_i: 1.835 W.

or: **II 2 D Ex tD A21 IP 65 T 80 °C** type of protection **Explosion proof enclosure**

Max. surface temperature 80 °C [176 °F],

Max. permissible excitation voltage 12 V.

Zone 2: **II 3 G Ex nA II C T4** type of protection **Explosion proof enclosure**

Max. surface temperature 80 °C [176 °F],

Max. permissible excitation voltage 12 V.

Zone 22: (dust/air mixtures with **non conductive** dust)

II 3 D Ex tD A22 IP 65 T 80 °C type of protection **Explosion proof enclosure**

Max. surface temperature 80 °C [176 °F],

Max. permissible excitation voltage 12 V.

3 Installing the junction boxes

The best way to fit the VKK... junction boxes is with the grommets pointing downward. This increases protection against moisture penetration.

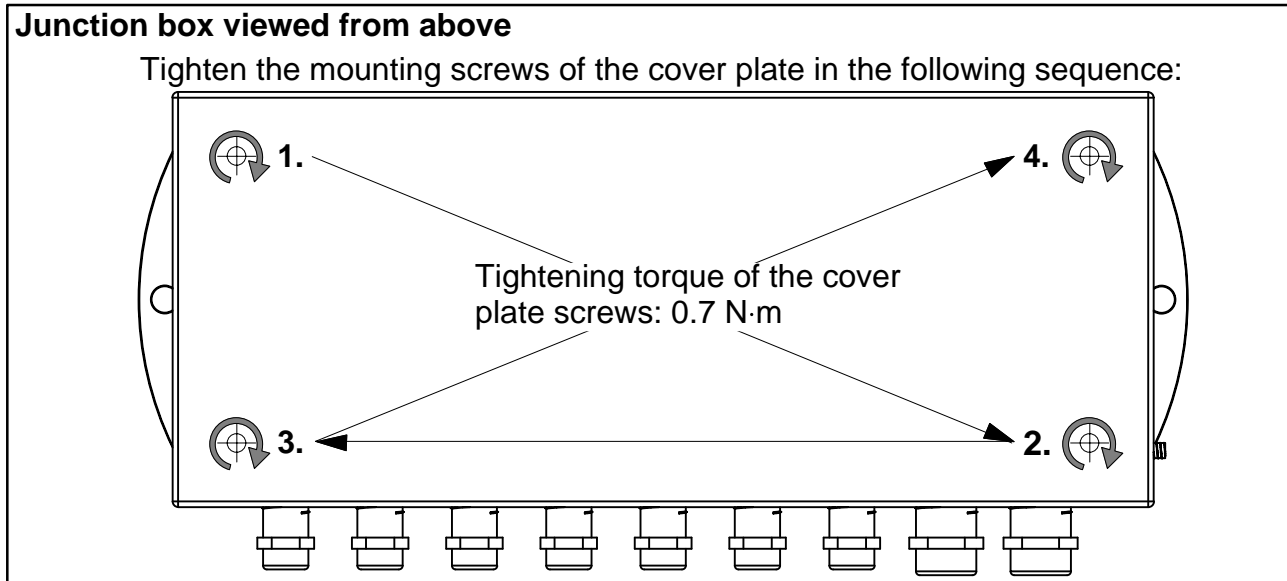


Fig. 3.1: Correct order for tightening the mounting screws of the cover plate



CAUTION

Please tighten the cover plate screws with a torque of 0.7 N·m to ensure the specified IP degree of protection and maximum EMC protection. The sealing washers under the cover plate screws must not be removed.

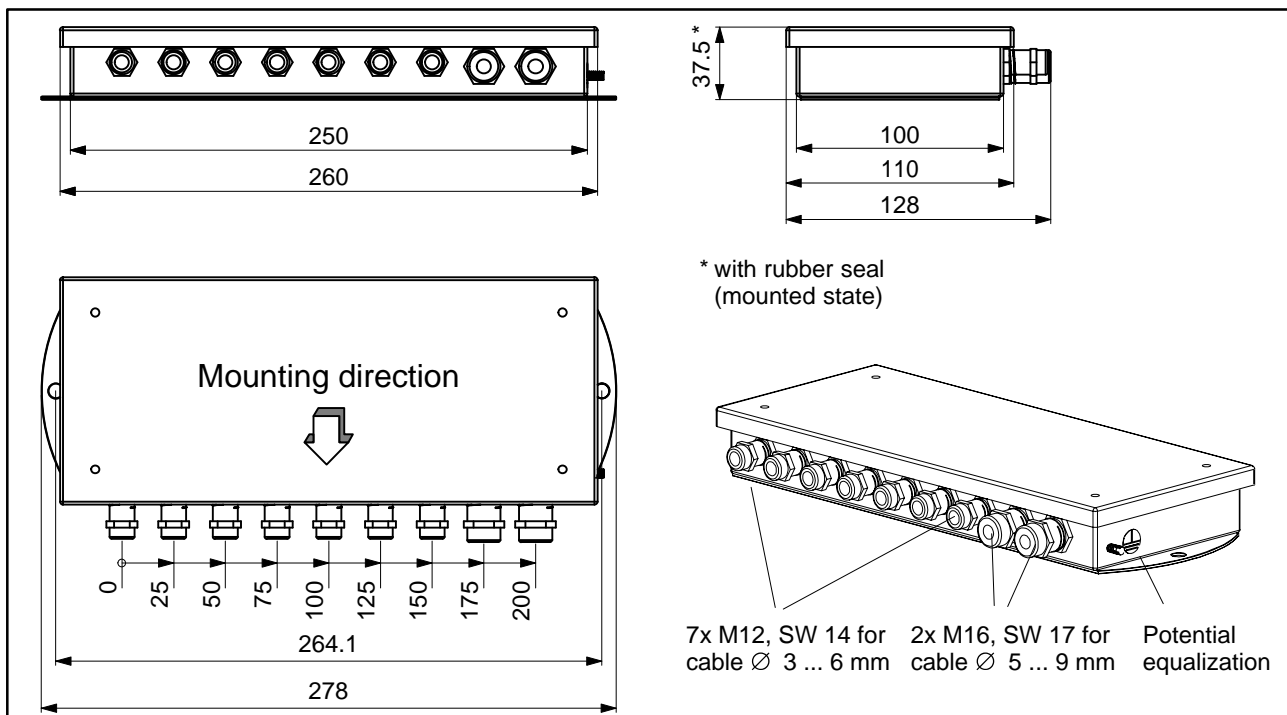


Fig. 3.2: Mounting dimensions

4 Preparing the cables

For optimum results, proceed as follows:

- Remove the outer sheath of the cable and, depending on the cable diameter, expose the braided shield for about 10...15 mm.
- Push the cap nut and the bladed insert with the sealing ring onto the cable.
- Bend the braided shield outward at right angles (90°).
- Crimp the braided shield over towards the outer sheath of the cable, i.e. fold it a further 180°.
- Slip the intermediate connection piece on as far as the braided screen, briefly turning it to and fro around the cable axis.
- Push the bladed insert with the sealing ring into the intermediate connection piece and engage the locking element.
- Firmly tighten the cap nut.

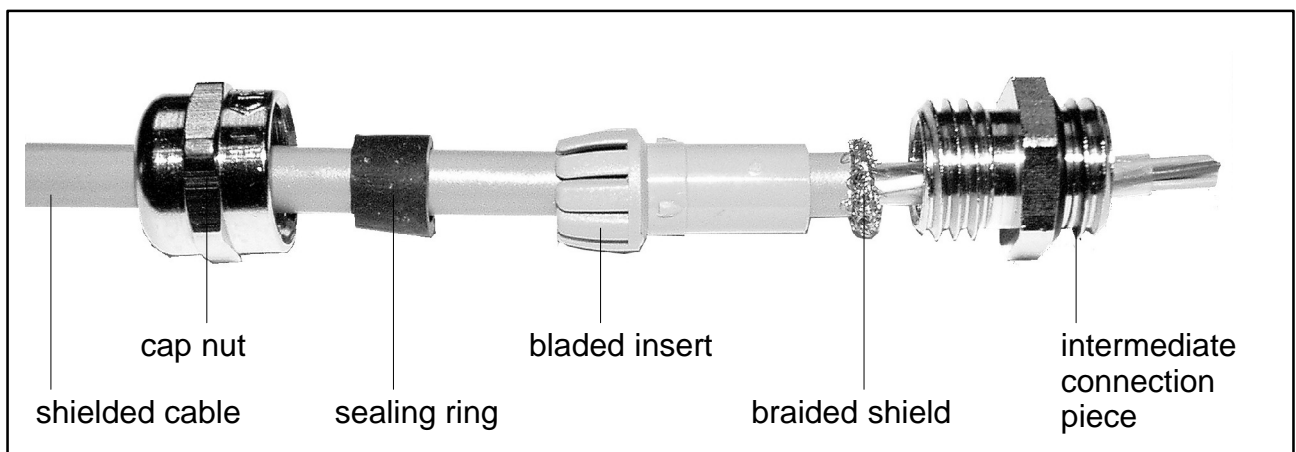
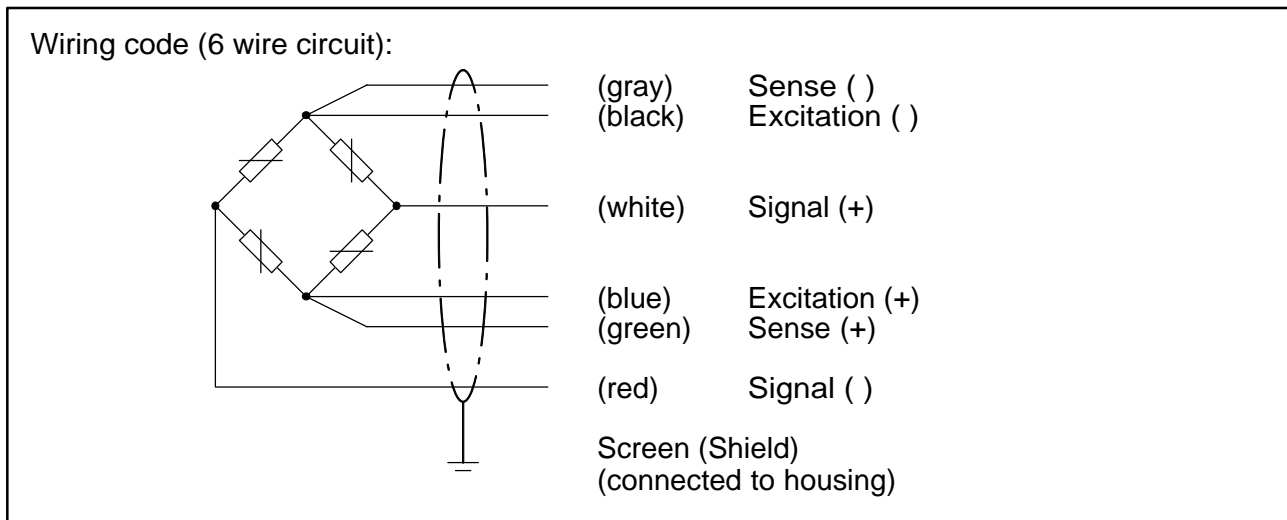


Fig. 4.1: Configuration of screwed connection

5 Connection

The junctions are identified as shown in the following diagram. The colors correspond to the wire colors used by most HBM load cells.



To achieve the best-possible measurement results and to optimize interference immunity, connect to the weighing electronics with HBM cables using 6-wire circuitry.

If the load cells **and** the weighing electronics use 4-wire circuitry, the sense terminals are unused.

If the load cells use 4-wire circuit and the weighing electronic use 6-wire circuit, the terminal for sense (+) must be bridged with the terminal for excitation (+) as well as the terminal for sense () with the terminal for excitation (). See also the Installation Instructions for the corresponding load cell.

The terminals have been designed for a wire cross section of 2.5 mm² with single-wire (inflexible) and fine-wire (flexible) conductors. When using fine-wire conductors with wire end ferrules, the cross section is limited to 1.5 mm².

The equipment is fitted with a potential equalization terminal.



CAUTION

To ensure compliance with the IP65 degree of protection, all unused grommets must be closed off with the plugs provided for the purpose. Tighten the associated sleeve nut in each case to stop the moisture getting in.

It is essential to use cables only that fall within the range of diameters as specified by the manufacturer of the screwed cable glands:

M12 x 1.5: Ø 3 mm up to 6.5 mm

M16 x 1.5: Ø 5 mm up to 9 mm

6 Corner load balancing

With weighing machines, mechanical imbalance may lead to corner load errors. According to the EN 45501 3.6.2 standard for non-automatic weighing machines, specific values are to be maintained for eccentric loading.

The junction boxes provide an easy way to compensate for these errors electrically. A binary stepped network of 4 resistors is available for each load cell, that is **shorted** at the factory via 0 Ω resistors (see Fig. 6.1). Opening the vertical 0 Ω resistors activates the relevant resistances and thus reduces the load cell signal.

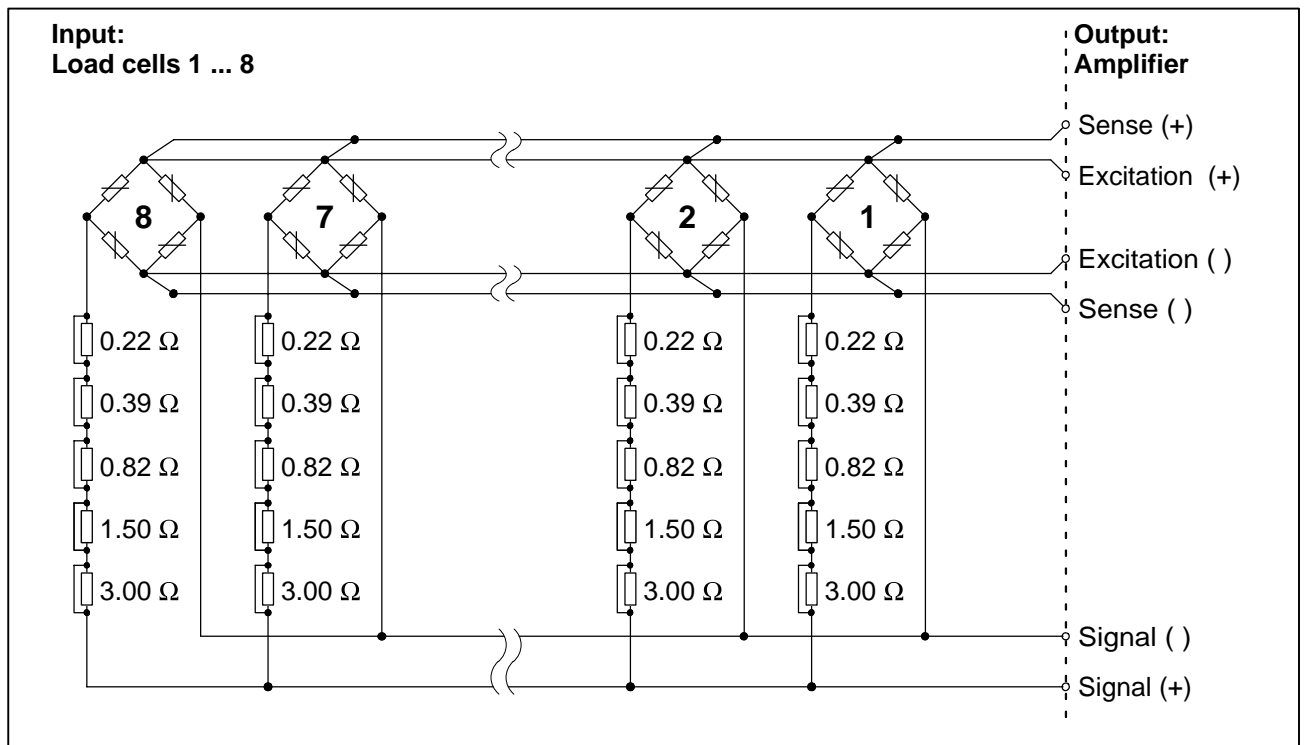


Fig. 6.1: Resistor network for corner load balancing of 8 load cells

Opening the equipment while in operation is only permissible in the case of the intrinsic safety type of protection. In the case of other types of protection, a Hot Work Permit from the operator's side is required for work on the equipment.

7 Technical recommendations

Practical example using a platform with 4 load cells:

- When the four corners of the platform are loaded, note the weighing machine signals in order to assess the respective differences (in kg) to the corner of the weighing machine (load cell) with the lowest indication. This load cell is the reference load cell (4) and does not need balancing (in the example in Fig. 7.1, load cell 4).
- The chart (Fig. 7.2) is graduated in 7 test load ranges. Select the test loads used (in this example 12.5 t) in the relevant line. Starting from the calculated corner load error difference on the X-axis, look for the intersection with the test load and then, on the Y-axis, read off the resistance and the most suitable combination. The resistance values here apply for 350 Ω load cells (see the table in the lid of the VKK...).

In our example, load cell 3 has a corner load error of 80 kg, which produces an adjustment resistance of $1.5+0.82 \Omega$ (shown in Fig. 7.2).

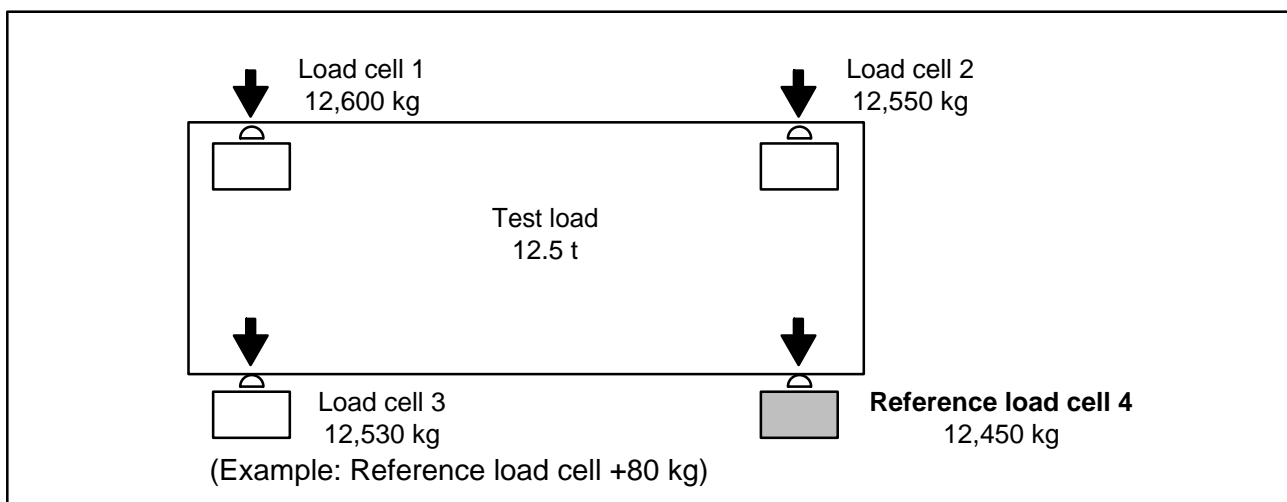


Fig. 7.1: Example: Platform weighing machine with four load cells with 12.5 t test load

- For the load cell affected (e.g. load cell 3), the necessary resistances are activated by opening the relevant 0 Ω resistor. Tip: Divide the wire and bend it to one side
- Repeat this procedure for all the load cells apart from the reference load cell (in our example, this is load cell 4).

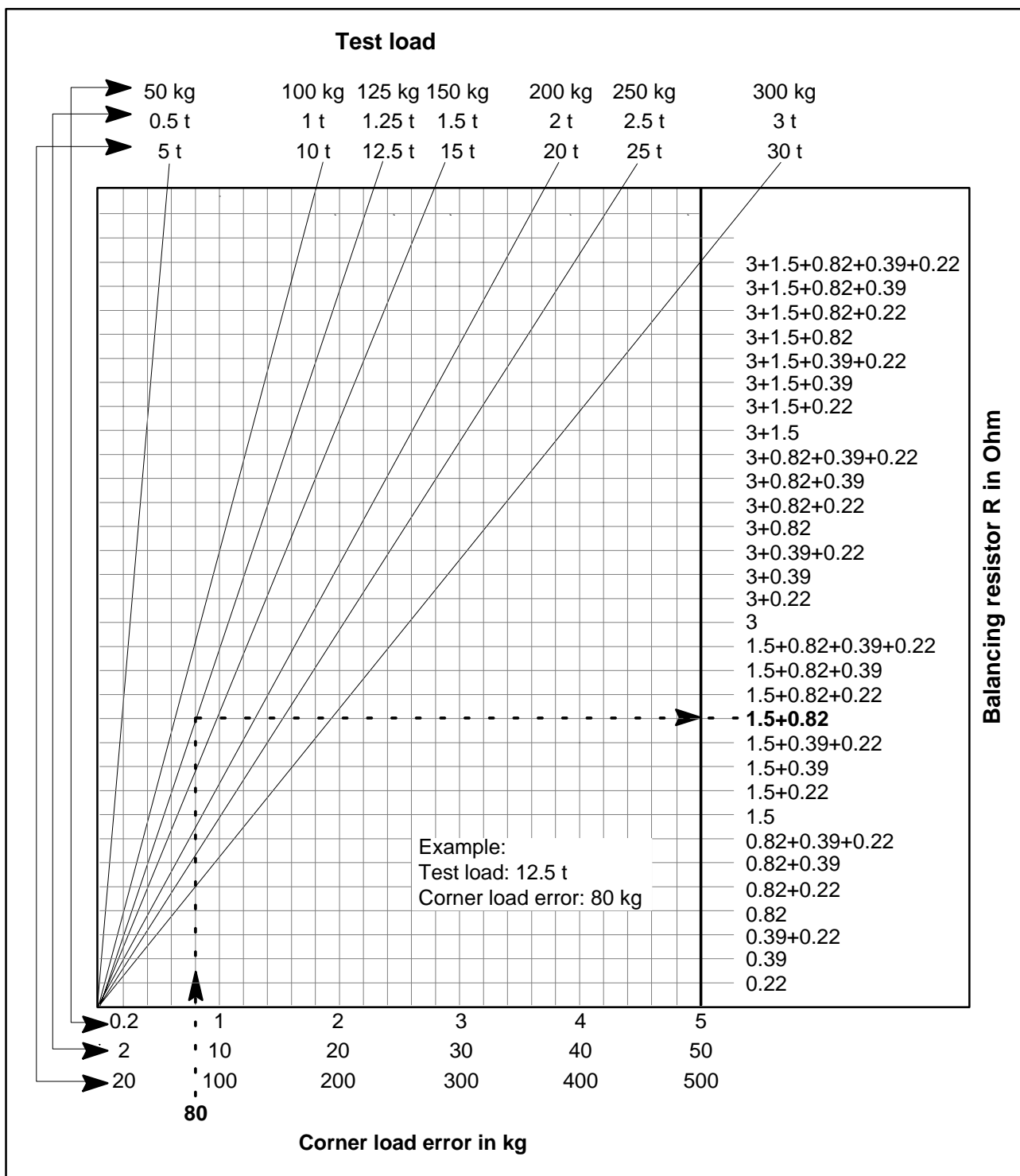


Fig. 7.2: Corner load balancing for 350 Ω load cells
 (For 700 Ω load cells, the established value must be doubled.)

Bridge resistant 350 Ω (the values for corner load error are to be doubled at 700 Ω)											
Testing load [t]											
5 ↓	10 ↓	12.5 ↓	20 ↓	25 ↓	30 ↓						
Corner load error between [kg]						3.00	1.50	0.82	0.39	0.22	Ω
0	0	0	0	0	0	○	○	○	○	○	0.00
1.6	3.1	3.9	6.3	7.9	9.4	○	○	○	○	*	0.22
4.4	8.7	10.9	17.4	21.8	26.1	○	○	○	*	○	0.39
7.1	14.3	17.9	28.6	35.7	42.9	○	○	○	*	*	0.61
10.2	20.4	25.5	40.9	51.1	61.3	○	○	*	○	○	0.82
13.3	26.6	33.2	53.1	66.4	79.7	○	○	*	○	*	1.04
16.1	32.1	40.2	64.3	80.4	96.4	○	○	*	*	○	1.21
18.9	37.7	47.1	75.4	94.3	113.1	○	○	*	*	*	1.43
20.9	41.9	52.3	83.7	104.6	125.6	○	*	○	○	○	1.50
23.0	46.0	57.5	92.0	115.0	138.0	○	*	○	○	*	1.72
25.8	51.6	64.5	103.1	128.9	154.7	○	*	○	*	○	1.89
28.6	57.1	71.4	114.3	142.9	171.4	○	*	○	*	*	2.11
31.6	63.3	79.1	126.6	158.2	189.9	○	*	*	○	○	2.32
34.7	69.4	86.8	138.9	173.6	208.3	○	*	*	○	*	2.54
37.5	75.0	93.8	150.0	187.5	225.0	○	*	*	*	○	2.71
40.3	80.6	100.7	161.1	201.4	241.7	○	*	*	*	*	2.93
42.4	84.7	105.9	169.4	211.8	254.1	*	○	○	○	○	3.00
44.4	88.9	111.1	177.7	222.1	266.6	*	○	○	○	*	3.22
47.2	94.4	118.0	188.9	236.1	283.3	*	○	○	*	○	3.39
50.0	100.0	125.0	200.0	250.0	300.0	*	○	○	*	*	3.61
53.1	106.1	132.7	212.3	265.4	318.4	*	○	*	○	○	3.82
56.1	112.3	140.4	224.6	280.7	336.9	*	○	*	○	*	4.04
58.9	117.9	147.3	235.7	294.6	353.6	*	○	*	*	○	4.21
61.7	123.4	154.3	246.9	308.6	370.3	*	○	*	*	*	4.43
63.8	127.6	159.5	255.1	318.9	382.7	*	*	○	○	○	4.50
65.9	131.7	164.6	263.4	329.3	395.1	*	*	○	○	*	4.72
68.6	137.3	171.6	274.6	343.2	411.9	*	*	○	*	○	4.89
71.4	142.9	178.6	285.7	357.1	428.6	*	*	○	*	*	5.11
74.5	149.0	186.3	298.0	372.5	447.0	*	*	*	○	○	5.32
77.6	155.1	193.9	310.3	387.9	465.4	○	○	*	○	*	5.54
80.4	160.7	200.9	321.4	401.8	482.1	*	*	*	*	○	5.71
83.1	166.3	207.9	332.6	415.7	498.9	*	*	*	*	*	5.93

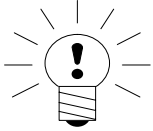
Fig. 7.3: Alternative to the method described in Fig. 7.2

(The dividing points are shown = see table in lid)

For 700 Ω load cells, the established value must be doubled.

8 Special instructions

For other test loads types (e.g. building site vehicle testing), the user can extend the chart by drawing an additional line between the zero point and the actual test load used.



NOTE

The bases for calculation described in this section for corner load balancing and appearing in the form of a chart, a table or a formula, apply to load cells with a symmetrical output voltage. In practice, the balancing effect may differ from the target value, depending of the type of load cell involved. In this case, you will have to use empirical values for balancing.

9 Specifications

Type		VKK2R-8 Ex	
		Zone1; 2; 21; 22	Zone1, 21, 22 (intrinsic safety)
Resistor network for corner load balancing	Ω	0.22...5.93 (in 31 steps)	
Max. permissible voltage	V	12	22
Nominal temperature range		20...+70 [4...+158]	
Operating temperature range	$^{\circ}\text{C}$	20...+70 [4...+158]	
Storage temperature range	$[^{\circ}\text{F}]$	40...+85 [40...185]	
Interference immunity check			
Electromagnetic field (26...1000 MHz)	V/m	10	
Burst (to connected cables)	V	1000	
Electrostatic discharge (to housing)	V	6000	
Weight, approx.	kg	1	
Max. wire cross section of cable strands	mm^2	1.5	
Degree of protection according to EN 60529 (IEC 529)		IP65 (dust-tight and protected against water jets)	
Materials: Housing		stainless steel	
Screwed cable gland:			
Sleeve nut		7x M12, a.f.14; 2x M16, a.f.17 nickel-plated brass	
Clamping cone		Neoprene, for cable \varnothing 5...9 mm with M16 x 1.5 for cable \varnothing 5...6.5 mm with M12 x 1.5	

10 Declaration of Conformity



Konformitätserklärung

Declaration of Conformity

Déclaration de Conformité

Document: 237 / 2009-10

Wir,

We,

Nous,

Hottinger Baldwin Messtechnik GmbH, Darmstadt

erklären in alleiniger Verantwortung,
dass das Produkt

declare under our sole
responsibility that the product

déclarons sous notre seule
responsabilité que le produit

Junction box

Type: VKK2R-8Ex

⊗ II 2 G or ⊗ II 3 G or ⊗ II 2 D or ⊗ II 3 D

auf das sich diese Erklärung
bezieht, mit der/den folgenden
Norm(en) oder normativen
Dokument(en) übereinstimmt (siehe
Seite 2) gemäß den Bestimmungen
der Richtlinie(n)

to which this declaration relates is
in conformity with the following
standard(s) or other normative
document(s) (see page 2)
following the provisions of
Directive(s)

auquel se réfère la présente
déclaration est conforme à la (aux)
norme(s) ou autre(s) document(s)
normatif(s) (voir page 2)
conformément aux dispositions de
la (des) Directive(s)

94/9/EC - *Directive 94/9/EC of the European Parliament and of the Council of 23 March 1994 on the approximation of the laws of the Member States concerning equipment and protective systems intended for use in potentially explosive atmospheres*

EG-Baumusterprüfbescheinigung:
EC type examination certificate:
Attestation CE de type:

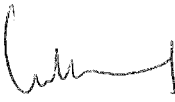
PTB 05 ATEX 2014
*Physikalisch-Technische Bundesanstalt
Bundesallee 100, D-38116 Braunschweig
Identification no. 0102*

Die Absicherung aller produkt-
spezifischen Qualitätsmerkmale
erfolgt auf Basis eines zertifizierten
Qualitätsmanagementsystems nach
ISO 9001.
Die Überprüfung der sicherheits-
relevanten Merkmale (Elektro-
magnetische Verträglichkeit, Sicher-
heit elektrischer Betriebsmittel) stellt
ein von der DATech erstmals 1991
akkreditiertes Prüflaboratorium
unabhängig im Hause HBM sicher.

All product-related features are
secured by a certified quality
system in accordance with
ISO 9001.
The safety-relevant features
(electromagnetic compatibility,
safety of electrical apparatus) are
secured at HBM by an independent
testing laboratory which has been
accredited by DATech in 1991 for
the first time.

La garantie de toutes les
caractéristiques de qualité d'un
produit spécifique s'effectue sur la
base d'un système d'assurance
qualité certifié selon la norme
ISO 9001.
Le contrôle des caractéristiques
relatives à la sécurité (compatibilité
électromagnétique, sécurité
d'équipement électrique) est assuré
chez HBM de manière
indépendante par un laboratoire
d'essais, accrédité pour la première
fois en 1991 par DATech.

Darmstadt, 2009-10-01


Andreas Hüllhorst, CEO


Dr. Wolfram Meiritz, CFO

GV051-F1, Vers. 12/09/2008

Hottinger Baldwin Messtechnik GmbH
Im Tiefen See 45 · D-64293 Darmstadt · Germany · Tel. +49 6151 803 0 · Fax +49 6151 803 9100 · Email: info@hbm.com · www.hbm.com

Zertifiziert nach ISO 9001 und ISO 14001 (DQS-000001)
Certified acc. to ISO 9001 and ISO 14001 by DQS

Akkreditiert als DKD-Kalibrierlab. (DKD-K-00101)
Accredited as calibration laboratory by DKD

Akkreditiert als EMV-Prüflab. (DAT-P-012/ DAT-P-006)
Accredited as EMC testing laboratory by DATech



Seite 2 zu

Page 2 of

Page 2 du

Document: 237 / 2009-10

Diese Erklärung bescheinigt die Übereinstimmung mit den genannten Richtlinien, beinhaltet jedoch keine Zusicherung von Eigenschaften.

Die Sicherheitshinweise der mitgelieferten Produktdokumentation sind zu beachten.

This declaration certifies conformity with the directives mentioned, but is no warranty of characteristics.

The safety instructions of the included product documentation must be complied with.

Cette déclaration certifie la conformité avec les directives citées mais n'inclut pas de garantie des caractéristiques techniques.

Les consignes de sécurité de la documentation jointe au produit doivent être suivies.

Folgende Normen werden zum Nachweis der Übereinstimmung mit den Vorschriften der Richtlinie(n) eingehalten:

The following standards are met as proof of conformity with the provisions of the Directive(s):

Pour la preuve de conformité aux dispositions de la (des) Directive(s) le produit répond aux normes:

EN 60079-0:2006	Electrical apparatus for explosive gas atmospheres - Part 0: General requirements (IEC 60079-0:2004, modified)
EN 60079-7:2007	Explosive atmospheres - Part 7: Equipment protection by increased safety "e" (IEC 60079-7:2006)
EN 60079-11:2007	Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i" (IEC 60079-11:2006)
EN 60079-15:2005	Electrical apparatus for explosive gas atmospheres - Part 15: Construction, test and marking of type of protection "n" electrical apparatus (IEC 60079-15:2005)
EN 61241-0:2006	Electrical apparatus for use in the presence of combustible dust - Part 0: General requirements (IEC 61241-0:2004+Corrigendum 1:2005, modified)
EN 61241-1:2004	Electrical apparatus for use in the presence of combustible dust - Part 1: Protection by enclosures "tD" (IEC 61241-1:2004)
EN 61241-11:2006	Electrical apparatus for use in the presence of combustible dust - Part 11: Protection by intrinsic safety "tD" (IEC 61241-11:2005 + Corrigendum 1:2006)

01/1031-F1, Vers. 12, 09/2009

Hottinger Baldwin Messtechnik GmbH

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Zertifiziert nach ISO 9001 und ISO 14001 (DQS-000001)
Certified acc. to ISO 9001 and ISO 14001 by DQSAkkreditiert als DKD-Kalibrierlab. (DKD-K-00101)
Accredited as calibration laboratory by DKDAkkreditiert als EMV-Prüflab. (DAT-P-012/ DAT-P-006)
Accredited as EMC testing laboratory by DATech

11 EC-type examination certificate

Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

PTB



(1) **EC-TYPE-EXAMINATION CERTIFICATE**
(Translation)

(2) Equipment and Protective Systems Intended for Use in
Potentially Explosive Atmospheres - **Directive 94/9/EC**

(3) EC-type-examination Certificate Number:

PTB 05 ATEX 2014

(4) Equipment: Terminal box, type VKK2R-8 Ex

(5) Manufacturer: Hottinger Baldwin Messtechnik

(6) Address: Im Tiefen See 45
64293 Darmstadt, Germany

(7) This equipment and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.

(8) The Physikalisch-Technische Bundesanstalt, notified body No. 0102 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive.

The examination and test results are recorded in the confidential report PTB Ex 05-24403 .

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 50014:1997 + A1 + A2 EN 50020:2002 EN 50021:1999 EN 50281-1-1:1998

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.


(11) This EC-type-examination Certificate relates only to the design, examination and tests of the specified equipment in accordance to the Directive 94/9/EC. Further requirements of the Directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.

(12) The marking of the equipment shall include the following:

 **II 2 G EEx ia IIC T4 or II 3 G EEx nA IIC T4**
II 2 D IP65 T 80 °C or II 3 D IP65 T 80 °C

Zertifizierungsstelle Explosionschutz

By order:


Dr.-Ing. U. Gerlach
Regierungsrat



Braunschweig, February 21, 2005

sheet 1/3

EC-type-examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt. In case of dispute, the German text shall prevail.

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Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin



SCHEDULE

(14) **EC-TYPE-EXAMINATION CERTIFICATE PTB 05 ATEX 2014**

(15) Description of equipment

The terminal box, type VKK2R-8 Ex is a passive electrical apparatus which is intended for connection of up to 8 load cells with a bridge-resistance of $\geq 350 \Omega$. A resistor network makes it possible to adjust the load cell's individual parameter (sensitivity). The terminal box is suitable for application in hazardous areas due to gas/air- or dust/air-mixtures where equipment of category 2 or 3 is required. It is operated either with an intrinsically safe circuit or with non-intrinsically safe supply.

The maximum permissible ambient temperature is + 70 °C.

Electrical data

Marking: II 2 G EEx ia IIC T4

Input/output and
measuring circuits
(internal terminal clamps)

type of protection Intrinsic Safety EEx ia IIC

$U_i = 22 \text{ V}$

$I_i = 469 \text{ mA}$

$P_i = 1835 \text{ mW}$

L_i negligibly low

C_i negligibly low

Marking: II 3 G EEx nA IIC T4 or II 2 D 3 D IP65 T 80 °C

Supply voltage

$U_{\max} = 12 \text{ V}$

All circuits are operationally grounded.

(16) Test report PTB Ex 05-24403

(17) Special conditions for safe use

none

Notes for manufacture and operation

1. The terminal box shall be included in the local equipotential bonding system.
2. Either only intrinsically safe or only non-intrinsically safe circuits shall be connected. A combination is not permitted.
3. When the terminal box is operated with non-intrinsically safe circuits, the subsequent use for type of protection Intrinsic Safety is not permitted.

sheet 2/3

EC-type-examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt. In case of dispute, the German text shall prevail.

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Physikalisch-Technische Bundesanstalt



Braunschweig und Berlin


SCHEDULE TO EC-TYPE-EXAMINATION CERTIFICATE PTB 05 ATEX 2014

(18) Essential health and safety requirements

met by compliance with the standards mentioned above

Zertifizierungsstelle Explosionschutz
By order:

Braunschweig, February 21, 2005


Dr.-Ing. U. Genack
Regierungsrat



sheet 3/3

EC-type-examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt. In case of dispute, the German text shall prevail.

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Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin



1. SUPPLEMENT

according to Directive 94/9/EC Annex III.6

to EC-TYPE-EXAMINATION CERTIFICATE PTB 05 ATEX 2014

(Translation)

Equipment: Terminal box, type VKK2R-8 Ex

Marking: Ex II 2 G EEx ia IIC T4 or Ex II 3 G EEx nA IIC T4
 Ex II 2 D IP65 T 80 °C or Ex II 3 D IP65 T 80 °C

Manufacturer: Hottinger Baldwin Messtechnik

Address: Im Tiefen See 45
64293 Darmstadt, Germany

Description of supplements and modifications

In the future the terminal box may also be manufactured and operated in accordance with type of protection Increased Safety "e".

The marking for this application is: Ex II 2 G EEx e II T4

The maximum permissible ambient temperature is + 70 °C.

The electrical data change as follows:

Electrical data

Marking: II 2 G EEx e II T4

Input/output and
measuring circuits

(63 internal terminal clamps)

type of protection Increased Safety EEx e II

$U_{\max} = 12 \text{ V}$

$I_{\max} = 350 \text{ mA}$

$P_{\max} = 4 \text{ W}$

cross section: up to 2,5 mm² resp. 1,5 mm²

All further specifications and notes of the EC-type examination certificate apply without changes.

Sheet 1/2

EC-type-examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt. In case of dispute, the German text shall prevail.

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Physikalisch-Technische Bundesanstalt



Braunschweig und Berlin

1. SUPPLEMENT TO EC-TYPE-EXAMINATION CERTIFICATE PTB 05 ATEX 2014

Applied standards

EN 50014:1997 + A1 + A2 EN 50281-1-1:1998	EN 50019:2000	EN 50020:2002	EN 50021:1999
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Test report: PTB Ex 05-25222

Zertifizierungsstelle Explosionsschutz
By order:

Braunschweig, September 16, 2005

Dr.-Ing. U. Johannsmeyer
Direktor und Professor



Sheet 2/2

EC-type-examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt. In case of dispute, the German text shall prevail.

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Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin



2. SUPPLEMENT

according to Directive 94/9/EC Annex III.6

to EC-TYPE-EXAMINATION CERTIFICATE PTB 05 ATEX 2014

(Translation)

Equipment: Terminal box, type VKK2R-8 Ex

Marking: Ex II 2 G EEx ia IIC T4 or Ex II 3 G EEx nA IIC T4 or
 Ex II 2 G EEx e II T4 or
 Ex II 2 D IP65 T 80 °C or Ex II 3 D IP65 T 80 °C

Manufacturer: Hottinger Baldwin Messtechnik

Address: Im Tiefen See 45
64293 Darmstadt, Germany

Description of supplements and modifications

In the future the terminal box, type VKK2R-8 Ex may also be manufactured according to the test documents listed in the test report. The modifications concern the introduction of the type of protection Intrinsic Safety "iD" for the application in hazardous areas due to combustible dusts as well as the adaption to the current state of the standard series EN 60079-et seq. and, therefore, the marking of the equipment.

This reads in future:

Marking: Ex II 2 G Ex ia IIC T4 or Ex II 2 G Ex e II T4 or
 Ex II 3 G Ex nA IIC T4 or
 Ex II 2 D Ex iaD 21 T 80 °C or Ex II 2 D Ex tD A21 IP65 T 80 °C
 Ex II 3 D Ex tD A22 IP65 T 80 °C

The electrical data and all other specifications and notes given in the EC-type examination certificate and the 1st supplement apply without changes also to this 2nd supplement.

ZSEx10101e.dot

Sheet 1/2

EC-type-examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt. In case of dispute, the German text shall prevail.

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Physikalisch-Technische Bundesanstalt



Braunschweig und Berlin

2. SUPPLEMENT TO EC-TYPE-EXAMINATION CERTIFICATE PTB 05 ATEX 2014

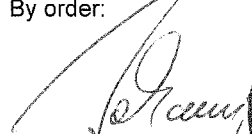
Applied standards

EN 60079-0:2006 EN 60079-7:2007 EN 60079-11:2007 EN 60079-15:2005
EN 61241-0:2006 EN 61241-1:2004 EN 61241-11:2006

Assessment and test report: PTB Ex 09-29121

Zertifizierungssektor Explosionsschutz
By order:

Braunschweig, September 23, 2009


Dr.-Ing. U. Johannsmeyer
Direktor und Professor



Sheet 2/2

EC-type-examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt. In case of dispute, the German text shall prevail.

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Alle Angaben beschreiben unsere Produkte in allgemeiner Form. Sie stellen keine Beschaffenheits- oder Haltbarkeitsgarantie im Sinne des §443 BGB dar und begründen keine Haftung.

7-2002.1552

Hottinger Baldwin Messtechnik GmbH

Postfach 10 01 51, D-64201 Darmstadt
Im Tiefen See 45, D-64293 Darmstadt
Tel.: +49 6151 803-0; Fax: +49 6151 8039100
Email: support@hbm.com Internet: www.hbm.com



measurement with confidence

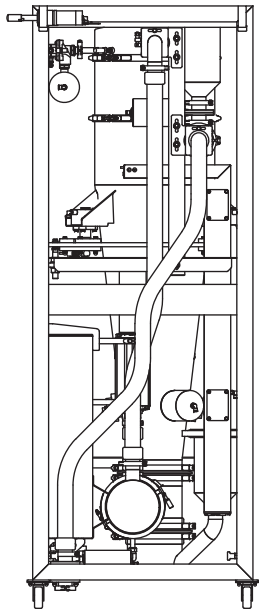
A1552 4.1 en/de

Chapter 8:

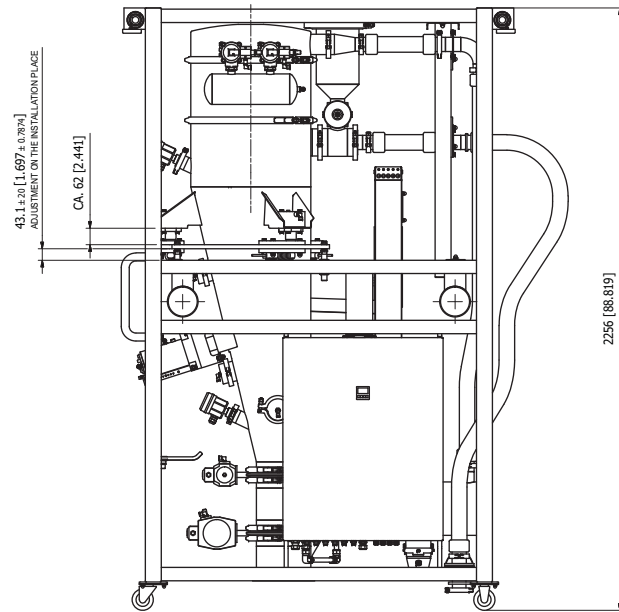
Mechanical Drawings

- 1315690000 Cart with Conveyor
- 1214530001 Rail complete
- 1214530004 Receiver
- 1104657003 Filter D160x200
- 1104657004 Filter with Jet Nozzle
- 1214530003 Cart Conveyor
- 1104657008 Holder Tube
- 1214530002 Pneumatic Connection
- 1315690500 Pickup Transfer System
- 1315690300 Labeling Pickup Transfer System
- 1315690501 Take Off Pot
- 1315690800 P+ID Scheme
- 1315690801 Pneumatic Scheme

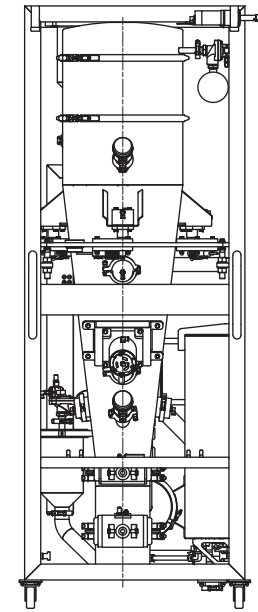
RIGHT SIDE VIEW



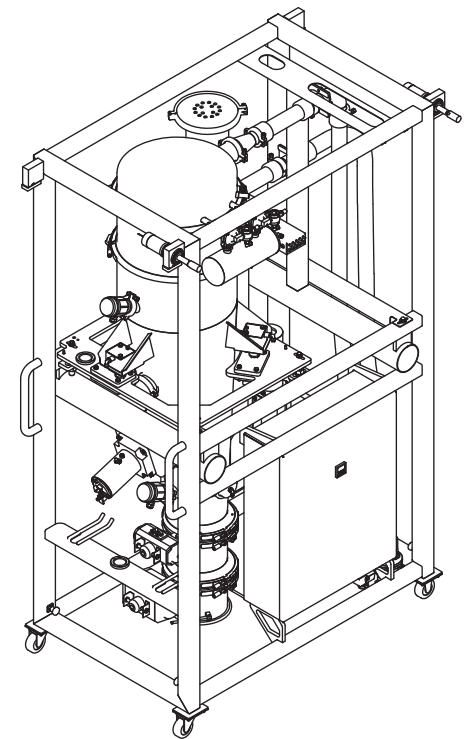
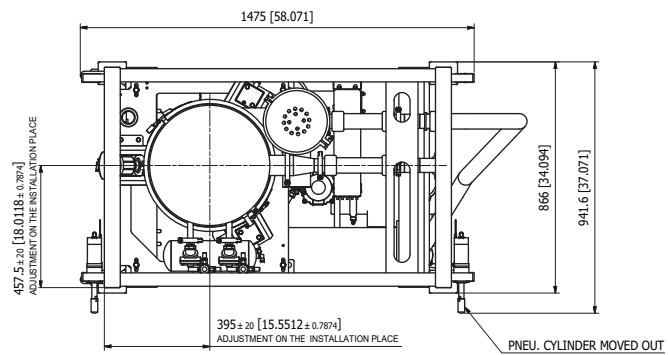
FRONT VIEW



LEFT SIDE VIEW

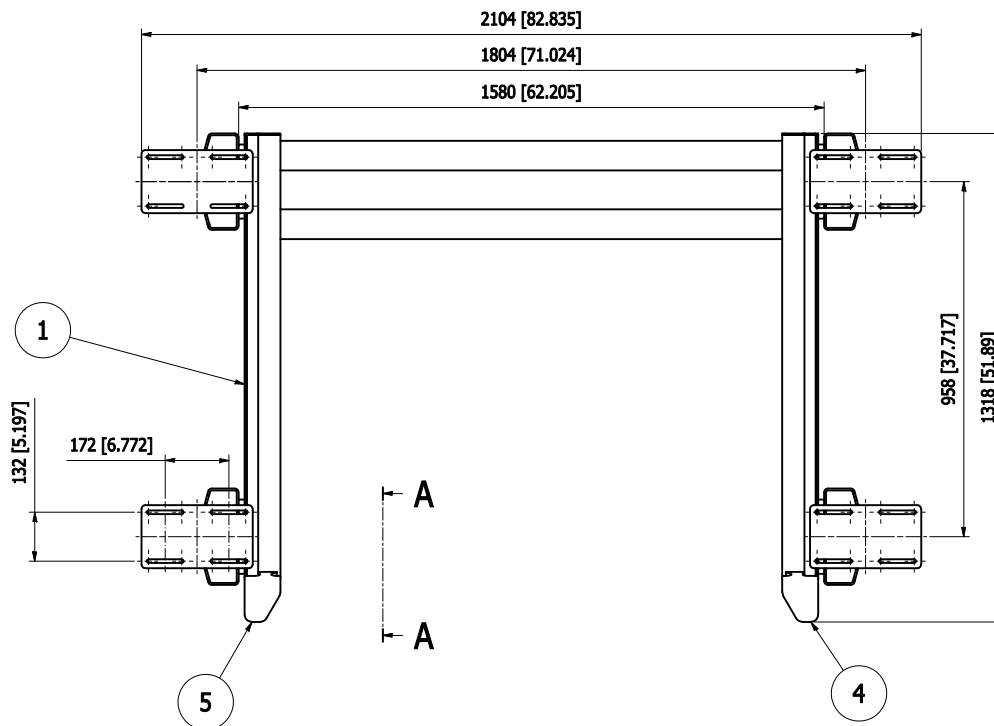
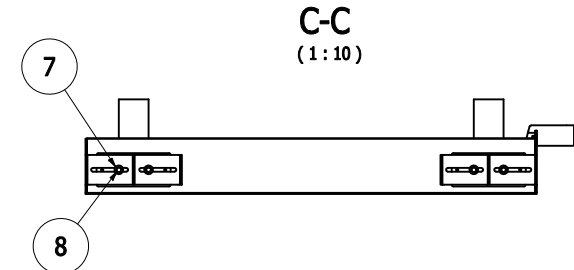
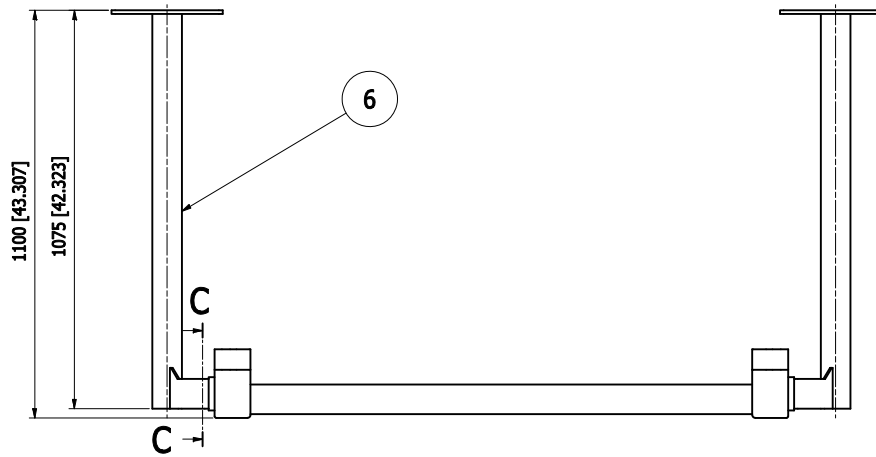


TOP VIEW

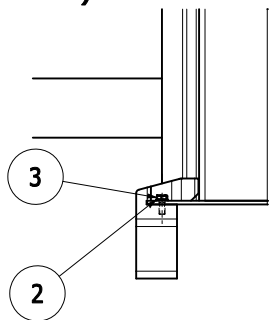


SG.TBP.202.M.5235/C002
 CART / ROLLWAGEN WITH CONVEYOR
 PTS buffer to Melt Extruder
 (GMP - WITH TRI CLAMP)

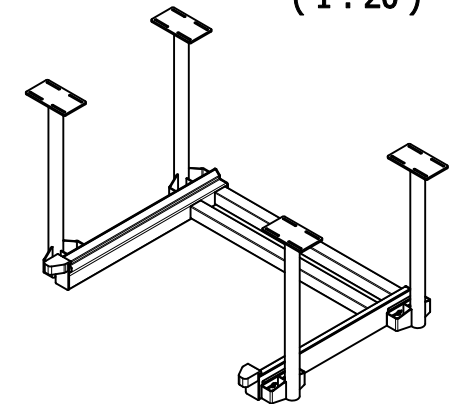
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A-A (1:5)



(1:20)

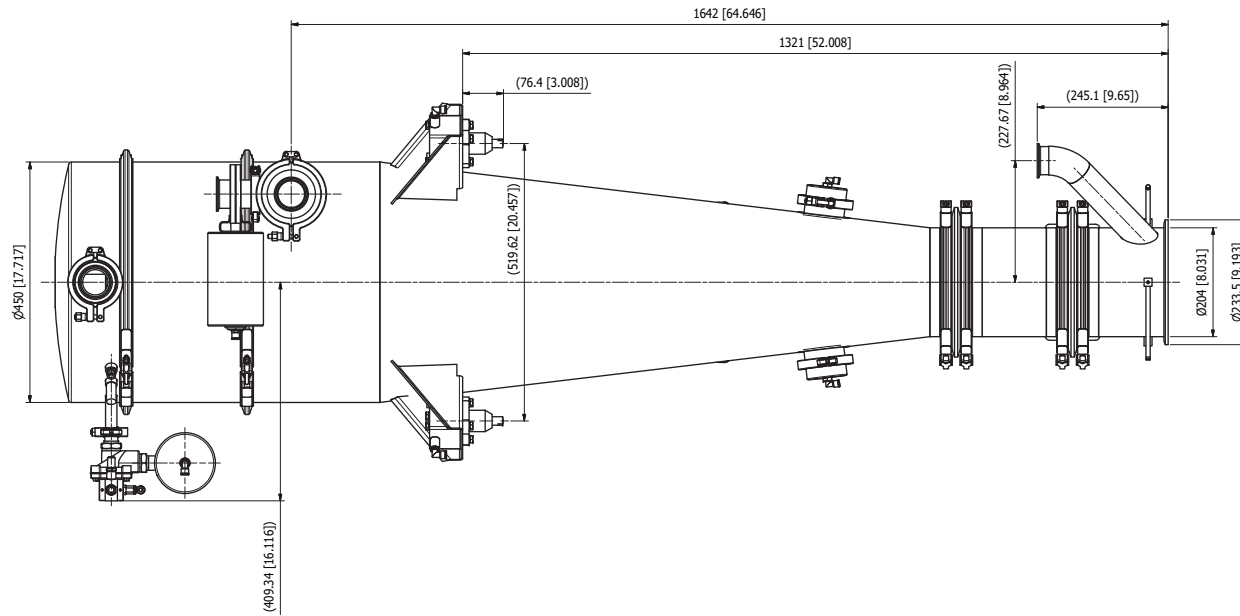
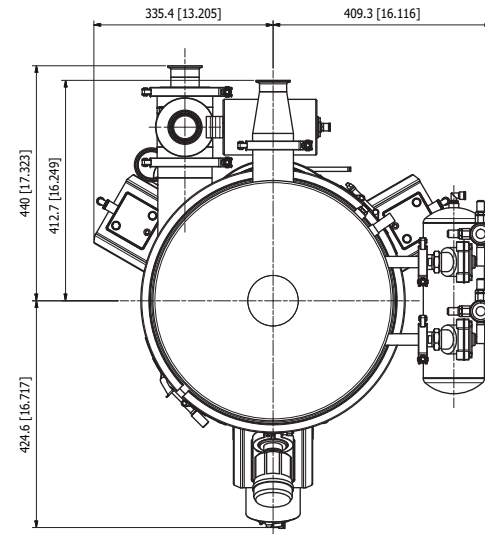
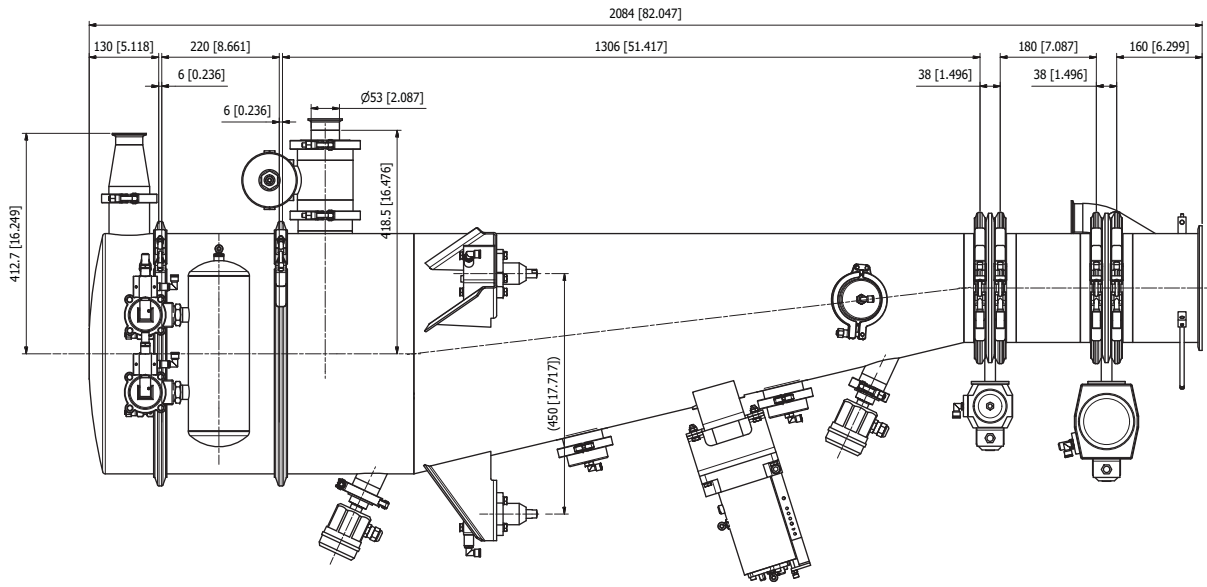


MASS OF THE COMPLETE RAIL 120 kg +/- 10%

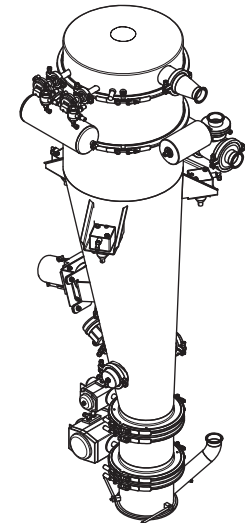
MASSE DER KOMPLETTEN SCHIENE 120 kg +/- 10%

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7	8	0000991225	WASHER / SCHEIBE - FLAT OVS M8 8.4/24x2 ISO7093	A2 AISI 304
6	4	000030745	SUPPORT / STUETZE - SST304 PCKLD	
5	1	000030687	PLATE / PLATTE - INSERT 97X100X40 POM	POM
4	1	000030689	PLATE / PLATTE - INSERT 97X100X40 POM	POM
3	4	0000990386	SCREW / SCHRAUBE - HEX M8x20 ISO4017	A2 AISI 304
2	4	0000991167	WASHER / SCHEIBE - FLAT M8 8.4/16x1.6 ISO7089	A2 AISI 304
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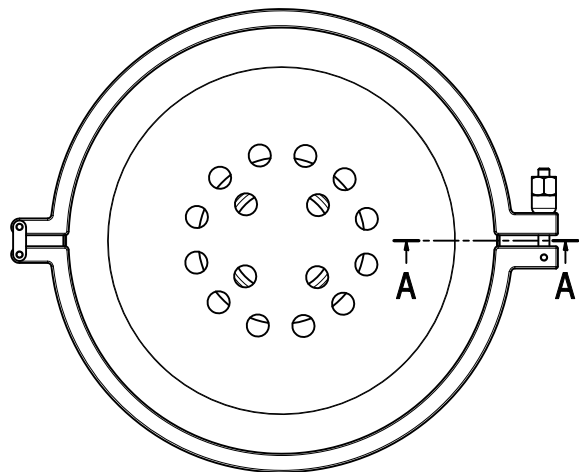
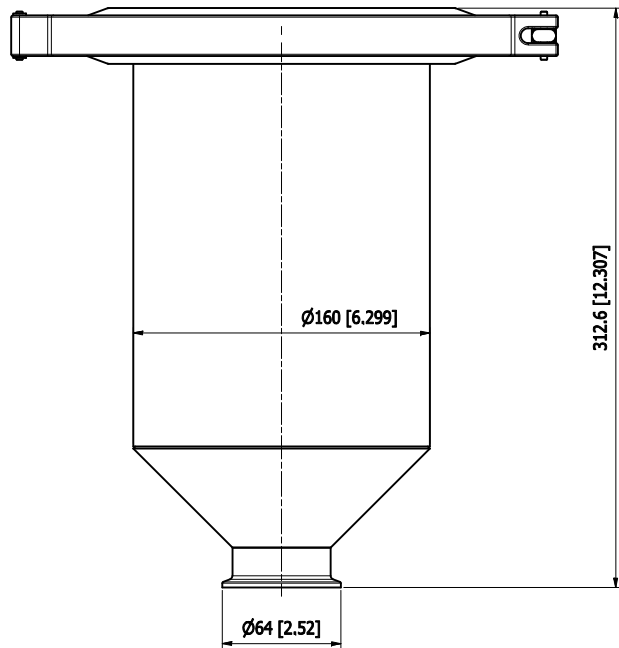
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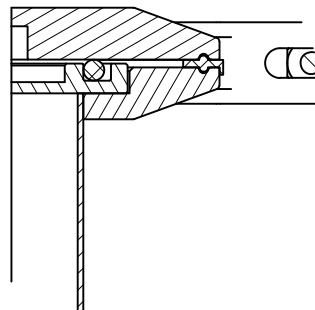
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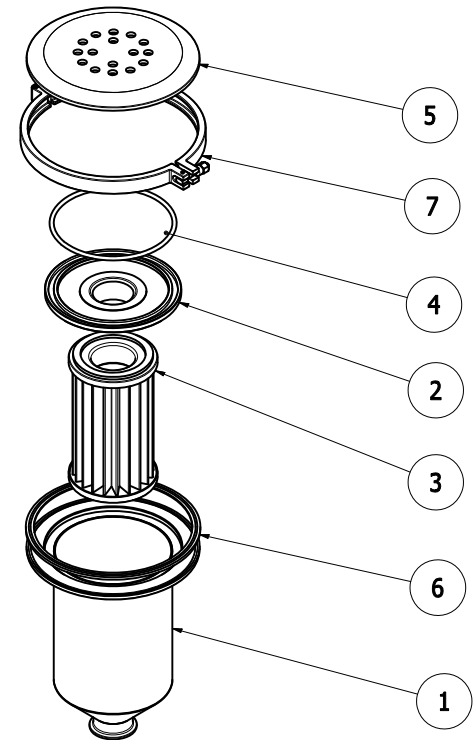
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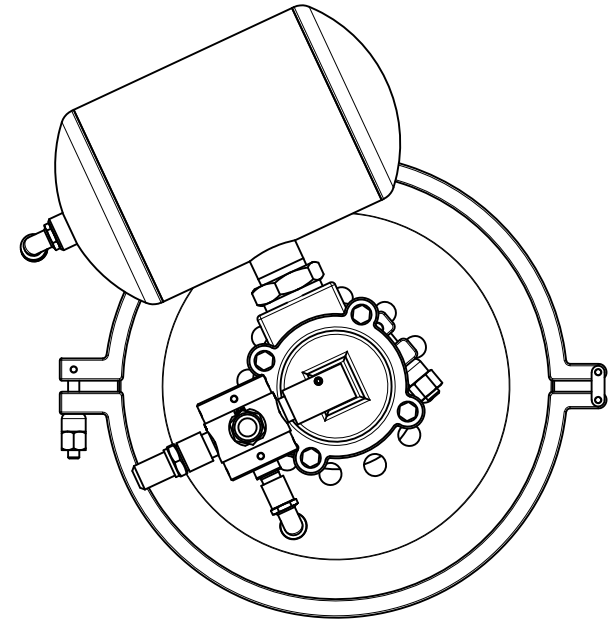
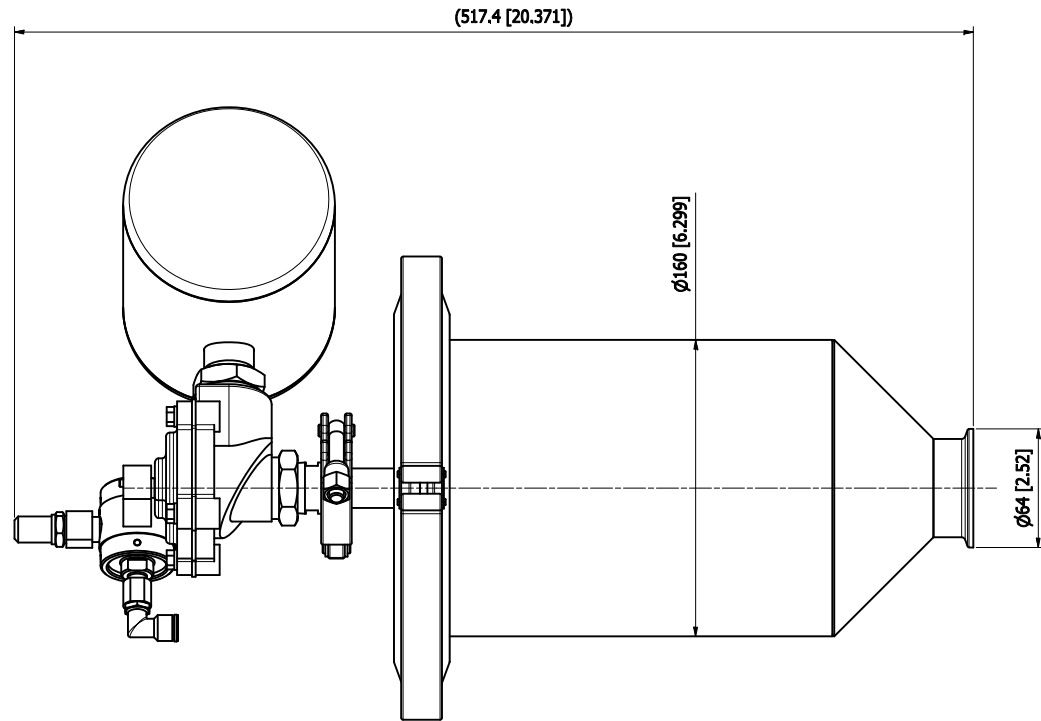
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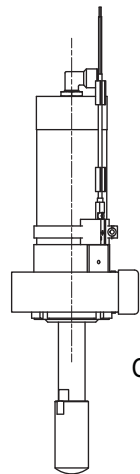
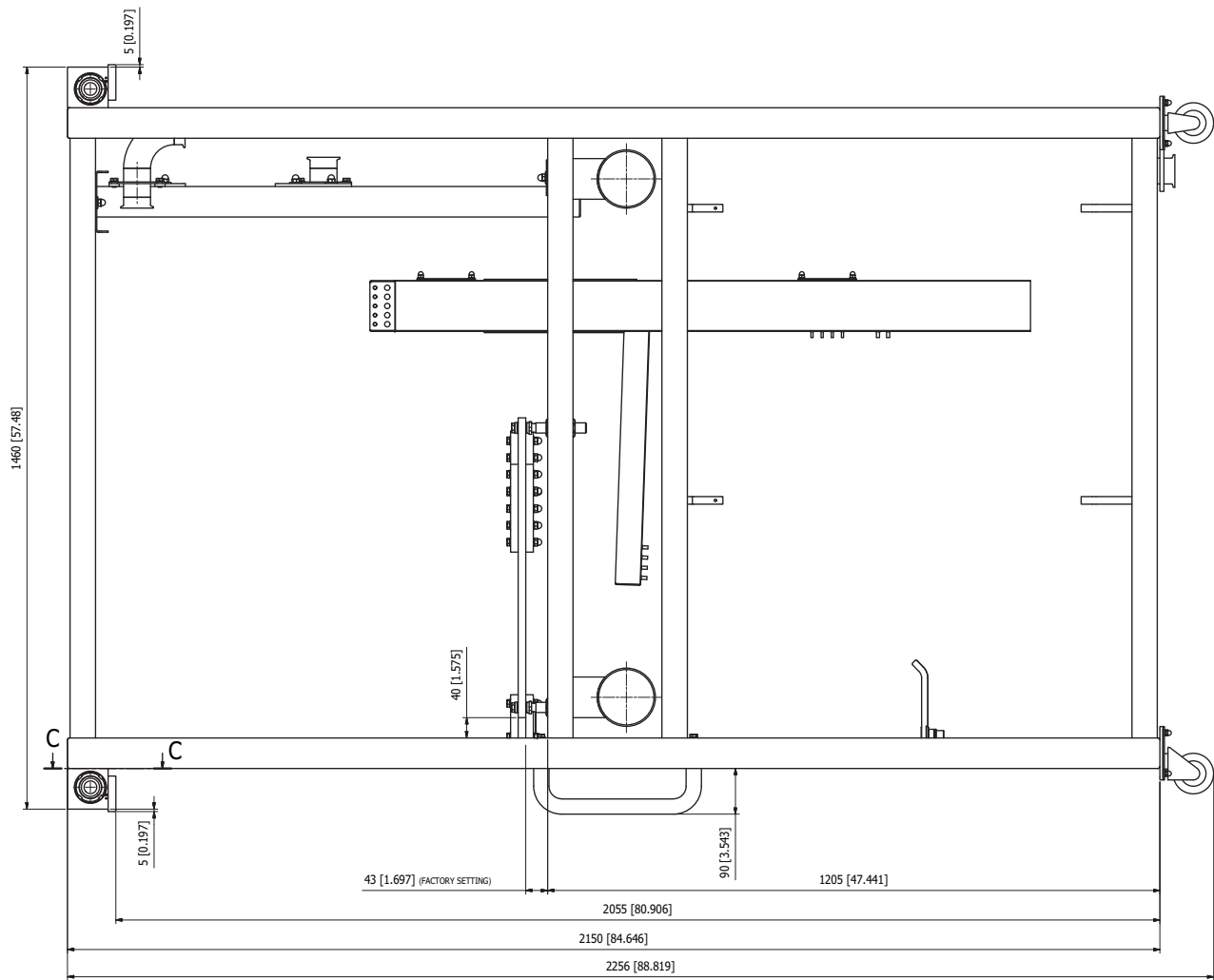
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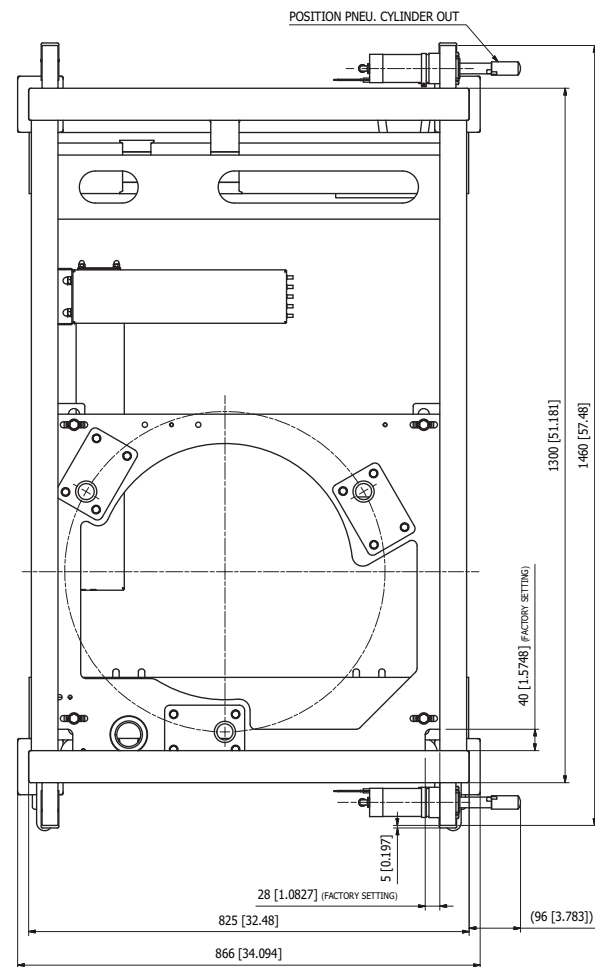
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4	1	0000030581	O-RING - 160X5,7 60SH MVQ RED FDA	MVQ	
3	1	0000011741	FILTER CART POLY/PVDF 200MM	A4	
2	1	0000030623	PLATE / PLATTE - DUST FILTER D184X8 SST316L PL2		
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				FORMAT A2	NUMBER 1104657003
					REV C



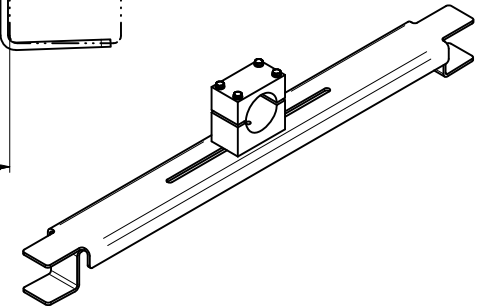
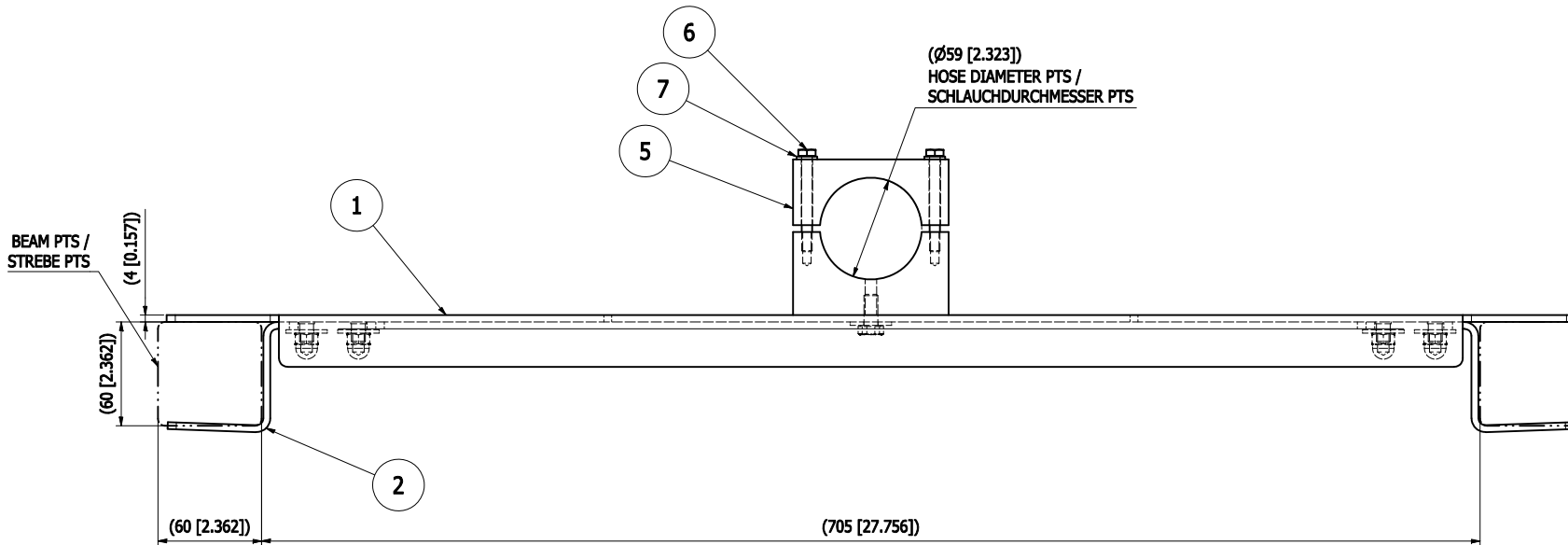
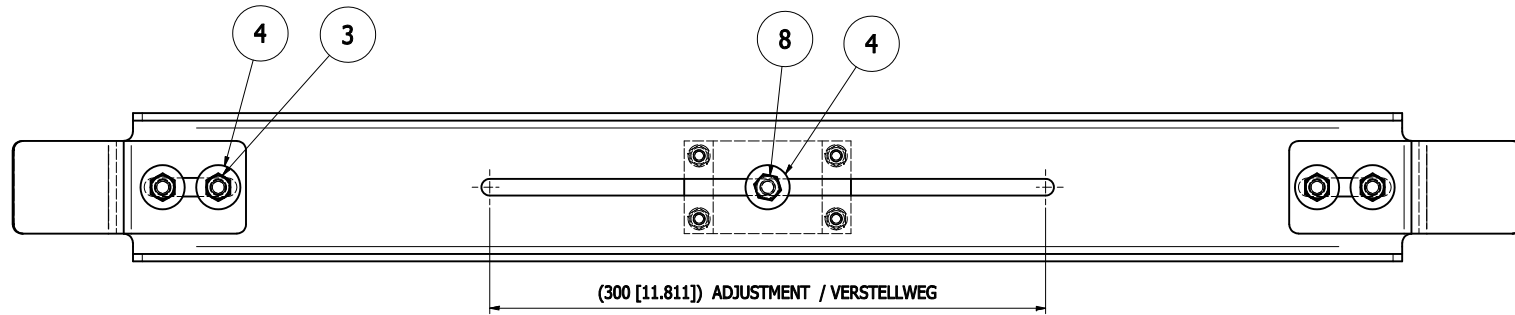
PTS H71 FILTER - BREATH, W/ JET NOZZLE D160X200	SCALE 1:2	DRAWN: DD.MM.YYYY SIGN 05.04.2011 TBMG
	FIRST ANGLE	APPROVED: DD.MM.YYYY SIGN 05.02.2013 ARY
	PAGE 2 OF 1	CATEGORY: P-Level
	FORMAT A2	NUMBER 1104657004
		REV C



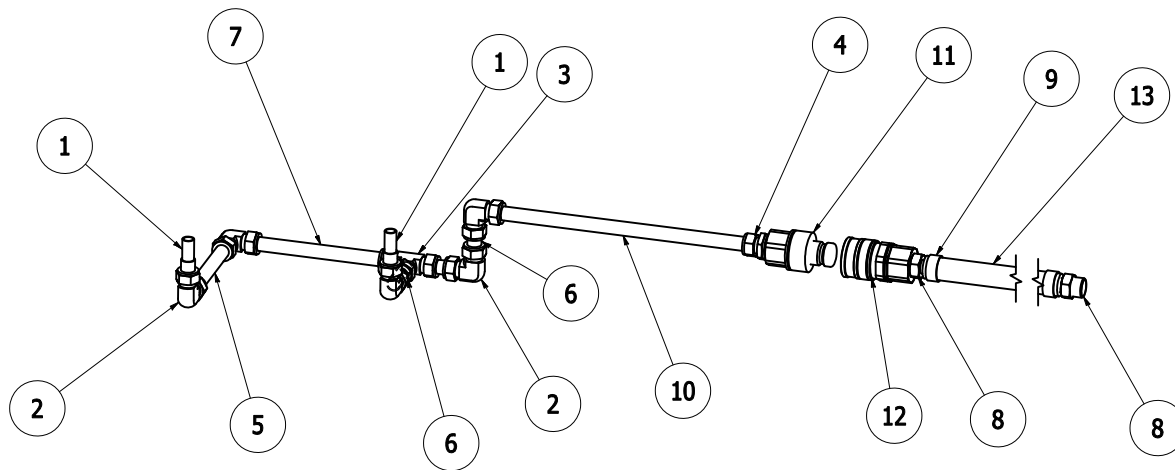
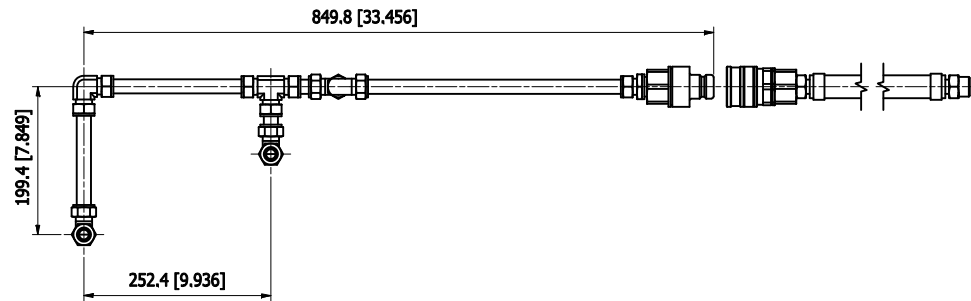
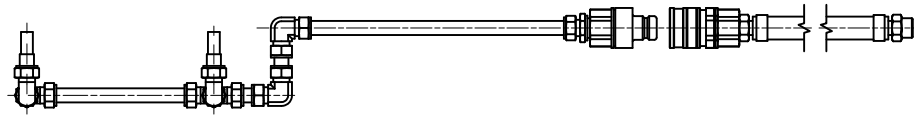
C-C (1:2)



- CART / ROLLWAGEN CONVEYOR (GMP - WITH TRI CLAMP)		SCALE 1:5 FIRST ANGLE DRAWING APPROVED DATE 1 OF 2	DRAWN 25.11.2013 APPROVED 03.12.2013 CATEGORY Level	SIGN SIGN PNE	DIMENSION SHOWN IN MILLIMETERS [INCH] ALL RIGHTS RESERVED © 2013 WWW.COPERIONKTRON.COM	FORMAT A1	NUMBER 1214530003	REV A
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8	1	0000990385	SCREW / SCHRAUBE - HEX M8x18 ISO4017	A2 AISI 304
7	4	0000991166	WASHER / SCHEIBE - FLAT M6 6.4/12x1.6 ISO7089	A2 AISI 304
6	4	0000990613	SCREW / SCHRAUBE - HEX M6x55/18 ISO4014	A2 AISI 304
5	1	0000031531	HOLDER / HALTER - POM	
4	5	0000991225	WASHER / SCHEIBE - FLAT OVS M8 8.4/24x2 ISO7093	A2 AISI 304
3	4	0000991118	NUT / MUTTER - HEX DOME M8 DIN1587	A2 AISI 304
2	2	0000031530	HOLDER / HALTER - SST304	X5 CN118-10 AISI 304
1	1	0000031529	HOLDER / HALTER - SST304	
SEQ QTY NUMBER			DESCRIPTION / SUPPLIER	MATERIAL
PTS HOLDER TUBE / HALTER SCHLAUCH				SCALE 1:2 DRAWN 15.07.2011 TRMGZ FIRST ANGLE APPROVED 07.04.2014 MKE PAGE 1 OF 1 CATEGORY P-Level
			DIMENSION SHOWN IN MILLIMETERS [INCH] ALL RIGHTS RESERVED © 2014 WWW.COPERIONKTRON.COM	FORMAT A2 NUMBER 1104657008 REV D



13	15	0000032086	HOSE / SCHLAUCH - FLEX ID19 OD31 WHITE FDA	NBR
12	1	0000032081	COUPLING / KUPPLUNG - COUPLING G3/4 SST316L	X2 CNIMo17-12-2 AISI 316L
11	1	0000037358	FITTING - NIP BARB BSPP(F) 3/4" SST316L	X2 CNIMo17-12-2 AISI 316L
10	1	0000032085	TUBE / ROHR - RND 3/4"x390 16SWG SST316L	X2 CNIMo17-12-2 AISI 316L
9	2	6110-00145	BRIDE D25-32 A2	A2
8	2	0000018686	3/4" BSP HOSE NIPPLE SS	Default
7	1	0000032084	TUBE / ROHR - RND 3/4"x200 16SWG SST316L	X2 CNIMo17-12-2 AISI 316L
6	3	0000032083	TUBE / ROHR - RND 3/4"x60 16SWG SST316L	X2 CNIMo17-12-2 AISI 316L
5	1	0000032082	TUBE / ROHR - RND 3/4"x169 16SWG SST316L	X2 CNIMo17-12-2 AISI 316L
4	1	0000032076	FITTING - MALE CONNECTOR 3/4" TUBE 3/4" BSPP(M)	X5 CNIMo17-12-2 AISI 316
3	1	0000032075	FITTING - TEE TUBE 3/4" SST316	X5 CNIMo17-12-2 AISI 316
2	5	0000032074	FITTING - ELB90 TUBE 3/4" SST316	X5 CNIMo17-12-2 AISI 316
1	2	0000037230	ADAPTER - TUBE D16 TO 3/4" SST316L	X2 CNIMo17-12-2 AISI 316L
SEQ	QTY	NUMBER	DESCRIPTION / SUPPLIER	MATERIAL

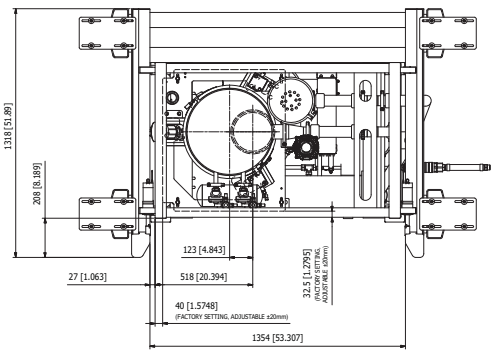
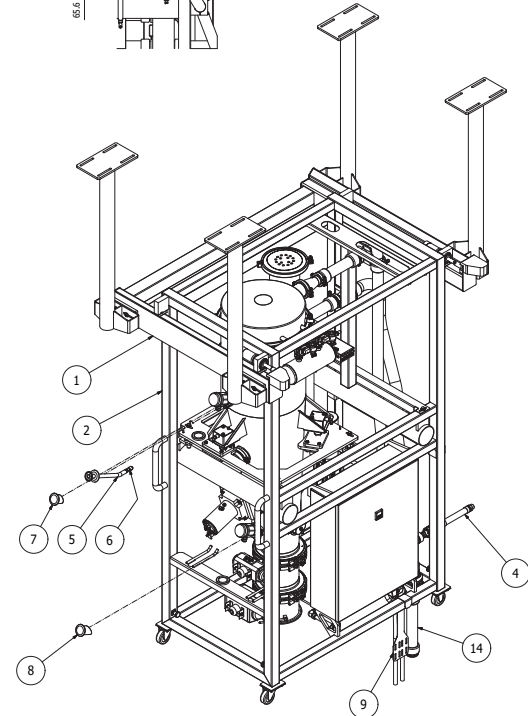
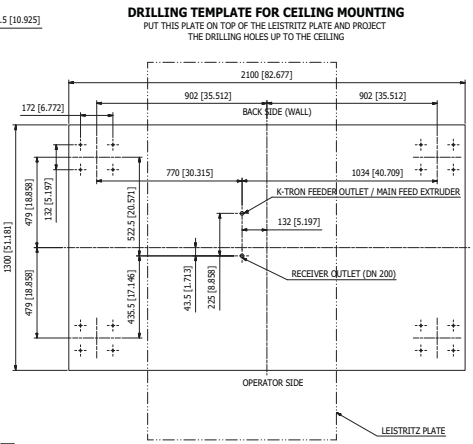
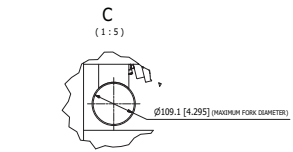
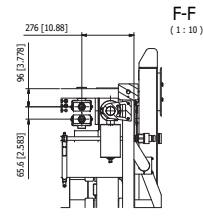
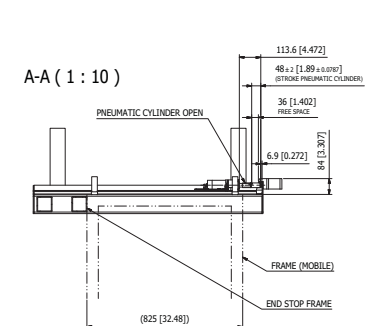
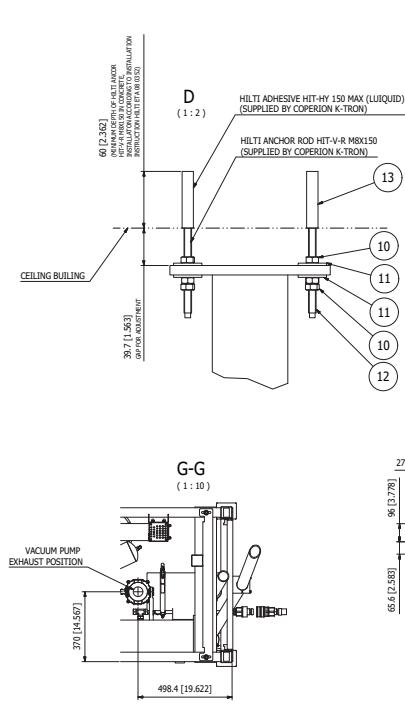
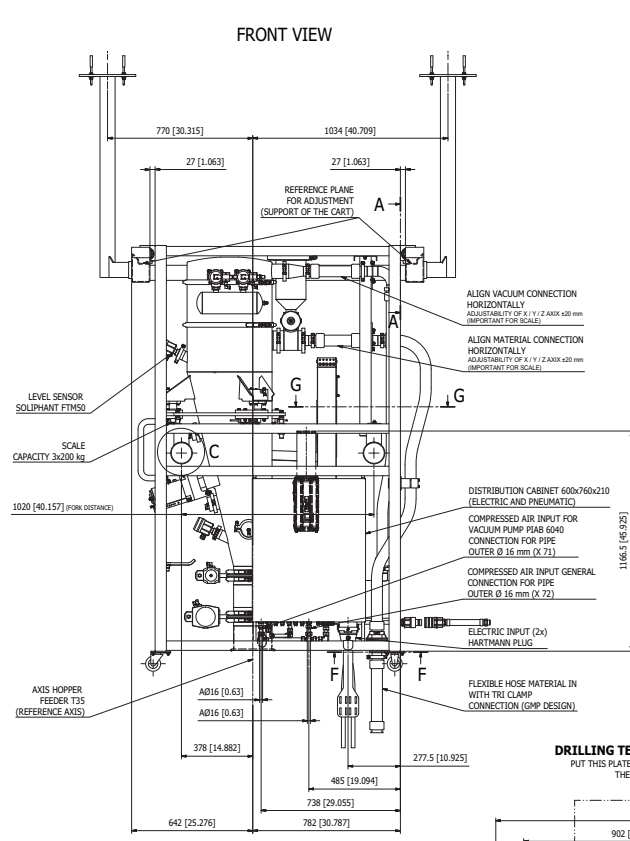
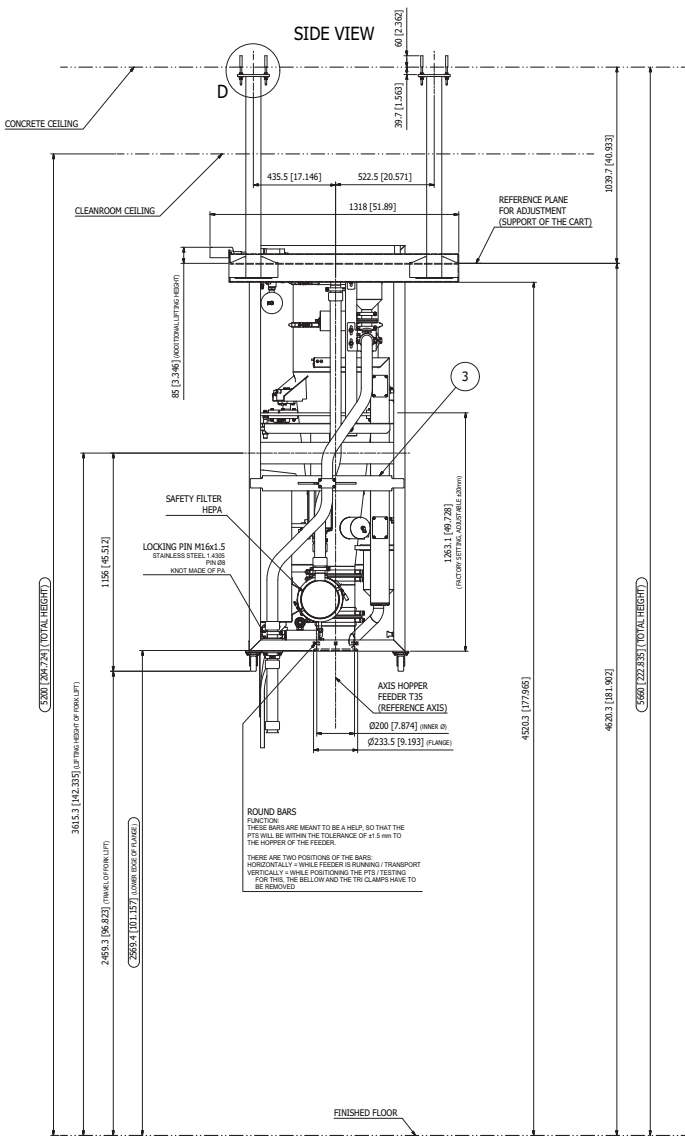
PNEUMATIC CONNECTION / LUFTANSCHLUSS

SCALE 1:2 DRAWN: DD.MM.YYYY SIGN 22.01.2013 TBMG

FIRST ANGLE APPROVED: DD.MM.YYYY SIGN 31.01.2013 ARY

PAGE 1 OF 1 CATEGORY: P-Level

		FORMAT A2	NUMBER 1214530002	REV A
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MASS OF THE PTS WITH FRAME 420 kg ±10%
MASS OF THE RAIL 130 kg ±10%

RAIL PTS
STAINLESS STEEL 304
SURFACE FINISH OUTSIDE Rm 8
PLASTIC FINISH INSIDE FROM FRAME FOR DETAILED INFORMATION SEE DRAWING NUMBER 1244530001

FRAME PITS
STAINLESS STEEL 304
SURFACE FINISH OUTSIDE Rm 8
CLOSED CONSTRUCTION (SPRASH-PROOF) FOR DETAILED INFORMATION SEE DRAWING NUMBER 1244530003

RECEIVER P100
PRODUCT CONTACT PARTS STAINLESS STEEL 316L
SURFACE FINISH Rm 4
PRODUCT CONTACT SIDE
FOR DETAILED INFORMATION SEE DRAWING NUMBER 1244530004

SOLENOID ENCLOSURE
STAINLESS STEEL 304
SURFACE FINISH OUTSIDE Rm 8
FOR DETAILED INFORMATION SEE DRAWING NUMBER 10460700

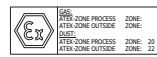
FRAMED DIMENSIONS ARE GIVEN FROM NOVARTIS

THE SOLENOID ENCLOSURE IS LOCATED OUTSIDE THE ATEX ZONE

INSTALLATION OF HILTI ANCHOR ROD HIT-V-R M8x150 ACCORDING TO INSTALLATION INSTRUCTION (ETA 08 0352) WITH HILTI ADHESIVE HIT-HY 150 MAX

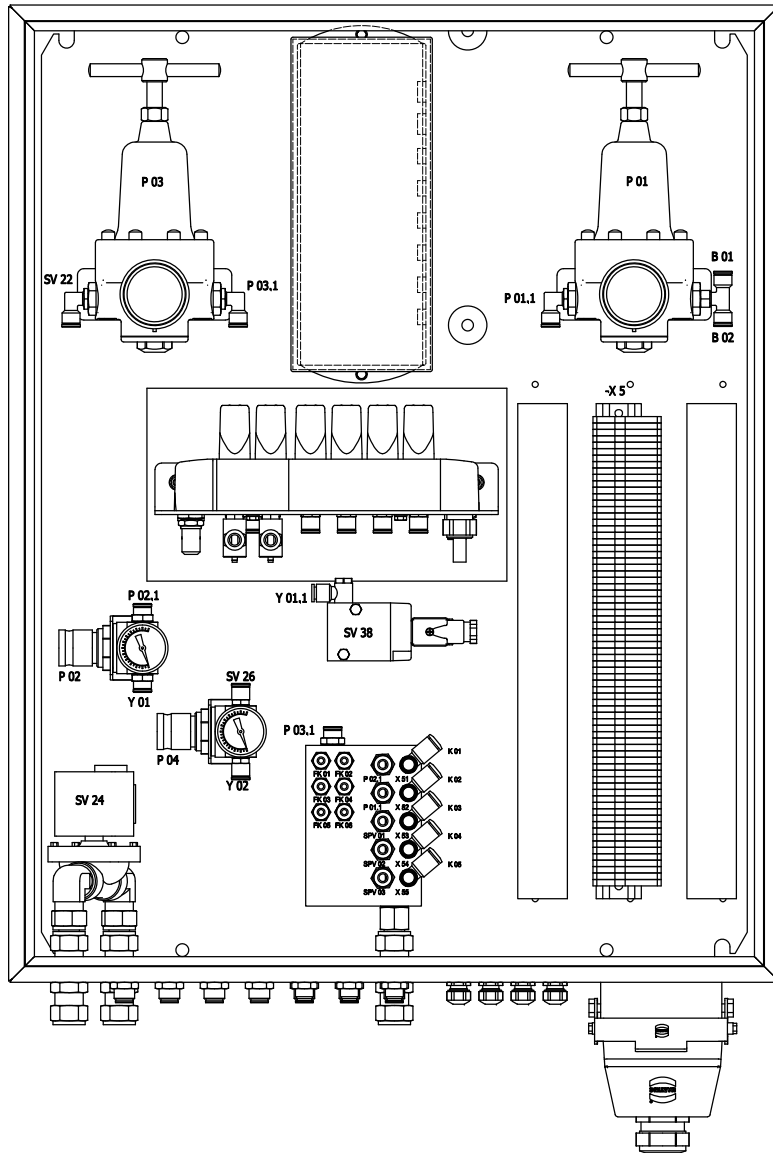
K-TRON PROJECT NO.:	1315690	DATE OF ISSUE:	28.02.2014
K-TRON PROJECT NR.:	AUSGABESTADIUM:	DATE OF ISSUE:	28.02.2014
NOTE / ANMERKUNG:	IN ORDER TO PREVENT A DELIVERY DELAY, PLEASE RETURN THE APPROVED DRAWING, ASSISTING OUR OFFICE LATEST.		
DATE OF THE LAST MODIFICATION:	KANN BETRIEB VON EINER ANDEREN PERSON VERFÜHRT WERDEN (EINGEWALTEN DER GEMEINSAMEN VERANTWORTUNG DER VERANTWORTLICHEN PERSONEN).		
APPROVED:	DATE:	DRAWN:	
DESIGNED:	DATE:	SIGNATURE:	
		UNTERSCHRIFT:	

1	1	000004021	HOSE / SCHLAUCH - 500 0050 LPT30 PUR TRANSP FE6	
1	1	000003789	HILTI ADHESIVE / ANCHOR - HIT-HY 150 MAX	
1	1	000003790	HILTI ANCHOR ROD - ANCHOR - HIT-V-R M8x150	KS COMPA13-2-2 / ASES 316
1	1	000009126	WASHER - FÖRBERE FLAT OVS M16 SE 5,0/2x2,5 R02090	A2 / ASES 304
1	1	000009109	WELT FILTER - 100 MESH 50/50	A2 / ASES 304
1	1	000003194	STRAIN RELIEF / KABELZUGENTLASTUNG - SST304	KS COMPA13-2-2 / ASES 304
1	1	000002780	PLUG / STOPFEN - CONN LAD / DROSS FER	POH
1	1	000002709	PLUG / STOPFEN - CONN LAD / DROSS FER	POH
1	1	000002987	NOZZLE / DÜSE SPIN ROT 430°	KS COMPA13-2-2 / ASES 316L
1	1	000002988	UNION / LANGE SPIN WEGE 130°	KS COMPA13-2-2 / ASES 316L
4	1	021453002	PNEUMATIC CONNECTION / LUFTANSCHLUSS	
2	1	110467008	HOLDER TUBE / FÄHRTLEHRSCHLAUCH	
2	1	131569009	CAST / SCHÜLLEREN MIT CONN FER	
1	1	021453003	RAIL / SCHENE - COMPLETE	
1	1	021453004	DISCREETLY / SUPPLIERS	

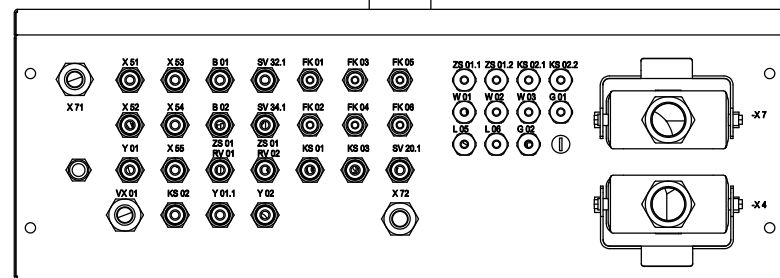


ATEX-ZONE PROZESS:	ZONE:	20
ATEX-ZONE AUSSEN:	ZONE:	21
ATEX-ZONE PROZESS:	ZONE:	20
ATEX-ZONE AUSSEN:	ZONE:	21

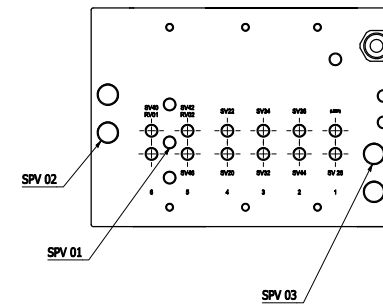
ENCLOSURE WITHOUT DOOR, DRAWING #1104657006 (1 : 2)



ENCLOSURE, DRAWING #1104657006 (1 : 2)



PNEUMATIC VALVES, DRAWING #0000026936

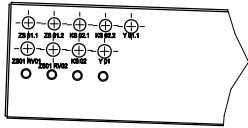


SG.TBP.202.M.5235/C002

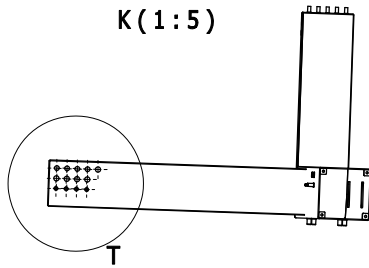
PTS buffer to Melt Extruder

LABELING PICKUP TRANSFER SYSTEM (GMP - WITH TRL CLAMP)	SCALE	1:2	DATE	27.05.2014	DESIGNER	SSB	
	FIGURE	1	APPROVED	27.05.2014	DESIGNER	SSB	
	FORM	1 OF 4	EXTENDED	PLANT			
DIMENSION SHOWN IN MILLIMETERS (INCH)		FORMAT	A1	NUMBER	1315690300	REV	A
Coperton K-TRON		ALL RIGHTS RESERVED © 2014 WWW.COPERTONKTRON.COM					

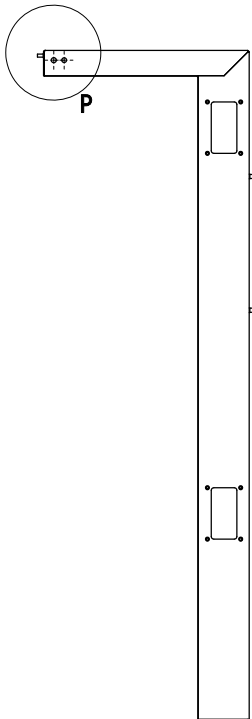
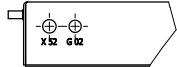
T(1:2)



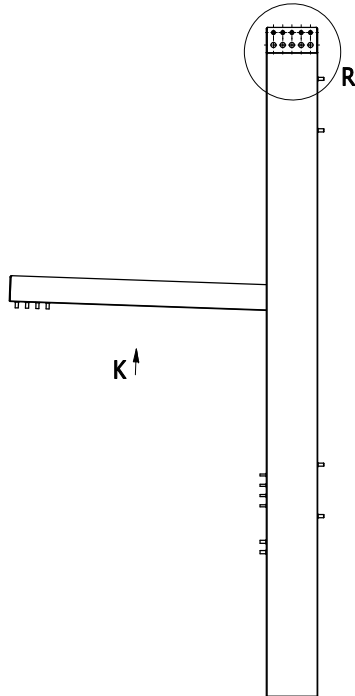
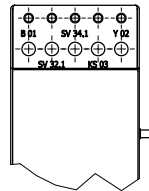
K(1:5)



P(1:2)

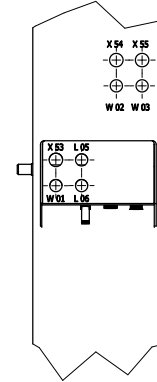


R(1:2)

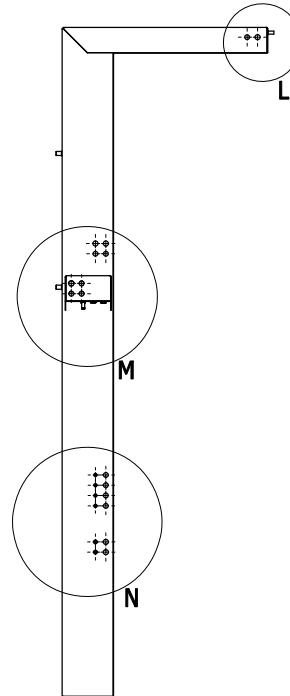
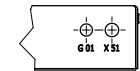


CHANNEL CABLE, DRAWING #000030783 (1:5)

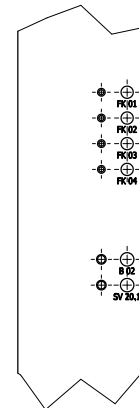
M(1:2)



L(1:2)



N(1:2)

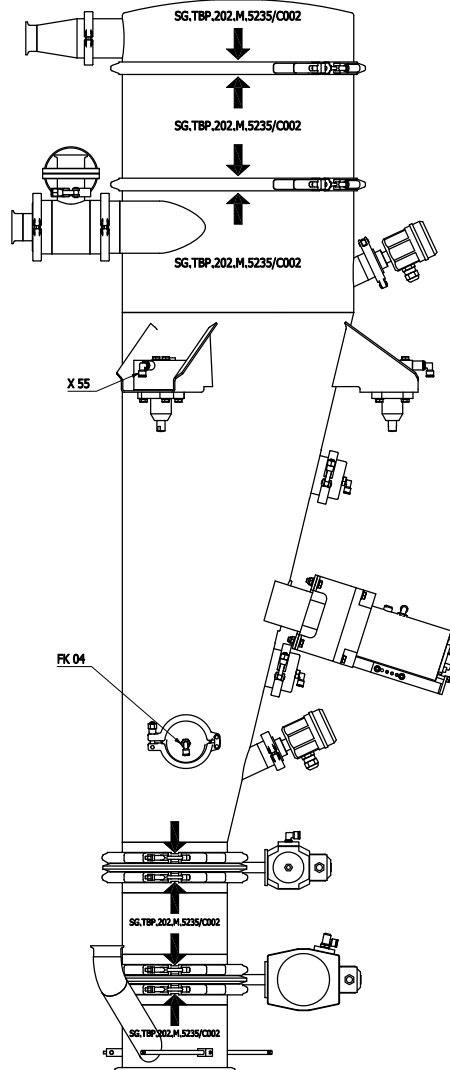
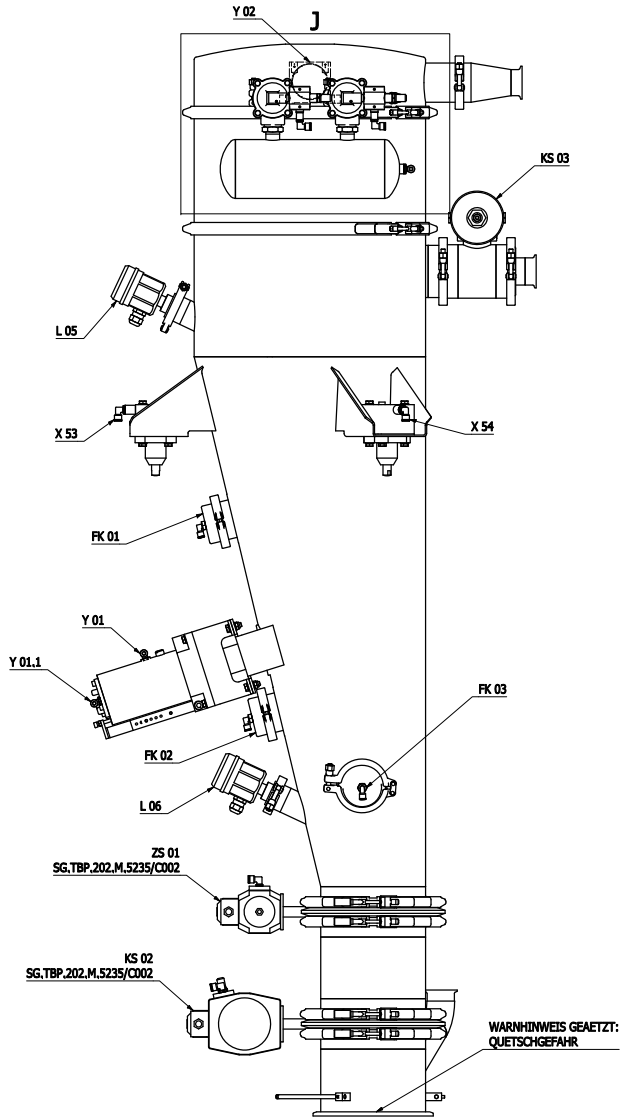


SG.TBP.202.M.5235/C002

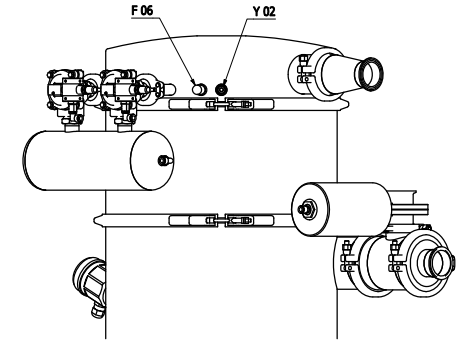
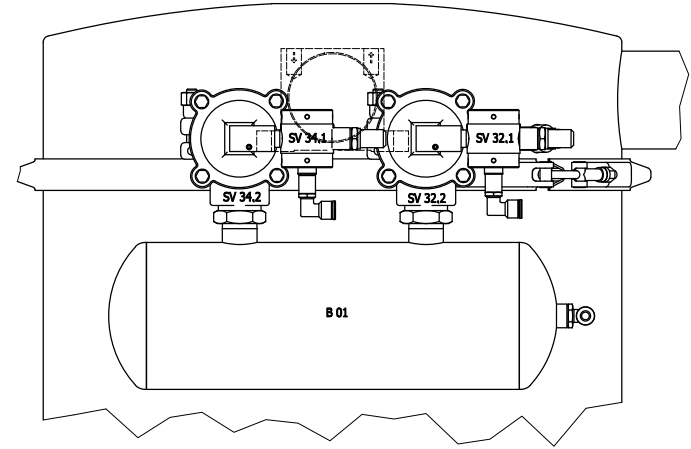
PTS buffer to Melt Extruder

LABELING PICKUP TRANSFER SYSTEM (GNP - WITH TRU CLAMP)		SCALE 1:5	DATE 27.05.2014	DESIGNER	QUALITY	ISSUE
DIMENSION SHOWN IN MILLIMETERS [INCH]		FORMAT A1	FIGURE 2 OF 4	APPROVED	DATE 27.05.2014	REV A
		ALL RIGHTS RESERVED © 2014 WWW.COPERIONTRON.COM		1315690300		

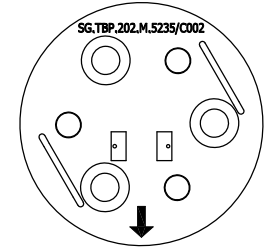
RECEIVER, DRAWING #1214530004
(1:5)



J
(1:2)



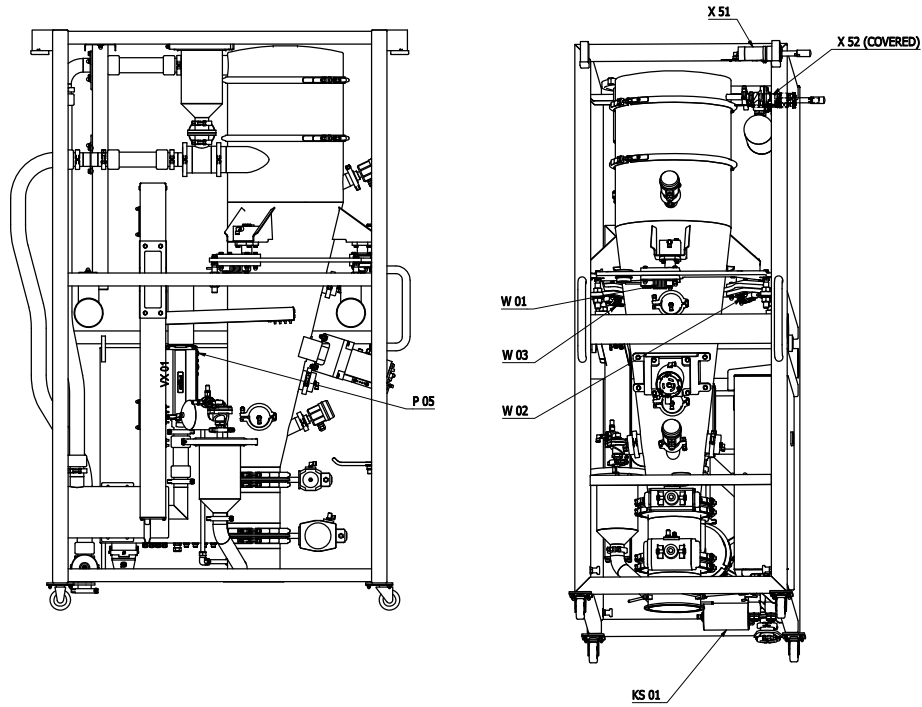
FILTER PLATE, DRAWING #1214530004
(1:5)



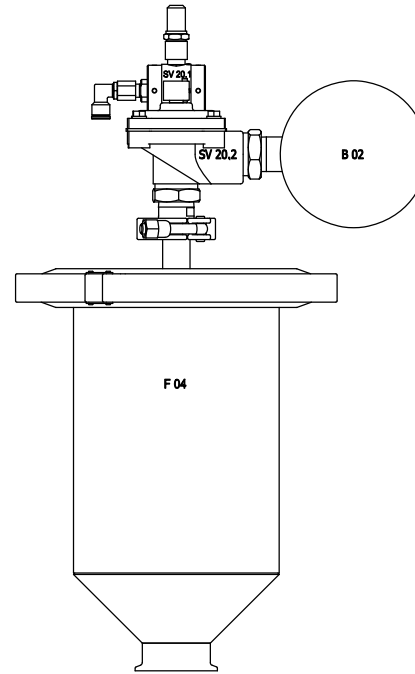
SG.TBP.202.M.5235/C002
PTS buffer to Melt Extruder

LABELING PICKUP TRANSFER SYSTEM (GMP - WITH TRL CLAMP)		SCALE	DATE	QUALITY
DIMENSION SHOWN IN MILLIMETERS [INCH]		1:1	07.05.2014	001
ALL RIGHTS RESERVED © 2014 WWW.COPERIONK-TRON.COM		FORMAT	APPROVED	QUALITY
A1		1315690300	07.05.2014	002
PAGE 3 OF 4 (EXTERNAL PLANT)		REVISION		

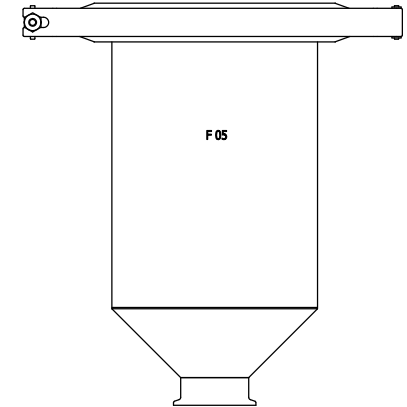
CART WITH CONVEYOR, DRAWING #131569000 (1 : 10)



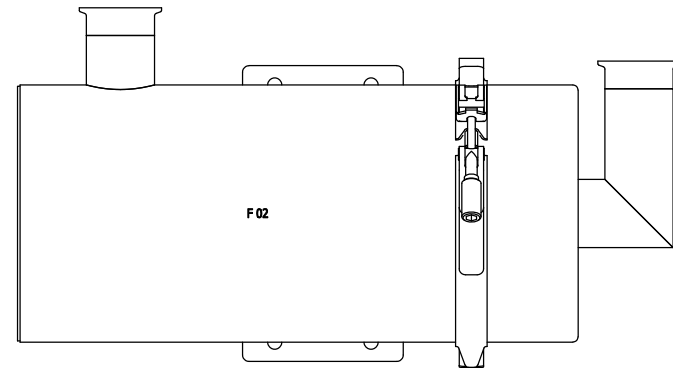
FILTER BREATH, DRAWING #1104657004 (1 : 2)



FILTER DUST, DRAWING #1104657003 (1 : 2)



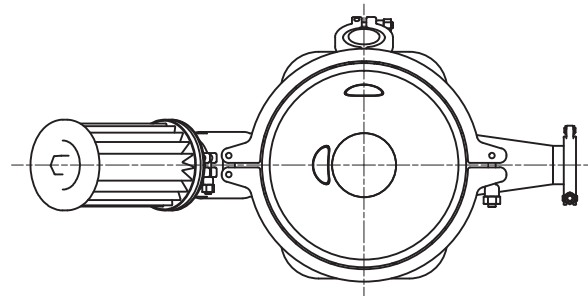
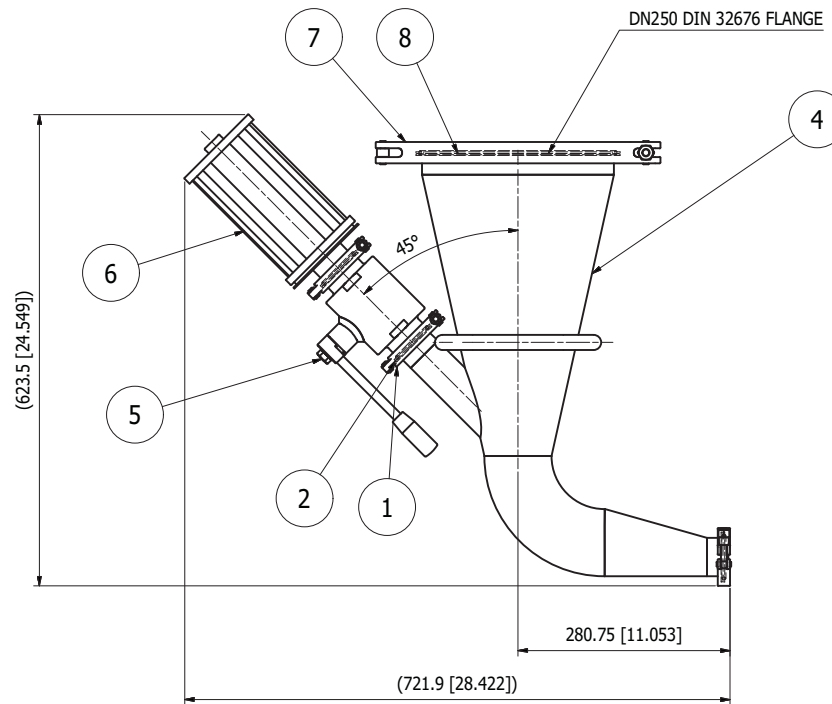
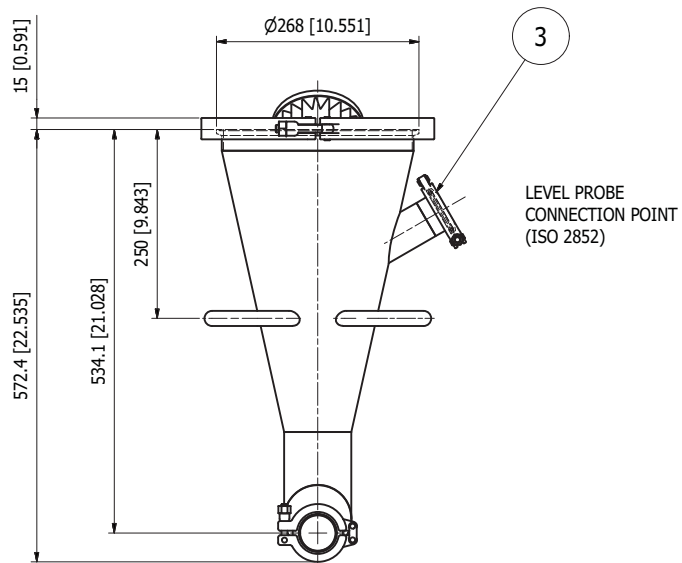
FILTER SAFETY HEPA, DRAWING #1214530006 (1 : 2)



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PTS buffer to Melt Extruder

LABELING PICKUP TRANSFER SYSTEM (GMP - WITH TRI CLAMP)	SCALE	DATE	QUALITY
	DIMENSION SHOWN IN MILLIMETERS (INCH) ALL RIGHTS RESERVED © 2014 WWW.COPERIONK-TRON.COM	27.05.2014 APPROVED 27.05.2014 PAGE 4 OF 4 OUTSIDE PLANT	27.05.2014 APPROVED 27.05.2014 PAGE 4 OF 4 OUTSIDE PLANT
Coperion K-TRON	DIMENSION SHOWN IN MILLIMETERS (INCH) ALL RIGHTS RESERVED © 2014 WWW.COPERIONK-TRON.COM	FORMAT A1	NUMBER 1315690300 REV A



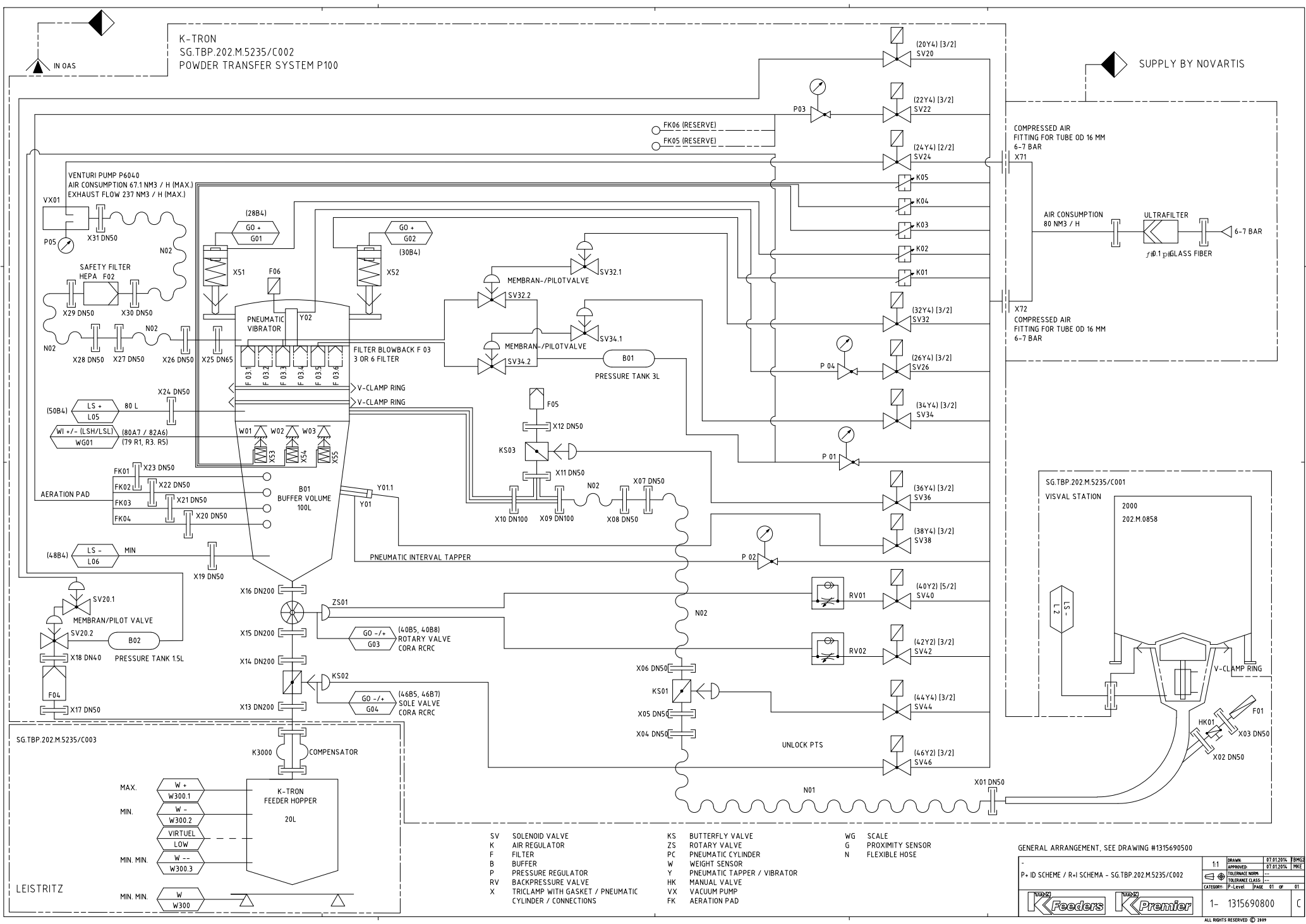
8	1	0000038023	GASKET / DICHTUNG - RND FER CLAMP DN268 ID250	MVQ
7	1	0000038022	CLAMP / KLEMME - FL D268 FER D308.4X28 SST316	
6	1	1104657009	FILTER - AIR FOR TAKE OFF POT	
5	1	0000031532	VALVE / VENTIL - BALL DN50 PTFE SST316	X2 CrNiMo17-12-2 AISI 316L
4	1	0000030757	HOPPER / TRICHTER- SST316L PL2 CERT3.1	
3	1	0000018768	D2" (D64) ISO 2852 CONNECTOR BLANK	X2 CrNiMo17-12-2
2	4	0000019471	GASKET / DICHTUNG - RND FER CLAMP DN64 ID50.2 MVQ	MVQ
1	4	0000019466	CLAMP / KLEMME - FL D64 FER D76.5X16.5 SST316	
SEQ	QTY	NUMBER	DESCRIPTION / SUPPLIER	MATERIAL

SCALE 1:5		DRAWN 06.01.2014 TBMG2
FIRST ANGLE		APPROVED 26.02.2014
PAGE 1 OF 1	CATEGORY P-Level	REV

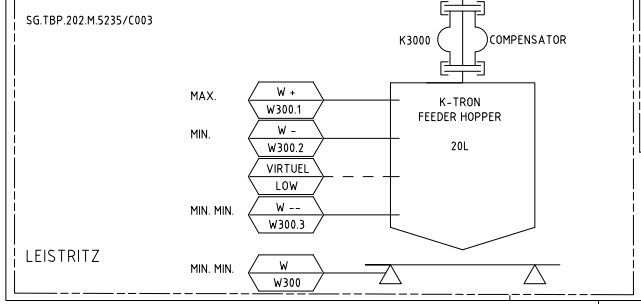
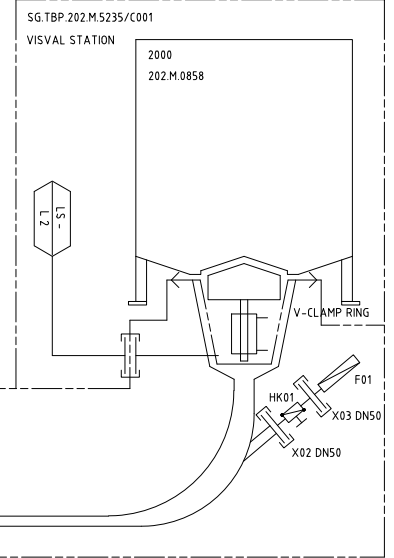
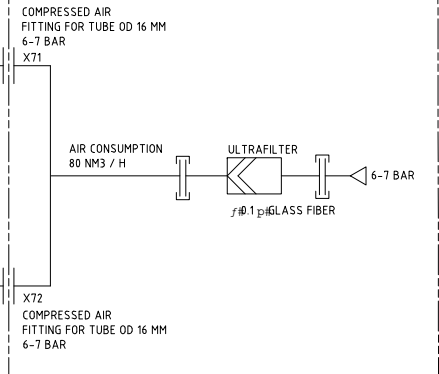
	DIMENSION SHOWN IN MILLIMETERS [INCH]	FORMAT A2	NUMBER 1315690501	REV B
	ALL RIGHTS RESERVED © 2013 WWW.COPERIONKTRON.COM			

APPROX STORAGE VOLUME: 10L +/- 10%
 APPROX WEIGHT: 8KG +/- 10%

K-TRON
SG.TBP.202.M.5235/C002
POWDER TRANSFER SYSTEM P100



SUPPLY BY NOVARTIS



- | | | | | | |
|----|---|----|-----------------------------|----|------------------|
| SV | SOLENOID VALVE | KS | BUTTERFLY VALVE | WG | SCALE |
| K | AIR REGULATOR | ZS | ROTARY VALVE | G | PROXIMITY SENSOR |
| F | FILTER | PC | PNEUMATIC CYLINDER | N | FLEXIBLE HOSE |
| B | BUFFER | W | WEIGHT SENSOR | | |
| P | PRESSURE REGULATOR | Y | PNEUMATIC TAPPER / VIBRATOR | | |
| RV | BACKPRESSURE VALVE | HK | MANUAL VALVE | | |
| X | TRICLAMP WITH GASKET / PNEUMATIC CYLINDER / CONNECTIONS | VX | VACUUM PUMP | | |
| | | FK | AERATION PAD | | |

GENERAL ARRANGEMENT, SEE DRAWING #1315690500

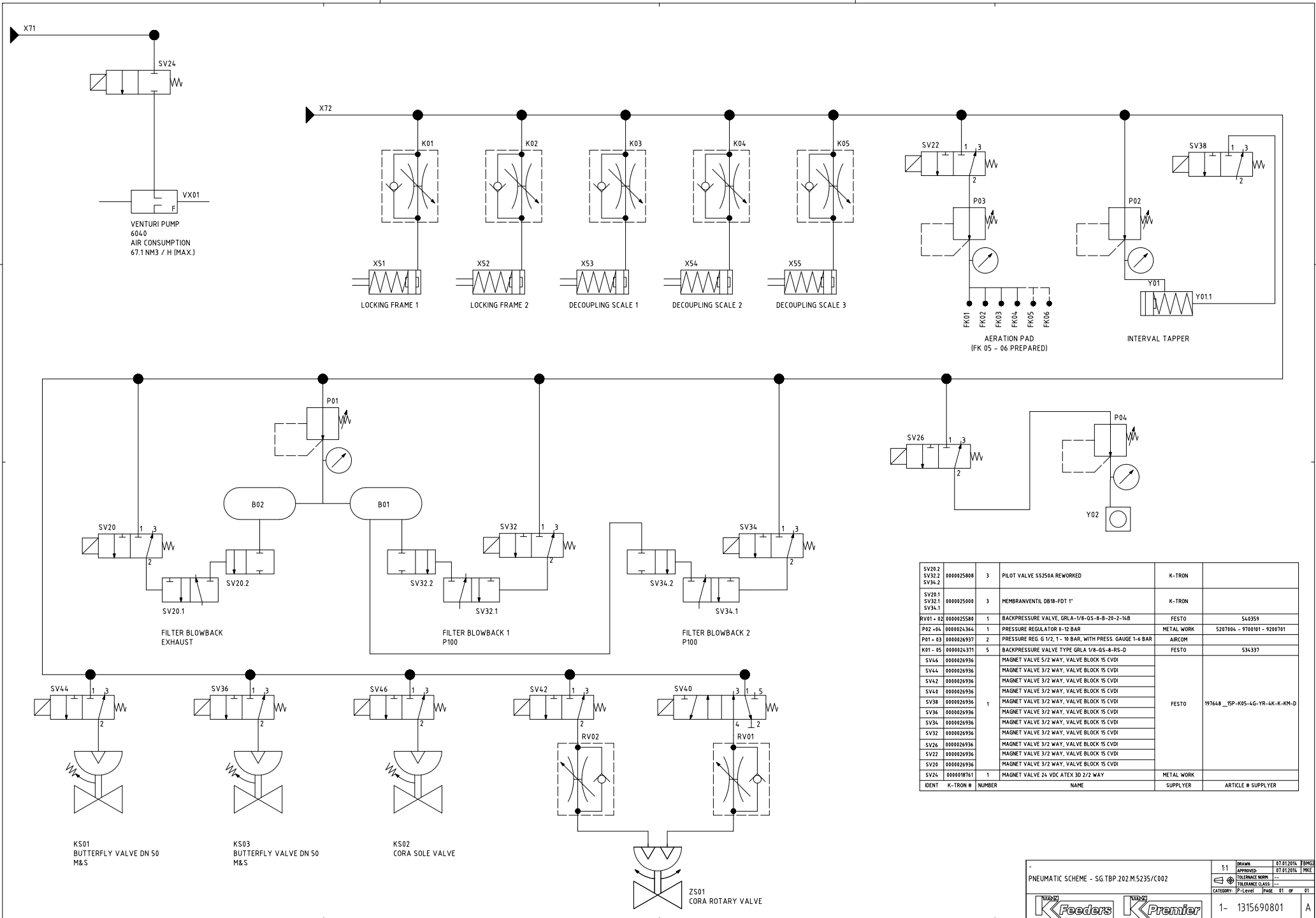
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	APPROVED	07.01.2014	PMK
	TOLERANCE		
	TOLERANCE CLASS		
	CATEGORY	P-Level	PAGE 01 OF 01

P-ID SCHEME / R-I SCHEME - SG.TBP.202.M.5235/C002

1- 1315690800

Reeders Premier

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SV20.2	0000025808	3	PILOT VALVE S2250A REWORKED	K-TRON	
SV32.2					
SV34.2					
SV24.1	0000025000	3	MEMBRANVENTIL 0818-FDT 1"	K-TRON	
SV32.1					
SV34.1					
RV01 - 02	0000025580	1	BACKPRESSURE VALVE, GRLA-1/8-05-8-B-20-2-14B	FESTO	546359
P02 - 04	0000024364	1	PRESSURE REGULATOR 0-12 BAR	METAL WORK	5207404 - 9700101 - 9200701
P01 - 03	0000026937	2	PRESSURE REG. G 1/2, 1 - 10 BAR, WITH PRESS. GAUGE 1-6 BAR	AIRCROM	
K01 - 05	0000024371	5	BACKPRESSURE VALVE TYPE GRLA 1/8-05-8-RS-D	FESTO	534337
SV46	0000026936		MAGNET VALVE 5/2 WAY, VALVE BLOCK 15 CVDI		
SV44	0000026936		MAGNET VALVE 3/2 WAY, VALVE BLOCK 15 CVDI		
SV42	0000026936		MAGNET VALVE 3/2 WAY, VALVE BLOCK 15 CVDI		
SV40	0000026936		MAGNET VALVE 3/2 WAY, VALVE BLOCK 15 CVDI		
SV38	0000026936	1	MAGNET VALVE 3/2 WAY, VALVE BLOCK 15 CVDI	FESTO	197648 _TSP-K05-4G-YR-4K-K-KM-D
SV36	0000026936		MAGNET VALVE 3/2 WAY, VALVE BLOCK 15 CVDI		
SV34	0000026936		MAGNET VALVE 3/2 WAY, VALVE BLOCK 15 CVDI		
SV32	0000026936		MAGNET VALVE 3/2 WAY, VALVE BLOCK 15 CVDI		
SV26	0000026936		MAGNET VALVE 3/2 WAY, VALVE BLOCK 15 CVDI		
SV22	0000026936		MAGNET VALVE 3/2 WAY, VALVE BLOCK 15 CVDI		
SV20	0000026936		MAGNET VALVE 3/2 WAY, VALVE BLOCK 15 CVDI		
SV24	0000108761	1	MAGNET VALVE 24 VDC ATEX SD 2/2 WAY	METAL WORK	
IDENT	K-TRON #	NUMBER	NAME	SUPPLIER	ARTICLE # SUPPLIER

PNEUMATIC SCHEME - SG.TBP.202.M.5235/C002

1:1	DRAWN	07/01/2014	TBMG
	APPROVED	07/01/2014	IMKE
	TOLERANCE MARK		
	TOLERANCE CLASS		
	CATEGORY	P-Level	PAGE 01 OF 01

1- 1315690801 A

Feeders Premier

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Chapter 9:

Electrical Drawings

- 1315690700

KS project no.: 1315690

customer: Novartis Singapore Pharmaceutical Manufacturing Pte Ltd

PTS buffer to Melt Extruder

SG.TBP.202.M.5235/C002

■ supply by K-Tron

Follow the instructions in your manual!

rev.	date:	drawn:	checked:	released:	changed pages:	change description:
A	10.02.2014	R.Freund	H.Siegrist	H.Siegrist	--	--
B						
C						
D						
E						

title: Powdertransfersys.SG.TBP.202.M.5235/C002

accompanying projekt-no.:

File: E:/PROJEKTE.78/KD13/englisch/1315690

total pages: 52

drawing no.:

1315690700





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=5235-C002

plant	drawing no.:	sheet	revision	title	special notes
5235-C002	1315690700	0	A	Powdertransfersys.SG.TBP.202.M.5235/C002	cover sheet
5235-C002	1315690700	1	A	directory	directory
5235-C002	1315690700	2	A	directory	directory
5235-C002	1315690702	5	A	New cable color code	system
5235-C002	1315690702	10	A	power supply	system
5235-C002	1315690702	12	A	24V-DC distributor	system
5235-C002	1315690702	13	A	24V-DC distributor	system
5235-C002	1315690702	14	A	emergency stop shut off	system
5235-C002	1315690702	15	A	emergency stop safety relay	system
5235-C002	1315690702	16	A	emergency stop, Reset, maintenance	system
5235-C002	1315690702	17	A	maintenance, return info customer	system
5235-C002	1315690702	18	A	24V-power supply HMI MP277	system
5235-C002	1315690702	20	A	cleaning breather filter F04	system
5235-C002	1315690702	22	A	fluidisation pads FK01-04	system
5235-C002	1315690702	24	A	Venturi Vacuum pump Piab VX01	system
5235-C002	1315690702	26	A	Vibrator Y02	system
5235-C002	1315690702	28	A	Position Left cylinder/actuator	system
5235-C002	1315690702	30	A	Position right cylinder/actuator	system
5235-C002	1315690702	32	A	1.Filtercleaning F03.1 - F03.3	system
5235-C002	1315690702	34	A	2.Filtercleaning F03.4 - F03.6	system
5235-C002	1315690702	36	A	Filter-Ventilation-DamperKS03	system
5235-C002	1315690702	38	A	discharge support tapper Y01	system
5235-C002	1315690702	40	A	1.Rotary valve Cora ZS01	system
5235-C002	1315690702	42	A	2.Rotary valve Cora ZS01	system
5235-C002	1315690702	44	A	M&S Safety-Damper KS01	system
5235-C002	1315690702	46	A	Cora Damper KS02	system
5235-C002	1315690702	48	A	L06-level indicator min	system
5235-C002	1315690702	50	A	L05-level indicator 80dm3	system
5235-C002	1315690702	52	A	operating hours counter Tico 772	system
5235-C002	1315690702	53	A	Reserve	system
5235-C002	1315690702	55	A	PLC-Inputs internal	system
5235-C002	1315690702	58	A	signalexchange Leistritz-K-TRON	system
5235-C002	1315690702	60	A	signalexchange Visval - K-TRON	system
5235-C002	1315690702	62	A	signal exchange Novartis-K-TRON	system
5235-C002	1315690702	63	A	Signalexchange Novartis-K-TRON	system

	K-Tron (Schweiz) AG Industrie Lenzhard CH-5702 Niederlenz	Alle Rechte vorbehalten All rights reserved © K-Tron Soder 2005	title: directory		next page: 2 page no.: 1	
			project no.: 1315690		=5235-C002	+

plant	drawing no.:	sheet	revision	title	special notes				
5235-C002	1315690702	64	A	Signalexchange Novartis-K-TRON	system				
5235-C002	1315690702	65	A	Reserve	system				
5235-C002	1315690702	72	A	Reserve	system				
5235-C002	1315690702	74	A	Reserve	system				
5235-C002	1315690702	79	A	Weighing conveyer	system				
5235-C002	1315690702	80	A	SPS, S7-313C-2DP	system				
5235-C002	1315690702	81	A	CP 341-1, Reserve SPS	system				
5235-C002	1315690702	82	A	control panell MP277 -Profibus	system				
5235-C002	1315690704	750	A	cable list	sytem				
5235-C002	1315690705	800	A	cable position plan	system				
5235-C002	1315690708	930	A	cabinet disposition Typ: TS8806.500	system				
5235-C002	1315690708	931	A	cabinet disposition Typ: TS8806.500	system				
5235-C002	1315690708	932	A	operation terminal -62A1	system				
	K-Tron (Schweiz) AG Industrie Lenzhard CH-5702 Niederlenz	Alle Rechte vorbehalten All rights reserved © K-Tron Soder 2005	title: directory project no.: 1315690		=5235-C002	+	next page: drawing no.:	page no.: 2	rev.: A
							1315690700		

Singapore Government
 New cable colour code valid from 1 Mar 2011

Single Phase 230V AC

- Phase L (Line) = brown
- Neutral N = blue
- Earth PE = green-and-yellow

Three Phase Cicuits 400V AC

- Phase L1 (Line) = brown
- Phase L2 (Line) = black
- Phase L3 (Line) = grey
- Neutral N = blue
- Protective conductors Earth PE = green-and-yellow
- Functional earthing conductor = cream

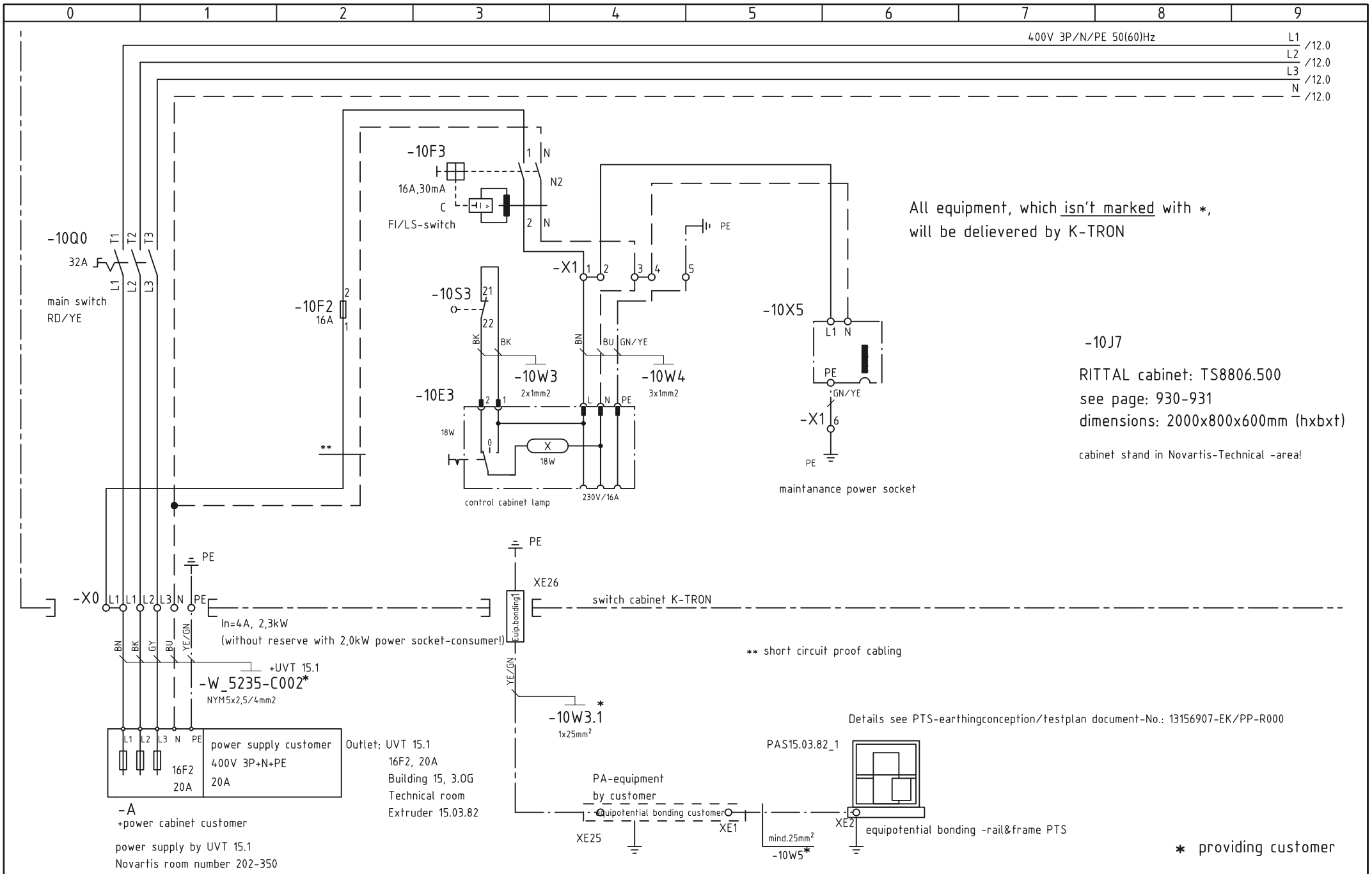
Control Circuits, ELV and other applications

- Phase L = brown
- Phase L = black
- Phase L = red
- Phase L = orange
- Phase L = yellow
- Phase L = violet
- Phase L = grey
- Phase L = white
- Phase L = pink
- Phase L = turquoise
- Neutral N or M = blue An earthed PELV conductor is blue

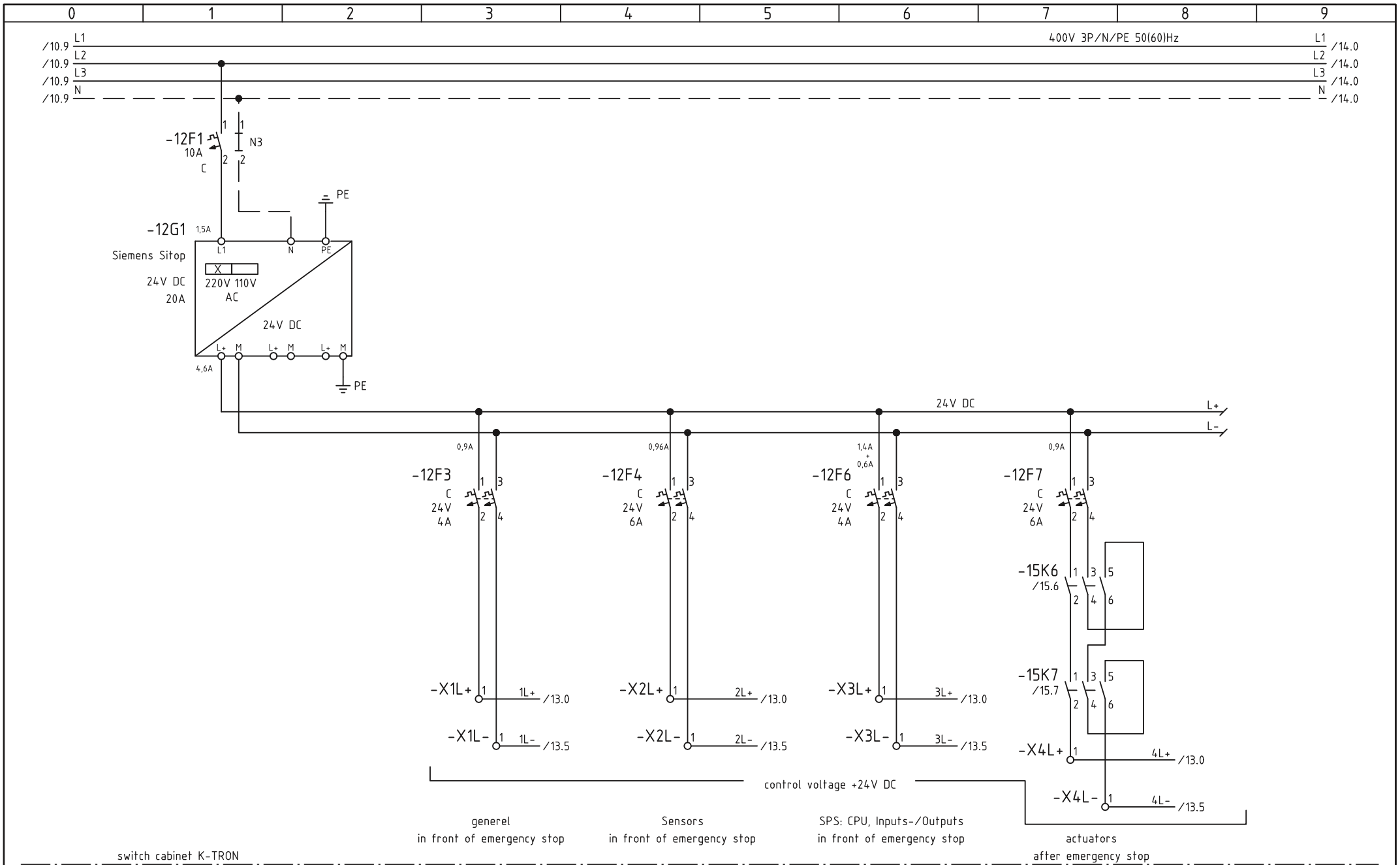
TWO-Wire earthed and unearthed D.C.Power Circuit


- Positive L+ = brown
- Negative L- = grey

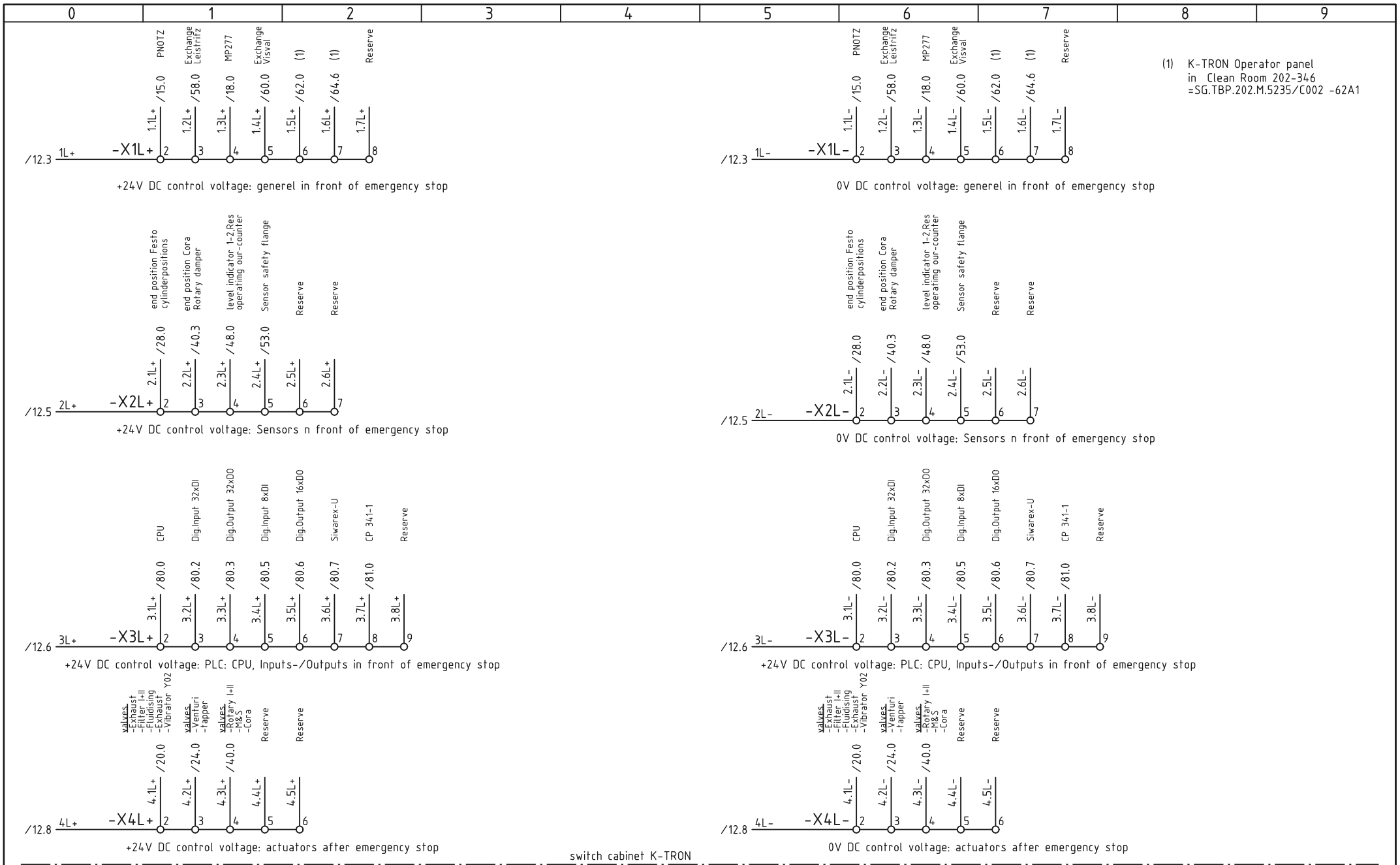




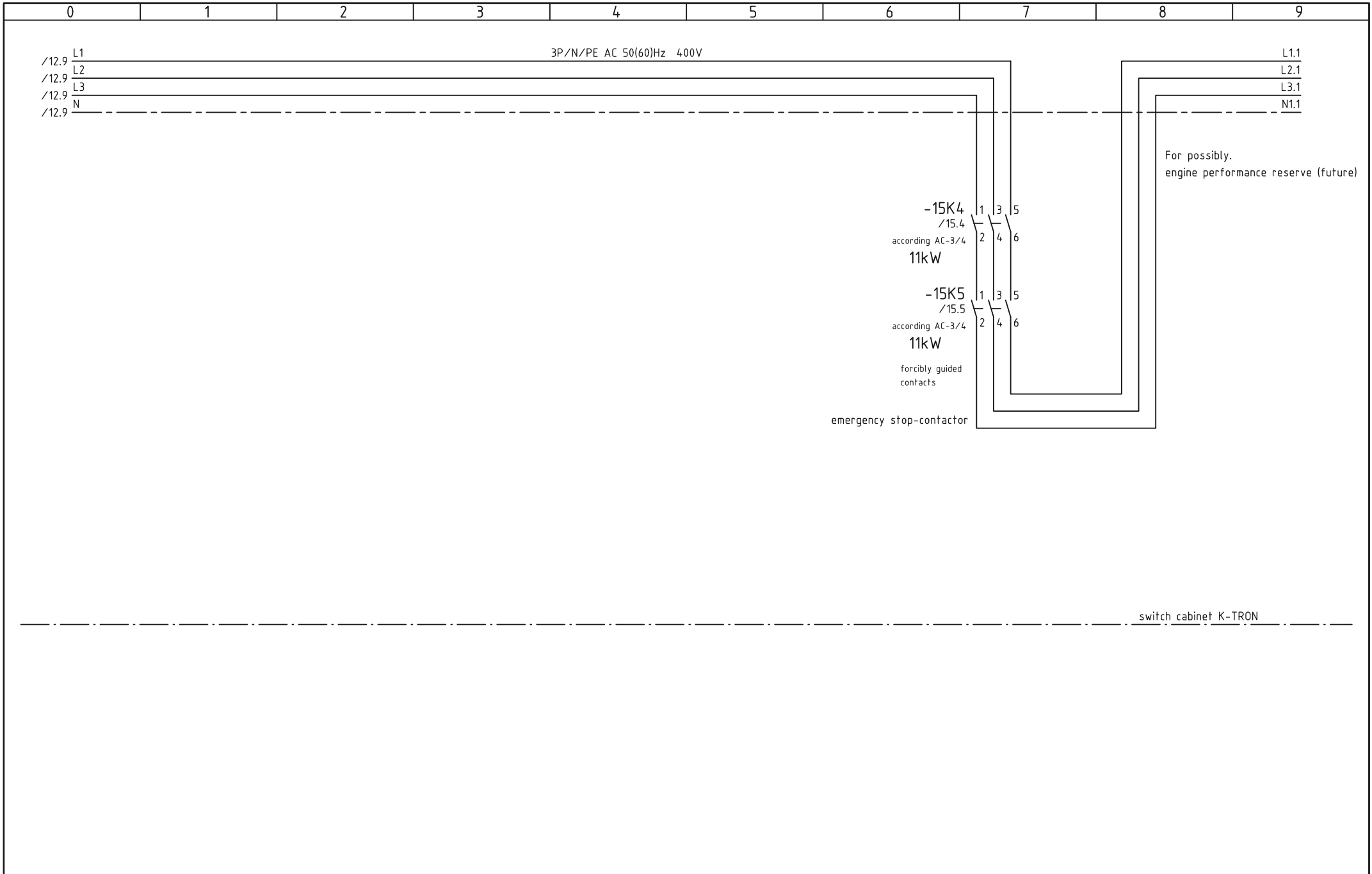
	K-Tron (Schweiz) AG Industrie Lenzhard CH-5702 Niederlenz Alle Rechte vorbehalten All rights reserved © K-Tron Soder 2002	title: power supply	type: system	next page: 12	page no.: 10
		project no.: 1315690	no.: tag:	=5235-C002 +S002	drawing no.: 1315690702




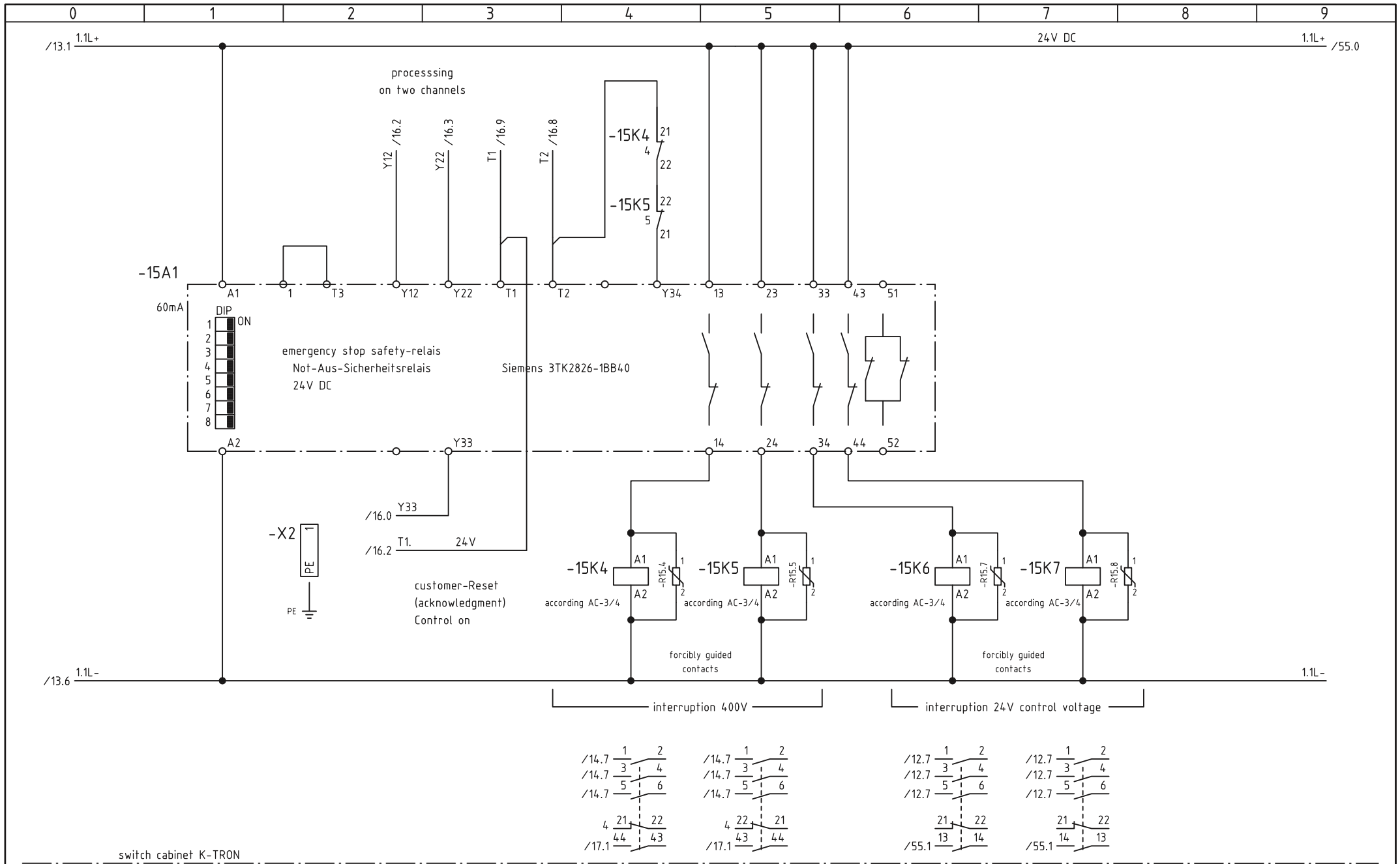
 K-Tron (Schweiz) AG Industrie Lenzhard CH-5702 Niederlenz © K-Tron Soder 2002	title: 24V-DC distributor project no.: 1315690	type: system no.: tag:	=5235-C002 +S002	next page: 13 drawing no.: 1315690702	page no.: 12 rev.: A
	switch cabinet K-TRON				

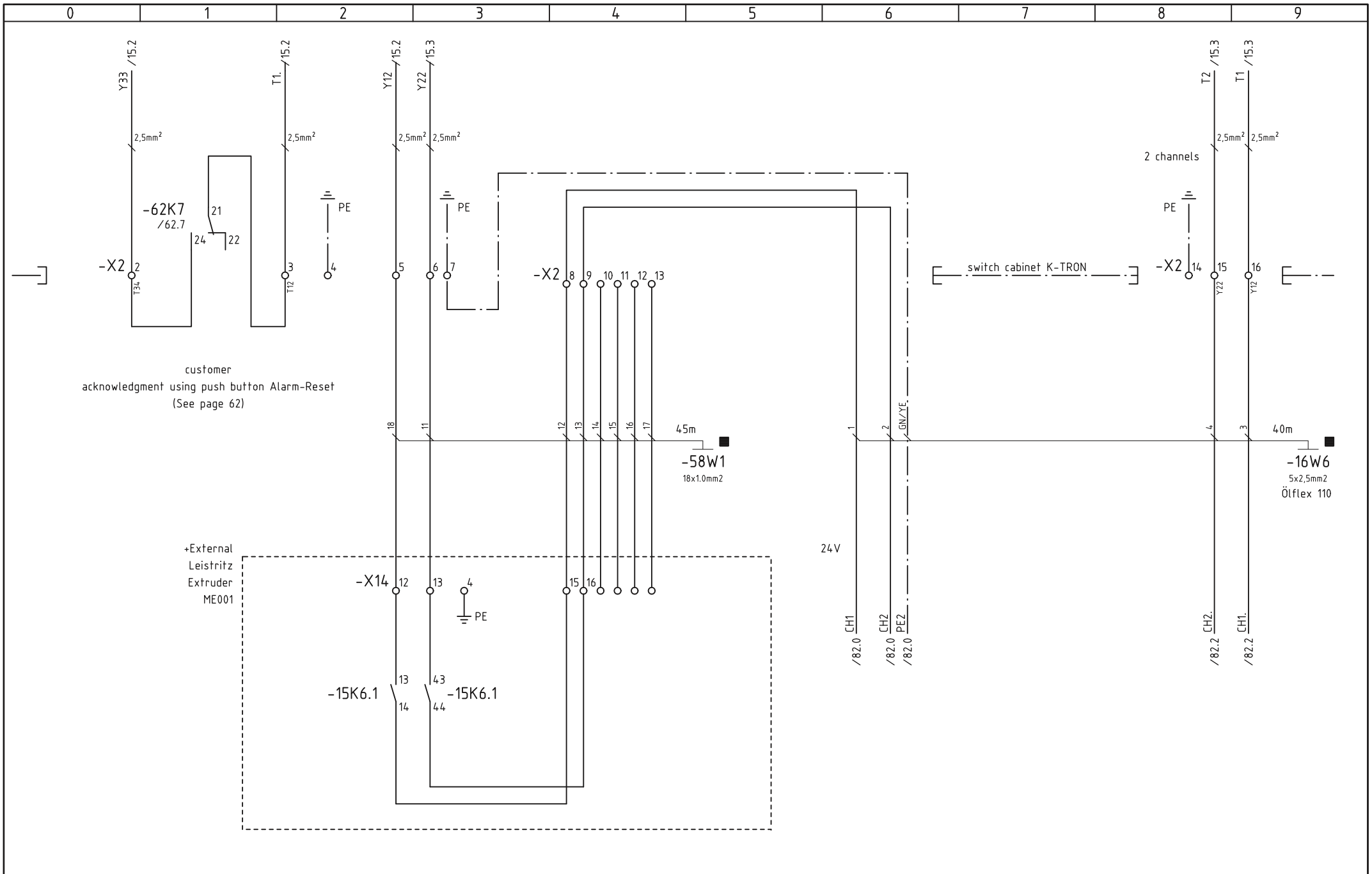


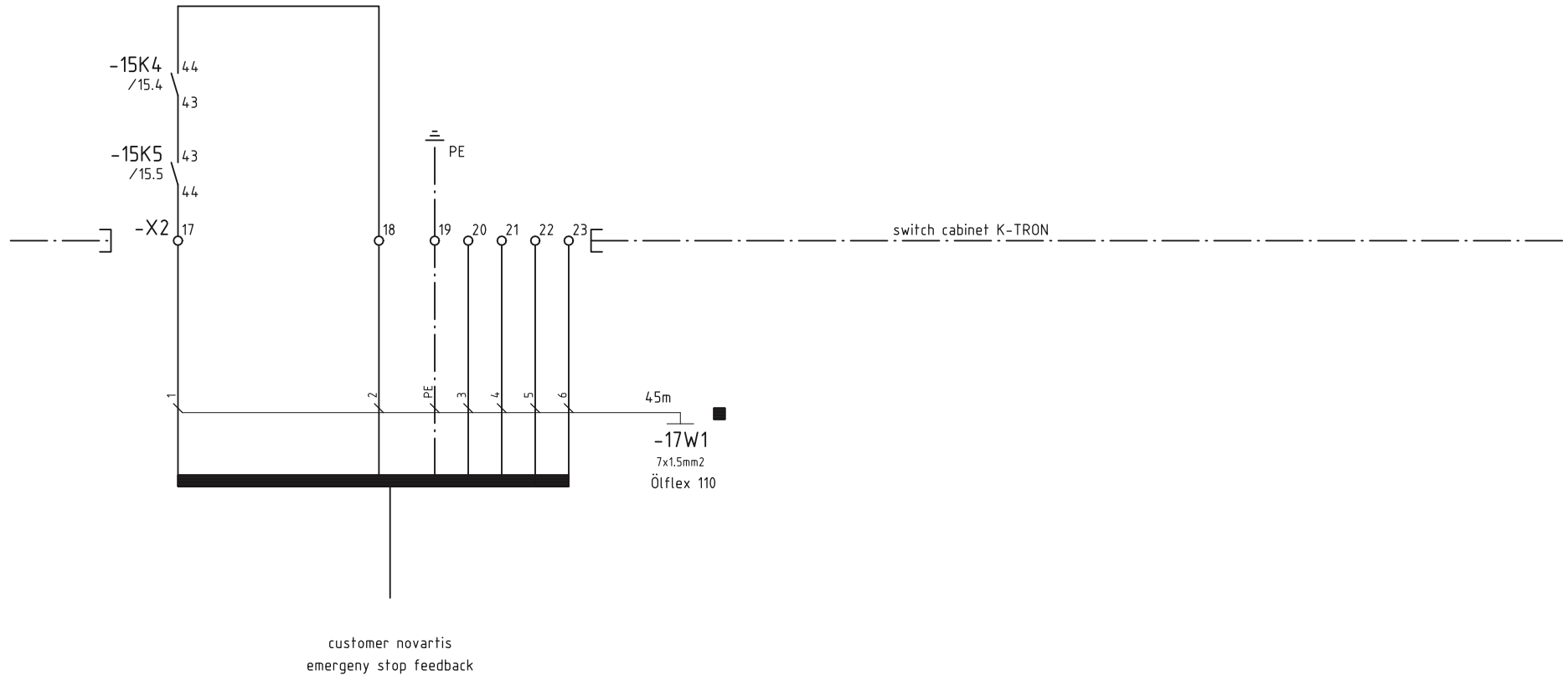
(1) K-TRON Operator panel
in Clean Room 202-346
=SG.TBP.202.M.5235/C002 -62A



	K-Tron (Schweiz) AG Industrie Lenzhard CH-5702 Niederlenz Alle Rechte vorbehalten All rights reserved © K-Tron Soder 2002	title: emergency stop shut off		type:system		next page: 15	page no.: 14	
		project no.: 1315690		no.:		drawing no.:		rev.:
				tag:		=5235-C002	+S002	1315690702







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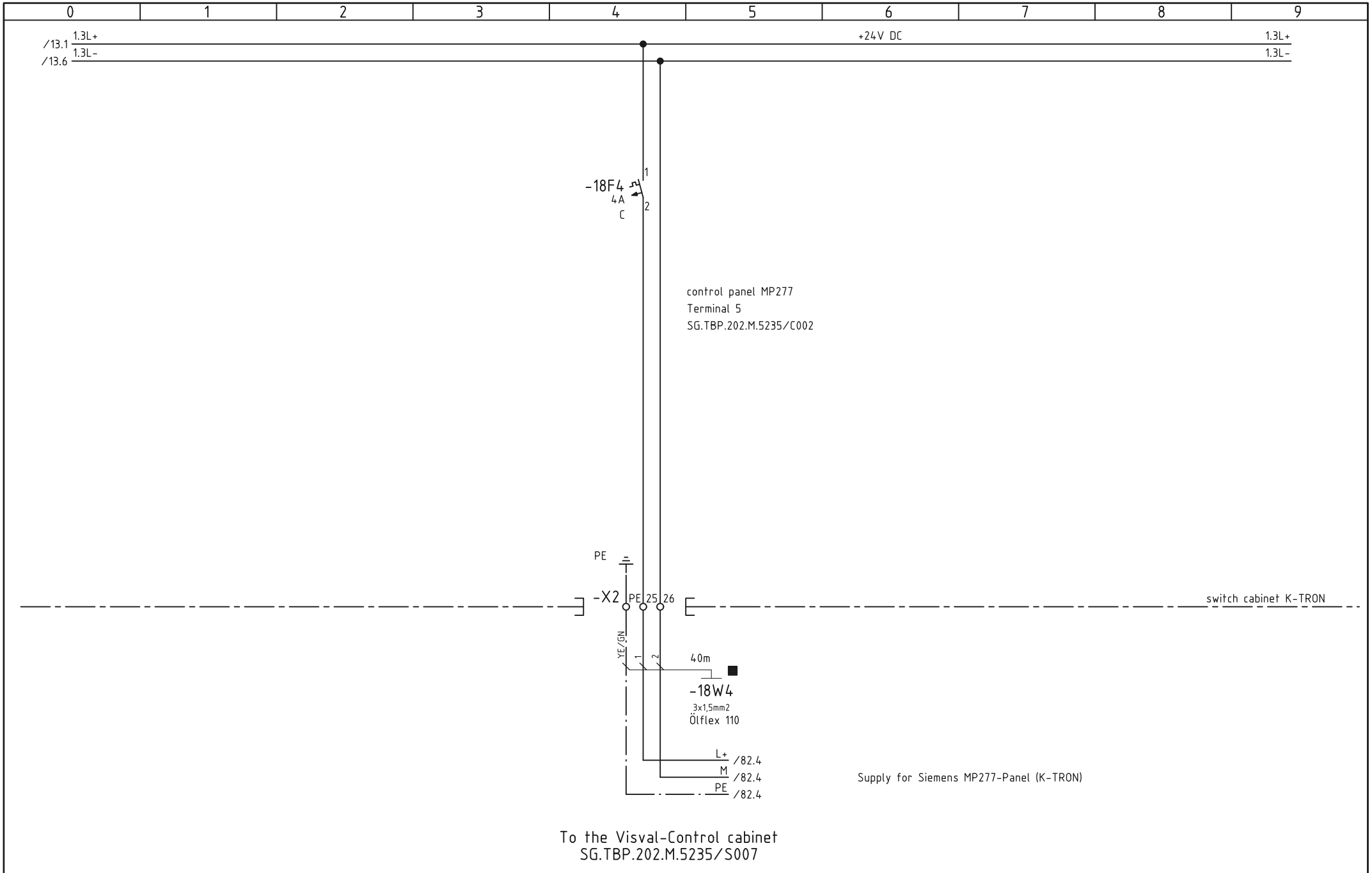
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title: maintenance, return info customer
 project no.: 1315690

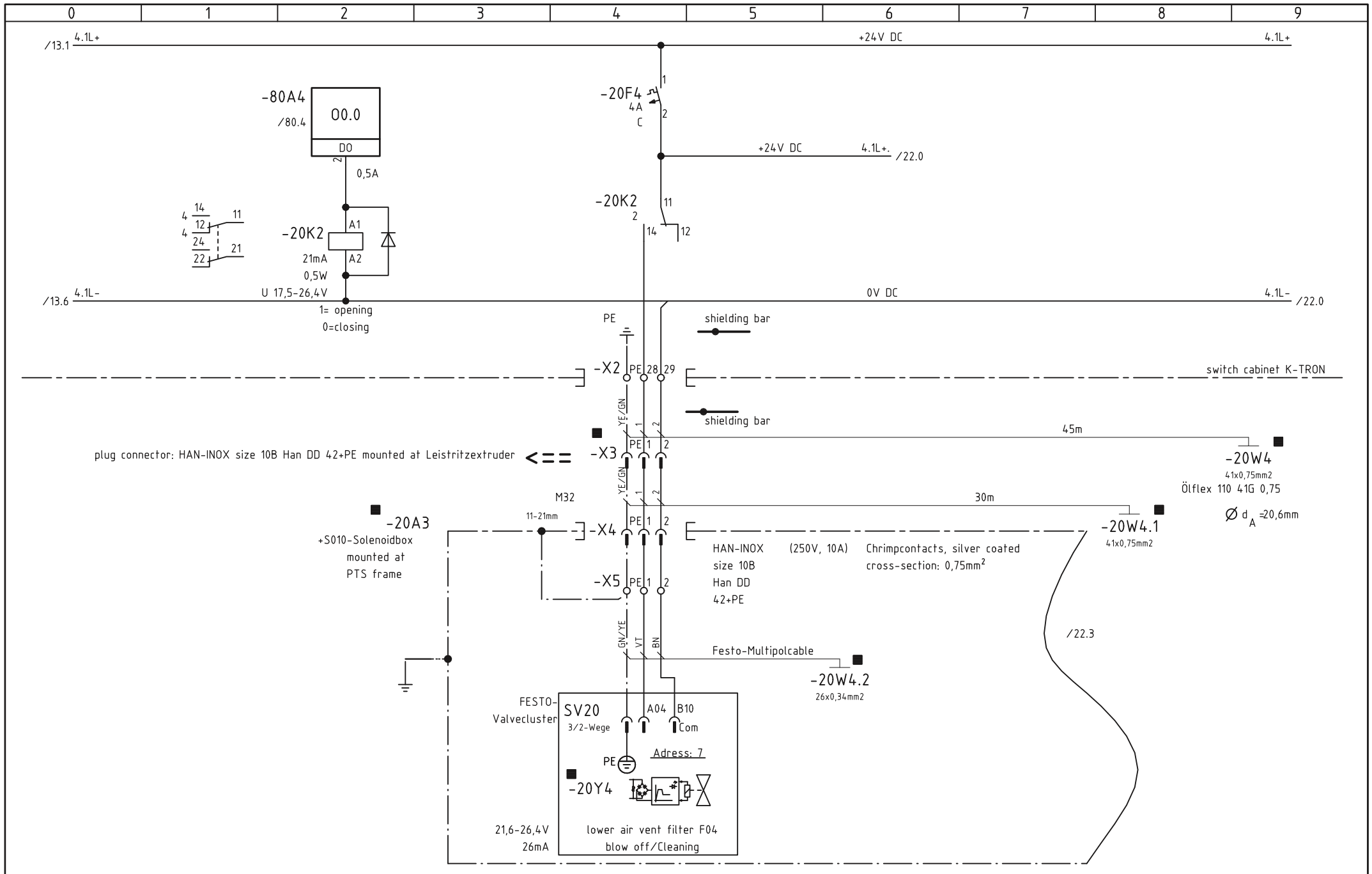
type:system
 no.:
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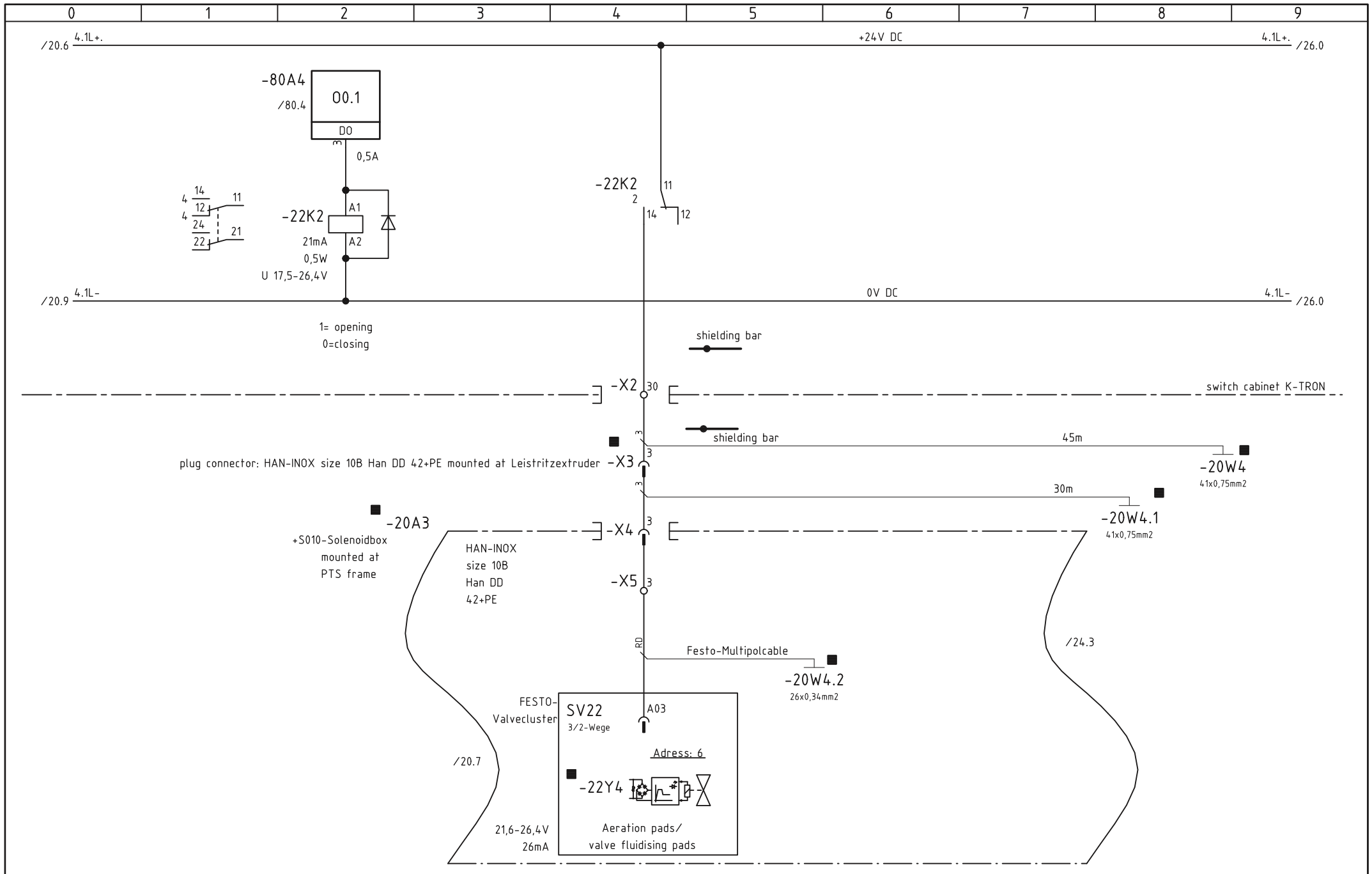
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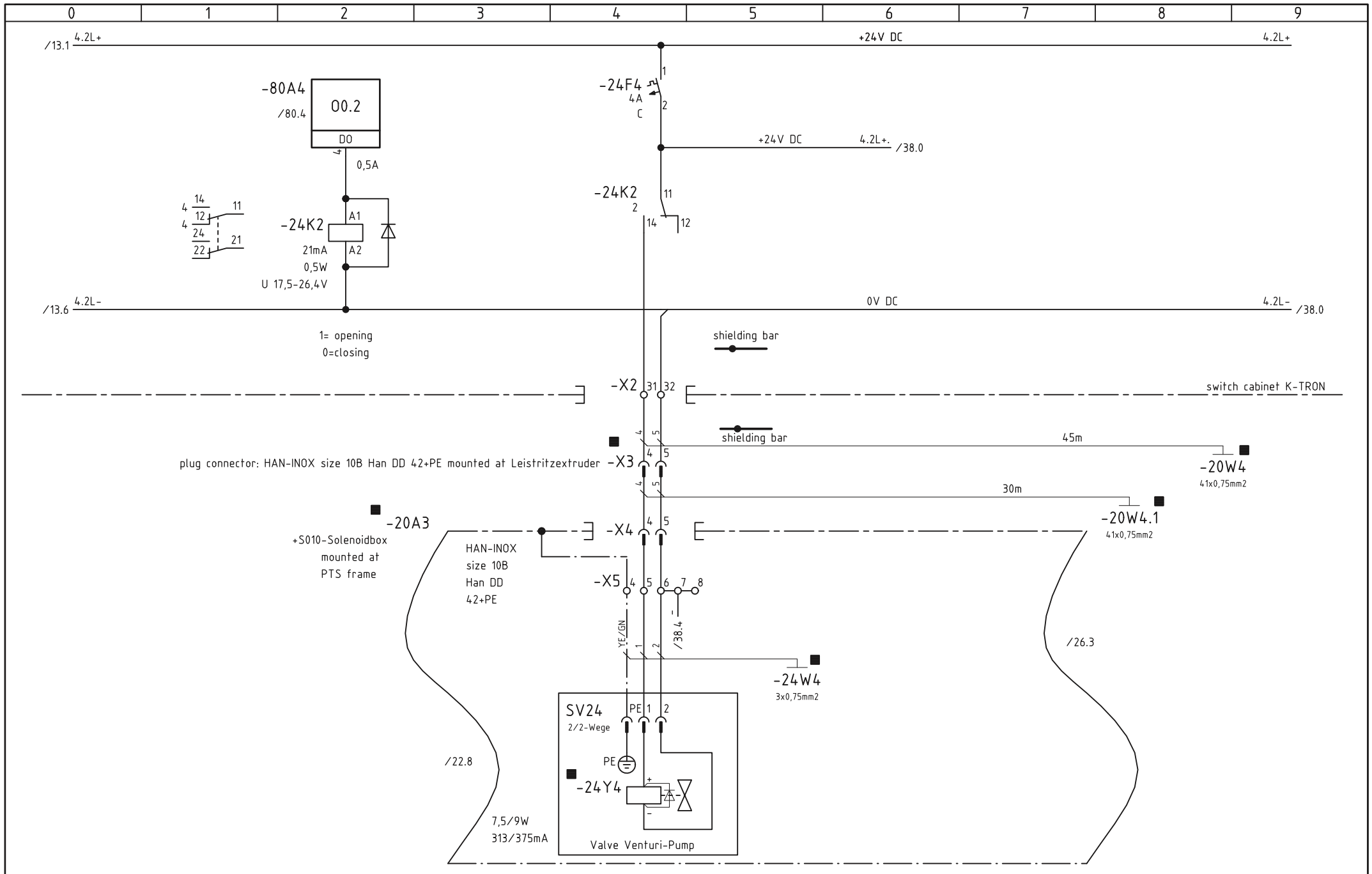
next page: 18	page no.: 17
drawing no.: 1315690702	rev.: A

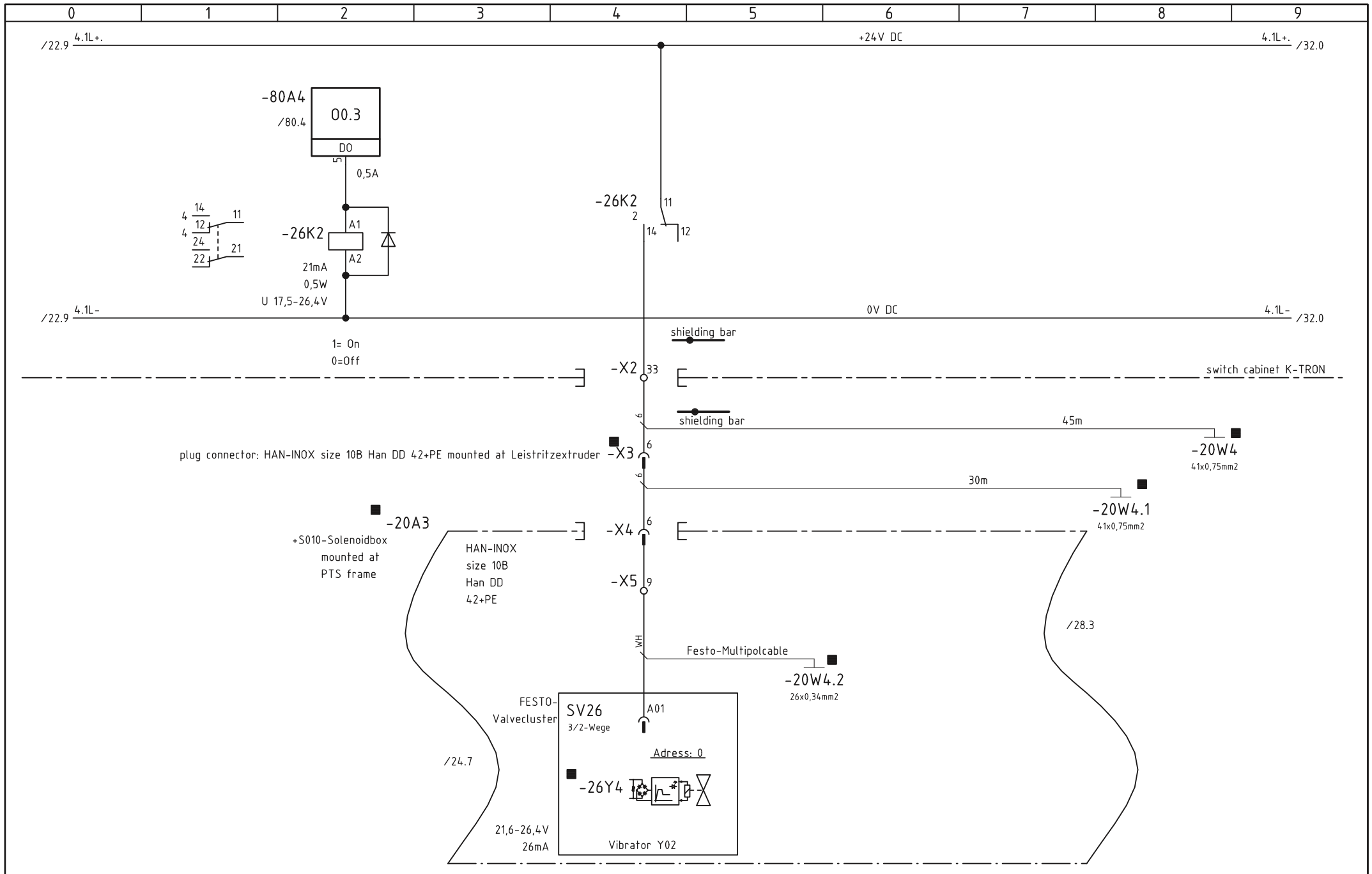


	K-Tron (Schweiz) AG Industrie Lenzhard CH-5702 Niederlenz © K-Tron Soder 2002	Alle Rechte vorbehalten All rights reserved	title: 24V-power supply HMI MP277		type: system		next page: 20	page no.: 18
			project no.: 1315690		no.:		=5235-C002 +S002	
			tag:					









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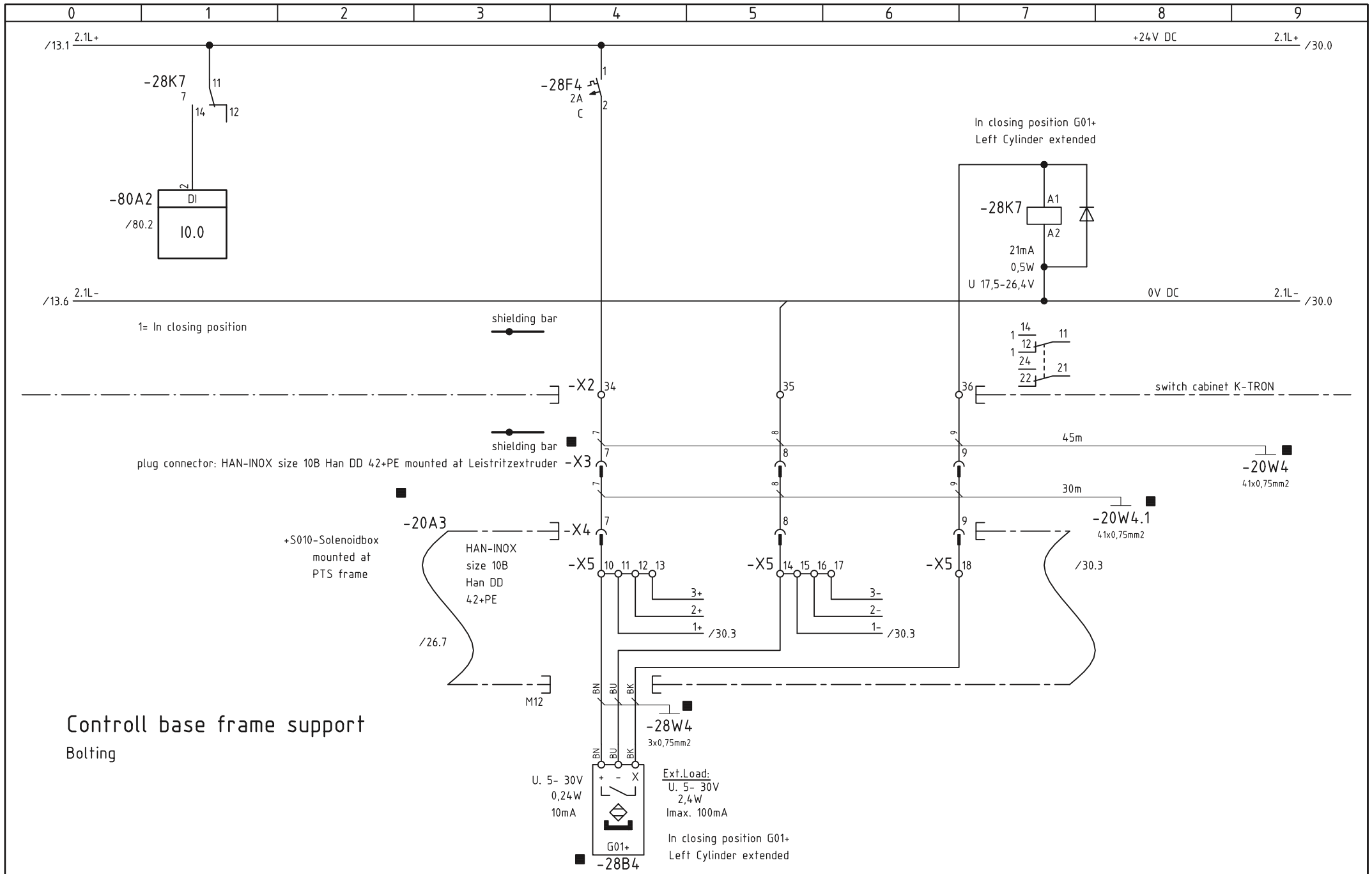
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title: Vibrator Y02
 project no.: 1315690


type: P100, special
 no.: 1
 tag:

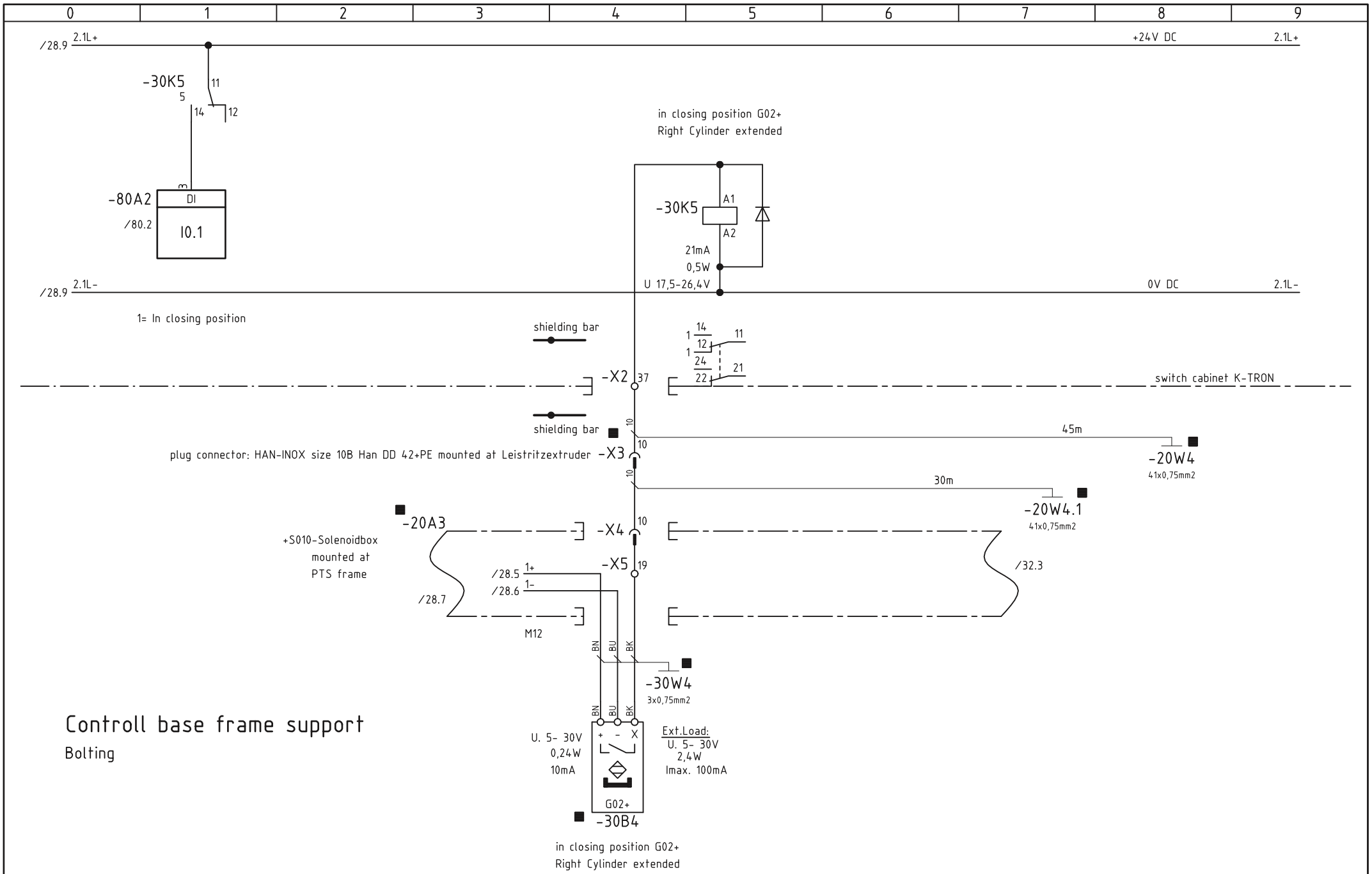
Pneumatic Vibrator Y02
 =5235-C002 +S002


next page: 28 page no.: 26
 drawing no.: 1315690702 rev.: A

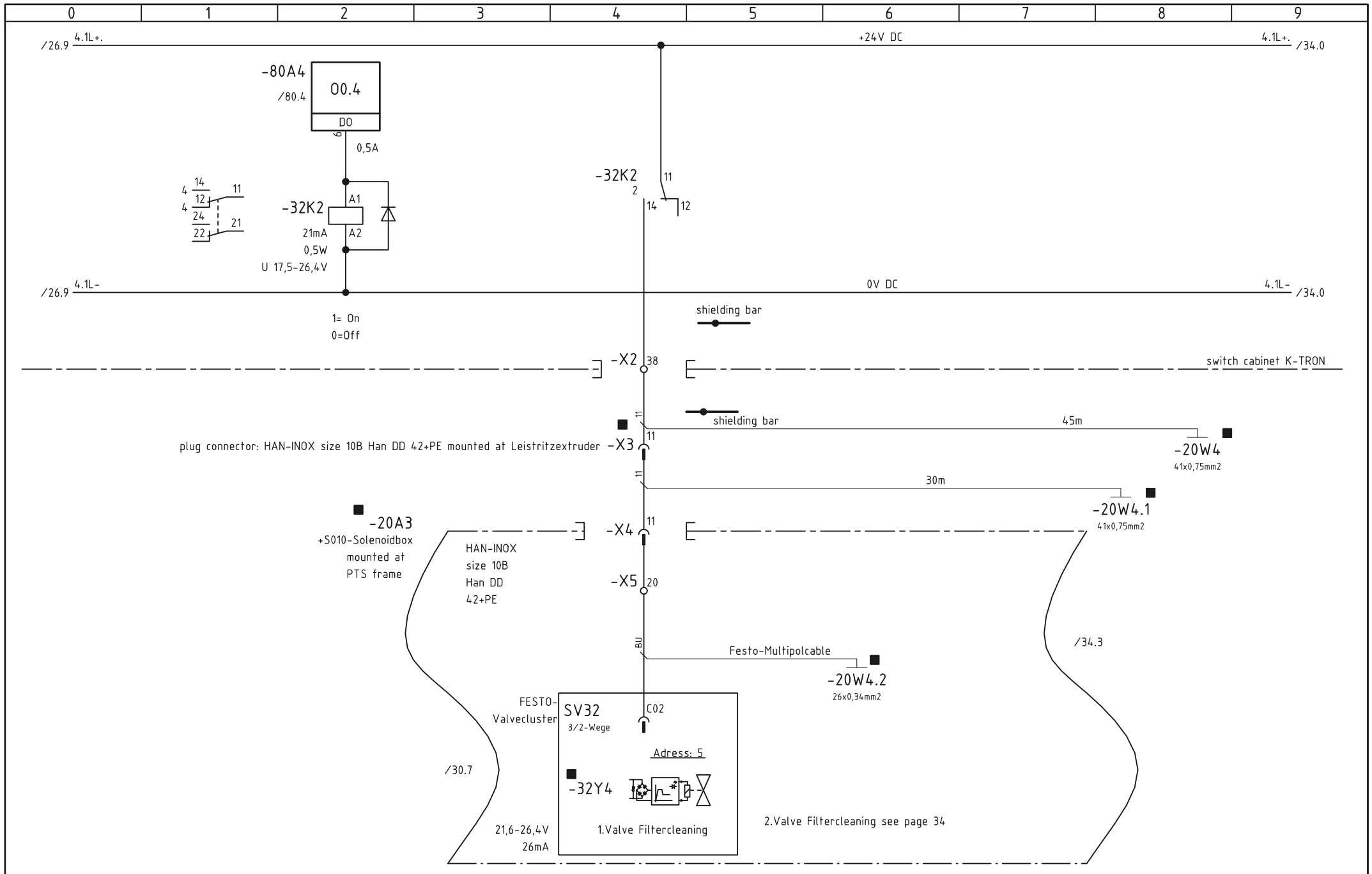



Controll base frame support
Bolting

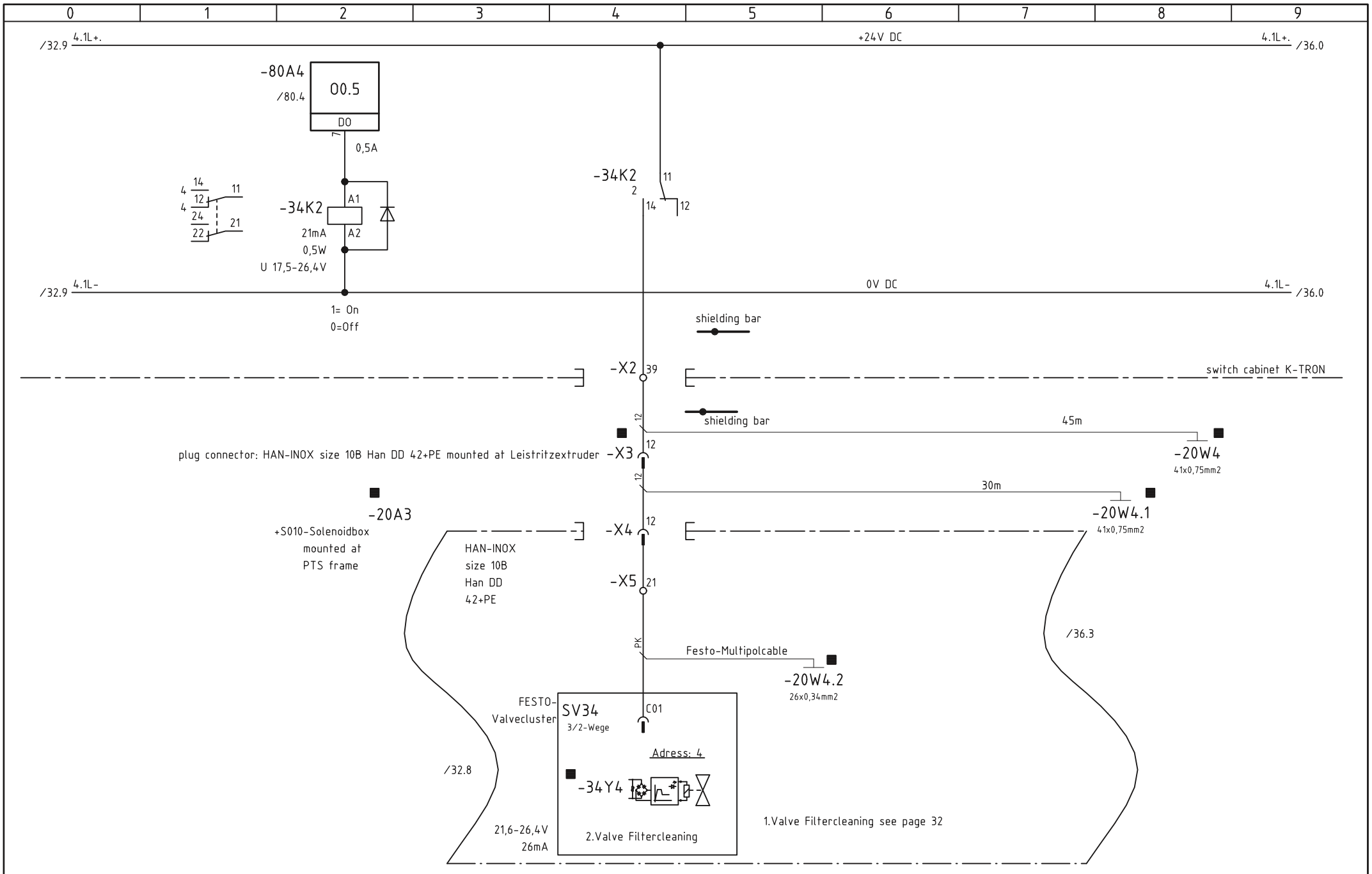
	K-Tron (Schweiz) AG Industrie Lenzhard CH-5702 Niederlenz © K-Tron Soder 2002	Alle Rechte vorbehalten All rights reserved	title: Position Left cylinder/actuator		type:P100,special		Left Cylinderpositon to conveyer		next page: 30	page no.: 28
			project no.: 1315690			no.: 1		=5235-C002 +S002		drawing no.: 1315690702

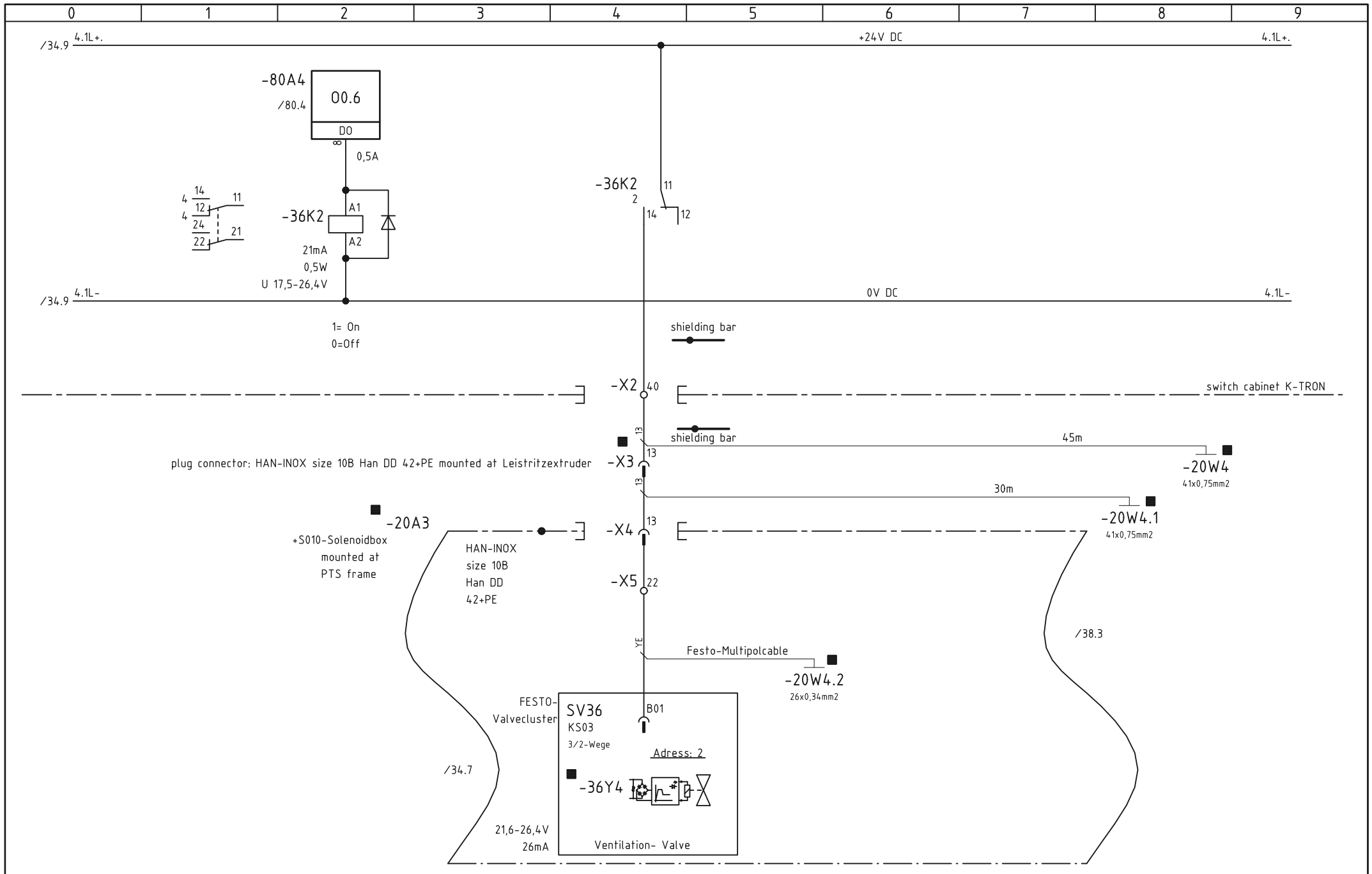


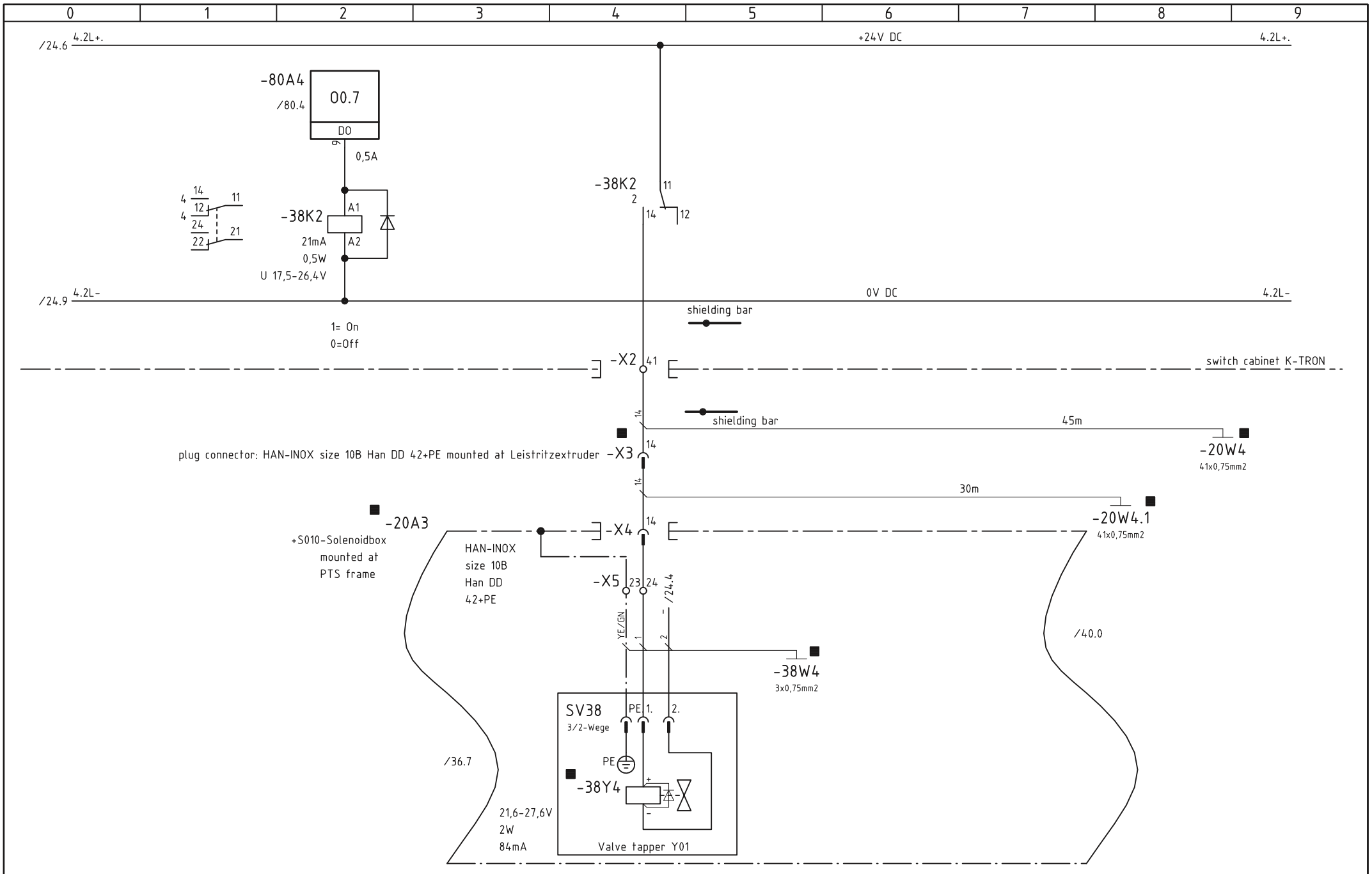
	K-Tron (Schweiz) AG Industrie Lenzhard CH-5702 Niederlenz Alle Rechte vorbehalten All rights reserved © K-Tron Soder 2002	title: Position right cylinder/actuator	type:P100,special	right Cylinderpositon to conveyer		next page: 32	page no.: 30
		project no.: 1315690	no.: 1	=5235-C002	+S002	drawing no.: 1315690702	rev.: A

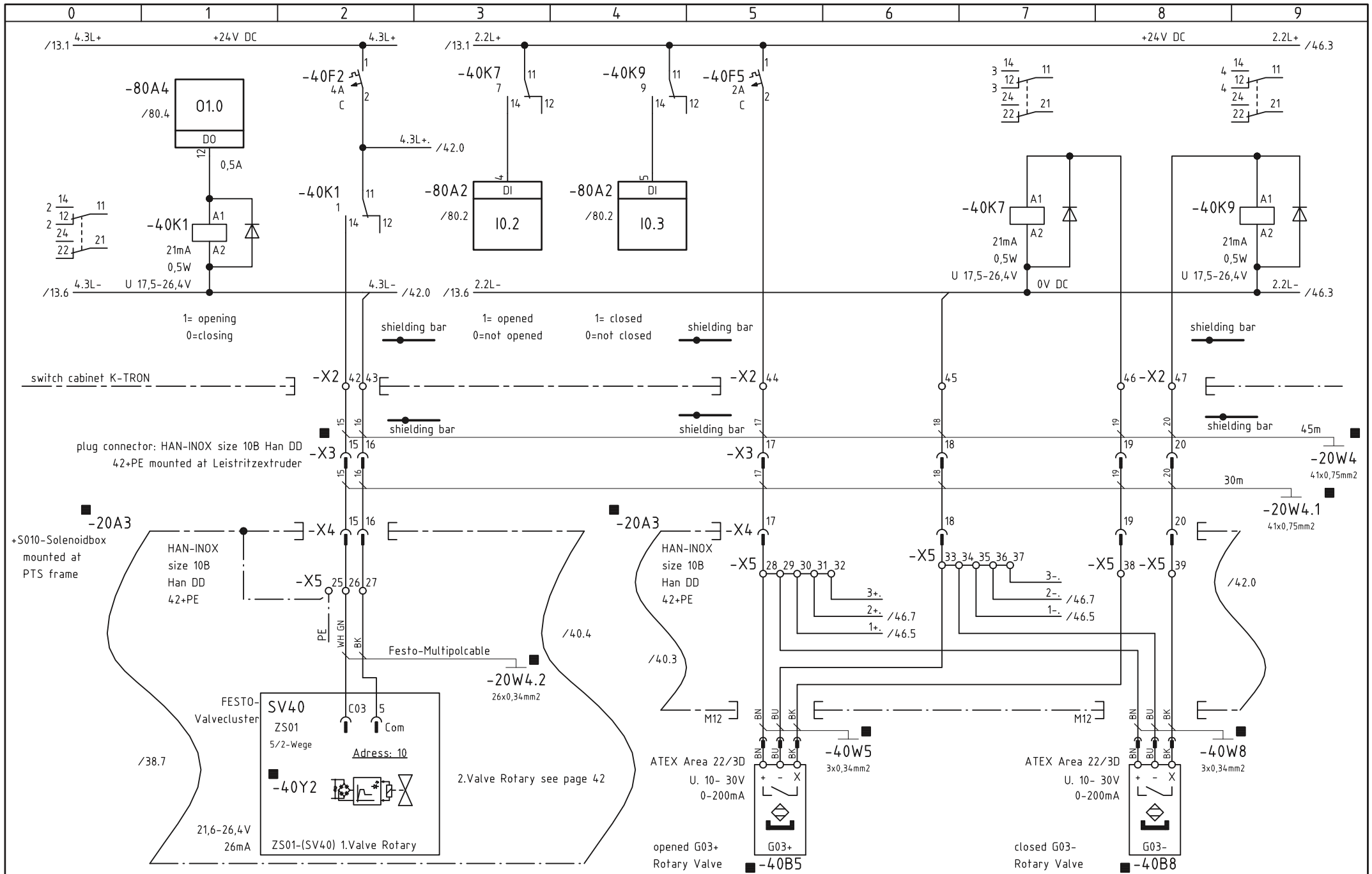


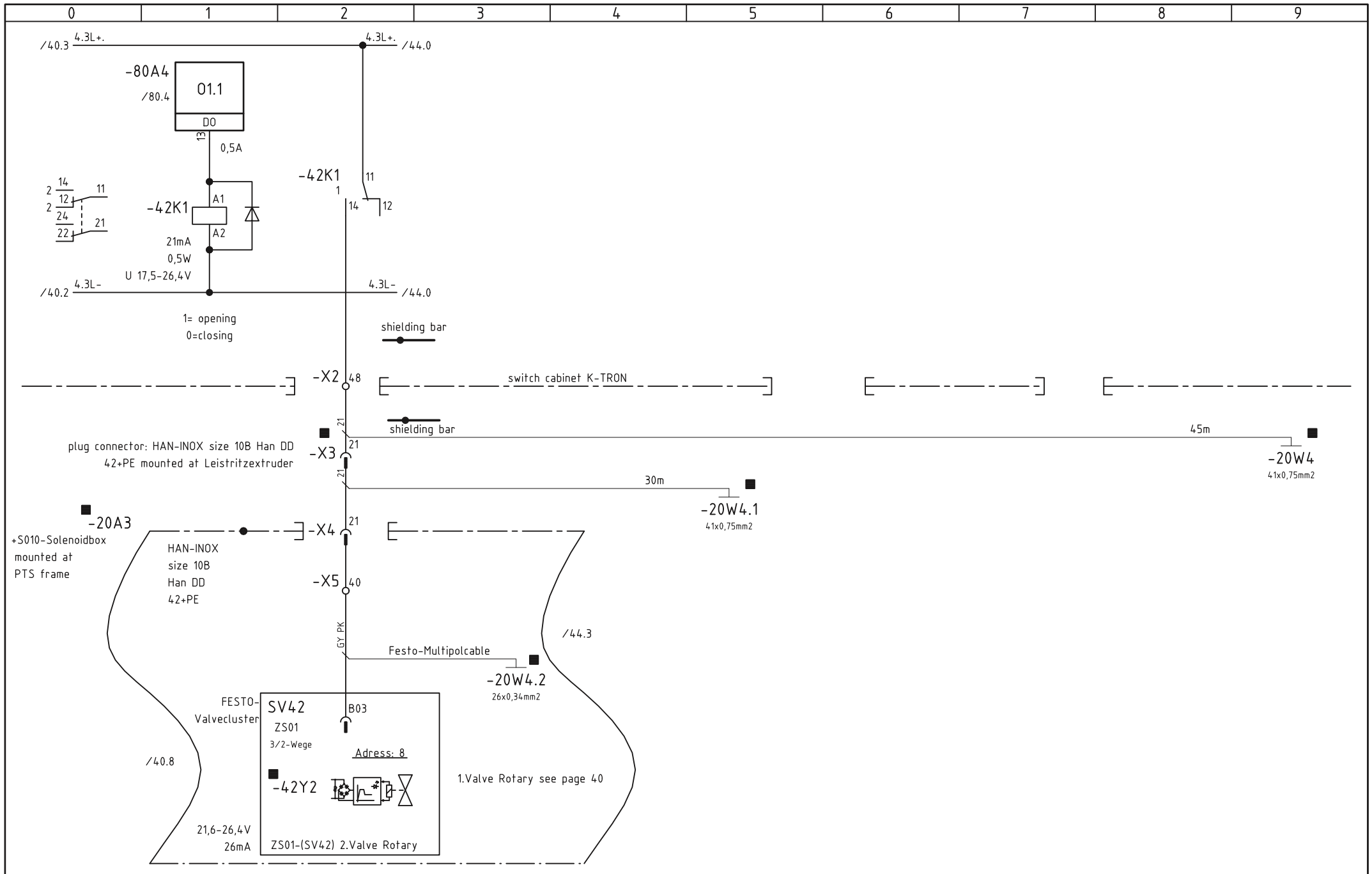
	K-Tron (Schweiz) AG Industrie Lenzhard CH-5702 Niederlenz Alle Rechte vorbehalten All rights reserved © K-Tron Soder 2002	title: 1.Filtercleaning F03.1 - F03.3	type: P100, special	To Filterdedusting at conveyer		next page: 34	page no.: 32
		project no.: 1315690	no.: 1 tag:	=5235-C002	+S002	drawing no.: 1315690702	rev.: A




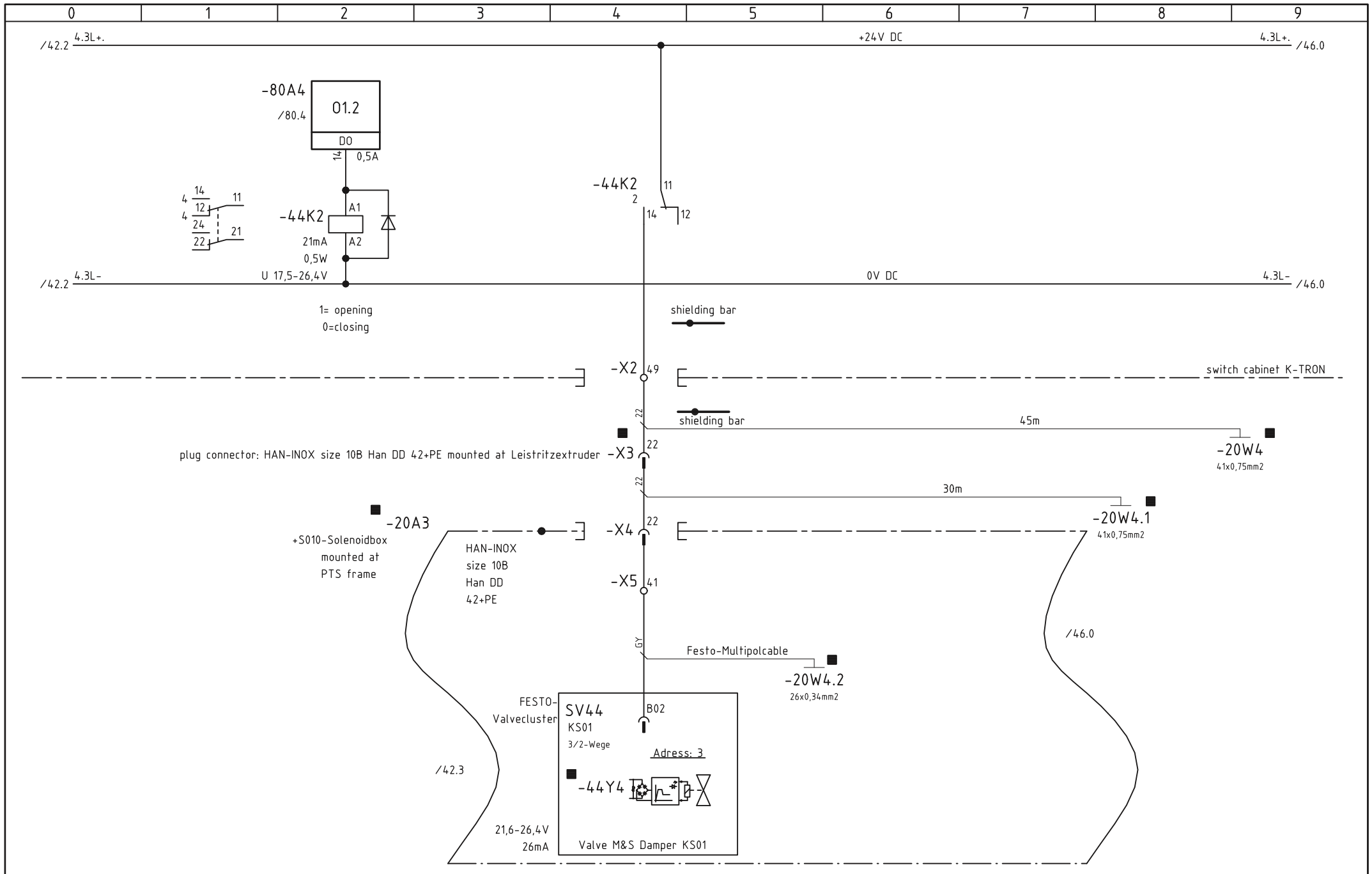


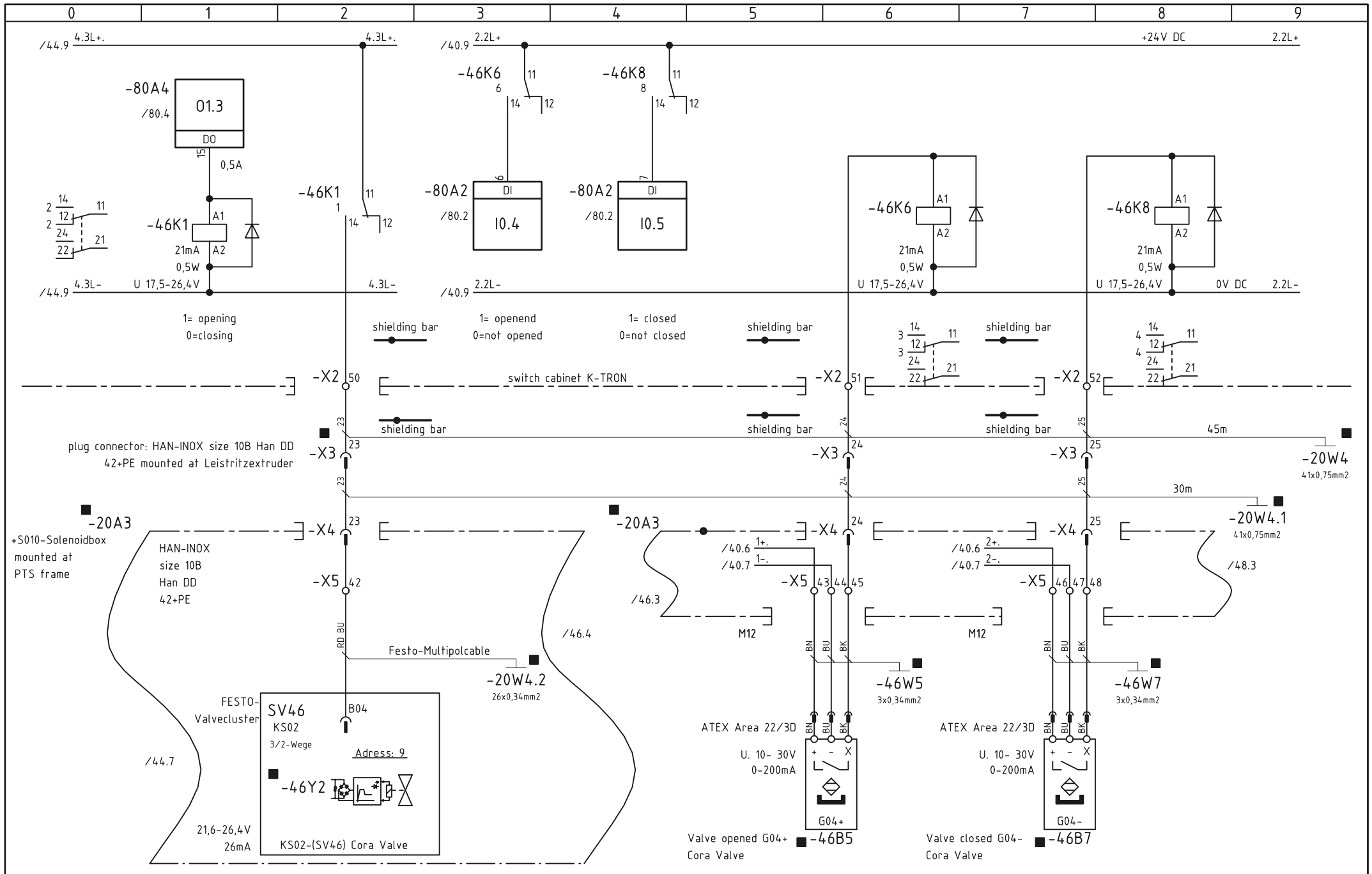






	K-Tron (Schweiz) AG Industrie Lenzhard CH-5702 Niederlenz Alle Rechte vorbehalten All rights reserved © K-Tron Soder 2002	title: 2.Rotary valve Cora ZS01	type:P100,special	Rotary valve to conveyer		next page: 44	page no.: 42
		project no.: 1315690	no.: 1	=5235-C002	+S002	drawing no.: 1315690702	rev.: A





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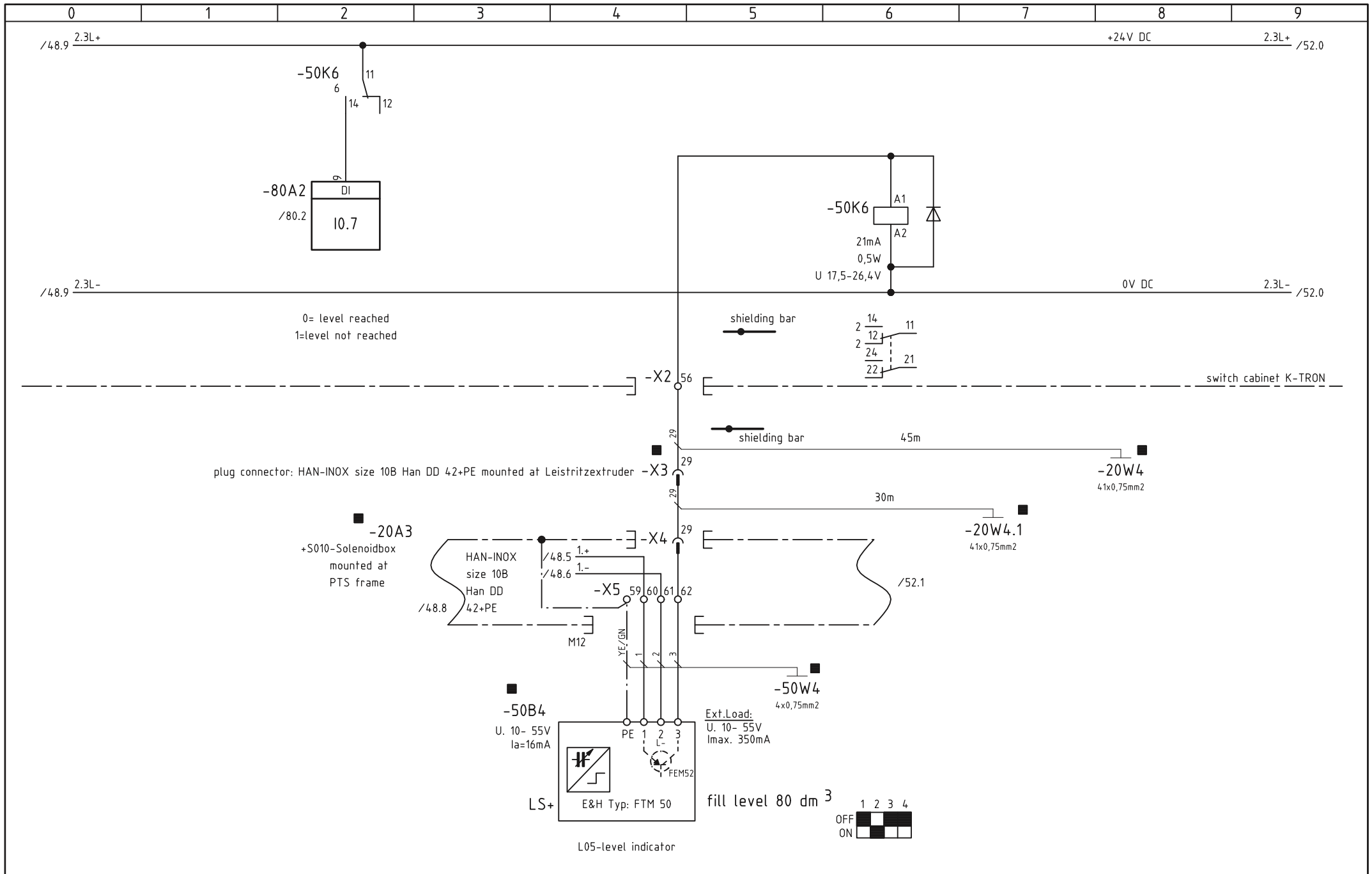
title: Cora Damper KS02
project no.: 1315690

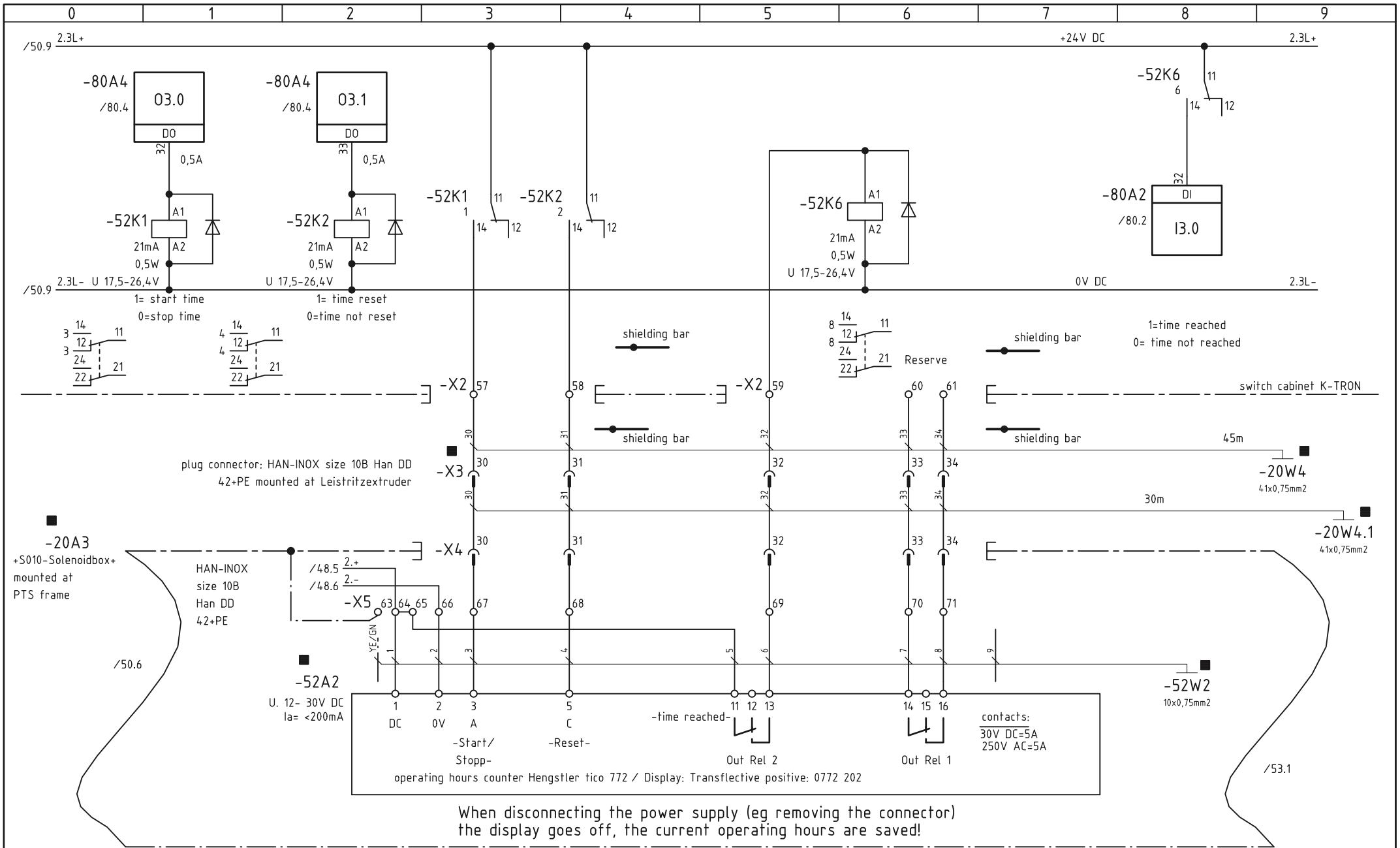
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no.: 1
tag:

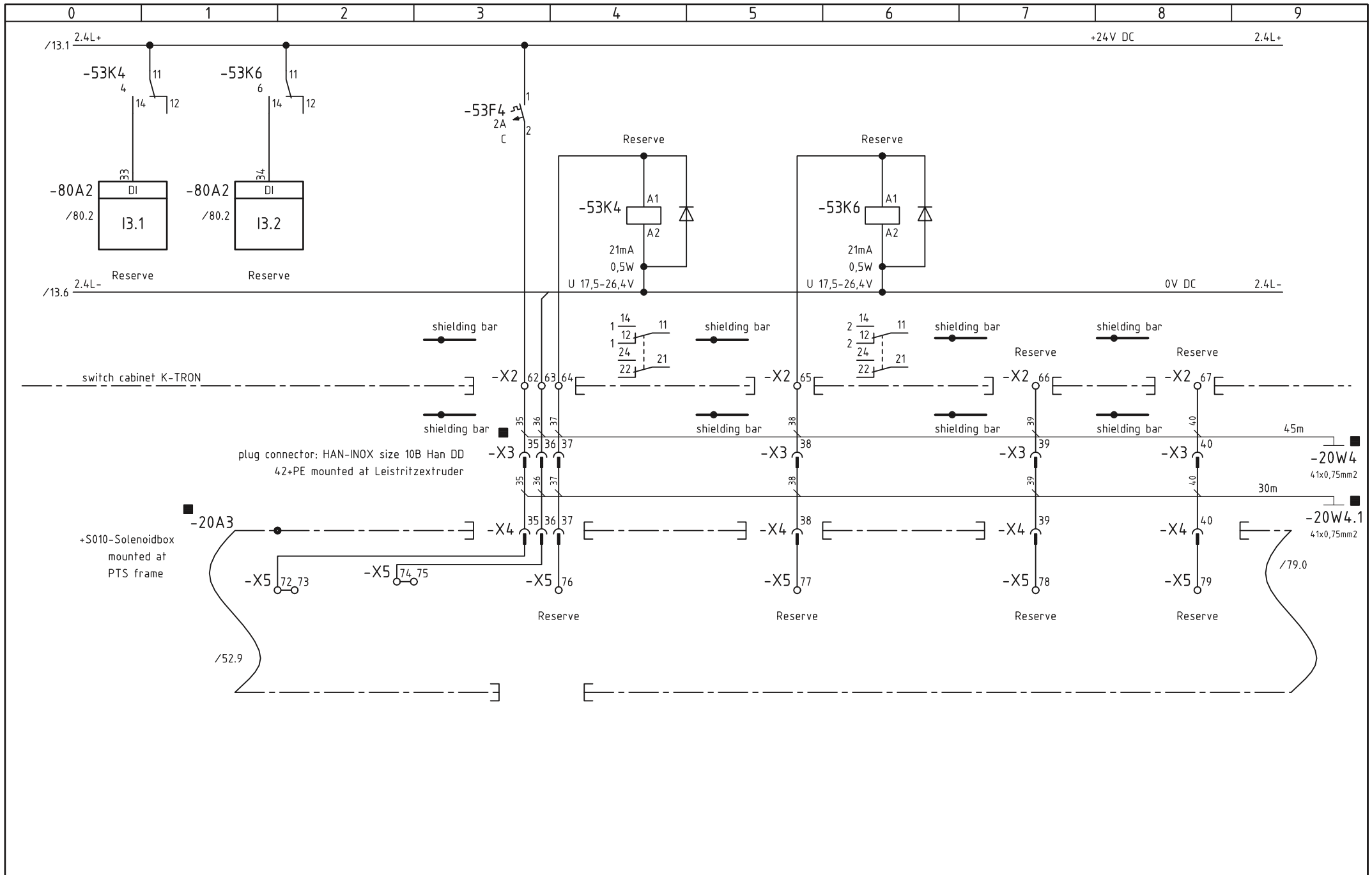
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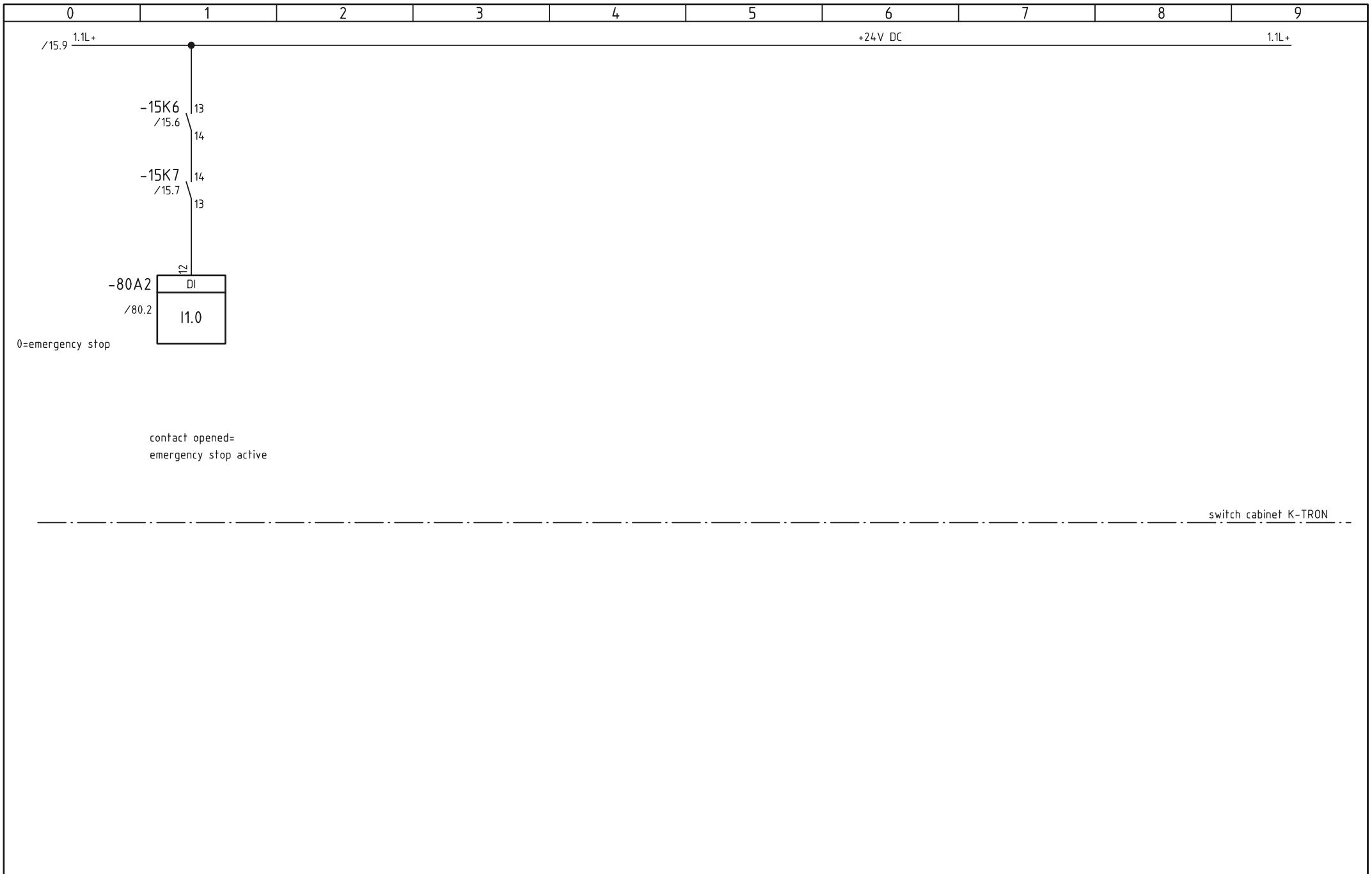
+S002


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drawing no.: 1315690702	rev.: A

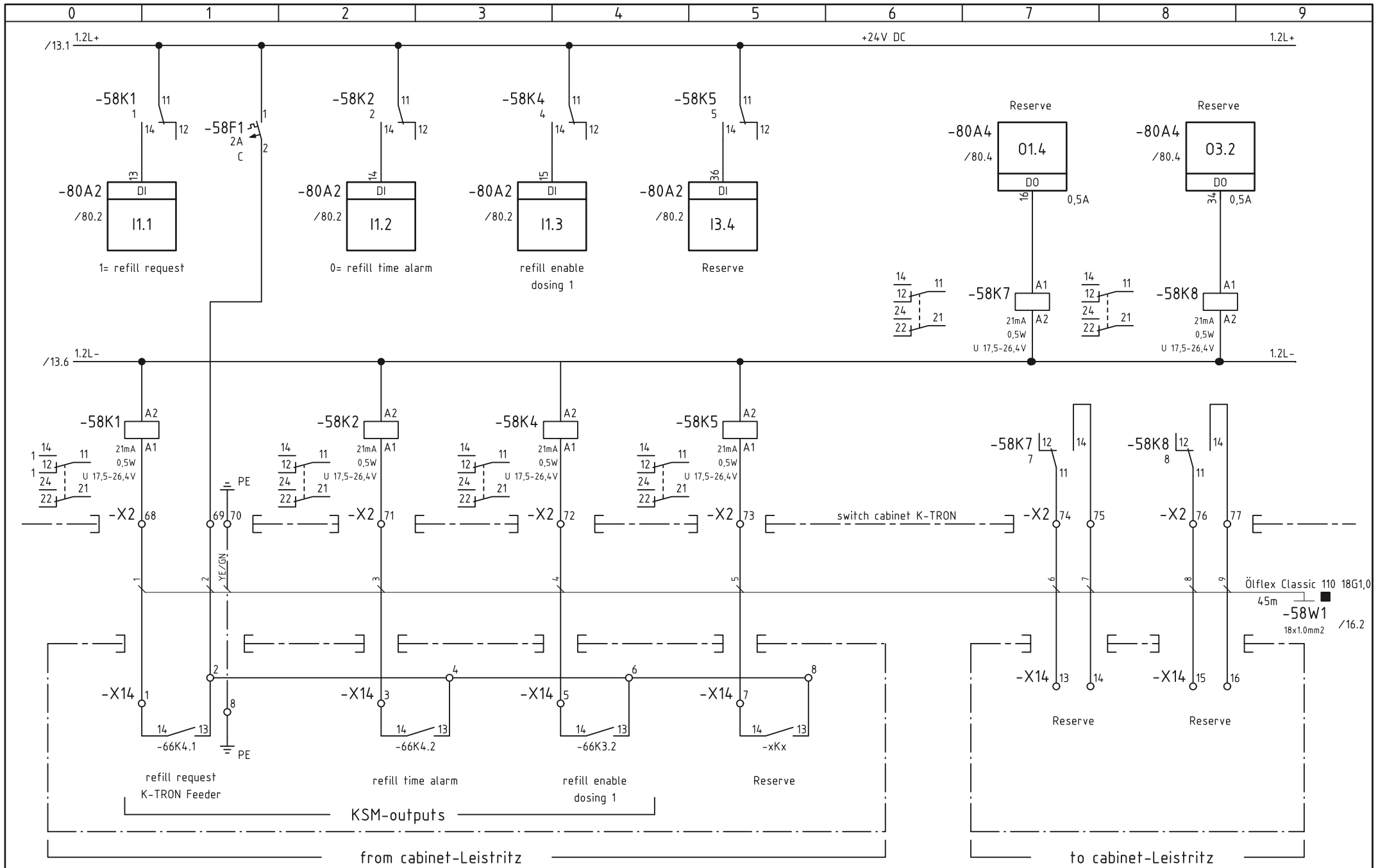


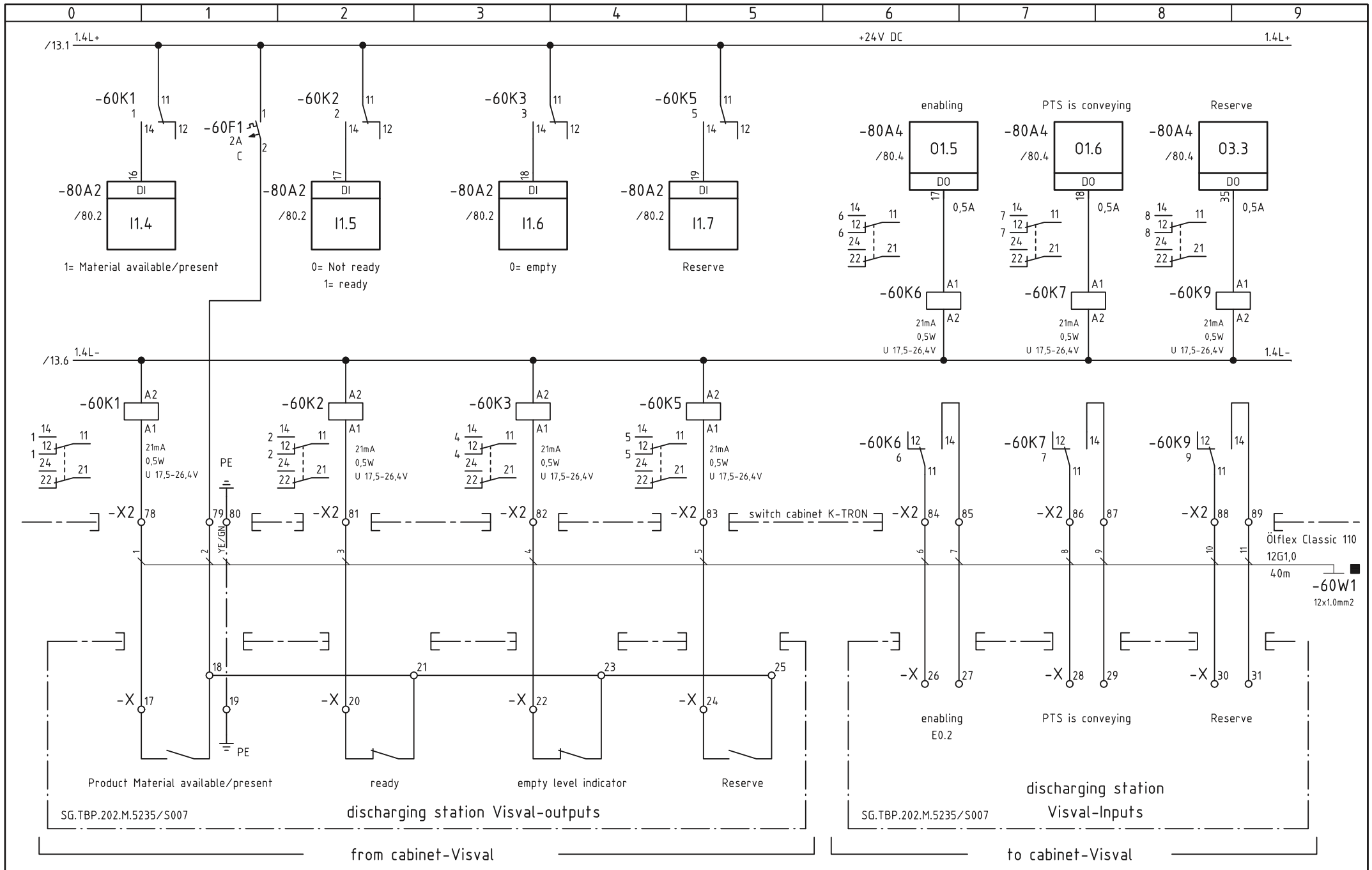


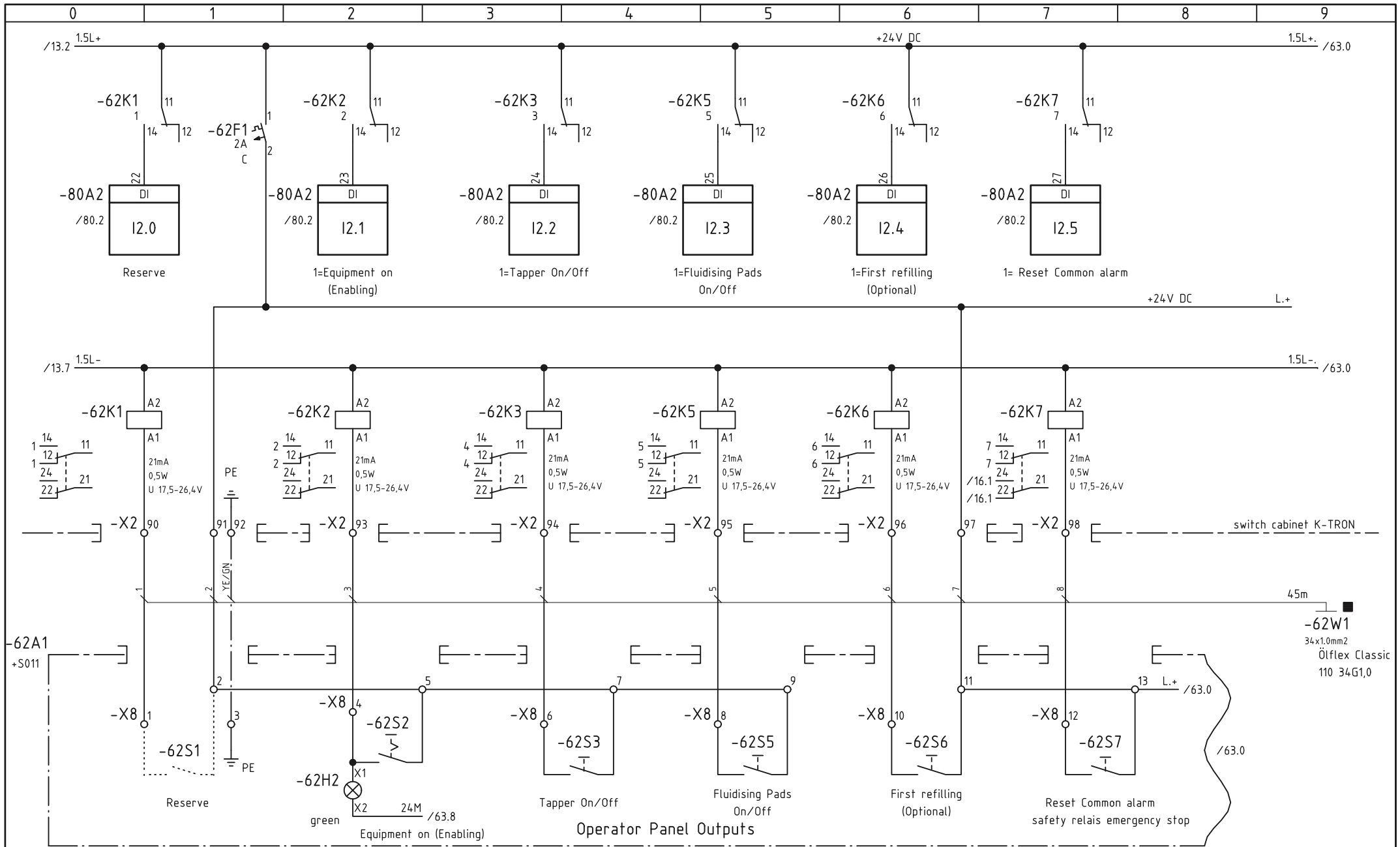




	K-Tron (Schweiz) AG Industrie Lenzhard CH-5702 Niederlenz © K-Tron Soder 2002	Alle Rechte vorbehalten All rights reserved	title: PLC-Inputs internal		type:system		next page: 58	page no.: 55	
			project no.: 1315690		no.:		drawing no.:		rev.:
					tag:		=5235-C002	+S002	1315690702

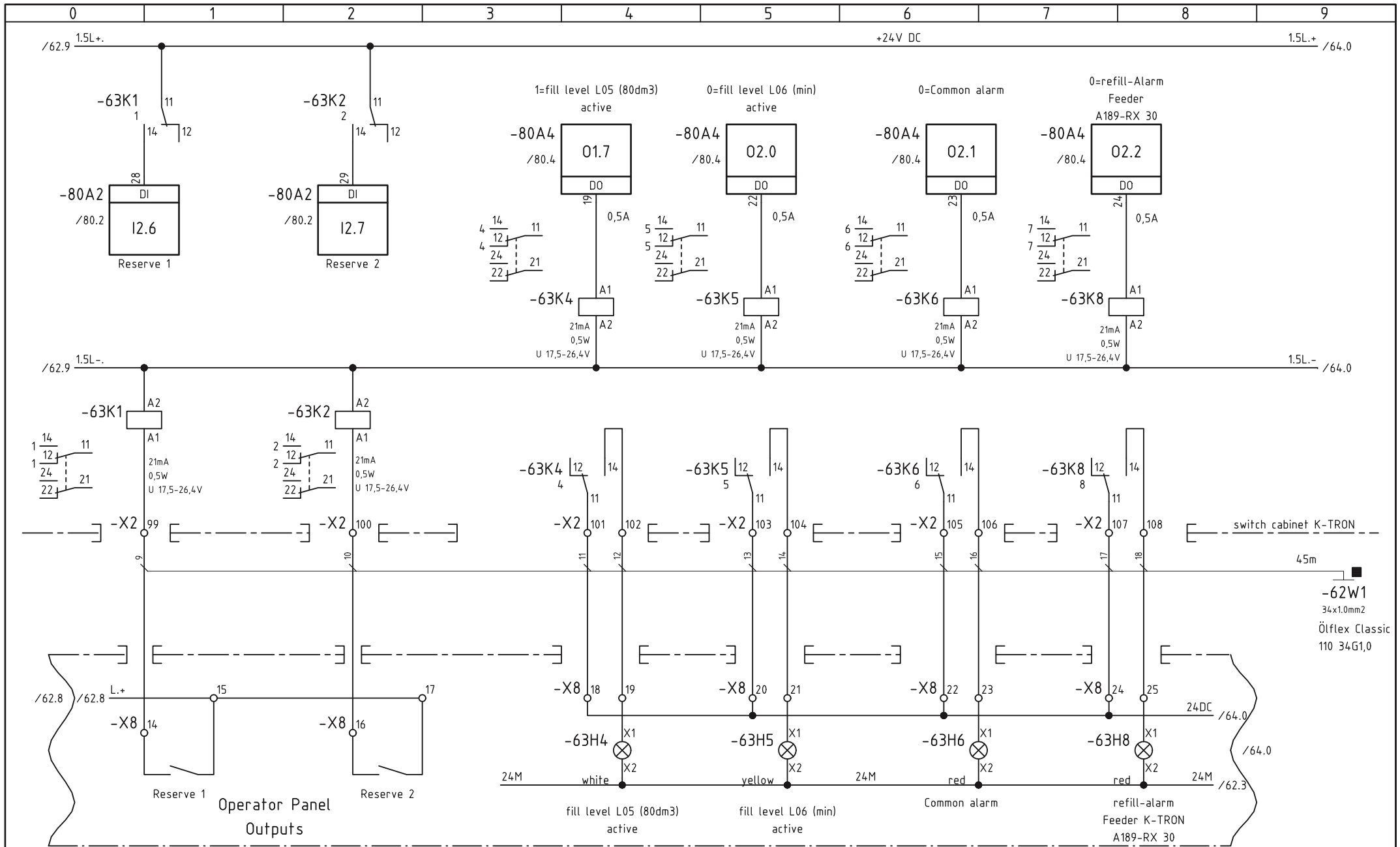






=5235/C002 +S011 -62A1

operation terminal SG.TBP.202.M.5235/C002



=5235/C002 +S011 -62A1

operation terminal SG.TBP.202.M.5235/C002



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title: Signalexchange Novartis-K-TRON

project no.: 1315690

type: system

no.:

tag:

=5235-C002

+S002

next page: 64

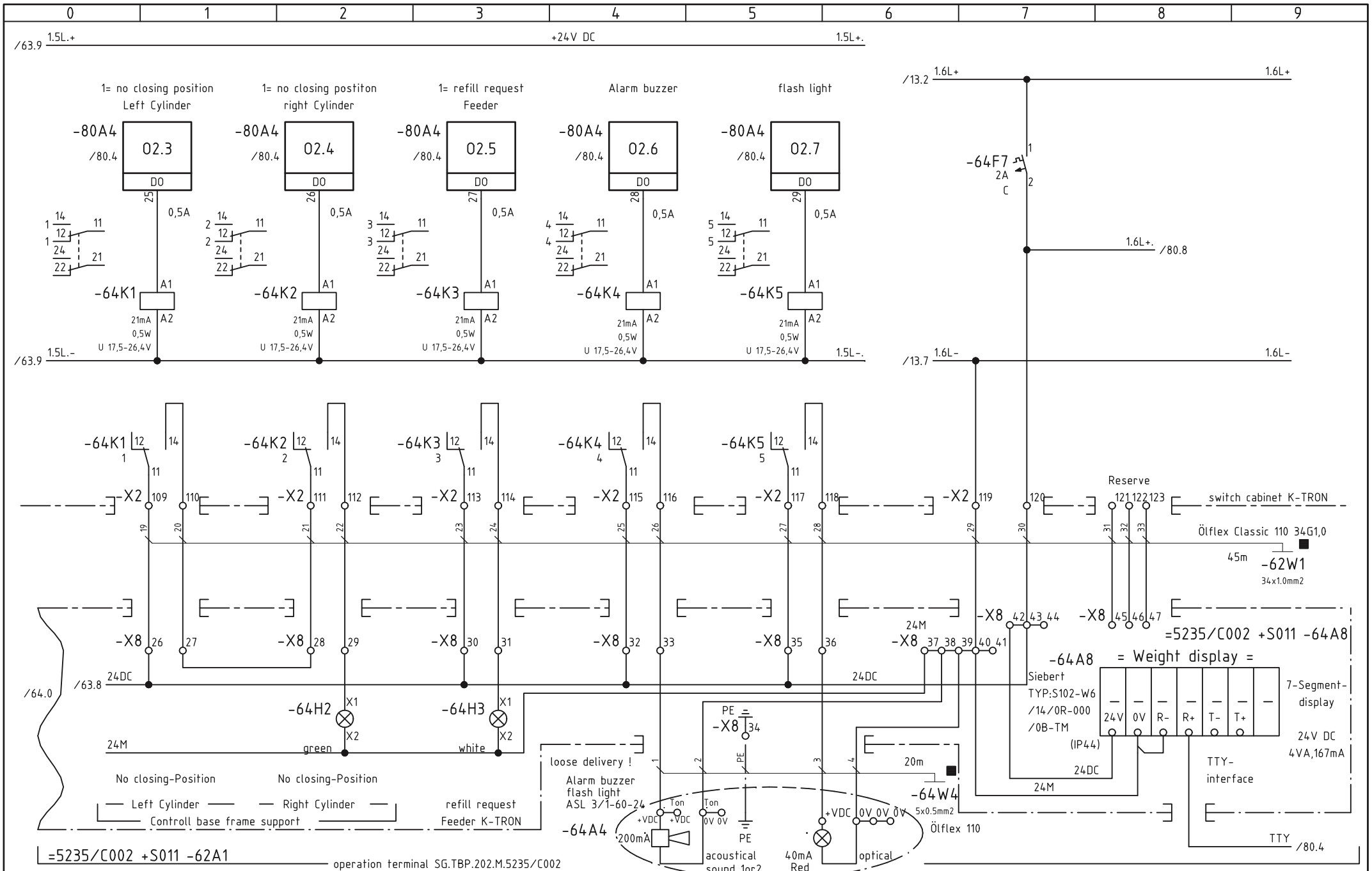
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1315690702


page no.: 63

rev.:


A




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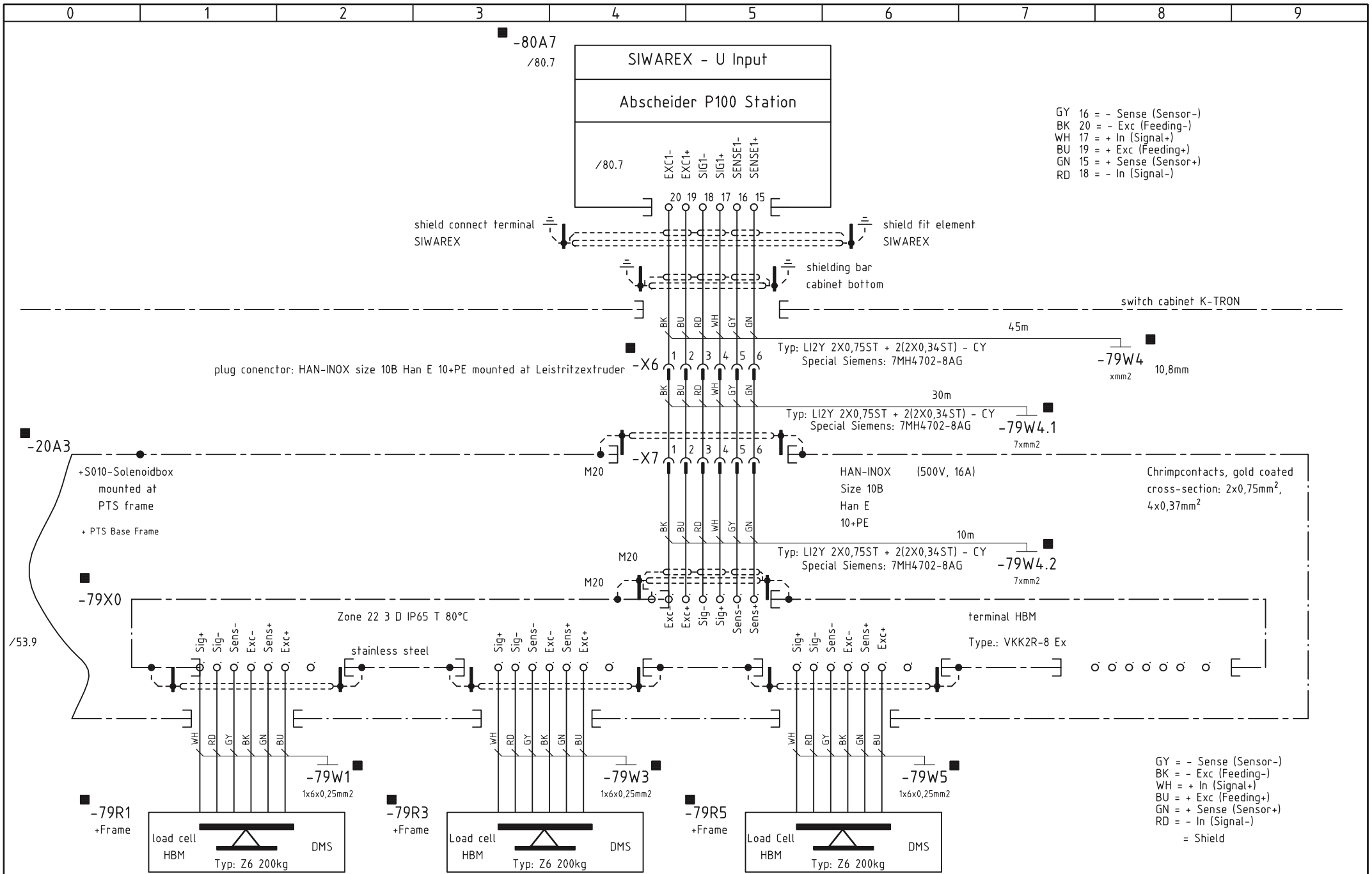
	K-Tron (Schweiz) AG Industrie Lenzhard CH-5702 Niederlenz	Alle Rechte vorbehalten All rights reserved © K-Tron Soder 2002	title: Reserve		type:system		next page: 72 page no.: 65		
			project no.: 1315690		no.:		drawing no.:		rev.: A
					tag:		=5235-C002	+S002	

0	1	2	3	4	5	6	7	8	9

	K-Tron (Schweiz) AG Industrie Lenzhard CH-5702 Niederlenz	Alle Rechte vorbehalten All rights reserved © K-Tron Soder 2002	title: Reserve		type:system		next page: 74 page no.: 72		
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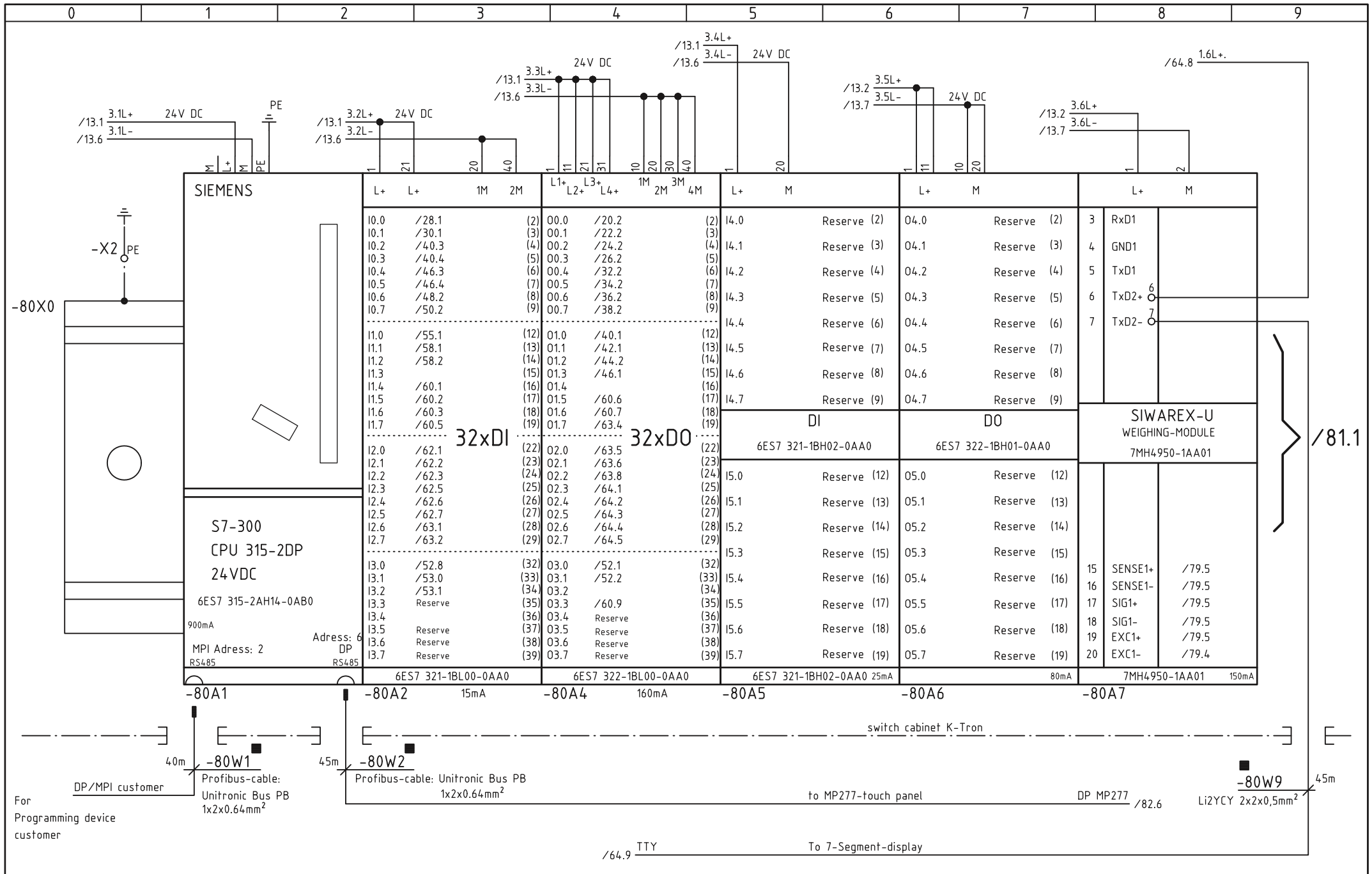
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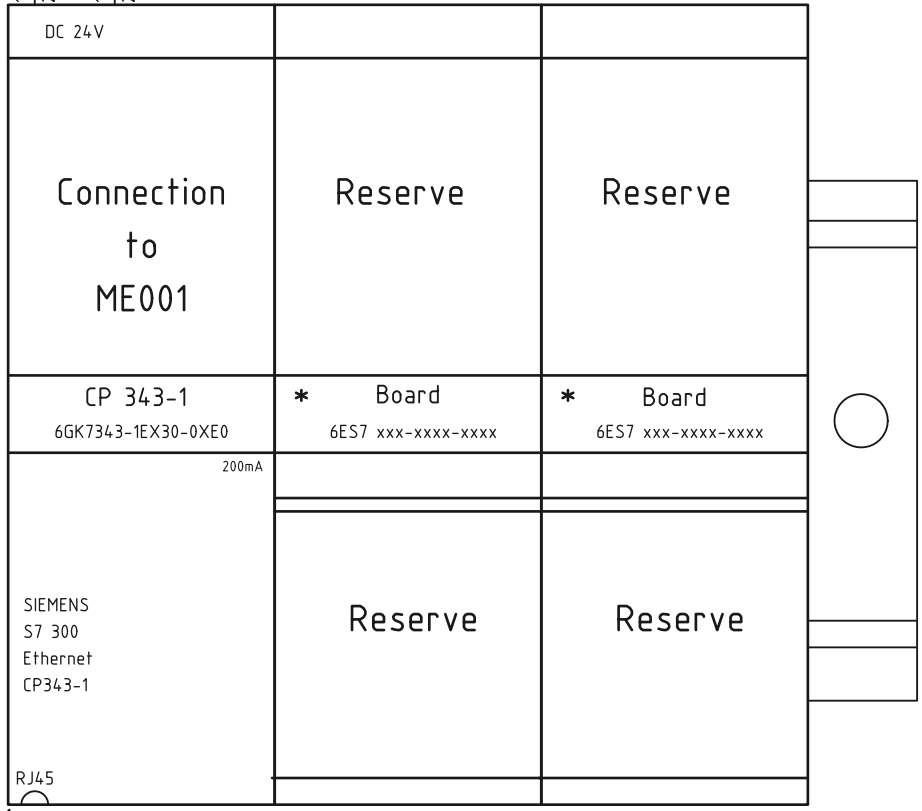
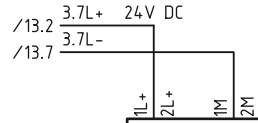
	K-Tron (Schweiz) AG Industrie Lenzhard CH-5702 Niederlenz	Alle Rechte vorbehalten All rights reserved © K-Tron Soder 2002	title: Reserve		type: system		next page: 79		page no.: 74		
			project no.: 1315690		no.:				drawing no.:		rev.:
					tag:		=5235-C002	+S002	1315690702		A



GY 16 = - Sense (Sensor-)
BK 20 = - Exc (Feeding-)
WH 17 = + In (Signal+)
BU 19 = + Exc (Feeding+)
GN 15 = + Sense (Sensor+)
RD 18 = - In (Signal-)

GY = - Sense (Sensor-)
BK = - Exc (Feeding-)
WH = + In (Signal+)
BU = + Exc (Feeding+)
GN = + Sense (Sensor+)
RD = - In (Signal-)
= Shield





/80.9

-81A1

switch cabinet K-Tron



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title: CP 341-1, Reserve SPS
project no.: 1315690

type:
no.:
tag:

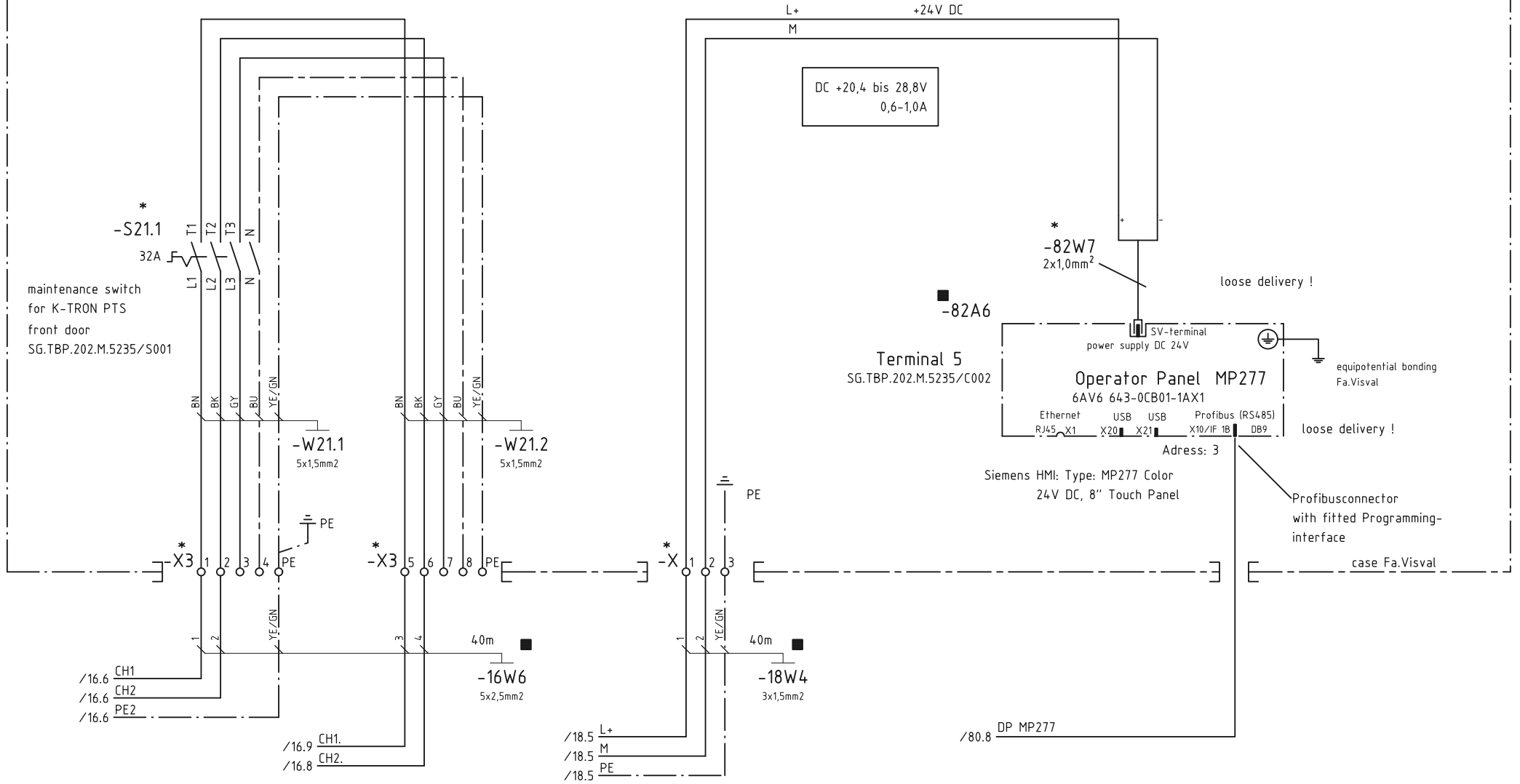
=5235-C002 +S002

next page: 82 page no.: 81
drawing no.: 1315690702

rev.: A

cabinet Fa.Visval
SG.TBP.202.M.5235/S007

cabinet Fa.Visval
SG.TBP.202.5235/S007



* providing customer



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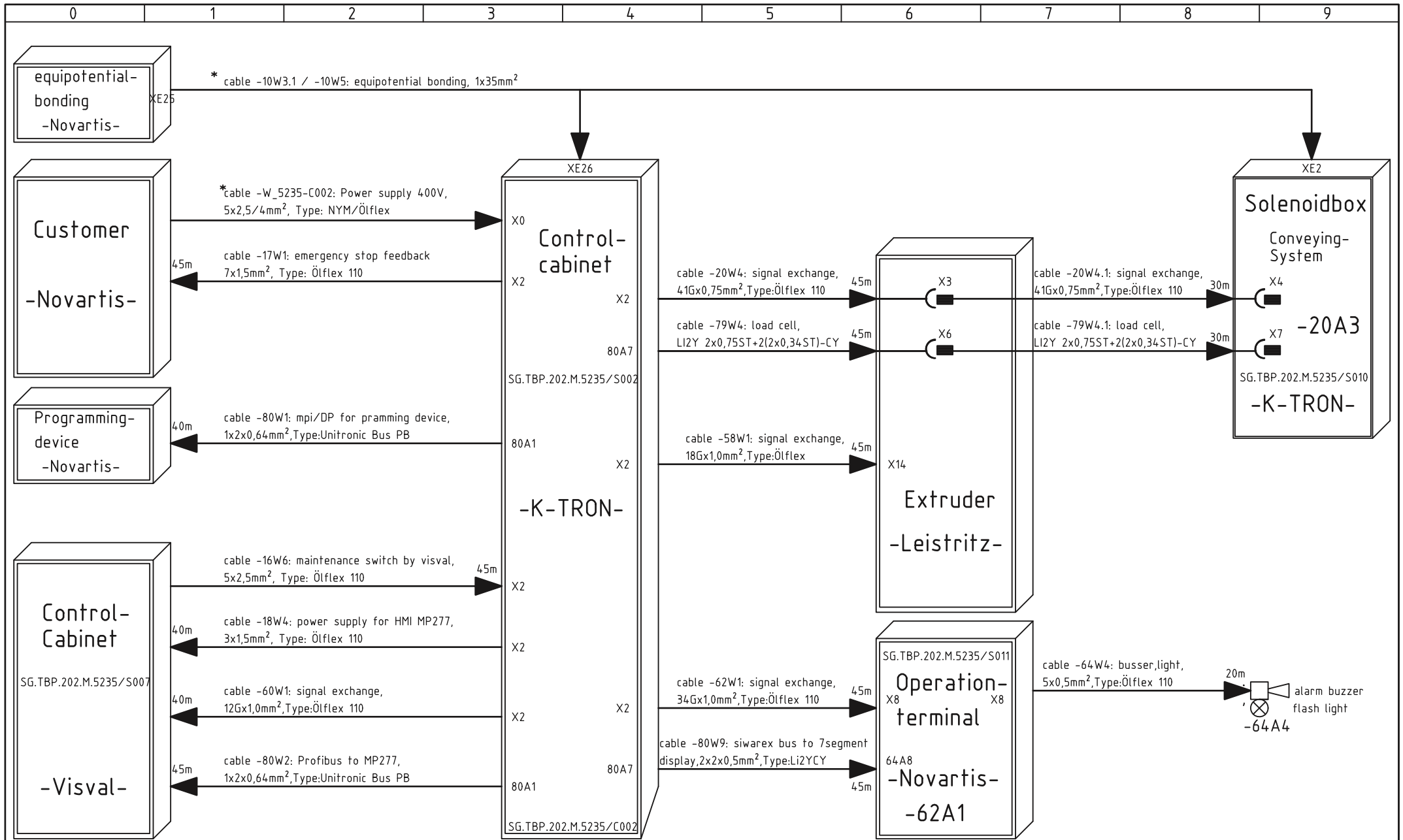
title: control panell MP277 -Profibus
project no.: 1315690

type:MP277
no.: Terminal 5
tag:

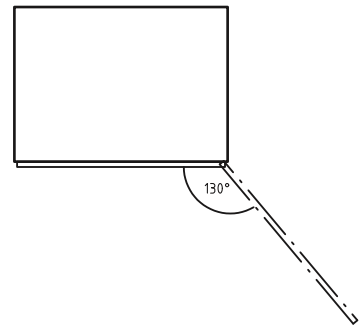
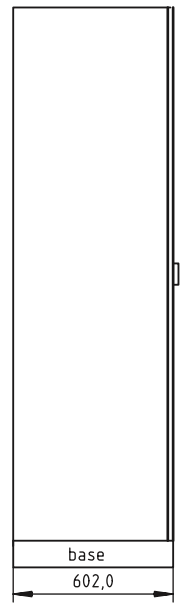
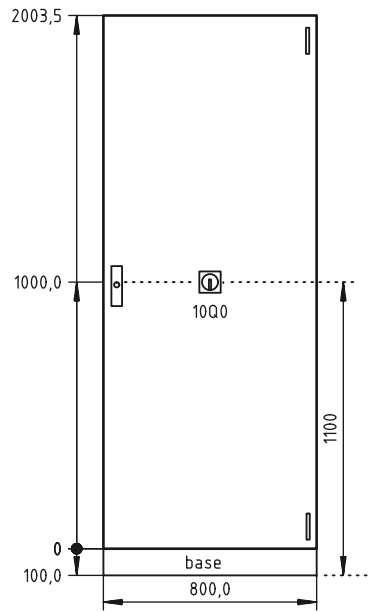
Terminal 5
=5235-C002 +cabinet Visval

next page:
drawing no.: 1315690702
page no.: 82
rev.: A

Nr.	length	cable designation	comment	type	destination from	destination to
1	0.00	-W_5235/C002 *	AC-power supply K-TRON Cabinet S002	NYM/Ölflex 5 x 2,5/4mm ²	= supply customer-X	=5235/C002 +S002-X0
2	0.00	-10W3.1/10W5 *	equipotential bonding Equipment	1 x 25/35mm ²	equipotential bonding customer-X	=5235/C002 +S002-bar
3	45m	-16W6	K-TRON maintenance switch by Visval	Ölflex 110 5 x 2,5mm ²	=5235/C002+S002 -X2	=202.M.5235 +S001-X
4	45m	-17W1	emergency stop feedback	Ölflex 110 7 x 1,5mm ²	=5235/C002+S002 -X2	=customer +Sx-X
5	40m	-18W4	24V-power supply MP277 (at Visval)	Ölflex 110 3 x 1,5mm ²	=5235/C002 +S002-X2	=202.M.5235 +S001-X
6	45m	-20W4	signal exchange Solenoidbox/conveyer	Ölflex 110 41G x 0,75mm ²	=5235/C002 +S002-X2	=5235/C002 +Leistritz-X3
7	30m	-20W4.1	signal exchange Solenoidbox/Conveyer	Ölflex 110 41G x 0,75mm ²	=5235/C002 +Leistritz-X3	=5235/C002 +S010 -20A3-X
8	45m	-58W1	signal exchange Leistritz	Ölflex 110 18G x 1,0mm ²	=5235/C002 +S002-X2	=5235/C002+cabLeistritz-X
9	40m	-60W1	signal exchange Visval	Ölflex 110 12G x 1,0mm ²	=5235/C002 +S002-X2	=5235/C002 +S007-X
10	45m	-62W1	signal exchange Novartis term.panel	Ölflex 110 34G x 1,0mm ²	=5235/C002 +S002-X2	=5235/C002 +S011 -62A1-X8
11	20m	-64W4	activation Alarm buzzer,flash light	Ölflex 110 5 x 0,5mm ²	=5235/C002 +S011-62A1-X8	=5235/C002 +field-64A4
12	45m	-79W4	load cell Siwarex-U	LI2Y 2x0,75ST + 2(2x0,34ST) -CY x	=5235/C002 +S002-80A7	=5235/C002 +Leistritz-X6
13	30m	-79W4.1	load cell Siwarex-U	LI2Y 2x0,75ST + 2(2x0,34ST) -CY x	=5235/C002 +Leistritzextr-X6	=5235/C002 +S010-20A3-X7
14	40m	-80W1	DP for Programming device	Unitronic Bus PB 1x2 x 0,64mm ²	=5235/C002 +S002-80A1 MPI/DP	=5235/C002 +Progr.device-X
15	45m	-80W2	Profibusconnection K-TRON Touchpanel	Unitronic Bus PB 1x2 x 0,64mm ²	=5235/C002 +S002-80A1 DP	=202.M.5235+S001-82A6 DP
16	45m	-80W9	Busconnection 7-Segment-display	Li2YCY 2x2 x 0,5mm ²	=5235/C002 +S002-80A7 TxD	=5235/C002 +S011-64A8 RX
				* providing customer		



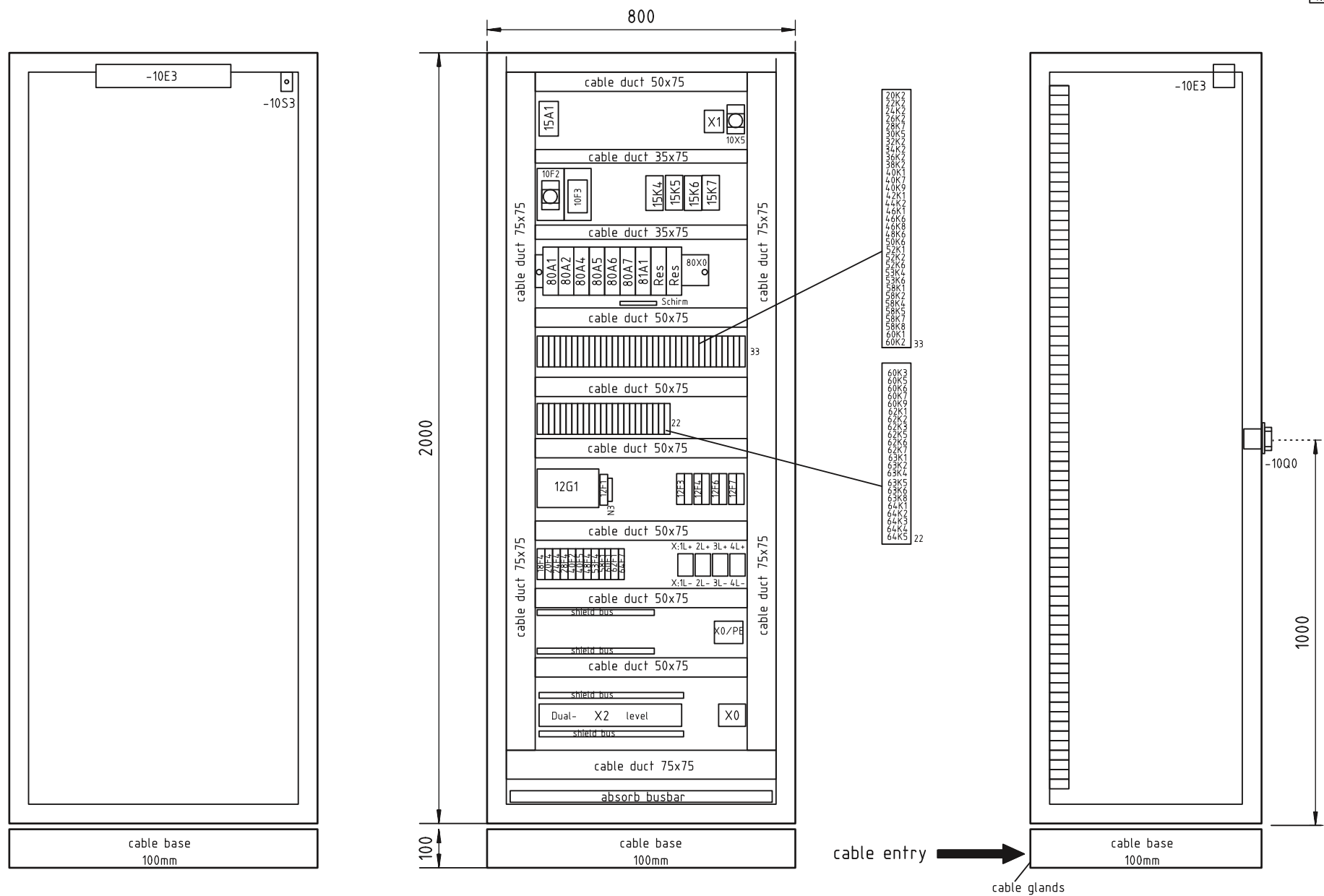
* providing customer



cabinet design:

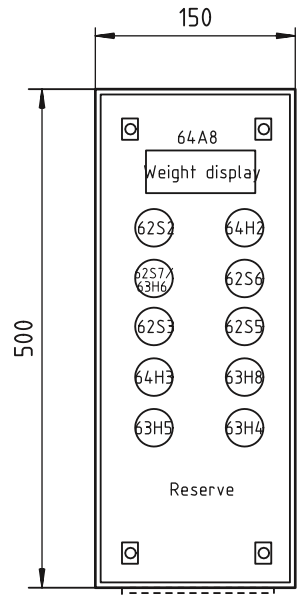
- door: steel plate 2,0mm
- rear wall: steel plate 1,5mm
- mounting plate zinc plated: steel plate 3,0mm
- protection class IP 55
- colour: RAL 7035
- weight: ca: 300kG



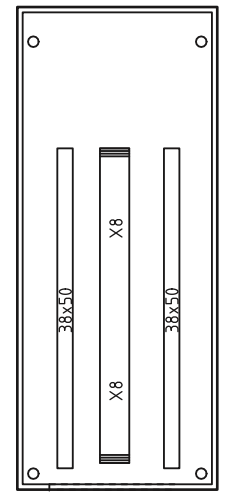


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 - 64K5
- 22

Novartis Panel Tag: SG.TBP.202.M.5235/S002



SG.TBP.202.M.5235/S011

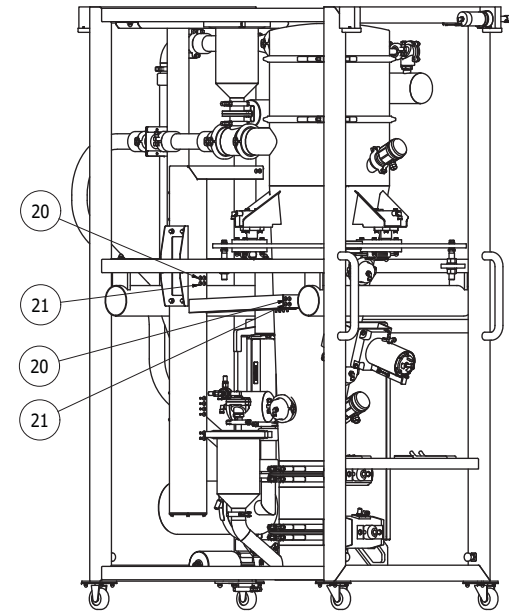
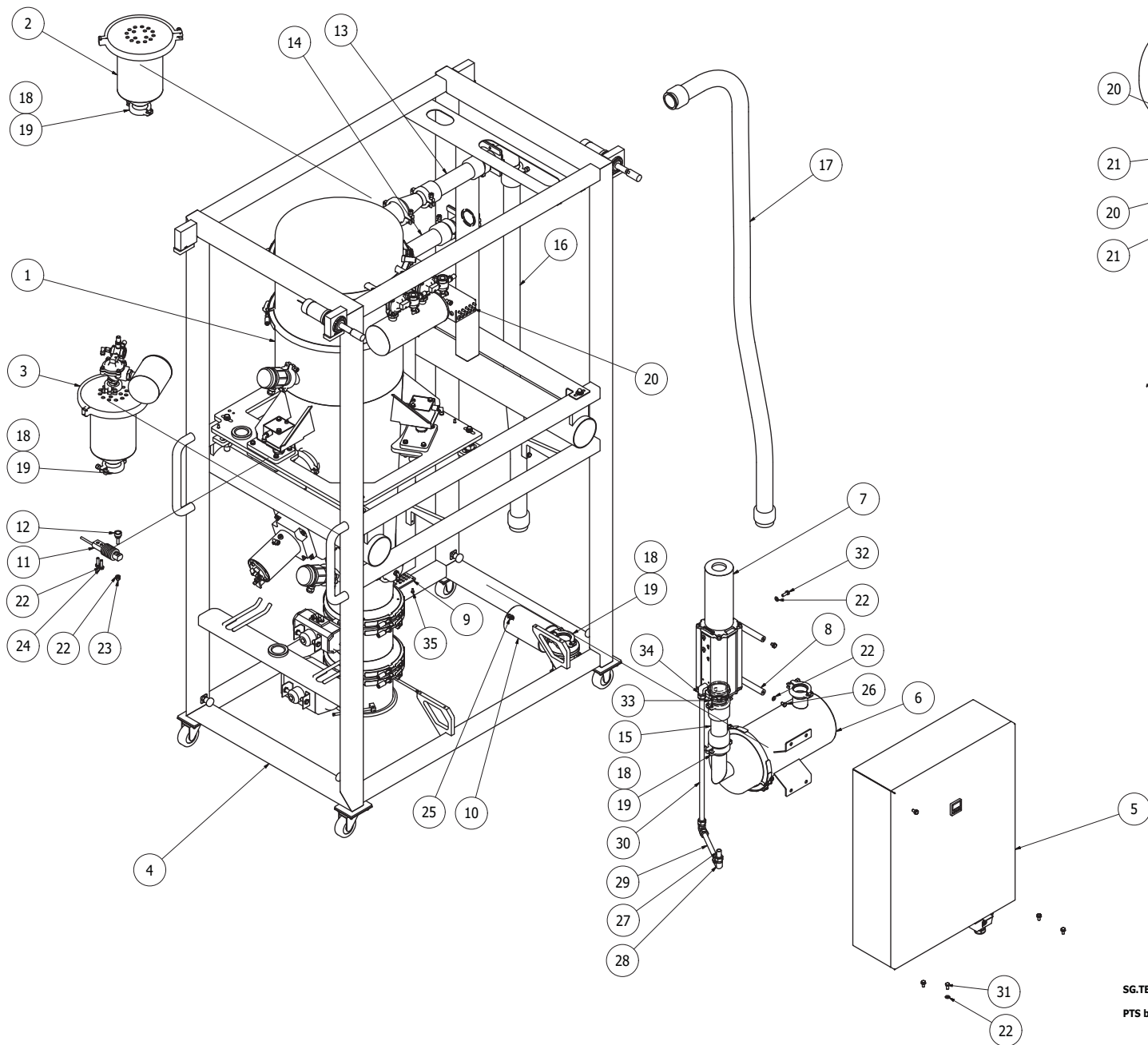


Chapter 10:

Spare Parts

- 1315690000 Cart with Conveyor
- 1214530001 Rail complete
- 1214530004 Receiver
- 1104657003 Filter D160x200
- 1104657004 Filter with Jet Nozzle
- 1214530003 Cart Conveyor
- 1104657006 Control Cabinet
- 1104657008 Holder Tube
- 1214530006 Filter Safety HEPA
- 1214530002 Pneumatic Connection
- 1315690500 Pickup Transfer System
- 1315690501 Take Off Pot
- 1104657009 Filter Air for Take Off Pot

Other Spare Part List see Operating Instructions!



MASS THE CART WITH CONVEYOR 420 kg +/- 10%

MASS DES ROLLWAGENS MIT ABSCHIEDER 420 kg +/- 10%

SEQ	QTY	NUMBER	DESCRIPTION / SUPPLIER	MATERIAL
25	4	0000990344	SCREW / SCHRAUBE - HEX M5x10 ISO4017	A2 AISI 304
34	1	0000025367	FITTING - ELB90 1/2" (M) TUBE D16	X5 CrNiMo17-12-2 AISI 316
23	1	0000040370	NOZZLE / STÜTZEN - PIAB PUMP 2.5" FER L60	X2 CrNiMo17-12-2 AISI 316L
32	4	0000990387	SCREW / SCHRAUBE - HEX M8x22 ISO4017	A2 AISI 304
31	6	0000990384	SCREW / SCHRAUBE - HEX M8x16 ISO4017	A2 AISI 304
30	1	0000026959	ROHR / TUBE Ø16/1.5x574	X2 CrNiMo17-12-2 AISI 316L
29	1	0000032071	TUBE / ROHR - RND D16/1.5X200 SST316L	X2 CrNiMo17-12-2 AISI 316L
28	2	0000025369	FITTING - ELB90 TUBE D16	X5 CrNiMo17-12-2 AISI 316
27	1	0000025379	ROHR / TUBE Ø16/1.5x50	X2 CrNiMo17-12-2 AISI 316L
26	2	0000990382	SCREW / SCHRAUBE - HEX M8x12 ISO4017	A2 AISI 304
25	1	0000036620	FITTING PNEU STR 1/8" PUSH 8 MM	X2 CrNiMo17-12-2 AISI 316L
24	6	0000990389	SCREW / SCHRAUBE - HEX M8x20 ISO4017	A2 AISI 304
23	3	000091118	NUT / MUTTER - HEX DOME M8 DIN1587	A2 AISI 304
22	21	000091167	WASHER / SCHEIBE - FLAT M8 8.4/16x1.6 ISO7089	A2 AISI 304
21	15	0000026923	GROMMET / TUELLE - CABLE ID6 OD14 S1.5	CR
20	17	0000026921	GROMMET / TUELLE - CABLE ID8 OD15 S1.5	CR
19	14	0000019466	CLAMP / KLEMME - FL D84 FER D/6 SX15.5 SST316	
18	14	0000019471	GASKET / DICHTUNG - RND FER Ø164 ID50.2 MWQ	MWQ
17	1	0000040400	HOSE / SCHLAUCH - ID50 OD58 LANNI PUR TRANSP FDA	
16	1	0000040393	HOSE / SCHLAUCH - ID50 OD58 LANNI PUR TRANSP FDA	
15	1	0000040392	HOSE / SCHLAUCH - ID50 OD58 L191 PUR TRANSP FDA	
14	1	0000040385	HOSE / SCHLAUCH - ID50 OD58 L264 PUR TRANSP FDA	
13	1	0000040374	HOSE / SCHLAUCH - ID50 OD58 L291 PUR TRANSP FDA	
12	3	0000026823	BUSHING / BÜCHSE - CNTR THD D24 (M8X30)	X17 CrNi16-2 AISI 431
11	1	0000034220	SCALE / WÄGE - Z8FD1 200KG CBL SM	X2 CrNiMo17-12-2 AISI 316L
10	1	0000018894	VALVE / VENTIL - BTFL TYP SV04 CC DN 50	X2 CrNiMo17-12-2 AISI 316L
9	1	0000030784	PLATE / PLATTE CABLE HOSE - POM FDA	POM
8	2	0000026753	BAR / STANGE - RND D20 X 174.5 AISI 304	X5 CrNi18-10 AISI 304
7	1	0000024267	VACUUMPUMP PIAB P6040	
6	1	1214530006	FILTER SAFETY HEPA	
5	1	1104657006	ENCLOSURE / STEUERKASTEN CPL	
4	1	1214530003	CART / ROLLWAGEN CONVEYOR	
3	1	1104657004	FILTER - BREATH W/ JET NOZZLE D160X200	K-TRON MODEL #1104657004
2	1	1104657003	FILTER - DUST D160X200	K-TRON MODEL #1104657003
1	1	1214530004	RECEIVER / ABSCHIEDER - VAC W/ ROTARY VALVE	CAPACITY 100L
SEQ	QTY	NUMBER	DESCRIPTION / SUPPLIER	MATERIAL

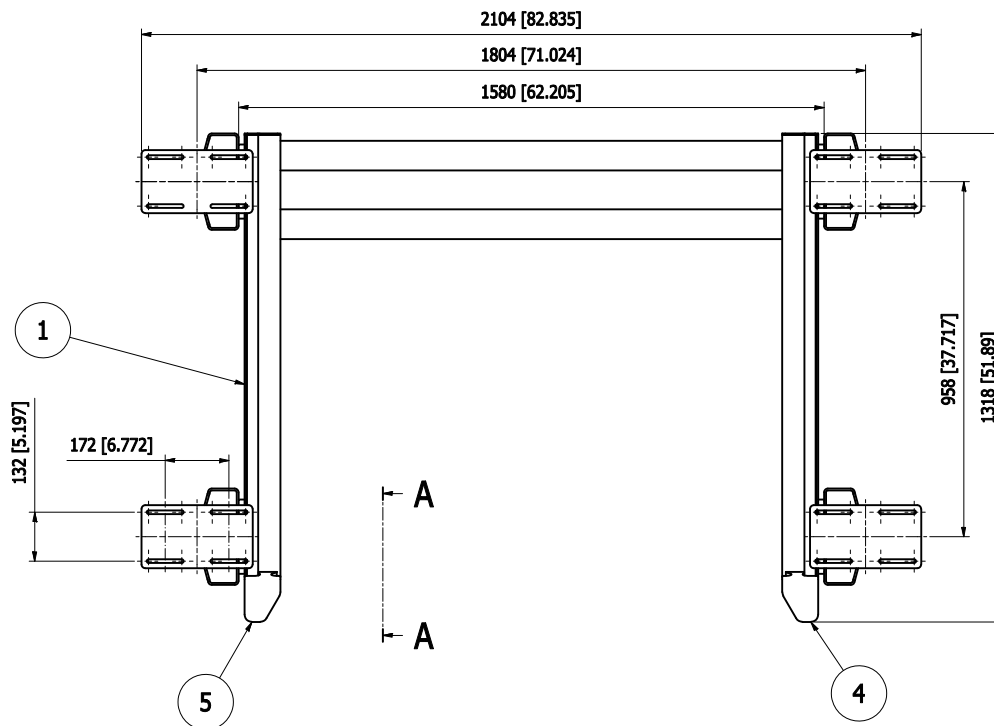
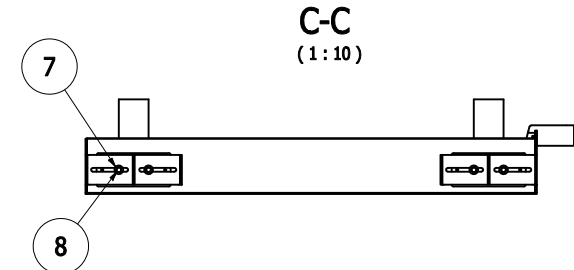
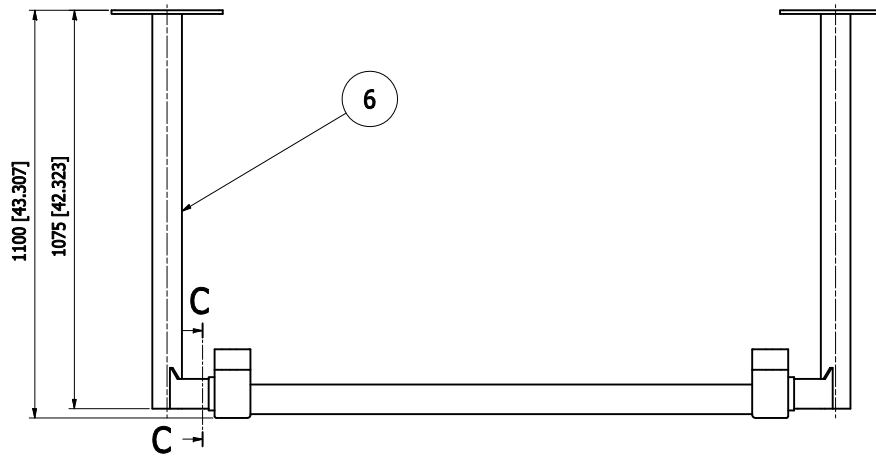
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PTS buffer to Melt Extruder

CART / ROLLWAGEN WITH CONVEYOR
(GMP - WITH TRI CLAMP)

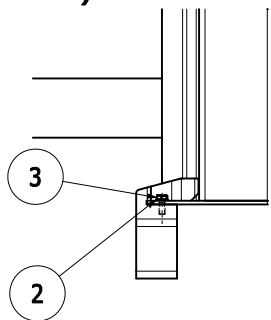
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FIRST ANGLE
APPROVED: 02.03.2014 (PKE)
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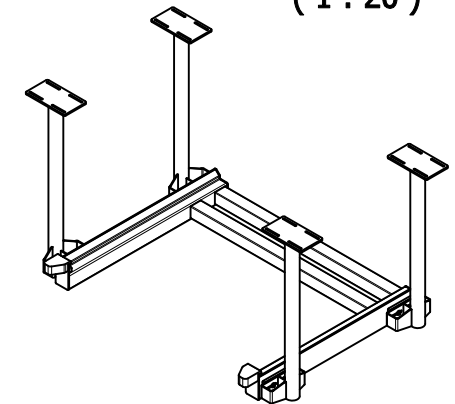
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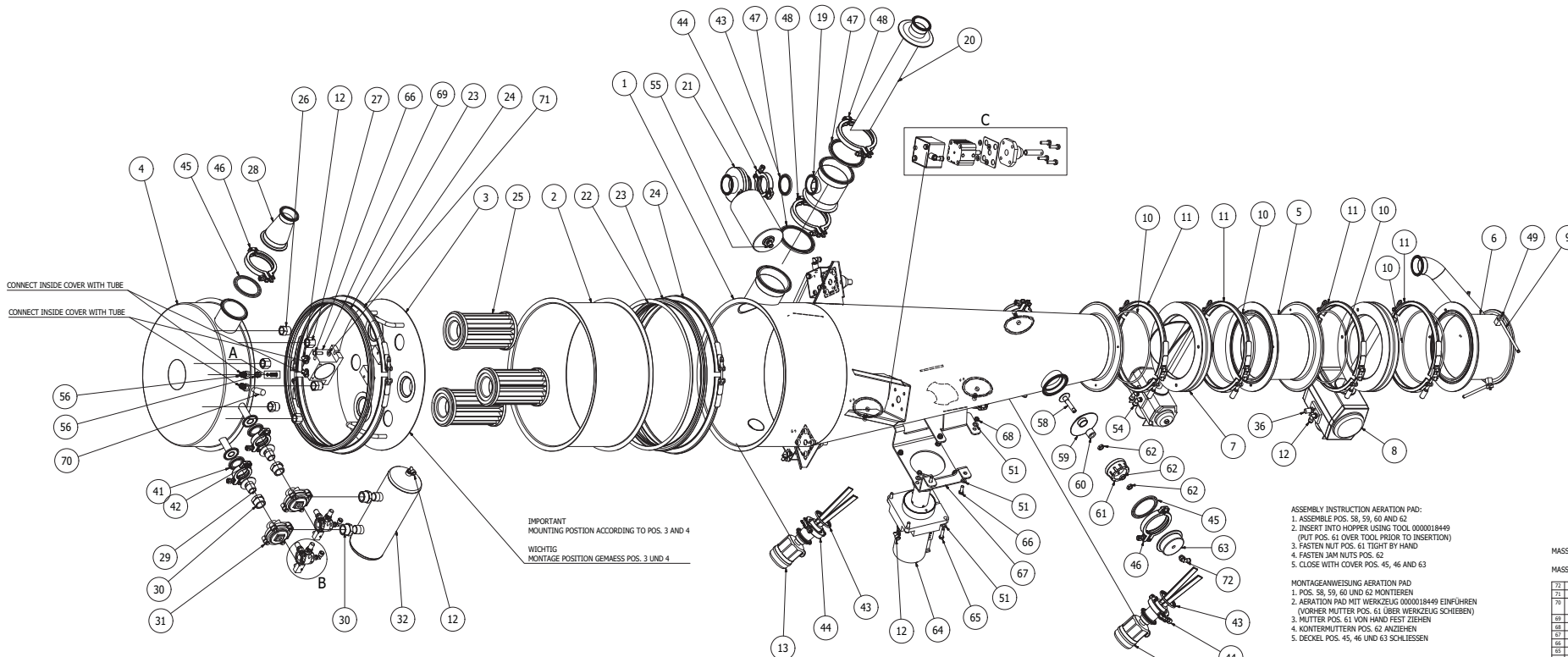


MASS OF THE COMPLETE RAIL 120 kg +/- 10%

MASSE DER KOMPLETTEN SCHIENE 120 kg +/- 10%

SEQ	QTY	NUMBER	DESCRIPTION / SUPPLIER	MATERIAL
8	8	0000990387	SCREW / SCHRAUBE - HEX M8x22 ISO4017	A2 AISI 304
7	8	0000991225	WASHER / SCHEIBE - FLAT OVS M8 8.4/24x2 ISO7093	A2 AISI 304
6	4	000030745	SUPPORT / STUETZE - SST304 PCKLD	
5	1	000030687	PLATE / PLATTE - INSERT 97X100X40 POM	POM
4	1	000030689	PLATE / PLATTE - INSERT 97X100X40 POM	POM
3	4	0000990386	SCREW / SCHRAUBE - HEX M8x20 ISO4017	A2 AISI 304
2	4	0000991167	WASHER / SCHEIBE - FLAT M8 8.4/16x1.6 ISO7089	A2 AISI 304
1	1	000030739	RAIL / SCHIENE - SST304 PCKLD	

RAIL / SCHIENE - COMPLETE		SCALE	1:10	DRAWN	DD.MM.YYYY SIGN
		FIRST ANGLE		APPROVED	DD.MM.YYYY SIGN
		PAGE	1 OF 1	CATEGORY	P-Level
		DIMENSION SHOWN IN MILLIMETERS [INCH]		FORMAT	NUMBER
ALL RIGHTS RESERVED © 2014 WWW.COPERIONKTRON.COM		A2	1214530001		REV
					B



ASSEMBLY INSTRUCTION AERATION PAD:
 1. ASSEMBLE POS. 58, 59, 60 AND 62
 2. INSERT INTO HOPPER USING TOOL 0000018449
 (PUT POS. 61 COVER TOOL PRONG TO INSERTION)
 3. FASTEN NUT POS. 61 TIGHT BY HAND
 4. FASTEN JAM NUTS POS. 62
 5. CLOSE WITH COVER POS. 45, 46 AND 63

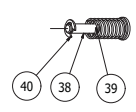
MONTAGEANWEISUNG AERATION PAD:
 1. POS. 58, 59, 60 UND 62 MONTIEREN
 2. AERATION PAD MIT WERKZEUG 0000018449 EINFÜHREN
 (VORHER MUTTER POS. 61 ÜBER WERKZEUG SCHIEBEN)
 3. MUTTER POS. 61 VON HAND FEST ZIEHEN
 4. MONTIERMUTTERN POS. 62 ANZIEHEN
 5. DECKEL POS. 45, 46 UND 63 SCHLIESSEN

MASS OF THE RECEIVER W/ ROTARY VALVE 155 kg +/- 10%

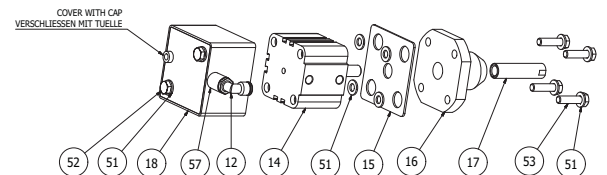
MASS DES RECEIVERS MIT ROTARY VALVE 155 kg +/- 10%

71	4	00002642	FITTING PNEU ELBO 1/4" PUSH 6 MM	K2	02MAY12-2	ASSI 316L
71	2	000091270	MASHER / SCHEBE - COAX SPR M8 8 418/2 COAX796	A2	ASSI 304	
68	1	000023204	VIBRATORY / VIBRATOR - PNEU NETAG DA 102 2037	K2	02MAY12-2	ASSI 316L
68	8	000091153	NUT / MUTTER - M8 PA R08 M8 820551	A2	ASSI 304	
67	1	000030800	BRACKET / PRATZE - MTE BEATER M2TAG EA 102 SST316L	K2	02MAY12-2	ASSI 316L
65	5	000091088	SCREW / SCHRAUBE - HEX M8X12 SC4027	A2	ASSI 304	
65	4	000091090	SCREW / SCHRAUBE - HEX M8X15 SC4027	A2	ASSI 304	
64	1	000023203	BEATER / KOLPER - PNEU M2TAG EA 102 2037	K2	02MAY12-2	ASSI 316L
63	4	000091204	COVER / DECKEL - AERATION PAD SST316 PL2 CERT3.1	K2	02MAY12-2	ASSI 316L
62	12	000091039	NUT / MUTTER - HEX JAM M12 SC4025	A2	ASSI 304	
61	4	000040023	NUT / MUTTER - AERATION PAD M12 FROM HOA	POW		
60	4	000050579	BUSHING / BOUCHE - OXENUT316L EPL 8x8.8	K2	02MAY12-2	ASSI 316L
59	4	000017818	PAD AIR ACTIVATED SILICON	SILICON		
58	4	000091204	SCREW / SCHRAUBE - AERATION PAD M12 SST316L	K2	02MAY12-2	ASSI 316L
57	3	8000-4669	MUFFENNIPPELSCHLEIFT 1/4" - 1/8"	K2	02MAY12-2	ASSI 316L
55	3	000026021	FITTING PNEU STR 1/4" PUSH 8 MM	K2	02MAY12-2	ASSI 316L
55	1	000026020	FITTING PNEU STR 1/8" PUSH 8 MM	K2	02MAY12-2	ASSI 316L
54	4	000026043	FITTING PNEU ELBO 1/4" PUSH 8 MM	K2	02MAY12-2	ASSI 316L
53	124	000091089	SCREW / SCHRAUBE - HEX M8X12 SC4027	A2	ASSI 304	
53	6	000091086	SCREW / SCHRAUBE - HEX M8X10 SC4027	A2	ASSI 304	
52	46	000091187	MASHER / SCHEBE - PLAT M8 418/2 COAX796	A2	ASSI 304	
50	2	000091414	SCREW SET / GEWINDESTIFT - COAX PT M8X12 SC4027	A2	ASSI 304	
48	3	000091283	SCREW SET / GEWINDESTIFT ALU 1 PT M8 x 12 SC4025	A2	ASSI 304	
48	2	000091969	CLAMP / ALMERE - FL D53 FÜR D53/54 S ST316	POW		
47	2	000019474	GASKET / DICHTLING - RING FÜR CLAMP D53 IN D100.2	SILICON		
46	5	000015688	CLAMP / ALMERE - FL D53 FÜR D53/54 S ST316	SILICON		
45	5	000019473	GASKET CLAMP 782 FL COX	SILICON		
44	3	000019466	CLAMP / ALMERE - FL D54 FÜR D54/55 S ST316	POW		
44	3	000019471	GASKET / DICHTLING - RING FÜR CLAMP D54 IN D100.2	POW		
44	2	000019465	CLAMP / ALMERE - FL D53.5 FÜR D53.5/54 S ST316	POW		
44	2	000019470	GASKET / DICHTLING - RING FÜR CLAMP D52.5 D53.2 M2Q	SILICON		
40	1	000018114	VALVE SOFTLY CLOSED CON VALV	K2	02MAY12-2	
39	1	000018113	SPRING PRESSURE D530 BUCH	L4310		
38	1	000018115	ROCK SPRINGING	K2	02MAY12-2	ASSI 316L
37	2	000025032	ADAPTER - MALE/FEMALE 1/4"PT*1/8"	K2	02MAY12-2	ASSI 316L
36	5	000018024	PLATE / PLATE - FILTER SST316 PL2 CERT3.1	K2	02MAY12-2	ASSI 316L
35	4	000025031	ADAPTER - MALE/FEMALE 1/4"PT*1/4"	K2	02MAY12-2	ASSI 316L
34	2	000025030	ADAPTER MALE 1/4"PT*1/8"	K2	02MAY12-2	ASSI 316L
33	2	000025028	VALVE SOFTLY CLOSED	K2	02MAY12-2	ASSI 316L
31	1	000018010	TANK COMPRESSOR AIR 3L PH P2 2 CONNECTIONS	POW		
31	2	000022000	VALVE SHARPCORR 1818 FEET 1"	K2	02MAY12-2	ASSI 316L
29	4	000020013	1" BSP TO 3/4" BSP	K2	02MAY12-2	
29	2	000018079	ADAPTER 1.5" FLANGE VALVE	K2	02MAY12-2	ASSI 316L
28	1	000023243	REGULATOR 1/2" TO 1/4" 2"	K2	02MAY12-2	ASSI 316L
27	3	6110-02469	CAP / KAPPE HEX 1/2" (PT) 316L NORM 8-231	K2	02MAY12-2	ASSI 316L
26	3	000018024	INCLZIP 3PT BLAST GLOP - PH2	K2	02MAY12-2	ASSI 316L
25	3	000017794	PLATE / PLATE - FILTER COAX 796 COAX	M4		
24	2	000025026	CLAMP RING V CHD	K2	02MAY12-2	ASSI 316L
23	2	000017808	GASKET RING D53 V SHAP	SILICON		
22	1	000017805	RING D530 GASKET V-SHAP	K2	02MAY12-2	ASSI 316L
21	1	000018084	VALVE / VALVE - FILTER TYP SVNH CC ON 80	K2	02MAY12-2	ASSI 316L
20	1	000040029	FITTING - FÜR D530 L119 SST316 PL2 CERT3.1	K2	02MAY12-2	ASSI 316L
19	1	000020472	FITTING - FÜR D530 (FL119 D530-PL44)	K2	02MAY12-2	ASSI 316L
18	3	000023208	COVER / HÄUTLEIN - COX 450 1020	POW		
17	3	000026730	SLEEVE / HÄUBLE - EXT PISTON D53 M30.5	VS	02MAY10	ASSI 304
16	3	000026729	SLEEVE / HÄUBLE - GUIDE PISTON B08X035	POW		
15	2	000024248	GASKET FASTENING CYLINDER	SILICON		
14	3	000025303	CYLINDER / ZYLINDER PNEU M8X10-10-PA	K2	02MAY12-2	ASSI 316L
13	2	000024249	SPRING / FEDER RING RING	POW		
11	4	000026444	FITTING PNEU ELBO 1/4" PUSH 8 MM	K2	02MAY12-2	ASSI 316L
11	4	000025789	CLAMP RING COBA V CHD20	K2	02MAY12-2	ASSI 316L
10	4	000024866	SPRING BUSHES	POW		
9	3	000024161	ROD OR A 158 (LOCATING)	VS	02MAY10	ASSI 304
8	1	000018081	CHD20 COBA SIDE VALVE	VS	02MAY12-2	ASSI 316L
7	1	000018060	CHD20 COBA ROTARY VALVE	VS	02MAY12-2	ASSI 316L
6	1	000018063	CYLINDER / ZYLINDER OUT - CHD20 M150	VS	02MAY12-2	ASSI 316L
5	1	000018062	CYLINDER / ZYLINDER OUT - CHD20 M150	VS	02MAY12-2	ASSI 316L
4	1	000020727	COVER / DECKEL - TOP SST316 PL2 CERT3.1	K2	02MAY12-2	ASSI 316L
3	1	000020727	PLATE / PLATE - FILTER SST316 PL2 CERT3.1	K2	02MAY12-2	ASSI 316L
2	1	000026724	HOPPER / TRICHTER - COX 450 1020	POW		
1	1	000020629	HOPPER / TRICHTER - ASTM 110L 450 200 PL2 CERT3.1	K2	02MAY12-2	ASSI 316L
			SEAL TIGHT PNEUMATIC	DISCONTINUED		

A (1:1)

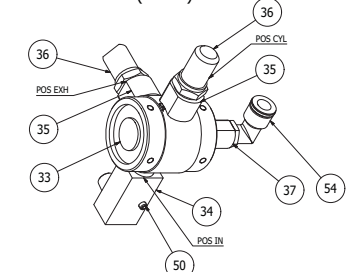


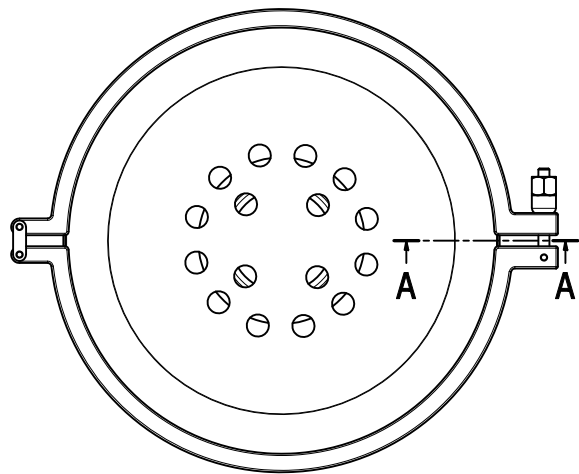
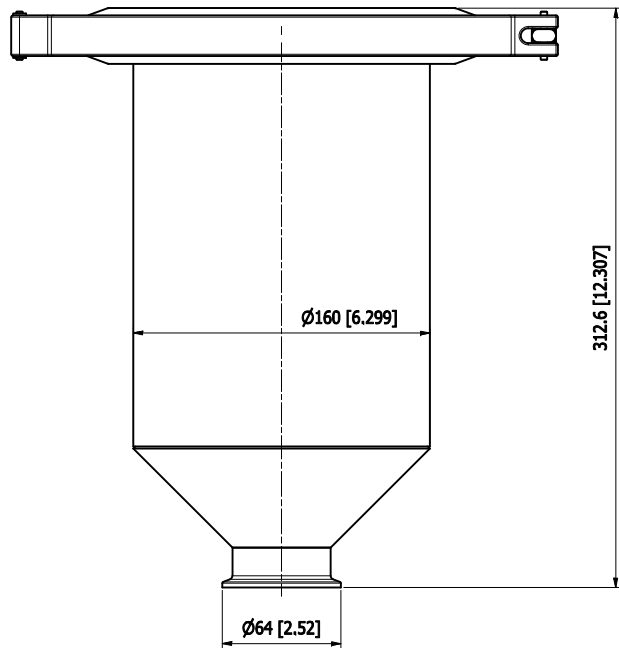
C (1:2)



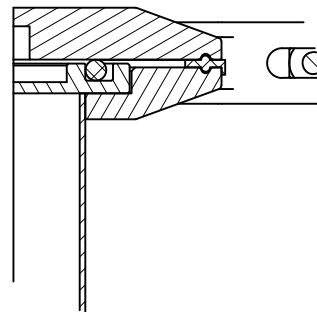
POS. 14 SECURE WITH LOCTITE SICHERN MIT LOCTITE

B (1:1)

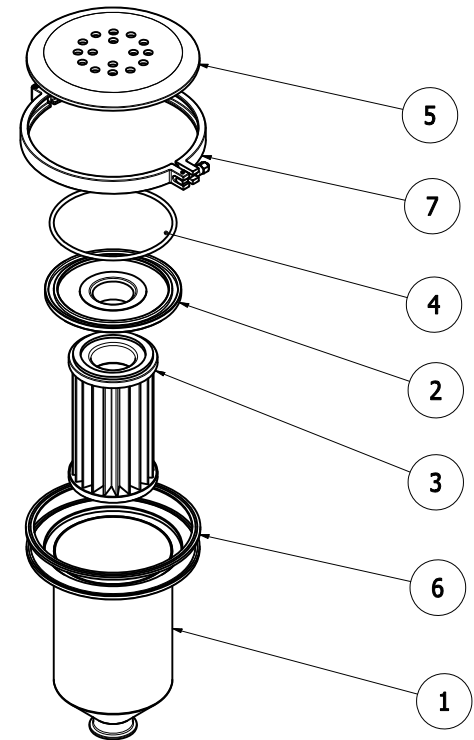




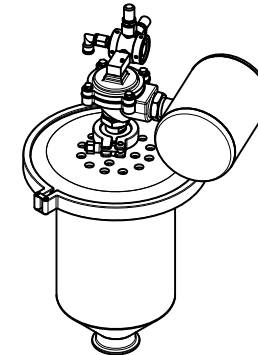
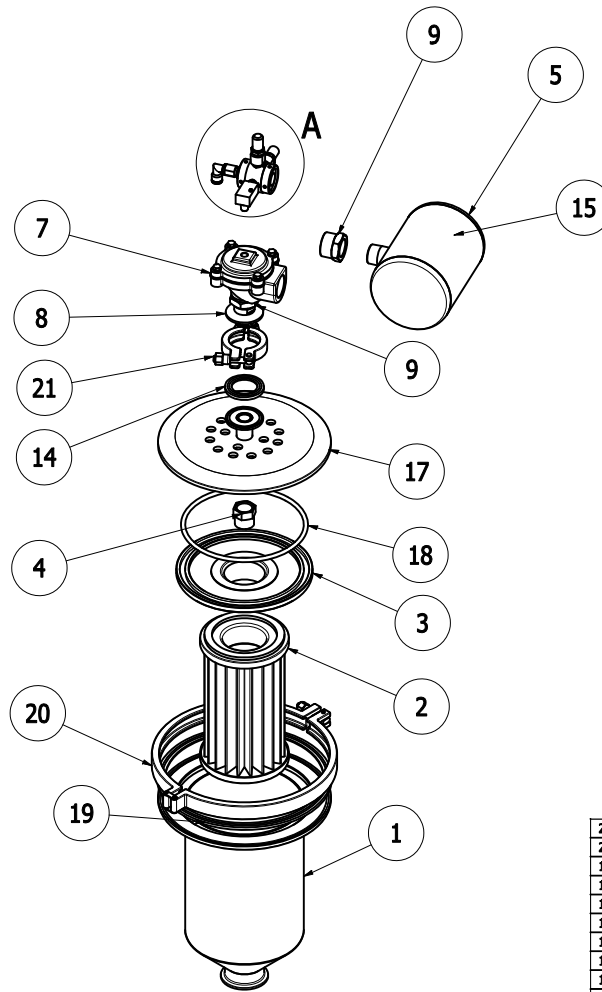
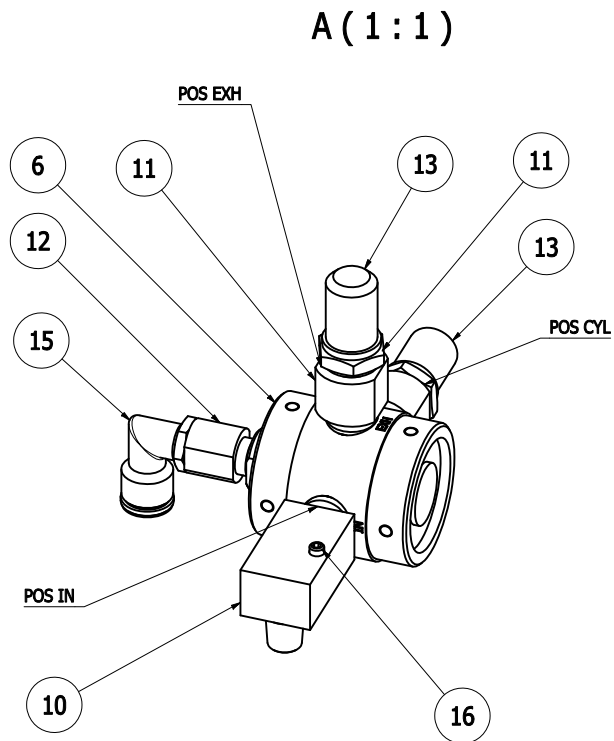
A-A (1:1)



(1:5)



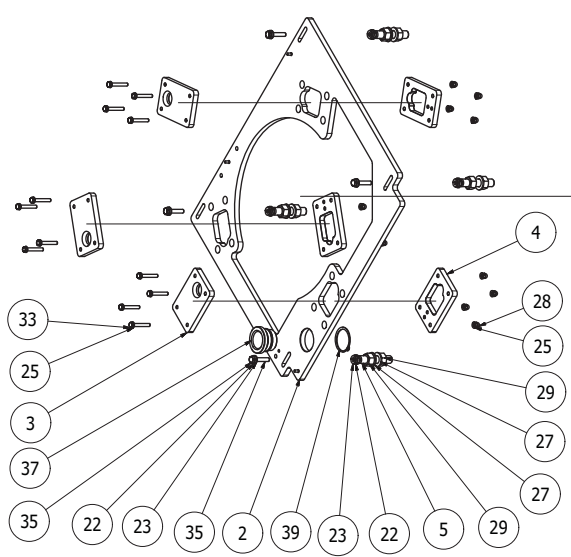
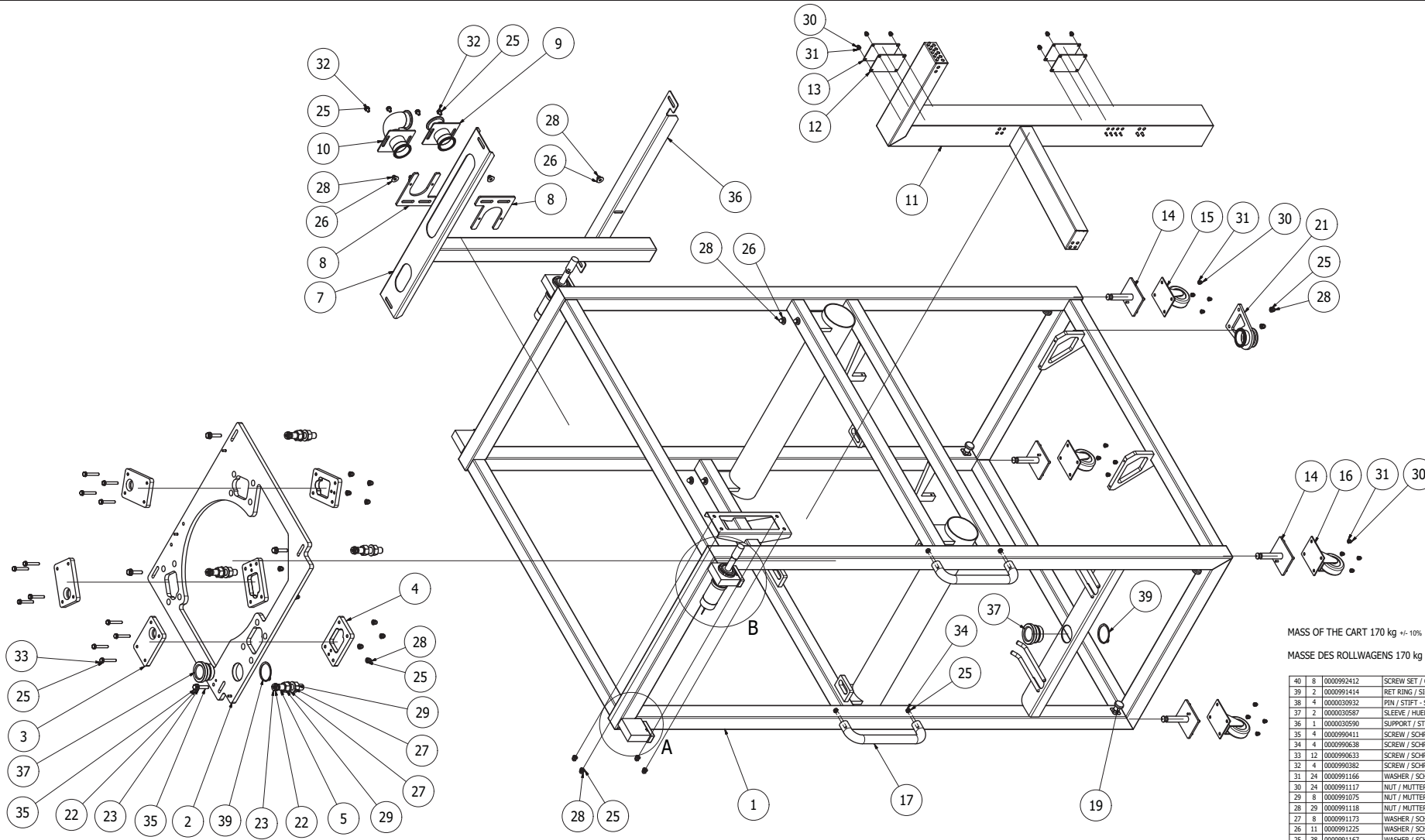
7	1	0000019531	CLAMP TRI FL D233.5	X2 CNIMo17-12-2	
6	1	0000019533	GASKET DN200 TRI-CLAMP	SILIKON	
5	1	0000030591	COVER / DECKEL - D233.5 SST316L PL2 CERT3.1	X2 CNIMo17-12-2 AISI 316L	
4	1	0000030581	O-RING - 160X5,7 60SH MVQ RED FDA	MVQ	
3	1	0000011741	FILTER CART POLY/PVDF 200MM	A4	
2	1	0000030623	PLATE / PLATTE - DUST FILTER D184X8 SST316L PL2		
1	1	0000030627	CONE / KONUS - DUST FILTER D160 SST316L PL2		
SEQ	QTY	NUMBER	DESCRIPTION / SUPPLIER	MATERIAL	
PTS H71				SCALE 1:2	DRAWN: DD.MM.YYYY SIGN 04.04.2011 TBMG
FILTER - DUST D160X200				FIRST ANGLE	APPROVED: DD.MM.YYYY SIGN 05.02.2013 ARY
				PAGE 1 OF 1	CATEGORY: P-Level
				FORMAT A2	NUMBER 1104657003
					REV C



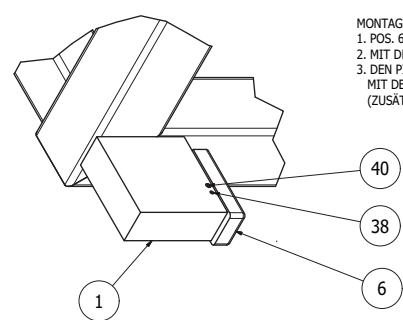
21	1	0000019465	CLAMP / KLEMME - FL D50.5 FER D61X16.5 SST316	
20	1	0000019531	CLAMP TRI FL D233.5	X2 CNiMo17-12-2
19	1	0000019533	GASKET DN200 TRI-CLAMP	SILIKON
18	1	0000030581	O-RING - 160X5.7 60SH MVQ RED FDA	MVQ
17	1	0000030592	COVER / DECKEL - D233.5 SST316L PL2 CERT3.1	
16	1	0000992414	SCREW SET / GEWINDESTIFT - CON PT M4x20 ISO4027	A2 AISI 304
15	2	0000026643	FITTING PNEU EL890 1/8" PUSH 8 MM	X2 CNiMo17-12-2 AISI 316L
14	1	0000019470	GASKET CLAMP TRI FL D50.5	SILIKON
13	2	0000019363	FILTER PSS 14 S G1/4"	X2 CNiMo17-12-2
12	1	0000025032	ADAPTER: MALE/FEMALE 1/8"NPT+1/8"	X2 CNiMo17-12-2 AISI 316L
11	2	0000025031	ADAPTER: MALE/FEMALE 1/4"NPT+1/4"	X2 CNiMo17-12-2 AISI 316L
10	1	0000025030	ADAPTER MALE 1/4"NPT+1/8"	X2 CNiMo17-12-2 AISI 316L
9	2	0000020703	1" BSPT TO 3/4" BSPP	X2 CNiMo17-12-2
8	1	0000018679	ADAPTOR 1.5" PULSE VALVE	X2 CNiMo17-12-2 AISI 316L
7	1	0000025000	VALVE DIAPHRAGM DB18-FDT 1"	X2 CNiMo17-12-2 AISI 316L
6	1	0000025808	VALVE SS250A REWORK	
5	1	0000018898	TANK COMPRESSED AIR 1.5L PH P2	
4	1	0000018024	NOZZLE JET BLAST G1/2" PH2	X2 CNiMo17-12-2 AISI 316L
3	1	0000030623	PLATE / PLATTE - DUST FILTER D184X8 SST316L PL2	
2	1	0000011741	FILTER CART POLY/PTFE 200MMH	A4
1	1	0000030627	CONE / KONUS - DUST FILTER D160 SST316L PL2	
SEQ	QTY	NUMBER	DESCRIPTION / SUPPLIER	MATERIAL

PTS H71		SCALE	1:5	DRAWN:	DD.MM.YYYY SIGN 05.04.2011 TBM
FILTER - BREATH, W/ JET NOZZLE D160X200		FIRST ANGLE		APPROVED:	DD.MM.YYYY SIGN 05.02.2013 ARY
		PAGE	2	OF	2
		CATEGORY:	P-Level		

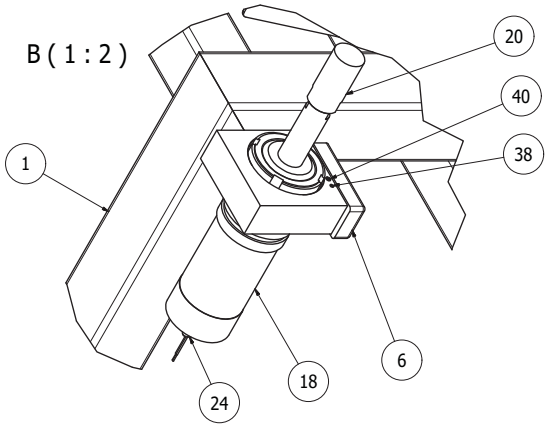
		FORMAT	A2	NUMBER	1104657004	REV	C
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A (1:2)



MONTAGEANWEISUNG POS. 6
 1. POS. 6 IN POS. 1 INSETZEN
 2. MIT DEN SCHRAUBEN POS. 38 LOCKER ANZIEHEN
 3. DEN PIN POS. 39 NACH EINSTELLUNG DER ENDPPOSITION MIT DER SCHIENE (ZEICHNUNG 1104657001) EINFÜGEN, (ZUSÄTZLICHE BOHRUNG IN POS. 6 MACHEN)



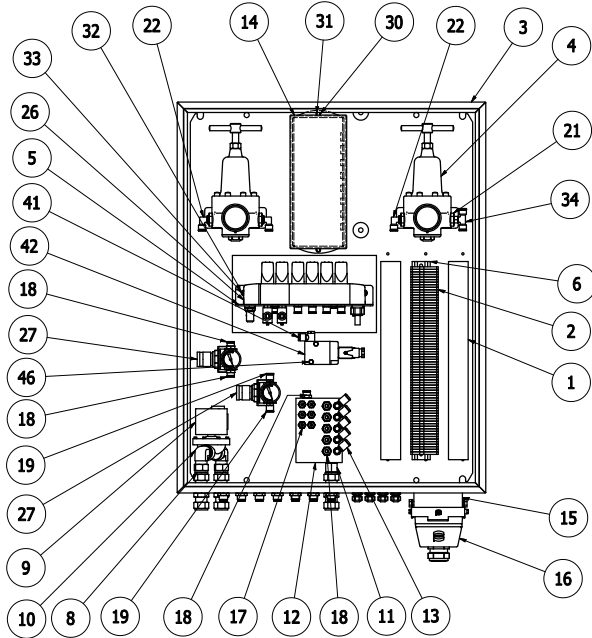
B (1:2)

POS. 20
 MONTAGE MIT LOCTITE

MASS OF THE CART 170 kg +/- 10%
 MASSE DES ROLLWAGENS 170 kg +/- 10%

SEQ	QTY	NUMBER	DESCRIPTION / SUPPLIER	MATERIAL
40	8	000092412	SCREW SET / GEWINDESTIFT - CON PT M4x12 ISO4027	A2 AISI 304
39	2	000091414	RET RING / SICHERUNGSRING - SHFT 60x2 DIN471	1.4110 AISI 420
38	4	000030932	PIN / STIFT - SPR ROLL BN 686 D3 L30	1.4310 AISI 301
37	2	000030587	SLEEVE / HUELSE - D70x45 POM FDA	POM
36	1	000030590	SUPPORT / STUETZE - SST304 PKCLD	X5 CN18-10 AISI 304
35	4	0000990411	SCREW / SCHRAUBE - HEX M10x50 ISO4017	A2 AISI 304
34	4	0000990638	SCREW / SCHRAUBE - HEX M8x80/22 ISO4014	A2 AISI 304
33	12	0000990633	SCREW / SCHRAUBE - HEX M8x55/22 ISO4014	A2 AISI 304
32	4	0000990382	SCREW / SCHRAUBE - HEX M8x12 ISO4017	A2 AISI 304
31	24	0000991166	WASHER / SCHEIBE - FLAT M6 6.4/2x1.6 ISO7089	A2 AISI 304
30	24	0000991177	NUT / MUTTER - HEX DOME M6 DIN1587	A2 AISI 304
29	8	0000991075	NUT / MUTTER - HEX M20 ISO4032	A2 AISI 304
28	29	0000991118	NUT / MUTTER - HEX DOME M8 DIN1587	A2 AISI 304
27	8	0000991173	WASHER / SCHEIBE - FLAT M20 21/32x3 ISO7089	A2 AISI 304
26	11	0000991225	WASHER / SCHEIBE - FLAT D15 M8 8.4/2x2 ISO7093	A2 AISI 304
25	38	0000991167	WASHER / SCHEIBE - FLAT M8 8.4/16x1.6 ISO7089	A2 AISI 304
24	2	0000026644	FITTING PNEU ELB90 1/4" PUSH 8 MM	X2 CN18-10 AISI 316L
23	8	0000024275	KUGELSCHEIBE / WASHER BALL M10 DIN6319	A2
22	8	0000024276	KEGELPFANNE / WASHER CONE PAN M10 DIN6319	A2
21	1	0000026757	FITTING - TUBE W/ FLG FER DNS0	
20	2	0000030940	SLEEVE / HUELSE - PNEUMATIC CYLINDER SST304	X5 CN18-10 AISI 304
19	4	0000024271	SNAP BOLT/STRAPBOLZEN M16x15 08	X5 CN18-10 AISI 304
18	2	0000036822	CYLINDER / ZYLINDER - AIR SCL EN50-50-50	
17	2	0000024523	HANDLE DOOR / TÜRGRUPPE 300x330	X5 CN18-10 AISI 316
16	2	0000024274	CASTOR ROLL LOP PUS8 080	X5 CN18-10 AISI 304
15	2	0000024272	PEDESTAL ROLL BOP PUS8 080	X5 CN18-10 AISI 304
14	4	0000024256	SUPPORT CASTOR.	
13	2	0000026817	COVER / DECKEL - ACSHOLE 115X80x2	X5 CN18-10 AISI 304
12	2	0000026816	GASKET / DICHTUNG - RECT ACSHOLE 115X80x2	MVQ
11	1	0000030788	CHAIN/CABLE / KANAL KABEL - SST 304 PKCLD	
10	1	0000040338	TUBE / ROHR - FER DNS0 90° SST316L EPL CERT3.1	
9	1	0000040351	TUBE / ROHR - FER DNS0 100 SST316L EPL CERT3.1	
8	2	0000026894	PLATE / PLATTE HOSE CONN 152.5X150X6	X5 CN18-10 AISI 304
7	1	0000030628	SUPPORT / STUETZE - HOSE CONNECTION SST304 PKCLD	
6	4	0000030925	PLATE / PLATTE - ALIGN STAND POM FDA	POM
5	4	0000026752	BOLT / BOLZEN - LEVELING M20x113	X5 CN18-10 AISI 304
4	3	0000036786	PLATE / PLATTE - BTM, SCALE 150X100X15	X2 CN18-10 AISI 316L
3	3	0000026788	PLATE / PLATTE - TOP, SCALE 150X100X15	X2 CN18-10 AISI 316L
2	1	0000030621	PLATE / PLATTE - 750X650X15 SST304 PKCLD	
1	1	0000030694	STAND / GESTELL - PTS	
SEQ	QTY	NUMBER	DESCRIPTION / SUPPLIER	MATERIAL

WITHOUT DOOR - OHNE TUERE



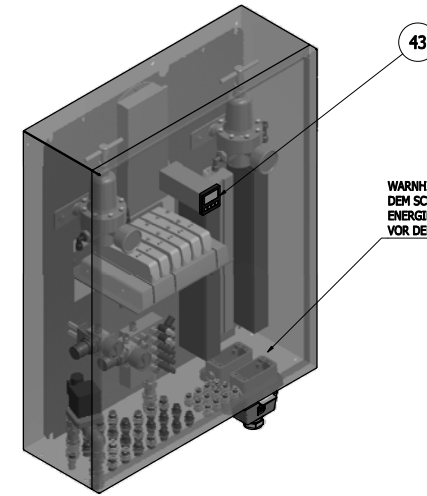
NUMBER OF TERMINALS ACCORDING TO THE E-SCHEMA
LENGHT OF THE CLAMP RAIL AND THE CABLE CHANNELS
ACCORDING TO THE NUMBER OF TERMINALS

ANZAHL DER KLEMMEN GEMAESS E-SCHEMA
LAENGE DER KLEMMSCHIENE UND DER KABELKANAELE
GEMAESS ANZAHL KLEMMEN

EQUIPPING ACCORDING TO THE E-SCHEMA
CHOICE OF THE CABLE GLANDS ACCORDING TO THE E-SCHEMA
CHECK THE HARTMANN ENCLOSURE TYPE ACCORDING TO THE CABLE GLANDS

BESTUECKUNG GEMAESS E-SCHEMA
AUSWAHL DER KABELVERSCHRAUBUNG GEMAESS E-SCHEMA
HARTMANN GEHAUSE TYP PRUEFEN GEMAESS DER KABELVERSCHRAUBUNG

(1:5)

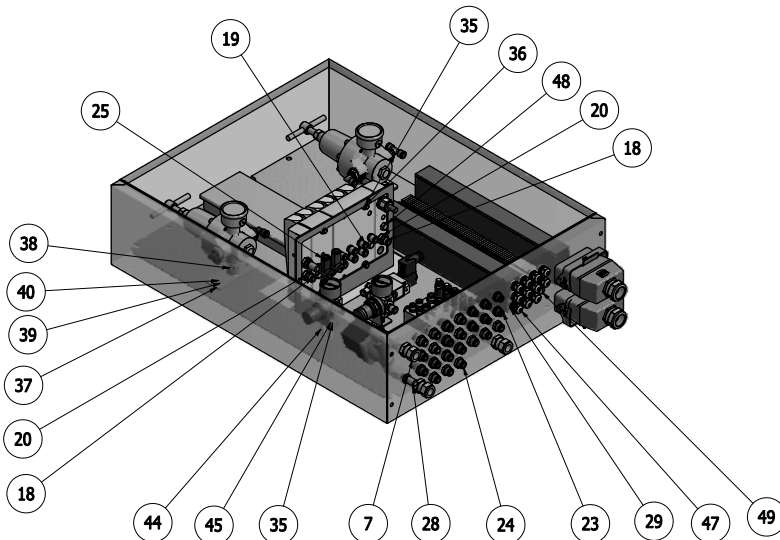


WARNHINWEIS GEÄTZT AUF
DEM SCHALTSCHRANK:
ENERGIEENTKOPPLUNG
VOR DEM ÖFFNEN

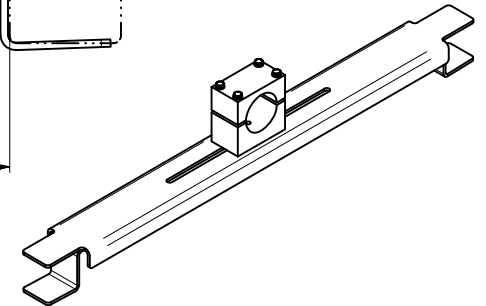
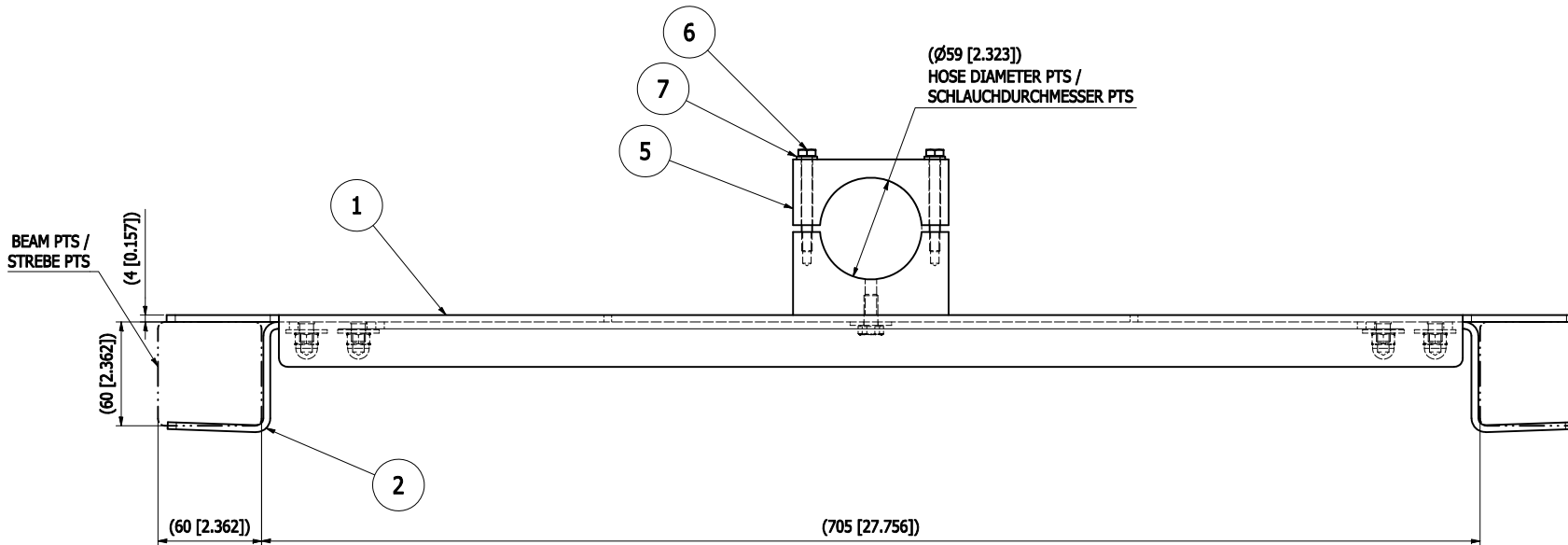
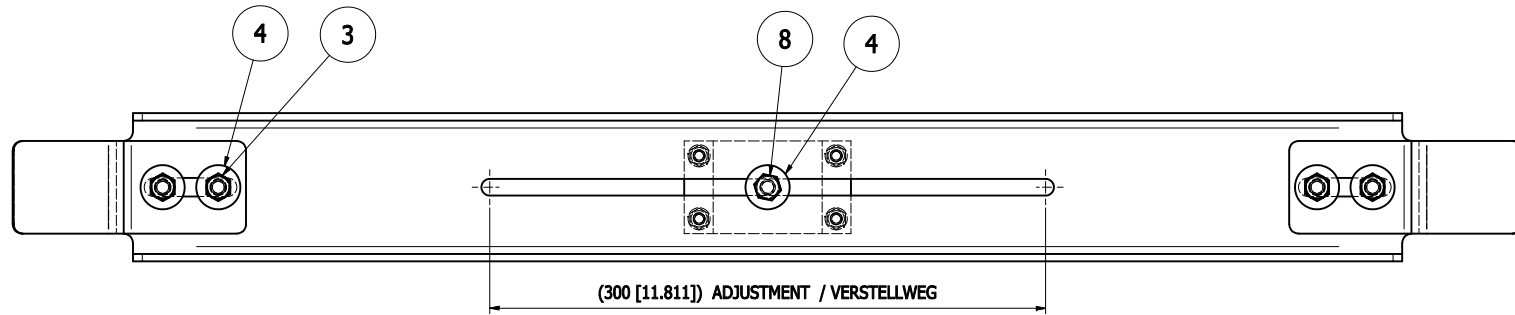
MASS OF THE ENCLOSURE 40 kg +/-10%

MASSE DES STEUERKASTENS 40 kg +/-10%

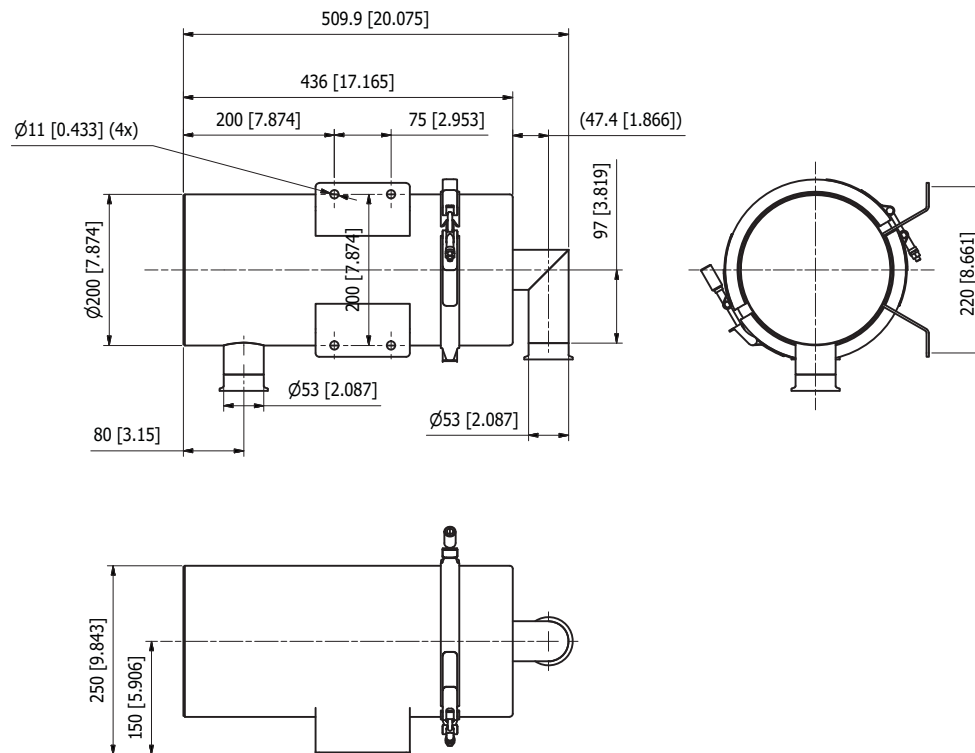
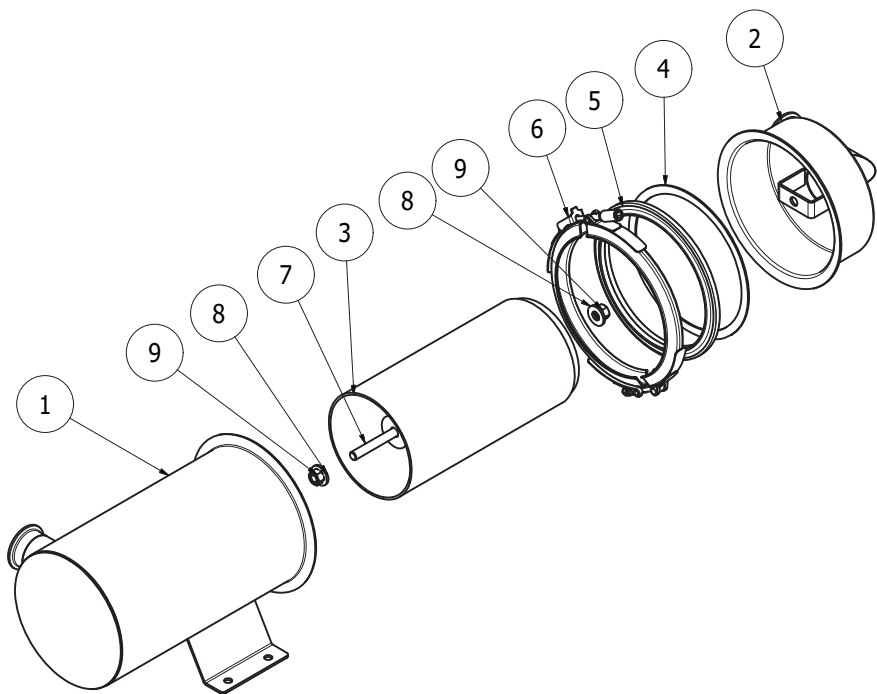
WITHOUT DOOR - OHNE TUERE



49	1	0000993095	PLUG / STOPPEN - M12x1.5 EMC	A2 AISI 304
48	3	9399-42980	STOPPEN GLEIT MIT GKT KOPF	X2 CHN1617-12-2
47	11	000029697	CABLE GLAND / KABELVERSCHR. - M12x1.5 5.0-6.5 PPM	X2 CHN1617-12-2 AISI 316L
46	2	000029332	SCREW / SCHRAUBE - HEX M8x30 ISO4017	A2 AISI 304
45	4	000099394	SCREW / SCHRAUBE - HEX M8x10 ISO4017	A2 AISI 304
44	4	9399-40616	SPACER / DISTANZBOLEN - H5X35	STL GALV
43	1	000026688	COUNTER / MULTIFUNKTIONSZÄHLER - TICO 722	
42	1	6110-00520	MAGNETVENTIL 3/2 3/8"	
41	1	000099296	FITTING/VERSCHR. L W 1/8-8	BN OHS94L 1 UNS C25600
40	4	000099363	SCREW / SCHRAUBE - HEX M8x6 ISO4017	A2 AISI 304
39	4	0000991224	WASHER / SCHEIBE - FLAT OVS M6 6.4/18x1.6 ISO7093	A2 AISI 304
38	2	000027502	FITTING - RDCR 1/2" (M) 1/4" (M) SST316L	X2 CHN1617-12-2 AISI 316L
37	2	6110-01924	PLATE / PLATTE - BASE RP1/4" 2 HOLE	X2 CHN1617-12-2 AISI 316L
36	4	000099349	SCREW / SCHRAUBE - HEX M8x2 ISO4017	A2 AISI 304
35	8	000091165	WASHER / SCHEIBE - FLAT H5 5.3/10x1 ISO7089	A2 AISI 304
34	1	000026966	FITTING PNEU TEE 1/4" PUSH 8 mm	X2 CHN1617-12-2 AISI 316L
33	2	0000991068	NUT / MUTTER - HEX M6 ISO4032	A2 AISI 304
32	2	0000991166	WASHER / SCHEIBE - FLAT M6 6.4/12x1.6 ISO7089	A2 AISI 304
31	2	000099331	SCREW / SCHRAUBE - HEX M6x10 ISO4017	A2 AISI 304
30	2	0000991164	WASHER / SCHEIBE - FLAT M4 4.3/9x0.8 ISO7089	A2 AISI 304
29	11	000029300	MULTIPLUTTER M12x1.5/1.5 EMC	RES NP
28	2	000019303	FILTER P55 14 S G1/4"	X2 CHN1617-12-2
27	2	000004364	REGULATOR KIT 0-12 BAR (AIR)	
26	1	0000026936	VALVE / VENTIL - PNEU TERMINAL (4+2)	
25	2	000002590	VENTIL NP CHOKE GRA-4-1/8-8	BN OHS94L 1 UNS C25600
24	18	000002657	FITTING PNEU BHD M8x8 PUSH 8 mm	X2 CHN1617-12-2 AISI 316L
23	6	0000026943	FITTING PNEU BHD M8x8 PUSH 6 mm	X2 CHN1617-12-2 AISI 316L
22	3	0000026644	FITTING PNEU EL800 1/4" PUSH 8 mm	X2 CHN1617-12-2 AISI 316L
21	4	0000026942	FITTING - RDCR 1/2" (M) 1/4" (F)	X2 CHN1617-12-2 AISI 316L
20	3	0000026941	FITTING - RDCR 3/8" (M) 1/4" (F)	X2 CHN1617-12-2 AISI 316L
19	11	0000026920	FITTING PNEU STR 1/8" PUSH 8 mm	X2 CHN1617-12-2 AISI 316L
18	19	0000026821	FITTING PNEU STR 1/4" PUSH 8 mm	X2 CHN1617-12-2 AISI 316L
17	6	0000026818	FITTING PNEU STR 1/8" PUSH 6 mm	X2 CHN1617-12-2 AISI 316L
16	2	000004392	HOUSING GROMMET HAN INOX 10B	X2 CHN1617-12-2 AISI 316L
15	2	000004394	HOUSING SOCKET HAN INOX 10B	X2 CHN1617-12-2 AISI 316L
14	1	0000025421	KLEMMENKASTEN / JUNCTION BOX - TYP VIKOR-BEX	X2 CHN1617-12-2 AISI 316L
13	5	0000024571	VALVE FLOW RESTRICTION GRA-1/8-8-8-RS-D	NP
12	1	0000026927	PLATE / PLATTE - AIR FISTRIB SST316L CERT3.1	X2 CHN1617-12-2 AISI 316L
11	1	000002596	FITTING - G1/2" TUBE D16 SPEC	X2 CHN1617-12-2 AISI 316L
10	2	0000025367	FITTING - EL800 1/2" (M) TUBE D16	X5 CHN1617-12-2 AISI 316
9	1	0000018761	SOLENOID VALVE BRASS 2/2 0.5" 24VDC	
8	2	0000025379	ROHR / TUBE Ø16x1.5x90	X2 CHN1617-12-2 AISI 316L
7	3	0000025368	FITTING - Ø16 1" (M) TUBE D16	X5 CHN1617-12-2 AISI 316
6	1	9544-40902	KLEMMSTRÖBE W544 N-131	AluØ16mm
5	1	0000026938	SUPPORT / STÜTZZE - TERM VALVE 200/40X314	X5 CHN18-10 AISI 304
4	2	0000026937	REGULATOR - PRESS 1-10 BAR 1/2" (F)	X2 CHN1617-12-2 AISI 316L
3	1	0000030741	ENCLOSURE MACHINING / STEUERSCHRANK NACHBEARBEITET	
2	-	-	KLEMMEN GEMAESS PROJEKT	
1	1	2	CHANNEL CABLE / KAWAL KABEL - 38.5075	PVC
SEQ	QTY	NUMBER	DESCRIPTION / SUPPLIER	MATERIAL

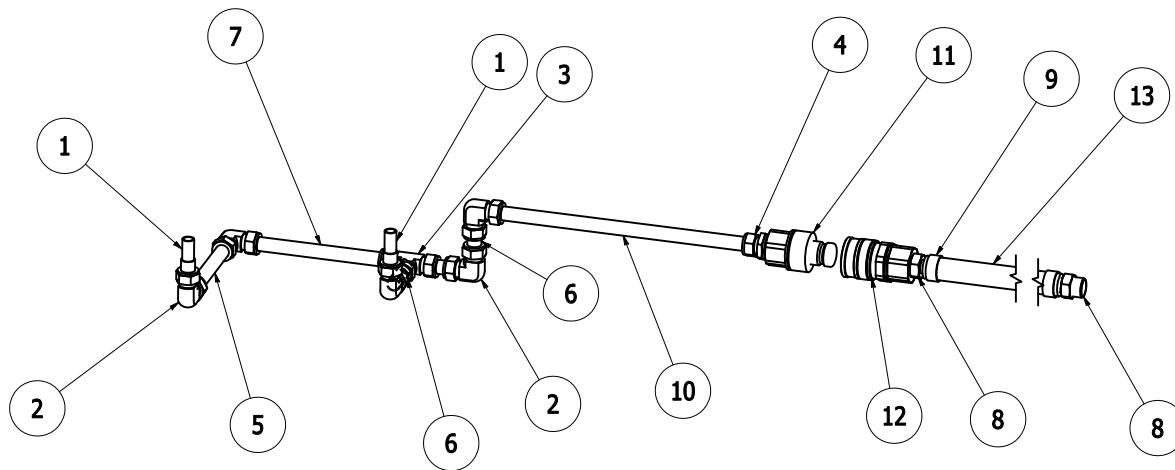
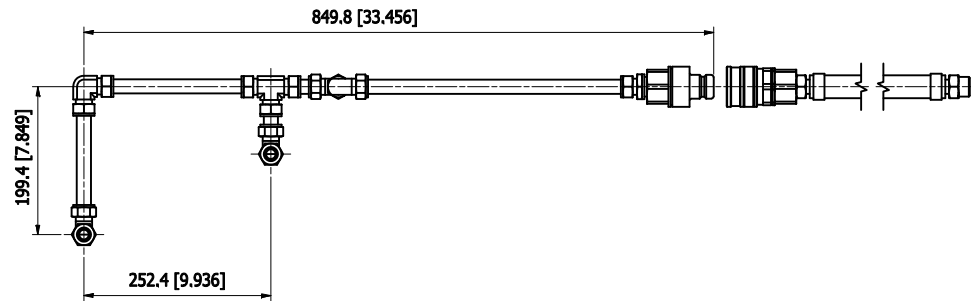
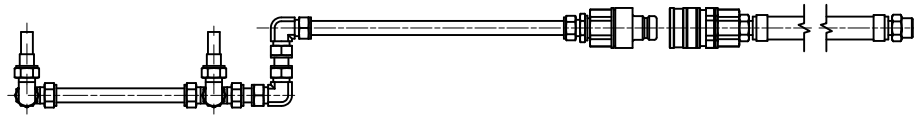


8	1	0000990385	SCREW / SCHRAUBE - HEX M8x18 ISO4017	A2 AISI 304
7	4	0000991166	WASHER / SCHEIBE - FLAT M6 6.4/12x1.6 ISO7089	A2 AISI 304
6	4	0000990613	SCREW / SCHRAUBE - HEX M6x55/18 ISO4014	A2 AISI 304
5	1	0000031531	HOLDER / HALTER - POM	
4	5	0000991225	WASHER / SCHEIBE - FLAT OVS M8 8.4/24x2 ISO7093	A2 AISI 304
3	4	0000991118	NUT / MUTTER - HEX DOME M8 DIN1587	A2 AISI 304
2	2	0000031530	HOLDER / HALTER - SST304	X5 CrNi18-10 AISI 304
1	1	0000031529	HOLDER / HALTER - SST304	
SEQ QTY NUMBER			DESCRIPTION / SUPPLIER	MATERIAL
PTS HOLDER TUBE / HALTER SCHLAUCH				SCALE 1:2 DRAWN 15.07.2011 TRMGZ FIRST ANGLE APPROVED 07.04.2014 MKE PAGE 1 OF 1 CATEGORY P-Level
			DIMENSION SHOWN IN MILLIMETERS [INCH] ALL RIGHTS RESERVED © 2014 WWW.COPERIONKTRON.COM	FORMAT A2 NUMBER 1104657008 REV D



9	3	0000991071	NUT / MUTTER - HEX M12 ISO4032	A2 AISI 304
8	2	0000991272	WASHER / SCHEIBE - CON SPR M12 13/29x3 DIN6796	A2 AISI 304
7	1	0000019826	THREADED BAR M12 x 1.75 x 330 LONG	Default
6	1	0000007479	CLAMP RING V D200	X2 CrNiMo17-12-2 AISI 316L
5	1	0000017971	GASKET RING D200 V-SHAPE	SILIKON FDA
4	1	0000018232	RING D200 GASKET V-SHAPE	X2 CrNiMo17-12-2 AISI 316L
3	1	0000018651	AZA-304 HEPA	Default
2	1	0000040369	COVER / DECKEL - FILTER HEPA D200 SST316L	
1	1	0000040368	CONTAINER / BEHALTER - FILTER HEPA D200 SST316L	
SEQ	QTY	NUMBER	DESCRIPTION / SUPPLIER	MATERIAL

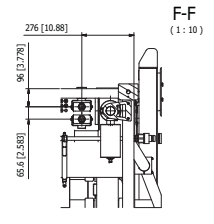
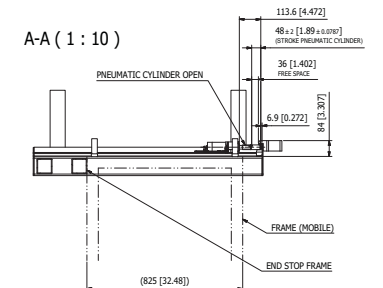
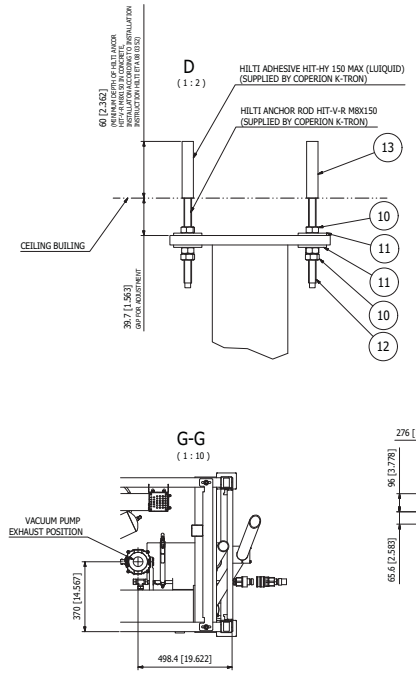
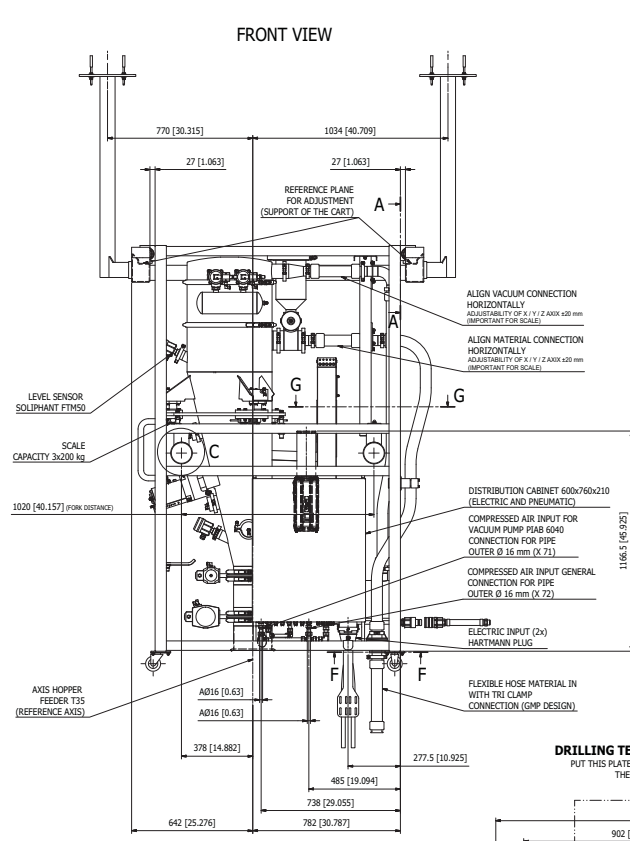
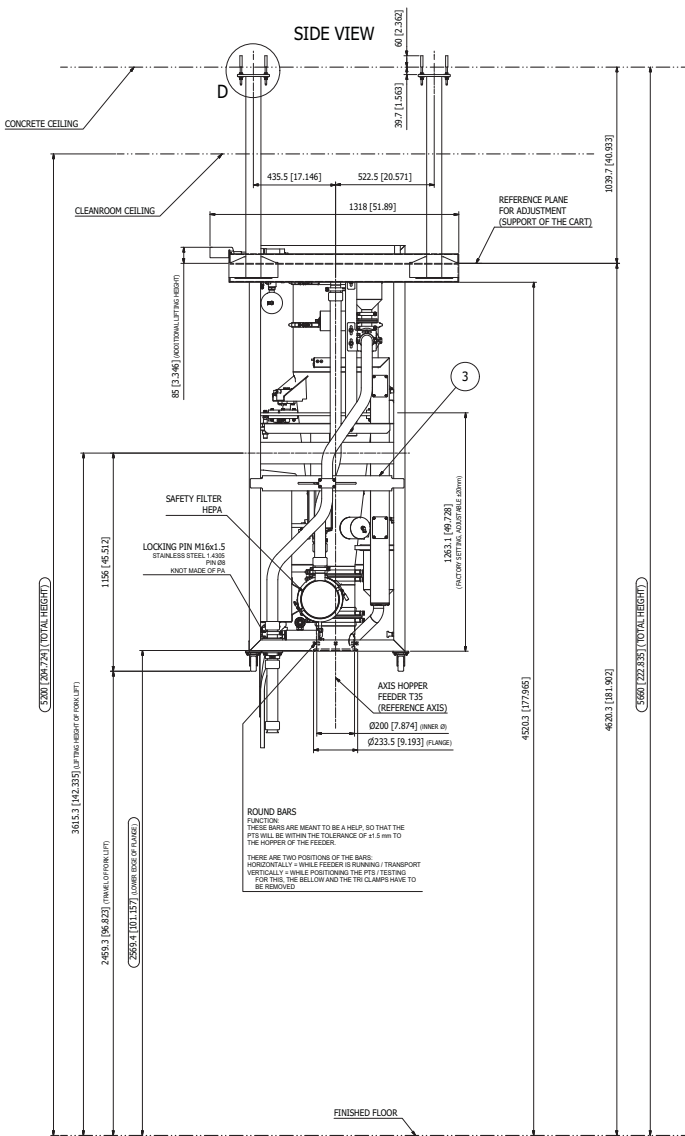
-		SCALE	1:5	DRAWN	DD.MM.YYYY SIGN
FILTER SAFETY HEPA		FIRST ANGLE		APPROVED	DD.MM.YYYY SIGN
(GMP - WITH TRI CLAMP)		PAGE	1 OF 1	CATEGORY	P-Level
		DIMENSION SHOWN IN MILLIMETERS [INCH]		FORMAT	NUMBER
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					A



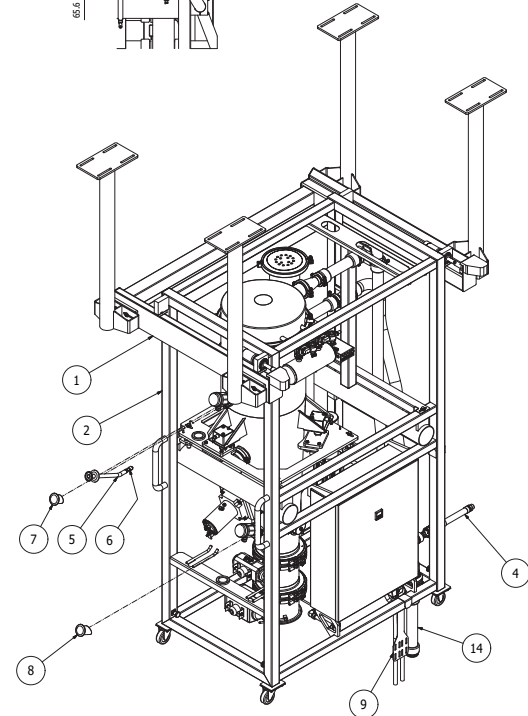
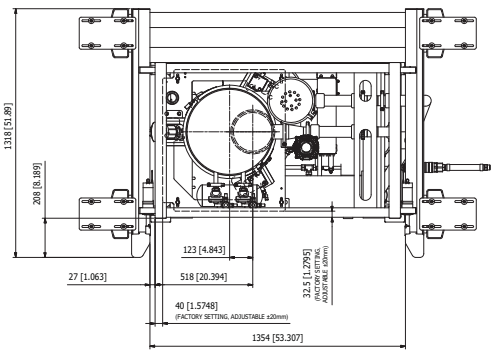
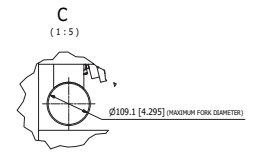
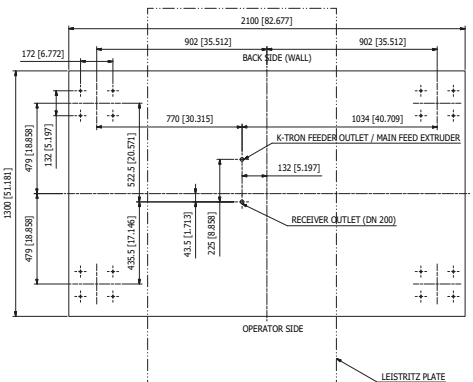
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12	1	0000032081	COUPLING / KUPPLUNG - COUPLING G3/4 SST316L	X2 CNIMo17-12-2 AISI 316L
11	1	0000037358	FITTING - NIP BARB BSPP(F) 3/4" SST316L	X2 CNIMo17-12-2 AISI 316L
10	1	0000032085	TUBE / ROHR - RND 3/4"X390 16SWG SST316L	X2 CNIMo17-12-2 AISI 316L
9	2	6110-00145	BRIDE D25-32 A2	A2
8	2	0000018686	3/4" BSP HOSE NIPPLE SS	Default
7	1	0000032084	TUBE / ROHR - RND 3/4"X200 16SWG SST316L	X2 CNIMo17-12-2 AISI 316L
6	3	0000032083	TUBE / ROHR - RND 3/4"X60 16SWG SST316L	X2 CNIMo17-12-2 AISI 316L
5	1	0000032082	TUBE / ROHR - RND 3/4"X169 16SWG SST316L	X2 CNIMo17-12-2 AISI 316L
4	1	0000032076	FITTING - MALE CONNECTOR 3/4" TUBE 3/4" BSPP(M)	X5 CNIMo17-12-2 AISI 316
3	1	0000032075	FITTING - TEE TUBE 3/4" SST316	X5 CNIMo17-12-2 AISI 316
2	5	0000032074	FITTING - ELB90 TUBE 3/4" SST316	X5 CNIMo17-12-2 AISI 316
1	2	0000037230	ADAPTER - TUBE D16 TO 3/4" SST316L	X2 CNIMo17-12-2 AISI 316L
SEQ	QTY	NUMBER	DESCRIPTION / SUPPLIER	MATERIAL

PNEUMATIC CONNECTION / LUFTANSCHLUSS		SCALE 1:2	DRAWN: DD.MM.YYYY SIGN 22.01.2013 TBMG
FIRST ANGLE		APPROVED: DD.MM.YYYY SIGN 31.01.2013 ARY	
PAGE 1 OF 1	CATEGORY: P-Level	FORMAT A2	NUMBER 1214530002 REV A





DRILLING TEMPLATE FOR CEILING MOUNTING
PUT THIS PLATE ON TOP OF THE LEISTRITZ PLATE AND PROJECT THE DRILLING HOLES UP TO THE CEILING



MASS OF THE PTS WITH FRAME 420 kg +/- 10%
MASS OF THE RAIL 130 kg +/- 10%

RAIL PTS
STAINLESS STEEL 304
SURFACE FINISH: OUTSIDE Rm 8
SURFACE FINISH: INSIDE Rm 10
PLASTIC FINISH: INSIDE FROM FORM
FOR DETAILED INFORMATION SEE DRAWING NUMBER 1244530001

FRAME PTS
STAINLESS STEEL 304
SURFACE FINISH: OUTSIDE Rm 8
CLOSED CONSTRUCTION (SPR-ASH-PROOF)
FOR DETAILED INFORMATION SEE DRAWING NUMBER 1244530003

RECEIVER P100
PRODUCT CONTACT PARTS STAINLESS STEEL 316L
SURFACE FINISH:
Rm 4 PRODUCT CONTACT SIDE
Rm 8 OUTSIDE
FOR DETAILED INFORMATION SEE DRAWING NUMBER 1244530004

SOLENOID ENCLOSURE
STAINLESS STEEL 304
SURFACE FINISH: OUTSIDE Rm 8
FOR DETAILED INFORMATION SEE DRAWING NUMBER 110460700

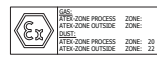
FRAMED DIMENSIONS ARE GIVEN FROM NOVARTIS

THE SOLENOID ENCLOSURE IS LOCATED OUTSIDE THE ATEX ZONE

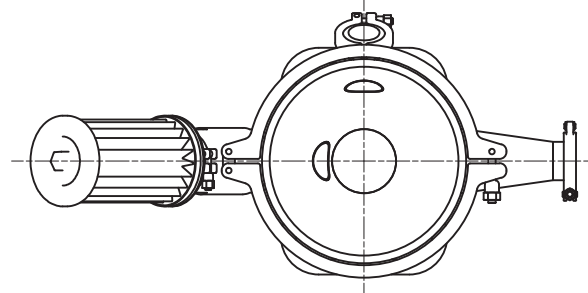
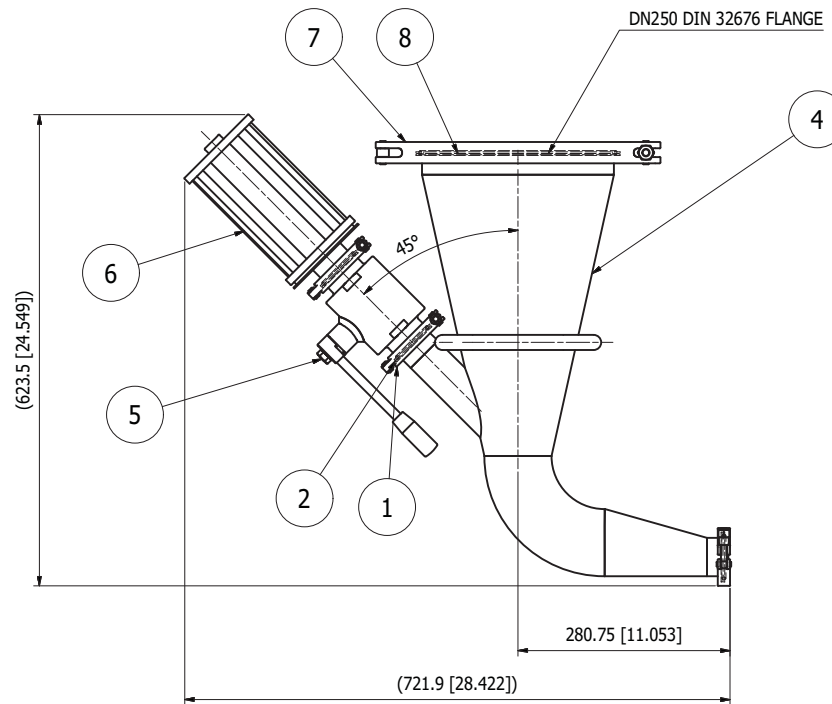
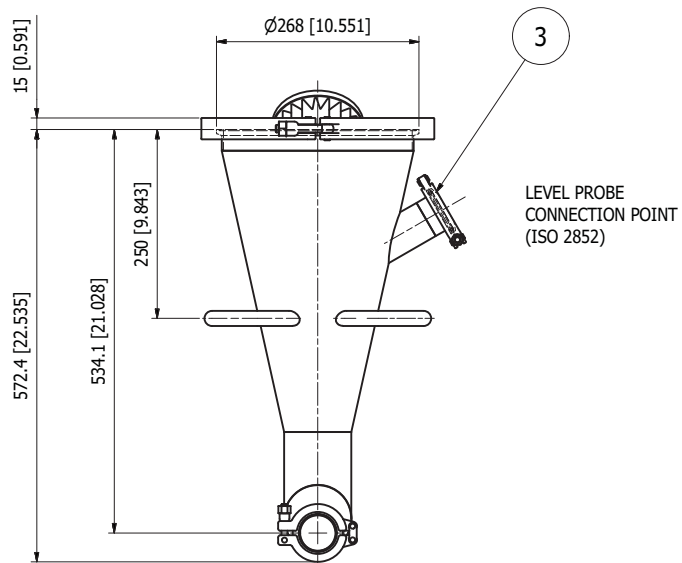
TO INSTALLATION INSTRUCTION (ETA 08 0352) WITH HILTI ADHESIVE HIT-HY 150 MAX

K-TRON PROJECT NO.:	1315690	DATE OF ISSUE:	28.02.2014
K-TRON PROJECT NR.:	AUSGABESTADIUM:	DATE OF ISSUE:	28.02.2014
NOTE / ANMERKUNG:	IN ORDER TO PREVENT A DELIVERY DELAY, PLEASE RETURN THE APPROVED DRAWING, ASSISTING OUR OFFICE LATEST		
DATE OF THE LAST REVISION (ENGLISH) / DATUM DER LETZTEN REVISION (DEUTSCH):	KANN BETTEN WIR UN REVISIONEN DER GEMEINEN ZEICHNUNGSSCHREIBER:		
APPROVED:	DATE:	DRAWN:	
DESIGNED:	DATE:	DATE:	
DATE:	DATE:	DATE:	
DATE:	DATE:	DATE:	

1	1	000004021	ROSE / SCHALICH - 500 0050 LPT08 PUR TRANSP FE6		
1	1	000003709	HILTI ADHESIVE HIT-HY 150 MAX		
1	1	000003708	HILTI ANCHOR ROD HIT-V-R M8x150		
1	1	000003726	WASHER - FÖR SCHRIBE PLAT OVS M16 SE 5,0/2x2,5 8020909	AS2	AS2 316
1	1	000003669	NETZ FILTER - 16A 16A 50/50/50	AS2	AS2 304
1	1	000003684	STRAIN RELIEF / KABELZUGENTLASTUNG - SST304	AS5	AS5 316 / AS5 304
1	1	000003700	PLUG / STOPFEN - CONN LAD 1 CROSS FER	POH	
1	1	000003709	PLUG / STOPFEN - CONN LAD 1 CROSS FER	POH	
1	1	000003687	NOZZLE / DÜSE SPIN ROT 430°	AS2	AS2 316 / AS2 304
1	1	000003688	LANCE / SPIN WEGE 130°	AS2	AS2 316 / AS2 304
4	1	021453002	PNEUMATIC CONNECTION / LUFTANSCHLUSS		
3	1	110460708	HOLDER TUBE / FÄHRTLEITUNG SCHALICH		
2	1	131569009	CACT / SCHALICHEN MIT CONN FER		
1	1	121453003	RAIL / SCHENE - COMPLETE		
1	1	121453003	RAIL / SCHENE - COMPLETE		



ATEX-ZONE PROZESS:	ZONE:	ATEX-ZONE AUSSEN:	ZONE:
ATEX-ZONE PROZESS:	ZONE: 20	ATEX-ZONE AUSSEN:	ZONE: 22
ATEX-ZONE AUSSEN:	ZONE:	ATEX-ZONE AUSSEN:	ZONE:

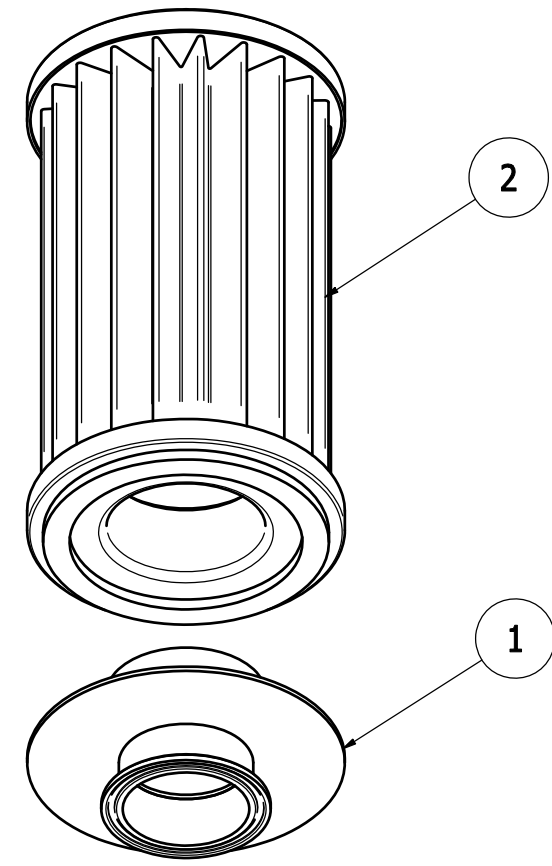
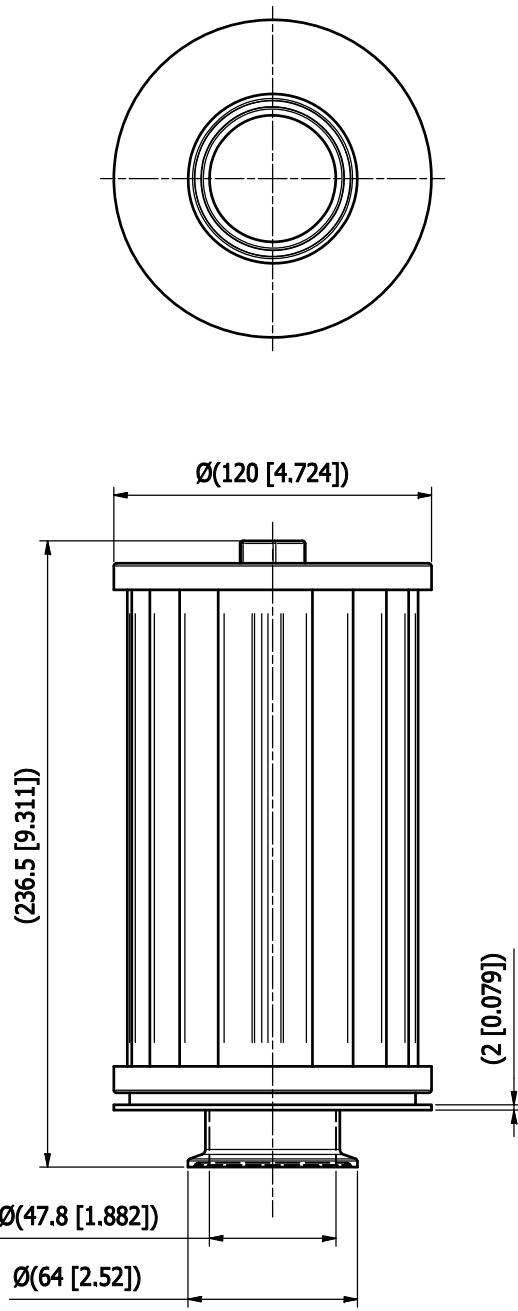


8	1	0000038023	GASKET / DICHTUNG - RND FER CLAMP DN268 ID250	MVQ
7	1	0000038022	CLAMP / KLEMME - FL D268 FER D308.4X28 SST316	
6	1	1104657009	FILTER - AIR FOR TAKE OFF POT	
5	1	0000031532	VALVE / VENTIL - BALL DN50 PTFE SST316	X2 CrNiMo17-12-2 AISI 316L
4	1	0000030757	HOPPER / TRICHTER- SST316L PL2 CERT3.1	
3	1	0000018768	D2" (D64) ISO 2852 CONNECTOR BLANK	X2 CrNiMo17-12-2
2	4	0000019471	GASKET / DICHTUNG - RND FER CLAMP DN64 ID50.2 MVQ	MVQ
1	4	0000019466	CLAMP / KLEMME - FL D64 FER D76.5X16.5 SST316	
SEQ	QTY	NUMBER	DESCRIPTION / SUPPLIER	MATERIAL

SCALE 1:5		DRAWN 06.01.2014 TBMG2
FIRST ANGLE		APPROVED 26.02.2014
PAGE 1 OF 1	CATEGORY P-Level	REV

	DIMENSION SHOWN IN MILLIMETERS [INCH]	FORMAT A2	NUMBER 1315690501	REV B
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APPROX STORAGE VOLUME: 10L +/- 10%
 APPROX WEIGHT: 8KG +/- 10%



2	1	0000011741	FILTER CART POLY/PTFE 200MM	A4
1	1	0000032150	HOLDER / HALTER - FILTER SST316L PL2 CERT3.1	
SEQ	QTY	NUMBER	DESCRIPTION / SUPPLIER	MATERIAL
PTS H71				SCALE 1:2
FILTER - AIR FOR TAKE OFF POT				DRAWN: DD.MM.YYYY SIGN 07.09.2011 TBMG
				FIRST ANGLE
				APPROVED: DD.MM.YYYY SIGN 05.02.2013 ARY
				PAGE 1 OF 1 CATEGORY: P-Level
				FORMAT A3
			NUMBER 1104657009	REV B

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- Address list K-Tron Companies and Reps

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Chapter 12:

Appendix