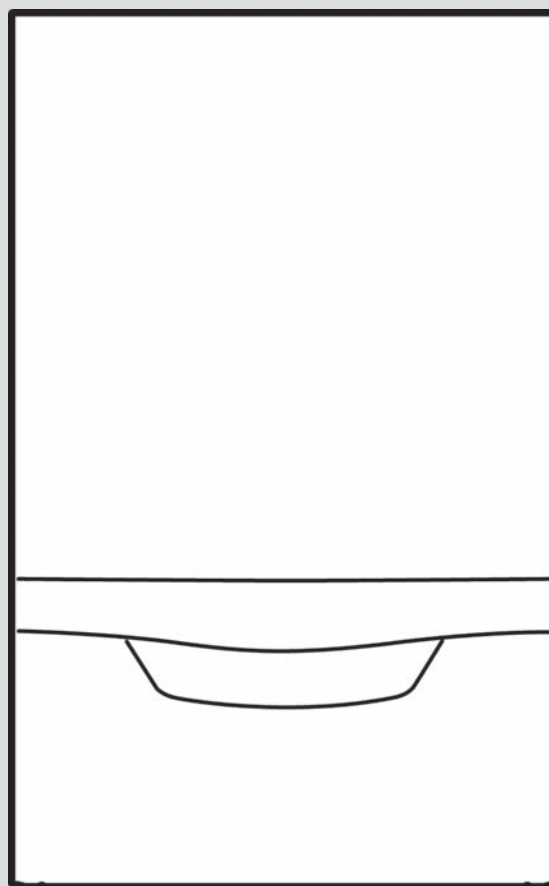




ecoTEC plus

VU 446/5-5 (H-GB)
VU 606/5-5 (H-GB)



Installation and maintenance instructions

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1 Safety

1.1 Intended use

The product is intended as a heat generator for sealed heating installations and for domestic hot water generation.

Improper use of any kind is prohibited.

Intended use also includes the following:

- Installing and operating the product only in conjunction with accessories for the air/flue pipe which are listed in the other applicable documents and comply with the type of unit
- Using the product while observing the accompanying operating, installation and maintenance instructions for the product along with all other components of the installation
- Installing and setting up the product while observing the product and system approval
- Observing all inspection and maintenance conditions listed in the instructions
- Installing while observing the IP code

The following is classed as improper use:

- Using the product in vehicles, such as mobile homes or caravans. Units that are not classed as vehicles are those that are installed in a fixed and permanent location (known as "fixed installation").
- Any direct use in industrial or commercial processes
- Any use other than those described in these instructions and any use that goes beyond what is described here

1.2 Qualification

The person carrying out the work described here must have completed professional training. The competent person must demonstrably have all of the knowledge, skills and capabilities that are required in order to carry out the work mentioned below.

The following work must only be carried out by competent persons who are sufficiently qualified to do so:

- Set-up
- Dismantling
- Installation
- Start-up

- Inspection and maintenance
- Repair
- Decommissioning
- ▶ Proceed in accordance with current technology.
- ▶ Use the correct tool.

The above-mentioned work must always only be carried out by persons with sufficient qualifications.

This product can be used by children over eight years old and also by persons with limited physical, sensory or mental capabilities or insufficient experience and/or knowledge if they are supervised or have been provided with instructions on how to safely use the product, and they understand the risks resulting from using the product. Children must not play with the product. Cleaning and user maintenance work must not be carried out by children unless they are supervised.

1.3 General safety information

The following sections convey important safety information. It is essential to read and observe this information in order to prevent risk of death, risk of injury, material damage or environmental damage.

1.3.1 Gas

If you smell gas:

- ▶ Avoid rooms that smell of gas.
- ▶ If possible, open doors and windows fully and ensure adequate ventilation.
- ▶ Do not use naked flames (e.g. lighters, matches).
- ▶ Do not smoke.
- ▶ Do not use any electrical switches, mains plugs, doorbells, telephones or other communication systems in the building.
- ▶ Close the emergency control valve or the main isolator.
- ▶ If possible, close the gas stopcock on the product.
- ▶ Warn other occupants in the building by yelling or banging on doors or walls.
- ▶ Leave the building immediately and ensure that others do not enter the building.
- ▶ Alert the police and fire brigade, and inform the emergency service department of





the gas supply company as soon as you are outside the building.

1.3.2 Flue gas

Flue gases may cause poisoning, while hot flue gases may also cause burns. Flue gases must therefore never be allowed to escape uncontrollably.

What to do if you smell flue gas in the property:

- ▶ Open all accessible doors and windows fully to provide ventilation.
- ▶ Switch off the product.
- ▶ Check the flue gas routes in the product and the flue gas diversions.

To prevent flue gas exit:

- ▶ Only operate the product if the air/flue pipe has been completely installed.
- ▶ With the exception of short periods for testing purposes, only operate the product when the front casing is installed and closed.

If you operate the product with an empty condensate trap / siphon, then flue gas may escape into the room air.

- ▶ In order to operate the product, ensure that the condensate trap / siphon is always full.

Condition: Permitted B23 or B23P unit types with condensate siphon (third-party accessory)

- Water seal level: ≥ 200 mm

To ensure that the seals are not damaged:

- ▶ Instead of grease, use only water or commercially available soft soap to aid installation.

1.3.3 Air supply

Unsuitable or insufficient combustion and room air may lead to material damage, but also to life-threatening situations.

To ensure that the combustion air supply is sufficient during open-flued operation:

- ▶ Ensure that the air supply to the product's installation room is permanently unobstructed and sufficient in accordance with the relevant ventilation requirements. This also applies, in particular, for cupboard installations.

To prevent corrosion on the product and in the flue system:

- ▶ Ensure that the combustion air supply is free from sprays, solvents, chlorinated cleaning agents, paint, adhesives, ammonia compounds, dust or similar substances.
- ▶ Ensure that no chemical substances are stored at the installation site.
- ▶ If you are installing the product in hairdressing salons, painter's or joiner's workshops, cleaning businesses or similar locations, choose a separate installation room in which the room air is technically free of chemical substances.

Validity: Except Great Britain

- ▶ Ensure that the combustion air is not routed through chimneys which have previously been used with oil-fired floor-standing boilers, or with other boilers, which could cause soot to build up in the chimney.

1.3.4 Electricity

The power supply terminals L and N remain live.

To prevent electric shocks, proceed as follows before working on the product:

- ▶ Disconnect the product from the power supply by switching off all power supplies at all poles (electrical partition with a contact gap of at least 3 mm, e.g. fuse or circuit breaker) or remove the mains plug (if present).
- ▶ Secure against being switched back on again.
- ▶ Wait at least three minutes until the condensers have discharged.
- ▶ Check that there is no voltage.

1.3.5 Weight

To prevent injuries when transporting the product:

- ▶ Make sure that the product is transported by at least two people.

To prevent material damage to the flexible gas pipe:

- ▶ Never suspend the compact thermal module on the flexible gas pipe.





1.3.6 Explosive and flammable substances

To prevent explosions and fire:

- ▶ Do not use the product in storage rooms that contain explosive or flammable substances (such as petrol, paper or paint).

1.3.7 High temperatures

To prevent burns:

- ▶ Only carry out work on components once they have cooled down.

To prevent material damage that is caused by heat transfer:

- ▶ Only solder connectors if the connectors are not yet screwed to the service valves.

1.3.8 Heating water

Both unsuitable heating water and air in the heating water may cause material damage to the product and in the heat generator circuit.

- ▶ Check the quality of the heating water. (→ Page 33)
- ▶ If you use non-diffusion-tight plastic pipes in the heating installation, ensure that no air gets into the heat generator circuit.

1.3.9 Neutralisation device

To prevent contamination of the waste water:

- ▶ Check whether a neutralising unit must be installed in accordance with national regulations.
- ▶ Observe local regulations on neutralising condensate.

1.3.10 Frost

To prevent material damage:

- ▶ Do not install the product in rooms prone to frost.

1.3.11 Safety devices

- ▶ Install the necessary safety devices in the installation.

1.3.12 Risk of death from leaks if the product is installed below ground level

Liquid gas accumulates at floor level. If the product is installed below ground level, liquid gas may accumulate at floor level if there

are any leaks. In this case, there is a risk of explosion.

- ▶ Make sure that liquid gas cannot escape from the product or the gas pipe under any circumstances.

1.3.13 Risk of damage to the flexible gas pipe

The corrugated gas pipe may become damaged if weight is placed on it.

- ▶ Do not suspend the compact thermal module on the flexible gas pipe, for example during maintenance work.

1.4 Regulations (directives, laws, standards)

- ▶ Observe the national regulations, standards, directives, ordinances and laws.

1.5 List of relevant standards for Great Britain and Ireland

- ▶ Observe the national regulations, standards, directives, ordinances and laws.

Validity: Great Britain OR Ireland



You can find a list of relevant standards at:
<https://www.vaillant.co.uk/standards>



Validity: Great Britain OR Ireland

Guarantee Registration

Thank you for installing a new Vaillant appliance in your home. Vaillant appliances are manufactured to the very highest standard so we are pleased to offer our customers a comprehensive guarantee.

To maintain your guarantee, the boiler must be serviced annually by a competent person who holds the required qualifications in accordance with the rules in force of the country where the product is installed and in accordance with the manufactures recommendations.

We recommend you complete your guarantee registration as soon as possible.

Sales Support:

Telephone: 0345 602 0262

Technical Enquiries:

Telephone: 0344 693 3133

Email: technical@vaillant.co.uk

General Enquiries:

Telephone: 0345 602 2922

Training Enquiries:

Telephone: 0345 601 8885

Email: training.enquiriesuk@vaillant-group.com

Spares Enquiries:

Telephone: 01773 596 615

To register your Vaillant appliance visit:

<https://self-service.vaillant.co.uk/warranty-registration>



Vaillant is a licensed member of the Benchmark Scheme. Benchmark places responsibilities on both manufacturers and installers. The purpose is to ensure that customers are provided with the correct equipment for their needs, that it is installed, commissioned and serviced in accordance with the manufacturer's instructions by a competent person approved at the time by the Health and Safety Executive and that it meets the requirements of the appropriate Building Regulations. The Benchmark Checklist can be used to demonstrate compliance with Building Regulations and should be provided to the customer for future reference.

Installers are required to carry out installation, commissioning and servicing work in accordance with the Benchmark Code of Practice which is available from the Heating and Hotwater Industry Council who manage and promote the Scheme. Benchmark is managed and promoted by the Heating and Hotwater Industry Council.



3 Technical data

Technical data – General

	VU 446/5-5 (H-GB)	VU 606/5-5 (H-GB)
Gas category	II2H3P	II2H3P
Diameter of the gas pipe at the product outlet	25 mm	25 mm
Diameter at the outlet of the gas compression fitting, outside thread	1"	1"
Diameter at the outlet of the gas stopcock, inside thread	1"	1"
Diameter of the heating pipe at the product outlet, outside thread	1 1/2"	1 1/2"
Diameter at the outlet of the heating connection, outside thread	1 1/2"	1 1/2"
Diameter at the outlet of the heating stopcock, inside thread	1 1/4"	1 1/4"
Connection diameter of the expansion relief valve, inside thread	1"	1"
Air/flue connection	80/125 mm	80/125 mm
G20 gas flow pressure	2.0 kPa (20.0 mbar)	2.0 kPa (20.0 mbar)
G31 gas flow pressure	3.7 kPa (37.0 mbar)	3.7 kPa (37.0 mbar)
CE number (PIN)	CE-0063CS3428	CE-0063CS3428
Min. flue gas mass flow rate	3.9 g/s	5.3 g/s
Max. flue gas mass flow rate	20.3 g/s	27.0 g/s
Released system types	C13, C33, C43, C53, C93, B23, B23(P), B33, B53, B53(P)	C13, C33, C43, C53, C93, B23, B23(P), B33, B53, B53(P)
Min. flue gas temperature at P 50/30 °C	37 °C	37 °C
Max. flue gas temperature at P 50/30 °C	53 °C	61 °C
Min. flue gas temperature at P 80/60 °C	61 °C	65 °C
Max. flue gas temperature at P 80/60 °C	78 °C	78 °C
Nominal efficiency at 80/60 °C	97.5 %	97.8 %
Nominal efficiency at 50/30 °C	106.2 %	105.9 %
Nominal efficiency at 60/40 °C	103.2 %	102.8 %
Nominal efficiency in partial load mode (30%) at 40/30 °C	109.1 %	109.5 %
NOx class	6	6
NOx emission weighted in accordance with EN 15502	≤ 40 mg/kW-h	≤ 40 mg/kW-h
SAP 2009/2012 annual efficiency (%)	89.4 %	89.4 %
Product dimensions, width	440 mm	440 mm
Product dimensions, depth	405 mm	473 mm
Product dimensions, height	720 mm	720 mm
Net weight	37.8 kg	47.2 kg

Technical data – Power/heat input (G20)

	VU 446/5-5 (H-GB)	VU 606/5-5 (H-GB)
Nominal heat output range P at 50/30 °C	8.7 to 48.0 kW	12.2 to 63.5 kW
Nominal heat output range P at 60/40 °C	8.5 to 46.6 kW	11.8 to 61.7 kW
Nominal heat output range P at 80/60 °C	7.8 to 44.1 kW	11.0 to 58.7 kW
Maximum heat input (Q max.)	45.2 kW	60.0 kW
Minimum heat input (Q min.)	8.1 kW	11.3 kW

Technical data – Power/heat input (G31)

	VU 446/5-5 (H-GB)	VU 606/5-5 (H-GB)
Nominal heat output range P at 50/30 °C	8.6 to 46.6 kW	12.0 to 62.1 kW
Nominal heat output range P at 80/60 °C	7.8 to 44.0 kW	11.1 to 58.4 kW
Maximum heat input (Q max.)	45.2 kW	60.0 kW
Minimum heat input (Q min.)	8.1 kW	11.3 kW

Technical data – Heating

	VU 446/5-5 (H-GB)	VU 606/5-5 (H-GB)
Maximum heating flow temperature (default setting – D.71)	75 °C	75 °C
Range for the heating flow temperature control	30 to 80 °C	30 to 80 °C
Maximum permissible pressure (PMS)	0.35 MPa (3.5 bar)	0.35 MPa (3.5 bar)
Safety discharge of expansion relief valve	0.4 MPa (4.0 bar)	0.4 MPa (4.0 bar)
Nominal water flow ($\Delta T = 20$ K)	1,900 l/h	2,500 l/h
Approximate value for the condensate volume (pH value between 3.5 and 4.0) at 50/30 °C	4.5 l/h	5.6 l/h
Maximum heat output (factory setting – D.000)	Auto	Auto

Technical data – Electrics

	VU 446/5-5 (H-GB)	VU 606/5-5 (H-GB)
Electric connection	– 230 V – 50 Hz	– 230 V – 50 Hz
Built-in fuse (slow-blow)	T4H/4A,250V	T4H/4A,250V
Maximum electrical power consumption	≤ 162 W	≤ 250 W
Standby electrical power consumption	1.8 W	1.8 W
IP rating	IPX4D	IPX4D
Permissible connected voltage	195 to 253 V	195 to 253 V

4 Notes on the documentation

- ▶ Always observe all operating instructions enclosed with the installation components.
- ▶ Store these instructions and all other applicable documents for further use.

These instructions apply only to:

Product article number

VU 446/5-5 (H-GB) ecoTEC plus	0010021520
VU 606/5-5 (H-GB) ecoTEC plus	0010021521

Gas Council Number

VU 446/5-5 (H-GB) ecoTEC plus	41-694-28
VU 606/5-5 (H-GB) ecoTEC plus	41-694-29

5 Product description

This product is a gas-fired wall-hung condensing boiler.

5.1 CE marking



The CE marking shows that the products comply with the basic requirements of the applicable directives as stated on the declaration of conformity.

The declaration of conformity can be viewed at the manufacturer's site.

5.2 Energy Saving Trust Endorsed Products

Validity: Great Britain



Only the most energy efficient products can carry the 'Energy Saving Trust Endorsed Product' landmark making it easy for consumers to choose products that have met strict energy performance criteria.

Available for: Boilers, Heating controls and chemical inhibitors, the Energy Saving Trust endorsed product landmark gives consumers confidence that a product will cost less to run, help lower energy bills and reduce carbon emissions.

About the Energy Saving Trust

Energy Saving Trust is an independent and impartial organisation that provides trusted energy saving advice to empower millions of people to lead affordable, low energy lifestyles. For more information visit energysavingtrust.org.uk

5.3 Hot Water Association

Vaillant is a full member of the Hot Water Association and promotes the scheme in association with its cylinder range. Details are available on the web site www.vaillant.co.uk



5.4 Information on the identification plate

The identification plate is mounted on the underside of the product in the factory.

Validity: Great Britain

Information on the identification plate	Meaning
Serial number	for identification; 7th to 16th digits = product article number
VU...	Vaillant gas-fired wall-hung boiler for heating
ecoTEC plus	Product description
2H, G20 - 20 mbar (2 kPa)	Gas group and gas connection pressure as set at the factory
Cat.	Unit category
Types	Gas-fired boiler types
PMS	Permissible total overpressure in heating mode
PMW	Permissible total overpressure during hot water generation
T _{max.}	Max. flow temperature
ED 92/42	Current efficiency directive fulfilled with 4* rating
230 V 50 Hz	Electric connection
W	Max. electrical power consumption
IP	Level of protection
	Heating mode
P	Nominal heat output range
Q	Heat input range



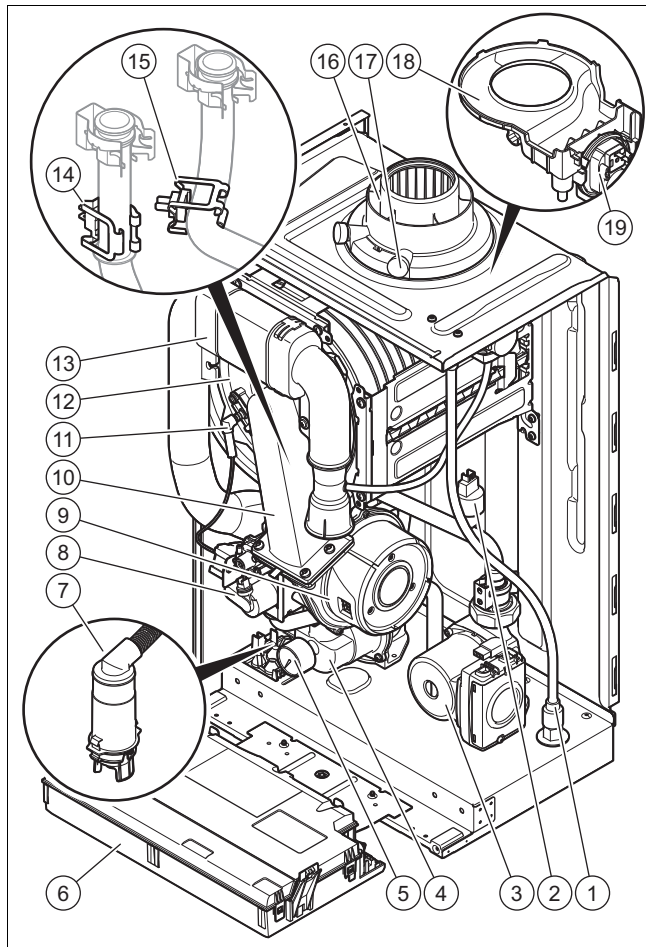
Note

Make absolutely sure that the product is compatible with the gas group at the installation site.

5.5 Serial number

The serial number can be found on the identification plate.

5.6 Product design



1	Rainwater drain hose	11	Ignition electrode
2	Hydraulic pressure sensor	12	Integrated condensation heat exchanger
3	Heating pump	13	Air intake pipe
4	Dynamic air separation system	14	Temperature sensor in the heating flow
5	Water-pressure manometer	15	Temperature sensor in the heating return
6	Electronics box	16	Connection for the air/flue pipe
7	Condensate siphon	17	Flue gas measuring stub pipe
8	Gas valve assembly	18	Rainwater collecting device
9	Fan	19	Pressure switch
10	Compact thermal module		

5.7 Safety Devices

5.7.1 Electrical Supply Failure

The boiler will not work without an electrical supply. Normal operation of the boiler should resume when the electrical supply is restored.

Reset any external controls, to resume normal operation of the central heating.

If the boiler does not resume normal operation press the reset button. If the boiler does not resume normal operation after this call your Installation/Service company or Vaillant service.

5.7.2 Overheating Safety

The boiler software is designed to recognise the potential for an overheat lockout and will shutdown before this happens.

To restart the boiler, press the reset button on the boiler interface.

If the boiler fails to resume normal operation and all external controls are calling for heat, then call your Installation/Service company or Vaillant service.

5.7.3 Frost protection

The appliance has a built in frost protection device that protects the boiler from freezing. With the gas and electric supplies ON and irrespective of any room thermostat setting, the frost protection device will operate the pump when the temperature of the boiler water falls below 12 °C.

A timer is used so that the temperature can be checked periodically. After 10 minutes the pump will be stopped if the temperature is higher than 10 °C or has already reached 35 °C. The burner will activate if the boiler temperature does not reach 10 °C after 30 minutes or at any time if the temperature drops to 5 °C.

The burner will switch off when the temperature reaches 35 °C.

5.7.4 Condensate Drain Blockage

As a safety feature the boiler will stop working if the condensate drain becomes blocked. During freezing conditions this may be due to the forming of ice in the condensate drain external to the house. Release an ice blockage by the use of warm cloths on the pipe. After pressing reset the boiler should restart.

6 Set-up

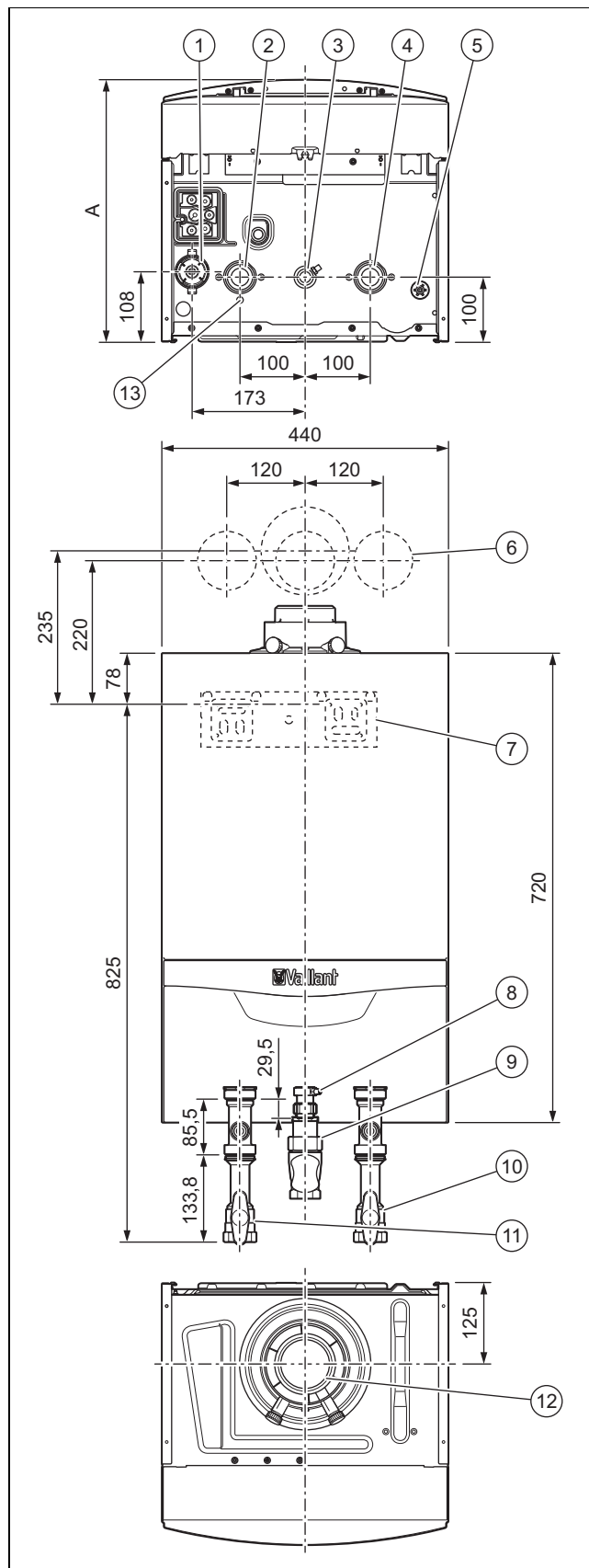
6.1 Checking the scope of delivery

Validity: VU 446/5-5 (H-GB) OR VU 606/5-5 (H-GB)

► Check that the scope of delivery is complete and intact.

Number	Designation
1	Heat generator
1	Bag of set-up parts with retainer for the wall-mounting, fastening accessories and condensate discharge hose
1	Cardboard box for the hydraulic connection with expansion relief valve, draining cock, air separator and seals
1	Cardboard box with the stopcocks for the heating circuit
1	Cardboard box with the stopcock for the gas line assembly
1	Documentation material including gas conversion set

6.2 Dimensions



- | | | | |
|---|---|---|---|
| 1 | Condensate siphon | 6 | Position of the holes for the flue system |
| 2 | Heating flow connection | 7 | Retainer for securing the product |
| 3 | Gas connection | 8 | Gas pressure connection |
| 4 | Heating return connection | 9 | Gas stopcock |
| 5 | Drain for the rainwater collecting device | | |

- | | | | |
|----|--------------------------------|----|---|
| 10 | Stopcock in the heating return | 12 | Connection for the air/flue pipe |
| 11 | Stopcock in the heating flow | 13 | Drain for the dynamic air separation system |

Dimension A

VU 446/5-5 (H-GB)	405 mm
VU 606/5-5 (H-GB)	473 mm

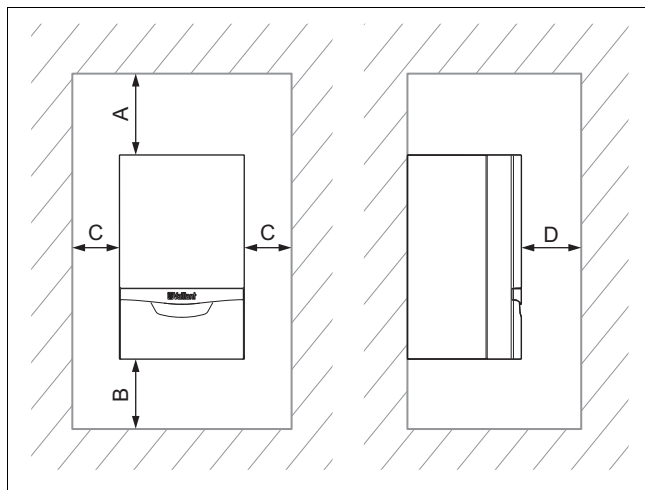
6.3 Installation site

Validity: Great Britain OR Ireland

This boiler is not suitable for outdoor installation. This boiler may be installed in any room. However if the boiler is being installed in a room containing a bath or shower it must only be installed in zones 2 or 3. In GB this is the current I.E.E. WIRING REGULATIONS and BUILDING REGULATIONS. In IE reference should be made to the current edition of I.S.813 "Domestic Gas Installations" and the current ETCl rules.

If the boiler is to be installed in a timber frame building it should be fitted in accordance with the current version of the Institute of Gas Engineers document IGE/UP/7. If in doubt seek advice from local gas undertaking or the manufacturer.

6.4 Minimum clearances



- ▶ When using the accessories, observe the minimum clearances/installation clearances.

Minimum clearances

A	B	C	D
≥ 275 mm	≥ 180 mm	≥ 5 mm	≥ 500 mm

- Optimum dimension (B): ≈ 250 mm
- Optimum dimension (C): ≈ 50 mm
- Dimension (D): The clearance in front of the product to facilitate easy access for maintenance work can be reduced to 5 mm if there is a door in front of the product

6.5 Clearance from combustible components

It is not necessary to maintain a clearance between the product and components made of combustible materials that go beyond the minimum clearances.

6.6 Compartment Ventilation

Validity: Great Britain

The boilers are very high efficiency appliances.

As a consequence the heat loss from the appliance casing during operation is very low.

Compartment ventilation is not required as the products are only certified, and can only be fitted with a concentric flue system.

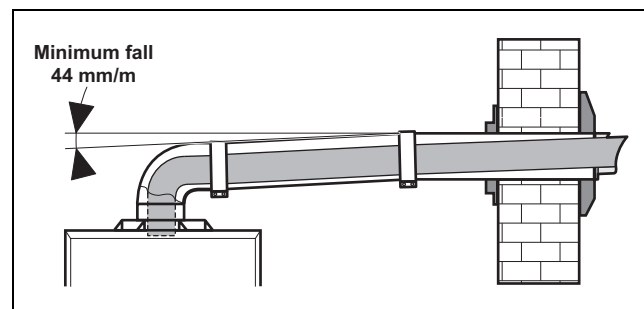
6.7 Air/flue pipe

6.7.1 Regulation

Validity: Great Britain OR Ireland

Different flue outlet configurations can be carried out.

- Consult the installation manual for air/flue gas systems for more information about the other possibilities and associated accessories.



- Standard flue terminal kits have an in-built fall back to the boiler to drain the condensate. These can be fitted level between the appliance and the termination position. All other extended flues must have a fall of at least 44 mm/m.

The maximum length of the flue outlet is defined according to its type (for example C13).

- Whatever the kind of flue system chosen, observe the minimum distances to position the flue terminals.
- To install the flue, refer to the separate flue instruction supplied with your appliance.
- Explain these requirements to the user of the appliance.

In GB the minimum acceptable siting dimensions for the terminal from obstructions, other terminals and ventilation openings are shown in diagram overleaf.

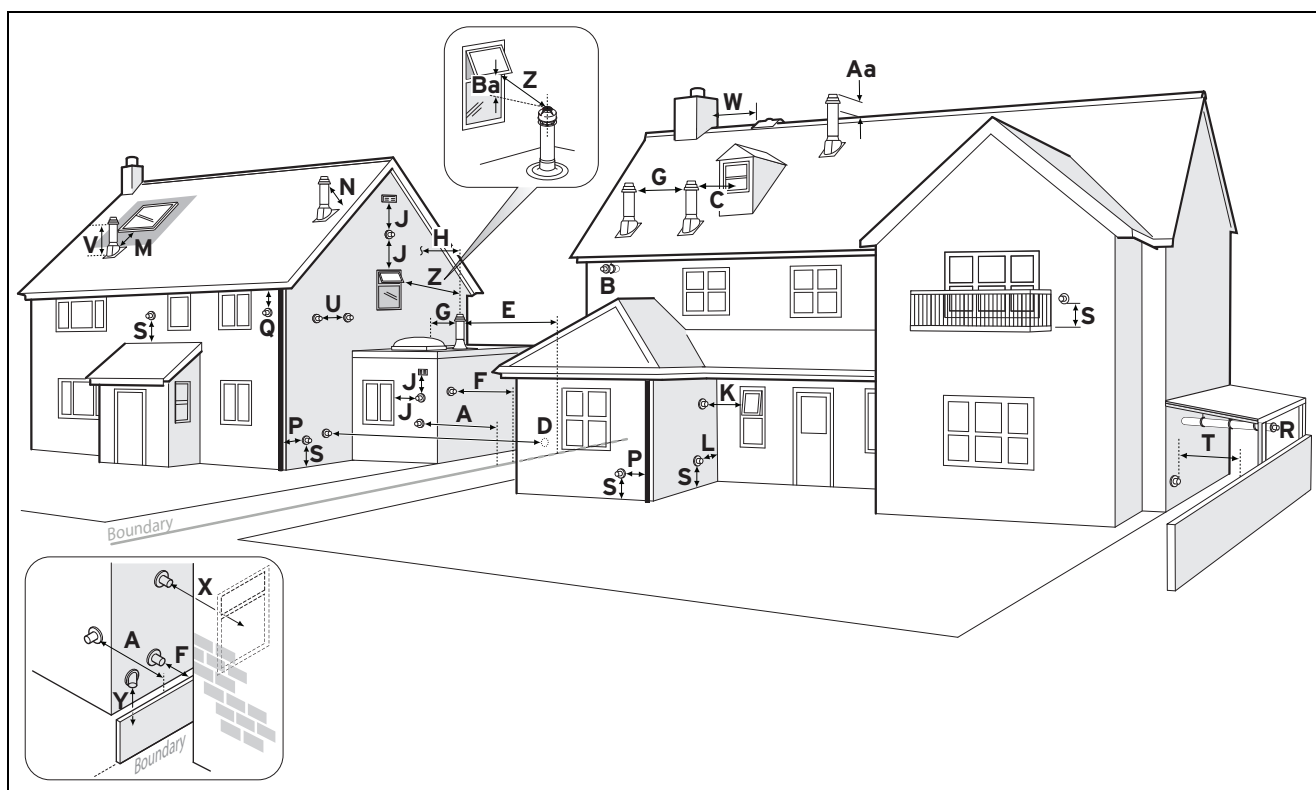
In IE the minimum distances for flue terminal positioning must be those detailed in I.S. 813 "Domestic Gas Installations".

The terminal must be exposed to the external air, allowing free passage of air across it at all times.

Being a condensing boiler some plumbing may occur from the flue outlet. This should be taken into consideration when selecting the position for the terminal.

6.7.2 Position of the air/flue terminal

Validity: Great Britain OR Ireland



6.7.2.1 Positioning the terminal of a fan-supported flue system

Validity: Great Britain OR Ireland

	Installation site	Dimensions
A	Adjacent to a boundary.	300 mm
B	¹⁾ The dimension below eaves, balconies and car ports can be reduced to this value, as long as the flue terminal is extended to clear any overhang. External flue joints must be sealed with a suitable silicon sealant.	25 mm
C	Between a vertical flue terminal and a window or dormer window on a roof.	1,500 mm
D	Between terminals facing each other.	1,200 mm
E	Vertical flue clearance, adjacent to a boundary line.	300 mm
F	²⁾ Distance to a boundary line, unless it will cause a nuisance. BS 5440:Part 1 recommends that care is taken when siting terminal in relation to boundary lines.	600 mm
G	Minimum clearance from a skylight to a vertical flue or to another vertical flue.	Min. 300 mm
H	Vertical flue clearance, to noncombustible building material. Vertical flue clearance to combustible building material.	500 mm 1,500 mm
J	Above, below and either side of an opening door, air vent or opening window.	300 mm
K	Diagonally to an opening door, air vent or opening window.	600 mm
L	²⁾ To an internal or external corner.	200 mm
M	Below a Velux window. Above or to either side of the Velux window.	2,000 mm 600 mm
	<p>1) There should be no ventilation/opening in the eaves within 300 mm distance of the terminal.</p> <p>2) These dimensions comply with the building regulations, but they may need to be increased to avoid wall staining and nuisance from plumbing depending on site conditions.</p> <ul style="list-style-type: none"> - Terminals must be positioned so to avoid combustion products entering the building. - Support the flue at approximately one metre intervals and at a change of direction, use suitable brackets and fixings. - Installations in car ports are not recommended. - The flue cannot be lower than 1 metre from the top of a lightwell due to the build up of combustion products. - Dimensions from a flue terminal to a fanned air inlet to be determined by the ventilation equipment. 	

	Installation site	Dimensions
N	From a pitched roof. In regions with heavy snowfall.	400 mm 500 mm
P	From vertical drain pipes and soil pipes.	25 mm
Q	Below eaves. Below gutters, pipe and drains.	200 mm 75 mm
R	The dimension below eaves, balconies and car ports can be reduced to this value, as long as the flue terminal is extended to clear any overhang. External flue joints must be sealed with suitable silicon sealant.	25 mm
S	Above adjacent ground or balcony.	300 mm
T ²⁾	Distance to a surface facing a terminal, unless it will cause a nuisance. BS 5440: Part 1 recommends that care is taken when siting terminals in relation to surfaces facing a terminal.	600 mm
U	Clearance alongside another terminal.	300 mm
V	Above roof level.	300 mm
W	Minimum to vertical structure on roof, roof vent.	Min. 300 mm
X	Minimum to opening in adjacent building.	Min. 2000 mm
Y	Minimum at an angle to a boundary which is not less than 300 mm to the terminal	Min. 600 mm
Z	Minimum measured to the nearest corner of the OPEN window	Min. 600 mm
Aa	No more than this value above ridge.	Max. 300 mm
Ba	Not less than this value below the opening window	Min. 300 mm
	1) There should be no ventilation/opening in the eaves within 300 mm distance of the terminal. 2) These dimensions comply with the building regulations, but they may need to be increased to avoid wall staining and nuisance from pluming depending on site conditions. <ul style="list-style-type: none"> - Terminals must be positioned so to avoid combustion products entering the building. - Support the flue at approximately one metre intervals and at a change of direction, use suitable brackets and fixings. - Installations in car ports are not recommended. - The flue cannot be lower than 1 metre from the top of a lightwell due to the build up of combustion products. - Dimensions from a flue terminal to a fanned air inlet to be determined by the ventilation equipment. 	

6.7.2.2 Horizontal terminal positioning

Validity: Great Britain OR Ireland

BS 5440-1 recommends that fanned flue chimney terminals should be positioned as follows:

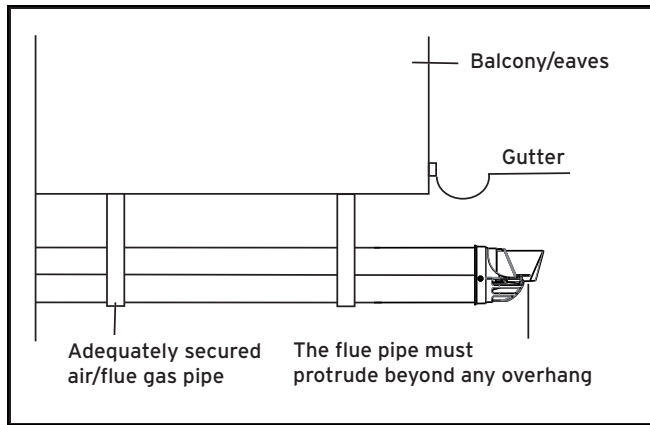
- a) at least 2 m from an opening in the building directly opposite, and
- b) so that the products of combustion are not directed to discharge directly across a boundary if the products are likely to cause a nuisance to a neighbour or discharge over a walkway or patio.

For IE see current issue of IS 813.

For boilers covered within this manual.

Dimensions B and R:

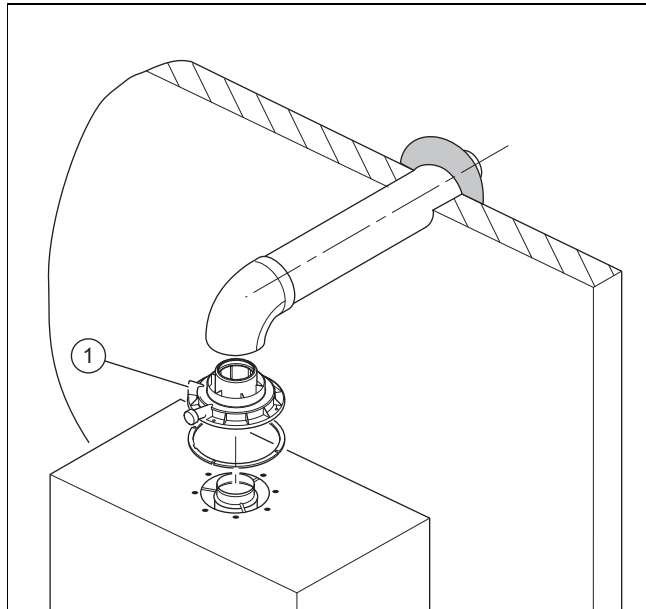
These clearances may be reduced to 25 mm without affecting the performance of the boiler. In order to ensure that the condensate plume does not affect adjacent surfaces the terminal should be extended as shown below.



You can use a plume management kit to enable the termination point to be positioned and directed away from the building fabric.

6.7.3 Flue Configuration Description

6.7.3.1 Horizontal Concentric Flue \varnothing 80/125 mm (C13 type installation)



1 Gasket (fitted)



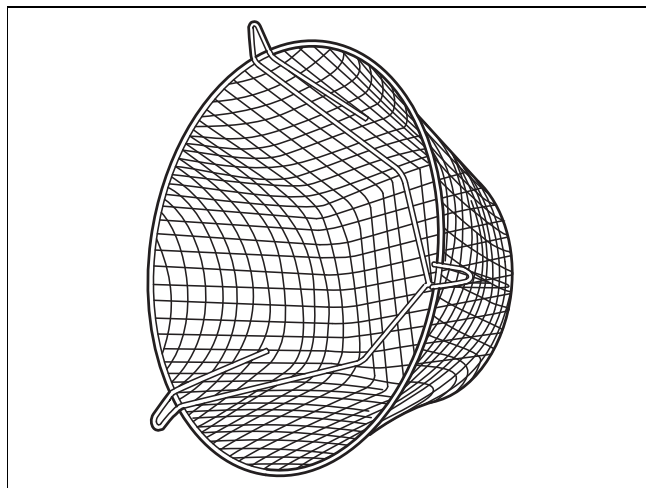
Note

If the terminal is at less than 1.80 m from the ground, you must install a terminal protection kit.

Consult the separate installation manual for air/flue gas systems supplied with your appliance for all possibilities and associated accessories and how to install the flue system.

6.7.3.2 Terminal protection

Validity: Great Britain OR Ireland

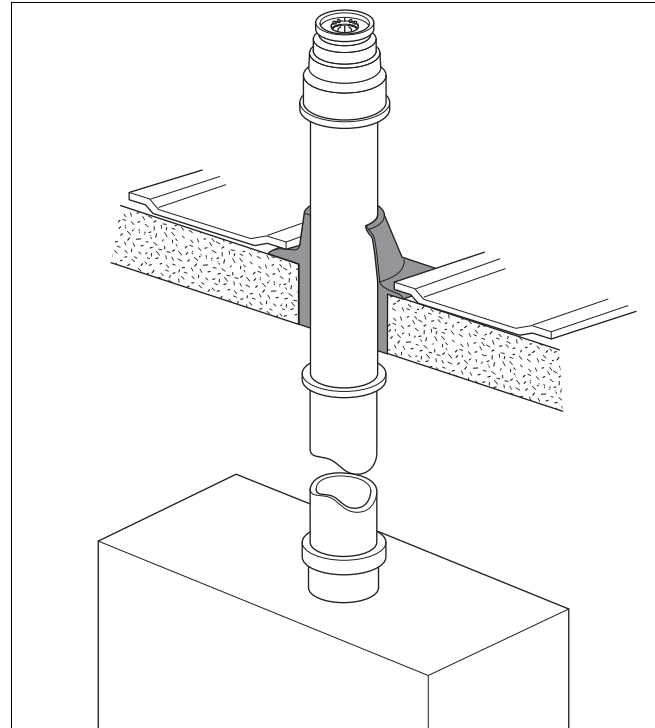


A terminal guard is required if persons could come into contact with the terminal or the terminal could be subject to damage.

If a terminal guard is required, it must be positioned to provide minimum of 50 mm clearance from any part of the terminal and be central over the terminal.

The guard should be similar to that shown in the figure.

6.7.3.3 Vertical Concentric Flue \varnothing 80/125 mm (C33 type installation)

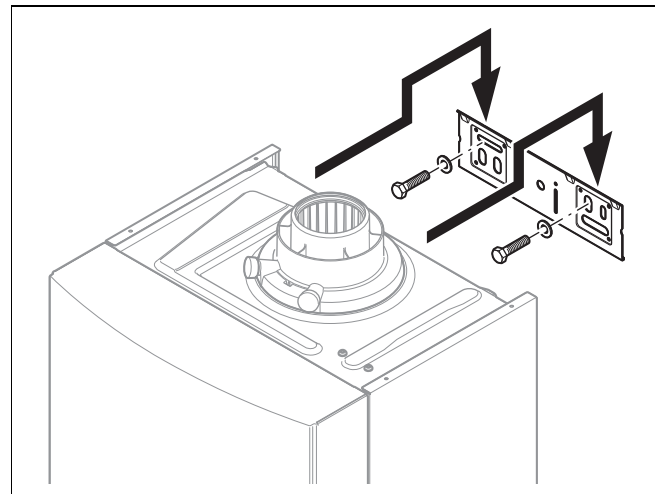


Consult the separate installation manual for air/flue gas systems supplied with your appliance for all possibilities and associated accessories and how to install the flue system.

6.8 Using the mounting template

- ▶ Use the mounting template to ascertain the locations at which you need to drill holes and make breakthroughs.

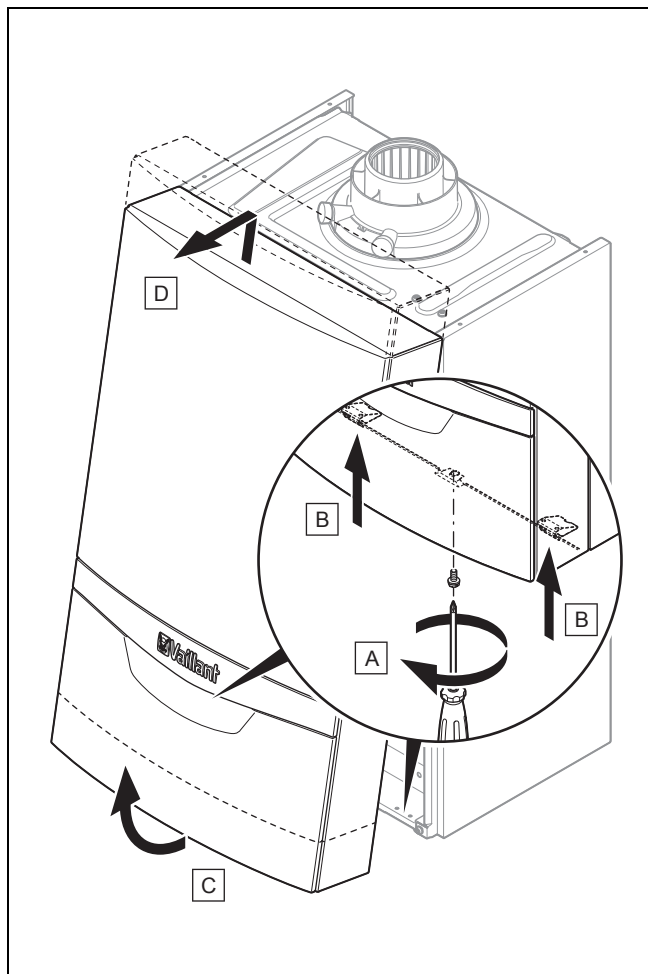
6.9 Wall-mounting the product



1. Check the load-bearing capacity of the wall.
2. Note the total weight of the product.
3. Only use fixing material that is permitted for the wall.
4. If required, ensure that mounting apparatus on-site has sufficient load-bearing capacity.
5. Wall-mount the product as described.

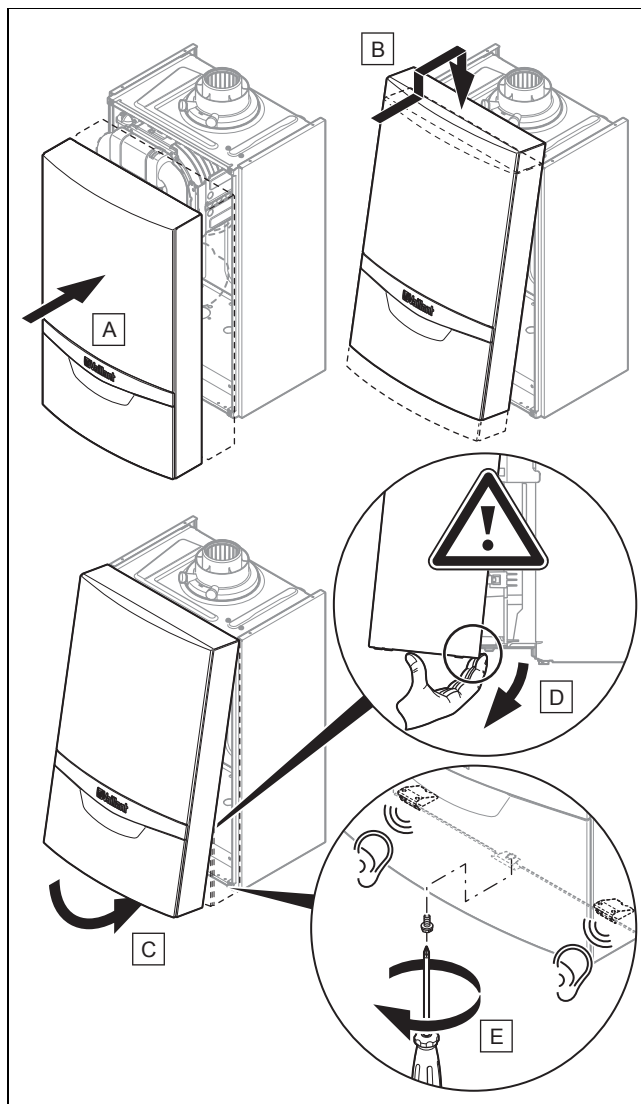
6.10 Removing/installing the front casing

6.10.1 Removing the front casing



1. Undo the screw (A).
2. Push in both retaining clips (B) so that the front casing is released.
3. Pull the front casing forwards at the bottom edge (C).
4. Lift the front casing upwards from the bracket (D).

6.10.2 Installing the front casing



1. Place the front casing (A) on the upper retainer (B).
2. Hinge the front casing down in the direction of the product (C).
3. Push the front casing onto the product and, in doing so, ensure that the insulation is not damaged (D).
4. Let the retaining clips on the front casing snap into place.
5. Tighten the screw (E) in order to secure the front casing.

6.11 Removing/installing the side section

6.11.1 Removing the side section

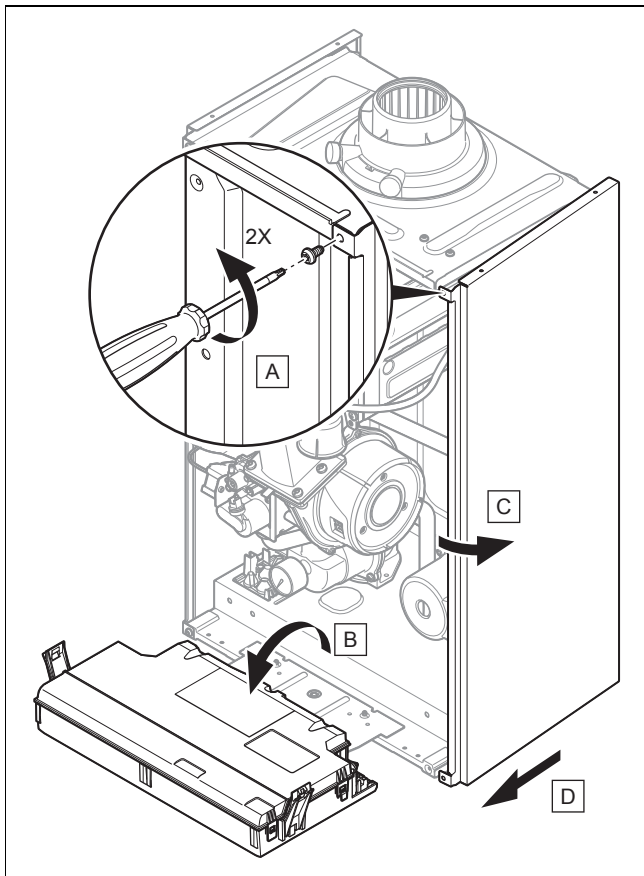


Caution.

Risk of material damage caused by mechanical deformation.

Removing both side sections may cause mechanical distortion in the product, which may cause damage to the piping, for example, and potentially result in leaks.

- Always only remove one side section – never both side sections at the same time.



- ▶ Remove the side section as shown in the illustration.

6.11.2 Installing the side section

- ▶ Install the side section; to do so, proceed in reverse order to how you removed it.

7 Installation

7.1 Preparing for installation

1. Make sure that the existing gas meter is capable of passing the rate of gas supply required.
2. Consider the maximum heat output given in DHW mode.
3. Install the following components:
 - Draining cocks at the lowest points in the heating installation (→ current version of "BS 2879")
 - A stopcock on the cold water connection
 - A stopcock in the gas pipe
 - A filling/draining device in the heating installation
4. Install the connection pipes such that they are free from mechanical stress.
5. If you use non-diffusion-tight plastic pipes in the heating installation, ensure that no air gets into the heat generator circuit.
6. Only solder connectors if the connectors are not yet screwed to the service valves.
7. Only bend connection pipes if they have not yet been connected to the product.
8. Flush the heating installation thoroughly before installing the product.
9. If, during gas leak-tightness tests, you also place the gas pipes and the gas valve assembly in the product under pressure, use a max. test pressure of ≤ 11 kPa (110 mbar).
10. If you cannot limit the test pressure to 11 kPa (110 mbar), close any gas stopcocks that are installed upstream from the product before you carry out the gas leak-tightness test.
11. If, during gas leak-tightness tests, you have closed the gas stopcock that is installed upstream of the product, relieve the gas line pressure before you open this gas stopcock.
12. If the hydraulic circuit contains a pump other than the one for the product, only start up the product if a sufficiently dimensioned low loss header is installed between the heat generator circuit and the heating circuit or the cylinder charging circuit.
Low loss header (→ Page 23)
13. If the product's pump is the only circulation pump in the hydraulic circuit, check whether the product's feed head is sufficient for the installation. (→ Page 41)
 - ▽ If this is not the case, use an appropriately designed low loss header and circulation pump.
14. With older installations in particular, install a magnetic filter at the heating circuit return in order to protect the product against dirt from the installation.
 - Ensure that there is sufficient dimensioning in order to prevent it from blocking quickly and to prevent high pressure losses.
15. Use fibre seals. Seals made of rubber-like materials may be subject to plastic deformation, which can lead to pressure losses.

7.2 Sample system installations

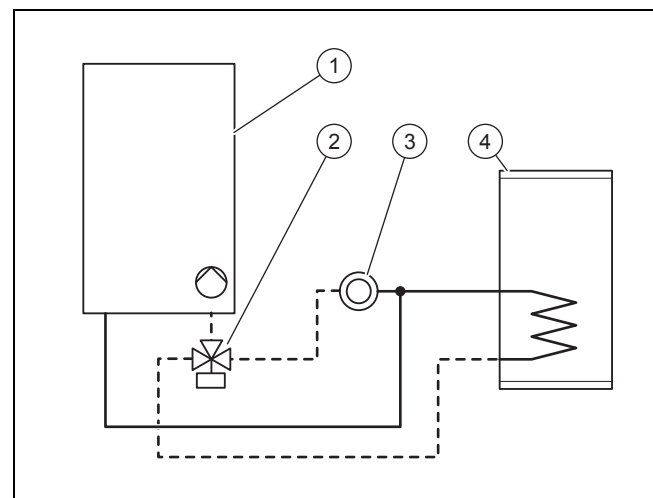
- ▶ Use the basic installation diagrams as examples.
- ▶ Select the basic installation diagram based upon which you want to configure your installation.
- ▶ Only install the control systems that are listed in the tables for the basic system diagrams in order to ensure that all of the system's functions are available.
- ▶ Establish the connections correctly.
- ▶ Observe the applicable national and international laws, standards and directives.
- ▶ With older installations in particular, install a magnetic filter at the heating circuit return in order to protect the product against dirt from the installation.
 - Ensure that there is sufficient dimensioning in order to prevent it from blocking quickly and to prevent high pressure losses.
- ▶ Observe the information on treating heating water. (→ Page 33)
 - ▽ If you cannot guarantee the conditions for treating the heating water, install an external plate heat exchanger to protect the product.
- ▶ Install the required safety devices and system components in the installation.

7.2.1 Basic system diagram type 1: One direct heating circuit with one optional domestic hot water cylinder



Note

This basic diagram type can then only be used if the product's pump is the only pump in the system.



- | | | | |
|---|-------------------------------------|---|-----------------------------|
| 1 | Wall-hung boiler with internal pump | 3 | Heating circuit |
| 2 | Prioritising diverter valve | 4 | Domestic hot water cylinder |

- ▶ To use this basic diagram type, ensure that the product works within the defined operating ranges. (→ Page 41)

Number for the basic diagram	Control system	Number of circuits	Carrying out the wiring
0020253233	Basic control	1	See appendix or contact customer service for special basic diagrams.

Number for the basic diagram	Control system	Number of circuits	Carrying out the wiring
0020253235	VRC 700 system control	1	Contact customer service.
0020253236	Connected vSMART control	1	Contact customer service.



Note

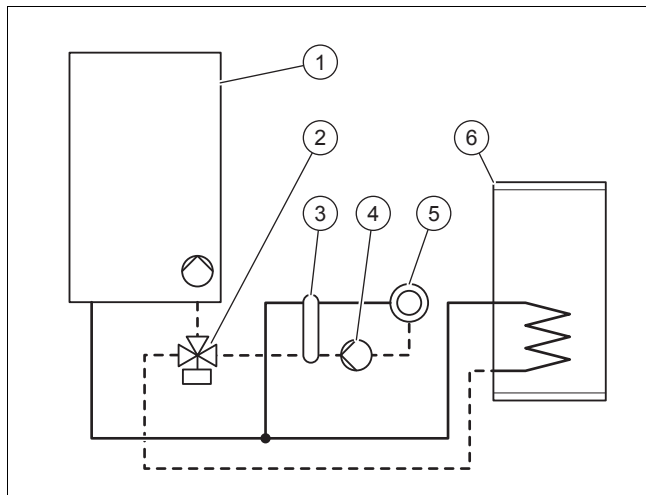
The example of a basic installation diagram that is shown in the appendix does not replace any correct and expert system planning. (→ Page 66)

The settings for the internal pump are made at the factory.

- ▶ Ensure that there is sufficient dimensioning for the connections and the domestic hot water cylinder. (→ Page 23)
- ▶ Connect the external prioritising diverter valve to the plug X13 on the main PCB.
- ▶ In order to control the cylinder's post-heating, connect a VR 10 temperature sensor or a thermostat to the plug that is connected to the main PCB.
Wiring diagram (→ Page 64)

To start up the prioritising diverter valve, it is not necessary to set a diagnostics code. It is directly actuated by the product's main PCB.

7.2.2 Basic system diagram type 2: Decoupled heating circuit plus one directly connected domestic hot water cylinder



- | | | | |
|---|---|---|---|
| 1 | Wall-hung boiler with internal pump | 4 | External pump for the decoupled heating circuit |
| 2 | Prioritising diverter valve | 5 | Heating circuit |
| 3 | Low loss header or plate heat exchanger | 6 | Domestic hot water cylinder |

- ▶ In order to use this basic diagram type, ensure that the minimum flow volumes are guaranteed for the operation. (→ Page 8)

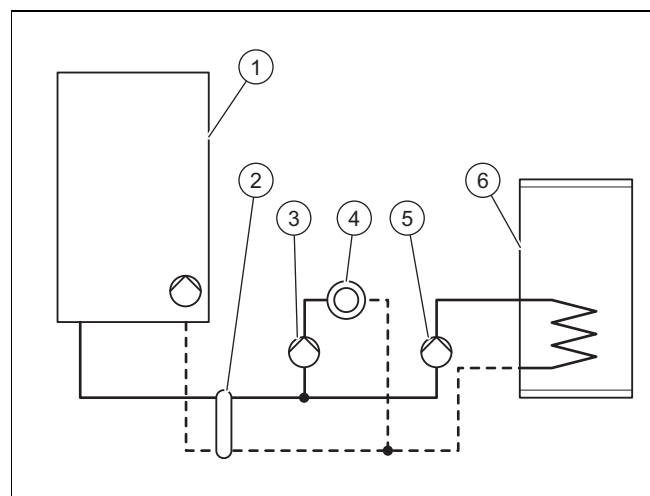
The product can control a decoupled heating circuit and a directly connected domestic hot water cylinder.

Number for the basic diagram	Control system	Number of circuits	Carrying out the wiring
0020253238	VRC 700 system control	1	Inform Customer Service.
0020253239	VRC 700 system control VR 70 multi-functional module	2	Inform Customer Service.
0020259027	VRC 700 system control VR 71 multi-functional module	>3	Inform Customer Service.

The settings for the internal pump are made at the factory.

- ▶ Ensure that there is sufficient dimensioning for the connections and the domestic hot water cylinder. (→ Page 23)
- ▶ Downstream of the low loss header, select a heating pump that is appropriate for the installation.
- ▶ Connect the external pump for the decoupled heating circuit to the plug X16 for the main PCB.
- ▶ Connect the external prioritising diverter valve to the plug X13 on the main PCB.
- ▶ Connect the temperature sensor for the low loss header to plug X41 on the main PCB. Observe the instructions for the low loss header.
- ▶ In order to control the cylinder's post-heating, connect a VR 10 temperature sensor or a thermostat to the plug that is connected to the main PCB.
Wiring diagram (→ Page 64)
- ▶ Set diagnostics code D.026 to 2.
Overview of diagnostics codes (Validity: VU 446/5-5 (H-GB) OR VU 606/5-5 (H-GB)) (→ Page 55)

7.2.3 Basic system diagram type 3: Decoupled heating circuit plus one decoupled domestic hot water cylinder



- | | | | |
|---|---|---|---|
| 1 | Wall-hung boiler with internal pump | 3 | External pump for the decoupled heating circuit |
| 2 | Low loss header or plate heat exchanger | | |

- 4 Heating circuit
- 5 External pump for the decoupled domestic hot water circuit
- 6 Domestic hot water cylinder

The product can control a decoupled heating circuit and a decoupled domestic hot water cylinder.

Number for the basic diagram	Control system	Number of circuits	Carrying out the wiring
0020259029	VRC 700 system control	1	Inform Customer Service.
0020259030	VRC 700 system control VR 70 multi-functional module	2	See appendix or contact customer service for special basic diagrams.
0020259031	VRC 700 system control VR 71 multi-functional module	>3	Inform Customer Service.



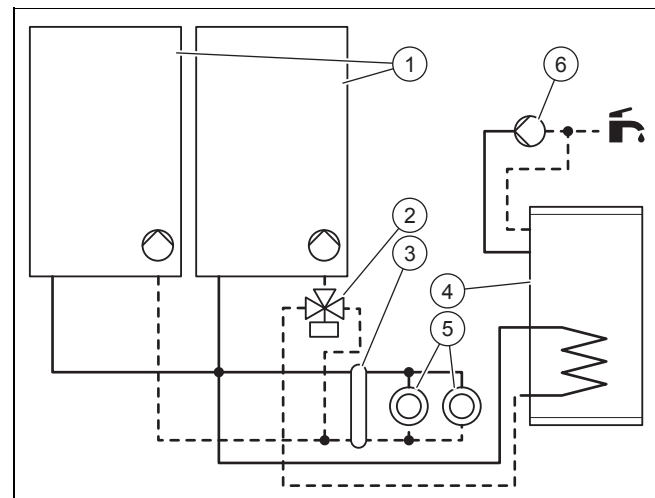
Note

The example of a basic installation diagram that is shown in the appendix does not replace any correct and expert system planning. (→ Page 66)

The settings for the internal pump are made at the factory.

- ▶ Ensure that there is sufficient dimensioning for the connections and the domestic hot water cylinder. (→ Page 23)
- ▶ Downstream of the low loss header, select a heating pump that is appropriate for the installation.
- ▶ Downstream of the low loss header, select a domestic hot water pump that is suitable for the domestic hot water cylinder.
- ▶ Connect the external pump for the decoupled heating circuit to the plug X16 for the main PCB.
- ▶ Connect the pump for the decoupled domestic hot water circuit to the plug X13 for the main PCB.
- ▶ Connect the temperature sensor for the low loss header to plug X41 on the main PCB. Observe the instructions for the low loss header.
- ▶ In order to control the cylinder's post-heating, connect a VR 10 temperature sensor or a thermostat to the plug that is connected to the main PCB.
Wiring diagram (→ Page 64)
- ▶ Set diagnostics code **D.026** to 2.
Overview of diagnostics codes (**Validity:** VU 446/5-5 (H-GB) OR VU 606/5-5 (H-GB)) (→ Page 55)

7.2.4 Basic system diagram type 4: Cascade with two boilers plus one cylinder that is connected to the boiler



- 1 Wall-hung boiler with internal pump
- 2 Prioritising diverter valve
- 3 Low loss header or plate heat exchanger
- 4 Domestic hot water cylinder
- 5 Heating circuits
- 6 External domestic hot water circulation pump

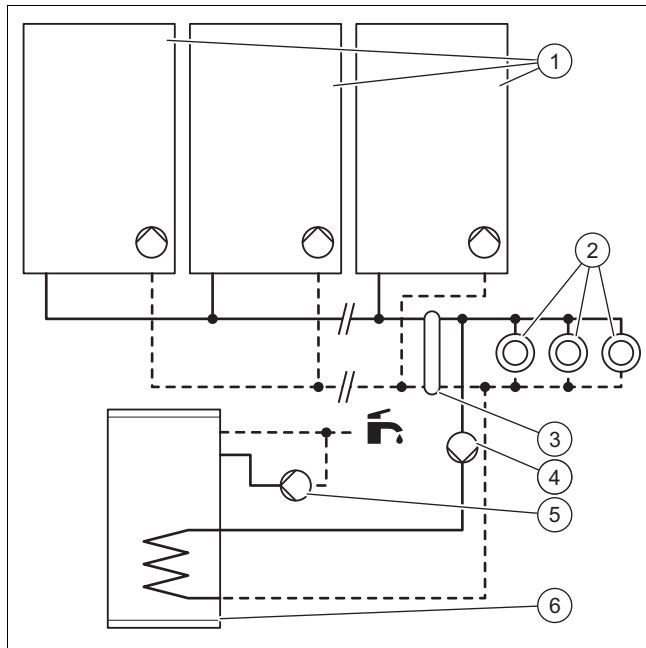
The product can control a cascade system.

Number for the basic diagram	Control system	Number of circuits	Carrying out the wiring
0020259032	VRC 700 system control VR 70 multi-functional module	2	Inform Customer Service.

The settings for the internal pump are made at the factory.

- ▶ Ensure that there is sufficient dimensioning for the connections and the domestic hot water cylinder. (→ Page 23)
- ▶ Connect the domestic hot water circulation pump to the plug X16 on the main PCB.
- ▶ Connect the external prioritising diverter valve to the plug X13 on the main PCB.
- ▶ Connect the temperature sensor for the low loss header to plug X41 on the main PCB. Observe the instructions for the low loss header.
- ▶ In order to control the cylinder's post-heating, connect a VR 10 temperature sensor or a thermostat to the plug that is connected to the main PCB.
Wiring diagram (→ Page 64)
- ▶ Set diagnostics code **D.026** to 1.
Overview of diagnostics codes (**Validity:** VU 446/5-5 (H-GB) OR VU 606/5-5 (H-GB)) (→ Page 55)

7.2.5 Basic system diagram type 5: Cascade with two to seven boilers + a cylinder that is connected to the heating circuit



- | | | | |
|---|---|---|--|
| 1 | Wall-hung boiler with internal pump | 4 | External pump for the decoupled domestic hot water circuit |
| 2 | Heating circuits | 5 | External domestic hot water circulation pump |
| 3 | Low loss header or plate heat exchanger | 6 | Domestic hot water cylinder |

The product can control a cascade system.

Number for the basic diagram	Control system	Number of circuits	Carrying out the wiring
0020259033	VRC 700 system control VR 71 multi-functional module	>3	Inform Customer Service.

The settings for the internal pump are made at the factory.

- ▶ Ensure that there is sufficient dimensioning for the connections and the domestic hot water cylinder. (→ Page 23)
- ▶ Downstream of the low loss header, select a domestic hot water pump that is suitable for the domestic hot water cylinder.
- ▶ Connect the pump for the decoupled domestic hot water circuit to the plug X13 for the main PCB.
- ▶ Connect the temperature sensor for the low loss header to plug X41 on the main PCB. Observe the instructions for the low loss header.
- ▶ In order to control the cylinder's post-heating, connect a VR 10 temperature sensor or a thermostat to the plug that is connected to the main PCB.
Wiring diagram (→ Page 64)
- ▶ Set diagnostics code D.026 to 1.

Overview of diagnostics codes (Validity: VU 446/5-5 (H-GB) OR VU 606/5-5 (H-GB)) (→ Page 55)

7.3 Selecting the domestic hot water cylinder

The product can control an optional domestic hot water cylinder (recommended option for products with an output below 50 kW).

- ▶ Use a low loss header for products that are connected to a domestic hot water cylinder and have a domestic hot water output requirement of over 50 kW, . (→ Page 23)
- ▶ Use the following components to connect the domestic hot water cylinder:

Domestic hot water cylinder

	Cylinder	Internal diameter of the connection
VU 446/5-5 (H-GB)	VIH R 300	20 mm
VU 606/5-5 (H-GB)	VIH R 500	25 mm

7.4 Selecting a low loss header

The low loss header disconnects the heat generator hydraulically from the heating system. This prevents feed head interactions between the individual circulation pumps. Furthermore, the low loss header ensures that a sufficient minimum volume of water continuously circulates through the heat generator.

- ▶ Observe the information on treating heating water. (→ Page 33)
 - ▽ If you cannot guarantee the conditions for treating the heating water, install an external plate heat exchanger to protect the product.

Low loss header

	Heating system spread		
	10 K	15 K	20 K
VU 446/5-5 (H-GB)	WH 95	WH 40-2	WH 40-2
VU 606/5-5 (H-GB)	WH 160	WH 95	WH 40-2

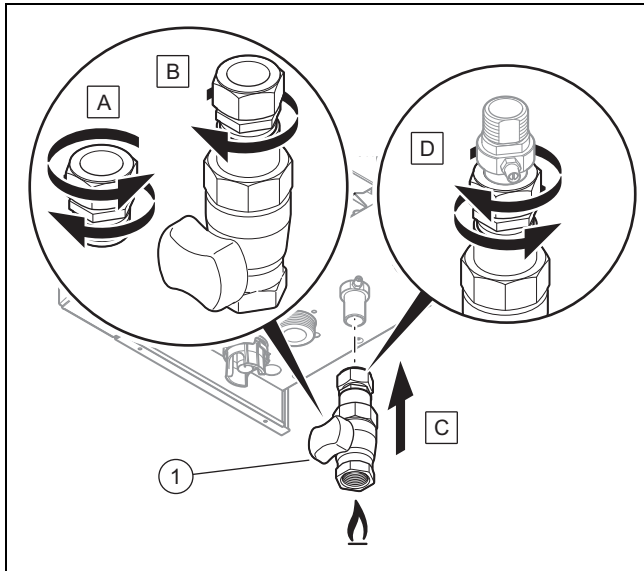
- ▶ Observe the instructions for the low loss header.

You do not require any electronic accessories when using a low loss header. You can connect simple installations directly inside the electronics box.

- ▶ Observe the wiring diagram.
Wiring diagram (→ Page 64)

7.5 Gas connection

- ▶ Do not reduce the gas pipe dimension downstream of the gas meter.
- ▶ Maintain the dimension right up to the product.
- ▶ Select the correct gas stopcock.
- ▶ Remove the residues from the gas pipe by blowing through the gas pipe beforehand.



- ▶ If required, use a suitable sealant.
- ▶ Undo the press connection **(A)**.
- ▶ Secure the gas stopcock to the compression fitting **(B)**.
- ▶ Install the unit **(1)** on the gas pipe at the product's outlet **(C)** by tightening the compression fitting **(D)**.
- ▶ Install the gas pipe such that it is free from mechanical stress in accordance with the recognised rules of technology.
- ▶ Purge the gas pipe before start-up.

7.6 Checking the gas line for leak-tightness

- ▶ Check the entire gas line properly for leak-tightness.

7.6.1 Information on the gas group

In the as-supplied condition, the product is preset for operation with the gas group indicated on the data plate.

Validity: Except Great Britain

If you have a product that has been preset for operation with natural gas, you must convert it to run on liquid gas. You will need a conversion set for this. The conversion procedure is described in the instructions supplied with the conversion set.

7.6.2 Purging the liquid gas tank

If the liquid gas tank is not purged properly, this may result in ignition problems.

- ▶ Ensure that the liquid gas tank has been purged properly before installing the product.
- ▶ If required, contact the filler or the liquid gas supplier.

7.6.3 Using the correct gas type

Using the incorrect gas type may cause fault shutdowns in the product. Ignition and combustion noise may occur in the product.

- ▶ Only use the gas type listed on the data plate.

7.7 Hydraulic connection

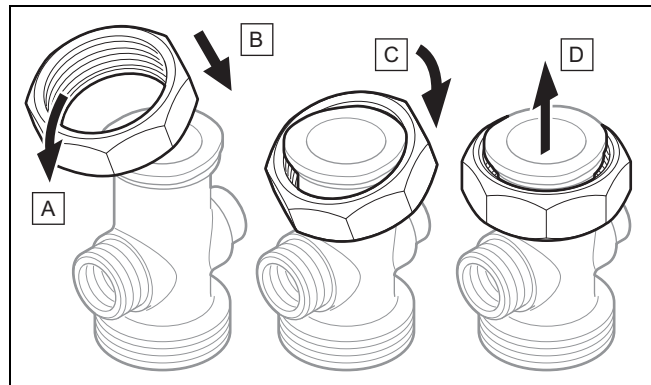


Note

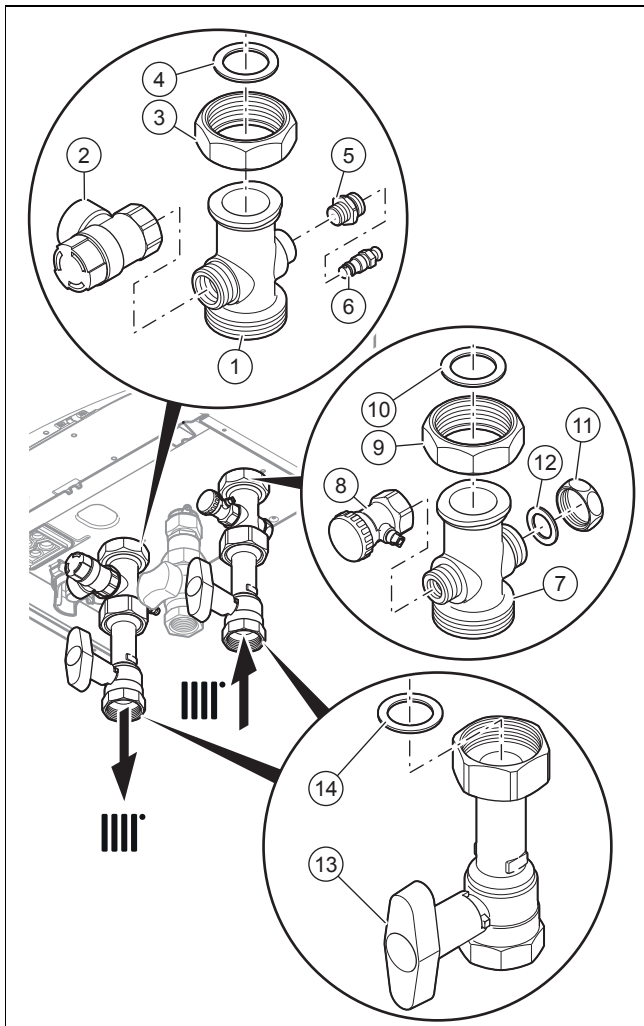
In order to keep heat losses to a minimum, we recommend that you provide heat insulation for the water pipe spigots on the product's outlet and on the installation.

- ▶ If you are using plastic pipes in the heating installation, install a safety cut-out in the heating flow.
 - The safety cut-out is required to protect the heating installation against temperature-related damage if a fault occurs.
- ▶ Connect a control or a safety cut-out to the electronics. (→ Page 29)

7.7.1 Connecting the heating flow and heating return



1. Attach the nut to the connection in accordance with steps **(A)** to **(D)**.



2. Assemble the heating return connection as shown by numbers (7) to (12).
3. Assemble the heating flow connection as shown by numbers (1) to (6).
4. Insert the seals (14).
5. Install the stopcocks (13) at the heating flow and return connection.
6. Connect the heating circuit to the connections for the heating flow and return.
7. Install an expansion vessel in the heating return (11), as close to the product as possible.
 - Ensure that the volumetric capacity of the expansion vessel is sufficient for the system volume.

7.8 Connecting the drainage devices

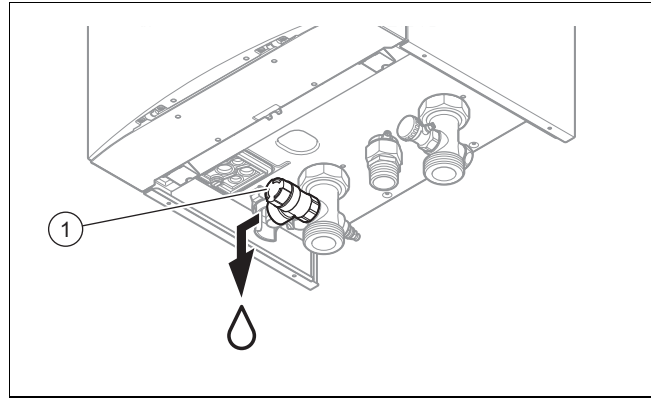


Caution. Risk of water flowing out below the product

The water drains for the rainwater collecting device and the dynamic air separation system are not connected to the waste-water outflow, but water may escape.

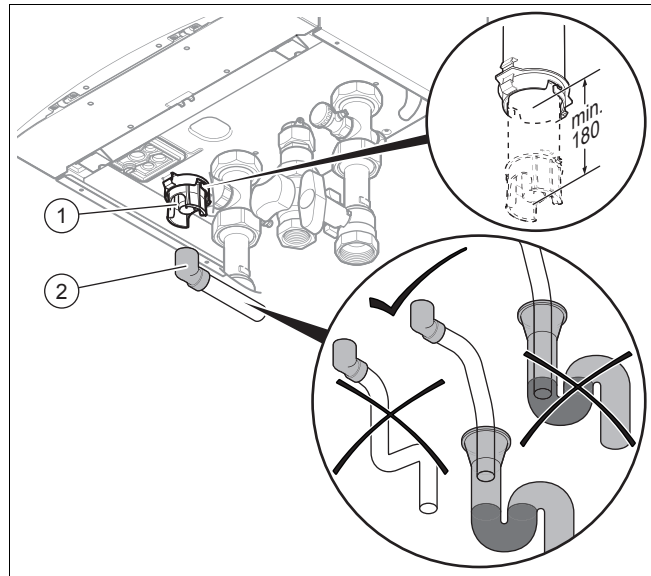
- ▶ Do not place any electrical units or objects that may be damaged by water below the product.

7.8.1 Connecting the drain pipework for the expansion relief valve



1. Connect the expansion relief valve (1) to a suitable draining circuit. Make sure that the drain hose remains open to the surrounding air.
2. Lay drain pipework for the expansion relief valve that is as short as possible, at a downward gradient.
3. Terminate the drain pipework in such a way that escaping water or steam cannot cause injury to persons or damage to electronic components.
4. Make sure that the line end is visible.

7.9 Connecting the condensate discharge pipe



- ▶ Follow the instructions listed here and observe the legal and local regulations on condensate discharge.
- ▶ Use PVC or any other material that is suitable for draining the non-neutralised condensate.
- ▶ If you cannot guarantee that the materials from which the condensate discharge pipe is made are suitable, install a system to neutralise the condensate.
 - The condensate drain pipework must have a continuous fall (45 mm per metre) and should whenever possible terminate at a suitable drain point within the heated envelope of the building that will remain frost free under long periods of low external temperatures.



Note

Ensure that the connection between the condensate discharge pipe and the drain hose is not air-tight.

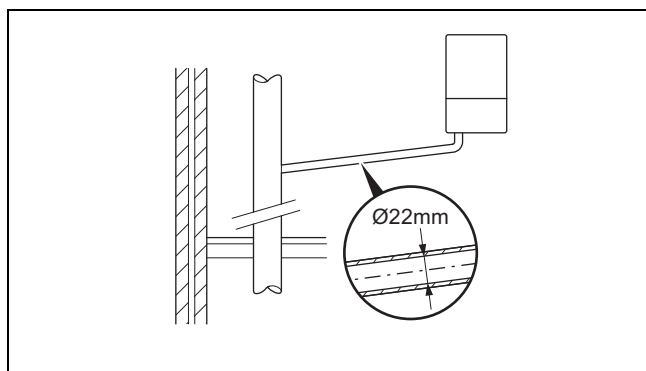
- ▶ Connect the condensate siphon (1). Use the supplied condensate discharge hose (2) to do this.
- ▶ Connect a condensate discharge pipe (21.5 mm, not included in the scope of delivery) to the condensate discharge hose (2).
- ▶ During installation remove all burrs from inside of cut pipe work and avoid excessive adhesive which may trap small pockets of water close to the pipe wall which can freeze and build into a larger ice plug.
- ▶ As with other pipe work insulate the condensate discharge pipe to minimise any risk of freezing and beware when crossing cavities that the fall is maintained and the pipe sleeved.

You can find further information in specification "BS 6798" for installing and maintaining gas-fired boilers with a nominal heat input below 70 kW.

7.9.1 Overview of the condensate discharge systems

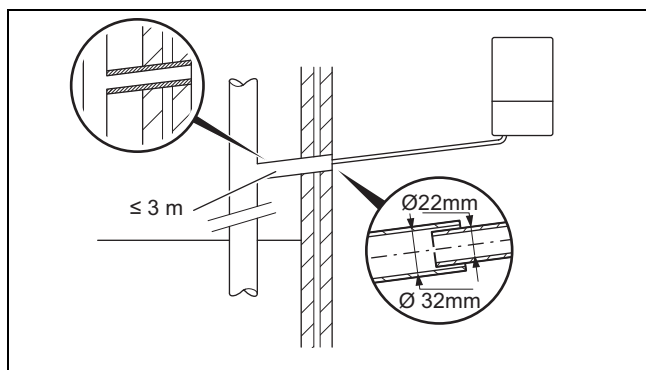
Validity: Great Britain OR Ireland

7.9.1.1 Direct Connection to internal soil and vent stack

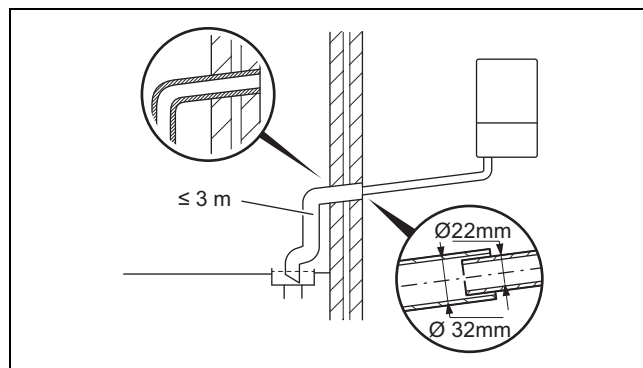


Preferred option

7.9.1.2 Direct connection to external soil and vent stack

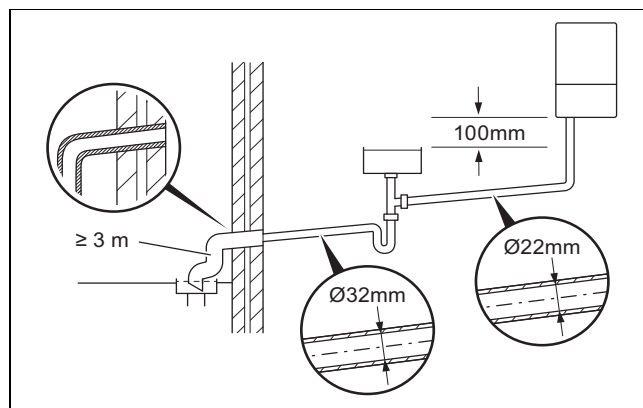


7.9.1.3 External termination to gully or hopper



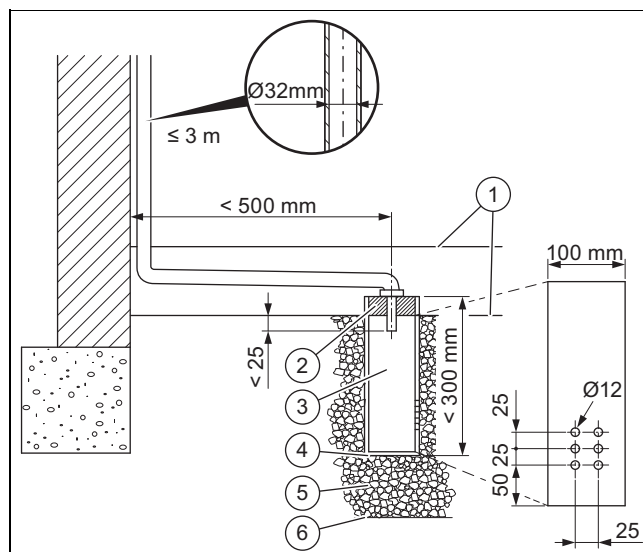
Best practice

7.9.1.4 Internal termination into combined sink waste



Preferred option for external termination

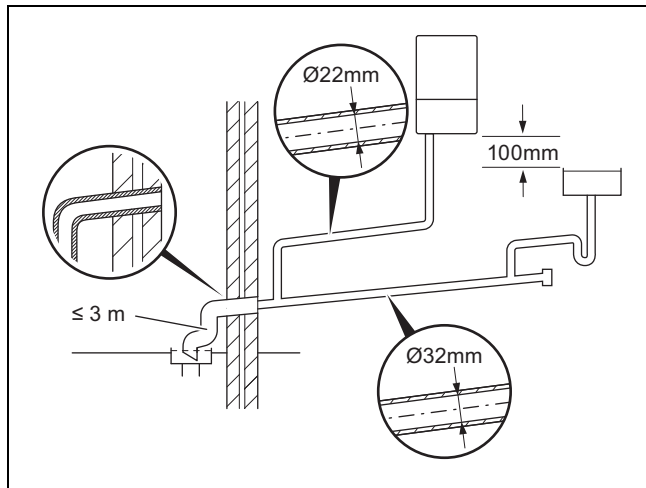
7.9.1.5 External termination into soakaway



- | | | | |
|---|-------------------------------|---|---------------------------|
| 1 | Ground (either/or) | 4 | Bottom of sealed tube |
| 2 | Seal | 5 | Limestone chippings |
| 3 | Plastic tube, 100 mm diameter | 6 | Hole depth 400 mm minimum |

Least preferred option, must not terminate in rain water drain

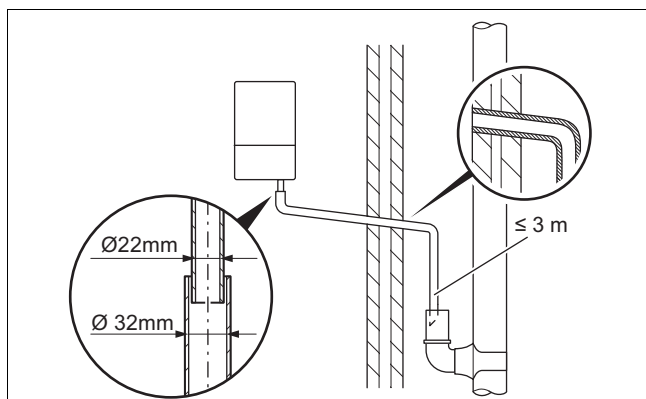
7.9.1.6 Internal termination downstream of sink waste



Open end of pipe direct into gully below ground level but above water level

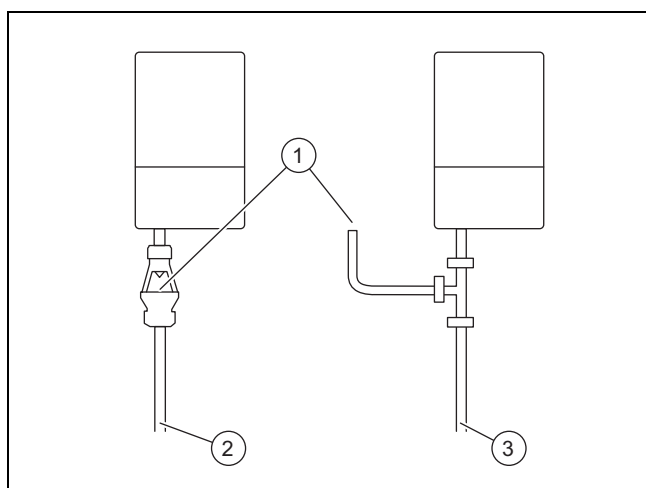
Susceptible to siphonage, must terminate in a gully

7.9.1.7 External termination into rain water down pipe



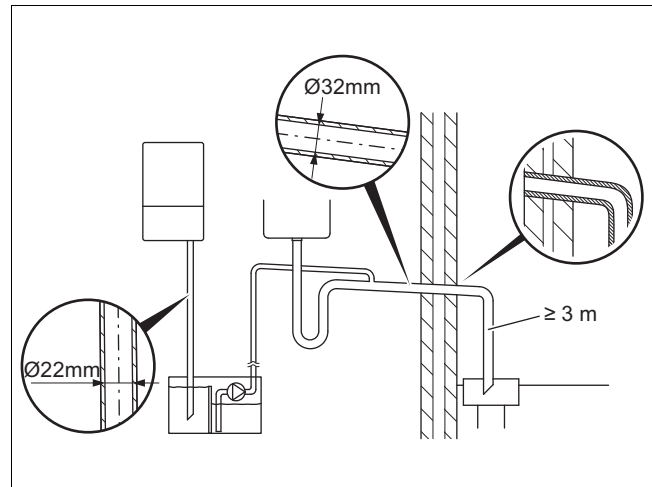
NB only combined foul/rainwater drain

7.9.1.8 Additional methods of introducing air breaks



- 1 Air break
- 2 Using a tundish
- 3 Using a pipe

7.9.1.9 Connection of condensate pump



Preferred option for external connection

7.10 Flue installation

7.10.1 Installing and connecting the air/flue pipe

1. You can find out which air/flue pipes may be used by consulting the enclosed set-up instructions for the air/flue system.

Condition: Product installed individually in living rooms

- Observe the information on positioning the air/flue terminal.

Condition: Product installed in cascade or in business spaces

- If the product is installed in cascade or in business spaces, observe the requirements for standard IGEM / UP / 10 for the conditions regarding aerating and installing the attachment for the air/flue pipe.
 - <https://www.vaillant.co.uk>

Condition: Installation in damp rooms

- Connect the product to a room-sealed air/flue system.
 - The combustion air must not be taken from the installation site.



Caution.

Risk of poisoning due to escaping flue gas.

Mineral-oil-based greases can damage the seals.

- Instead of grease, use only water or commercially available soft soap to aid installation.

2. Install the air/flue pipe using the set-up instructions.

7.10.2 B23 installation

Validity: Except Great Britain AND Except Ireland

A flue system for permitted unit type B23 (atmospheric gas-fired wall-hung boilers) requires careful planning and implementation.

- Observe the product's technical data when planning.

- ▶ Use the recognised rules of technology.

7.10.3 Installation with flue non-return flap

When installing a flue non-return flap, you must set the minimum output in order to prevent ignition problems.

- ▶ Use diagnostics code **D.085** to set the minimum output. (→ Page 40)

Setting the minimum output of the product

	D.085 (factory setting)	Setting D.085 for the flue non-return flap
VU 446/5-5 (H-GB)	8 kW	13 kW
VU 606/5-5 (H-GB)	11 kW	16 kW

7.11 Electrical installation

Only qualified electricians may carry out the electrical installation.



Danger!

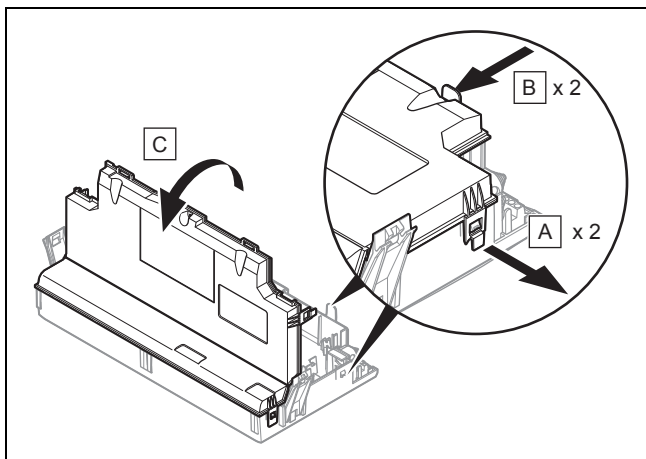
Risk of death from electric shock!

Power supply terminals L and N remain live even if the on/off button is switched off:

- ▶ Disconnect the product from the power supply by switching off all power supplies at all poles (electrical partition with a contact gap of at least 3 mm, e.g. fuse or circuit breaker).
- ▶ Secure against being switched back on again.
- ▶ Wait for at least 3 minutes until the capacitors have discharged.
- ▶ Check that there is no voltage.

7.11.1 Opening the electronics box

1. Remove the front casing. (→ Page 18)



2. Tilt the electronics box forward.
3. Loosen the four clips from the retainers **(A)** and **(B)** on the electronics box.
4. Hinge the cover **(C)** up.

7.11.2 Closing the electronics box

1. Close the cover by pushing it downwards onto the electronics box.
2. Ensure that all of the clips audibly click into the retainers.
3. Tilt the electronics box upwards.

7.11.3 Carrying out the wiring

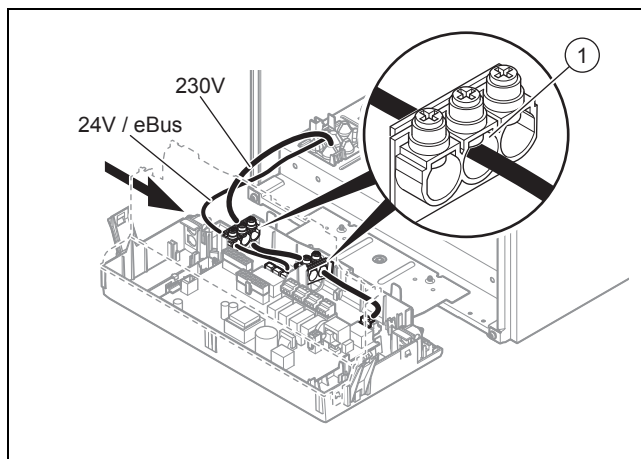


Caution.

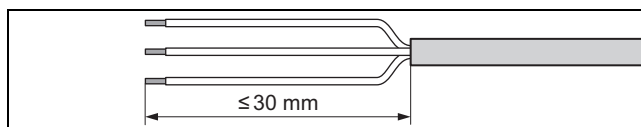
Risk of material damage caused by incorrect installation.

Mains voltage at incorrect terminals and plug terminals may destroy the electronics.

- ▶ Do not connect the eBUS terminals (+/-) to the mains voltage.
- ▶ Only connect the power supply cable to the terminals marked for the purpose.



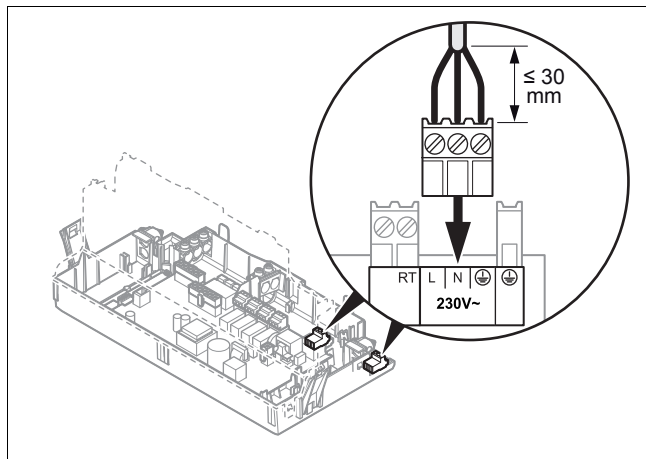
1. Route the connection cables for the components to be connected in the cable trunking on the left of the underside of the product.
2. Use the strain reliefs **(1)**.
3. If required, shorten the connection cables.



4. Strip the flexible line as shown in the figure. In doing so, ensure that the insulation on the individual conductors is not damaged.
5. Only strip inner conductors just enough to establish good, sound connections.
6. To avoid short circuits resulting from loose individual wires, fit conductor end sleeves on the stripped ends of the conductors.
7. Screw the plug to the connection cable.
8. Check whether all conductors are properly fastened to the connection terminals of the plug. Remedy this if necessary.
9. Plug the plug into the slot provided on the PCB in accordance with the wiring diagram in the appendix.

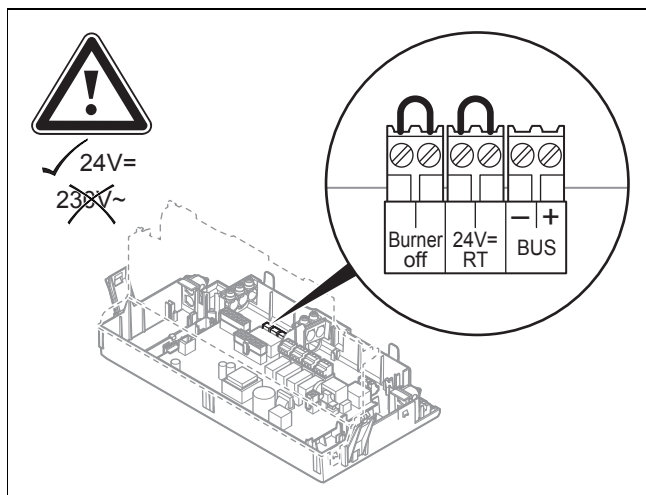
7.11.4 Establishing the power supply

1. Provide one common power supply for the boiler and for the corresponding control:
 - Power supply: Single-phase, 230 V, 50 Hz
 - Fuse protection: ≤ 3 A
2. Observe all valid regulations.
3. Do not interrupt the mains supply with a time switch or programmer.
4. Connect the product using a fixed connection and an electrical partition with a contact gap of at least 3 mm (e.g. fuses or power switches).
5. Isolation should preferably be by a double pole switched fused spur box having a minimum contact separation of 3 mm on each pole. The fused spur box should be readily accessible and preferably adjacent to the boiler. It should be identified as to its use.



6. Use a flexible line for the power supply cable, which is routed through the grommet into the product.
7. Carry out the wiring. (→ Page 28)
8. Screw the supplied plug to a three-core power supply cable that complies with the relevant standards.
9. Plug the plug for the connection cable into the 230V slot on the main PCB.
10. Close the electronics box. (→ Page 28)
11. Make sure that access to the power supply is always available and is not covered or blocked.

7.11.5 Connecting controls to the electronics



1. Open the electronics box. (→ Page 28)
2. Carry out the wiring. (→ Page 28)

3. **Alternatives 1 – Connecting the weather-compensated eBUS control or eBUS room temperature control:**

- ▶ Connect the control to the *BUS* plug.
- ▶ Bridge the 24V=RT plug if it is not already bridged.

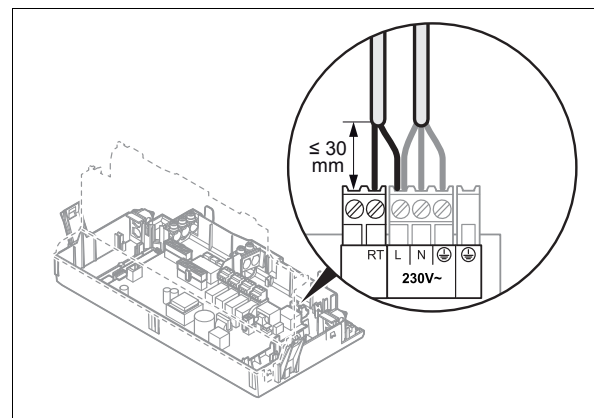
3. **Alternatives 2 – Connecting a 24 V extra low voltage room temperature control:**

- ▶ Instead of the bridge, connect the control to the 24 V plug.

3. **Alternatives 3 – Connecting limit thermostats for the underfloor heating:**

- ▶ Connect the limit thermostat to the *Burner off* plug instead of the bridge.

3. **Alternatives 4 – Connecting the 230 V low voltage room temperature control:**



- ▶ Connect the control to the *L* main plug and to the *RT* plug.
- ▶ Remove the bridge from the 24V=RT plug.

4. Close the electronics box.
5. To trigger the **Comfort** pump operating mode (pump runs permanently) using a multi-circuit control, change the diagnostics code **D.018** pump operating mode from **Eco** (pump runs intermittently) to **Comfort**. (→ Page 40)

7.11.6 Connecting the hydraulic accessory

- ▶ Connect the hydraulic accessory in accordance with the selected basic system diagram. (→ Page 20)

7.11.7 Connecting additional components

You can use the integrated additional relay to actuate an additional component.

You can use the optional multi-functional module to actuate two further additional components.

7.11.7.1 Using the additional relay

1. Connect an additional component directly to the integrated additional relay using the grey plug on the PCB.
2. Carry out the wiring. (→ Page 28)
3. Select **D.026** to actuate the connected component. (→ Page 40)

7.11.7.2 Using the VR 40 (2 in 7 multi-functional module)



1. Install the components in accordance with the respective instructions.
2. Select **D.027** to actuate relay 1 on the multi-functional module. (→ Page 40)
3. Select **D.028** to actuate relay 2 on the multi-functional module. (→ Page 40)

8 Operation

8.1 Operating concept

The operating concept and the display and setting options of the end user level are described in the operating instructions.

8.2 Calling up the installer level

1. Only call up the installer level if you are a competent person.
2. Navigate to **Menu** → **Installer level** and confirm by pressing .
3. Set the value **17** (code) and confirm by pressing .

8.3 Live Monitor (status codes)

Menu → **Live monitor**

Status codes in the display specify the product's current operating mode.

Status codes – Overview (→ Page 58)

9 Start-up

9.1 Carrying out the initial start-up

Validity: Great Britain OR Ireland

Initial start-up must be carried out by a customer service technician or an authorised competent person using the Benchmark Checklist. The Benchmark Checklist in the appendix (→ Page 69) (**Validity:** Great Britain) of the installation instructions must be filled in and stored carefully along with the unit's documentation.

- ▶ Carry out the start-up procedure using the Benchmark Checklist in the appendix.
- ▶ Fill out and sign the Benchmark Checklist.

9.2 Starting up the product

- ▶ Press the product's on/off button.
 - ◀ The basic display appears on the display.

9.3 Calling up appliance config. and diagnostics menu

To recheck and reset the most important system parameters, call up the **Appliance config.** menu item.

Menu → **Installer level** → **Appliance config.**

The setting options for more complex installations can be found in the **Diagnostics menu**.

Menu → **Installer level** → **Diagnostics menu**

Overview of diagnostics codes (**Validity:** VU 446/5-5 (H-GB) OR VU 606/5-5 (H-GB)) (→ Page 55)

9.4 Running the installation assistants





The installation assistant is displayed whenever the product is switched on until it has been successfully completed. It provides direct access to the most important check programmes and configuration settings for starting up the product.

- ▶ Confirm the launch of the installation assistant.
 - ◀ All heating demands are blocked whilst the installation assistant is active.
- ▶ To access the next item, confirm by pressing **Next** in each case.
 - ▽ If you do not confirm the launch of the installation assistant, it is closed 10 seconds after you switch on the unit and the basic display then appears.

9.4.1 Language

- ▶ Set the required language.
- ▶ Press **OK** twice to confirm the set language and to avoid unintentionally changing it.

If you have unintentionally set a language that you do not understand, proceed as follows to change it:

- ▶ Press and hold the  and  buttons at the same time.
- ▶ Also press the reset button for a short time.
- ▶ Press and hold  and  until the display shows the language setting option.
- ▶ Select the required language.
- ▶ Press **OK** twice to confirm this change.

9.4.2 Filling the heating circuit

This function is displayed but it is not yet active for this product type.

9.4.3 Purging the heating installation

Purging (corresponds to check programme **P.00**) is activated automatically by the installation assistant and remains in the display for as long as the purging is active. Without the installation assistant, purging also occurs automatically.

The programme must be carried out once or else the product will not start.

- ▶ If the radiators in the house are equipped with thermostatic valves, ensure that all thermostatic valves are open so that the circuit can be purged effectively.
- ▶ To ensure that the purging takes place correctly, the filling pressure of the heating installation must not fall below the minimum filling pressure.
 - Minimum heating installation filling pressure: 0.08 MPa (0.80 bar)



Note

Check programme **P.00** runs for approx. 6.5 minutes for each circuit.

At the end of the filling procedure, the filling pressure of the heating installation must be at least 0.02 MPa (0.2 bar) above the counter-pressure of the expansion vessel ("Exp") ($P_{\text{Installation}} \geq P_{\text{Exp}} + 0.02 \text{ MPa (0.2 bar)}$).

If, at the end of the purge programme, the flow rate that is achieved is insufficient, fault code **F75** appears in conjunction with diagnostics code **D.149** = 8. The purge programme is considered to have failed and is repeated.

- ▶ Ensure that all of the stopcocks in the hydraulic installation are open.
- ▶ Ensure that the thermostatic valves on the radiators are open.
- ▶ Press the product's reset button to restart an automatic purge programme.
- ▶ Check all connections for tightness.

9.4.4 Setting the target heating temperature

You can use this setting to adjust the required target heating temperature.

9.4.5 Setting the target hot water temperature

This setting is only possible if a domestic hot water cylinder (optional) is installed in the system. This means that the required target hot water temperature can be adjusted (by post-heating the cylinder).

9.4.6 Setting the maximum heating output

The product's maximum heating output can be adjusted to the installation's heat demand. Use diagnostics code **D.000** to set a value that corresponds to the unit output in kW.

9.4.7 Additional relay and multi-functional module

Additional components that are connected to the installation can be adjusted in these menu items. You can use diagnostics codes **D.026**, **D.027** and **D.028** to change the setting.

9.4.8 Telephone: Competent person

You can store your telephone number in the product menu. The end user can view the telephone number. The telephone number can be up to 16 digits long and must not contain any spaces.

9.4.9 Ending the installation assistant

Once the installation assistant has been completed and confirmed, it will not start up automatically next time the unit is switched on.

9.4.10 Restarting the installation assistants

You can restart the installation assistant at any time by calling it up in the menu.

Menu → Installer level → Start inst. assistant

9.5 Using test programmes

As well as the installation assistants, you can also call up the test programmes for start-up, service and troubleshooting.

Menu → Installer level → Test programs

In addition to the **Function menu**, the product comprises an **Electronics self-test** but also **Check programs** (→ Page 33).

9.6 Using check programmes

Menu → Installer level → Test programs → Check programs

You can activate various special functions in the product by using various check programmes.

Display	Meaning
P.00	<p>Purging check programme: The internal pump is cyclically actuated. The heating circuit and the domestic hot water circuit are purged via the air separation system.</p> <p>1 x : Start the heating circuit purging 2 x → : Start the domestic hot water circuit purging 3 x → : Restart the heating circuit purging 1 x (Cancel): End the purge programme</p> <p>Note The purging programme runs for 6.5 minutes per circuit and then terminates.</p>
P.01	<p>Maximum load check programme: After successful ignition, the product is operated at maximum heat input if the flow rate in the heating circuit permits this. Otherwise, the power is reduced in order to adapt to the flow rate.</p>
P.02	<p>Minimum load check programme: After successful ignition, the product is operated at minimum heat input if the flow rate in the heating circuit permits this. Otherwise, the product does not ignite and it remains in waiting mode (status code S.85).</p>



Note

If the product is in error condition, you cannot start any check programmes. You can detect an error condition by the fault symbol shown in the left bottom corner of the display. You must first reset.

To terminate the check programmes, you can select (**Cancel**) at any time; this does not apply for initial start-up, however. The purging cycle must be completely carried out once so that the burner can ignite.

9.7 Descaling the water

Scale deposition increases as the water temperature increases.

- ▶ Descale the water as required.

9.8 Checking and treating the heating water/filling and supplementary water



Caution.

Risk of material damage due to poor-quality heating water

- ▶ Ensure that the heating water is of sufficient quality.

- ▶ Before filling or topping up the installation, check the quality of the heating water.

Checking the quality of the heating water

- ▶ Remove a little water from the heating circuit.
- ▶ Check the appearance of the heating water.
- ▶ If you ascertain that it contains sedimentary materials, you must desludge the installation.
- ▶ Use a magnetic rod to check whether it contains magnetite (iron oxide).
- ▶ If you ascertain that it contains magnetite, clean the installation and apply suitable corrosion-inhibition measures, or fit a magnetic filter.
- ▶ Check the pH value of the removed water at 25 °C.
- ▶ If the value is below 8.2 or above 10.0, clean the installation and treat the heating water.
- ▶ Ensure that oxygen cannot get into the heating water.

Checking the filling and supplementary water

- ▶ Before filling the installation, measure the hardness of the filling and supplementary water.

Treating the filling and supplementary water

- ▶ Observe all applicable national regulations and technical rules when treating the filling and supplementary water.

Provided the national regulations and technical rules do not stipulate more stringent requirements, the following applies:

You must treat the heating water in the following cases

- If the entire filling and supplementary water quantity during the operating life of the system exceeds three times the nominal volume of the heating installation, or
- If the guideline values listed in the following table are not met, or
- If the pH value of the heating water is less than 8.2 or more than 10.0.

Validity: New Zealand

Total heating output	Water hardness at specific system volume ¹⁾					
	≤ 20 l/kW		> 20 l/kW ≤ 50 l/kW		> 50 l/kW	
kW	°dH	mol/m ³	°dH	mol/m ³	°dH	mol/m ³
< 50	< 16.8	< 3	11.2	2	0.11	0.02

Total heating output	Water hardness at specific system volume ¹⁾					
	≤ 20 l/kW		> 20 l/kW ≤ 50 l/kW		> 50 l/kW	
kW	°dH	mol/m ³	°dH	mol/m ³	°dH	mol/m ³
> 50 to ≤ 200	11.2	2	8.4	1.5	0.11	0.02
> 200 to ≤ 600	8.4	1.5	0.11	0.02	0.11	0.02
> 600	0.11	0.02	0.11	0.02	0.11	0.02

1) Nominal capacity in litres/heating output; in the case of multi-boiler systems, the smallest single heating output is to be used.

Validity: Great Britain OR Ireland

Total heating output	Water hardness at specific system volume ¹⁾					
	≤ 20 l/kW		> 20 l/kW ≤ 50 l/kW		> 50 l/kW	
kW	ppm CaCO ₃	mol/m ³	ppm CaCO ₃	mol/m ³	ppm CaCO ₃	mol/m ³
< 50	< 300	< 3	200	2	2	0.02
> 50 to ≤ 200	200	2	150	1.5	2	0.02
> 200 to ≤ 600	150	1.5	2	0.02	2	0.02
> 600	2	0.02	2	0.02	2	0.02

1) Nominal capacity in litres/heating output; in the case of multi-boiler systems, the smallest single heating output is to be used.

Validity: Great Britain OR Ireland OR New Zealand



Caution.

Risk of material damage if the heating water is treated with unsuitable additives.

Unsuitable additives may cause changes in the components, noises in heating mode and possibly subsequent damage.

- ▶ Do not use any unsuitable antifreeze and corrosion inhibitors, biocides or sealants.

No incompatibility with our products has been detected to date with proper use of the following additives.

- ▶ When using additives, follow the manufacturer's instructions without exception.

We accept no liability for the compatibility of any additive or its effectiveness in the rest of the heating system.

Additives for cleaning measures (subsequent flushing required)

- Adey MC3+
- Adey MC5
- Fernox F3
- Sentinel X 300
- Sentinel X 400

Additives intended to remain permanently in the installation

- Adey MC1+
- Fernox F1
- Fernox F2

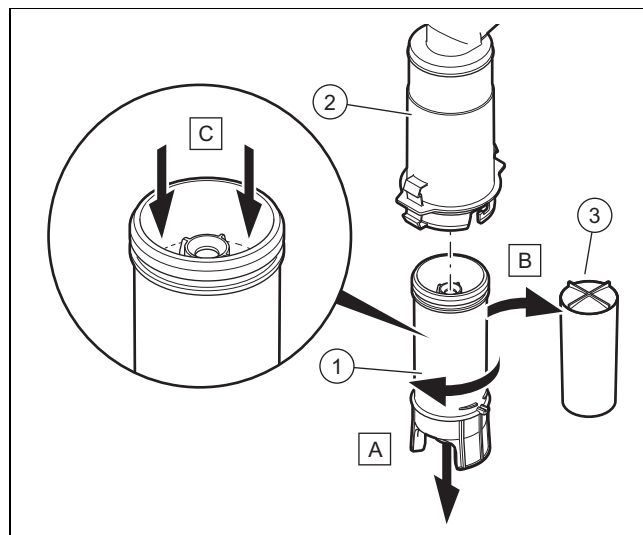
- Sentinel X 100
- Sentinel X 200

Additives for frost protection intended to remain permanently in the installation

- Adey MC ZERO
- Fernox Antifreeze Alphi 11
- Sentinel X 500

- ▶ If you have used the above-mentioned additives, inform the end user about the measures that are required.
- ▶ Inform the end user about the measures required for frost protection.

9.9 Filling the condensate siphon



1. Unclip the lower section of the siphon (1) from the upper section of the siphon (2) without removing the product's front casing.
2. Remove the float (3).
3. Fill the lower section of the siphon with water up to 10 mm below the upper edge of the condensate discharge pipe.
4. Re-insert the float (3).



Note

Check whether the float is present in the condensate siphon.

5. Clip the lower section of the siphon (1) into the upper section of the siphon (2).

9.10 Preventing low water pressure

To prevent damage to the heating installation that is caused by low filling pressure, the product is fitted with a water pressure sensor. If the filling pressure falls below 0.1 MPa (1.0 bar), the product indicates low pressure by displaying a flashing pressure value. If the filling pressure falls below 0.05 MPa (0.5 bar), the product switches off. The display shows **F.22**.

- ▶ Top up the heating water to start the product up again.

The pressure value flashes on the display until a pressure of 0.11 MPa (1.1 bar) or higher has been reached.

- ▶ If you notice frequent drops in pressure, determine and eliminate the cause.

The purging function is automatically active after a filling procedure.

9.11 Flushing the heating installation for the first time ("cold")

Validity: Great Britain OR Ireland



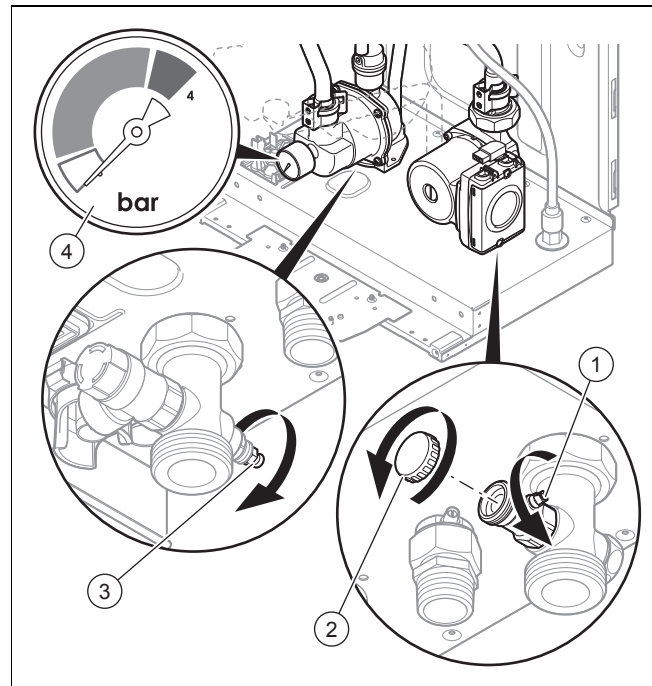
Note

The complete heating system must be flushed at least twice: Once with cold water and once with hot water in accordance with the following instructions.

1. Check whether all thermostatic radiator valves and both service valves on the product are open.
2. Connect a hose to the drain valve that is located at the lowest position in the heating system.
3. Open the radiator valves and the drain valves so that the water can drain quickly. Start at the next point in the installation and open the purging valves on the radiators so that the contaminated water can completely drain.
4. Close the draining cocks.
5. Refill the heating system with water.
6. Check that the expansion relief valve of the heating system is functioning correctly by turning the handle on the valve.
7. Check the pressure in the heating system and top up with water if necessary.
8. Close the filling valve and the cold water tap.

9.12 Filling the heating installation

1. Flush the heating installation thoroughly before filling it.
2. Observe the information on treating heating water. (→ Page 33)
 - ▽ If you cannot guarantee the conditions for treating the heating water, install an external plate heat exchanger to protect the product.



3. Open the plugs (2) and then connect the filling/draining cock connection to a heating water supply in accordance with the relevant standards.
4. Open the heating water supply.
5. Open all thermostatic radiator valves.
6. If necessary, check that both service valves on the product are open.
7. Slowly open the filling/draining cock (1) so that the water flows into the heating installation.
8. Open the air separator (3) and wait until the water flows out of the air separator without bubbles.
9. Purge all of the radiators until the entire heating installation is filled with water.
10. Close all purging valves.
11. Use the manometer (4) to monitor the rising filling pressure in the heating installation.
 - To optimise the purging, the pressure should be limited in such a way that it lies in the first third of the grey display field on the manometer. Once the purging procedure is complete, the digital manometer can be used to set the hydraulic pressure depending on the distribution network (required feed head, multilevel installation, etc.).
12. Fill it with water until the required filling pressure is reached.

Filling pressure

	Recommended filling pressure	Maximum filling pressure
VU 446/5-5 (H-GB)	0.15 to 0.25 MPa (1.50 to 2.50 bar)	< 0.40 MPa (< 4.00 bar)
VU 606/5-5 (H-GB)	0.15 to 0.25 MPa (1.50 to 2.50 bar)	< 0.40 MPa (< 4.00 bar)

13. Close the filling/draining cock and the heating water supply.
14. Check all of the connections and the entire circuit for leaks.

9.13 Gas inspection

9.13.1 Checking the factory setting



Caution.

An incorrect gas type setting may cause malfunctions or a reduction in the service life of the product.

If the product design does not match the local gas type, this may lead to malfunctions or to some components wearing prematurely.

- ▶ Before you start up the product, compare the gas type information on the data plate with the gas type group available at the installation site.

The product's combustion has been factory tested and is preset for operation with the gas type indicated on the data plate. In some supply areas, these settings may need to be adjusted at the installation site.

Condition: The product design is not compatible with the local gas type

- ▶ Do not start up the product.
- ▶ Carry out a gas conversion in accordance with your installation.

Condition: The product design is compatible with the local gas type

- ▶ Proceed as described below.

9.13.2 Checking the air/flue pipe/flue gas recirculation

Validity: Great Britain OR Ireland

- ▶ Check the flue gas installation is intact in accordance with the latest gas safe technical bulletin and information supplied in the installation instructions.
1. For extended flue gas installations check for flue gas recirculation using the air analysis point.
 2. Use a flue gas analyser.
 3. If you discover unusual levels of CO or CO₂ in the supply air, search for the leak in the flue system or for signs of flue gas recirculation.
 4. Eliminate the damage properly.
 5. Check again whether the supply air contains any unusual levels of CO or CO₂.
 6. If you cannot eliminate the damage, do not start up the product.

9.13.3 Checking the gas flow rate

Validity: Great Britain OR Ireland

The boiler is fitted with a multifunctional automatic gas valve which ensures that the precise air/gas ratio is provided under all operating conditions. The gas flow rate has been set during production and does not require adjustment. With the front casing fitted check the gas flow rate of the boiler as follows:

- ▶ Start up the product with the check programme **P.01**.
- ▶ In addition, ensure that maximum heat can be dissipated into the heating system by turning up the room thermostat.

- ▶ Wait at least 5 minutes until the boiler has reached its operating temperature.
- ▶ Ensure that all other gas appliances in the property are turned off.
- ▶ Measure the gas flow rate at the gas meter.
- ▶ Compare the measured values with the corresponding values in the table.

Validity: VU 446/5-5 (H-GB)

Qnw from the data plate	H gas in m ³ /h			P gas in m ³ /h		
	Nom.	+5%	-10%	Nom.	+5%	-10%
8.1	0.86	0.90	0.77	-	-	-
9.5	-	-	-	0.39	0.41	0.35
26.7	2.82	2.96	2.54	-	-	-
27.4	-	-	-	1.19	1.25	1.07
45.2	4.78	5.02	4.30	1.85	1.94	1.67

Validity: VU 606/5-5 (H-GB)

Qnw from the data plate	H gas in m ³ /h			P gas in m ³ /h		
	Nom.	+5%	-10%	Nom.	+5%	-10%
11.3	1.19	1.25	1.08	0.46	0.49	0.42
35.7	3.77	3.96	3.39	1.46	1.53	1.31
60.0	6.34	6.66	5.71	2.45	2.58	2.21

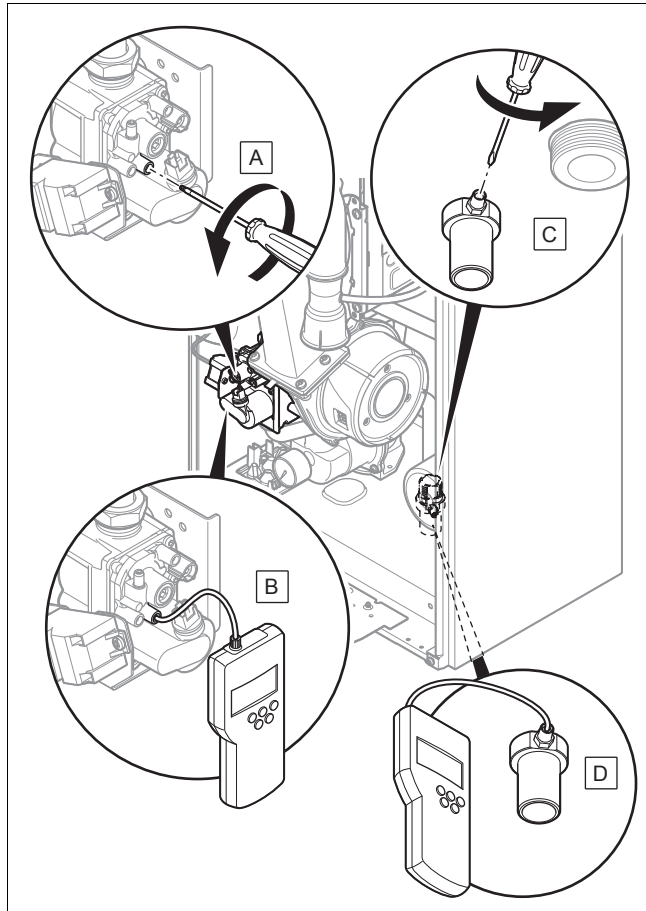
Condition: Gas flow rate not in the permissible range

- ▶ Check all of the piping and ensure that the gas flow rates are correct.
- ▶ Only put the product into operation once the gas flow rates have been corrected.

Condition: Gas flow rate in the permissible range

- ▶ End check programme **P.01**.
- ▶ Allow the boiler to cool down by allowing pump overrun to operate for a minimum of two minutes.
- ▶ Record the boiler maximum gas flow rate onto the Benchmark gas boiler commissioning checklist.

9.13.4 Checking the gas flow pressure



1. Ensure that the gas inlet working pressure can be obtained with all other gas appliances in the property working.
2. Close the gas stopcock.
3. **Alternatives 1 – Measuring the gas pressure at the gas valve assembly::**
 - ▶ Undo the test nipple screw **(A)** on the gas valve assembly.
 - ▶ Connect a digital manometer or U-tube manometer **(B)**.
3. **Alternatives 2 – Measuring the gas pressure at the gas connection::**
 - ▶ Undo the test nipple screw **(C)** at the gas connection.
 - ▶ Connect a digital manometer or U-tube manometer **(D)**.
4. Open the gas stopcock.
5. Open the hydraulic circuit's valves.
6. Start up the product with the check programme **P.01**.
7. In addition, ensure that maximum heat can be dissipated into the heating system by turning up the room thermostat.
8. With the boiler operating at full load check that the gas inlet working pressure at the reference test point **(1)** complies with the requirements.

Gas connection pressure/gas flow pressure difference for natural gas H

	Permitted gas flow pressure that is measured at point (D)	Permitted gas flow pressure that is measured at point (B)
VU 446/5-5 (H-GB)	1.70 to 2.50 kPa (17.00 to 25.00 mbar)	1.60 to 2.40 kPa (16.00 to 24.00 mbar)
VU 606/5-5 (H-GB)	1.70 to 2.50 kPa (17.00 to 25.00 mbar)	1.55 to 2.35 kPa (15.50 to 23.50 mbar)

Gas connection pressure/gas flow pressure difference for liquefied petroleum gas P

	Permitted gas flow pressure that is measured at point (D)	Permitted gas flow pressure that is measured at point (B)
VU 446/5-5 (H-GB)	2.50 to 4.50 kPa (25.00 to 45.00 mbar)	2.45 to 4.45 kPa (24.50 to 44.50 mbar)
VU 606/5-5 (H-GB)	2.50 to 4.50 kPa (25.00 to 45.00 mbar)	2.35 to 4.35 kPa (23.50 to 43.50 mbar)

9. Should the pressure recorded at the reference test point in the boiler be lower than indicated check if there is any blockage in the pipework or if the pipework is undersized.

Condition: Gas flow pressure not in the permissible range



Caution.

Risk of material damage and operating faults caused by incorrect gas flow pressure.

If the gas flow pressure lies outside the permissible range, this can cause operating faults in and damage to the product.

- ▶ Do not make any adjustments to the product.
 - ▶ Check the gas installation.
 - ▶ Do not start up the product.
-
- ▶ If you cannot correct the failure, notify the gas supply company and proceed as follows:
 - ▶ End check programme **P.01**.
 - ▶ Allow the boiler to cool down by allowing pump overrun to operate for a minimum of two minutes.
 - ▶ Close the gas stopcock.
 - ▶ Remove the pressure gauge and retighten the sealing screw **(A)** or **(C)** for the measuring nipple.
 - ▶ Open the gas stopcock.
 - ▶ Check the test nipple for gas tightness.
 - ▶ Close the gas stopcock.
 - ▶ Install the front casing. (→ Page 18)
 - ▶ Disconnect the product from the power grid.
 - ▶ You must not start up the boiler.

Condition: Gas flow pressure in the permissible range

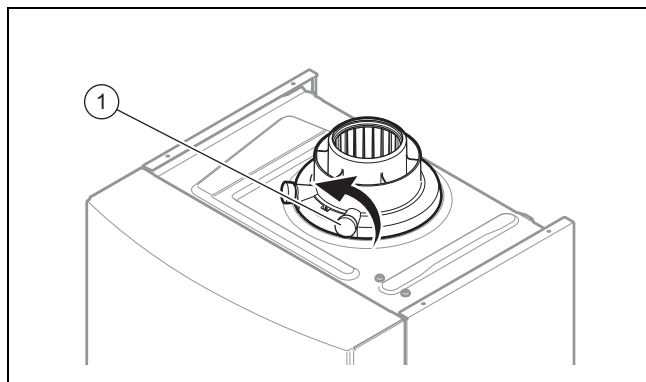
- ▶ End check programme **P.01**.
- ▶ Allow the boiler to cool down allowing pump overrun to operate for a minimum of two minutes.
- ▶ Close the gas stopcock.
- ▶ Remove the pressure gauge and retighten the sealing screw **(A)** or **(C)** for the measuring nipple.
- ▶ Open the gas stopcock.
- ▶ Check the test nipple for gas tightness.
- ▶ Install the front casing. (→ Page 18)
- ▶ Reset boiler controls for normal operation.

Validity: Great Britain OR Ireland

- ▶ Record the appliance gas inlet working pressure (kPa resp. mbar) in the Benchmark gas boiler commissioning checklist.

9.13.5 Checking the CO₂ content and, if necessary, adjusting it (air ratio setting)

1. Ensure that the heating circuit valves are open.
2. Start up the product with the check programme **P.01**.
3. Wait at least five minutes until the product reaches its operating temperature.



4. Use a combustion analyser to measure the CO₂ content at the flue gas analysis point **(1)**.
5. Compare the measured value with the corresponding value in the table.

Set values, natural gas H

		VU 446/5-5 (H-GB)	VU 606/5-5 (H-GB)
CO ₂ after 5 minutes in full load mode with front casing closed	Checking during start-up	9.2 ± 1.0 vol. %	9.2 ± 1.0 vol. %
	Checking after resetting	9.2 ± 0.3 vol. %	9.2 ± 0.3 vol. %
CO ₂ after 5 minutes in full load mode with front casing removed	Checking during start-up	9.0 ± 1.0 vol. %	9.0 ± 1.0 vol. %
	Checking after resetting	9.0 ± 0.3 vol. %	9.0 ± 0.3 vol. %
Set for Wobbe index W ₀		14.1 kW-h/m ³	14.1 kW-h/m ³
O ₂ after 5 minutes in full load mode with front casing closed	Checking during start-up	4.5 ± 1.8 vol. %	4.5 ± 1.8 vol. %
	Checking after resetting	4.5 ± 0.5 vol. %	4.5 ± 0.5 vol. %

	VU 446/5-5 (H-GB)	VU 606/5-5 (H-GB)
CO content	≤ 250 ppm	≤ 250 ppm
CO/CO ₂ content	≤ 0.0031	≤ 0.0031

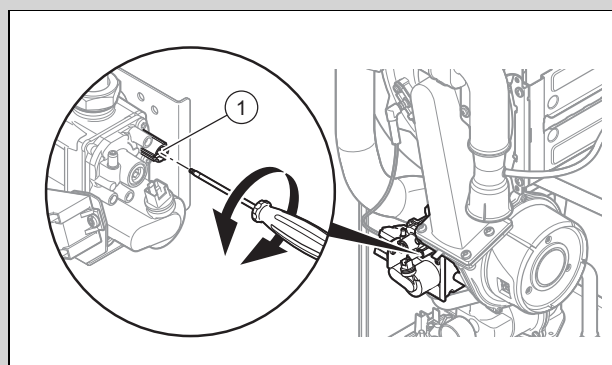
Set values, liquefied petroleum gas P

		VU 446/5-5 (H-GB)	VU 606/5-5 (H-GB)
CO ₂ after 5 minutes in full load mode with front casing closed	Checking during start-up	9.9 ± 1.0 vol. %	10.1 ± 1.0 vol. %
	Checking after resetting	9.9 ± 0.3 vol. %	10.1 ± 0.3 vol. %
CO ₂ after 5 minutes in full load mode with front casing removed	Checking during start-up	9.7 ± 1.0 vol. %	9.9 ± 1.0 vol. %
	Checking after resetting	9.7 ± 0.3 vol. %	9.9 ± 0.3 vol. %
Set for Wobbe index W ₀		21.3 kW-h/m ³	21.3 kW-h/m ³
O ₂ after 5 minutes in full load mode with front casing closed	Checking during start-up	5.9 ± 1.8 vol. %	5.5 ± 1.8 vol. %
	Checking after resetting	5.9 ± 0.5 vol. %	5.5 ± 0.5 vol. %
CO content		≤ 250 ppm	≤ 250 ppm
CO/CO ₂ content		≤ 0.0029	≤ 0.0028

6. Remove the front casing. (→ Page 18)

Validity: VU 446/5-5 (H-GB)

Condition: The CO₂ content must be adjusted



- ▶ Set the CO₂ content (value with front casing removed) by turning the screw **(1)**.
- ▶ Only carry out the adjustment in increments of 1/8 turn and wait approximately 1 minute after each adjustment until the value stabilises.

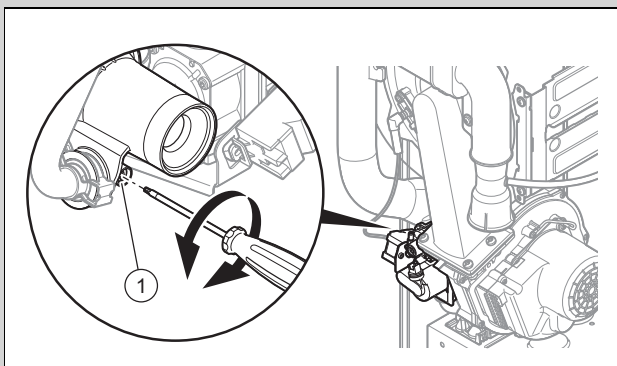


Note

Turn anti-clockwise: Lower CO₂ content
Turn to clockwise: Higher CO₂ content

Validity: VU 606/5-5 (H-GB)

Condition: The CO₂ content must be adjusted



- ▶ Set the CO₂ content (value with front casing removed) by turning the screw (1).
- ▶ Only carry out the adjustment in increments of 1/8 turn and wait approximately 1 minute after each adjustment until the value stabilises.



Note

Turn to the left: Higher CO₂ content
Turn to the right: Lower CO₂ content

7. Once the setting is finished, lock the check programme.
8. If an adjustment is not possible in the specified adjustment range, do not start up the product.
 - Inform Customer Service.
9. Install the front casing. (→ Page 18)

9.13.6 Gas conversion procedure



Note

The conversion procedure is described in the instructions that are included with the conversion set that is supplied with the product.

- ▶ Follow the instructions in the manual for the conversion set to carry out the gas conversion on the product.

9.14 Thoroughly flushing the heating installation ("hot")

Validity: Great Britain OR Ireland

1. Operate the appliance until the boiler and the heating system are up to temperature.
2. Check the heating system for leaks.
3. Connect a hose to the drain valve located at the lowest position of the heating system.
4. Shut off the boiler, open the drain valve and all purge valves on the radiators and allow the water to flow out of the heating system and the boiler quickly and fully.
5. Close the drain valve.
6. Fill the heating system again with water as described in Filling the heating installation and Purging the heating installation.
7. Re-fill the system until the system design pressure of 0,1 MPa (1,0 bar) is attained.



Note

The actual reading on the digital pressure gauge should ideally be 0,05 MPa (0,5 bar) plus an additional pressure corresponding to the highest point of the system above the base of the boiler – 10 m head equals an additional 1 bar reading on the pressure gauge. The minimum pressure should not be less than 0,1 MPa (1 bar) in any installation. If the system is to be treated with an inhibitor it should be applied at this stage in accordance with the manufacturer's instructions

8. Install the front casing.

9.15 Checking leak-tightness

- ▶ Check the gas pipe, the heating circuit and the hot water circuit for leak-tightness.
- ▶ Check that the air/flue pipe has been installed correctly.

Condition: Room-sealed operation

- ▶ Check whether the vacuum chamber has been closed tightly.

9.15.1 Checking the heating mode

1. Ensure that there is a heating demand at the product.
2. Call up **Live monitor**.
Status codes – Overview (→ Page 58)
 - ◁ If the product is working correctly, the display shows **S.04**.

9.15.2 Checking the domestic hot water generation

Condition: Cylinder connected



Danger!

Risk of death from legionella.

Legionella multiply at temperatures below 60 °C.

- ▶ Ensure that the end user is familiar with all of the Anti-legionella measures in order to comply with the applicable regulations regarding legionella prevention.

- ▶ Make sure that the cylinder thermostat is requesting heat.

1. Call up **Live monitor**.
Status codes – Overview (→ Page 58)
 - ◁ If the cylinder charging is carried out correctly, **S.24** appears in the display.
2. If you have connected a control to the installation and you can set the domestic hot water temperature on this control, set the domestic hot water temperature on the boiler to the maximum possible temperature.
3. Adjust the target temperature for the connected domestic hot water cylinder to the control.
 - ◁ The boiler adopts the target temperature which is set on the control.

10 Adapting the unit to the heating installation

To reset the most important system parameters, call up the **Appliance config.** menu item.

Menu → Installer level → Appliance config.

Or manually relaunch the installation assistant.






Menu → Installer level → Start inst. assistant

10.1 Activating diagnostics codes

The setting options for more complex installations can be found in the diagnostics codes.

Menu → Installer level → Diagnostics menu

You can use the parameters that are marked as adjustable in the overview of diagnostics codes to adapt the product to the heating installation and the needs of the customer.

- ▶ Press  or  to change the diagnostics code.
- ▶ Press  (**Select**) to select the parameter to change.
- ▶ Press  or  to change the current setting.
- ▶ Confirm by pressing (**OK**).

10.2 Adapting the heating settings

10.2.1 Setting the maximum heating output

The maximum heating output for the product is set to **Auto** at the factory. If you want to set a fixed maximum heat output, you can use diagnostics code **D.000** to define a value that corresponds to the product output in kW.

10.2.2 Setting the burner anti-cycling time

To prevent frequent switching on and off of the burner and thus prevent energy losses, an electronic restart lockout is activated for a specific period each time the burner is switched off. You can adjust the burner anti-cycling time to the conditions of the heating installation. The burner anti-cycling time is only active for the heating mode. Switching on domestic hot water mode during the burner anti-cycling time has no effect. You can use diagnostics code **D.002** to set the maximum burner anti-cycling time (factory setting: 20 min.). The effective burner anti-cycling times with respect to the target flow temperature and the maximum set burner anti-cycling time can be found in the following table:

T _{Flow} (target) °C	Set maximum burner anti-cycling time min						
	1	5	10	15	20	25	30
30	2.0	4.0	8.5	12.5	16.5	20.5	25.0
35	2.0	4.0	7.5	11.0	15.0	18.5	22.0
40	2.0	3.5	6.5	10.0	13.0	16.5	19.5
45	2.0	3.0	6.0	8.5	11.5	14.0	17.0
50	2.0	3.0	5.0	7.5	9.5	12.0	14.0
55	2.0	2.5	4.5	6.0	8.0	10.0	11.5
60	2.0	2.0	3.5	5.0	6.0	7.5	9.0
65	2.0	1.5	2.5	3.5	4.5	5.5	6.5
70	2.0	1.5	2.0	2.5	2.5	3.0	3.5
75	2.0	1.0	1.0	1.0	1.0	1.0	1.0

T _{Flow} (target) °C	Set maximum burner anti-cycling time min					
	35	40	45	50	55	60
30	29.0	33.0	37.0	41.0	45.0	49.5
35	25.5	29.5	33.0	36.5	40.5	44.0
40	22.5	26.0	29.0	32.0	35.5	38.5
45	19.5	22.5	25.0	27.5	30.5	33.0
50	16.5	18.5	21.0	23.5	25.5	28.0
55	13.5	15.0	17.0	19.0	20.5	22.5
60	10.5	11.5	13.0	14.5	15.5	17.0
65	7.0	8.0	9.0	10.0	11.0	11.5
70	4.0	4.5	5.0	5.5	6.0	6.5
75	1.0	1.0	1.0	1.0	1.0	1.0



Note

The remaining burner anti-cycling time following a regular shutdown in heating mode can be called up under diagnostics code **D.067**.

10.2.3 Resetting the remaining burner anti-cycling time

1st option

Menu → Reset anti-cycl. time

The current burner anti-cycling time appears in the display.

- ▶ Confirm the burner anti-cycling time reset by pressing (**Select**).

2nd option

- ▶ Press the reset button.

10.2.4 Setting the pump overrun and pump mode

You can set the pump overrun under **D.001** (factory setting: 5 min.).

You can use diagnostics code **D.018** to set the pump mode **Comfort** or **Eco**.

In the **Comfort** operating mode, the internal pump is switched on when the heating flow temperature is not at **Heating off** (→ Operating instructions) and the heat demand is enabled via an external control.

The **Eco** operating mode (factory setting) is useful for removing residual heat after hot water generation when the heat demand is extremely low and large target temperature spreads exist between the hot water generation and heating mode target values. This prevents living rooms from being under-supplied. If there is a heat demand, the pump is switched on every 25 minutes for 5 minutes once the overrun time has elapsed.

10.2.5 Setting the heating pump

10.2.5.1 Pump mode setting

The product is equipped with a stage-controlled high-efficiency pump. In the automatic operating mode (**D.014** = 0), the pump stage is controlled in such a way that a constantly available pressure is guaranteed. The target values for the available pressure in mbar can be called up via the diagnostics codes:

- **D.122** for the heating circuit
- **D.148** for the domestic hot water circuit

If required, you can manually set the pump mode to five fixed, selectable stages based on the maximum possible output. This switches the speed regulation off.

- ▶ To change the pump output, change **D.014** to the desired value.



Note

If a low loss header is installed in the heating installation, we recommend switching off the speed regulation and setting the pump output to a fixed value.

10.2.5.2 Help when adjusting a heating installation or when checking the flow rate

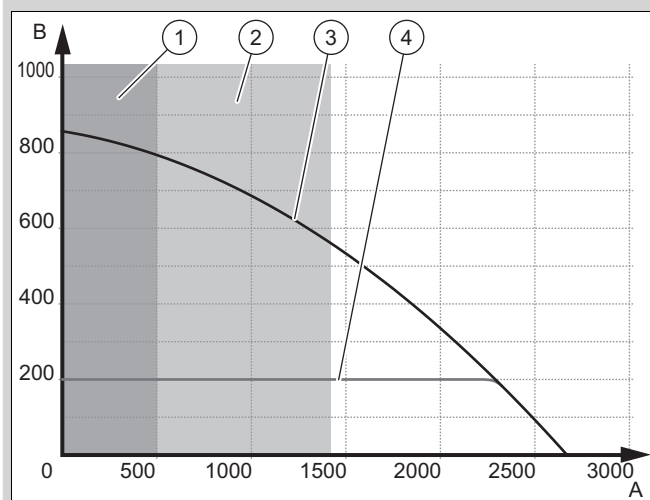
You can use diagnostics code **D.029** to display the flow rate in real time (in l/min).

By setting the automatic pump mode (**D.014** = 0) and defining a target value for the available pressure (e.g. **D.122** = 200 mbar), it is possible to adjust the balancing valves for the various radiators.

- ▶ To guarantee that the pump operates, set a permanent heat demand (using the control or the room thermostat).
- ▶ Insulate each radiator and/or each radiator group, one after the other.
- ▶ Adjust the balancing valve for the circuit by displaying the flow rate via diagnostics code **D.029** in order to achieve the flow rate that is recommended for the properties of the radiator and/or radiator group.

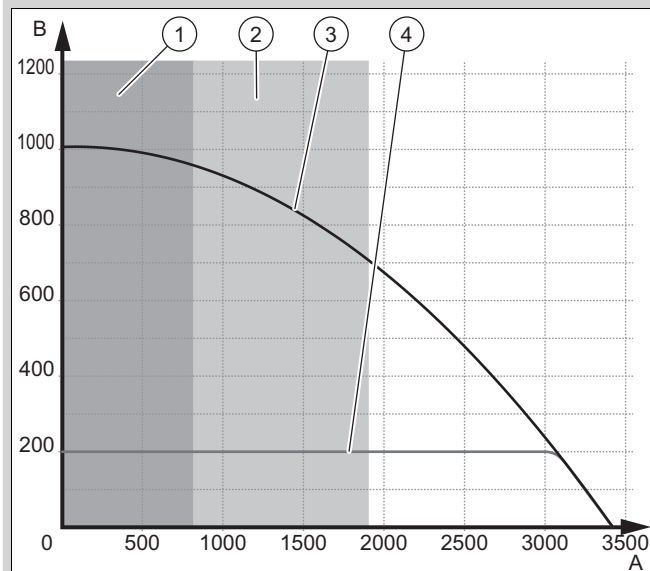
10.2.5.3 Product pump curve and operating range

Validity: VU 446/5-5 (H-GB)



- | | | | |
|---|---|---|-----------------------------------|
| 1 | Flow range without operating the product | 4 | ΔP constant |
| 2 | Operating range with limited flow temperature and power | A | Installation volume flow in l/h |
| 3 | Pump curve at 100% PWM | B | Remaining pump head in hPa (mbar) |

Validity: VU 606/5-5 (H-GB)



- | | | | |
|---|---|---|-----------------------------------|
| 1 | Flow range without operating the product | 4 | ΔP constant |
| 2 | Operating range with limited flow temperature and power | A | Installation volume flow in l/h |
| 3 | Pump curve at 100% PWM | B | Remaining pump head in hPa (mbar) |

In order to guarantee that the product works without any problems, the flow rate is permanently monitored to determine the operating range.


10.2.6 Setting the maximum flow temperature

You can use diagnostics code **D.071** to set the required maximum flow temperature for the heating mode (factory setting: 75 °C).

10.2.7 Setting the return temperature control

If the product is connected to an underfloor heating system, the temperature control setting can be changed from flow temperature control (factory setting) to return temperature control using diagnostics code **D.017**.

10.3 Setting the maintenance interval

If you set the maintenance interval, after a configurable number of burner operating hours, the message that the product must be serviced appears in the display, together with the maintenance symbol .

- ▶ Use diagnostics code **D.084** to set the operating hours until the next maintenance work is due.

You can set the operating hours in increments of ten from 0 to 3010 h (hours).

If you do not set a numerical value but do set the symbol "-", the function **Maintenance messages** is not active.



Note

On completion of the set operating hours, you must set the maintenance interval again.

11 Handing over to the end user

- ▶ At the time of commissioning complete all relevant sections of the Benchmark commissioning checklist, located at the rear of this document.
- ▶ For IE: Complete a "Declaration of Conformity" to indicate compliance to I.S. 813. An example of this is given in the current edition of I.S. 813.
- ▶ When you have finished the installation, affix the enclosed sticker (which requests that the user reads the instructions) to the front of the product in the end user's language.
- ▶ Draw attention, to the current issue of the Gas Safety (Installation and Use) Regulations, Section 35, which imposes a duty of care on all persons who let out any property containing a gas appliance in the UK.
- ▶ Explain to the end user how the safety devices work and where they are located.
- ▶ Inform the end user how to handle the product.
- ▶ In particular, draw attention to the safety warnings that the end user must follow.
- ▶ Inform the end user that they must have the product maintained in accordance with the specified intervals.
- ▶ Pass all of the instructions and documentation for the product to the end user for safe-keeping.
- ▶ Inform the end user about measures taken to ensure the supply of combustion air and flue gas guiding, and instruct the operator that he must not make any changes.
- ▶ Inform the end user that they must not store or use explosive or highly flammable substances (such as petrol, paper or paint) in the installation room of the product.
- ▶ Complete and sign off the Benchmark commissioning check list.
- ▶ Complete and sign off the guarantee documentation.

12 Inspection and maintenance

12.1 Complete Service Interval Record section

Validity: Great Britain OR Ireland

- ▶ After servicing, complete the relevant Service Interval Record section of the Benchmark Checklist located on the inside back pages of this document.

12.2 Using original seals

If you replace components, use only the enclosed original seals; additional sealing materials are not required.

12.3 Inspection and maintenance

- ▶ You must carry out an annual inspection of the product. The annual inspection can be effectively performed without removing components by requesting data from the DIA system, carrying out the simple visual checks indicated in the table in the appendix and performing a flue gas measurement. The maintenance intervals and their scope are determined by the heating engineer based on the condition of the boiler found during the inspection. All inspection and maintenance work should be performed in the order specified in the table in the appendix.

During any inspection and maintenance or after change of parts of the combustion circuit, the following must be checked:

- The boiler has been installed in accordance with the relevant installation instructions.
- The integrity of the flue gas installation and flue seals is in accordance with the relevant flue installation instructions enclosed.
- Visual, the integrity of the boiler combustion circuit and relevant seals (paying particular attention to the burner door seal).
- The gas inlet working pressure at maximum rate.
- The gas flow rates.
- Correctness of electrical, water and gas connections.
- Correctness of the water pressure.
- The condition of the whole system, in particular the condition of radiator valves, evidence of leakage from the heating system and dripping taps.
- ▶ Correct any faults before proceeding.

12.4 Using the function menu

The function menu allows you to actuate and test individual components in the heating installation.

Menu → Installer level → Test programs → Function menu

- ▶ Choose the heating installation components.
- ▶ Confirm by pressing (**Select**).

Display	Test programme	Action
T.01	Check internal pump	The internal heating pump is switched on and off.
T.02	Checking the domestic hot water cylinder charging pump	The domestic hot water cylinder charging pump is switched on and off.
T.03	Check fan	The fan is switched on and off; it runs at maximum speed.

Display	Test programme	Action
T.04	Not active	
T.05	Domestic hot water circulation pump check	The domestic hot water circulation pump is switched on and off.
T.06	Check external pump	The external heating pump (if present) is switched on and off.
T.08	Checking the burner	Product starts up and switches to minimum load. The flow temperature is shown in the display.

- ▶ To terminate the function menu, select (**Cancel**).

12.5 Carrying out electronics self-tests

Menu → Installer level → Test programs → Electronics self-test

The electronic self-test allows for pre-monitoring of the PCBs.

12.6 Checking the electrical plug connections

1. Use the main switch to switch off the product.
2. Disconnect the product from the power supply by switching off the circuit breaker in the case of a fixed connection.

Condition: Product disconnected from the power supply

- ▶ Check that the electrical plug connections and connections are working correctly and are connected correctly.

12.7 Cleaning/checking the components

1. Carry out the preparatory work before cleaning/checking any of the components. (→ Page 43)
2. Carry out the work required to finish the task after cleaning/checking any of the components. (→ Page 47)

12.7.1 Preparing the cleaning and inspection work

1. Decommission the product.
2. Disconnect the product from the power grid.
 - Take all necessary precautions to ensure that it cannot be switched back on again.
3. Remove the front casing. (→ Page 18)
4. Close the gas stopcock.
5. Close the service valves in the heating flow and return.
6. Close the service valve in the cold water pipe.
7. Drain the product when you are carrying out work on hydraulic components.
8. Ensure that water does not drip on live components (e.g. the electronics box).
9. Use only new seals.

12.7.2 Removing the compact thermal module



Danger!
Risk of death and risk of material damage caused by hot flue gas.

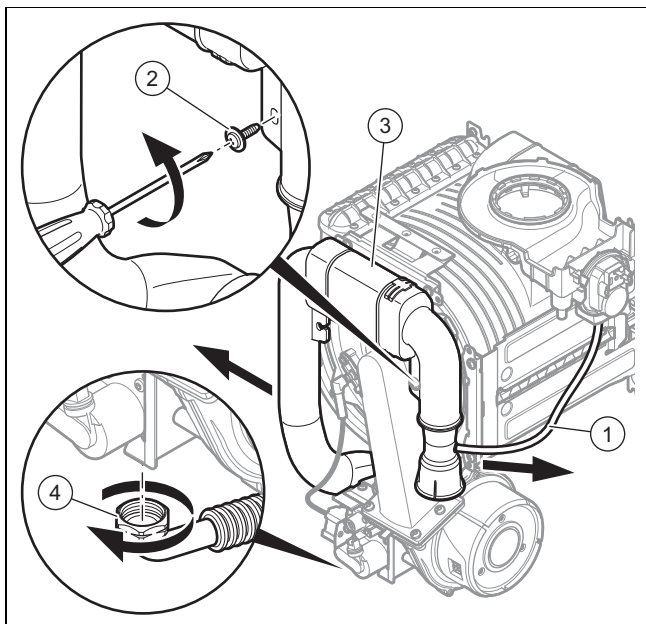
The seal, heat insulation and self-locking nuts on the burner flange must not be damaged. Otherwise, hot flue gases may escape and cause personal injury and material damage.

- ▶ Replace the seal each time you open the burner flange.
- ▶ Replace the self-locking nuts on the burner flange each time you open the burner flange.
- ▶ If the heat insulation on the burner flange or on the back panel of the heat exchanger shows signs of damage, replace the heat insulation.

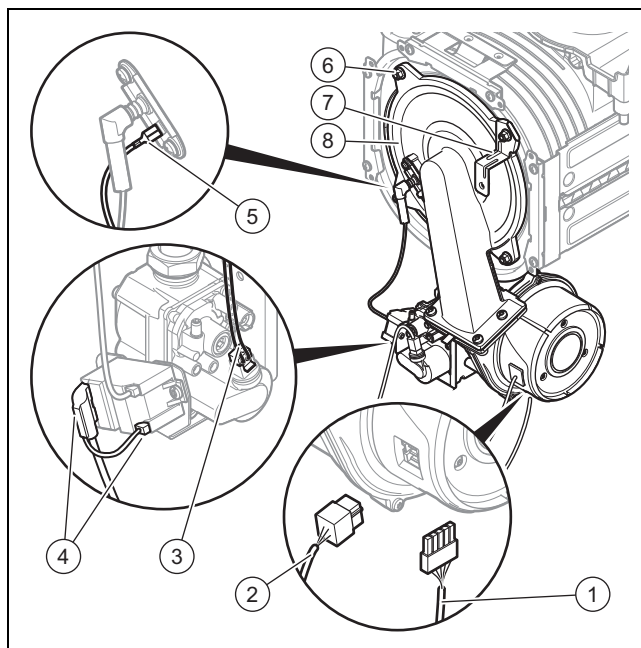


Note
 The compact thermal module consists of five main components:

- Speed-regulated fan,
- Gas valve assembly including support plate,
- Venturi and gas connection pipe,
- Burner flange,
- Premix burner.

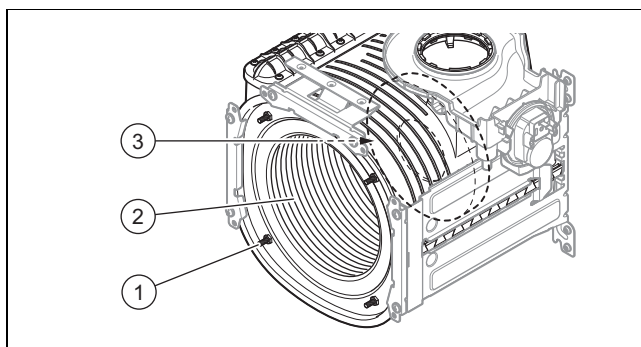


1. Disconnect the test system's silicone pipe for checking the airflow rate (1).
2. Undo the fixing screw (2) and remove the air intake pipe (3) from the intake stub.
3. Unscrew the union nut (4) from the gas valve assembly.



4. Remove the plug for the earth cable (5) from the ignition electrode.
5. Remove the plug (4) from the ignition device.
6. Remove the plugs (1) and (2) from the fan motor by pushing in the latching lug.
7. Remove the plug from the gas valve assembly (3).
8. Unscrew the four nuts (6).
9. Remove the fixing tab (7) for the air intake pipe.
10. Pull the assembly group for the compact thermal module (8) out of the heat exchanger.
11. Check the burner and the heat exchanger for damage and dirt.
12. If necessary, clean or replace the components according to the following sections.
13. Fit a new burner flange seal.
14. Check the insulating mat on the back panel of the heat exchanger.
 - If you notice any signs of damage, replace the insulating mat.
15. Check the insulating material on the burner flange.
 - If you notice any signs of damage, replace the insulating mat.

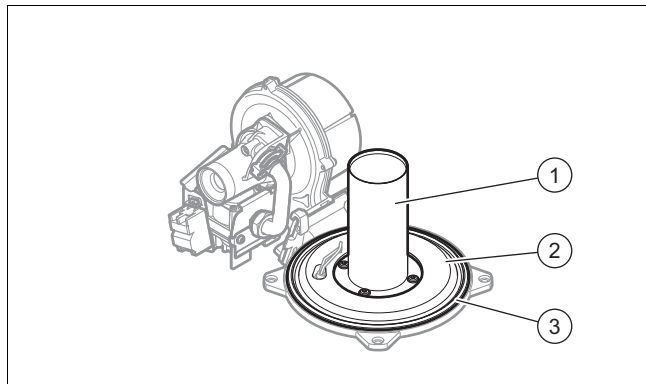
12.7.3 Cleaning the heat exchanger



1. Never undo the four nuts on the threaded pin (1) or tighten them.
2. Clean the spiral immersion heater (2) of the heat exchanger using water or, if required, vinegar (up to a maximum acid content of 5%). Allow the vinegar to act on the heat exchanger for 20 minutes.

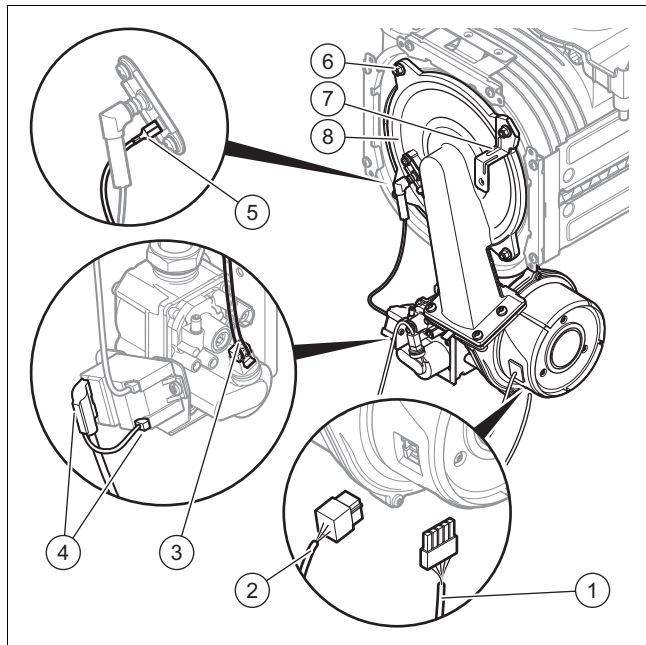
3. Use a plastic brush or sufficiently strong jet of water to remove the loosened dirt. In doing so, ensure that no spraying water reaches the other components. Do not point the jet of water directly at the insulating mat (3) on the back of the heat exchanger.
 - ◁ The water flows via the condensate siphon and out of the heat exchanger.
4. Check the insulating mat on the heat exchanger for damage.
 - ▽ Insulating mat is damaged:
 - ▶ Replace the insulating mat.

12.7.4 Checking the burner



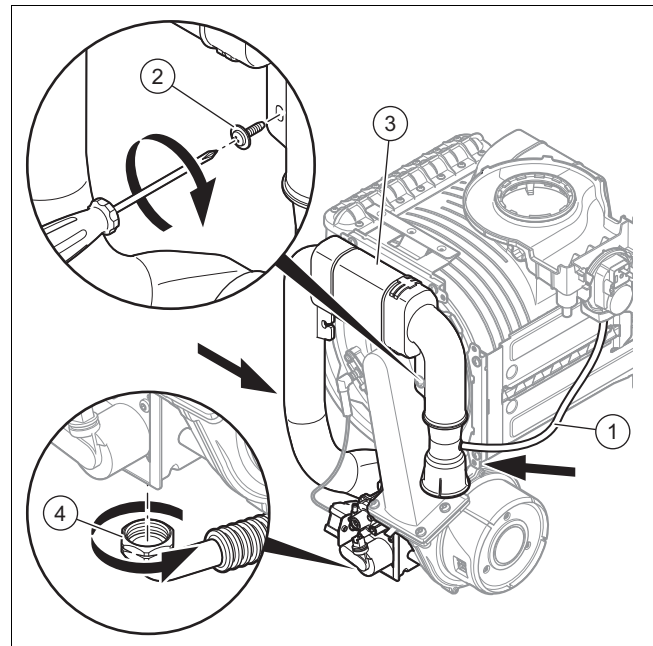
1. Check the surface of the burner (1) for damage. If you see any damage, replace the burner.
2. Check the burner's insulation (2). If required, replace the burner's insulation.
3. Fit a new burner flange seal (3).

12.7.5 Installing the compact thermal module



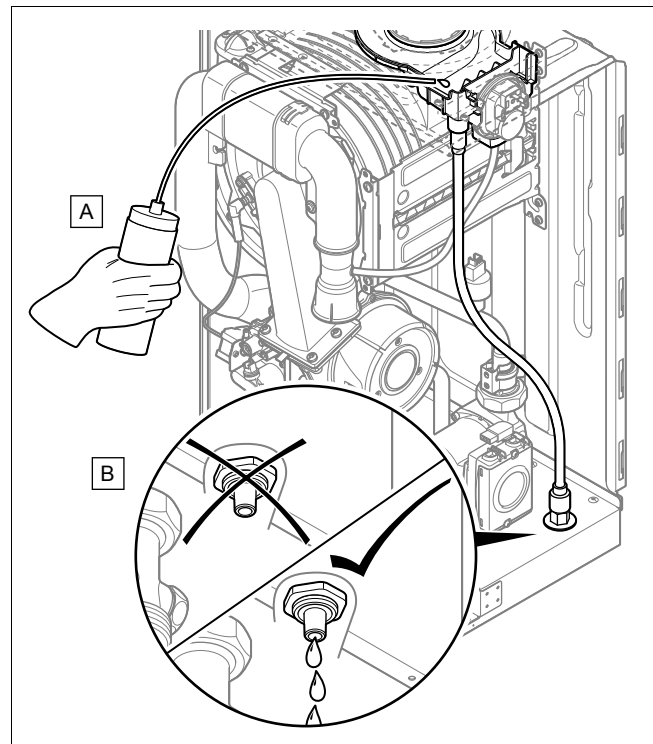
1. Fit the compact thermal module (8) onto the heat exchanger.
2. Attach the fixing tab (7) for the air intake pipe.
3. Tighten the four new nuts (6) across the diagonal until the burner flange fits closely and uniformly onto the mating surfaces.

- Tightening torque: 6 Nm
4. Reconnect the plugs (1), (2), (3), (4) and (5).



5. Connect the gas pipe (4) using a new seal.
6. Open the gas stopcock.
7. Make sure that there are no leaks.
8. Check that the sealing ring in the air intake pipe (3) is positioned correctly in the seal seat.
9. Reconnect the air intake pipe to the intake stub.
10. Secure the air intake pipe using the retaining screw (2).
11. Reconnect the test system's silicone pipe for checking the airflow rate (1).

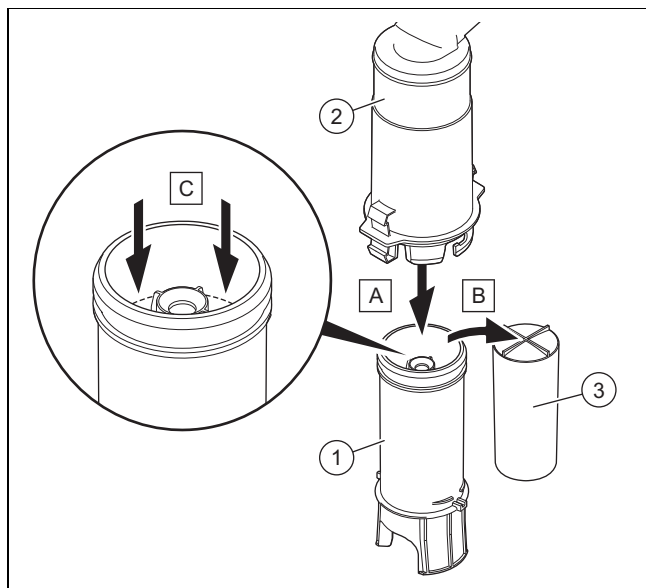
12.7.6 Cleaning the rainwater collector's draining circuit



1. Ensure that the rainwater collector is not dirty or blocked and, if required, clean it.
2. Pour water into the rainwater collector (A).

3. Check whether the water drains correctly via the drain (B).
 - ▽ If the water does not drain correctly, clear out the draining circuit.

12.7.7 Cleaning the condensate siphon



1. Unclip the lower section of the siphon (1) from the upper section of the siphon (2).
2. Remove the float (3).
3. Flush out the float and lower section of the siphon with water.
4. Fill the lower section of the siphon with water up to 10 mm below the upper edge of the condensate discharge pipe.
5. Re-insert the float (3).

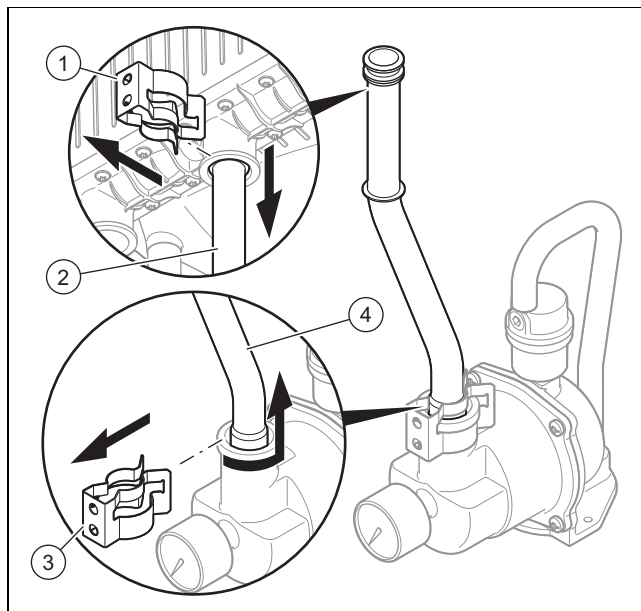


Note

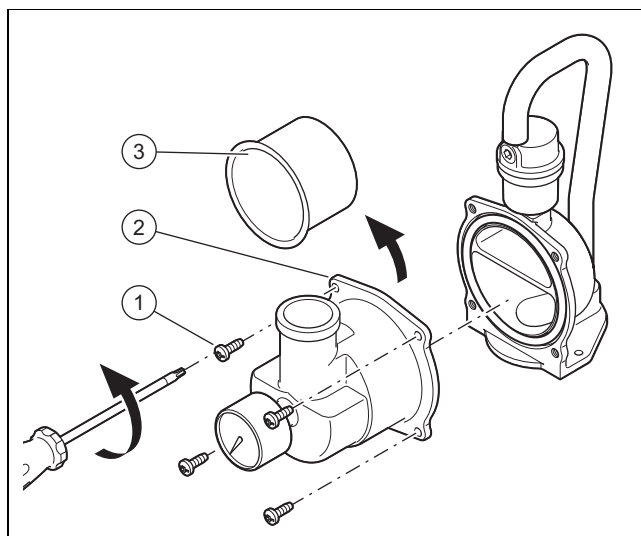
Check that the float is present in the condensate siphon.

6. Clip the lower section of the siphon (1) into the upper section of the siphon (2).

12.7.8 Cleaning the filter in the dynamic air separation system

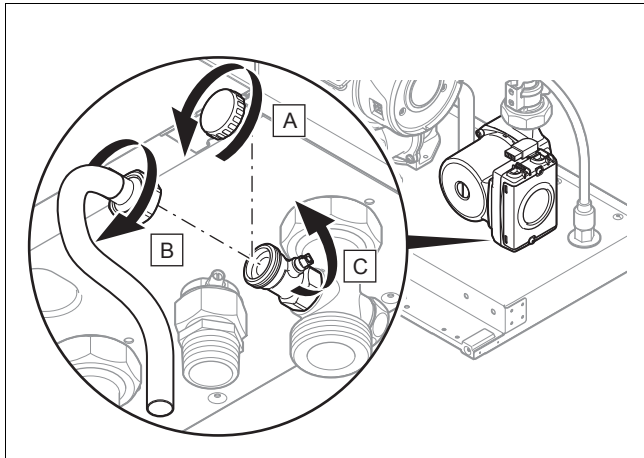


1. Remove the clips (1) and (3).
2. Loosen the upper section of the pipe (2).
3. Then turn and loosen the lower section of the pipe (4).



4. Remove the screws (1).
5. Remove the housing (2) from the air separation system.
6. Clean the filter (3) using hot water.
 - ▽ If the filter is damaged, replace it.
7. Insert the filter into the air separation system.
8. Replace the seal on the air separation system's housing.
9. Reattach the housing for the air separation system and use the screws to secure it in place.
 - Tightening torque: 7.5 Nm
10. Reinsert the pipe and insert the clip.

12.7.9 Draining the product



1. Close the service valves of the product.
2. Remove the cap (A) from the draining cock.
3. Connect a draining hose (B) to the connection on the draining cock.
4. Open the draining cock (C).
5. Use the air separator on the heating flow connection so that the product can be completely drained.

12.7.10 Checking the pre-charge pressure of the external expansion vessel

1. Depressurise the heating installation.
2. Measure the pre-charge pressure of the expansion vessel at the vessel valve.
 - ▽ Expansion vessel pre-charge pressure
 - ≥ 0.075 MPa (≥ 0.750 bar)
 - ▶ Fill the expansion vessel with air at a lower pre-charge pressure (in relation to the static height of the heating installation).
3. If water escapes from the valve of the expansion vessel, replace the expansion vessel.
4. Fill the heating installation. (→ Page 35)

12.7.11 Checking the filling pressure of the heating installation

1. Check the filling pressure of the heating installation, top it up with heating water, if necessary, and purge it.
2. Fill the heating installation. (→ Page 35)

12.7.12 Checking the quality of the heating water

- ▶ Check the quality of the heating water: Clarity (clouding), correct inhibitor and pH value. (→ Page 33)

12.7.13 Completing cleaning and inspection work

1. Tilt the electronics box upwards.
2. Install the front casing. (→ Page 18)
3. Establish the power supply if this has not yet been done.
4. Open the gas stopcock.
5. Switch the product back on if this has not yet been done. (→ Page 32)
6. Open all service valves and the gas stopcock if this has not yet been done.

12.8 Completing inspection and maintenance work

- ▶ Check the gas flow pressure. (→ Page 37)
- ▶ Check the CO₂ content and, if necessary, adjust it (air ratio setting). (→ Page 38)
- ▶ Check that the product is leak-tight. (→ Page 39)
- ▶ If required, reset the maintenance interval. (→ Page 42)
- ▶ Log the inspection/maintenance work.

13 Troubleshooting

You can find an overview of the fault codes in the appendix.


Fault messages – Overview (→ Page 60)

13.1 Contacting your service partner

If you contact your service partner, if possible, please mention

- The fault code that is displayed (F.xx),
- The product status that is displayed (S.xx).

13.2 Calling up service messages

If the  maintenance symbol appears in the display, there is a service message that must be noted.

The maintenance symbol appears if you have set a maintenance interval, for example, and this has elapsed. The product is not in fault mode.

- ▶ To obtain more information about the service message, call up the **Live Monitor**. (→ Page 31)


13.3 Reading off the fault codes

If a fault occurs in the unit or in the system, the display shows an F.xx code.

Fault messages – Overview (→ Page 60)

Fault codes have priority over all other displays.

If multiple faults occur at the same time, the display shows the corresponding fault codes for two seconds each in sequence.



- ▶ Eliminate the fault.
- ▶ To restart the product, press the reset button  (Operating instructions).
- ▶ If you are unable to remedy the fault and the fault recurs despite reset attempts, contact customer service.

13.4 Querying the fault memory


Menu → Installer level → Fault list

The product has a fault memory. You can use this to query the last ten faults that occurred in chronological order.

The display shows:

- Number of faults that occurred
 - The fault that is currently selected with fault number F.xx
 - A plain text display explaining the fault.
- ▶ Use the  or  button to display the last ten faults that occurred.

13.5 Resetting the fault memory

- ▶ To delete the fault memory, press  (Delete, OK) twice.

13.6 Resetting parameters to factory settings

- ▶ To simultaneously reset all parameters to the factory settings, set diagnostics code **D.096** to 1.

13.7 Performing diagnostics

- ▶ You can use the diagnostics codes during fault diagnostics to change individual parameters or to display further information. (→ Page 40)

13.8 Using check programmes

- ▶ You can also use the check programmes for troubleshooting. (→ Page 33)

13.9 Replacing defective components

1. Carry out the preparatory work before undertaking any repair work. (→ Page 48)
2. Carry out the work required to finish the task before undertaking any repair work. (→ Page 52)

13.9.1 Preparing the repair work

1. Decommission the product.
2. Disconnect the product from the power grid.
 - Take all necessary precautions to ensure that it cannot be switched back on again.
3. Remove the front casing. (→ Page 18)
4. Close the gas stopcock.
5. Close the service valves in the heating flow and in the heating return.
6. Close the service valve in the cold water pipe.
7. Drain the product to replace hydraulic components.
8. Ensure that water does not drip on live components (e.g. the electronics box).
9. Use only new seals.

13.9.2 Procuring spare parts

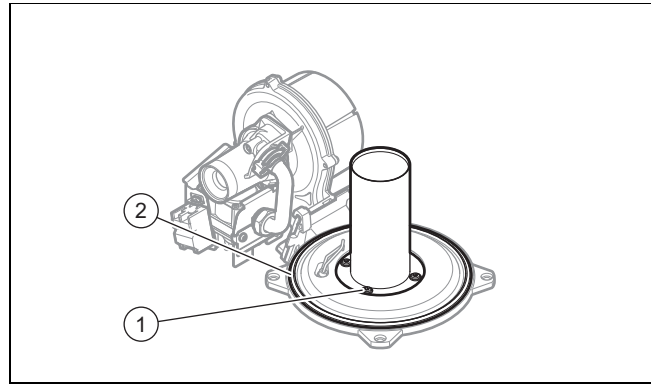
The original components of the product were also certified by the manufacturer as part of the declaration of conformity. If you use other, non-certified or unauthorised parts during maintenance or repair work, this may void the conformity of the product and it will therefore no longer comply with the applicable standards.

We strongly recommend that you use original spare parts from the manufacturer as this guarantees fault-free and safe operation of the product. To receive information about the available original spare parts, contact the contact address provided on the back page of these instructions.

- ▶ If you require spare parts for maintenance or repair work, use only the spare parts that are permitted for the product.

13.9.3 Replacing the burner

1. Remove the compact thermal module. (→ Page 44)



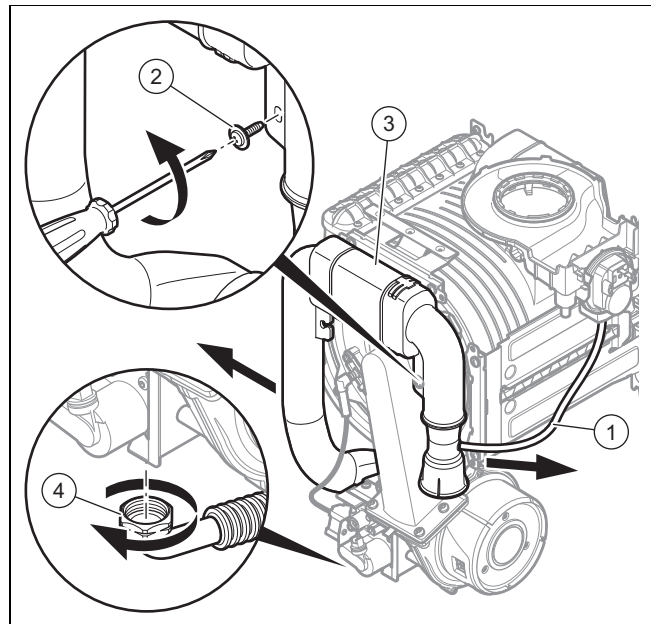
2. Undo the four screws (1) on the burner.
3. Remove the burner.
4. Fit the new burner with a new seal.
5. Replace the burner flange seal (2).
6. Install the compact thermal module. (→ Page 45)

13.9.4 Replacing the gas valve assembly, Venturi or fan

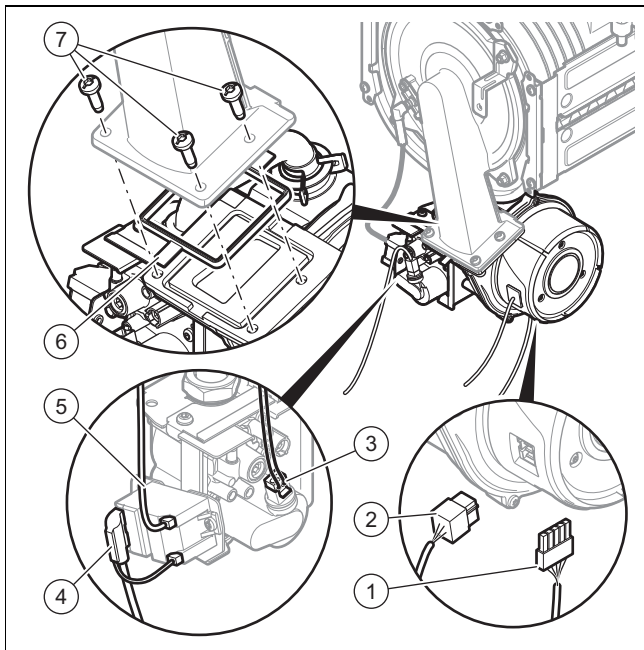


Note

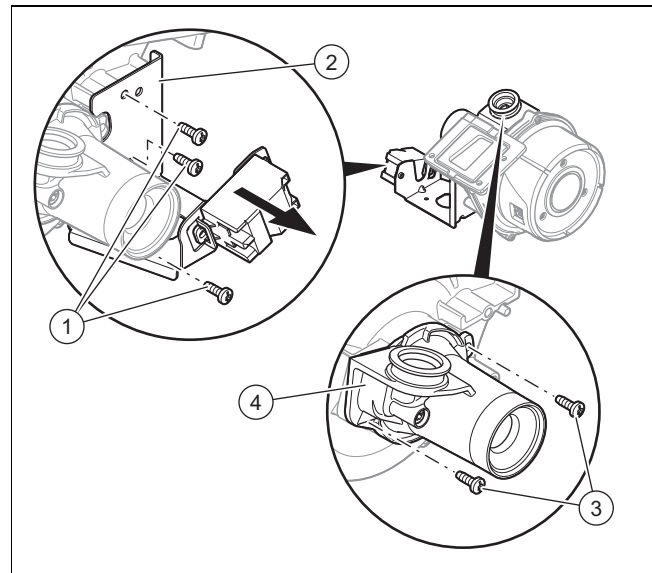
Each destroyed seal must be restored.



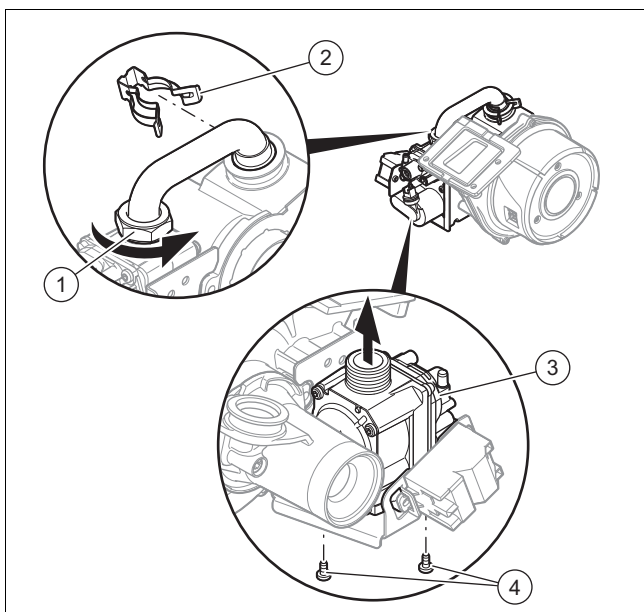
1. Disconnect the test system's silicone pipe for checking the airflow rate (1).
2. Undo the fixing screw (2) and remove the air intake pipe (3) from the intake stub.
3. Unscrew the union nut (4) from the gas valve assembly.



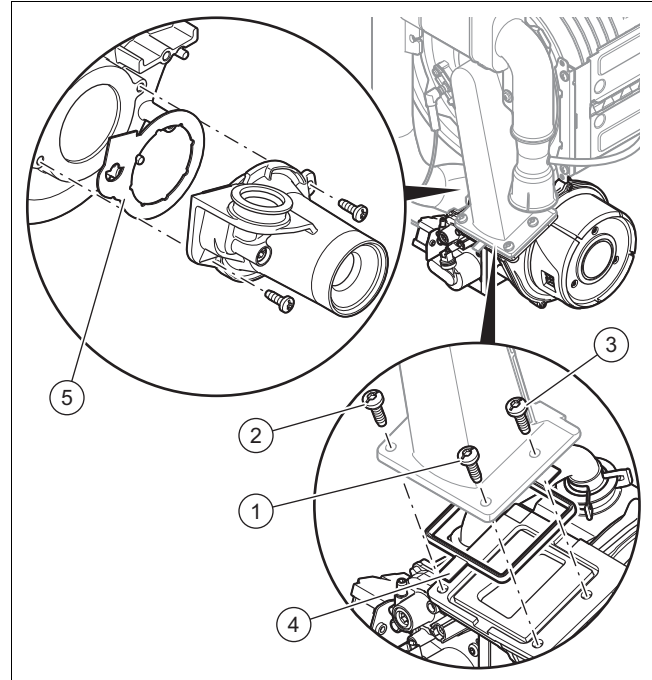
4. Pull out the plugs **(1)**, **(2)**, **(3)**, **(4)** and **(5)**.
5. Undo the three screws **(7)** between the mixture pipe and the fan flange.
6. Replace the seal **(6)**.



13. Remove the retainer **(2)** for the gas valve assembly. To do this, undo the three screws **(1)**.
14. Undo the fixing screws **(3)** for the Venturi.
15. Remove the Venturi **(4)**.
16. Replace the Venturi if it is defective.
17. Replace the fan if it is defective.



7. Remove the entire unit from the fan, Venturi and gas valve assembly.
8. Undo the nuts **(1)** on the gas valve assembly.
9. Remove the clip **(2)**.
10. Undo the fixing screws **(4)** on the gas valve assembly's retainer.
11. Remove the gas valve assembly **(3)** from the retainer.
12. Replace the gas valve assembly if it is defective.



18. Reinstall the components in the reverse order. You must use new seals at position **(4)** and **(5)**. Follow the tightening sequence for the three screws that connect the fan to the mixture pipe by following the numbering **(1)**, **(2)** and **(3)**.
19. Screw the gas pipe onto the gas valve assembly. Use new seals for this.
20. Hold on to the gas valve assembly when tightening the union nuts.
21. Once the new components have been installed, carry out the following steps.

Condition: Gas valve assembly

- Carry out a leak-tightness check, check the CO₂ content and adjust this, if required.

Condition: Venturi

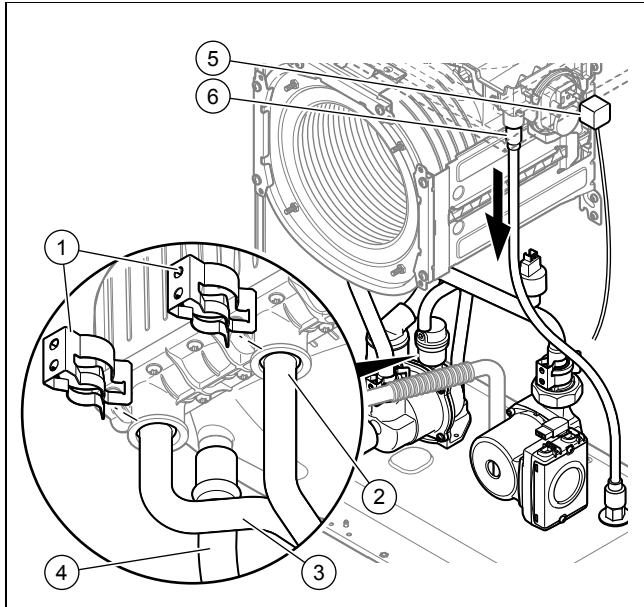
- Check the CO₂ content and adjust this, if required.

Condition: Fan

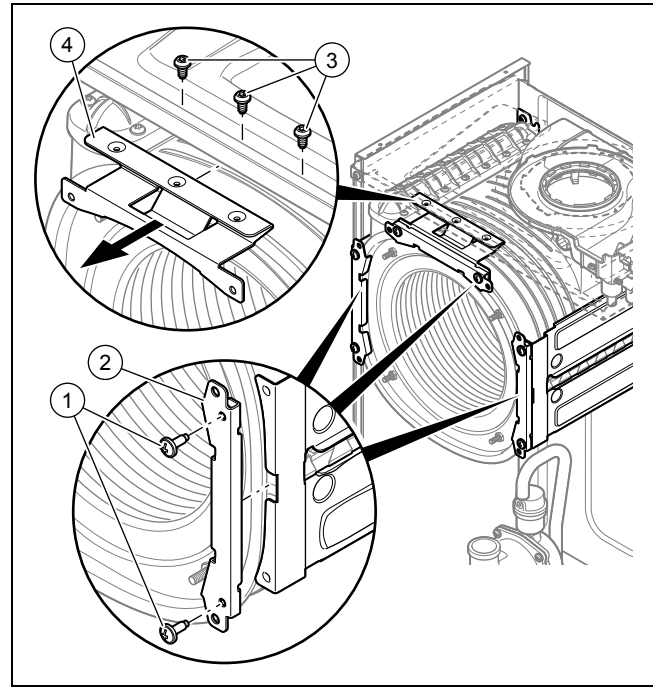
- Check the CO₂ content and adjust this, if required.

13.9.5 Replacing the heat exchanger

1. Remove the adapter for the flue system.
2. Remove the compact thermal module. (→ Page 44)



3. Remove the clips (1).
4. Loosen the flow (2) and return pipe (3).
5. Remove the condensate discharge hose (4) from the heat exchanger.
6. Remove the rainwater drain hose (6) from the heat exchanger.
7. Remove the plug (5).



8. Remove the screws (1) and (3).
9. Remove the retainer for the heat exchanger (2) and (4).
10. Pull the heat exchanger downwards and to the right, and remove it from the product.
11. Install the new heat exchanger in reverse order.



Caution.

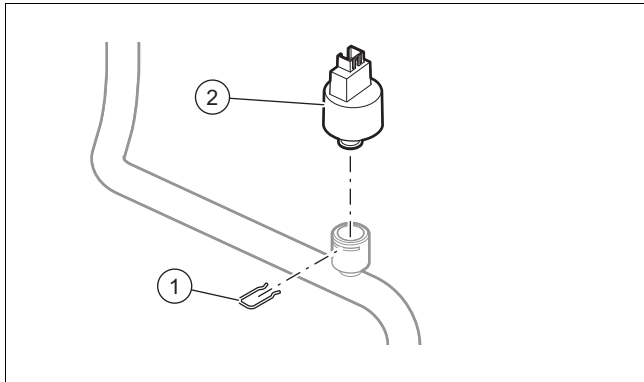
Risk of poisoning due to escaping flue gas.

Mineral-oil-based greases can damage the seals.

- Instead of grease, use only water or commercially available soft soap to aid installation.

12. Replace the seals.
13. Insert the flow and return pipes into the heat exchanger as far as they will go.
14. Ensure that the clips on the flow and return connection have been attached correctly.
15. Install the compact thermal module. (→ Page 45)
16. Fill and purge the product and, if necessary, the heating installation.

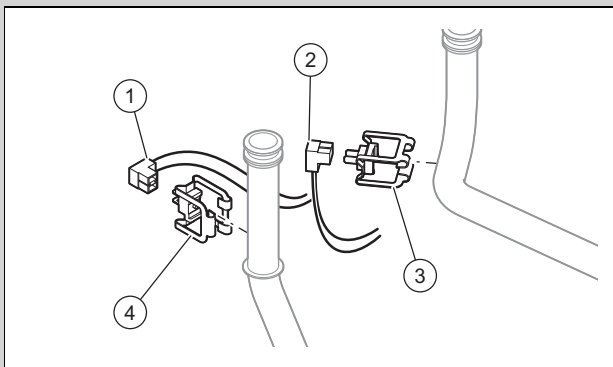
13.9.6 Replace the pressure sensor



1. Pull out the plug for the pressure sensor.
2. Remove the fastening clip (1).
3. Remove the defective pressure sensor (2).
4. Replace the pressure sensor.
5. Fill and purge the product and, if necessary, the heating installation.

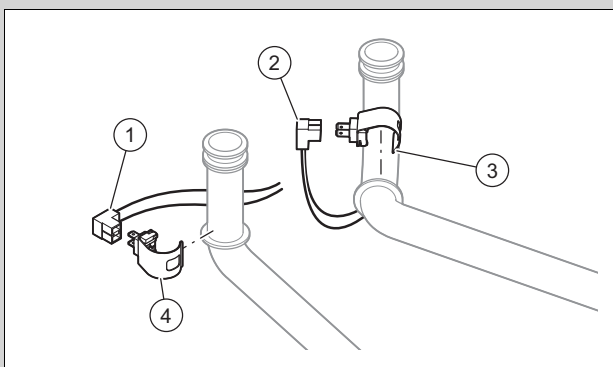
13.9.7 Replacing the heating flow and return temperature sensor

Validity: VU 446/5-5 (H-GB)



- ▶ Pull out the heating flow (4) and return temperature sensor (3).

Validity: VU 606/5-5 (H-GB)

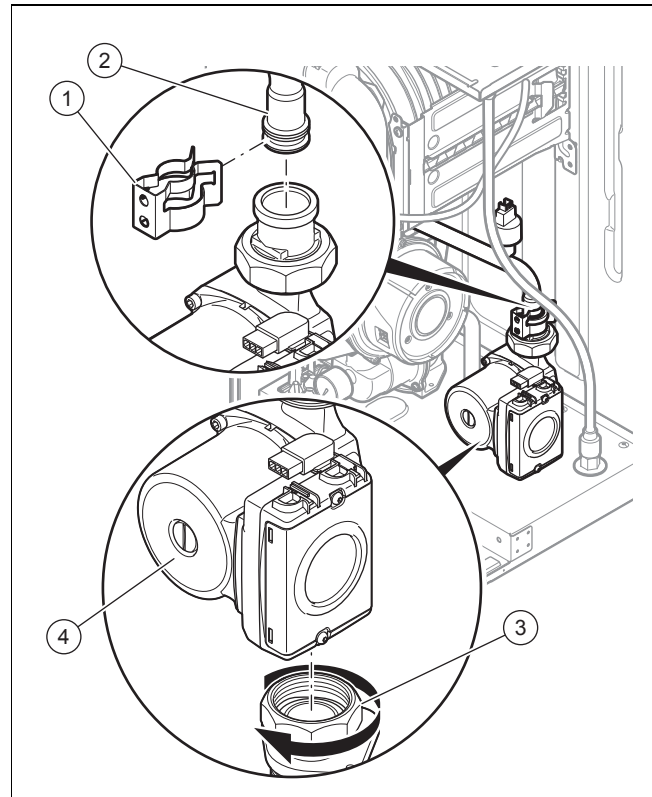


- ▶ Pull out the heating flow (4) and return temperature sensor (3).

1. Remove the heating flow (1) and return plug (2).
2. Install the new temperature sensor.
3. When reinstalling, note the colour of the conductors.

- Blue conductor: Heating return
- Red conductor: Heating flow

13.9.8 Replacing the pump



1. Pull out the plug (5) for the pump.
2. Remove the clip (1) from the pipe (2).
3. Detach the connection (3) from below the pump.
4. Remove the defective pump (4).
5. Detach the connection (5) from the pump.
6. Replace the seals.
7. Install the new pump. To do this, proceed in reverse order.

13.9.9 Replace the main PCB and/or the control element's PCB



Caution.

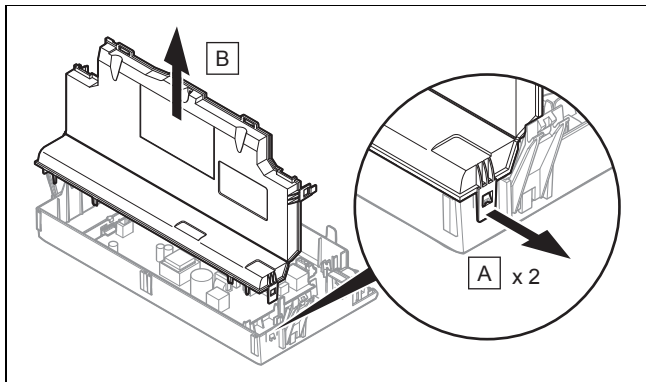
Risk of material damage caused by incorrect repairs.

Using an incorrect PCB may lead to damage to the electronics.

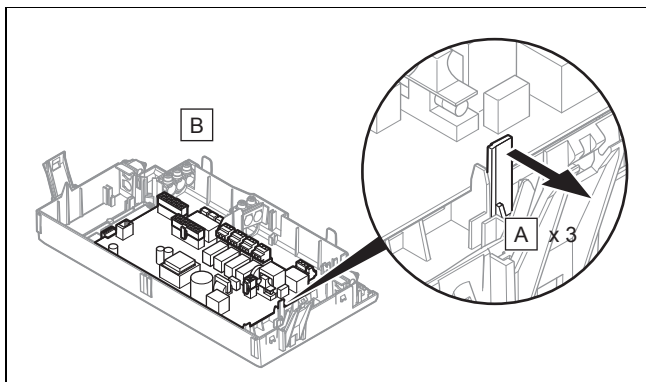
- ▶ Before replacing, check that the correct PCB is available.
- ▶ Never use a different PCB when replacing it.

If you are replacing only one component, the set parameters are transferred automatically. When the product is switched on, the new component adopts the previously set parameters from the unreplaced component.

13.9.9.1 Replacing the main PCB

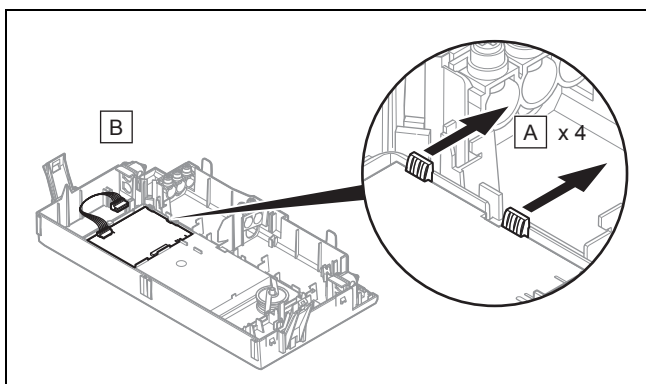


1. Open the electronics box. (→ Page 28)
2. Undo the two clips **(A)** on the electronics box.
3. Remove the cover **(B)** from the electronics box.



4. Remove the PCB in accordance with the installation instructions that are enclosed with the spare part.
5. Pull all of the plugs out from the PCB.
6. Force the fixing tabs **(A)** apart in order to loosen the PCB.
7. Remove the PCB **(B)**.
8. Install the new PCB.
9. Plug the plug into the new PCB.

13.9.9.2 Replacing the PCB for the user interface



1. Remove the main PCB.
2. Disconnect all of the plugs from the PCB for the user interface.
3. Force the fixing tabs **(A)** apart in order to loosen the PCB for the user interface.
4. Remove the PCB for the user interface **(B)**.
5. Install the new PCB for the user interface.
6. Plug the plug into the new PCB for the user interface.
7. Reinstall the main PCB.

13.9.9.3 Replacing the main PCB and control element's PCB at the same time

1. If you are replacing both components at the same time, the product switches directly to the menu to select the language after switching on. The default language setting is English.
2. Select the required language.
3. Press **OK** to confirm this setting.
4. Set the product code **D.093** that is on the data plate.
5. Confirm your setting.
 - ◁ The electronics are now set to the product type (model) and the parameters for all diagnostics codes are set to the default settings.
 - ◁ The display automatically restarts with the installation assistant.
6. Make the system-specific settings.

13.9.10 Completing repair work

1. Open the service valve in the cold water pipe.
2. Open all service valves and the gas stopcock.
3. Check the leak-tightness of the gas pipe and the hydraulic circuits.
4. Install the front casing. (→ Page 18)
5. Switch on the product. (→ Page 32)
6. Check that the product works correctly.
7. Check that the product is leak-tight. (→ Page 39)

14 Decommissioning

14.1 Temporarily decommissioning the product

- ▶ Press the on/off button.
 - ◁ The display goes out.
- ▶ Close the gas stopcock.
- ▶ On products with a connected domestic hot water cylinder, you must also close the cold-water isolation valve.

14.2 Permanently decommissioning

- ▶ Decommission the product.
- ▶ Disconnect the product from the power grid.
- ▶ Close the gas stopcock.
- ▶ Close the heating stopcocks.
- ▶ Drain the product. (→ Page 47)

15 Recycling and disposal

Disposing of the packaging

- ▶ Dispose of the packaging correctly.
- ▶ Observe all relevant regulations.

Validity: Great Britain OR Ireland

- ▶ For detailed information refer to www.vaillant.co.uk.

16 Customer service

Validity: New Zealand

For contact details for our customer service department, you can write to the address that is provided on the back page, or you can visit www.vaillant.com.

Validity: Great Britain OR Ireland

For contact details for our customer service department, you can write to the address that is provided on the back page, or you can visit www.vaillant.co.uk.

Appendix

A Inspection and maintenance work – Overview


The table below lists the manufacturer requirements with respect to minimum inspection and maintenance intervals. If national regulations and directives require shorter inspection and maintenance intervals, you should observe these instead of the required intervals listed in the table. Carry out the preparatory work each time before inspection/maintenance work is carried out, and carry out the completion work each time after the inspection/maintenance work is carried out.



Note

For those appliances which are not part of an annual service agreement/policy, maintenance must be carried out at least every 5 years.

#	Maintenance work	Interval	
1	Record all of the analysis results in the Benchmark Checklist in these instructions	Annually	
2	Ask the end user whether any significant problems occur when operating the product	Annually	
3	Use the diagnostics system to check the product's fault history	Annually	
4	Check the air/flue pipe for leak-tightness and correct fastening. Make sure that it is not blocked or damaged and has been installed in accordance with the relevant set-up instructions	Annually	
5	Check that the unit has been installed correctly and the connections have been secured	Annually	
6	Check that the condensate pipe is in good condition, that it is leak-tight and that the drain is correct	Annually	
7	Check whether all of the externally routed condensate pipes are dimensioned correctly and have been insulated sufficiently (frost protection)	Annually	
8	Check the gas connection pressure at maximum heat input. If the gas connection pressure is not within the correct range, carry out maintenance work	Annually	
9	Check the general condition of the product and, if required, eliminate any faults that are found	Annually	
10	Carry out the combustion analysis: Measure the CO content, CO ₂ content and the CO/CO ₂ ratio and readjust this if necessary. Logging the measurement	Annually	
11	Check the product's recirculation at the supply air test point on the air/flue pipe. If required, inspect the entire air/flue system and, if necessary, correct the fault	Annually	
12	Disconnect the product from the electrical installation	Annually	
13	Check and, if required, correct the electrical installation	Annually	
14	Remove any dirt from the product and vacuum chamber	Annually	
15	Visually check the heat cell to ascertain its condition and detect any corrosion, rust or damage, and carry out maintenance work, if required	Annually	
16	Check that the gas stopcock and service valves function correctly	Annually	
17	Check the quality of the heating water: Clarity (clouding), correct inhibitor and pH value. Log the values in a system book. If required, use water treatment to correct the water hardness	Annually	
18	Removing the compact thermal module	at regular intervals	44
19	Checking the burner	at regular intervals	45
20	Check all seals and the insulating mat in the combustion area. Replace the seals or insulating mat if they are damaged. Replace the burner door seal after each time it is opened and, accordingly, each time maintenance work is carried out	at regular intervals	
21	Cleaning the heat exchanger	at regular intervals	44
22	Cleaning the condensate siphon	Annually	46
23	Installing the compact thermal module	at regular intervals	45
24	Checking the pre-charge pressure of the external expansion vessel	at regular intervals	47
25	Cleaning the filter in the dynamic air separation system	at regular intervals	46
26	Cleaning the rainwater collector's draining circuit	Annually	45
27	Cleaning the low loss header	at regular intervals	

#	Maintenance work	Interval	
28	Reassemble the product	After each time maintenance work is carried out	
29	Opening the service valves	Annually	
30	Test that the product/heating installation and the domestic hot water generation (if required) are working correctly. If required, carry out purging	Annually	
31	Checking and, if required, correcting the position of the frost protection heating elements	Annually	
32	Completing inspection and maintenance work	Annually	47
33	Visually check the ignition and burner behaviour	Annually	
34	Checking the CO/CO ₂ content following maintenance work	Annually	
35	Check the product for gas, flue gas and water leaks	Annually	

B Overview of diagnostics codes

Validity: VU 446/5-5 (H-GB) OR VU 606/5-5 (H-GB)



Note

Since the code table is used for various products, some codes may not be visible for the product in question.

Code	Parameter	Values or explanations	Default setting	User-specific setting
D.000	Partial heat load	Adjustable partial heat load in kW Auto: The product automatically adjusts the maximum partial load to the current system demand.	Auto	
D.001	Overrun time for the internal pump after a heat demand	2 to 60 min	5 min	
D.002	Max. burner anti-cycling time in heating mode at 20 °C flow temperature	2 to 60 min	20 min	
D.003	Domestic hot water temperature	Not connect.		
D.004	Measured value for the cylinder temperature in °C	If a domestic hot water cylinder with sensor is connected		Not adjustable
D.005	Target value for the heating flow temperature (or target value for the return) in °C	The current target value, maximum value of the parameter that is set for D.071, limitation by an eBUS control, if connected		Not adjustable
D.007	Target value for the domestic hot water cylinder temperature in °C	(15 °C = frost protection, 40 °C up to D.020 (max. 70 °C))		Not adjustable
D.009	Heating flow temperature, target value from external eBUS controller	°C		
D.010	Status of the internal heating pump	0 = Off 1 = On		Not adjustable
D.011	Status of additional external heating pump	0 = Off 1-100 = On		Not adjustable
D.012	Status of cylinder charging pump	0 = Off 1-100 = On		Not adjustable
D.013	Status of circulation pump	0 = Off 1-100 = On		Not adjustable
D.014	Setting for speed-controlled internal heating pump	0 = auto (pump modulates in accordance with the control, with constant pressure) From 1 to 5 = Fixed pump setting – 1 = 53% – 2 = 60% – 3 = 70% – 4 = 85% – 5 = 100%	0	
D.015	Current speed of the internal heating pump in %			Not adjustable
D.016	24 V DC room thermostat open/closed	Heating mode off/on		Not adjustable

Code	Parameter	Values or explanations	Default setting	User-specific setting
D.017	Heating control type	0 = Flow temperature control 1 = Return temperature control	0	
D.018	Pump mode setting	1 = Comfort (continuously operating pump) 3 = Eco (intermittently operating pump)	3	
D.020	Max. set value for target cylinder value	50 to 65 °C	65 °C	
D.022	Domestic hot water demand	0 = Off 1 = on		Not adjustable
D.023	Heating demand	0 = Off 1 = on		Not adjustable
D.024	Status of the air pressure monitor	0 = open 1 = closed		Not adjustable
D.025	Domestic hot water generation enabled by eBUS control	0 = No 1 = Yes		
D.026	Control of the optional grey relay X16	1 = Circulation pump 2 = External pump 3 = Cylinder charging pump 4 = Smoke flap 5 = External solenoid valve 6 = External fault message 7 = Solar pump (not active) 8 = eBUS remote control (not active) 9 = Anti-legionella pump (not activated) 10 = Solar valve (not active)	2	
D.027	Switching accessory relay 1 for 2 in 7 multi-functional module accessory	1 = Circulation pump 2 = External pump 3 = Cylinder charging pump (not activated) 4 = Smoke flap 5 = External solenoid valve 6 = External fault message 7 = Solar pump (not active) 8 = eBUS remote control (not active) 9 = Anti-legionella pump (not activated)	1	
D.028	Switching accessory relay 2 for 2 in 7 multi-functional module accessory	1 = Circulation pump 2 = External pump 3 = Cylinder charging pump (not activated) 4 = Smoke flap 5 = External solenoid valve 6 = External fault message 7 = Solar pump (not active) 8 = eBUS remote control (not active) 9 = Anti-legionella pump (not activated)	2	
D.029	Heating flow (heating circuit or cylinder charging)	l/min		Not adjustable
D.033	Fan speed target value	rpm		Not adjustable
D.034	Fan speed actual value	rpm		Not adjustable
D.035	Position of the prioritising diverter valve	Not connect.		Not adjustable
D.040	Flow temperature	Actual value in °C		Not adjustable
D.041	Return temperature	Actual value in °C		Not adjustable
D.044	Digitised ionisation value	0 to 1,020 Good flame < 400 No flame > 800		Not adjustable
D.047	Outdoor temperature (with weather-compensated control)	Actual value in °C if an outdoor temperature sensor is connected to X41		Not adjustable
D.050	Offset for minimum speed	0 to 3,000 rpm	30	

Code	Parameter	Values or explanations	Default setting	User-specific setting
D.051	Offset for maximum speed	-990 to 0 rpm	-45	
D.060	Number of switch-off sequences for the safety cut-out	Number of shutdowns		Not adjustable
D.061	Number of flame sequence control faults	Number of unsuccessful ignitions in the last attempt		Not adjustable
D.064	Average ignition time	s		Not adjustable
D.065	Maximum ignition time	s		Not adjustable
D.067	Remaining burner anti-cycling time	min		Not adjustable
D.068	Unsuccessful ignitions at 1st attempt	Number of unsuccessful ignitions		Not adjustable
D.069	Unsuccessful ignitions at 2nd attempt	Number of unsuccessful ignitions		Not adjustable
D.071	Target value maximum heating flow temperature	30 to 80 °C	75 °C	
D.072	Overrun time for the heating pump after cylinder post-heating	0 to 600 s	120 s	
D.074	Anti-legionella function	Thermal disinfection is carried out every 24 hours 0 = Inactive 1 = Active	0	
D.075	Maximum charging time for the domestic hot water cylinder	20 to 90 min	45 min	
D.076	Product-specific number	Unit variant display (DSN)		Not adjustable
D.077	Limit on cylinder charging output	Adjustable cylinder charging output in kW	Maximum output	
D.078	Cylinder charging temperature limit (target flow temperature in cylinder charging mode) in °C	55 to 85 °C	80 °C	
D.080	Operating hours of the burner in heating mode	h		Not adjustable
D.081	Operating hours of the burner for domestic hot water generation	h		Not adjustable
D.082	Number of burner start-ups in heating mode	Number of burner start-ups (x 100)		Not adjustable
D.083	Number of burner starts in domestic hot water mode	Number of burner start-ups (x 100)		Not adjustable
D.084	Maintenance indicator: Number of hours until the next maintenance	0 to 3,000 h "-" to deactivate the function	"-"	
D.085	Minimum output of the product	kW		
D.090	Status of the eBUS control	1 = Detected 2 = Not detected		Not adjustable
D.091	Status of DCF with outdoor temperature sensor connected	0 = No reception 1 = Reception 2 = Synchronised 3 = Valid		Not adjustable
D.093	Unit variant setting (DSN)	Adjustment range: 170 to 199 The three-digit DSN code is located on the product's data plate.		
D.094	Delete fault history	Delete fault list 0 = No 1 = Yes		
D.095	Software version of PeBUS components	Main PCB (BMU) PCB for the control element (AI)		Not adjustable
D.096	Default setting	Reset all adjustable parameters to factory setting 0 = No 1 = Yes	0	

Code	Parameter	Values or explanations	Default setting	User-specific setting
D.122	Target value for the available pressure in the heating circuit	100 to 400 mbar	200 mbar	
D.123	Duration of last cylinder charging	min		
D.124	Domestic hot water cylinder in ECO mode	Not connect.		
D.125	Domestic hot water temperature at the cylinder outlet	Not connect.		
D.126	Back-up heater delay when there is sunlight	Not connect.		
D.148	Target value for the available pressure in the cylinder charging circuit	100 to 400 mbar	200 mbar	
D.149	Precise information about circulation fault F.75	If fault F.75 occurs, read the explanation below for the relevant value of the diagnostics code in order to analyse the problem. 0 = No fault 1 = Pump blocked 2 = Electrical pump fault 3 = Pump dry run 5 = Pressure sensor fault 6 = No feedback from the pump 7 = Incorrect pump detected 8 = Flow rate at the end of the purge programme is insufficient		

C Status codes – Overview



Note

Since the code table is used for various products, some codes may not be visible for the product in question.

Code	Meaning
S.00 Heating: No heat demand	Heating has no heat demand. The burner is off.
S.01 Heating mode: Fan start-up	The fan start-up for heating mode is activated.
S.02 Heating mode: Pump pre-run	The pump prerun for heating mode is activated.
S.03 Heating mode: Ignition	The ignition for heating mode is activated.
S.04 Heating mode: Burner on	The burner for heating mode is activated.
S.05 Heating mode: Pump/fan overrun	The pump/fan overrun for heating mode is activated.
S.06 Heating mode: Fan overrun	The fan overrun for heating mode is activated.
S.07 Heating mode: Pump overrun	The pump overrun for heating mode is activated.
S.08 Heating mode: Anti-cycling time	The anti-cycling time for heating mode is activated.
S.10 DHW demand	The domestic hot water demand is activated.
S.11 DHW mode: Fan start-up	The fan start-up for domestic hot water mode is activated.
S.13 DHW mode: Ignition	The ignition for domestic hot water mode is activated.
S.14 DHW mode: Burner on	The burner for domestic hot water mode is activated.
S.15 DHW mode: Pump/fan overrun	The pump/fan overrun for domestic hot water mode is activated.
S.16 DHW mode: Fan overrun	The fan overrun for domestic hot water mode is activated.
S.17 DHW mode: Pump overrun	The pump overrun for domestic hot water mode is activated.
S.20 DHW demand	The domestic hot water demand is activated.
S.21 DHW mode: Fan start-up	The fan start-up for domestic hot water mode is activated.

Code	Meaning
S.22 DHW mode: Pump pre-run	The pump prerun for domestic hot water mode is activated.
S.23 DHW mode: Ignition	The ignition for domestic hot water mode is activated.
S.24 DHW mode: Burner on	The burner for domestic hot water mode is activated.
S.25 DHW mode: Pump/fan overrun	The pump/fan overrun for domestic hot water mode is activated.
S.26 DHW mode: Fan overrun	The fan overrun for domestic hot water mode is activated.
S.27 DHW mode: Pump overrun	The pump overrun for domestic hot water mode is activated.
S.28 DHW anti-cycling time	The anti-cycling time for domestic hot water mode is activated.
S.30 No heat demand: Controller	Room thermostat blocks heating mode.
S.31 No heat demand: Summer mode	Summer mode is activated; there is no heat demand.
S.32 Waiting time deviation: Fan speed	The waiting period for the fan start-up is activated.
S.34 Heating mode: Frost protection	The frost protection function for heating mode is activated.
S.36 Target value for ext. controller lower than 20 °C	The target value on the external control is lower than 20 °C.
S.39 Contact thermostat triggered	The surface-mounted thermostat or the condensate pump has triggered.
S.40 Comfort protection active	The comfort protection mode is activated.
S.41 Water pressure too high	The system pressure is too high.
S.42 Flue non-return flap closed	Flue non-return flap return signal blocks burner operation (only in conjunction with the multi-functional module) or condensate pump defective, heat demand is blocked.
S.46 Comfort protection: Minimum load, loss of flame	Comfort protection mode for flame loss at minimum load is activated.
S.53 Waiting time: Water shortage	The product is within the waiting period of the modulation block/operating block function as a result of a water deficiency (flow/return spread too large).
S.54 Waiting time: Water shortage	Product is in the waiting period of the operation blocking function as a result of low water pressure (temperature gradient).
S.57 Waiting time: Measuring program	The product is within the waiting period as a result of the measuring programme.
S.58 Burner modulation limitation	The burner modulation limitation is activated.
S.61 Fault: Incorrect gas type	The coding resistor on the PCB does not match the entered gas group (see also F.92).
S.62 Adjust CO₂	Set the CO ₂ content.
S.63 Fault: Check gas route	A fault message is activated. Check the gas route.
S.76 Service message: Check water pressure	A service message is activated. Check the water pressure.
S.85 Service message: Check water circulation volume	A service message is activated. Check the water circulation volume.
S.88 Purging programme is running	The purge programme is activated.
S.92 Water circulation volume self-test	The self-test for the water circulation volume is activated.
S.93 Flue gas measurement not possible	Flue gas analysis is not currently possible.
S.96 Return temperature sensor self-test	The self-test for the return temperature sensor is activated.
S.97 Water pressure sensor self-test	The self-test for the water pressure sensor is activated.
S.98 Flow/return temperature sensor self-test	The self-test for the flow/return temperature sensor is activated.
S.99 Vaillant self-test	The Vaillant self-test is activated.

D Fault messages – Overview

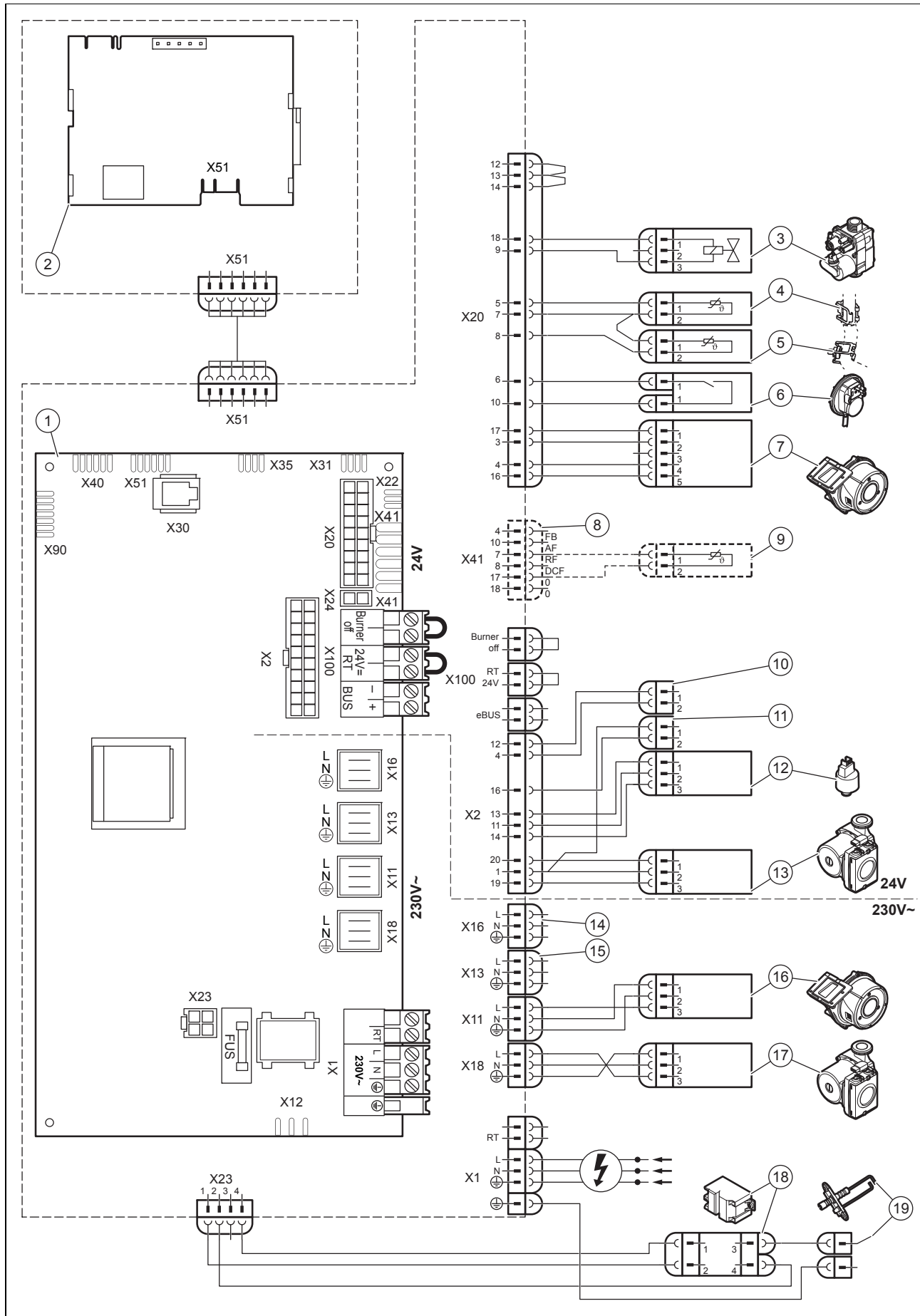
Code/meaning	Possible cause	Measure
F.00 Flow temperature sensor interruption	NTC plug loose/not plugged in	▶ Check the NTC plug and plug connection.
	NTC sensor defective	▶ Replace the NTC sensor.
	Multiple plug loose/not plugged in	▶ Check the multiple plug and plug connection.
	Interruption in the cable harness	▶ Check the cable harness.
F.01 Return temperature sensor interruption	NTC plug loose/not plugged in	▶ Check the NTC plug and plug connection.
	NTC sensor defective	▶ Replace the NTC sensor.
	Multiple plug loose/not plugged in	▶ Check the multiple plug and plug connection.
	Interruption in the cable harness	▶ Check the cable harness.
F.03 Cylinder temperature sensor interruption	NTC sensor defective	▶ Replace the NTC sensor.
	NTC plug loose/not plugged in	▶ Check the NTC plug and plug connection.
	Connection to cylinder electronics defective	▶ Check the connection to the cylinder electronics.
F.10 Flow temperature sensor short circuit	NTC sensor defective	▶ Replace the NTC sensor.
	Short circuit in the cable harness	▶ Check the cable harness.
F.11 Return temperature sensor short circuit	NTC sensor defective	▶ Replace the NTC sensor.
	Short circuit in the cable harness	▶ Check the cable harness.
F.13 Cylinder temperature sensor short circuit	NTC sensor defective	▶ Replace the NTC sensor.
	Short circuit in the cable harness	▶ Check the cable harness.
F.20 Safety shutdown: Safety cut-out	Flow NTC defective	▶ Check the flow NTC.
	Return NTC defective	▶ Check the return NTC.
	Earth connection faulty	▶ Check the earth connection.
	Stray spark via the ignition cable, ignition plug or ignition electrode	▶ Check the ignition cable, ignition plug and ignition electrode.
F.22 Safety shutdown: Water deficiency	Insufficient/no water in the product.	▶ Fill the heating installation. (→ Page 35)
	Interruption in the cable harness	▶ Check the cable harness.
F.23 Safety shutdown: Temperature spread too great	Pump blocked	▶ Check that the pump is working correctly.
	Pump runs with insufficient output	▶ Check that the pump is working correctly.
	Flow and return NTC connected the wrong way round	▶ Check the connection for the flow and return NTC.
F.24 Safety shutdown: Temperature rise too fast	Pump blocked	▶ Check that the pump is working correctly.
	Pump runs with insufficient output	▶ Check that the pump is working correctly.
	Non-return valve blocked	▶ Check that the non-return valve is working correctly.
	Non-return valve installed incorrectly	▶ Check the installation position of the non-return valve.
	System pressure too low	▶ Check the system pressure.
F.25 Safety shutdown: Flue gas temperature too high	Flue gas safety cut-out plug is not plugged in or is loose	▶ Check the plug and the plug connection.
	Interruption in the cable harness	▶ Check the cable harness.
F.27 Safety shutdown: Flame simulation	Gas solenoid valve not leak-tight	▶ Check that the gas solenoid valve works correctly.
	Moisture on the PCB	▶ Check that the PCB works correctly.
	Flame monitor defective	▶ Replace the flame monitor.
F.28 Ignition unsuccessful	Gas stopcock closed	▶ Open the gas stopcock.
	Gas valve assembly defective	▶ Replace the gas valve assembly.
	The gas pressure monitor has been triggered	▶ Check the gas flow pressure.

Code/meaning	Possible cause	Measure
F.28 Ignition unsuccessful	Gas flow pressure too low	▶ Check the gas flow pressure.
	The thermal isolator device has been triggered	▶ Check the thermal isolator device.
	Cable connections not plugged in/loose	▶ Check the cable connections.
	Ignition system defective	▶ Replace the ignition system.
	PCB defective	▶ Replace the PCB.
	Ionisation flow interrupted	▶ Check the monitoring electrodes.
	Earthing defective	▶ Check the product's earthing.
	Air in the gas supply	▶ Check the gas-air ratio.
	Gas meter defective	▶ Replace the gas meter.
	Gas supply is interrupted	▶ Check the gas supply.
	Flue gas circulation is incorrect	▶ Check the air/flue system.
	Ignition misfire	▶ Check that the ignition transformer works correctly.
	Diagnostics code D.085 incorrectly set	▶ Using an installation with a flue non-return flap, check whether the diagnostics code D.085 has been set correctly. (→ Page 28)
	Condensate siphon blocked	1. Check whether the condensate discharge is connected correctly. (→ Page 25) 2. If the drain is blocked, check whether the heat exchanger's internal insulating material is OK.
F.29 Ignition and check faults during operation – flame has gone out	Gas valve assembly defective	▶ Replace the gas valve assembly.
	Gas meter defective	▶ Replace the gas meter.
	The gas pressure monitor has been triggered	▶ Check the gas flow pressure.
	Air in the gas supply	▶ Check the gas-air ratio.
	Gas flow pressure too low	▶ Check the gas flow pressure.
	The thermal isolator device has been triggered	▶ Check the thermal isolator device.
	Cable connections not plugged in/loose	▶ Check the cable connections.
	Ignition system defective	▶ Replace the ignition system.
	Ionisation flow interrupted	▶ Check the monitoring electrodes.
	Earthing defective	▶ Check the product's earthing.
	PCB defective	▶ Replace the PCB.
F.32 Fan fault	Plug on fan not plugged in or is loose	▶ Check the plug on the fan and the plug connection.
	Multiple plug loose/not plugged in	▶ Check the multiple plug and plug connection.
	Interruption in the cable harness	▶ Check the cable harness.
	Fan blocked	▶ Check that the fan works correctly.
	Electronics defective	▶ Check the PCB.
F.33 Air pressure switch fault	Air/flue pipe blocked	▶ Check the entire air/flue pipe.
	Defective air pressure switch	▶ Replace the air pressure switch.
	Cable connections not plugged in/loose	▶ Check the cable connections.
	Fan defective	▶ Check that the fan works correctly.
	PCB defective	▶ Replace the PCB.
	Excessive counter-pressure in the air/flue pipe	1. Ensure that there is no risk of excessive counter-pressure. 2. If required, protect the product (wind guard, cascade lines with a larger diameter, etc.).
F.49 Fault: eBUS	eBUS overload	▶ Check that the eBUS connection works correctly.
	Short circuit in the eBUS connection	▶ Check that the eBUS connection works correctly.
	Different polarities at the eBUS connection	▶ Check that the eBUS connection works correctly.

Code/meaning	Possible cause	Measure
F.61 Gas safety valve drive fault	Short circuit in the cable harness	▶ Check the cable harness.
	Gas valve assembly defective	▶ Replace the gas valve assembly.
	PCB defective	▶ Replace the PCB.
F.62 Gas safety valve connection fault	PCB defective	▶ Replace the PCB.
	The connection to the gas valve assembly has been interrupted/broken	▶ Check the connection to the gas valve assembly.
F.63 Fault: EEPROM	PCB defective	▶ Replace the PCB.
F.64 Fault: Electronics/NTC	Flow NTC short circuit.	▶ Check that the flow NTC works correctly.
	Return NTC short circuit	▶ Check that the return NTC works correctly.
	PCB defective	▶ Replace the PCB.
F.65 Electronics temperature fault	Electronics overheated	▶ Check the external heat effects on the electronics.
	PCB defective	▶ Replace the PCB and the ionisation electrode.
F.67 Flame plausibility fault	PCB defective	▶ Replace the PCB.
F.70 Invalid device specific number (DSN)	Device Specific Number not set/is incorrect	▶ Set the correct Device Specific Number.
	Output range coding resistor missing or is incorrect	▶ Check the output range coding resistor.
F.71 Flow temperature sensor fault	The flow NTC reports a constant value	▶ Check the positioning of the flow NTC.
	Incorrect position of the flow NTC	▶ Check the positioning of the flow NTC.
	Flow NTC defective	▶ Replace the flow NTC.
F.72 Flow and/or return temperature sensor fault	Flow NTC defective	▶ Replace the flow NTC.
	Return NTC defective	▶ Replace the return NTC.
F.73 Water pressure sensor signal in the wrong range (too low)	Short circuit in the cable harness	▶ Check the cable harness.
	Interruption in the cable harness	▶ Check the cable harness.
	Water pressure sensor defective	▶ Replace the water pressure sensor.
F.74 Water pressure sensor signal outside correct range (too high)	Short circuit in the cable harness	▶ Check the cable harness.
	Interruption in the cable harness	▶ Check the cable harness.
	Water pressure sensor defective	▶ Replace the water pressure sensor.
F.75 Pump fault/water deficiency	Malfunction	▶ Call up diagnostics code D.149 to obtain further information about the malfunction. Overview of diagnostics codes (Validity: VU 446/5-5 (H-GB) OR VU 606/5-5 (H-GB)) (→ Page 55)
	D.149 = 1, pump blocked alarm	1. Remove the blockage from the pump. 2. Replace the pump.
	D.149 = 2, electrical pump fault alarm	1. Check the pump's supply voltage. 2. Replace the pump.
	D.149 = 3, pump dry running alarm	1. Check the pressure of the hydraulic circuit; ensure that there is no air in the circuit. 2. Replace the pump.
	D.149 = 5, no pressure peak detection	1. Check the system pressure. 2. Purge the heating installation (purge programme). 3. Check the water pressure sensor. 4. Replace the water pressure sensor.

Code/meaning	Possible cause	Measure
F.75 Pump fault/water deficiency	D.149 = 6, no feedback from the pump	<ol style="list-style-type: none"> 1. Check the pump's cable harness. 2. Check the main PCB. 3. Check that the plugs are connected correctly. 4. Check the pump's supply voltage. <ul style="list-style-type: none"> – ≥ 195 V 5. Replace the pump. 6. Replace the main PCB.
	D.149 = 7, incorrect pump detected	<ol style="list-style-type: none"> 1. The detected pump is not correct for the product code; check the product code. 2. Use the pump that has the correct article number.
	D.149 = 8, flow rate at the end of the purge programme is insufficient	<ol style="list-style-type: none"> 1. Check whether the stopcocks and thermostatic valves are open. 2. Check the filling pressure; purge the circuit. <ul style="list-style-type: none"> – ≥ 0.15 MPa (≥ 1.50 bar)
F.77 Accessory fault (flue non-return flap, condensate pump, etc.)	No feedback from the flue non-return flap or the feedback is incorrect	▶ Check that the flue non-return flap works without any problems.
	Flue non-return flap defective	▶ Replace the flue non-return flap.
	No feedback from the condensate pump or the feedback is incorrect	▶ Check that the condensate pump is working correctly.
F.83 Fault: Flow and/or return temperature sensor temperature change	Water deficiency	▶ Fill the heating installation. (→ Page 35)
	Flow NTC: No contact	▶ Check whether the flow NTC is lying against the flow pipe correctly.
	Return NTC: No contact	▶ Check whether the return NTC is lying against the return pipe correctly.
F.84 Fault: Temperature difference at the flow and return temperature sensors	Flow NTC installed incorrectly	▶ Check that the flow NTC has been installed correctly.
	Return NTC installed incorrectly	▶ Check that the return NTC has been installed correctly.
F.85 Flow and return temperature sensors have been installed incorrectly (inverted)	Flow/return NTC installed on the same/incorrect pipe	▶ Check that the flow and return NTCs have been installed on the correct pipe.

E Wiring diagram



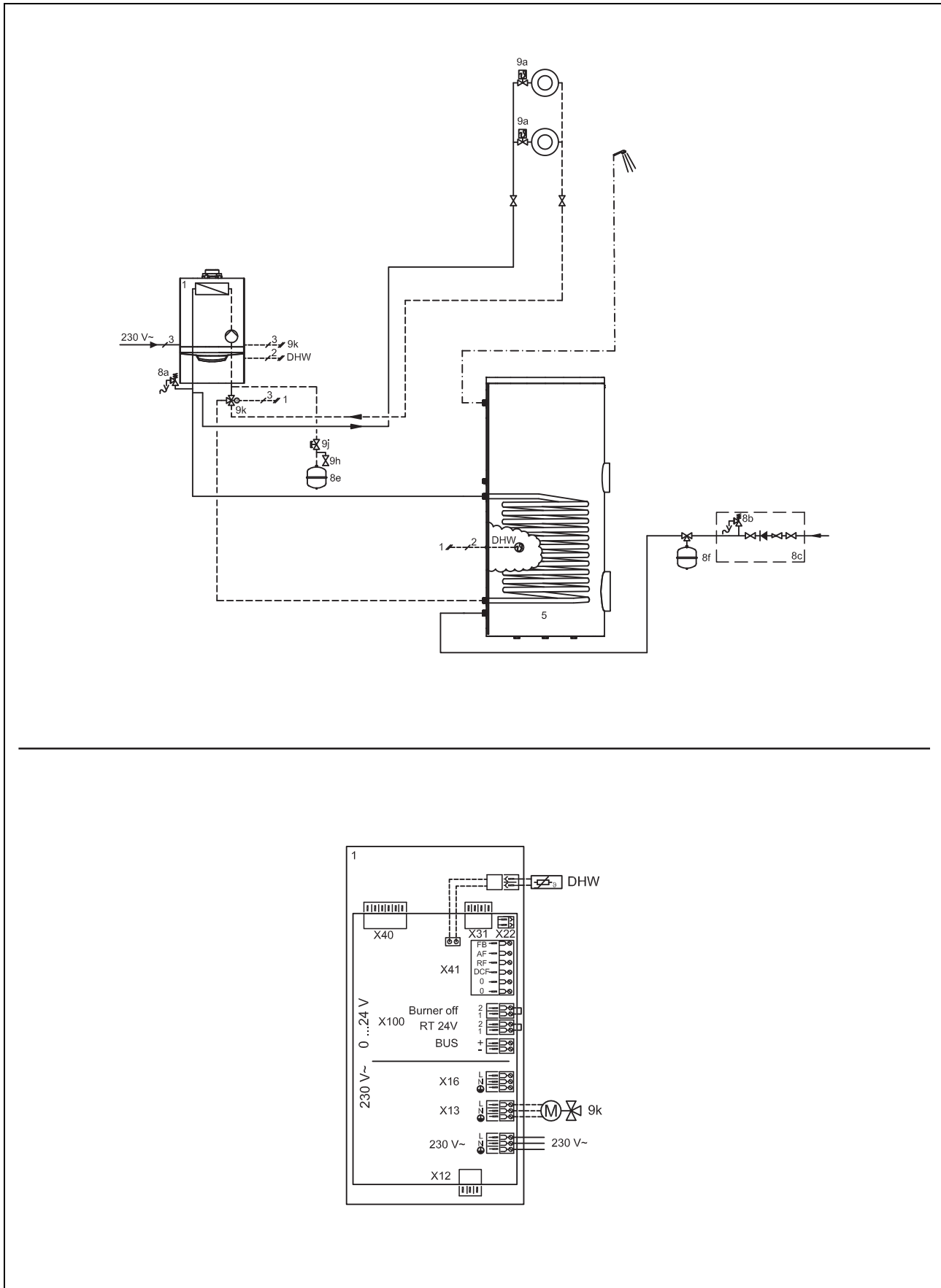
1 Main PCB (BMU)

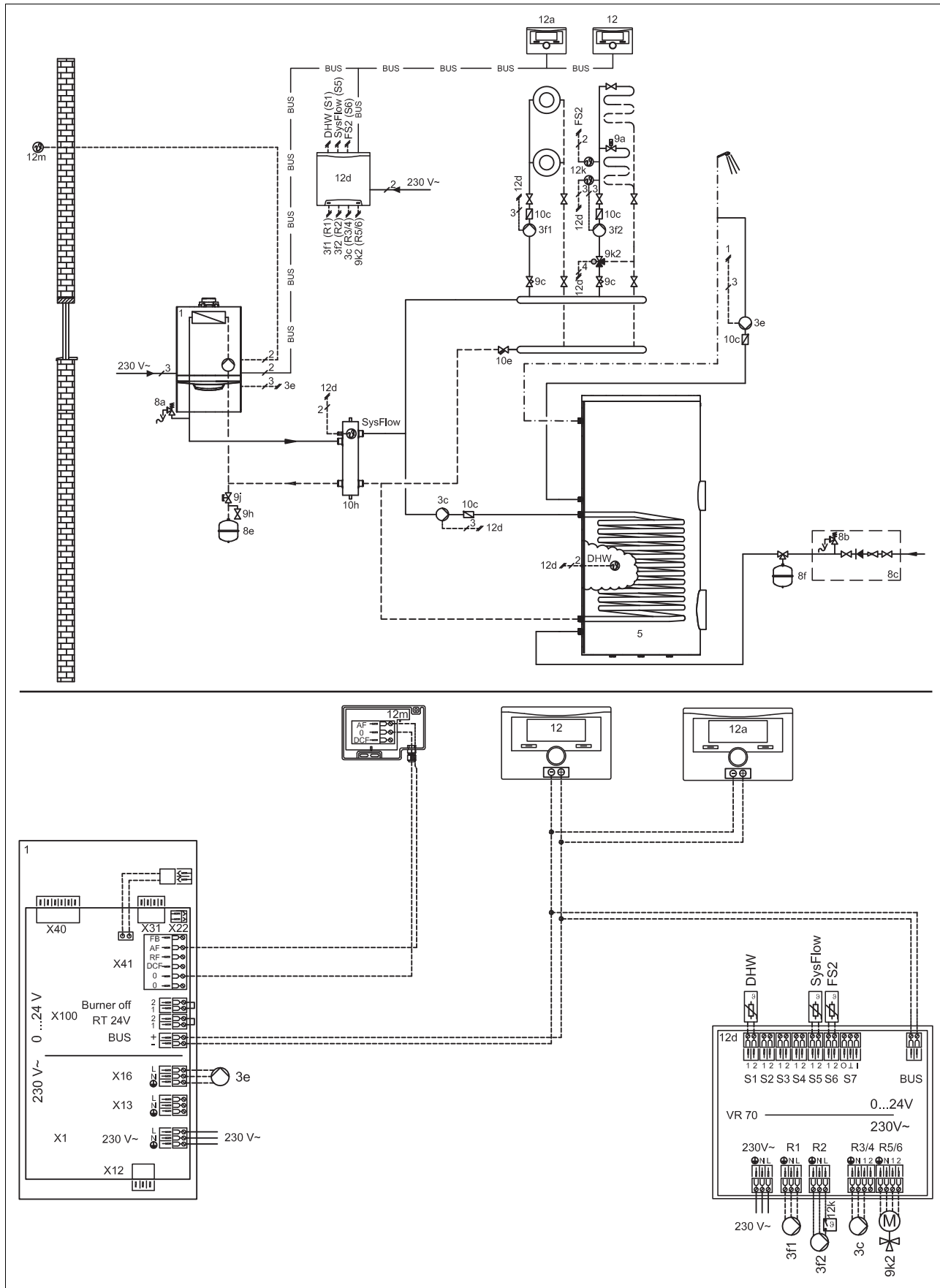
2 PCB for the control element (AI)

3	Gas valve assembly	11	Plug for the domestic hot water cylinder's contact (optional)
4	Temperature sensor in the heating flow	12	Water pressure sensor
5	Temperature sensor in the heating return	13	Heating pump control signal
6	Pressure switch	14	Control of the optional relay D.026
7	Control signal for the fan	15	Power supply for the prioritising diverter valve or domestic hot water charging pump (optional)
8	Plug that is enclosed with the system control (optional)	16	Fan power supply
9	Temperature sensor for the low loss header (optional)	17	Power supply for the heating pump
10	Plug for the domestic hot water cylinder's temperature sensor (optional)	18	Igniter
		19	Ignition electrode

F Basic installation diagram

F.1 0020253233





F.3 Key for the basic system diagrams

Component	Meaning
1	Heat generator
3	Heat generator circulation pump
3c	Cylinder charging pump
3e	Circulation pump
3f	Heating pump
5	Monovalent domestic hot water cylinder
8a	Expansion relief valve
8b	Potable water expansion relief valve
8c	Safety group – drinking water connection
8e	Heating diaphragm expansion vessel
8f	Diaphragm expansion vessel – potable water
9a	Single-room temperature control valve (thermostatic/motorised)
9c	Flow regulator valve
9e	Domestic hot water generation prioritising diverter valve
9h	Filling/draining cock
9j	Tamper-proof capped valve
9k	3-port mixing valve
10c	Non-return valve
10e	Line strainer with magnetite separator
10h	Low loss header
12	System control
12a	Remote control unit
12d	Expansion/wiring centre
12k	Limit thermostat
12m	Outdoor temperature sensor
DHW	Cylinder temperature sensor
FS2	Heating circuit volume temperature sensor
SysFlow	System temperature sensor
Components that have been used multiple times (x) are numbered consecutively (x1, x2, ..., xn).	

G Commissioning Checklist

Validity: Great Britain

Benchmark Commissioning & Warranty Validation Service Record

It is a requirement that the boiler is installed and commissioned to the manufacturers' instructions and the data fields on the commissioning checklist completed in full.

To instigate the boiler warranty the boiler needs to be registered with the manufacturer within one month of the installation. The warranty rests with the end-user (consumer), and they should be made aware it is ultimately their responsibility to register with the manufacturer, within the allotted time period.

It is essential that the boiler is serviced in line with the manufacturers' recommendations, at least annually. This must be carried out by a competent Gas Safe registered engineer. The service details should be recorded on the Benchmark Service and Interim Boiler Work Record and left with the householder. Failure to comply with the manufacturers' servicing instructions and requirements will invalidate the warranty.



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This Commissioning Checklist is to be completed in full by the competent person who commissioned the boiler as a means of demonstrating compliance with the appropriate Building Regulations and then handed to the customer to keep for future reference.

Failure to install and commission according to the manufacturers' instructions and complete this Benchmark Commissioning Checklist will invalidate the warranty. This does not affect the customer's statutory rights.

* All installations in England and Wales must be notified to Local Authority Building Control (LABC) either directly or through a Competent Persons Scheme. A Building Regulations Compliance Certificate will then be issued to the customer.

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GAS BOILER SYSTEM COMMISSIONING CHECKLIST & WARRANTY VALIDATION RECORD

Address:															
Boiler make and model:															
Boiler serial number:															
Commissioned by (PRINT NAME):						Gas Safe registration number:									
Company name:						Telephone number:									
Company email:						Company address:									
										Commissioning date:					
Heating and hot water system complies with the appropriate Building Regulations?											Yes				
Optional: Building Regulations Notification Number (if applicable):															
Time, temperature control and boiler interlock provided for central heating and hot water											Yes				
Boiler Plus requirements (tick the appropriate box(s))															
Boiler Plus option chosen for combination boiler in ENGLAND						Weather compensation			Smart thermostat with automation and optimisation						
						Load compensation			Flue Gas Heat Recovery						
Time and temperature control to hot water			Cylinder thermostat and programmer/timer						Combination boiler						
Zone valves			pre-existing			Fitted			Not required						
Thermostatic radiator valves			pre-existing			Fitted			Not required						
Automatic bypass to system			pre-existing			Fitted			Not required						
Underfloor heating			pre-existing			Fitted			Not required						
Water quality															
The system has been flushed, cleaned and a suitable inhibitor applied upon final fill, in accordance with BS7593 and boiler manufacturers' instructions											Yes				
What system cleaner was used?						Brand:			Product:						
What inhibitor was used?						Brand:			Product:						
Primary water system filter			pre-existing			Fitted			Not required						
CENTRAL HEATING MODE measure and record (as appropriate)															
Gas rate (for combination boilers complete DHW mode gas rate)						m ³ /hr			or			ft ³ /hr			
Central heating output left at factory settings?											Yes	No			
If no, what is the maximum central heating output selected?											kW				
Dynamic gas inlet pressure											mbar				
Central heating flow temperature											°C				
Central heating return temperature											°C				
System correctly balanced/rebalanced?											Yes				
COMBINATION BOILERS ONLY															
Is the installation in a hard water area (above 200ppm)?											Yes	No			
Water scale reducer/softener			pre-existing			Fitted			Not required						
What type of scale reducer/softener has been fitted?						Brand:			Product:						
Water meter fitted?											Yes	No			
If yes- DHW expansion vessel			pre-existing			Fitted			Not required						
Pressure reducing valve			pre-existing			Fitted			Not required						
DOMESTIC HOT WATER MODE Measure and record															
Gas rate						m ³ /hr			or			ft ³ /hr			
Dynamic gas inlet pressure at maximum rate											mbar				
Cold water inlet temperature											°C				
Hot water has been checked at all outlets											Yes	Temperature	°C		
CONDENSATE DISPOSAL															
The condensate drain has been installed in accordance with the manufacturers' instructions and/or BS5546/BS6798											Yes				
Point of termination						Internal			External (only where internal termination impractical)						
Method of disposal						Gravity			Pumped						
ALL INSTALLATIONS															
Record the following		At max rate:		CO		ppm		CO ₂		%		CO/CO ₂		Ratio	
		At min rate (where possible)		CO		ppm		CO ₂		%		CO/CO ₂		Ratio	
Where possible, has a flue integrity check been undertaken in accordance with manufacturers' instructions, and readings are correct?											Yes				
The operation of the boiler and system controls have been demonstrated to and understood by the customer											Yes				
The manufacturers' literature, including Benchmark Checklist and Service Record, has been explained and left with the customer											Yes				
Commissioning Engineer's signature															
Customer's signature (To confirm satisfactory demonstration and receipt of manufacturers' literature)															

* All installations in England and Wales must be notified to Local Authority Building Control (LABC) either directly or through a Competent Persons Scheme. A Building Regulations Compliance Certificate will then be issued to the customer.

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SERVICE & INTERIM BOILER WORK RECORD

It is recommended that your boiler and heating system are regularly serviced and maintained, in line with manufacturers' instructions, and that the appropriate service / interim work record is completed.

Service provider

When completing a service record (as below), please ensure you have carried out the service as described in the manufacturers' instructions. Always use the manufacturers' specified spare parts.

SERVICE/INTERIM WORK ON BOILER <small>delete as appropriate</small>					Date:
Engineer name:		Company name:			
Telephone N°:		Gas Safe registration N°:			
Max rate	CO	ppm	CO ₂	%	CO/CO ₂
Min rate	CO	ppm	CO ₂	%	CO/CO ₂
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Gas rate:	m ³ /h	OR	ft ³ /h		
Were parts fitted? <small>delete as appropriate</small>		Yes	No		
Parts fitted:					
System inhibitor concentration has been checked and appropriate action taken, in accordance with BS 7593 and boiler manufacturers' instructions. *					yes n/a
Comments:					
Signature:					

*A System inhibitor efficacy test is required on every annual service in accordance with the manufacturers' instructions and BS 7593. It is only acceptable to not have undertaken this if the service engineers attendance visit was in between annual services to attend a non-water facing component.

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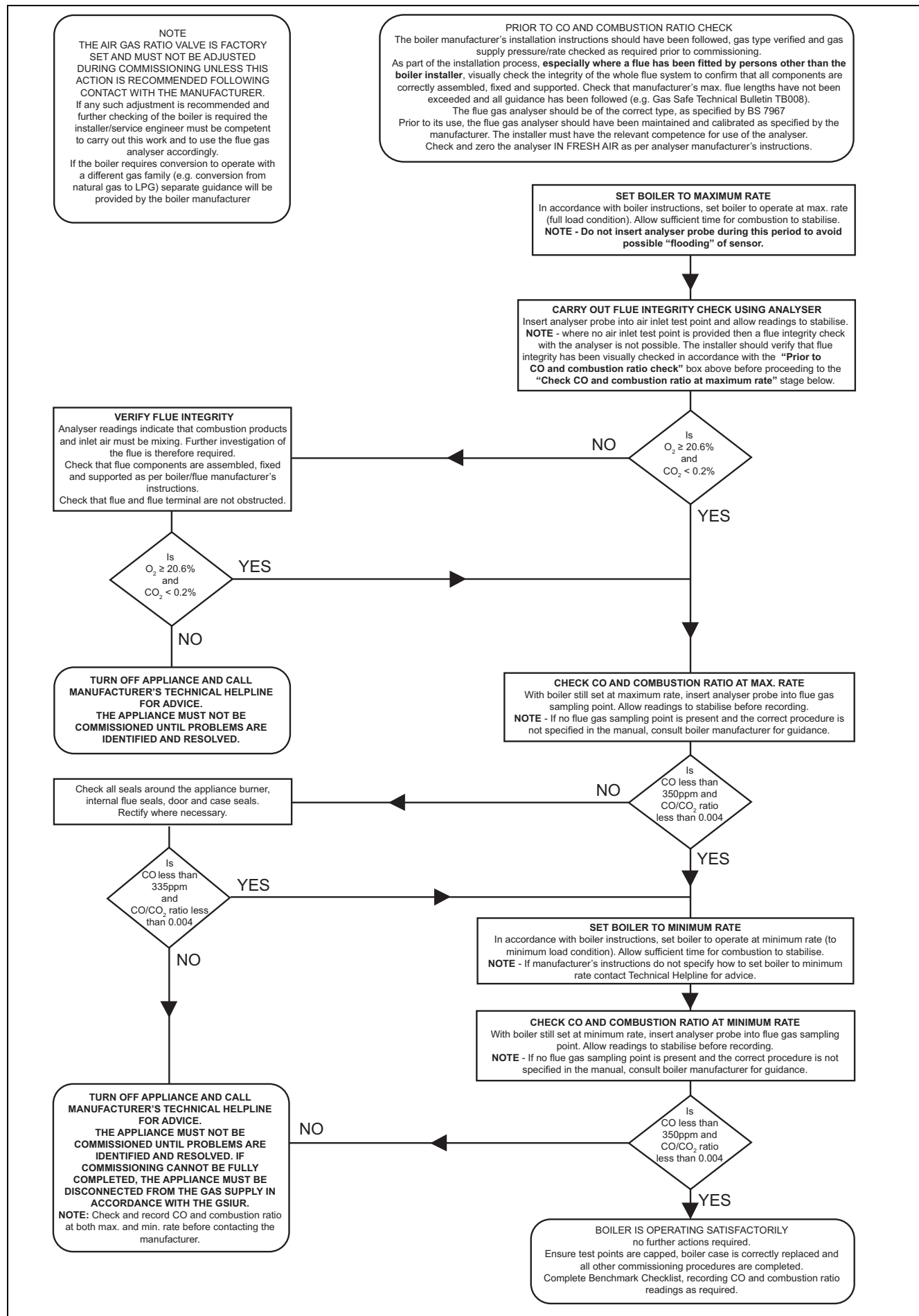
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H Commissioning Flow Chart

Validity: Great Britain



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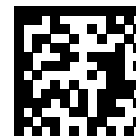
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