

# ADI CD

## CONDENSING BOILER

### TECHNICAL MANUAL OF INSTALLATION, USE AND MAINTENANCE

V. 07/2017



**ADISA**

HEATING SERIES BY  HITECSA

# **INDEX**

<b>1. INTRODUCTION</b>	<b>4</b>
<b>2. REGULATIONS</b>	<b>5</b>
<b>3. EEC APPROVALS AND CERTIFICATIONS</b>	<b>5</b>
<b>4. BOILER GENERAL VIEW: DESCRIPTION OF THE COMPONENTS</b>	<b>6</b>
<b>5. DIMENSIONS</b>	<b>8</b>
<b>6. TECHNICAL DATA RANGE ADI CD</b>	<b>10</b>
6.1 Models ADI CD 70 to ADI CD 375	10
6.2 Models ADI CD 450 to ADI CD 950	11
<b>7. BOILER HEAT EXCHANGER</b>	<b>12</b>
<b>8. POWER MODULATION AND COMBUSTION SYSTEM</b>	<b>13</b>
8.1 Assembly of gas connection – air/gas inlet	14
8.2 Air inlet filter	16
<b>9. BURNER</b>	<b>16</b>
9.1 Ignition and ionization kit	16
<b>10. CONTROL PANEL - SIEMENS</b>	<b>17</b>
10.1 Display	18
10.2 Programming	21
10.3 Available parameters at enduser level	24
10.4 Boiler lockout code	25
10.5 Function boiler maintenance	25
10.6 Data and information visualized on the display	25
<b>11. CONTROL OF SEVERAL BOILERS – CASCADED SYSTEM</b>	<b>26</b>
11.1 Boilers sequence included	26
11.2 External control signal 0...10 V to regulate start-up and power modulation of each boiler	31
11.3 Remote Control or telecomputing	32
<b>12. ELECTRIC DRAWING</b>	<b>33</b>
12.1 Electric drawing ADI CD 70 – 750	34
12.2 Electric drawing ADI CD 850 – 950	35
12.3 Siemens LMS control cover	346
12.4 Cable entry points	36
<b>13. HEATING CIRCUITS</b>	<b>37</b>
13.1 Heating circuits basic parameters	39
13.2 Professional installer parameters	39
<b>14. DOMESTIC HOT WATER</b>	<b>43</b>
14.1 Basic parameters	44
14.2 Professional installer parameters	45
<b>15. SAFETIES</b>	<b>47</b>
<b>16. BOILERS IDENTIFICATION LABEL</b>	<b>47</b>
<b>17. INSTALLATION</b>	<b>48</b>
17.1 Boilers heat output	48
17.2 Lifting and transporting the boilers by a crane	48
17.3 Boilers room	48

<b>17.4 Gas supply</b>	<b>49</b>
<b>17.4.1 Gas pressure higher than 45 mbar</b>	<b>49</b>
<b>17.5 Draining of the boiler condensate</b>	<b>50</b>
<b>17.5.1 Water condensing</b>	<b>50</b>
<b>17.5.2 Condensate neutralization treatment</b>	<b>50</b>
<b>17.5.3 Condensate drainage</b>	<b>50</b>
<b>17.5.4 Boiler chimney</b>	<b>50</b>
<b>17.6 CHIMNEYS</b>	<b>51</b>
<b>17.6.1 Chimney sizing</b>	<b>51</b>
<b>17.6.2 Flue draught stabilizer</b>	<b>52</b>
<b>17.6.3 Old installation</b>	<b>52</b>
<b>17.6.4 Adjustable flue damper at the boiler flue outlet</b>	<b>53</b>
<b>17.7 Hydraulic installation</b>	<b>54</b>
<b>17.7.1 Data to be considered</b>	<b>54</b>
<b>17.7.2 Overpressure safety valve</b>	<b>54</b>
<b>17.7.3 Hydraulic pressure drop</b>	<b>55</b>
<b>17.7.4 Water manifold</b>	<b>56</b>
<b>17.7.5 Water quality of the installation</b>	<b>57</b>
<b>17.7.6 System drawings</b>	<b>58</b>
<b>18. THE BOILER START-UP</b>	<b>62</b>
<b>18.1 Before the start-up</b>	<b>62</b>
<b>18.2 Gas pressure switch</b>	<b>62</b>
<b>18.3 The boiler control unit and operating cycle</b>	<b>63</b>
<b>18.4 Gas/air adjustments</b>	<b>64</b>
<b>18.4.1 Combustion adjustment</b>	<b>64</b>
<b>18.4.2 Change of fuel: from Propane gas to Natural gas</b>	<b>66</b>
<b>19. MAINTENANCE</b>	<b>67</b>
<b>19.1 Procedure to dismantle the burner</b>	<b>67</b>
<b>19.2 Position of probes and sensors</b>	<b>69</b>
<b>20. Ecodesign Directive (ErP)</b>	<b>70</b>
<b>21. BOILER GUARANTEE</b>	<b>71</b>
<b>22. APPENDIX I: LIST OF ERROR CODES</b>	<b>73</b>

Data indicated in the present manual are liable to changes.

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## 1. INTRODUCTION

The global trend, European and international, aims at improving energy efficiency both in buildings and generators, in order to reduce pollutant emissions in the atmosphere (SAVE directive, treaty of KYOTO).

Carbon dioxide (CO<sub>2</sub>) is one of the greenhouse gases that remain the longest in the atmosphere. In accordance with IEO2007, predicted CO<sub>2</sub> emissions will be 33.9 billion tons in 2015 and 42.9 in 2030. This is why the European campaign known as “20-20-20 in 2020” has been created, with the aim, among others, of cutting carbon dioxide emissions by 20% by 2020.

ADISA BY HITECSPA, company specialized in the manufacturing of gas boilers with high efficiency performances and reduced pollutant emissions (“clean combustion”), has developed an **innovating** and revolutionary product contributing to a technological evolution in the field of water boilers for centralized installations: the ADI CD boiler.

The main characteristics of the **ADI CD** boiler are:

- Maximum efficiency in every kind of installations at any working temperatures.
  - Renovation of installations with traditional heat radiators
  - New installations of very Low Temperature (heating floor, fan-coils, A.H.U., etc.)
  - Domestic Hot Water (D.H.W.), in accordance with anti-legionella regulations.
- EEC Approval by CERTIGAZ.
- Seasonal efficiency up to 108%.
- In compliance with the European Directive Ecodesign ErP (Energy related Products).
- Boiler certified as “Condensing”: flow temperature up to 90°C, no limit of return temperature.
- Boiler heat exchanger in stainless steel.
- Power outputs from 70.5 to 904 kW.
- Maximum efficiency per year :
  - Variable temperature on boiler.
  - Boiler power modulation according to the demands of the installation.
  - High reduction of stop/start cycles.
  - Minimum heat losses due to convection/radiation through the boiler.
  - Inconsiderable heat losses through the chimney when the boiler is not operating.
- Gas boilers with modulating burner starting from 30% of power (depending on the installation conditions and on the boiler models).
- Burner power modulation by varying the premix air-gas flow by means of a variable speed motor fan.
- Reduced electric consumptions per year thanks to the variable speed motor-fan for the air-gas inlet.
- Ecological combustion (“PREMIX” burner of innovative design).  
NO<sub>x</sub>: about 10 ppm, CO: about 50 ppm (both referred to 3% O<sub>2</sub>).
- Boiler control adaptable to all systems available on the market:
  - The boiler can operate by means of its own control.
  - It can be connected to a sequence control unit in an installation with several boilers.
  - It can be connected to Building Management System (B.M.S.).
  - It can be connected to telecomputing.
- Reduced dimensions and weight:  
Boiler heat exchanger ADI CD 450 (440 kW of output) → Large: 81 cm, Long: 94 cm, Weight: 460 kg.  
Easy installation in boilers rooms of difficult access.  
Installation in terraces (reinforcement of the structure is not required).  
Space saving in boilers rooms (440 kW in less than 0.76 m<sup>2</sup>).

**2. REGULATIONS**

The installation must be designed and made by qualified professionals in accordance with the current regulations referring to gas, air venting, flues evacuation, electricity, safeties, fire prevention, etc.

The boiler maintenance must be made following the instructions of the manufacturer's technical manual and with a minimum regularity as indicated by the current regulations.

**3. EEC APPROVALS AND CERTIFICATIONS**



ADISA boilers, model ADI CD, are certified as follows:

<b>MODEL ADI CD</b>	<b>70 to 375</b>	<b>450 to 750</b>	<b>850 to 950</b>
<b>GAS BOILERS DIR. 2009/142/EEC</b>	<b>1312CO5826</b> (AND EFFICIENCY DIR. 92/42/EEC)	<b>1312CO5830</b>	<b>1312CO5824</b>

The European Directive of Boilers Efficiency, dir. 92/42/EEC, is only applied to boilers from 4 to 400 kW.

The ADI CD boilers are in compliance with the following regulations and directives:

- European Directive 2009/142/CE for Gas devices
- European Directive 92/42/CE for Boilers efficiencies (to be applied up to 400 kW)
- UNE regulations: UNE-EN 303-7, UNE-EN 303-1, UNE-EN 676:A2
- Low Tension Directive: 2006/95/CE
- Ecodesign Directive (ErP: Energy related Products). More information in chapter 20.
- RoHS Directive: 2011/65/UE: restriction of hazardous substances.

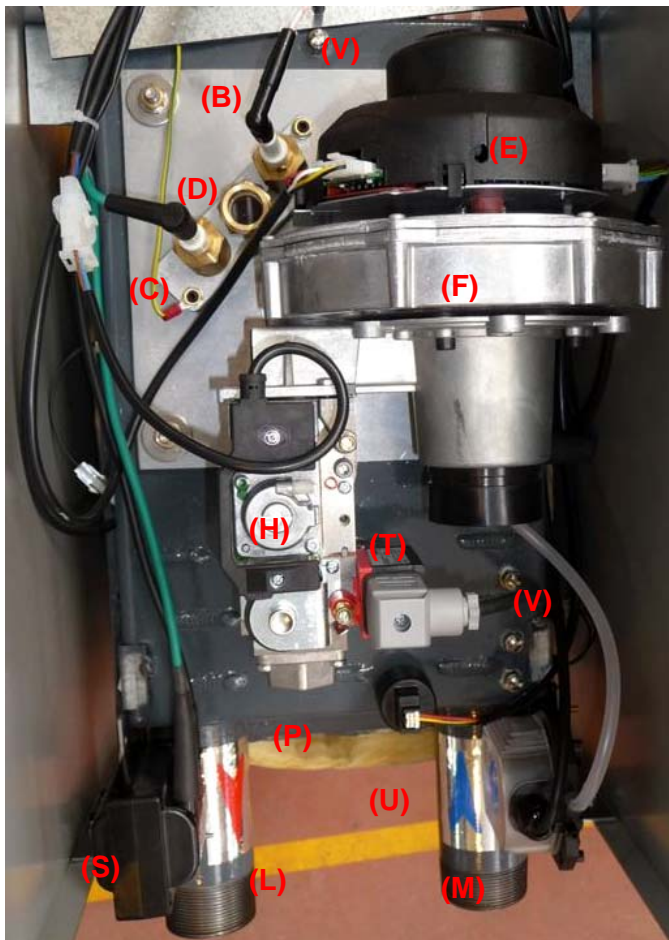
		<b>MODEL</b>	<b>POWER OUTPUTS (kW)</b>
	ADI CD	70 - 450	71.4 – 443.5
	ADI CD	550- 950	535.5 – 904.1



4. BOILER GENERAL VIEW: DESCRIPTION OF THE COMPONENTS

A	Boiler heat exchanger (higher collector)
B	Flanges (boiler heat exchanger – burner – air/gas fan)
C	Ignition-ionization kit
D	Flame visor
E	Motor fan (variable speed)
F	Fan
G	Venturi for air inlet and gas mix
H	Gas shut-off valve
J	Boiler control unit and power modulation
L	Hot water flow
M	Hot water return
N	Flues outlet
P	Gas connection
Q	Air pressure switch
R	Air filter
S	Ignition transformer
T	Gas pressure switch
U	Pressure sensor
V	Air vents (manual)

**Models ADI CD 70 to 175 (view from above):**

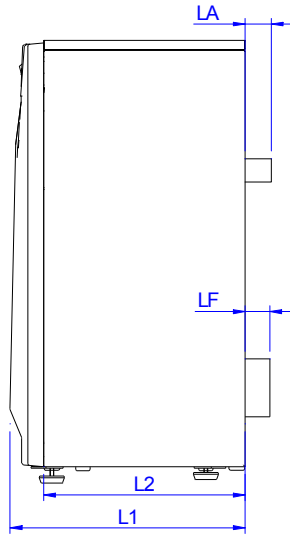
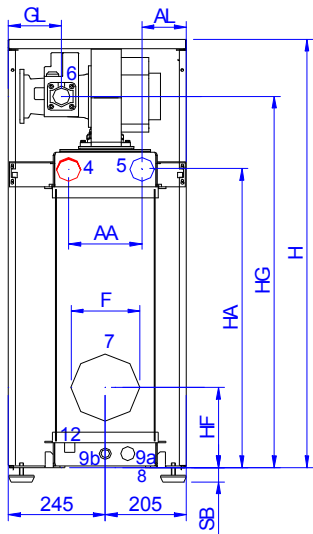


Models ADI CD 200 and higher:

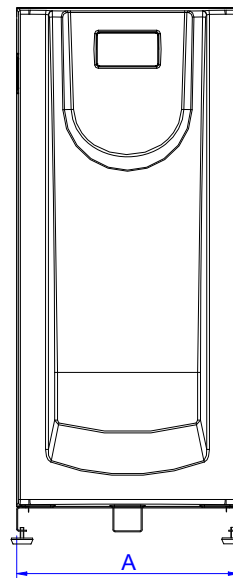
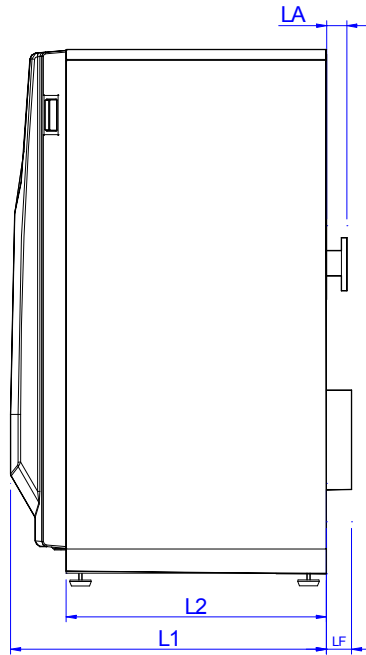
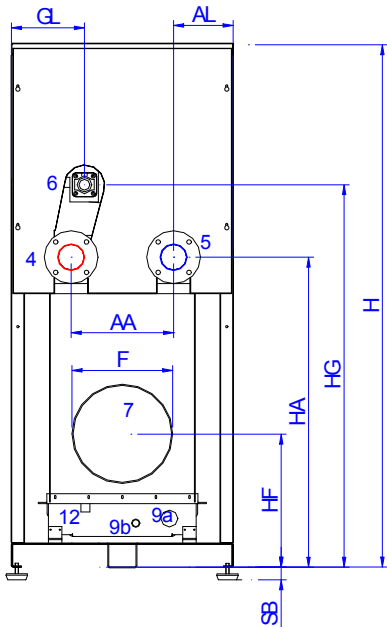
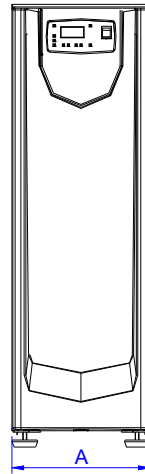
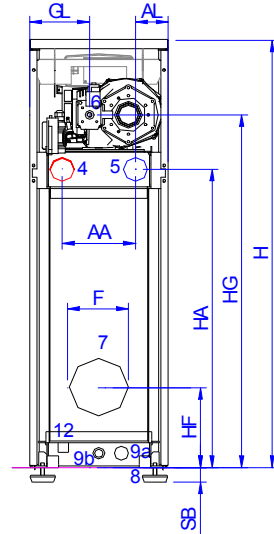


5. DIMENSIONS

ADI CD 120 - 175



ADI CD 70 - 105



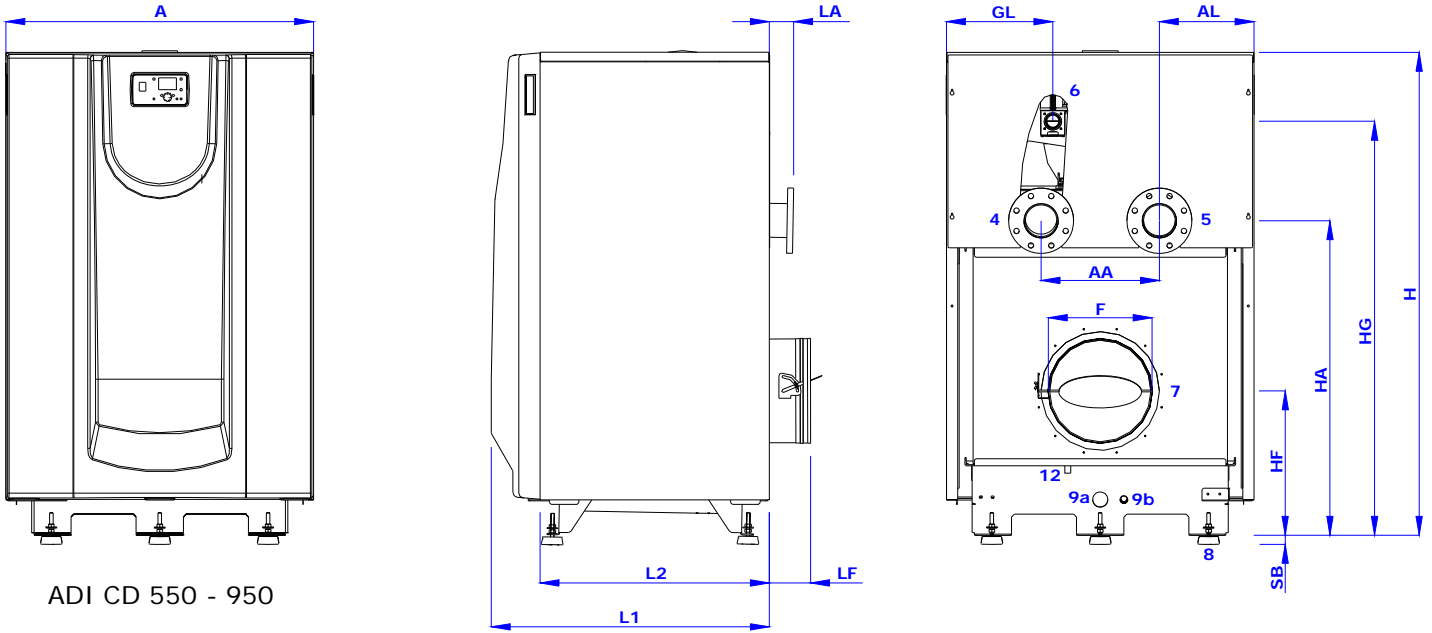
ADI CD  
200 - 450

Model CD	A	AA	AL	F (7)	H	HA	HF	HG	L1	L2	LA	LF	GL
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
70	350	185	82.5	150	1110	774	208	915	595	510	66	121	151.5
85	350	185	82.5	150	1110	774	208	915	615	510	66	121	151.5
105	350	185	82.5	150	1110	774	208	915	635	510	66	121	151.5
120	450	185	112.5	150	1110	774	198	963	635	530	66	121	134.3
175	450	185	112.5	150	1110	774	198	963	655	570	66	121	134.3
200	660	305	177.5	175	1583	937	403	1156	940	775	61	134	217.3
250	660	305	177.5	175	1583	937	403	1156	940	775	61	134	217.3
325	810	360	225	250	1583	936	445	1156	940	775	61	134	292
375	810	360	225	250	1583	936	445	1190	940	775	61	134	249.3
450	810	360	225	250	1583	936	445	1190	940	775	61	134	249.3

Attention: Heights H, HG, HA, HF, without taking into consideration the increase due to the silent-block feet supplied with the boiler (dimension "SB").

Note: data in the present document are liable to changes without prior warning.





ADI CD 550 - 950

Model CD	A	AA	AL	F (7)	H	HF	HA	HG	L1	L2	LA	LF	GL
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
550	1040	400	320	350	1628	487	1060	1396	940	775	82	140	360
650	1040	400	320	350	1628	487	1060	1396	940	775	82	140	360
750	1040	400	320	350	1628	487	1060	1396	940	775	82	140	360
850	1040	400	320	350	1658	487	1063	1393	1083	918	60	122	359
950	1040	400	320	350	1658	487	1063	1393	1083	918	60	122	359

Attention: Heights H, HG, HA, HF, without taking into consideration the increase due to the silent-block feet supplied with the boiler (dimension "SB").

ADI CD	4-5	6	9	12
	Diam.	Diam.	Diam.	Diam.
70	2", threaded	3/4"	3/4"	1/2" H
85	2", threaded	1"	3/4"	1/2" H
105	2", threaded	1"	3/4"	1/2" H
120	2", threaded	1"	3/4"	1/2" H
175	2", threaded	1"	3/4"	1/2" H
200	2 1/2", to be flanged (PN 6)	1"1/4	1"1/2	1/2" M
250	2 1/2", to be flanged (PN 6)	1"1/4	1"1/2	1/2" M
325	2 1/2", to be flanged (PN 6)	1"1/4	1"1/2	1/2" M
375	2 1/2", to be flanged (PN 6)	1"1/4	1"1/2	1/2" M
450	2 1/2", to be flanged (PN 6)	1"1/4	1"1/2	1/2" M
550	4", to be flanged (PN 10)	1"1/4	1"1/2	1/2" M
650	4", to be flanged (PN 10)	1"1/4	1"1/2	1/2" M
750	4", to be flanged (PN 10)	1"1/4	1"1/2	1/2" M
850	4", to be flanged (PN 10)	1"1/4	1"1/2	1/2" M
950	4", to be flanged (PN 10)	1"1/4	1"1/2	1/2" M

Legend	Concept
4	Hot water flow
5	Hot water return
6	Gas connection (female)
7	Flues outlet (connection to chimney)
F	Anti-vibration supports
8	Boiler water draining (female-threaded sleeve)
9	Draining of condensed products (female or male-threaded sleeve)
12	Control panel
13	

Gas connection: the installation company must install a female 3-pieces coupling, for an easier dismantling and maintenance of the boiler.  
Add gas filter.

Note: data in the present document are liable to changes without prior warning.

## 6. TECHNICAL DATA RANGE ADI CD

### 6.1 Models ADI CD 70 to ADI CD 375

CONCEPT		Units	70	85	105	120	175	200	250	325	375
Power output	Maximum power (average water temp: 70°C)	kW	70.5	85	104	120	161.8	197.5	241	294	354
Power output	Maximum power (average water temp: 40°C)	kW	71.4	86.1	105.6	121.3	163.4	204.5	244.7	302.6	358.7
Power output	Minimum power (average water temp: 40°C)	kW	22.8	27.5	34	39	52.3	63.1	77.4	94.4	113.6
Power input	Maximum	kW	72.7	87.7	107	123	166	202.2	246.5	300.5	361.2
	Minimum	kW	21.8	26.3	32	37	49.8	60.7	74	90.2	108.4
Natural Gas (G20)	Gas flow Max.	m <sup>3</sup> /h	6.8	8.2	10	11.5	15.4	18.8	22.9	27.9	33.6
	Flues flow	m <sup>3</sup> /h	159	190	233	269	377	459	560	683	821
	Flues Residual Pressure	Pa	42	37.8	90	64.8	54	60	81	90	64.8
Boiler weight without water		kg	110	116	120	135	138	330	350	440	445
Water capacity		litres	30	33	34	34	35	86	90	112	118
Max. water pressure		bar	5	5	5	5	5	5	5	5	5
Water flow rate	ΔT = 10°C	m <sup>3</sup> /h	6.0	7.3	8.9	10.3	13.9	17	20.7	25.3	30.4
	ΔT = 12°C	m <sup>3</sup> /h	5.0	6.1	7.5	8.6	11.6	14.2	17.3	21.1	25.4
	ΔT = 15°C	m <sup>3</sup> /h	4.0	4.9	6	6.9	9.3	11.3	13.8	16.9	20.3
Electric consumption	At max. output	W	47.8	64.6	134	93.3	95.2	131.6	167.4	267.9	435
	At min. output	W	16.7	17.9	23.9	19.1	19.5	31.1	40.7	64.6	69
	Maximum consumption	W	236.5	239.9	254.9	245	249.9	260.7	274.1	308.9	435
	Supply	V	1x230 V	1x230 V	1x230 V	1x230 V	1x230 V	1x230 V	1x230 V	1x230 V	1x230 V

Natural gas L.C.V. = 10.757 kW/m<sup>3</sup> (38.728 MJ/m<sup>3</sup>)

Propane gas = CONSULT chapter 18.4.2.

Electric supply to the boiler: 230 V, 50 Hz, single-phase and ground.

The electric protection of each boiler must be prepared considering the maximum value between the electric consumption at the start-up and the electric consumption at the maximum power output.

ADI CD 70 to ADI CD 375: modulating power from 30%.

Note: data in the present document are liable to changes without prior warning.

6.2 Models ADI CD 450 to ADI CD 950

CONCEPT		Units	450	550	650	750	850	950
Power output	Maximum power (average water temp: 70°C)	kW	440	530	598	675	792.7	892.3
Power output	Maximum power (average water temp: 40°C)	kW	443.5	535.5	605	682.4	802.1	904.1
Power output	Minimum power (average water temp: 40°C) (*)	kW	141	230.9 (173.8)	259.4 (195.2)	292.4 (220.1)	338.2	380.9
Power input	Maximum	kW	448	546	618	700	818.5	924.5
	Minimum (*)	kW	134	218.6 (163.9)	247.2 (185.4)	280 (210)	327.4	369.8
Natural Gas (G20)	Gas flow Max.	m <sup>3</sup> /h	41.7	50.8	57.5	65.1	76.1	85.9
	Flues flow	m <sup>3</sup> /h	1018	1170	1321	1491	1775	2007
	Flues Residual Pressure	Pa	90	72	75	78	177.5	266.2
Boiler weight without water		kg	460	480	485	485	545	545
Water capacity		litres	118	120	120	120	164	164
Max. water pressure		bar	5	5	5	5	5	5
Water flow rate	ΔT = 10°C	m <sup>3</sup> /h	37.8	45.6	51.4	58.1	68.2	76.7
	ΔT = 12°C	m <sup>3</sup> /h	31.5	38	42.9	48.4	56.8	64
	ΔT = 15°C	m <sup>3</sup> /h	25.2	30.4	34.3	38.7	45.5	51.2
Electric Consumption	At max. output	W	767.8	627.4	830	1139	1300	1800
	At min. output	W	124.4	83	82.8	108.4	300	320
	Maximum consumption	W	767.8	627.4	830	1139	1300	1800
	Supply	V	1x230 V	1x230 V	1x230 V	1x230 V	3x380 V	3x380 V

Natural gas L.C.V. = 10.757 kW/m<sup>3</sup> (38.728 MJ/m<sup>3</sup>)

Propane gas = CONSULT chapter 18.4.2

Electric supply to the boiler:

ADI CD 450 – 750: 230 V, 50 Hz, single-phase and ground.

ADI CD 850 – 950: 380 V, 50 Hz, three-phase and ground.

ADI CD electric current	Maximum power	Minimum power (40%)
ADI CD 850	2.43 amp	0.34 amp
ADI CD 950	2.74 amp	0.35 amp

The electric protection of each boiler must be prepared considering the maximum value between the electric consumption at the start-up and the electric consumption at the maximum power output.

ADI CD 450 to 750: modulating power from 30%.

(\*) Minimum power output adjustable up to 30% of the gas power: to be adjusted onsite (during commissioning), depending on installation factors → second values of the above chart list.

ADI CD 850 and ADI CD 950: modulating power from 40%.

Note: data in the present document are liable to changes without prior warning.

**7. BOILER HEAT EXCHANGER**

The ADI CD boilers use gas to heat water for closed heating circuits and/or DHW primary circuits.

The boiler heat exchanger (where takes place the heat transfer from flues to water) is made of stainless steel: it is a stainless steel enriched with a special alloy (for a better resistance to corrosion and to high temperatures).

The boiler heat exchanger consists of 2 water collectors, an upper one and a lower one, connected by means of multiple vertical tubes forming the combustion chamber. The vertical tubes generate a big heat transfer surface that uses the sensible heat of the flues.

During the manufacturing process, the boiler is subjected to a strict quality control, carried out through a process of three leak tests: one with penetrant liquids, another one with air pressure and the last one with water pressure.

The boiler heat exchanger is insulated.

Several manual vents are installed in the higher part of the boiler for the air venting of the boiler.

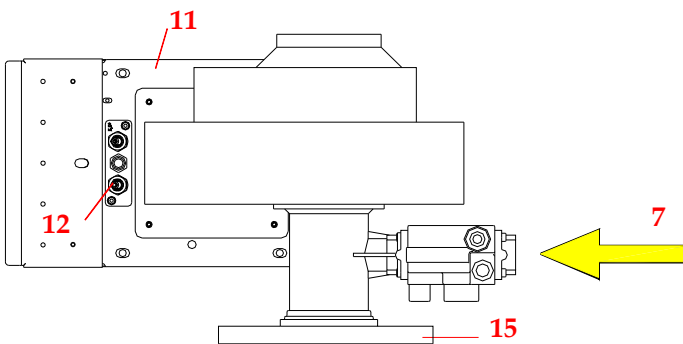
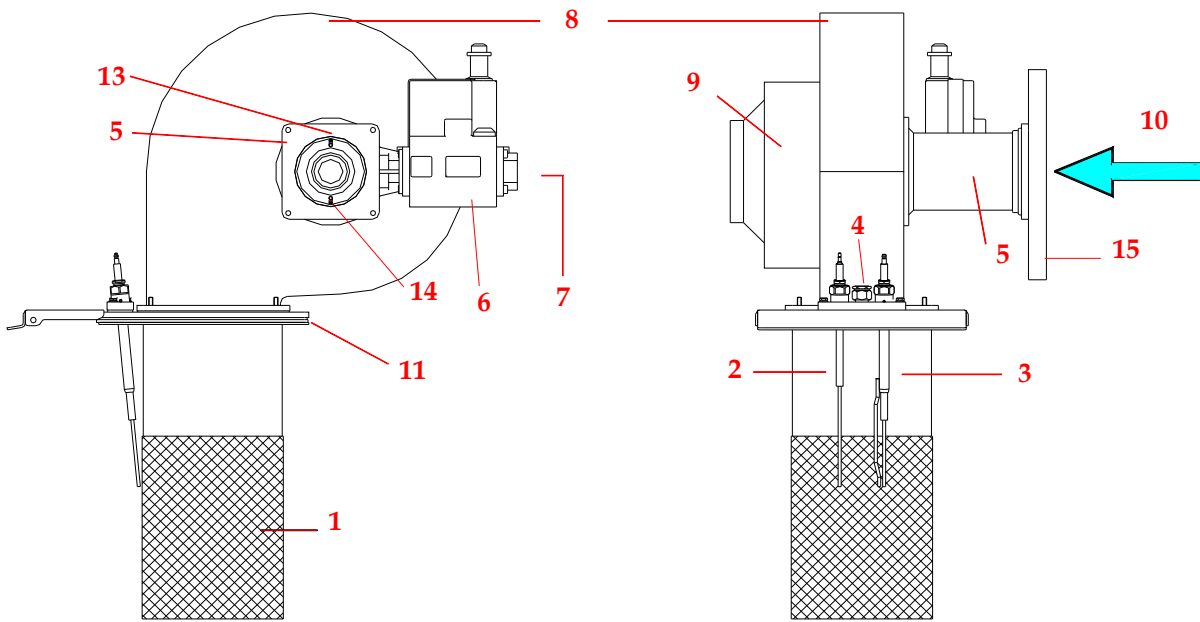


Front and rear view: models ADI CD 175 and lower.  
Without rear casing, simple casings



Front and rear view: models ADI CD 200 and higher.

8. POWER MODULATION AND COMBUSTION SYSTEM



- (1) Burner of fire resisting alloy mesh
- (2) Ionization electrode (checking the flame presence)
- (3) Ignition electrode
- (4) Pilot flame
- (5) Venturi for the air-gas mix
- (6) Gas shut-off valve
- (7) Gas inlet (boiler gas connection to the installation)
- (8) Fan for the air-gas mix
- (9) Variable speed motor-fan
- (10) Air inlet
- (11) Flange of the group motor-fan, to be coupled to the flange of the boiler heat exchanger
- (12) Ignition-ionization kit
- (13) Pressure connection for the gas valve (just models CD 200 and higher)
- (15) Air filter (just models CD 200 and higher)

NOTE: this is a guide diagram; according to the model, the position of electrodes, pilot flame, motor fan and gas shut-off valve can vary.

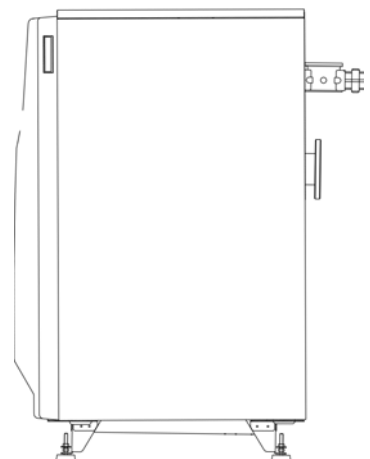
Gas filter in models ADI 850 and 950:

In these models, the gas filter is supplied dismantled inside the boiler, for an easier and safer transport.

It must be assembled once the boiler is in the installation.

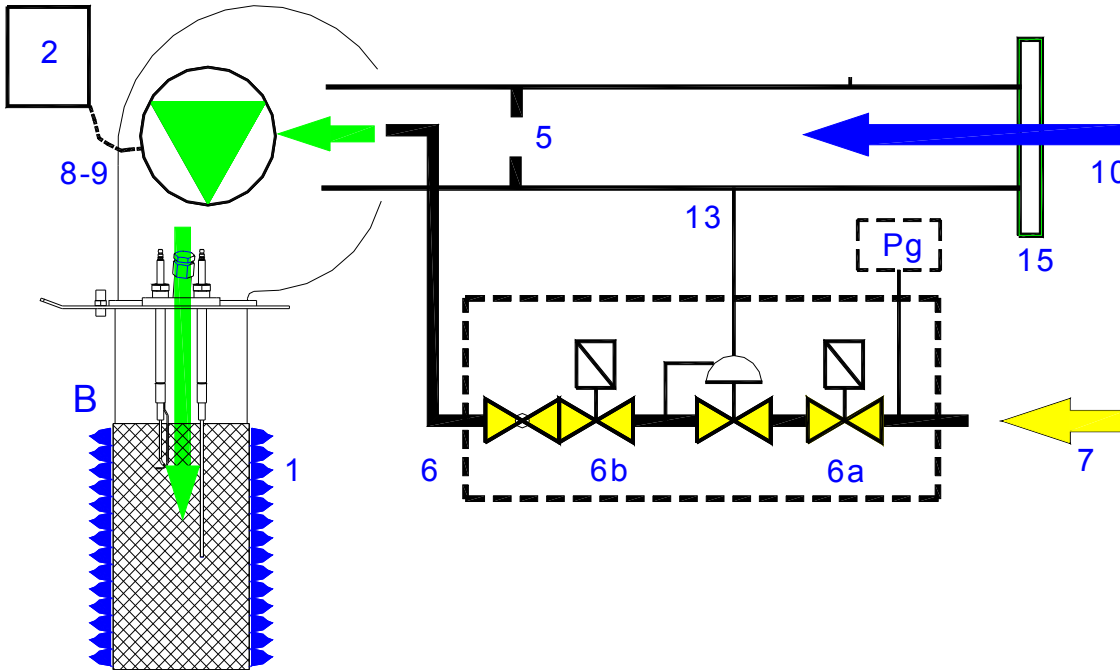
The minimum gas pressure gauge is connected to the gas filter inlet.

In order to rotate the motor-fan group and take off the burner, you have to remove first the gas filter and then proceed according to the instructions indicated in the corresponding chapter (19.1).



8.1 Assembly of gas connection – air/gas inlet

The ADI CD boiler includes an air-gas premix system of modulating combustion, composed of:



5. Venturi operating as an air-gas mixer, ensuring combustion with a constant proportion of air/gas to the premix burner, throughout its power modulation range.

The venturi produces a depression and drives the gas (7) towards the gas valve outlet (6). It operates as an additional safety: if there is no air inlet, there will be no gas admission.

6. The gas shut-off valve controls the gas outlet pressure according to the pressure value in the venturi.

Note: (13) in models CD 200 and higher, a coupling pipe between the gas shut-off valve and the venturi measures the pressure drop before the mix. For lower models there is no pipe, the connection between the gas shut-off valve and the venturi is internal.

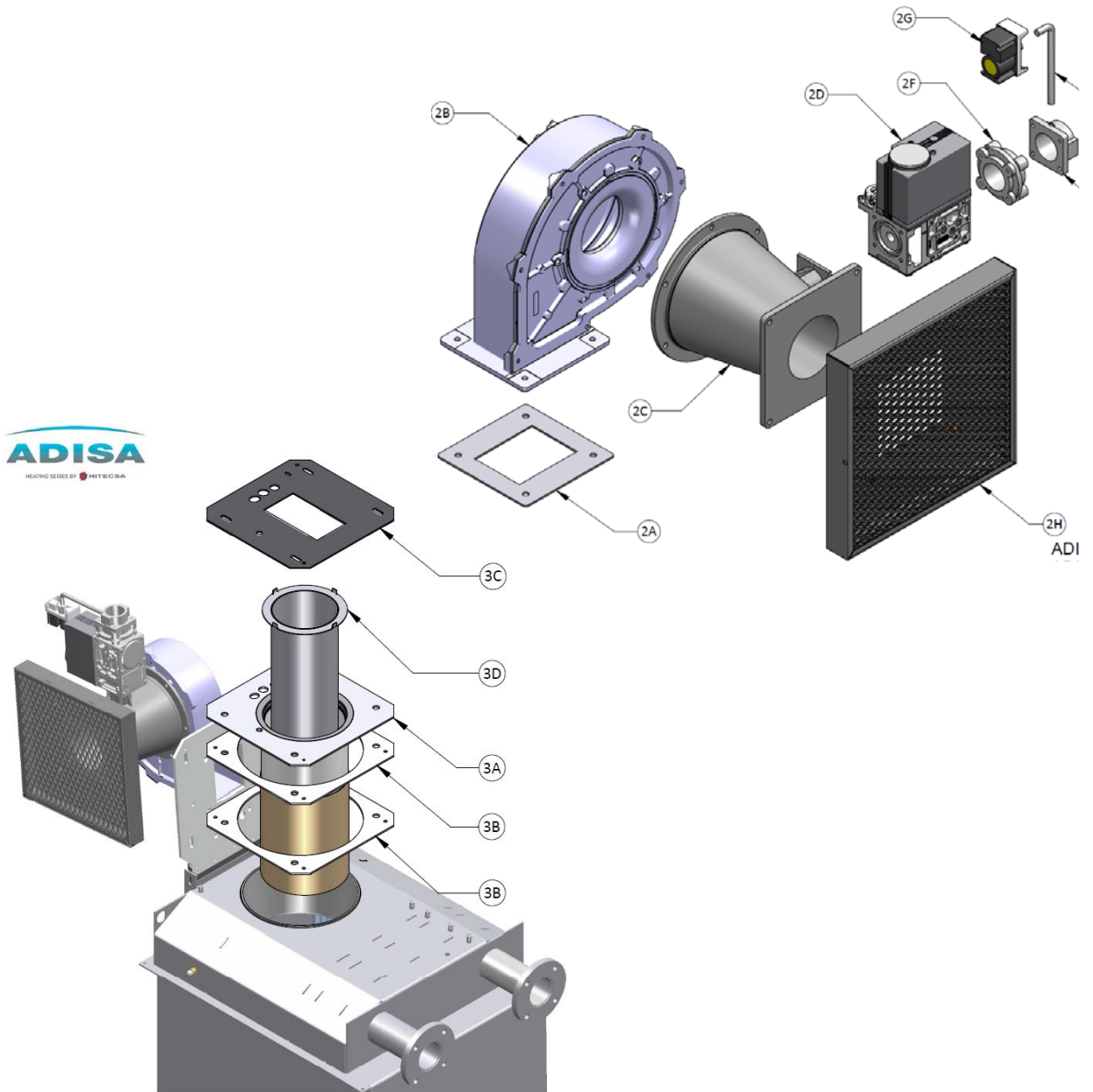
8-9. The power modulation is made by varying the fan speed, which also produces a variation of the air-gas mix flow entering into the burner (B).

Pg. Minimum inlet pressure switch: adjusted at 15 mbar (natural gas).

In **Models ADI CD 70 to 250**, these pieces form one only global group: burner, burner-holder plate, motor-fan, venturi and gas shut-off valve.



**Exploded view of the burner – fan – gas valve assembly for models CD 325 and higher:**



Motor-fan rotating forward  
(ADI CD 325 to 750) or backward  
(ADI CD 850 and 950).



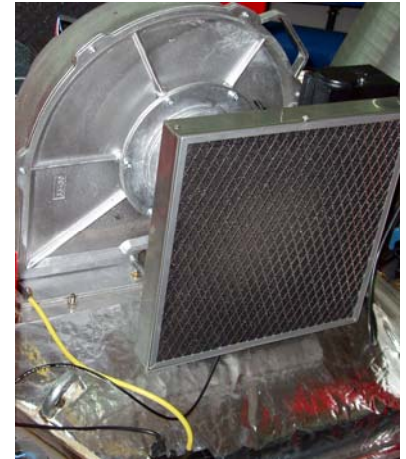
**8.2 Air inlet filter**

The air inlet to the venturi is protected by a filter retaining the dust that is usually in the atmosphere.

Attention: it is important to avoid excessively dusty or dirty environments (for ex. in case of building work in the same room or in places next to the ventilation ducts of the boilers room) or environments with aggressive steams (evacuation or air outlet of industrial laundries...).

See an example of the filter in the attached photo.

Only included in models CD 200 and higher.



**9. BURNER**

The boiler includes an air-gas premix burner of innovative design and material:

- Fire resisting alloy mesh.
- Homogeneous and stable combustion in case of any change in the power demand.
- High mechanic resistance and high resistance to high temperatures.
- Very low thermal inertia → fast cooling (for an easier maintenance).
- Fast answer to the changes of the power demand.
- Thanks to its structure and design, noise produced by the combustion is very low and without resonance.

The cylindrical shape of the burner allows the flame to be homogeneously distributed. It is vertically introduced in the boiler.

The boiler incorporates an ionization flame control. The minimum ionization value must always be superior to 5 microamperes.

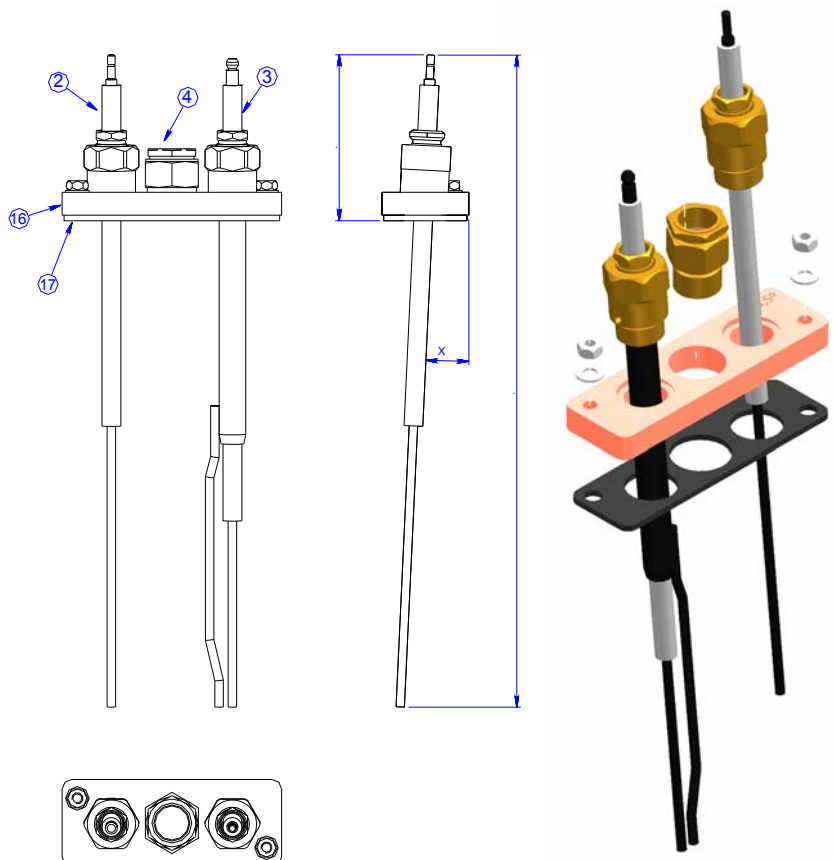
**9.1 Ignition and ionization kit**

The ignition is electronic by means of an electric transformer that produces a train of sparks on the ignition electrode (3), with the special feature that the sparks fly from the electrode to the mass included in this electrode, and not on the burner.

The safety of flame presence is controlled by means of an ionization electrode (2).

The minimum ionization value must be always higher than 5 microamperes.

Flame may be checked by means of a glass spy (4)



ADI CD	Slope / inclination (X)	Length (mm)
70 – 250	9°	340
325 – 450	5.5°	340
550 - 950	8°	380

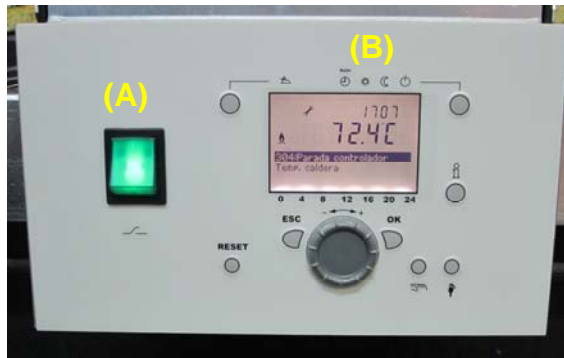
(16) Electrodes holder plate

(17) Joint for the set.

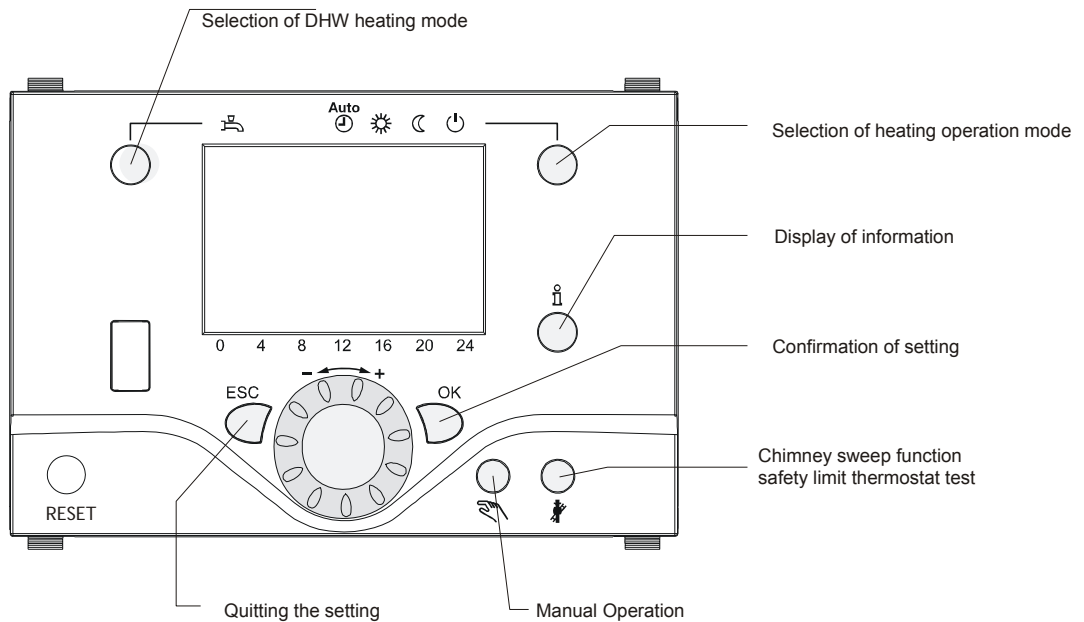


10. CONTROL PANEL - SIEMENS

The boiler control panel is placed in the upper part of the boiler front.



(A) Boiler on/off switch (B) Display: readings, messages, errors...

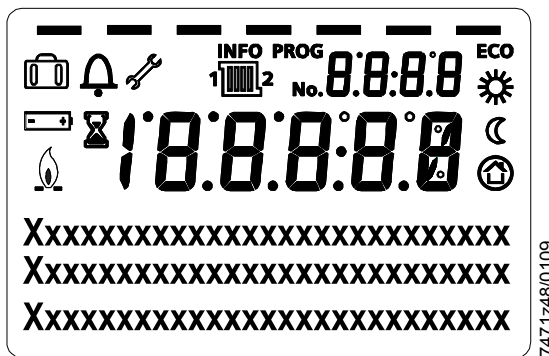


ITEM		CONCEPT
1		Button for boiler reset when pressing > 0.5 s.
2		D.H.W. on/off
3		Select heating circuit mode. Change the operation mode: <ul style="list-style-type: none"> <li>• Automatic mode: Circuit works according to the time program </li> <li>• Continuous operation according to <i>Comfort</i> setpoint </li> <li>• Continuous operation according to <i>Reduced</i> setpoint </li> <li>• Standby: circuit is disconnected, <i>Frost Protection</i> function activated </li> </ul>
4		Available information is displayed by pressing the Info button
5		Turn the setting knob to select parameters. For heating circuits, turn the setting knob to increase or decrease the <i>Comfort</i> setpoint

6		Set the installation in manual operation. The different relays remain in a certain status (on/off) depending on a predefined setting. Deaeration mode when pressing > 3 sec.
7		To enter in parametrization mode. To confirm the values of adjustment of the parameters on the display.
8		For quitting the setting. Cancel, return to main menu.
9		Function maintenance, stop controller. Chimney sweeper mode when pressing button < 3 sec.

To go to the initial display, boiler temperature, press .

10.1 Display



	Heating to <i>Comfort</i> setpoint	<b>INFO</b>	Info level activated
	Heating to <i>Reduced</i> setpoint	<b>PROG</b>	Programming activated
	Heating to <i>Frost Protection</i> setpoint	<b>ECO</b>	Heating temporarily Off
	Process running – please wait		<i>ECO</i> function active
	Change battery		<i>Holiday</i> function active
	Burner in operation (only oil/gas boiler)		Reference to heating circuit
			Maintenance/special operation
			Error messages

Selecting Heating Mode

	<p>This setting is used to switch between the different operating modes. The selection mode is indicated by a bar which appears below the respective symbol.</p>
--	--

**Automatic operation AUTO**

- Heating mode according to the time program
- Temperature setpoint according to heating program *Comfort* setpoint or *Reduced* setpoint
- Protective functions active
- Automatic summer/winter changeover and automatic 24-hour heating limit active (*ECO* functions)

Continuous operation ☀ or ☾


☀	Heating to <i>Comfort</i> setpoint
☾	Heating to <i>Reduced</i> setpoint

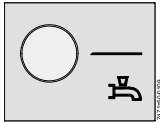
- Heating mode with no time program
- Protective functions active
- Automatic summer/winter changeover (*ECO* functions) and 24-hour heating limit inactive in the case of continuous operation with *Comfort* setpoint

Protection mode

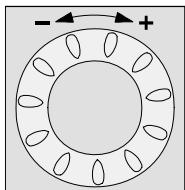
- *Heating mode Off*
- Temperature according to the *Frost Protection* level
- Protective functions active
- Automatic summer/winter changeover (*ECO* functions) and automatic 24-hour heating limit active

Selecting Domestic Hot Water Mode

The button is used to switch DHW mode on and off. The selection made is indicated by a bar which appears below the respective symbol .

<ul style="list-style-type: none"> <li>• <i>On:</i> DHW is heated according to the selected switching program</li> <li>• <i>Off:</i> No DHW heating, but the protective function is active</li> </ul>	
---	--

Adjustment of room temperature setpoint

<p>Turn the setting knob to increase or decrease the <i>Comfort</i> setpoint ☀.</p> <p>For the <i>Reduced</i> setpoint ☾</p> <ul style="list-style-type: none"> <li>- press <b>OK</b>,</li> <li>- select operating page <i>Heating circuit</i>, and</li> <li>- adjust the <i>Reduced</i> setpoint.</li> </ul>	
---	---

**Displaying information**

Various data can be displayed by pressing the **Info** button.

- General Information (\*)**
- Error messages
  - Maintenance messages
  - Operation messages
  - Room temperature
  - Boiler temperature
  - Outside temperature
  - DHW temperature
  - State heating circuits
  - State of DHW
  - State of boiler
  - State of solar
  - Date and time of day
  - Telephone customer service


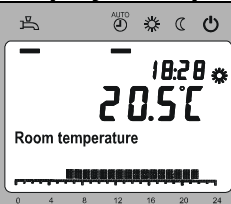


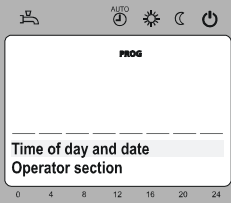

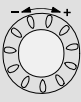
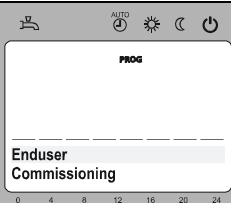

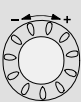
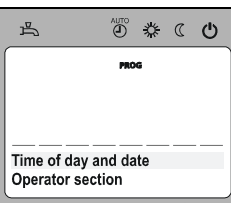
(\*) According to sensors and optionals connected to the boiler.

<p><b>🔔 Error messages:</b> If this symbol appears, an error in the plant occurred. Press the <b>Info</b> button and read further information.</p>	<p><b>🔧 Maintenance or special operation:</b> If this symbol appears, a maintenance symbol is shown, or the plant has changed to special mode. Press the <b>Info</b> button and read further information.</p>
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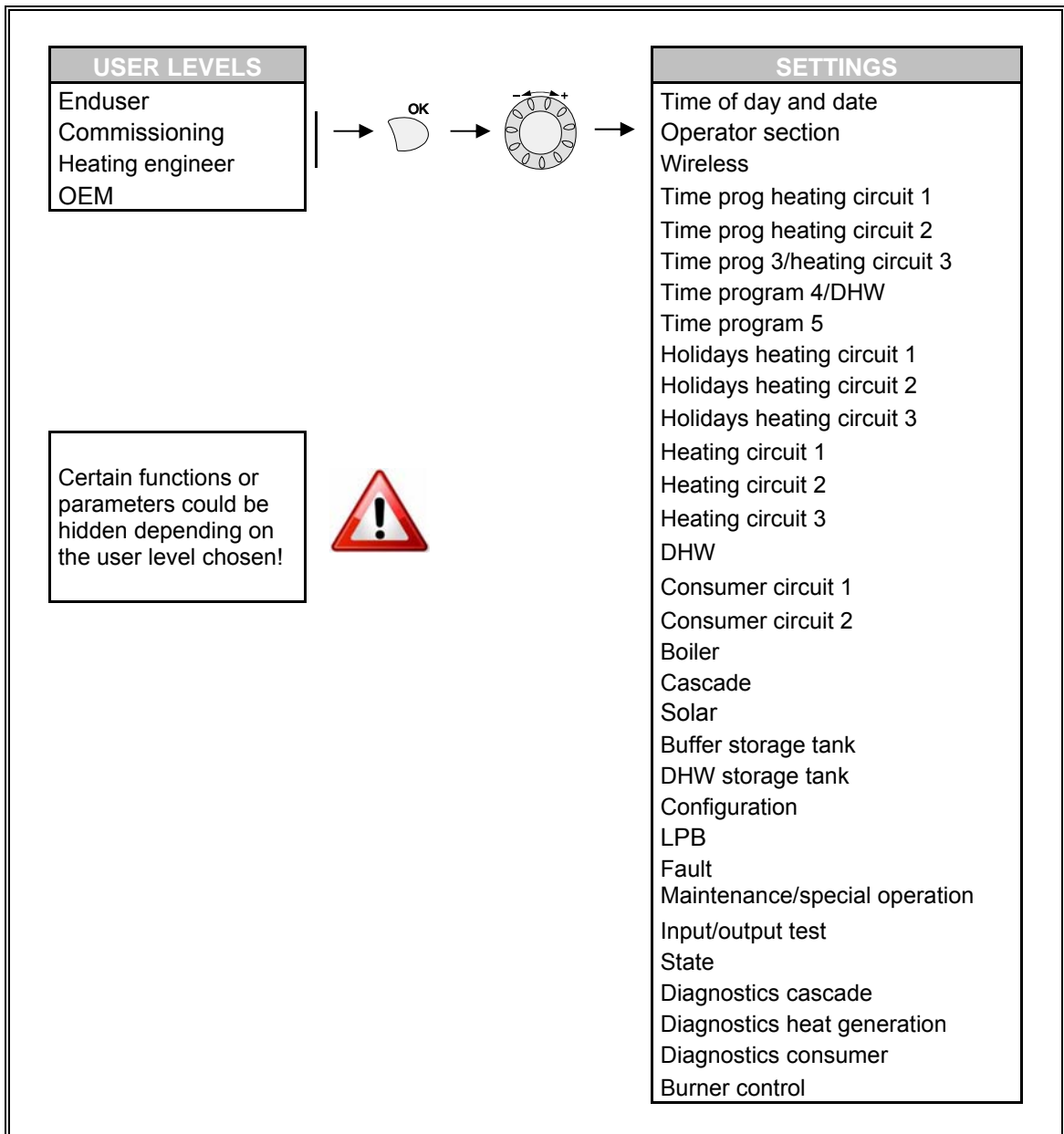
## 10.2 Programming

### User levels

The user levels only allow authorized user groups to make settings. To reach the required user level, proceed as follows:

	Operation	Display example	Description
1			<p>This is the basic display. If the basic display is not shown, press <b>ESC</b> to return to it.</p>
			<p>Press <b>OK</b>.</p>
2			<p>You are on the <i>Enduser</i> level. Turn the setting knob until you reach the required parameter.</p>
			<p>Press the <b>Info</b> button for 3 seconds.</p>
3			<p>You are now given a choice of user levels. Turn the setting knob until you reach the required user level.</p>
			<p>Press <b>OK</b>.</p>
4			<p>You are now on the required user level. Turn the setting knob until you reach the required parameter.</p>

**Overview of setting**



**Parameters setting**

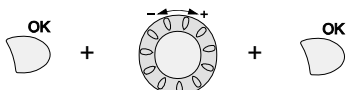
These examples below show a basic programme process:

**Setting of the time of day and date**

From initial display, press OK button and select “Time of day and date”. Press OK button and set the parameter 1 “Hours/minutes”.



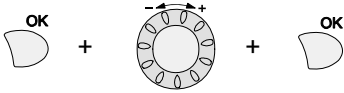
Press OK button and the value will blink. While the value is blinking, use the setting knob to set the correct time. Confirm with OK button.



Move the setting knob and set the parameter 2 “Day/month”.



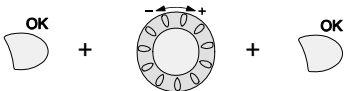
Press OK button and the value will blink. While the value is blinking, use the setting knob to set the correct date. Confirm with OK button.



Move the setting knob and set the parameter 3 “Year”.



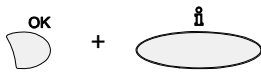
Press OK button and the value will blink. While the value is blinking, use the setting knob to set the correct year. Confirm with OK button.



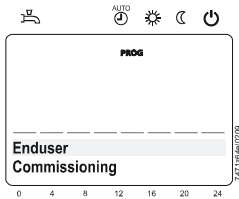
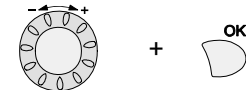
Press ESC button to return to the main display, where the boiler temperature is shown.

**Setting of boiler flow temperature – Setpoint**

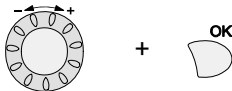
From initial display, press INFO Button for 3 seconds. It appears the different user levels.



Move the setting knob and set “Commissioning” level. Press OK button. You are now in the general menu.

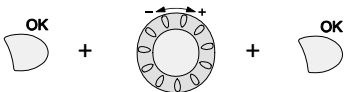


Move the setting knob and set “Consumer circuit 1”. Press OK button.



The first parameter, 1859 “Flow temp setp cons request” is the boiler flow temperature (setpoint).

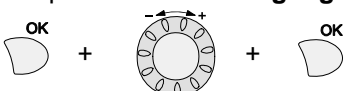
Press OK button and the value will blink. While the value is blinking, use the setting knob to set the temperature. Confirm with OK button.



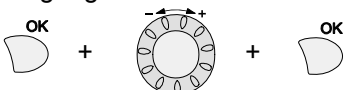
Press ESC button to return to the main display, where the boiler temperature is shown.

**Setting of Language**



From initial display, press OK button and select “Operator section” with the setting knob. Press OK button and set the parameter 20 “Language”.




Press OK button and the value will blink. While the value is blinking, use the setting knob to set the correct language. Confirm with OK button.



10.3 Available parameters at enduser level

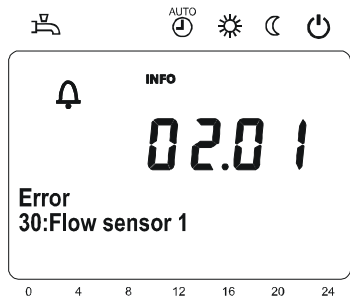
- When you are in the main display, press  to enter at “Enduser level”.
- Choose the required parameter by turning the setting knob  and confirm with OK. Modify the parameters depending on the required adjustments.



<i>Level</i>	<i>Line nr.</i>	<i>Function</i>
Time of day and date	1	Hours/minutes
	2	Day/month
	3	Year
Operator section	20	Language
Time prog heating circuit 1	500-516	Preselection, Phases
Time prog heating circuit 2	520-536	Preselection, Phases
Time prog 3/heating circuit 3	540-556	Preselection, Phases
Time program 4/DHW	560-576	Preselection, Phases
Time program 5	600-616	Preselection, Phases
Holidays heating circuit 1	641-648	Periods, Start-End
Holidays heating circuit 2	651-658	Periods, Start-End
Holidays heating circuit 3	661-668	Periods, Start-End
Heating circuit 1	710	Comfort setpoint
	712	Reduced setpoint
	714	Frost Protection setpoint
	720	Heating curve slope
	730	Summer/winter heating limit
Heating circuit 2	1010	Comfort setpoint
	1012	Reduced setpoint
	1014	Frost Protection setpoint
	1020	Heating curve slope
	1030	Summer/winter heating limit
Heating circuit 3	1310	Comfort setpoint
	1312	Reduced setpoint
	1314	Frost Protection setpoint
	1320	Heating curve slope
	1330	Summer/winter heating limit
DHW	1610	Nominal setpoint
Boiler	2214	Setpoint manual control
Fault	6705	SW diagnostic code
Maintenance/special operation	7130	Chimney sweep function
	7131	Burner output
	7140	Manual control
Diagnostics heat generation	8338	Hours run counter burner
	8527	Total yield solar energy
	8530	Hours run solar yield
Diagnostics consumer	8701-8702	Outside temp min-max

- Press the button  to get out of the programming Enduser level.
- If nothing changes after 8 minutes or any other button has been pressed, you will come back to the initial display and changes won't be saved.




**10.4 Boiler lockout code**






Meaning
In case of boiler lockout or an error in the installation, the symbol  is shown. Press the button INFO  and the error code with its meaning appears on the display.

To detect the type of error, see the “list of Error Codes” described at the end of this manual.

Once solved the cause of the lockout, reset the boiler by pressing the button RESET during more than half a second.

To go back to the initial display, press the button .

**10.5 Function boiler maintenance**

- If you are on the main display (if not, press the button ESCAPE ) , press the button “heating operation mode”  during 3 seconds at least. In the screen appears “Controller stop function On”.
- After that, press the button INFO  and the display will show the percentage (%) of power at which the boiler is working.
- Press OK button and the value of percentage will blink. While the value is blinking, use the setting knob to set the value. Confirm with OK button. In order to make the maintenance operations, the action PID of the controller on the boiler will be deactivated. The boiler power can be increased or decreased to make the necessary adjustments (combustion check, for example).

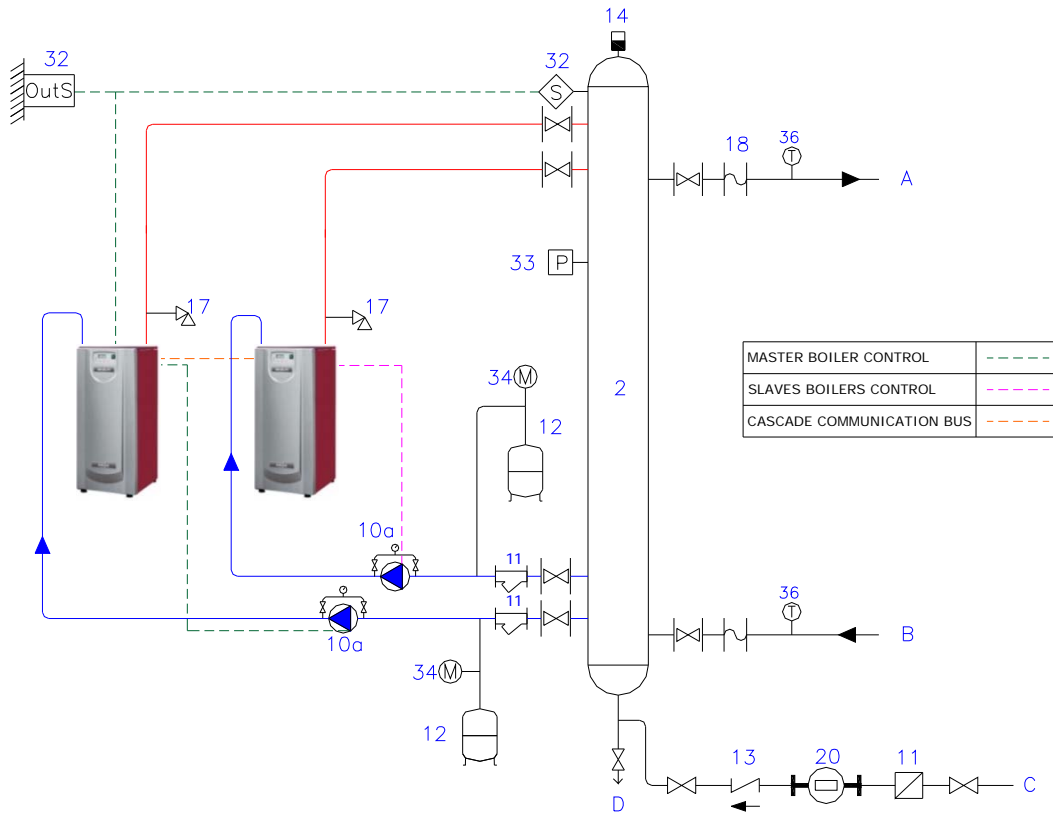
**10.6 Data and information visualized on the display**

DIAGNOSTICS HEAT GENERATION	
BOILER INFORMATION	LINE NR.
Boiler temperature	8310
Boiler Setpoint	8311
Flues gas temperature (*)	8316
Fan Speed	8323
Setpoint fan	8324
Current fan control	8325
Burner modulation	8326
Ionization current	8329
Hours run	8330

(\*) Just if the boiler has the flues sensor connected (optional).

### 11. CONTROL OF SEVERAL BOILERS – CASCADED SYSTEM

In an installation with several boilers it is important that the power generated by the boilers adapts at any moment to the demand of the installation, always optimizing the generators' efficiency.



#### 11.1 Boilers sequence included

When there are several boilers supplying the same installation, the boiler LMS control unit is able to make a sequence up to 16 boilers equipped with this controller. The boiler with device address 1 assumes the role of the cascade master. It activates the required functions and shows the additional menus with the parameters for use with the cascaded system.

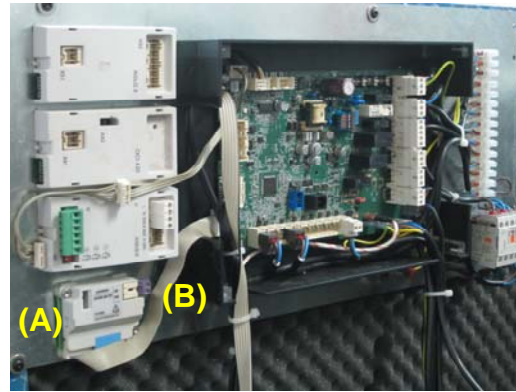
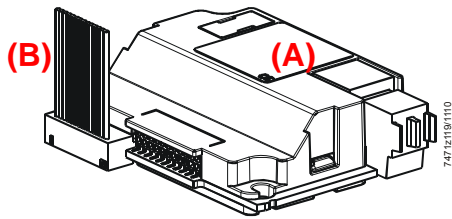
LPB		
Line nr.	Function	Value
6600	Device address	1 (Master) - 2...16 (Slaves)

Once the LPB bus is connected between the different boilers of the cascade, any message, error or diagnostic of the cascaded system is shown in the Master display. The sequence control unit, Master of boilers, allows evaluating the demand of the installation and regulating the boilers according to a strategy of selection. This boiler has all the logic control of cascaded system and also regulates the stop/start sequence of each boiler according to the demand of the installation. It is necessary to connect a temperature sensor in the hydraulic collector or inertial tank (immersion sensor model QAZ36 of ADISA Price List).

Configuration		
Line nr.	Function	Value
5930	Sensor input BX1	Common flow sensor B10
5931	Sensor input BX2	Cascade return sensor B70

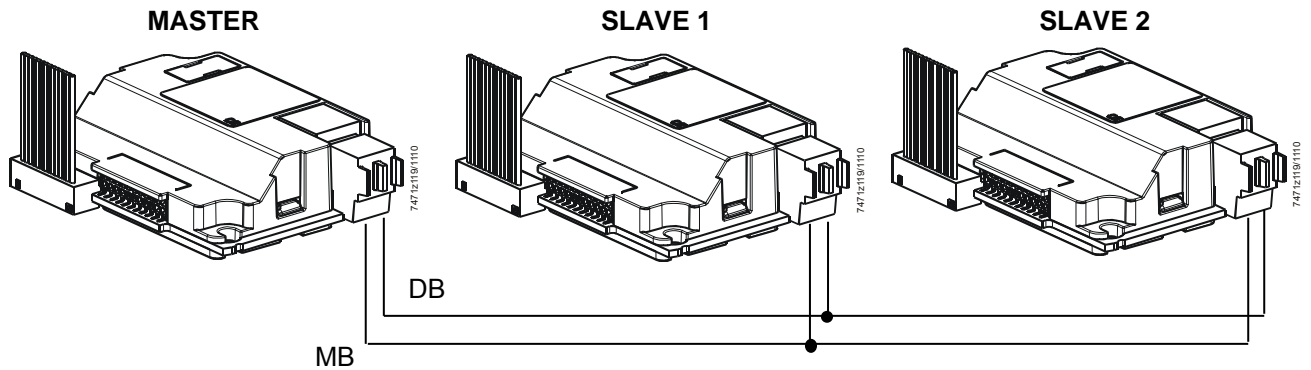
For each boiler:

- Add an additional module OCI345.06/101 (consult the current pricelist) of communication bus type LPB
- Connect the additional module to the boiler control unit, by means of the bus cable included in the OCI345 (see the photo attached)
- Make a serie between each OCI345 of the boilers connecting (DB – LPB data bus and MB – LPB ground).



(A) Cascade Module OCI345.06/101      (B) Cascade Cable LPB

**LPB BUS CONNECTION CASCADED SYSTEM**



Only the Official Technical Service can modify the internal parameters in order to use this control on the boiler.

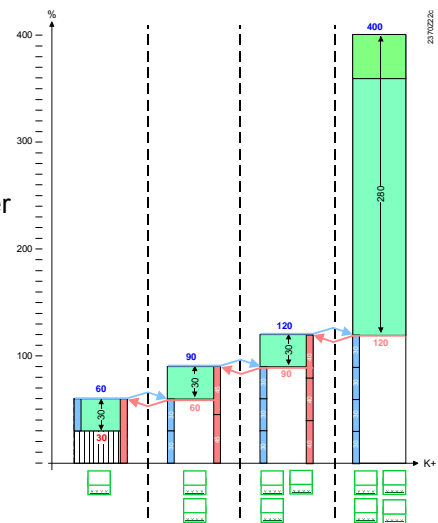
Basic parameters:

Cascade			
Line nr.	Function	Value	Unit
3510	Lead strategy	<i>Early on, late off</i>	
3511	Output band min	40	%
3512	Output band max	90	%
3530	Release integral source sequence	20	°Cmin
3531	Reset integral source sequence	300	°Cmin
3532	Reset integral source sequence	120	s
3533	Restart lock	2	min
3540	Auto source sequence changeover	150	h
3541	Auto source sequence exclusion	<i>None</i>	
3544	Leading source	<i>Source 1</i>	
3560	Return setpoint minimum	60	°C
3562	Return influence consumers	On/Off	

Lead strategy (3510)

The heat sources are switched on and off according to the selected lead strategy while giving consideration to the preset output band.

In the strategy “Early on, late off”, additional boilers are switched on as early as possible (output band min) and switched off again as late as possible (output band min). This means that the largest possible number of boilers are in operation, or additional boilers operate with the longest possible on times.

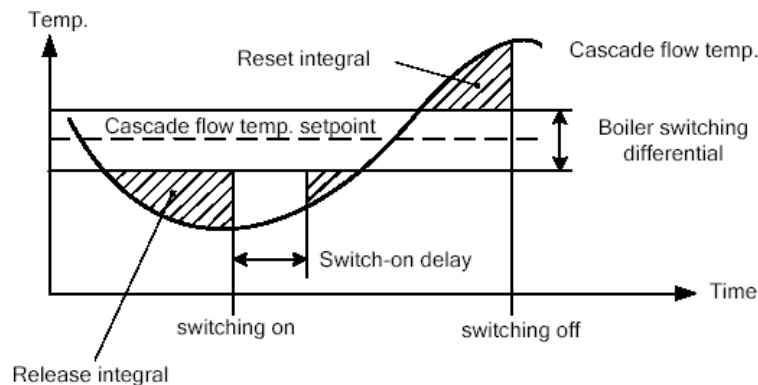


Release integral source sequence (3530)

When, with the heat source currently in operation, the demand for heat cannot be met –the difference being the release integral set here – another boiler is switched on. When the value is increased, additional heat sources are switched on at a slower rate. When the value is decreased, additional heat sources are switched on at a faster rate.

Reset integral source sequence (3531)

When, with the heat source currently in operation, the demand for heat is exceeded by the reset integral set here, the heat source with the highest priority is shut down. When the value is increased, heat sources operate for longer periods of time (in the case of surplus heat). When the value is decreased, heat sources are switched off at a faster rate.



Restart lock (3532)

The restart lock prevents a deactivated heat source from being switched on again. It is released again only after the set time has elapsed. This prevents too frequent switching actions of the heat sources and ensures stable plant operating states.

Switch on delay (3533)

Correct adjustment of the switch-on delay ensures that plant operating conditions will be stable. This prevents too frequent switching actions of the boilers (cycling).

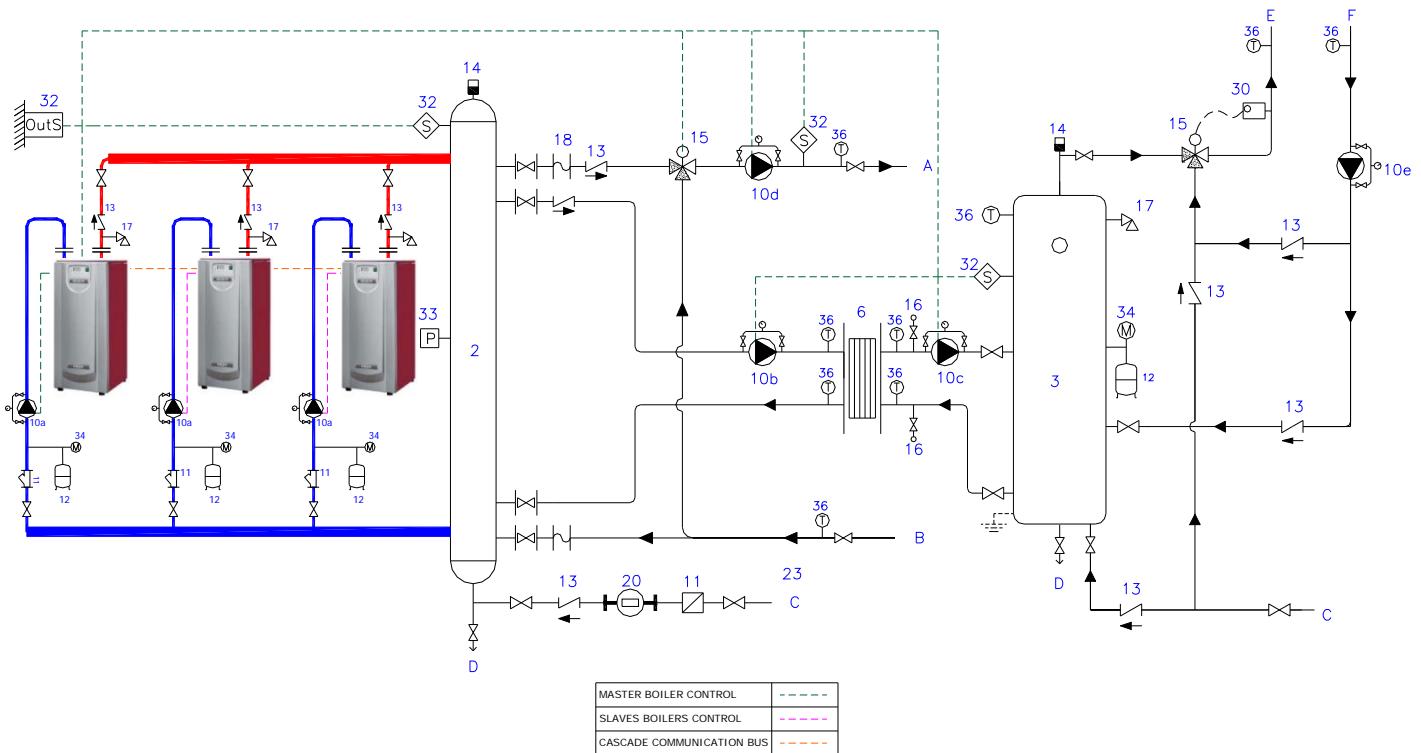
Auto source sequence changeover (3540)

With automatic changeover of the heat source sequence, the boiler loads in a cascaded system can be influenced by defining the order of lead and lag boiler. On completion of the set number of operating hours, the boiler sequence in the cascaded system changes. It is always the boiler with the next higher device address which assumes the role of the lead boiler.

Leading source (3544)

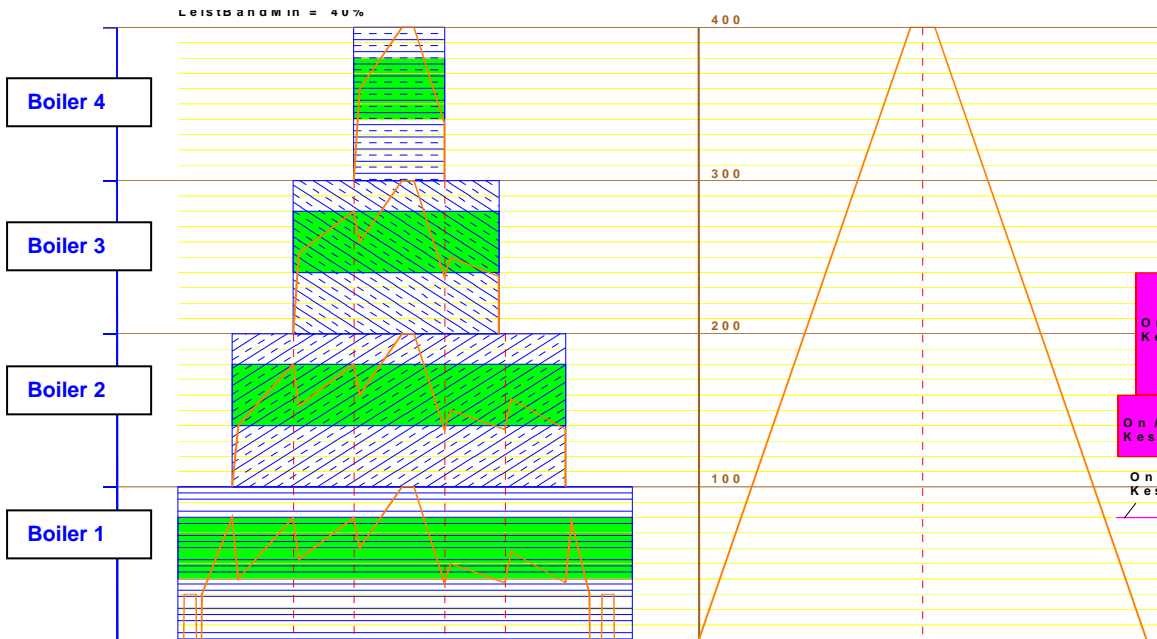
The boiler selected as the lead boiler is always the first to be switched on, or the last to be switched off. The other boilers are switched on and off in the order of their device addresses.

a) Three boilers cascade, heating and DHW circuit

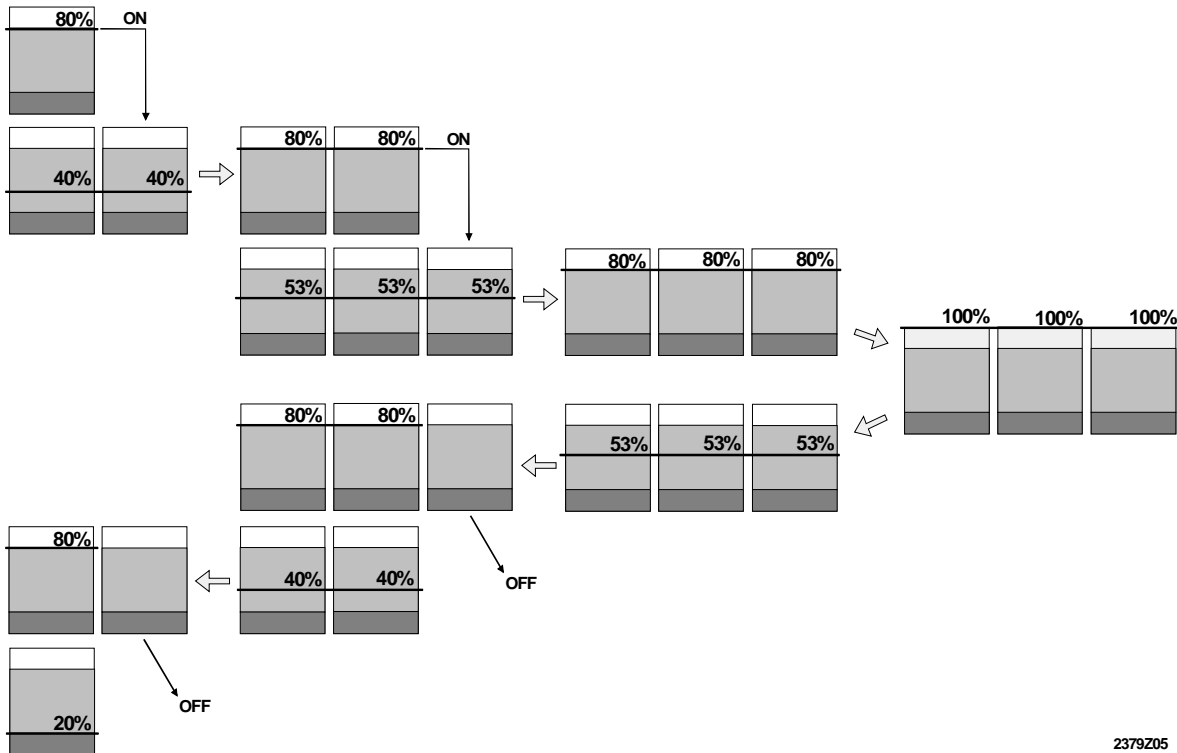


b) Example of boilers sequence and power control

Example of a possible sequence that can be made (multiple options can be chosen).

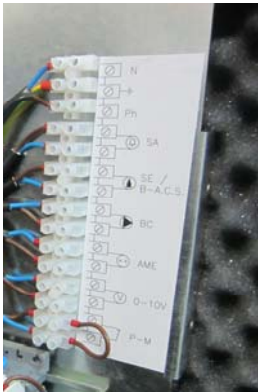


In this example, the boilers' activation and their power control would be made as shown below:

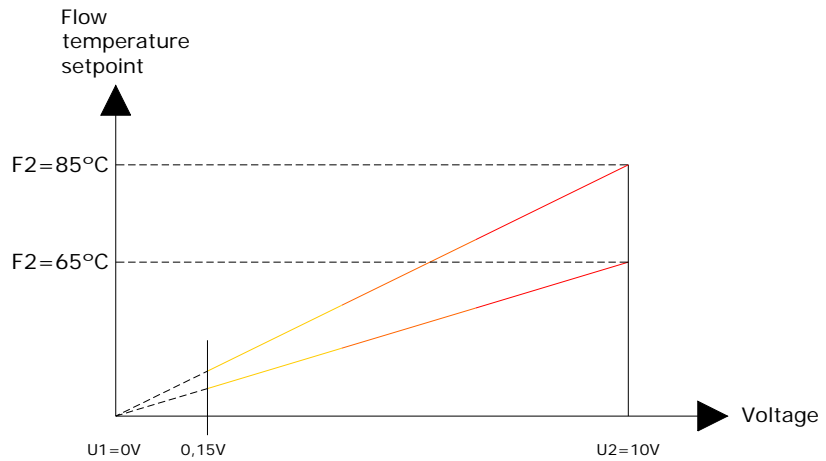


2379205

11.2 External control signal 0...10 V to regulate start-up and power modulation of each boiler



The external electric signal 0...10 V must be connected to the terminals shown in the electric cabinet of the boiler. The signal 0...10 V will transmit to the boiler a set-up temperature value.



These are the predefined 0...10 V values in **configuration**:

		Line nr.	predefined
<b>F1</b>	<b>Function value 1</b>	5954	150 (15°C)
<b>F2</b>	<b>Function value 2</b>	5956	850 (85°C)
<b>U1</b>	<b>Voltage value 1</b>	5953	0
<b>U2</b>	<b>Voltage value 2</b>	5955	10

These are the setpoints that we get from 0...10 V demand:

Voltage (V)	Setpoint (°C)
1	22
2	29
3	36
4	43
5	50
6	57
7	64
8	71
9	78
10	85

If it is necessary to get different values of temperature, change the following values to get a new linear characteristic:

$$m = (F2-F1) / (U2-U1)$$

- F2 = Final Temperature (°C)
- F1 = Initial Temperature (°C)
- U2 = Final Voltage (V)
- U1 = Initial Voltage (V)

First of all, calculate the new slope of the linear characteristic with the new 2 fixed points (initial and final points). Once you get the new relation °C/V, use it to the new characteristic in order to get the new temperature setpoints.

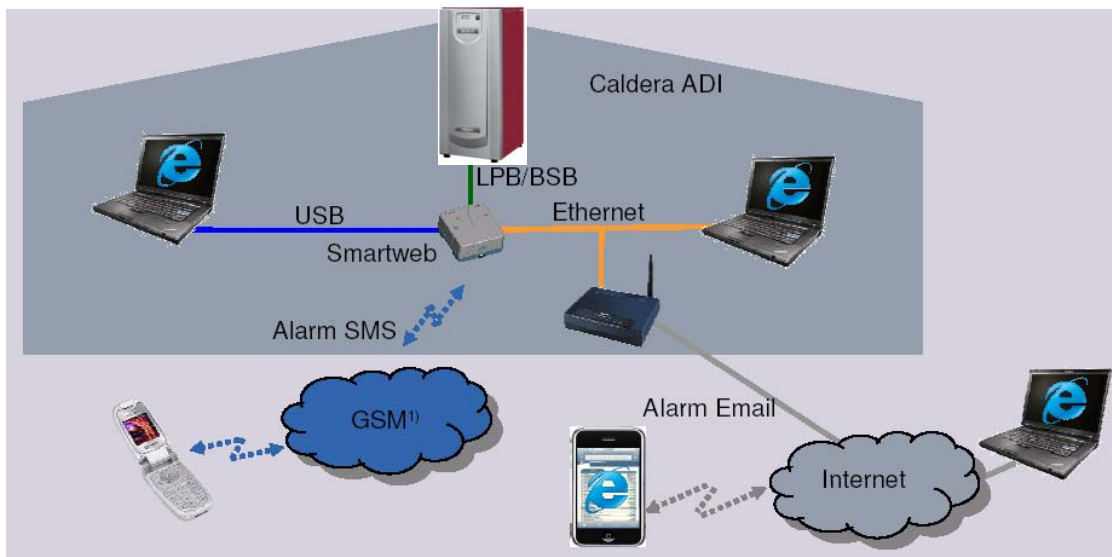
$$F2 = m \cdot (U2-U1) + F1$$

### 11.3 Remote Control or telecomputing

Boilers provided with the LMS control unit (cascade sequence and circuits' control) can be connected to a WEBSERVER OZW672 for communication through ETHERNET that allows controlling the boilers' operation and the installation via WebBrowser in a computer or Laptop and receiving messages and e-mails in Smartphones.

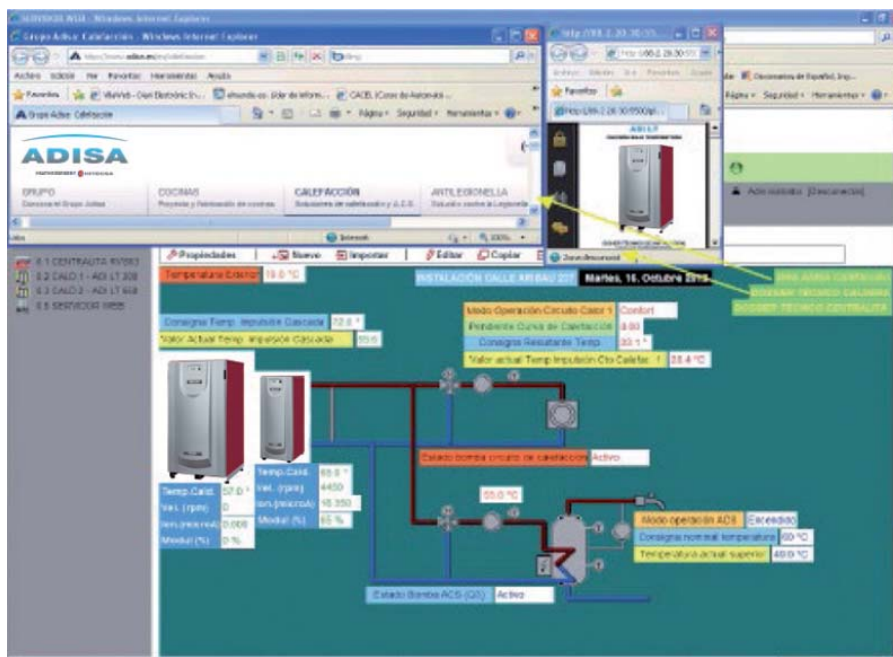
Web server OZW672 allows for remote plant control and monitoring via the web:

- Operation via web PC/Laptop or Smartphone.
- Connection type Ethernet (ADSL is needed for the installation, IP address is fixed)
- Display fault messages in the web browser.
- 1 to 4 devices are available to connect (boilers).
- Send fault messages to a maximum of 4 e-mail recipients.
- Plant visualization in the web browser based on customized plant web pages.



Requirements:

- Web server OZW672 for remote control and monitoring. Available in two versions:
  - For 1 boiler and its circuits.
  - For 4 boilers and their circuits.
- Internet connection with fixed with ADSL and fixed IP address (by costumer).





**12. ELECTRIC DRAWING**

The electric installation must comply with the current rules. The electric power consumed by each boiler is indicated in the table of technical characteristics.

ADI CD 70 to ADI CD 750: The electric supply must be 220/230 V, 50 Hz, single phase, ground connection.

(Remember: in case of 220/230 V, two phases, it is necessary to install an electric insulating transformer with one of the phases of the secondary connected to ground acting as neutral).

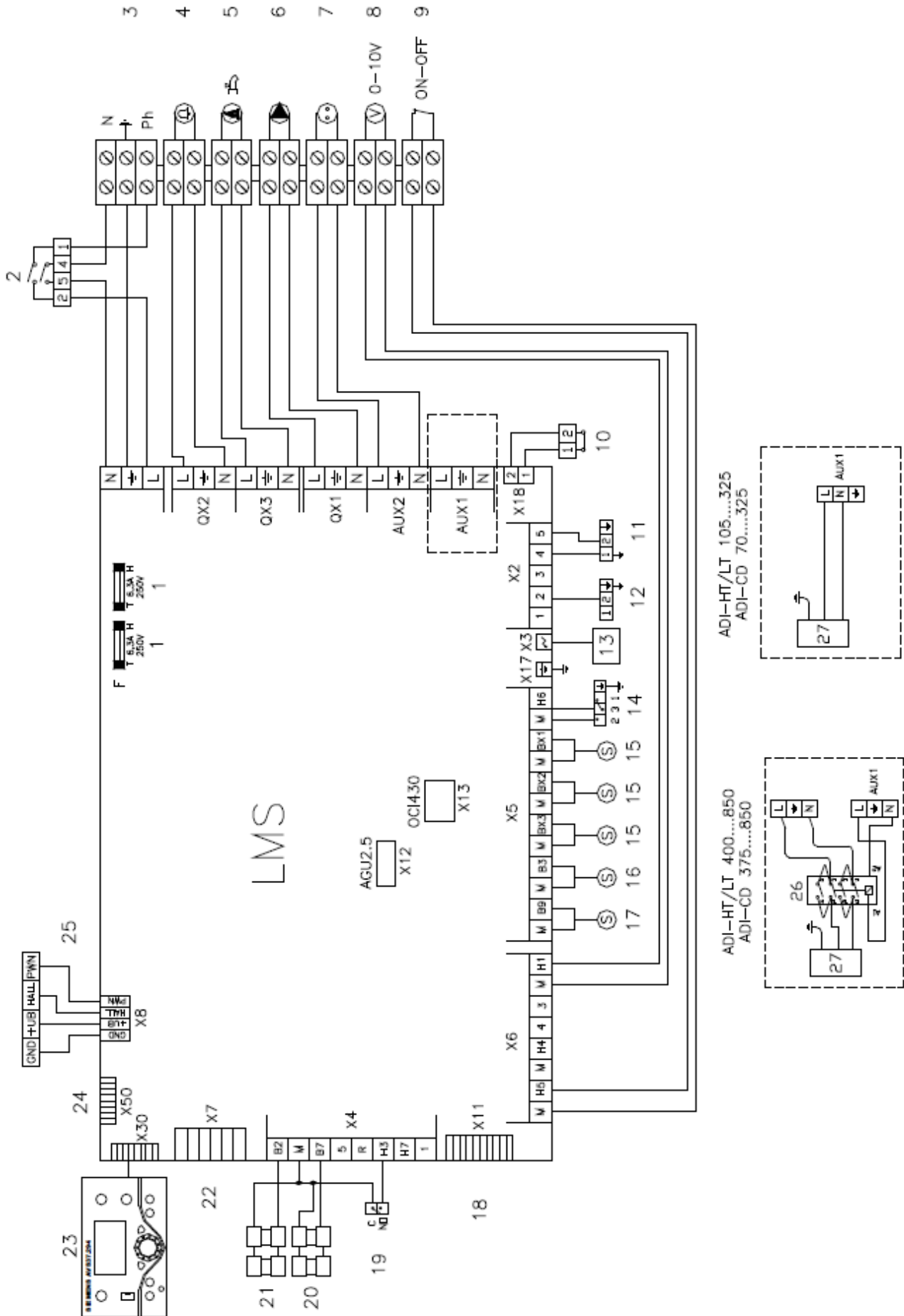
ADI CD 850 to ADI CD 950: The electric supply must be three-phase, 380 V, 50 Hz, ground connection, for the motor fan.

Protect separately the three-phase motor's electric supply (L1-L2-L3) from the boiler's electric supply (Ph-N).

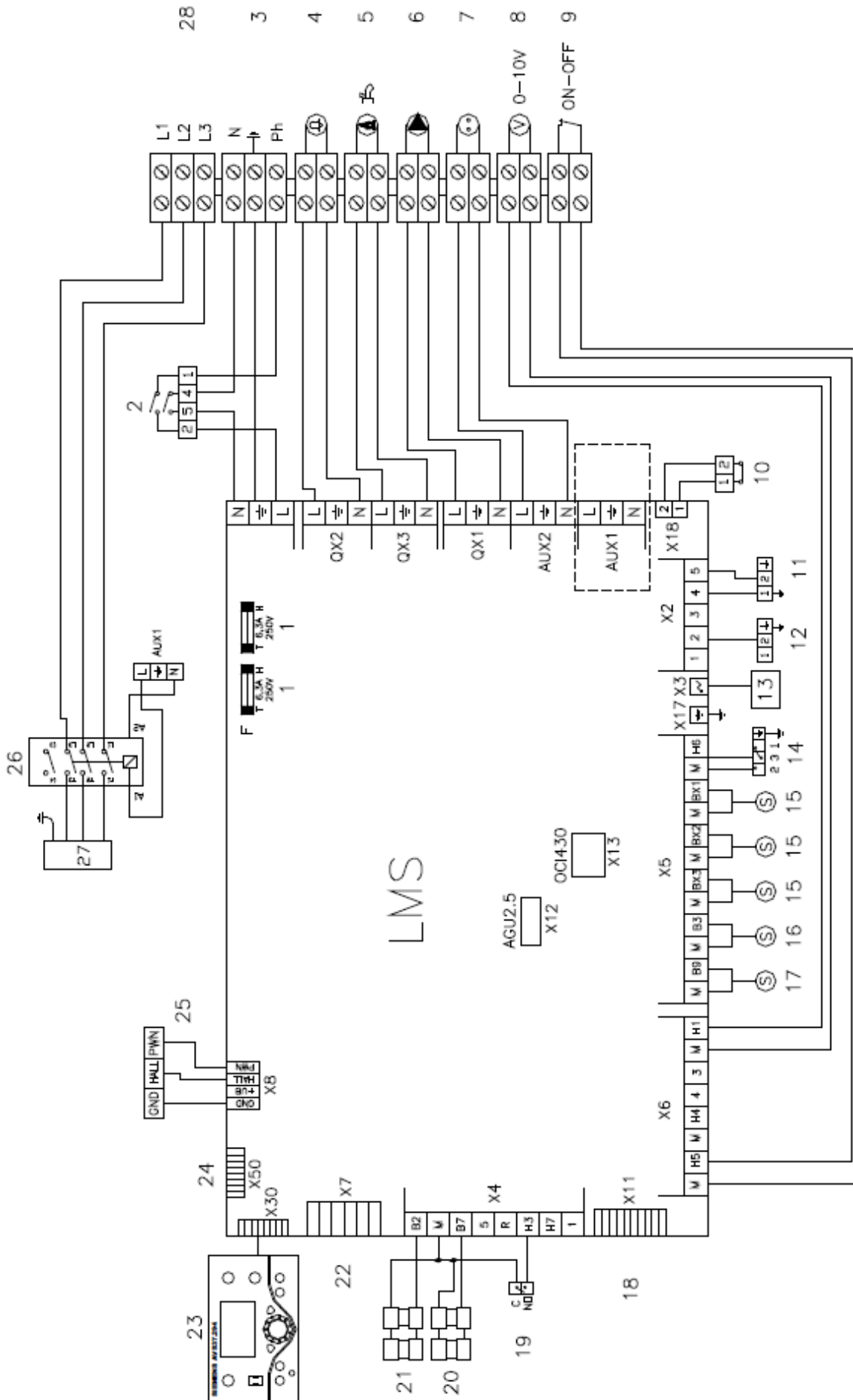
*Legend of the electric drawing:*

1	FUSE
2	ON/OFF SWITCH
3	220V-50Hz ELECTRIC SUPPLY
4	ALARM OUTPUT
5	STATUS OUTPUT
6	BOILER PUMP
7	220V-50Hz ELECTRIC SUPPLY FOR EXTENSION MODULES "CLIP IN"
8	EXTERNAL DEMAND 0...10V
9	START/STOP EXTERNAL CONTACT
10	SAFETY LIMIT THERMOSTAT
11	IGNITION TRANSFORMER
12	GAS SHUT-OFF VALVE
16	IONIZATION ELECTRODE
14	GAS PRESSURE SWITCH
15	PROGRAMMABLE SENSOR INPUT
16	DHW TEMPERATURE SENSOR
17	OUTSIDE TEMPERATURE SENSOR
18	CASCADED SYSTEM COMMUNICATION BUS
19	MINIMUM WATER PRESSURE SWITCH
20	RETURN TEMPERATURE SENSOR
21	FLOW TEMPERATURE SENSOR
22	ROOM UNIT
23	DISPLAY
24	EXTENSION MODULES COMMUNICATION BUS
25	PWM MOTOR SIGNAL
26	CONTACTOR
27	MOTOR FAN

12.1 Electric drawing ADI CD 70 – 750

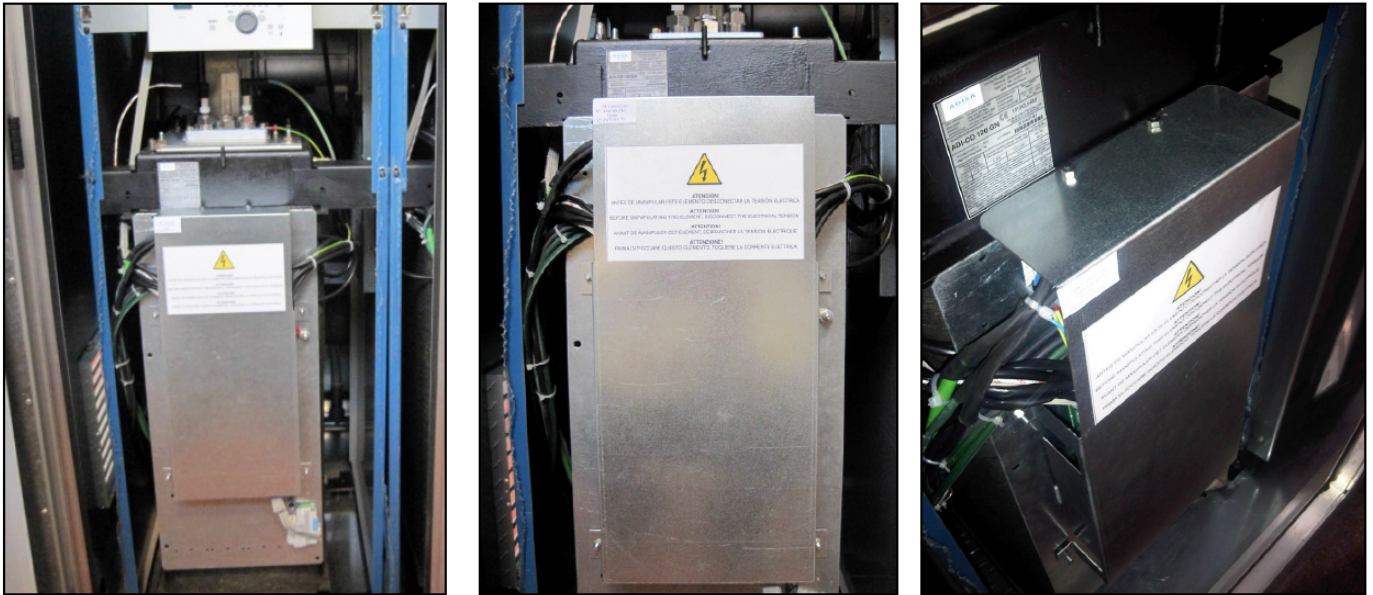


12.2 Electric drawing ADI CD 850 – 950



12.3 Siemens LMS control cover

For the ADI boilers of small power/size, ADI CD 70 to 175, the cover is located in the boiler front part and it is accessible by removing the boiler front casing.

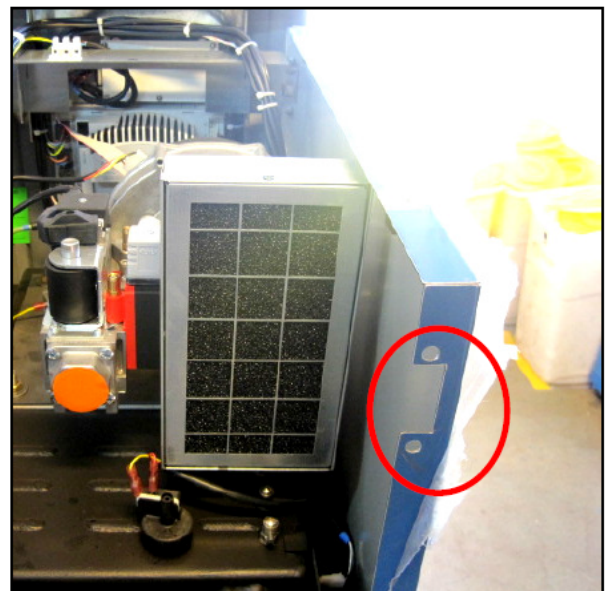


12.4 Cables entry points

In the boiler rear part.

ADI MEDIUM/LARGE POWER

ADI SMALL POWER



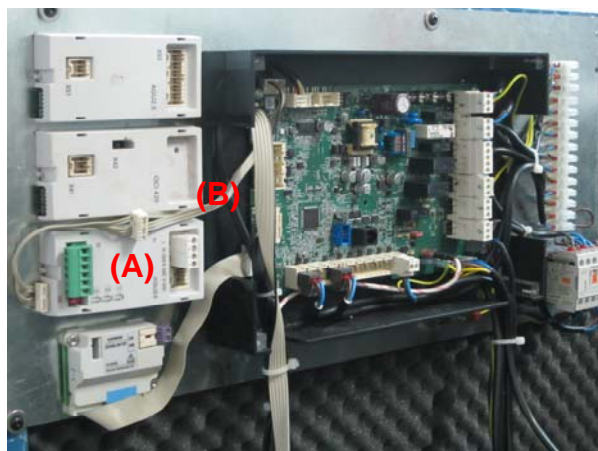
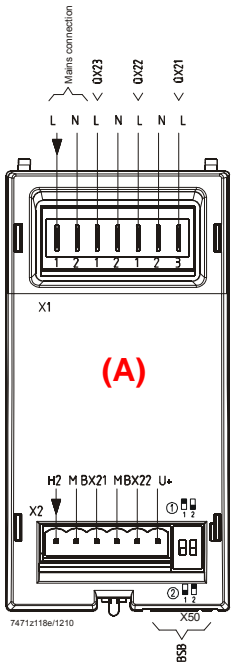
Small power boilers (air filter not included, optional)

### 13. HEATING CIRCUITS

For the heating circuits, a number of functions are available (see parameters table) which can be individually set for each heating circuit. Every heating circuit can be a virtual circuit, pump circuit or mixing circuit. The *Mixing* function is available only when an external extension module (AGU2.550A109) is needed.

If, with the mixing circuit, the flow sensor of that circuit is not connected, it becomes a pump circuit with regard to functions.

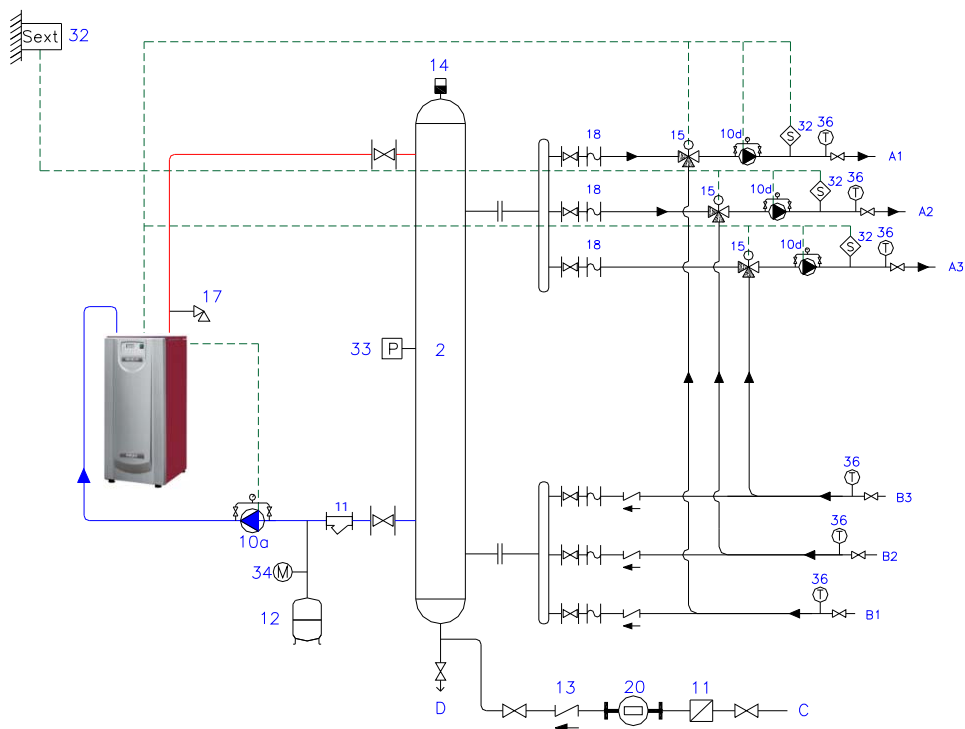
Every boiler is able to control 3 heating circuits with mixing function (3 extension modules are needed). It is necessary to give power supply and a bus connection to each extension module (AGU2.110).



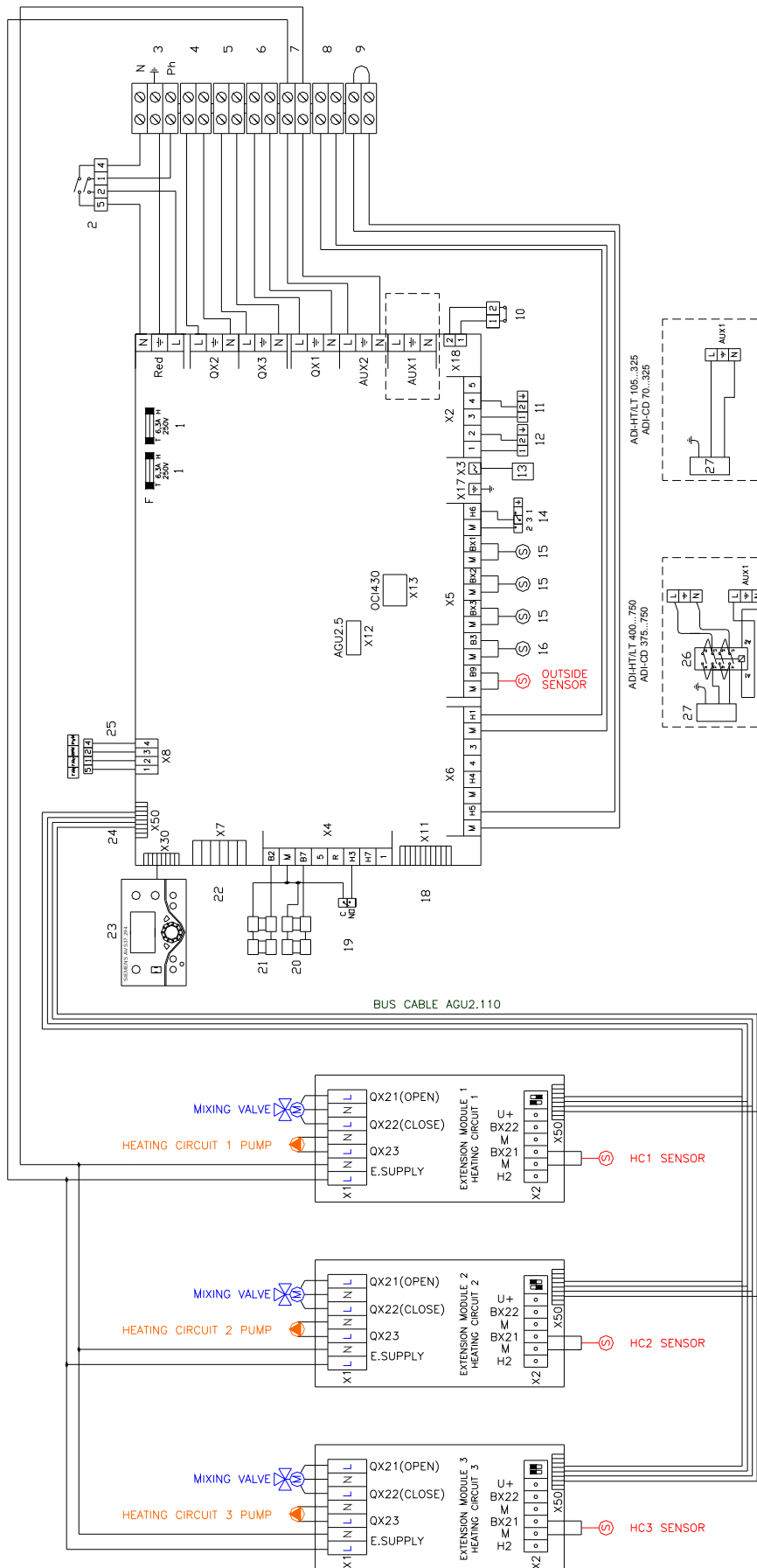
EXTENSION MODULES DIRECTIONS	
①	= Extension module 1
②	= Extension module 2
On/On	= Extension module 3
Off/Off	= No function

(A) Extension module AGU2.550A109  
 (B) Bus Cable AGU2.110

a) System drawing: 1 Boiler with 3 heating circuits



b) Electric drawing: 1 Boiler with 3 heating circuits



### 13.1 Heating circuits basic parameters

#### Activation of heating circuits

Heating circuits are deactivated in default parametrization (heat demand of the boiler is given by the parameter 1859 “Flow temp setp cons request”). Adjust the following parameters to enable the heating circuits and to assign the extension modules to each heating circuit.

Configuration		
Line Nr.	Function	Adjustment
5710	Heating circuit 1	On
5715	Heating circuit 2	On
5721	Heating circuit 3	On
6020	Function extension module 1	Heating circuit 1
6021	Function extension module 2	Heating circuit 2
6022	Function extension module 3	Heating circuit 3

#### Default values

HC1	HC2	HC3	Function	Default Value	Unit
Line Nr.	Line Nr.	Line Nr.			
710	1010	1310	Comfort setpoint	20	°C
712	1012	1312	Reduced setpoint	15	°C
714	1014	1314	Frost Protection setpoint	6	°C
716	1016	1316	Comfort setpoint max	25	°C
720	1020	1320	Heating curve slope	2,5	-
721	1021	1321	Heating curve displacement	0	°C
730	1030	1330	Summer/winter heating limit	---	°C
732	1032	1332	24-hour heating limit	---	-
740	1040	1340	Flow temp setpoint min	25	°C
741	1041	1341	Flow temp setpoint max	85	°C
770	1070	1370	Boost heating	2	°C
780	1080	1380	Quick setback	Down to <i>Reduced</i> setpoint	-
809	1109	1409	Continuous pump operation	No	
812	1112	1412	Frost Protection flow temp	On	
830	1130	1430	Mixing valve boost	5	°C
832	1132	1432	Actuator type	3 positions	-
834	1134	1434	Actuator running time	Depending on the actuator	s

### 13.2 Professional installer parameters



The operating modes of the heating circuits are selected directly with the operating mode button. This setting is used to switch between different operating modes. Functionality corresponds to the operating mode selection via the operating mode button:

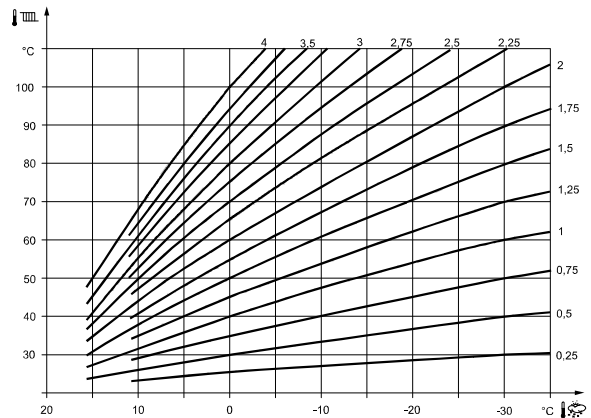
- Automatic operation AUTO
- Continuous operation or
- Protection mode

Setpoints

Line no.			Meaning
HC1	HC2	HC3	
714	1014	1314	TRF Frost Protection setpoint

Heating curve slope

The heating curve (720,1020,1320) generates the flow temperature setpoint, which is used to maintain a certain flow temperature level depending on the prevailing weather conditions.



Notes:

- An outside temperature probe model QAC34 should be added (supplied separately from the boiler and not included in the price).
- The set heating curve is based on a room temperature setpoint of 20°C. If this setpoint is changed, the heating curve automatically adapts to the new value.

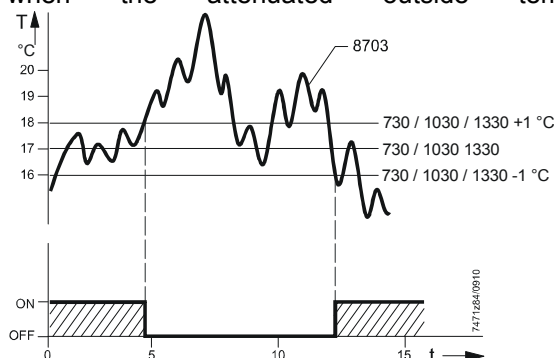
Additional parameters for the heating curve:

- Heating curve displacement (721,1021,1321): Parallel displacement of the heating curve is used to change the flow temperature evenly across the entire outside temperature range or, in other words, if the room temperature is always too high or too low, a readjustment must be made via parallel displacement. Default value "0".
- Heating curve adaption (726,1026,1326): Adaption of the heating curve is used by the controller to automatically adapt the heating curve to the prevailing weather conditions. In that case, a readjustment of heating curve slope and parallel displacement is not required. An outside temperature sensor must be connected and a correct adjustment of the "Room influence" (750,1050,1350). Default value "Off".

Summer/winter heating limit

The summer/winter heating limit (730,1030,1330) is used to switch the heating on and off in the course of the year, depending on the outside temperature. In Automatic operation, switching on/off takes place automatically, so there is no need for the user to do this manually.

The Summer/winter changeover function switches the heating off when the attenuated outside temperature exceeds the adjusted changeover temperature, in the last 24 hours. The heating system is switched on again (winter mode) when the attenuated outside temperature drops 1 °C below the adjusted value.

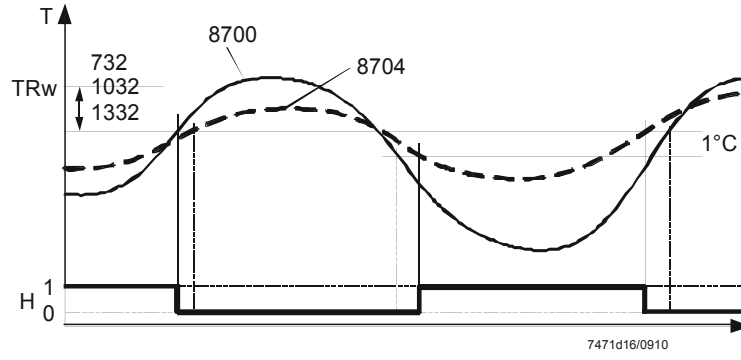




24-hour heating limit

The 24-hour heating limit (732,1032,1332) is used to switch the heating on and off in the course of the day, depending on the outside temperature. This function is used primarily during spring and autumn to respond to short-term temperature variations.

The heating is switched on again when the current outside temperature and the composite outside temperature drop 1 °C below the adjusted differential.



<b>Operating line</b>	<b>Example</b>
Room temperature setpoint	20 °C
24-hour heating limit (THG)	-2 °C
Changeover temperature - heating Off	= 18 °C
Switching differential (fixed)	-1 °C
Changeover temperature - heating On	= 17 °C

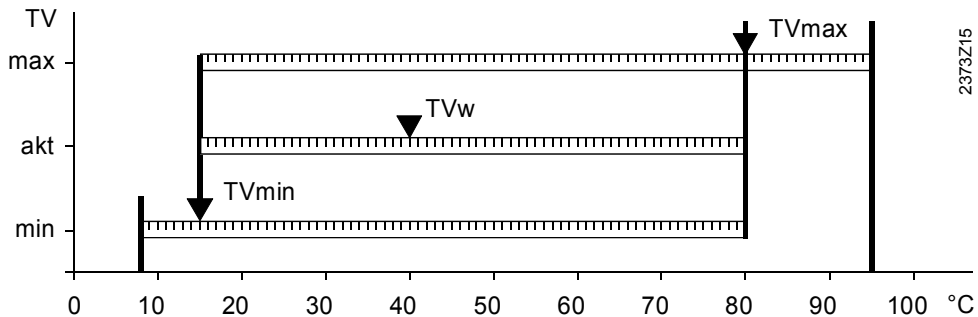
Notes:

- The function is not active in operating mode Continuously Comfort temperature ☀
- An outside temperature probe model QAC34 should be added (supplied separately from the boiler and not included in the price).
- Display shows the text ECO, indicating it is in ECONOMY mode.

Flow temperature setpoint limits

Using this limitation, a temperature range for the flow temperature setpoint can be defined. If the flow temperature setpoint called for by the heating circuit reaches the relevant limit and the request for heat increases or decreases, the flow temperature setpoint is maintained at the maximum (741,1041,1341) or minimum (740,1041,1341) limit.

Notes: To get a fixed setpoint in the heating circuit, adjust these two values at the same temperature.



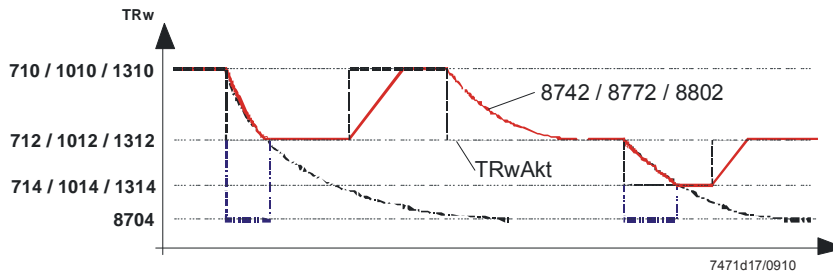
<b>Meaning</b>	
TVmin	Minimum flow temperature setpoint
TVmax	Maximum flow temperature setpoint
TVAkt	Flow temperature setpoint 1/2/3

Room model and room influence

The room model calculates a fictive room temperature for rooms without room sensor.

This allows boost heating, quick setback and optimum start/stop control to be implemented with no need for using a room sensor.

The calculation takes into account the attenuated outside temperature (8703) and the room model gradient for switching to a higher setpoint, plus the building's time constant for switching to a lower setpoint (6110).




Line no.			Meaning	
HC1	HC2	HC3		
710	1010	1310	TRK	Room temperature <i>Comfort</i> setpoint
712	1012	1312	TRR	Room temperature <i>Reduced</i> setpoint
714	1014	1314	TRF	<i>Frost protection</i> setpoint
8704			TAgem	Composite outside temperature
8742	8772	8802	TRmod	Room temperature model
			TRwAkt	Current room temperature setpoint

When a room sensor is used, there is a choice of 3 different types of compensation and it is necessary to adjust this parameter (750, 1050, 1350):

Setting	Type of compensation
--- %	Weather compensation alone
1...99%	Weather compensation with room influence
100%	Room compensation alone

Deviations of the current room temperature from the setpoint are acquired and taken into account when controlling the temperature. Heat gains can thus be considered, allowing more accurate room temperature control. The authority of deviation is set as a percentage figure. The better the reference room (correct room temperature, correct mounting location, etc.) the higher the value can be set.

14. DOMESTIC HOT WATER

If there is demand for DHW, the heat sources can be switched on at any time. The strategy is to produce the amount of heat required at a certain point in time – and no more. For that purpose, switching programs, different setpoints and release criteria are available. To activate the DHW, connect the storage tank sensor to B3 input (see the following electric drawing) and select the DHW mode with the operating mode button .

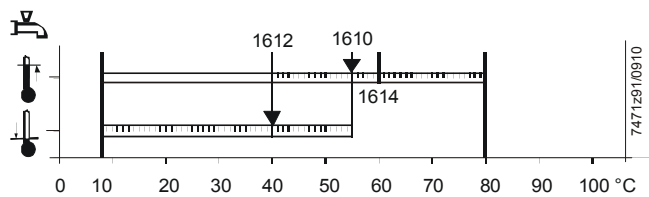
Off

Continuous operation, the setpoint being the DHW Frost Protection setpoint (5 °C).

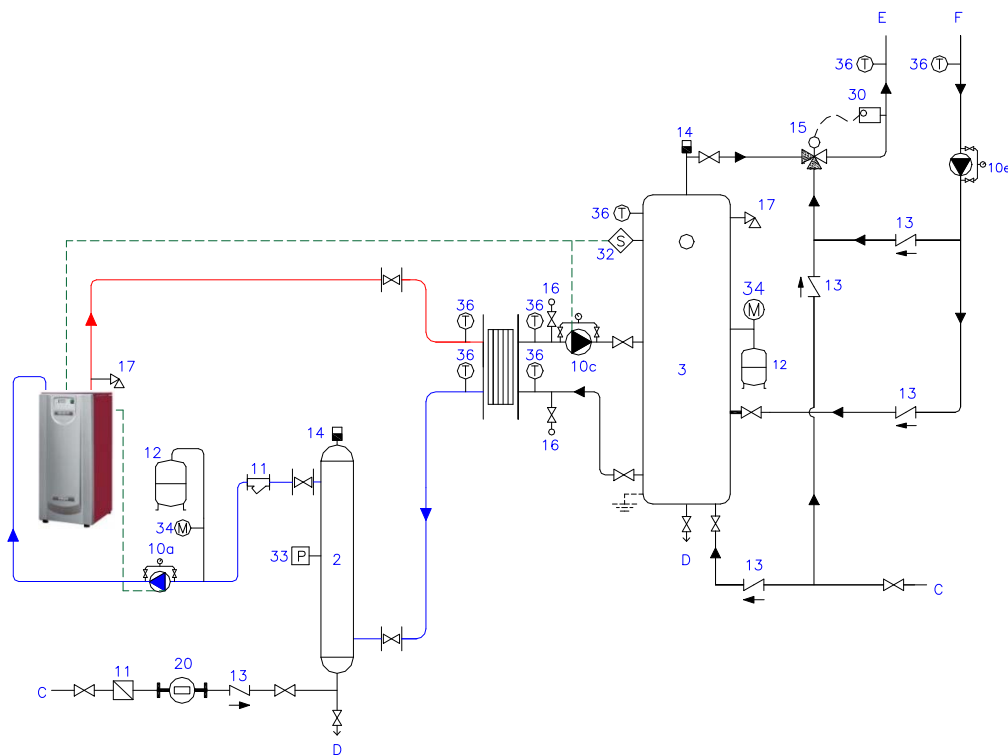
On

DHW charging takes place automatically, the setpoint being the Nominal DHW setpoint or the Reduced DHW setpoint according to the selected kind of DHW release.

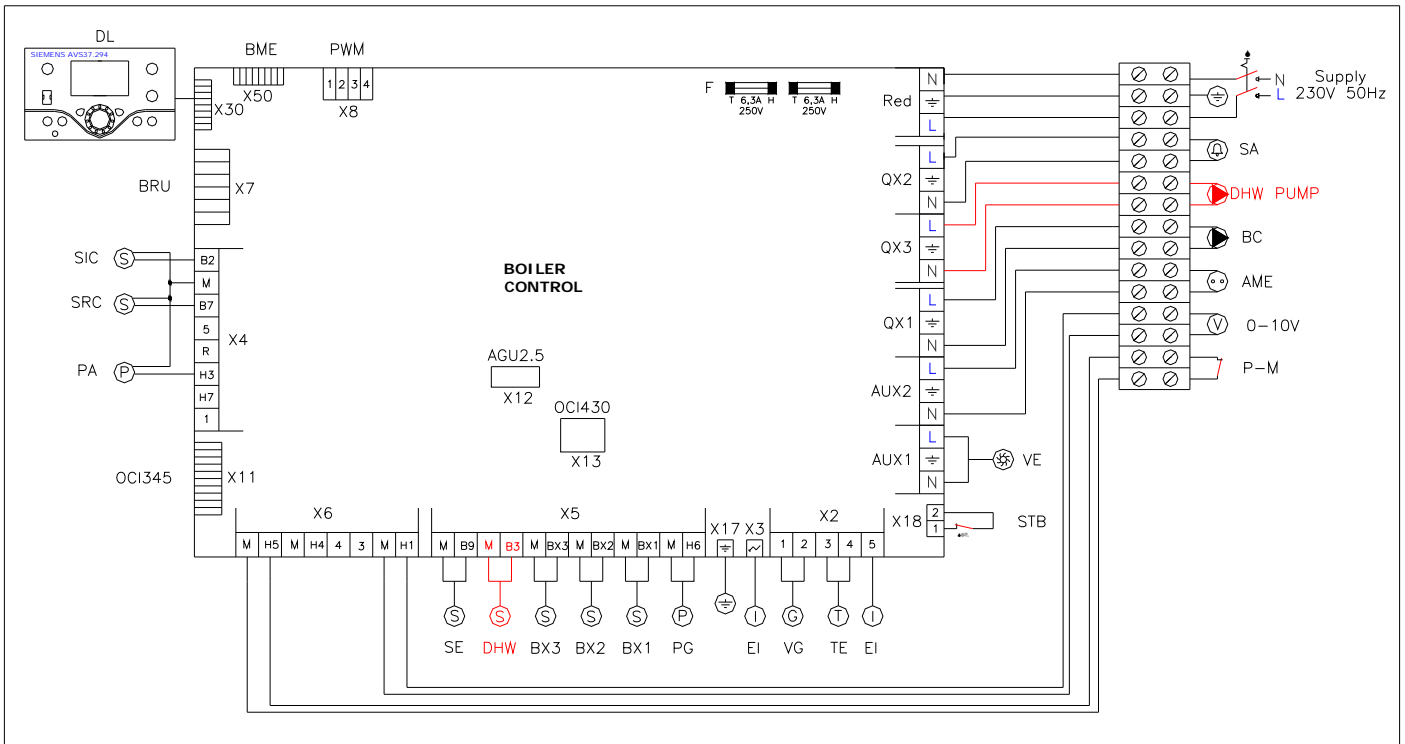
Setpoints



a) System drawing: 1 Boiler and Domestic Hot Water



b) Electric drawing: 1 Boiler and Domestic Hot Water



14.1 Basic parameters

Activation of Domestic Hot Water

Domestic Hot Water is deactivated in default parametrization. Connect the DHW tank temperature sensor in B3 terminal of the boiler and push the operation mode button until a bar appears below the symbol

Adjust the following parameter to enable the relay output for the charging pump Q3.

Configuration		
Line Nr.	Function	Adjustment
5892	Relay output QX3	DHW ctrl elem Q3

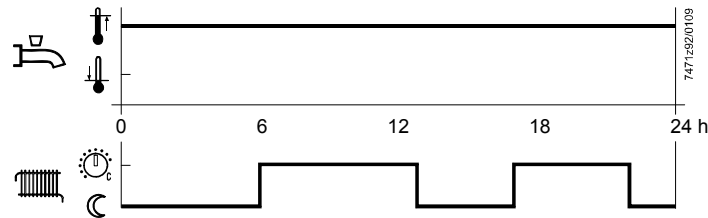
Default values

DHW			
Line Nr.	Function	Default Value	Unit
1610	Nominal setpoint	60	°C
1612	Reduced setpoint	55	°C
1614	Nominal setpoint max	65	°C
1620	Release	24h/day	
1630	Charging priority	None/parallel	
1640	Legionella function	Fixed day	
1641	Legionella funct periodically	7	days
1642	Legionella funct weekday	Sunday	
1644	Legionella function time	1:00:00	hh:mm
1645	Legionella funct setpoint	70	°C
1646	Legionella funct during	120	min

## 14.2 Professional installer parameters

### Release

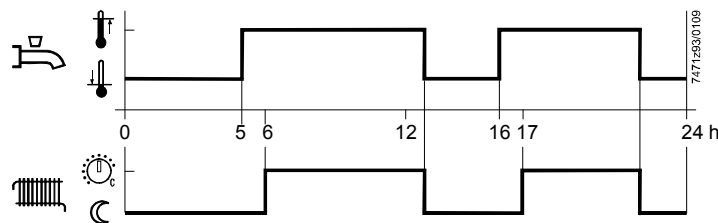
When DHW heating is On, the release parameter (1620) can be used to determine when – within a 24-hour period – DHW charging shall take place. When “24h/day” is used (the default value), DHW heating is continuously released as long as it is On. The DHW setpoint is always the Nominal setpoint, unless the Legionella function has been activated. When DHW heating is Off, the *Frost Protection* setpoint applies.



DHW heating can be released in 2 other ways:

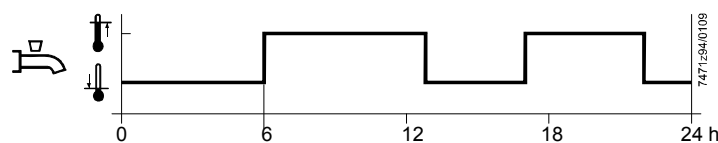
- *Time programs HCs*

When this setting is used, DHW heating is released during the occupancy times of the connected heating circuits. If at least one of the heating circuits operates at the *Comfort* level, DHW heating is released also. If all heating circuits operate at the *Reduced* level or in *Protection* mode, the DHW level is set to *Reduced* also. To ensure that the DHW storage tank is already charged when space heating is started, the release of DHW heating is brought forward 1 hour against the switch-on point for space heating.



- *Time program 4/DHW*

When using this setting, a specific time program is available for DHW heating. For every weekday, a time program with a maximum of 3 on phases can be set. During the release time, the Nominal DHW setpoint applies, outside the release time, the Reduced DHW setpoint.



### Charging priority

When both space heating and DHW heating call for heat, the DHW priority function (1630) ensures that while DHW charging is in progress, the boiler’s capacity is used primarily for DHW heating.

#### *Absolute*

Mixing and pump heating circuits stay locked until DHW heating is completed.

#### *Shifting*

If the capacity of the heat source is not sufficient, the mixing and pump heating circuits will be restricted until the DHW is heated up.

#### *None*

DHW heating and space heating take place at the same time. In the case of tightly sized boilers and mixing heating circuits, the DHW setpoint may not be reached if space heating calls for considerable amounts of heat.

*MC shifting, PC absolute*

The pump heating circuits stay locked until the DHW storage tank is heated up. If the capacity of the heat source is not sufficient, the mixing heating circuits will be restricted also.

Legionella function

When the Legionella function (1640) is activated, the DHW storage tank temperature is periodically raised to the Legionella function setpoint.

*Off*

Function is deactivated.

*Periodically*


The Legionella function is repeated according to the selected interval (1641). If the Legionella setpoint is attained via solar heating – independent of the selected interval – the time period is started again. This means that the heat source is switched on only if the solar plant was not able to ensure the required Legionella function setpoint within the set period of time.


*Fixed weekday*

The Legionella function can be activated on a fixed weekday (1642). When using this setting, heating up to the Legionella setpoint takes place on the selected weekday, independent of previous storage tank temperatures.

Guide Values:

Storage tank temperature	Dwelling time
80 °C	A few seconds
70 °C	1 minute
66 °C	2 minutes
60 °C	32 minutes
55 °C	6 hours
50 °C	No killing of viruses
45 °C	Ideal conditions for viruses

	<b>Warning!</b> The figures given in the table are guide values. They do not guarantee that Legionella viruses will be completely killed.
---	--

	<b>Warning!</b> During the time the of the Legionella function, there is a risk of scalding when opening the taps.
---	---

**15. SAFETIES**

These are the safeties included in the boiler:

Cause for safety activation	Safety component of the boiler	Boiler restart
No flame	Ionization electrode	Manual reset
Fan failure/air passage obstruction	LMS controller (low fan speed)	Manual reset
Overheating	Safety overheating thermostat	> 90°C+- hysteresis: the control stops the boiler. > 95°C: boiler lockout, error on the display. Manual reset. > 100°C: fan at the maximum power to cool down the boiler. > around 103°C: lockout, other error on the display, manual reset.
No gas	Minimum gas pressure switch	Automatic reset
Low water flow through the boiler	Boiler control unit	<u>Safety 1:</u> if the Delta T in the boiler is higher than the maximum Delta T, the power drops by 20%. <u>Safety 2:</u> if it overcomes “the maximum Delta T” + 8°C, the boiler operates at the minimum power. <u>Safety 3:</u> if it overcomes a higher value, the boiler stops and an error message appears on the display E 110/428.
Lack of water pressure in the circuit	Pressure sensor	The boiler stops for safety if pressure in the circuit is around 0.8 bar.

**16. BOILERS IDENTIFICATION LABEL**

The adhesive identification label of each boiler is placed inside the boiler, stuck in the front of the higher water collector of the boiler heat exchanger.

In order to visualize it, you have to lift up the top casing of the boiler and remove the front casing. The label shows the boiler serial number, model and the rest of technical data.

BOILER FRONT VIEW



**17. INSTALLATION**

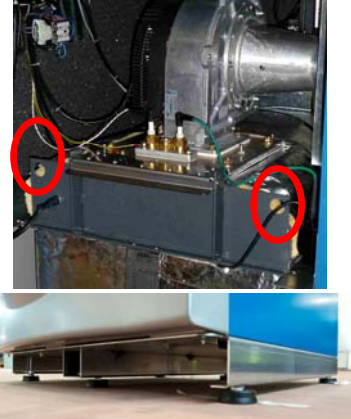
**17.1 Boilers heat output**

The boilers total power output to be installed must be the proper one to respond to the demands of the installation. In order to generate heating with the maximum efficiency at every moment, it is important to consider the number of the boilers to be installed, so that the total power should be appropriate for the different demands of the installation in the different periods of the year.

**17.2 Lifting and transporting the boilers by a crane**

Models ADI CD 200 and higher:

- a) In order to lift the boilers by a crane, attach the straps to the boiler hooks: there are 2 in the front and 1 in the back of the boiler heat exchanger. Before making this operation, you have to dismantle / take out all the casing panels of the boiler.
- b) They are provided with some sections on the base to ease their transport by transpallet.
- c) Anti-vibrating supports (silent-blocks) are supplied with each boiler.



Models ADI CD 175 and lower:

They are supplied on pallets. Anti-vibrating supports (silent-blocks) are supplied with each boiler.

**17.3 Boilers room**

The boilers room must be clean, well vented and lightened, and must comply with the current regulations for gas equipments. It is important to avoid environments with excess of humidity, dust and aggressive steams. If the boilers room needs to have some building works, the boilers should be switched off and protected in order to avoid dust.

For an easier maintenance it is important to respect the minimum distances indicated by the regulations and the manufacturer's instructions, both for one boiler and for several boilers. Every part of the boiler must be easily accessible.

**Installation of several boilers (modular assembly):** being the boilers maintenance carried out from the front and the back, several boilers can be installed leaving a minimum distance of 10 cm between them.

**MINIMUM FREE HEIGHT TO REMOVE THE BURNER:**

In order to remove the burner, leave a free space between the top of the boiler and the ceiling.

Model ADI CD	70-105	120	175	200	250	325	375	450	550	650	750	850	950
Minimum net free space from the top of the boiler (mm)	350	600	600	197	197	97	167	167	362	362	362	272	272
Free height from the leaning point of the boiler on the floor (mm)	1475	1725	1715	1805	1805	1705	1775	1775	2020	2020	2020	1960	1960

**Boiler draining:** Connect the boiler draining to the boilers room drainage.

In order to drain water from the boiler, turn off the boiler, close the cut-off valves and open the boiler draining. Beside the boiler draining, there is a connection with a threaded bar that has to be unscrewed and taken out in order to allow the draining of the water from the boiler.





**17.4 Gas supply**

The gas supply pressure, the gas flow and the dimensions of the gas connection, they all depend on the type of gas used, according to the boiler installed and to the current regulations.

Gas connection: the installation company has to install a three-pieces coupling per boiler in order to facilitate the dismantling and the maintenance of every boiler.

The boiler incorporates a small mesh. If the connecting pipe is not clean or has particles, the mesh will immediately block them, so the installation company will have to install a gas filter before the boiler gas connection.

If the boilers gas pressure is higher than the maximum value indicated in this manual, it is necessary to install a gas pressure governor so that the inlet working pressure can be in accordance with the values required.

It is advisable to install a flue gas header previous to the boilers that will operate as a gas inertial tank when the boilers start working.

When different consumptions are simultaneously required, the dimensions of the gas pipes and of the gas connections must be calculated so that, when all the consumptions are demanded simultaneously, the inlet working gas pressure to each boiler will correspond to the values indicated in this manual (see table TECHNICAL DATA).

**17.4.1 Gas pressure higher than 45 mbar**

Units	Boiler model	Inertial volume (m3)
1	CD 70	<b>0.0065</b>
1	CD 85	<b>0.0082</b>
1	CD 105	<b>0.0100</b>
1	CD 120	<b>0.0115</b>
1	CD 175	<b>0.0154</b>
1	CD 200	<b>0.0188</b>
1	CD 250	<b>0.0229</b>
1	CD 325	<b>0.0279</b>
1	CD 375	<b>0.0336</b>
1	CD 450	<b>0.0417</b>
1	CD 550	<b>0.0508</b>
1	CD 650	<b>0.0575</b>
1	CD 750	<b>0.0651</b>
1	CD 850	<b>0.0761</b>
1	CD 950	<b>0.0859</b>
2	CD 325	<b>0.0736</b>
2	CD 375	<b>0.0736</b>
2	CD 450	<b>0.0899</b>
2	CD 550	<b>0.1058</b>
2	CD 650	<b>0.1196</b>
2	CD 750	<b>0.1196</b>
2	CD 850	<b>0.1522</b>
2	CD 950	<b>0.1719</b>
3	CD 375	<b>0.1348</b>
3	CD 450	<b>0.1587</b>
3	CD 550	<b>0.1794</b>
3	CD 650	<b>0.2016</b>
3	CD 750	<b>0.2016</b>
3	CD 850	<b>0.2283</b>
3	CD 950	<b>0.2578</b>

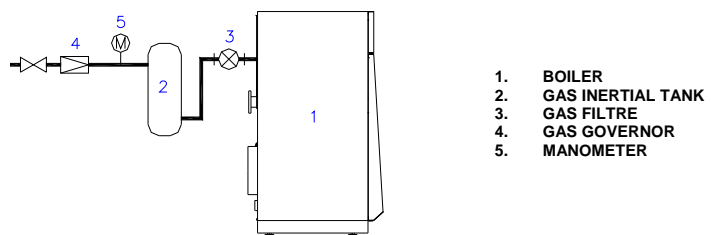
A gas pressure governor must be installed to reduce pressure to a value in accordance with the table of paragraph "Technical data". To select the type and its speed of opening/closing, consult the Technical Department of ADISA BY HITECSA.

An inertial tank must be installed between the gas pressure governor and the boiler, acting as a gas inertial volume when the boiler starts up and as an absorber/compensating of the pressure rise produced by the closing of the gas pressure governor when the boiler stops (see diagrams below).

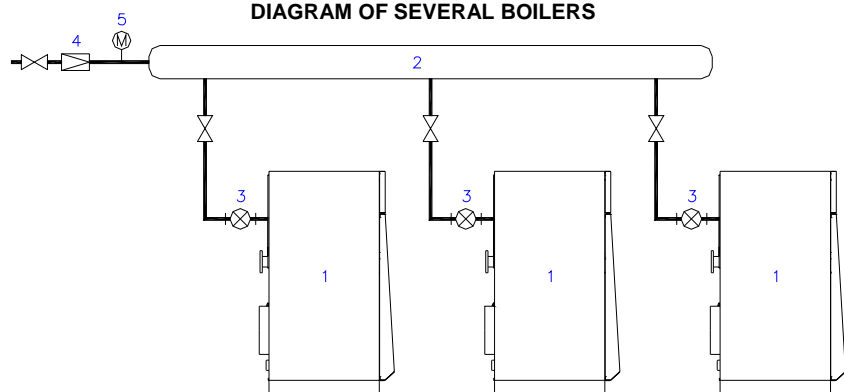
Its volume will be at least equal to 1/1000 of the boilers maximum flow per hour.

This inertial tank must be placed as close as possible to the boiler.

**DIAGRAM OF 1 BOILER**



**DIAGRAM OF SEVERAL BOILERS**



## **17.5 Draining of the boiler condensate**

### **17.5.1 Water condensing**

The heat exchanger being in stainless steel, the ADI CD boiler has no limit of the minimum return temperature. This allows obtaining a higher profit of the heat generated by the combustion products:

- Sensible heat: the heat transferred due to the cooling of burnt gases.
- Latent heat: the heat transferred due to the energy issuing from the water steam when it condenses and turns into liquid.

The energy efficiency added thanks to the use of the latent heat of the condensate can be up to 11% in case of natural gas, which is the relation between the High Calorific Value (HCV) and the Low Calorific Value (LCV).

The theoretical volume of the condensate can be:

- 1.63 kg / m<sup>3</sup>
- up to 0.14 kg / kWh

### **17.5.2 Condensate neutralization treatment**

For natural gas, the condensed water has a pH value that can be between 3.5 and 5.5.

It is recommended to carry out a condensate neutralization treatment before throwing them to the general drainage of the building, or similar.

Generally, you have to make the condensate circulate mixed with a sort of powder, which can be calcium carbonate, hydrolyte of magnesium (salt formed by calcium hydride, CaH<sub>2</sub>, and magnesium) or similar, in order to neutralize them, which means to increase the value of its pH so that it will be between 6.5 and 9.

It is recommended to take periodical measurements of the water pH after the neutralization treatment: when the value measured is lower than 6.5 it is recommended to replenish with the powder.

In any case, the neutralization treatment must be made in conformity with the local, autonomic and national laws.

The neutralization system should be placed at a level of height lower than the boiler condensate drain pipe. If this is not possible, consider the installation of a condensate pump.

### **17.5.3 Condensate drainage**

- The boiler condensate drain pipe should be connected to a siphon.  
(Fill the siphon with clean water before starting the boiler).
- Some boiler models should be placed on a base with sufficient height to allow the installation of the condensate drain pipe, of the siphon and of the connection to the condensate neutralization system.
- The evacuation of the condensate to the general drainage should be made in a visible way, through a visible connection, open funnel or similar.
- Due to the characteristics of the condensed water, the material of the piping must be resistant to the action of acid water, for example: plastics (P.V.C).
- The evacuation pipe must have a minimum slope of 30 mm/metre.
- Drainage by means of an external piping is not recommended, due to the risks of condensation and corrosion.

### **17.5.4 Boiler chimney**

The chimney must be made with materials that are resistant to condensed water, which is acid.

The gaskets joining the components of the chimney must be watertight.

The chimney must comply with the national and European regulations.

## 17.6 Chimneys

The flues outlet, according to the current rules, must ensure a correct evacuation of the burnt gases, without backward flows and without producing condensate. The natural draught of the chimney must evacuate the burnt gases from the boiler flues outlet.

### 17.6.1 Chimney sizing

The internal diameter depends on:

- Heat input of the boilers, type, number of boilers installed and water working temperatures.
- Type of gas.
- Chimney: vertical height, horizontal length (minimum slope: 3 to 5%).
- Number of elbows and their angles (they should be reduced to the minimum).
- The chimney material and if it is insulated or not.

If several boilers are connected to the same chimney, it is important to consider the distance between them and the dimensions of the flue header.

The base of the vertical chimney must include a drainage pipe to evacuate the condensate.

With regard to boilers, these are the data to be considered for calculation:

- **Values of CO<sub>2</sub>, for Natural Gas: it is recommended to adjust CO<sub>2</sub> at 8.1%, for all the boilers**

Models	Range CO <sub>2</sub> (%) for Natural Gas
ADI CD 70 to 120	<b>7.3 - 9.3%</b>
ADI CD 120 to 175	<b>7.2 - 8.7%</b>
ADI CD 200 to 250	<b>7.3 - 8.8%</b>
ADI CD 325 to 550	<b>7.6 - 8.6%</b>
ADI CD 850 to 950	<b>7.7 - 9.0%</b>

- **Flues temperature:**

Flues temp.	MAXIMUM POWER		MINIMUM POWER	
	High (70°C)	Low (40°C)	High (70°C)	Low (40°C)
Average Water temperature →				
Flues Temp.	70 - 80°C	50 - 60°C	60 - 70°C	40°C

- **Residual pressure at the boiler flues outlet:**

Model ADI CD	Ø boiler flue outlet External diam. (mm)	MAXIMUM POWER		MINIMUM POWER	
		Power Input kW	Residual Pressure (Pa)	Power Input kW	Residual Pressure (Pa)
70	150	72.7	42.0	21.8	2.5
85	150	87.7	37.8	26.3	7.5
105	150	107	90.0	32	40.0
120	150	123	64.8	37	5.0
175	150	166	54.0	49.8	10.0
200	175	202.2	60.0	60.7	7.5
250	175	246.5	81.0	74	8.5
325	250	300.5	90.0	90.2	20.0
375	250	361.2	64.8	108.4	7.5
450	250	448	90.0	134	45.0
550	350	546	72.0	163.9 (*)	10.0
650	350	618	75.0	185.4 (*)	10.0
750	350	700	78.0	210 (*)	7.5
850	350	818.5	177.5	327.4	24.7
950	350	924.5	266.2	369.8	39.4

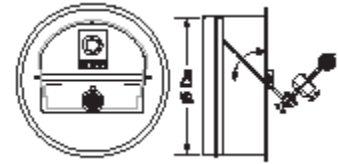
(\*) Minimum power adjustable up to 30% of the gas power: to be adjusted onsite in the installation (during commissioning), according to the installation conditions.

### 17.6.2 Flue draught stabilizer

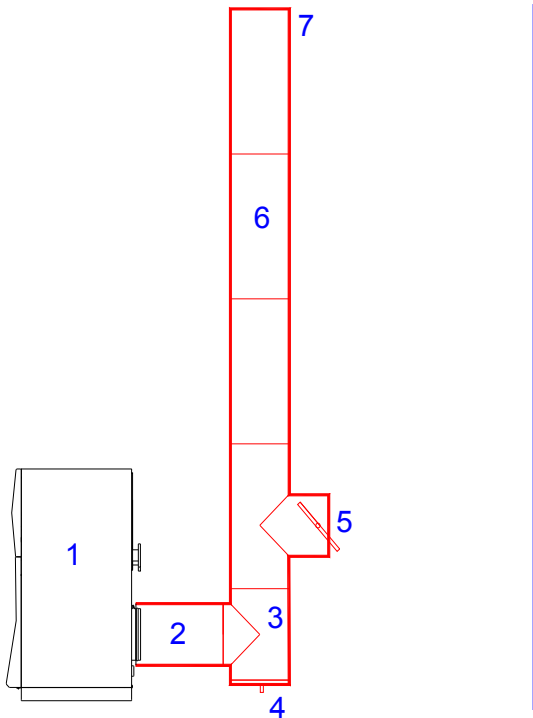
In case of excessive draught / depression (this can cause vibrations in the chimney), or a chimney with fan for flues diluted with air, you have to install a flue draught stabilizer inside the chimney.

In this case, you have to install a stabilizer for each boiler to guarantee the correct draught of the chimney in all the boiler operating modes: at the minimum power, at the maximum power and at intermediate points.

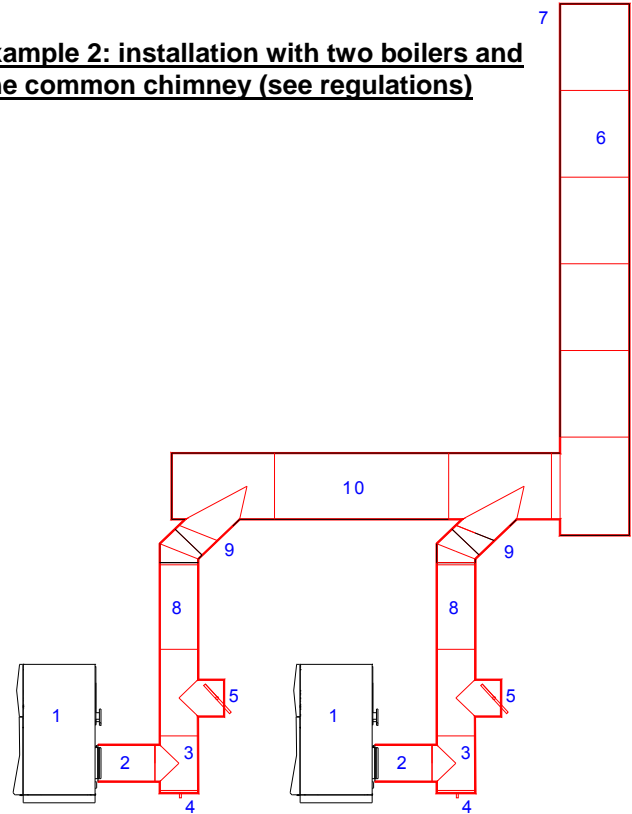
Example of a flue draught stabilizer:



#### Example 1: installation with 1 boiler



#### Example 2: installation with two boilers and one common chimney (see regulations)



#### Legend:

1. Boiler
2. Horizontal section connected to the boiler flues outlet (it should be as shortest as possible and with the minimum number of elbows)
3. "T" chimney
4. Draining: outlet of condensate and rain water
5. Flue draught stabilizer
6. Vertical section of the chimney
7. Chimney outlet
8. Connection between boilers and flues collector
9. "T" to connect the flues collector to each boiler
10. Flues collector (we recommend that it has an upward slope up to the vertical section of the chimney, min. 3%)

**CAUTION:** Check that no flues are getting outside through the damper (5). Damage may be caused to people. It is a responsibility of the installation company to check and ensure the proper operation of this matter. The manufacturer of the boilers declines any responsibility for these matters.

### 17.6.3 Old installation

- If using a metallic and insulated chimney already existing, before installing the boiler it is advisable to verify that the chimney has the right dimensions to allow a correct evacuation of the burnt gases and an easy cleaning of its interior.
- In case of using a brick chimney already existing, it is necessary to fit it with an internal metal casing in order to avoid water condensing in all its length. If it is not possible to do it, it is advisable to install a new insulated chimney, preferably made of stainless steel and in accordance with the current regulations.

### 17.6.4 Adjustable flue damper at the boiler flue outlet

Every installation is different because of:

- different chimney
- different outdoor temperature (maximum and minimum), according to the height on the sea level.

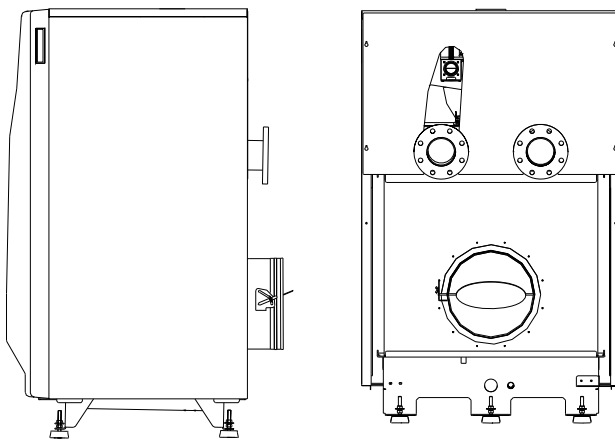
The opening of the flue damper must be adjusted according to the values indicated at the beginning of this chapter, for a correct and quick adjustment of the boiler combustion.

The damper is included in the boiler supply.

For those boilers without built-in flue damper, this can be added as an optional accessory, see second point of this chapter.

Its opening must be adjusted at the moment of the boiler's commissioning and not varied anymore.

As a built-in part of the boiler:



In case of chimney with excessive draught, see paragraph "Flue draught stabilizer".

**17.7 Hydraulic installation**

**17.7.1 Data to be considered**

Concept	Value
Minimum water working pressure	1 bar
Maximum water working pressure	5 bar
Maximum flow temperature	90°C

Minimum water pressure safety device

The boiler includes a water pressure switch that stops the boiler when the water pressure achieves a minimum value. It stops at 0.8 + 0.1 bar, and reactivates at 1 + 0.2 bar.

It is important to consider the following instructions (see hydraulic diagrams):

- Cut-off/closing valves in the flow and return pipes of each boiler.
- Do not weld the boiler to the installation piping.
- Models ADI CD 70 to ADI CD 175: male threaded flow-return connections of 2".  
Higher models:  
ADI CD 200 to ADI CD 450: 2 ½ ", flanged connections, PN6.  
ADI CD 550 to ADI CD 950: 4", flanged connections, PN10.
- Closed expansion vessel, calculated and installed according to the regulations.
- Overpressure safety valves and boiler draining in accordance with the current regulations.
- A pressure switch whose function is to stop the boiler if the hydraulic pressure is lower than the minimum value.
- An automatic air vent of big capacity, installed in the flow pipe or in the higher part of the flow circuit of the installation.
- A filter with a stainless steel mesh of 0.3 mm in the heating return of every boiler.
- A water meter in the refilling of the primary circuit.
- A drain pipe for the evacuation of condensate: it must be connected to the drainage of the boilers room and it is important that the outlet is visible to verify if it condenses.

**17.7.2 Overpressure safety valve**

The boilers maximum operating pressure is 5 bar. This value must never be exceeded and precautions must be taken to avoid this could happen, even accidentally.

It is important to install overpressure safety valves in each boiler, according to the current regulations and to the equipments installed. Minimum dimensions of the safety valve:

ADI CD	70	85	105	120	175	200	250	325	375	450	550	650	750	850	950
INCHES	1"	1"	1"	1"	1"1/4	1"1/4	1"1/4	1"1/2	1"1/2	2"	2"	2"	2"	2"	2"

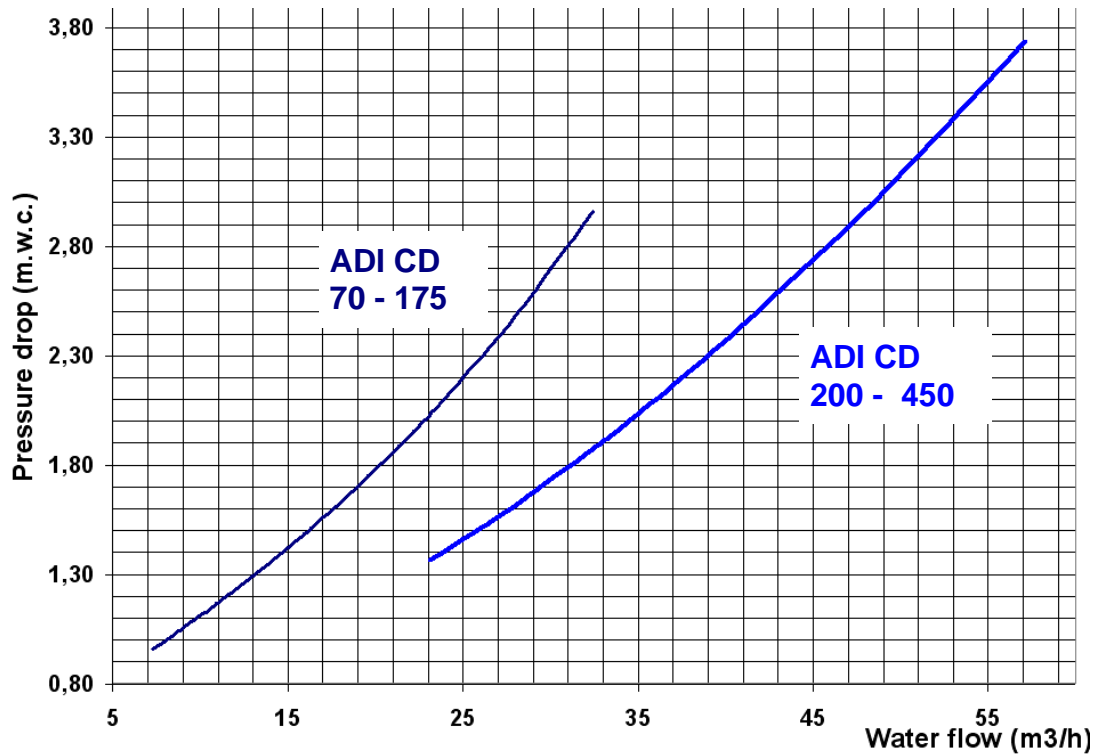
17.7.3 Hydraulic pressure drop

The boiler pressure drop depends on the water flow; the maximum  $\Delta T$  must be 15 °C:

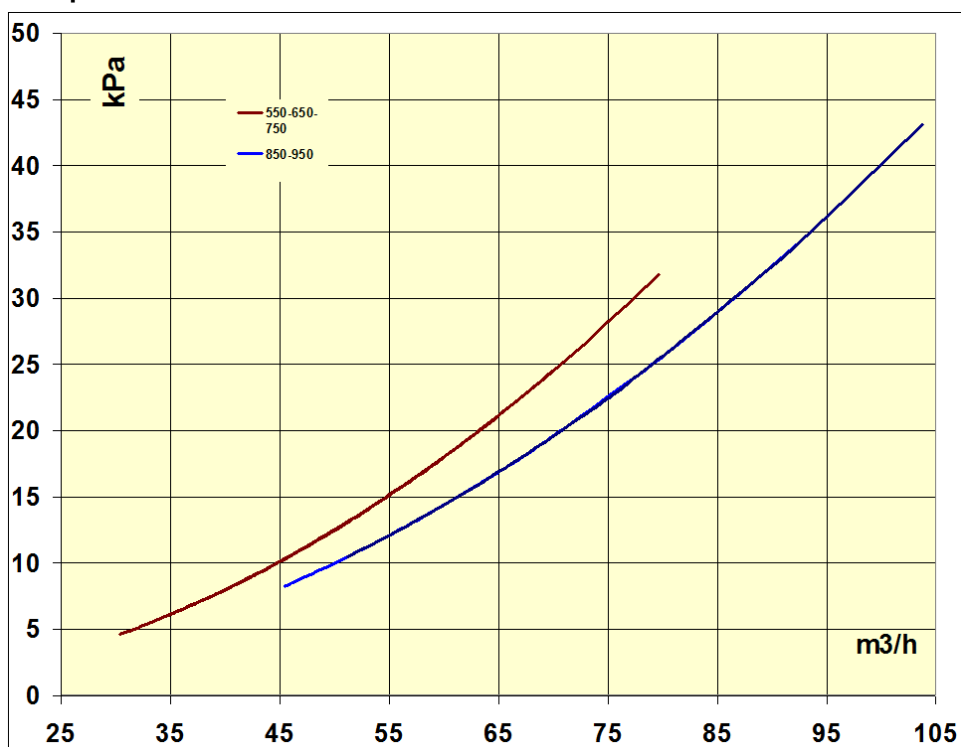
	Units	70	85	105	120	175	200	250	325	375	450	550	650	750	850	950
$\Delta T = 10^{\circ}\text{C}$	m <sup>3</sup> /h	6.0	7.3	8.9	10.3	13.9	17.0	20.7	25.3	30.4	37.8	45.6	51.4	58.1	68.2	76.7
$\Delta T = 12^{\circ}\text{C}$	m <sup>3</sup> /h	5.0	6.1	7.5	8.6	11.6	14.2	17.3	21.1	25.4	31.5	38.0	42.9	48.4	56.8	64.0
$\Delta T = 15^{\circ}\text{C}$	m <sup>3</sup> /h	4.0	4.9	6.0	6.9	9.3	11.3	13.8	16.9	20.3	25.2	30.4	34.3	38.7	45.5	51.2

If you have to stop the boiler pump, it is required that you stop it with a time delay of 3 to 5 minutes once the boiler has stopped. This can be obtained by installing a timer-disconnect electrical relay.

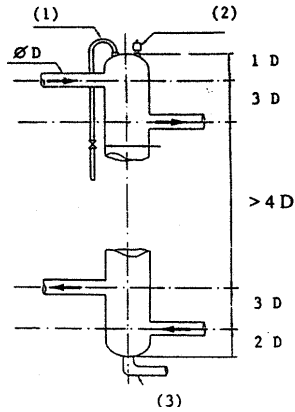
Pressure drop for ADI CD 70 - 450



Pressure drop for ADI CD 550 - 950



**17.7.4 Water manifold**



- It avoids hydraulic unbalances between the circuits and the boilers.
- It ensures a constant water flow to the boiler, independently from the consumptions required. In accordance with current regulations.
- In case of heavy sludge in the water, it drives it to the bottom of the tank. It can not avoid lighter sludge.

It is necessary to install (2) an automatic air vent of big capacity in the higher part of the tank, (3) an appropriate drainage with a diameter of 50/60, and optionally, (1) a manual air vent with a diameter of 15/21.

**Inertial volume**

ADI CD	OPTION 1 (see text)			OPTION 2 (see text)			
	Nr. Boilers →	1 boiler	2 boilers	3-4 boilers	1 boiler	2 boilers	3-4 boilers
ADI CD 70 - 105		20 lit.	30 lit.	40 lit.	40 lit.	60 lit.	75 lit.
ADI CD 120		30 lit.	40 lit.	65 lit.	50 lit.	100 lit.	125 lit.
ADI CD 175		35 lit.	75 lit.	125 lit.	80 lit.	150 lit.	200 lit.
ADI CD 200		35 lit.	50 lit.	75 lit.	50 lit.	75 lit.	125 lit.
ADI CD 250		35 lit.	50 lit.	75 lit.	80 lit.	100 lit.	175 lit.
ADI CD 325		50 lit.	75 lit.	100 lit.	100 lit.	175 lit.	250 lit.
ADI CD 375		50 lit.	100 lit.	150 lit.	100 lit.	200 lit.	300 lit.
ADI CD 450		75 lit.	150 lit.	250 lit.	150 lit.	300 lit.	375 lit.
ADI CD 550		100 lit.	175 lit.	300 lit.	150 lit.	350 lit.	500 lit.
ADI CD 650		125 lit.	250 lit.	400 lit.	175 lit.	400 lit.	600 lit.
ADI CD 750		150 lit.	300 lit.	500 lit.	200 lit.	500 lit.	800 lit.
ADI CD 850		175 lit.	350 lit.	500 lit.	250 lit.	700 lit.	1000 lit.
ADI CD 950		200 lit.	400 lit.	600 lit.	300 lit.	800 lit.	1200 lit.

This inertial volume may be distributed between (see system drawings in this document):

- o Water header / collectors linked by a by-pass (not closed) or one common water header / manifold.
- o Water pipes between header / collector and boilers.

**OPTION 1:**

Boiler cascade (for 2 or more boilers) managed by the boiler control:

- o Siemens LMS 14
- o Similar controller from another trademark with 0...10 V control signal (one signal per each boiler), to control the cascade of several boilers.

Caution: when the consumption required is DHW instantaneous production (that means no DHW buffer vessel) with quick and high consumption peaks → the inertial volume of Option 2 must be used.

**OPTION 2:**

- No controller manages the boiler cascade (for 2 or more boilers at the same circuit).
- Instantaneous DHW production.

**Installations with a sufficient inertial volume and a constant water flow, without interruption.**

These are installations where the main circuit/s has/have a minimum water capacity ensuring a constant and uninterrupted water flow to the boilers (unless the boilers stop). For example:

- Heating circuits with a main loop to which are connected A.H.U., fan-coils, where there are the control elements + valves. This loop will have enough water capacity to ensure a constant water flow to the boilers.
- Renovation of old boilers rooms (previously located in the basement) which have been moved to the top of the building or terrace, where the flow and the return piping connecting the new boilers room to the old one have a sufficient water capacity to guarantee a constant water flow, without interruption, through the boiler.

See system drawings.



**17.7.5 Water quality of the installation**

It is important to follow the instructions indicated in the present manual. The primary circuit of an installation, being a closed circuit, can not be refilled with non-treated water.

Periodical refillings with non-treated water could cause a constant input of:

- Oxygen and dissolved gases (contributing to produce oxidation and corrosion to the installation). This problem can be minimized by installing an air/gas venting in the higher part of the water flow connection or in a common flow pipe.
- Carbonates (contributing to produce scaling in the boilers).

Due to this reason, water refillings must be reduced to the minimum, and a water meter must be installed in the refilling of the primary circuit.

It is necessary to take the appropriate precautions with respect to the quality of the water circulating, in order to avoid corrosion and oxidation of the installation and allow equipments to operate at their maximum performances:

**a. Water characteristics** These are the values of the circuit water and of the refilling water.

Concept	VALUE	Concept	VALUE
<b>Total hardness (TH)</b>	Lower than 12 °F	<b>Maximum volume allowed of refilling water in the installation (m3)</b>	0.04 x P output / (TH x 0.1) being: P output: power output total sum in kW TH: water hardness in °F, Ca(HCO3)2
<b>Chloride</b>	Lower than 100 mg/l	<b>Salinity</b>	Lower than 50 mg/litre
<b>pH</b>	between 9.6 and 10	<b>Conductivity</b>	Lower than 500 µS/cm
<b>Resistivity</b>	Higher than 2000 Ohms x cm	<b>Iron</b>	Lower than 1 mg/litre

**b. A WATER TREATMENT IS ABSOLUTELY INDISPENSABLE FOR THE INSTALLATION OF THE PRIMARY CIRCUIT IN THE FOLLOWING CASES:**

1. Big installations (with high water contents).
2. Characteristics of the refilling water different from the hardness (TH) indicated in the previous table.
3. Frequent refillings of the installation with new water (because of drainings, water leaks, repairing), even if the water has a hardness lower than 12°F.
4. When the maximum volume allowed of refilling water is exceeded (see table).

**c. A mesh filter should be installed before each boiler (mesh of 0.3 mm).**

**d. Air purging/venting:**

If the boilers circuit incorporates a common vertical water manifold: place an air vent of big capacity in its higher point. Otherwise: it would be necessary to install an air vent of big capacity or corrosion inhibitor equipment in a high point of the circuit behind the boilers.

**e. Old installations**

e1) Before replacing the existing boilers with new boilers, proceed to clean the installation.

If a chemical product is used, it must be compatible with the installation materials.

Drainage must be made from a low point of the installation, if possible different from the boilers' draining point.

e2) A separator of oxides and sludge must be installed in the circuits' return, so that all the return water flow can pass through it, allowing its draining without suspending the service.

Apply the considerations of paragraphs "a,b,c,d".

If the circuit is in very bad conditions and the previous measures taken were not sufficient, or the cleaning of the installation was not efficient, the solution would be to separate the boilers' circuit from the heat emitters' circuit, so that they are independent one from the other, by means of a plate heat exchanger or similar, according to the hydraulic diagrams included in this manual (see the corresponding paragraph).

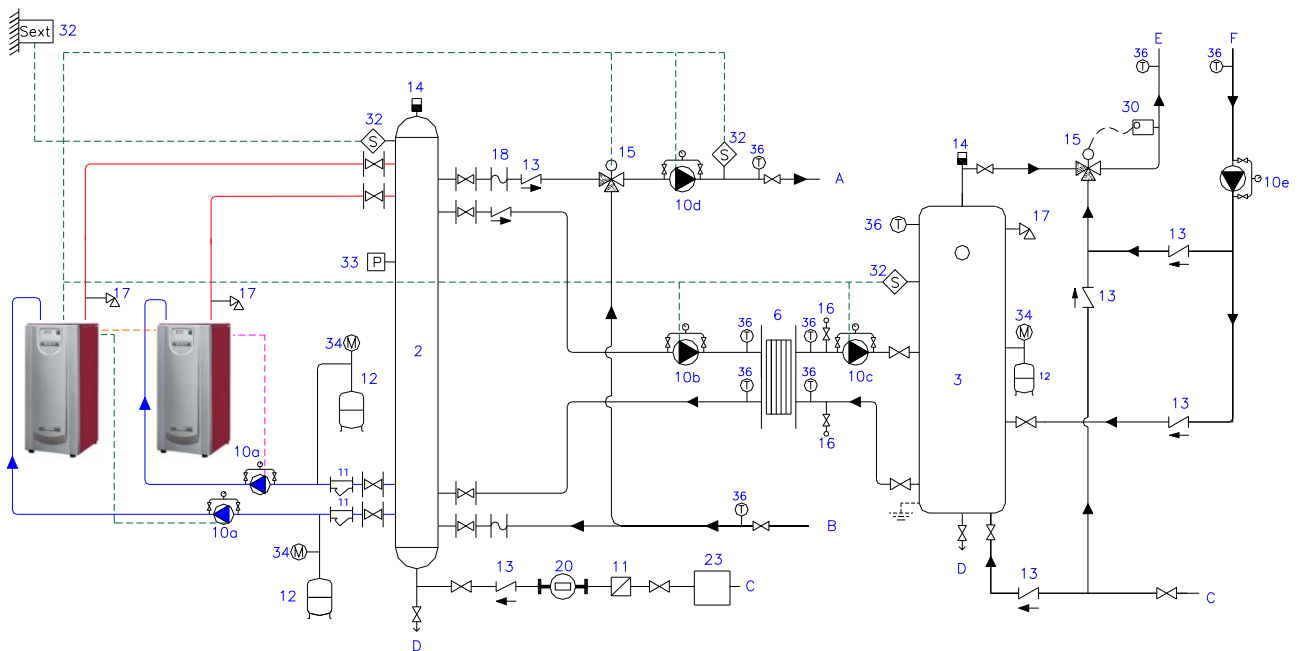
ADISA BY HITECSA disposes of professional staff that, after a visit of the installation, can advise you according to each case.

17.7.6 System drawings

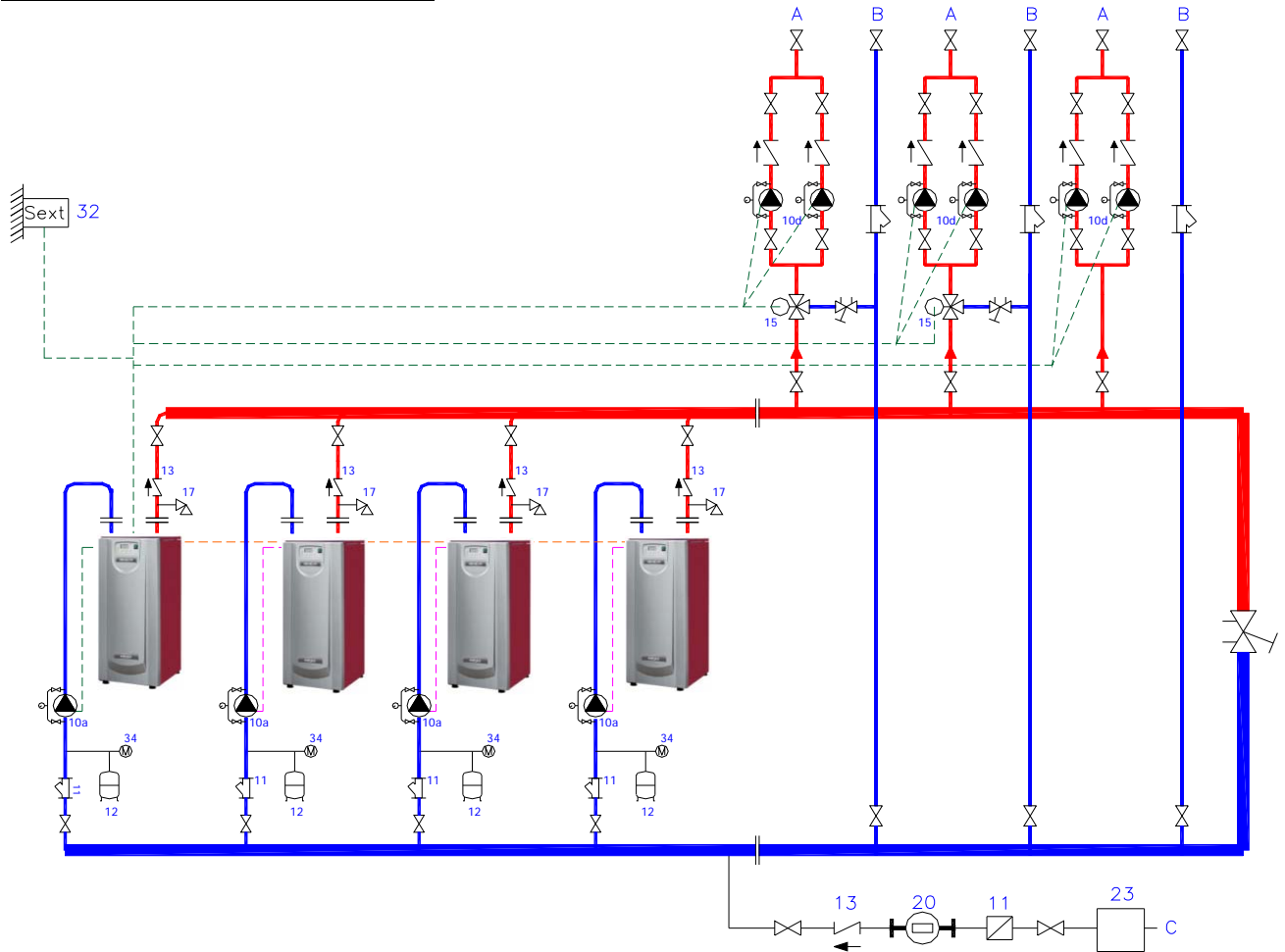
1	Boiler	30	Controller
2	Water collector or water manifold	31	Thermostat
3	D.H.W. buffer vessel	32	Temperature sensor
6	Plate heat exchanger	33	Pressure switch
10	Boiler circulation pump	34	Manometer
11	Mesh filter	36	Thermometer
12	Closed expansion vessel	37	Filter to separate sludge, oxides
13	Non-return valve	A	Flow to heating circuit
14	Automatic air venting	B	Return from heating circuit
15	Mixing valve	C	Cold feed
16	Valves to clean D.H.W. PHE secondary circuit	D	Drain
17	Overpressure safety valve	E	Flow to D.H.W. circuit
18	Non-vibrations mounts	F	Return from D.H.W. circuit
19	Adjusting water flow valve		
20	Water meter		
23	Water treatment		

LEGEND CONTROL LINES	
MASTER BOILER CONTROL	-----
SLAVES BOILERS CONTROL	-----
CASCADE COMMUNICATION BUS	-----

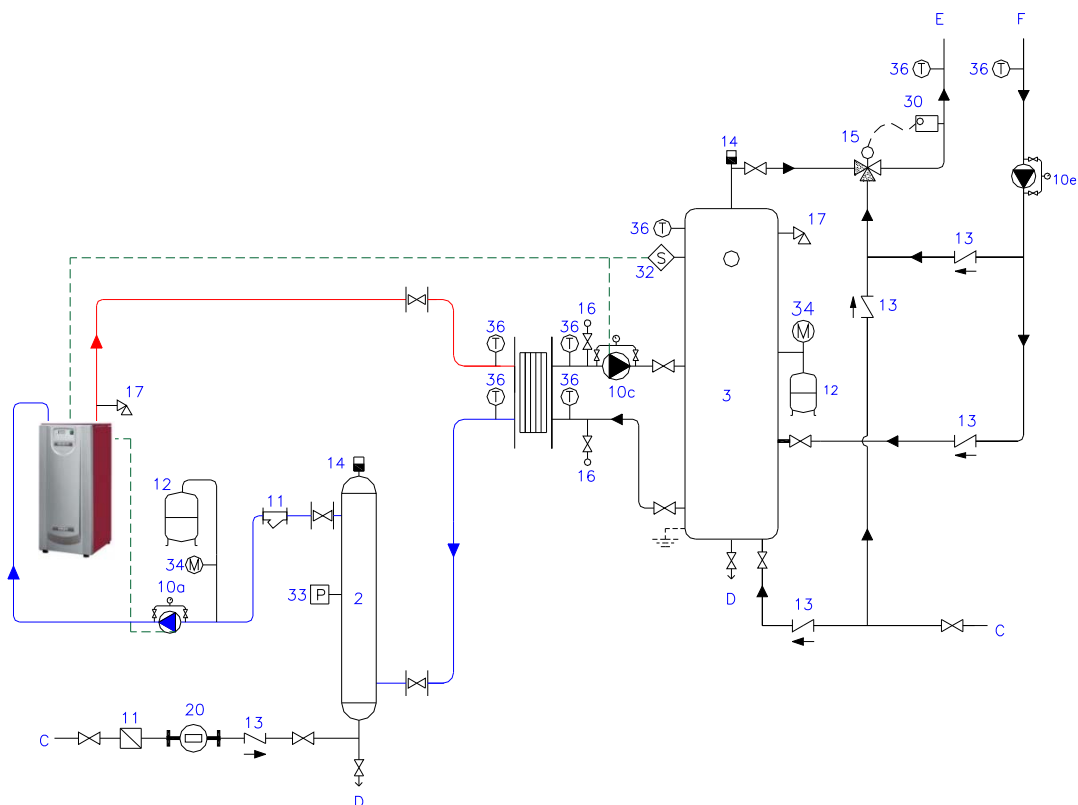
• **System drawing of several boilers: heating and D.H.W.**



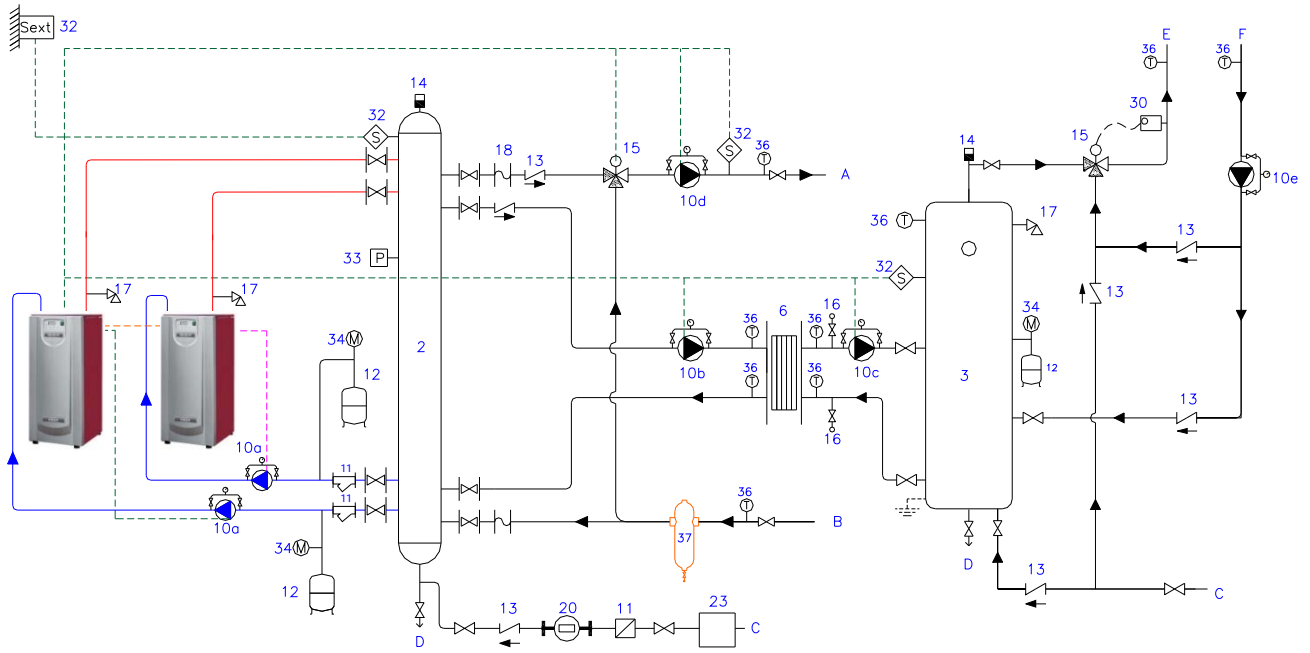
- **System drawing of heating circuits**



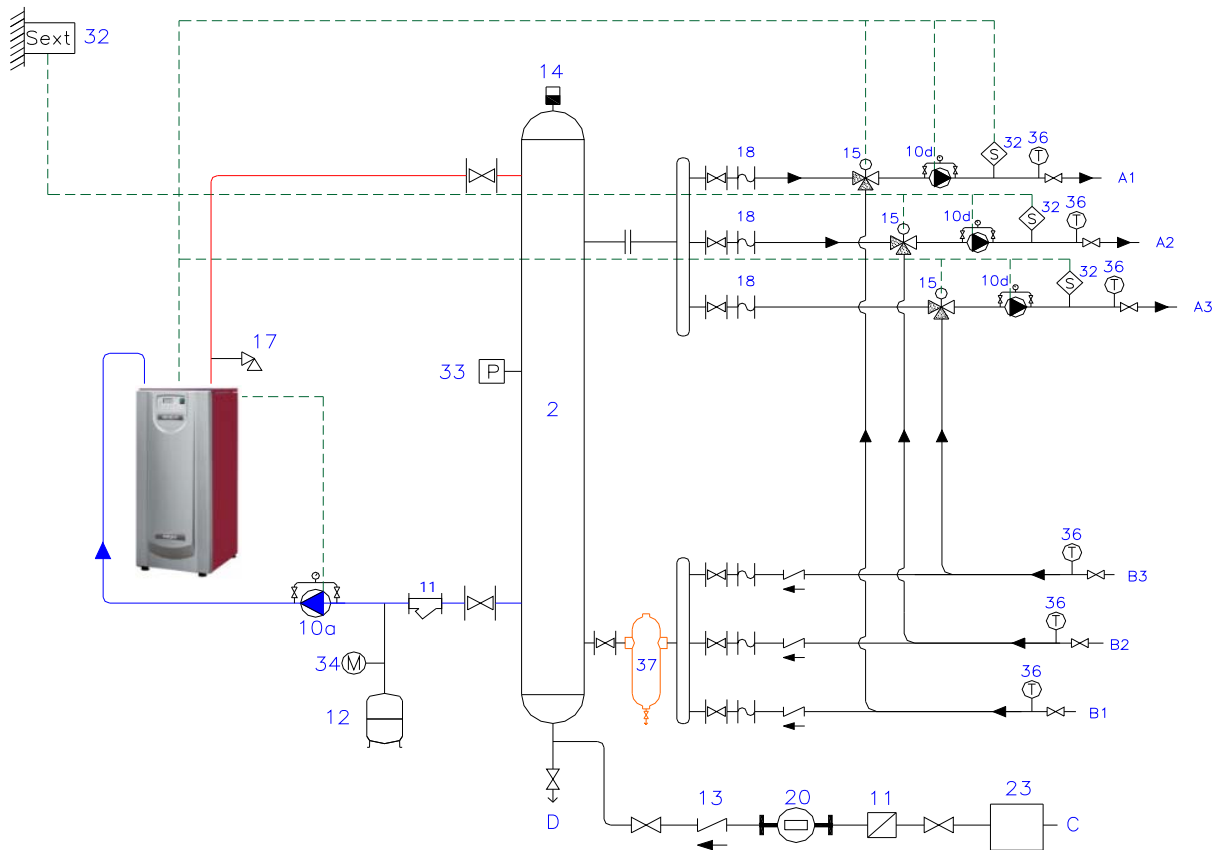
- **System drawing of one boiler and only D.H.W.**



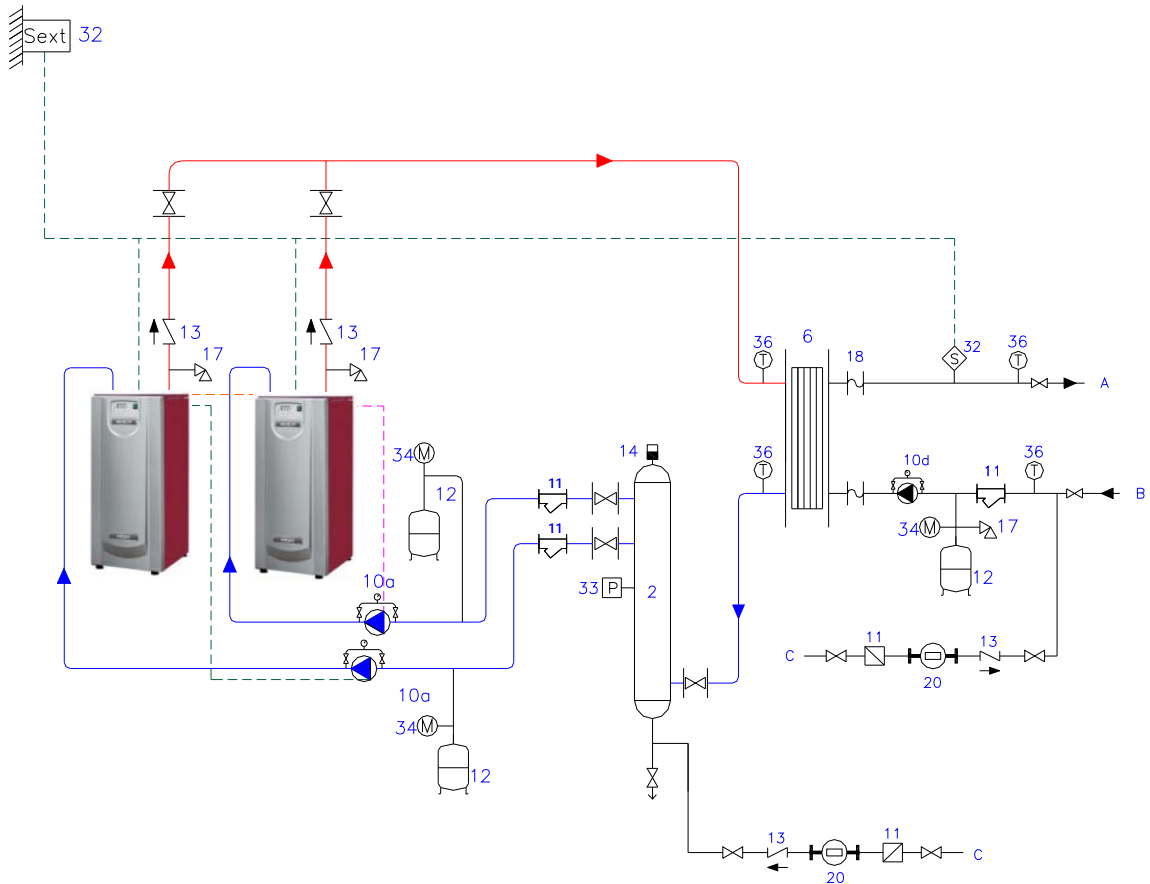
- **System drawing: D.H.W. and heating circuit**



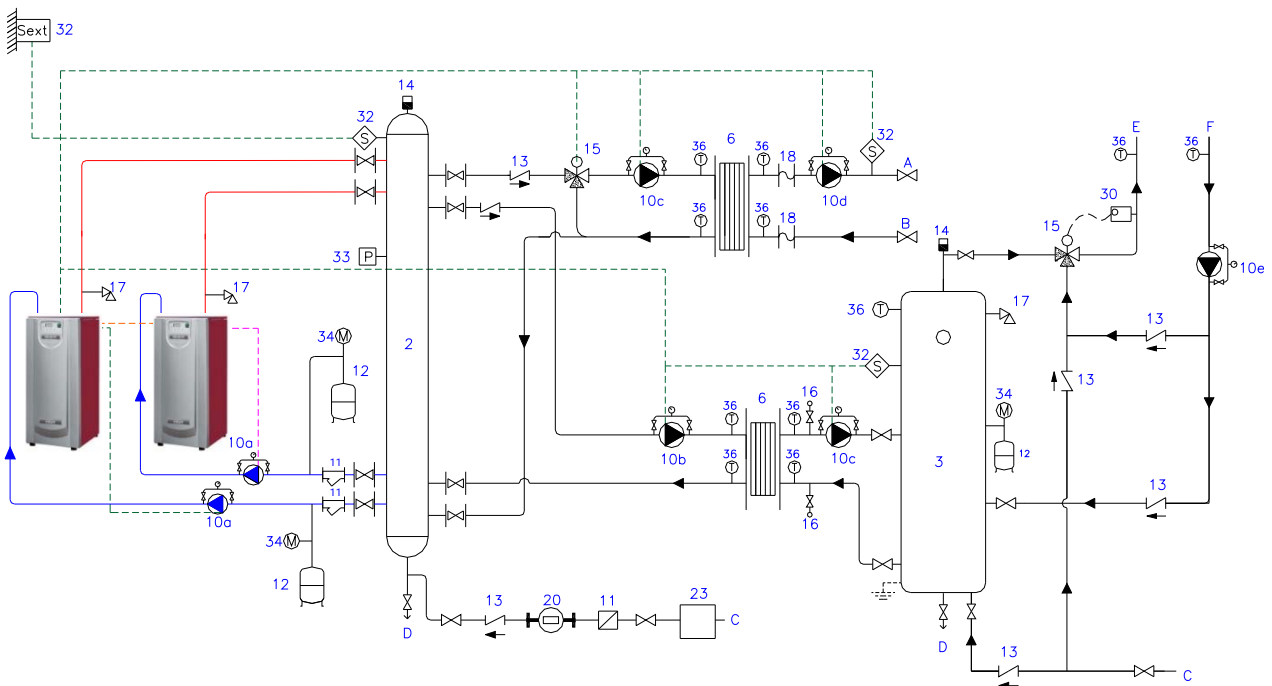
- **System drawing of an old installation: heating circuit**



- **System drawing of an installation with high pressure in the secondary circuit (very high building with the boilers room in the ground floor), or old installation in very bad conditions: heating circuit.**



- **System drawing of an installation as in the previous case: D.H.W. and heating circuit.**



**18. THE BOILER START-UP**

**18.1 Before the start-up**

The first start-up is a very important operation on which the future effectiveness and reliability of the equipment can depend. For this reason, it must be carried out by our own Official Technical Assistance Service.




Before the start-up, it is important to check that:

- The installation is in accordance with this manual's instructions and with the local regulations.
- The installation is full of water and vented of air.
- The static water pressure of the installation (when cold) is between 1 bar minimum and 4 bar maximum.
- The water circulation pumps operate in the correct direction.
- The water cut-off valves are open.
- The gas type and pressure correspond to the ones indicated for that boiler (see the boiler identification plate).
- The gas valves are open, the air of the gas installation vented and there are no gas leaks.
- Electrical connections are correct (see electrical supply for every model), the boiler is electrically supplied.
- The controls are set so as to require heat from the system.

Instruments required for the start-up:

- A manometer to check the combustion chamber pressure drop, the gas injectors pressure and the inlet gas pressure. We recommend using two digital manometers (or U-shaped manometers with water columns).
- A flue electronic analyser to measure CO, CO<sub>2</sub>, O<sub>2</sub> and the flues temperature.
- Ammeter/electrical tester.
- Ionization electrode, ignition electrode, fuses, screws, nuts.

**18.2 Gas pressure switch**

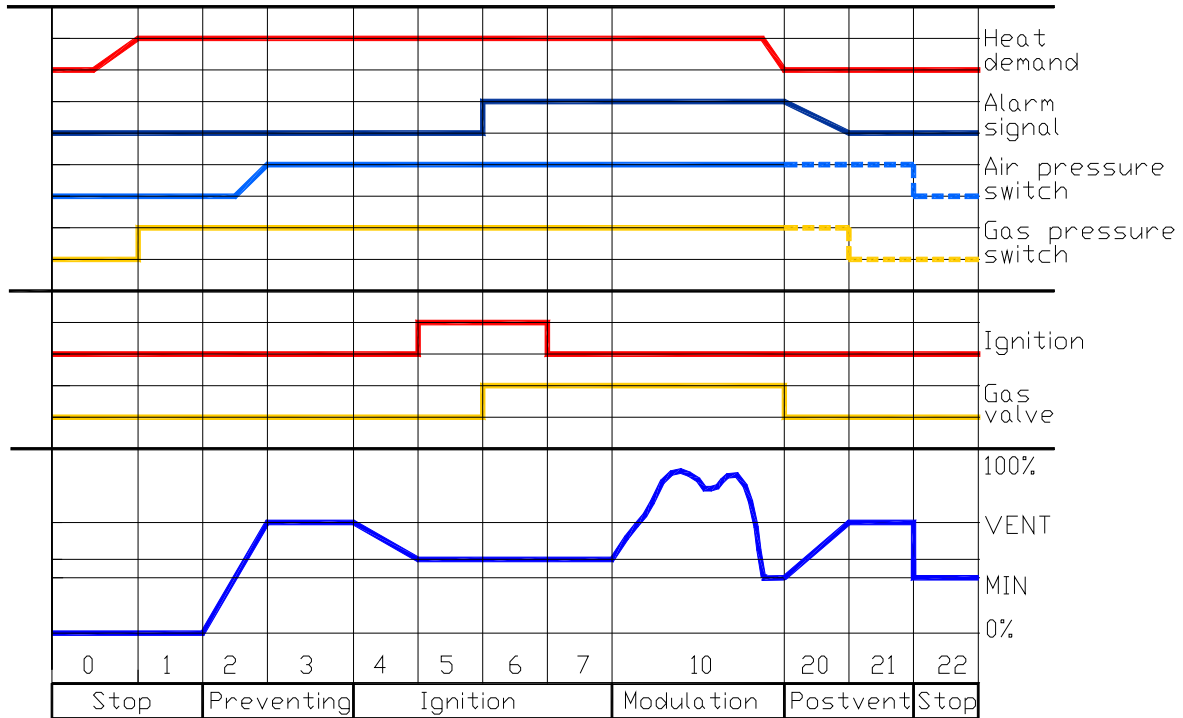
Model	Natural Gas pressure switch				
ADI CD	Adjustment (mbar)	Type	Image	OFF	ON
70 – 105	10	Blind cover, open the cover to adjust		10 +/- 1	12.5 +/- 1
120 – 175	15	Transparent cover, fixed to the side of the gas shut-off valve		15 +/- 1	17.5 +/- 1
Rest of the range	15	Transparent cover, connected to a pipe to facilitate access		15 +/- 1	17.5 +/- 1

### 18.3 The boiler control unit and operating cycle

The control unit regulates:

- The boiler operating cycle.
- The boiler safeties (by indicating also the possible reasons for the boiler lockout).
- The boiler power modulation.

Short description of the boiler operating cycle:



LEGEND of the operating phases:

Display	Meaning
00	Boiler in stand-by (the installation is not receiving any request of heat)
01	The boiler stops due to lack of gas pressure (minimum gas pressure switch)
02	Motor fan is activated (revolutions increase)
03	Start of the pre-venting phase
04	Time out (control of the fan speed)
05	Time of pre-ignition
06	Safety time of ignition and ionization control (constant)
07	Safety time of ignition and ionization control (variable)
10	Operation in the heating mode
11	Not available phase: D.H.W.S. operation (according to the installation and to the boiler configuration)
12	Not available phase: Heating and D.H.W. operating in parallel (according to the installation and to the boiler configuration)
20 / 21	Post air-venting and fan stop
22	Self-test and return to the initial position
99	Alarm / lockout (alarm code visualized on the display)

**18.4 Gas/air adjustments**

All the boilers are tested in our factory and every one is supplied with a table indicating the combustion figures. Both the start-up and the maintenance must be carried out by authorized technical staff.

First of all verify: electric supply, if the gas connection is air vented, type of gas and pressure, if the heating demand is at the maximum value, correct draught of the chimney, if the hydraulic installation is vented, if the pump is correctly working...

The process would be as follows:

- First adjust the combustion at the minimum power (to avoid lockout).
- Adjust combustion at the maximum power.
- Adjust combustion at the minimum power.
- Repeat the previous steps at the minimum and maximum power.
- Once adjusted, check the combustion at the intermediate stages between the minimum and the maximum power.

Any change in the gas shut-off valve produces a change in the combustion, both at the maximum and the minimum power. Check them alternatively until you reach the required combustion figures.

Check combustion in the main burner:

- Ionization current (> 5 microamperes): connect in series the meter to the ionization electrode and to its electric connection.
- Pressure: gas (Pg), combustion chamber (Pf), air-gas mix (Pa) (similar to the values indicated in the combustion document issued in our factory).
- Gas flow.
- Combustion parameters: CO<sub>2</sub>, O<sub>2</sub>, CO, flues temperature, air temperature, efficiency, water temperatures.

Models	Range CO <sub>2</sub> (%) for Natural Gas
ADI CD 70 to 120	<b>7.3 - 9.3%</b>
ADI CD 120 to 175	<b>7.2 - 8.7%</b>
ADI CD 200 to 250	<b>7.2 - 8.4%</b>
ADI CD 325 to 750	<b>7.3 - 8.8%</b>
ADI CD 850 to 950	<b>7.7 - 9.0%</b>

Remember that these changes must be made by specialized technicians.

**18.4.1 Combustion adjustment**

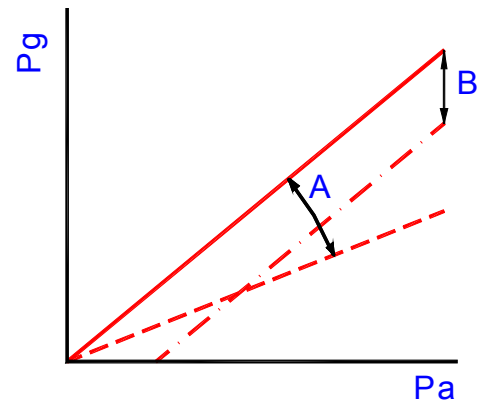
- a) Once the boiler is operating, press the button “Selection of heating operation mode” for more than 3 seconds.
- b) The boiler is now in controller stop mode. After that, press the button INFO and the display shows the percentage of power at which the boiler is working. The function PID of the controller is disabled.
- c) Press the button OK and the value of percentage will blink. Use the setting knob to select the different loads of the boiler (full load and minimum load).
- d) First adjust the combustion at the boiler maximum power.  
For the combustion adjustment at the maximum power according to the boiler models, see paragraph on the next page “Detail of the gas shut-off valve”:
- e) Check the content of CO<sub>2</sub> with the flue analyzer (by introducing the probe inside the flues outlet of the boiler that you are adjusting).
- f) Then proceed to adjust the combustion at the boiler minimum power.  
For the combustion adjustment at the minimum power according to the boiler models, see paragraph on the next page “Detail of the gas shut-off valve”.
- g) Check the content of CO<sub>2</sub> with the flues analyzer (by introducing the probe inside the chimney flue outlet of the boiler that you are adjusting).
- h) Repeat the previous steps both at the maximum and the minimum power until the values of CO<sub>2</sub> are correct at both stages.
- i) Once finished, press the button the button “Selection of heating operation mode” for more than 3 seconds to go back to the automatic operation mode, and confirm that controller stop mode is disabled.



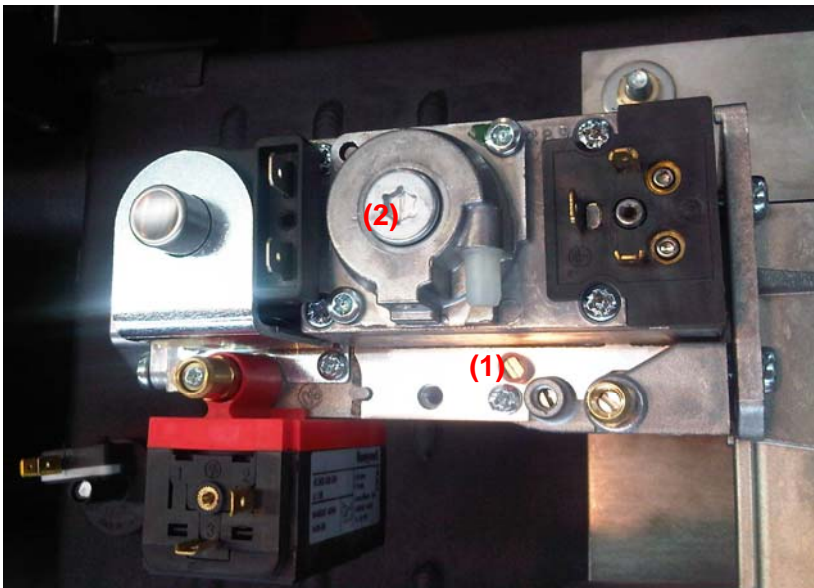
In this way, you will obtain two points of a straight line, as you can see in the chart, where “Pg” is the gas pressure (mbar) and “Pa” is the air pressure (mbar).

With the higher control of the gas valve you can vary the slope of the straight line (movement A in the chart).

With the lower control of the gas valve you can move the straight line vertically (movement B in the chart).



### Detail of the gas shut-off valve in models ADI CD 105 (for the combustion adjustment):



First remove the cover and turn the screw inside it:

1. Combustion adjustment at the maximum power: turn it counter clockwise → more gas flow.
2. Combustion adjustment at the minimum power: turn it clockwise → more gas flow

### Detail of the gas shut-off valve in models ADI CD 120 – 950 (for the combustion adjustment):



First remove the cover and turn the screw inside it:

1. Combustion adjustment at the maximum power: turn it counter clockwise → more gas flow.
2. Combustion adjustment at the minimum power: turn it clockwise → more gas flow

**18.4.2 Change of fuel: from Propane gas to Natural gas, or vice versa**

In order to change fuel (this operation must be carried out by an ADISA official service or by authorised professional staff):

- Reprogram the control unit
- Adjust the boiler combustion with the new fuel to the correct parameters, either for Natural Gas or for Propane Gas.
- Characteristics plate: put the corresponding one according to the gas used.

The process is the same if you have to change from natural gas to propane.

**Note: Propane option just available for models with power output lower than 550 kW.**

Data for maximum power:

Model	Power output	Power input	LPG Max	LPG Max
	kW	kW	m <sup>3</sup> /h	kg/h
CD 70	70.5	72.7	3.0	6.0
CD 85	85	87.7	3.7	7.2
CD 105	104	107.2	4.5	8.8
CD 120	120	123.5	5.1	10.2
CD 175	161.8	166.0	6.9	13.7
CD 200	197.5	202.2	8.4	16.7
CD 250	241	246.5	10.3	20.4
CD 325	294	300.5	12.5	24.8
CD 375	354	361.2	15.1	29.8
CD 450	440	448.2	18.7	37.0
CD 550	530	546.4	22.8	45.1

LPG (Propane gas):

LCV: 23.98 kW/m<sup>3</sup>

Density: 1.98 kg/m<sup>3</sup>

### 19. MAINTENANCE

The maintenance operations must be carried out from:

- The front of the boiler (main burner, electrodes, control panel, sight hole).
- The back of the boiler (gas shut-off valve, air damper, fan motor).

This allows that several boilers can be installed in a modular way, one beside the other (leaving a distance of 3 cm between them).

#### 19.1 Procedure to dismantle the burner

Be sure that:

- The boiler general switch is on the OFF position.
- The gas duct to the boiler is closed.

Take out the frontal casing panel of the boiler and lift the top.

Once made these steps, you can place the control panel in two different positions, in order to allow the reading of parameters when you are carrying out the boiler maintenance.

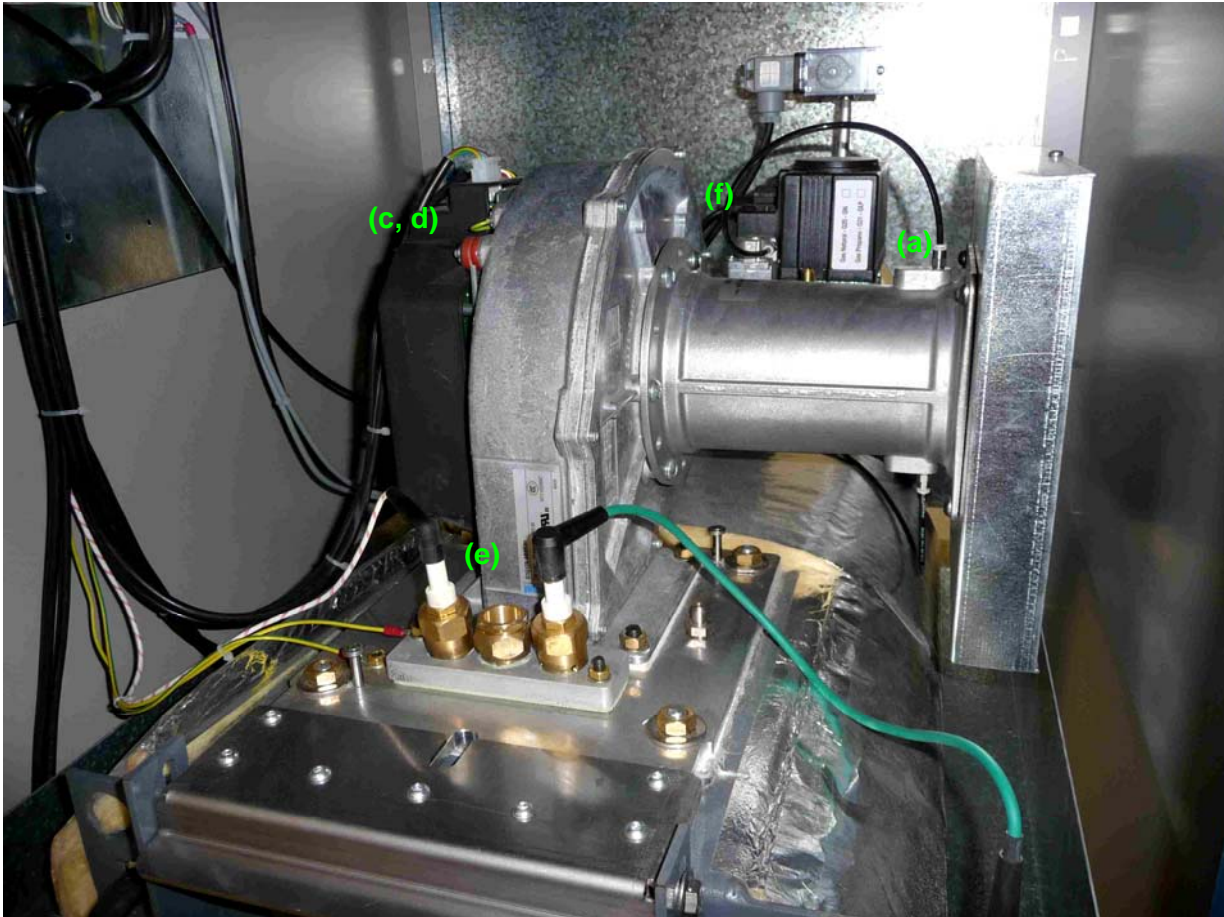
RANGE ADI CD 200 to 450:

Front view of the boiler without lower casing panel

Second position of the control panel



Front view of the boiler inside:



Disconnect the electric connections and the pressure pipes:

- (a) Pressure pipe connecting the gas valve to the venturi (just included in models ADI CD 200 and higher).
- (c) Motor fan: electric supply connection (in the higher part of the motor).
- (d) Motor fan: control indicator PWM
- (e) Ionization-ignition kit: ionization electrode cap, ignition electrode cap and ground connection cable.
- (f) Gas valve: electric supply connection.

Note: (a) has fast connections (by pressing the plastic ring you can remove the pipe).

Remove the ionization-ignition kit.

If the gas connection has a two-pieces coupling, disconnect it.

Disconnect the two flanges of the gas valve (each flange has Allen screws of 4 mm).

Remove the nuts/screws of the flange connecting the fan-burner group to the boiler heat exchanger.

By rotating the assembly motor-fan, you will find:

- Two gaskets between the boiler heat exchanger and the burner flange
- Burner flange
- Gasket between the burner flange and the fan plate
- Fan plate.

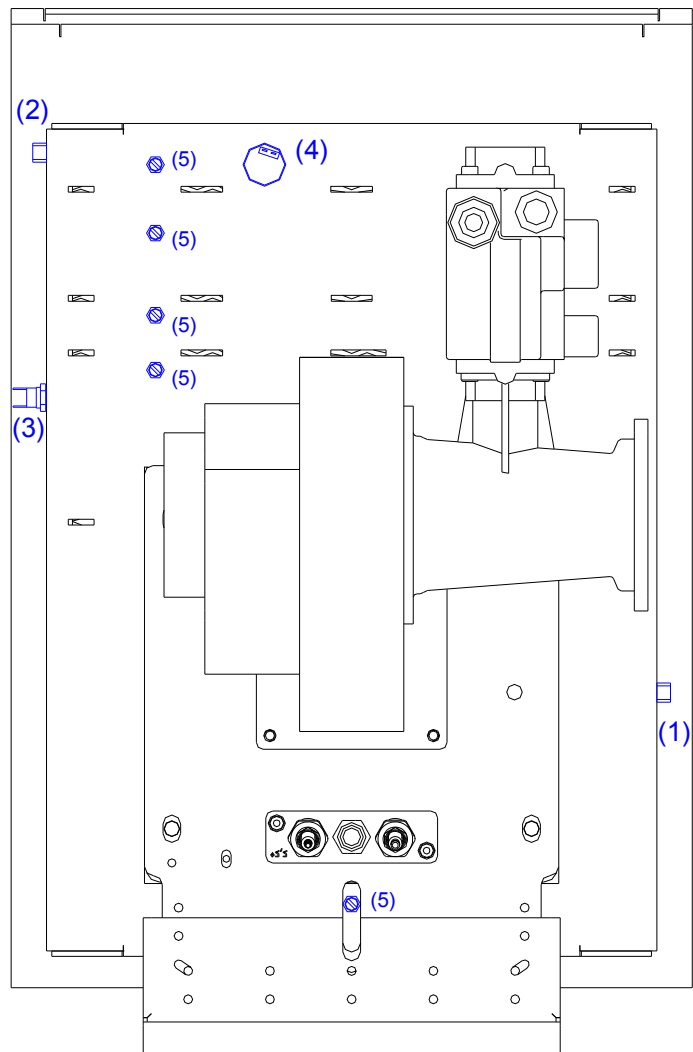
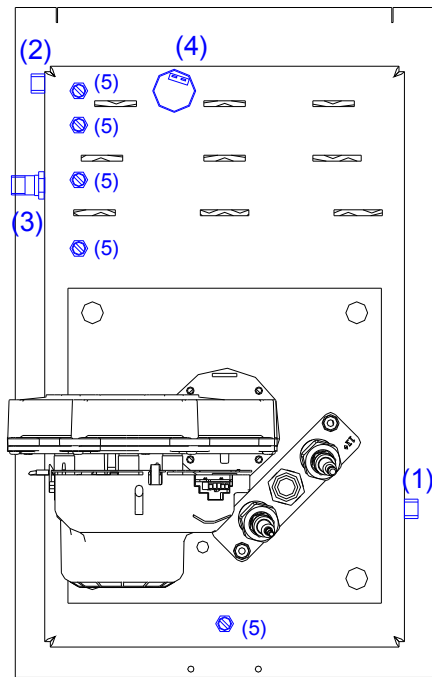
Consider the minimum free height between the highest level of the boiler and the ceiling in order to extract/rotate the burner (see paragraph “boilers room”).

Note: in models ADI CD 325 to ADI CD 750 the fan-burner assembly is rotating forward; in models ADI CD 850 and ADI CD 950, the fan-burner group is rotating backward.



19.2 Position of probes and sensors

- (1) Water flow temperature sensor
- (2) Water return temperature sensor
- (3) Safety overheating thermostat
- (4) Water pressure sensor
- (5) Manual air venting (their number can vary according to the model).



20. ECODESIGN DIRECTIVE (ErP)

Model: ADI CD  
 Condensing boiler  
 Boiler type: B23

CONCEPT		Units	70	85	105	120	175	200	250	325	375
Power output	100% (*)	kW	70.5	85.0	104.0	120.0	161.8	197.5	241.0	294.0	354.0
	30% (**)	kW	21.8	26.3	32.2	37.0	49.8	60.7	74.0	90.2	108.4
Efficiency ref/HCV	100% (*)	%	87.83	87.62	87.72	87.87	88.09	88.30	88.38	88.45	88.60
	30% (**)	%	94.56	94.65	94.74	94.92	94.92	94.02	94.65	94.74	94.74
Efficiency ref/LCV	100% (*)	%	97.2	96.9	97.0	97.2	97.5	97.7	97.8	97.8	98.0
	30% (**)	%	104.6	104.7	104.8	105.0	105.0	104.0	104.7	104.8	104.8
Auxiliary electric consumption	Full load (normal operation)	kW	47.8	64.6	134.0	93.3	95.2	131.6	167.4	267.9	435.0
	Start-up (seconds)	kW	236.0	240.0	255.0	245.0	250.0	261.0	274.0	309.0	435.0
	Partial load	kW	16.7	17.9	23.9	19.1	19.5	31.1	40.7	64.6	69.0
NOx	Full load	mg/kWh	28.0	20.1	19.3	17.6	6.2	7.6	9.7	8.8	3.5

(\*): Average temperature (flow-return): 70°C.

(\*\*): Low temperature refers to a return temperature of 30 °C for condensing boilers.

See more data in Chapter 8.



## 21. BOILER GUARANTEE

1. **ADISA BY HITECSPA (HIPLUS AIRE ACONDICIONADO, S.L.)** guarantees the **ADI CD** boilers of its own manufacturing as follows:
  - \* **3 years for the boiler heat exchanger**
  - \* **2 years for the rest of components**
2. The GUARANTEE takes effect from the invoicing date of the material by ADISA BY HITECSPA.
3. The **COMMISSIONING** is not included in the price of the boiler. It must be carried out by the Official Technical Assistance Services of ADISA BY HITECSPA that will also check if the installation complies with the minimum requirements for the boiler correct operation. They will provide the responsible of the installation with a sealed copy of the GUARANTEE CERTIFICATE.
4. Repairing or replacing components or parts of the boiler does not extend the period of the guarantee, neither for the pieces that are replaced.
5. The elements in guarantee will be repaired or replaced freely in case of manufacturing faults.
6. The Official Technical Assistance Services are the only competent services that can carry out repairs under guarantee and ADISA will send its technical staff according to its own internal organization planning. In case other people external to ADISA manipulate the boiler, the guarantee would lose its effect.
7. The parts replaced under guarantee will remain property of ADISA BY HITECSPA, and the user is obliged to return them to ADISA BY HITECSPA free of charges within a maximum period of 7 days, otherwise the spare parts provided will be invoiced.
8. The guarantee just covers the material repairing. The guarantee does not cover the expenses for the dismantling of the equipments, for the installation and/or for the local or premises where they are installed, neither for the connections of the new equipments, or for additional works necessary to repair the material.
9. In order to consider as "GUARANTEE" the spare parts or the replaced components of the boilers, the installation should comply with the requirements described in this manual.

Guarantee will not be valid when breakdowns are due to:

- A. No correct installation, no proper use, inadequate manipulation or maintenance of the boiler.
- B. **Electric supply** different from: 220/230 V, 50Hz, single phase, ground connection.
- C. **No correct sizing or execution of the chimney** and of the flues outlets. Bad evacuation of the condensate generated by the smokes in the chimney.
- D. **Force majeure** such as: fire, flood, sinking, freezing of the circuit water...
- E. **No proper water quality requirements**, both for the water of the circuit and for the water supplied.

Values must be:

- Total hardness (TH): lower than 12°F
- PH: between 9.6 and 10
- Iron content: lower than 1 mg/litre
- Resistivity: higher than 2000 Ohms\*cm (conductivity lower than 500 microS/cm)
- Turbidity: lower than 10 mg/litre
- Salinity: lower than 50 mg/litre
- Chloride: lower than 100 mg/litre

**Or when water refillings to the boilers circuit exceed the maximum volume allowed of refilling water into the installation (see the corresponding paragraph in this document).**

- F. **Lack of water**. It is obligatory to supply the installation with minimum water content, so that it can circulate through the boiler with constant water flow and without interruption.
- G. **Gas connection**: no correct pressure, no proper dimensions or inadequate type of gas.
- H. **No correct air ventilation** of the boilers room, or environment with excess of humidity, dust or aggressive vapours or steams.
- I. **Operating water pressures** lower than 1.5 bar or higher than 5 bar.
- J. **No correct sizing or execution of the expansion systems** (safety valve, expansion vessel, etc.).
- K. **No correct calculation** of the heating consumption of the installation.
- L. **Natural wear and tear of the boiler.**

#### 10. THE GUARANTEE

- The GUARANTEE loses its effect in case of non-fulfilment of the payment conditions established at the moment of the purchase.
- The GUARANTEE does not cover expenses for damage.
- In order to exercise the rights of this guarantee, the purchaser must renounce to his own right and submit to the jurisdiction of the courts of Barcelona.
- The guarantee validity excludes any other kind of responsibility for ADISA BY HITECOSA (HIPLUS AIRE ACONDICIONADO, S.L.).

Any non-payment by the Buyer to HIPLUS AIRE ACONDICIONADO S.L. will immediately cancel the guarantee on the supplied products and services.

All products are property of Hiplus until their payment has been completed. For title reservation purposes, the payment will be considered completed when it is irrevocable. Without detriment to the title reservation, Hiplus will transfer to the client the right to use the Product, provided that he complies with the General sales conditions and he is up to date with the payment of the Products in accordance with the terms agreed.



22. APPENDIX I: LIST OF ERROR CODES

ERROR CODE	DESCRIPTION OF ERROR - TEXT	DIAGNOSTIC CODE	DIAGNOSTIC
0	No error		
10	Outside sensor fault		Check connection and component
20	Boiler temperature 1 sensor fault	439-440	Short circuit or Open circuit boiler flow sensor (B2). Check connection and component
28	Flue gas temperature sensor fault	539...544	Short circuit or Open circuit flue gas sensor. Check connection and component
30	Flow temperature 1 sensor fault		Short circuit or Open circuit flow sensor B1. Check connection and component
32	Flow temperature 2 sensor fault		Short circuit or Open circuit flow sensor B12. Check connection and component
40	Return temperature 1 sensor fault	441-442	Short circuit or Open circuit boiler return sensor (B7). Check connection and component
46	Cascade return temperature sensor fault		Check connection and component (B70)
50	DHW temperature sensor 1 fault		Check connection and component (B3)
60	Room temperature 1 sensor fault		Check connection and component
65	Room temperature 2 sensor fault		Check connection and component
68	Room temperature 3 sensor fault		Check connection and component
73	Collector temperature 1 sensor fault		Check connection and component
81	LPB short-circuit or no bus power supply		Check bus connection and components
82	LPB address collision		Check devices addresses
83	BSB-Wire short-circuit or no communication		Check room units connection
84	BSB-Wire address collision		Check room units addresses
85	BSB radio communication fault		Check bus connection and components
91	Data loss in EEPROM		Internal fault, call technical service
98	Extension module 1 fault		Check connection and extension module
99	Extension module 2 fault		Check connection and extension module
100	Two clock time masters		Check LPB menu
102	Clock time master without power reserve		Check clock
105	Maintenance message		Push info button and see maintenance codes
109	Supervision Boiler temp	503-504	Call technical service
110	SLT lock-out	412	STB interruption. Incorrect water circulation
110	SLT lock-out	419	SLT temperature exceeded (2531). Incorrect heat transfer, incorrect water circulation
110	SLT lock-out	436	Temperature SLT lock-out (3639.1). Incorrect heat transfer, incorrect water circulation
110	SLT lock-out	420...438	Gradient and Delta-T safeties. Incorrect heat transfer, incorrect water circulation
111	Temp limiter safety shut-down		Temp limiter safety shut-down. Incorrect heat transfer, incorrect water circulation
119	Water pressure switch has cut out	563-564	Cut out to lock-out or start prevention. Check water pressure, fill circuit
121	Flow temp HC1 not reached		Check installation and components

ERROR CODE	DESCRIPTION OF ERROR - TEXT	DIAGNOSTIC CODE	DIAGNOSTIC
122	Flow temp HC2 not reached		Check installation and components
125	Maximum boiler temperature exceeded	501-502	Supervision exceeded, no temperature modification after flame
126	DHW charging temperature not reached		Check installation and components
127	DHW legionella temperature not reached		Check installation and components
128	Loss of flame in operation	394	Check electric supply, polarity and ionization electrode
128	Loss of flame in operation, counter exceeded	625	Check electric supply, polarity and ionization electrode
130	Flue gas temperature max. limit exceeded		Check sensor, connection and chimney
132	Gas pressure switch safety shut-down	409	Insufficient gas supply, check gas pressure
133	Safety time for establishment of flame exceeded	625	Check electric supply, polarity and ionization electrode
151	BMU fault internal		Check parameters, call technical service
152	Parameterization error	781	9525 LF > 9530 HF. Check burner revolutions
152	Parameterization error	782	9513 ignition > 9530 HF. Check burner revolutions
152	Parameterization error	575	9612 GP configuration - H6 6008 double function. Check parametrization
152	Parameterization error	576	9611 LP configuration - H7 6011 double function. Check parametrization
152	Parameterization error	Others	Call technical service for diagnostic code
153	Unit manually locked		-
160	Fan fault	380	Fan speed threshold not reached. Faulty fan, bad adjustments, check connections
164	Flow/pressure switch HC fault	562	Check water pressure, fill circuit, check electric terminal
183	Unit in parameterization mode		-
260	Flow temperature 3 sensor fault		Short circuit or Open circuit flow sensor B14. Check connection and component
317	Mains frequency outside permissible range		Check correct electric supply in boiler terminals
324	Same sensor Input BX		Check configuration in parameters list
325	Same sensor Input BX/extension module		Check configuration in parameters list
326	Same sensor Input BX/mixing valve group		Check configuration in parameters list
327	Same function mixing valve group		Check configuration in parameters list
328	Same function mixing valve group		Check configuration in parameters list
329	Same funct ext module/mixing valve group		Check configuration in parameters list
330	Sensor input BX1 no function		Connect temperature sensor in BX terminal
331	Sensor input BX2 no function		Connect temperature sensor in BX terminal
332	Sensor input BX3 no function		Connect temperature sensor in BX terminal
335	Sensor input BX21 no function (any extension module)		Connect temperature sensor in BX terminal
336	Sensor input BX22 no function (any extension module)		Connect temperature sensor in BX terminal
339	Collector pump Q5 missing		Check connection and component
341	Collector sensor B6 missing		Check connection and component

ERROR CODE	DESCRIPTION OF ERROR - TEXT	DIAGNOSTIC CODE	DIAGNOSTIC
343	Solar integration missing		Check connection and component
353	Cascade flow sensor B10 missing		Check connection and component B10
373	Extension module 3 fault		Check connection and component
378	Repetition internal		Call technical service
382	Repetition speed		Call technical service
384	Extraneous light		Continuous ionization signal after switch off. Check burner and gas valve.
385	Mains undervoltage		Check electric supply in boiler terminals
386	Fan speed tolerance	384	Check air filter, clean burner
432	Function ground not connected		Check ground connection

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