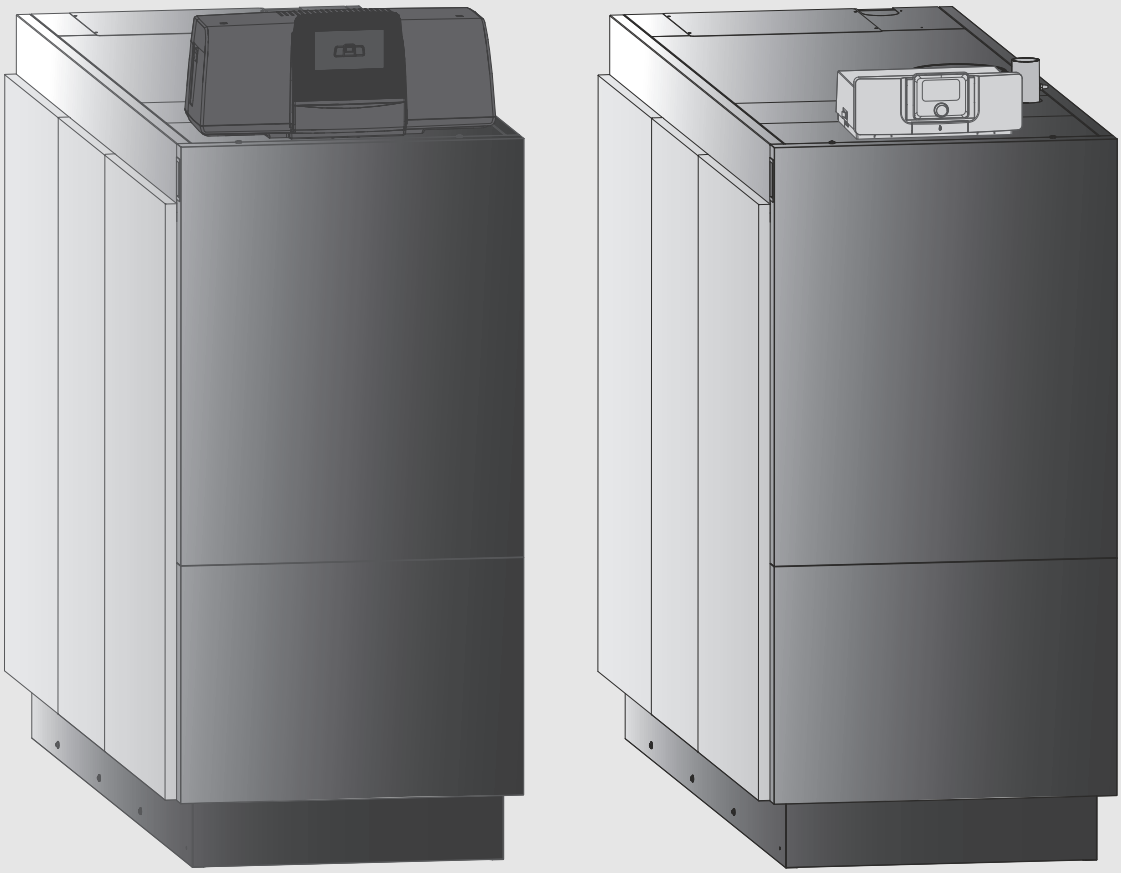
BOSCH

Installation and Service Instructions for Specialists

Floor standing gas condensing boiler

Condens 7000 FP

GC7000FP 350...500



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1 Explanation of symbols and safety instructions

1.1 Explanation of symbols

Warnings

In warnings, signal words at the beginning of a warning are used to indicate the type and seriousness of the ensuing risk if measures for minimizing danger are not taken.

The following signal words are defined and can be used in this document:

DANGER

DANGER indicates that severe or life-threatening personal injury will occur.

WARNING

WARNING indicates that severe to life-threatening personal injury may occur.

CAUTION

CAUTION indicates that minor to medium personal injury may occur.

NOTICE

NOTICE indicates that material damage may occur.

Important information

The info symbol indicates important information where there is no risk to people or property.

Additional symbols

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

Table 1

1.2 General safety instructions

⚠ Notices for the target group

These installation instructions are intended for gas, plumbing, heating and electrical contractors. All instructions must be observed. Failure to comply with instructions may result in material damage and personal injury, including danger to life.

- ▶ Read the installation, service and commissioning instructions (heat source, heating controller, pumps, etc.) before installation.
- ▶ Observe the safety instructions and warnings.
- ▶ Follow national and regional regulations, technical regulations and guidelines.
- ▶ Record all work carried out.

⚠ Working on the boiler

- ▶ Installation, commissioning, inspection as well as any repair work must only be carried out by an approved contractor. In doing so, observe the regulations (→ chapter 3).
- ▶ Do not repair, manipulate or bypass safety equipment.
- ▶ Observe all relevant instructions for system components, accessories and spare parts.

⚠ If you smell gas

- ▶ Close gas isolator.
- ▶ Open windows and doors
- ▶ Never operate electrical switches, including telephones, plugs or doorbells.
- ▶ Extinguish any naked flames.
- ▶ Never smoke.
- ▶ Never use any lighters or sources of ignition of any kind.
- ▶ Warn all occupants in the building, but do not ring doorbells.
- ▶ If you can actually hear gas escaping, leave the building immediately.
- ▶ Prevent third parties from entering and notify the police and fire brigade as well as the gas supplier and heating contractor **from outside** the building.

⚠ Danger of explosion of flammable gases

- ▶ Any work on components that carry gas may only be carried out by an approved contractor.

⚠ Danger posed by explosive and easily flammable materials

- ▶ Never use or store easily flammable materials (paper, curtains, clothing, thinners, paints, etc.) near the device.
- ▶ Observe all local regulations in relation to the storage of combustible materials at the installation location.

⚠ Danger through short circuits

To prevent short circuits:

- ▶ Only use original cabling by the manufacturer.

⚠ Danger through electric shock when the boiler is open

- ▶ Before opening up the boiler, isolate it completely from the mains power supply and ensure the power cannot be inadvertently reconnected.
- ▶ It is not enough to switch off the control unit.

⚠ Danger if you smell flue gas

- ▶ Switch off the boiler.
- ▶ Open windows and doors.
- ▶ Notify an approved contractor.

⚠ In devices with open-flue mode: there is a risk of poisoning from flue gas if there is an inadequate combustion air supply

- ▶ Ensure that there is an adequate combustion air supply.
- ▶ Do not cover or reduce the size of ventilation apertures in doors, windows and walls.
- ▶ Ensure that there is an adequate combustion air supply, including for any devices installed at a later date, e.g. extractor fans, kitchen fans or air conditioning units that discharge air to the outside.
- ▶ Never operate the device if there is an insufficient combustion air supply.

⚠ Danger of escaping flue gases

- ▶ Ensure that the flue pipes and gaskets are not damaged.
- ▶ Ensure that the boiler is not equipped with a thermostatic flue gas damper downstream of the flue gas connection.

Use of motor-controlled supply air flaps is permitted.

⚠ Installation and operation

- Correct and proper installation and adjustment of the burner and the controller are the fundamental requirements for safe and economical operation of the boiler.
- The boiler must only be installed and adjusted by an approved contractor.
- Do not change parts at the boiler as otherwise the approval would be invalidated.
- Never modify any parts through which flue gas is routed.
- Electrical work must only be carried out by qualified electricians.
- **With open flue operation:** do not cover or reduce the size of ventilation apertures in doors, windows and walls. Make sure that windows that are used as combustion air vents cannot be shut accidentally. Attach a warning sign near the window. If draft-proof windows are installed, ensure an adequate supply of combustion air.
- If the supply air flaps can be closed via motors, combustion must only start when the supply air flap is fully open (volt free checkback signal to the boiler controller via failsafe limit switch). Provide for control of supply air flaps.
- Make sure the boiler installation location is frost-proof.
- **Never shut off pressure relief valves!**
  Water may escape from the pressure relief valve for the heating circuit and piping when the water is heating up.
- The heating system must be installed and operated in accordance with the applicable rules of technology as well as national, regional and local regulations.

⚠ Danger to life from explosion

An increased and permanent ammonia concentration may lead to stress corrosion cracking on brass (e.g.gas valves, union nuts). As a result, there is a risk of explosion from gas escaping.

- Do not use wall mounted gas boilers in rooms where there is an increased or permanent ammoniac concentration (e.g. livestock stables or storage room for fertilisers).

⚠ Risk of damage from operating errors

Operator errors can result in personal injury and/or material damage.

- Ensure that children never operate this appliance unsupervised or play with it.
- Ensure that only personnel who can operate this appliance correctly have access to it.

⚠ Instruction of the operator

- Explain to the user how the boiler works and how to operate it.
- The operator is responsible for the safety and environmental compatibility of the heating system (→local regulations and laws).
- Inform the operator that he or she must not carry out any modifications or repairs.
- Also point out the need for inspection and preventative maintenance for safe and environmentally friendly operation.
- Maintenance and repairs may only be performed by an authorised heating contractor.
- Only use genuine spare parts!
- Any other combinations, accessories and wearing parts may only be used if these are specifically designed for the application and impair neither the performance characteristics nor the safety requirements.
- Operate the boiler only with mounted and closed casing.

2 Product Information

2.1 Intended use

The Condens GC7000FP is designed for use as a floor standing gas condensing boiler for DHW and central heating.

- Observe the details on the type plate and the technical data (→Chapter 17.1, page 67).

2.2 GB Importer

Bosch Thermotechnology Ltd.
Cotswold Way, Warndon
Worcester WR4 9SW / UK

2.3 Permissible fuels

This product may only be operated using gases from the municipal gas supply.

For gas type conversion and operation with LPG, the information in the instructions supplied with this product and/or the required accessories applies.

Information on the certified gas types can be found in chapter “Technical data” as well as on the type plate on the product.

Within the scope of the conformity assessment, the use of natural gas with hydrogen admixtures of up to 20% by volume was also tested and certified.

You can obtain detailed information on the gas mixture supplied and its effect on the performance and CO_2 content from your responsible gas supply company and our service department on request.

2.4 Scope of delivery

The Condens 7000 FP is delivered with a control unit, which is assigned when ordering, in 2 packaging units.

- Upon receipt, check that all packaging is in perfect condition.
- Check that all package contents are present.
- Dispose of packaging in an environmentally responsible manner.

Packaging unit	Component	Packaging
1 (boiler)	Floor standing boiler installed (with gas burner, without casing)	1 shrink-wrap package, on a pallet
	Adjustable feet	1 shrink-wrap package
	Label for gas type conversion	1 shrink-wrap package
	Technical documents	1 shrink-wrap package
	Casing	2 boxes, on a pallet
2 (separate)	Control unit	1 carton

Table 2 Scope of delivery

2.5 Accessories

Refer to the Technical product brochure for a complete overview of all available accessories.

The following accessories are available from your local sales office:
- Water treatment accessories for initial filling and feeding
- Pressure relief valve or safety assembly
- Flue system
- Air supply system
- Control unit
- Cascade pipework (on the water and flue gas side for dual cascades)

2.6 Tools, materials and assembly aids

The following tools and assembly aids are required for commissioning, inspection and maintenance of the boiler:
- Standard tools used by heating system installers and for gas and water installations
- Metric hexagon wrench set (7; 8; 10; 13 width across flats)
- Allen key set (4 mm)
- Torx key set
- The control unit as a monitoring device for commissioning, inspection and maintenance of the boiler.

The following may also prove useful:
- 2 transport rollers (furniture transport rollers; load-bearing capacity > 300 kg, height >150 mm) for rolling the boiler.
  - Alternative: 5 pipes (approx. R 1¼ ", approx. 700 mm long) as base for rolling the floor standing boiler.
- Cleaning blade and/or chemical cleaning agent for wet cleaning (available as accessories).

2.7 The heating system is operated and monitored via App or Web Portal

We offer, in combination with the relevant control unit, a comprehensive range of products for monitoring, diagnosis and control of the floor standing boiler via mobile terminal devices, PC or tablet.

2.8 Product overview

The GC7000FP is a floor standing condensing boiler with an aluminium heat exchanger.

2.8.1 Product description

The main components of the Condens 7000 FP are:
- Control unit
- Boiler block
- Device frame and casing
- Gas burner

The control unit monitors and controls all electrical components of the floor standing boiler.

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

The control unit enables the basic operation of the heating system. It provides the following functions, among others, for that purpose:
- Turning the heating system on/off
- Setting the DHW temperature and maximum boiler temperature in heating mode
- Status display

The control unit CC83xx or MX25 must be mounted at the designated position on the boiler.
It is forbidden to extend the data line and mount the control unit outside the boiler.

Many additional functions that enhance control and operating convenience as well as providing information on the heating system settings are described in the relevant technical documentation of the installed control unit.

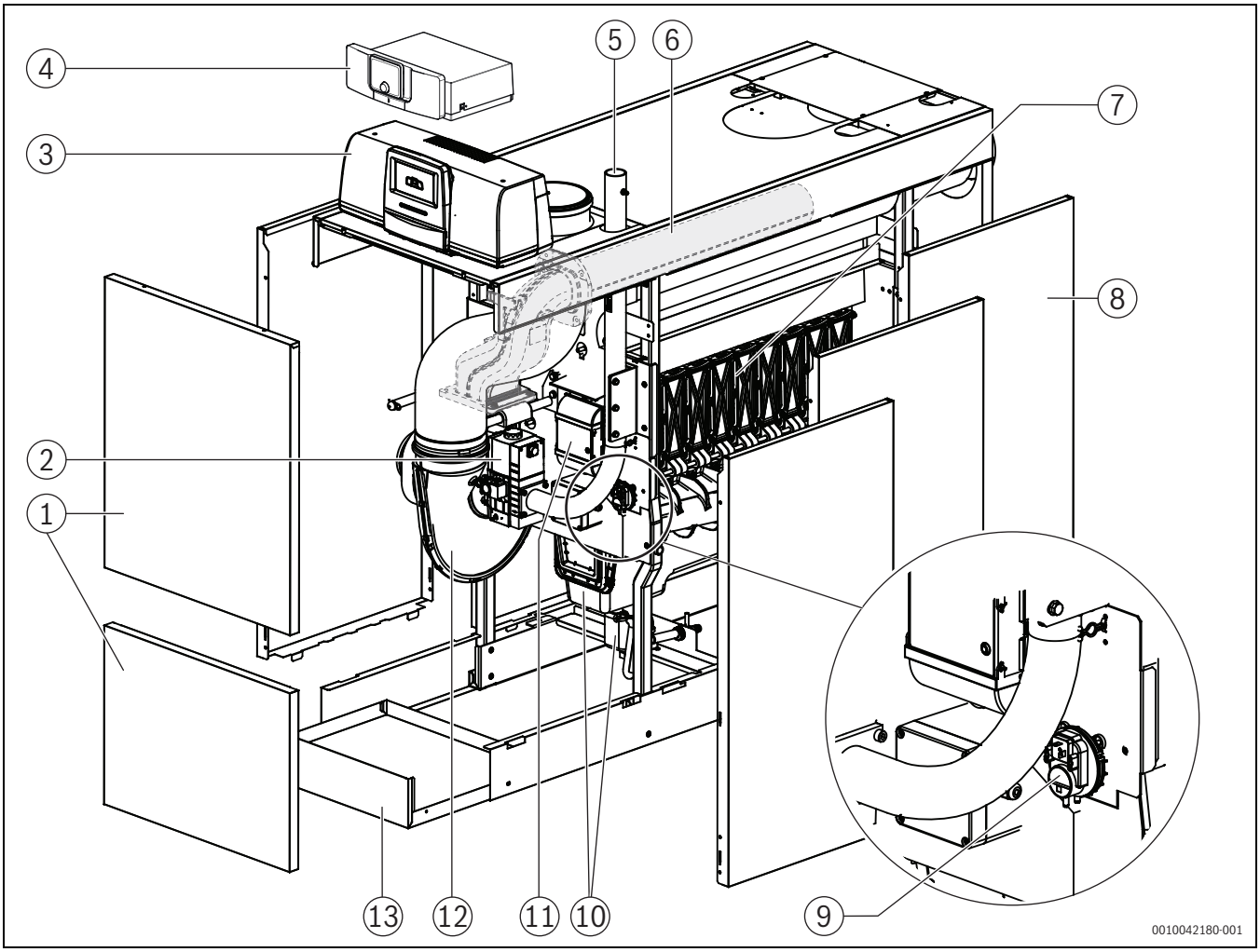


Fig. 1 Condens 7000 FP, 350...500 kW main components (shown: right-hand version; cleaning cover and flow and return are located on the right)

[1] Boiler front panel (2-part)
[2] Air/gas ratio control valve
[3] Control unit CC83xx (optional)
[4] Regelgerät MX25 (optional)
[5] Gas supply pipe
[6] Gas burner with burner rod
[7] Boiler block with thermal insulation (shown without thermal insulation)
[8] Boiler casing
[9] Pressure switch
[10] Condensation catch pan and siphon
[11] Burner control unit
[12] Fan
[13] Bottom panel

The right-hand version of the boiler is shown. In this case the cleaning cover and the flow and return are located on the right.
In the left-hand version, the cleaning cover and flow and return are located on the left.

2.9 Dimensions and specifications

2.9.1 Dimensions and connections Condens 7000 FP

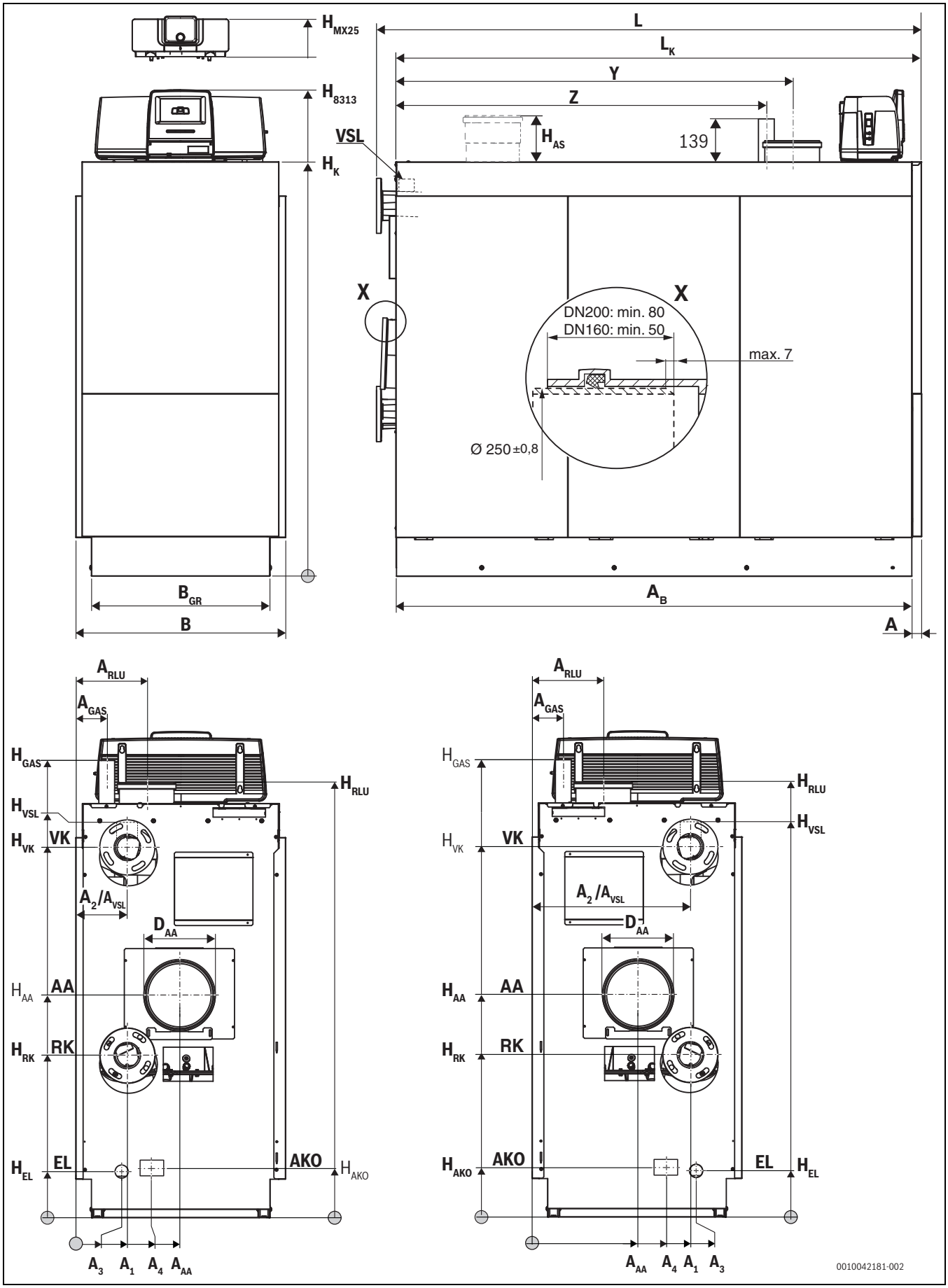


Fig. 2 Dimensions and connections for Condens 7000 FP, 350…500 kW (right and left-hand version; dimensions in mm)

Key to Fig. 2:

A	Space
A_1	Boiler return clearance
A_2/A_{VSL}	Boiler flow clearance
A_3	Drain clearance
A_4	Condensate outlet clearance
A_{AA}	Flue gas connection clearance
A_B	Base frame width
A_{GAS}	Gas connection clearance
A_{RLU}	Combustion air connection clearance
AA	Flue gas outlet
AKO	Condensate connection
B	Width of boiler including casing
B_{GR}	Base frame width
D_{AA}	Inside Ø of flue gas outlet
EL	Cold water inlet/drain
H_{83xx}	Control unit height CC83xx
H_{MX25}	Control unit height MX25
H_{AA}	Flue outlet height
H_{AS}	Vertical height of flue connector (optional)
H_{AKO}	Condensate outlet height
H_{GAS}	Gas connection height
Z	Clearance rear gas connection
H_{EL}	Drain height
H_K	Boiler height
H_{RK}	Boiler return (low temperature return) height
H_{RLU}	Combustion air connection height
Y	Clearance rear combustion air connection
H_{VK}	Boiler flow height
H_{VSL}	Flow safety pipe height
L	Length of boiler including casing
L_K	Boiler length
VK	Boiler flow
VSL	Pressure relief valve and flow safety pipe connections (for open vented systems)

		Boiler size (output in kW)					
	Unit	350[1)]	350[2)]	400[1)]	400[2)]	500[1)]	500[2)]
Length L	mm	1903	1903	1903	1903	2088	2088
Length L_K	mm	1832	1832	1832	1832	2017	2017
Width B	mm	803	803	803	803	803	803
Width B_{GR}	mm	684	684	684	684	684	684
Dimension A_B	mm	1880	1880	1880	1880	1968	1968
Clearance A	mm	50	50	50	50	50	50
Height H_K	mm	1582	1582	1582	1582	1582	1582
Height H_{AA}	mm	855	855	855	855	874	874
Dimension A_{AA}	mm	396	406	396	406	396	406
Height H_{AKO}	mm	171	171	171	171	171	171
Dimension A_4	mm	267	277	267	277	267	277
Height H_{EL}	mm	177	177	177	177	177	177
Dimension A_3	mm	175	632	175	632	175	632
Height H_{RLU}	mm	1662	1662	1662	1662	1662	1662
Dimension Y	mm	1314	1314	1314	1314	1502	1502
Dimension A_{RLU}	mm	282	282	282	282	282	282
Height H_{VK}	mm	1414	1414	1414	1414	1414	1414
Dimension A_2/A_{VSL}	mm	196	605	196	605	196	605
Height H_{VSL}	mm	1480	1480	1480	1480	1480	1480
Height H_{RK}	mm	620	620	620	620	620	620
Dimension A_1	mm	196	605	196	605	196	605
Dimension A_{GAS}	mm	118	118	118	118	118	118
Height H_{GAS}	mm	1670	1670	1670	1670	1670	1670
Dimension Z	mm	1227	1227	1227	1227	1416	1416
Internal flue gas outlet Ø AA	mm	251 +1.2/-0.5	251 +1.2/-0.5	251 +1.2/-0.5	251 +1.2/-0.5	251 +1.2/-0.5	251 +1.2/-0.5
RLU connection	mm	200 ± 0.5	200 ± 0.5	200 ± 0.5	200 ± 0.5	200 ± 0.5	200 ± 0.5
Connection VK and RK	DN/mm	100	100	100	100	100	100
Connection Ø VSL	inch	R 2"	R 2"	R 2"	R 2"	R 2"	R 2"
Connection Ø GAS	inch	R 2"	R 2"	R 2"	R 2"	R 2"	R 2"
Condensate connection	inch (DN/mm)	¾" (DN20)	¾" (DN20)	¾" (DN20)	¾" (DN20)	¾" (DN20)	¾" (DN20)
$Height_{83xx}$	mm	1822	1822	1822	1822	1822	1822
$Height_{MX25}$	mm	1724	1724	1724	1724	1724	1724

1) Right-hand version

2) Left-hand version

Table 3 Measurements and connection dimensions

3 Regulations

DANGER

Failure to comply with instructions may result in material damage and personal injury, including danger to life!

- ▶ Comply with all instructions.

NOTICE

System damage due to differing operating conditions!

Faults may arise when deviating from the specified operating operating conditions. Individual components or the boiler may be destroyed if there are deviations.

- ▶ Observe the binding information on the data plate.

3.1 Regulations

In order to ensure installation and operation of the product in accordance with the regulations, please observe all the applicable national and regional regulations as well as all technical rules and guidelines.

The document 6720807972 contains information about the applicable regulations. You can use the document search on our website to display this. You will find the address of the website on the back of these instructions.

3.2 Duty to obtain a permit and provide notification

Prior to installation of the heating and flue system:

- ▶ Inform relevant building authority.
- ▶ If required by the Clean Air Act 1993, seek approval for the flue system from the Local Authority. For additional guidance see IGE/UP/10 edition 4.
- ▶ Make sure that there are no concerns on the part of the authority regarding the planned installation
- ▶ Make sure that official requirements are complied with.
- ▶ Please note that in certain regions approvals may be required for the flue system and the connection of the condensate outlet to the public sewerage system.

3.3 Validity of regulations

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

3.4 Notes on installation and operation

Use only genuine spare parts from the manufacturer. The manufacturer can assume no liability for damage caused by spare parts not supplied by the manufacturer.

When installing and operating the heating system, observe the following requirements:

- The local building regulations regarding installation conditions.
- The local building regulations regarding the supply and exhaust air systems, and the chimney connection.
- Latest edition of the IEE Wiring regulations governing electrical connection to the mains power supply
- Regulations and standards regarding the safety equipment in water-filled heating systems. For guidance see the ICOM water treatment guide for commercial heating systems.
- Make sure that the regional approvals required for the flue system and condensate connection to the public sewage system have been obtained.

3.5 Installation location

DANGER

Danger to life from explosion!

An increased and permanent ammonia concentration may lead to stress corrosion cracking on brass (e.g.gas valves, union nuts). As a result, there is a risk of explosion from gas escaping.

- ▶ Do not use wall mounted gas boilers in rooms where there is an increased or permanent ammoniac concentration (e.g. livestock stables or storage room for fertilisers).
- ▶ If contact with ammonia is unavoidable, make sure that there are no brass parts installed in the system.

DANGER

Risk of fire through flammable materials or liquids.

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

NOTICE

Frost damage!

- ▶ Install the heating system in a frost-free room.

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 involving the production of manure.
- ▶ Never operate boilers in locations where trichloroethene, halogenated hydrocarbons or other corrosive chemical substances are used or stored. Certain adhesives, solvents, cleaning agents and paints, for example, contain these substances.
- ▶ Choose or prepare a suitable installation location.

NOTICE

The boiler may only be operated up to a maximum installation altitude of 1200 m above sea level!

- ▶ →Table 20 (technical data), see 68.

NOTICE

The boiler may be operated with combustion air up to a certain maximum temperature!

The maximum temperature of the combustion air must not exceed 35 °C.

- ▶ →Table 20 (technical data), see 68.

3.6 Quality of the heating water

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

- Observe the water quality requirements contained in the "Water Quality Operator's Log".
- Warranty claims for the boilers will only be considered provided the water quality requirements have been met and the operator's log has been maintained.

3.7 Pipework quality

NOTICE

Boiler damage through corrosion.

- Never operate this boiler as a gravity-fed or as open vented heating system unless working in combination with a hydraulic system separator with a heat exchanger.

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. If the plastic pipes do not comply with these standards, they must be separated from the rest of the system using a heat exchanger.

3.8 Combustion air quality

- To avoid corrosion, keep the supply of combustion air free of corrosive substances (e.g. halogenated hydrocarbons that contain chlorine or fluorine compounds).
- Keep the combustion air supply free of dust or use the "air filter" accessory set .

3.9 Combustion air/flue gas connection/air vents

The installation room must be equipped with the required combustion air openings or ventilation apertures leading to the outside.
The conditions of installation rooms and the setting up of gas appliances must comply with country-specific regulations.

WARNING

Danger to life due to poisoning!

Risk of poisoning due to escaping flue gases when the air supply is inadequate.

- Make sure that a supply of air is available in every operating mode through corresponding openings to the open air.

- Inform the user about the need for the openings.

The following applies for **open-flue** mode:

- Provide a combustion air opening that complies with the minimum size specified in table 4[1)].

Combustion air vents		
Boiler size [kW]	Area per opening [cm^2]	Number of openings [n]
350	400	2
400	450	2
500	550	2

Table 4 Combustion air openings during open flue operation

- Never place objects in front of these vents.
- Ensure that combustion air vents are unobstructed at all times.

The following applies for **room sealed** operation:

The boiler must be connected to a flue system.

- Observe country-specific and local regulations.
- Observe attached documentation "Information on flue gas routing".

In order to provide ventilation, the installation room must have a ventilation aperture leading to the outside of at least 150 cm^2, or ventilation vents of at least 2 × 75 cm^2, or pipes to the open air with equivalent flow cross-sections.[1)]
At rated outputs above 100 kW, a top and bottom vent of 150 cm^2 respectively is required. The ventilation apertures must be enlarged by 1 cm^2 for each kW over 100 kW.

- Never place objects in front of these vents.
- The air vents must always be unobstructed.
- Calculate dimensions of the air supply pipe in accordance with the applicable regulations.
- Provide a combustion air opening that complies with the minimum size specified in table 5 [1)].

Combustion air vents		
Boiler size [kW]	Area per opening [cm^2]	Number of openings [n]
350	400	2
400	450	2
500	550	2

Table 5 Combustion air openings during balanced flue operation

For additional information on the combustion air/flue gas connection, see chapter 5.6, page 19.

3.10 Frost protection

- Observe technical documentation of the installed control unit for frost protection settings.

1) In addition to this, country-specific and local regulations must be observed.

4 Transporting the boiler

DANGER

Risk to life through falling loads!

Falling loads can result in life-threatening injuries.

- Only transport the boiler by means of a crane, forklift truck pallet truck or transport rollers.
- Only trained authorised personnel may undertake the handling (e.g. by forklift truck) or lifting by means of a crane/hoist.
- Observe safety instructions relating to the lifting of heavy loads (e.g. by means of a crane/hoist).
- Wear personal safety equipment (e.g. safety boots and protective gloves).
- Protect the boiler against slippage by means of a transport strap.

CAUTION

Risk of injury through carrying heavy loads!

- Only transport the boiler by means of a crane/hoist, forklift truck or transport rollers.

NOTICE

Boiler damage due to impact!

The boiler scope of delivery includes components that are susceptible to impact damage.

- If the boiler has to be moved after delivery, protect all components against shocks and impacts.
- Observe the transport instructions on the packaging.

The boiler may be transported to the place of installation by crane, forklift truck or pallet truck. Where possible, transport the boiler to the installation room in its shipping packaging to protect it from contamination.

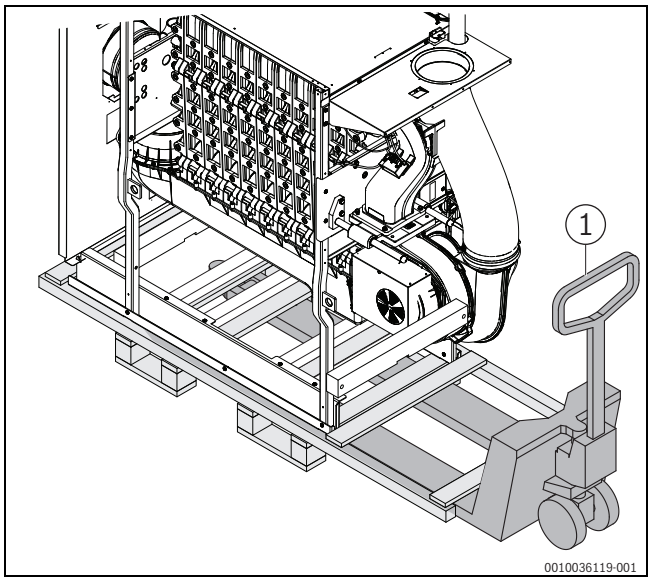


Fig. 3 Transport the floor standing boiler with pallet truck (example for illustration purposes)

[1] Pallet truck

4.1 Remove the burner to reduce the transport volume, and install

Removing the burner

To reduce the transport volume during transport and delivery to the installation location, the burner can be removed according to the following description.

- Open the hose clamp on the air hose at the top and remove the air hose (→Fig. 4).
- Turn the inlet duct of the fan downwards (→Fig. 5).

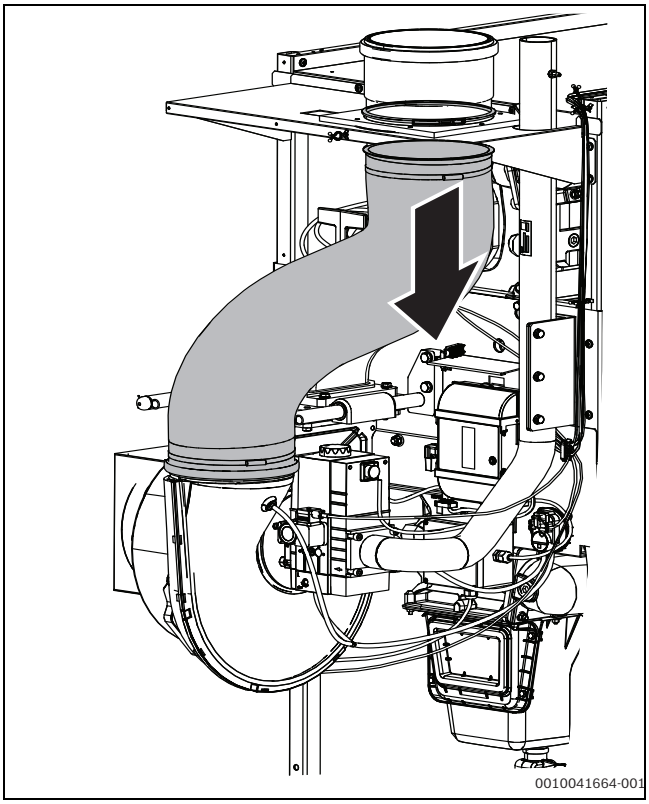


Fig. 4 Remove the air hose to the top

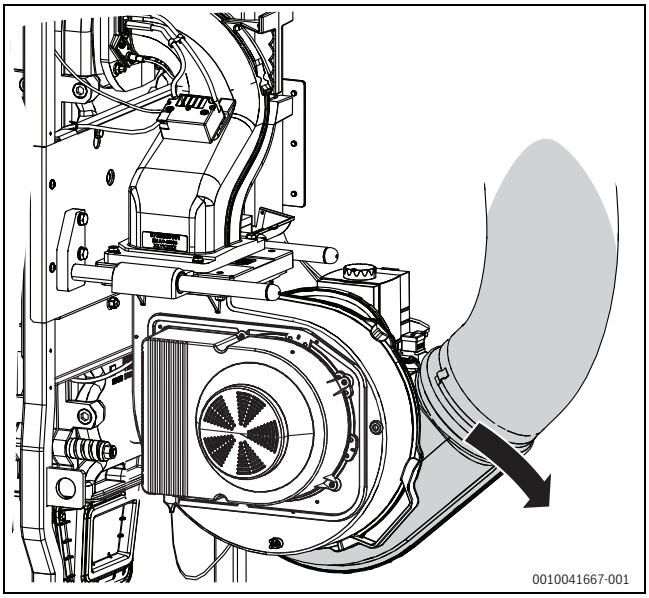


Fig. 5 Turn the inlet duct of the fan downwards

▶ Open the top flap on the burner controller and unplug the plug (→Fig. 6).

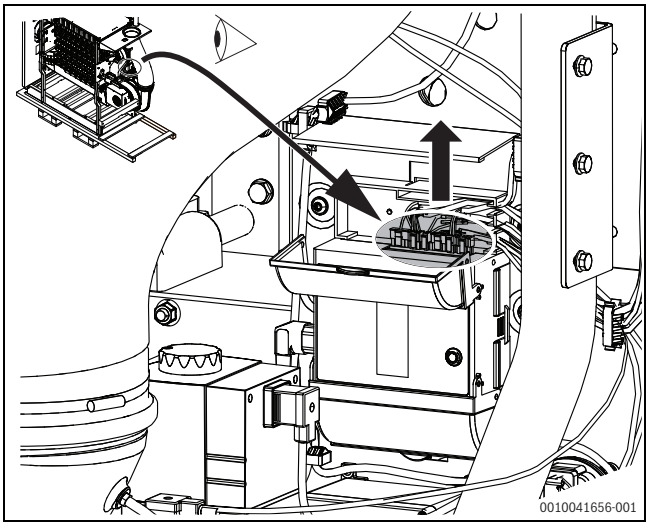


Fig. 6 Unplug the plug from the burner control unit

▶ Loosen the cable on the side and at the top of the supporting plate, and place on top of the boiler (→Fig. 7).
▶ Remove the 6 screws on the supporting plate for the air hose and take off the supporting plate (→Fig. 7, [1+2]).
▶ Unplug both plugs on the differential pressure sensor (→Fig. 7, [3]).
▶ Unplug the plug on the solenoid valve (→Fig. 7, [4]).

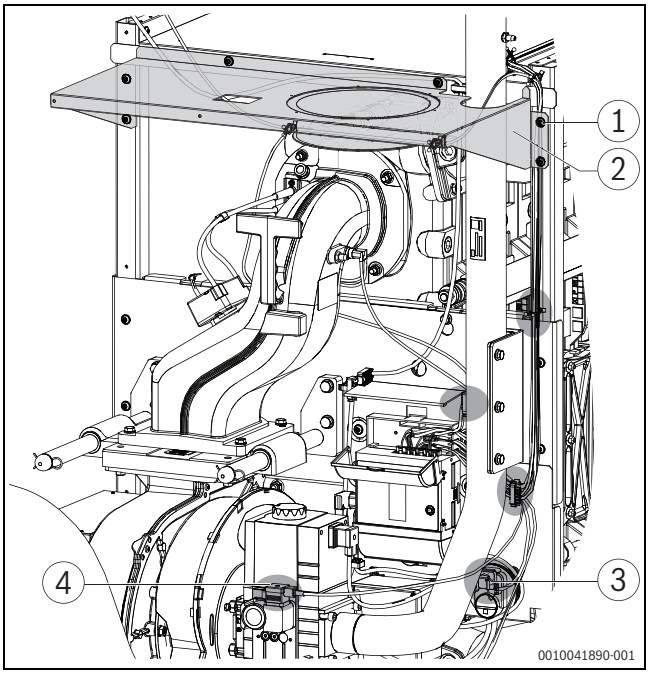


Fig. 7 Loosen the cable and remove the supporting plate

[1] 6x screws
[2] Supporting plate for air hose
[3] Plug on differential pressure sensor
[4] Plug for solenoid valve

▶ Unplug the plug on the fan (→Fig. 8).

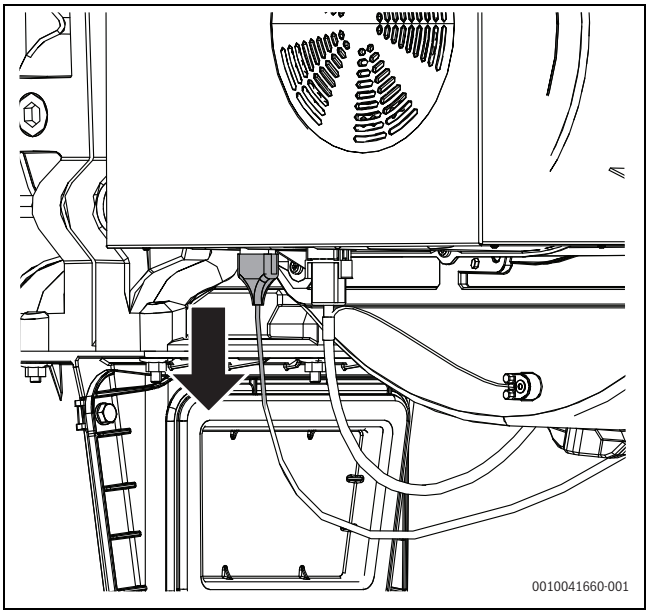


Fig. 8 Unplug the plug from the fan

▶ Unplug the plug on the ignition transformer (→Fig. 9).
▶ Remove the 4 nuts on the mixture manifold / front section (→Fig. 9).

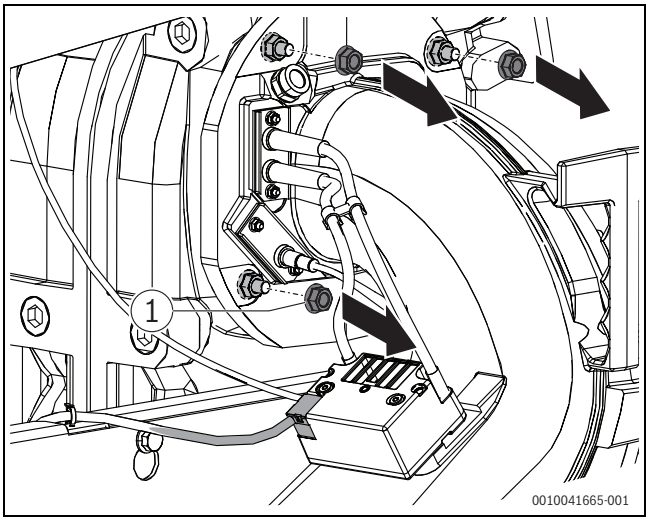


Fig. 9 Unplug the plug on the ignition transformer and remove the nuts on the mixture manifold / front section

[1] Plug on the ignition transformer
[2] Nuts on the mixture manifold

▶ Pull the mixture manifold with burner rod and fan back to the end position (O-ring on the guide pin)
▶ Remove the mixture manifold with burner rod as described in chapter 11.7 for the Figs. 50 and 51.
▶ Remove the 4 screws on the holding plate of the burner base (→Fig. 10, [2]).

- Loosen the 2 securing screws on the holding plate of the burner base, do not remove them (→Fig. 10, [1]).

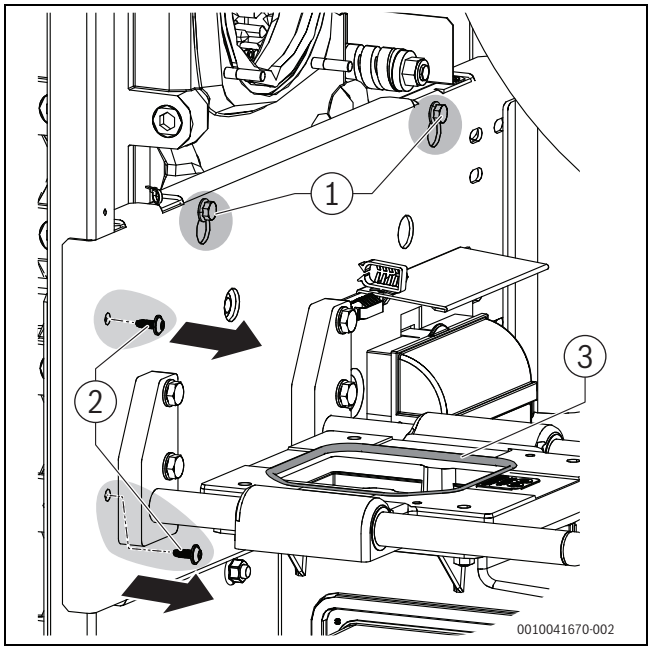


Fig. 10 Screws on the burner base

[1] 2 securing screws
[2] 4 screws on the holding plate
[3] Gasket in the carriage

- With the help of a second person, lift the burner base slightly and unhook from the securing screws. In doing so, observe the gas supply pipe protruding to the top and the cable.
- Put down the burner base and protect against pollution and damage.

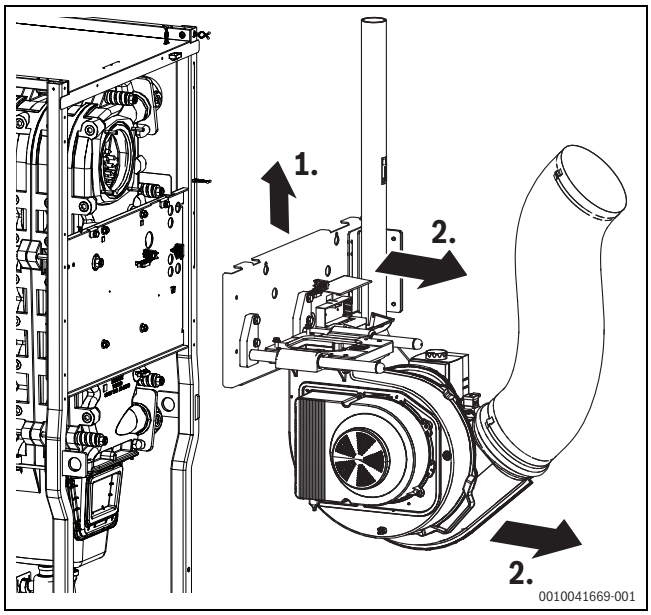


Fig. 11 Remove the burner base

Installing the burner

NOTICE

Property damage from trapping cables and gaskets!

During installation, the cable hanging down and gaskets not inserted correctly may be damaged.

- During installation, take care that the cable cannot be trapped and is routed back in its original position.
- Take care that the gaskets are mounted correctly (→Fig. 10 and 10).

- Hang the burner base in the securing screws and screw tight. In doing so, observe the gas supply pipe protruding to the top and the cable.
- Loosen the gas pipe on the gas valve. For this purpose, remove the 4 screws on the flange (→Fig. 48).
- Pull the burner base back until the end position (O-ring on the guide pins).
- Install the mixture manifold with burner rod (→Chapter 11.12.4, page 50)
- Installing the gas pipe on the gas valve.
- Reconnect electrical connections.
- Check for tightness after installation.

4.2 Transporting the boiler by crane

WARNING

Property damage and personal injury up until danger to life from incorrect transport with a crane!

Incorrect transporting with a crane may damage the appliance and / or lead to life-threatening injuries when falling down.

- Use only transport ropes that are in a flawless state.
- Hooks may only be attached to the crane lifting eyes intended for this purpose.
- Secure the load against falling.
- Do not walk under the suspended load.

- When transporting, a second person must assist for securing and stabilising.
- Remove the front and rear wooden crate (do not remove the upper wooden frame)
- Check the screws of the transport timber for a secure seat.

- Secure the lifting gear (round slings) to the transport timber, guide along the boiler frame to the top and hook onto the crane hook (→Fig. 12).

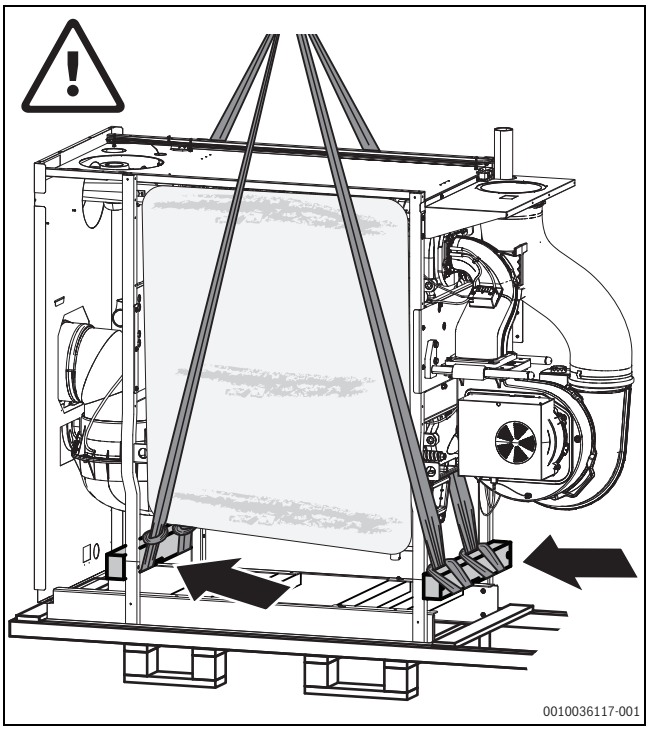


Fig. 12 Guide of crane lifting gear on the frame

4.3 Lifting the floor standing boiler off the pallet

The floor standing boiler is screwed to the pallet with 4 strips via the lower tie bar.

To remove the boiler from the pallet, proceed as follows:

- Remove the front and rear cross strips from the pallet (→Fig. 13).
- Remove the 2 strips on the long side from the pallet (→Fig. 13).
- Position a trolley jack (max. ground clearance 215 mm and min. lifting height 345 mm) under one of the cross bars on the boiler frame (→Fig. 14, step 1 – 3) and lift the boiler far enough so that a partial pallet can be removed.

WARNING

Risk of injury and property damage caused by insufficient stability as well as the boiler; risk of tipping

- Do not leave the boiler on the trolley jack unsupervised for a longer period.
- Secure the boiler against tipping over.

If the boiler has to be transported further to the final installation location using transport rollers:

- Check the subsurface for sufficient load bearing capacity and evenness.
- Push transport rollers underneath between both longitudinal traverses.
- Slowly lower and remove the trolley jack.
- Position the trolley jack under the second cross bar (→Fig. 14, step 4 – 6) and lift the boiler far enough so that the second partial pallet can be removed.
- Once the boiler is located at the final installation location, screw in the 4 boiler feet to the traverses on the side (→Fig. 16).

WARNING

Risk of injury and property damage caused by the boiler slipping; risk of tipping!

If the boiler only has to stand on one transport roller, it must be secured against slipping away by positioning at an angle when lowering.

- Secure the boiler with the help of a second person.

- For further transport, push transport rollers underneath between both longitudinal traverses. When lowering, the transport timbers in the middle are put down on the transport roller (→Fig. 15). The boiler can now be moved using transport rollers.

-or-

- Transport the boiler using the pallet truck (move underneath from the front) (→Fig.).
- Once the boiler is located at the final installation location, screw in the 4 boiler feet to the traverses on the side (→Fig. 16).
- Put down the boiler using the pallet truck, or remove the transport rollers (→following section).
- Remove the 4 transport timbers between the tie bars.

Remove the transport rollers

(→Fig. 16)

If it is necessary to remove the transport rollers at the final installation location (boiler feet are installed), proceed as follows:

- Position the trolley jack under the cross bars again and lift the boiler far enough so that the respective transport roller is relieved and can roll.
- Roll the transport roller to the middle underneath the boiler or to the end of the tie bar and remove.
- Slowly lower and remove the trolley jack.
- Proceed as described above to remove the second transport roller.
- Remove the 4 transport timbers between the tie bars (→Fig. 17).
- Remove the front and rear cross bars on the boiler frame (→Fig. 17).

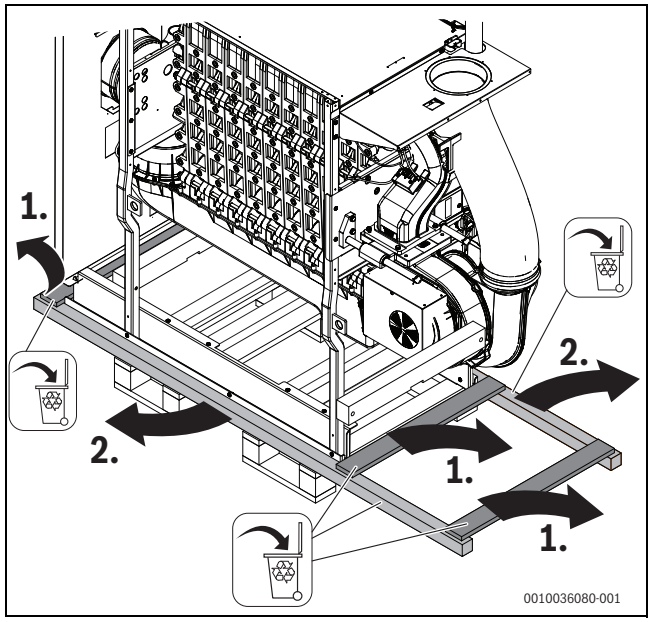


Fig. 13 Remove the fixing strips from the pallet (example for illustration purposes)

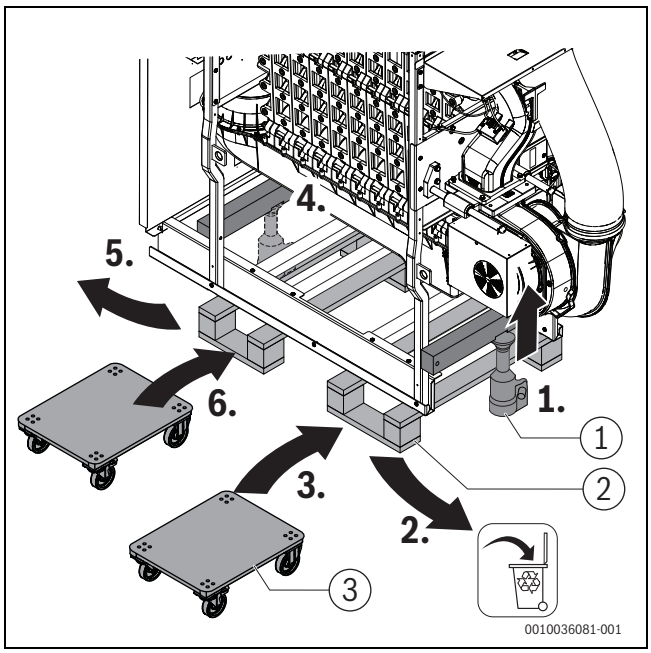


Fig. 14 Place the trolley jack underneath, push in the transport rollers (example for illustration purposes)

[1] Trolley jack
[2] Pallet (2x)
[3] Transport rollers (2x)

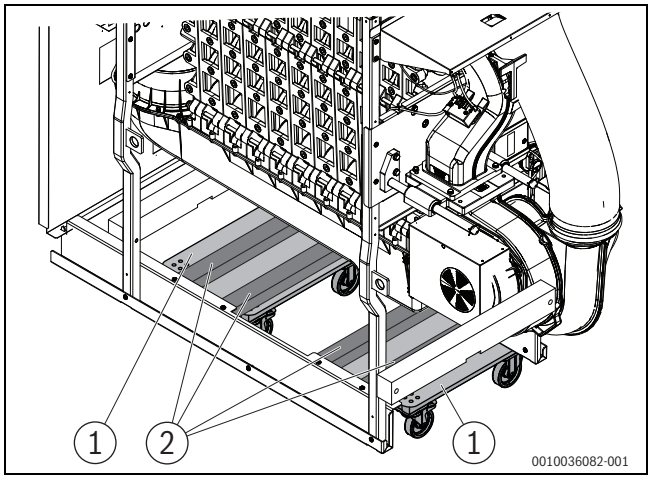


Fig. 15 Boiler on the transport rollers (example for illustration purposes)

[1] Transport rollers
[2] Transport timber

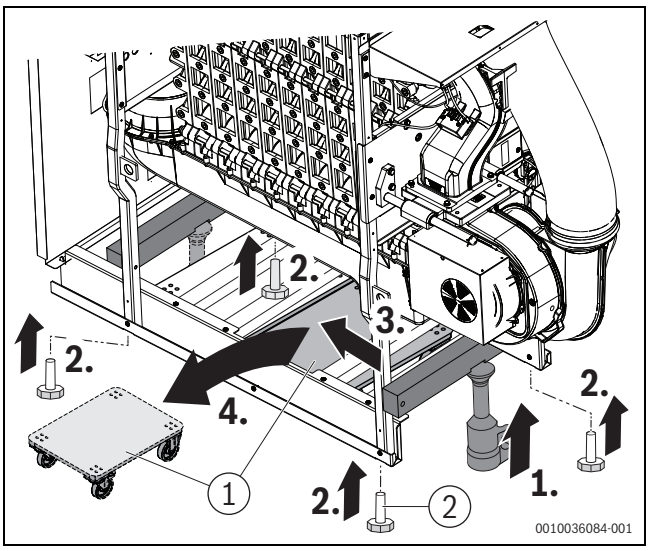


Fig. 16 Remove the transport rollers, mount the adjustable feet (example for illustration purposes)

[1] Transport rollers
[2] Adjustable feet (4x)

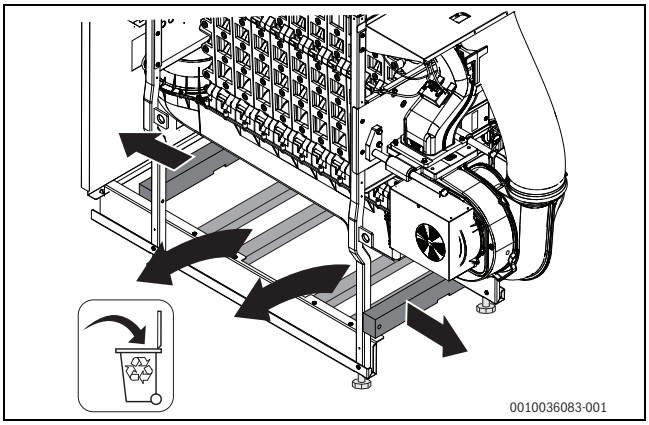


Fig. 17 Remove the transport timbers (example for illustration purposes)

4.4 Transporting the boiler on rollers

If the route to the boiler room is level, the boiler can also be rolled.

- ▶ Use at least 5 pipe sections of approx. 700 mm length (Diameter R 1¼ ") as rollers.
- ▶ Position the pipes approx. 400 mm apart on the floor.
- ▶ Lift the floor standing boiler onto the lengths of pipe and carefully roll it to the boiler room.

Commercially-available transport rollers can be used.

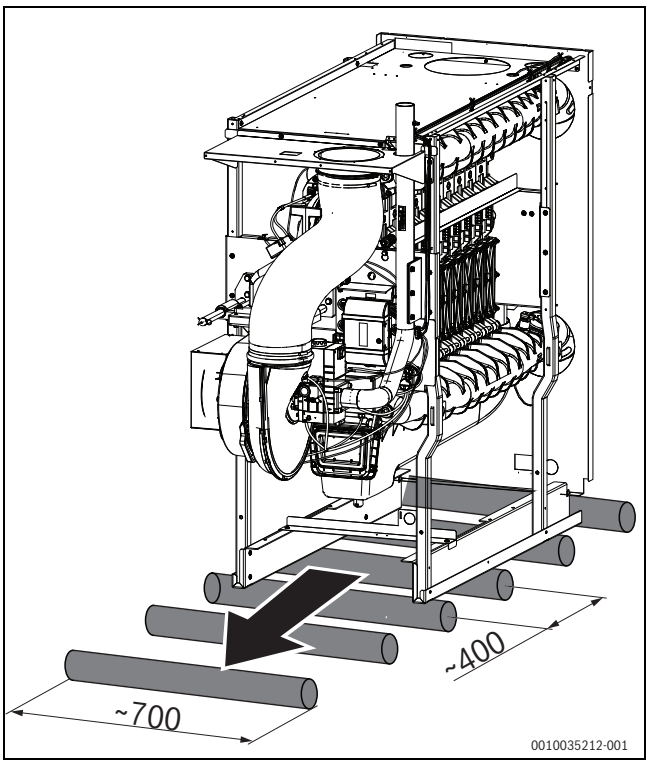


Fig. 18 Transporting the floor standing boiler on rollers (measurements in mm)

If the floor standing boiler is not to be brought into operation:

- ▶ Protect boiler from contamination.

Dispose of packaging in an environmentally responsible manner.

5 Installation

5.1 Installation location requirements

DANGER

Danger to life from explosion!

An increased and permanent ammonia concentration may lead to stress corrosion cracking on brass (e.g.gas valves, union nuts). As a result, there is a risk of explosion from gas escaping.

- ▶ Do not use wall mounted gas boilers in rooms where there is an increased or permanent ammoniac concentration (e.g. livestock stables or storage room for fertilisers).
- ▶ If contact with ammonia is unavoidable, make sure that there are no brass parts installed in the system.

DANGER

Risk of fire through flammable materials or liquids.

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

NOTICE

Risk of material damage due to contaminated combustion air!

- ▶ Do not use cleaning agents that contain chlorine or halogenated hydrocarbons (e.g. in spray cans, solvents and cleaning agents, paints and adhesives).
- ▶ Do not store or use these substances in the boiler room.
- ▶ Keep the combustion air supply free of dust or use the “air filter” accessory set .

NOTICE

Material damage due to overheating!

Excessive ambient temperatures can result in heating system damage.

- ▶ Ensure the ambient temperature is above 0 °C and below 35 °C.

NOTICE

Frost damage!

- ▶ Install the heating system in a frost-free room.

5.2 Preventing noise disturbance for end-users

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

5.3 Single boiler (350...500)

When determining the installation location, take the clearances for the flue gas routing and the connection pipe assembly into consideration (→ Fig. 19).

Where applicable, allow extra wall clearances for additional components, for example DHW cylinder, pipe connections or other components on the flue gas side.

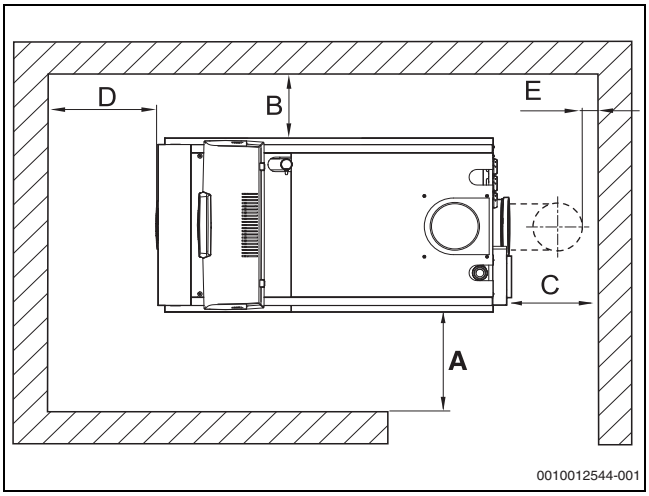


Fig. 19 Wall clearances at the installation location (right-hand version)

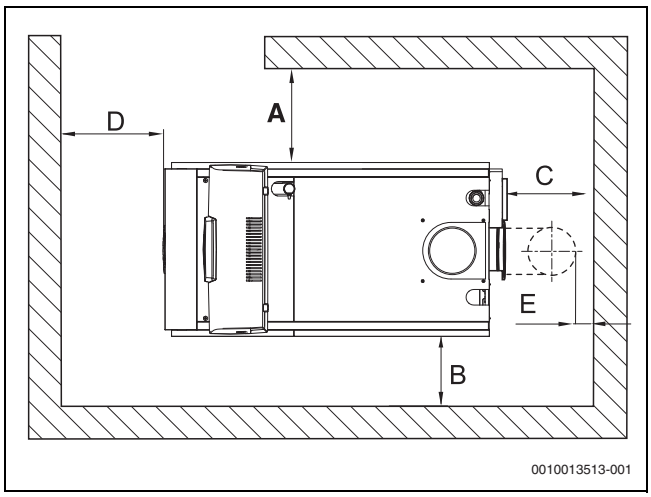


Fig. 20 Wall clearances at the installation location (left-hand version)

Dimension	Wall clearance [mm]	
	Minimum	recommended
O	600	1000
B	100	400
C[1)]	–	–
D; 350 kW	900	1100
D; 400 kW	900	1100
D; 500 kW	1100	1300
E[1)]	150	400

1) This clearance depends on the installed flue system.

Table 6 Recommended and minimum wall clearances

5.4 Levelling the floor standing boiler

NOTICE

Boiler damage through insufficient load-bearing capacity of the installation surface or unsuitable substrate!

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

To prevent air collecting in the floor standing boiler and to allow the condensate to drain freely from the condensate pan, the floor standing boiler must be horizontal.

- ▶ Place the floor standing boiler in its final position.
- ▶ Level the floor standing boiler horizontally by turning the adjustable feet and using a spirit level.

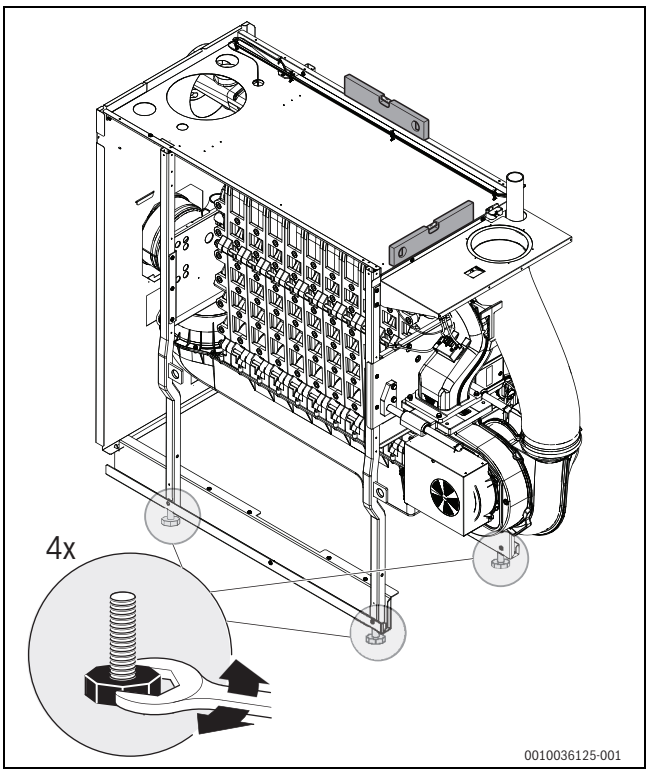


Fig. 21 Levelling the floor standing boiler

5.5 Installing the condensate pipes

DANGER

Danger to life due to poisoning!

Siphons not filled with water can cause danger to life through escaping flue gas.

- ▶ Filling the siphon with water.

Information regarding the condensates pipes:

- ▶ Carefully drain the condensate that has accumulated inside the floor standing boiler and flue (route the flue with a slope towards the floor standing boiler).
- ▶ Drain the condensate into the public sewerage system in accordance with the regulations in your country.
- ▶ Also observe any applicable local regulations.
- ▶ Install condensate neutraliser (accessory) if necessary.

Siphon bracket, hose bracket and siphon (in a bag with small parts) are attached to the right side on the tie bar when delivered.

- ▶ Screw the siphon support panel (→Fig. 22, [2]) on the siphon bracket [1] and assemble together on the cross beams.
- ▶ Hang the hose bracket (→Fig. 22, [3]) into the siphon bracket and screw onto the rear panel of the boiler.
- ▶ Guide the condensate hose through the opening in the back panel and route the hose in the hose bracket. If necessary, secure the hose in the hose bracket using cable ties.
- ▶ Attach the condensate hose to the condensate drain [5] and secure with hose clamps.
- ▶ Insert the condensate drain with condensate hose through the siphon bracket from behind and secure with the lock nut (not shown).

- ▶ Mount siphon [4] in the condensation catch pan of the boiler from underneath and in the condensate drain.
- ▶ Mount the positive pressure hose on the vertical connector of the condensate drain.
- ▶ Fill the siphon below the flue outlet with roughly 3 litres of water.

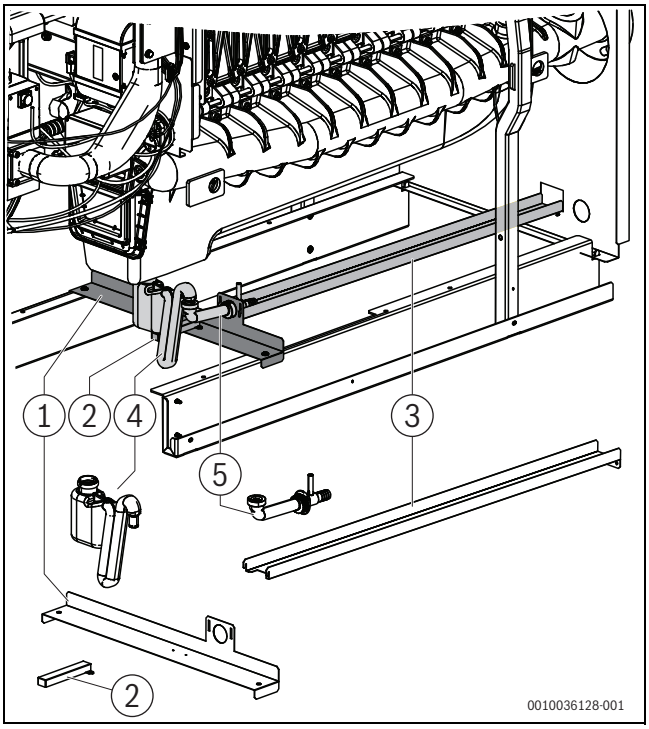


Fig. 22 Installing the condensate pipes

[1] Siphon bracket
[2] Siphon support panel
[3] Hose bracket
[4] Siphon
[5] Condensate drain with condensate hose connection

5.5.1 Installing the condensate neutraliser

As an alternative, the boiler can be equipped with a condensate neutraliser (accessory) for the neutralisation of the condensate.
The condensate neutraliser is positioned under the boiler instead of the hose bracket (→Fig. 22).

- ▶ Install the condensate drain according to chapter 5.5 (without hose bracket).
- ▶ Install condensate neutraliser (accessory) according to the respective installation instructions.
- ▶ Connect the inlet hose (can be shortened) from the siphon to the condensate neutraliser with a slope.
- ▶ If required, make the connection to the waste water system in accordance with the instructions for the condensate neutraliser and locally applicable regulations.
- ▶ Guide the drain hose through under the rear panel to a drain in the waste water system. If necessary, secure with cable ties.
- ▶ Fill the siphon below the flue outlet with roughly 3 litres of water.

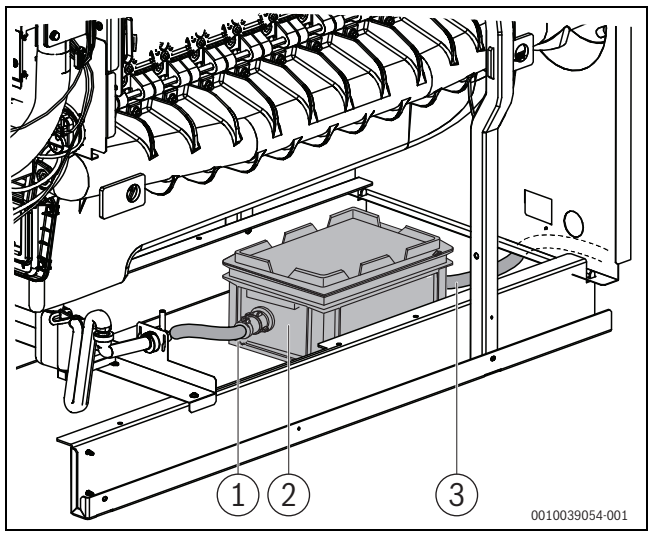


Fig. 23 Installing the condensate pipes

[1] Inlet hose
[2] Condensate neutraliser
[3] Drain Hose

5.6 Establishing the flue gas connection

For position and dimension of flue gas connection →Chapter 2.9, page 8.

DANGER

Risk to life from escaping flue gas inside at the installation location!

- ▶ Ensure that the seal in the flue gas connection on the condensation catch pan is fitted, undamaged and correctly inserted.

DANGER

Risk to life through toxic exhaust gases escaping.

- ▶ Check all joints in the flue system to ensure they are correctly made, secured and sealed.

DANGER

Risk to life due to poisoning by escaping flue gas!

The use of unsuitable lubricating paste during assembly of the flue gas system may lead to destruction of the seals later on and thus to flue gas escaping.
The use of oil or grease may lead to the subsequent damage and leaks.

- ▶ Use only lubricating paste which has been released by the manufacturer of the flue gas system.

CAUTION

Risk of injury from sharp edges and burrs!

- ▶ Wear protective gloves.

Centrocerin must be used as a lubricating paste when installing the flue system on the connector.

NOTICE

Damage to gaskets due to burred edges on the insertion ends of the pipe parts!

- Make sure the insertion ends are free of burrs. If chamfering on site is required, only do so in accordance with the manufacturer's documentation.

For the flue gas routing upwards, use only the original accessory with supporting lugs.
When converting the flue gas routing upwards, the cover panel is mounted on the rear panel opening from above.

Flue gas routing on multi-boiler systems (cascade; accessory).
These instructions only concern single boiler systems.

- Observe separate technical documentation (information on flue gas routing and documentation on accessories).

The flue system is to be carried out either in accordance with pressure classification (EN 1443) H1 or pressure classification (EN 1443) P1 with additional mechanical impact stability up to 5000 Pa.

Class	Leakage rate l*s-1*m-2	Rated pressure [Pa]	Mode of operation
P1	0.006	200	Positive pressure/ negative pressure[1)2)]
H1	0.006	5000	Positive pressure/ negative pressure[3)]

1) Positive pressure up to maximum 200 Pa
2) Usage only with additional mechanical impact stability up to 5000 Pa in the connection piece
3) Positive pressure up to maximum 5000 Pa

Table 7 Pressure classifications of the flue system

When installing the flue gas connection:

- Observe the installation instructions for the flue accessories.
- Observe national regulations.
- Make sure that the flue pipe cross-section is calculated in accordance with all current regulations.
- Select the shortest possible route for the flue pipe and install it with a slope towards the floor standing boiler.
- Fasten the flue securely at 1 m intervals.
- Ensure the connection is mechanically uncompressed, and that no loads are transferred to the flue gas connection.
- **During planning and installation of the flue system, create a layout that optimised flow favours the flue gas flow.**

The wind barriers for the combustion air supply and the flue gas routing must be installed on the same wall of the building.

The boiler must not be connected to any combined flue system with motorised motor systems (e.g. combined heat and power unit).

Flue gas routing upwards
(→Fig. 24)

The flue gas connection is intended to the rear ex-factory. The flue gas connection can also be made at the top. The following conversion measures are necessary for this purpose:

For the flue gas routing upwards, use only the original accessory with supporting lugs.
When converting the flue gas routing upwards, the cover panel is mounted on the rear panel opening from above.

- Observe all country-specific requirements when installing the flue system.
- Remove the rear panel.
- Remove the 90° flue bend mounter in the factory.
- Attach the straight pipe connector (accessory) to the connector on the condensation catch pan and secure to the upper hood with two screws. And nuts (→Fig. 24).
- Install the flue mechanically uncompressed.

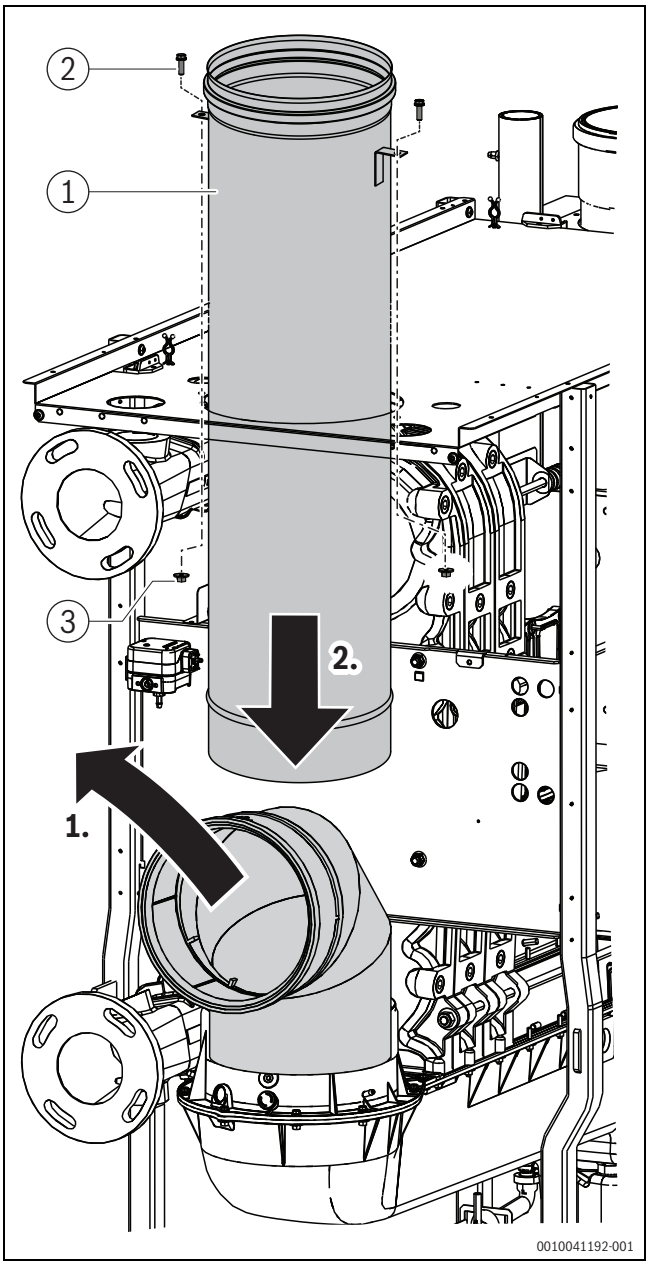


Fig. 24 Mount the flue pipe vertically

[1] Flue pipe vertical
[2] 2x screws
[3] 2x nuts

5.7 Connecting the air supply (for balanced flue operation)

NOTICE

Damage to gaskets due to burred edges on the insertion ends of the pipe parts!

- Make sure the insertion ends are free of burrs. If chamfering on site is required, only do so in accordance with the manufacturer's documentation.

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

The dimensions of the combustion air pipe must be calculated in accordance with the current regulations.

An adaptor is available as an accessory for balanced flue operation.

- Only install the original accessories set.

We would recommend the installation of a silencer in the combustion air pipe, subject to the location of the air inlet opening on the outside of the building.

The wind barriers for the combustion air supply and the flue gas routing must be installed on the same wall of the building.

- Remove cover panel [2] from the front boiler cover.
- Remove front [1] and rear [4] boiler covers.
- Fit adaptor [3] (accessory) on the tie bar and seal with sealant (accessory).
- Installing the front and rear boiler cover (→Chapter 5.11).
- Establish on-site connection between supply air connection with standard air supply system and the adapter ensuring it is free from tension and seal.
- Observe the installation instructions for the standard air supply system.
- **In cascade arrangements, ensure that the floor standing boiler is equipped with a separate combustion air pipe.**
- Install supply air pipe up to adapter using a standard air supply system according to the national requirements and ensuring it is free from tension.

To avoid condensate formation in the combustion air pipe (inside and outside), insulate the combustion air pipe.

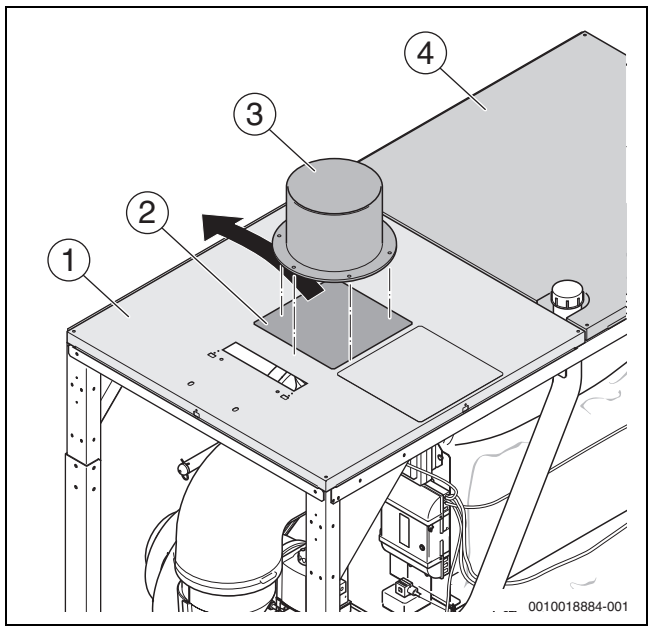


Fig. 25 Accessory set for open flue mode

[1] Front boiler cover
[2] Temporary cover
[3] Adapter
[4] Hear boiler cover

5.8 Hydraulic connection

NOTICE

Risk of system damage due to leaking connections!

- Before installing the pipe connections, check connections and gaskets on the boiler for possible damage.
- Install connecting pipework / connection flanges mechanically uncompressed at the connection flanges of the floor standing boiler on-site.
- Tighten the screws of the flange connections in the heating flow and return to a maximum tightening torque of 50 Nm only after the assembly of the connections.
- Use new gasket if screw fittings need to be undone.

We recommend that the on-site system flange is initially connected to the boiler and then establish the further system piping. Mechanical loading of the connection flanges is not permissible.

Heating flow (VK)/Heating return (RK)	
Boiler size [kW]	**Connection**
350 – 500	DN100, PN6 standard flange EN1092

Table 8 Water connection sizes

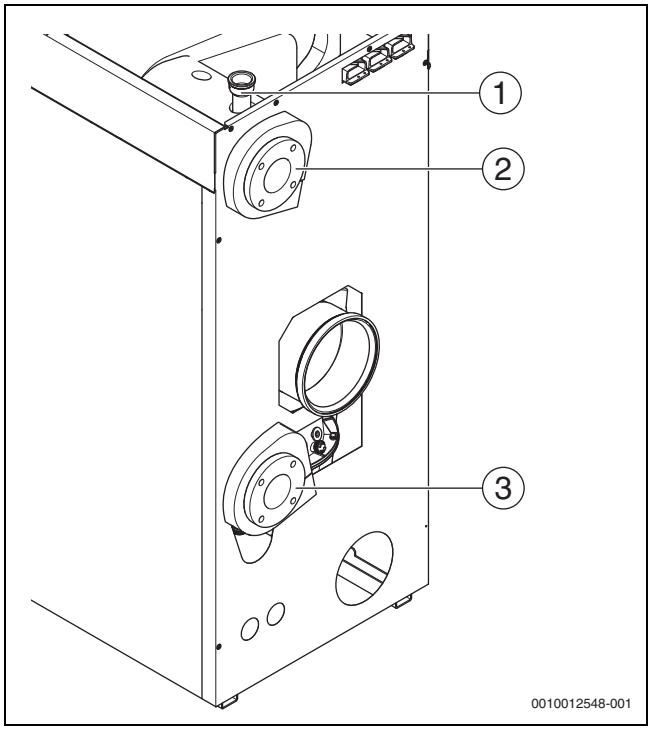


Fig. 26 Hydraulic connections at the boiler (shown: right-hand version)

[1] Boiler safety connection
[2] Boiler flow
[3] Boiler return

Position and dimensions of connections → Chapter 2.9, page 8.

5.8.1 Connecting the flow

With flanged connection (→Tab. 8, page 21):

- Insert a gasket between the flange on the floor standing boiler and the flange on the flow pipe.
- Secure the flange connection with 4 bolts, washers and nuts (maximum tightening torque50 Nm).

5.8.2 Connecting the return

We recommend fitting a dirt filter (accessory) on site in the return to prevent contamination of the boiler by the water.

With flanged connection (→Tab. 8, page 21):

- Insert a gasket between the flange on the boiler and the flange on the return.
- Secure the flange connection with 4 bolts, washers and nuts (maximum tightening torque50 Nm).

Connect the expansion vessel

To safeguard individual boilers, an accessory set (expansion vessel) can be connected to the drain connection, in accordance with EN 12828.

- Observe the installation instructions for the accessories.
- Remove the drain valve mounted on the return (→Fig. 27)
- Unscrew the 2" reduction.
- Mount accessory set with gasket (tightening torque: 35 Nm).
- Install expansion vessel on site to maintain the system pressure in the return on the intake side of the pump.

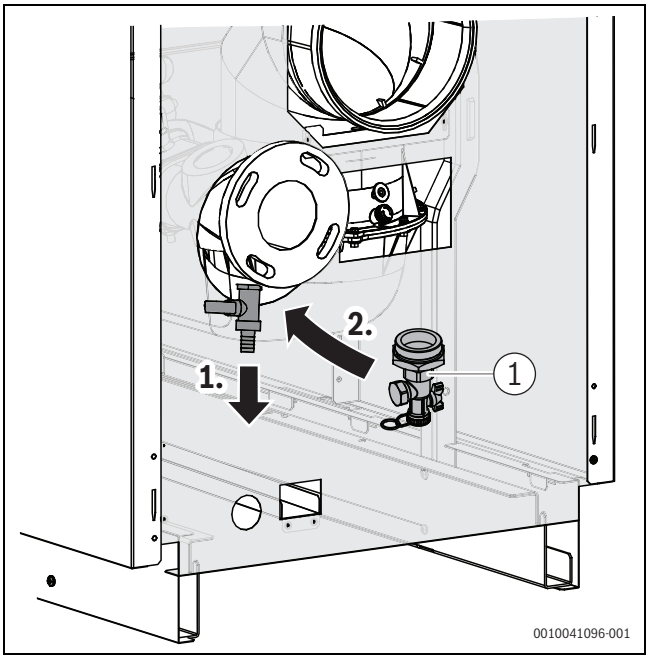


Fig. 27 Disassembly drain valve (shown: right-hand version)

[1] Accessory set expansion vessel connection set

Connecting the drain valve on site

- Observe the installation instructions for the accessories.
- To enable a topping up of the fill water, instruct the user about the location of the drain valve.
- Install the fill and drain valve in the return outside the floor standing boiler.

5.8.3 Installing the safety assembly on the flow (on site)

NOTICE

Risk of system damage due to faulty assembly!

- Install the safety valve and air vent or safety assembly on the safety connection of the flow.

The safety assembly (accessory) comprises an air vent **for ventilation of the boiler** (not the heating system) and a pressure gauge and enables the adoption of a safety valve (additional accessory) and both maximum pressure limiters.
If these accessories are not used, a pressure relief valve, pressure gauge and automatic air vent valve must generally be installed in the flow, upstream of the first shut-off device.

Subject to operating pressure, different pressure relief valves are required.

Observe the safety equipment in accordance with EN12828!
Generally, every boiler >300 kW must be equipped with a maximum pressure limiter, which must be electrically connected to the control unit. A low water indicator or a minimum pressure limiter are not required. The function is ensured by an integrated water pressure sensor.
Only an additional maximum pressure limiter is required as replacement for an expansion valve. Due to the design, an additional high limit safety cut-out is not required.

- Observe the installation instructions for the accessories.

Connection of safety set 3 bar, 4 bar, 5 bar and 6 bar
(→Fig. 28)

- Seal the safety valve [2] at the connector on the boiler safety assembly [1] using suitable sealing agent.
- Screw in pressure gauge [3].
- Mount maximum pressure limiter [4] with gasket [5] (tightening torque: 50 Nm).
- Remove the plug from the flow connector [9].
- Screw connector pipe 2" [7] with O-ring [8] into the flow connector [9] (tightening torque: 70 Nm).
- Mount the pre-assembled boiler safety assembly [6] to the 2" connector pipe [[7] (tightening torque: 70 Nm). In doing so, counterhold the connector pipe.

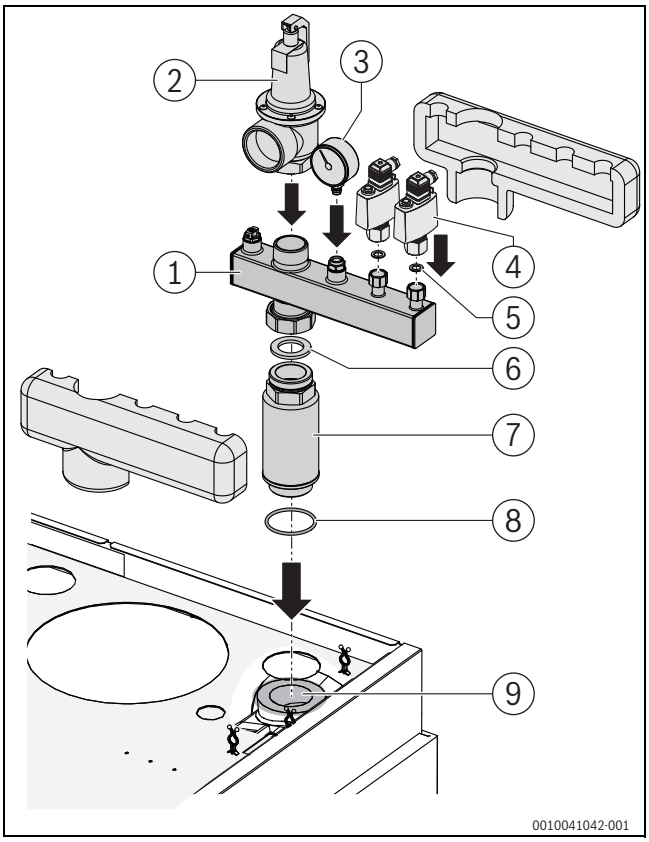


Fig. 28 Connection of safety set

[1] Boiler safety assembly
[2] Water pressure relief valve
[3] Pressure gauge
[4] 2x maximum pressure limiter
[5] Flat gasket
[6] Flat gasket
[7] Connector pipe 2”
[8] O-ring
[9] Flow connector

- At an operating pressure up to 3 bar, seal in the pressure relief valve at the manifold connector with a suitable sealant.
- Fit the discharge pipe to the respective pressure relief valve according to local regulations.

5.8.4 Installing the DHW cylinder

Make the connection of a DHW cylinder to the flow and return on site. The required external cylinder primary pump can be controlled by the control unit (→ technical documentation of control unit).

5.9 Establishing the fuel supply

DANGER

Danger to life through explosion of flammable gases!

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

Subject to local regulations, install thermally activated shut-off device (TAE).
We generally recommend the installation of a compensator in the gas line.

- Install gas isolator [2] in the gas line (GAS). When doing so, secure the gas line inside the boiler to prevent it from becoming twisted.
- Connect expansion joint [1] (recommended) to the gas isolator.
- Connect the gas line to the gas connection or expansion joint free of stress.
- Secure the gas line with pipe clips so that the gas connection is free from any stresses.
- Close gas isolator.

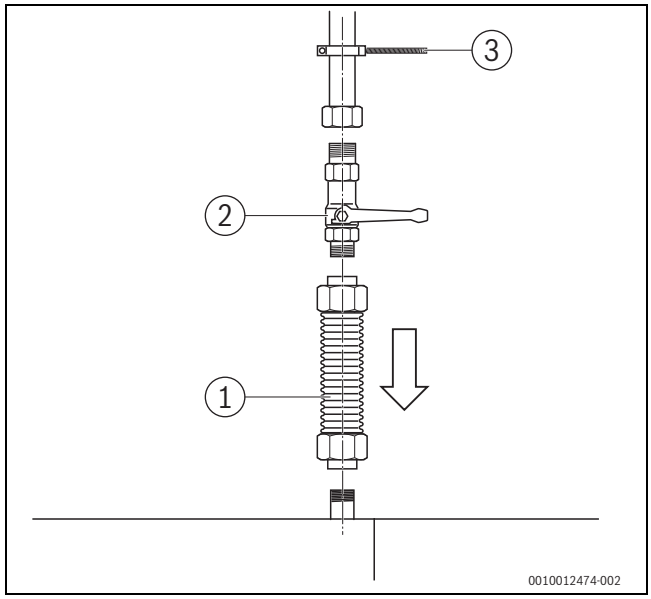


Fig. 29 Establishing the gas connection

[1] Expansion joint
[2] Gas isolator (here with thermally activated shut-off device)
[3] Pipe clip

For higher gas supply pressures than shown in table 10 (→ page 29), Bosch offers additional gas pressure governors as accessories.

5.10 Filling the heating system and checking for leaks

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

To ensure efficient ventilation:

- ▶ Open all heating circuits and thermostatic valves prior to filling the system.
- ▶ Open non-return valves at the pumps.
- ▶ Put all non-return valves at the venting position.

CAUTION

Health risk through contaminated drinking water!

- ▶ Observe all country-specific regulations and standards regarding the prevention of drinking water contamination.
- ▶ In Europe, observe standard EN 1717. In the UK observe the Water Supply (water fittings) Regulations 1999.

NOTICE

Risk of property damage due to unsuitable heating and fill water!

Unsuitable heating and fill water can cause corrosion and scale formation and/or shorten the service life of the heating system. Warranty claims for the heat sources will only be considered provided the water quality requirements have been met and the operator's log has been maintained.

- ▶ Observe the details regarding water quality in the operator's log.
- ▶ If necessary, treat heating and fill water.
- ▶ Provide system separation by means of heat exchangers when using oxygen-permeable pipework (e.g. underfloor heating system).

NOTICE

NOTICE - material damage due to positive pressure during leak testing!

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

- ▶ After filling the heating system, pressure test to the excess pressure of the pressure relief valve.

- ▶ Prior to filling the heating system, carefully read and observe the enclosed operator's log on water quality.
- ▶ Open safety caps on all automatic air vent valves.
- ▶ Open the fill and drain valve.
- ▶ Slowly fill the heating system using a filling facility. During the filling observe the pressure gauge.

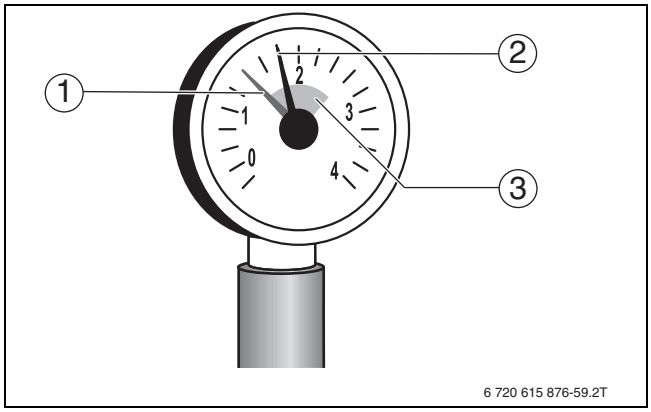


Fig. 30 Pressure gauge for sealed systems

[1] Red needle
[2] Pressure gauge needle
[3] Green marking

- ▶ Close the water tap and the DFV once the required test pressure has been reached.
- ▶ Check the connections and pipework for leaks.
- ▶ Vent the heating system via the radiator air vent valves.
- ▶ Top up with water if the pressure drops as a result of venting the system.
- ▶ Remove the hose from the DFV valve.
- ▶ Carry out a tightness test in accordance with locally applicable regulations.
- ▶ Once the heating system has been tested and no leaks have been found, set the correct operating pressure.
- ▶ Put all non-return valves at the operating position.
- ▶ Mark the minimum and maximum pressure on the pressure gauge when the system is cold.

5.11 Install the side tie bars and hood front/centre

- ▶ Install the side tie bars at the bottom left and right to the frame, each with 3 screws.
- ▶ Install the side tie bars at the top left and right to the frame, each with 2 screws, also screw to the rear panel each with one self-tapping screw.

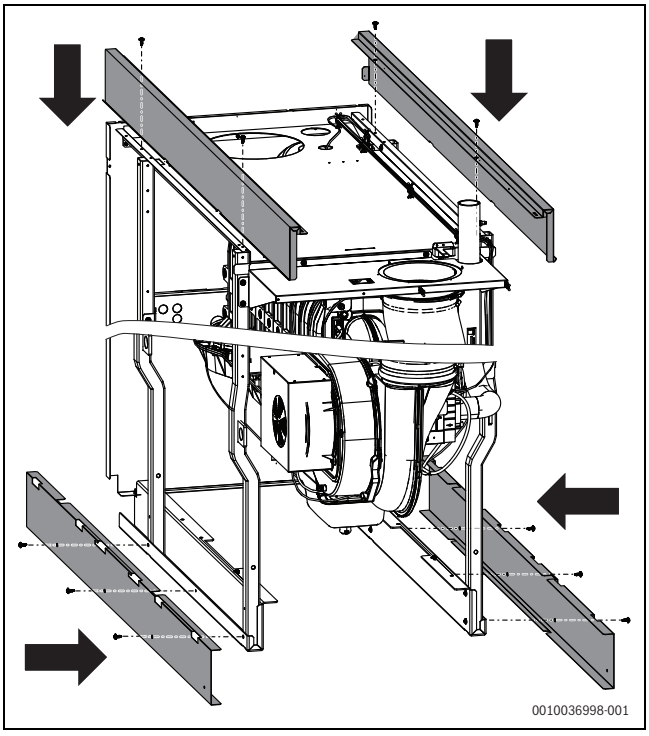


Fig. 31 Install the side tie bars

- ▶ Install the front hood [1] and fix with 2 screws.

We recommend that the hood supply air cover [2] is installed before routing the electric cable.

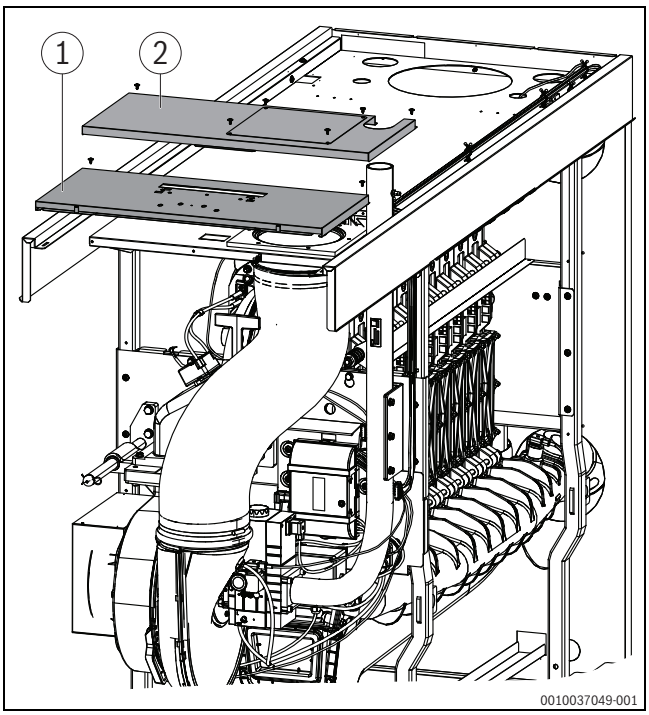


Fig. 32 Install the front hood

[1] Front of hood
[2] Hood supply air cover

6 Electrical connection

WARNING

Risk to life from electric shock!

Touching live electrical parts can cause an electric shock.

- Before working on electrical parts, disconnect all phases of the power supply (fuse/circuit breaker) and lock the isolator switch to prevent unintentional reconnection.

WARNING

Danger to life from electric current!

Incorrectly connected electrical cables can result in faulty operation with potentially dangerous consequences.

- When making the electrical connections, refer to the connection diagrams for the individual devices and components.
- When performing maintenance, label all power cables before disconnecting them.

WARNING

Danger to life from incorrectly connected safety components!

Boiler parts and components relative for safety may not be electrically bypassed and/or manipulated.

- Install and connect respective components according to the wiring diagram.
- Document connection and services in the inspection and maintenance record.

NOTICE

Material damage if the maximum current consumption is exceeded!

Short-term high (start-up) currents can can damage electrical components.

- When connecting external components to the control unit, make sure that the sum of the individual power consumption (consider the power consumption of the boiler) does not exceed the maximum current consumption (→control unit data plate).

Note the following when making electrical connections:

- Electrical work on heating systems must only be carried out by qualified electricians. If you are not suitably qualified, ask a licensed heating contractor/electrician to establish the electrical connection.
- Make sure that all boiler components are earthed via the control unit and burner control unit (earthing is a constituent part of the control unit used).
- Observe all local regulations!

6.1 Installing the control unit

The boiler is supplied with the control unit that was assigned when placing the order. The boiler is only fully functional with an installed control unit.

The control unit must be mounted at the designated position on the boiler.

- To install the control unit, observe the corresponding technical documentation.
- When making the electrical connections, refer to the connection diagrams for the individual devices and components (→Chapter 17.4, page 70).

6.2 Establishing the power supply connection and installing the cables

Establish a permanent connection to the power supply in accordance with the locally applicable regulations.

- To connect the cables, observe the relevant technical documentation of the installed control unit.

DANGER

Risk of material damage due to hot boiler components!

Hot boiler components can damage electrical cables in close proximity.

- Make sure that all cables are routed through the conduits provided.

NOTICE

Material damage due to induced overvoltage!

Incorrectly installed cables can lead to induced overvoltages which can cause the control unit to malfunction or be damaged.

- Route 230 V cables and extra-low voltage cables separately.

- Lines that are guided to the rear via the top cover panel or if necessary, route in a cable conduit.
- Route all cables through the cable conduits to the control unit and connect them as shown in the connection diagram.

NOTICE

Fault due to power failure!

- When connecting external components to the control unit, ensure that sum of currents consumed by these components does not exceed the maximum current consumption of the installed control unit.

- Secure all cables with cable clips (control unit scope of delivery).

Inserting function modules

For information on the function modules, refer to the relevant technical documentation.

- Observe technical documentation of the control unit and the function modules.

Install the hood supply air cover

- After the cables have been routed, install the hood supply air cover (→Fig. 32). In doing so, insert the angled tab in the respective recess of the front hood.
- If necessary, install the cover for the combustion air with 4 screws.

7 Commissioning

This chapter describes commissioning using the standard module of the main controller.

- Before commissioning the boiler, make sure that the cover hood of the control unit is installed.
- After completing the work described below, complete the commissioning report (→ Chapter 17.6, page 72).

NOTICE

Material damage through excessive dust and dirt contamination in open flue mode!

Heavy dust and dirt contamination can occur, for example, due to building work at the installation location.

- Install the “air filter” accessory set.
  By using the “air filter” accessory set, the gas-air path and in particular the burner rod are protected against dust.

If room sealed operation is not possible, use the air filter set which is available as an accessory.

NOTICE

Risk of boiler damage through 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 substances at the installation location.

- Burners contaminated during building work must be cleaned before commissioning.
- Inspect flue and combustion air pipe (with room sealed operation) and combustion air supply and ventilation openings (→ Chapter 5.6, page 19).

7.1 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

Risk of property damage due to unsuitable heating and fill water!

Unsuitable heating and fill water can cause corrosion and scale formation and/or shorten the service life of the heating system. Warranty claims for the heat sources will only be considered provided the water quality requirements have been met and the operator’s log has been maintained.

- Observe the details regarding water quality in the operator's log.
- If necessary, treat heating and fill water.
- Provide system separation by means of heat exchangers when using oxygen-permeable pipework (e.g. underfloor heating system).

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

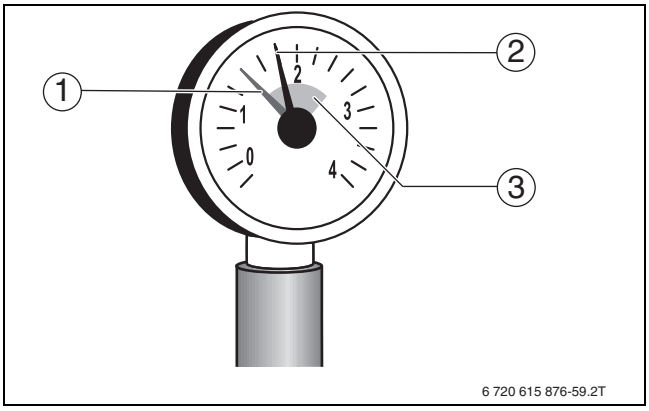


Fig. 33 Pressure gauge for sealed systems

[1] Red needle
[2] Pressure gauge needle
[3] Green marking

CAUTION

Health risk through contaminated drinking water!

- Observe all country-specific regulations and standards regarding the prevention of drinking water contamination.
- In Europe, observe standard EN 1717. In the UK observe the Water Supply (water fittings) Regulations 1999.

- Top up heating water or drain off water via an approved WRAS method, until the required operating pressure has been reached.
- During filling, vent the heating system via the radiator bleed valves.

7.2 Checking for leaks

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

DANGER

Risk of explosion!

If there are leaks in the gas lines and gas connections, there is a danger of explosion.

- ▶ Carry out an appropriate leak test with a foaming agent.

NOTICE

Risk of material damage due to a short circuit!

Liquid on live electrical parts can result in a short circuit.

- ▶ Prior to carrying out a leak test: cover electrical parts.
- ▶ Never apply leak detection agent to cable conduits, plugs or electrical cables/leads.
- ▶ Ensure that no leak detection agent drips onto electrical parts.
- ▶ To prevent corrosion, carefully wipe off the leak detection agent afterwards.

- ▶ Check the new pipe section, including the joint at the air/gas ratio control valve, for external tightness. The test pressure at the air/gas ratio control valve inlet must be no higher than 150 mbar.

If a leak is discovered during this test, all connections must be checked using a foaming agent. The agent must be approved for gas tightness testing.

- ▶ Confirm in the commissioning report that the tightness test has been carried out.

7.3 Recording gas parameters

Ask your gas supplier to advise you of the gas parameters (Wobbe index and calorific value) and record these in the commissioning report (→ Chapter 17.6, page 72).

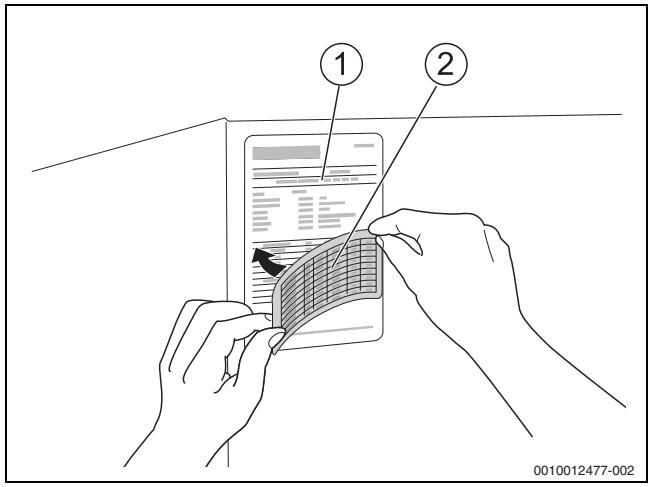
If the boiler is to be replaced in existing systems:

- ▶ Consult gas suppliers to ensure that the nominal gas pressure according to table 10, page 29 is adhered to.

7.4 Checking device equipment

The burner is supplied ready for use with a particular gas group or sub-group of a gas group according to the delivery specifications. This gas group or its sub-group must be available in the supply area. If you discover that the floor standing boiler has been ordered with the wrong setting, it must be converted and the data plate updated accordingly.

- ▶ Check with the relevant gas supplier which gas group or sub-group is supplied.
- ▶ Compare the actual supply with the details indicated on the device.
- ▶ If necessary, affix the label [2] (supplied with the floor standing boiler) that corresponds to the supply over the appropriate area on the data plate [1] (on the back panel) and set the gas/air ratio during commissioning (→Chapter 7.10).



Country	Gas type	Factory settings
AT, BE, BG, BY, CH, CZ, DE, EE, ES, FR, GB, GR, HR, HU, IE, IT, KG, KZ, LT, LU, LV, MK, NL, NO, PL, PT, RO, RS, RU, SI, SK, TR, UA, UZ	Natural gas group H (G20) Natural gas group E (G20) Sub-group Es of natural gas group E (G20)	Delivered factory-set ready for use. The air/gas ratio control valve is set and sealed. Upper Wobbe index for 15 °C, 1013 mbar: • Adjusted to 14.1 kWh/m^3 • Applicable for 11.4 to 15.2 kWh/m^3 Upper Wobbe index for 0 °C, 1013 mbar: • Adjusted to 14.9 kWh/m^3 • Applicable for 12.0 to 16.1 kWh/m^3 (Natural gas group “H according to DVGW Code of Practice G 260” falls within natural gas group “E according to DIN EN 437”)
DE	Natural gas group LL Sub-group Ei of natural gas group E	The gas type is adjusted on site (→Chapter 7.10, page 30). Upper Wobbe index for 15 °C, 1013 mbar: • Adjusted to 12.1 kWh/m^3 • Applicable for 11.4 to 12.4 kWh/m^3 Upper Wobbe index for 0 °C, 1013 mbar: • Adjusted to 12.8 kWh/m^3 • Applicable for 12.0 to 13.1 kWh/m^3 (Natural gas group “L according to DVGW Code of Practice G 260” falls within natural gas group“ LL according to DIN EN 437”)
NL	Natural gas group K (G25.3)	The gas type is adjusted on site (→Chapter 7.10). Upper Wobbe index for 15 °C, 1013 mbar: • Adjusted to 11.9 kWh/m^3 • Applicable for 11.4 to 11.9 kWh/m^3 1) Upper Wobbe index for 0 °C, 1013 mbar: • Adjusted to 12.5 kWh/m^3 • Applicable for 12.1 to 12.6 kWh/m^3 1) (Natural gas group K according to “NTA 8837-2012” falls within the 2nd gas family according to DIN EN 437)

1) According to Table C.1 “Nominally distributed limit gases of gas group K” of NTA 8837:2012.

Table 9 Factory settings

7.5 Venting the gas line

- ▶ Release the locking screw of the test nipple for gas supply pressure and ventilation by turning it through two revolutions and attach the hose.
- ▶ Slowly open the gas isolator.
- ▶ Flare off the escaping gas through a water seal. Remove the hose when no more air is expelled, and tighten the locking screw.
- ▶ Close gas isolator.

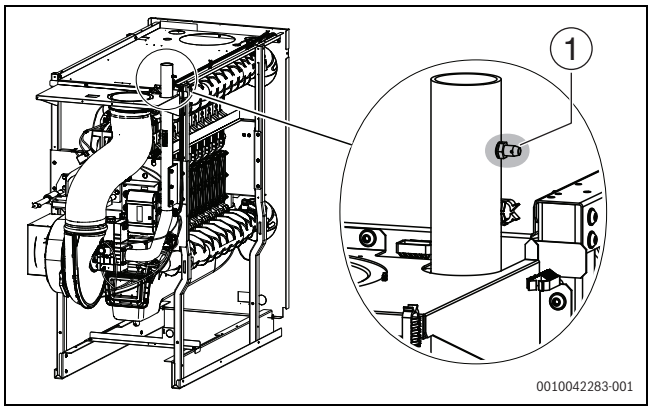


Fig. 34 Venting the gas line

[1] Test nipple for measuring the gas supply pressure and for venting

7.6 Supply air and flue gas connection

7.6.1 Check supply and extract ventilation and flue gas connection

- ▶ Check whether the supply and extract ventilation comply with locally applicable regulations. Have any faults rectified immediately.

DANGER

Danger to life due to poisoning!

Insufficient ventilation can lead to dangerous flue gas leaks.

- ▶ Never block supply 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 danger.

- ▶ Check whether the flue gas connection complies with the applicable regulations (→ Chapter 5.6, page 19).
- ▶ Have any faults rectified immediately.

7.6.2 Checking the flue gas damper (scope of delivery of flue gas cascade set)

When using motorised flue gas dampers the closing function must be checked. The damper is closed in the electrically de-energised state.

Check function of flue gas damper:

- ▶ Open flue gas damper manually via the setting pin (from position 1 to position 2).
  The function exists if the damper closes automatically (pin in position 1).

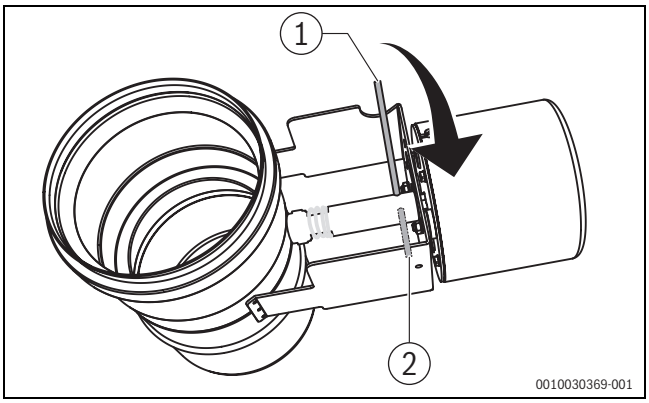


Fig. 35 Setting pin on the butterfly valve

[1] Position 1: damper closed
[2] Position 2: damper open

7.7 Making the heating system operational

- ▶ Open the fuel supply at the main shut-off valve and upstream of the air/gas ratio control valve.
- ▶ Switch on the heating system emergency stop switch (if installed) and/or the corresponding domestic fuse/circuit breaker.

7.8 Commissioning the control unit and burner

7.8.1 Switching on the boiler at the control unit

- ▶ To commission the control unit, observe the technical documentation for the specific control unit.

To avoid frequent cycling of the burner and to ensure efficient operation, the heating curve should generally be set as low as possible.

7.8.2 Carrying out a flue gas test

- ▶ To set up and perform the flue gas test, observe the corresponding technical documentation for the control unit.

7.9 Measuring the gas supply pressure and static pressure

- ▶ Release the locking screw of the gas supply pressure and ventilation test nipple (→ Fig. 34, [1], page 28) by turning it through 2 revolutions.
- ▶ Push the test hose of the pressure gauge (measurement precision less than 0.1 mbar) onto the pressure test nipple.
- ▶ With the burner operational (full load), check the gas supply pressure and record the value in the commissioning report (→ Chapter 17.6, page 72).

If the gas supply pressure falls outside the values in table 10

- ▶ Shut down the floor standing boiler and notify the gas supplier. Commissioning is not permitted.

To check the gas pressure regulator or the gas static pressure in the gas installation:

- ▶ Shut down the burner from full load.
- ▶ Wait 10-20 seconds and then measure the resulting gas supply pressure/static pressure at the test nipple for the gas supply pressure/static pressure.

The gas static pressure must not exceed 50 mbar.

If exceeded:

- ▶ Inform the gas supplier that the gas pressure governor needs to be replaced.
- ▶ Do not perform commissioning in accordance with the manufacturer's instructions.
- ▶ If the system is currently in operation, take the floor standing boiler out of operation.
- ▶ Remove the test hose.
- ▶ Carefully tighten the locking screw on the test nipple for gas supply pressure.

Country	Gas group (reference gas)	Supply pressure[1] [mbar]		
		Min.	Rated	Max.
AT, BE, BG, BY, CH, CZ, DE, EE, ES, GB, GR, HR, IE, IT, KG, KZ, LT, LV, MK, NO, PT, RO, RS, RU, SI, SK, TR, UA, UZ	Natural gas H (G20)	17	20	25
HU	Natural gas H (G20)	18	25	33
DE[2], LU, NL[2], PL	Natural gas E (G20)	17	20	25
FR, BE	Sub-group ES Natural gas E (G20)	17	20	25
FR, BE	Sub-group Ei natural gas E (G25)	20	25	30
NL[3]	Natural gas K (G25.3)	20	25	30
DE[2]	Natural gas LL (G25)	18	20	25
PL	Natural gas Lw (G27)	16	20	23
HU	Natural gas S (G25.1)	18	25	33

1) The gas supplier must ensure that the pressure conforms to country-specific or local regulations. The conditions mentioned above must also be observed. If the gas supply pressure is outside the specified range, commissioning is prohibited.

2) Natural gas group "H according to DVGW Code of Practice G 260" falls within natural gas group "E according to DIN EN 437". Natural gas group "L according to DVGW Code of Practice G 260" falls within natural gas group "LL according to DIN EN 437".

3) Natural gas group K according to “NTA 8837-2012” falls within the 2nd gas family according to DIN EN 437.

Table 10 Gas groups and supply pressures according to EN 437

The specified supply pressure must be ensured across the boiler's entire modulation range. If necessary, an additional pressure regulator must be provided. In the case of multi-boiler or multi-consumer systems, the supply pressure range for single boilers must be ensured in each operating condition of the multi-boiler or multi-consumer system. If necessary, supply each boiler or consumer via a separate pressure regulator.

For higher supply pressures than shown in table 10, Bosch offers additional gas pressure regulators as accessories.

7.10 Check and adjust the gas/air ratio

The deviation between the measures CO_2 value in full load and partial load must not be greater than 0.5% CO_2.

- ▶ Check the CO_2 setting for full and partial burner loads.
- ▶ Make corrections if required.
- ▶ Take the O_2 content corresponding to the specified CO_2 setting values (natural gas DK CO_2 rat.=12.0 Vol. – %) of the flue gas (→ Chapter 17.5, page 71).

7.10.1 Carry out a CO_2 adjustment at full load (to at least 70%)

Always carry out an adjustment at full load first and then at low load. During the flue gas test, ensure that enough heat is being drawn off.

- ▶ Read off the load at the control unit (→technical documentation of the control unit).
- ▶ Wait until at least 70% load has been reached.
- ▶ Insert the test sensor through the measurement port (→ Fig. 38, page 31) in the flue gas collector into the core stream and check the CO_2 value.
- ▶ In the case of CO_2 values below 8.7% or above , 9.2% correct 9.7% the setting on the high full load screw to (→ Fig. 36).
  - – Turning the screw clockwise reduces the CO_2 level.
  - – Turning anticlockwise increases the CO_2 level.
- ▶ Enter the values in the commissioning report (→Chapter 17.6, page 72).

When operating with gaseous fuels with a hydrogen content of up to 20 % by volume, the CO_2 values may deviate from the data specified. You can obtain detailed information on the gas mixture supplied and its effect on the performance and CO_2 content from your responsible gas supply company and our service department on request.

Only for type C93:

- ▶ If the supply air infeed is designed as an annular gap around the flue, check the CO_2 value in the combustion air at the on-site measurement port.
  Values above 0 % indicate faults or leaks in the flue gas routing.
- ▶ Identify and eliminate the fault.

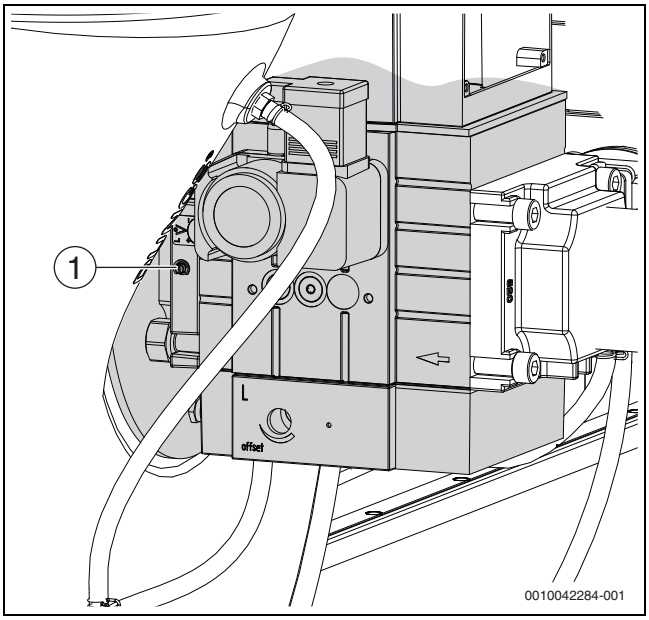


Fig. 36 Carry out a CO_2 adjustment at full load

7.10.2 Carry out an adjustment and check of the CO_2 level at low load

- ▶ Adjust the flue gas test function via the control unit (→technical documentation of control unit)
- ▶ Read off load at control unit.
- ▶ Wait until the smallest output has been reached.
- ▶ Insert the test sensor through the measurement port (→ Fig. 38, page 31) in the flue pipe into the core stream and check the CO_2 value.
- ▶ In the case of CO_2 values below 8.7% or above 9.7%, correct the setting on the low load adjusting screw [1] to 9.2%.
  - – Turning the screw clockwise reduces the CO_2 level.
  - – Turning anticlockwise increases the CO_2 level.
- ▶ Check the CO_2 value again and enter in the commissioning report (→ Chapter 17.6, page 72)

When operating with gaseous fuels with a hydrogen content of up to 20 % by volume, the CO_2 values may deviate from the data specified. You can obtain detailed information on the gas mixture supplied and its effect on the performance and CO_2 content from your responsible gas supply company and our service department on request.

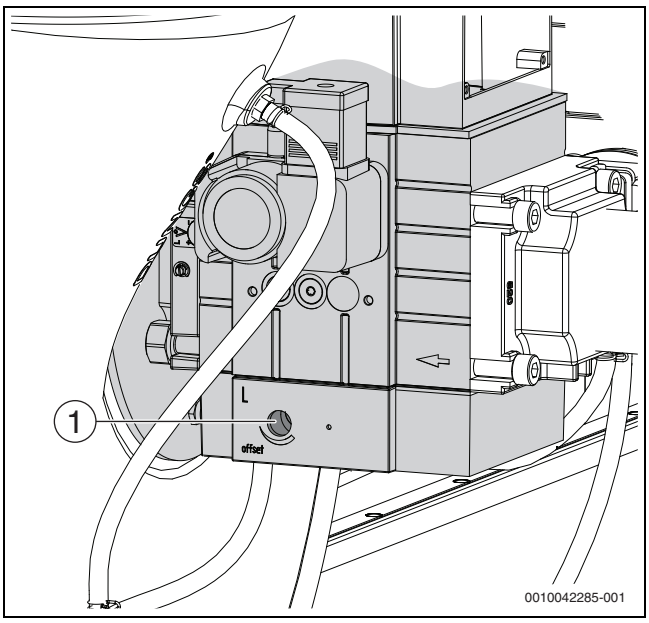


Fig. 37 Check the adjustment under low load

7.10.3 Check the CO_2 adjustment at full load (at least 70%)

- ▶ Read off load at control unit.
- ▶ Wait until at least 70% load has been reached.
- ▶ Check the CO_2 content again and correct if necessary (→ Chapter 7.10.1, page 30).
- ▶ Check the CO_2 content again and enter the value in the commissioning report (→ Chapter 17.6, page 72)

NOTICE

Impermissible CO_2 values due to incorrect burner setting!

- ▶ The deviation between the CO_2 values measured in full load and low load may not be greater than 0.5% CO_2.
  Example 1:
  Measured at full load: 9.5% CO_2.
  Measured at low load: 9.2% CO_2.
  Deviation: 0.3% → OK.
  Example 2:
  Measured at full load: 8.7% CO_2.
  Measured at low load: 9,3% CO_2.
  Deviation: 0.6% → not OK, correct the full load.

7.11 Recording measurements

- ▶ Carry out the following measurements at the test point in the connector and enter in the commissioning report (→ Chapter 17.6, page 72):
  - Flue resistance
  - 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 content

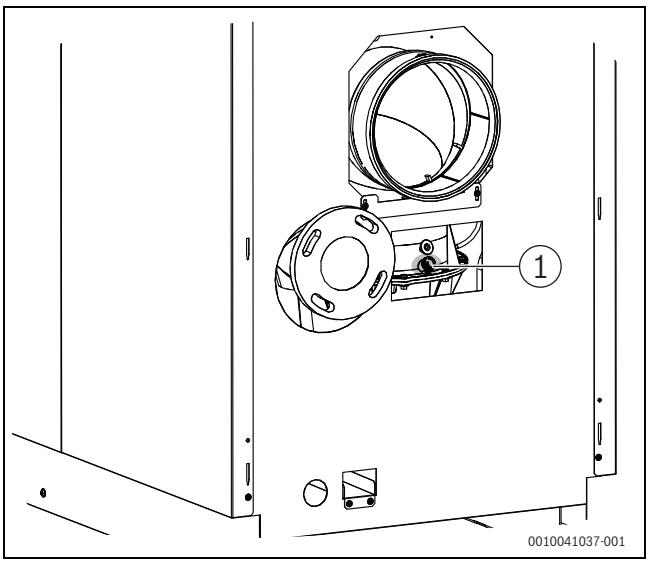


Fig. 38 Recording measurements

[1] Test point in the flue

7.11.1 Flue resistance

The required flue resistance for the installed flue gas/air supply system must not exceed 200 Pa (2.0 mbar).

DANGER

Danger to life through toxic flue gases escaping.

- ▶ Only operate the boiler with a chimney or flue system (→ Table 20, page 68).

7.11.2 CO content

CO content in air-free (lf)[1)] state must be less than 100 ppm (lf)[1)] or 0.01 % by vol.

Levels above 100 ppm (lf)[1)] indicate incorrect burner adjustment, dirt in the burner or heat exchanger, burner faults or incorrect burner setting.

- ▶ Identify and eliminate the fault.

7.12 Concluding the flue gas test

- ▶ To conclude and change to the operating mode, observe the corresponding technical documentation for the control unit.

7.13 Set the standard display at the control unit

- ▶ To set the standard display, observe the technical documentation of the control unit.

7.14 Function tests

NOTICE

Material damage and malfunctions due to contamination!

The function of the burner may be impaired due to greater accumulation of dust during the construction phase.

- ▶ Clean the burner once the construction phase is complete (→Chapter 11.7 and 11.8.1).

During commissioning and the annual inspection, make sure all regulating, control and safety equipment is functioning correctly and, where applicable, check for correct settings.

7.14.1 Checking the ionisation current (flame current)

- ▶ To test the ionisation current, observe the corresponding technical documentation for the control unit.

1) (lf) = air-free

7.15 Checking tightness during operation

NOTICE

Risk of material damage due to a 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 or allow leak detection agent to drip onto cable entries, plugs or electrical cables.
- ▶ To prevent corrosion, carefully wipe off the leak detection agent afterwards.

- ▶ With the burner operational, use a foaming agent to test all joints along the entire burner path, such as:

- Test nipple
- Locking screw for gas supply pressure
- Screw fittings (also at the gas connection) etc.

The agent must be approved for gas tightness testing.

7.16 Installing casing panels

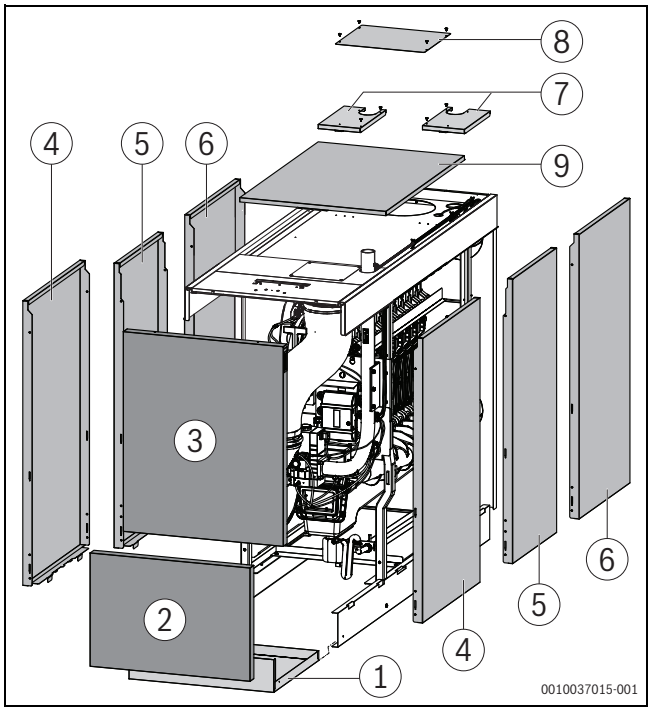


Fig. 39 Installing casing panels

[1] Bottom panel
[2] Front panel at bottom
[3] Front panel at top
[4] Side panels at front
[5] Side panels in the middle
[6] Side panels at rear
[7] Hood rear right / left
[8] Cover for flue gas top (for flue gas to the rear)
[9] Middle hood

- ▶ Insert bottom panel [1] and secure on the left and right with one self-tapping screw each.
- ▶ Install the middle hood [9] and fix with self-tapping screws. In doing so, insert the angled tab in the respective recess of the hood supply air cover.
- ▶ Install the hood rear right / left [7].
- ▶ If necessary, install the top flue gas cover [8].
- ▶ First hook the side panels [6] at the rear into the bottom rail, lift slightly and hook in at the top. With the rear fold, place over the rear panel.
- ▶ First hook the middle side panels [5] into the bottom rail, push a little to the rear, then lift slightly and hook in at the top.
- ▶ Using fixing screws, secure the rear side panels [5] to the rear of the boiler.
- ▶ First hook the side panels at the front [4] into the bottom rail at the bottom, then lift them slightly and hook in at the top.
- ▶ Hook the bottom boiler front panel [2] into the cutouts at the bottom of the boiler casing and hook into the side panels.
- ▶ Insert the upper boiler front panel [3] into the lower boiler front panel and place against side panels.
- ▶ Make sure that bolts at the top have engaged in the corresponding holes.
- ▶ Turn the unlocking screws on the top of the boiler clockwise using a suitable tool and lock the front panel [3].
- ▶ Affix the clear pocket containing the technical documentation in a clearly visible spot on one of the of the floor standing boiler side panels.

8 Briefing the user, handing over technical documents

WARNING

Danger to life due to poisoning!

Risk of poisoning due to escaping flue gases when the air supply is inadequate.

- ▶ Make sure that a supply of air is available in every operating mode through corresponding openings to the open air.

- ▶ Make the user aware of the need for and function of the ventilation and combustion air apertures.
- ▶ 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 17.6).
- ▶ Together with the user and referring to the operating instructions, perform a shutdown and restart.
- ▶ Point out the user that frequent refilling of heating water is a sign that the system is faulty and/or leaking (ensure required water quality according to the operator's log).
- ▶ Inform operator about the required water quality and point out where the heating water must be refilled.
- ▶ Explain to the customer what to do in an emergency, e.g. a fire, referring to the operating instructions.
- ▶ Hand over the technical documents to the user.

9 Shutdown

NOTICE

Frost damage!

The heating system can freeze up when it is not in operation.

- ▶ Whenever possible, leave the heating system permanently switched on.
- ▶ Protect the heating system against frost by draining the heating system and DHW pipes from the lowest point.

9.1 Shutting down the heating system via the control unit

- ▶ To shut down the heating system, observe the corresponding technical documentation for the control unit.
- ▶ Close off the fuel supply.

9.2 Shutting down the heating system in an emergency

Only in emergencies, shut down the heating system via the fuse/circuit breaker at the installation location or the heating system emergency stop switch.

Explain to the operator/user what to do in an emergency, e.g. fire.

- ▶ Never risk your own life. Your own safety is paramount.
- ▶ Close off the fuel supply installed on site.
- ▶ Isolate the heating system from the mains power supply via the heating system emergency stop switch or the main circuit breaker.

10 Environmental protection and disposal

Environmental protection is a fundamental corporate strategy of the Bosch Group.
The quality of our products, their economy and environmental safety are all of equal importance to us and all environmental protection legislation and regulations are strictly observed.
We use the best possible technology and materials for protecting the environment taking account of economic considerations.

Packaging

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

Used appliances

Used appliances contain valuable materials that can be recycled.
The various assemblies can be easily dismantled. Synthetic materials are marked accordingly. Assemblies can therefore be sorted by composition and passed on for recycling or disposal.

Old electrical and electronic appliances

This symbol means that the product must not be disposed of with other waste, and instead must be taken to the waste collection points for treatment, collection, recycling and disposal.

The symbol is valid in countries where waste electrical and electronic equipment regulations apply, e.g. "(UK) Waste Electrical and Electronic Equipment Regulations 2013 (as amended)". These regulations define the framework for the return and recycling of old electronic appliances that apply in each country.

As electronic devices may contain hazardous substances, it needs to be recycled responsibly in order to minimize any potential harm to the environment and human health. Furthermore, recycling of electronic scrap helps preserve natural resources.

For additional information on the environmentally compatible disposal of old electrical and electronic appliances, please contact the relevant local authorities, your household waste disposal service or the retailer where you purchased the product.

You can find more information here:
www.weee.bosch-thermotechnology.com/

Batteries

Batteries must not be disposed together with your household waste.
Used batteries must be disposed of in local collection systems.

11 Inspection and maintenance

NOTICE

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

- ▶ Have the heating system inspected at least once a year, and have any necessary maintenance or cleaning work carried out.
- ▶ Clean the boiler at least every 2 years. We recommend annual cleaning.
- ▶ Check and clean the condensate pipes and siphon annually.
- ▶ Carry out any maintenance immediately to avoid any damage to the system.
- ▶ Remedy all faults immediately.

Heating systems must be serviced regularly for the following reasons:

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

Maintenance work must only be carried out by approved contractors. Use only original spare parts. The results of the inspection must be recorded in the inspection and maintenance protocol.

Offer your customer an annual maintenance and inspection contract, which is based on actual requirements. You can check in the inspection and maintenance protocols which activities must be included in a maintenance contract (→ Chapter 17.7).

Refer to the spare parts catalogue when ordering spare parts.
We recommend the service set for the burner maintenance.

11.1 Preparing the floor standing boiler for inspection

DANGER

Danger to life from electric current!

- ▶ Before opening the boiler, isolate all phases of the mains voltage and secure against unintentional reconnection.
- ▶ After isolating, wait 5 minutes to allow the capacitors to discharge before touching live parts.

CAUTION

Risk of injury from protruding components!

After disassembly of the casing, components of the boiler may protrude.

- ▶ When working on the boiler, take care of danger sources, in particular in the area of your head.
- ▶ If necessary, cover the respective components.

Remove front panels

- ▶ Shut down the heating system.
- ▶ Remove the fixing screws on the top of the floor standing boiler and remove the upper boiler front panel.
- ▶ To do this, slightly raise the lower boiler front panel and remove it towards the front.

Removing the side panels

- ▶ Slightly raise the front side panel, then tilt outwards and lift off.
- ▶ Remove the two fixing screws at the rear that secure each of the rear side panels.
- ▶ Slightly raise the rear side panel, then tilt outwards and lift off.

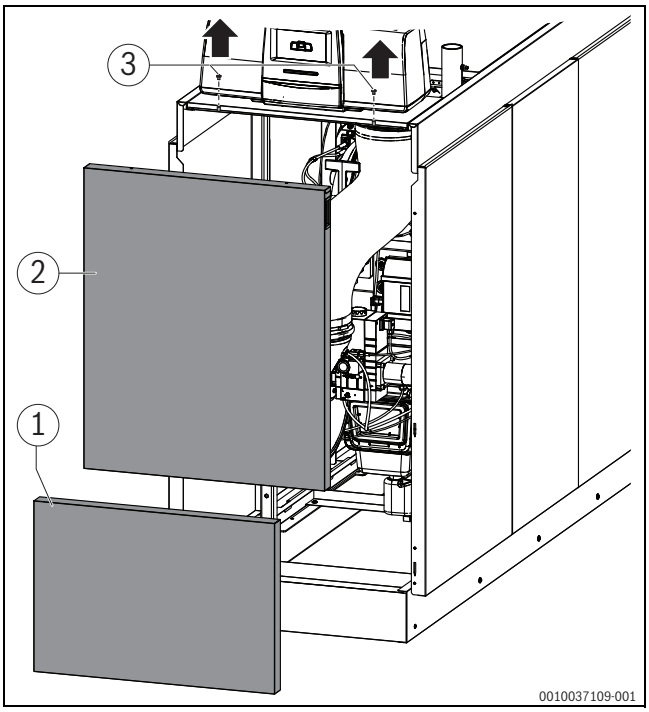


Fig. 40 Remove front panels

[1] Front panel at bottom
[2] Front panel at top
[3] Fixing screws

11.2 Detailed overview of boiler components

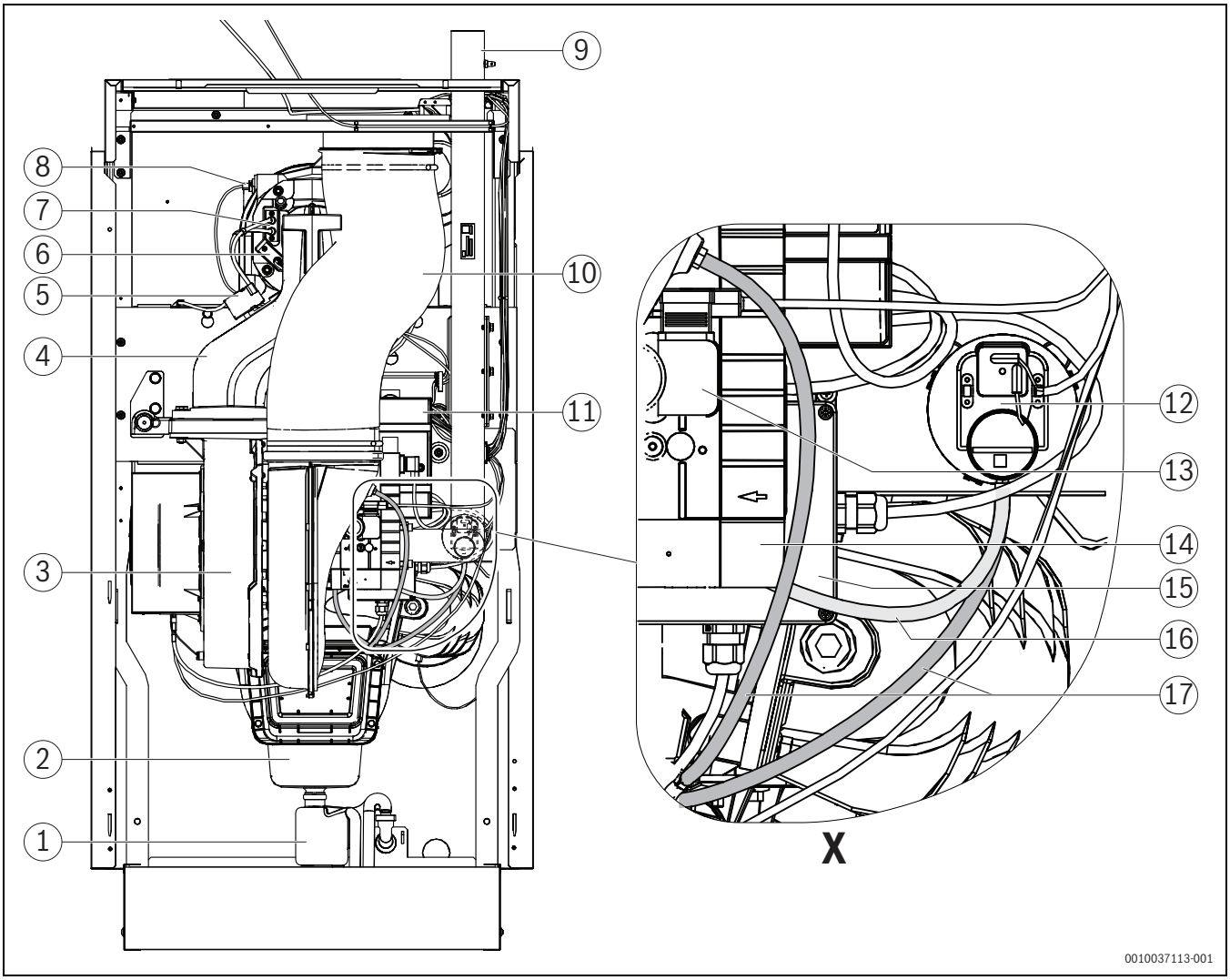


Fig. 41 Detailed overview of components, front view (shown: 500 kW rating)

[1] Siphon
[2] Condensation catch pan
[3] Fan
[4] Mixture manifold
[5] Ignition transformer
[6] Monitoring electrode
[7] Ignition electrode
[8] High limit safety cut-out (on the first centre section, on the left under the thermal insulation)
[9] Gas pipe
[10] Combustion air inlet hose
[11] Burner control unit
[12] Differential pressure switch (p_1-blue gas line, p_2-white gas line)
[13] Valve check system
[14] Air/gas ratio control valve
[15] Relay box
[16] Test cable for gas outlet pressure (transparent gas line)
[17] Compensation line (blue)

X View without gas pipe

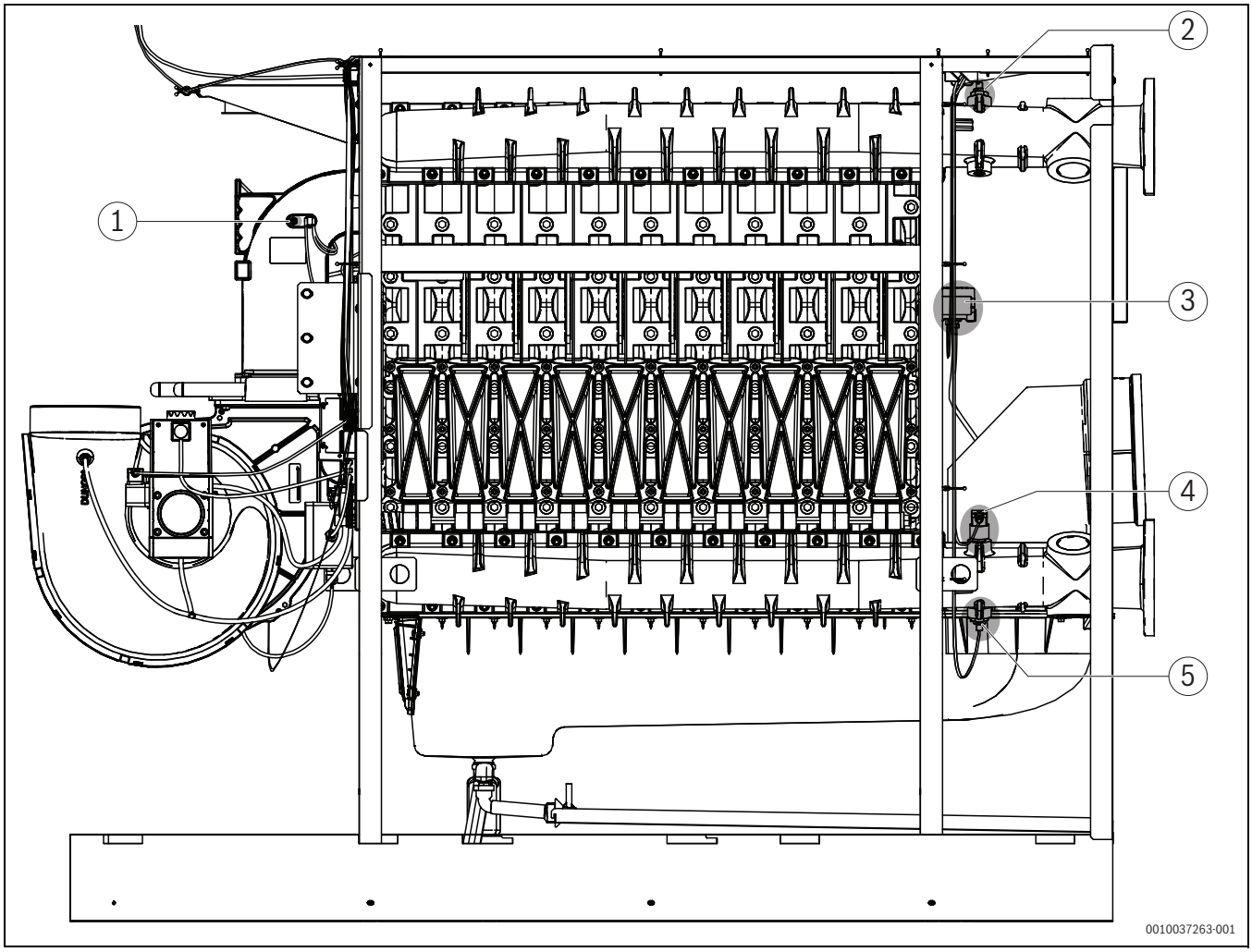


Fig. 42 Detail overview of the components, side view right side (shown: without combustion air inlet hose, gas pipe and thermal insulation 500 kW rating)

[1] Gas pressure test nipple with temperature switch
[2] Flow temperature sensor
[3] Flue gas pressure limiter
[4] Water pressure sensor
[5] Return temperature sensor

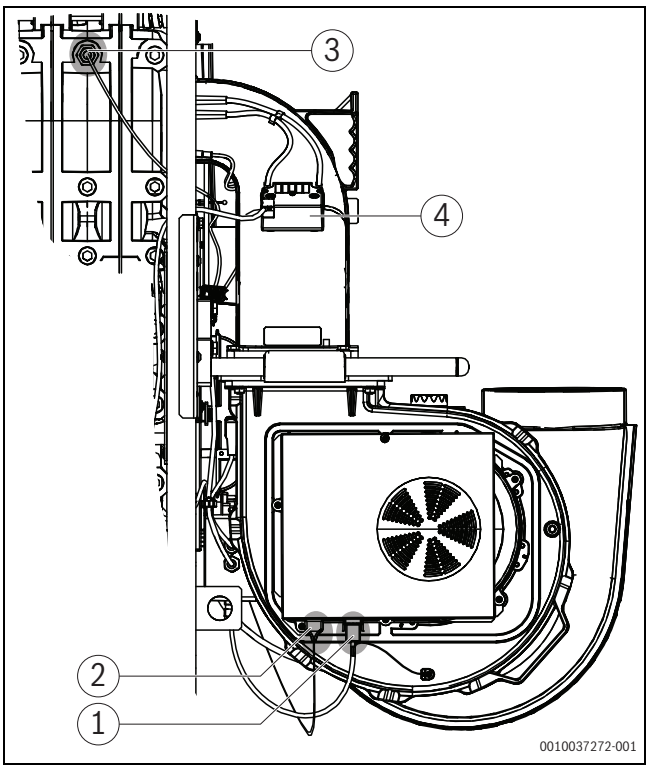


Fig. 43 Detail overview of the components, side view left side (shown: without combustion air inlet hose, gas pipe and thermal insulation 500 kW rating)

[1] Mains power supply plug
[2] PWM signal plug
[3] High limit safety cut-out (on the first centre section, on the left under the thermal insulation)
[4] Ignition transformer

11.3 General work

The following work is not described in any further detail in this document. However, they have to be carried out:

- Check the general condition of the heating system.
- Perform a visual inspection and function check of the heating system.
- Check the supply air and flue gas routing for function and safety.
- Check all pipes in contact with gas and water for corrosion.
- Replace any corroded pipework.
- Check the pre-charge pressure of the expansion vessel.
- Check the concentration of antifreeze / additives that may be used in the heating water annually.
- If necessary, check installed water treatment cartridges (in the backfeed section) to ensure they are functioning correctly and for wear.
- During the annual inspection, check the correct function of all regulating, control and safety equipment and, where applicable, for correct settings.

11.4 Internal tightness test

11.4.1 Determining the testing volume

- Measure the length of the pipeline up to the fuel shut-off valve.
- Calculate using value for volume of air/gas ratio control valve (→Table 11).

Volume of air/gas ratio control valve $V_{Air/gas\ ratio\ control\ valve}$ [l]	
Volume of air/gas ratio control valve ≤ 50 kW	0.1
Volume of air/gas ratio control valve > 50 kW	0.2

Table 11 Volume of air/gas ratio control valve ($V_{air/gas\ ratio\ control\ valve}$)

- Determine the pipe volume (V_{pipe}) using table 12 and table 13.
- Calculate the test volume (V_{test}) using the equation.
  $V_{test} = V_{tot} = V_{pipe} + V_{air/gas\ ratio\ control\ valve}$

Pipe length	Pipework diameter [inch]					
[m]	½	¾	1	1 ¼	1 ½	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	11.0
6	1.2	2.2	3.5	6.1	8.2	13.2
7	1.4	2.5	4.1	7.1	9.6	15.4
8	1.6	2.9	4.6	8.1	11.0	17.6
9	1.8	3.3	5.2	9.1	12.4	19.8
10	2.0	3.6	5.8	10.1	13.7	22.0

Table 12 Pipework volume (V_{pipe}) in litres, subject to pipe length and diameter

Pipe length	Pipework diameter [mm] (copper pipe)					
[m]	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	–

Table 13 Pipework volume (V_{pipe}) in litres, subject to pipe length and diameter

11.4.2 Carrying out gas tightness test

- ▶ Close device shut-off valve.
- ▶ Undo locking screw on test nipple by turning it through 2 revolutions.
- ▶ Push the test hose of the U-tube pressure gauge onto the test nipple.
- ▶ Open the fuel shut-off valve and wait for the pressure to stabilise.
- ▶ Note and record the pressure.
- ▶ Close the device shut-off valve 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. 45, page 38) whether the gas train is still usable.

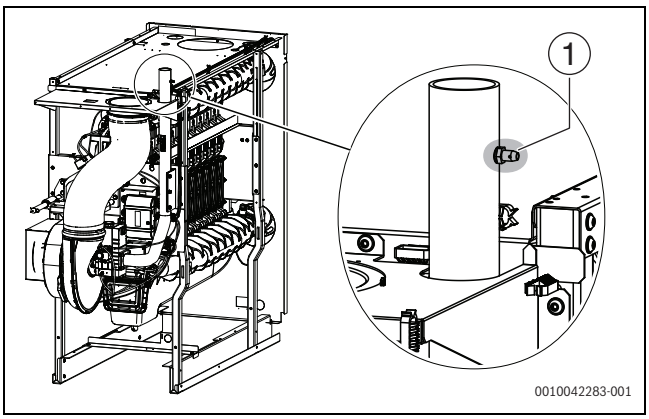


Fig. 44 Checking internally for tightness

[1] Test nipple

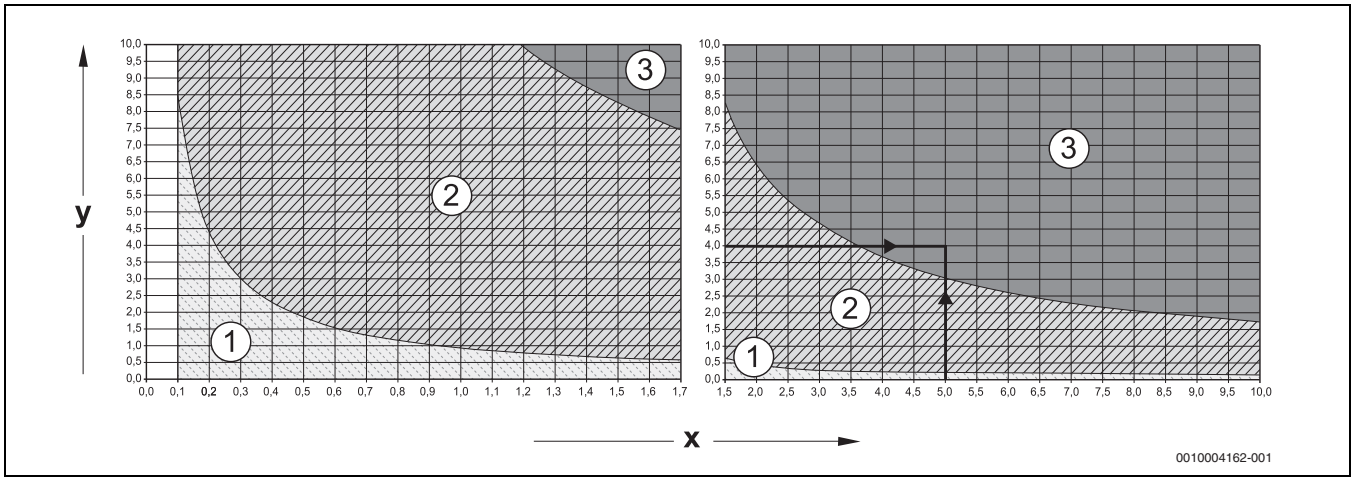


Fig. 45 Permissible pressure drop per minute for the internal tightness test with gas pressure present

[1] "Valve tight" range = applies to new installations
[2] "Valve sufficiently tight" range = valve can be used without restrictions
[3] "Valve leaks" range = valve may not be used (→perform a test as described in the following)

x Test volume in litres
y Pressure drop in mbar within one minute
Read-off example: test volume (V_{test}) 5 litres and pressure drop 4 mbar/min = range 3 (valve leaking = valve may not be used) →carry out test as described below.

If you detect a steep pressure drop of > 10 mbar/minute at a test volume of (V_{test}) of < 1 litre, increase the test volume (V_{test}). For the following include the pipework up 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 the test volume (V_{test}) and pressure drop per minute lies within the "Valve leaks" range (see Read-off example), you must carry out the test described below.

NOTICE

Risk of material damage due to a short circuit!

- ▶ 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 joints in the tested pipework section using a foaming leak detection agent.
- ▶ If required, seal any leaks and repeat the test.
- ▶ If no leak is detected, replace the air/gas ratio control valve.

Complete the tightness test

- ▶ Remove the hose.
- ▶ After completing the measurements, retighten the locking screw of the test nipple.
- ▶ Check tightness of the test nipples.

11.5 Checking the heating system operating pressure

NOTICE

Risk of system damage due to thermal stress!

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

- ▶ Only fill the boiler when cold (the boiler temperature should not exceed 40 °C).
- ▶ When the boiler is in operation, never fill it via the boiler DFV valve. Instead, only use a WRAS approved filling method in the return.
- ▶ Observe the requirements for fill water.

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.
- ▶ Immediately seal any leaks.

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

The red needle of the pressure gauge must be set to the required operating pressure.

Establish an operating pressure of at least 1.2 bar.

- ▶ Check the operating pressure of the heating system.

The operating pressure is too low, if the pressure gauge needle is below the green marking.

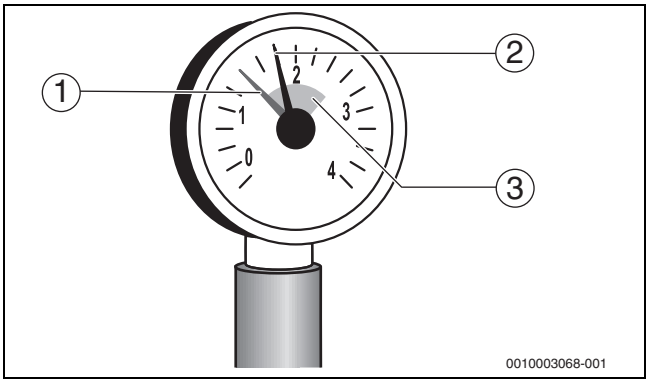


Fig. 46 Pressure gauge for sealed systems

[1] Red needle
[2] Pressure gauge needle
[3] Green marking

CAUTION

Health risk through contaminated drinking water!

- ▶ Observe all country-specific regulations and standards regarding the prevention of drinking water contamination.

- ▶ Water should be topped up via WRAS approved filling method.
- ▶ Vent the heating system via the radiator air vent valves.
- ▶ Check the operating pressure again.

The operating pressure can also be checked at the control unit via the "Info menu" (e.g. display "P1.4" corresponds to 1.4 bar).

- ▶ Enter the amount of top-up water in the "Water Quality Operator's Log".

11.6 Measuring the carbon dioxide content

- ▶ Insert the sensor into the core stream through the measurement port in the flue.
- ▶ Make a note of the flue gas values.
  The CO_2 value must be in the range between 8.7 % and 9.7 % and the CO content must be air free in the flue gas below 100 ppm.

The following applies for **Denmark**:

- ▶ Take the O_2 content corresponding to the specified CO_2 values (natural gas DK CO_2 rat.=12.0 Vol. – %) from Chapter 17.5, page 71

11.7 Removing the burner

CAUTION

Risk of burning due to hot surfaces!

Individual components of the boiler can become very hot even after being shut down for a long time.

- ▶ Allow the boiler to cool down.
- ▶ If necessary, wear protective gloves.

NOTICE

Risk of material damage due to improper maintenance/cleaning!

When removing the burner or when cleaning the boiler, the control unit may be soiled or damaged.

- ▶ Cover the control unit before removing the burner or cleaning the boiler.

Removing the mixture manifold with burner tube

- ▶ Shut down the heating system (→Chapter 9.1, page 33).
- ▶ Remove the boiler front panel and front side panels (→Chapter 11.1, page 34).
- ▶ Undo toggle clip [1] at the top of the supply air collector.
- ▶ Remove the supply air hose [2] from the upper inlet duct.

If the supply air hose at the top is released, it can be turned to the front with the supply air collector.

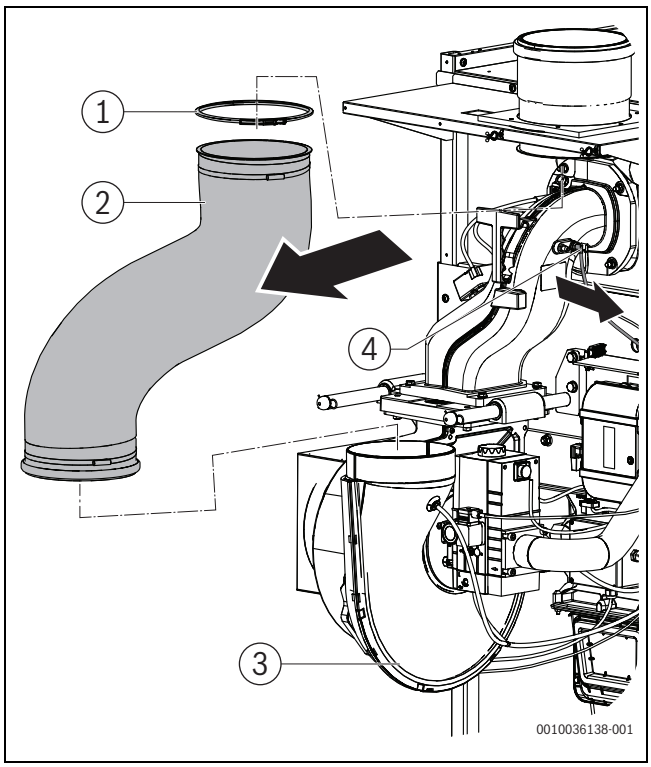


Fig. 47 Undoing the supply air hose

[1] Toggle clip
[2] Supply air hose
[3] Ventilation air collector
[4] Temperature switch / burner controller connecting cable

▶ Loosen the gas pipe on the gas valve. For this purpose, remove the 4 screws on the flange (→Fig. 48).

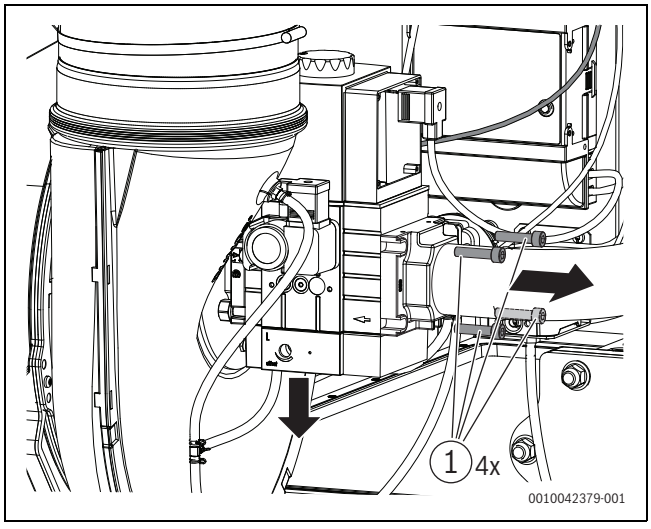


Fig. 48 Unscrew the screws on the air/gas ratio control valve

[1] Screws on the flange (4x)

▶ Undo the temperature switch / burner controller connecting cable on the mixture manifold (→Fig. 47).
▶ Undo the connecting cable on the ignition transformer (→Fig. 49, [5]).
▶ Undo the electrical connections at the air/gas ratio control valve and fan (→Fig. 52, page 41).
▶ Remove the hoses on the differential pressure sensor (→Fig. 52).
▶ Remove the 4 fixing nuts (→Fig. 49, [4]) at the top on the mixture manifold.

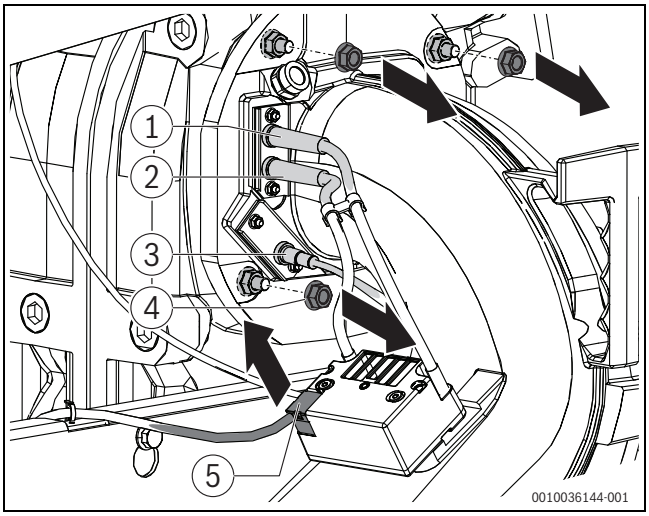


Fig. 49 Undo the connecting cable and nuts on the ignition transformer

[1] Ignition cable
[2] Ignition cable
[3] Monitor lead
[4] Fixing nuts (4x)
[5] Ignition transformer connecting cable

▶ Pull the mixture manifold with burner rod and fan back to the end position (O-ring on the guide pin) (→Fig. 50).

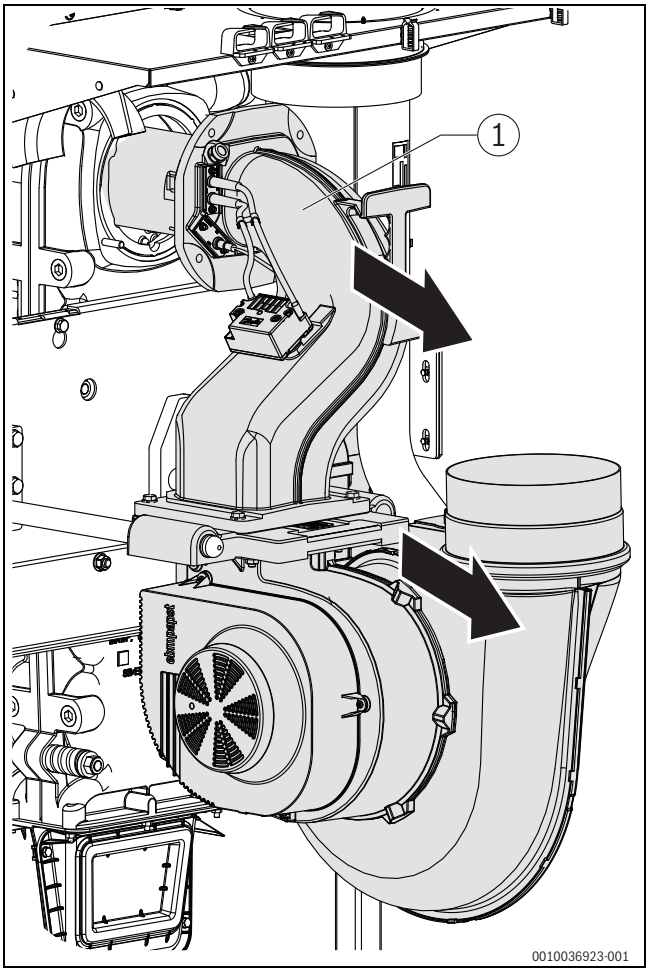


Fig. 50 Pull the burner back

[1] Mixture manifold

▶ Install the insertion aid. When delivered, the insertion aid is attached on the upper cover plate (→Fig. 51).

- Remove the 4 Screws on the mixture manifold / slide (→Fig. 50).
- Remove the mixture manifold with burner rod and put down stably on the footprint; protect against contamination and damage (→Fig. 51).

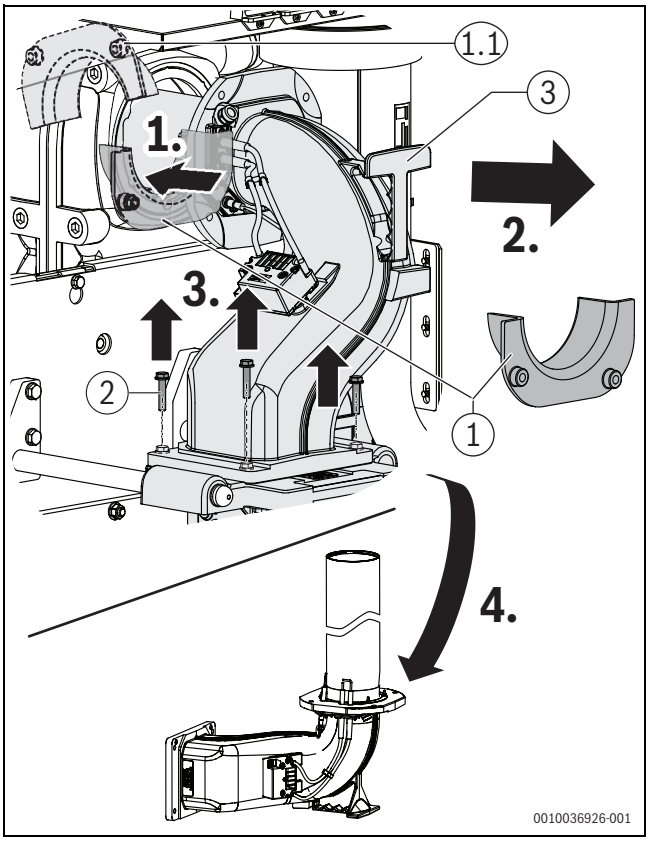


Fig. 51 Remove the mixture manifold with burner rod and put down

[1] and 1.1 insertion aid
[2] Screws on the mixture manifold / slide (4x)
[3] Handle and footprint on the mixture manifold

Remove the burner for maintenance purposes

- Remove the 4 fixing nuts (→Fig. 49, [4]) at the top on the mixture manifold.
- Undo the connecting cable on the ignition transformer (→Fig. 49, [5]).
- Undo the temperature switch / burner controller connecting cable on the mixture manifold (→Fig. 47).
- Remove the plug screw on the air/gas ratio control valve (→Fig. 52).
- Remove the hoses on the differential pressure sensor (→Fig. 52).
- Remove the 4 screws on the flange of the gas pipe (→Fig. 52).
- Remove the O-ring on the guide pins of the burner sled (→Fig. 52).
- Unplug the plug on the fan (→Fig. 53).
- Carefully remove the entire burner and put down stably on the footprint [3] of the mixture manifold (→Fig. 51) and protect against damage.

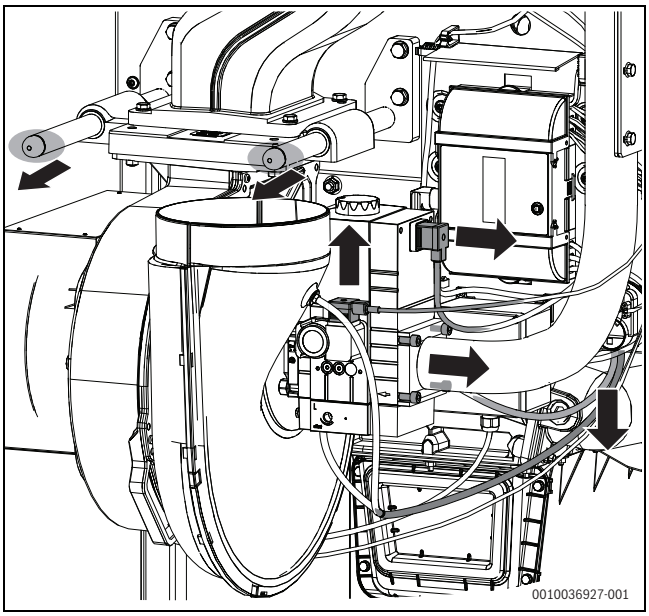


Fig. 52 Removing the burner

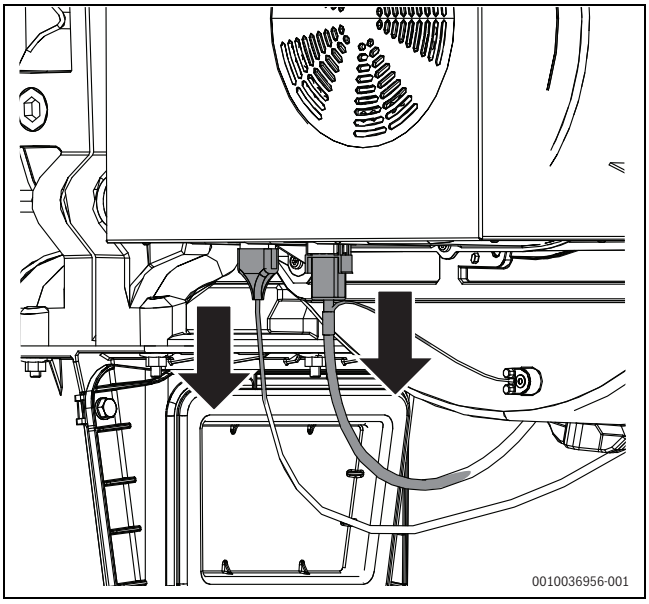


Fig. 53 Unplug the plug from the fan

11.7.1 Burner in maintenance position

CAUTION

Risk of burning due to hot surfaces!

Individual components of the boiler can become very hot even after being shut down for a long time.

- Allow the boiler to cool down.
- If necessary, wear protective gloves.

- Shut down the heating system (→Chapter 9.1, page 33).
- Remove the boiler front panel and front side panels (→Chapter 11.1, page 34).
- Undo toggle clip (→Fig. 54, [1] at the) top of the supply air collector.
- Remove the supply air hose (→Fig. 54, [2]) from the upper inlet duct.

If the supply air hose at the top is released, it can be turned to the front with the supply air collector.

- Remove the 4 screws on the flange of the gas pipe (→Fig. 55).
- Remove the plug screw on the air/gas ratio control valve (→Fig. 55).
- Remove the hoses on the differential pressure sensor (→Fig. 55).
- Undo the temperature switch / burner controller connecting cable on the mixture manifold (→Fig. 54).
- Undo the connecting cable on the ignition transformer (→Fig. 56, [5]).
- Unplug the plug on the fan (→Fig. 53, page 41)
- Remove the 4 fixing nuts (→Fig. 56, [4]) at the top on the mixture manifold.

Application of lubricating paste on the guide pins facilitates pulling the burner forwards.

- Pull the mixture manifold with burner rod and fan back to the end position (O-ring on the guide pin) (→Fig. 57).

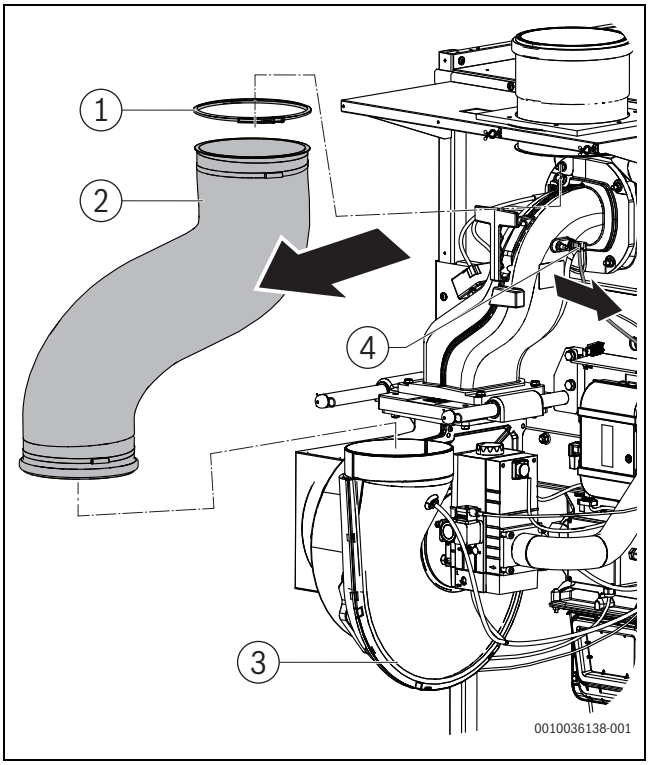


Fig. 54 Undoing the supply air hose

[1] Toggle clip
[2] Supply air hose
[3] Ventilation air collector
[4] Temperature switch / burner controller connecting cable

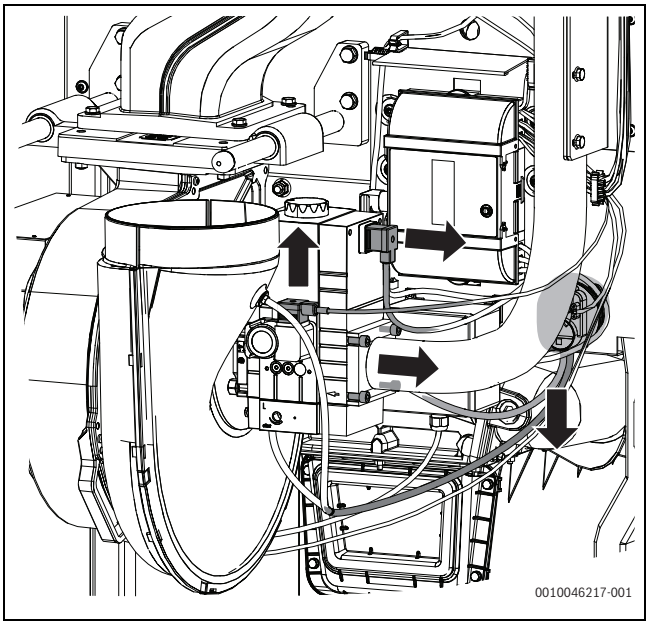


Fig. 55 Undo the plug, hoses and gas supply pipe

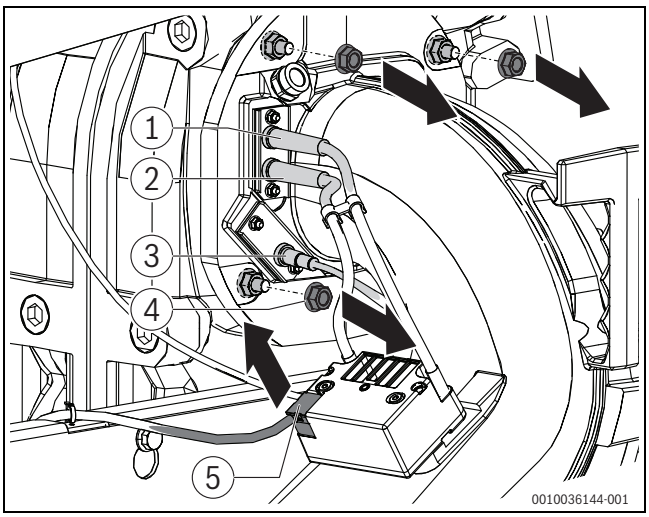


Fig. 56 Undo the connecting cable and nuts on the ignition transformer

[1] Ignition cable
[2] Ignition cable
[3] Monitor lead
[4] Fixing nuts (4x)
[5] Ignition transformer connecting cable

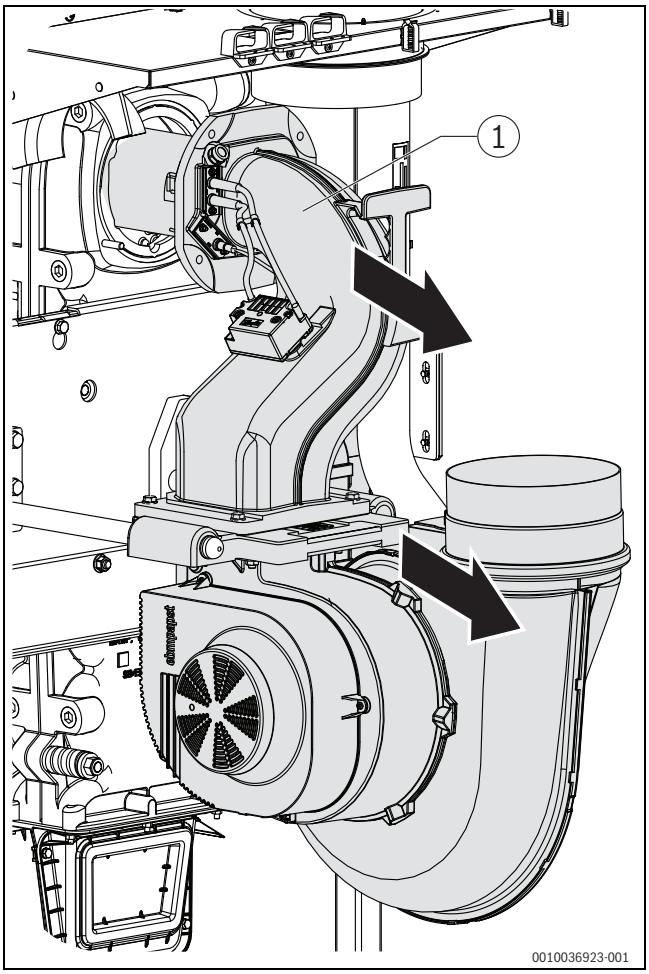


Fig. 57 Pull the burner back

[1] Mixture manifold

11.8 Cleaning the burner and heat exchanger

11.8.1 Clean the burner

With intensive contamination, the burner rod may be separated from the mixture manifold and blown-out using a blower gun (max. 3 bar).

- ▶ Blow out the burner rod from the outside to the inside and vacuum clean inside.
- ▶ Mount the burner rod with new gasket again.

11.8.2 Clean the heat exchanger

DANGER

Danger to life through escaping flue gas!

- ▶ During installation, look out for faulty gaskets and ensure they are seated correctly. Replace faulty gaskets.
- ▶ Replace the gaskets as described (→ Chapter 11.11.4, page 48).

- ▶ Dry and/or wet clean the heat exchanger.
- ▶ Shut down the heating system (→ Chapter 9, page 33).
- ▶ Close the gas main shutoff valve or gas isolator.
- ▶ Allow floor standing boiler to cool down.
- ▶ Remove the front panels and corresponding side panels.
- ▶ Place the tundish that collects dirt and condensate residues under the condensation catch pan.
- ▶ Pull the siphon [1] off the drainage connection of the condensation catch pan [2] and out of the drain pipe. Turn slightly sideways in doing so.

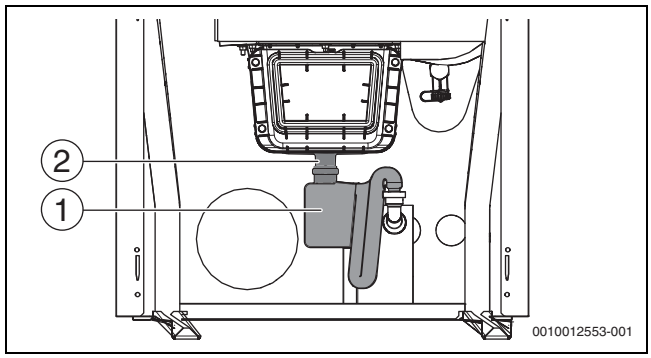


Fig. 58 Removing the siphon

[1] Siphon
[2] Condensation catch pan outlet

- ▶ Remove the screws from the cover of the condensation catch pan.

▶ Remove the cover.

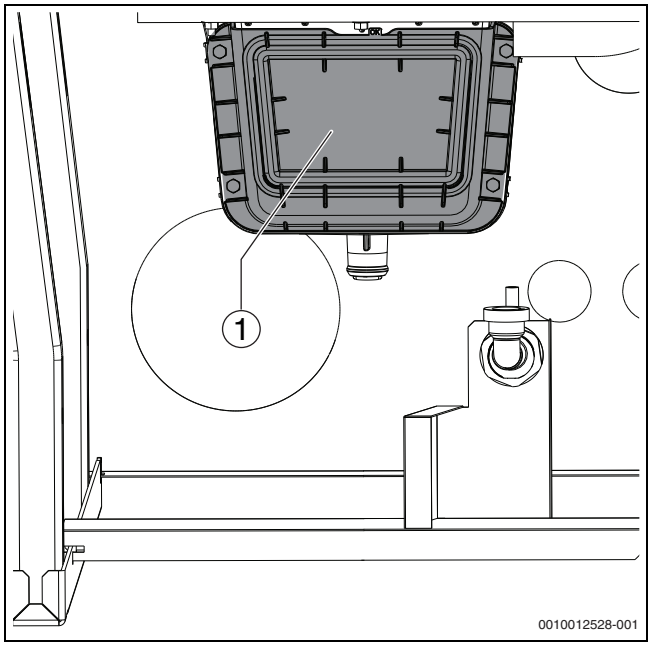


Fig. 59 Disassembly of the condensation catch pan cover

[1] Cover of condensation catch pan

▶ Remove the dirt trap: press the bottom tabs slightly together so the dirt trap can be lifted up and out of the drainage connection.

▶ Rinse the dirt trap and siphon under running water.

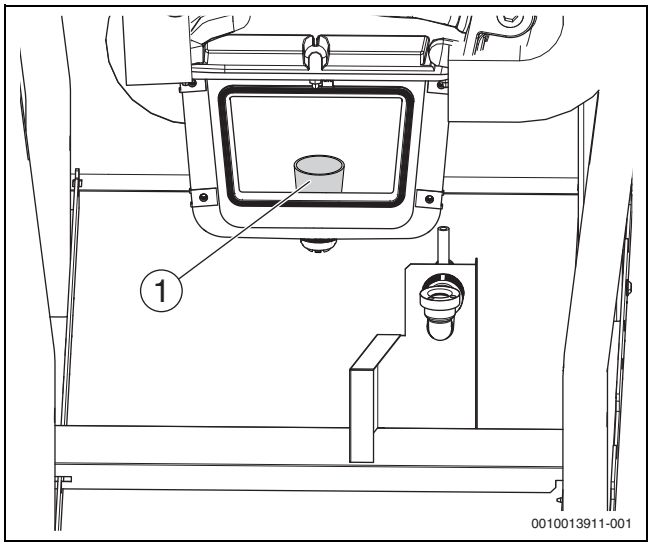


Fig. 60 View of condensation catch pan without cover

[1] Dirt trap

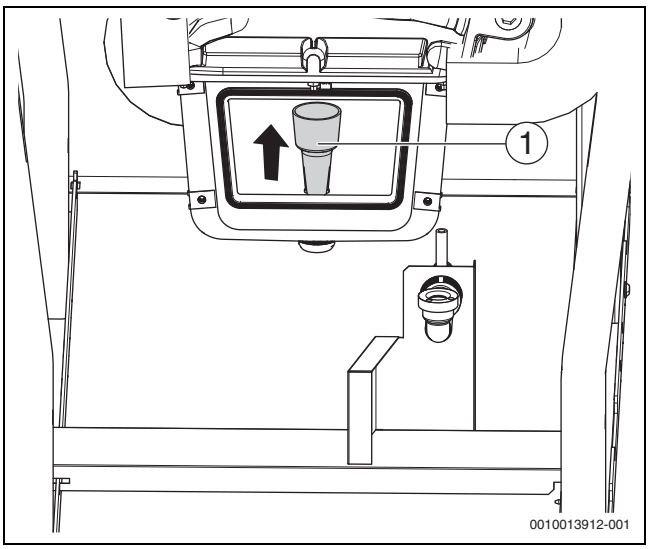


Fig. 61 Dirt trap following removal

[1] Dirt trap

Cleaning the heat exchanger mechanically

A plastic scraper is available as an accessory for mechanical cleaning of the condensation catch pan.

A cleaning blade is available as an accessory for dry-cleaning the heat exchanger. Cleaning equipment for wet cleaning is also available as an accessory.

The cleaning covers are always on the flow and return connection side (service side), which depends on whether the boiler is a right or left-hand version.

▶ Remove the clips [1] on the thermal insulation.

▶ Remove the thermal insulation [2] from the heat exchanger.

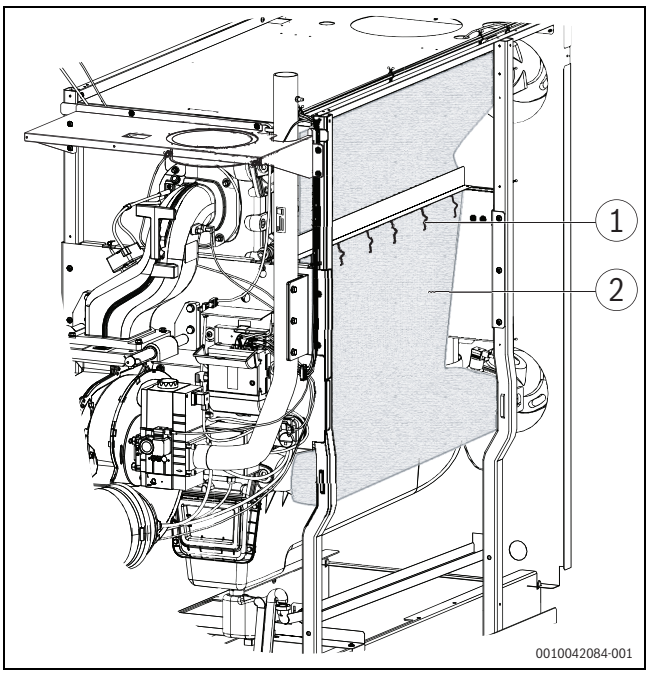


Fig. 62 Thermal insulation on the heat exchanger

[1] Clip
[2] Thermal insulation

- ▶ Unscrew the fixing nuts on the cleaning covers [1] of the heat exchanger.
- ▶ Remove the cleaning covers.

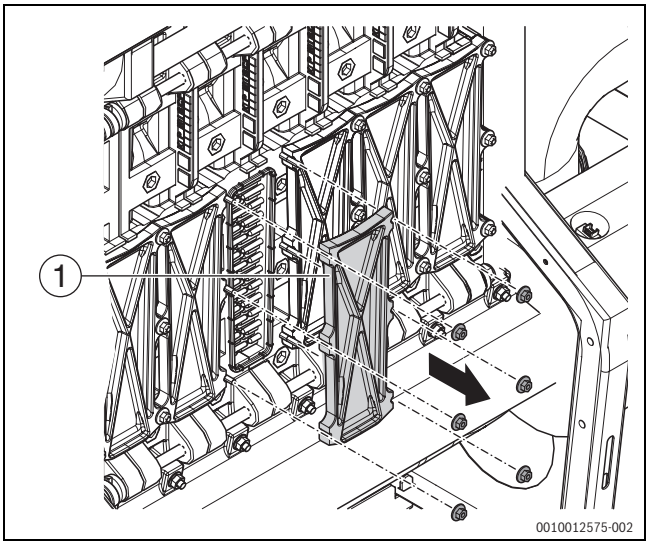


Fig. 63 Removing the cleaning covers

[1] Cleaning cover

CAUTION

Risk of injury from sharp edges of cleaning blade!

- ▶ To avoid injury, wear protective gloves when cleaning the boiler using cleaning blades (accessories).

- ▶ Clean the heat exchanger hot gas flues horizontally and diagonally using the cleaning blade.

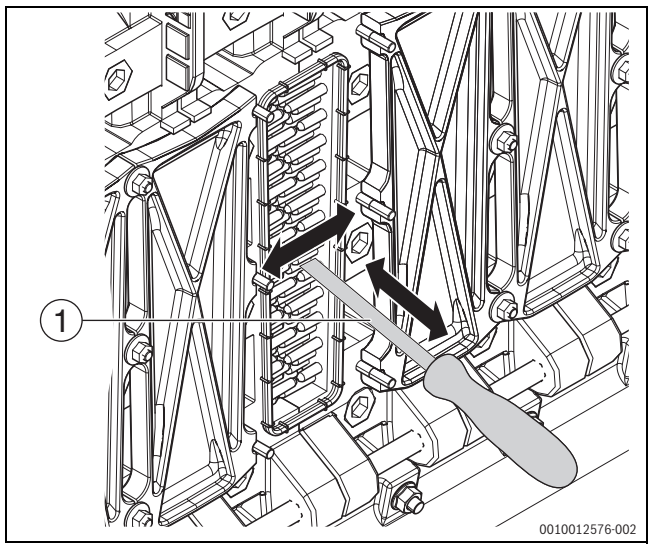


Fig. 64 Cleaning the heat exchanger horizontally

[1] Cleaning blade (available as accessory)

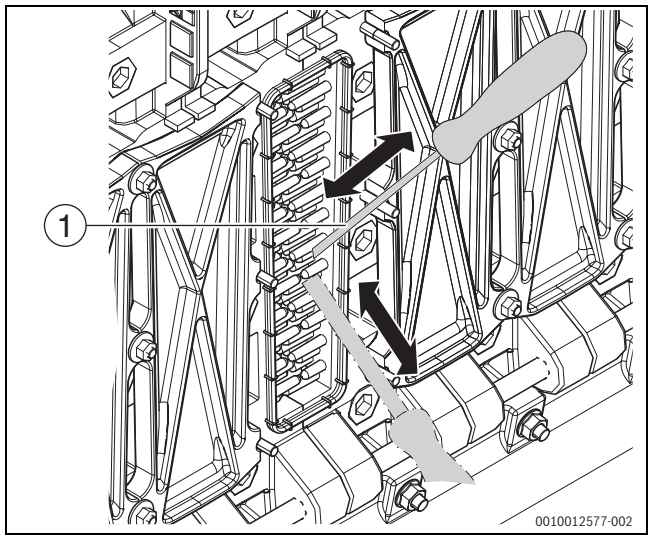


Fig. 65 Cleaning the heat exchanger diagonally

[1] Cleaning blade (available as accessory)

- ▶ Remove dirt particles from the condensation catch pan (e.g. using a vacuum cleaner).
- ▶ Reinsert the dirt trap.
- ▶ Replace faulty gaskets, observe replacement intervals.
- ▶ Make (trapezoid) sure the covers and gaskets are positioned correctly.
- ▶ Screw the cleaning access cover back on according to the following tightening diagram (1-2-3-4-5-6-7-8-9; →Fig. 66) (tightening torque: 7 Nm) or wet clean the heat exchanger.

Recommended: put on all cleaning access covers and always screw them on in pairs according to the tightening diagram.

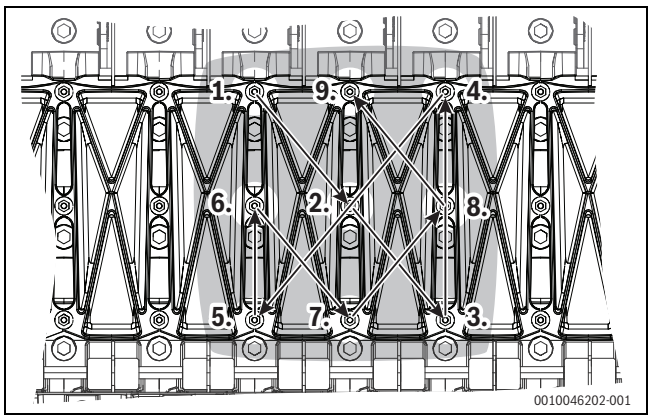


Fig. 66 Cleaning access cover tightening diagram

Wet cleaning the heat exchanger

CAUTION

Property damage and/or personal injury from unsuitable cleaning agent!

Unsuitable cleaning agent with flammable components may explode and/or cause burns.

- ▶ Do not use cleaning agent with flammable propellants.

NOTICE

Risk of material damage due to improper cleaning!

Dirt and moisture can damage boiler components during cleaning.

- ▶ During wet cleaning, protect electrical and other vulnerable components (fan, air/gas ratio control valve, etc.) against moisture and contamination.

- ▶ When wet cleaning, use a cleaning agent appropriate to the degree of soiling (encrustation or soot). -
  The cleaning agent must be approved for use with aluminium.
- ▶ Clean the heat exchanger with water or a cleaning agent approved for aluminium (see instructions provided by the manufacturer of the cleaning agent).
- ▶ Spray the edges of the heat exchanger in particular.

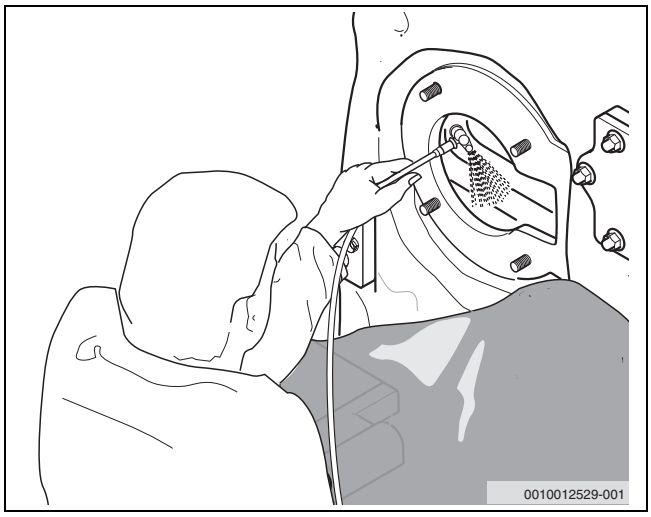


Fig. 67 Wet cleaning the heat exchanger

Working on the heat exchanger during wet and dry cleaning

- ▶ Use a hose to rinse off any residues from the tundish or condensation catch pan.
- ▶ Remove the dirt trap.
- ▶ Clean the condensation catch pan with water.
- ▶ Clean the siphon with water.
- ▶ Check that the siphon and condensate drain with condensate hose are unobstructed.
- ▶ Insert the dirt trap.
- ▶ Install the siphon and fill with approx. 3 litres of water.

DANGER

Danger to life due to poisoning! Siphons not filled with water can cause danger to life through escaping flue gas.

- ▶ Fit the siphon (→ Chapter 5.5, page 18 ff.).
- ▶ Fill the siphon with approx. 3 litres of water.
- ▶ Each time you carry out maintenance or an inspection, make sure that siphon is sufficiently filled with water.

- ▶ Screw on cover of condensation catch pan (tightening torque: 3.5 Nm).

11.9 Inspecting the burner electrodes

NOTICE

Malfunction of boiler!

If the woven filaments of the burner rod surface come into contact with the electrodes, this can cause a fault shutdown.

- ▶ Make sure that no woven threads are sticking out in the area of the electrodes.
- ▶ Carefully cut off any fibres that are sticking out using scissors.

Checking electrode position

- ▶ Move the burner into its service position (→ Chapter 11.8, page 43).

If the monitoring electrode tapers to a point or has reduced in length, this is a sign of significant wear.

- ▶ Replace the electrode.

- ▶ Check the gaps between the electrodes and compare them with those shown in Fig. 68.

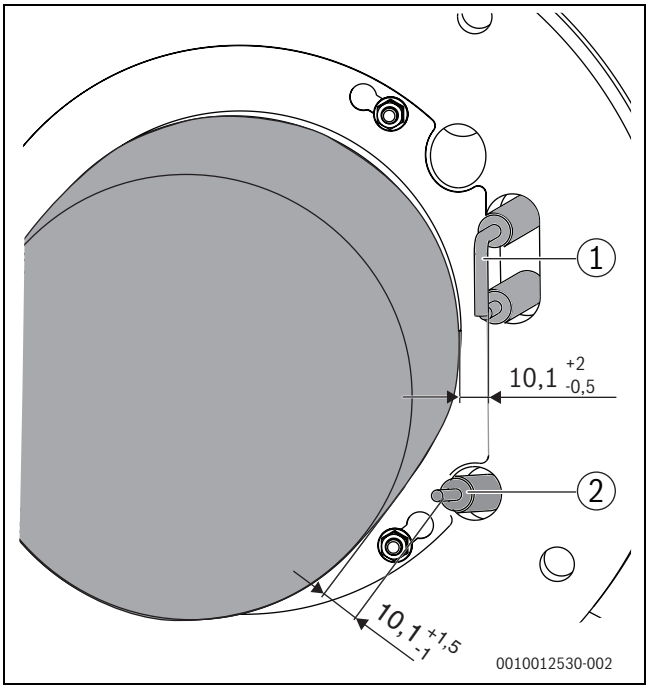


Fig. 68 Electrode position (dimension in mm)

[1] Ignition electrode
[2] Monitoring electrode

- ▶ Replace the electrode block together with a new gasket if actual values deviate from the specified parameters.
- ▶ If deposits are found on the electrodes, replace the electrode block together with a new gasket or sand down the electrodes to remove the deposits.

We recommend replacing the electrode block as part of annual maintenance.

If a part needs to be replaced:

- ▶ Observe information in Chapter 11.11.4, page 48.
- ▶ To complete the maintenance, observe Chapter 11.12, page 49

11.10 Testing the differential pressure switch

The differential pressure switch must be checked to ensure it is working correctly each time maintenance or an inspection is carried out (→Chapter 16, page 65).

11.11 Replacing components

NOTICE

Malfunctions due to incorrectly connected or unconnected hose lines!

If the wrong hose lines are used or if they are incorrectly connected, this leads to unhygienic combustion.

- ▶ Connect the hose lines as shown in the connection diagram (→Chapterl 17.4.3, page 71).
- ▶ Make sure the hose lines are not buckled or trapped.

11.11.1 Removing the air/gas ratio control valve

Observe replacement interval of the air/gas ratio control valve.

- ▶ Replace air/gas ratio control valve depending on the service life according to Tab. 14, page 49.

The valve testing system is set to 5 mbar at the factory.

- ▶ Shut down the heating system (→ Chapter 9.1, page 33).
- ▶ Close the main gas shut-off valve or gas isolator and secure against unintentional re-opening.
- ▶ Move the burner into its service position (→Chapter 9.1, page 33).
- ▶ Remove 3 nuts [2] from the nozzle plate and remove air/gas ratio control valve [1].

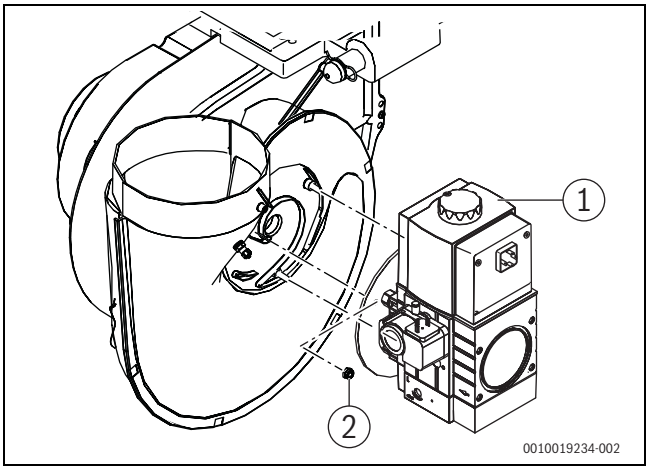


Fig. 69 Unscrewing the air/gas ratio control valve

[1] Air/gas ratio control valve
[2] Nut (3x)

- ▶ Remove the test cables.
- ▶ When installing a new air/gas ratio control valve, first connect the "test line for gas outlet pressure" and the "compensation line" correctly to the new air/gas ratio control valve (→Chapter 11.2, page 35).

Tightening torque of the nuts: 15 Nm.

- ▶ To complete the maintenance: →Chapter 11.12, page 49)

11.11.2 Changing the gas filter

- ▶ Shut down the heating system (→Chapter 9.1, page 33).
- ▶ Close the main gas shut-off valve or gas isolator and secure against unintentional re-opening.
- ▶ Remove the front panel (→Chapter 11.1, page 34).
- ▶ Undo both screws [4] on the filter cover [3] underneath the air/gas ratio control valve.
- ▶ Remove filter cassette [1] and insert a new one.

▶ Insert new gasket [2] at the filter cover and refit using both screws.

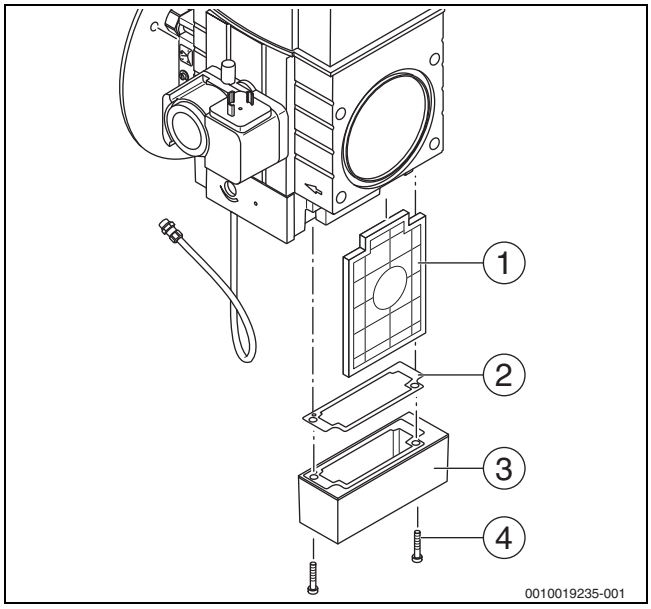


Fig. 70 Changing the gas filter

[1] Filter cassette
[2] Gasket
[3] Filter cover
[4] Screw (2x)

▶ To complete the maintenance: →Chapter 11.12, page 49)

11.11.3 Removing the fan

▶ Shut down the heating system (→ Chapter 9.1, page 33).
▶ Close the main gas shut-off valve or gas isolator and secure against unintentional re-opening.
▶ Remove the front panel (→ Chapter 11.1, page 34).
▶ Undo electrical connections at the fan.
▶ Pull out the burner (→Chapter 11.7, page 39)
▶ Remove the air/gas ratio control valve (→Chapter 11.11.1).
▶ Undo the front semi-shell [3] and pull off the studs.
▶ Pull air intake worm [2] and fan inlet [1] off the studs.

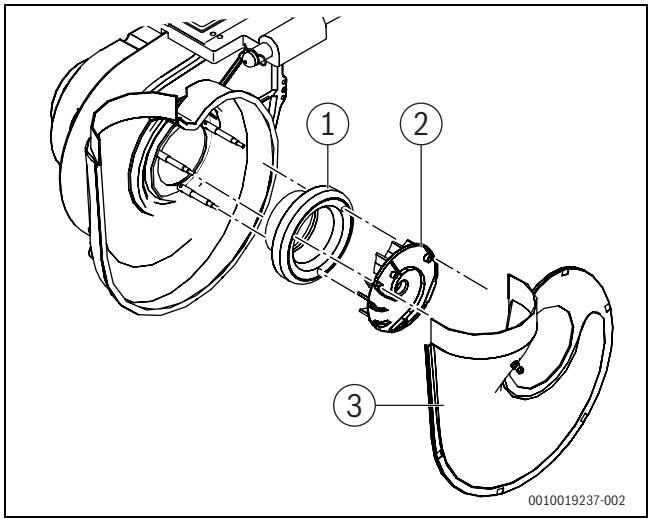


Fig. 71 Disassembling the components of the ventilation air collector

[1] Fan inlet
[2] Air intake worm
[3] Semi-shell, front

▶ Remove the rear semi-shell [1].

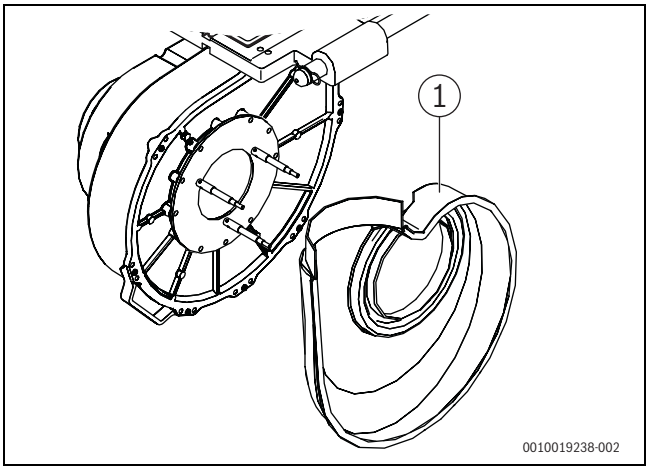


Fig. 72 Removing rear semi-shell

[1] Rear semi-shell

▶ Remove mounting plate [1] from the fan.
▶ Undo both rear nuts [3] (joint between slide [2] and fan [5], do not remove).
▶ Support the fan and remove both front nuts [4].
▶ Pull out the fan towards the front.

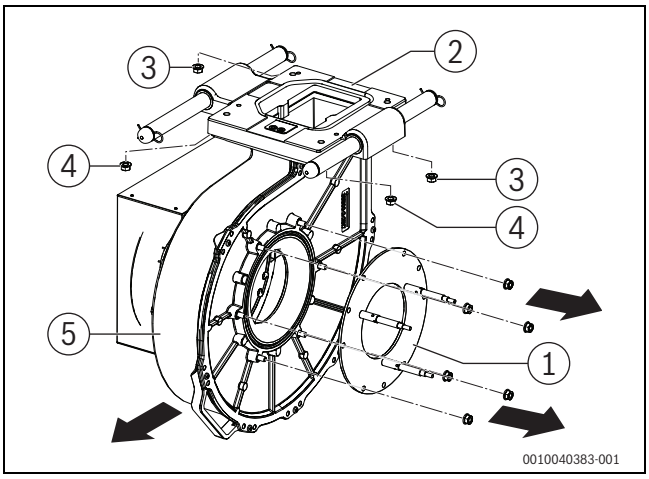


Fig. 73 Removing the fan

[1] Installation board
[2] Carriage
[3] Rear nuts
[4] Front nuts
[5] Fan

▶ To complete the maintenance: →Chapter 11.12, page 49)

11.11.4 Replacing components according to the service life

Components relevant for safety (e.g. air/gas ratio control valves) have a limited service life, which depend on their operation time in switching cycles or years.

When exceeding the operation time or by increased wear, the affected component may fail resulting in the loss of system reliability.

▶ Do not repair, manipulate or deactivate safety-relevant components.
▶ Check components relevant for safety during each inspection and maintenance in order to determine the ongoing system reliability.
▶ Replace components relevant for safety in case of increased wear or when reaching the service life at the latest.
▶ For replacement, use only new and undamaged original spare parts.

The following components must be replaced after expiry of the specified service life.

Component	Replace according to specification, depending on what occurs first	
	Replace after service life of x years	Replace after y boiler starts
Mixture manifold gasket (O-ring)	5	–
Heat exchanger cleaning cover gasket	5	–
Gasket of condensation catch pan cleaning cover	5	–
Fan including gaskets	10	–
Air/gas ratio control valve including gaskets	10	500000
	or following detection of fault by valve testing system	
Flue gas pressure limiter with connecting hose	10	–
Differential pressure sensor with connecting hoses	10	250000
Water pressure relief valve	10	–

Table 14 Replacement according to service life

The replacement intervals specified are instructions of the component manufacturer and serves to ensure the long-term technically flawless state and high utilisation rate of the system.

- ▶ Document replacement of components in the maintenance protocol.

DANGER

Danger to life from poisoning!

Disregarding the specified replacement intervals for gaskets in the flue gas path (observe instructions of the flue gas system manufacturer) may lead to life-threatening flue gases escaping.

- ▶ It is essential to observe the prescribed replacement intervals (manufacturer instructions) of the gaskets.
- ▶ Gaskets must generally be replaced in case of damage or signs of ageing, independent of the replacement interval.
- ▶ Document the replacement of the gaskets.

DANGER

Risk to life due to poisoning by escaping flue gas!

The use of unsuitable lubricating paste when installing the flue gas system may lead to destruction of the gaskets at a later time and thus to gas escaping.

- ▶ Use only lubricating paste which has been released by the manufacturer of the flue gas system.

DANGER

Danger to life through escaping gases!

- ▶ Always replace the electrode block gasket when replacing electrodes.
- ▶ Generally, replace damaged gaskets or ones that appear aged.

We recommend replacing the electrode block as part of annual maintenance.

11.12 Refitting detached parts

11.12.1 Refitting parts removed

- ▶ Refit all parts of the floor standing boiler that have been removed for inspection and maintenance purposes in the reverse order of removal.
- ▶ Insert new gaskets when assembling the air/gas ratio control valve. Make sure they are seated correctly.
- ▶ Connect the compensation line and secure with hose clip.
- ▶ Tighten the screws on the cover of the condensation catch pan with a torque of 3.5 Nm.

NOTICE

Material damage due to incorrect or unconnected compensation line!

If the wrong compensation line is used or if it is connected incorrectly, this can cause overheating of the burner and unhygienic combustion.

- ▶ Connect the compensation line correctly (→page 71).

- ▶ Check all gaskets for wear and damage.

CAUTION

Material damage and leaks due to power transmission!

- ▶ When removing and installing the gas pipe, counterhold to avoid subjecting other components to stress.

Observe the specified replacement interval for gaskets (→ Chapter 11.11.4, page 48).

- ▶ Replace gaskets if required.
- ▶ Reconnect electrical push fit connections.
- ▶ During commissioning, make sure that the fan is not covered.

Tightening torque

Component	Tightening torque [Nm]
Screws on the mixture manifold / slide	15,5±10%
Nuts at the mixture manifold/front section	10-12
2” gas pipe union nut	115
Screws of the condensation catch pan cover	3,5
Cleaning access cover nuts	7
Gas valve/fan nuts	15
M8x35 screws on the gas valve flange	15,5±10%
Nuts for electrodes, burner rod	3±10%

Table 15 Tightening torque

11.12.2 Fitting the fan

- Slide the fan under the threaded stud protruding on the underside of the slide. Lower the fan in the front area a little and insert a new gasket [1] in the intended groove of the slide.
- Secure the fan to the carriage using all 4 screws.

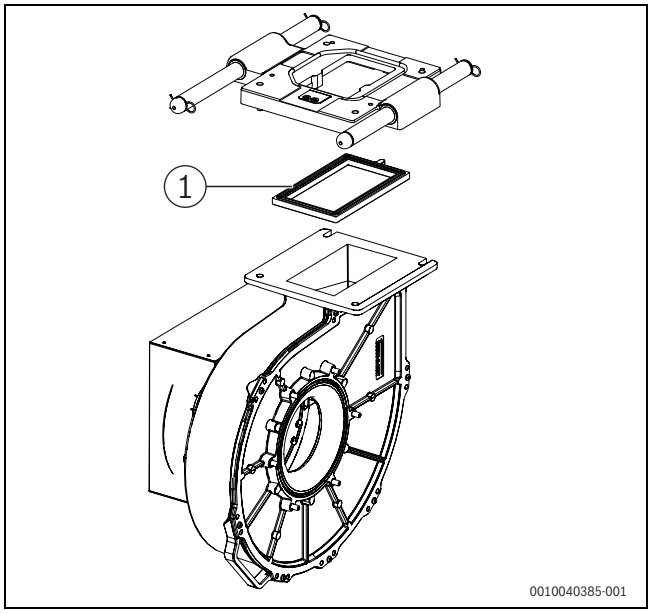


Fig. 74 Replacing the fan/carriage gasket

- Once the fan has been installed, check the gasket for correct seating.

11.12.3 Fitting the ventilation air collector and air/gas ratio control valve

- Secure the mounting plate on the fan. Position the rear semi-shell of the ventilation air collector on the studs of the mounting plate and push the fan inlet over the studs towards the semi-shell, then secure it.
- Push the air intake worm onto the studs, so that the marking points upwards.

When fitting the air intake worm, ensure that the marking points upwards

- Secure the front semi-shell with clips to the ventilation air collector.
- Push the compensation hose onto the ventilation air collector.
- Fasten the air/gas ratio control valve with the nozzle plate to the studs.

11.12.4 Installing the burner

DANGER

Danger to life through escaping flue gas!

- During installation, look out for faulty gaskets and ensure they are seated correctly. Replace faulty gaskets.
- Replace the gaskets as described (→ Chapter 11.11.4, page 48).

- Insert the gasket on the top of the carriage.
- Insert the O-ring on the front section.
- Push the mixture manifold in the combustion chamber via the installation aid. In doing so, take care that the gasket in the slide is not damaged and check the correct fit in the groove (if necessary, check the correct fit using a torch).
- Screw in the screws on the mixture manifold / slide (maximum tightening torque: 15,5±10%).
- Remove the installation aid.

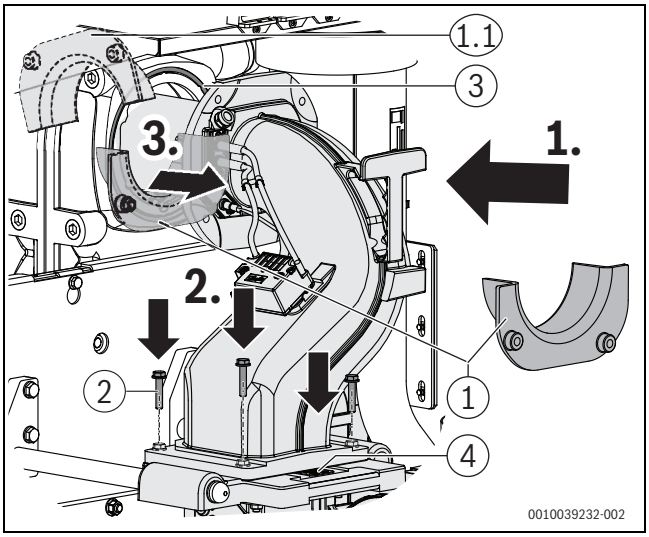


Fig. 75 Install the mixture manifold with burner rod using the installation aid

[1] Installation aid
[1.1] Storage of the installation aid when not used
[2] Screws on the mixture manifold / slide (4x)
[3] Gasket (O-ring) in the front section
[4] Indicator window

- After removal of the installation aid, push the slide with mixture manifold and fan on the 4 studs towards the front section.
- Installing the gas pipe on the air/gas ratio control valve.
- Install the mixture manifold on the front section using 4 nuts (maximum tightening torque: 10-12). In doing so, take care that the insulation is not trapped between the mixture manifold and front section.
  Observe the correct fit of the gasket (O-ring).

There is an indicator window on the top of the flange which allows a check to be carried out from the outside to determine whether the gasket is inserted (→Fig. 75).

- Plug all electrical connecting leads into the air/gas ratio control valve and fan, and the plug-in connections into the electrode block.
- Attach the temperature switch / burner controller connecting cable to the mixture manifold (→Fig 47).

▶ Install the ignition transformer connecting cable as shown in Fig. 75.

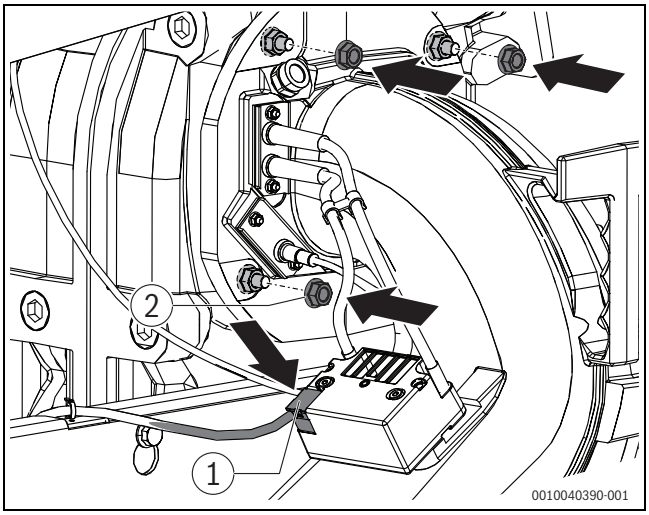


Fig. 76 Install the mixture manifold

[1] Ignition transformer connecting cable

11.12.5 Fitting the gas line to the gas valve

▶ Insert a new O-ring into the gas valve flange.
▶ Secure the flange of the gas connection again to the gas valve using 4 screws.

11.12.6 Installing the ventilation air unit

NOTICE

System damage through contaminated supply air!

▶ Prior to fitting the ventilation air hose, check the ventilation air grille (integrated into the lower hose adaptor) for contamination and clean if required.

▶ Push the ventilation air hose together with the connector onto the ventilation air collector
and secure with a hose clip to the upper adaptor.

11.13 Check for leaks during operation

NOTICE

Risk of material damage due to a short circuit!

▶ Cover fan electronics, burner control unit and other points at risk before carrying out the leak test.
▶ Do not spray leak detector onto cable routing, plugs or electrical connecting leads or allow it to drip onto them.

▶ Start the floor standing boiler and check tightness of all gaskets under full load using a leak detection agent.

▶ Check the tightness of the fan gasket, and gaskets between the fan and slide unit and elbow and slide unit on all sides.

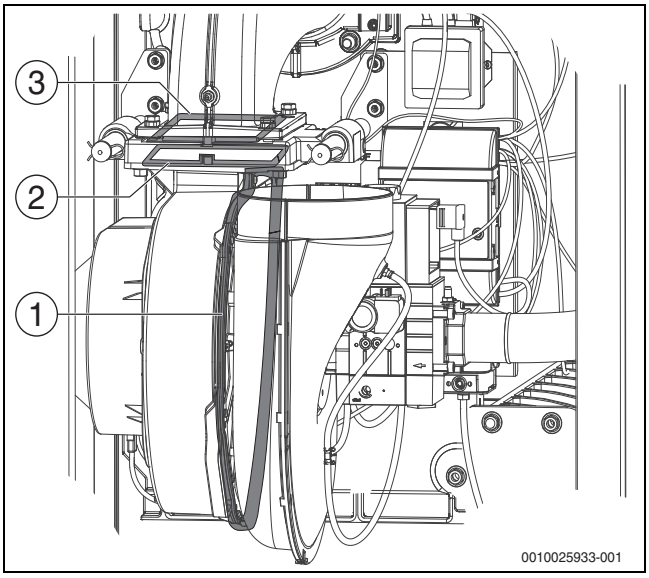


Fig. 77 Joints on fan and elbow

[1] Fan gasket
[2] Fan/carriage gasket
[3] Elbow/carriage gasket

▶ Further checks of the tightness of the entire gas path (→ Chapter 11.4, page 37).
▶ Check the tightness of the flue gas path and if installed, the function and tightness of the flue gas damper.
▶ If required, replace gaskets and/or components.

11.14 Checking the ionisation current

To ensure trouble-free operation, the ionisation current at partial and full load (when flame is lit) must be at least 10 µA.

Check the ionisation current (flame current) using a control unit

▶ To test the ionisation current, observe the corresponding technical documentation for the control unit.
▶ Read the flame current (ionisation current) and enter in the inspection and maintenance record (→Chapter 17.7, page 73).

Check the ionisation current (flame current) on the burner

▶ Pull out the plug on the flame sensing electrode.
▶ Set the measuring device to the respective measuring range “µA”.
▶ Connect the measuring device to the ionisation circuit in series (ionisation electrode – ionisation cable plug).

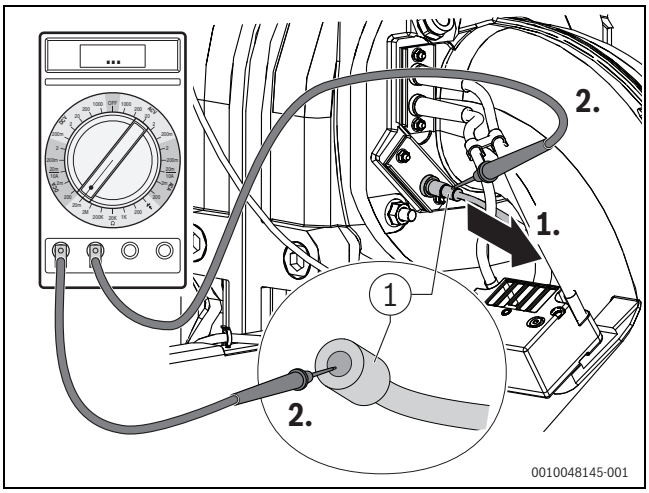


Fig. 78 Measure the ionisation current (flame current)

[1] Ionisation cable plug

▶ Read the measured value at partial load and full load and when the burner is switched off and enter in the inspection and maintenance record (→Chapter 17.7, page 73).

ionisation current when the burner is running:
- ≥ 10 µA = OK
- < 10 µA = fault.

Ionisation current when the burner is switched off:
- < 10 µA = OK
- ≥ 10 µA = fault.

11.15 Completing inspection and maintenance

11.15.1 Removing measuring devices

Observe corresponding technical documentation for the control unit and user interface.

11.15.2 Installing casing parts

▶ Fit all casing sections (→ Fig. 39, page 32).

11.15.3 Checking the gas/air ratio

▶ Measure carbon dioxide content (→ Chapter 11.6, page 39).

11.15.4 Confirming inspection and maintenance

▶ Sign the inspection and maintenance protocol in this manual (→ Chapter 17.7).

12 Emergency operation

The burner control unit automatically goes to emergency operation, if the communication with the control unit is interrupted.

During emergency operation, the burner control unit regulates the boiler temperature at 60 °C to's maintain the operation of the heating system until communication has been restored.

12.1 Resetting faults in emergency mode

Observe corresponding technical documentation for the control unit and user interface.

Emergency mode of the burner control unit is only possible in conjunction with a MX25 controller without UM10.
When using a CC83xx, emergency mode of the burner control unit is not possible!

In emergency operation, faults can only be cleared via the reset button on the burner control unit. Resetting is only possible if a locking fault is present.

▶ Press the reset button to clear the fault.

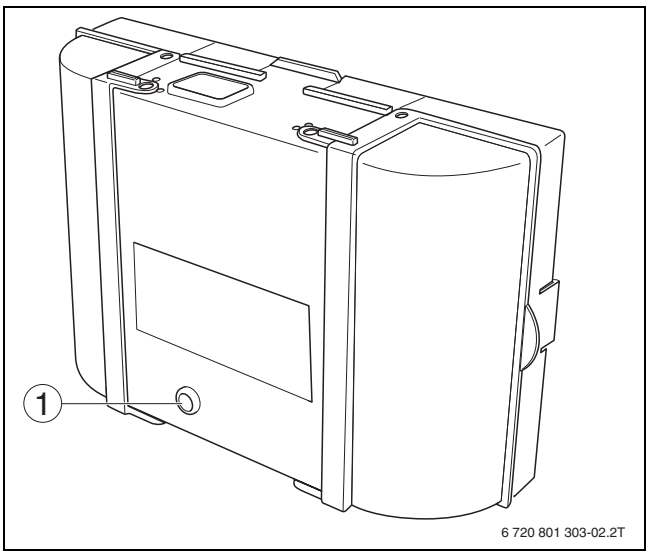


Fig. 79 Clearing a fault on the burner control unit

[1] Reset button

13 Troubleshooting

DANGER

Risk to life through poisoning!

▶ Check for leaks after working on flue gas-carrying components.

DANGER

Danger to life due to electrical shock!

▶ Before carrying out work on electrical components, isolate them from the power supply (230 V AC) (fuse, circuit breaker) and secure against unintentional reconnection.

WARNING

Risk of scalding!

Hot water can lead to severe scalding.

▶ Close all valves and possibly drain device prior to working on parts routing water.

NOTICE

Material damage due to water leaks!

Water leaks can damage the MX25 control unit.

▶ Cover the MX25 control unit before carrying out work on water-carrying components.

13.1 Recognising the operating condition and clearing faults

NOTICE

System damage due to 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.

Depending on which control unit is installed or the user interface used, faults may be displayed differently. The fault history is also called up in different ways.
For an overview of the operating and fault codes, along with possible causes and remedial measures, refer to the → technical documentation of the control unit and the user interface (→Chapter 14, page 55).

Some faults have to be cleared using the reset button on the burner control unit (→ Chapter 14, page 55).

Observe corresponding technical documentation for the control unit and user interface.

13.2 Resetting pressure monitor

WARNING

Risk of poisoning from escaping gas!

Due to faults and/or malfunctions in the flue gas system, the pressure monitor may trigger.

- ▶ After triggering the pressure monitor, always check the supply air and flue gas path as well as the flue gas damper (if installed) for contamination and blocking.
- ▶ Cleaning the siphon (→Chapter 11.8.2, page 43).
- ▶ Make sure that the condensate drains off properly.

If the pressure monitor has triggered:

- ▶ Reset by pressing the Reset button (the enclosure does not have to be opened), → Fig. 81.

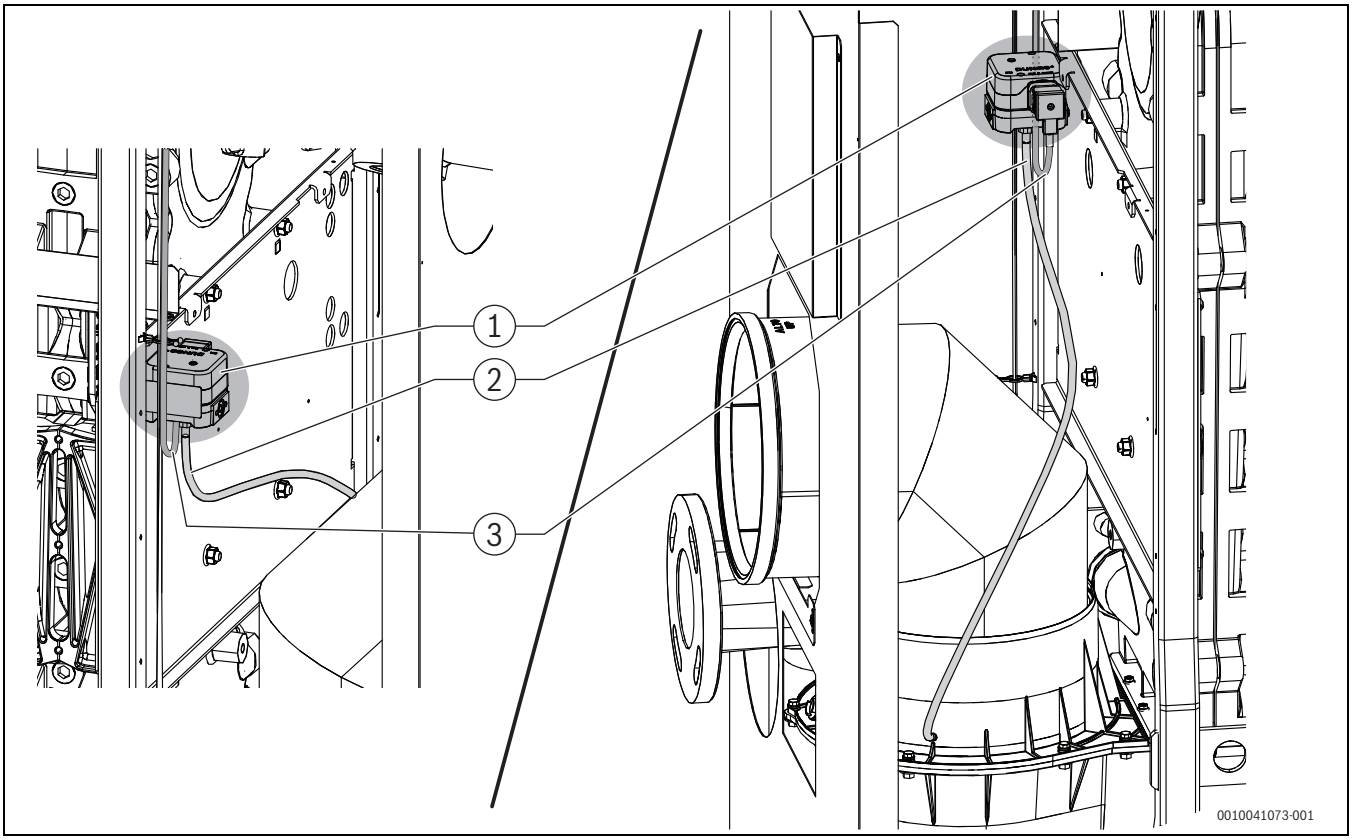


Fig. 80 Pressure monitor position; view from the right and left side

[1] Pressure switch
[2] Combustion chamber test cable (DN8: colour black)
[3] Connection line with plug

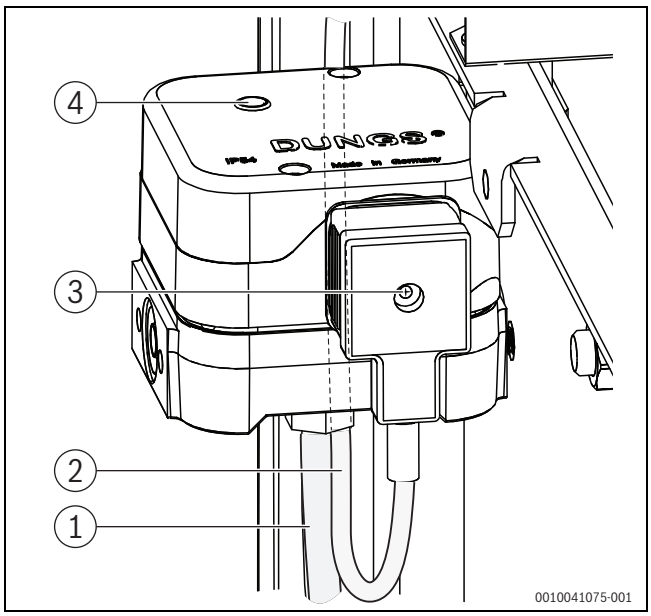


Fig. 81 Detail view of pressure monitor

[1] Connection for combustion chamber test cable (DN8: colour black)
[2] Connection line with plug
[3] Securing screws
[4] Reset key

If a blocking fault display is displayed permanently, check on the burner control unit if a blocking is actually present (LED flashes slowly) and then unlock this on the burner control unit.

If no fault code can be shown in the display with an interlock, it can be queried in the service menu.

WARNING

Danger to life from deactivated safety functions!

A test cable that is not connected to the pressure monitor and/or an incorrectly set pressure monitor may disable the safety function.
The pressure monitor is set and sealed in the factory.

- Do not disconnect the test cable of the pressure monitor during maintenance!
- The switching point may not be modified!
- When replacing parts in case of a repair, observe the correct allocation of the test cables according to Fig. 80 and 81!

13.3 Calling up the fault history

The fault history is called up in different ways, depending on the control unit used or the user interface installed.

Observe corresponding technical documentation for the control unit and user interface.

14 Operating and fault displays

14.1 Control unit status indicators

Operating code	Sub-code	Cause	Description	Test procedure/ Cause	Action
OA	-	Device is in optimized switching mode.	A new request for burner operation has occurred within the set switching optimisation time. Device is in standby period. The standard switching optimisation time is 10 minutes.	Check output setting on basic controller. Check the control setting at the control unit.	Adjust boiler output to required heat energy demand of the building. Adjust control setting to system conditions.
OC	-	Beginning of burner start.	-	-	-
OE	-	The device is on standby, heat demand exists but too much heat is being delivered.	The current heat energy demand from the system is lower than that supplied by the burner with the minimum modulation setting.	-	-
OF	-	Insufficient flow rate through the boiler.	Temperature difference between supply and return > 15 K Temperature difference between flow and safety temperature sensor > 15 K	Check the flow temperature with the basic controller, check the return temperature with the control unit or service key, measure the resistance of the boiler water temperature sensor (high limit safety cut-out) and compare it with the curve.	Adjust the setting of the boiler circulation pump. Check the surface temperature of the cast section, which is fitted with the safety temperature sensor, using a temperature measuring instrument. Check if cast section is blocked with dirt.
OH	-	The device is on standby; no heat energy demand present.	The floor standing boiler is on standby and there is no heat requirement from the heating circuit.	-	-
OL	-	Air/gas ratio control valve opening.	-	-	-
OP	-	Waiting for fan to start up.	Start-up of the fan has to be detected before the sequence can be continued.	-	-
OU	-	Beginning of burner start program sequence.	-	-	-
OY	-	The current boiler temperature is higher than the set boiler water temperature.	The current boiler temperature is higher than the set boiler water temperature. The floor standing boiler is shut down.	-	-
2P	564	Temperature rises too quickly at the boiler temperature sensor (> 70K/min).	Heat exchanger cut-out due to excessive rate of temperature rise.	Little or no heat draw (e.g. thermostatic valves and mixer closed). Volumetric flow rate too low. Pump does not work. Deposits in water carrying parts of boiler (dirt from heating system, calcification).	Ensure adequate heat draw-off. Install adequately sized pumps. Check whether the pump is being activated. Replace the pump if required. Flush/clean heating water side of boiler block with agents suitable and approved for aluminium.
8Y	572	The control unit is locked externally via the terminal EV.	The control unit sets the heat requirement to the burner control unit to 0.	–	If external blocking is not required, a jumper must be fitted to the EV terminals.

Table 16 Operating codes

14.2 Service displays

SC[1]	FC[2]	Description	Possible cause	Action
H03	1013	Hours run expired	The set number of hours run until maintenance is due has been exceeded.	▶ Carry out maintenance.
H06	1016	Frequent flame interruption	During the last burner starts, the flame was frequently lost. Faulty ignition system. Faulty burner setting Faulty burner components Blocked flue gas/supply air route	To check in which operating phase the loss of flame occurred. ▶ Read out the fault memory of the blocking fault. ▶ Check gas supply. ▶ Check for blocking of supply air intake / flue outlet apertures and flue gas/supply air route. Eliminate blocking. ▶ Check the flame sensor current with user interface. ▶ Check ignition by performing a function check/ relay test with the user interface. ▶ Check burner setting against burner setting table; correct if required. If other blocking faults are present (loss of flame after the flame was successfully established): ▶ Check burner setting against burner setting table; correct if required. ▶ Check gas supply equipment. ▶ Check plug assignment of 1st/2nd solenoid valve.
H07	1017	Water pressure too low	The water pressure is not correct. The pressure sensor is defective.	▶ Check water pressure. ▶ Add water if necessary, and vent the heating system. ▶ Replace pressure sensor.
H08	1018	Service time expired	The maintenance date set has been reached.	▶ Carry out maintenance.

1) Service Code SC (is indicated on the display of the user interface)

2) Fault Code FC (indicated on the display of the user interface)

Table 17 Service displays

14.3 Control unit fault displays

Type[1]	Fault code	Sub code	Cause	Description	Test procedure/Cause	Action
B	2E	207	Water pressure < 0.8 bar.	-	Check whether the pressure in the system is at least 1.2 bar.	▶ Adjust operating pressure.
V	2U	533	Incorrect hydraulic connection of floor standing boiler or pump	The floor standing boiler control unit has detected an incorrect flow on the water side.	Make sure the boiler flow and return have not been swapped round. Check pump for correct direction of flow.	▶ Connect the flow and return correctly. ▶ Ensure correct pump flow direction.
B	2U	565	Excessive differential between the flow and return temperature. > 60 K	Heat exchanger cut-out due to excessive temperature difference.	System configuration problems.	▶ Check the system hydraulics.
V	2U	575	Intelligent high limit safety cut-out (ISTB) for the flow	The actual boiler flow temperature reaches the intelligent high-limit safety temperature for the flow of 140 °C and an ionisation current is detected or the solenoid valves are open.	Check the flow rate on the water side.	▶ Ensure sufficient flow. ▶ Replace the boiler water temperature sensor/high-limit safety cut-out. ▶ Replace ignition/monitoring electrode.

Type[1)]	Fault code	Sub code	Cause	Description	Test procedure/Cause	Action
V	3C	537	No speed signal.	There is no speed feedback message at the burner control unit, although the fan should be in operation.	Check the connecting leads between the burner control unit and the fan for faulty contacts, breaks and damage. Check the plug-in connectors at the burner control unit and fan.	▶ Establish good electrical contact. Replace cables if necessary. ▶ Replace the burner control unit. ▶ Replace the fan if necessary.
V	3C	538	Fan speed too slow.	The actual speed detected is slower than the set speed.	Dirt in fan. Defective fan.	▶ Clean the fan if necessary. ▶ Replace fan.
V	3C	540	Fan speed too fast.	The actual speed detected is faster than the set speed. Flue resistance too high (>150 Pa).	Check PWM signal/burner control unit connecting cable for faulty contacts, breaks or damage. Check plug-in connectors for damage. Check flue resistance.	▶ Establish good electrical contact. Replace cables if necessary. ▶ Replace the burner control unit. ▶ Install butterfly valve/secondary air device, if necessary.
V	4A	520	Intelligent high limit safety cut-out (ISTB) for the flow	The flow temperature has reached a value of 110 °C.	Since the temperature increase in the boiler is monitored by the boiler water temperature sensor, and consequently the burner is switched off in good time, this fault display can not appear under normal circumstances. Unfavourable hydraulics in two-boiler systems: the boilers influence each other reciprocally, e.g. via the return or flow.	▶ Check hydraulics.
V	4A	575	ISTB (intelligent high limit safety cut-out) responds.	The boiler flow temperature has reached its maximum permissible level.	High limit safety cut-out has triggered.	▶ Check the air/gas ratio control valve. (Does the flame extinguish after a controlled shutdown?)
V	4A	700		Factory supplied condition	Boiler is locked out	▶ Reset the boiler with "Reset" (→ Chapter 12, page 52)
V	4U	521	Sensor differential on the boiler temperature sensor between temperature sensors 1 and 2 is too high.	Temperature differential between temperature sensors 1 and 2 is too high (deviation > 5 K/2s).	Check whether the reset button on the burner control unit lights up. Check whether the plug-in connectors at the boiler temperature sensor and the burner control unit are dirty or damaged. Check the pressure drop values at boiler temperature sensor against the table and visually check the plug on the temperature sensor. Check the connecting lead for continuity.	▶ Press the reset button on the burner control unit. ▶ If required, clean or replace the plug-in connectors. ▶ If sensor values deviate from those specified or the plug is faulty, replace the boiler water temperature sensor. ▶ If there are any deviations, replace the connecting lead.
V	4U	522	Short circuit between temperature sensors 1 and 2 at the boiler water temperature sensor.	A temperature sensor fault was detected in test mode.	Check sensor lead. Check plug-in connector. Check sensor readings against table. Check the voltage values at the sensor against the table.	▶ Replace if damaged. ▶ Clean if dirty or replace if necessary. ▶ Reconnect any loose plugs. ▶ Replace the temperature sensor, if there are any deviations from the table.
V	4U	524	Short circuit at the boiler water temperature sensor.	An excessively high temperature (> 130 °C) is measured at the boiler water temperature sensor.	Check sensor lead. Check plug-in connector. Check sensor readings against table. Check the voltage values at the sensor against the table.	▶ Replace if damaged. ▶ Clean if dirty or replace if necessary. ▶ Reconnect any loose plugs. ▶ Replace the temperature sensor, if there are any deviations from the table.

Type[1)]	Fault code	Sub code	Cause	Description	Test procedure/Cause	Action
V	4Y	523	Interruption in the floor standing boiler temperature sensor.	Temperature at the boiler water temperature sensor too low (< -5 °C)	Check sensor lead. Check plug-in connector. Check sensor readings against table. Check the voltage values at the sensor against the table.	▶ Replace if damaged. ▶ Clean if dirty or replace if necessary. ▶ Reconnect any loose plugs. ▶ Replace the temperature sensor, if there are any deviations from the table.
B	5L	542	Incomplete communication with the burner control unit.	The control unit generates this fault, if not all the required data is supplied by the burner control unit.	Check the cable connections between the burner control unit and the control unit.	▶ If the connections are OK, replace the burner control unit.
B	5L	543	No communication with the burner control unit.	The control unit is not receiving any data from the burner control unit. Consequence: quick flashing of the reset button on the burner control unit (= Emergency operation)	Check whether the cable plugs (BUS cable and power cable) between the burner control unit and the control unit are correctly plugged in. Check on the control unit whether 230 V is present at the terminals of the "Mains combustion automatic cut-out". Check whether the connecting leads (BUS and power cable) between the burner control unit and the control unit are damaged. Check whether the reset button on the burner control unit lights up green. Disconnect the BUS cable between the burner control unit and the control unit and check whether the boiler enters emergency operation (runs up 60 °C to boiler temperature). Check by replacing, whether the burner control unit or the control unit is faulty. If the reset button on the burner control unit does not light up, wait a certain period of time, since the device may not start up if the burner control unit is cold. Check whether the safety chain (terminal 17/18 control unit) has triggered.	▶ Reconnect any loose plugs. ▶ Replace the control unit if 230 V is present. ▶ Replace the connecting lead if necessary. ▶ If the reset button does not light up, replace the burner control unit. ▶ If the floor standing boiler does not start up, replace the burner control unit. ▶ Replace the burner control unit or control unit. ▶ Wait for max. 30 minutes and check, whether the reset button on the burner control unit then lights up green again. If this is not the case, replace the burner control unit. ▶ Determine the cause of safety chain triggering and resolve the problem. Then reset the relevant safety element.

Type[1)]	Fault code	Sub code	Cause	Description	Test procedure/Cause	Action
B	6A	577	No flame detected within the safety time.	Ionisation current < 1.1 µA during safety time.	Air in gas line. Excessively high flue system backpressure due to unfavourable layout (too many deflections; cross-section inadequate or too long; horizontal sections too long). Inadequately sized gas line cross-sections (min. cross-section of the gas supply pipe) The gas pressure regulator is not appropriate for the required gas volume. Gas supply pressure too low. Check whether the plug-in connector for the compensation/ionisation line is correctly installed. Check the connecting lead between the burner control unit and the monitoring electrode for poor contacts, breaks and damage. Check the connecting lead between the ignition transformer and ignition electrode for poor contacts (on electrode and transformer), breaks and damage. Check electrode gaps and ignition/ monitoring electrode for damage. Ignition/monitoring electrode dirty. Ignition transformer faulty (no ignition spark or delayed ignition spark, "hard start"). Burner control unit defective.	▶ Venting the gas line. ▶ Install properly dimensioned and configured flue system. ▶ Install adequately dimensioned gas lines. ▶ Install a gas pressure governor that is appropriate for the required gas volume and, if necessary, notify the gas supplier. ▶ If pressure too low, inform gas company. ▶ Establish good electrical contact. Replace cables if necessary. ▶ Align burner rod or electrode. Replace defective electrode. ▶ Clean or replace ignition/ monitoring electrode. ▶ Replace ignition transformer. ▶ Replace burner control unit.
V	6A	578	No flame detected within the safety time.	No flame signal was detected during the safety time. Flue gas and/or supply air route blocked. Interlock following 3rd attempt.	If the service code is still displayed, check the temperature switch (→Chapter 15).	▶ Replace the temperature switch if required.
V	6C	576	Ionisation current > 0.9 µA during preventilation.	No flame signal was detected within the preventilation phase.	Electrode dirty or faulty.	▶ Clean the electrode and, if necessary, replace it. If replacing the electrode does not resolve the issue, the burner control unit must be replaced.
B	6L	514	Loss of flame during the flame stabilization period.	No flame signal was detected within the flame stabilization period.	-	▶ None, the burner control unit tries to start again.
B	6L	515	Loss of ionisation signal when boiler is running.	Ionisation signal is lost when the burner is in operation.	-	▶ None, the burner control unit tries to start again.
V	6L	561	5 power-up sequences (power supply disconnection during burner start).	The burner control unit was switched off 5 times during the burner start.	Check the 230 V power supply to the control unit.	▶ Reset the burner control unit at the reset button. ▶ Rectify power supply problem.

Type[1)]	Fault code	Sub code	Cause	Description	Test procedure/Cause	Action
B	7A	550	Voltage too low.	The mains voltage is too low.	The mains voltage must not fall below 195 V.	▶ Connect the correct power supply.
B	7A	551	Power failure.	There has been a brief interruption in the mains voltage.	Check the mains cable for loose contacts. Check the wiring and correct contacts of the mains plug at the control unit and burner control unit.	▶ Remedy any contact problems if required.
B	7P	549	The safety chain has opened.	The continuity of the external components integrated into the safety chain has been interrupted.	Check the continuity of the components.	▶ If required, replace faulty components.
V or B	8L	534	No sufficient gas supply pressure. Flue gas pressure limiter has tripped Differential pressure switch has tripped. Differential pressure switch defective.	The internal safety chain (flue gas pressure limiter, differential pressure switch, valve testing system) is open; →Fig. 92, page 71	Check that the gas isolator is open. Check whether there is gas pressure. Check whether the flue gas pressure limiter has responded. If the flue gas pressure limiter has responded, check connections and tightness of the flue system! Check flue and combustion air pipe for soiling (possible soiling of filter, if installed) or blockage. Check gas filter for contamination. Check if the differential pressure sensor has switched(→Fig. 86, page 66). Check whether the valve testing system has responded.	▶ Measure gas pressure. ▶ After resetting the flue gas pressure limiter, find the cause of the trigger, check the burner rod, check the position of the ignition electrode, check the condition of the ignition electrode, check ignition spark, check ignition cable contact. ▶ After triggering, check the boiler flue gas pressure limiter for leaks and damage. ▶ Check the following components: – Air intake worm – Burner rod – Cleaning cover at the condensation catch pan – Coupling piece from condensation catch pan to flue elbow (inside the casing) – Flue gas system, in particular in the installation room – Motorised flue gas damper (if fitted) ▶ Blow out burner rod against the flow direction. ▶ When using the “air filter” accessory set, check the filter for contamination. To do so, pull off the PWM plug on the fan and when the fan is running, check whether the yellow warning is visible at the fill level indicator. If it is, replace the filter. ▶ Test the differential pressure switch (→Chapter 16, page 65). ▶ Replace the gas filter if necessary. ▶ Replace the air/gas ratio control valve if necessary.

Type[1)]	Fault code	Sub code	Cause	Description	Test procedure/Cause	Action
B	8L	579	No gas supply pressure.	Although the solenoid valve 1 must have opened, there is no gas supply pressure. The burner makes three successive attempts at starting, then waits for one hour before making three more start attempts.	Check that the gas isolator is open. Measure the gas supply pressure. if applicable, Replace air/gas ratio control valve.	▶ If necessary, replace the air/gas ratio control valve. ▶ Check whether there is any gas supply pressure.
V	8P	580	Solenoid valve 1 leaking.	The valve test system has detected an unacceptably high leakage rate on solenoid valve 1.	Check the air/gas ratio control valve for contamination. Gas filter fitted.	▶ Replace air/gas ratio control valve.
V	8U	581	Solenoid valve 2 leaking.	The valve test system has detected an unacceptably high leakage rate on solenoid valve 2.	Before replacing the air/gas ratio control valve, check the function of the siphon and condensate drain (condensate back-up). Check the air/gas ratio control valve for contamination. Gas filter fitted.	▶ Replace air/gas ratio control valve.
B	8U	584	No diverter module feedback	Diverter module does not receive feedback within the specified time.	No feedback from external components. Power cable damaged or faulty. Faulty external component.	▶ Check flue gas damper or other connected component. ▶ Check diverter module. ▶ Check the plug-in connection. ▶ Replace power cable if necessary. ▶ Replace external component if necessary.
V	9Y	500 501 502 503	Fault in the internal relay of the burner control unit.	Internal electronic fault in the burner control unit.	Press the "Reset" button and wait to see if the fault is eliminated.	▶ If the fault persists after "Reset", the burner control unit must be replaced.
V	A01	800	Outside temperature sensor is faulty	Temperature sensor incorrectly connected or installed. Breakage or short circuit in the sensor lead. Temperature sensor is defective.	Check configuration. Check the sensor port and sensor lead. Check installation of sensors. Check resistance values of temperature sensor against table.	▶ Change configuration. ▶ If necessary, eliminate the contact problem. ▶ Replace the temperature sensor if necessary. ▶ If the connecting lead, contacts and resistance values are all OK, replace the control unit.
V	A01	808	Control device receiving invalid values from DHW temperature sensor	Temperature sensor incorrectly connected or installed. Breakage or short circuit in the sensor lead. Temperature sensor is defective	Check the sensor port and sensor lead. Check the sensor mounting on the cylinder. Check resistance values of temperature sensor against table.	▶ If necessary, eliminate the contact problem. ▶ Replace the temperature sensor if necessary. ▶ If the connecting lead, contacts and resistance values are all OK, replace the control unit.

Type[1)]	Fault code	Sub code	Cause	Description	Test procedure/Cause	Action
V	A01	810	DHW stays cold	Constant drawing or system leak. Temperature sensor incorrectly connected or installed. Breakage or short circuit in the sensor lead. Temperature sensor is defective. Cylinder primary pump incorrectly connected or faulty.	Check the sensor port and sensor lead. Check installation of sensors. Check resistance values of temperature sensor against table. Check that the cylinder primary pump is working, e.g. by carrying out a function check.	▶ Repair any leaks. ▶ Eliminate fault in sensor port and sensor lead. ▶ Replace the temperature sensor if necessary. ▶ If necessary, replace the cylinder primary pump.
V	A01	845	Hydraulic configuration not supported	Heat source does not support the existing hydraulic configuration (e.g. because more pump outputs are required than are available)	Check configuration.	▶ Configure DHW at the module or uninstall. ▶ Configure heating circuit 1 at the module or uninstall. ▶ Set heating pump to “None”.
V	AD1	818	Heat source stays cold	If the floor standing boiler remains below the pump logic temperature for a specified period even though the burner is in operation, this fault display is generated.	Check configuration.	▶ Check the system configuration and pump parameters in the control unit. ▶ If required, adjust the system configuration and pump parameters in the control unit. ▶ Check the non-return valve is working. ▶ Retrofit if required. ▶ Check whether check valves are in operating position.
V	CO	568	Water pressure sensor fault (broken cable).	Water pressure sensor break (voltage > 3.5 V).	Check connecting cable running to water pressure sensor. Check water pressure sensor.	▶ Rectify any breaks. ▶ Replace water pressure sensor.
V	CO	569	Water pressure sensor fault (short-circuit).	Water pressure sensor short-circuit (voltage < 0.5 V).	Check connecting cable running to water pressure sensor. Check water pressure sensor.	▶ Rectify any short-circuits. ▶ Replace water pressure sensor.
V	CY	566	Return temperature < -5 °C (interruption)	The control unit is receiving implausible values from the return temperature sensor.	Check the connecting lead between the burner control unit and the return temperature sensor. Check the electrical connection of the connecting lead at the burner control unit and return temperature sensor. Check resistance values of temperature sensor against table. Burner control unit defective.	▶ Replace the connecting lead if necessary. ▶ If necessary, eliminate the contact problem. ▶ Replace the temperature sensor if necessary. ▶ If the connecting lead, contacts and resistance values are all OK, replace the burner control unit.
V	CY	567	Return temperature > 130 °C (short-circuit)	The control unit is receiving implausible values from the return temperature sensor.	Check the connecting lead between the burner control unit and the return temperature sensor. Check the electrical connection of the connecting lead at the burner control unit and return temperature sensor. Check resistance values of temperature sensor against table. Burner control unit defective.	▶ Replace the connecting lead if necessary. ▶ If necessary, eliminate the contact problem. ▶ Replace the temperature sensor if necessary. ▶ If the connecting lead, contacts and resistance values are all OK, replace the burner control unit.

Type[1)]	Fault code	Sub code	Cause	Description	Test procedure/Cause	Action
V	CY	573	Flow temperature < -5 °C (interruption)	Control unit is receiving implausible values from flow temperature sensor	Check the connecting lead between the burner control unit and the flow temperature sensor.	▶ Replace the connecting lead if necessary.
					Check the electrical connection of the connecting lead at the burner control unit and the flow temperature sensor.	▶ If necessary, eliminate the contact problem.
					Check resistance values of temperature sensor against table.	▶ Replace the temperature sensor if necessary.
					Burner control unit defective.	▶ If the connecting lead, contacts and resistance values are all OK, replace the burner control unit.
V	CY	574	Flow temperature > 130 °C (short-circuit)	Control unit is receiving implausible values from flow temperature sensor	Check the connecting lead between the burner control unit and the flow temperature sensor.	▶ Replace the connecting lead if necessary.
					Check the electrical connection of the connecting lead at the burner control unit and the flow temperature sensor.	▶ If necessary, eliminate the contact problem.
					Check resistance values of temperature sensor against table.	Replace the temperature sensor if necessary.
					Burner control unit defective.	▶ Replace the temperature sensor if necessary. ▶ If the connecting lead, contacts and resistance values are all OK, replace the burner control unit.
V	EE	601	Boiler water temperature sensor reading (twin sensors).	Successive measurements of the boiler temperature are too widely divergent.	Check the cable running to the boiler water temperature sensor and the contacts at the burner control unit and pressure sensor. Check plug-in connector.	▶ Replace if damaged. ▶ Clean if dirty or replace if necessary. ▶ Reconnect any loose plugs.
					Check sensor readings against table.	▶ Replace temperature sensor if there are discrepancies.
					Burner control unit defective.	▶ If the connecting lead, contacts and resistance values are all OK, replace the burner control unit.
V	EE	612	Readings of the return temperature sensor	Successive return temperature readings are too widely divergent.	Check the cable running to the return temperature sensor and the contacts. Check plug-in connector.	▶ Replace if damaged. ▶ Clean if dirty or replace if necessary. ▶ Reconnect any loose plugs.
					Check sensor readings against table.	▶ Replace temperature sensor if there are discrepancies.
					Burner control unit defective.	▶ If the connecting lead, contacts and resistance values are all OK, replace the burner control unit.
V	EE	613	Flow temperature sensor reading	Successive flow temperature readings are too widely divergent.	Check the cable running to the flow temperature sensor and the contacts. Check plug-in connector.	▶ Replace if damaged. ▶ Clean if dirty or replace if necessary. ▶ Reconnect any loose plugs.
					Check sensor readings against table.	▶ Replace temperature sensor if there are discrepancies.
					Burner control unit defective.	▶ If the connecting lead, contacts and resistance values are all OK, replace the burner control unit.

Type[1)]	Fault code	Sub code	Cause	Description	Test procedure/Cause	Action
V	LL	571	Too many restarts despite resetting.	15 restarts have occurred in direct succession. This means that the same problem persisted after the resets. Please note: this fault can only be reset via the reset button on the burner control unit.	Faults have continually been reset and not rectified.	▶ Identify and eliminate the cause of the faults leading to the resets.
V	LP	570	Too many resets via the interface.	Too many resets have been received via the interface within a certain period. Please note: this fault can only be reset via the reset button on the burner control unit.	Faults have continually been reset and not rectified. The basic controller has developed a fault, which is causing constant resets. The burner control unit has malfunctioned.	▶ Identify and eliminate the cause of the faults leading to the resets. ▶ Replace basic controller. ▶ Replace burner control unit.

Table 18 Fault displays1) V = locking; B = blocking

14.4 Status indicator of the burner control unit.

The lighting of the reset button displays the current operating condition.

Operating condition	Colour code	Lighting of the reset button
Burner control unit is in operation	■.....	on
The burner control unit is in the locked-out fault status	■.....❍.....■.....❍.....■.....❍.....■.....❍.....■.....❍.....■.....❍.....	flashes slowly
The boiler control unit is in emergency operation, communication disrupted	■❍■❍■❍■❍■❍■❍■❍■❍■❍	flashes quickly
The burner control unit is not in operation	❍.....	Off

Table 19 Display of the operating condition of the burner via the lighting of the reset button.

... Permanently
❍ Off
■ GREEN

15 Check temperature switch

If service code 6A 578 is continuously displayed (→ Fig. 82), the temperature switch on the burner must be checked as follows:

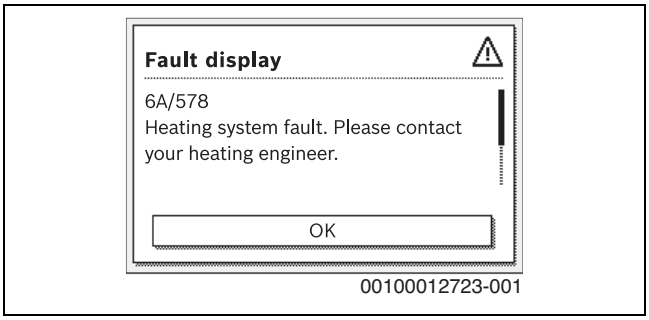


Fig. 82 Display of service code 6A 578 (example of display CW400/800)

- ▶ Pull plug off temperature switch.
- ▶ Measure electrical resistance across the contacts of the temperature switch (→ Fig. 83).
  If the value measured is < 1 Ohm (or signal tone, depending on measuring device), the temperature switch is ok.
  If no value, or a resistance of > 1 Ohm, is displayed (→ Fig. 84) contact the plant customer service to arrange a return and replace the burner.

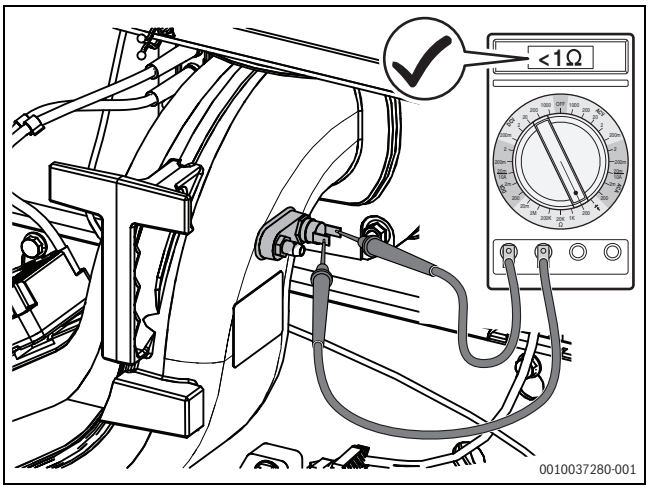


Fig. 83 Measure the electrical resistance across the contacts of the temperature switch (temperature switch ok)

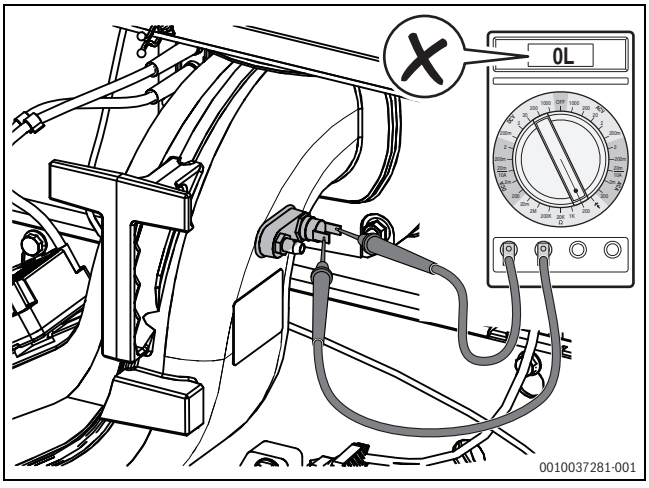


Fig. 84 Measure the electrical resistance across the contacts of the temperature switch (temperature switch not ok)

16 Testing the differential pressure switch

If the service code 8L 534 is continuously displayed, the differential pressure switch (→Fig. 41, page 35) must be tested as follows to make sure it is working correctly:

16.1 Test the continuity of the differential pressure switch at negative pressure

The differential pressure switch is closed during operation. The contacts are closed.
The fan must be switched on in order to simulate an operating condition with negative pressure.

- ▶ Put the control unit on standby (→ technical documentation of control unit).
- ▶ Pull off plug (PWM signal) [1] at fan. The fan starts.

NOTICE

Measuring errors and malfunctions due to incorrect flue gas damper setting!

When using a flue gas damper, the flue gas damper must be opened manually during the check and put back in automatic mode after the test (→Chapter 7.6.2, page 29).

- ▶ Check correct function.

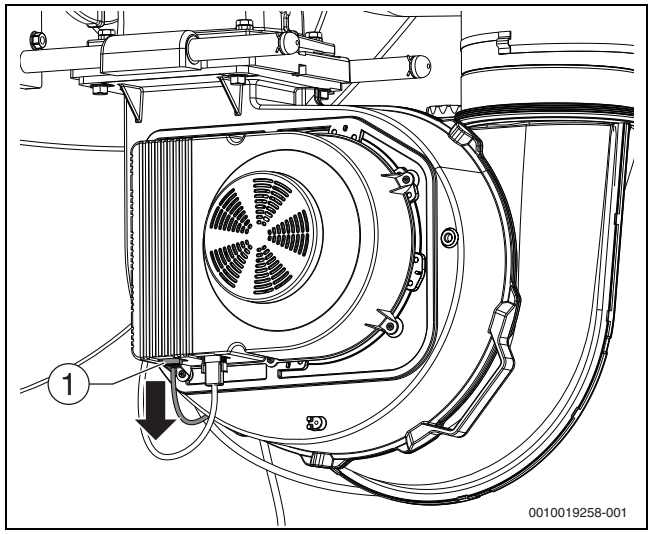


Fig. 85 Pull off plug (PWM signal) at fan

[1] PWM signal plug

- ▶ Pull off power cables at the differential pressure switch and measure the resistance across the contacts (→Fig. 86).
  If the value measured is < 1 ohm (or buzzer sound, depending on measuring device), the differential pressure switch is ok.
  If no value, or a resistance of > 1 ohm, is displayed (→ Fig. 87), replace the differential pressure switch.

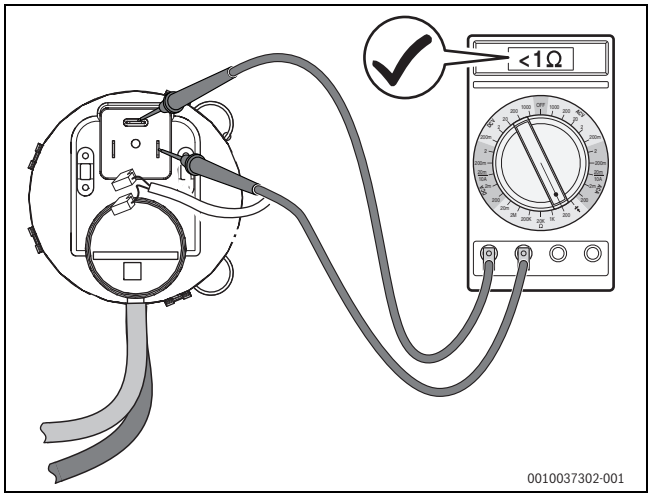


Fig. 86 Test the continuity of the differential pressure switch (differential pressure switch ok)

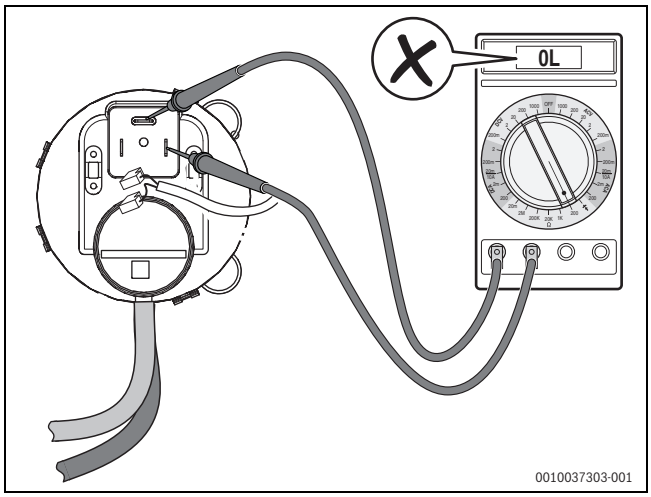


*Fig. 87 Test the continuity of the differential pressure switch (differential pressure switch **not** ok).*

- Following replacement, plug in (PWM signal) [1] plug at fan.

16.2 Testing the differential pressure switch for continuity

The differential pressure switch is open when the boiler is switched off.

- Switch off the boiler at the control unit.

In event of a fault, check the correct connection of the pressure hoses. When replacing the pressure switch, take care that the switching points printed on the new pressure switch corresponds with those of the pressure switch to be replaced.

- Pull off power cables at the differential pressure switch and measure the resistance across the contacts (→Fig. 88).
  If no value, or a resistance of > 1 ohm, is displayed, the differential pressure switch is ok.
  If the value measured is < 1 Ohm (or buzzer sound, depending on measuring device; →Fig. 89), replace the differential pressure switch.

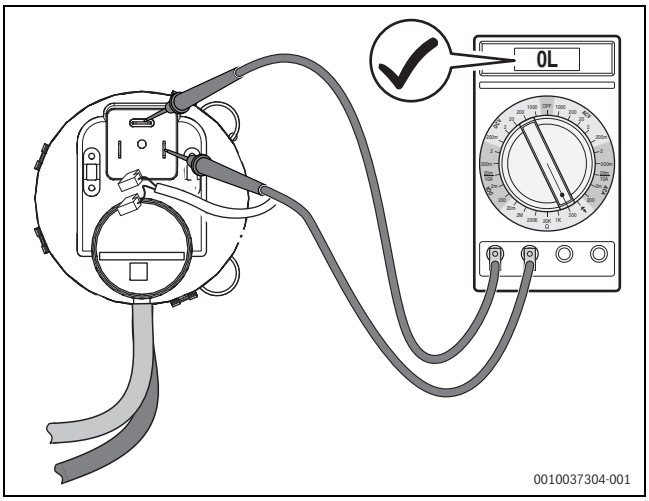


Fig. 88 Test the continuity of the differential pressure switch (differential pressure switch ok)

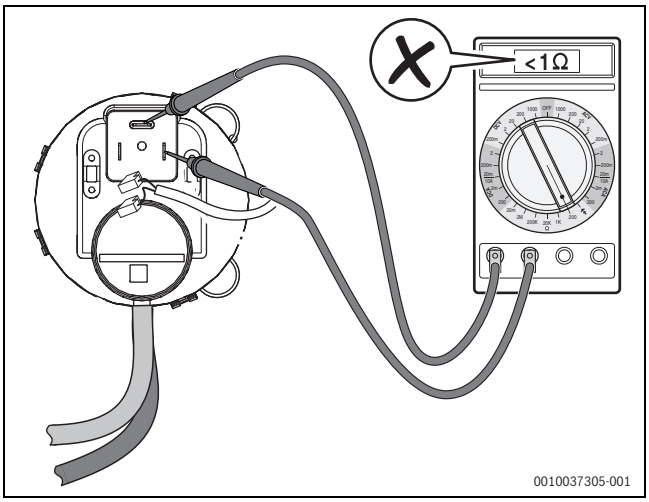


*Fig. 89 Measure the electrical resistance across the contacts of the differential pressure switch (differential pressure switch **not** ok)*

17 Appendix

17.1 Technical data

		Unit	Boiler size (output – no. of sections)		
			350-9	400-9	500-11
max. rated heat input [Qn(Hi)][1) 2)]		kW	333.3	388.6	476.2
min. rated heat input [Qn(Hi)][1)2)]		kW	64.8	64.8	79.4
max. rated output [Pn 80/60][1)2)] with temperature pair 80/60 °C	350 kW: Mod 1:5[3)]	kW	326.7	380.6	466.7
min. rated output [Pn 80/60][1)2)] at temperature pair 80/60 °C	400/500 kW: Mod 1:6[3)]	kW	63.5	63.5	77.8
max. rated output [Pn 50/30][1)2)] with temperature pair 50/30 °C		kW	350	408	500
min. rated output [Pn 50/30][1)2)] at temperature pair 50/30 °C		kW	68.0	68.0	83.5
Boiler efficiency, maximum output with temperature pair 80/60 °C		%	98.0	98.0	98.0
Boiler efficiency, maximum output with temperature pair 50/30 °C		%	105.0	105.0	105.0
Standard seasonal efficiency [to DIN] with heating curve 75/60		%	106.5	106.5	106.5
Standard seasonal efficiency [to DIN] with heating curve 40/30		%	109.5	109.5	109.5
Standby heat loss at excess temperature 30/50 K		%	0.12/0.26	0.11/0.23	0.09/0.20
Maximum possible installation altitude of boiler		m	1200	1200	1200
Heating circuit					
Floor standing boiler water content [V][1)]		l	54.4	54.4	64.8
Pressure drop on the heating water side at Δ 15 K		mbar	50	50	50
Maximum flow temperature heating/DHW mode with CC83xx / (full load)		°C	95 / (91)	95 / (91)	95 / (91)
Maximum flow temperature heating/DHW mode with MX25 / (full load)		°C	90 / (86)	90 / (86)	90 / (86)
Safety limit/high limit safety cut-out [T_{max}][1)]		°C	110	110	110
Maximum permissible water operating pressure [PMS][1)]		bar	6	6	6
Maximum differential between flow and return temperatures	Full Load	K	50	50	50
	Partial load	K	59	59	59
Maximum permitted flow rate through the boiler[4)]		l/h	37625	43000	53750
Flue gas values					
Condensate accumulation rate for natural gas G20, 40/30 °C		kg/h	31.5	36.2	45.2
Flue gas mass flow rate 80/60 °C	Full Load	g/s	153.5	178.9	219.3
	Partial load	g/s	29.9	29.9	36.6
Flue gas mass flow rate 50/30 °C	Full Load	g/s	149.4	174.2	213.5
	Partial load	g/s	29.1	29.1	35.6
Flue gas temperature 80/60 °C	Full Load	°C	68	68	70
	Partial load	°C	58	58	58
Flue gas temperature 50/30 °C	Full Load	°C	46	46	46
	Partial load	°C	32	32	32
CO_2 value, natural gas[5) 2)]	Full Load	%	9.2	9.2	9.2
	Partial load	%	9.2	9.2	9.2
Standard emission factor (EN15502) CO		mg/kWh	6	6.3	3.1
Standard emission factor (EN15502) NOx[6)]		mg/kWh	33	33.4	36.7
Fan for residual pressure differential (flue gas and combustion air system)		Pa	200	200	200
Fan for residual pressure differential with cascades (flue gas and combustion air system)		Pa	120	120	120
Maximum pressure at boiler 2 (shut down), if boiler 1 is at full load (positive pressure cascade)		Pa	50	50	50
Flue system					
Temperature classification to be used for flue system in accordance with EN 1443			min. T120	min. T120	min. T120
Pressure classification to be used for flue in accordance with EN 1443			H1, P1	H1, P1	H1, P1
Pressure classification to be used for connecting piece in accordance with EN 1443			H1, P1 with additional mechanical impact stability up to 5000 Pa		
Condensate resistance classification to be used for flue system in accordance with EN 1443			W	W	W

		Unit	Boiler size (output – no. of sections)		
			350-9	400-9	500-11
Corrosion resistance classification to be used for flue system in accordance with EN 1443			min. 2	min. 2	min. 2
Soot combustion resistance classification to be used for flue system in accordance with EN 1443			G, O	G, O	G, O
Maximum permitted flue gas return flow under wind conditions		%	10	10	10
Maximum allowable temperature of the combustion air		°C	35	35	35
Type (according to DV/GW regulations)			Open-flue mode: B_{23P} Room sealed operation: C_{13}, C_{33}, C_{53}, C_{63}, C_{83}, C_{93}		
Type (Belgium and Netherlands)			Open-flue mode: B_{23P} Room sealed operation: C_{13}, C_{33}, C_{53}, C_{63} (not valid for Belgium), C_{83}, C_{93}		
Electrical details					
IP rating		–	IPX0D	IPX0D	IPX0D
Supply voltage/frequency		V/Hz	230/50	230/50	230/50
Electric power consumption [P(el)][1]	Full Load	W	327	452	486
	Partial load	W	46	46	47
Protection against electrocution			Protection class 1		
Maximum permissible unit fuse protection (with CC83xx)		A	10	10	10
Maximum permissible unit fuse protection (with MX25)		A	6.3	6.3	6.3
Appliance dimensions and weight					
Handling dimensions width × depth × height (without packaging)		mm	755x1883x1670		755x2048x 1670
Handling dimensions width × depth × height (with packaging)		mm	800x1913x1826		800x2156x 1826
Handling dimensions width × depth × height (minimum)		mm	755x1278x1558		755x1463x 1558
Total weight		kg	336	336	384
Weight (excl. casing)		kg	280	280	320
Smallest shipping weight		kg	244	244	278

1) The details [xxx] correspond to the symbols and formula signs used on the data plate.

2) When operating with gaseous fuels with a hydrogen content of up to 20 % by volume, the CO_2 values may deviate from the data specified. You can obtain detailed information on the gas mixture supplied and its effect on the performance and CO_2 content from your responsible gas supply company and our service department on request.

3) The load indicated on the display corresponds to the percentage fan speed and not the percentage modulation.

4) Is to be ensured by means of system sizing, and it corresponds to a minimum differential between flow and return temperatures of 8 K.

5) Nominal Co_2 value with nominal gas load, differences can arise depending on the quality of the gas available locally (→Chapter 7.10, page 30).

6) Satisfies NO_x class 6 in accordance with EN15502-1.

Table 20 Technical data

Boiler rating	Gas throughput			
	Natural gas E, H, Es (G20) Wobbe index 12.69 kWh/m³	Natural gas LL, L, Ei (G25) Wobbe index 10.38 kWh/m³	Natural gas S (G25.1) (HU) Wobbe index 9.79 kWh/m³	Natural gas K (G25.3) (NL) Wobbe index 10.69 kWh/m³
[kW]	[m³/h]	[m³/h]	[m³/h]	
350	31.8	36.9	36.9	36.1
400	36.3	42.2	42.2	41.3
500	45.4	52.8	52.7	51.6

Table 21 Gas throughput (relative to 15 °C gas temperature and 1013 mbar air pressure)

Country	Boiler rating	Gas category	Gas family, gas group and reference gas set on delivery	Set to rated gas pressure on delivery in mbar[1)]
DE	350 – 500	I_{2ELL}	2E, G20	20
AT, BG, BY, CH, CZ, EE, ES, GB, GR, HR, IE, IT, KG, KZ, LT, LV, MK, NO, PT, RO, RS, RU, SI, SK, TR, UA, UZ	350 – 500	I_{2H}	2H, G20	20
FR	350 – 500	I_{2Esi}[2)]	2Es[2)], G20	20
BE	350 – 500	$I_{2E(R)}$	2Es[2)], G20	20
NL	350 – 500	I_{2EK}	2E, G20	20
LU	350 – 500	I_{2E}	2E, G20	20
PL	350 – 500	I_{2ELw}	2E, G20	20
HU	350 – 500	I_{2HS}	2H, G20	25

1) The gas supplier must ensure the minimum and maximum pressures (in accordance with national regulations for public gas supply).

2) Es and Ei are sub-groups of gas group E

Table 22 Country-specific gas categories

If the boiler is to be replaced in existing systems:

- Consult gas suppliers to ensure that the nominal gas pressure according to table 10, page 29 is adhered to.

17.2 Sensor curves

WARNING

Danger to life from electric current!

Touching live parts can result in an electric shock.

- Prior to every measurement, disconnect the power supply completely from the heating system.

- 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.

17.2.1 Temperature sensor at digital burner control unit

Temperature [°C]	Temperature sensor resistance values at digital burner control unit		
	Minimum value [Ω]	Nominal value [Ω]	Maximum value [Ω]
5	23466.20	24495.00	25523.80
10	18770.80	19553.00	20335.20
15	15120.00	15701.00	16282.00
20	12245.80	12690.00	13134.20
25	9951.30	10291.00	10630.70
30	8145.40	8406.00	8666.60
35	6711.50	6912.00	7112.50
40	5560.60	5715.00	5869.40
45	4625.40	4744.00	4862.60
50	3866.90	3958.00	4049.10
55	3239.10	3312.00	3384.90
60	2730.20	2786.00	2841.80
65	2314.50	2357.00	2399.50
70	1969.90	2004.00	2038.10
75	1683.30	1709.00	1734.70
80	1444.90	1464.00	1483.10
85	1241.90	1257.00	1272.10
90	1073.10	1084.00	1094.90
95	927.60	938.90	950.20
100	805.20	815.90	826.60

Table 23 Resistance values

2 similar temperature sensors (twin sensors), which are installed in a single sensor casing, are used as boiler water temperature sensors. All temperature sensors in the boiler have the same sensor curve.

17.3 Hydraulic resistance

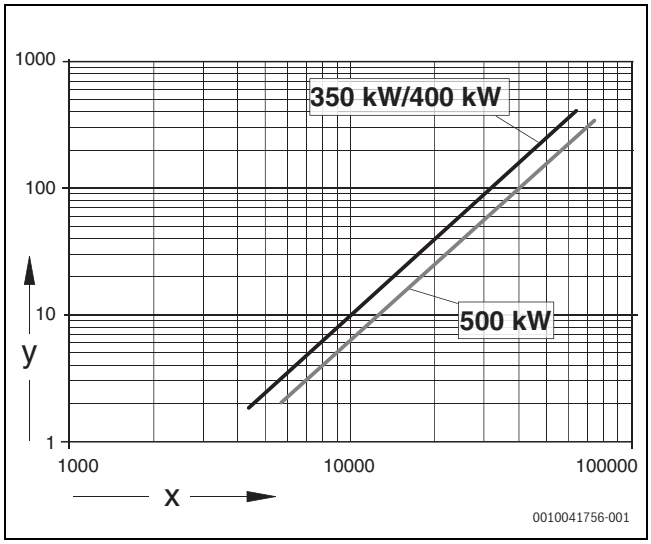


Fig. 90 Pressure drop on the heating water side

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

17.4 Connection diagrams

17.4.1 Control unit connection diagram

- To connect the control unit, observe the corresponding technical documentation and the connection diagram for the specific control unit.

DANGER

Danger to life from electric current!

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

NOTICE

System damage with incorrect installation!

- Provide a permanent power supply (not a safety plug).
- Ensure that the power supply 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.

17.4.2 Burner control unit

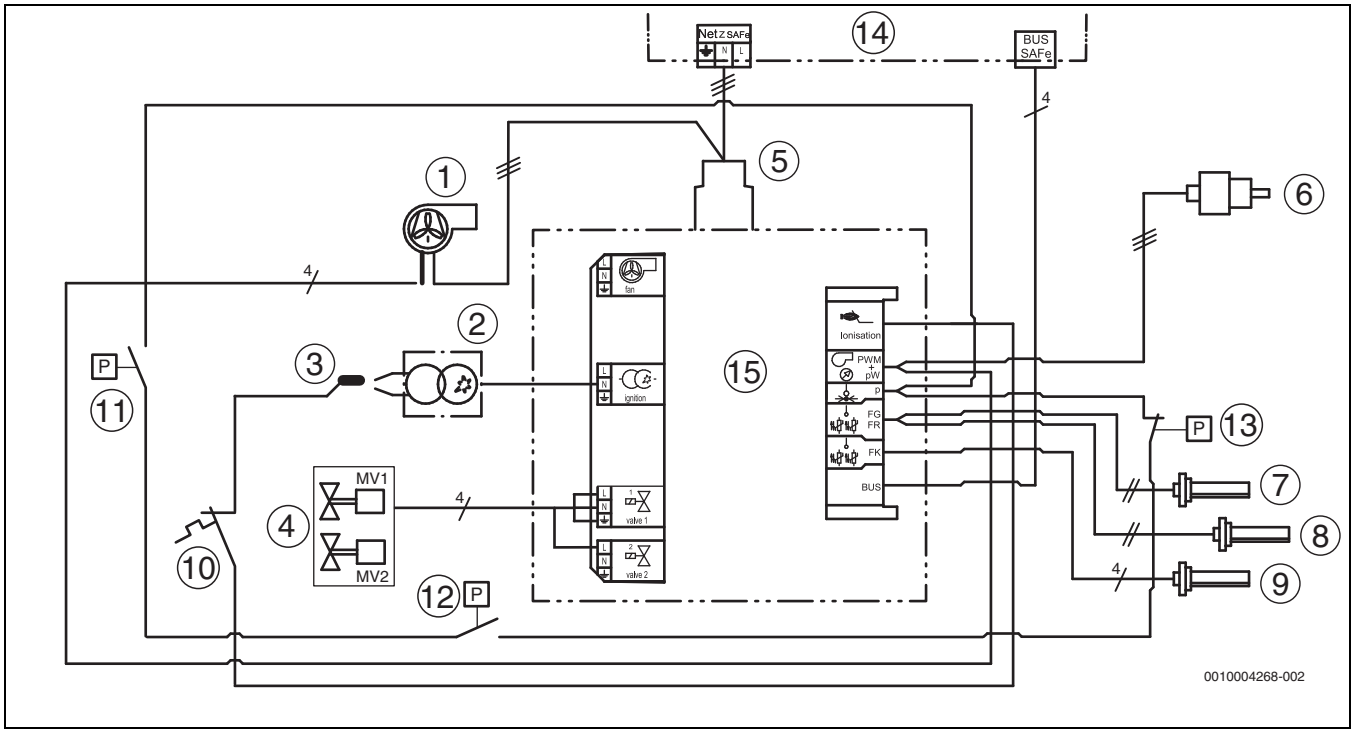


Fig. 91 Wiring diagram of burner control unit

[1] Fan (connection of PWM signal and mains)
[2] Ignition transformer
[3] Ionisation
[4] Gas solenoid valve (MV1/MV2)
[5] Mains input
[6] Water pressure sensor
[7] Flow temperature sensor
[8] Return temperature sensor
[9] Boiler water temperature sensor
[10] Temperature switch
[11] Valve check system (closed during operation)
[12] Differential pressure switch (closed during operation)
[13] Flue gas pressure limiter (always closed)
[14] Control unit
[15] Burner control unit

17.4.3 Diagrammatic representation of supply air/flue gas monitor and gas tightness

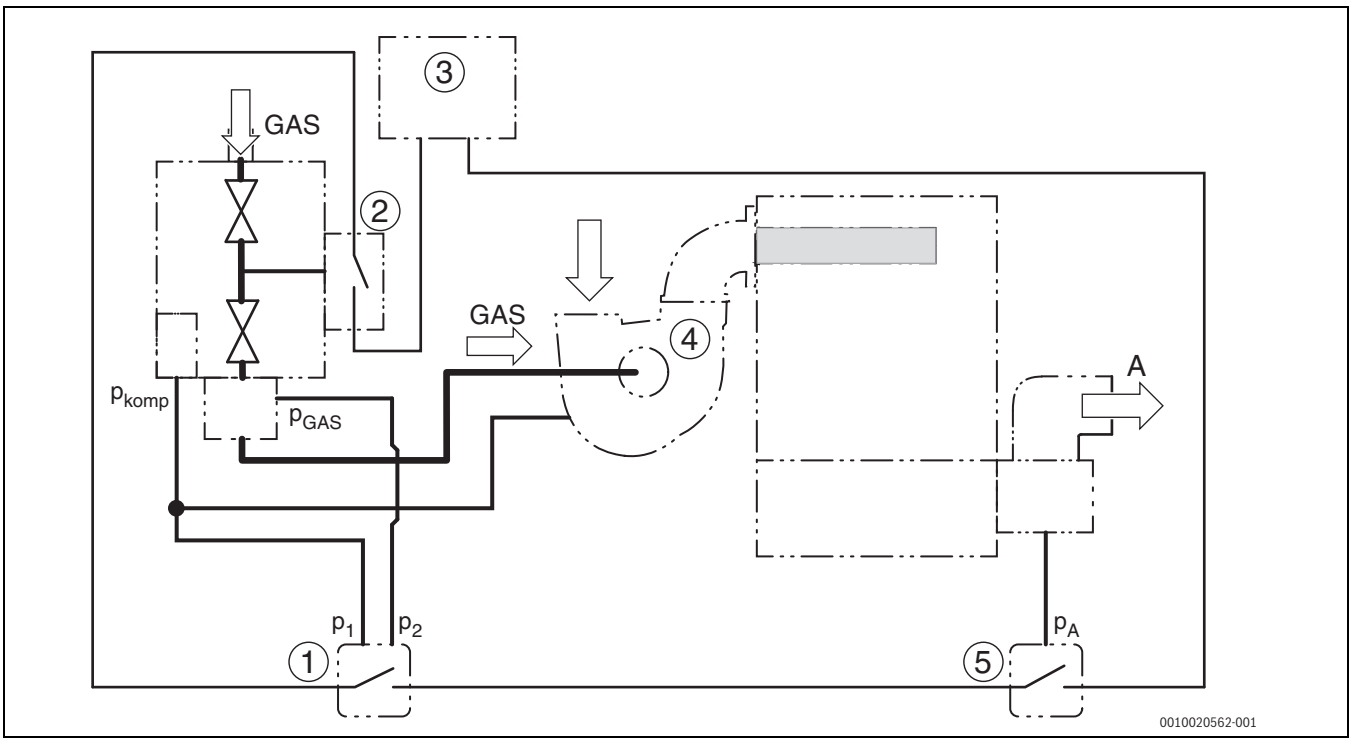


Fig. 92 Diagrammatic representation of supply air/flue gas monitor and gas tightness (according to EN 15502)

[1] Differential pressure switch (closed during operation)
[2] Valve check system
[3] Burner control unit
[4] Gas burner
[5] Flue gas pressure limiter (must be manually unlocked)
[p_1] Compensation line connection (blue)
[p_2] Test cable connection for gas outlet pressure (white)
[p_{komp}] Pressure compensation line
[p_{GAS}] Gas outlet pressure
[p_A] Pressure in flue system
[A] Flue gas

17.5 Conversion of vol.% CO_2 into vol.% O_2 for burner setting

Depending on the nominal $CO_{2\,max}$ in vol. – % of the distributed gas, the named CO_2 default value can be converted into an O_2 default value according to the following formula:

$$O_2 = 20{,}95 \times \frac{CO_{2max} - CO_2}{CO_{2max}}$$

F. 1 Formula for calculating the O_2 value

[O_2] Default value of O_2 in vol. – %
[CO_2] Default value of CO_2 in vol. – %
[CO_{2max}] Nominal value of CO_{2max} for the distributed gas in vol. – %

Calculation example:
Default value for CO_2 = 9.2 vol. – %
Nominal value for CO_{2max} = 12.0 vol. – %

$$O_2 = 20{,}95 \times \frac{12 - 9{,}2}{12} \approx 4{,}9$$

F. 2 Example of O_2 value calculation

[O_2] O_2 in vol. – %
[9,2] Default value of CO_2 in vol. – %
[12] Nominal value of CO_{2max} for the distributed gas in vol. – %

▶ Request nominal $CO_{2\,max}$ in vol. – % from your gas supplier.

If the specified values for $CO_{2\,max}$ and CO_2 are listed in the following table, the corresponding O_2 value can be read off directly from the table.

Nominal $CO_{2\ max}$ for the distributed gas [vol. – %]	11.4	11.5	11.6	11.7	11.8	11.9	12	12.1	12.2	12.3
CO_2 default value for the burner setting [vol. – %]	O_2 value [vol. – %]	O_2 value [vol. – %]	O_2 value [vol. – %]	O_2 value [vol. – %]	O_2 value [vol. – %]	O_2 value [vol. – %]	O_2 value [vol. – %]	O_2 value [vol. – %]	O_2 value [vol. – %]	O_2 value [vol. – %]
8.2	5.9	6.0	6.1	6.3	6.4	6.5	6.6	6.8	6.9	7.0
8.3	5.7	5.8	6.0	6.1	6.2	6.3	6.5	6.6	6.7	6.8
8.4	5.5	5.6	5.8	5.9	6.0	6.2	6.3	6.4	6.5	6.6
8.5	5.3	5.5	5.6	5.7	5.9	6.0	6.1	6.2	6.4	6.5
8.6	5.1	5.3	5.4	5.6	5.7	5.8	5.9	6.1	6.2	6.3
8.7	5.0	5.1	5.2	5.4	5.5	5.6	5.8	5.9	6.0	6.1
8.8	4.8	4.9	5.1	5.2	5.3	5.5	5.6	5.7	5.8	6.0
8.9	4.6	4.7	4.9	5.0	5.1	5.3	5.4	5.5	5.7	5.8
9	4.4	4.6	4.7	4.8	5.0	5.1	5.2	5.4	5.5	5.6
9.1	4.2	4.4	4.5	4.7	4.8	4.9	5.1	5.2	5.3	5.5
9.2	4.0	4.2	4.3	4.5	4.6	4.8	4.9	5.0	5.2	5.3
9.3	3.9	4.0	4.2	4.3	4.4	4.6	4.7	4.8	5.0	5.1
9.4	3.7	3.8	4.0	4.1	4.3	4.4	4.5	4.7	4.8	4.9
9.5	3.5	3.6	3.8	3.9	4.1	4.2	4.4	4.5	4.6	4.8
9.6	3.3	3.5	3.6	3.8	3.9	4.0	4.2	4.3	4.5	4.6
9.7	3.1	3.3	3.4	3.6	3.7	3.9	4.0	4.2	4.3	4.4
9.8	2.9	3.1	3.6	3.4	3.6	3.7	3.8	4.0	4.1	4.3
9.9	2.8	2.9	3.1	3.2	3.4	3.5	3.7	3.8	3.9	4.1
10	2.6	2.7	2.9	3.0	3.2	3.3	3.5	3.6	3.8	3.9
10.1	2.4	2.6	2.7	2.9	3.0	3.2	3.3	3.5	3.6	3.7
10.2	2.2	2.4	2.5	2.7	2.8	3.0	3.1	3.3	3.4	3.6

Table 24 O_2 default values depending on the nominal CO_{2max} value (with the read-off example)

Read-off example:
Default value: CO_2 = 9.2 vol. – %
Nominal value: CO_{2max} = 12.0 vol. – %
Result: O_2 = 4.9 vol. – %

17.6 System commissioning report

▶ Initial and date the commissioning work carried out.

	Commissioning work	Page	Measurements		Remarks
1.	Fill the heating system and check for leaks.	24	☐		
2.	Has the information about water quality in the operator's log been observed and has the necessary information been documented in the operator's log?		Yes: ☐		
	• Concentration of additives		Additives: _____	Concentration: _____%	
3.	Fill the siphon with approx. 3 litres of water.	23	☐		
4.	Recording gas parameters:				
	• Wobbe index	27	_____ kWh/m³		
	• Net calorific value	27	_____ kWh/m³		
5.	Check tightness of gas line.	27	☐		
	• Venting the gas line.	28	☐		
6.	Establish operating pressure on water side.	26	☐		
7.	Check air intake and outlet openings and flue gas connection.	28	☐		
8.	Check device equipment.	27	☐		
9.	Starting up the control unit and the burner.	29	☐		

	Commissioning work	Page	Measurements		Remarks
10.	Recording measurements:	31	Full Load	Partial load	
	• Flue resistance		_____ Pa	_____ Pa	
	• Negative pressure in the ventilation air line (measured at the boiler inlet during partial load)			_____ Pa (permissible maximum	
	• 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 losses q_A		_____ %	_____ %	
	• CO content, air free		_____ ppm or _____ mg/kWh	_____ ppm or _____ mg/kWh	
11.	Measure the gas supply pressure (static pressure).	29	_____mbar		
12.	Measure the gas supply pressure.	29	Full load:	Partial	
13.	Check tightness during operation (gas side).	32/ 51	☐		
14.	Check tightness during operation (flue gas side) .	28	☐		
15.	Function checks:	31			
	• Check ionisation current.		_____ µA		
16.	Install casing panels.	32	☐		
17.	Inform operator, hand over technical documentation.	32	☐		
18.	Correct commissioning by the installing contractor		Signature:_____ _____		
19.	Signature of operator		Signature:_____ _____		

Table 25 System commissioning report

17.7 Inspection and maintenance protocols

The inspection and maintenance records also serve as a master copy.

▶ Sign and date the completed inspection work.

Inspection work		Page	Full Load	Partial load	Full Load	Partial load
1.	Check general condition of heating system (visual inspection and function check)		☐	☐	☐	☐
2.	Check the gas and water-bearing system components for:					
	• internal leaks		☐	☐	☐	☐
	• signs of corrosion		☐	☐	☐	☐
	• signs of ageing		☐	☐	☐	☐
3.	Check the concentration of antifreeze/ additives in the heating water (observe the manufacturer's instructions and the details in the operator's log).		Concentration:_____%		Concentration:_____%	
4.	Check the heating system water pressure.	39	☐	☐	☐	☐
	• Pre-charge pressure of the expansion vessel (→ expansion vessel installation instructions)					

Inspection work		Page	Full Load	Partial load	Full Load	Partial load
	• Operating pressure	39				
5.	Check the burner and heat exchanger for contamination; shut down the heating system for this step. Clean burner and/or heat exchanger as needed.		☐	☐	☐	☐
6.	Check the siphon and condensation catch pan; shut down the heating system for this step.					
7.	Check electrodes, shut down the heating system for this.	46				
8.	Check the gas supply pressure (static pressure)	29				
9.	Measure the gas supply pressure.	29				
10.	Check the supply and extract air apertures are unobstructed and clean.	28	☐	☐	☐	☐
11.	Check the flue connection and flue gas routing.	28	☐	☐	☐	☐
	• Check flue gas damper	31	☐			
	• Fill the siphon with approx. 3 litres of water.	46				
12.	Recording measurements:	31				
	• Flue resistance		_____Pa	_____Pa	_____Pa	_____Pa.
	• Negative pressure in the ventilation air line (measured at the boiler inlet during partial load)			_____ Pa (permissible maximum value - 25 Pa)		_____ Pa (permissible maximum value - 25 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 content, air free		_____ ppm or _____ mg/kWh	_____ ppm or _____ mg/kWh	_____ ppm or _____ mg/kWh	_____ ppm or _____ mg/kWh
13.	Carry out function checks:	31				
	• Check ionisation current.		_____µA	_____µA	_____µA	_____µA
	• Test the differential pressure switch.	65	☐	☐	☐	☐
14.	Check for leaks during operation.	32 / 51	☐	☐	☐	☐
15.	If necessary, check function of installed water treatment cartridge and check for wear.		☐	☐	☐	☐
16.	Check that the control unit is set correctly in line with demand (see documents for the control unit).	–	☐	☐	☐	☐
17.	Final check of servicing work	–	☐	☐	☐	☐
18.	Document replacement of components: Which components were replaced?	–				

Inspection work		Page	Full Load	Partial load	Full Load	Partial load
19.	Document hours run and burner starts.	–				
	Confirm correct inspection Company stamp/date/signature					

Table 26 Inspection and maintenance record

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

The requirements for replacement of gaskets are detailed in Chapter 11.11.4, page 48)

	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.	☐	☐	☐	☐	☐	☐	☐	☐
11.	☐	☐	☐	☐	☐	☐	☐	☐
12.								
	_____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 | mg/kWh	_____ ppm | mg/kWh	_____ ppm | mg/kWh	_____ ppm | mg/kWh	_____ ppm | mg/kWh	_____ ppm | mg/kWh	_____ ppm | mg/kWh	_____ ppm | mg/kWh

	Full Load	Partial load	Full Load	Partial load	Full Load	Partial load	Full Load	Partial load
13.								
	_____µA	_____µA	_____µA	_____µA	_____µA	_____µA	_____µA	_____µA
	☐	☐	☐	☐	☐	☐	☐	☐
14.	☐	☐	☐	☐	☐	☐	☐	☐
15.	☐	☐	☐	☐	☐	☐	☐	☐
16.	☐	☐	☐	☐	☐	☐	☐	☐
17.	☐	☐	☐	☐	☐	☐	☐	☐
18.								
19.	Document hours run and burner starts.							

Table 27 Inspection and maintenance record

	Responsive maintenance	Page	Date: _____	Date: _____
1.	Shut down the heating system.	33	☐	☐
2.	Clean the burner and heat exchanger.	43	☐	☐
3.	Replace gaskets on the cleaning cover of the heat exchanger.	48	☐	☐
4.	Replace the electrode block.	46	☐	☐
5.	Clean the siphon.	43	☐	☐
6.	Clean the condensation catch pan.	43	☐	☐
7.	Replace the mixture manifold gasket (O-ring).	48	☐	☐
8.	Carry out a function check.		☐	☐
9.	Replace components according to the service life.	48	☐	☐
	Confirmation that maintenance has been correctly carried out. Company stamp/signature			

Table 28

	Date: _____	Date: _____	Date: _____	Date: _____	Date: _____
1.	☐	☐	☐	☐	☐
2.	☐	☐	☐	☐	☐
3.	☐	☐	☐	☐	☐
4.	☐	☐	☐	☐	☐
5.	☐	☐	☐	☐	☐
6.	☐	☐	☐	☐	☐
7.	☐	☐	☐	☐	☐
8.	☐	☐	☐	☐	☐
9.	☐	☐	☐	☐	☐
	Company stamp/signature	Company stamp/signature	Company stamp/signature	Company stamp/signature	Company stamp/signature

Table 29

17.8 Data Protection Notice

We, **Bosch Thermotechnology Ltd., Cotswold Way, Warndon, Worcester WR4 9SW, United Kingdom** process product and installation information, technical and connection data, communication data, product registration and client history data to provide product functionality (art. 6 (1) sentence 1 (b) GDPR / UK GDPR), to fulfil our duty of product surveillance and for product safety and security reasons (art. 6 (1) sentence 1 (f) GDPR / UK GDPR), to safeguard our rights in connection with warranty and product registration questions (art. 6 (1) sentence 1 (f) GDPR / UK GDPR) and to analyze the distribution of our products and to provide individualized information and offers related to the product (art. 6 (1) sentence 1 (f) GDPR / UK GDPR). To provide services such as sales and marketing services, contract management, payment handling, programming, data hosting and hotline services we can commission and transfer data to external service providers and/or Bosch affiliated enterprises. In some cases, but only if appropriate data protection is ensured, personal data might be transferred to recipients located outside of the European Economic Area and the United Kingdom. Further information are provided on request. You can contact our Data Protection Officer under: Data Protection Officer, Information Security and Privacy (C/ISP), Robert Bosch GmbH, Postfach 30 02 20, 70442 Stuttgart, GERMANY.

You have the right to object, on grounds relating to your particular situation or where personal data are processed for direct marketing purposes, at any time to processing of your personal data which is based on art. 6 (1) sentence 1 (f) GDPR / UK GDPR. To exercise your rights, please contact us via **privacy.ttgb@bosch.com** To find further information, please follow the QR-Code.

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