Installation and maintenance instructions

Gas condensing boiler

Logano plus GB312

For contractors

Read carefully prior to installation and maintenance.

6 720 644 531 (08/2010) GB/IE

Buderus

Contents

1 Key to symbols and safety instructions

1.1 Explanation of symbols

Warnings

Warnings in this document are framed and identified by a warning triangle which is printed on a grey background.

Electrical hazards are identified by a lightning symbol surrounded by a warning triangle.

Keywords indicate the seriousness of the hazard in terms of the consequences of not following the safety instructions.

- **NOTE** indicates that material damage may occur.
- **CAUTION** indicates that minor to medium injury may occur.
- **WARNING** indicates that serious injury may occur.
- **DANGER** indicates possible risk to life.

Important information

Important information in cases where there is no risk of injury or material losses is identified by the symbol shown on the left. It is bordered by horizontal lines above and below the text.

Additional symbols

Symbol	Meaning
▶	a step in an action sequence
→	a reference to a related part in the document or to other related documents
•	a list entry
–	a list entry (second level)

Tab. 1

1.2 Safety instructions

Risk of explosion if you can smell gas

- ▶ Close the gas tap (→ page 42).
- ▶ Open windows and doors.
- ▶ Never operate electrical switches, pull plugs, or use the phone or doorbells.
- ▶ Extinguish all naked flames. Do not smoke. Do not use lighters.
- ▶ **From outside,** warn all occupants of the building, but do not ring doorbells. Call your gas supply utility and approved contractor.
- ▶ If you can actually hear gas escaping, leave the building immediately. Prevent others from entering and notify the police and fire services from outside the building.

If you smell flue gas

- ▶ Shut down the heating system (→ page 42).
- ▶ Open windows and doors.
- ▶ Notify an authorised contractor.

Risk of poisoning. Inadequate air supply can result in dangerous flue gas leaks

- ▶ Never block ventilation and extract air apertures or reduce their size.
- ▶ The boiler must not be operated, unless you immediately remedy the fault.
- ▶ Inform the system user in writing of the problem and associated risk.

Risk of explosion of flammable gases

- ▶ Any work on components in contact with gas may only be carried out by an approved contractor.

Risk of electric shock when the boiler is open

- ▶ Before opening the boiler:
  Disconnect the heating system from the power supply using the emergency stop switch or the relevant domestic fuse/MCB. It is not enough to switch off the control unit.
- ▶ Safeguard the heating system against unintentional reconnection.

Danger posed by explosive and easily flammable materials

- ▶ Never use or store easily flammable materials (paper, thinners, paints etc.) near the boiler.

Danger through failure to consider your own safety in an emergency such as a fire

- ▶ Never put yourself at risk of fatal injury. Your own safety is paramount.

Risk of scalding

- Prior to inspection and maintenance, let the heating system cool down. Temperatures in excess of 60 °C can be generated inside the heating system.

Siting, conversion:

Caution: System damage

- In case of **open flue operation**, never close or restrict ventilation apertures in doors, windows and walls. If draught-proof windows are fitted, ensure there is an adequate supply of combustion air.
- The boiler must not be operated, unless you immediately remedy the fault.
- Use the DHW cylinder exclusively for heating hot water.
- **Never close safety valves**
  When DHW is being heated water can be expelled by the DHW cylinder safety valve.
- Never modify any parts in contact with flue gas.

Working on the boiler

- Only authorised contractors must carry out installation, commissioning and possible repair work. For this, observe all relevant regulations (→ Chapter 3, page 13).

Instructing the customer

- Explain to the customer how the boiler works and how to operate it.
- The user is responsible for the safety and environmental compliance of the heating system.
- Inform the customer that they must not carry out any modifications or repairs.
- Maintenance and repairs may only be carried out by an authorised contractor.
- Use only original spare parts.
- Only use alternative combinations, accessories and wearing parts if these are designed for this application.

2 Product information

2.1 Regarding these instructions

These installation and maintenance instructions contain important information for the safe and appropriate installation, commissioning and servicing of this gas condensing boiler.

These installation and maintenance instructions are designed for contractors who – on account of their professional training and experience – are knowledgeable in handling heating systems and gas installations.

The following documents are available for this boiler:

- Operating instructions
- Installation and maintenance instructions
- Technical guide
- Spare parts catalogue
- Water quality log

The above documents are also available for downloading via the Buderus website.

Please contact us with any suggested improvements in connection with the above documentation or if you have noticed anything amiss. For contact addresses and our internet address, see the back cover of this document.

2.2 EU Declaration of Conformity

This product conforms in design and operation to the European Directives and the supplementary national requirements. Its conformity is confirmed by the CE designation. You can call up the Declaration of Conformity for this product on the internet at www.buderus.de/konfo or request a copy from your local Buderus sales office.

Observe the details on the boiler type plate.

2.3 Correct use

Use the boiler for its intended purpose only and according to the installation and maintenance instructions.

Use the boiler exclusively to heat up heating water in heating systems and/or for the indirect heating of potable water, e.g. in a DHW cylinder. Any other use is deemed to be inappropriate.

2.4 Boiler designation

The boiler designation comprises of the following parts:

Logano:	Model name
GB	Gas condensing boiler
• 90 • 120 • 160 • 200 • 240 • 280	Maximum output in kW

Tab. 2

2.5 Standard delivery

Component	Pce	Packaging
Boiler, completely assembled with casing	1	1 carton on a pallet
Technical documentation	1	1 shrink-wrap package
Set of adjustable feet	1	1 shrink-wrap package

Tab. 3 Standard delivery

Accessories

The following components are available as accessories.

Component		Pce
Safety valve or safety assembly [1)]	R1" (for 90 and 120 kW)	1
	R1¼ " (for 160 to 280 kW)	
Boiler connection elbow		1
Boiler flue connection		1

Tab. 4 Required accessories

1) Safety valve or safety assembly are required to ensure the function and safety.

2.6 Product overview

The boiler is a gas condensing boiler with an aluminium heat exchanger.

Subject to the software version of the burner control unit, the boiler is equipped either with or without a check valve (→ Chapter 5.5.1, page 21).

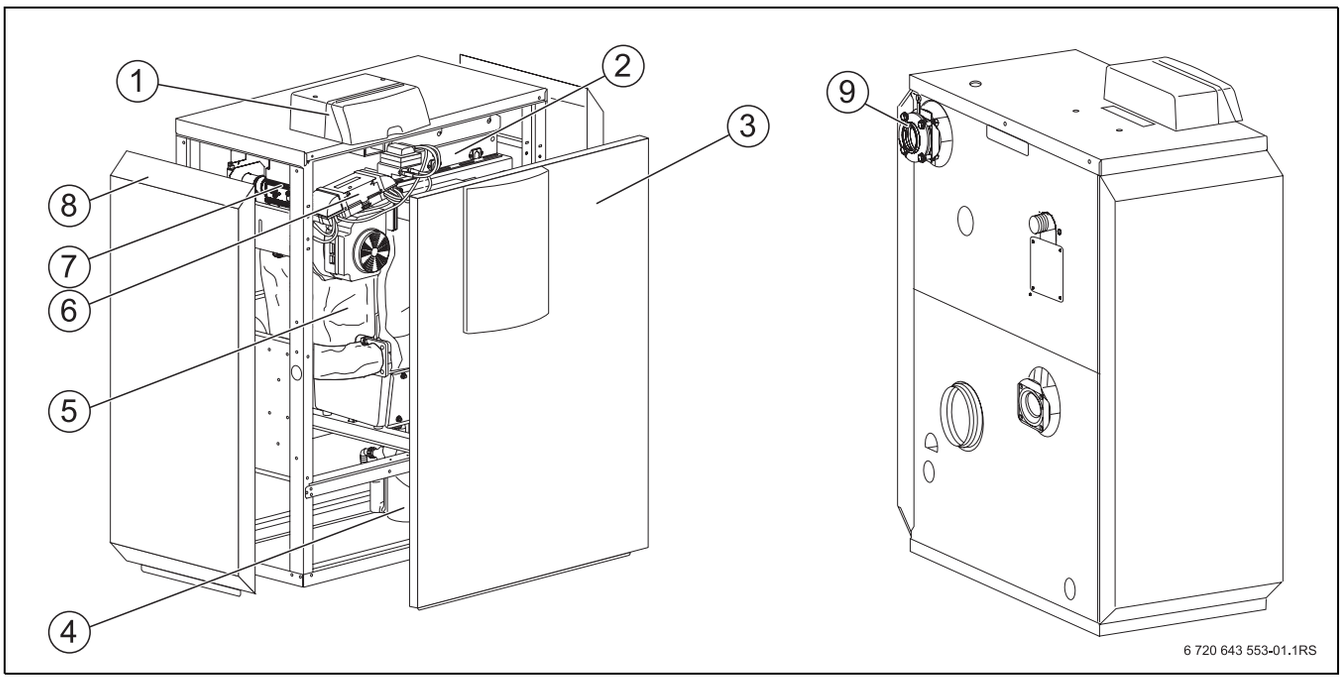


Fig. 1 Product overview

1 Control unit
2 Gas burner
3 Boiler front panel
4 Siphon
5 Boiler block with thermal insulation
6 Burner control unit
7 Gas train
8 Boiler casing
9 Check valve (→ Chapter 5.5.1, page 21)

The boiler comprises:

- Control unit
- Appliance frame with casing
- Boiler block with thermal insulation
- Gas burner

The control unit monitors and controls all electrical boiler components.

The boiler block transfers the heat generated by the burner to the heating water. The thermal insulation reduces energy losses.

2.7 Dimensions and connections

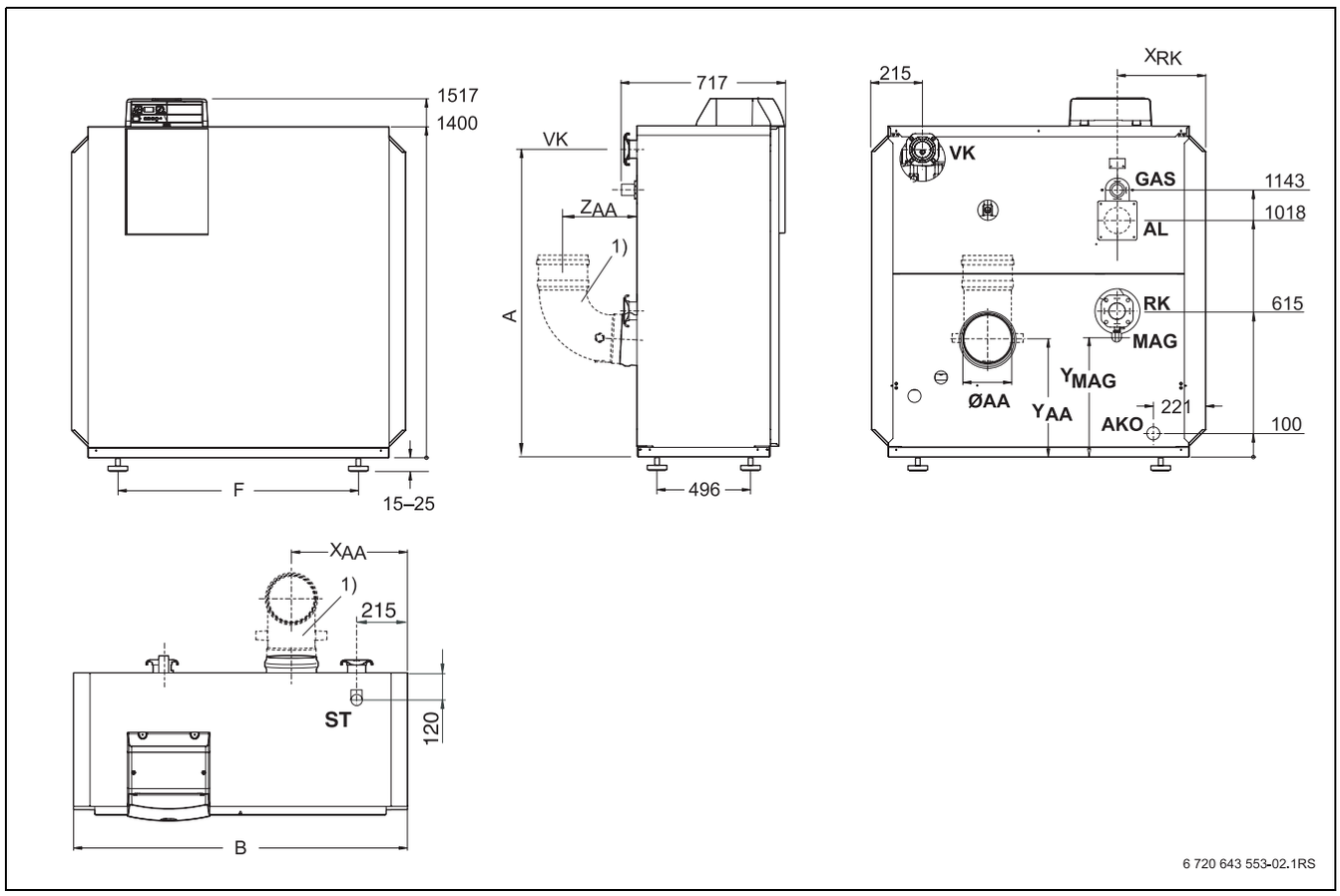


Fig. 2

1) Not included in delivery

Connections					
AA	=	Flue gas connection	AKO	=	Condensate outlet
AL	=	Combustion air pipe connection (balanced flue operation only)	GAS	=	Gas connection
VK	=	Boiler flow	ST	=	Connection for safety valve or safety assembly
MAG	=	Connection for diaphragm expansion vessel	RK	=	Boiler return

Tab. 5 Connections

Boiler size (output in kW)		90	120	160	200	240	280
Number of sections		4	4	5	6	7	8
Width B	**mm**	994	994	1202	1202	1410	1410
Dimension X_{AA}	**mm**	332	332	384	436	488	540
Dimension X_{RK} (= X_{AL} = X_{GAS})	**mm**	270	270	374	270	374	270
Dimension F	**mm**	800	800	1008	1008	1216	1216
Dimension A	**mm**	1308	1308	1300	1300	1300	1300
Flue diameter Ø AA	**DN (mm)**	160	160	160	200	200	200
Dimension Y_{AA}	**mm**	470	470	470	495	495	495
Dimension Y_{MAG}	**mm**	522	522	514	514	514	514
Dimension Z_{AA}	**mm**	145	145	145	310	310	310
Combustion air pipe diameter AL (balanced flue only)	**DN (mm)**	110	110	110	110	110	110
VK and RK connection		Rp 2" (DN 50)		PN6 standard flange (DN 65)			
ST connection		R 1"		R 1¼ "			
Ø GAS		R ¾ "		R 1½ "			

Tab. 6 Dimensions and connection measurements

2.8 Specification

Boiler size (output in kW)			90	120	160	200	240	280
Number of sections			4	4	5	6	7	8
Rated output Temperature pair 50/30 °C	Full load	kW	90	120	160	200	240	280
	Partial load	kW	31	31	42	62	75.2	87.2
Rated output Temperature pair 80/60 °C	Full load	kW	84	113	150	187	225	263
	Partial load	kW	28	28	38	56.2	67.6	79.2
Rated heat input	Rated load	kW	86.5	115.9	155	193	232	271
	Partial load	kW	29	29	38.8	57.9	69.6	81.3
Flue gas mass flow rate 50/30 °C	Full load	g/s	38.2	53.8	70.2	87.8	106.0	125.9
	Partial load	g/s	13.6	10.1	12.9	21.5	23.0	28.4
Flue gas mass flow rate 80/60 °C	Full load	g/s	38.9	53.7	70.2	89.3	107.4	125.4
	Partial load	g/s	14.5	11.1	14.1	21.6	25.0	33.4
CO_2 content with natural gas	Full load	%	9.1					
	Partial load	%	9.3					
Minimum flue gas temperature 50/30 °C	Full load	°C	49	56	54	55	55	57
	Partial load	°C	34	32	31	34	33	34
Minimum flue gas temperature 80/60 °C	Full load	°C	< 70	< 75	< 75	< 75	< 75	< 75
	Partial load	°C	58	57	56	59	58	59
Available draught, flue system		Pa	100					
Gas								
Fan			G1G 170					
Gas train			Honeywell			Kromschröder		
			VR 4615V		VR 415VE	CG 20	CG 25	CG 25
Gas restrictor diameter								
Natural gas H (G20), Wobbe index 14.9 kWh/m³		mm	15.7		Gas restrictor or not fitted	14.2	13.6	12.6
Natural gas L (Germany), Wobbe index 12.8 kWh/m³		mm	15.0					
Natural gas L (G25) (Netherlands), Wobbe index 12.2 kWh/m³		mm	14.8					
Type (acc. to DVGW regulations)			B_{23}, B_{23P}, ($C_{63(x)}$) open flue and balanced flue operation					
Type (Belgium)			B_{23}, $B_{33\,(x)}$, ($C_{53(x)}$) open flue and balanced flue operation					

Tab. 7 Specification

Boiler size (output in kW)			90	120	160	200	240	280
Type (Netherlands)			B_{23}, $B_{63(x)}$ open and balanced flue operation					
Heating water circuit								
Boiler water capacity		**l**	16	16	20	24	27	30
Pressure drop on the heating water side		**mbar**	see diagram, page 70					
Maximum flow temperature		**°C**	85					
Safety temp. for high limit safety cut-out		**°C**	100					
Permissible operating pressure		**bar**	4					
Electrical data								
IP rating			IPX0D					
Power supply		**V/Hz**	230/50					
Power consumption	**Full load**	**W**	84	150	190	230	270	330
	Partial load	**W**	40	40	45	50	50	50
Boiler dimensions and weight								
Transport dimensions Width x Depth x Height		**mm**	851 x 612 x 1400		1059 x 612 x 1400		1267 x 612 x 1400	
Weight		**kg**	205	205	240	265	300	330

Tab. 7 Specification

2.9 Gas throughput

Boiler size	Gas throughput		
	Natural gas H (G20), Wobbe index 14.9 kWh/m³	**Natural gas L (DE) Wobbe index 12.8 kWh/m³**	**Natural gas L (G25) NL Wobbe index 12.2 kWh/m³**
kW	**m³/h**	**m³/h**	**m³/h**
90	9.2	9.8	10.6
120	12.3	13.2	14.3
160	16.4	17.6	19.1
200	20.4	21.9	23.8
240	24.6	26.3	28.6
280	28.7	30.7	33.4

Tab. 8 Gas throughput (relative to 15 °C gas temperature and 1013 mbar air pressure)

2.10 Country-specific gas categories and supply pressures

Country:	Mains supply pressure P in mbar	Gas category	Preset gas type or corresponding gas type conversion kits supplied	Preset to the mains supply pressure in mbar [1)]
DE	20	I_{2ELL}	G20/G25	20
AT, CH, SK	20	I_{2H}	G20	20
ES, GB, IE, IT, PT, SI	20	I_{2H}	G20	20
EE, DK, HR, LT, LV	20	I_{2H}	G20	20
FR	20/25	I_{2ESi}	G20	20
BE	20/25	$I_{2E(R)B}$	G20	20
CZ	20	I_{2H}	G20	20
LU	20	I_{2E}	G20	20
NL	20	I_{2L}	G25	25
PL	20	I_{2ELw}	G20	20
HU	20	I_{2HS}	G20	25

Tab. 9 Country-specific gas categories and supply pressures

1) The gas supply utility must assure the minimum and maximum pressures (in accordance with the national requirements for gas supply utilities).

The boilers can be manufactured for the following:
- Natural gas H or E (G20, 20 mbar)
- Natural gas L (DE) (20 mbar)
- Natural gas L (NL) (G25, 25 mbar)
- Natural gas H (BE) (G20, 20 mbar)

3 Regulations

In its design and operational characteristics, this boiler complies with the following standards:

- EN 677
- EN 437, EN 483
- Gas Equipment Directive 2009/142/EC
- Efficiency Directive 92/42 EEC
- EMC Directive 2004/108/EC
- Low Voltage Directive 2006/95/EC

3.1 Standards and directives

For installation and operation observe the following regulations and requirements in your country:

- local building regulations regarding the installation conditions
- local building regulations regarding ventilation and extract air systems and the chimney connection
- regulations regarding connection to the power supply
- the technical rules of the gas supply utility concerning the connection of the gas burner to the public gas mains
- the regulations and standards regarding safety equipment of water heating systems
- the installation instructions for heating system installers

3.2 Duty to obtain a permit and provide notification

- ▶ Ensure that the installation of a gas condensing boiler is notified to and approved by the relevant gas supply utility.
- ▶ Please note that regional approvals may be required for the flue system and the connection of the condensate outlet to the public sewerage system.
- ▶ Prior to commencing the installation, notify the responsible flue gas inspector and the waste water authority.

3.3 Installation location

NOTICE: System damage due to frost!

- ▶ Site the heating system in a room safe from the risk of frost.

DANGER: Risk of fire from flammable materials or liquids!

- ▶ Never store flammable materials or liquids in the immediate vicinity of the boiler.

NOTICE: Boiler damage through contaminated combustion air or contaminated air in the vicinity of the boiler!

- ▶ Never operate the boiler under dusty conditions or where the atmosphere is contaminated with corrosive substances. These might be, for example, paint shops, hairdressing salons and agricultural operations (manure).
- ▶ Never operate boilers where trichloroethene, halogenated hydrocarbons or other corrosive chemical substances are used or where such material is stored. These substances are contained, for example, in certain adhesives, solvents, cleaning agents and paints.
- ▶ In such cases, always select balanced flue operation in a separate, hermetically sealed installation room that has a fresh air supply.

3.4 Ventilation requirements

Ventilation for combustion and cooling should be provided in the boiler house in accordance with BS 6644 and IGE/UP/10. The tables below may be used for guidance.

3.4.1 Open flue boilers

Opening free area sizes given in cm² per kW net.

% Load in Summer	Low level	High level
50	4	2
75	5	3
100	6	4

Tab. 10

3.4.2 Room sealed boilers

Opening free area sizes given in cm² per kW net.

% Load in Summer	Low level	High level
50	2	2
75	5	5
100	6	6

Tab. 11

- ▶ Never restrict or block ventilation openings. Keep the ventilation openings clear at all times.

3.5 Heating water quality

As pure water cannot be used for heat transfer, water quality is important. Poor water quality can damage heating systems due to scaling and corrosion.

Water quality is an essential factor for increased efficiency, functional reliability, long service life and for maintaining the constant operational condition of a heating system.

- ▶ To verify the water quality, check for the values listed in the "Water quality log".

3.6 Pipework quality

When using plastic pipes in the heating system, for example in underfloor heating systems, ensure these are impermeable to oxygen in accordance with DIN 4726/ 4729. Ensure system separation by means of a heat exchanger if the plastic pipes do not conform with these standards.

NOTICE: Boiler damage through corrosion!

- ▶ Never operate this boiler as a gravity-fed or as open vented heating system.

3.7 Frost protection

NOTICE: System damage due to frost!

- ▶ If there is the risk that a line might freeze up when operating in room temperature-dependent mode (e.g. radiator in a garage), set the pump run-on time to 24 hours.

3.8 Inspection/maintenance

Heating systems should be regularly serviced for the following reasons:

- to achieve a high level of efficiency and to operate the heating system economically
- to achieve a high level of operational reliability
- to maintain the cleanest possible combustion

Maintenance interval

NOTICE: Boiler damage through a lack of, or unsatisfactory, cleaning and maintenance!

- ▶ Inspect the heating system annually and clean if required.
- ▶ Carry out maintenance as required. To prevent damage to the heating system, remedy all faults immediately.

3.9 Tools, materials and auxiliary equipment

For boiler installation and maintenance, the tools generally required by heating system installers and those dealing with gas and water installations are required.

In addition, the following is appropriate:

- 2 pipes (approx. R 1¼ , approx. 2 m long) for carrying or
  5 pipes (approx. R 1¼ , 0.7 m long) as supports for rolling the boiler.

3.10 Validity of regulations

Modified regulations or supplements are also valid at the time of installation and must be observed.

4 Transporting the boiler

This chapter details how to safely transport the boiler.

NOTICE: Boiler damage through impact!
The standard delivery of the boiler includes components that are susceptible to impact damage.

- ▶ Protect all components against impact influences when transporting the boiler.
- ▶ Observe the transport markings on the packaging.

NOTICE: Boiler damage through contamination!
If the boiler is not to be taken into use after unpacking:

- ▶ Protect the boiler against contamination by leaving the protective caps fitted to the connections.

4.1 Checking the delivery for completeness

- ▶ After delivery, check all packaging is in perfect condition.
- ▶ Check the delivery for completeness (→ Tab. 3 and Tab. 4, page 6).
- ▶ Dispose of packaging in an environmentally responsible manner.

4.2 Lifting and handling the boiler

After removing the front and side panels, the boiler can be carried with 2 pipes (R 1¼ , approx. 2 m long) to the installation location.

Removing the front and side panels

- ▶ Remove locking screw [3] from the top of the front panel at the centre of the boiler.
- ▶ Slightly lift front panel [1] and remove towards the front.
- ▶ Remove locking screws [3] from the side panels at the front and back of the boiler.
- ▶ Slightly lift side panels [2] and remove.

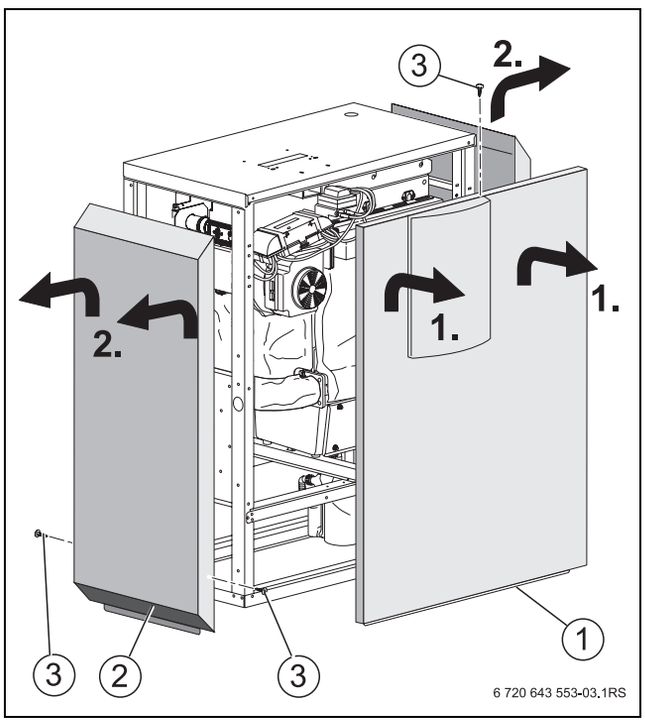


Fig. 3 Removing the front and side panels

1 Front panel
2 Side panel
3 Locking screws

Lifting the boiler from its pallet

- ▶ To lift the boiler from its pallet [2], first remove locking screws [1] at the bottom of the boiler.

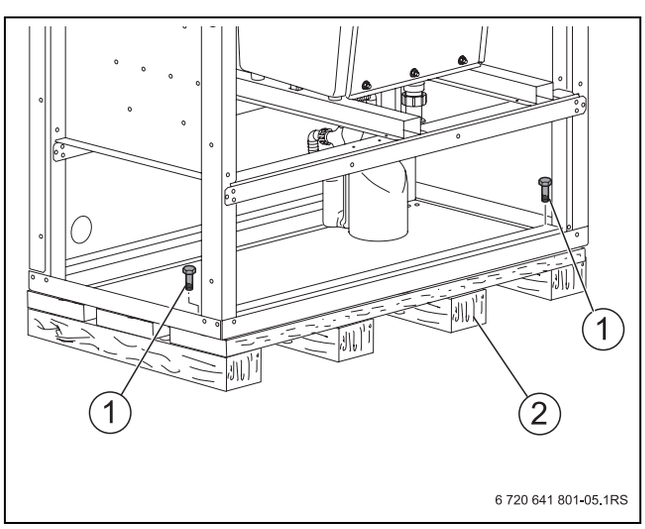


Fig. 4 Lifting the boiler from its pallet

1 Locking screws
2 Pallet

Transporting the boiler using pipes

WARNING: Risk of injury through incorrect lifting and carrying!
- ▶ Lifting and carrying the boiler requires at least 4 persons.
- ▶ Only lift the boilers at the points provided.
- ▶ Secure the boiler against slippage.

- ▶ Slide the pipes through the holes in the front of the boiler.
- ▶ Secure pipes against slippage at the points shown in Fig. 5 [1], e.g. with adhesive tape.
- ▶ Carry the boiler to the installation location.

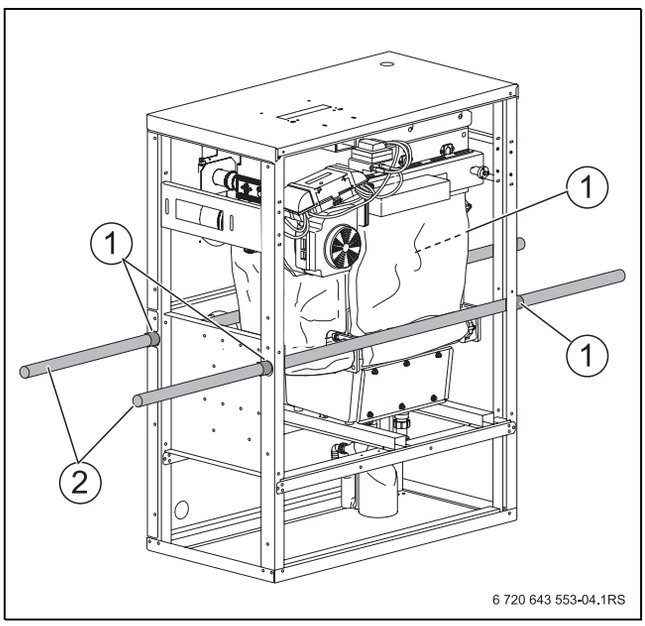


Fig. 5 Transporting the boiler using pipes

1 Points to secure the boiler against slippage
2 Pipe

4.3 Transporting the boiler on rollers

If the path to the installation location is level, the boiler can also be rolled. For this, use at least 5 pipes of approx. 700 mm length (R 1¼ " diameter) as rolling supports.

- ▶ Position the pipes approx. 400 mm apart on the floor.
- ▶ Lift the boiler onto the pipe sections and carefully transport it to the installation location.

Commercially available transport rollers can be used.
- ▶ Ensure even load distribution on the load-bearing parts to prevent distortion of the bottom plate.

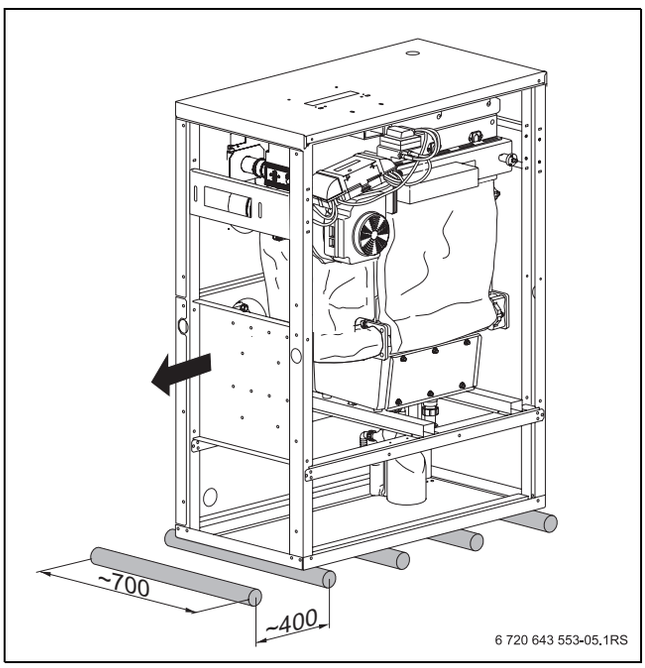


Fig. 6 Transporting the boiler on rollers (measurements in mm)

5 Installation

This chapter details how to install the boiler correctly. This involves the following steps:

- Siting
- Flue gas connection
- Hydraulic connection
- Connecting the fuel supply

5.1 Installation requirements

NOTICE: System damage due to frost!

▶ Site the heating system in a room safe from the risk of frost.

DANGER: Danger through explosive and easily flammable materials!

▶ Never use or store easily flammable materials (paper, curtains, clothing, thinners, paints, etc.) in the vicinity of the boiler.

NOTICE: Risk of boiler damage from contaminated combustion air!

▶ Never use chlorinated cleaning agents or halogenated hydrocarbons (as contained in spray cans, solvents, cleaning agents, paints and adhesives, for example).

▶ Never store or use such materials in the boiler room.

▶ Avoid very dusty atmospheres (building dust).

NOTICE: Boiler damage through overheating!

Excessive ambient temperatures can result in heating system damage.

▶ Ensure ambient temperatures above 0 °C and below 35 °C.

▶ Where the boiler surroundings are sensitive to noise (e.g. residential units), use the silencer options offered by the manufacturer (flue gas silencers, compensators).

5.2 Wall clearances

Position the boiler with the recommended wall clearances. Reducing the minimum clearances makes access to the boiler difficult.

The boiler base or foundation must be perfectly flat and level.

Where appropriate, observe further wall clearances of additional components, such as DHW cylinder, pipe connections, flue gas silencers or other components on the flue gas side, etc.

Dimension	Wall clearance (mm)	
	minimum	recommended
A	500	700
B	550	700
C	100	500
D	500	700

Tab. 12 Recommended and minimum wall clearances (dimensions in mm).

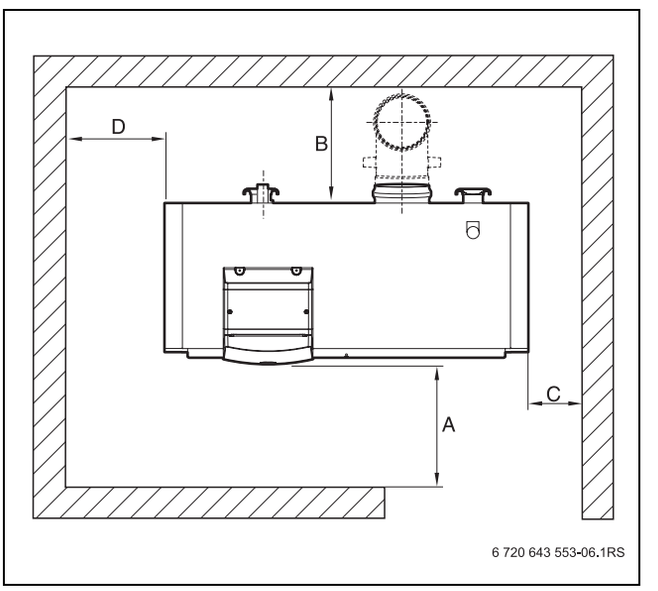


Fig. 7 Wall clearances in the installation room (boiler placed on the left or right)

5.3 Levelling the boiler

The boiler must be level to prevent air pockets forming inside the boiler and to ensure that the condensate can freely drain from the condensate pan.

NOTICE: Boiler damage through insufficient load-bearing capacity of the installation area or unsuitable substrate!

- ▶ Ensure that the installation area offers sufficient load-bearing capacity.

- ▶ Bring the boiler into its final position.
- ▶ Level the boiler horizontally by means of the adjustable feet [1] and a spirit level [2].

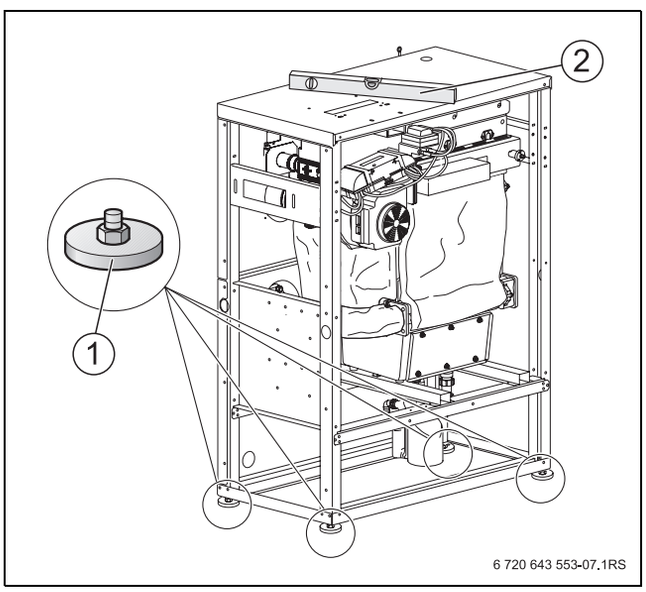


Fig. 8 Levelling the boiler

1 Adjustable feet
2 Spirit level

5.4 Flue and ventilation air connections

5.4.1 Making the flue connection

When installing the flue connection, observe the following:

- Country-specific regulations.
- The flue pipe cross-section must comply with all current regulations.
- Select the shortest possible route for the flue pipe.
- Lay the flue pipes so that they slope upwards.

DANGER: Risk to life from escaping flue gas inside the installation room!

- ▶ Gaskets in the flue connections must be present, in perfect condition and correctly inserted.

- ▶ Insert the boiler connection elbow (accessory) into the flue connection.
- ▶ Make the flue connection in accordance with the requirements applicable in your country.

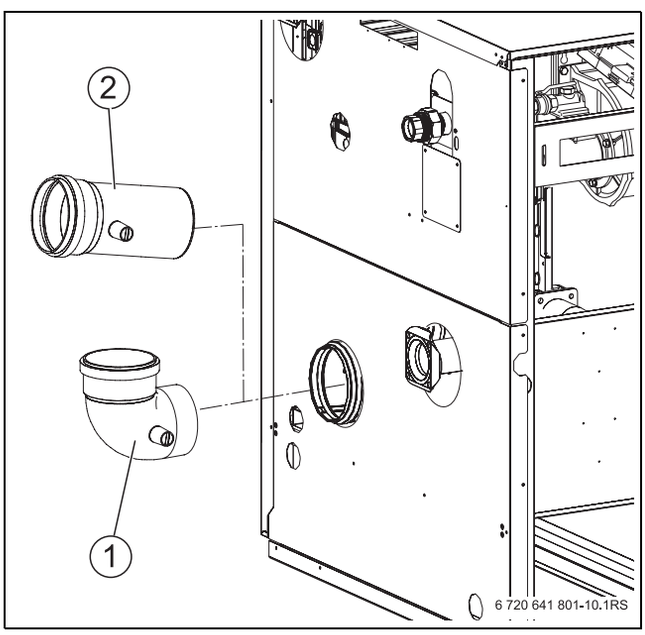


Fig. 9 Fitting the flue connection

1 Boiler connection elbow (accessory)
2 Boiler connector (accessory)

5.4.2 Making the ventilation air connection (Room sealed operation)

The combustion air is supplied to the boiler either through an external wall connection, a duct or a separate pipe in the duct.

For Room sealed operation, the ventilation air connection elbow RLU is available as an accessory.

- If the side panel is still fitted, remove it now.
- Remove the cover from the rear panel.

To prevent problems when connecting the gas supply, fit the ventilation air connection elbow RLU either on the right or on the left.

- Insert the ventilation air connection elbow RLU through the rear panel into the air inlet connector.

Insulate the ventilation air system to prevent condensate forming inside.

- Connect the ventilation air connection to the ventilation air connection elbow RLU using a standard air ventilation air system which conforms to the requirements applicable in your country.

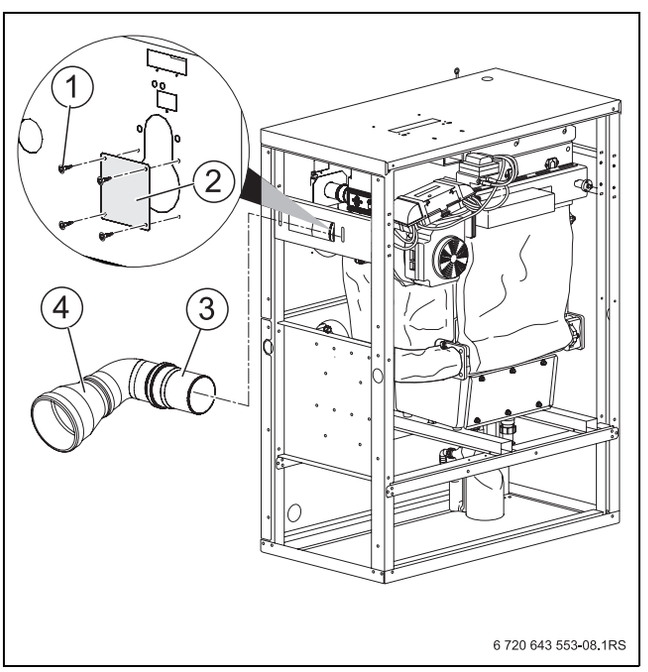


Fig. 10 Making the ventilation air connection for balanced flue operation

1 Screw
2 Cover
3 Ventilation air connection elbow RLU (accessory)
4 Adaptor (accessory)

5.5 Making the water connections

NOTICE: System damage due to leaking connections!

- Install all lines free from stress to the boiler connections.
- Use new gaskets if fittings need to be undone.
- Only tighten flanges in the heating flow and return after the connections have been made.
- Before installing the pipe connections, check connections and gaskets on the boiler for possible damage.

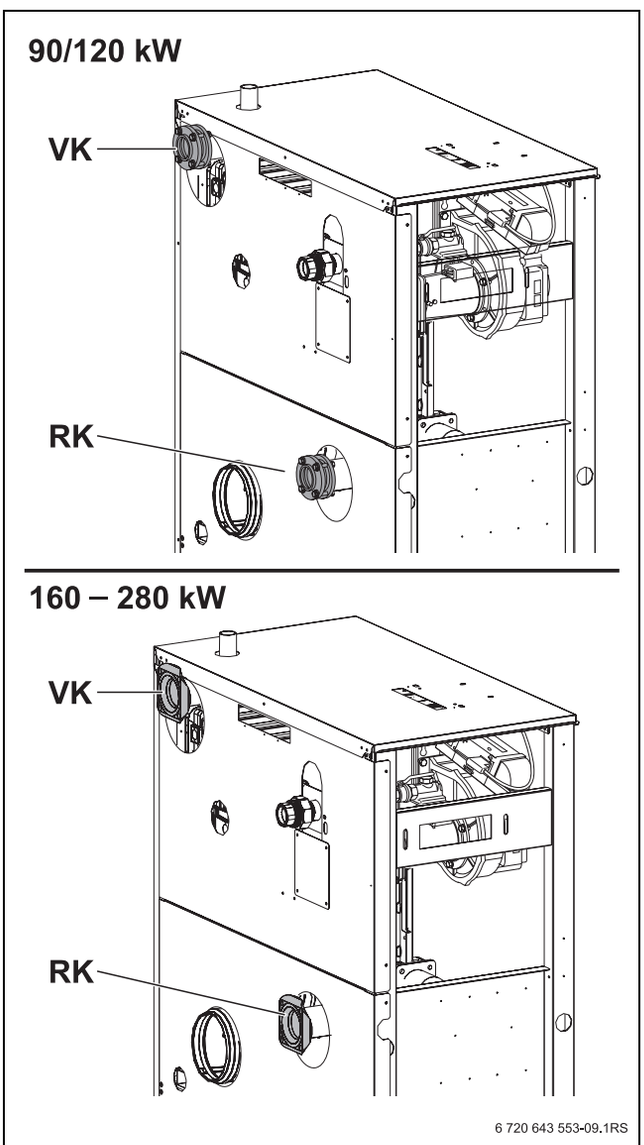


Fig. 11

RK Return
VK Flow

Boiler output	Boiler flow (VK) Boiler return (RK)	
90 - 120 kW	DN 50	Rp 2
160 - 280 kW	DN 65	PN6 standard flange EN1092

Tab. 13 Water connection dimensions

We recommend the installation of a dirt trap in the return to prevent contamination on the water side.

5.5.1 Connecting the heating flow

Subject to the software version of the burner control unit, the boiler is equipped either with or without a check valve.

Check valve included in the standard delivery:
- ▶ Fit check valve [4] in the flow.

- ▶ Remove mating flange [3] in flow VK.
- ▶ Fit mating flange to the flow pipe (on site) (→ Tab. 13, page 21).

NOTICE: System damage through incorrectly fitted or missing check valve!
- ▶ Install the check valve in the direction of flow away from the boiler (observe the arrow on the check valve - the check valve closes against the direction of the arrow).

- ▶ Insert gasket [8] between mating flange [3] and check valve [4].
- ▶ Insert gasket between the flange on the boiler and the check valve.
- ▶ Tighten the flange connection by hand with four screws [1] and nuts [7] (each with washer).
- ▶ Centre the check valve with fitting aid [5] and simultaneously tighten the screws firmly.

Check valve not included in the standard delivery:
Check valves are not required in single boiler systems. The software of the burner control unit will recognise incorrect flow. This would result in a fault shutdown.

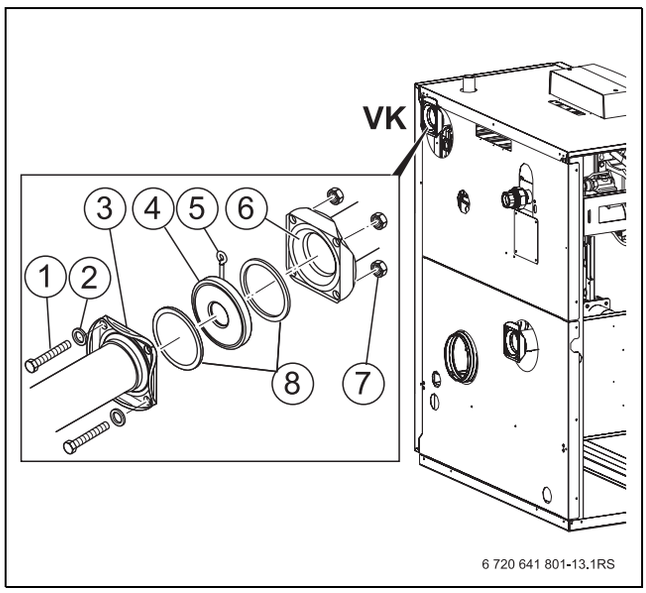


Fig. 12 Fitting the flow

1 Screw (4 x)
2 Washer (4 x)
3 Mating flange
4 Check valve
5 Fitting aid
6 Flange on boiler flow
7 Nuts with washers (4 x)
8 Gasket (2 x)

Multi-boiler systems or cascades

In multi-boiler systems a check valve [4] must be fitted to prevent excessive cooling losses and faults (irrespective of the software version of the burner control unit).

- The check valve is part of the accessory pack when using the boiler accessories for connecting cascades.
- When creating multi-boiler systems or cascades on site, use the following check valves:
  - for boilers 90/120 kW: DN50-PN6-Oventrop packed
  - for boilers 160 - 280 kW: DN65-PN6-Oventrop packed

5.5.2 Connecting the heating return

- ▶ Remove mating flange [3] from return RK.
- ▶ Fit mating flange to the return pipe (on site) (→ Tab. 13, page 21).
- ▶ Insert gasket [8] between the boiler flange and the mating flange.
- ▶ Secure the flange connection with four screws [1] and nuts [7] (each with washer).

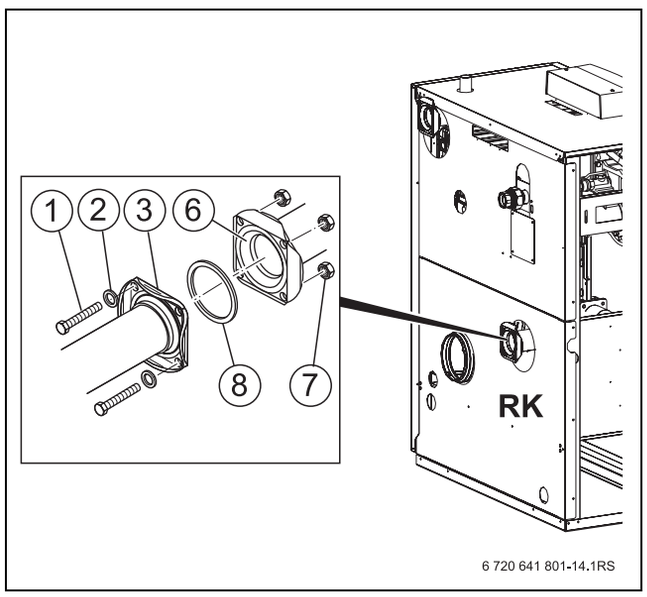


Fig. 13 Fitting the return

1 Screw (4 x)
2 Washer (4 x)
3 Mating flange
6 Flange on boiler return
7 Nuts with washers (4 x)
8 Gasket

5.5.3 Installing a DHW cylinder

You can also connect a DHW cylinder to the VK and RK connections. The external cylinder primary pump can be controlled by the control unit.

5.5.4 Fitting safety valve and automatic air vent valve or safety assembly (provided by customer)

NOTICE: System damage through incorrect installation!

- ▶ Fit the safety valve and automatic air vent valve or safety assembly to the safety connection on the flow.

- ▶ Fit the blow-off line on site to the safety valve.

The following automatic air vent valves can be used with the safety valve:

- Quick-acting air vent valve with shut-off valve
- Taco-Hy-Vent float air vent

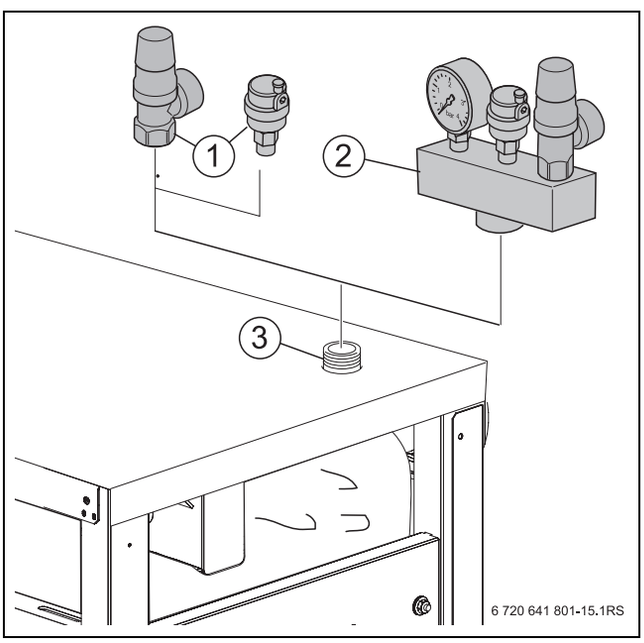


Fig. 14 Installing the safety valve

1 Safety valve and automatic air vent valve (install on site; required accessory)
2 Safety assembly (required accessory)
3 Safety connection
R 1" (for 90 and 120 kW)
R 1¼ " (for 160 to 280 kW)

5.5.5 Installing the condensate drain

DANGER: Risk to life from flue gas!
Siphons that are not filled with water can pose a risk to life through escaping flue gas.

- ▶ Fill the siphon with water.
- ▶ Ensure that the siphon and the flue connections are sealed correctly.
- ▶ Ensure that the sealing washer with gasket is seated in the locking cap.

- ▶ Remove the siphon [5].
- ▶ Undo locking cap [4] and fill siphon with approx. 2 litres of water.

▶ Install the siphon.

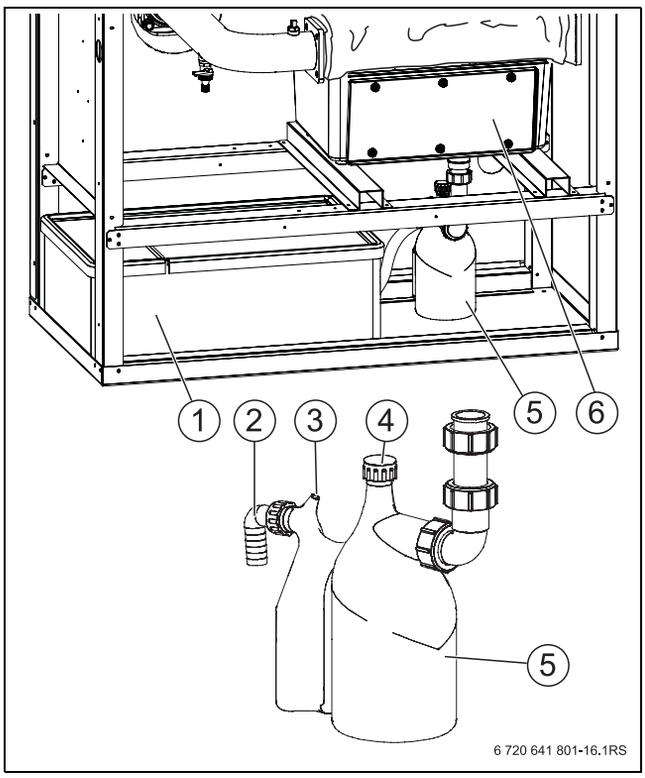


Fig. 15 Installing the condensate hose

1 Neutralising system (accessory)
2 Siphon outlet to the neutralising system and sewer
3 Vent on the siphon
4 Locking cap
5 Siphon
6 Condensate pan

Condensate may leak through the vent on siphon [3].
▶ Route the condensate drain away from the siphon with a fall.

Observe the following when draining condensate:
▶ Drain all condensate correctly.
▶ Drain condensate into public sewers in accordance with the regulations applicable in your country.
▶ Observe regional regulations.

Neutralisation devices are available as an accessory and can be fitted inside the boiler casing.
▶ Installing the neutralising system (accessory) in accordance with the installation instructions
▶ Fit the siphon provided to the drain on the condensate pan.

DANGER: Risk to life from flue gas!
▶ If the internal boiler siphon is not used, route the condensate from the flue system via a separate siphon.

5.5.6 Fitting the connection for the diaphragm expansion vessel

Fit a tee [2] and a double nipple [1] to the return on site to enable the installation of a diaphragm expansion vessel (accessory).

▶ Fit drain tap [3] to the return.
▶ Seal in and tighten the double nipple on site in place of the drain tap.
▶ Apply sealant to the tee (on site) and screw it onto the double nipple with the opening pointing towards the rear panel.
▶ Insert the drain tap into the tee.
▶ Install the line to the diaphragm expansion vessel on site through the connection in the back panel.

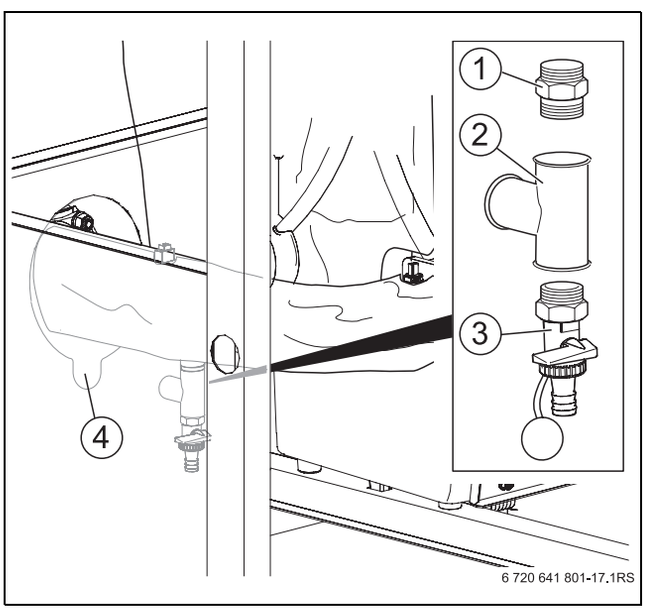


Fig. 16 Connection for diaphragm expansion vessel

1 Double nipple
2 Tee
3 Drain tap
4 Cut-out for the diaphragm expansion vessel connection (in the back panel)

5.6 Filling the heating system and checking for leaks

Before commissioning, check the heating system for leaks to prevent problems during operation.

- Ensure all heating circuits are open with all thermostatic valves fully on.
- Ensure all automatic air vents are able to operate.

NOTICE: System damage through boiler scaling!

- Note the information specified in the operator's log.

NOTICE: Risk of system damage from excess pressure when testing for leaks!

Pressure, control and safety equipment may be damaged by excessive pressure.

- After filling, pressure-test the heating system with a pressure equal to the response of the safety valve.

NOTICE: System damage!

If the heating system is filled when hot, the resulting temperature stresses can cause stress cracks. The boiler will then leak.

- Only fill the heating system when cold (the flow temperature should not exceed 40 °C).
- Pay attention to the water quality as specified in the operator's log, and record the volume and quality of fill water used.

CAUTION: Health risk from contaminated drinking water!

- Observe all regulations and standards applicable in your country regarding the prevention of drinking water contamination.
- In Europe, observe standard EN 1717.

The heating system should be filled by a method that has been approved by the Water Regulations Advisory Scheme (WRAS) for the type of heating appliance. Non domestic sealed systems are covered by fluid category 4. This means that an assembly incorporating an RPZ valve will be necessary.

If an auto fill unit is used it is important to ensure that each boiler in a system has its own expansion vessel adjacent to the boiler in accordance with BSEN 12828. The connection of the auto fill unit into the heating system should be in the flow header, to avoid causing thermal stress to the boiler.

Check the connections and pipe work for leaks.

Vent the heating system via all air vents on the system.

Once the heating system has been tested, vented and there are no leaks, set the system operating pressure.

5.7 Fuel connection

DANGER: Risk to life from explosion of flammable gases!

- Work on gas components must only be carried out by an authorised gas fitter.
- Observe all local regulations relating to the gas connection.
- Seal in the gas connections with an approved sealant.

- Install a gas shut-off valve in the gas supply line. When doing so, prevent the gas line inside the boiler from becoming twisted.

Subject to local regulations, install thermally activated shut-off equipment.
In addition, we recommend the installation of a gas filter and compensator in the gas line in accordance with local regulations.

- Connect a compensator (recommendation) to the gas shut-off valve.
- Connect the gas line to the gas connection or compensator free of stress.
- Secure the gas line with pipe clips so that the gas connection is free from any stresses.
- Close the gas shut-off valve.

5.8 Making the electrical connection

The boiler can only function fully with an installed control unit.

When connecting electrical components, also observe the connection diagram and instructions of the relevant product.

Ensure that a standard-compliant isolator (contact separation > 3 mm) for isolating the boiler from the power supply across all poles is installed.

- Install such an isolator if none is present.

NOTICE: System damage through incorrect installation!
Observe the following points regarding the electrical connection:

- Electrical work on heating systems must only be carried out by qualified electricians.
- If you do not possess an appropriate qualification, ask a qualified electrician to make the electrical connection.
- Observe all local regulations!

DANGER: Risk to life from electric shock when the appliance is open!

- Before opening the boiler:
  Disconnect the heating system from the power supply by means of the emergency stop switch or the relevant circuit breaker/ fuse in the main fuse board. It is not enough to switch off the control unit.
- Safeguard the heating system against unintentional reconnection.

5.8.1 Installing the control unit

- Insert the push-in hooks of the control unit into the oval holes of the front boiler cover.
- Push the control unit towards the outside edge of the boiler.
- Let the resilient hooks of the control unit click into the openings by pushing the control unit.

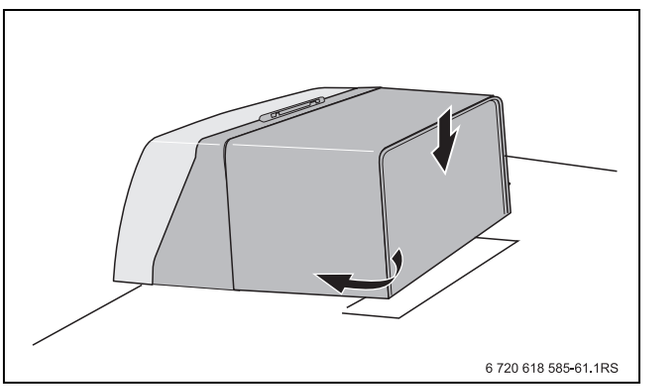


Fig. 17 Fitting the control unit (Logamatic MC10)

5.8.2 Mains power connection and connection of additional components

Create a permanent power connection in accordance with local regulations.

You can fit up to four modules (accessories) in the boiler in the position shown in Fig. 18 [1].

- When installing a module, follow the relevant documentation.

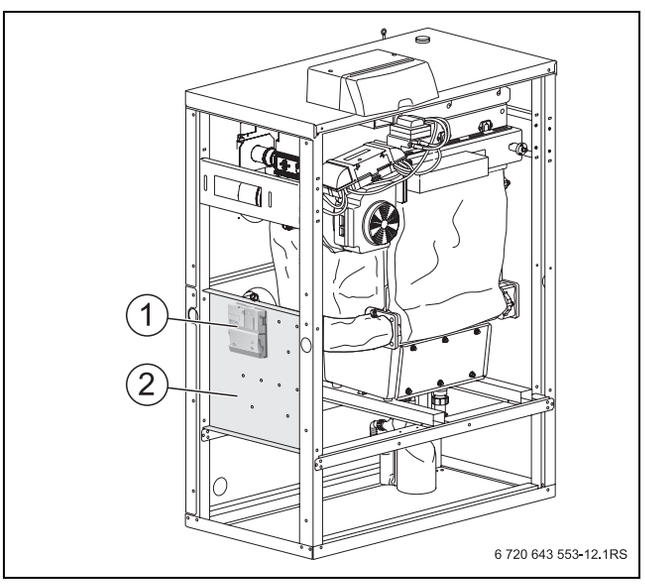


Fig. 18 Fitting modules

1 Module (accessory)
2 Mounting plate

- Release two screws on the control unit cover and remove the cover.

DANGER: Risk to life from electric shock!
Incorrectly terminated cables can result in faulty operation and possible dangerous consequences.

- When making the electrical connections, observe the connection diagram of the MC10 and its installation instructions (part of the standard delivery of the control unit).

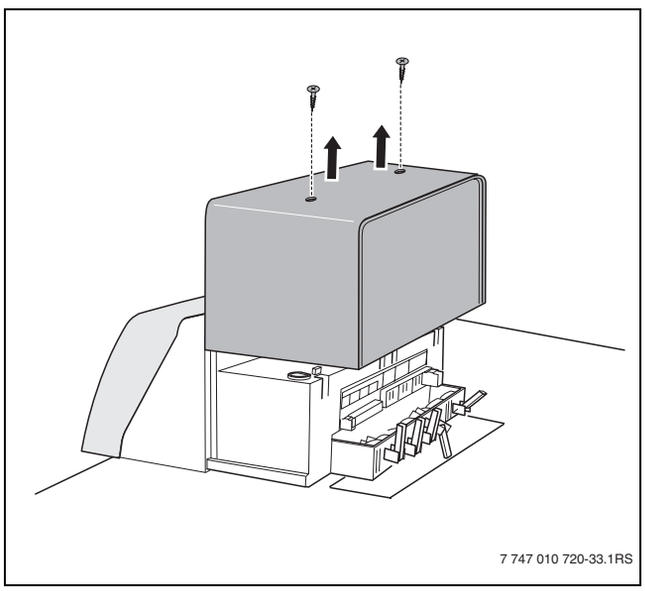


Fig. 19 Removing the cover

DANGER: Risk of fire through hot boiler components!
Hot boiler components may damage electrical cables and leads.

- Ensure that all cables are routed through the cable entries provided or along the boiler insulation material.

NOTICE: System damage through incorrect control!

- Route low and ultra low voltage cables separately inside the cable ducts.

- Route all cables through the cable entries to the control unit and connect in accordance with the connection diagram.

- Secure all cables with cable clips (part of the standard delivery).

1. Insert the cable clip together with the cable from the top into the slot in the frame.
2. Slide the cable clip downwards.
3. Counterhold.
4. Flip the lever up.

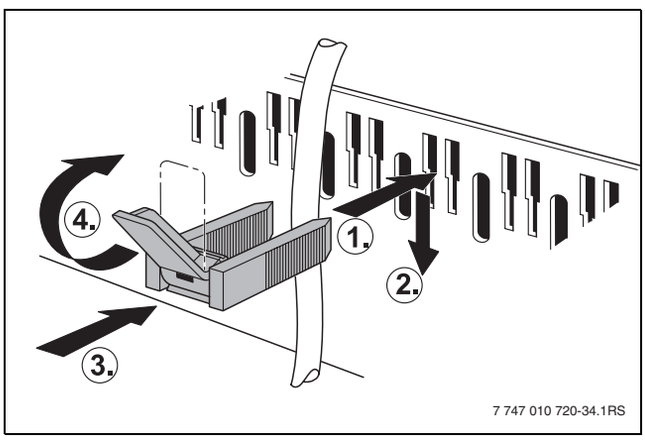


Fig. 20 Securing cables with cable clips

5.8.3 Fitting the cover

- Push the control unit cover down into the guide rails.
- Secure the control unit cover with 2 screws.

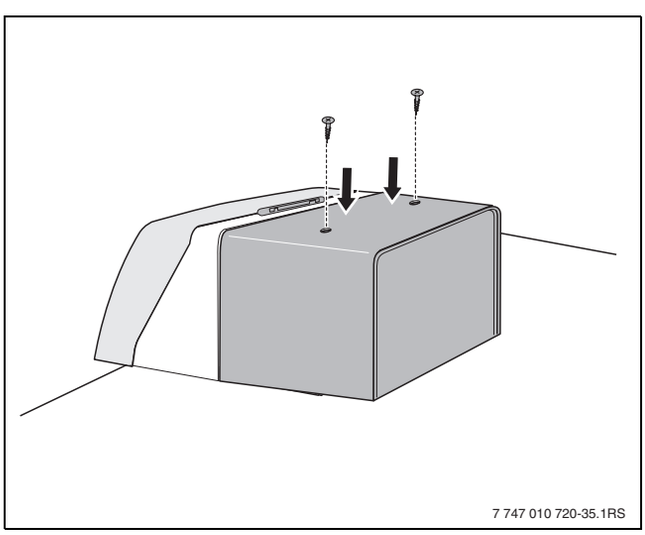


Fig. 21 Fitting the cover

5.9 Levelling the boiler vertically

The boiler must be vertically plumb to enable the side panels to be hooked in.

- Undo nuts [2].
- To plumb the boiler vertically using a spirit level [3], wind screws [1] in or out, as required.
- Tighten the nuts when the boiler is plumb.

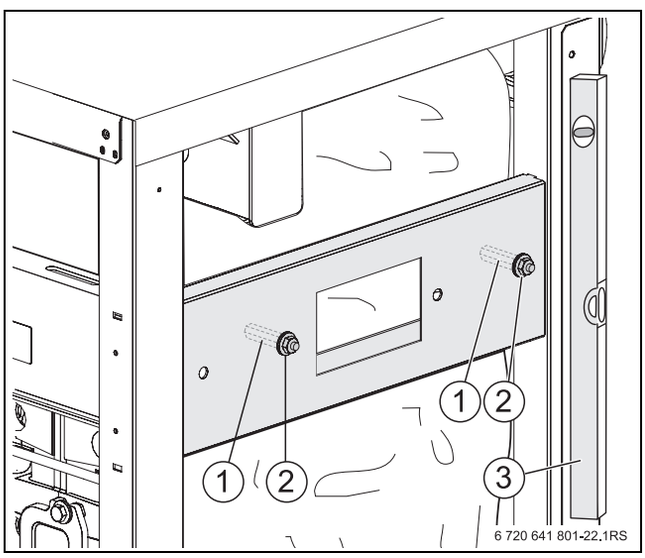


Fig. 22 Levelling the boiler vertically

1 Screws
2 Nuts
3 Spirit level

6 Commissioning

This chapter describes commissioning using the standard control unit module.

- After completing the work described below, complete the commissioning report (→ Chapter 6.23).

NOTICE: Boiler damage through excessive dust and dirt contamination in open flue mode!

Strong dust and dirt contamination can occur, for example, due to building work in the installation room.

- During building work, operate the boiler in balanced flue mode.

NOTICE: Risk of boiler damage from contaminated combustion air!

- Never use chlorinated cleaning agents or halogenated hydrocarbons (as contained in spray cans, solvents, cleaning agents, paints and adhesives, for example).
- Never store or use such materials in the boiler room.
- Avoid very dusty atmospheres (building dust).

- A burner contaminated during building work must be cleaned before commissioning.
- Inspect flue and combustion air pipework (with balanced flue operation) and the apertures for combustion air supply and ventilation (→ Chapter 3.4, page 14).

6.1 Checking the operating pressure

This boiler cannot be operated with open vented heating systems.

- Prior to commissioning, check the operating pressure of the heating system on the water side and adjust if required.

NOTICE: System damage through boiler scaling!

- Observe the details in the "Water quality log".

- Set the red needle [1] of the pressure gauge to the required operating pressure of at least **1 bar**.

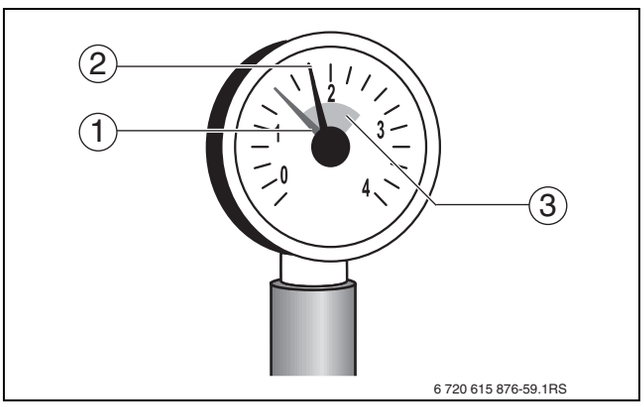


Fig. 23 Pressure gauge for sealed unvented systems

1 Red needle
2 Pressure gauge needle
3 Green band

CAUTION: Health risk from contaminated drinking water!

- Observe all regulations and standards applicable in your country regarding the prevention of drinking water contamination.
- In Europe, observe standard EN 1717.

- During filling, vent the heating system via the radiator bleed valves.

6.2 Recording gas parameters

Check the gas parameters (Wobbe index and calorific value) with the relevant gas supply utility and enter them in the commissioning report (→ Chapter 6.23).

6.3 Check the system equipment level

In its delivered condition, the burner is set up to be operated with natural gas H or L.

Only use the burner with the correct gas nozzles.

- ▶ Check with the relevant gas supply utility which gas type is supplied.
- ▶ Check whether the actual gas type is the same as that stated on the type plate.

Country:	Gas type	Factory settings
AT, BA, BE, BG, BY, CH, CN, CZ, DE, DK, EE, ES, FR, GB, GR, HR, HU, IE, IT, LU, LT, LV, NO, PL, PT, RO, RU, SE, SI, SK, UA	Natural gas H or E (G20)	Factory-set ready for use. The gas train is adjusted and sealed. Wobbe index for 15 °C, 1013 mbar: • Adjusted to 14.1 kWh/m^3 • Applicable for 11.4 to 15.2 kWh/m^3 Wobbe index for 0 °C, 1013 mbar: • Adjusted to 14.9 kWh/m^3 • Applicable for 12.0 to 16.1 kWh/m^3
DE	Natural gas L	Factory-set ready for use. The gas train is adjusted and sealed. Wobbe index for 15 °C, 1013 mbar: • Adjusted to 12.1 kWh/m^3 • Applicable for 11.4 to 12.4 kWh/m^3 Wobbe index for 0 °C, 1013 mbar: • Adjusted to 12.8 kWh/m^3 • Applicable for 12.0 to 13.1 kWh/m^3
NL	Natural gas L (G25)	Factory-set ready for use. The gas train is adjusted and sealed. Wobbe index for 15 °C, 1013 mbar: • Adjusted to 11.5 kWh/m^3 • Applicable for 10.85 to 12.4 kWh/m^3 Wobbe index for 0 °C, 1013 mbar: • Adjusted to 12.2 kWh/m^3 • Applicable for 10.6 to 13.8 kWh/m^3

Tab. 14 Factory settings

6.4 Checking for leaks

Prior to commissioning, check all new line sections on the gas side for external gas tightness.

DANGER: Risk of explosion!
Leaking gas lines and gas connections create the risk of explosions.
- ▶ Carry out an appropriate tightness test with a foaming agent.

NOTICE: System damage!
- ▶ Prior to checking for leaks, cover the areas at risk, e.g. the internal water pressure sensor and the return temperature sensor at the boiler return.
- ▶ Never spray or let leak detection agent drip onto cable entries, plugs or electrical cables/leads.

- ▶ Check the new pipe section, including the seal at the gas train, for external leaks.
  The test pressure on the gas train inlet must be no higher than 150 mbar.

If a leak is found during the tightness test, carry out a tightness test on all connections using a foam leak detector. The agent must be approved for gas tightness testing.
- ▶ Never allow the agent to come in contact with electrical cables.

- ▶ Confirm the tightness test with an entry into the commissioning report (→ Chapter 6.23).

6.5 Gas type conversion

If you discover that the boiler has been ordered for the wrong gas type, convert it to the correct gas type, and update the type plate accordingly.

6.5.1 Conversion for boiler size 90 and 120 kW

The boiler is converted to a different gas type by replacing the gas restrictor.

Use only the gas restrictors listed in Tab. 15.

Boiler size	Gas type	Gas restrictor diameter
90/120 kW	Natural gas H (Wobbe index 14.9 kWh/m^3)	15.7
	Natural gas L - DE (Wobbe index 12.8 kWh/m^3)	15.0
	Natural gas L - NL (Wobbe index 12.2 kWh/m^3)	14.8

Tab. 15

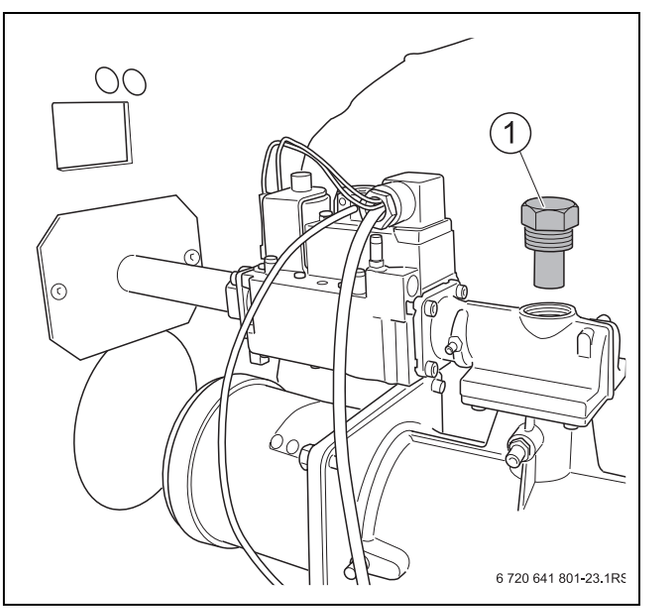


Fig. 24 Replacing the gas restrictor (boiler size 90/120 kW)

1 Gas restrictor

6.5.2 Conversion for boiler size 160 kW

The boiler size 160 kW is not equipped with a gas restrictor. Consequently, the conversion is achieved via the full load adjusting screw.

Converting from gas type H to gas type L:

- Rotate full load adjusting screw [1] one half turn anti-clockwise.

Converting from gas type L to gas type H:

- Rotate full load adjusting screw [1] one half turn clockwise.

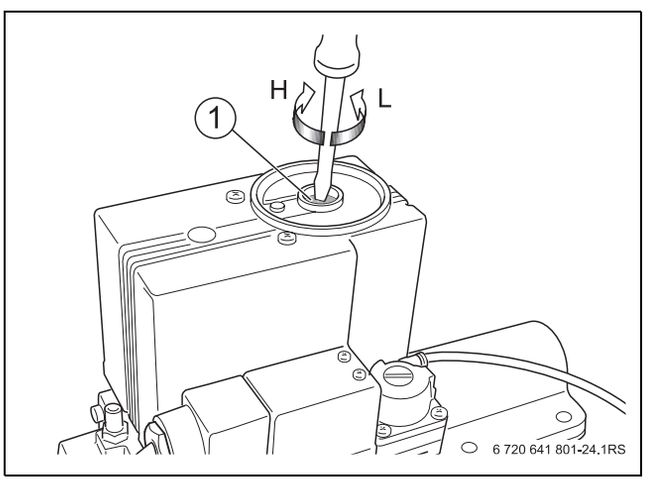


Fig. 25 Conversion to a different gas type (boiler size 160 kW)

1 Full load adjusting screw

6.5.3 Conversion for boiler sizes from 200 to 280 kW

Converting from gas type H to gas type L:

- Increase the value of adjusting screw V (→ Fig. 26, [2]) by 0.5, e.g. from setting 1.1 to 1.6.

Converting from gas type L to gas type H:

- Decrease the value of adjusting screw V (→ Fig. 26, [2]) by 0.5, e.g. from setting 1.6 to 1.1.

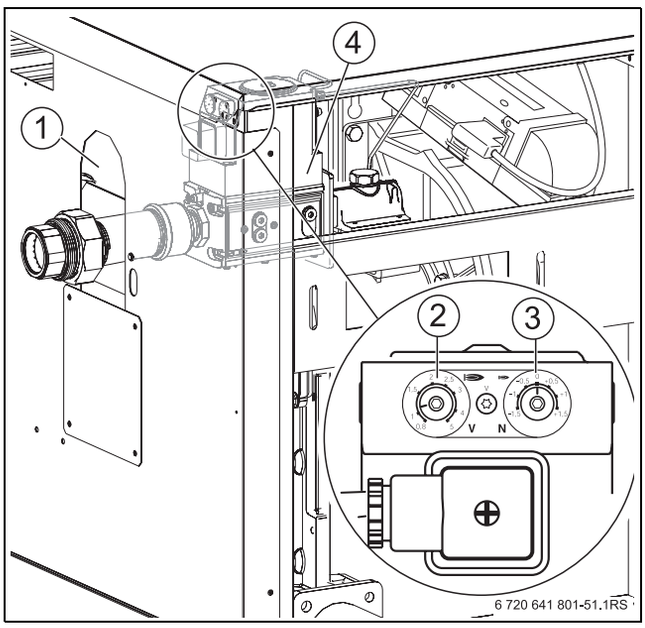


Fig. 26 Conversion to a different gas type (boiler size 200 to 280 kW)

1 Apertures for adjusting the gas train
2 Adjusting screw V (sealed)
3 Adjusting screw N (sealed)
4 Gas train

6.5.4 Updating the type plate

- Affix label [2] (supplied with the boiler) in the respective area over type plate [1] (on the side panel).

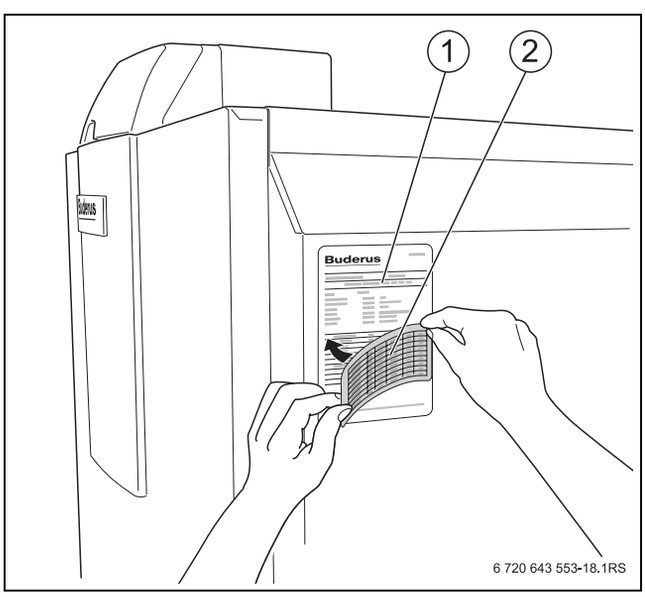


Fig. 27 Updating the type plate

1 Type plate
2 Label (gas values)

6.6 Purging the gas line

- Undo the pressure test nipple plug for the gas supply pressure and purging (→ Fig. 28, 29, 30 [1]) by two revolutions, and push on the hose.
- Slowly open the gas tap.
- Flare off escaping gas via a hydraulic seal. Remove the hose when no more air is expelled, and tighten the plug.
- Close the gas tap.

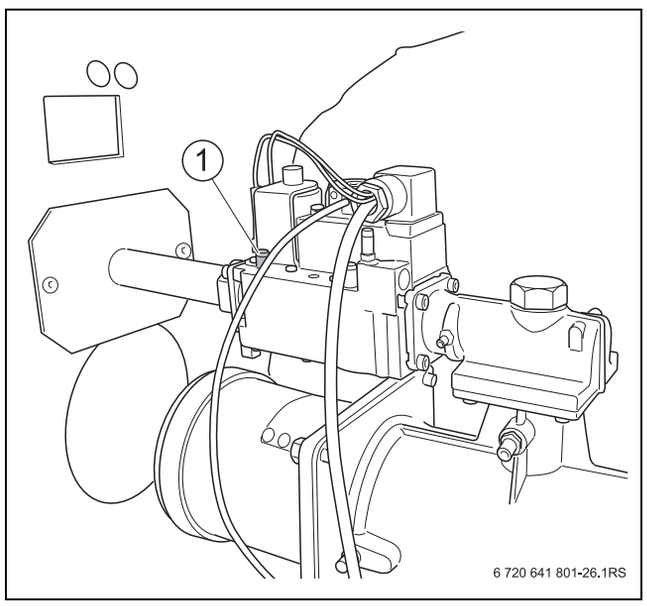


Fig. 28 Purge the gas line (boiler size 90/120 kW)

1 Pressure test nipple for testing the gas supply pressure and for purging

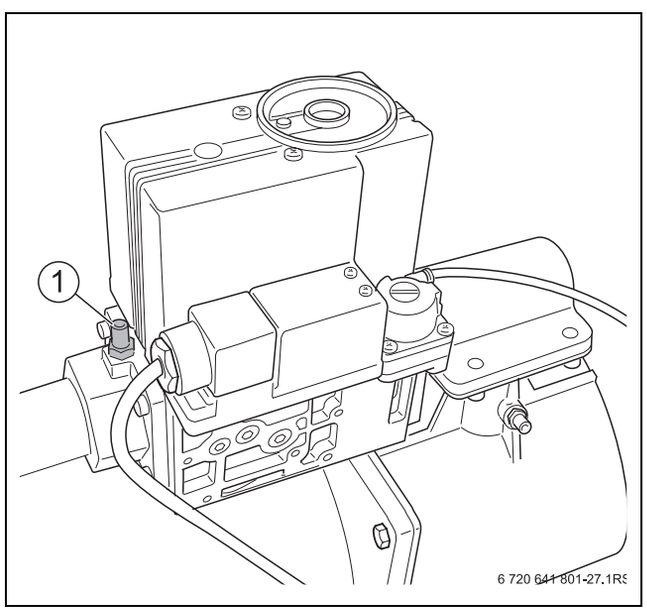


Fig. 29 Purging the gas line (boiler size 160 kW)

1 Pressure test nipple for testing the gas supply pressure and for purging

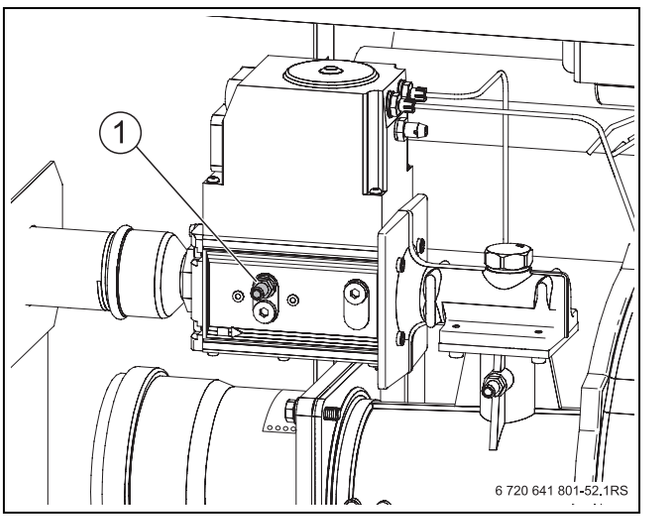


Fig. 30 Purging the gas line (boiler size 200 to 280 kW)

1 Pressure test nipple for testing the gas supply pressure and for purging

6.7 Checking the ventilation and extract air apertures and the flue connection

- Check whether the apertures for ventilation and extract air comply with locally applicable regulations or those of your gas supply utility. Have any faults rectified immediately.

DANGER: Risk to life through poisoning!
An insufficient supply of air can result in dangerous escape of flue gas.

- Never block ventilation and extract air apertures or reduce their size.
- The boiler must not be operated, unless you immediately remedy the fault.
- Inform the system user in writing of the problem and associated risk.

- Check whether the flue connection complies with the applicable requirements (→ Chapter 3.4, page 14).
- Have any faults rectified immediately.

6.8 Check the ventilation air diaphragm

- Check whether ventilation air diaphragm [1] is fitted to air inlet connector [2] and abuts the pipe.
- Check that the ventilation air diaphragm on the air inlet connector is flexible and does not stick to the pipe.

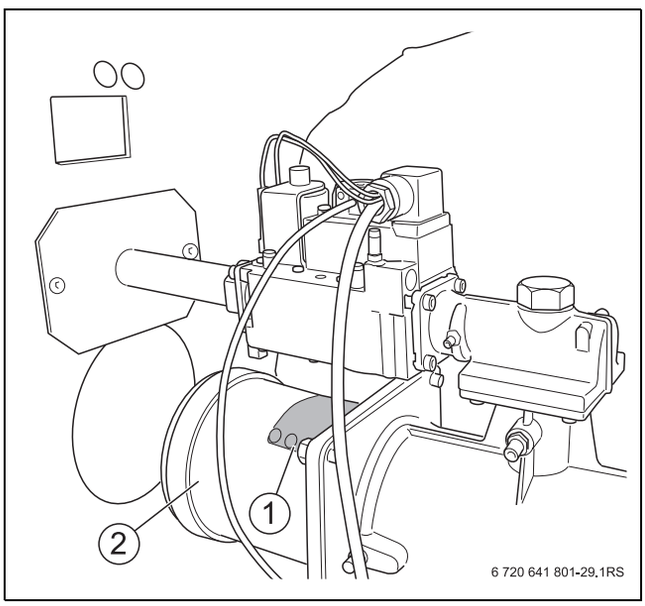


Fig. 31 Check the ventilation air diaphragm

1 Ventilation air membrane
2 Air inlet connector

6.9 Preparing the heating system for operation

- Open the main shut-off valve or gas tap.
- Switch ON the heating system emergency stop switch (if installed) and/or the corresponding main circuit breaker.

6.10 Switching on the boiler at the BC10

- Set the rotary selector for “maximum boiler temperature” and the rotary selector for “set DHW temperature” to 0.
  This ensures that the burner will not start yet (there is no heat demand).
- Set the ON/OFF switch on the base controller to position “1”.
  The entire heating system is switched on. During commissioning, “-” briefly flashes on the display, then fault message “4A”-“700” is displayed. Fault display “4A”-“700” appears, as the burner is supplied in a fault state.
- Wait approx. 1 minute to enable the EMS connection to the RC35 programming unit (available separately) to be established.

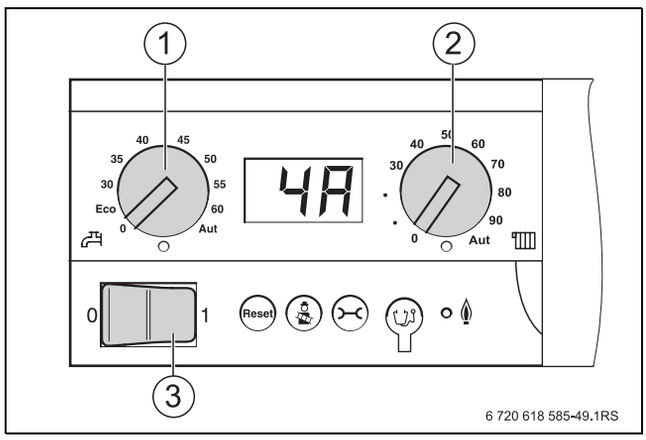


Fig. 32 Logamatic BC10 basic controller

1 “Set DHW temperature” rotary selector
2 “Maximum boiler temperature” rotary selector
3 ON/OFF switch

- Press “Reset” on the BC10. The status display on the BC10 illuminates and the display shows the current boiler water temperature in °C.

If fault message “A11” appears, set the date and time on the RC35 programming unit. Only then will the current boiler water temperature be displayed.

Before continuing with further commissioning steps, set the correct parameters on the RC35 programming unit. The DHW heating configuration (heating circuit pump and cylinder primary pump) must be set correctly to ensure the heating system works properly. For this, observe the installation and maintenance instructions of the RC35 programming unit.

When using the Logamatic 4000 control system, take the following commissioning steps:

- Switch off the Logamatic 4000 control unit.
- Install the RC35 programming unit.

6.11 Carrying out a flue gas test

Key (🔧) is used by your heating contractor for the flue gas test.

The heating control unit operates for 30 minutes at a higher flow temperature (ensure heat is drawn off at this time). During the flue gas test, the decimal point illuminates in the status display.

- ▶ Hold down (🔧) until the decimal point in the status display illuminates (at least 2 seconds).
- ▶ Carry out a flue gas test.
- ▶ Cancel the flue gas test; press (🔧) again.

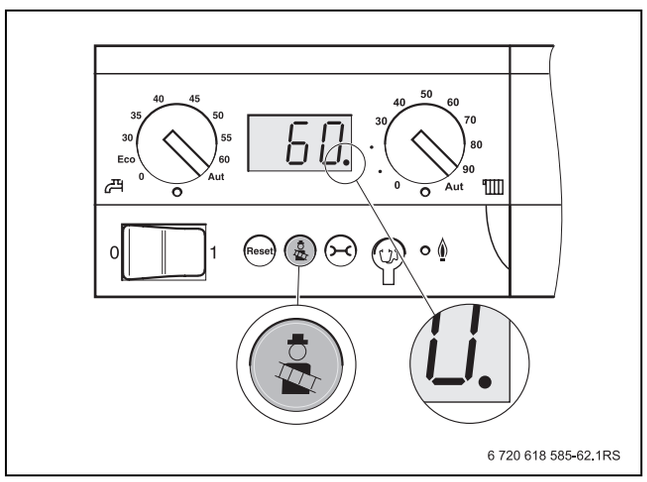
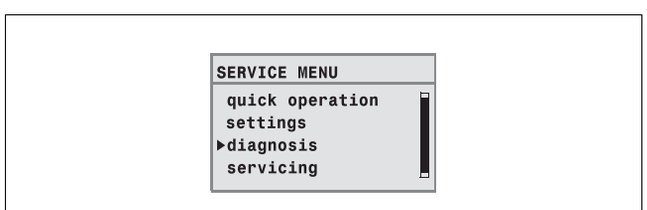


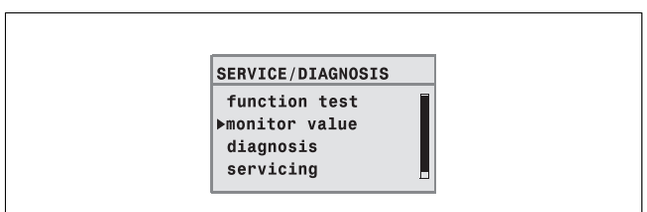
Fig. 33 Calling up the flue gas test

6.12 Calling up the service level of the RC35 programming unit and displaying the monitor data

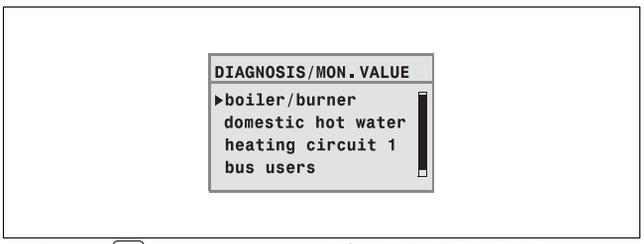
- ▶ Press Menu OK + Info + ↩ simultaneously to open menu **SERVICE MENU**.
- ▶ Turn rotary selector ◯ anti-clockwise until **diagnosis** is selected (highlighted with ►).



- ▶ Press Menu OK to open the **SERVICE/DIAGNOSIS** menu.
- ▶ Turn rotary selector ◯ anti-clockwise, until **monitor value** is selected (highlighted with ►).



- ▶ Press Menu OK to open the **DIAGNOSIS/MON. VALUE** menu.
- ▶ Turn rotary selector ◯ anti-clockwise until **boiler / burner** is selected (marked with ►).



- ▶ Press Menu OK to open menu **BOILER/BURNER**.
  The values monitored are displayed as a list; in other words, more values might appear if the rotary selector is turned.

The current burner output (set/actual) and the flame current can be checked in these menus.

6.13 Checking and adjusting the CO_2 settings under full load

Only check and correct the CO_2 content from a burner output of ≥ 70 % upwards.

- ▶ Activate flue gas test (→ Chapter 6.11).
- ▶ Check the load at the RC35 programming unit or via the service key.
- ▶ Wait until 70 % burner output is achieved.

Gas train boiler size 90/120 kW

- ▶ Check the CO_2 content.
  Insert the test probe through the test port into the core flow inside the flue.
- ▶ Replacement of the gas restrictors at CO_2 values below 8.5 % (→ Fig. 24, page 30).

Wobbe index [kW/m³]	Gas type	Ø Gas restrictor in the delivered condition [mm]	Ø Gas restrictor for lower Wobbe index [mm]
12.0 - 16.1	Natural gas H	15.7	
12.0 - 13.1	Natural gas L - DE	15.0	
10.0 - 12.2	Natural gas L - DE		14.5
10.6 - 13.8	Natural gas L (G25) - NL	14.8	

Tab. 16

Gas train boiler size 160 kW

- ▶ Check the CO_2 content.
  Insert the test probe through the test port into the core flow inside the flue.

- At CO_2 values below 8.5 % adjust full load adjusting screw [1] to 9 %.
  - Turning clockwise reduces the CO_2 content.
  - Turning anti-clockwise increases the CO_2 content.

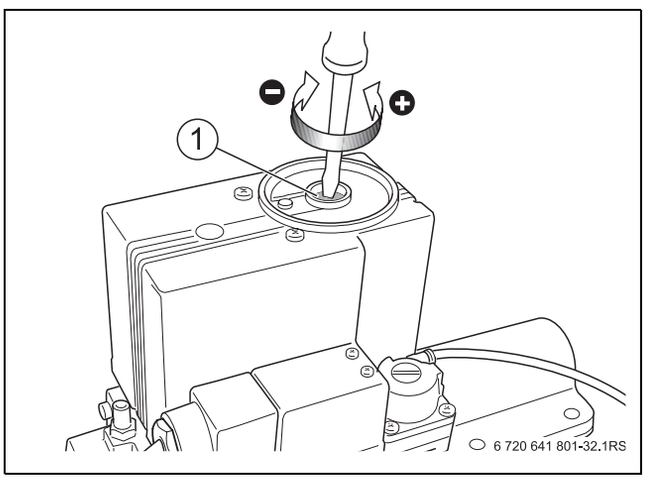


Fig. 34 Correct the CO_2 content under full load (boiler size 160 kW)

1 Full load adjusting screw

- Recheck the CO_2 content and enter the value in the commissioning report, Chapter 6.23.

Gas train boiler size 200 to 280 kW

- Check the CO_2 content.
  At values below 8.5 % or in excess of 9.4 %, make the necessary correction at adjusting screw V.
- Set the CO_2 value to 9.0 %.
  - Turning clockwise increases the CO_2 content.
  - Turning anti-clockwise reduces the CO_2 content.

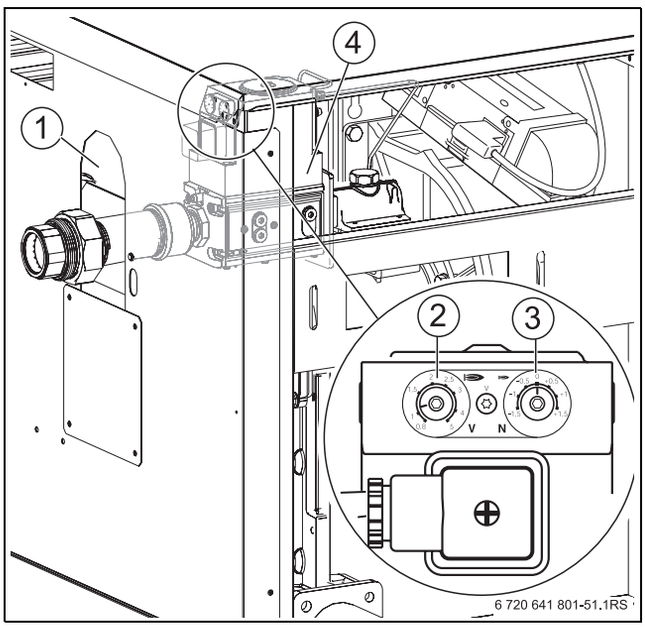


Fig. 35 Correct the CO_2 content under full load (boiler size 200 to 280 kW)

1 Apertures for adjusting the gas train
2 Adjusting screw V (sealed)
3 Adjusting screw N (sealed)
4 Gas train

6.14 Checking and adjusting the CO_2 settings under partial load

- Press (Info) until the decimal point in the status display **illuminates** (at least 2 seconds).
- Press (Info) and (Service) simultaneously and hold for approx. 5 seconds.

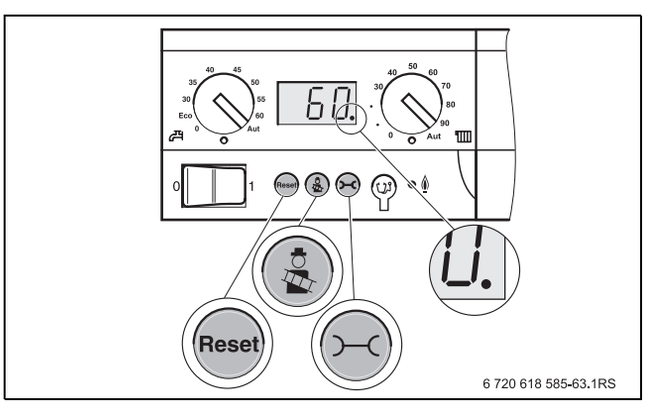


Fig. 36 Calling up partial load on the BC10

With standard settings, the display shows "L - -".

- Press (Reset) to reduce the boiler output in percent to the minimum modulation ranges of the various boiler sizes.
  - L25 for boiler size 120 and 160 kW
  - L33 for boiler size 90 kW
  - L30 for boiler size 200 to 280 kW

  These values represent the minimum modulation ranges for the different boiler sizes.

- Check the load at the RC35 programming unit or via the service key.

Gas train boiler size 90/120 kW

- Wait until the minimum modulation range for the corresponding boiler size (90 kW or 120 kW) has been reached.
- Check the CO_2 content.
  Insert the test probe through the test port into the core flow inside the flue.
- At CO_2 values below 9.0 % or in excess of 9.6 %, adjust partial load adjusting screw [1] to 9.3 %.
  – Turning clockwise increases the CO_2 content.
  – Turning anti-clockwise reduces the CO_2 content.

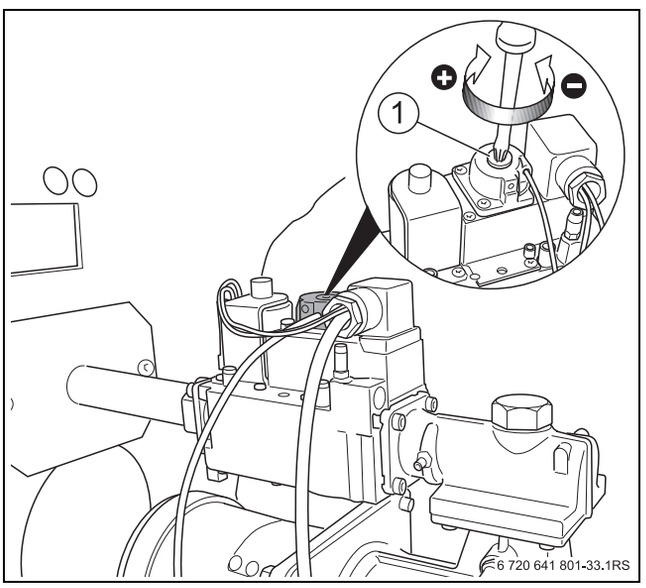


Fig. 37 Correct the CO_2 content under partial load (boiler size 90/120 kW)

1 Partial load adjusting screw

- Recheck the CO_2 content and enter the value in the commissioning report, Chapter 6.23.

Gas train boiler size 160 kW

- Wait until 25 % burner output is achieved.
- Check the CO_2 content.
  Insert the test probe through the test port into the core flow inside the flue.
- At CO_2 values below 9.0 % or in excess of 9.6 %, adjust partial load adjusting screw [1] to 9.3 %.
  – Turning clockwise increases the CO_2 content.
  – Turning anti-clockwise reduces the CO_2 content.

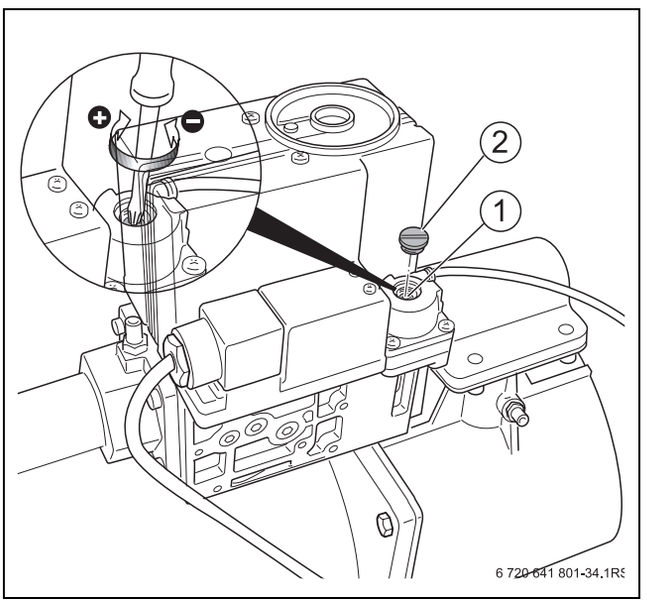


Fig. 38 Correct the CO_2 content under partial load (boiler size 160 kW)

1 Partial load adjusting screw
2 Covering screw

- Recheck the CO_2 content and enter the value in the commissioning report, Chapter 6.23.

Gas train boiler size 200 to 280 kW

- Wait until 30 % burner output is achieved.
- Check the CO_2 content.
  Insert the test probe through the test port into the core flow inside the flue.
- At CO_2 values below 9.0 % or in excess of 9.6 %, set adjusting screw N [3] to 9.3 %.
  - Turning clockwise increases the CO_2 content.
  - Turning anti-clockwise reduces the CO_2 content.

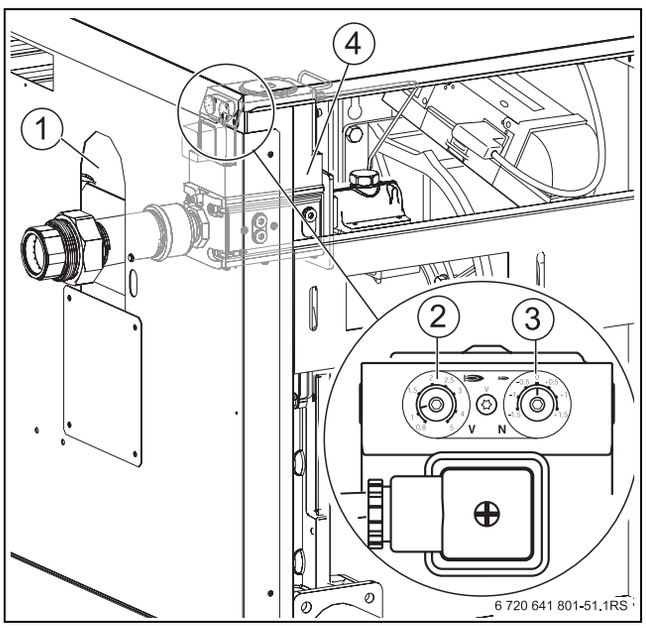


Fig. 39 Correct the CO_2 content under partial load (boiler size 200 to 280 kW)

1 Apertures for adjusting the gas train
2 Adjusting screw V (sealed)
3 Adjusting screw N (sealed)
4 Gas train

- Recheck the CO_2 content and enter the value in the commissioning report, Chapter 6.23.

6.15 Switching the status display on the BC10 to show the boiler temperature status

- Press ⟨⟩ to change to the next status display.
  The current operating pressure P1.7 is displayed.
- Press ⟨⟩ to change to the next status display.
  Operating status 0Y (display code) is shown.
- Press ⟨⟩ to change to the next status display.
  The boiler temperature is displayed.

6.16 Returning to operating mode from the flue gas test

- Press ⟨⟩ to terminate the flue gas test.
- Return to the operating mode at the RC35 programming unit.
- Close the flap on the RC35 programming unit.
- If the boiler is intended to be operated with the Logamatic 4000 control system, remove the RC35 programming unit again. Start the Logamatic 4000 control system.

6.17 Recording actual values

- Carry out the following tests at a test port in the boiler flue connection and enter the results in the commissioning report (→ Chapter 6.23):
  - Draught
  - Flue gas temperature t_A
  - Air temperature t_L
  - Net flue gas temperature t_A - t_L
  - Carbon dioxide content (CO_2) or oxygen content (O_2)
  - CO value

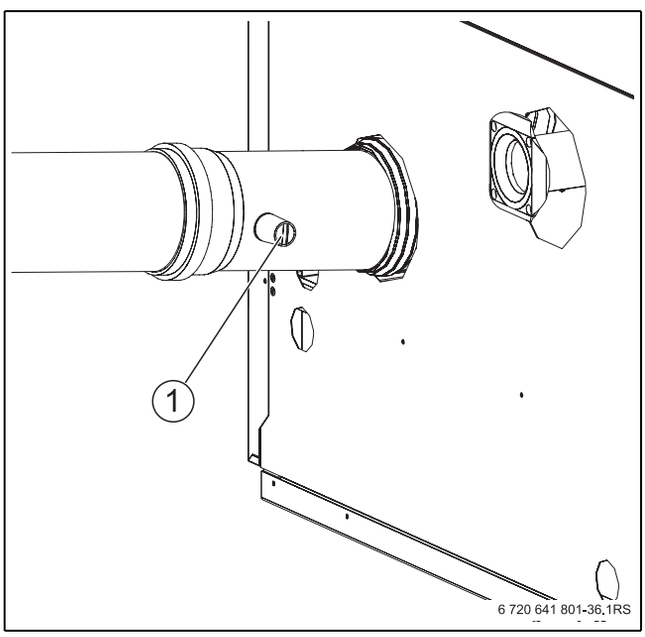


Fig. 40 Recording actual values

1 Position of the test port in the flue

6.17.1 Draught

The required draught for the installed flue gas/ventilation air system must not exceed 100 Pa (1.0 mbar).

DANGER: Risk to life from toxic flue gases escaping.
- Only operate the boiler with a chimney or flue system (→ Tab. 7, page 10).

6.17.2 CO value

CO values in an air-free state must be below 400 ppm or 0.04 % vol.

Values above 100 ppm indicate an incorrect burner adjustment, incorrect appliance setup, burner and/or heat exchanger contamination or burner faults.

- Identify and eliminate the cause.

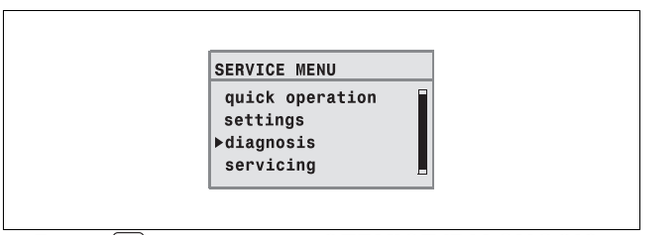
6.18 Function tests

During commissioning and the annual inspection, check all regulating, control and safety equipment for correct function and, where applicable, for correct settings.

6.18.1 Checking the ionisation current (flame current)

Call up the service level of RC35 programming unit

- Open the flap on the RC35 programming unit.
- Press Menu OK + Info + ↩ simultaneously to open menu **SERVICE MENU**.
- Turn rotary selector anti-clockwise until **diagnosis** is selected (highlighted with ►).



- Press Menu OK to open menu **SERVICE/DIAGNOSIS**.
- Turn rotary selector anti-clockwise, until **diagnosis** is selected (highlighted with ►).
- Press Menu OK to open menu **SERVICE/DIAGNOSIS**.

The menu items shown will vary depending on the heating system.

- Hold down Menu OK and turn rotary selector simultaneously to change the setting, e.g. flame current.
  The change takes effect when you release the key.
- Read off the ionisation current and enter it in the commissioning report (→ Chapter 6.23, page 41). To ensure fault-free operation, the ionisation current at partial and full load (with a burning flame) should be at least 3 µA.
- Return to the operating mode at the RC35 programming unit.
- Close the flap on the RC35 programming unit.

6.19 Testing the gas supply pressure

- Undo the plug on the pressure test nipple for the gas supply pressure and purging (→ Fig. 41, 42, 43 [1]) by 2 revolutions.
- Push the test hose of the pressure gauge onto pressure test nipple [1].
- With the burner operational (full load), check the gas supply pressure and record the value in the commissioning report (→ Chapter 6.23).
- If the gas supply pressure falls outside the values in Tab. 17, page 40, shut down the boiler and notify your gas supply utility.

If the burner is switched off from a full load and a gas supply pressure of > 50 mbar results, shut down the boiler and notify the gas supply utility (do not proceed with commissioning).

- Remove the test hose.
- Carefully tighten the plug on the pressure test nipple for the gas supply pressure.

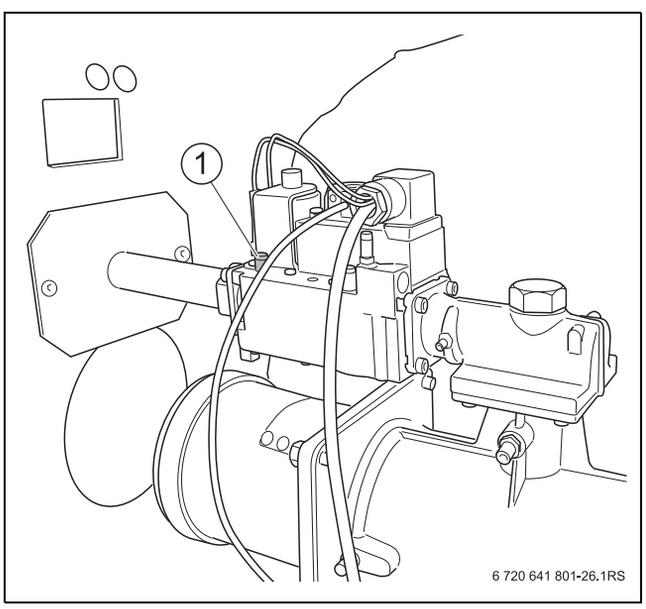


Fig. 41 Checking the gas supply pressure (boiler size 90/120 kW)

1 Pressure test nipple for testing the gas supply pressure and for purging

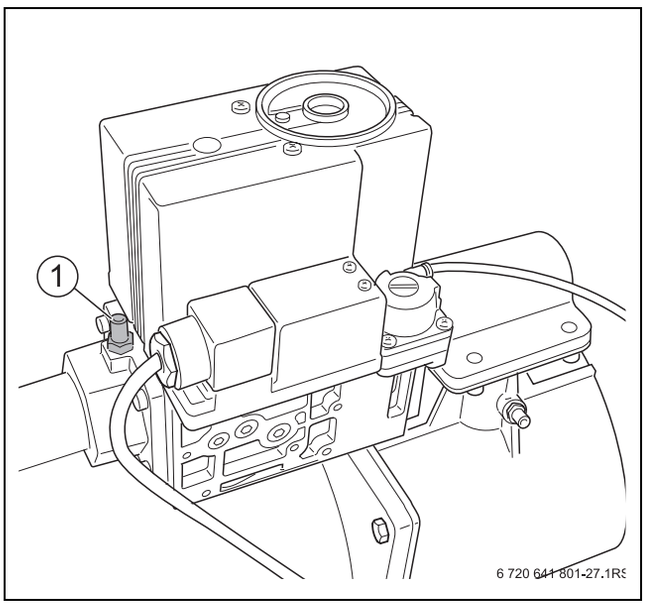


Fig. 42 Checking the gas supply pressure (boiler size 160 kW)

1 Pressure test nipple for testing the gas supply pressure and for purging

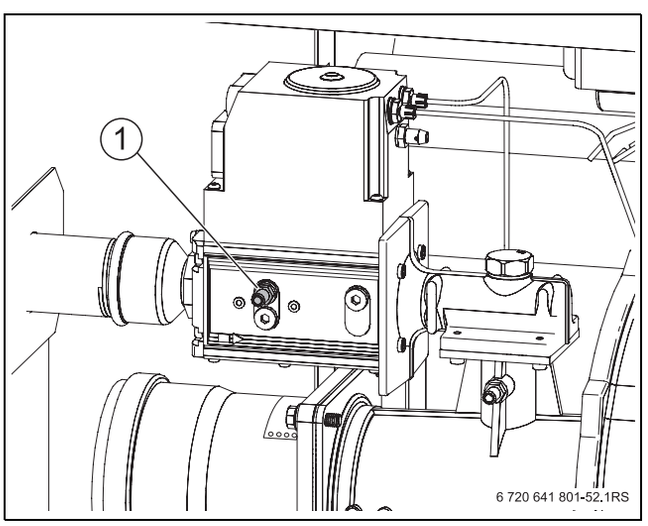


Fig. 43 Checking the gas supply pressure (boiler size 200 to 280 kW)

1 Pressure test nipple for testing the gas supply pressure and for purging

Country	Gas type	Gas supply pressure 1) [mbar]		
		Min.	Rated	Max.
AT, BA, BE, BG, BY, CH, CN, CZ, DE, DK, EE, ES, GB, GR, HR, IE, IT, LU, PL, PT, RO, RU, SI, SK, UA	Natural gas H (G20) or Natural gas L (G25) Natural gas L_W (formerly GZ41.5)	17	20	25
NL	Natural gas L (G25)	20	25	30
HU	Natural gas H (G20) Natural gas S (G25.1)	20	25	33

Tab. 17 Gas types and supply pressures

1) The gas supply utility must assure the minimum and maximum pressures (in accordance with the national requirements for gas supply utilities).

6.20 Checking for leaks during operation

- With the burner operational, use a foaming agent to test all sealed points in the entire burner gas train, such as:

- Pressure test nipple
- Plug for gas supply pressure
- Fittings (also at the gas connection) etc.

The agent must be approved for gas tightness testing.

NOTICE: Risk of system damage due to short circuit!

- Prior to checking for leaks, cover areas at risk, e.g. the internal water pressure sensor and the return temperature sensor in the boiler return.
- Never spray leak detection agent onto cable entries, plugs or electrical cables. Do not allow it to drip onto them either.
- To prevent corrosion, carefully wipe off the leak detection agent afterwards.

6.21 Fitting sections of the casing

If the side and front panels cannot be fitted correctly, plumb the boiler vertically (→ Chapter 5.9, page 27)

- First hook in side panels [2] at the bottom, then lift them slightly and hook in at the top.
- Secure the side panels with locking screws [3] at the front and back of the boiler.
- First hook in the bottom of the front panel [1], then raise slightly and hook in at the top.
- Secure the front panel with locking screw [3] at the top of the boiler.

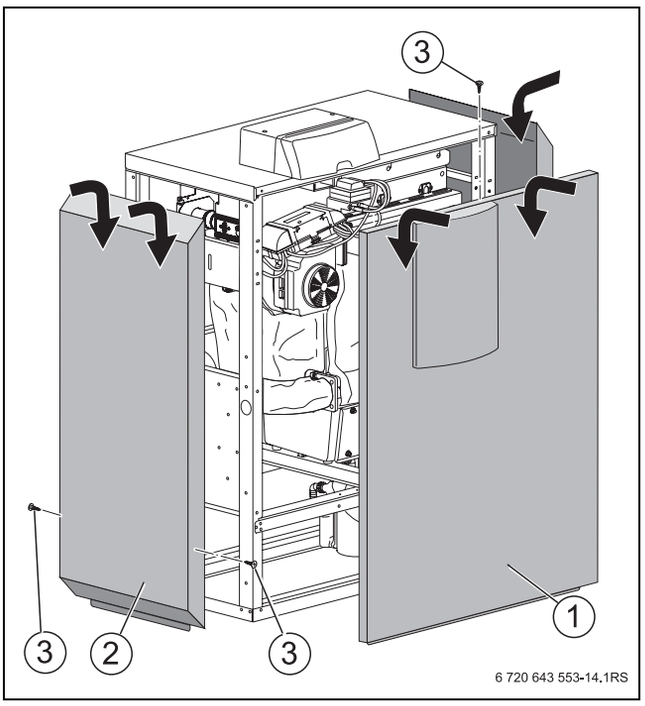


Fig. 44 Fitting sections of the casing

1 Front panel
2 Side panel
3 Locking screws

- Affix the clear pocket containing the technical documentation in a clearly visible spot on the side of the boiler.

6.22 Informing the user; handing over technical documentation

- Make the user familiar with the heating system and the boiler operation.
- Make the user aware that the boiler and control unit must only be opened by qualified contractors.
- Confirm commissioning in the report (→ Chapter 6.23).
- Together with the user, carry out a system shutdown and restart.
- Explain to the customer what to do in an emergency, e.g. a fire, referring to the operating instructions.
- Hand over the technical documentation to the user.

6.23 Commissioning report

▶ Confirm commissioning as complete; sign and date the report.

	Commissioning tasks	Page	Actual values		Comments
1.	Fill the heating system and check for leaks	24	☐		
2.	Have the details regarding water quality in the log been observed?		Yes: ☐		
	- Concentration of additives		Additives: _____	Concentration: _____%	
3.	Check the operating pressure	28	☐		
4.	Record gas parameters: Wobbe index Calorific value	29	_____ kW/m³ _____ kW/m³		
5.	Check the appliance equipment level	29	☐		
6.	Check the gas pipe for tightness	30	☐		
7.	Convert to a different gas type, if required	30 ff.			
8.	Purge the gas line	32	☐		
9.	Check the ventilation and extract air apertures and the flue connection	32	☐		
10.	Check the ventilation air diaphragm	33	☐		
11.	Switch on the heating system	33	☐		
12.	Record actual values:	37	Full load	Partial load	
	- Draught		_____Pa	_____Pa	
	- Gross flue gas temperature t_A		_____ °C	_____ °C	
	- Air temperature t_L		_____ °C	_____ °C	
	- Net flue gas temperature t_A - t_L		_____ °C	_____ °C	
	- Carbon dioxide content (CO_2) or oxygen content (O_2)		_____ %	_____ %	
	Flue gas losses q_A		_____ %	_____ %	
	CO value, free of air		_____ ppm	_____ ppm	
13.	Testing the gas supply pressure	39	_____ mbar		
14.	Function tests	38			
	– Check ionisation current		_____ µA		
15.	Check for leaks during operation	40	☐		
16.	Fit sections of the casing	40	☐		
17.	Informing the user; handing over technical documentation	40	☐		
18.	Correct commissioning by the installing contractor		Signature:_____		
19.	User signature		Signature:_____		

Tab. 18 Commissioning report

7 Shutting down the heating system

7.1 Shutting down the heating system at the base controller

Shut down the heating system at the base controller. The burner stops automatically as well.

- Set the ON/OFF switch on the base controller to "0" (OFF).

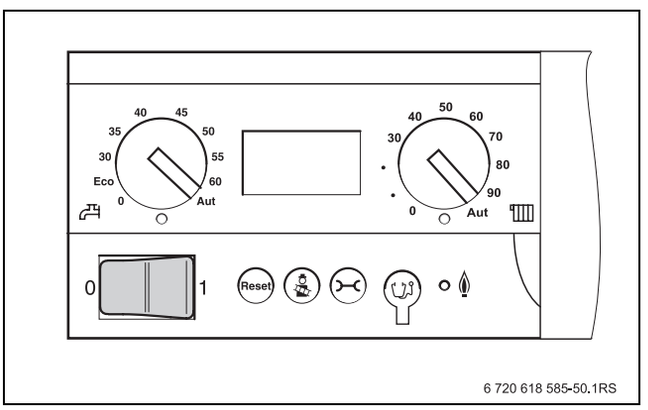


Fig. 45 Shutting down the heating system

- Close the main shut-off valve or gas tap.

NOTICE: System damage due to frost!
The heating system can freeze up after a prolonged period (e.g. during a power failure, switching off the power supply, faulty gas supply, boiler fault etc.).

- Ensure that the heating system is in constant use (particularly when there is a risk of frost).

If the boiler is taken out of use for a longer period and there is a risk of frost, also drain the heating system.

- Open the automatic air vent valve at the highest point in the system.
- Drain the heating water at the lowest point of the heating system by means of the drain & fill valve or a radiator.

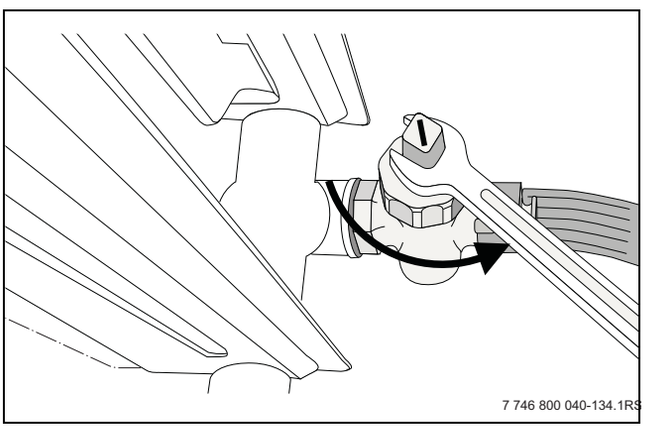


Fig. 46 Draining the heating system when there is a risk of frost

Disposal

- Dispose of all heating system components that are no longer required in an environmentally responsible manner.

7.2 Shutting down the heating system in emergencies

Explain to your customer what to do in case of an emergency, e.g. if there is a fire.

7.2.1 In an emergency

- Never put yourself at risk of fatal injury. Your own safety is paramount.
- Close the main shut-off valve or gas tap.
- Isolate the heating system from the mains power supply by means of the heating system emergency stop switch or the appropriate domestic fuse/circuit breaker.

8 Environmental protection/disposal

Environmental protection is one of the fundamental company policies of the Bosch Group.
Quality of performance, efficiency and environmental protection are equally important objectives for us. Laws and requirements aimed at protecting the environment are strictly adhered to.
To protect the environment we will, subject to economical aspects, use the best possible technology and materials.

Packaging

Where packaging is concerned, we participate in country-specific recycling processes that ensure optimum recycling.
All packaging materials are environmentally compatible and can be recycled.

Used appliances

Old appliances contain materials that should be recycled. The relevant assemblies are easy to separate, and all plastics are identified. This allows the various assemblies to be appropriately sorted for recycling or disposal.

9 Inspection and maintenance

Heating systems should be regularly serviced for the following reasons:

- to maintain a high level of efficiency and to operate the system economically (low fuel consumption)
- to achieve a high level of operational reliability
- to maintain the cleanest possible combustion
- to ensure reliable operation and a long service life

Maintenance work must only be carried out by authorised contractors. Use only original spare parts. The system should be serviced annually. The results of the services must be recorded in the inspection and maintenance report.

Offer your client an annual inspection and demand-dependent maintenance contract. You can check in the inspection and service reports which activities should be included in a maintenance contract (→ Chapter 9.12).

Refer to the spare parts catalogue when ordering spare parts.

9.1 Preparing the boiler for inspection

DANGER: Risk to life from electric shock!

- ▶ Prior to opening the boiler: Disconnect the power across all poles and secure against unintentional reconnection.

- ▶ Shut down the heating system (→ Chapter 7.1, page 42).
- ▶ Remove locking screw [2] from the top of the front panel at the centre of the boiler.
- ▶ Slightly lift front panel [1] and remove towards the front.

DANGER: Risk to life from explosion of flammable gases!

- ▶ Work on gas components must only be carried out by authorised gas fitters (observe local regulations).

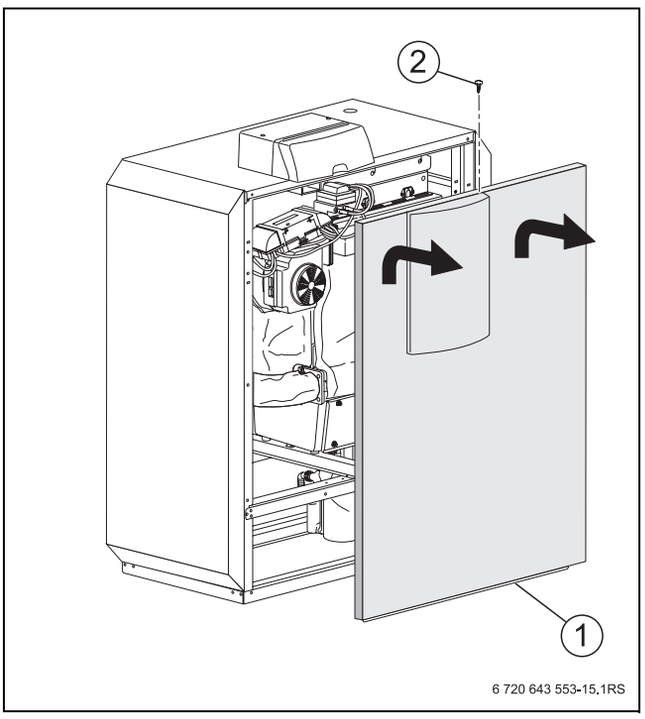


Fig. 47 Removing the front panel

1 Front panel
2 Locking screw

9.2 General work

The following work is not described in any further detail in this document. It must, nevertheless, still be carried out:

- ▶ Check the general condition of the heating system.
- ▶ Visual inspection and function check of the heating system.
- ▶ Check the ventilation air and flue gas routing for function and safety.
- ▶ Check all gas and water pipes for signs of corrosion.
- ▶ Replace any corroded lines.
- ▶ Check the pre-charge pressure of the diaphragm expansion vessel.
- ▶ Once a year, check the concentration of any anti-freeze/additives that may be used in the system fill water.

9.3 Internal leak test

9.3.1 Determining the test volume

$V_{test} = V_{total} = V_{pipe} + V_{gas\ train}$

- Determine the length of pipe to the main fuel shut-off valve.
- Determine the gas train volume ($V_{gas\ train}$) using Tab. 19.
- Determine the pipework volume (V_{pipe}) using Tab. 20 and Tab. 21.
- Calculate the test volume (V_{test}) according to the above equation.

Gas train volume (approximate values)	
Gas train volumes up to 50 kW	0.1 litres
Gas train volume > 50 kW	0.2 litres

Tab. 19 Gas train volume ($V_{gas\ train}$)

Pipework length	Pipework volume (V_{pipe}) in litres Pipework diameter in inches					
in metres	½	¾	1	1¼	1½	2
1	0.2	0.4	0.6	1.0	1.4	2.2
2	0.4	0.7	1.2	2.0	2.7	4.4
3	0.6	1.1	1.7	3.0	4.1	6.6
4	0.8	1.5	2.3	4.0	5.5	8.8
5	1.0	1.8	2.9	5.1	6.9	-
6	1.2	2.2	3.5	6.1	8.2	-
7	1.4	2.5	4.1	7.1	9.6	-
8	1.6	2.9	4.6	8.1	-	-
9	1.8	3.3	5.2	9.1	-	-
10	2.0	3.6	5.8	10.1	-	-

Tab. 20 Pipework volume (V_{pipe}) subject to pipe length and diameter

Pipework length	Pipework volume (V_{pipe}) in litres Pipework diameter in mm (copper pipe)					
in metres	15 x 1	18 x 1	22 x 1	28 x 1.5	35 x 1.5	45 x 1.5
1	0.1	0.2	0.3	0.5	0.8	1.4
2	0.3	0.4	0.6	1.0	1.6	2.8
3	0.4	0.6	0.9	1.5	2.4	4.2
4	0.5	0.8	1.3	2.0	3.2	5.5
5	0.7	1.0	1.6	2.5	4.0	6.9
6	0.8	1.2	1.9	2.9	4.8	8.3
7	0.9	1.4	2.2	3.4	5.6	9.7
8	1.1	1.6	2.5	3.9	6.4	-
9	1.2	1.8	2.8	4.4	7.2	-
10	1.3	2.0	3.1	4.9	8.0	-

Tab. 21 Pipework volume (V_{pipe}) subject to pipe length and diameter

9.3.2 Carrying out a leak test

- Close the main shut-off valve or gas tap.
- Undo the pressure test nipple plug by two revolutions.
- Push the test hose of the U-pipe pressure gauge onto the pressure test nipple.
- Open the main shut-off valve or gas tap, then note and record the pressure.
- Close the main shut-off valve or gas tap and check the pressure again a minute later.
- Calculate the pressure drop per minute from the differential.

By means of the determined pressure drop per minute and the test volume (V_{test}), check in the following diagram (→ Fig. 51, page 47) whether the gas train is still useable.

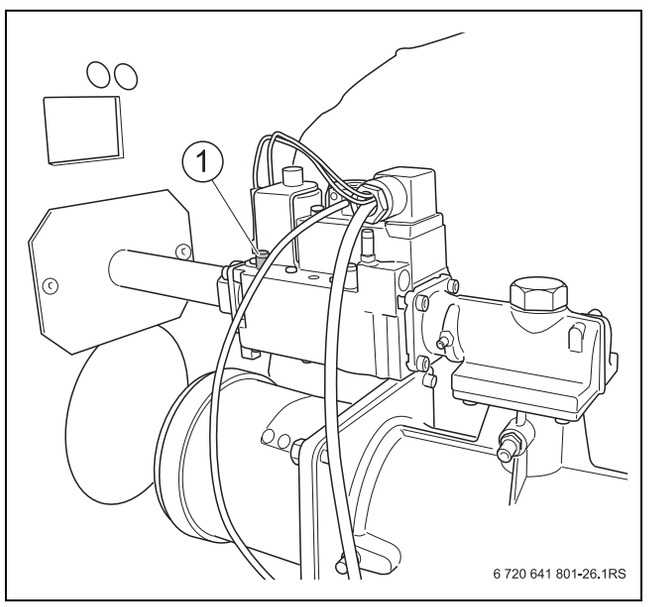


Fig. 48 Checking the internal tightness (boiler size 90/ 120 kW)

1 Pressure test nipple

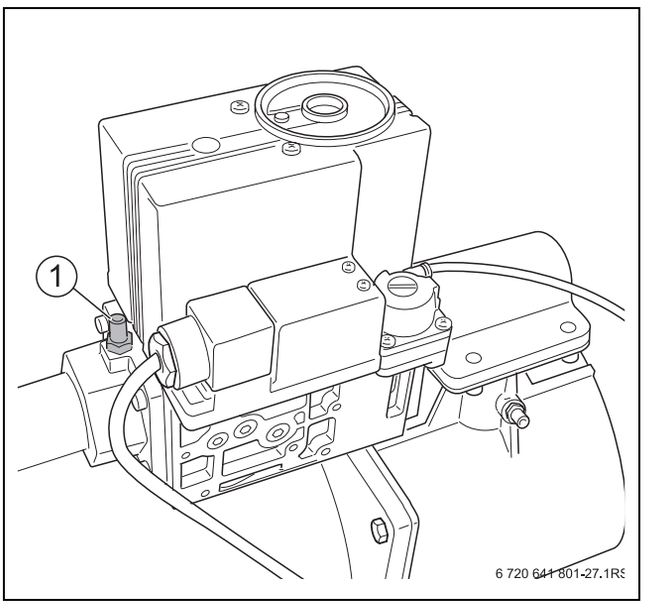


Fig. 49 Checking the internal tightness (boiler size 160 kW)

1 Pressure test nipple

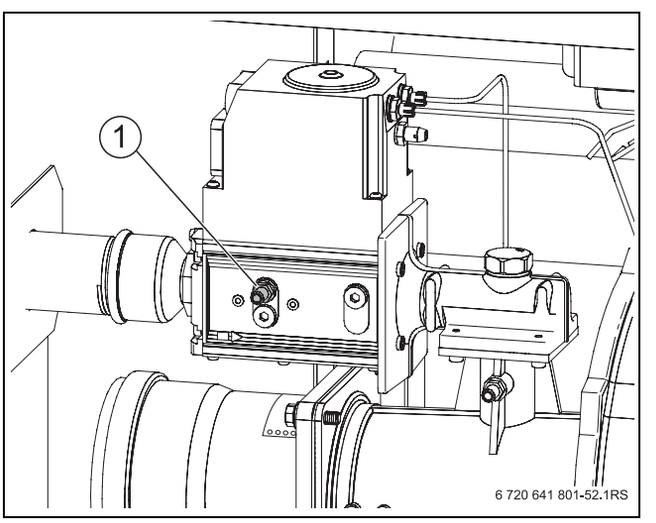


Fig. 50 Checking the internal tightness (boiler sizes 200 to 280 kW)

1 Pressure test nipple

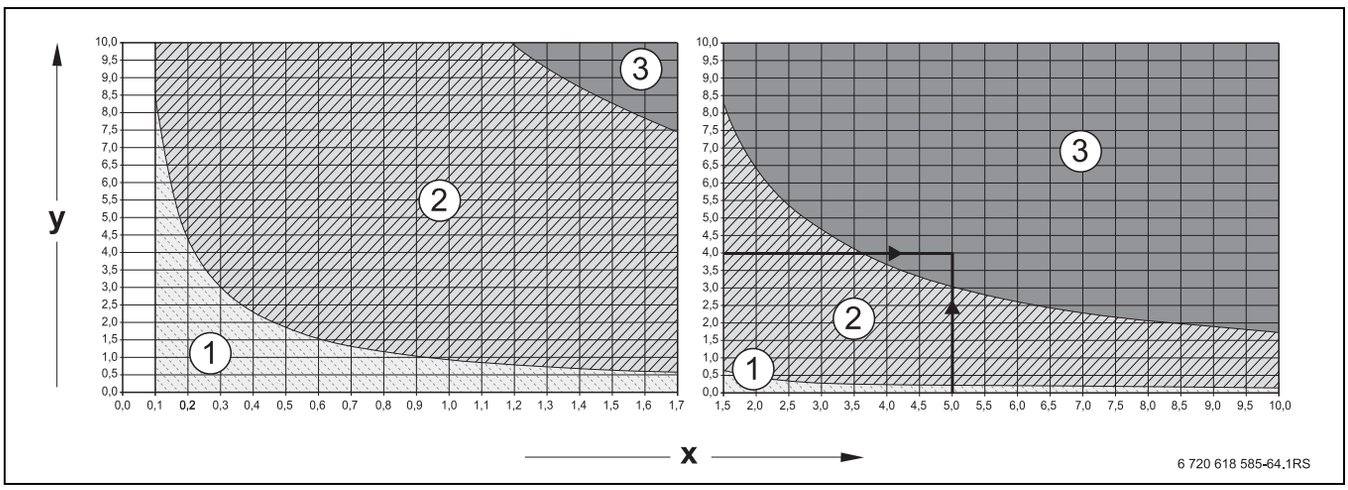


Fig. 51 Permissible pressure drop per minute during the internal tightness test with prevailing gas supply pressure

x Test volume in litres
y Test volume in mbar within one minute
1 Range "Valve tight" = applies to new installations
2 Range "Valve adequately tight" = valve can be used without restrictions
3 Range "Valve leaks" = valve may not be used
>> check as described in the following

Read-off example: test volume (V_{test}) 5 litres and pressure drop 4 mbar/min = range 3 "Valve leaks" = valve may not be used >> check as described in the following

If you detect a steep pressure drop of > 10 mbar/minute at a test volume of (V_{test}) of < 1, increase the test volume (V_{test}). For this, include the pipework to the next shut-off valve in the tightness test and repeat the test using the new test volume (V_{test}).

If the read-off point for test volume (V_{test}) and pressure drop per minute lies within the range "Valve leaks" (see read-off example), carry out the test described below.

NOTICE: System damage!
- Never spray or let leak detection agent drip onto cable entries, plugs or electrical cables/leads.
- Cover areas at risk before testing for leaks.

- Check all sealed points in the tested pipework section using a foaming leak detection agent.
- If required, seal any leaks and repeat the test.
- If no leaks are found, replace gas train.

Completing the leak test

- Remove hose.
- After completing the test, fully tighten the screw inside the pressure test nipple.
- Check the pressure test nipple for tightness.

9.4 Checking the heating system operating pressure

NOTICE: System damage through boiler scaling!

- Observe the water quality in accordance with the "Water quality log" and enter the volume and quality of the fill water.

NOTICE: System damage!

If the heating system is filled when hot, the resulting temperature stresses can cause stress cracks. The boiler will then leak.

- Only fill the heating system when cold (the flow temperature should not exceed 40 °C).

NOTICE: System damage due to frequent topping up!

Depending on water quality, the heating system may be damaged by corrosion or scaling if you frequently need to top up the water (observe the water quality log).

- Vent the heating system during filling.
- Check the heating system for leaks.
- Check the function of the expansion vessel.

In sealed unvented systems the pressure gauge needle must be within the green band.

Ensure that the red pressure gauge needle is set to the required operating pressure.

Create an operating pressure of at least 1 bar.

- Check the operating pressure of the heating system. The operating pressure is too low if the pressure gauge needle is below the green band. Top up with water.

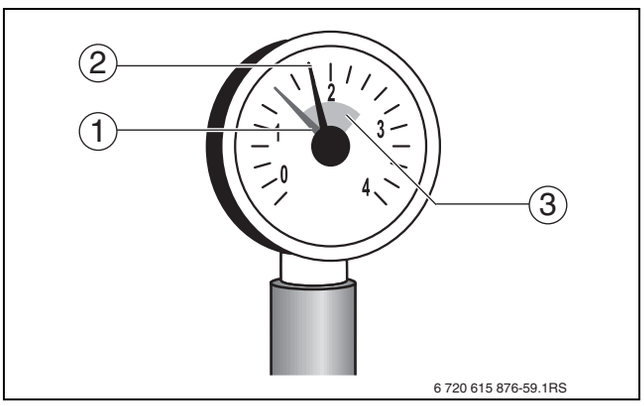


Fig. 52 Pressure gauge for sealed unvented systems

1 Red needle
2 Pressure gauge needle
3 Green band

CAUTION: Health risk from contaminated drinking water!

- Observe all regulations and standards applicable in your country regarding the prevention of drinking water contamination.
- In Europe, observe standard EN 1717.

- Vent the heating system via the radiator bleed valves.
- Check the operating pressure again.

You can also check the operating pressure on the base controller (e.g. indication "P1.4" corresponds to 1.4 bar).

- Enter the amount of top up water in the "Water quality log".

9.5 Measuring the CO_2 content

- Insert the test sensor through the test port in the flue pipe and hold it in the core gas flow.
- Record the flue gas values.
  If the CO_2 content deviates by more than 0.5 % from its set value (→ Tab. 7, page 10), adjust the burner as described in Chapter 6.13 and 6.14, page 34 ff.

9.6 Checking the level of contamination of burner and heat exchanger

The burner and heat exchanger can be wet cleaned.

Prior to cleaning the burner and heat exchanger, first check or carry out the following steps.

9.6.1 Checking the level of contamination

- Connect a differential pressure tester between the test nipple on the burner [1] and the boiler connection elbow or boiler flue connection [2] at the back of the boiler.

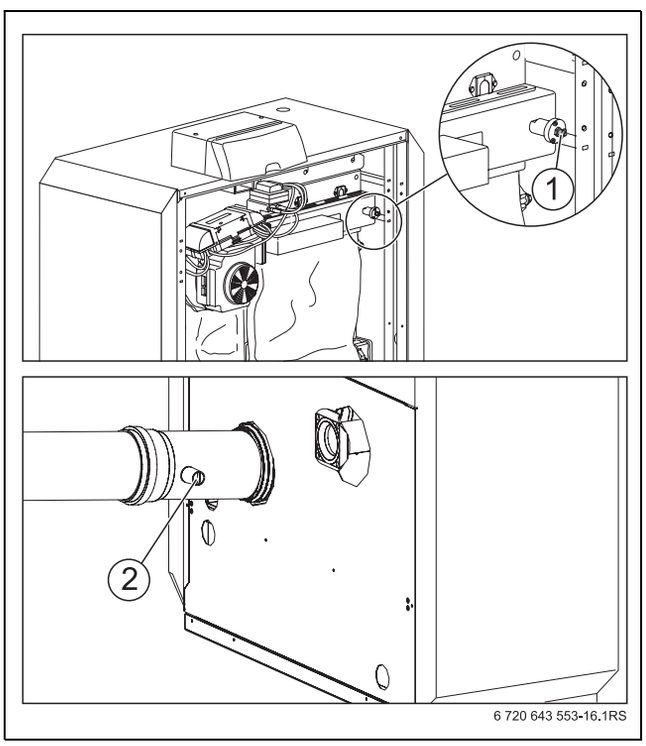


Fig. 53 Checking the level of contamination

1 Test nipple on the burner
2 Test point at the boiler flue connection

Start the heating system at the base controller

- Set the ON/OFF switch at the base controller to "I".

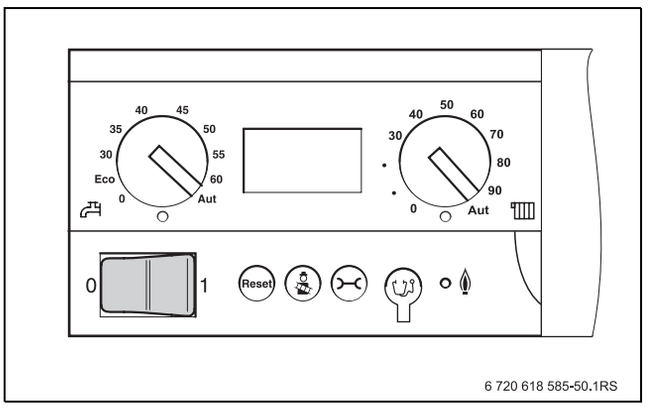


Fig. 54 Switching on the heating system

The entire heating system is switched on. The status is displayed and shows the current boiler water temperature in °C.

Carrying out a flue gas test

Key (🔧) is used by your heating contractor for the flue gas test.

The heating control unit operates for 30 minutes at a higher flow temperature. During the flue gas test, the decimal point illuminates in the status display.

- Ensure heat is being drawn off.
- Hold down (🔧) until the decimal point in the status display illuminates (at least 2 seconds).
- Carry out a flue gas test.
- Cancel the flue gas test; press (🔧) again.

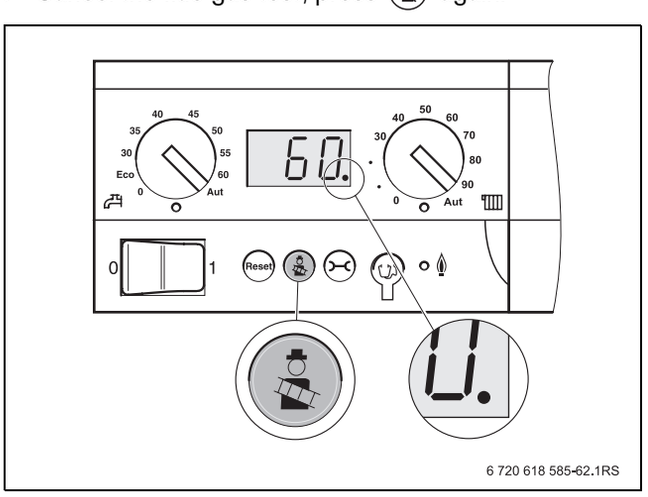
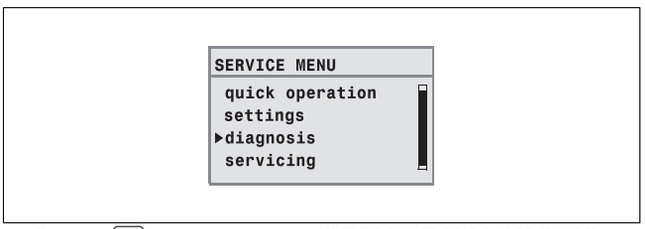


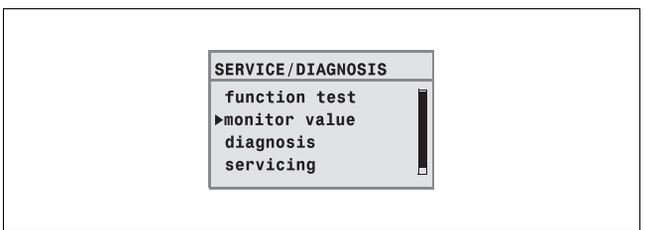
Fig. 55 Calling up the flue gas test

Calling up the service level of the RC35 programming unit and displaying the monitor data

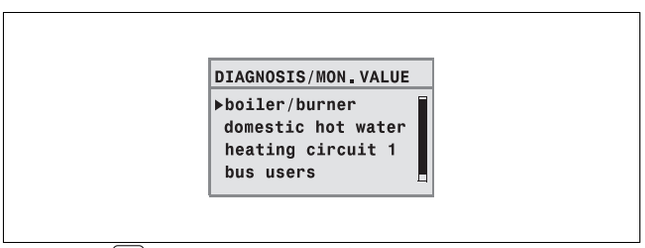
- Press Menu/OK + Info + ⊃ simultaneously to open menu **SERVICE MENU**.
- Turn rotary selector anti-clockwise until **diagnosis** is selected (highlighted with ►).



- Press Menu/OK to open menu **SERVICE/DIAGNOSIS**.
- Turn rotary selector anti-clockwise, until **monitor value** is selected (highlighted with ►).



- Press Menu/OK to open menu **DIAGNOSIS/MON. VALUE**.
- Turn rotary selector anti-clockwise, until **boiler / burner** is selected (highlighted with ►).



- Press Menu/OK to open menu **BOILER/BURNER**.
  The values monitored are displayed as a list; in other words, more values might appear if the rotary selector is turned.
- Check the "Current output" at the RC35 programming unit.
- Wait until the "Current output" has reached 100 %.
- Check the differential pressure at the tester and compare it with the value in Tab. 22.
  If the actual pressure is higher than the value in the table, clean the heat exchanger.

Boiler size [kW]					
90	**120**	**160**	**200**	**240**	**280**
360	460	550	530	540	560

Tab. 22 Cleaning threshold - differential pressure in Pa

9.7 Cleaning the burner and heat exchanger

- Shut down the heating system (→ Chapter 7.1, page 42).
- Close the main shut-off valve or gas tap.
- Allow the boiler to cool down.
- Remove siphon (→ Fig. 56, [1]) from the condensate pan outlet (→ Fig. 56, [2]) and place a bucket or pan below.

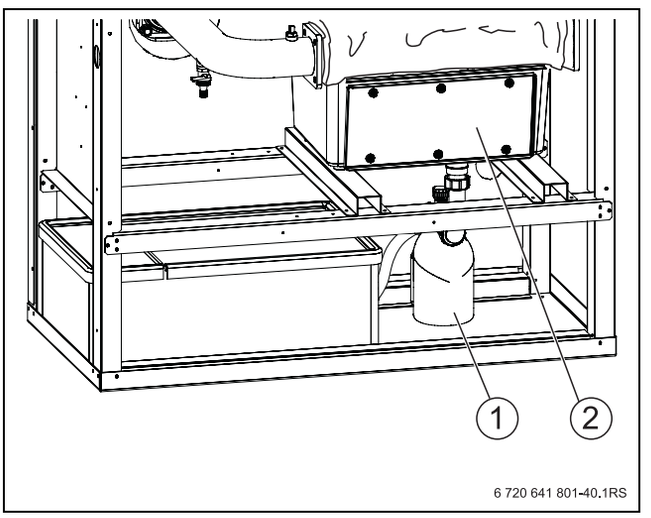


Fig. 56 Removing the siphon

1 Siphon
2 Condensate pan

9.7.1 Removing the burner

- Undo all electrical plug-in connections [1, 2] from the burner.

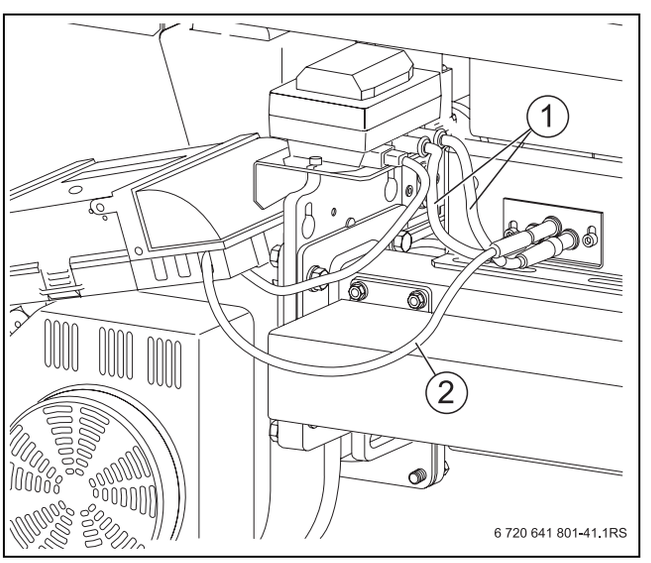


Fig. 57 Undoing electrical plug-in connections from the burner

1 Ignition cable
2 Monitoring cable

- Undo fixing nuts [3] from the top and bottom of the burner plate.
- Screws on the side of the fan:
  Undo the rear 2 hexagon screws [2] by 2 turns; remove front 2 hexagon screws [1].
- Carefully pull out the burner towards you.

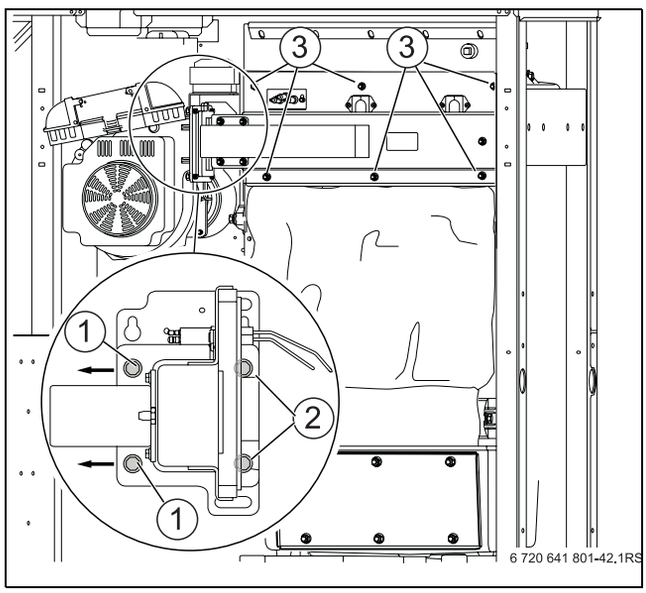


Fig. 58 Removing the burner from the heat exchanger

1 Front hexagon screws
2 Rear hexagon screws
3 Fixing nuts

9.7.2 Wet cleaning the heat exchanger

When wet cleaning, use a cleaning agent appropriate to the level of contamination (soot or encrusted residues). The cleaning agent must be suitable for aluminium!

DANGER: Risk to life from escaping flue gas!
- When fitting the cleaning cover, check for damaged gaskets and their correct seating.

- Clean the heat exchanger with water or a cleaning agent suitable for aluminium (see instructions provided by the manufacturer of the cleaning agent).

During wet cleaning, protect electrical components (fan, gas train etc.) against moisture and contamination.

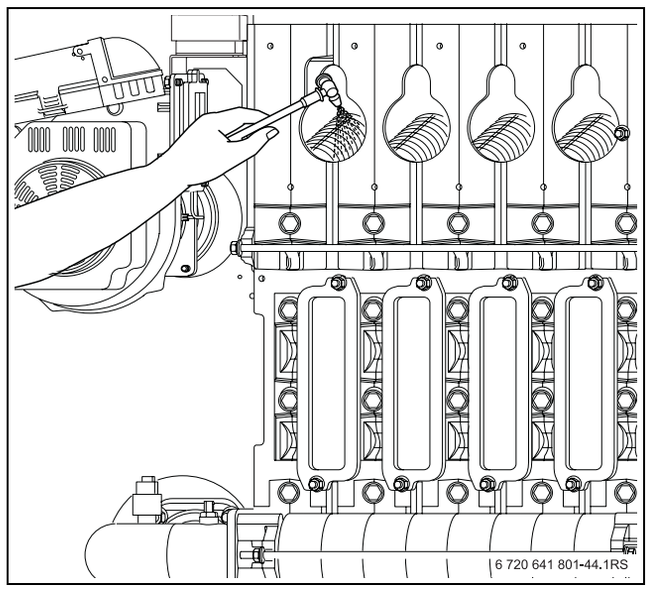


Fig. 59 Wet cleaning the heat exchanger

- Use a hose to flush any residues into the bucket or the condensate pan.
- Clean the condensate pan with water.
- Clean the siphon with water.

DANGER: Risk to life through poisoning!
Siphons not filled with water can cause a risk to life through escaping flue gas.
- Fill the siphon with approx. 2 litres of water.
- Fit the siphon (→ Chapter 5.5.5, page 22 ff.).

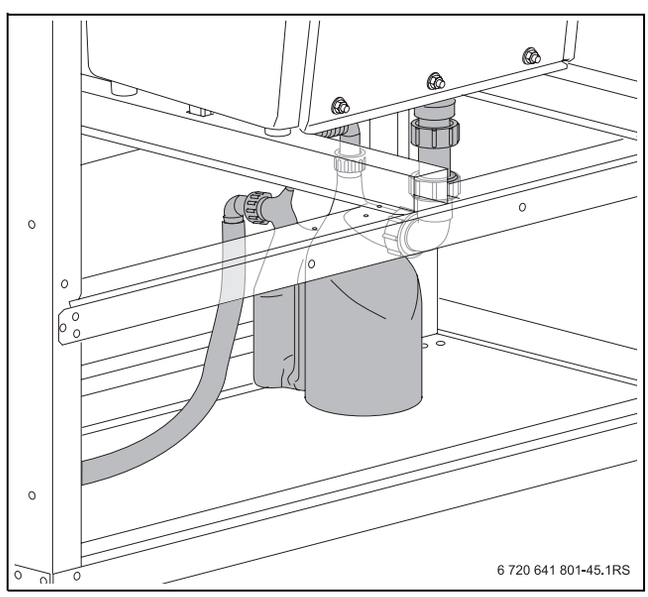


Fig. 60 Cleaning the siphon

- Check the condensate hose between the boiler flue connection and the siphon for free flow.

9.7.3 Cleaning the burner

- Blow off the burner rods and manifold from the inside out with compressed air.

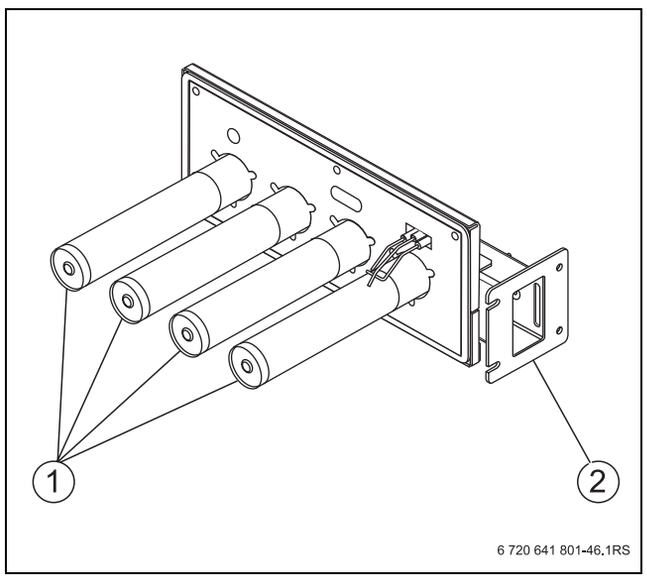


Fig. 61

1 Burner rods
2 Manifold

Checking and adjusting electrode position

- Check the electrode gaps in accordance with Fig. 62 and correct if required.
- Adjust the burner rod so that the electrode position corresponds to Fig. 62.
  The electrode is positioned above the row of slots.

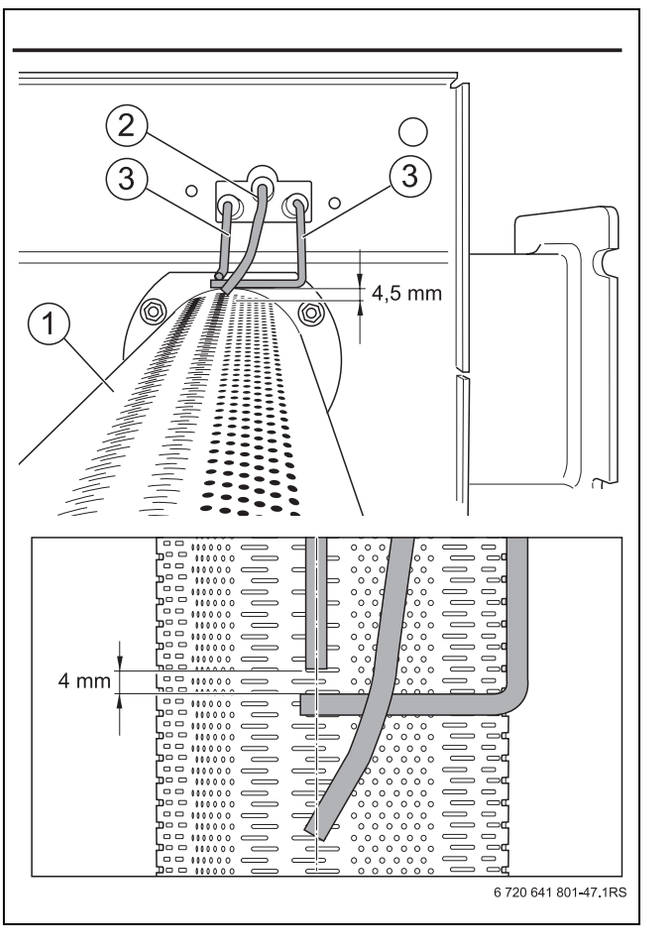


Fig. 62 Check the electrode position (dimension in mm)

1 Burner rod
2 Ionisation electrode
3 Ignition electrode

Burnout

- Inspect the ignition electrode gap (burn-off).

9.8 Refitting detached parts

- Reassemble all boiler parts that were removed for inspection and maintenance purposes in the reverse order.
- Check all gaskets for wear and damage.
- Replace gaskets if required.
- Check the flat gasket inside the flange and replace, if required, following an inspection or service.

There is an indicator window on the top of the flange so you can check from the outside that a gasket has been inserted.

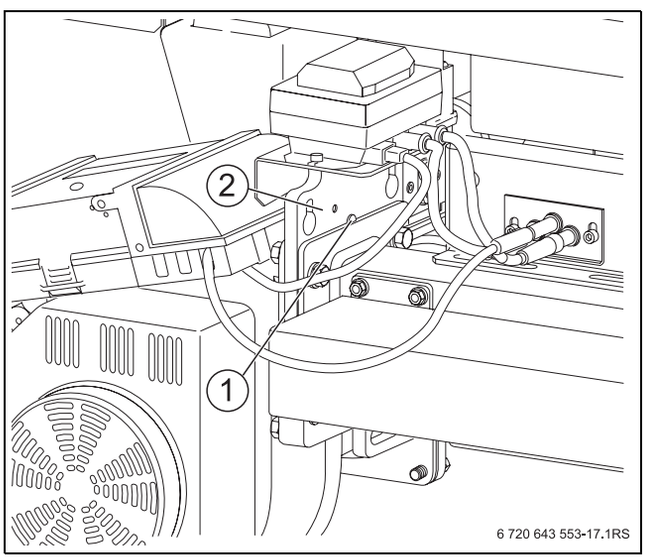


Fig. 63

1 Indicator window on flange
2 Flange

9.9 Checking for leaks during operation

NOTICE: Risk of system damage due to short circuit!

- Cover the fan and other points at risk prior to checking for leaks.
- Never apply leak detector spray to cable entries, plugs or electrical cables/leads. Do not allow it to drip onto them either.

- Start the boiler and check all gaskets for leaks under full load using a leak detection agent.
- Further checks of the tightness of the entire gas path (→ Chapter 6.20, page 40).

9.10 Checking the ionisation current

To ensure trouble-free operation, the ionisation current at partial and full load (and burning flame) should be at least 3 µA.

The ionisation current (flame current) can be read off on the RC35 programming unit at "SERVICE MENU DIAGNOSIS/MONITOR VALUE" (→ Chapter 6.18.1).

9.11 Completing inspection and maintenance

9.11.1 Fitting sections of the casing

- Fit all casing sections (→ Fig. 44, page 40).

9.11.2 Confirming inspection and maintenance

- Sign the inspection and maintenance report in this manual (→ Chapter 9.12).

9.12 Inspection and maintenance reports

The inspection and maintenance reports are also designed as templates and may be photocopied.

▶ Sign and date the completed inspection work.

Inspection work		Page	Full load	Partial load	Full load	Partial load
1.	Check the general condition of the heating system (visual inspection and function check).		☐		☐	
2.	Check system areas that are in contact with gas or water for the following:					
	- Internal leaks		☐		☐	
	- Visible signs of corrosion		☐		☐	
	- Signs of ageing		☐		☐	
3.	Check the concentration of anti-freeze/additives in the heating water (observe manufacturer's instructions and the details in the log).		Concentration:_____%		Concentration:_____%	
4.	Check the heating system water pressure.	48	☐		☐	
	- Pre-charge pressure of the expansion vessel (→ expansion vessel installation instructions).					
	- Operating pressure	48				
5.	Check the burner and heat exchanger for contamination; shut down the heating system for this step.					
6.	Check the siphon and condensate pan; shut down the heating system for this step.					
7.	Check the electrode block; shut down the heating system for this step.	52				
8.	Check the gas supply pressure.	39				
9.	Check the ventilation and extract air apertures, the flue connection and flue gas routing.	32	☐		☐	
10.	Record actual values:	37				
	- Draught		_____Pa	_____Pa	_____Pa	_____Pa
	- Gross flue gas temperature t_A		_____ °C	_____ °C	_____ °C	_____ °C
	- Air temperature t_L		_____ °C	_____ °C	_____ °C	_____ °C
	- Net flue gas temperature t_A - t_L		_____ °C	_____ °C	_____ °C	_____ °C
	- Carbon dioxide content (CO_2) or oxygen content (O_2)		_____%	_____%	_____%	_____%
	- CO value, free of air		_____ppm	_____ppm	_____ppm	_____ppm
11.	Carry out function checks:	38				
	- Check the ionisation current.		_____µA	_____µA	_____µA	_____µA
12.	Check for leaks during operation.	40	☐		☐	
13.	Check that the control unit is set correctly for the prevailing conditions (see control unit documentation).	–	☐		☐	
14.	Final checking of inspection work.	–	☐		☐	
	Confirm professional inspection Company stamp/date/signature					

Tab. 23

If any condition requiring maintenance is identified in the course of the inspection, that work must be carried out as required.

	Full load	Partial load	Full load	Partial load	Full load	Partial load	Full load	Partial load
1.	☐		☐		☐		☐	
2.								
	☐		☐		☐		☐	
	☐		☐		☐		☐	
	☐		☐		☐		☐	
3.	Concentration:_____%		Concentration:_____%		Concentration:_____%		Concentration:_____%	
4.	☐		☐		☐		☐	
5.								
6.								
7.								
8.								
9.	☐		☐		☐		☐	
10.								
	_____Pa	_____Pa	_____Pa	_____Pa	_____Pa	_____Pa	_____Pa	_____Pa
	_____ °C	_____ °C	_____ °C	_____ °C	_____ °C	_____ °C	_____ °C	_____ °C
	_____ °C	_____ °C	_____ °C	_____ °C	_____ °C	_____ °C	_____ °C	_____ °C
	_____ °C	_____ °C	_____ °C	_____ °C	_____ °C	_____ °C	_____ °C	_____ °C
	_____%	_____%	_____%	_____%	_____%	_____%	_____%	_____%
	_____ppm	_____ppm	_____ppm	_____ppm	_____ppm	_____ppm	_____ppm	_____ppm
11.								
	_____µA	_____µA	_____µA	_____µA	_____µA	_____µA	_____µA	_____µA
12.	☐		☐		☐		☐	
13.	☐		☐		☐		☐	
14.	☐		☐		☐		☐	

Tab. 24

	Demand-dependent maintenance	Page	Date:_____	Date:_____
1.	Shut down the heating system.	42	☐	☐
2.	Clean the burner and heat exchanger.	50	☐	☐
3.	Replace gaskets on the cleaning cover of the heat exchanger.	51	☐	☐
4.	Clean the siphon.	51	☐	☐
5.	Clean the condensate pan.	51	☐	☐
6.	Replace the electrode block.	52	☐	☐
7.	Replace the mixture manifold gasket (O-ring).		☐	☐
8.	Carry out a function check.		☐	☐
	Confirm professional service. Company stamp/signature			

Tab. 25

	Date:_____	Date:_____	Date:_____	Date:_____	Date:_____
1.	☐	☐	☐	☐	☐
2.	☐	☐	☐	☐	☐
3.	☐	☐	☐	☐	☐
4.	☐	☐	☐	☐	☐
5.	☐	☐	☐	☐	☐
6.	☐	☐	☐	☐	☐
7.	☐	☐	☐	☐	☐
8.	☐	☐	☐	☐	☐
	Company stamp/ signature	Company stamp/ signature	Company stamp/ signature	Company stamp/ signature	Company stamp/ signature

Tab. 26

10 Troubleshooting

10.1 Recognising the operating state and resetting faults

If a fault has developed, the fault code flashes on the control unit display. The RC35 programming unit shows faults as plain text messages.

NOTICE: Risk of system damage through frost.

The heating system can freeze up if it has been switched off through a fault shutdown.

- ▶ Rectify the fault immediately and restart the heating system.
- ▶ Where that is not possible, drain the heating and DHW pipework at the lowest point.

A fault has developed if the display flashes and indicates something other than the current boiler water temperature or an operating message.

Example: "6A" = the burner will not start

For an overview of the operating and fault codes, along with possible causes and remedial measures, see the control unit → documentation and the following Chapter 10.2.

▶ Hold down "Reset" for 5 seconds to clear the fault.

A reset is only possible if a fault message is flashing. The display shows "rE" whilst the reset is being implemented.

If the display then reverts to a standard operating message, the fault has been cleared. Should the fault recur, repeat the reset two or three times.

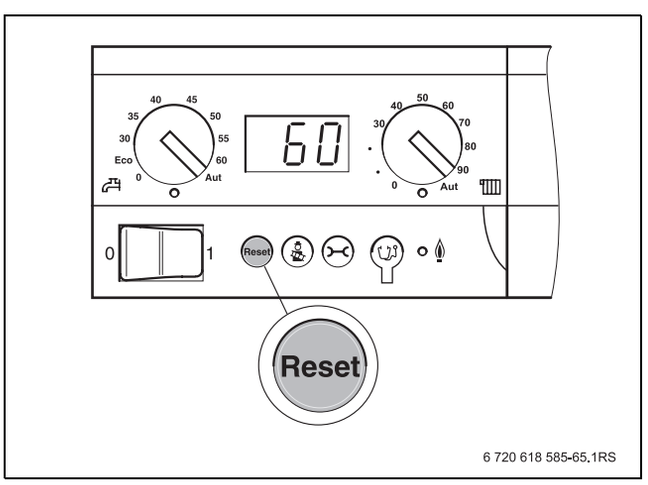


Fig. 64 Clearing a fault with the "Reset" key

10.2 Operating and fault displays

10.2.1 Operating messages

Display code	Supplementary code	Cause	Description	Test procedure/ cause	Action
2P	564	Temperature rises too quickly at the boiler temperature sensor (> 70 K/min).	Heat exchanger protection due to excessively fast heat-up speed.	No or insufficient heat transfer (e.g. thermostatic valves or mixers closed).	Ensure adequate heat transfer.
				Inadequate boiler flow rate.	Install adequately sized pumps.
				Pump does not work.	Check whether the pump is being switched. Replace the pump if required.
				Deposits on the water side of the boiler (dirt from the heating system, scaling).	Flush/clean the boiler block on the heating water side with agents approved for use with aluminium.
OA	-	Appliance in the switching optimisation routine.	A new burner demand occurs within the set switching optimisation time. Appliance in cycle block. The standard switching optimisation time is 10 minutes.	Check output setting at the BC10 base controller.	Match the boiler output to the required heat demand of the building.
				Check the control setting at the RC35 programming unit.	Match the control setting to the system conditions.
OH	-	The appliance is in standby mode; there is no heat demand.	The boiler is ready to operate; there is no heat demand from the heating circuit.	-	-
OY	-	The current boiler water temperature is higher than the set boiler water temperature.	The current boiler water temperature is higher than the set boiler water temperature. The boiler shuts down.	-	-
OP	-	Waiting for the fan to ramp up.	The ramp-up needs to be detected for the sequence to be able to proceed.	-	-
OE	-	The appliance is in standby mode, there is an active heat demand, but an excess of energy is being supplied.	The current system heat demand is lower than that which the minimum modulation level of the burner supplies.	-	-
OU	-	Start of the program sequence to start the burner.	-	-	-
OC	-	Burner start begins.	-	-	-

Tab. 27 Operating codes

Display code	Supplementary code	Cause	Description	Test procedure/ cause	Action
OL	-	Opening the gas train.	-	-	-
OF	-	Insufficient boiler flow rate.	Temperature differential between the flow and return > 15 K. Temperature differential between flow and safety temperature sensor > 15 K.	Check the flow temperature with the BC10, check the return temperature with the RC35 programming unit or service key, check the resistance of the boiler temperature sensor (high limit safety cut-out) and compare with the curve.	Adjust the setting of the boiler circuit pump. Check the surface temperature of the cast section that is equipped with the safety temperature sensor using a thermometer. Check whether a cast section is blocked with dirt.

Tab. 27 Operating codes

10.2.2 Fault displays

Type[1)]	Display code	Fault code	Cause	Description	Test procedure/cause	Action
B	2E	207	Water pressure < 0.6 bar.	-	Check whether the heating system pressure is at least 1 bar.	Correct the operating pressure.
V	2U	533	Incorrect hydraulic connection of boiler or pump.	The boiler control unit has recognised an incorrect flow on the water side.	Check whether the boiler flow and return sensor have been swapped. Check pump for correct direction of flow.	Connect flow and return correctly. Ensure correct pump flow direction.
B	2U	565	Excessive differential between the flow and return temperature. > 40 K	Heat exchanger protection due to excessive temperature spread.	Problems with the hydraulics.	Check the system hydraulics.
V	2U	575	Intelligent high limit safety cut-out in flow.	The actual boiler flow temperature reaches the intelligent high limit safety temperature for the flow of 140 °C, and a flame current is detected or the solenoid valves are open.	Check the flow rate on the water side.	Ensure adequate flow rate. Replace boiler temperature sensor/high limit safety cut-out. Replace ignition/ monitoring electrode.

Tab. 28 Fault displays
1) V = locking; B = blocking

Type[1)]	Display code	Fault code	Cause	Description	Test procedure/cause	Action
V	3C	537	No speed.	The SAFe receives no speed feedback, although the fan is supposed to be running.	Check cabling between the SAFe and the fan for contact separation, breaks and damage. Check plug-in connection at the SAFe and the fan.	Make the contacts correctly. Replace cable if required. If power is available (no fan start), replace fan.
V	3C	538	Fan speed too low.	The detected speed is lower than the specified speed.	Fan contaminated.	Clean fan if required.
					Fan faulty.	Replace fan.
V	3C	540	Excessively high fan speed.	The detected speed is higher than the specified speed.	Check PWM signal/SAFe cabling for contact separation, breaks or damage. Check plug-in connections for damage.	Make the contacts correctly. Replace cable if required. Replace fan.
V	4A	520	Intelligent high limit safety cut-out in flow.	The flow temperature has reached a value of 100 °C.	The boiler temperature sensor monitors the temperature increase in the boiler. This results in a timely burner shutdown. Therefore, this fault message can generally not appear. Unfavourable hydraulics in two-boiler systems: boilers influence each other, e.g. via the return or flow.	Check hydraulics.

Tab. 28 Fault displays
1) V = locking; B = blocking

Type[1)]	Display code	Fault code	Cause	Description	Test procedure/cause	Action
V	4U	521	Excessive differential between temperature sensors 1 and 2 of the boiler temperature sensor.	Excessive temperature differential between temperature sensors 1 and 2 (deviation > 5 K/2s).	Check that the "Reset" button illuminates on the SAFe.	Press "Reset" on the SAFe.
					Check that the check valve on the cylinder primary pump is closed.	Close the check valve if it is still open.
					Check whether the flow and return have been connected correctly.	If flow and return have been swapped, connect flow and return correctly.
					Check whether the plug-in connections at the boiler temperature sensor and the SAFe are contaminated or damaged.	If required, clean or replace the plug-in connections.
					Check resistance values at boiler temperature sensor against table or visually check plug on temperature sensor.	If sensor values deviate from those specified or plug is faulty, replace boiler temperature sensor.
					Check the voltage at the boiler temperature sensor in accordance with the table.	Replace the SAFe if there are deviations.
V	4U	522	Short circuit between temperature sensors 1 and 2 at the boiler temperature sensor.	A temperature sensor fault was detected in test mode.	Check the sensor lead. Check the plug-in connection.	Replace in case of damage. Clean or replace if contaminated. Reconnect the loose plug.
					Check sensor values according to table.	Replace the temperature sensor in case of deviations.
					Check the voltage at the temperature sensor according to table.	Replace the SAFe in case of deviations.

Tab. 28 Fault displays
1) V = locking; B = blocking

Type[1)]	Display code	Fault code	Cause	Description	Test procedure/cause	Action
V	4Y	523	Boiler temperature sensor lead break.	Temperature too low at the boiler temperature sensor (< -5 °C)	Check the sensor lead.	Replace in case of damage.
					Check the plug-in connection.	Clean or replace if contaminated. Replace in case of damage. Reconnect the loose plug.
					Check sensor values according to table.	Replace the temperature sensor in case of deviations.
					Check the voltage at the temperature sensor according to table (SAFe documentation).	Replace the SAFe in case of deviations.
V	4U	524	Short circuit at the boiler temperature sensor.	An excessively high temperature (> 130 °C) is measured at the boiler temperature sensor.	Check the sensor lead.	Replace in case of damage.
					Check the plug-in connection.	Clean or replace if contaminated. Replace in case of damage. Reconnect the loose plug.
					Check sensor values according to table.	Replace the temperature sensor in case of deviations.
					Check the voltage at the temperature sensor according to table (SAFe documentation).	Replace the SAFe in case of deviations.
V	4A	575	Intelligent high limit safety cut-out responds.	The boiler flow temperature has reached its maximum permissible level.	The high limit safety cut-out has responded.	Check gas train. (Does the flame extinguish after a control shutdown?)
B	5L	542	Incomplete communication with the SAFe.	The MC10 generates this fault if not all required data is supplied by the SAFe.	Check the cabling between the SAFe and the MC10.	Replace the SAFe if the connections are OK.

Tab. 28 Fault displays
1) V = locking; B = blocking

Type[1)]	Display code	Fault code	Cause	Description	Test procedure/cause	Action
B	5L	543	No communication with the SAFe.	The MC10 does not receive data from the SAFe.	Check whether the cable plugs (BUS cable and power cable) between SAFe and MC10 are correctly plugged in.	Reconnect the loose plug.
					Check in the MC10 at terminals "Mains SAFe" whether 230 V are present.	Replace the MC10 if there are not 230 V.
					Check whether the cables (BUS cable and power cable) between the SAFe and the MC10 are damaged.	Replace cable.
					Check whether the green indicator illuminates on the SAFe.	Replace the SAFe if the indicator does not illuminate.
					Separate the BUS cable between SAFe and MC10 and check whether the boiler enters emergency mode (runs at 60 °C boiler water temperature).	Replace the SAFe if the boiler does not start.
					Make replacements to check whether it is the SAFe or the MC10 that is faulty.	Replace the SAFe or MC10.
					If the SAFe remains dark, wait a short time as the appliance will not start up if the SAFe is cold.	Wait up to 30 minutes and check whether the green indicator on the SAFe illuminates again. Replace the SAFe if that is not the case.
B	6L	515	Ionisation signal failure during operation.	Ionisation signal failure during burner operation.	-	None; the SAFe will try a restart.
B	6L	514	Flame torn off within the flame stabilisation time.	No flame signal was detected within the stabilisation time.	-	None; the SAFe will try a restart.
V	6C	576	Ionisation current within the pre-purge time > 0.9 µA.	A flame signal was detected during the pre-purge time.	Check the ionisation electrode. Ensure that the metal fibres of the burner gauze have no contact with the electrodes. Check gas train function.	Check electrode gap on the ionisation electrode. Replace ionisation electrode. Replace gas train.

Tab. 28 Fault displays

1) V = locking; B = blocking

Type[1)]	Display code	Fault code	Cause	Description	Test procedure/cause	Action
B	6A	577	No flame within the safety time.	Ionisation current within the safety time < 1.1 µA.	Gas supply pressure too low.	Notify gas supply utility if the supply pressure is too low.
					The gas governor is not adjusted to the required gas volume.	Install gas governor that is adjusted to the required gas volume or, if necessary, notify gas supply utility.
					Inadequate gas line cross-sections (min. gas line cross-section)	Install adequately sized gas lines.
					Air in the gas line.	Purge the gas line.
					Excessively high flue system backpressure through unfavourable layout (too many diversions; cross-section inadequate or too long; horizontal sections too long).	Size and route the flue system correctly.
					Ignition/ionisation electrode contaminated.	Clean or replace ignition/ionisation electrode.
					Check cabling between the SAFe and the ionisation electrode for contact separation, breaks and damage.	Make the contacts correctly. Replace cable if required.
					Check electrode gaps and ignition/ionisation electrode for damage.	Align burner rod or electrode. Replace faulty electrode.
					Check cabling between the ignition transformer and ignition electrode for contact separation (on electrode and transformer), breaks and damage.	Make the contacts correctly. Replace cable if required.
					SAFe burner control unit faulty.	Replace the SAFe.
					Ignition transformer faulty (no or delayed ignition spark, "hard start").	Replace the ignition transformer.

Tab. 28 Fault displays
1) V = locking; B = blocking

Type[1)]	Display code	Fault code	Cause	Description	Test procedure/cause	Action
V	6L	561	"Power up" 5 times (power interruption during burner start).	The burner control unit was stopped 5 times during the burner start.	Check the 230 V power supply to the control unit.	Reset burner control unit. Remedy problem with the power supply.
B	7A	550	Undervoltage.	The mains voltage is too low.	The power supply must not fall below 195 V.	Ensure the correct power supply.
B	7A	551	Voltage interruption.	There has been a brief power failure.	Check the power cable for possible loose contacts. Check the wiring and correct contacts of the mains plug at the MC10 or SAFe.	Remedy any contact problems.
B	7P	549	The safety chain has opened.	The continuity of the external components tied into the MC10 safety chain has been interrupted.	Check the continuity of the components.	If required, replace faulty components.
B	8L	579	No gas supply pressure	There is no gas supply pressure although the solenoid valve 1 is supposed to have opened. The burner makes three successive attempts at starting, then there is a delay of one hour, before making three more start attempts.	Check that the gas tap is open.	Replace the gas train if required.
					Check whether there is a gas supply pressure.	Test the gas supply pressure. Replace gas train if necessary.
V	8P	580	Solenoid valve 1 leaking.	The valve test system has detected an unacceptably high leakage rate on solenoid valve 1.	Check gas train for contamination. Gas filter fitted.	Replace gas train.
V	8U	581	Solenoid valve 2 leaking.	The valve test system has detected an unacceptably high leakage rate on solenoid valve 2.	Check gas train for contamination. Gas filter fitted.	Replace gas train.

Tab. 28 Fault displays
1) V = locking; B = blocking

Type[1)]	Display code	Fault code	Cause	Description	Test procedure/cause	Action
V	9Y	500 501 502 503	Internal SAFe relay faulty.	Internal SAFe electronics faulty.	Press "Reset" and wait to see if the fault has been removed.	Replace the SAFe if the fault persists after "Reset" has been pressed.
V	CY	566	Return temperature < -5 °C (interruption)	The control unit receives unrealistic values from the return temperature sensor.	Check the lead between the SAFe and the return temperature sensor. Check electrical connection of the SAFe cable.	Replace cable if required. Remedy contact problem if required. Replace temperature sensor if required.
					Check resistance values of temperature sensor according to table. Check voltage at the temperature sensor terminals inside the SAFe according to table.	Replace SAFe if resistance values of the temperature sensor are correct, but voltage values are incorrect.
V	CY	567	Return temperature > 130 °C (short circuit)	The control unit receives unrealistic values from the return temperature sensor.	Check the lead between the SAFe and the return temperature sensor.	Replace cable if required.
					Check electrical connection of the SAFe cable.	Remedy contact problem if required.
					Check resistance values of temperature sensor according to table.	Replace temperature sensor if required.
					Check voltage at the temperature sensor terminals inside the SAFe according to table.	Replace SAFe if resistance values of the temperature sensor are correct, but voltage values are incorrect.
V	CO	568	Water pressure sensor fault (cable break).	Water pressure sensor interruption (voltage > 3.5 V).	Check lead to water pressure sensor. Check water pressure sensor.	Remedy any interruption. Replace water pressure sensor.
V	CO	569	Water pressure sensor fault (short circuit).	Water pressure sensor short circuit (voltage < 0.5 V).	Check lead to water pressure sensor. Check water pressure sensor.	Remedy any short circuit. Replace water pressure sensor.

Tab. 28 Fault displays
1) V = locking; B = blocking

Type[1)]	Display code	Fault code	Cause	Description	Test procedure/cause	Action
V	CY	573	Flow temperature < -5 °C (interruption)	The control unit receives unrealistic values from the flow temperature sensor.	Check cabling between SAFe and flow temperature sensor.	Replace cable if required.
					Check electrical connection of the SAFe cable.	Remedy contact problem if required.
					Check resistance values of temperature sensor according to table.	Replace temperature sensor if required.
					Check voltage at the temperature sensor terminals inside the SAFe according to table.	Replace SAFe if resistance values of the temperature sensor are correct, but voltage values are incorrect.
V	CY	574	Flow temperature > 130 °C (short circuit)	The control unit receives unrealistic values from the flow temperature sensor.	Check cabling between SAFe and flow temperature sensor.	Replace cable if required.
					Check electrical connection of the SAFe cable.	Remedy contact problem if required.
					Check resistance values of temperature sensor according to table.	Replace temperature sensor if required.
					Check voltage at the temperature sensor terminals inside the SAFe according to table.	Replace SAFe if resistance values of the temperature sensor are correct, but voltage values are incorrect.
V	LP	570	Too many resets via the interface.	Too many resets were carried out via the interface within a certain period. Please note: this fault can only be reset via the button on the SAFe.	Faults have been repeatedly reset but not removed.	Identify the cause for the faults that have resulted in the resets and remove them.
					The BC10 has developed a fault causing constant resets.	Replace the BC10.
					The SAFe has developed a fault.	Replace the SAFe.

Tab. 28 Fault displays

1) V = locking; B = blocking

Type[1)]	Display code	Fault code	Cause	Description	Test procedure/cause	Action
V	LL	571	Too many restarts despite resets.	15 restarts occurred in direct succession. This means that the same problem persisted after the resets. Please note: this fault can only be reset via the button on the SAFe.	Faults have been repeatedly reset but not removed.	Identify the cause for the faults that have resulted in the resets and remove them.
V	EE	601	Flow temperature sensor measurement.	Successive measurements of the flow temperature deviate severely from each other.	Check the lead to the boiler temperature sensor.	Replace in case of damage. Clean or replace if contaminated.
					Check the plug-in connection.	Reconnect the loose plug.
					Check sensor values according to table.	Replace the temperature sensor in case of deviations.
					Check the voltage at the temperature sensor according to table.	Replace the SAFe in case of deviations.
V	EE	612	Checking the return temperature sensor	Successive measurements of the return temperature deviate severely from each other.	Check the lead to the boiler temperature sensor.	Replace in case of damage. Clean or replace if contaminated.
					Check the plug-in connection.	Reconnect the loose plug.
					Check sensor values according to table.	Replace the temperature sensor in case of deviations.
					Check the voltage at the temperature sensor according to table.	Replace the SAFe in case of deviations.
V	EE	613	Flow temperature sensor measurement.	Successive measurements of the flow temperature deviate severely from each other.	Check resistance value of theflow temperature sensor.	Replace flow temperature sensor in case of deviations.

Tab. 28 Fault displays
1) V = locking; B = blocking

11 Appendix

11.1 Sensor curves

DANGER: Risk to life from electric shock.
- ▶ Isolate the heating system before taking any readings.

Always measure the temperatures being compared (room, flow, outside and flue gas temperatures) near the relevant sensor. The curves depict mean values and are subject to tolerances. Measure the resistance at the cable ends.

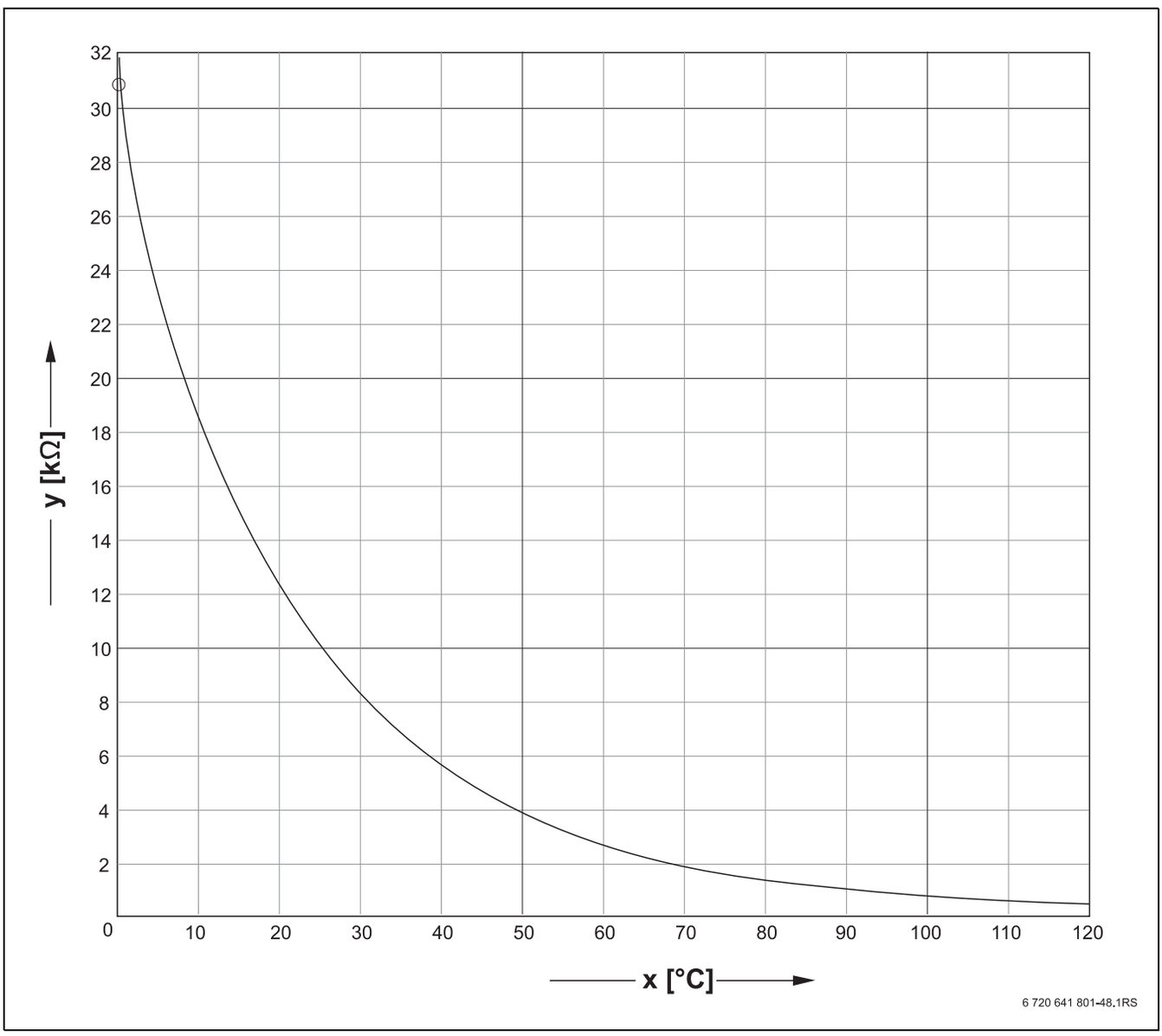


Fig. 65 Sensor curve: boiler water, return and flow temperature sensors

x Temperature in °C
y Resistance in k Ω

2 similar temperature sensors (twin sensors) fitted in a single sensor casing are used as boiler temperature sensors.
All temperature sensors on the boiler have the same sensor curve.

11.2 Pressure drop on the heating water side

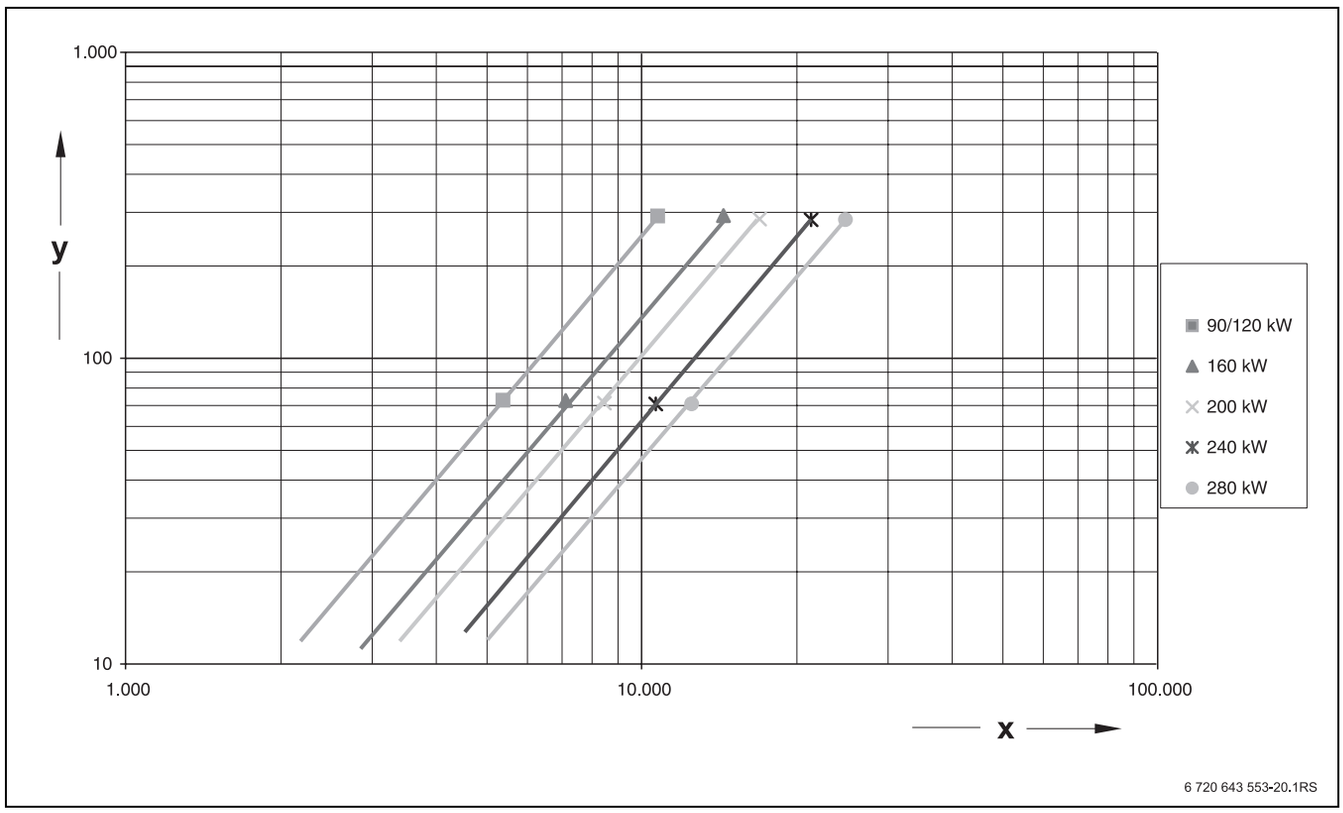


Fig. 66 Pressure drop on the heating water side (without check valve)

x Flow rate in l/h
y Pressure drop on the heating water side in mbar

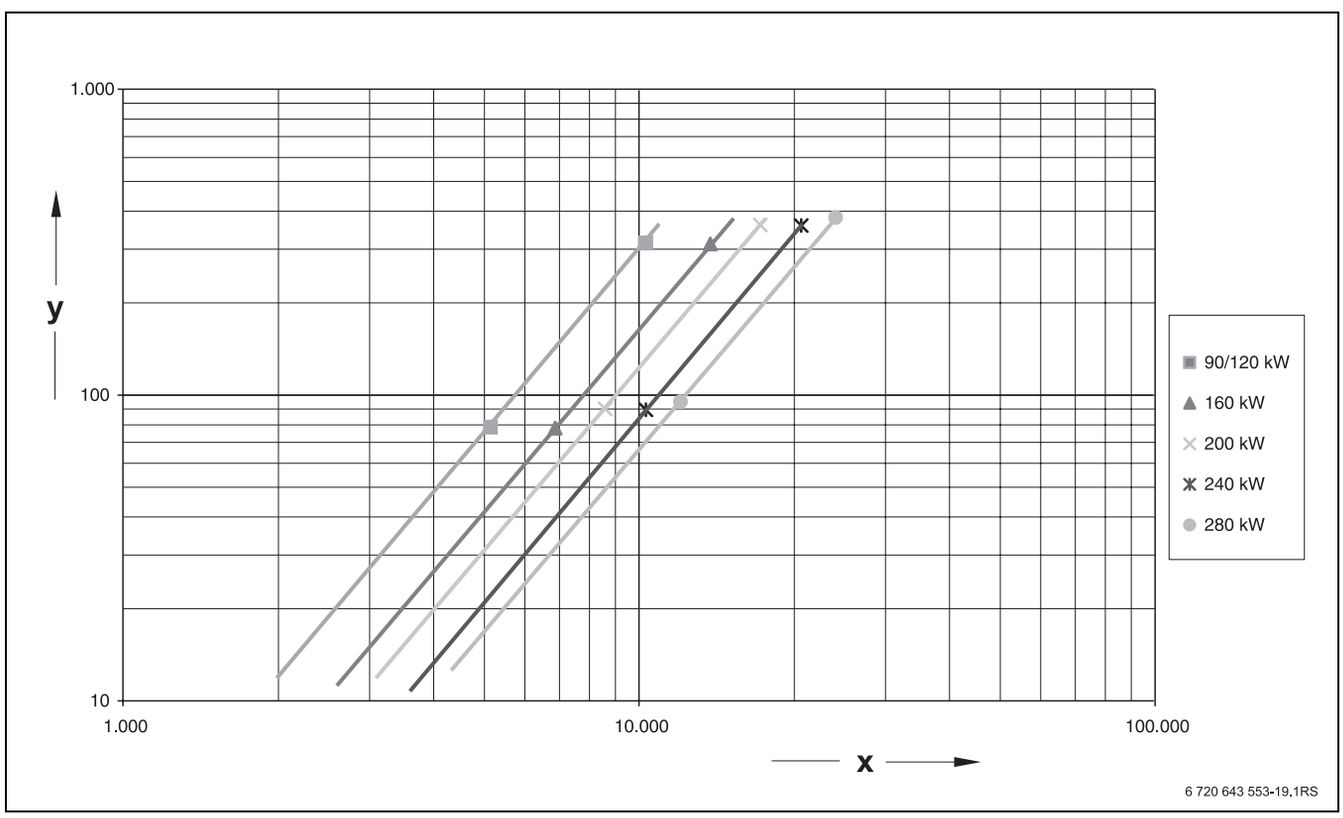


Fig. 67 Pressure drop on the heating water side (with check valve - cascade)

x Flow rate in l/h

y Pressure drop on the heating water side in mbar

11.3 MC10 connection diagram

NOTICE: System damage through incorrect installation!

- Provide a permanent power supply (not a safety plug).
- Ensure the power is connected to the correct phases.
- Select the installation, fuse/circuit breaker rating, ON/OFF switch, emergency stop switch and safety measures in accordance with local regulations.

DANGER: Risk to life from electric shock!

- Never use the earth conductor (green/yellow) as a control cable.

NOTICE: Operating faults through power failure!

- When connecting external components to the MC10 control unit, ensure that the total power consumption of these components does not exceed 5 A.

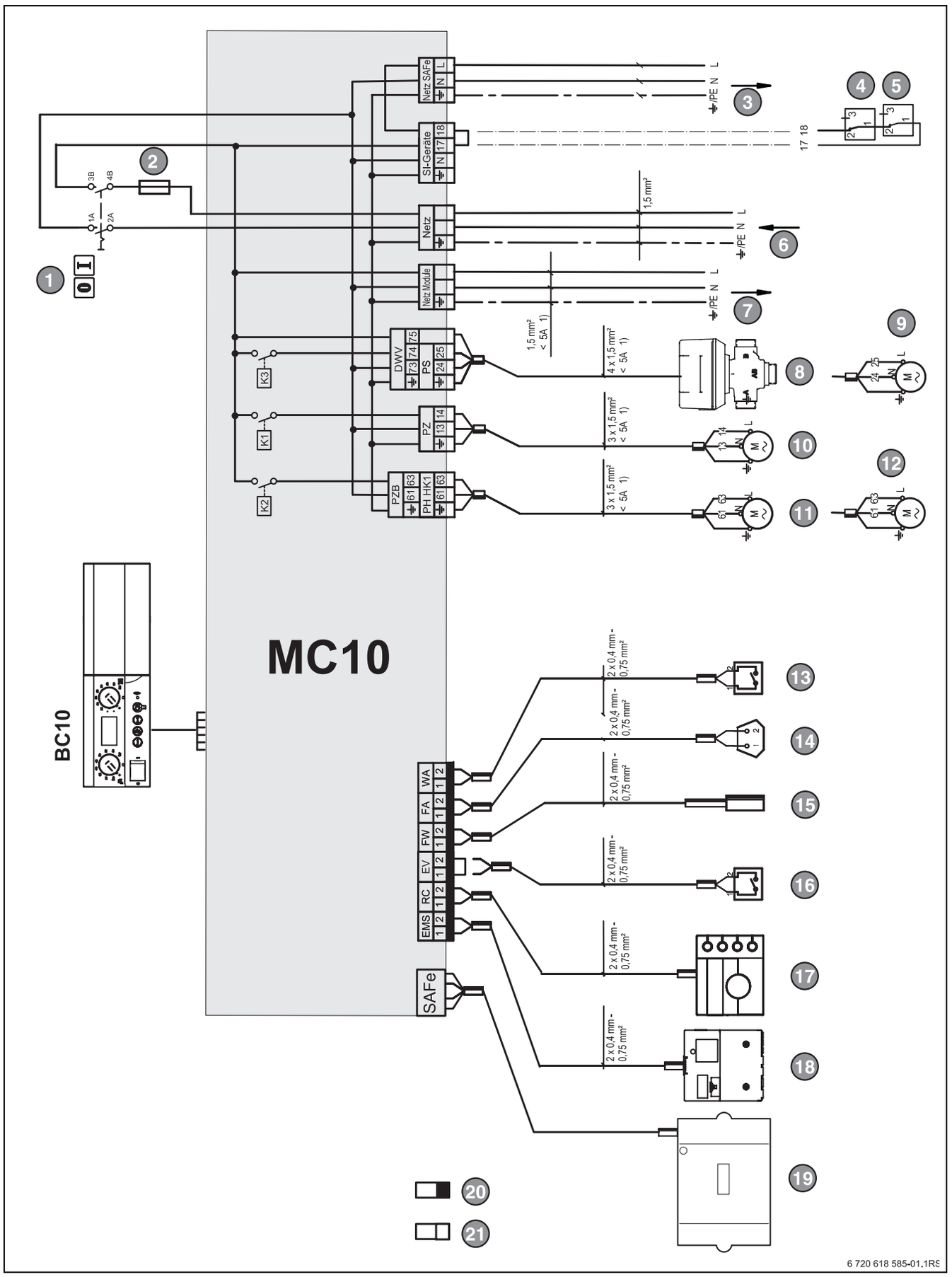


Fig. 68 MC10 connection diagram

1) The total current of all externally connected components must not exceed 5 A.

Legend for Fig. 68:

1 ON/OFF switch
2 Fuse, 10 AF
3 Power supply, burner control unit SAFe, 230 V/50 Hz
4 Component 1
5 Component 2
6 Mains supply, 230 V/50 Hz
7 Power supply for function modules, 230 V/50 Hz
8 DWV 3-way valve
Terminal 73 blue
Terminal 74 black
Terminal 75 brown
9 PS - Cylinder primary pump
10 PZ - DHW circulation pump
11 PZB - Feed pump
12 PH-HK1 - Heating circuit pump
13 WA - Heat demand (external – Volt-Free)
14 FA - Outside temperature sensor
15 FW - DHW temperature sensor
16 EV - External interlock
(remove jumper during connection)
17 RC - Room controller
18 EMS - BUS cable EMS,
connection to function modules
19 SAFe - BUS cable SAFe,
connection to the burner control unit
20 Low voltages
21 Control voltage 230 V~

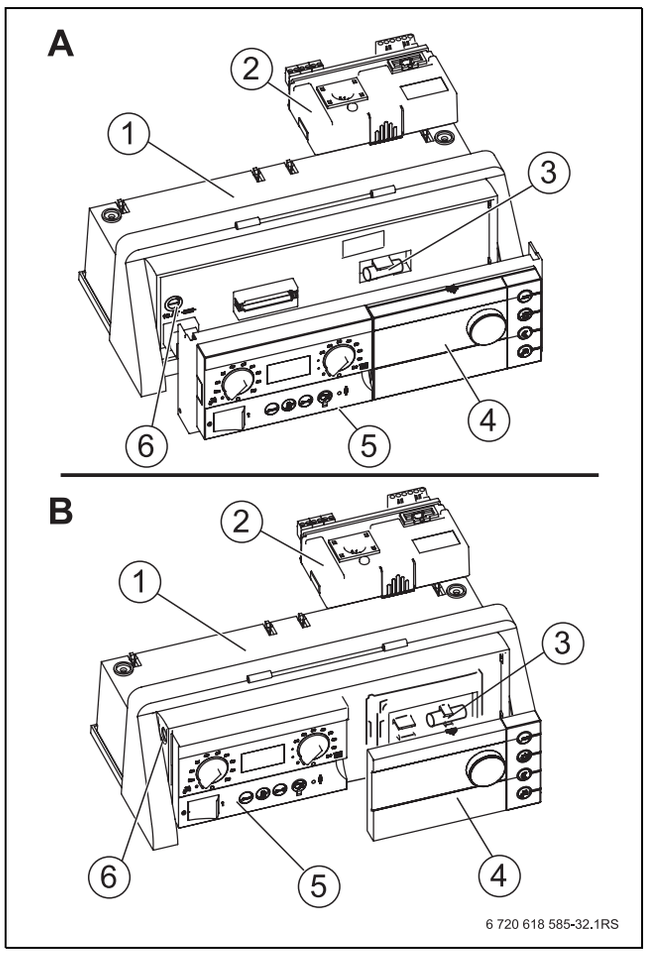


Fig. 69 Available versions BC10

A Fuse inside the MC10
B Fuse inside the BC10 base controller
1 Logamatic MC10
2 Function modules xM10
3 Spare fuse 10 AF
4 RC35 programming unit or dummy cover
5 BC10 base controller
6 Appliance fuse 10 AF

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Notes

Buderus

Cotswold Way, Warndon, Worcester WR4 9SW
Customer service: 0844 892 3004
Technical support: 0844 892 4224

www.buderus.co.uk

In the UK and IE, Buderus is a brand name
of Bosch Thermotechnology Ltd.

Bosch Thermotechnik GmbH
Sophienstrasse 30-32
D-35576 Wetzlar
www.buderus.de
info@buderus.de

C & F Quadrant Ltd.
Unit L40 Cherry Orchard Industrial Estate
Cherry Orchard, Dublin 10
Tel.: 01.6305700
Fax.: 01.6305706 / 01.6305715
www.cfquadrant.ie
E-mail: sales@cfquadrant.ie

Buderus