



OPERATING MANUAL

HET-ANKE FILTER SYSTEM A 2UED1-2 WSC S

Serial-No.: 11759

Customer: Novartis Singapore Pharmaceutical Manufacturing Pte Ltd

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11759

Novartis Singapore Pharmaceutical Manufacturing Pte Ltd



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1 General

1.1 Introduction

This Operating Manual is directed to all persons responsible for usage and operation of the filter system. It contains important safety instructions and describes particularly relevant details of the filter system.

Thorough knowledge and understanding of this Operating Manual is the basic requirement for safe handling and operation of this filter system!

The operator must ensure that this Operating Manual is actually provided to and known by the relevant and responsible persons.



NOTE

The Operating Manual must be read thoroughly **prior** to putting the filter system into operation. For any and all damage and operational malfunctions resulting from the non-observance of this Operating Manual, the manufacturer shall not assume any liability whatsoever.

This Operating Manual refers only to the A 2UED1-2 WSC S filter system with the serial number 11759. The illustrations and information/data in this Operating Manual that serve the improvement of the filter system are subject to technical changes.

1.2 Scope of the Technical Documentation

This Operating Manual contains all information on the setup, function and operation of the system that are necessary for its safe and secure operation.

The complete scope of the technical documentation is defined through the document No. 11759_DL-e of the document list.

2 Safety

2.1 Safety Instructions

This Operating Manual contains indications/warnings on work safety, which are marked with the following symbols:



DANGER!

This indication warns against hazards that can result in death or serious injury. Observe these indications/warnings and be especially careful in such cases. Ensure to pass on all indications/warnings on work safety to other operators.



CAUTION!

This indication warns against hazards that can result in damage to or destruction of the filter system, or contains instructions that will help to ensure operation that is trouble-free and according to regulations.



NOTE

This indication contains important information and additional tips for the operator.

2.2 Intended Use



CAUTION!

The A 2UED1-2 WSC S filter system with the serial number 11759 is intended exclusively for usage as described in the following. Any other or exceeding usage is not as intended for. For any and all damage resulting therefrom, the HET-ANKE Filtertechnik Corp. shall assume no liability whatsoever.

Any changes/alterations on behalf of the user, which influence the safety of the system, are not permitted.

The following is also included under the intended usage:

- Compliance with the outline conditions mentioned in chapter 3 "Technical Data",
- Observation of all indications/warnings in the Operating Manual, and
- Performing the inspection and maintenance work within the specified time.

The A 2UED1-2 WSC S filter system with the serial number 11759 is intended exclusively for the separation of a limited flow rate of dry and pourable solids from air or gases. Metal particles may not be drawn in. Neither the solids contained in the air/gas flow nor the gaseous matter may react among itself or with the components and materials in the filter housing. The maximum possible process temperature may not trigger any self-ignition/spontaneous combustion of the dust or of the gas. Upon designing and layout of the system, the materials within the process have been taken into account according to the state of knowledge; however, these remain fully within the responsibility scope of the user.

The filter system may only be switched on within operational/plant buildings.

The filter system described above is suitable for dedusting a maximum of 1,000 mg of dust per m³ of raw gas.



CAUTION!

Within the filter system, there are components that are operated via compressed air. For these, a certain, low degree of leakage/untightness cannot be exempt. In order to prevent inadmissible overpressure in the system, caused by outflowing compressed air, the filter system may not be sealed-off gas-tight on the raw-gas and clean-gas side at the same time.



CAUTION!

The filter system blows out the clean gas into a pipe system into which further systems are connected. When the filter system is switched off, the provided check valve (AK1.0) prevents that clean gas from other systems in operation can make their way into the filter system, thus causing an inadmissible overpressure in the filter system.

For this reason, the filter system may only be operated with the check valve.

2.2.1 Application Conditions



DANGER!

Increased danger of explosion!

The occurrence of combustible gases or vapors (e. g., from solvents) is not permitted and must be prevented by means of suitable measures on behalf of the operator.



CAUTION!

When dedusting, the blow-air pressure may not exceed 4 bar; otherwise, the filter material can be destroyed.

As a safety measure, a safety valve is installed in the blow-air supply line, which may not be removed.



NOTE

Guideline 94/4/EG (ATEX) subdivides unit group II into the following categories:

G (gases, vapors, mist)		D (dust)	
Category	Operating material suitable for	Category	Operating material suitable for
1G	Zone 0	1D	Zone 20
2G	Zone 1	2D	Zone 21
3G	Zone 2	3D	Zone 22

2.2.1.1 Conditions of Environment for Set-up

The control cabinet with the control system is mounted directly to the A 2UED1-2 WSC S filter system with the serial number 11759. For this reason, the system may be set up only in non-hazardous areas (= areas not subject to explosion hazard).

2.2.1.2 Process-specific Conditions

The A 2UED1-2 WSC S filter system with the serial number 11759 has no internal ignition sources and is thus suitable for dedusting **non-combustible** raw gas (e. g. air) with combustible dusts. The occurrence of combustible gases/solvents is not permitted and must be prevented by means of suitable measures on behalf of the operator.

The A 2UED1-2 WSC S system with the serial number 11759 fulfills the category Ex II 2D. Usage in a higher category is not permitted.

The following absolute application limits apply:

- Dusts with a max. Kst-value of 300 bar*m/s (St 2).
- Dusts with a max. explosion pressure of 10 bar.
- The following conditions apply for the process temperature (even in case of rare operational malfunctions):
 - Process temperature < 2/3 x minimum ignition temperature of the dust cloud in °C.
 - Process temperature < Smolder-temperature of the dust - 75 K.



DANGER!

In case of an explosion during operation above the permitted explosion parameters, it is possible that a such high explosion pressure develops, that the housing is destroyed.

Danger to life!

The system may only be operated in the operating-pressure range specified in section 3.1 "Filter System"!

Operation out of this range cannot be permitted until after an individual inspection by an expert for explosions has been carried out!

2.2.1.3 General Operating Conditions

Besides these, the following conditions must be met at all times:



DANGER!

Dust deposits between operational and safety filters indicate a malfunction of the primary filter stage, and impair the safety of the system. In case of an explosion, an inadmissible explosion pressure can build up. Danger to life! Examine and correct the cause of the dust deposits without delay. Clean the system before putting it into operation again.



NOTE

In proper operation, the A 2UED1-2 WSC S filter system with serial number 11759 counts/qualifies as a flame trap.

- During the dedusting, the raw-gas butterfly valve (AK1.11, AK1.21) must be shut in order to increase the effectivity of the dedusting and prevent backflushing of dust.
- On the raw-gas side, an explosion-technical separation is necessary. This may take place by means of the HET raw-gas butterfly valve (AK1.11, AK1.21) when the following requirements are met:
 - The maximum raw-gas concentration in the raw-gas conducting piping is << the minimum igniting concentration (please also refer to VDI 2236).

- The minimum igniting concentration is exceeded only during filter dedusting. During this period, the raw-gas butterfly valve is process-technically shut.
- In any event, this proceeding method is to be confirmed by an expert for explosions.
- Auxiliary extensions/equipment on behalf of the customer without means for separation/decoupling must correspond with the dimensioning of the filter housing.
- In case of an explosion, fittings/gauges on the clean-gas side must withstand the relieved pressure.
- The filling level of the dust container (BB1.1, BB1.2) is to be checked daily, as its overfilling leads to frequent occurrence of dust clouds that are capable of exploding. In this case, it is possible that the "Zone" determined by the operator is invalid.
- Dust deposits between operational (F1.1) and safety filters (F1.2) as well as their cause must be examined and corrected immediately. (Safety function!)
- Only original parts from the HET-ANKE Corp., which must be in perfect condition, are allowed to be installed/assembled.
- When dedusting, the blow-air pressure may not exceed 4 bar; otherwise, the filter material can be destroyed.
- The primary filter cell (F1.11, F1.21) may not exceed a filter resistance of 2,000 Pa.
- During operation, filter cells (F1.11, F1.21, F1.12, F1.22) must permanently be connected to ground/earth with all individual metal components; if required, use grounding/earthing cables. Provide for appropriate scheduled inspections.
- Only personnel that is qualified and trained on the system is permitted to work on and operate the system. Informing and training of personnel should include safety-conscious behavior, what to do in case of malfunctions, handling of materials/substances that are capable of exploding, etc.

2.2.2 Application Conditions for Materials/Substances Harmful to One's Health

To widely avoid the release of dust, the A 2UED1-2 WSC S dust filter system with the serial number 11759 is equipped with a:

- Safe-change-system for filter changing
- Safe-change-system for the discharge of dust



DANGER!

In case of contact with harmful materials/substances, there is danger of temporary or permanent damage to one's health.

As the detailed materials contained in the separated dust are known only to the operator, the following points are within the operator's sole responsibility:

- **Compliance with the national regulations concerning the rate of air-changing (ventilation) and the handling of hazardous materials for the present agents;**
- **Check of the correct usage as intended for in case of new information/findings concerning the dust type;**
- **Carrying out additional protection and containment measures;**
- **Determination of sufficient personal protective equipment when the release of dust is expected while working on the filter system.**

The HET-ANKE Filtertechnik Corp. shall not assume any liability whatsoever for damage resulting from insufficient protection measures.

2.3 Residual Hazards, Hazard Sources

2.3.1 Electrical Voltage



DANGER!

Electrical Voltage!

Danger of potentially hazard power surges!

The components in control cabinet/control box are "live" during operation. Any work being performed on the electrical equipment of the filter system is to be carried out by a qualified electrician and only with the power switched off.

- The electrical equipment of the filter system is to be checked regularly. Loose connections and scorched cabling/conductors are to be corrected immediately.

- The control cabinet is to be kept shut at all times. Access is permitted only to authorized personnel with the appropriate key or tools.
- Any work on "live" components is prohibited.

2.3.2 Pneumatic Components



DANGER!

Danger of injury from loose pneumatic hoses!

Pressurized loose pneumatic hoses can bounce around in an uncontrolled manner. Therefore, observe the following points:

Only qualified personnel with special knowledge and experience of pneumatics are permitted to work on the pneumatic equipment:

- Before carrying out repair work, the pressure in the pressure container and pressure lines is to be released.
- Check hose lines for compressed air regularly and replace in case of detectable defects (bent or chafed hoses).



DANGER!

Danger of contusions/crush injuries!

Air valves and cylinders are pneumatically driven.

Do not touch movable/moving parts when the control system is switched on!

2.4 Safety Equipment

2.4.1 Warning Indications

Warning indications on the filter system may not be removed and must always be readable. Warning indications:

- 1 „ACHTUNG! Vor dem Öffnen der Wartungstür Stillstand des Ventilators abwarten!
ACHTUNG! Gehäuse nur öffnen, wenn Hauptschalter aus!“
"Caution! Before opening the maintenance door, wait until the ventilator has stopped!
Caution! Open the housing only when the main switch is set to OFF!"
- 2 „Erdungsstecker im Gehäuse muss an der Filterzelle aufgesteckt sein! Explosionsgefahr!
Earthing plug inside the housing has to be connected to the filter cell!
Danger of explosion!“
(2x, auf jeder Filterkammer)
and
„Gehäuse muss innen staubfrei sein! Staub im Innenraum sofort beseitigen! //
Housing must be dust free inside!
Dust inside remove immediately!“
(2x, auf jeder Filterkammer)
- 3 „Vor dem Entleeren der Staubtonne Handklappe schließen und nach dem Entleeren wieder öffnen!//
Close manual actuated valve before emptying the dust bin and open it again after emptying the bin!“
(2x, auf jedem Staubaustrag)
- 4 „Staubbehälter nicht überfüllen! Füllstand regelmäßig kontrollieren! Niemals ohne Inliner betreiben! //
Do not overfill dust bins! Regular control of the level! Do not use dust bin without inliner!“
(2x, auf jedem Staubbehälter)
- 5 Warning indications concerning hand and foot injuries
- 6 „Das Einsaugen von Metallteilen und anderen Funken schlagenden Teilen ist unbedingt zu verhindern! //
Urgently prevent aspiration of metal objects and any spark striking parts!“
- 7 Warning indication electrical voltage
(2 x on compartment module, 1 x on switch cabinet)

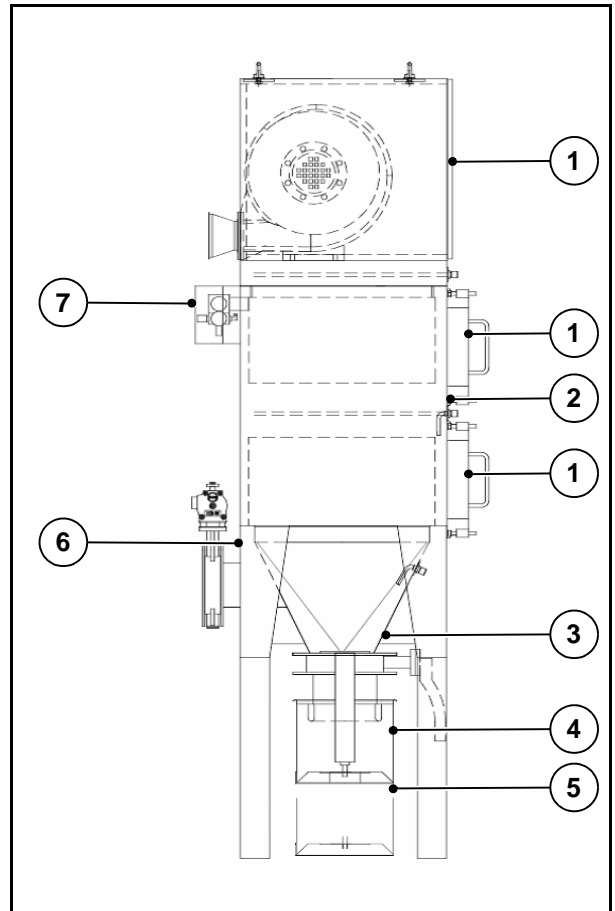


Fig. 1 Warning indications on the filter system

2.4.2 Safe-Change-System

In order to protect personnel against dust when changing the filter and discharging dust, the filter system is equipped with safe-change-systems for the filter change and the discharge of dust.

In order to ensure that the system is sealed-off/closed-off, the instructions for changing the filter and discharging dust must be followed exactly and step-by-step.



DANGER!

Danger of poisoning from hazardous dust!

When changing the filter and discharging dust, pay attention not to damage the plastic bag, so that the release of dust is avoided.

2.4.2.1 Changing the Filter

The safe-change-system enables contamination-free filter changing in accordance with DIN 25414.

The change-frame consists of an aluminum profile with 2 ring-grooves around it. A plastic bag is used as the protection bag. It is placed over the frame and fastened air- and gas-tight in the front groove with a corresponding rubber ring. When removing the used filter, it is packed directly into the plastic bag. The plastic bag is double-sealed and separated between the two closing locations. The used filter can be disposed of. The new filter cell is inserted into a new plastic bag. This is placed over the rest of the old plastic bag and fastened to the change-frame with a new rubber ring. The old rubber ring and the rest of the old plastic bag are pulled in the new plastic bag off of the change-frame and remain in the new plastic bag. The new filter cell can be inserted. In this manner, the filter system also remains sealed-off/closed-off when changing the filter.

2.4.2.2 Discharge of dust

The change-frame consists of an aluminum profile with 2 ring-grooves around it. A plastic bag is used as the dust-collection bag. It is placed over the frame and fastened air- and gas-tight in the front groove with a corresponding rubber ring. The separated dust is collected in the plastic bag. The plastic bag is double-sealed and separated between the two closing locations. The separated dust can be disposed of. An new plastic bag is placed over the rest of the old plastic bag and fastened to the change-frame with a new rubber ring. The old rubber ring and the rest of the old plastic bag are pulled in the new plastic bag off of the change-frame and remain in the new plastic bag. In this manner, the filter system also remains sealed-off/closed-off when discharging dust.

2.4.3 Two-hand-operation of the Dust-discharge System

Two pneumatic cylinders (Z1.11, Z1.12, Z1.21, Z1.22) press the dust-collection container (BB1.1, BB1.2) against the sealing surface of the dust-collection funnel. Operation takes place via three pushbuttons, which are installed to the left and right of the discharge valve. The left-hand pushbutton (Y1.11, Y1.21), is the release-button, which is pressed when the pneumatic cylinders are to be actuated. The two right-hand pushbuttons (Y1.12, Y1.22, Y1.14, Y1.24) are used to move the cylinders up and down.

The two-hand-operation ensures that both hands of the operator are outside of the danger area, minimizing the danger of injury upon actuation of the pneumatic cylinders.



DANGER!

Danger of contusions/crush injuries from pneumatically-moved components!

Lowering/pressing the dust-collection container against the outlet may be carried out only by a single person. Other persons are not permitted to be in the reach/direct vicinity of the dust-collection container while these work steps are carried out.

Any and all manipulation of this safety feature, with the goal of enabling single-hand operation are strictly prohibited! The HET-ANKE Filtertechnik Corp. shall not assume any liability whatsoever for damage resulting from violation or infringement of this prohibition.

2.4.4 Limit Monitoring of the Discharge Valve

To prevent lowering of the dust-collection container (BB1.1, BB1.2) when the discharge valve (AK1.12, AK1.22) is opened, a pneumatic limit switch (Y1.15, Y1.25) is mounted next to the discharge valve. As long as the discharge valve is open, the valve (2/1) is shut by means of spring force, and the compressed-air supply of the dust-discharge system is interrupted. The valve will not open, and thus provide the dust-discharge system with compressed air, until after the discharge valve is shut and the valve handle (2/3) presses against the roller (2/2) of the limit switch. The dust-collection container can now be lowered.

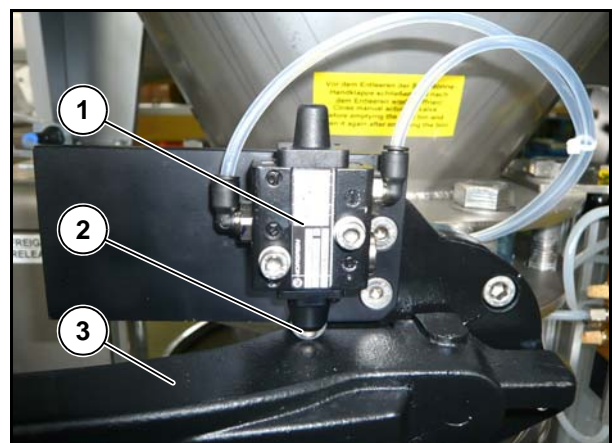


Fig. 2 Limit monitoring, general representation

2.4.5 Safety Valve, Blow-air

When dedusting, excessive blow-air pressure can destroy the filter material. To limit the blow-air pressure to maximum 4.0 bar, a safety valve (SV1.1) is installed in the blow-air supply line to the cleaning-cylinders. This valve is located on the rear side of the filter system and opens at 4.0 bar.



Fig. 3 Safety valve in blow-air supply line, general representation

2.5 Approved Personnel

The filter system may only be operated, maintained and repaired by sufficiently qualified and appropriately authorized personnel. Before using the filter system, the operating personnel must have undergone appropriate training/been instructed on the filter system, must have read and understood the Operating Manual, and must know the therein contained safety instructions. We recommend the operator having this confirmed in writing.

In addition to this, the operator must regularly inform the operating personnel about all guidelines and regulations that apply for the operation location and the materials in use. In this, all questions/matters concerning work safety and environmental protection are to be taken into account.

It is within the operator's sole responsibility to prevent operation of the filter system through unauthorized persons.

2.6 Safety during Operation

This filter system is designed/built according to the current state of art and the approved/accepted safety-technical regulations. Nevertheless, when using the system, it is possible that death or serious injury to the operator, users or third persons, as well as impairments to the filter system or other property/assets, can result. The filter system may be operated only

- as intended for,
- by appropriately trained and authorized personnel, and
- when in sound safety-technical condition.

Any malfunctions that impair the safety are to be corrected without delay.

When operating the system, all safety instructions as well as the local Regulations for Prevention of Accidents listed in this Operating Manual are to be observed.

2.7 Safety in Maintenance and Repairs



DANGER!

Danger of poisoning from hazardous dust!

Prior to any maintenance and repair work within the system, the system is to be cleaned to the extent possible, in order to avoid the release of dust during the work.

For all work on the opened system, wear sufficient protective equipment, as remainders of dust still have to be expected after the cleaning.

- Maintenance and repairs may be carried out only through trained and authorized personnel. The safety instructions listed in this Operating Manual are to be observed
 - Any work being performed on the electrical equipment may be carried out only by a qualified electrician and only with the power switched off.
 - Any work on the pneumatic equipment may be carried out only in pressure-free condition and only through personnel with special knowledge and experience of pneumatics.
- As a general rule, the power of the control system is to be switched off and the compressed-air system is to be made pressure-free prior to any maintenance and repair work. The system is to be secured against unintentional restarting.
- Danger of falling down! When changing the filter or during other inspection work, ensure safe positioning of the filter system and secure footing of the operating personnel! This applies particularly when the system is standing on a work platform or when a ladder is being used.
- Crush hazard! The filter cells are dedusted by means of a pneumatic linear drive. Do not work in a filter compartment when the system is running.
- Danger of injury! Wait until the ventilator has stopped prior to any assembly/mounting work!
- After major work on the electrical system, all safety equipment/features are to be checked.
- Observe the local safety instructions and regulations for prevention of accidents.

2.8 Warranty and Liability

Warranty is based on the "Technical warranty for gas cleaning equipment", VDI 2260. The scope of the warranty is specified in the contract text (quotation, order, order confirmation). Otherwise, we provide warranty for proper, machine-technical operation of our filter systems for a period of 2500 operating hours from the day of putting into operation, or respectively, 12 months from the day of delivery.

Warranty conditions to be observed on behalf of the operator:

- 1) Compliance with the operating parameters, such as:
 - Dust type or aggregate
 - Raw-gas volume and temperature
 - Raw-gas dust content
 - Dew point of the raw gas
 - Compressed-air supply
 - Voltage supply
- 2) Knowledge and implementation of the indications in the Operating Manual;
- 3) Proper storage of the filter system before putting into operation;
- 4) Intended use of the filter system;
- 5) Operation of the filter system
 - with the provided, intact protection devices/systems
 - without structural alterations of the filter system and control system,
 - without any own or self-made alterations to the program flow,
 - exclusively with original spare parts (filters, valves, etc.); operation with foreign (non-original) parts is not permitted;
- 6) Competent assembly, putting into operation, operation, maintenance and repair of the filter system, as far as activities are carried out by the customer themselves;
- 7) Compliance with the half-yearly inspection through trained and HET-ANKE Filtertechnik-authorized personnel;
- 8) Notification of our relevant agency in case of a malfunction or its immediate competent correction;
- 9) Proper operation of the filter system. Also included here is the regular emptying of dust-collection equipment.
- 10) Operation of the filter system with a ventilator/fan imbalance is not permitted!
The user must ensure that the ventilator/fan is operated free of imbalance and in accordance with the ventilator/fan manufacturer's documentation.

The warranty expires when

- the before mentioned conditions are infringed or violated against,
- in case of disasters caused by effect of foreign bodies and force majeure.

3 Technical Data

3.1 Filter System

System type	A 2UED1-2 WSC S
Number of filter compartments	2
Number of filter stages	2
Dimensions (W x D x H) without silencer	approx. 1,928 mm x 1,437 mm x 2,777 mm
Weight	approx. 1,250 kg
Raw-gas connection	On rear side 2 x DN 200 PN 10, Flange acc. to DIN 2501
Clean-gas connection	On rear side DN 150, flared (system Jacob)
Admissible ambient temperature	+5–+50 °C
Dimensioned pressure of the housing	1 bar overpressure, safe against pressure blasts
Operating pressure	0––5.500 Pa
Max. operating vacuum	-5.500 Pa
Material of housing	1.4301 (AISI 304)
Treatment of surface of housing	Welding seams pickled and passivated (chrome-treated), surfaces in contact with product: Ra < 1.2 µm
Medium	Air
Type of dust	Pharmacy dust, dry and pourable
Dust Ex class (assumed)	ST1 or ST2 ($K_{st} < 300 \text{ bar}\cdot\text{m/s}$)
Minimum ignition energy	> 1 mJ
Ex-categories	Exterior: none Exterior (control-system area): none Interior (product-contacted): Ex II 2D Interior (clean-gas area): none
Raw-gas dust loading (assumed)	100 mg/m ³
Clean-gas dust loading	< 0.001 mg/m ³
Flow rate	900–1,400 m ³ /h
Raw-gas temperature, normal	10–35 °C
Max. admissible raw-gas temperature	50 °C
Differential pressure of the system	300–2,500 Pa
Diff. pressure, primary filter	350 – 2,000 Pa
Diff. pressure, secondary filter	250 – 400 Pa
Mode of operation	Continuous
Compressed-air supply	Blow-air of 6 bar, ¾"-hose by customer
Voltage supply	400 V/50 Hz

3.2 Filter Cells

3.2.1 Primary Filter

Number of filter cells	2
Type	RL 215.110
Filter class	H13
Degree of separation	>99.95 %
Filter surface (total/per cell)	40 m ² / 20 m ²
Specific filter-surface load at 1,400 m ³ /h (operation/dedusting)	35 m ³ /m ² h / 70 m ³ /m ² h
Max. operating temperature	110 °C
Grounding/Leakage resistance	Yes/< 10 ⁶ Ω
Rated flow rate	2,000 m ³ /h
Initial filter-resistance	350 Pa
Operational filter resistance	350–2,000 Pa
Dimensions (W x D x H)	610 x 610 x 292 mm
Weight	approx. 32 kg
Housing	Stainless steel
Filter material	Micro glass-fiber fleece with lining
Spacer(s)	PAL
Casting compound	none
Seal	EPDM

3.2.2 Secondary Filter

Number of filter cells	2
Type	Stage 2, steel housing
Filter class	H13
Degree of separation	>99,95 %
Filter surface (total/per cell)	40 m ² / 20 m ²
Specific filter-surface load at 1,400 m ³ /h (operation/dedusting)	35 m ³ /m ² h / 70 m ³ /m ² h
Max. operating temperature	80 °C
Grounding/Leakage resistance	Yes/< 10 ⁶ Ω
Rated flow rate	2,000 m ³ /h
Initial-filter resistance	250 Pa
End-filter resistance	750 Pa

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Dimensions (W x D x H)	610 x 610 x 292 mm
Weight	approx. 20 kg
Housing	Steel, galvanized
Filter material	Micro glass-fiber fleece
Spacer(s)	Aluminum
Casting compound	PU
Seal	Foamed PU seal

3.3 Ventilator

Type	HRD 60 FU
Flow rate	1.400 m ³ /h
Vacuum	5,500 Pa (external 2,800 Pa)
Operating temperature	20 °C
Motor output	4 kW
Voltage	400 V/50 Hz
Degree of protection	IP 54
Blow-out noise L _{WA}	75 dB(A) with silencer
Jet noise L _{PA}	< 75 dB(A) (at 1 m clearance)
Weight	approx. 36 kg



NOTE

Observe the documentation of the ventilator manufacturer!

4 Transport, Storage

4.1 Packaging

The filter system is delivered in pre-mounted units, packed in wooden boxes. The delivery consists of:

- Filter compartments with dust funnels, mounted ventilator in housing, permanently mounted control system inserted filter elements
- dust discharge and base elements
- Check valve with accessories
- Silencer

4.2 Lifting the Filter System



DANGER!

Danger of injury from falling down parts!

Only use lifting tackle with sufficient carrying capacity and when in perfect condition.

When lifting loads, observe the safety instructions and regulations for prevention of accidents.

Information on weights and dimension for dispatch are listed on the delivery note/ packing slip.

The top side of the filter system is fitted with fastening points for lifting tackle:

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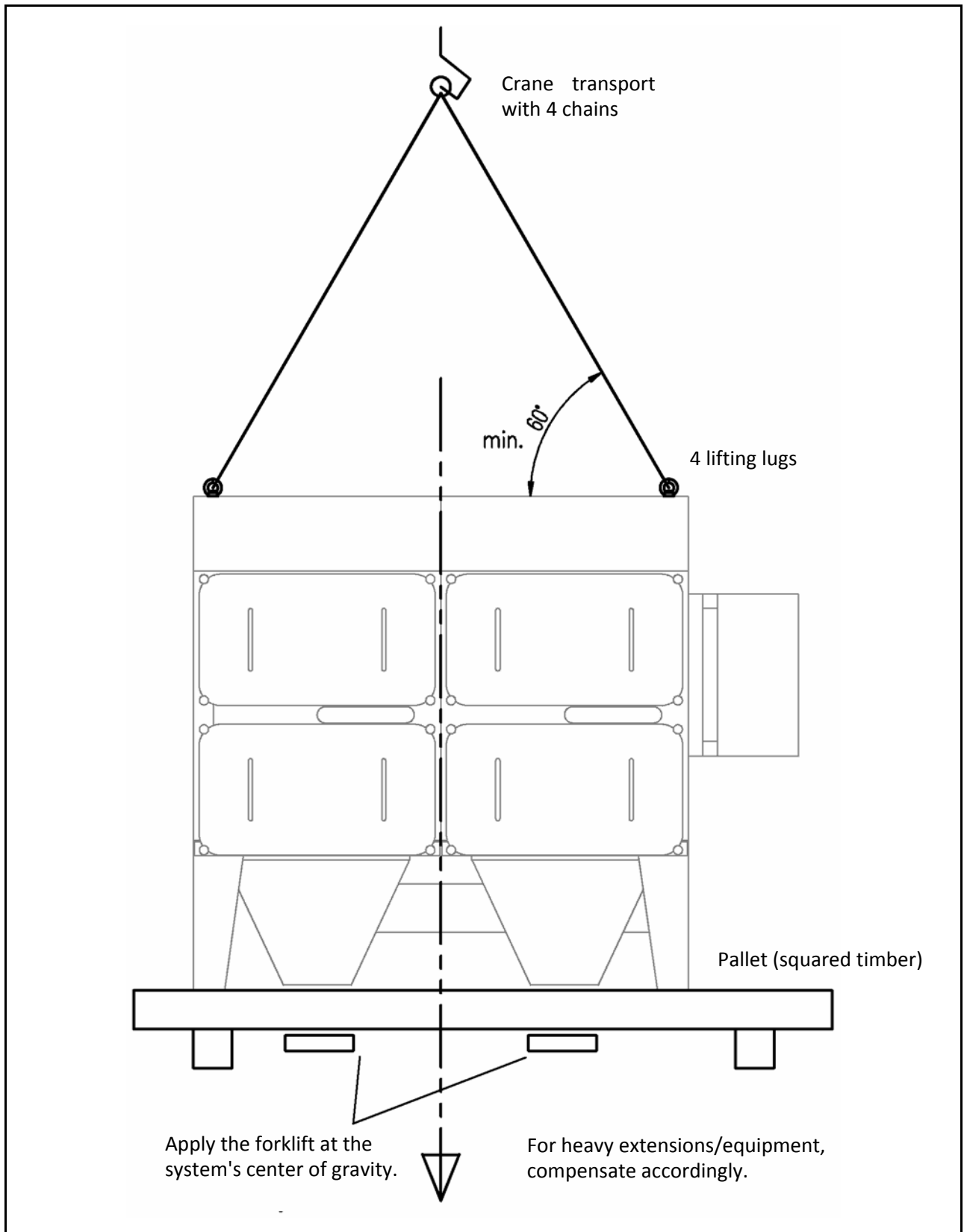


Fig. 4 View filter unit transportation (general representation)

4.3 Storage before the Initial Putting into Operation

All openings of the filter system, such as raw-gas connection, clean-gas connection and all doors of the system are to be shut/sealed off tightly.

The filter system is to be stored at a dry location that is free of condensate. If storage in such a manner should not be possible, all non-coated system components must be conserved for corrosion protection.

5 Setup, Installation

5.1 Space Requirements

For maintenance purposes, the following minimum clearances to the filter system must be kept:

- Front side of the filter system (filter changing, discharge of dust): 1.2 m
- Right-hand side (control cabinet with control system): 1.2 m
- Left-hand side (service area): 0.2 m
- Rear side (service area): 0.8 m

5.2 Mounting the Filter System

The filter system is delivered in pre-mounted units:

- Filter compartments with dust funnels, mounted ventilator in housing, permanently mounted control system inserted filter elements
- 2 dust discharges
- 4 base elements
- Check valve with 2 tapered adapters, DN 250-150; pipe element, DN 250; clamping rings and seals
- Silencer

Please observe:



DANGER!

Danger of injury by the system tipping over!

With the mounted ventilator, the system is top-heavy. When assembling, secure the system against tipping over and support it appropriately.



NOTE

Position or location changes of components mounted directly to the system, particularly to the control cabinet, are considered as structural modification and may be carried out only after consultation and approval on behalf of the HET-ANKE Filter-technik GmbH. Otherwise, the warranty shall be voided (see section 2.8 "Warranty and Liability").

- When assembling, pay particular attention to proper grounding of all metal parts. Flange connections require the use of fan-type lock washers.
- Flange and screw connections are to be sealed.

- The dummy lids at the air-intake and outlet openings must not be removed until directly before the respective connection work/mounting takes place.
- Install filter elements before putting into operation, if necessary.

Assembly:

- ➔ Screw the 4 frame legs to the filter-compartment unit.
- ➔ Set up and align the filter-compartment unit according to drawing 0-11759-001
- ➔ Compensate any unevenness of the floor, if required. Bolt the filter system to the floor with anchors.
- ➔ Screw on dust-discharge units with butterfly valves mounted; fasten ground cable and pressure-compensation hose to container.
- ➔ Assemble check valve according to drawing 0-11759-020 and mount to clean-gas outlet.
- ➔ Install silencer in the clean-gas line according to local conditions; supports to be provided by customer.

Connections:

- ➔ The following connections are to be established (also see layout drawing 0-11759-001):
 - Raw-gas duct,
 - Clean-gas duct,
 - Compressed air,
 - Power (only by a qualified electrician),
 - Control system (only by a qualified electrician).

5.3 Connections for Raw Gas and Clean Gas



DANGER!

Sparking metal parts or other ignition sources can trigger a dust explosion in the filter system!

The operator is under obligation to ensure through suitable measures that no metal particles, sparking metal parts and other ignition sources can make their way through the raw-gas inlet into the filter system.



CAUTION!

The dimensioning of the raw-gas line must correspond with the filter system. The raw-gas line must be connected to ground/earth.

5.4 Compressed-air Supply

The system is provided with the compressed air necessary for operation from the operator's compressed-air supply. The user/operator shall ensure that the following conditions are met:

- The compressed air must be free of oil and dry.
- The air-supply pressure must be 6 bar; the minimum pressure may not fall below 5.5 bar and the maximum pressure shall not exceed 8 bar.
- During dedusting (5 s per compartment), a compressed-air quantity of at least 20 NI/s must be available. During dedusting, the air-supply pressure may not fall below 5.0 bar.

Compressed-air connection:

- ➔ Connect the compressed-air hose to the 3/4" hose connection (5/1) of the pressure-regulating unit (DR1.1) and secure with a hose clamp.

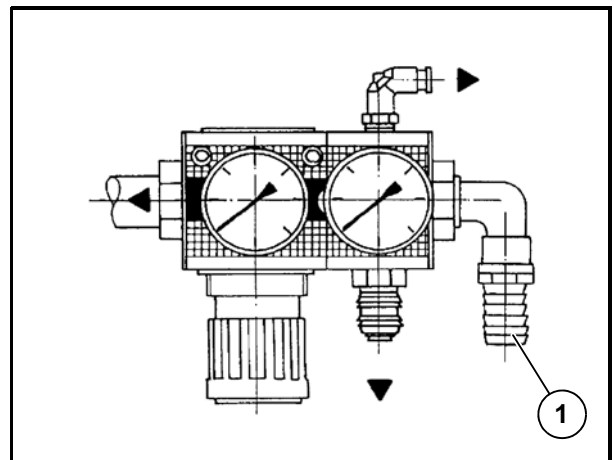


Fig. 5 Filter/regulator-lubricator for compressed air, general representation

5.5 Power Supply

The connection to the power supply is carried out according to the wiring diagram.

Voltage/frequency: 400 V/50 Hz



DANGER!

**Electrostatic charging can trigger an explosion in the filter system!
For this reason, it is imperative that the filter system is connected to ground/earth!**

The system is to be incorporated in the local equipotential bonding system. Thus all components, which are metallically connected to the system, are incorporated in the equipotential bonding system

In this, please observe the valid, relevant regulations!

The grounding points of the system are labelled/marked with white grounding-point stickers. These are located at:

- One base stand (central grounding point),
- The raw-gas inlet (equipotential bonding with raw-gas supply line on behalf of the customer),
- The clean-gas outlet (equipotential bonding with clean-gas line on behalf of the customer).

5.6 Connection to a Primary Control System (Option)

The dedusting control system is equipped with isolated interface contact points for connection to a primary control system. For more details on type and amount of the interface contact points, please refer to the operating instructions of the dedusting control system and the wiring diagram.

6 Description of the System

6.1 Filter System

- 1 Clean-gas connection
- 2 Filter housing
- 3 Change-frame
- 4 Clamping device of the secondary filter
- 5 Cleaning-cylinder
- 6 Inspection window
- 7 Clamping device of the primary filter
- 8 Maintenance door
- 9 Dust-collection funnel
- 10 Frame legs
- 11 Butterfly valve for discharge of dust
- 12 Dust-collection container

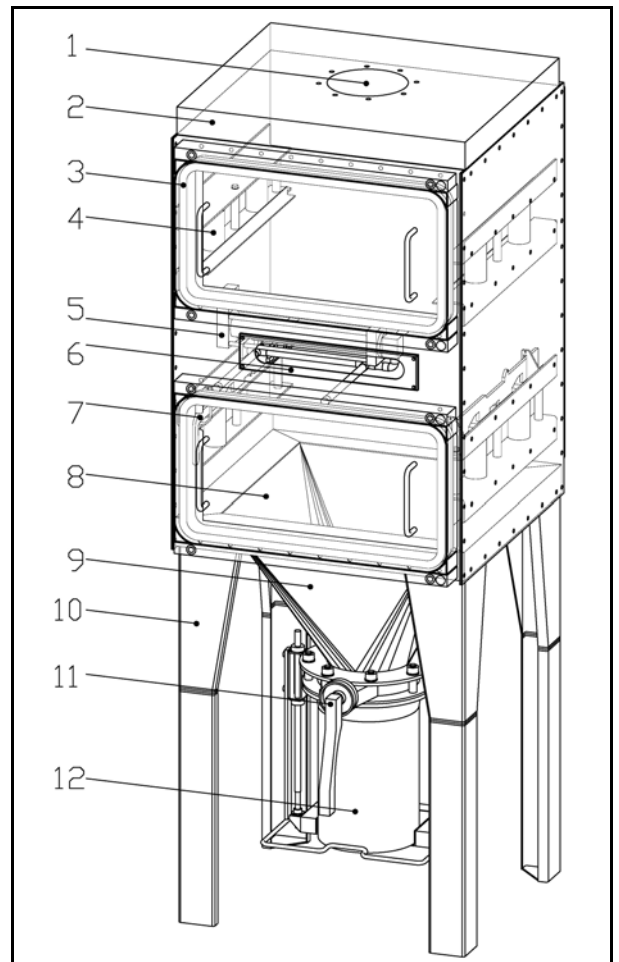


Fig. 6 General representation of a system with one filter compartment

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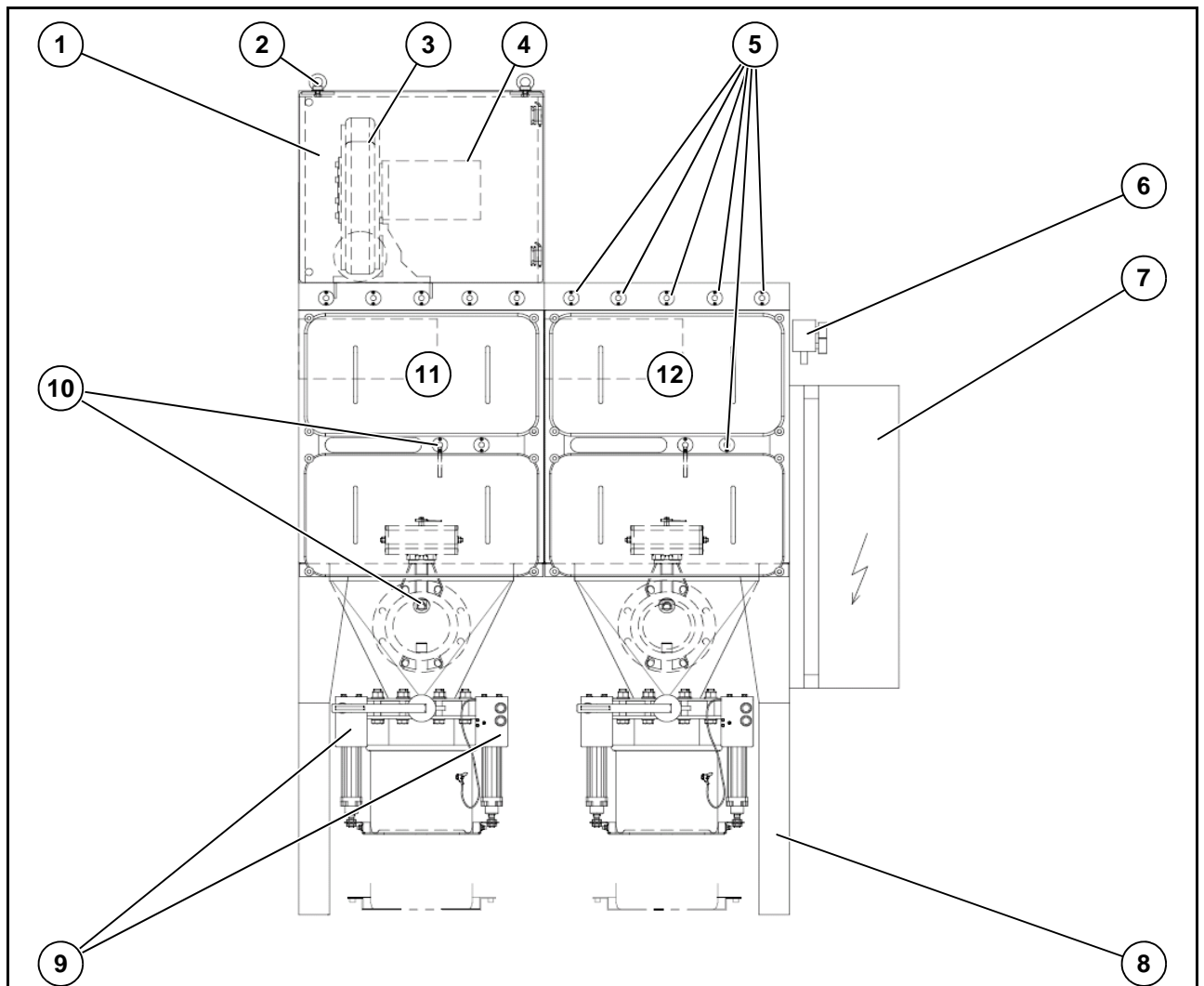


Fig. 7 Front view

- | | |
|--|---|
| 1 Ventilator housing, sound-insulated | 7 Control cabinet |
| 2 Lifting eye bolt, fastening point for lifting tackle | 8 Frame legs |
| 3 Ventilator (V1) | 9 Operation unit for dust discharge |
| 4 Ventilator motor | 10 Validation lance for infeed of testing medium |
| 5 Validation lances, measuring connectors | 11 Filter compartment 1 |
| 6 Compressed-air connection with pressure regulator (DR1.1) | 12 Filter compartment 2 |

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- 1 Clean-gas outlet, ventilator
- 2 Dust-collection funnel
- 3 Butterfly valve for discharge of dust (AK1.12, AK1.22)
- 4 Dust-collection container (BB1.1, BB1.2)
- 5 Pneumatic cylinder(s) for dust discharge (Z1.1, Z1.2)
- 6 Raw-gas connection
- 7 Valves, filter compartment, with pneumatic drives (AK1.11, AK1.21)
- 8 Filter compartment module
- 9 Clean-gas outlet
- 10 Check valve (AK1.0)

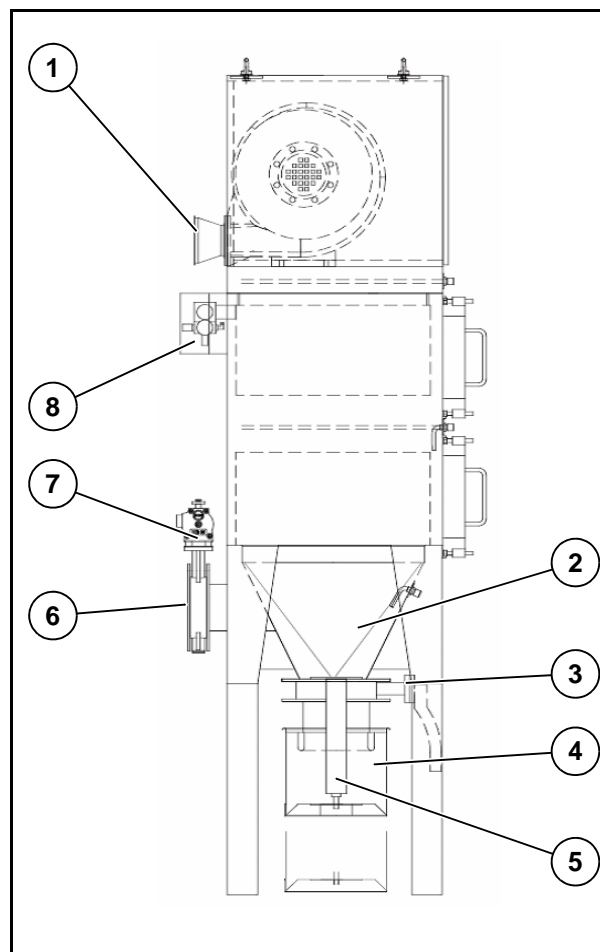


Fig. 8 Side view

6.2 Control Cabinet

The control cabinet is mounted on the right-hand side of the system. It contains all electrical and pneumatic components necessary to control the filter system.

- 1 Switch-cabinet ventilation, outlet filter
- 2 Control panel of control system with touch-panel and function keys
F1: System ON
F2: System OFF
F3: Manual dedusting
F4: Quit (acknowledge malfunction)
- 3 Main switch with emergency-off function
- 4 Switch-cabinet ventilation, filter fan

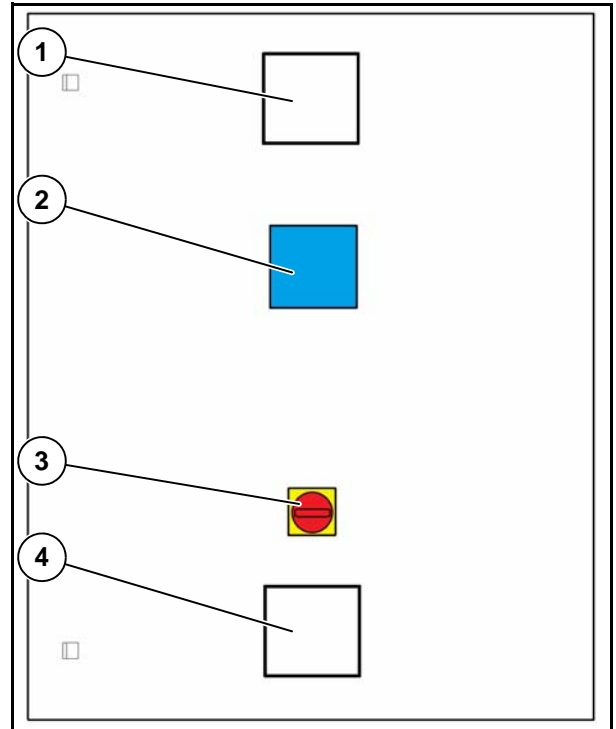


Fig. 9 Control cabinet

6.3 Control System

The filter cleaning system is designed as a master-slave system. A programmable control system (PLC) functions as the master. A filter compartment module (slave), used for control of the filter dedusting, is mounted on each filter compartment. The dedusting modules are connected Profinet bus to the master (PLC). Voltage is provided to the dedusting modules via a two-wire power supply (0-24 V DC).

The dedusting system's control system is equipped with isolated interface contact points for connection to a primary control system.

6.3.1 CPU (Central Processing Unit)

The CPU is installed in the control cabinet. It is the core element of the control system (master). This is where the information of the subordinate modules is processed and the respective control signals are put out.

6.3.1.1 Inputs

The condition of the following components/elements are transferred to the system:

- Inputs via the touch-panel of the control panel
- Function keys of the control panel (system on/off, malfunction reset, manual dedusting)
- Signals of the operator's primary control system via Profinet bus (enable I&C system, manual dedusting)
- Signals of the frequency converter/ventilator (motor OK)
- Signals of the pressure switch (PS1.1) (malfunction compressed air)
- Filter compartment modules (via bus):
 - Differential-pressure values of primary/secondary filter (AI01, AI02 (AFM1/AFM2))
 - Limit monitoring of valves (-10K8 (AFM1/AFM2))

6.3.1.2 Outputs

The system has the following outputs:

- Signals to the operator's primary control system via Profinet bus (malfunction, system operating, enable production, requirement of dedusting, maintenance necessary, dedusting active)
- Signals to the frequency converter/ventilator (enable ventilator)
- Signals for service indications at the control panel
- Signals for malfunction indications at the control panel

6.3.2 Filter Compartment Module

Two filter compartment modules are integrated in the control cabinet. Each module contains all components necessary for controlling of the processes in the respective filter compartment:

- Differential-pressure transmitter for monitoring the differential pressure of the primary and secondary filter (AI01, AI02);
- Pneumatic valves for opening/closing the raw-gas butterfly valve (Y01.1, Y01.3);
- Pneumatic valves for moving the cleaning cylinder and for blow-air supply (Y01.2, Y01.4).

6.3.3 Control Panel ANKE CS200

The control panel is installed in the control-cabinet door. It is equipped with a touchscreen and function keys. The touchscreen indicates operational messages of the control system and text of the operator menu. Data are entered via the touchscreen and the function keys.

The operating elements required for operation of this system are listed below.

- 1 Touchscreen
- 2 Function key **F1**: System ON
- 3 Function key **F2**: System OFF
- 4 Function key **F3**: Manual dedusting (starts a dedusting run)
- 5 Function key **F4**: Acknowledge malfunction

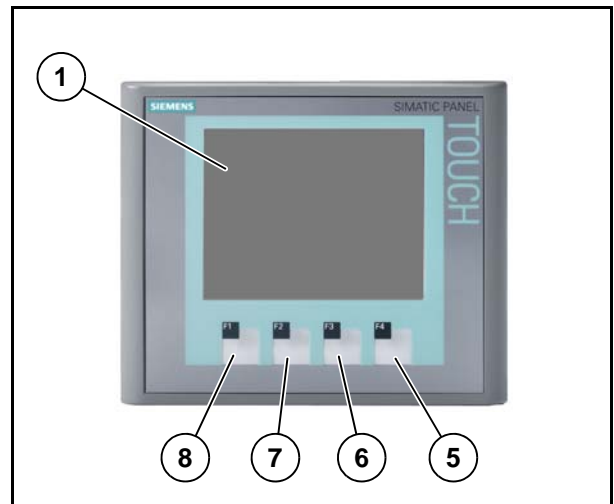


Fig. 10 Control panel ANKE CS200



CAUTION!

Damage to the touchscreen!

Pointed or sharp objects can cause damage to the plastic surface of the touchscreen.

Operate the touchscreen only with your finger or with a touch pen.

CAUTION!

Triggering unintentional activities!

Touching several control objects at the same time can trigger unintentional activities.

Only touch one control object at a time on your touchscreen.

6.3.4 Operator Menu

See separate control-system documentation.

6.4 Dust-discharge System

The dust-collection container (BB1.1, BB1.2) is pressed against a seal below the dust-collection funnel. In regular operation, the manual dust-discharge valve (AK1.12, AK1.22) above the dust-collection container is open, so that the dust can fall directly into the bag in the dust-collection container. The dust-discharge valve is shut when emptying the dust-collection container.

A pressure-equalization line between dust container and filter compartment ensures that the bag in the dust-collection container cannot be drawn into the filter system. The pressure-equalization line is fastened to the dust-collection container by means of a self-locking rapid-action coupling. The grounding of the dust-collection container takes place via a grounding cable.

6.4.1 Pneumatic Pressing Action

The dust-discharge system is equipped with a pneumatic limit switch (11/2) (Y1.15, Y1.25). The dust-discharge system is not supplied with compressed air until after the discharge valve is shut and the valve handle presses against the limit switch. In this manner, lowering of the dust-collection container is prevented when the discharge valve is open.

Two pneumatic cylinders (Z1.11, Z1.12, Z1.21, Z1.22) press the dust-collection container against the sealing surface of the dust-collection funnel. Operation takes place via three pushbuttons, which are installed to the left and right of the discharge valve. The left-hand pushbutton (11/1) is the release-button "●" (Y1.11, Y1.21), which is pressed when the pneumatic cylinders are to be actuated. The two right-hand pushbuttons raise "↑" (11/3) (Y1.12, Y1.22) and lower "↓" (11/4) (Y1.14, Y1.24) are used to move the cylinders up and down.

The two-hand-operation ensures that both hands of the operator are outside of the danger area, and cannot be bruised or crushed when the pneumatic cylinders are moved.

To prevent the dust-collection container from lowering in case of a pressure loss, the dust-collection container is additionally fastened to the dust-collection funnel by means of a quick-release ring.

6.4.2 Dust Bag

The dust bag is fastened to a change-frame by means of a rubber ring. When emptying the dust container, the plastic bag is double-sealed and separated between the two closing locations. The separated dust can be disposed of. A new dust bag is placed over the rest of the old dust bag and fastened to the change-frame with a new rubber ring. The old rubber ring and the rest of the old plastic bag are pulled in the new dust bag off of the change-frame and remain in the new dust bag. In this manner, the filter system also remains sealed-off/closed-off when discharging dust.

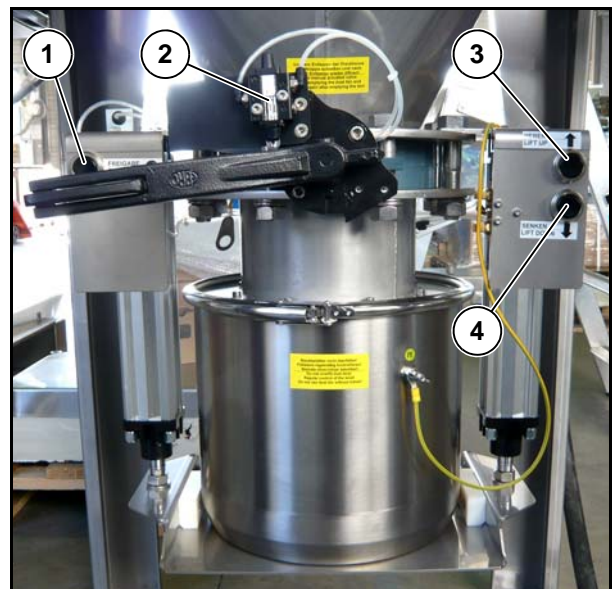


Fig. 11 Control unit, dust-discharge station, general representation

6.5 Ventilator

The ventilator (V1) is located in a sound-insulated housing. It is placed directly on the clean-gas outlet of the filter compartment. It produces the vacuum required for the filtration process in the filter system. The clean gas flows out of the filter compartments into the housing. There, the ventilator draws it in and blows it out through a check valve and a silencer. The vacuum is monitored and controlled via a frequency converter, which also controls the ventilator motor.



NOTE

Observe the documentation of the ventilator manufacturer!

6.6 Operational Sequence

6.6.1 Filter Operation

The dust-laden raw gas enters the dust-collection funnel through the raw-gas inlet. By means of deflection, the large and heavy dust particles are separated and entered directly into the dust discharge (BB1.1, BB1.2). The dust-laden raw gas now flows from below through the filter material (filter class H13), which is built into the filter cell (F1.11, F1.21) in a wound and turned manner. In the course, practically all dust particles adhere to the filter surface, while the clean air is forced through the filter material into the clean-gas room/area.

The subsequent safety-after-filter ("secondary filter", F1.12, F1.22, filter class H13) can maintain the high efficiency, even when the primary filter stage is interrupted, by taking over the separation function of the defective primary filter for as long as it takes until the system is shut down because of the malfunction, and the primary filter is replaced.

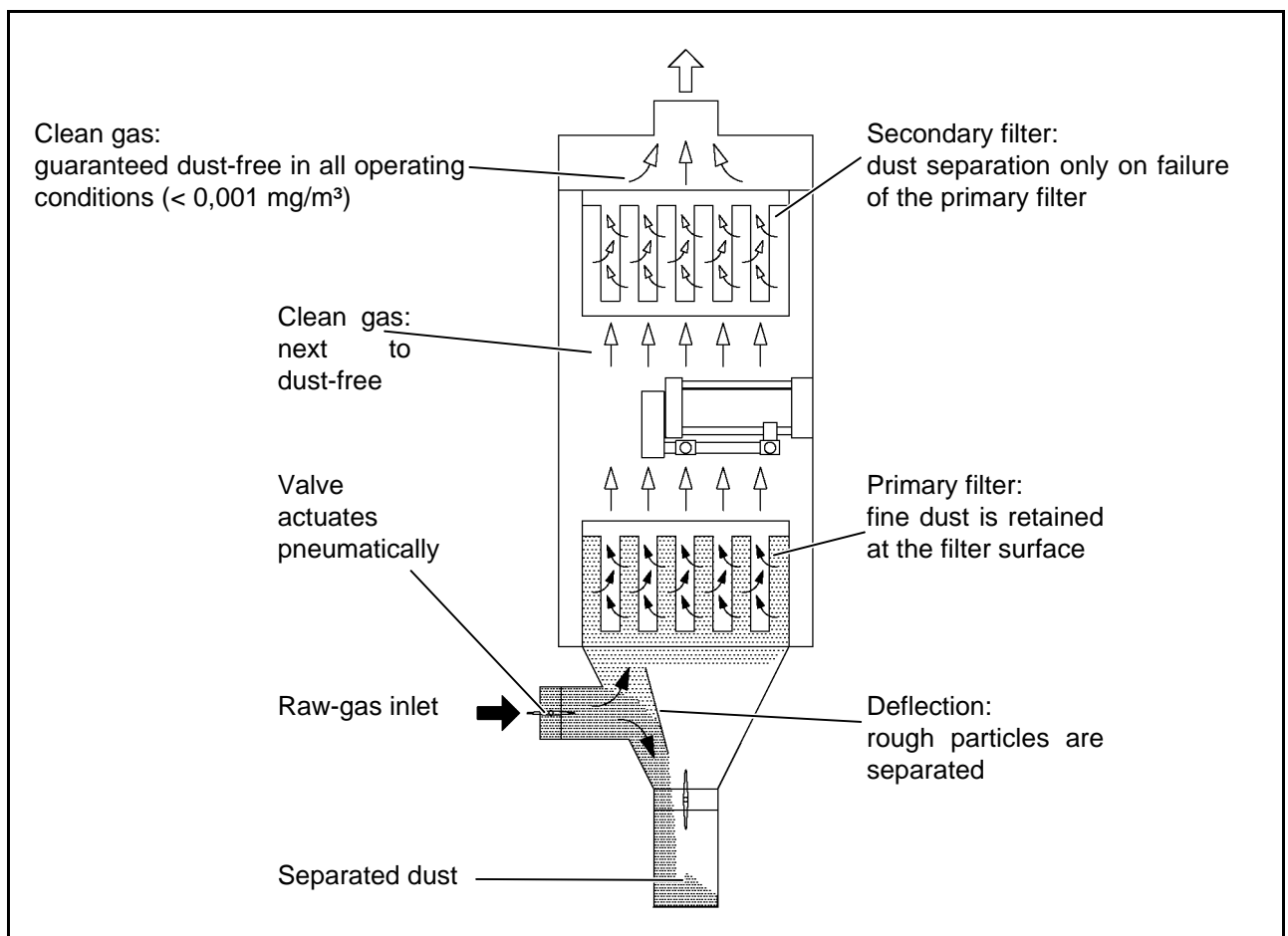


Fig. 12 Principle of the filter operation

6.6.2 Air-jet Backflushing of the Filter Cells

The backflushing procedure is controlled via the system's control system.

To enable continuous filter operation, the air-jet backflushing of the filter cells takes place in several steps: Only the raw gas valve (AK1.*1) of one filter compartment is shut, and only the filter cell in this filter compartment is backflushed. During this period, the filter operation continues through the other filter compartment. Once the backflushing procedure for the first filter compartment is finished, the second filter compartment is backflushed.

For the air-jet backflushing procedure, the flow through the filter compartment is interrupted by means of a butterfly valve (raw-gas butterfly valve). A cleaning system (RZ1.1, RZ1.2) situated above the filter cell regenerates the filter material by blowing it off with compressed air in the opposite direction of flow (air-jet backflushing). This loosens adhering dust from the filter material, and forces it downwards.

After the air-jet backflushing, the raw-gas butterfly valve remains shut until the dust removed from the filter has settled and made its way into the dust-discharge system (BB1.1, BB1.2).

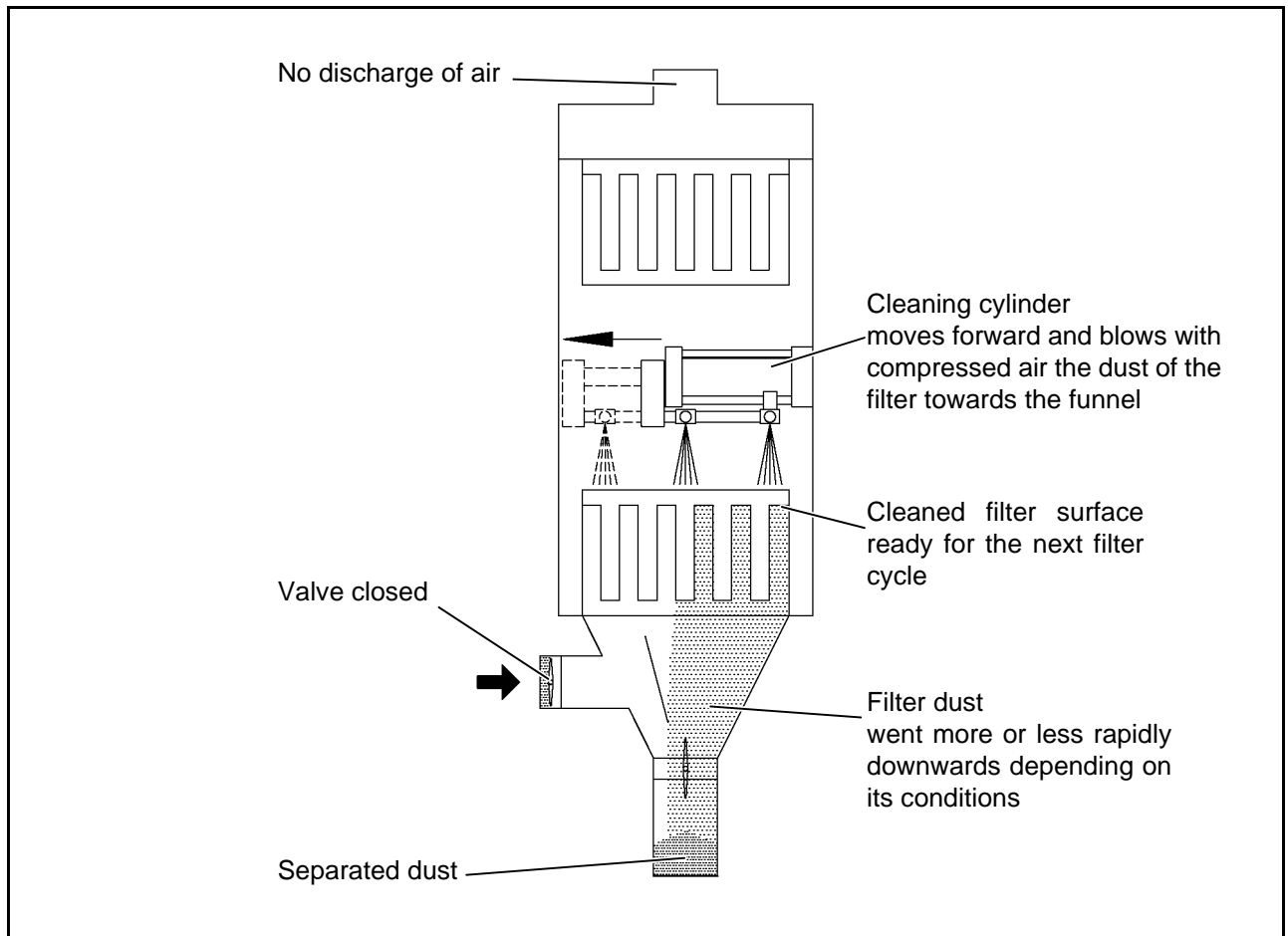


Fig. 13 Principle of the air-jet backflushing

7 Putting into Operation

7.1 Initial Start-up

The initial start-up should be performed by HET-ANKE-Filtertechnik service personnel, so that

- the operator's operating personnel can be trained/instructed,
- unexpected operating parameters can be noticed and corrected,
- questions and details can be clarified and implemented, and
- production downtime can be minimized.

The following points are to be checked within the scope of putting into operation:

- Proper and tight connection of raw-gas and clean-gas duct (dummy plugs removed?).
- Correct installation of the filter elements and corresponding nozzle piping.
- Is the available compressed air dry and free of oil according to section 5.4 "Compressed-air Supply"?
- Is the voltage supply to the control cabinet and other users connected upon assembly, if applicable, in accordance with section 5.5 "Power Supply"?
- Check of the ventilator's rotation direction.
- Is the container of the dust discharge fastened air-tight?
- The rapid-action coupling of the pressure-equalization line must be connected with the dust container, in order to prevent the dust bag from being drawn in.
- Initiation of a dedusting run with visual check via the inspection window to see if all filter elements are dedusted within a run. During the air-jet backflushing procedure, the pressure of the compressed-air system may not fall below 5.0 bar.

7.2 Restarting of Operation after an Explosion Case



DANGER!

In case of an explosion, it is possible that the filter system is damaged to such an extent that the function of safety-relevant components is no longer assured, and that the filter system cannot withstand a further explosion. In this case, it is possible that death or serious injury can occur to persons in the vicinity of the filter system during an explosion.

After an explosion, the operator is under obligation to check the filter system according to the following points before restarting operation again.

The HET-ANKE Filtertechnik Corp. shall not assume any liability whatsoever for damage resulting from insufficient examination/inspection of the filter system.

- Each point in accordance with the technical data is to be compared at the operator's own responsibility with the operating parameters of the process/system. Deviations are to be clarified with the manufacturer.
- All safety-relevant features of the design/construction must be beyond suspicion of not fulfilling their function! The inspection on behalf of an expert is necessary, and in case of doubt, an additional water-pressure test is to be carried out.
- The function of safety-relevant components is to be checked; filter cells are to be exchanged in any case.

7.3 Switching On the Filter System (Operational Readiness)

7.3.1 Checks Before Switching On (each time)

- ➔ Check if the primary filter (F1.11, F1.21) is installed below the cleaning-cylinder (RZ1.1, RZ1.2) by viewing through the window on the front side.
- ➔ Check if a minimum pressure of 5.5 bar is indicated on the compressed-air manometer (14/2) of the filter/regulator-lubricator (DR1.1).
- ➔ At pressure regulator (14/1), set a maximum pressure of 4.0 bar for the blow-air pressure via the adjustment knob (14/3)

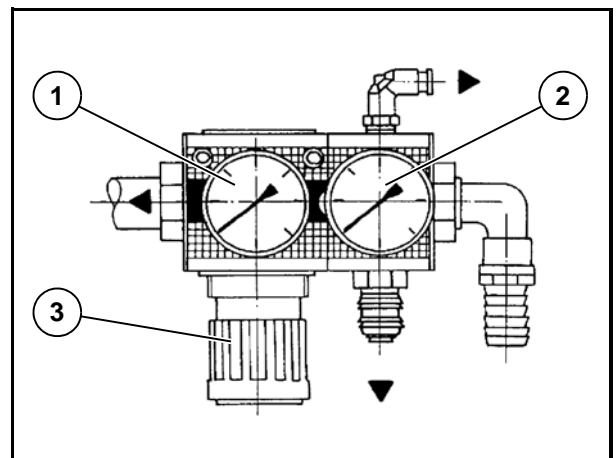


Fig. 14 Filter/regulator-lubricator for compressed air

7.3.2 Switching the System On

- ➔ Set the red main switch on the control cabinet to "ON".

The control system boots and afterwards, the filter system is ready-for-operation.

8 Setting Up



NOTE

For information on control-system settings, please refer to the separate control-system documentation.

9 Operation during Production

9.1 Switching the System On and Off

Requirement:

The filter system's control system is ready-for-operation.



NOTE

The raw-gas butterfly valves (AK1.11, AK1.21) are shut when the system is switched off. They will open when switching the system on and close again when switching the system off.

9.1.1 Switching On

➔ Press the „System ON“ function key F1 on the ANKE CS200 control panel.

The raw-gas butterfly valves are opened, the ventilator (V1) starts and the filter system is in operation.

9.1.2 Switching Off

➔ Press the „System OFF“ function key F2 on the ANKE CS200 control panel.

The raw-gas butterfly valves are shut and the ventilator switches off and runs down.

9.2 Monitoring the System

During operation, the operator must monitor the following points:

- The differential-pressure values of the filter stages (indication on touchscreen)




DANGER!

When the differential pressure of the primary filter (F1.11, F1.21) exceeds 2,000 Pa, protection against explosion is no longer ensured.

Pay attention that the primary filter is dedusted in good time. When the differential pressure cannot be lowered even after several dedusting runs, the primary filter must be changed.

- Filling level of the dust container (BB1.1, BB1.2).
The dust container must be emptied when it is approx. 3/4 full.

- Compressed-air supply during dedusting
- ➔ Check if a flow pressure of 3.5–4.0 bar is indicated on the compressed-air manometer (15/1) of the filter/regulator-lubricator (DR1.1) during dedusting.



CAUTION!
At a flow pressure below 3.5 bar, the filter element is no longer optimally dedusted.
For a flow pressure above 4.0 bar, the filter material can be destroyed!

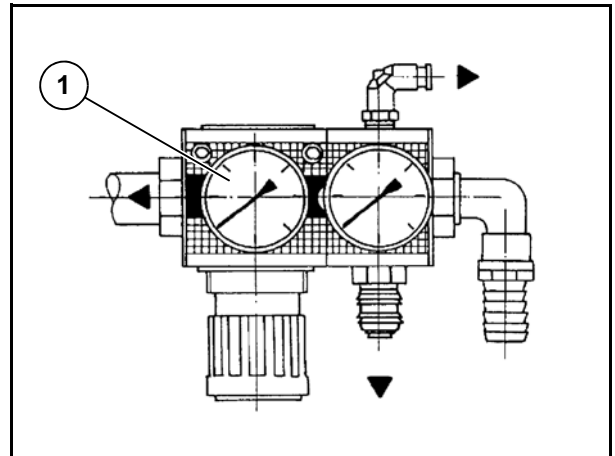


Fig. 15 Filter/regulator-lubricator for compressed air

- Service and alarm indications
- Visually check if the interior of the housing is free of dust.
Even minor discoloration of the primary-filter top side (F1.11, F1.21) and the secondary-filter bottom side (F1.12, F1.22) indicate a defect of the primary filter.

9.2.1 Indication of Operating Values

See separate control-system documentation.

9.3 Dedusting

The dedusting starts

- automatically after the time interval has elapsed or dependent of the differential pressure;
- Option: Through the “manual dedusting” signal from the operator’s primary control system. All compartments are dedusted (shortly) one after another.
- Manual:
 - ➔ To start the dedusting, press the “Manual dedusting” function key F3 on the ANKE CS200 control panel.
All compartments are dedusted (shortly) one after another.

9.4 Emptying the Dust Container



DANGER!

When the dust container or the dust funnel are overfilled, the safety of the system is no longer ensured.

Check the dust container regularly and empty it as soon as it is approx. 3/4 full.

Do not leave the dust-discharge valve shut unnecessarily long. Make sure to open it after finishing the emptying procedure.



DANGER!

Danger of explosion through electrostatic charging!

After finishing the work, check the tight seating of the grounding cable.



NOTE

Emptying must take place at regular intervals. For this reason, we recommend keeping a maintenance log book, in which the continuous emptying can be documented with date and signature.

Materials/Tools:

2 x dust bag, 390x1000 for d=240, conductive, black

Art.-No. 1.2850.012

2 x rubber ring, type 620, vulcanized

Art.-No. 1.2851.620

(If the dust bag is only fastened to the change-frame with a rubber ring, a 2. rubber ring is required.)

Depending on the separation process:

Foil-welding device

or

4 cable ties, pair of scissors



NOTE

The correct choice of dust bag and the circumferential rubber ring are decisive for contamination-free discharge of dust. The materials supplied by the HET-ANKE Filtertechnik GmbH are optimally matched to the change-frame and the filling weight.

When using materials from other suppliers, the HET-ANKE Filtertechnik Corp. shall deny any and all responsibility for contamination when changing the dust bag.



DANGER!

Danger of explosion through static charging!

The dust-collection container and thus the protection bag is located in Ex zone 21. To avoid static charging, use only the conductive dust bags listed here!

The HET-Anke Filtertechnik Corp. shall not assume any liability whatsoever for damage resulting from the use of other dust bags.

- ➔ Shut the dust-discharge valve (AK1.*2). For this, turn the lever (16/6) leftward. In this, the lever must press against the roller of the pneumatic limit switch (Y1.*5) (16/2) and thus open the compressed-air supply to the dust-discharge system.
- ➔ Open the quick-release ring (16/5), move it upwards above the flange and reclose it there. The ring remains in this position during the emptying procedure.
- ➔ Lower the dust container. For this, press and hold the release pushbutton “●“(16/1) (Y1.*1) left on the stand with your left hand and with your right hand, press the lower pushbutton “↓“(16/4) (Y1.*4) until the dust container (BB1.*) is completely lowered.

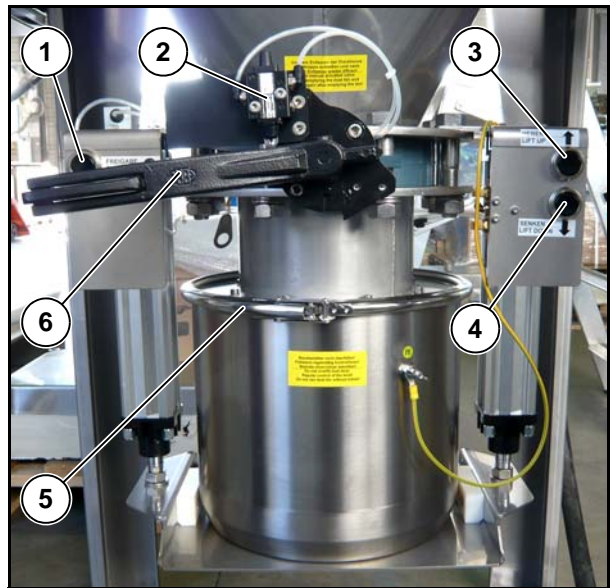


Fig. 16 General representation

- ➔ Tie off the dust bag twice (Fig. 17).



Fig. 17



DANGER!

Danger of poisoning from hazardous dusts.

Minor amounts of dust adhere to the material of the dust bag, which can be released when cutting through the dust bag with a pair of scissors.

When further-reaching protective measures are specified for the given dust due to its ingredients, the bag must cut apart/separated with heat (welded off), so that both ends are sealed.

The operator is responsible for the method of cutting apart/separating the dust bag, as only the operator knows the exact composition of the dust.

- ➔ Cut apart/separate the dust bag between the two tied-off locations (Fig. 18).
- ➔ Pull of the pressure-compensation hose from the dust container.
- ➔ Pull the dust container toward the front and remove the dust bag. Pay attention that the dust bag is not pierced or damaged.
- ➔ Dispose of the dust bag according to regulations, using suitable transport packaging.



Fig. 18 Cutting apart/separating the dust bag

- ➔ On the change-frame (19/2), check if the rubber ring (19/5) is positioned in the bottom ring groove (19/4). If not, work a second rubber ring into the bottom ring groove (19/4).
- ➔ If applicable, remove a given rubber ring from the upper ring groove (19/3) and place it aside.
- ➔ Fold the upper brim of the dust bag (19/1) over the rubber ring (19/5), so that the upper ring groove (19/3) is free.

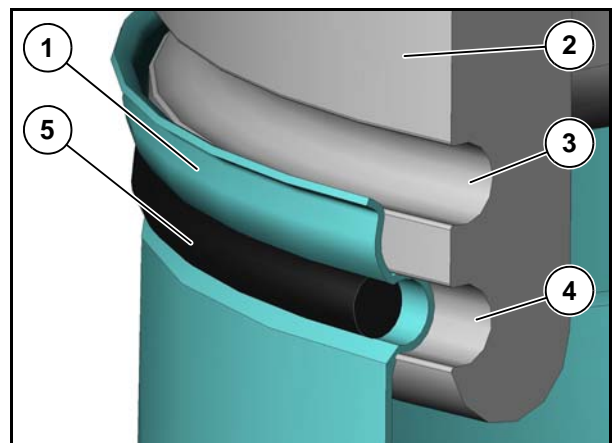


Fig. 19



CAUTION!

When operating with a defective dust bag, dust is released.

Check the new dust bag for any damage. Use only dust bags that are in perfect condition.

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- ➔ Pull a new dust bag (20/4) over the change-frame and fasten it with a new rubber ring (20/1) in the upper ring groove.
- ➔ Pull the remainder of the old dust bag (20/3) and the old rubber ring (20/2) of the change-frame through the new dust bag and allow it to fall into the new bag. The old rubber ring and the rest of the bag remain in the new bag.

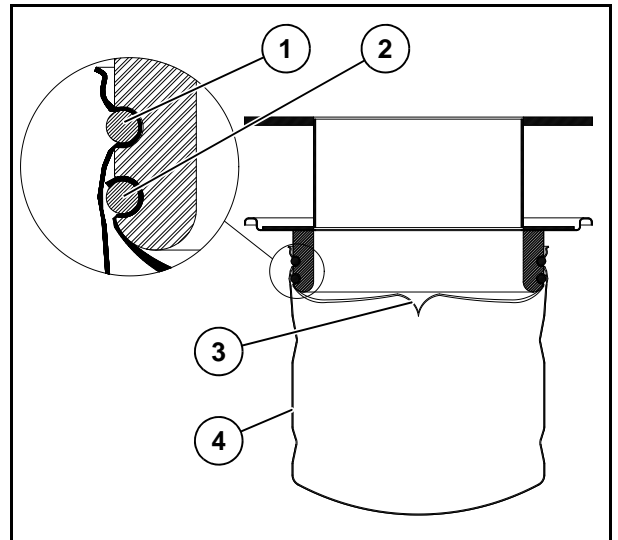


Fig. 20

- ➔ Press the rubber ring (21/2) previously set aside into the lower ring groove (21/1).

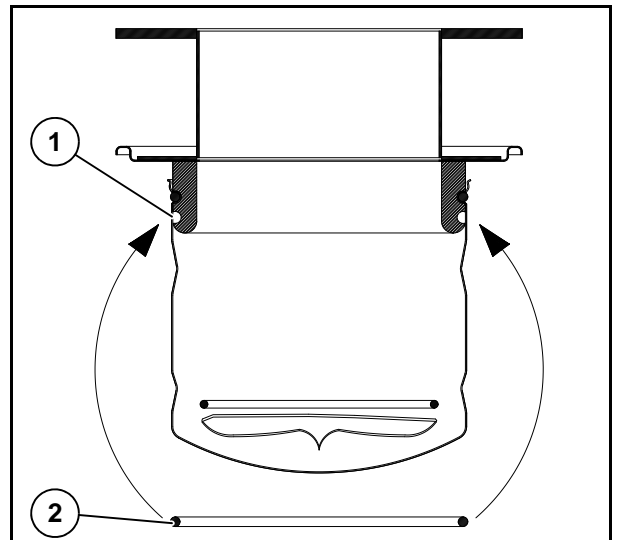


Fig. 21

- ➔ Move the dust container back below the change-frame and connect the pressure-compensation hose.
- ➔ Insert a new bag into the dust container (Fig. 22).



Fig. 22 Inserting a new dust bag



CAUTION!

When operating the system without a pressure-compensation hose, the vacuum in the filter compartment can cause the dust bag to be drawn into the filter funnel, causing an operational malfunction.

Check the proper connection and function of the pressure-compensation hose. The new dust bag must be sucked completely against the wall of the dust container.



DANGER!

Danger of explosion through static charging!

The dust-collection container and thus the dust bag are located in Ex zone 21. To avoid static charging, the dust bag must face completely against the wall of the dust container!

The HET-Anke Filtertechnik Corp. shall not assume any liability whatsoever for damage resulting from improper or insufficient installation.



CAUTION!

When the dust container is not positioned centrally below the change-frame, damage can occur to the dedusting system when the container is pressed against the outlet.

Proceed step by step when pressing the container against the outlet; check the correct position of the dust container.

- ➔ Press the dust container against the outlet. For this, press and hold the release pushbutton "●" (16/1) (Y1.*1) left on the stand with your left hand and with your right hand, press the raise pushbutton "↑" (16/3) (Y1.*2) until the dust container is completely pressed against the outlet.
- ➔ Open the quick-release ring (16/5), pull it over the brim of the dust container again and close it.
- ➔ Open the dust-discharge valve. For this, turn the lever (16/6) downward.

10 Malfunctions, Faults

10.1 Malfunction Indications of the System

See separate control-system documentation.

10.2 Malfunctions without System Messages

In the following, malfunctions/failures shall be described that cannot be monitored by the control system, but can only be ascertained by the operator.

Malfunction	Possible Cause	Corrective Action
Excessive increase of the primary-filter resistance	<ul style="list-style-type: none"> Pressure of the blow air too low during filter cleaning. 	<ul style="list-style-type: none"> Check compressed-air supply (supply, compressor); provide for sufficient high pressure of compressed air (> 5 bar). Increase size of the compressed-air supply line to 1".
	<ul style="list-style-type: none"> Blow-air valve does not open and shut. 	<ul style="list-style-type: none"> Free the solenoid valve from any foreign particles; if required, renew membrane or valve.
	<ul style="list-style-type: none"> For automatic dedusting: Controller does not switch. 	<ul style="list-style-type: none"> Check the voltage supply or the controller; replace defective fuse/circuit breaker.
	<ul style="list-style-type: none"> Dedusting not frequent enough. 	<ul style="list-style-type: none"> For automatic dedusting: Reduce pause period between the dedusting runs or change dedusting periods. For manual dedusting: Dedust more frequently.
	<ul style="list-style-type: none"> Gummed-up filter elements due to water or oil in the compressed air. 	<ul style="list-style-type: none"> Exchange the gummed-up filter elements; improve quality of the compressed air.
	<ul style="list-style-type: none"> Felty filter cake due to fibered components in the dust. 	<ul style="list-style-type: none"> Remove filter cake manually; replace filter elements, if required.

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Malfunction	Possible Cause	Corrective Action
Reduction of the filter resistance.	<ul style="list-style-type: none"> Filter element destroyed 	<ul style="list-style-type: none"> Replace defective filter element(s)
	<ul style="list-style-type: none"> Major leakage/untightness or other intake of secondary air on the clean-gas side of the filter. 	<ul style="list-style-type: none"> Stop or correct leakage/untightness
	<ul style="list-style-type: none"> Reduction of air flow due to mis-adjusted valves 	<ul style="list-style-type: none"> Readjustment with check of air flow
	<ul style="list-style-type: none"> Deposits or foreign particles in dust-conducting piping 	<ul style="list-style-type: none"> Remove
	<ul style="list-style-type: none"> Ventilator defective 	<ul style="list-style-type: none"> Repair or renew
Insufficient exhaust capacity at the work stations	For all points listed on excessive increase and reduction of the filter resistance and for corrective action, see description there	
	<ul style="list-style-type: none"> Leakage/untightness on the raw-gas side of the filter (e.g., defective piping, cleaning opening or bypass lines open) 	<ul style="list-style-type: none"> Correct leakage/untightness
	<ul style="list-style-type: none"> Service door open 	<ul style="list-style-type: none"> Close service door
Penetration of dust on the clean-gas side of the filter	<ul style="list-style-type: none"> Filter element not installed dust-tight. 	<ul style="list-style-type: none"> Repair or renew filter seal/gasket. Before reinstalling the filter element, clean the interior filter compartment!
	<ul style="list-style-type: none"> Filter element destroyed 	<ul style="list-style-type: none"> Replace filter element. Before reinstalling the filter element, clean the interior filter compartment!
	<ul style="list-style-type: none"> Filter element missing 	<ul style="list-style-type: none"> Install filter element. Before reinstalling the filter element, clean the interior filter compartment!

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Malfunction	Possible Cause	Corrective Action
Dust-collection container cannot be lowered	<ul style="list-style-type: none">• Discharge valve not completely shut; compressed-air supply of the dust-discharge system is interrupted.	<ul style="list-style-type: none">• Check discharge valve. The valve handle must press against the roller at the pneumatic limit switch in order to supply the dust-discharge system with compressed air.
	<ul style="list-style-type: none">• Pneumatic limit switch defective or not properly connected.	<ul style="list-style-type: none">• Check pneumatic line at the limit switch and attach properly, if required.• Check limit switch; replace defective component as required.

11 Maintenance, Servicing, Repairs

Repair work is to be carried out under consideration of the guidelines VDI 2262 "Ventilation-technical Measures" and draft VDI 2264 "Maintenance of Separator Systems". Else from this, the operation of HET-ANKE filter systems is almost maintenance-free. However, in conjunction with dusts that are hazardous to one's health, a regular inspection of the effectivity of filter systems is required by law.

To maintain the operational safety and the value of your system, we recommend that you enter into a service agreement with our Customer Service.

Customer Service:



H.E.T.-ANKE Filtertechnik GmbH

Dieselstraße 1

D-63674 Altenstadt

Phone: +49 (0)6047 - 9644-0

Fax: +49 (0)6047 - 9644-44

11.1 Maintenance Schedule

11.1.1 Daily to Weekly

- Visually check the dust-collection container (BB1.*) on a daily basis. Overfilling can prevent dust explosions from being carried on.
- Daily visual check if the interior of the housing is free of dust. Even minor discoloration of the primary-filter top side (F1.*1) and the secondary-filter bottom side (F1.*2) indicate a defect of the primary filter.
- Checking the operating pressure of the compressed-air system: Minimum pressure 5.5 bar; flow pressure during dedusting 3.5–4.0 bar.
- The filter inserts of the lower filter bank (primary filter, F1.*1) may not exceed a differential pressure of 2,000 Pa (2 kPa). During the first 100 operating hours (approx.), the differential pressure of the filter elements can increase considerably.
- The filter inserts of the upper filter bank (secondary filter, F1.*2) may not exceed a differential pressure of 400 Pa (0.4 kPa).

11.1.2 Monthly to Half-yearly

- Check of all cleaning and valve cylinders after an initiated dedusting run: Compartment by compartment, all primary filters are air-jet backflushed in rapid mode; in the course, the function of all moving parts is visually checked.



CAUTION!

The raw-gas butterfly valve must shut-off tightly in order for the explosion-block-off system to operate effectively. The correct position of the butterfly valve can be checked via the position indicator on the pneumatic rotational drive.

- During a dedusting run, follow the cleaning-cylinder (RZ1.*) through the inspection window and check if each filter element is being dedusted over its complete surface.
- Check the seals/gaskets of the service door, filter casing and dust container.
- Check the compressed-air filter, as well as the oil and water separator of the customer's compressed-air supply.
- Ventilator and motor maintenance according to the manufacturer's documentation.

11.1.3 Yearly

- This is the minimum required interval for checking the effectivity of all safety-relevant functions. Also included here are the grounding/earthing of all conductive components within the filter elements.
- Ventilator and motor maintenance according to the manufacturer's documentation.

11.2 Description of the Maintenance

11.2.1 Changing a Filter Cell



NOTE

Before changing the filter, dedust the primary filter manually several times. By doing so, the differential pressure can often be reduced to the extent that the filter change can be postponed.



DANGER!

Danger of poisoning from hazardous dusts!

For this activity, wear the personal protective equipment specified by the operator



CAUTION!

The dust-laden filter cell can be very heavy. In order not to damage the protection bag during handling of the filter cell, the filter change is to be carried out by 2 persons. Provide for secure footing and have a suitable support readily available!

11.2.1.1 Materials

Consumables/Tools:

2 x filter RL 215.110, H13 (F1.11, F1.21)

Art.-No. 1.25215.001

2 x filter stage 2, steel housing, H13 (F1.12, F1.22)

Art.-No. 1.2310.003

4 x protection bag, 1030x2000 H=430

Art.-No. 1.2850.001

4 x rubber ring, type 1660

Art.-No. 1.2851.001

Depending on the separation process:

Foil-welding device, pair of scissors



NOTE

The correct choice of protection bag and the circumferential rubber ring are decisive for contamination-free filter changing. The materials supplied by the HET-ANKE Filtertechnik GmbH are optimally matched to the change-frame.

When using materials from other suppliers, the HET-ANKE Filtertechnik Corp. shall deny any and all responsibility for contamination when changing the filter(s).

Filter Cells:



CAUTION!

With reference to explosion protection, the filter cells are considered as safety-relevant components.

Use only original HET-ANKE filter cells as defined in chapter 3 "Technical Data"! Other filter cells may only be used after consultation and approval on behalf of the HET-ANKE Filtertechnik GmbH.

The new filter cell is delivered packed in a stable cardboard box. Use this cardboard box later for packing the used filter cell.



CAUTION!

Even very minor damage to the filter material or seal/gasket can lead to loss of the high efficiency of the filter cell.

Handle filter cells with great care!

Unpacking new filter cells:

- ➔ Cut through the tape on the face side of the cardboard box.
- ➔ Fold down all four flaps of the cardboard box.
- ➔ Turn cardboard box upside down. The cardboard box now stands on the open face side.
- ➔ Pull off the cardboard box to the top.
- ➔ Check the proper condition of the filter cell:
 - Is the seal/gasket OK?
 - Is the filter paper OK?
 - Are all spacers OK?

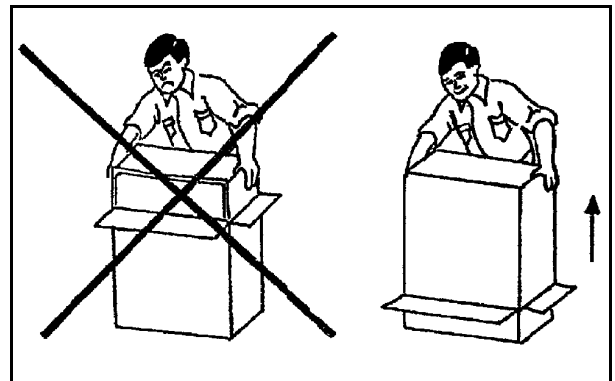


Fig. 23 Unpacking a filter cell

11.2.1.2 Removal of the Used Filter Cell

- ➔ Switch the filter system off.
- ➔ At the respective maintenance cover, disconnect the ground/earth cable from the ground/earth point (24/1) and remove the maintenance cover (24/2).
- ➔ Unroll a protection bag.



Fig. 24 General representation

- ➔ Connect the enclosed compressed-air hose for the filter change (25/2) to the compressed-air connection (25/1) at the pressure regulator (DR1.1) on the filter system.

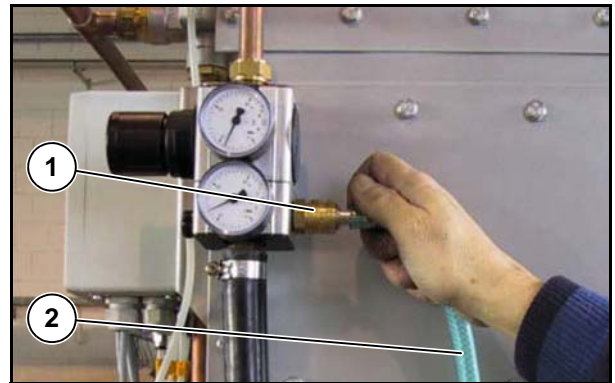


Fig. 25

- ➔ Connect the other end of the compressed-air hose (26/2) to connection (26/1) of the pneumatic clamping device (SZ1.**). The clamping device is released.

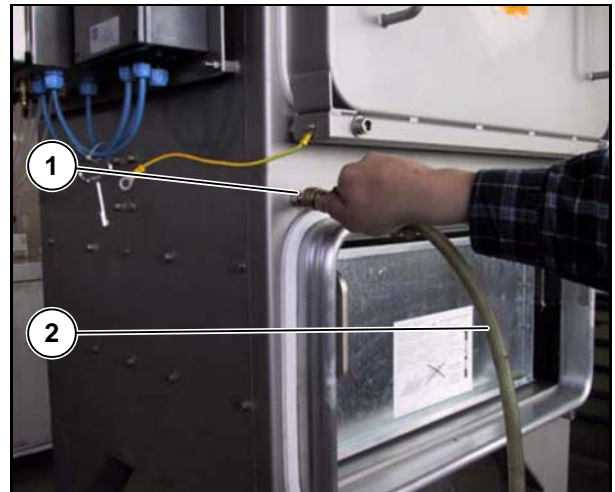


Fig. 26

- ➔ Carefully pull the filter out of the filter compartment without reaching into the protection bag or damaging it.

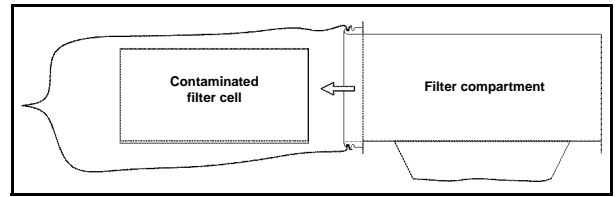


Fig. 27

- ➔ Squeeze the protection bag together between the filter cell and the filter compartment and flatten it out.
- ➔ Weld two seams on the protection bag within a distance of 2 cm using a suitable foil-welding device.

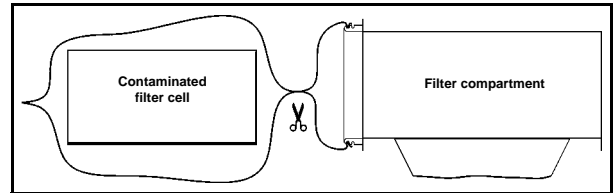


Fig. 28

- ➔ Cut apart/separate the protection bag between the two welded seams/locations.
- ➔ Slide used filter cell in suitable transport packaging (e.g., cardboard box of the new filter cell) and dispose of according to regulations.

11.2.1.3 Installing a New Filter Cell



CAUTION!

If there is dust in the filter compartment between the primary filter and the secondary filter (e.g. because of an untight primary filter), the tightness of the primary filter can no longer be checked. In this case, the interior of the filter compartment must be cleaned prior to installing a new filter cell!

- ➔ Check if the rubber ring is positioned in the front ring groove. If not, work a second rubber ring into the front ring groove and remove the rubber ring from the rear ring groove.
- ➔ Fold over the brim of the protection bag in such a manner that the rear ring groove is free.

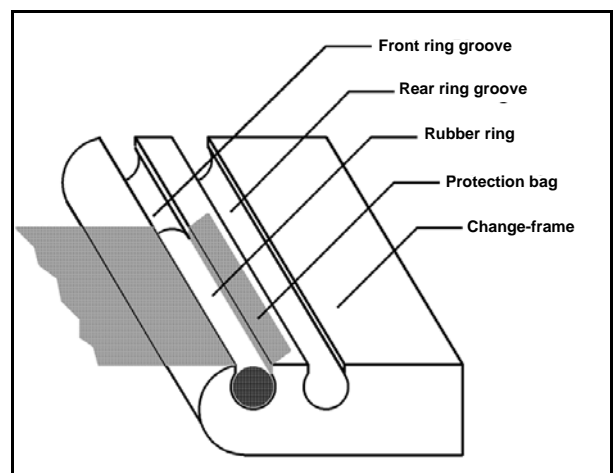


Fig. 29



CAUTION!

For incorrectly inserted filter cells, the air-jet backflushing of the filter material is ineffective! Insert the filter cell in such a manner that the direction of the spacers runs parallel to the nozzle pipes of the cleaning cylinder.

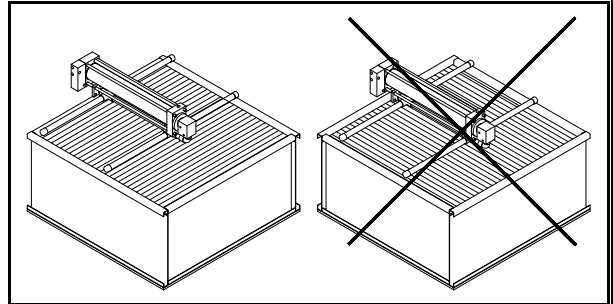


Fig. 30

- ➔ Insert the new filter cell into a suitable protection bag and pull a rubber ring over the open end of the protection bag.
- ➔ Fold the protection bag over the change-frame.
- ➔ Press rubber ring into the rear ring groove.

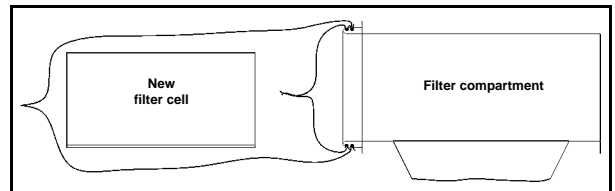


Fig. 31

- ➔ Pull off the old rubber ring and protection-bag remainder through the new protection bag of the change-frame.
- ➔ Position these remainders in front of the new filter cell. The remainders stay in the protection bag and are removed along with the next filter change.

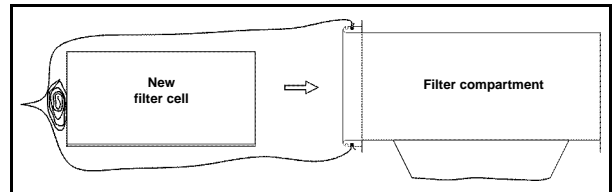


Fig. 32

- ➔ Insert new filter into the filter housing to the stop.
- ➔ Uncouple the compressed-air hose from the clamping device and the compressed-air regulator. The filter is securely clamped.
- ➔ Fold the protection bag in length direction and roll up.
- ➔ Press the roll in front of the inserted cell.

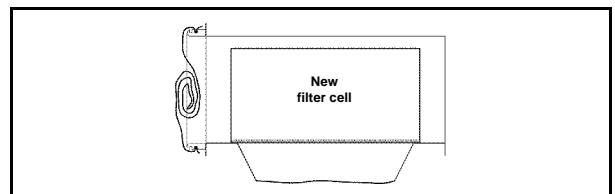


Fig. 33



NOTE

To prevent the roll from unintentionally rolling off, the rolled-up protection bag can be taped tight.

- ➔ Pull another rubber ring over the change-frame and press it into the front, empty ring groove.
- ➔ Remove the rubber ring from the rear ring groove and use it for the next filter change.

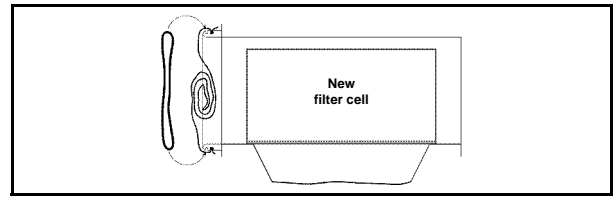


Fig. 34



CAUTION!

The protection bag can become damaged from scouring against or getting caught in the maintenance door.

Check the correct seating of the protection bag before closing the maintenance door.

- ➔ Mount the maintenance door and the ground/earth cables.

11.2.2 Cleaning the System



CAUTION!

The cleaning procedure depends on the process, the exact material contents of the dust and the type of further usage of the separated dust. As this is known only to the operator, the following points are within the operator's sole responsibility:

- Compliance with the applicable regulations. Especially when the separated dust is subject to further usage, care is to be given that only cleaning agents and procedures are applied that are permitted for this process.
- Examination that the cleaning agents used do not react and are not aggressive with the dust or with the materials of the filter system.
- Determination of sufficient personal protective equipment.

The HET-ANKE Filtertechnik Corp. shall not assume any liability whatsoever for damage resulting from insufficient protection measures and incorrectly selected cleaning agents and processes.

Possible cleaning processes:

- Removal of filter cell and emptying of dust container without installation of a new protection and/or dust bag. Vacuuming the filter system with a suitable vacuum cleaner. Afterwards, inserting new filter cells and new protection bag/dust bag.
- Removal of filter cell and emptying of dust container without installation of a new protection and/or dust bag. Cleaning of filter system with moist cloth (moistened only with water). When measuring lines have been connected, attention must be paid that no fluids can make their way into the connections. Allow system to dry completely. Then, insertion of new filter cells and new protection bag/dust bag.

- Removal of filter cell and emptying of dust container without installation of a new protection and/or dust bag. Cleaning of filter system with moist cloth (cleaning-agent solution). When measuring lines have been connected, attention must be paid that no fluids can make their way into the connections. If required, clean the system once more with clear water. Allow system to dry completely. Then, insertion of new filter cells and new protection bag/dust bag.

When selecting the cleaning agents, pay attention to the materials used in the filter system:

- Stainless steel ((casing, dust-discharge, nozzle piping of cleaning cylinders, check valve with piping)
- Steel, galvanized (clamping device)
- Aluminum (change-frame, cleaning-cylinder, pneumatic cylinders, ventilator)
- Copper, brass (compressed-air lines, safety valve)
- Gray cast iron (valve housings)
- Silumin (dust-discharge valve)
- EPDM (valve sealing collars)
- PA (pneumatic hoses)
- Silicone, PU, EDPM, PE, neoprene (seals/gaskets)

12 Putting Out of Operation

12.1 Temporary Putting Out of Operation

12.1.1 Without Product Change

- ➔ Initiate manually two dedusting runs.
- ➔ After the second dedusting run has elapsed, switch the system off.
- ➔ Empty the dust-collection container, if required.
- ➔ Switch off the main switch.

12.1.2 With Change of Product

- ➔ Put the system out of operation according to section 12.1.1 "Without Product Change".
- ➔ Remove the filter cells.
- ➔ Clean the system.
- ➔ Insert new filter cells.

12.2 Final Putting Out of Operation



DANGER!

Danger of poisoning from hazardous dust!

- **Wear sufficient personal protective equipment when direct contact with hazardous dust is to be expected!**
- **Observe the environmental regulations for the corresponding dust. If required, take suitable measures to prevent dust from being released into the environment.**
- **Dispose of contaminated system components in accordance with applicable regulations. Only completely decontaminated system components are allowed to be recycled.**

- ➔ Put the system out of operation according to section 12.1 "Temporary Putting Out of Operation".
- ➔ Clean the system.
- ➔ Dismantle and disassemble the system in such a manner that disposal is possible according to regulations.