



Glow-worm

The energy you need

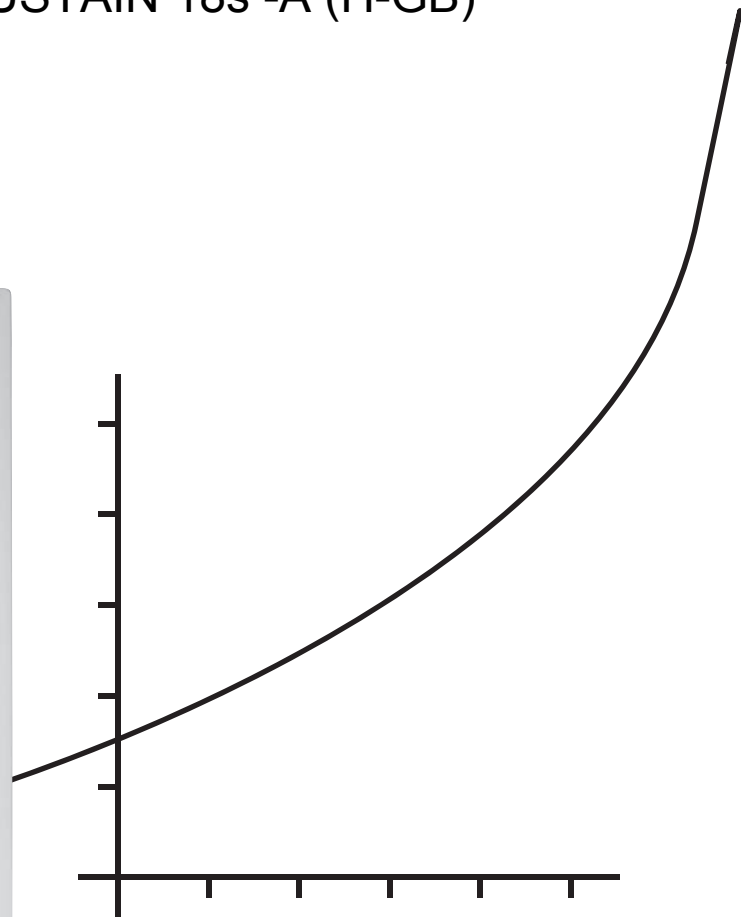
Installation and maintenance instructions

SUSTAIN ..s

SUSTAIN 12s -A (H-GB)

SUSTAIN 15s -A (H-GB)

SUSTAIN 18s -A (H-GB)



GB

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1 Safety

1.1 Action-related warnings

Classification of action-related warnings

The action-related warnings are classified in accordance with the severity of the possible danger using the following warning signs and signal words:

Warning symbols and signal words



Danger!

Imminent danger to life or risk of severe personal injury



Danger!

Risk of death from electric shock



Warning.

Risk of minor personal injury



Caution.

Risk of material or environmental damage

1.2 Risk caused by inadequate qualifications

Assembly and disassembly, installation, start-up, maintenance, repairs and decommissioning must only be carried out by a competent person who is sufficiently qualified to observe all of the instructions that come with the product, to proceed in accordance with the current state of the art, and to comply with all applicable directives, standards, laws and other regulations.

1.3 Intended use

There is a risk of injury or death to the user or others, or of damage to the product and other property in the event of improper use or use for which it is not intended.

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

The products referred to in these instructions must only be installed and operated in conjunction with the flue pipe accessories listed in other applicable documents.

Exceptions: For C63 and B23P installation types, follow the specifications in these instructions.

Intended use includes the following:

- observance of accompanying operating, installation and servicing instructions for the product and any other system components
- installing and fitting the product in accordance with the product and system approval
- compliance with all inspection and maintenance conditions listed in the instructions.

Intended use also covers installation in accordance with the IP class.

Any other use that is not specified in these instructions, or use beyond that specified in this document shall be considered improper use. Any direct commercial or industrial use is also deemed to be improper.

Caution.

Improper use of any kind is prohibited.

1.4 General safety information

1.4.1 Risk of death from escaping gas

What to do if you smell gas in the building:

- ▶ 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.
- ▶ If it is safe to do so, close the emergency control valve or the main isolator.
- ▶ If possible, close the gas isolator cock 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.
- ▶ Notify the gas supply company or National Grid Transco +44 (0) 800 111999 by telephone from outside of the building.

1.4.2 Risk of death from escaping flue gas

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



1 Safety



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

1.4.3 Risk of death due to blocked or leaking flue gas routes

Installation errors, damage, tampering, unauthorised installation sites or similar can cause flue gas to escape and result in a risk of poisoning.

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.

1.4.4 Risk of death due to cabinet-type casing

Cabinet-type casing can give rise to dangerous situations when used on a product which is operated with an open flue.

- ▶ Ensure that the product is supplied with sufficient combustion air.

1.4.5 Risk of death due to explosive and flammable materials

- ▶ Do not use or store explosive or flammable materials (e.g. petrol, paper, paint) in the installation room of the product.

1.4.6 Risk of death from electric shock

There is a risk of death from electric shock if you touch live components.

Before commencing work on the product:

- ▶ Unplug the mains plug.
- ▶ Or disconnect the product from the power supply by switching off all power supplies (electrical partition with a contact opening of at least 3 mm, e.g. fuse or line protection switch).
- ▶ Secure against being switched back on again.
- ▶ Wait for at least 3 minutes until the condensers have discharged.

1.4.7 Risk of death due to lack of safety devices

The schematic drawings included in this document do not show all safety devices required for correct installation.

- ▶ Install the necessary safety devices in the system.
- ▶ Observe the applicable national and international laws, standards and guidelines.

1.4.8 Risk of poisoning and burns caused by escaping hot flue gases

- ▶ 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.

1.4.9 Risk of poisoning caused by insufficient supply of combustion air

Conditions: 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.

1.4.10 Risk of being burned or scalded by hot components

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

1.4.11 Risk of injury during transport due to a high product weight.

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

1.4.12 Risk of corrosion damage due to unsuitable combustion and room air

Sprays, solvents, chlorinated cleaning agents, paint, adhesives, ammonia compounds, dust or similar substances may lead to corrosion on the product and in the air/flue pipe.

- ▶ Ensure that the supply of combustion air is always free of fluorine, chlorine, sulphur, dust, etc.





- ▶ Ensure that no chemical substances are stored at the installation site.
- ▶ Ensure that the combustion air is not routed through an old floor-standing oil-fired boiler chimney.
- ▶ 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 a combustion air supply is ensured that is technically free of chemical substances.

1.4.13 Risk of material damage caused by leak detection sprays and liquids

Leak detection sprays and liquids block the filter of the mass flow sensor on the Venturi, and thus destroy the mass flow sensor.

- ▶ During repair work, do not apply any leak detection sprays or liquids to the covering cap on the filter of the Venturi.

1.4.14 Risk of material damage caused by frost

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

1.4.15 Risk of material damage caused by using an unsuitable tool

- ▶ Use the correct tool to tighten or loosen screw connections.

1.5 Regulations (directives, laws, standards)

Installation and maintenance of the boiler must only be performed by a competent person with valid accreditation from the Health and Safety Executive in accordance with the "Gas Safety (Installation and Use) Regulations 1998" (hereinafter abbreviated to "competent person" or "heating specialist company"). The existing regulations, rules and guidelines must be observed when doing so. Any special requirements of Local Authorities, gas undertakings or insurers must be complied with. The competent person is also responsible for inspection, maintenance and repairs to the boiler, and for checking gas volume setting and flue gas analysis.

Installers shall carry out a full site risk assessment and put into place all necessary

steps and procedures to comply with Health and safety at work act and ensure safety of themselves and others with regard to manual handling and working at height requirements.

During the appliance installation (and any subsequent work, such as, the replacement of major parts) it will be necessary to employ caution. All installers and operatives involved from unloading the appliance until it is fully mounted on the wall in its final installed location must exercise full duty of care for themselves and others with regard to safety. When lifting and handling this appliance, operatives should employ assistance. In certain situations it may be necessary to use mechanical handling aids. Take care to avoid trip hazards, slippery or wet surfaces.

Employers and installers should refer to the HSE web site for full advice and manual handling assessment charts (MAC) tool.

In addition where no specific instructions are given then reference shall be made, but not restricted to, all applicable and relevant British Standards and codes of practice such as the following:

- Gas Safety (Installation and Use) regulations.
- All current Building Regulations for England, Northern Ireland and Wales, (as amended). This includes Approved Codes of Practice and approved documents and guidance for building regulations. (A to P and 7)
- The Building Standards, Scotland, and any requirements determined by the local authorities within.
- The Health and safety at work act
- COSHH Control of Substances Hazardous to Health.
- BS 7671 Requirements for electrical installations. IEE Wiring Regulations
- The Electricity at Work Regulations.
- The Water supply (water fittings) regulations 1999.
- Water bylaws 2000 (Scotland)
- BS 5854 Code of practice for flues and flue structures in buildings.
- BS EN 12828 Design of water-based heating systems.



1 Safety



- BS EN 806 Parts 1 - 5.
- BS 8558 Guide to the design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages.
- BS 6880 Code of practice for low temperature heating systems with outputs above 45 kW, Part 1, 2, and 3.
- BS 6891 Installation of low pressure gas pipe work of up to 35mm in domestic premises.
- BS 4814 Specification for: Expansion vessels using an internal diaphragm, for sealed hot water and heating systems.
- BS 7074 Application, selection and installation of expansion vessels and ancillary equipment for sealed water systems., Part 1 and 2.
- BS 7593 Code of practice for treatment of water in domestic hot water central heating systems.
- BS 12831 Heating systems in buildings. Method for calculating design heat load.
- BS EN 13831 Closed expansion vessels with built in diaphragm.
- EN 14336 Heating systems in buildings. Installation and commissioning of water based heating systems.
- BS 5440 – 1 Installation of flues and ventilation for gas appliances of rated input not exceeding 70kW*
- BS 5440 – 2 Flueing and ventilation for gas appliances of rated input not exceeding 70kW*
- * 1st 2nd and 3rd family gases.
- BS 5449 Forced circulation hot water systems up to 45kW.
- BS EN 6798 Installation & maintenance of gas fired hot water boilers of rated input not exceeding 70kW net.
- BS 5482 - Part 1 Domestic butane and propane gas burning installations

Institute of Gas Engineers Publications:

- IGE/UP/1B (Edition 2) Tightness testing and direct purging of small natural gas installations.
- IGE/UP/ 7 (Edition 2) Gas in timber and light steel framed buildings.

Additionally for gas boilers systems with outputs greater than 70KW.

- BS 6644 Installation of gas boilers between 60 kW and 2 MW (2nd and 3rd family gases)
- BS 5449
- IGE/UP/1 (Edition 2) Strength testing, tightness testing and direct purging of industrial and commercial gas installations.
- IGE/UP/1A (Edition 2) Strength testing, tightness testing and direct purging of small, low pressure industrial and commercial natural gas installations.
- IGE/UP/10 Installation of gas appliances in industrial and commercial premises. Part 1 Flued appliances.
- The installation must comply with the current version of the Clean Air Act.
- I.S. 813 Domestic Gas Installations
- I.S. 820 Non Domestic Gas Installations
- Building Control Act 2007
- ETCI Regulations for installing electrical systems



2 Notes on the documentation

2.1 Observing other applicable documents

- ▶ You must observe all the operating and installation instructions included with the system components.

2.2 Storing documents

- ▶ Pass these instructions and all other applicable documents on to the system operator.

2.3 Applicability of the instructions

These instructions apply only to:

Product article number


	Article number	Gas Council Number
SUSTAIN 12s -A (H-GB)	0010015888	41-019-36
SUSTAIN 15s -A (H-GB)	0010015889	41-019-37
SUSTAIN 18s -A (H-GB)	0010015890	41-019-38





3 Product description

3.1 Information on the identification plate

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

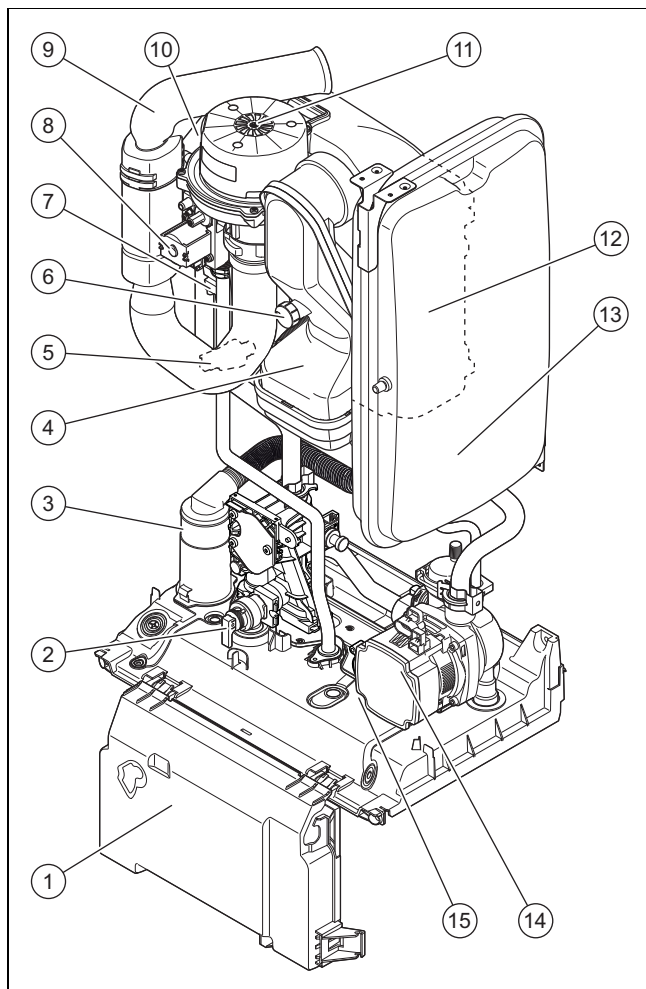
The identification plate keeps record of the country in which the product is to be installed.

Information on the identification plate	Meaning
	Barcode with serial number
Serial number	For quality control purposes; 3rd and 4th digits = year of production For quality control purposes; 5th and 6th digits = week of production For identification purposes; 7th to 16th digits = product article number For quality control purposes; 17th to 20th digits = place of manufacture
SUSTAIN ..s	Product description
2H, G20 - 20 mbar (2 kPa)	Factory setting for type of gas and gas connection pressure
Cat.	Approved gas category
Condensing technology	Efficiency class of the boiler in accordance with EC Directive 92/42/EEC
Type: Xx3(x)	Permissible flue gas connections
PMS	Maximum water pressure in heating mode
PMW	Maximum water pressure in hot water handling mode
V/Hz	Electric connection
W	Max. electrical power consumption
IP	Level of protection

Information on the identification plate	Meaning
	Heating mode
P_n	Nominal heat output range in heating mode
P_{nc}	Nominal heat output range in heating mode (condensing technology)
P	Nominal heat output range in hot water handling mode
Q_n	Nominal heating load range in heating mode
Q_{nw}	Nominal heating load range in hot water handling mode
$T_{max.}$	Max. flow temperature
NOx	NOx class for the product
Code (DSN)	Specific product code
	→ "CE label" section
	Read the instructions.
	→ "Recycling and disposal" section
GC no.	Gas council number

4 Installation

3.2 Functional elements: Pure boiler



- | | | | |
|---|--|----|--------------------------|
| 1 | Electronics box | 9 | Air intake pipe |
| 2 | Heating circuit expansion relief valve | 10 | Ignition electrode |
| 3 | Condensate siphon | 11 | Fan |
| 4 | Flue pipe | 12 | Primary heat exchanger |
| 5 | Pressure sensor | 13 | Heating expansion vessel |
| 6 | Flue gas analysis point | 14 | Heating pump |
| 7 | Ignition transformer | 15 | Bypass |
| 8 | Gas valve | | |

3.3 CE label



The CE label shows that the products comply with the basic requirements of the applicable directives as stated on the identification plate.

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

4 Installation

4.1 Transporting the unit

Important: With regard to the regulations of 1992 concerning the manual handling of loads, the unit exceeds the weight that can be lifted by a single person.

4.1.1 General

- ▶ Hold the load as close as possible to your body. Avoid rotational movements. Instead, reposition your feet.
- ▶ If the unit is being lifted by two persons, ensure your movements are coordinated during lifting.
- ▶ Avoid bending your upper body – do not lean forwards or to the side.
- ▶ Wear suitable non-slip protective gloves in order to protect your hands against sharp edges. Ensure that you are carrying the load securely.
- ▶ If required, get somebody to assist you in this.

4.1.2 Unloading the box from the delivery van

- ▶ It is recommended that two people lift the unit together.
- ▶ Lift the box using the straps provided.
- ▶ Use safe lifting techniques – keep your back straight and bend your legs at the knee.
- ▶ Hold the load as close as possible to your body.
- ▶ If the unit is being lifted by two persons, ensure your movements are coordinated during lifting.
- ▶ If required, get somebody to assist you in this.

4.2 Unpacking the product

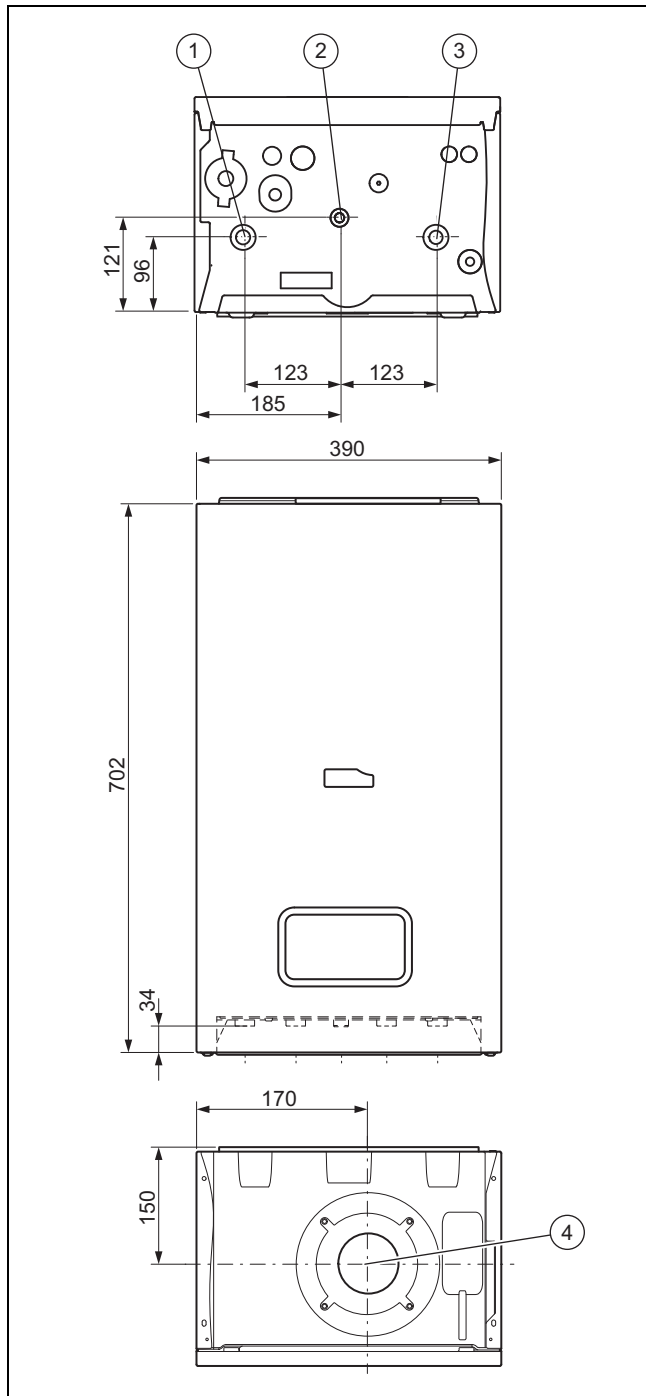
1. Remove the product from its box.
2. Remove the protective film from all of the product's components.

4.3 Checking the scope of delivery

- ▶ Check that the scope of delivery is complete and intact.

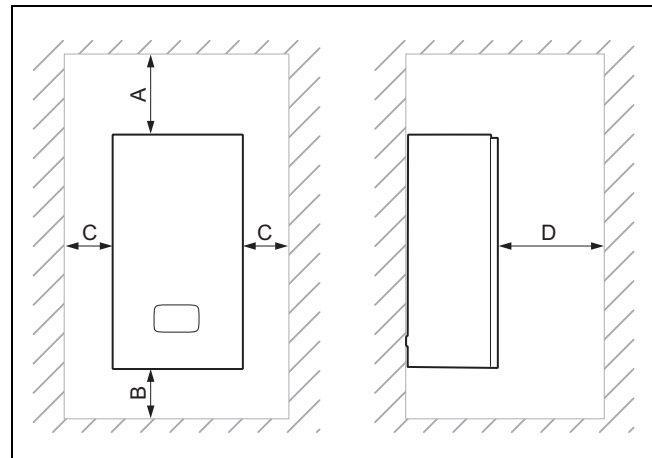
Number	Description
1	Heat generator
1	Hanging bracket
1	Screw
1	Flexible condensate drain pipework
4	3/4" seals
3	1/2" seals
2	Service valve
1	Gas isolator cock
2	Connection pipe (heating flow and return)
1	Gas pipe
1	Expansion relief valve discharge pipe
1	Installation template
1	Enclosed documentation

4.4 Dimensions



- 1 Heating flow
- 2 Gas connection
- 3 Heating return
- 4 Flue pipe connection

4.5 Minimum clearances



	Minimum clearance
A	150 mm
B	150 mm
C	5 mm
D	600 mm

4.6 Clearance from combustible components

It is not necessary to maintain a clearance between the product and components made of combustible materials.

4.7 Using the installation template

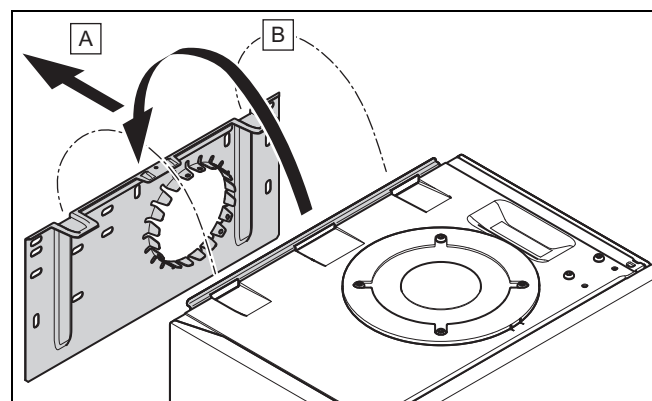
- Use the installation template to ascertain the locations at which you need to drill holes and make breakthroughs.

4.8 Wall-mounting the product



Note

If you are using the rear air/flue gas connection, install the flue pipe before you wall-mount the product.



1. Check whether the wall has sufficient load-bearing capacity to bear the operational weight of the product.
2. Check if the supplied fixing material may be used for the wall.

Conditions: The load-bearing capacity of the wall is sufficient, The fixing material may be used for the wall

- Wall-mount the product as described.

4 Installation

Conditions: The load-bearing capacity of the wall is not sufficient

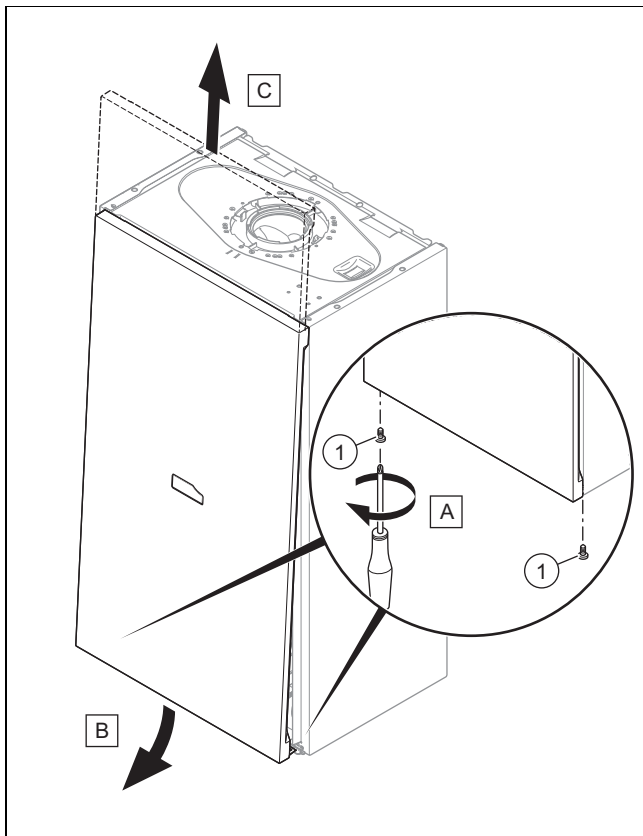
- ▶ Ensure that wall-mounting apparatus on-site has a sufficient load-bearing capacity. Use individual stands or primary walling, for example.
- ▶ Do not wall-mount the product if you cannot provide wall-mounting apparatus with a sufficient load-bearing capacity.

Conditions: The fixing material may not be used for the wall

- ▶ Wall-mount the product as described using the permitted fixing material provided on-site.

4.9 Removing/installing the front casing

4.9.1 Removing the front casing



1. Undo the two screws (1).
2. Gently press the front casing backwards in the centre so that the latching lug is released.
3. Pull the front casing forwards at the bottom edge.
4. Lift the front casing upwards from the bracket.

4.9.2 Fitting the front panel

- ▶ Refit the components in the reverse order.

4.10 Removing/installing the side section

4.10.1 Removing the side section



Caution.

Risk of material damage caused by mechanical deformation.

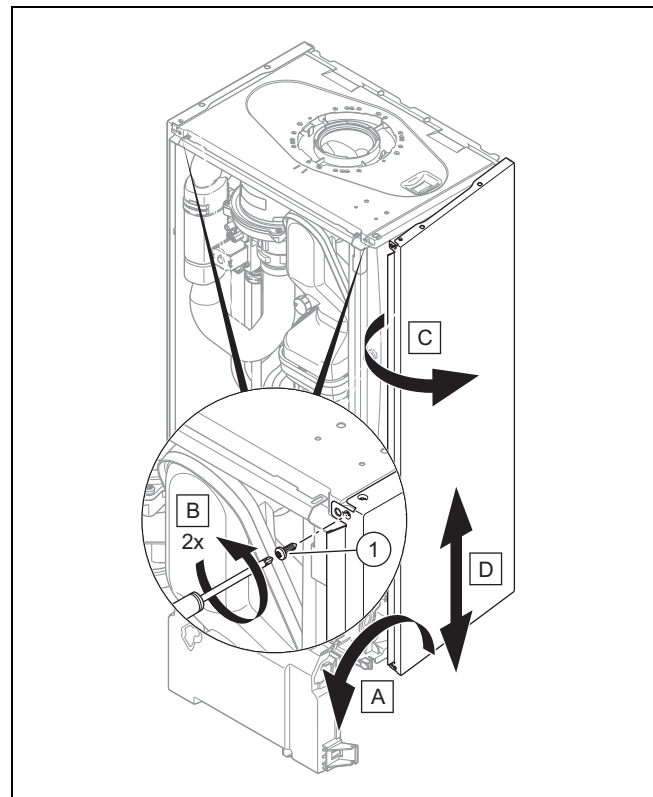
Removing **both** side sections may cause mechanical distortion in the product, which may cause damage to the piping, for example, and potentially result in leaks.

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



Note

If there is sufficient lateral clearance (at least 50 mm), you can remove the side section to facilitate maintenance or repair work.



1. Tilt the electronics box forward.
2. Hold on to the side section so that it cannot fall and unscrew both screws (1), one from the top and one from the bottom.
3. Tilt the side section to the outside and move it downwards and out.

4.10.2 Installing the side section

- ▶ Refit the components in the reverse order.

5 Installation



Danger!
Risk of explosion or scalding caused by incorrect installation.

Stresses in the supply line can cause leaks.

- ▶ Make sure there is no voltage in the supply lines when they are installed.



Caution.
Risk of damage caused by contaminated lines.

Foreign bodies, such as welding remnants, sealing residue or dirt in the water pipes, may cause damage to the boiler.

- ▶ Flush the heating installation thoroughly prior to installation.

5.1 Checking the gas meter

- ▶ Make sure that the existing gas meter is capable of passing the rate of gas supply required.

5.2 Gas and water connections



Caution.
Risk of damage caused by incorrect gas connection installation.

Excess test pressure or operating pressure may cause damage to the gas valve.

- ▶ Check the leak-tightness of the gas valve using a maximum pressure of 1.1 kPa (110 mbar).



Caution.
Risk of damage caused by corrosion.

If non-diffusion-tight plastic pipes are used in the heating installation, this may cause air to enter the heating water and corrosion of the heat generation circuit and the boiler.

- ▶ If using non-diffusion-tight plastic pipes in the heating installation, separate the system by installing an external heat exchanger between the boiler and the heating installation.



Caution.
Risk of material damage due to heat transfer during soldering.

- ▶ Do not solder the connection pieces if the connection pieces are screwed to the service valves.

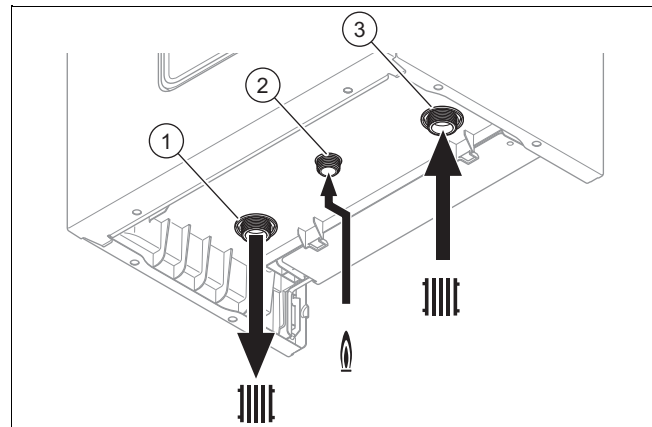


Note

We recommend that you provide the water pipes to the boiler outlet and to the system with thermal insulation.

Preliminary work

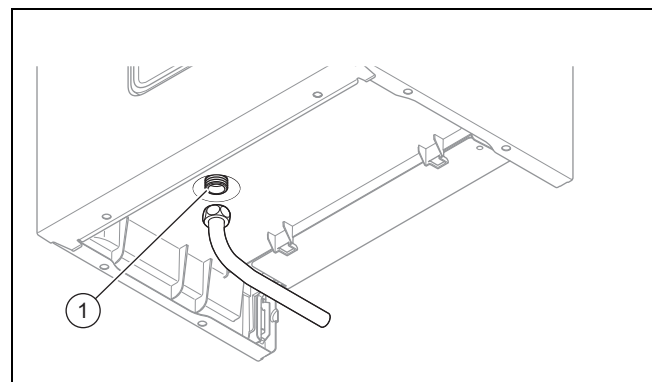
1. Check that the system volume and the volumetric capacity of the expansion vessel are the same.
 - ▽ If the volume of the expansion vessel is insufficient for the system.
 - ▶ Install an additional expansion vessel in the heating return, as close to the product as possible.
 - ▶ Install a non-return flap at the product's outlet (heating flow).
2. Ensure that the system has the following components:
 - A stop cock in the cold water supply
 - A stop cock in the gas line
 - A filling and draining device in the heating installation



- | | |
|---------------------------------|-----------------------------------|
| 1 Heating flow connection, G3/4 | 3 Heating return connection, G3/4 |
| 2 Gas connection, G1/2 | |

1. Connect the water and gas connections in accordance with the applicable standards.
2. Purge the gas line before start-up.
3. Check whether the connections (→ Page 20) are leak-tight.

5.3 Connecting the drain line for the expansion relief valve

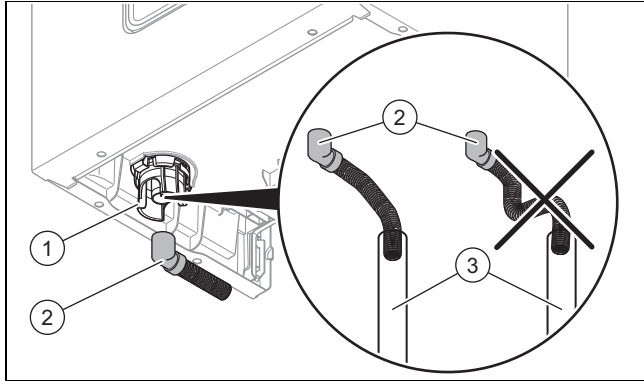


- ▶ Ensure that the pipeline is visible.

5 Installation

- ▶ The pipe must have a continuous fall and be routed to a position so that any discharge of water, possibly boiling, or steam cannot create any danger to persons, damage to property or external electrical components and wiring.
 - ◁ The components must be set up in such a way that you can see the water flowing out.

5.4 Connecting the condensate drain pipework



- ▶ Follow the instructions listed here and observe any legal directives and local regulations on condensate discharge.
- ▶ Use PVC or another material that is suitable for draining the non-neutralised condensate.
- ▶ If you cannot guarantee that the materials from which the drain lines are made are suitable, install a system for neutralising the condensate.
- ▶ Ensure that the connection between the condensate drain pipework and the drain hose is not air-tight.



Note

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.

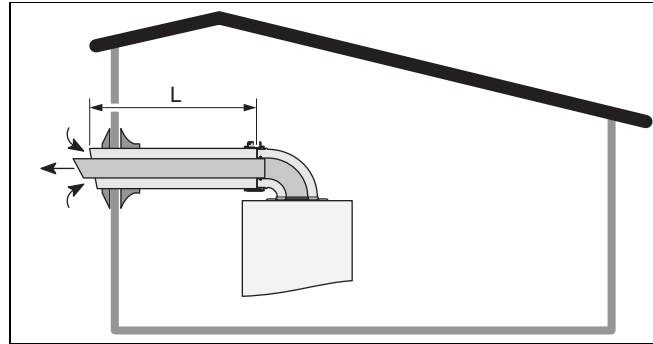
- ▶ Connect the condensate siphon (1). Use the supplied drain hose (2) for this.
- ▶ Connect condensate drain pipework (21.5 mm, not included in the scope of delivery) (3) to the drain hose (2).
- ▶ During installation remove all burrs from inside of cut pipe work and avoid excessive adhesive which may 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 BS 6789: "Specification for installing and maintaining gas-fired boilers with a nominal heat loading less than 70 kW".

5.5 Flue gas installation

5.5.1 Air/flue gas system

5.5.1.1 Horizontal air/flue gas system



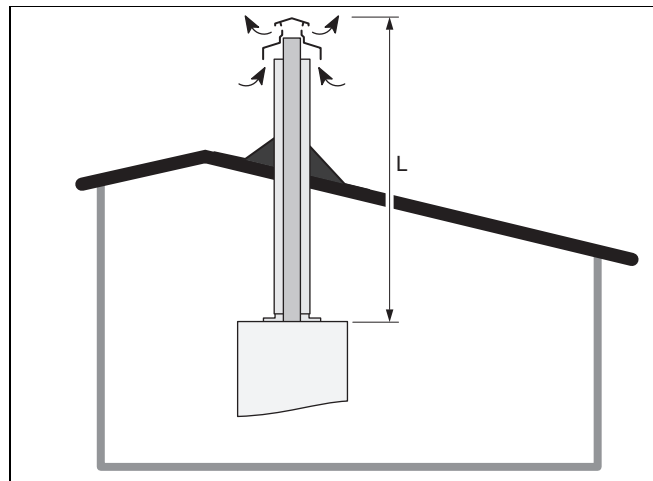
The openings in an attachment for separate lines must lead to a 50 cm-sided square.

For each additional 90° elbow (or two 45° elbows) that is required, the length (L) must be reduced by 1 m.

Length of the C13 type flue pipe

	Diameter of the air/flue pipe	
	Dia. 60/100 (L)	Dia. 80/125 (L)
	C13 type air/flue pipe	C13 type air/flue pipe
SUSTAIN 12s -A (H-GB)	≤ 10 m	≤ 25 m
SUSTAIN 15s -A (H-GB)	≤ 10 m	≤ 25 m
SUSTAIN 18s -A (H-GB)	≤ 10 m	≤ 25 m

5.5.1.2 Vertical air/flue gas system



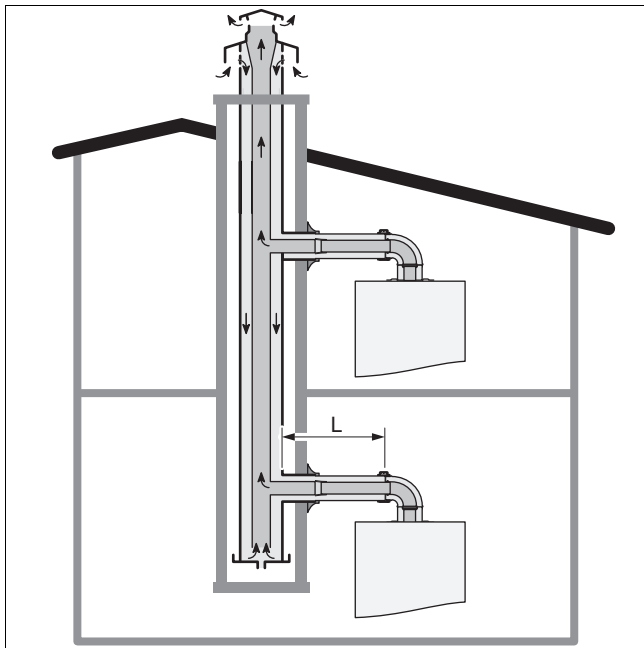
The openings in an attachment for separate lines must lead to a 50 cm-sided square.

For each additional 90° elbow (or two 45° elbows) that is required, the length (L) must be reduced by 1 m.

Length of the C33 type flue pipe

	Diameter of the air/flue pipe	
	Dia. 60/100 (L)	Dia. 80/125 (L)
	C33 type air/flue pipe	C33 type air/flue pipe
SUSTAIN 12s -A (H-GB)	≤ 10 m	≤ 25 m
SUSTAIN 15s -A (H-GB)	≤ 10 m	≤ 25 m
SUSTAIN 18s -A (H-GB)	≤ 10 m	≤ 25 m

5.5.1.3 Air/flue gas system for header lines



The connections with the line are established using the accessory specially developed by the product manufacturer.

A boiler that is connected to a type C43 system must only be connected to natural draught chimneys.

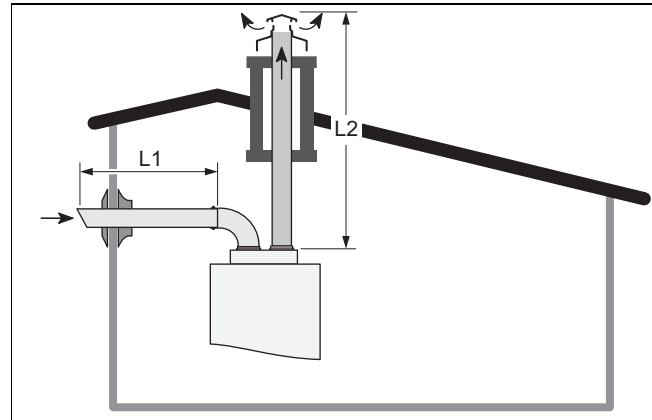
The condensate from header line systems must not drain into the boiler.

For each additional 90° elbow (or two 45° elbows) that is required, the length (L) must be reduced by 1 m.

Length of the C43 type flue pipe

	Diameter of the air/flue pipe
	Dia. 60/100 (L)
	C43 type air/flue pipe
SUSTAIN 12s -A (H-GB)	≤ 5 m
SUSTAIN 15s -A (H-GB)	≤ 5 m
SUSTAIN 18s -A (H-GB)	≤ 5 m

5.5.1.4 Air/flue gas system via separate pipes



Each line that runs through a wall and whose temperature exceeds the room temperature by 60 °C must be equipped with thermal insulation where it passes through the wall. This may be carried out using suitable insulating material with a strength of ≥ 10 mm and thermal conductivity of $\lambda \leq 0.04$ W/mK (e.g. glass wool). The attachments for the fresh air supply and flue gas extraction must not be installed on opposite walls of the building.

For each additional 90° elbow (or two 45° elbows) that is required, the length (L1+L2) must be reduced by 2 m.

Length of the C53 type flue pipe

	C53 type flue pipe	
	Min. dia. 80 (L1+L2)	Max. dia. 80 (L1+L2)
SUSTAIN 12s -A (H-GB)	2 x 0,5 m	2 x 20 m
SUSTAIN 15s -A (H-GB)	2 x 0,5 m	2 x 20 m
SUSTAIN 18s -A (H-GB)	2 x 0,5 m	2 x 20 m

5.6 Electrical installation



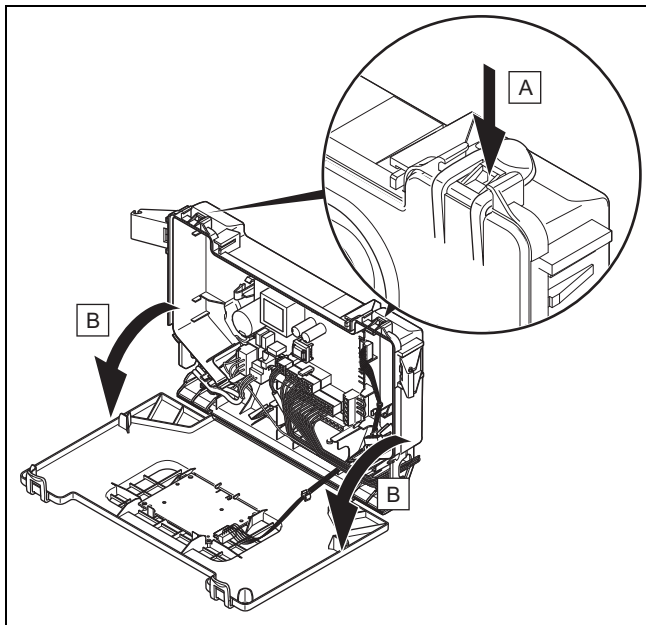
Danger!
Risk of death from electric shock!

The mains connection terminals L and N remain live even if the product is switched off:

- ▶ Switch off the power supply.
- ▶ Secure the power supply against being switched on again.

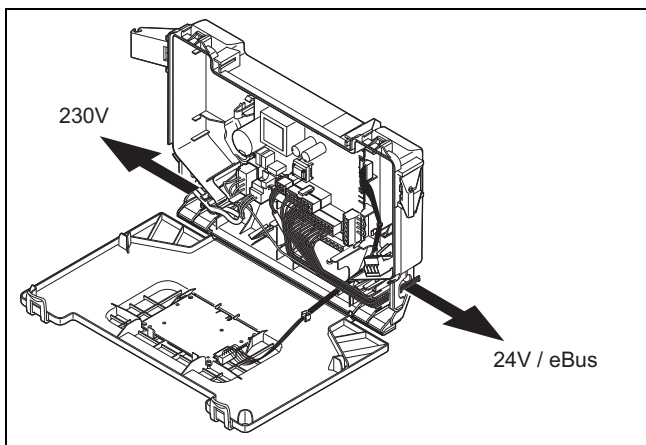
5 Installation

5.6.1 Opening the electronics box



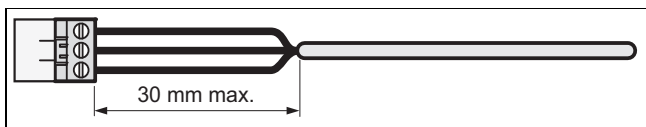
► Follow the instructions in the specified sequence.

5.6.2 Cable route



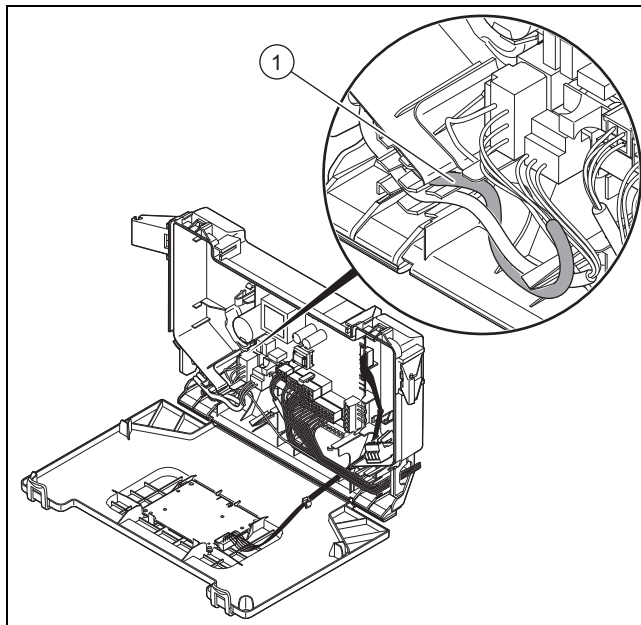
- 1 24-V eBUS cable route
- 2 230-V eBUS cable route

5.6.3 Carrying out the wiring

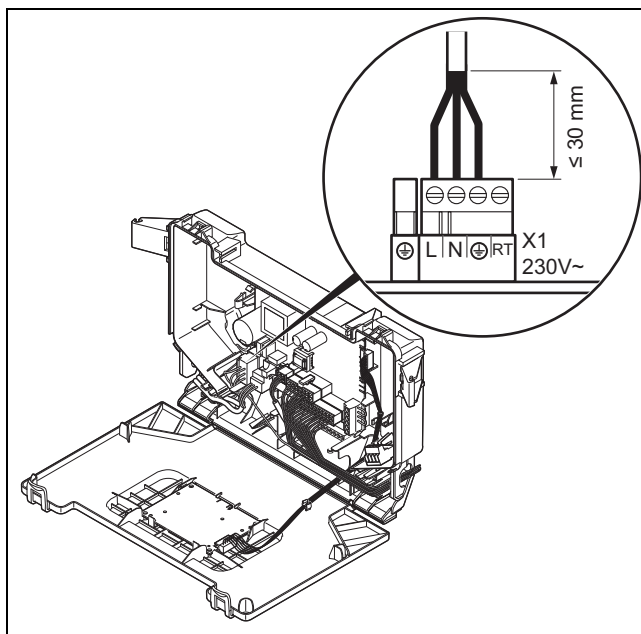


1. Shorten the connection cables to the appropriate lengths to prevent them from causing damage inside the electronics box.
2. Screw the plug to the connection cable.
3. Plug the plug into the slot provided on the PCB.

5.6.4 Establishing the power supply

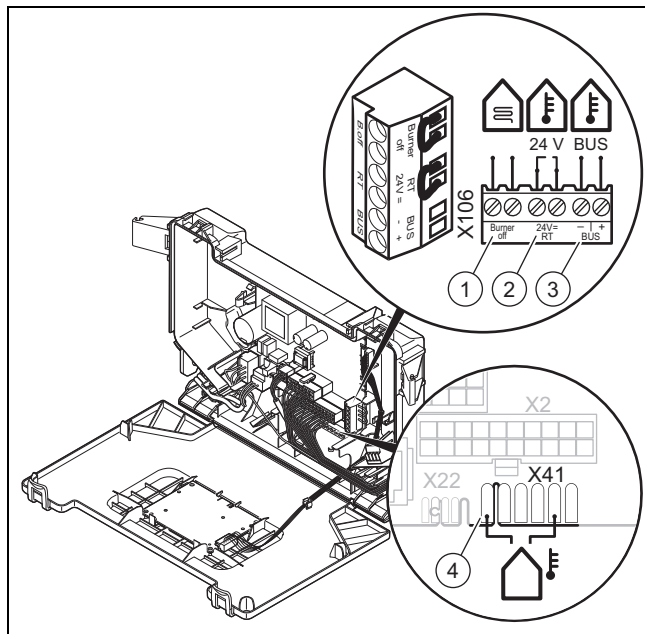


1. Observe all valid regulations.
2. Ensure that the rated mains voltage is 230 V.
3. Set up a fixed connection and install a partition with a contact opening of at least 3 mm (e.g. fuses or power switches).
4. Provide one common electricity supply for the boiler and for the corresponding controller:
 - Power supply: Single-phase, 230 V, 50 Hz
 - Fuse protection: ≤ 3 A
5. Open the electronics box. (→ Page 14)
6. Observe the routing of the power supply cable (1) in the electronics box in order to guarantee the strain relief.



7. Carry out the wiring. (→ Page 14)
8. Close the electronics box.
9. Make sure that access to the mains connection is always available and is not covered or blocked.

5.6.5 Connecting controllers to the electronic system



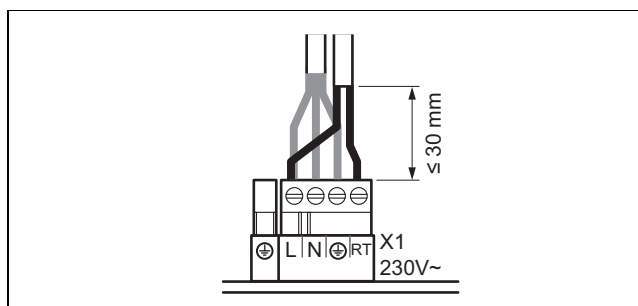
- | | | | |
|---|--|---|--|
| 1 | Safety thermostat for floor-standing heating | 3 | eBUS controller or radio receiver unit |
| 2 | 24 V controller | 4 | Outside temperature sensor, wired |

1. Open the electronics box. (→ Page 14)
2. Carry out the wiring. (→ Page 14)
3. Connect the individual components depending on the type of installation.

Conditions: If installing a multi-circuit controller.

- ▶ Change the pump's operating mode **d.18** from Eco (intermittently operating pump) to Comfort (continuously operating pump).

Conditions: When connecting a controller (230 V).



- ▶ Connect the controller to the main plug.
- ▶ Remove the bridge from the plug **24V=RT**.
4. Close the electronics box.

6 Operation

6.1 Using diagnostics codes

You can use the parameters marked as adjustable in the table of diagnostics codes to adapt the product to the system and customer requirements.

Overview of diagnostics codes (→ Page 28)

6.1.1 Activating diagnostics codes

1. Press and hold the **mode** button for 7 seconds.
 - ◁ is shown in the display.
2. Press the **-** or **+** button to set the value.
 - ◁ The access code **(96)** is reserved for the competent person.
 - ◁ The access code **(35)** is reserved for the customer service.
3. Press the **mode** button to confirm.
 - ◁ is shown in the display.

6.1.2 Setting a diagnostics code

1. Press the **-** or **+** button to select the diagnostics code.
2. Press the **mode** button to confirm.
 - ◁ The value and/or status of the diagnostics code is shown in the display.
3. Press the **-** or **+** button to set the value.
4. If you allow the value to flash for three seconds, the setting is automatically confirmed.
 - ◁ is shown in the display for 1 second.



Note

You can manually confirm the setting at any time by pressing and holding the **mode** button for less than 3 seconds.

5. Proceed accordingly for all parameters that need to be changed.
6. Press and hold the **mode** button for 3 seconds to finish configuring the diagnostics codes.
 - ◁ The display switches to the basic display.

6.2 Displaying the status codes

The status codes display the product's current operating status.

Status codes – Overview (→ Page 32)

6.2.1 Activating the status codes display

1. Hold the **+** button down for more than 7 seconds.
 - ◁ **S.XX** is shown on the display, followed by the heating flow temperature, the internal system pressure and the cylinder temperature (depending on the version).
2. Press the **mode** button to exit this menu.

7 Start-up













- ◁ The display switches to the basic display.

6.3 Using check programmes

By activating various check programmes, you can trigger various special functions on the product.

Check programmes – Overview (→ Page 28)

6.3.1 Calling up the check programmes



1. Hold the  button down for more than 5 seconds.
 - ◁ All symbols are shown in the display.
 - ◁  is shown in the display.
2. Press and hold the  button for five seconds.
 - ◁  is shown in the display.
3. Press the  or  button to select the check programme.
4. Press the  button to confirm.
 - ◁ **on** is shown in the display and the programme starts.
5. Press the  and  buttons at the same time whilst running a check programme.
 - ◁ The heating water temperature and the filling pressure for the heating installation are shown alternately in the display.
6. Press the  button to return to the check programme.
 - ◁ The display shows the check programme.
7. Press the  button to finish the check programme.
 - ◁ **OFF** is shown in the display.
8. Press and hold the  button for 3 seconds to finish the check programmes.
 - ◁ **End** is shown in the display.
 - ◁ The display switches to the basic display.



Note

If you do not press any button for 15 minutes, the current programme is automatically cancelled and the basic display is shown.

6.3.2 Displaying the pressure and temperature of the heating during a check programme

1. Press the  buttons simultaneously.
 - ◁ Display the filling pressure in the heating installation.
 - ◁ Display the heating flow temperature.
2. Press the  button to display the check programme currently running.

7 Start-up

7.1 Carrying out the initial start-up

Initial start-up must be carried out by a customer service technician or an authorised competent person using the first-commissioning-checklist. The first-commissioning-checklist in the appendix (→ Page 40) of the installation instructions must be filled in and stored carefully along with the unit's documentation.

- ▶ Carry out the initial start-up using the first-commissioning-checklist in the appendix.
- ▶ Fill out and sign the first-commissioning-checklist.

7.2 Checking the type of gas

Make sure that the product is set up correctly by checking the type of gas. This ensures optimum combustion quality.

- ▶ Check the type of gas as part of routine product maintenance work when replacing components, carrying out work on the gas route and carrying out a gas conversion.

7.3 Checking the factory setting

The product's combustion has been factory tested and is preset for operation with the gas group indicated on the identification plate.

- ▶ Check the information about the type of gas indicated on the identification plate and compare this with the type of gas available at the installation location.

Conditions: The product design is **not compatible** with the local gas group

- ▶ Do not start up the product.

Conditions: The product design is **compatible** with the local gas group

- ▶ Proceed as described below.

7.4 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 system, 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 system.
- ▶ Use a magnetic rod to check whether it contains magnetite (iron oxide).
- ▶ If you ascertain that it contains magnetite, clean the system and apply suitable corrosion-protection measures, or fit a magnet filter.
- ▶ Check the pH value of the removed water at 25 °C.
- ▶ If the value is below 6.5 or above 8.5, clean the system and treat the heating water.

- ▶ Ensure that oxygen cannot get into the heating water. (→ Page 20)

Checking the filling and supplementary water

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

Treating the filling and supplementary water

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

Provided the national regulations and technical standards 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 6.5 or more than 8.5.

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.



Caution.

The use of unsuitable heating water may cause aluminium corrosion and a resulting lack of leak-tightness.

In contrast to steel, grey cast iron or copper, for example, aluminium reacts with alkaline heating water (pH value > 8.5) to produce substantial corrosion.

- ▶ When using aluminium, make sure that the pH value of the heating water is between 6.5 and a maximum of 8.5.



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 frost and corrosion protection agents, 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)

- Fernox F3
- Sentinel X 300
- Sentinel X 400

Additives intended to remain permanently in the system

- Fernox F1
- Fernox F2
- Sentinel X 100
- Sentinel X 200

Additives for frost protection intended to remain permanently in the system

- Fernox Antifreeze Alphi 11
- Sentinel X 500

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

7.5 Avoiding danger arising from insufficient water pressure

The filling pressure must be between 0.10 and 0.15 MPa (1.0 and 1.5 bar).

If the heating installation extends over several storeys, higher filling pressures may be required to avoid air entering the heating installation.

If the water pressure falls below 0.05 MPa (0.5 bar), the value flashes in the display.

If the water pressure falls below 0.03 MPa (0.3 bar), the product switches off. The display shows 0.0 MPa (0.0 bar). Fault F22 will be stored in the fault list.

- ▶ Top up the water in the heating installation to start up the product again.
 - ◁ The pressure value flashes in the display until a pressure of 0.05 MPa (0.5 bar) or higher has been reached.

7.6 Switching on the product

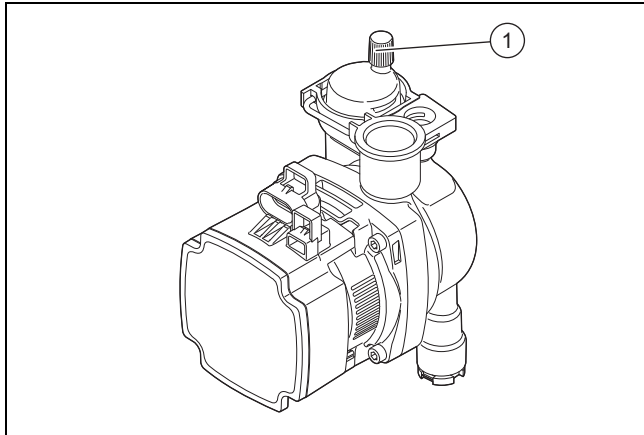
- ▶ Switch on the product via the main switch installed on-site.

7 Start-up

7.7 Filling and purging the heating installation

Preliminary work

- ▶ Rinse the heating installation through.



1. Loosen the purging valve cap **(1)** on the pump and on the automatic air vents.
2. Fill with water until the required filling pressure is reached.
 - Recommended filling pressure: 1 ... 1.5 bar
 - ◁ The heating and hot water functions cannot be activated.
 - ◁ The pressure value flashes in the display until a pressure of 0.05 MPa (0.5 bar) or higher has been reached.
 - ◁ Automatic purging is triggered as soon as the pressure increases above 0.07 MPa (0.7 bar) over longer than 15 seconds.
3. Purge each radiator until the water escapes normally, and then retighten the system's purging valves.



Note

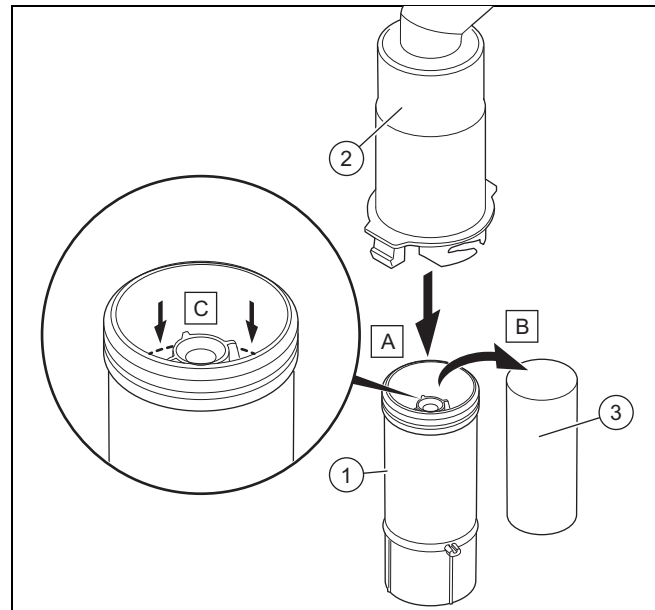
Leave the pump purging valve cap loosened.

4. Check whether all connections are leak-tight.

Conditions: If the noise persists in the boiler

- ▶ Purge the product again by activating check programme **(P.07)** and then **(P.06)**.
Check programmes – Overview (→ Page 28)

7.8 Filling 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. Fill the lower section of the siphon with water up to 10 mm below the upper edge of the condensate drain pipe-work.
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)**.

7.9 Checking and adjusting the gas settings

Only a qualified competent person is authorised to implement the settings on the gas valve.

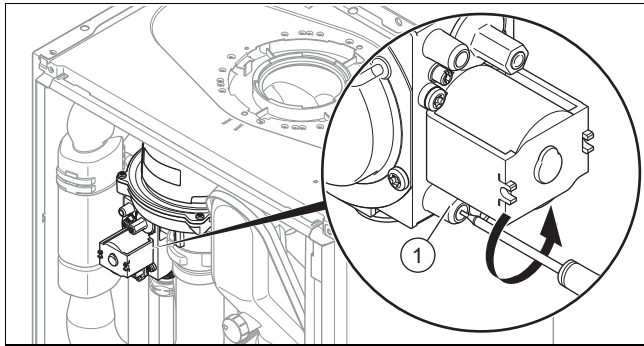
Each destroyed seal must be restored.

The CO₂ adjusting screw must be sealed.

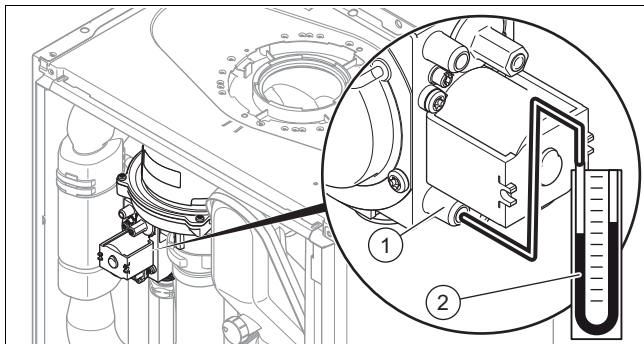
Never modify the factory setting of the gas pressure regulator of the gas valve.

7.9.1 Checking the gas connection pressure (gas flow pressure)

1. Close the gas isolator cock.



2. Use a screwdriver to undo the sealing screw on the measuring nipple (1) of the gas valve.



3. Connect a pressure gauge (2) to the measuring nipple (1).
4. Open the gas isolator cock.
5. Start up the product with check programme P.01.
6. Measure the gas connection pressure against atmospheric pressure.

Permissible connection pressure

Great Britain	Natural gas	G20	1.7 ... 2.5 kPa (17.0 ... 25.0 mbar)
---------------	-------------	-----	---

7. Switch off the product.
8. Close the gas isolator cock.
9. Remove the pressure gauge.
10. Tighten the screw on the measuring nipple (1).
11. Open the gas isolator cock.
12. Check the measuring nipple for gas tightness.

Conditions: Gas connection pressure **not** in the permissible range



Caution.

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

If the gas connection 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.
- ▶ Do not start up the product.

- ▶ If you are unable to remedy the fault, contact the gas supply company.
- ▶ Close the gas isolator cock.

7.9.2 Checking the leak-tightness of the flue gas system and for flue gas recirculation

1. Check that the flue gas system is intact, in accordance with British Gas TB 200.
2. If the flue gas installation is longer than 2 m, a flue gas recirculation test is strongly recommended. This test must be carried out in accordance with the instructions below.
3. Use the air analysis point (1) to check for flue gas recirculation.
4. Use the flue gas measuring instrument.
5. If you discover CO or CO₂ in the fresh air, search for a leak in the flue gas system or for the flue gas recirculation.
6. Eliminate the damage.
7. Repeat the above-mentioned test to determine if the fresh air contains CO or CO₂.
8. If you cannot eliminate the damage, you must not start up the boiler.

7.9.3 Thoroughly flushing the heating installation ("hot")

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 and purge the heating installation. (→ Page 18)
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. Further information can be obtained from Sentinel, Betz Dearborn Ltd., Tel: 0151 420 9595, or Fernox, Alpha– Fry technologies. Tel: 0870 8700362.

8. Fit the front panel. (→ Page 10)

7.9.4 Checking the CO₂ content

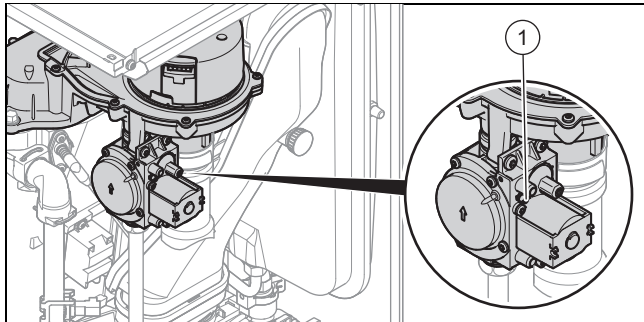
1. Start up the product with the check programme P.01.
2. Wait at least five minutes until the product reaches its operating temperature.
3. Measure the CO₂ content at the flue gas analysis point.
4. Compare the measured value with the corresponding value in the table.

8 Adapting the unit to the heating installation

Settings	Unit	G20 natural gas
CO ₂ after 5 minutes in full load mode with front casing closed	Vol.-%	9.2 ± 1.0
CO ₂ after 5 minutes in full load mode with front casing removed	Vol.-%	9.0 ± 1.0
Set for Wobbe index W ₀	kWh/m ³	15
CO in full load mode	ppm	≤ 250
CO/CO ₂		≤ 0.0031

- Set the CO₂ content as required. (→ Page 20)

7.9.5 Setting the CO₂ content



- Remove the yellow sticker.
- Remove the blue covering cap (1).
- Use an Allen key to turn the bolt in order to set the CO₂ content (value with front casing removed).
 - ◁ Turning to the right decreases the value.
 - ◁ Turning to the left increases the value.
- Only carry out the adjustment in increments of 1/8 turn and wait approximately 1 minute after each adjustment until the value stabilises.
- If an adjustment is not possible in the specified adjustment range, you must not start up the product.
- If this is the case, inform Customer Service.
- Secure the covering cap.

7.10 Checking function and leak-tightness

Before you hand the product over to the operator:

- ▶ Check the gas line, the flue gas installation, the heating installation and the hot water pipes for leaks.
- ▶ Check that the air/flue pipe and condensate drain pipe-work have been installed correctly.
- ▶ Check that the front casing has been installed correctly.

7.10.1 Checking the heating mode

- Activate the heating mode on the user interface.
- Turn all thermostatic radiator valves on the radiators until they are fully open.
- Allow the product to operate for at least 15 minutes.
- Fill and purge the heating installation. (→ Page 18)
- Activate the display for the current operating status. (→ Page 15)

Status codes – Overview (→ Page 32)

- ◁ If the product is working correctly, the display shows **S.04**.

7.10.2 Checking the hot water generation

- Activate the hot water handling mode on the user interface.
- Open a hot water valve completely.
- Activate the display for the current operating status. (→ Page 15)

Status codes – Overview (→ Page 32)

- ◁ If the product is working correctly, the display shows **S.14**.

8 Adapting the unit to the heating installation

You can reset/change the system parameters (section "Using diagnostics codes").

Overview of diagnostics codes (→ Page 28)



8.1 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. The burner anti-cycling time is only active for the heating mode. Hot water handling mode during a burner anti-cycling time does not affect the time function element.

8.1.1 Setting the maximum burner anti-cycling time

- Set the diagnostics code. (→ Page 15)
Overview of diagnostics codes (→ Page 28)
- If required, adjust the maximum burner anti-cycling time using the diagnostics code **d.02**.

8.1.2 Resetting the remaining burner anti-cycling time

- ▶ Hold the  button down for more than 3 seconds.
- ◁  is shown in the display.

8.2 Setting the pump output

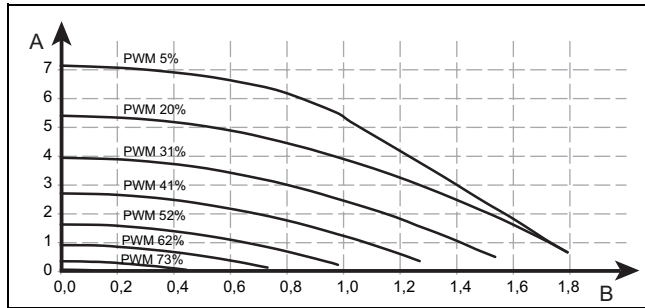
The product is equipped with a speed-regulated high-efficiency pump, which adjusts independently to the hydraulic conditions of the heating installation.

If you have installed a low loss header in the heating installation, you should switch off the speed regulation and set the pump output to a fixed value.

- ▶ If required, change the setting of the pump speed, which depends on the operating mode, under diagnostics code **d.14**.
- ▶ Set the diagnostics code. (→ Page 15)

Overview of diagnostics codes (→ Page 28)

8.2.1 Pump diagrams



A Remaining feed head [mbar] B Flow rate [m³/h]

8.3 Setting the bypass valve



Caution.

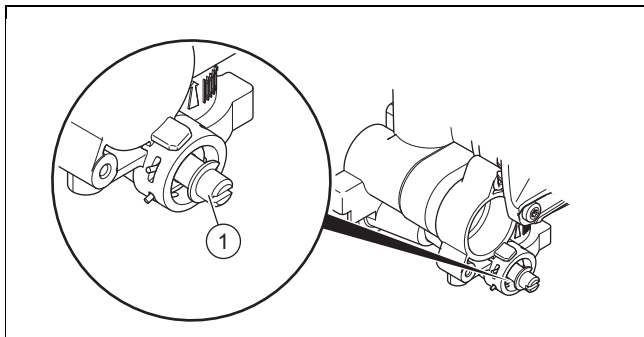
Risk of material damage caused by incorrect setting of the high-efficiency pump

If the pressure at the bypass valve is increased (by turning it clockwise) and the pump output is set to less than 100%, the product may not operate correctly.

- ▶ In this case, set the pump output to 5 = 100% using diagnostics parameter **d.14**.

If the pump operating mode **d.14 Pump speed target value** = Auto (Δp limit) is set, the default setting must not be changed.

- ▶ Remove the front casing. (→ Page 10)



- ▶ Regulate the pressure using the adjusting screw (1).

Position of the adjusting screw	Notes/application
Right-hand stop (screwed all the way in)	If the radiators do not heat up sufficiently at the default setting. In this case, you must set the pump to the maximum speed.
Mid-position (six anti-clockwise rotations)	Default setting
Five further anti-clockwise rotations starting from the mid-position	If noises are produced in the radiators or radiator valves.

- ▶ Fit the front panel. (→ Page 10)

9 Adjusting the hot water temperature

You can reset/change the system parameters (→ section "Using diagnostics codes").

Overview of diagnostics codes (→ Page 28)

9.1 Setting the hot water temperature



Danger!

Risk of death from Legionella.

Legionella multiply at temperatures below 60 °C.

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

- ▶ Set the hot water temperature.

Conditions: Water hardness: > 3.57 mol/m³

- Hot water temperature: ≤ 50 °C

10 Handing the product over to the operator

- ▶ When you have finished the installation, attach the sticker supplied (in the operator's language) to the product cover.
- ▶ Explain to the operator how the safety devices work and where they are located.
- ▶ Inform the operator how to handle the product.
- ▶ In particular, draw attention to the safety information which the operator must follow.
- ▶ Inform the operator of the necessity to have the product maintained on a regular basis.
- ▶ Instruct the operator about measures taken to ensure the supply of combustion air and flue gas pipe.

11 Inspection and maintenance

11.1 Observing inspection and maintenance intervals

- ▶ Comply with the minimum clearances for the inspection and maintenance. Depending on the results of the inspection, it may be necessary to bring maintenance work forward.

Inspection and maintenance work – Overview (→ Page 37)

11 Inspection and maintenance

11.2 Procuring spare parts

The original components of the product were also certified as part of the declaration of conformity. If you do not use certified Glow-worm original spare parts for maintenance or repair work, this voids the conformity of the product. We therefore strongly recommend that you install Glow-worm original spare parts. Information about available Glow-worm original spare parts is available by contacting the contact address provided on the reverse of this document.

- ▶ If you require spare parts for maintenance or repair work, use only Glow-worm original spare parts.

11.3 Removing the gas-air mixture unit

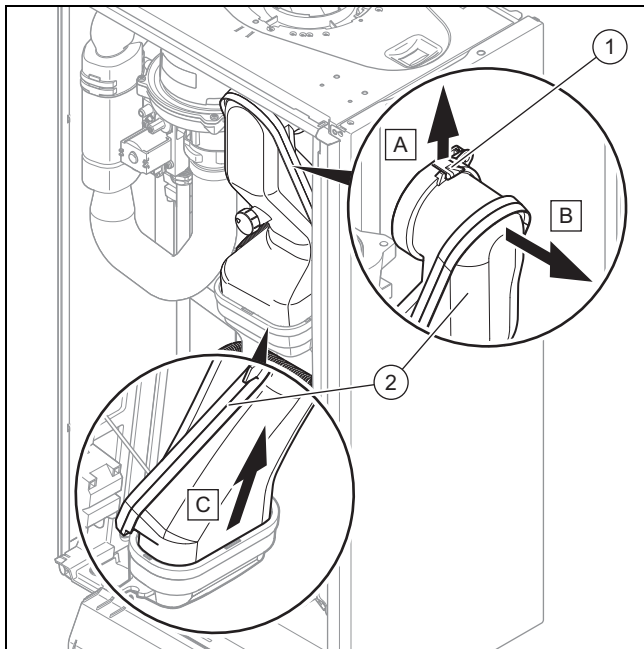


Note

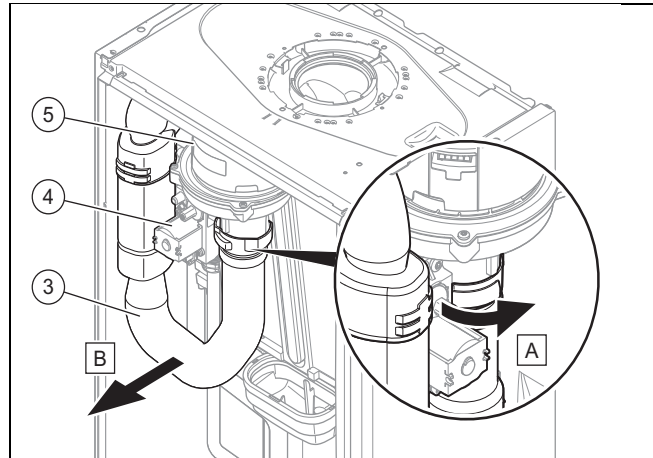
The gas-air mixture unit consists of three main components:

- Ventilator
- Gas valve,
- Burner cover

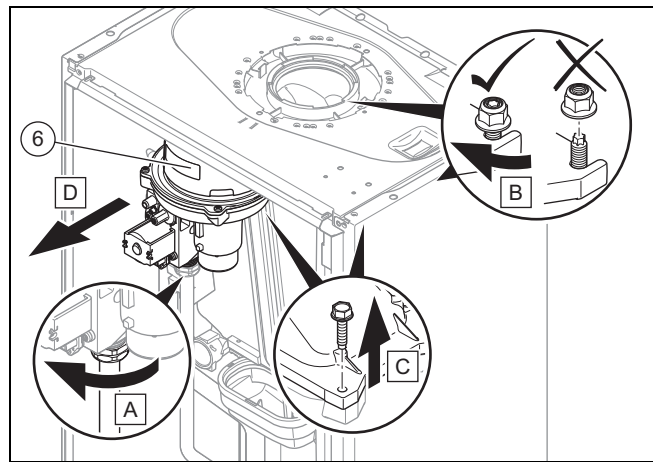
1. Switch off the product via the main switch.
2. Close the gas isolator cock.
3. Remove the front casing. (→ Page 10)



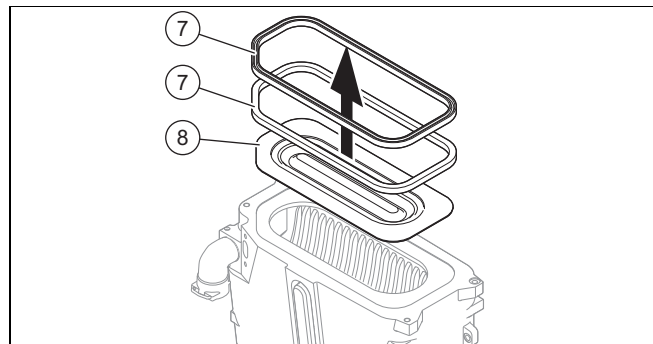
4. Push the clip (1) upwards.
5. Remove the flue pipe (2).



6. Remove the air intake pipe (3).
7. Remove the plugs from the gas valve (4) and from the fan (5).

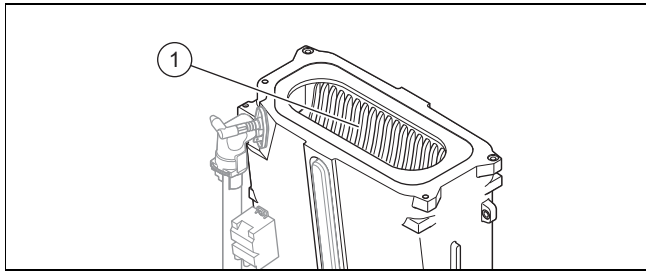


8. Remove the gas-air mixture unit (6).



9. Remove the burner seals (7) and the burner (8).
10. Check the burner and the heat exchanger for damage and dirt.
11. If necessary, clean or replace the components according to the following sections.
12. Install the two new burner seals.

11.4 Cleaning the heat exchanger

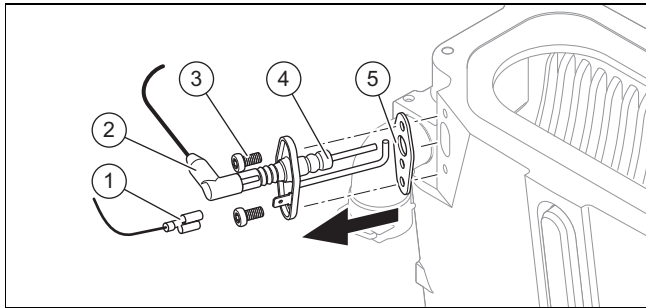


1. Protect the folded down electronics box against sprayed water.
2. Clean the ribs of the heat exchanger (1) with water.
 - ◁ The water runs out into the condensate tray.

11.5 Checking the burner

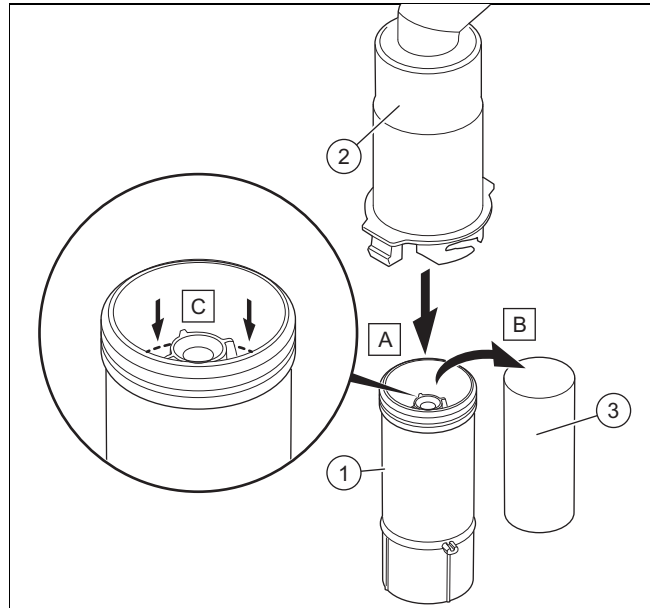
1. Search the surface of the burner for possible damage. If you see any damage, replace the burner.
2. Install the two new burner seals.

11.6 Checking the ignition electrode



1. Disconnect the connection (2) and the earthing cable (1).
2. Remove the fixing screws (3).
3. Carefully remove the electrode from the combustion chamber.
4. Check that the electrode ends (4) are undamaged.
5. Check the electrode distance.
 - Clearance for the ignition electrodes: 3.5 ... 4.5 mm
6. Make sure that the seal (5) is free from damage.
 - ▽ If necessary, replace the seal.

11.7 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 drain pipe-work.
5. Reinsert the float (3).



Note

Check whether 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).

11.8 Installing the gas-air mixture unit

1. Install the burner.
2. Install the gas-air mixture unit.
3. Install the air intake pipe.
4. Install the flue pipe.

11.9 Draining the product

1. Close the service valves of the product.
2. Start check programme P.05 (→ Page 16).
Check programmes – Overview (→ Page 28)
3. Open the drain valves.
4. Make sure that the air vent cap on the internal pump is open so that the product can be drained fully.

12 Troubleshooting

11.10 Checking the admission pressure of the expansion vessel

1. Drain the product. (→ Page 23)
2. Measure the pre-charge pressure of the expansion vessel at the vessel valve.

Conditions: Pre-charge pressure < 0.075 MPa (0.75 bar)

- ▶ Top up the expansion vessel in accordance with the static height of the heating installation, ideally with nitrogen, otherwise with air. Ensure that the drain valve is open when topping up.
3. If water escapes from the expansion vessel's valve, you must replace the expansion vessel (→ Page 25).
 4. Fill and purge the heating installation. (→ Page 18)

11.11 Completing inspection and maintenance work


1. Check the gas connection pressure (gas flow pressure). (→ Page 18)
2. Check the CO₂ content. (→ Page 19)

12 Troubleshooting

12.1 Rectifying faults



- ▶ If fault codes (F.XX) appear, refer to the table in the appendix or use the check programme(s).
Overview of fault codes (→ Page 33)
Check programmes – Overview (→ Page 28)

If several fault codes are generated at the same time, these are displayed alternately followed by the time at which the respective fault occurred.

- ▶ Hold the  button down for more than 3 seconds.
- ▶ If you are unable to clear the fault code and it reappears despite several fault clearance attempts, contact customer service.

12.2 Calling up the fault memory

The last 10 fault codes are stored in the fault memory (together with the time at which the respective fault occurred and, after 24 hours, with the number of days).

- ▶ Hold the  button down for more than 7 seconds.
Overview of fault codes (→ Page 33)
- ▶ Press the  button to exit this menu.

12.3 Deleting the fault memory

1. Delete the fault memory using the diagnostics code **d.94**.
2. Set the diagnostics code. (→ Page 15)
Overview of diagnostics codes (→ Page 28)

12.4 Resetting parameters to factory settings

1. Reset all parameters to the factory settings using the diagnostics code **d.96**.
2. Set the diagnostics code. (→ Page 15)
Overview of diagnostics codes (→ Page 28)

12.5 Preparing the repair work

1. Switch off the product.
2. Disconnect the product from the power mains.
3. Remove the front casing.
4. Close the gas isolator cock.
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 if you want to replace water-bearing components of the product.
8. Ensure that water does not drip on live components (e.g. the electronics box).
9. Use only new seals.

12.6 Replacing defective components

12.6.1 Replacing the burner

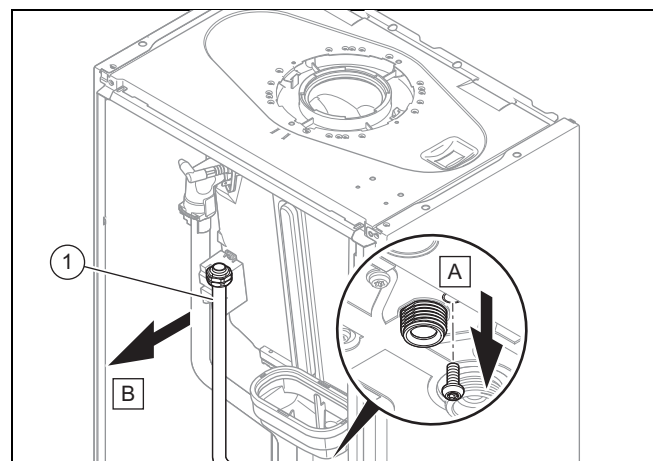
1. Remove the gas-air mixture unit. (→ Page 22)
2. Remove the burner seal.
3. Remove the burner.
4. Install the new burner complete with new seal on the heat exchanger.
5. Install the gas-air mixture unit. (→ Page 23)

12.6.2 Replacing the gas-air mixture unit

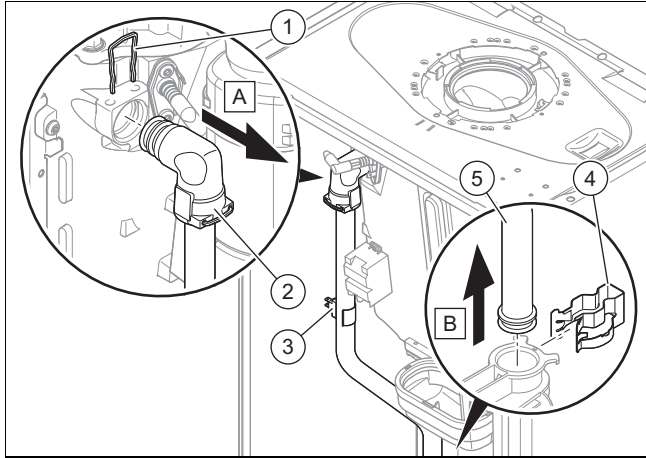
1. Remove the gas-air mixture unit. (→ Page 22)
2. Install the new gas-air mixture unit (→ Page 23).

12.6.3 Replacing the heat exchanger

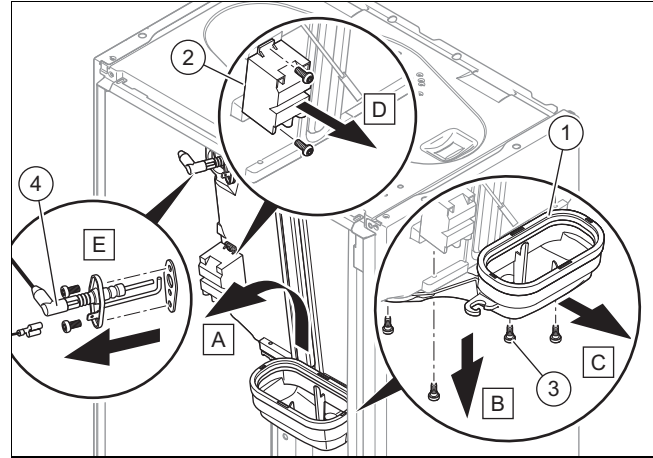
1. Remove the front casing. (→ Page 10)
2. Remove the gas-air mixture unit. (→ Page 22)



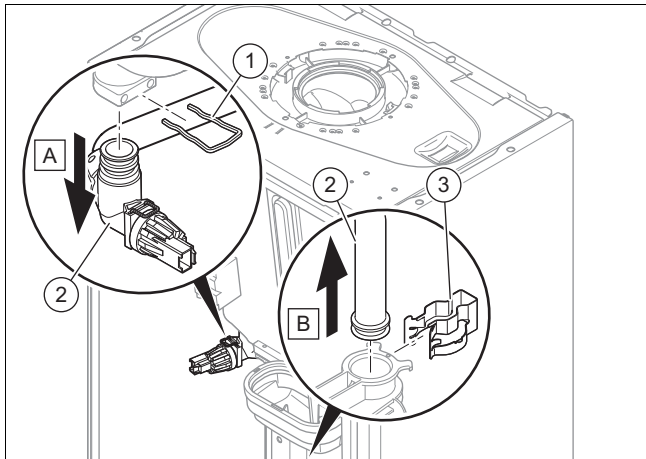
3. Remove the gas pipe (1).



4. Remove the temperature sensor (3).
5. Remove the upper clip (1).
6. Remove the lower clip (4).
7. Remove the supply pipe (5).

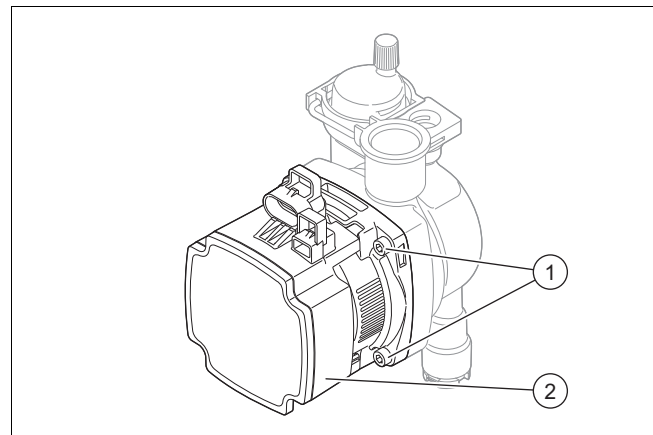


13. Lift the heat exchanger up slightly and remove it together with the condensate tray (1).
14. Undo the four screws (3).
15. Remove the condensate tray.
16. Remove the ignition transformer (2).
17. Use the bolts to secure the condensate tray to the new heat exchanger.
18. Install the new heat exchanger in reverse order.

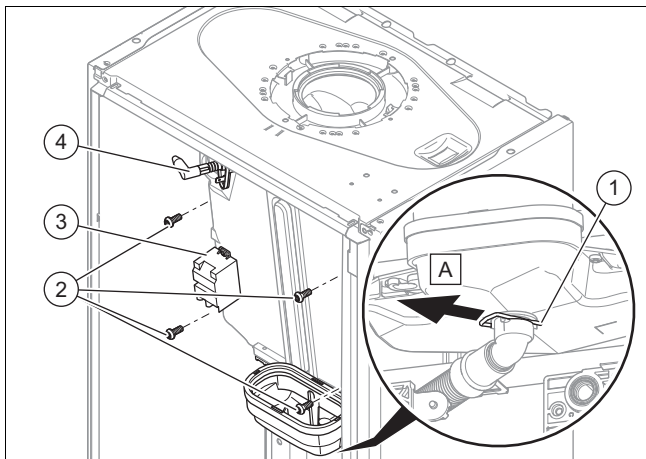


8. Remove the upper clip (1).
9. Remove the lower clip (3).
10. Remove the return pipe (2).

12.6.4 Replacing the pump head



1. Disconnect the pump cable from the electronics box.
2. Undo the four bolts (1).
3. Remove the pump head (2).
4. Replace the O-ring.
5. Use four screws to secure the new pump head.
6. Connect the pump cable to the electronics box.

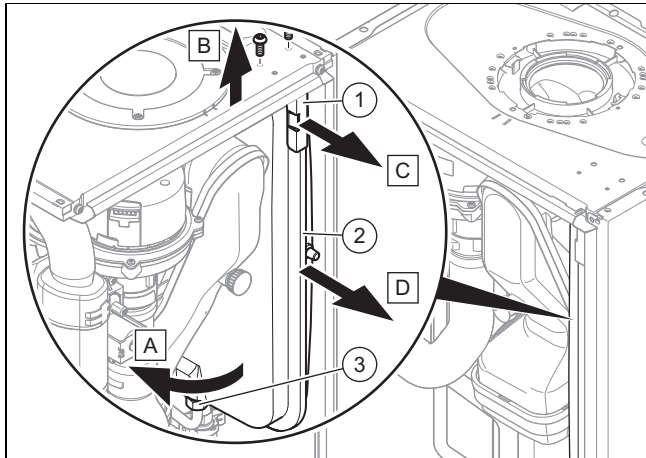


11. Remove the clip underneath the condensate tray (1).
12. Undo the four screws (2).

12.6.5 Replacing the expansion vessel

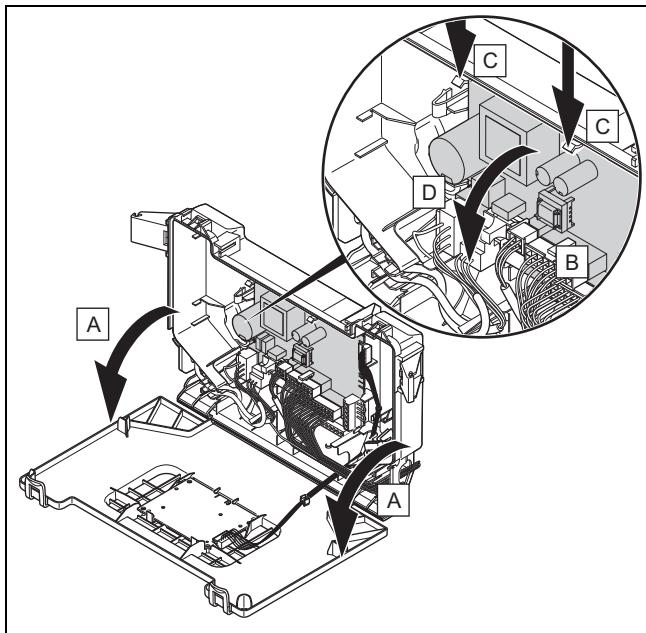
1. Drain the product. (→ Page 23)

12 Troubleshooting



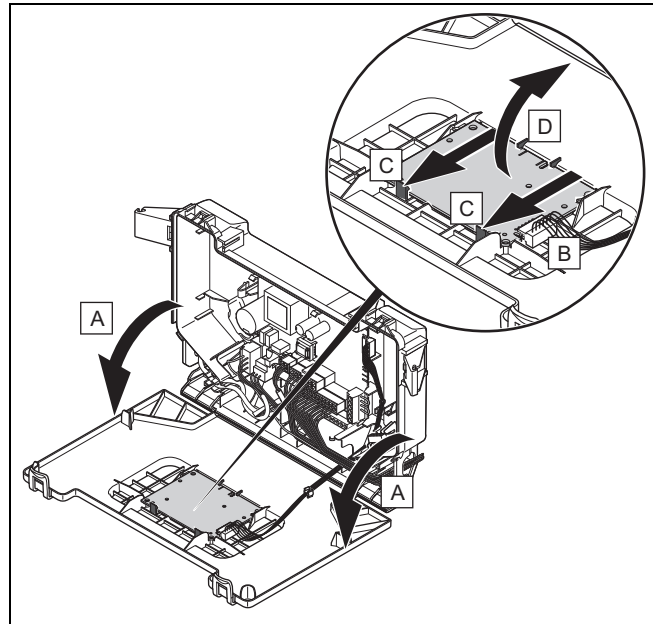
2. Undo the nut (3).
3. Remove both screws on the support plate (1).
4. Remove the support plate.
5. Pull out the expansion vessel (2) towards the front.
6. Insert the new expansion vessel into the product.
7. Screw the new expansion vessel to the water connection. To do this, use a new seal.
8. Attach the support plate using both screws.
9. Fill and purge the product (→ Page 18) and, if required, the heating installation.

12.6.6 Replacing the main PCB



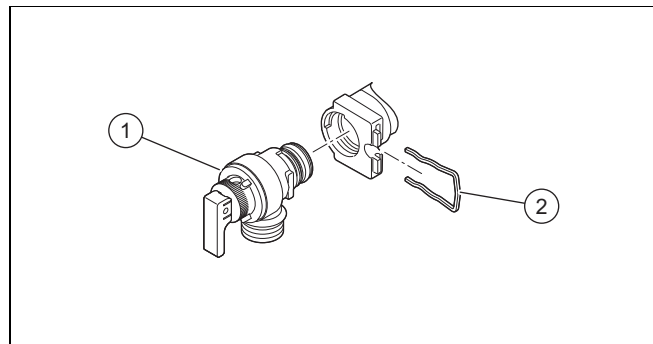
1. Open the electronics box. (→ Page 14)
2. Pull all of the plugs out from the PCB.
3. Undo the clips on the PCB.
4. Remove the PCB.
5. Install the new PCB in such a way that it clicks into the groove at the bottom and into the clip at the top.
6. Plug in the PCB plugs.
7. Close the electronics box.

12.6.7 Replacing the PCB for the user interface



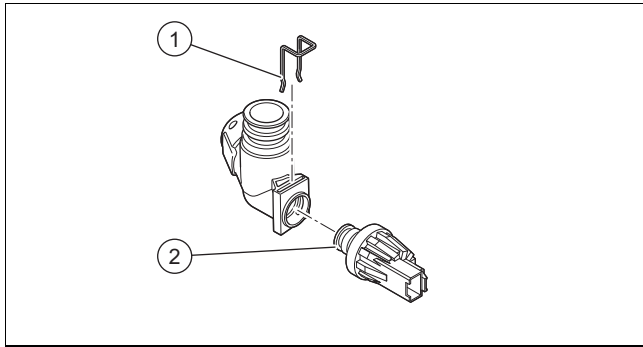
1. Open the electronics box. (→ Page 14)
2. Pull the plug out of the PCB.
3. Undo the clips on the PCB.
4. Remove the PCB.
5. Install the new PCB in such a way that it clicks into the groove at the bottom and into the clip at the top.
6. Plug in the PCB plug.
7. Close the electronics box.

12.6.8 Replacing the expansion relief valve



1. Remove the clip (2).
2. Remove the expansion relief valve.
3. Fit the new expansion relief valve with a new O-ring.
4. Reattach the clip (2).

12.6.9 Replace the pressure sensor



1. Pull out the plug.
2. Remove the clip (1).
3. Remove the pressure sensor (2).
4. Install the new pressure sensor.
5. Reattach the clip (1).

12.7 Completing repair work

- ▶ Check that the product functions correctly and is leak-tight (→ Page 20).

13 Decommissioning the product

- ▶ Switch off the product.
- ▶ Disconnect the product from the power mains.
- ▶ Close the gas isolator cock.
- ▶ Close the cold water stop cock.
- ▶ Drain the product. (→ Page 23)

14 Customer service

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.glow-worm.co.uk.

Appendix

Appendix

A Check programmes – Overview



Note

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

Display	Meaning
P.01	Start up the burner at the adjustable heat input: The product is operated after a successful ignition with the set heat input between "0" (0% = Pmin) and "100" (100% = Pmax). The function is activated for 15 minutes.
P.02	Start up the burner at ignition load: The product is operated at ignition load after successful ignition. The function is activated for 15 minutes.
P.03	The product runs in heating mode with the maximum heat input set using diagnostics code d.00.
P.04	Maximum output function: If there is a hot water request, the product runs in hot water handling mode with maximum heat input. If there is no hot water request, the product runs in heating mode with the heating partial load that is set using diagnostics code d.00. The function is activated for 15 minutes.
P.05	Filling the product: The diverter valve is moved to the mid-position. The burner and pump are switched off (to fill or drain the product). If the pressure is lower than 0.05 MPa (0.5 bar) and then is above 0.07 MPa (0.7 bar) for longer than 15 seconds, the automatic purging function is activated. The function is activated for 15 minutes.
P.06	Purging the heating circuit: The diverter valve is moved to the heating position. The function is activated in the heating circuit for 15 minutes. The pump runs and stops at regular intervals. If required, this function can be manually switched off.
P.07	Purging the hot water circuit: The function is activated in the small hot water circuit for 4 minutes and then in the heating circuit for 1 minute. The pump runs and stops at regular intervals. If required, this function can be manually switched off.
Automatic purging function	Purging the product: If the pressure is lower than 0.05 MPa (0.5 bar) and then is above 0.07 MPa (0.7 bar) for longer than 15 seconds, the automatic purging function is activated. The function is activated in the small hot water circuit for 4 minutes and then in the heating circuit for 1 minute. This function cannot be manually switched off.

B Overview of diagnostics codes



Note

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

Dia- gnostics code	Parameter	Values		Unit	Increment, select, explanation	Default set- ting	User-spe- cific setting
		Min.	Max.				
d.00	Heating maximum output	–	–	kW	The maximum heating output varies depending on the product. → Section "Technical data" Automatic: Unit automatically adjusts the maximum output to the current system demand	→ Section "Technical data"	Adjustable
d.01	Pump overrun in heating mode	1	60	min	1	5	Adjustable

Dia- gnostics code	Parameter	Values		Unit	Increment, select, explanation	Default set- ting	User-spe- cific setting
		Min.	Max.				
d.02	Maximum burner anti-cycling time in heating mode	2	60	min	1	20	Adjustable
d.04	Water temperature in the cylinder	Current value		°C	–	–	Not adjustable
d.05	Determined heating flow set target temperature	Current value		°C	–	–	Not adjustable
d.06	Hot water set target temperature	Current value		°C	(Combination unit only)	–	Not adjustable
d.07	Set target temperature for the domestic hot water cylinder	Current value		°C	–	–	Not adjustable
d.08	Status of the 230 V thermostat	Current value		–	0 = Room thermostat open (no heat requirement) 1 = Room thermostat closed (heat requirement)	–	Not adjustable
d.09	Heating flow set target temperature that is set on the eBUS room thermostat	Current value		°C	–	–	Not adjustable
d.10	Status of the internal pump in the heating circuit	Current value		–	off / on	–	Not adjustable
d.11	Status of the heating circuit's shunt pump	Current value		–	off / on	–	Not adjustable
d.13	Status of the hot water circuit's circulation pump	Current value		–	off / on	–	Not adjustable
d.14	Operating mode of the modulating pump	0	5	–	0 = variable rotational speed (auto) 1; 2; 3; 4; 5 = Fixed rotational speeds → Section "Setting the pump output"	0	Adjustable
d.15	Pump speed	Current value		%	–	–	Not adjustable
d.16	Status of the 24 V room thermostat	Current value		–	off = Heating off on = Heating on	–	Not adjustable
d.17	Heating control	–	–	–	off = Flow temperature on = Return temperature (adjustment for underfloor heating. If you have activated the return temperature control, the automatic heating output determination function is not active.)	0	Adjustable
d.18	Pump overrun operating mode	1	3	–	1 = Comfort (continuously operating pump) 3 = Eco (intermittent pump mode – for the dissipation of the residual heat after hot water generation at an extremely low heat demand)	1	Adjustable
d.19	Pump operating mode, 2 stage pump	0	3	–	0 = Burner mode stage 2, pump flow/overrun stage 1 1 = Heating mode and pump flow/overrun stage 1, hot water handling mode stage 2 2 = Automatic heating mode, pump flow/overrun stage 1, hot water handling mode stage 2 3 = Stage 2	3	Adjustable

Appendix

Dia- gnostics code	Parameter	Values		Unit	Increment, select, explanation	Default set- ting	User-spe- cific setting
		Min.	Max.				
d.20	Maximum hot water set target temperature	50	60	°C	1	50	Adjustable
d.21	Status of the warm start for hot water	Current value		–	off = Function deactivated on = Function activated and available	–	Not adjustable
d.22	Status of the hot water request	Current value		–	off = No current requirement on = Current requirement	–	Not adjustable
d.23	Status of the heating demand	Current value		–	off = Heating off (Summer mode) on = Heating on	–	Not adjustable
d.24	Status of the pressure monitor	0	1	–	off = Not switched on = Switched	–	Not adjustable
d.25	Status of the requirement to reheat the cylinder or for the hot water warm start from the eBUS thermostat	Current value		–	off = Function deactivated on = Function activated	–	Not adjustable
d.27	Function of relay 1 (multi-functional module)	1	10	–	1 = Circulation pump 2 = External pump 3 = Cylinder charging pump 4 = Extractor hood 5 = External solenoid valve 6 = External fault message 7 = Solar pump (omitted) 8 = eBUS remote control 9 = Legionella protection pump 10 = Solar valve	1	Adjustable
d.28	Function of relay 2 (multi-functional module)	1	10	–	1 = Circulation pump 2 = External pump 3 = Cylinder charging pump 4 = Extractor hood 5 = External solenoid valve 6 = External fault message 7 = Solar pump (omitted) 8 = eBUS remote control 9 = Legionella protection pump 10 = Solar valve	2	Adjustable
d.31	Automatic filling device	0	2	–	0 = Manual 1 = Semi-automatic 2 = Automatic	0	Adjustable
d.33	Fan speed target value	Current value		rpm	Fan speed = Display value x 100	–	Not adjustable
d.34	Value for the fan speed	Current value		rpm	Fan speed = Display value x 100	–	Not adjustable
d.35	Position of the diverter valve	Current value		–	0 = Heating 40 = Mid-position (parallel operation) 100 = Domestic hot water	–	Not adjustable
d.36	Value for the hot water flow	Current value		l/min	–	–	Not adjustable
d.39	Water temperature in the solar circuit	Current value		°C	–	–	Not adjustable
d.40	Heating flow temperature	Current value		°C	–	–	Not adjustable
d.41	Heating return temperature	Current value		°C	–	–	Not adjustable
d.43	Heating curve	0.2	4	–	0.1	1.2	Adjustable

Dia- gnostics code	Parameter	Values		Unit	Increment, select, explanation	Default set- ting	User-spe- cific setting
		Min.	Max.				
d.45	Value for the base point of the heating curve	15	30	–	1	20	Adjustable
d.47	Outside temperature	Current value		°C	–	–	Not adjustable
d.50	Correction of the minimum fan speed	0	3000	rpm	1 Fan speed = Display value x 10	600	Adjustable
d.51	Correction of the maximum fan speed	-2500	0	rpm	1 Fan speed = Display value x 10	-1000	Adjustable
d.58	Solar circuit reheating	0	3	–	0 = Boiler's Legionella protection function deactivated 3 = Hot water activated (min. target value 60 °C)	0	Adjustable
d.60	Number of blocks by the temperature limiter	Current value		–	–	–	Not adjustable
d.61	Number of unsuccessful ignitions	Current value		–	–	–	Not adjustable
d.62	Night set-back	0	30	–	1	0	Adjustable
d.64	Average burner ignition time	Current value		s	–	–	Not adjustable
d.65	Maximum burner ignition time	Current value		s	–	–	Not adjustable
d.66	Activation of the warm start function for hot water	–	–	–	off = Function deactivated on = Function activated	1	Adjustable
d.67	Remaining burner anti-cycling time (setting under d.02)	Current value		min	–	–	Not adjustable
d.68	Number of unsuccessful ignitions at 1st attempt	Current value		–	–	–	Not adjustable
d.69	Number of unsuccessful ignitions at 2nd attempt	Current value		–	–	–	Not adjustable
d.70	Operation of the diverter valve	0	2	–	0 = Normal operating mode (DHW and heating mode) 1 = Mid-position (parallel operation) 2 = Permanent setting: Heating mode	0	Adjustable
d.71	Maximum heating flow set target temperature	45	80	°C	1	→ Section "Technical data"	Adjustable
d.73	Correction of the hot water warm start temperature	-15	5	K	1	0	Adjustable
d.75	Maximum cylinder reheating time	20	90	min	1	45	Adjustable
d.77	Max. cylinder reheating	–	–	kW	1 → Section "Technical data"	–	Adjustable
d.80	Running time in heating mode	Current value		h	Running time = Display value x 100	–	Not adjustable
d.81	Running time in hot water handling mode	Current value		h	Running time = Display value x 100	–	Not adjustable
d.82	Number of burner ignitions in heating mode	Current value		–	Number of ignitions = Display value x 100	–	Not adjustable
d.83	Number of burner ignitions in hot water handling mode	Current value		–	Number of ignitions = Display value x 100	–	Not adjustable

Appendix

Dia- gnostics code	Parameter	Values		Unit	Increment, select, explanation	Default set- ting	User-spe- cific setting
		Min.	Max.				
d.84	Maintenance in	0	3000	h	Number of hours = Display value x 10	300	Not adjustable
d.85	Increase in the min. output (heating and hot water handling mode)	–	–	kW	1 → Section "Technical data"	–	Adjustable
d.88	Flow rate limit value for ignition in hot water handling mode	0	1	–	0 = 1.5 l/min (no delay) 1 = 3.7 l/min (2 s delay)	0	Adjustable
d.90	Status of the eBUS room thermostat	Current value		–	off = Not connected on = Connected	–	Not adjustable
d.91	Status DCF77	Current value		–	–	–	Not adjustable
d.93	Setting the product code	0	99	–	1	–	Adjustable
d.94	Delete fault list	0	1	–	off = No on = Yes	–	Adjustable
d.95	Software versions	–	–	–	1 = Main PCB 2 = Interface PCB	–	Adjustable
d.96	Default setting (reset)	–	–	–	0 = No 1 = Yes	–	Adjustable
d.128	Heating minimum target value	10	75	°C	1	10	Adjustable
d.129	Minimum hot water target value	35 (combination unit) 45 (pure boiler)	60	°C	1	35 (combination unit) 45 (pure boiler)	Adjustable

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.

Status code	Meaning
Displays in heating mode	
S.0	Heating mode: No requirement
S.01	Heating mode: Advance fan operation
S.02	Heating mode: Pump pre-run
S.03	Heating mode: Burner ignition
S.04	Heating mode: Burner on
S.05	Heating mode: Pump/fan overrun
S.06	Heating mode: Fan overrun
S.07	Heating mode: Pump overrun
S.08	Heating mode: Temporary shutdown after heating procedure
Displays in hot water handling mode	
S.10	Hot water handling mode: Requirement
S.11	Hot water handling mode: Advance fan operation
S.13	Hot water handling mode: Burner ignition
S.14	DHW mode: Burner on
S.15	DHW mode: Pump/fan overrun
S.16	DHW mode: Fan overrun

Status code	Meaning
S.17	DHW mode: Pump overrun
Display in Comfort mode with warm start or hot water handling mode with cylinder	
S.20	Hot water handling mode: Requirement
S.21	Hot water handling mode: Advance fan operation
S.22	Hot water handling mode: Pump pre-run
S.23	Hot water handling mode: Burner ignition
S.24	DHW mode: Burner on
S.25	DHW mode: Pump/fan overrun
S.26	DHW mode: Fan overrun
S.27	DHW mode: Pump overrun
S.28	Hot water handling mode: Temporary shutdown of the burner
Other displays	
S.30	Room thermostat is blocking heating mode.
S.31	No heating demand: Summer mode, eBUS controller, waiting period
S.32	Fan waiting time: Fan speed outside of the tolerance values
S.33	Forced fan operation until the pressure monitor is switched
S.34	Frost protection active
S.39	Underfloor heating contact open
S.41	Water pressure too high
S.42	Flue non-return flap closed
S.46	Frost protection mode (Comfort): Minimum load
S.53	Product in waiting period/operation block function due to low water pressure (flow/return spread too large)
S.54	Waiting period: Low water pressure in the circuit (flow/return spread too large)
S.76	Maintenance message: Check the water pressure
S.88	Product purging active
S.91	Maintenance: Demo mode
S.96	Automatic test programme: Return temperature sensor, heating demands blocked.
S.97	Automatic test programme: Water pressure sensor, heating demands blocked.
S.98	Automatic test programme: Return temperature sensor, heating demands blocked.
S.99	Internal automatic test programmes
S.108	Purging the combustion chamber, fan in operation
S.109	Product's standby mode activated

D Overview of fault codes



Note

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

Fault code	Meaning	Possible cause
F.00	Fault: Flow temperature sensor	NTC plug not plugged in or has come loose, multiple plug on the PCB not plugged in correctly, interruption in cable harness, NTC sensor defective
F.01	Fault: Return temperature sensor	NTC plug not plugged in or has come loose, multiple plug on the PCB not plugged in correctly, interruption in cable harness, NTC sensor defective
F.10	Short circuit: Flow temperature sensor	NTC sensor defective, short circuit in the cable harness, cable/casing
F.11	Short circuit: Return temperature sensor	NTC sensor defective, short circuit in the cable harness, cable/casing
F.12 and F.91	Short circuit: Cylinder temperature sensor	NTC sensor defective, short circuit in the cable harness, cable/casing
F.13	Short circuit: Domestic hot water cylinder temperature sensor	NTC sensor defective, short circuit in the cable harness, cable/casing

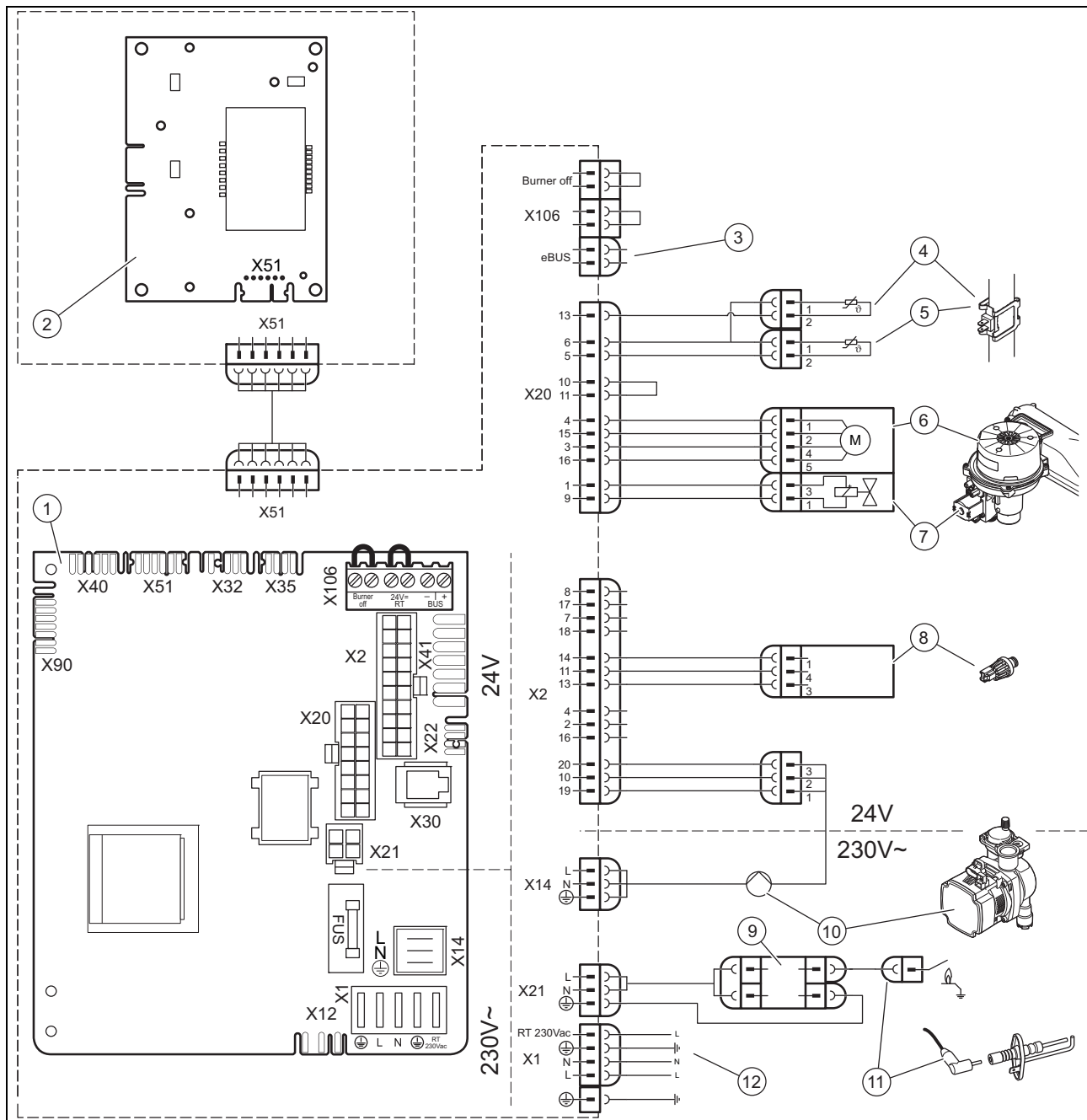
Appendix

Fault code	Meaning	Possible cause
F.20	Safety switch-off: Overheating temperature reached	Incorrect earth connection between cable harness and product, flow or return NTC defective (loose connection), black discharge via ignition cable, ignition plug or ignition electrode
F.22	Safety switch-off: Low water pressure in the boiler	No or insufficient water in the product, water pressure sensor defective, cable to the pump or to the water pressure sensor loose/not connected/defective
F.23	Safety switch-off: Temperature difference too great (NTC1/NTC2)	Pump blocked, insufficient pump output, air in product, flow and return NTC sensors connected the wrong way round
F.24	Safety switch-off: Temperature rise too fast	Pump blocked, insufficient pump output, air in product, system pressure too low, non-return valve blocked/incorrectly installed
F.25	Safety switch-off: Flue gas temperature too high	Break in plug connection for optional flue gas safety temperature limiter (STB), break in cable harness
F.27	Safety switch-off: Fault in flame detection	Moisture on the electronics, electronics (flame monitor) defective, gas solenoid valve leaking
F.28	Fault: Ignition unsuccessful when starting up	Gas meter defective or gas pressure monitor has triggered, air in gas, gas flow pressure too low, thermal isolator device (TAE) has triggered, incorrect gas restrictor, incorrect spare gas valve, fault on the gas valve, multiple plug on PCB incorrectly plugged in, break in cable harness, ignition system (ignition transformer, ignition cable, ignition plug, ignition electrode) defective, ionisation current interrupted (cable, electrode), incorrect earthing of product, electronics defective
F.29	Fault: Flame loss	Gas supply temporarily stopped, flue gas recirculation, incorrect earthing of product, ignition transformer has spark failure
F.32	Fan frost protection function active: Fan speed outside the tolerance values	Plug on fan not correctly plugged in, multiple plug on PCB not correctly plugged in, break in cable harness, fan blocked, Hall sensor defective, electronics defective
F.33	Fan frost protection function active: Air pressure switch fault	Pressure monitor has not switched or has switched at a fan speed value that is too high (insufficient air supply) Pressure monitor plug not correctly plugged in, pressure monitor defective, hose removed from between the pressure monitor and silencer, air/flue pipe blocked
F.49	eBUS fault: Voltage too low	Short circuit on eBUS, eBUS overload or two power supplies with different polarities on the eBUS
F.61	Fault: Gas valve control system	Short circuit/short to earth in cable harness for the gas valve, gas valve defective (coils shorted to earth), electronics defective
F.62	Fault: Gas valve switch-off control	Delayed switch-off of gas valve, delayed extinguishing of flame signal, gas valve leaking, electronics defective
F.63	Fault: EEPROM	Electronics defective
F.64	Fault: Electronics/sensor/analogue-to-digital converter	Flow or return NTC short circuited, electronics defective
F.65	Fault: Electronics temperature too high	Electronics overheating due to external influences, electronics defective
F.67	Value sent back by ASIC is incorrect (flame signal)	Implausible flame signal, electronics defective
F.68	Fault: Unstable flame (analogue input)	Air in gas, gas flow pressure too low, incorrect air ratio, incorrect gas restrictor, ionisation flow interruption (cable, electrode)
F.70	Invalid product code (DSN)	Display and PCB replaced at same time and Device Specific Number not reset, wrong or missing output range coding resistance
F.71	Fault: Flow/return temperature sensor	Flow temperature sensor signalling constant value: Flow temperature sensor incorrectly positioned on supply pipe, flow temperature sensor defective
F.72	Fault: Deviation in the water pressure sensor/return temperature sensor	Flow/return NTC temperature difference too great → flow and/or return temperature sensor defective
F.73	Fault: Water pressure sensor not connected or has short-circuited	Interruption/short circuit of water pressure sensor, interruption/short circuit to GND in supply line to water pressure sensor or water pressure sensor defective
F.74	Fault: Electrical problem in the water pressure sensor	Line to water pressure sensor has a short circuit to 5 V/24 V or internal fault in the water pressure sensor
F.75	Fault: Pressure sensor	Pressure switch defective
F.76	The safety cut-out in the primary heat exchanger is defective	Safety cut-out feedback does not match the gas valve feedback

Fault code	Meaning	Possible cause
F.77	Fault: Condensate or smoke	No response, flue non-return flap defective
F.78	Interruption to DHW outlet sensor at external controller	UK link box is connected, but hot water NTC not bridged
F.83	Fault: Burner temperature sensor	Burner temperature sensor is defective When the burner starts, the temperature change registered at the flow or return temperature sensor is non-existent or too small: Insufficient water in the product, the flow or return temperature sensor is not in the correct position on the pipe
F.84	Fault: Flow/return temperature sensor	Values not consistent, difference < -6 K Flow and return temperature sensors signalling implausible values: Flow and return temperature sensors have been inverted, flow and return temperature sensors have not been correctly installed
F.85	Fault: Temperature sensor	The flow and/or return temperature sensors have been installed on the same pipe/incorrect pipe Temperature sensor not connected or is connected incorrectly
F.86	Fault: Underfloor heating contact	Underfloor heating contact open, sensor disconnected or defective
F.87	Fault: Electrodes	Electrodes not connected or they are connected incorrectly, short circuit in the cable harness
F.88	Fault: Gas valve	Gas valve not connected or it is connected incorrectly, short circuit in the cable harness
F.89	Fault: Pump	Pump not connected or it is connected incorrectly, incorrect pump connected, short circuit in the cable harness
Connection	No communication between the PCB and the user interface	Electronics defective

Appendix

E Connection diagram: Pure boiler



- | | | | |
|---|--|----|----------------------|
| 1 | Main PCB | 7 | Gas valve |
| 2 | Interface PCB | 8 | Pressure sensor |
| 3 | Control system | 9 | Ionisation electrode |
| 4 | Temperature sensor in the heating flow | 10 | Heating pump |
| 5 | Temperature sensor in the heating return | 11 | Ignition electrode |
| 6 | Fan | 12 | Main power supply |

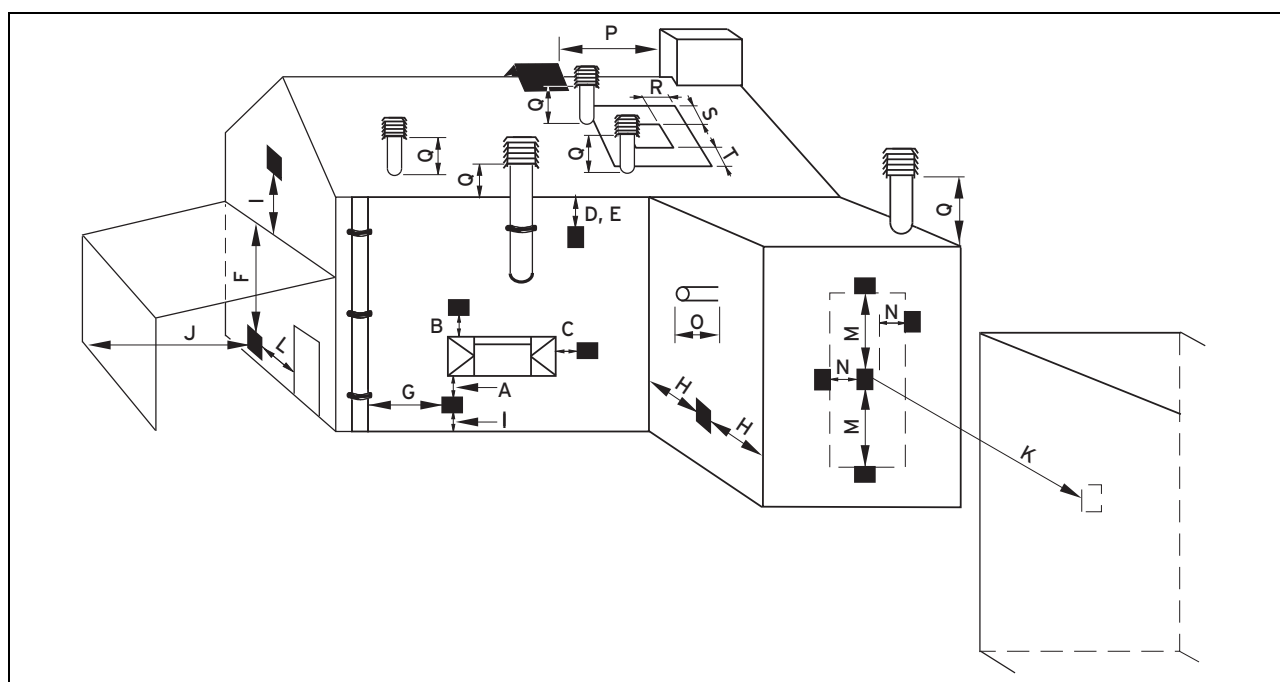
F Inspection and maintenance work – Overview

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 intervals listed in the table.

No.	Work	Inspection (annual)	Maintenance (at least every 2 years)
1	Check the flue pipe for leak-tightness and to ensure that it is fastened correctly. Make sure that it is not blocked or damaged and has been installed in accordance with the relevant Installation Manual.	X	X
2	Check the general condition of the product. Remove dirt from the product and from the vacuum chamber.	X	X
3	Visually inspect the general condition of the heat exchanger. In doing so, pay particular attention to signs of corrosion, rust and other defects. If you notice any damage, carry out maintenance work.	X	X
4	Check the gas connection pressure at maximum heat input. If the gas connection pressure is not within the correct range, carry out maintenance work.	X	X
5	Check the CO ₂ content (the air ratio) of the product and, if necessary, adjust it. Keep a record of this.	X	X
6	Disconnect the product from the power mains. Check that the electrical plug connections and other connections are seated correctly and correct these if necessary.	X	X
7	Close the gas isolator cock and the service valves.	X	X
8	Drain the product on the water side. Check the pre-charge pressure of the expansion vessel and, if required, top up the expansion vessel (approx. 0.03 MPa/0.3 bar below the system filling pressure).		X
9	Remove the gas-air mixture unit.		X
10	Check the seals in the combustion area. If you see any damage, replace the seals. Replace both burner seals each time it is opened and accordingly each time maintenance work is carried out.		X
11	Clean the heat exchanger.		X
12	Check the burner for damage and replace it if necessary.		X
13	Check the condensate siphon in the product, clean and fill if necessary.	X	X
14	Install the gas-air mixture unit. Caution: Replace the seals.		X
15	Open the gas isolator cock, reconnect the product to the power mains and switch the product on.	X	X
16	Open the service valves, fill the product/heating installation to 0.05-0.3 MPa/0.5-3.0 bar (depending on the static height of the heating installation), and start the purging programme P.XX .		X
17	Carry out a test operation of the product and heating installation and, if required, purge the system once more.	X	X
18	Perform the gas family check.		X
19	Visually inspect the ignition and burner behaviour.	X	X
20	Check the CO ₂ content (the air ratio) of the product again.		X
21	Check the product for gas, flue gas, water and condensate leaks, and repair if necessary.	X	X
22	Record the inspection/maintenance work carried out.	X	X

Appendix

G Opening in the air/flue pipe



G.1 Positioning of the opening of a fan-supported flue gas pipe

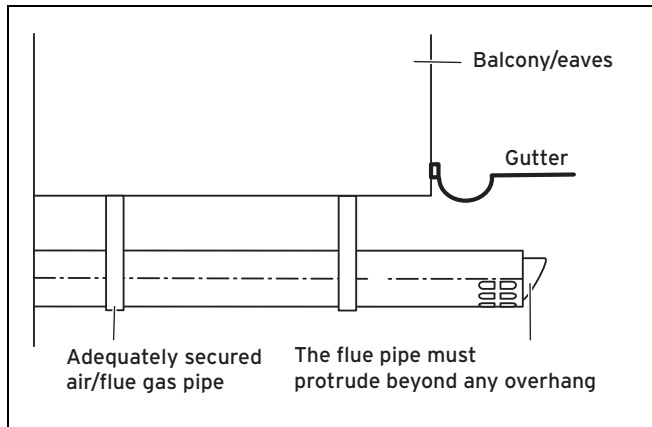
	Installation site	Minimum dimensions
A	Directly below an opening, air bricks, opening windows, etc., that can be opened.	300 mm
B	Above an opening, air bricks, opening windows, etc., that can be opened.	300 mm
C	Horizontally to an opening, air bricks, opening windows, etc., that can be opened.	300 mm
D	Below temperature-sensitive building components, e.g. plastic gutters, down pipes or wastewater pipes	75 mm
E	Below eaves	200 mm
F	Below balconies or car port roofs	200 mm
G	From vertical wastewater pipes or down pipes	150 mm
H	From external or internal corners	200 mm
I	Above floors, roofs or balconies	300 mm
J	From a surface facing a terminal	600 mm
K	From a terminal facing a terminal	1,200 mm
L	From an opening in the car port (e.g. door, window) which leads into the dwelling	1,200 mm
M	Vertical from a terminal on the same wall	1,500 mm
N	Horizontal from a terminal on the same wall	300 mm
O	From the wall on which the terminal has been installed	0 mm
P	From a vertical structure on the roof	N/A
Q	Above the roof area	300 mm
R	Horizontal from adjacent windows on pitched or flat roofs	600 mm
S	Above adjacent windows on pitched or flat roofs	600 mm
T	Below adjacent windows on pitched or flat roofs	2,000 mm

G.2 Text from BS 5440-1 on fan-supported flue gas pipes

BS 5440-1: It is recommended that the fanned flue gas system terminal is positioned as follows:

- At least 2 m from an opening in the building directly opposite, and
- So that the combustion products are not discharged directly across a property boundary.
- Dimensions D, E, F and G: These clearances may be reduced to 25 mm without affecting the performance of the boiler. In order to ensure that the condensate vapour plume does not damage adjacent surfaces, the terminal should be extended as shown.
- Dimension H: This clearance may be reduced to 25 mm without adversely affecting the performance of the boiler. However, in order to ensure that the condensate vapour plume does not damage adjacent surfaces, a clearance of 300 mm is preferred. For IE, recommendations are given in the current issue of the IS 813.

G.3 Opening of the flue pipe below eaves and balconies



H Commissioning Checklist

Benchmark Commissioning and Servicing Section

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 guarantee the boiler needs to be registered with the manufacturer within one month of the installation.

To maintain the boiler guarantee it is essential that the boiler is serviced annually by a Gas Safe registered engineer who has been trained on the boiler installed. The service details should be recorded on the Benchmark Service Interval Record and left with the householder.



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GAS BOILER SYSTEM COMMISSIONING CHECKLIST

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 manufacturer's instructions and complete this Benchmark Commissioning Checklist will invalidate the warranty. This does not affect the customer's statutory rights.

Customer name:	Telephone number:
Address:	
Boiler make and model:	
Boiler serial number:	
Commissioned by (PRINT NAME):	Gas Safe register number:
Company name:	Telephone number:
Company address:	
Commissioning date:	

To be completed by the customer on receipt of a Building Regulations Compliance Certificate*

Building Regulations Notification Number (if applicable):

CONTROLS (tick the appropriate boxes)			
Time and temperature control to heating	Room thermostat and programmer/timer		Programmable room thermostat
	Load/weather compensation		Optimum start control
Time and temperature control to hot water	Cylinder thermostat and programmer/timer		Combination Boiler
Heating zone valves	Fitted		Not required
Hot water zone valves	Fitted		Not required
Thermostatic radiator valves	Fitted		Not required
Automatic bypass to system	Fitted		Not required
Boiler interlock			Provided

ALL SYSTEMS			
The system has been flushed and cleaned in accordance with BS7593 and boiler manufacturer's instructions	Yes		
What system cleaner was used?			
What inhibitor was used?	Quantity	litres	
Has a primary water system filter been installed?	Yes	No	

CENTRAL HEATING MODE measure and record:			
Gas rate	m ³ /hr	OR	ft ³ /hr
Burner operating pressure (if applicable)	mbar	OR Gas inlet pressure	mbar
Central heating flow temperature			°C
Central heating return temperature			°C

COMBINATION BOILERS ONLY			
Is the installation in a hard water area (above 200ppm)?	Yes	No	
If yes, and if required by the manufacturer, has a water scale reducer been fitted?	Yes	No	
What type of scale reducer has been fitted?			

DOMESTIC HOT WATER MODE Measure and Record:			
Gas rate	m ³ /hr	OR	ft ³ /hr
Burner operating pressure (at maximum rate)	mbar	OR Gas inlet pressure at maximum rate	mbar
Cold water inlet temperature			°C
Hot water has been checked at all outlets	Yes	Temperature	°C
Water flow rate			l/min

CONDENSING BOILERS ONLY	
The condensate drain has been installed in accordance with the manufacturer's instructions and/or BS5546/BS6798	Yes

ALL INSTALLATIONS					
Record the following:	At max. rate:	CO	ppm	AND	CO/CO ₂ Ratio
	At min. rate: (where possible)	CO	ppm	AND	CO/CO ₂ Ratio
The heating and hot water system complies with the appropriate Building Regulations	Yes				
The boiler and associated products have been installed and commissioned in accordance with the manufacturer's instructions	Yes				
The operation of the boiler and system controls have been demonstrated to and understood by the customer	Yes				
The manufacturer's 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 manufacturer's 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.



Appendix

SERVICE RECORD

It is recommended that your heating system is serviced regularly and that the appropriate Service Interval Record is completed.

Service Provider

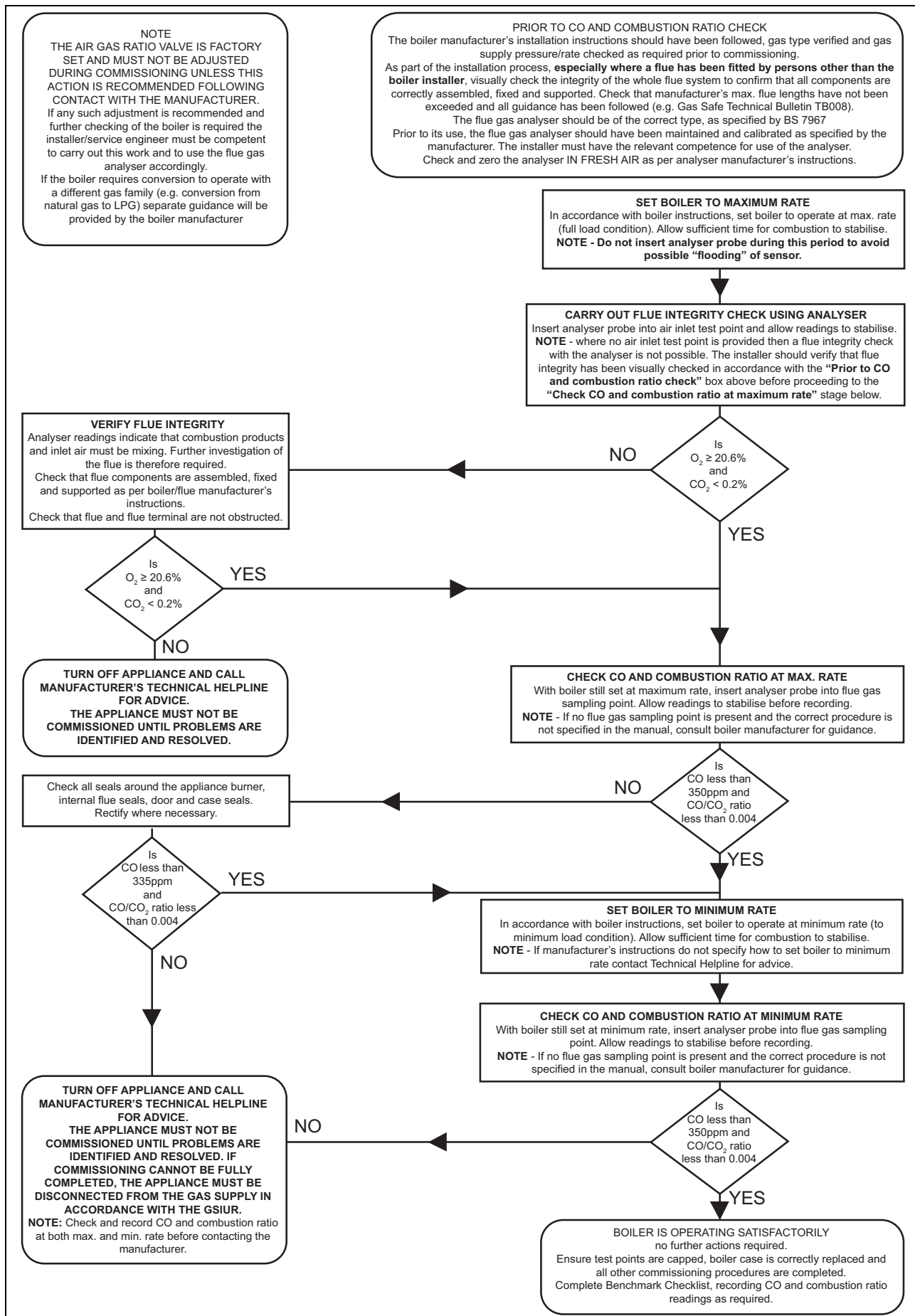
Before completing the appropriate Service Record below, please ensure you have carried out the service as described in the manufacturer's instructions. Always use the manufacturer's specified spare part when replacing controls.

<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="2">SERVICE 01</td> <td colspan="2">Date:</td> </tr> <tr> <td colspan="4">Engineer name:</td> </tr> <tr> <td colspan="4">Company name:</td> </tr> <tr> <td colspan="4">Telephone No:</td> </tr> <tr> <td colspan="4">Gas safe register No:</td> </tr> <tr> <td>Record:</td> <td>At max. rate:</td> <td>CO ppm</td> <td>AND CO₂ %</td> </tr> <tr> <td></td> <td>At min. rate: (Where Possible)</td> <td>CO ppm</td> <td>AND CO₂ %</td> </tr> <tr> <td colspan="4">Comments:</td> </tr> <tr> <td colspan="4">Signature</td> </tr> </table>	SERVICE 01		Date:		Engineer name:				Company name:				Telephone No:				Gas safe register No:				Record:	At max. rate:	CO ppm	AND CO ₂ %		At min. rate: (Where Possible)	CO ppm	AND CO ₂ %	Comments:				Signature				<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="2">SERVICE 02</td> <td colspan="2">Date:</td> </tr> <tr> <td colspan="4">Engineer name:</td> </tr> <tr> <td colspan="4">Company name:</td> </tr> <tr> <td colspan="4">Telephone No:</td> </tr> <tr> <td colspan="4">Gas safe register No:</td> </tr> <tr> <td>Record:</td> <td>At max. rate:</td> <td>CO ppm</td> <td>AND CO₂ %</td> </tr> <tr> <td></td> <td>At min. rate: (Where Possible)</td> <td>CO ppm</td> <td>AND CO₂ %</td> </tr> <tr> <td colspan="4">Comments:</td> </tr> <tr> <td colspan="4">Signature</td> </tr> </table>	SERVICE 02		Date:		Engineer name:				Company name:				Telephone No:				Gas safe register No:				Record:	At max. rate:	CO ppm	AND CO ₂ %		At min. rate: (Where Possible)	CO ppm	AND CO ₂ %	Comments:				Signature			
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*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.



I Combustion chart



Appendix

J Technical data

Technical data – Heating

	SUSTAIN 12s -A (H-GB)	SUSTAIN 15s -A (H-GB)	SUSTAIN 18s -A (H-GB)
Max. flow temperature adjustment range (default setting: 75 °C)	10 ... 80 °C	10 ... 80 °C	10 ... 80 °C
Maximum permissible pressure	0.3 MPa (3.0 bar)	0.3 MPa (3.0 bar)	0.3 MPa (3.0 bar)
Nominal water flow ($\Delta T = 20$ K)	530 l/h	655 l/h	788 l/h
Nominal water flow ($\Delta T = 30$ K)	353 l/h	436 l/h	525 l/h
Approximate value for the condensate volume (pH value between 3.5 and 4.0) at 50/30 °C	1.23 l/h	1.53 l/h	1.84 l/h
ΔP heating at nominal flow ($\Delta T = 20$ K)	0.025 MPa (0.250 bar)	0.025 MPa (0.250 bar)	0.025 MPa (0.250 bar)

Technical data – G20 power/loading G20

	SUSTAIN 12s -A (H-GB)	SUSTAIN 15s -A (H-GB)	SUSTAIN 18s -A (H-GB)
Maximum heat output	12 kW	15 kW	18 kW
Effective output range (P) at 40/30 °C	4.8 ... 13.0 kW	4.8 ... 16.2 kW	5.3 ... 19.5 kW
Effective output range (P) at 50/30 °C	4.7 ... 12.8 kW	4.7 ... 15.9 kW	5.2 ... 19.1 kW
Effective output range (P) at 80/60 °C	4.5 ... 12.3 kW	4.5 ... 15.2 kW	5.0 ... 18.3 kW
Domestic hot water heat output (P)	4.4 ... 15.0 kW	4.4 ... 18.0 kW	4.9 ... 25.2 kW
Maximum heat input – heating (Q max.)	12.3 kW	15.3 kW	18.4 kW
Minimum heat input – heating (Q min.)	4.5 kW	4.5 kW	5.0 kW
Maximum heat input – hot water (Q max.)	15.3 kW	18.4 kW	25.7 kW
Minimum heat input – hot water (Q min.)	4.5 kW	4.5 kW	5.0 kW

Technical data – General

	SUSTAIN 12s -A (H-GB)	SUSTAIN 15s -A (H-GB)	SUSTAIN 18s -A (H-GB)
Diameter of the gas pipe	1/2 inch	1/2 inch	1/2 inch
Diameter of the heating connections	3/4 inch	3/4 inch	3/4 inch
Expansion relief valve connector (min.)	15 mm	15 mm	15 mm
Condensate drain pipework (min.)	21.5 mm	21.5 mm	21.5 mm
G20 gas supply pressure	2.0 kPa	2.0 kPa	2.0 kPa
Gas flow at P max. – hot water (G20)	1.6 m ³ /h	1.9 m ³ /h	2.7 m ³ /h
Gas flow at P max. – heating mode (G20)	1.3 m ³ /h	1.6 m ³ /h	1.9 m ³ /h
Gas flow at P min. (G20)	0.480 m ³ /h	0.480 m ³ /h	0.533 m ³ /h
CE number (PIN)	0063CP3646	0063CP3646	0063CP3646
Flue gas mass rate in heating mode at P min.	2.08 g/s	2.08 g/s	2.31 g/s
Flue gas mass rate in heating mode at P max.	5.5 g/s	6.9 g/s	8.3 g/s

	SUSTAIN 12s -A (H-GB)	SUSTAIN 15s -A (H-GB)	SUSTAIN 18s -A (H-GB)
Flue gas mass rate in hot water handling mode at P max.	6.9 g/s	8.3 g/s	11.6 g/s
Flue gas temperature (80 °C/60 °C) at P max.	55 °C	55 °C	60 °C
Flue gas temperature (80 °C/60 °C) at P min.	55 °C	55 °C	55 °C
Flue gas temperature (50 °C/30 °C) at P max.	43 °C	48 °C	51 °C
Flue gas temperature (50 °C/30 °C) at P min.	32 °C	32 °C	34 °C
Flue gas temperature in hot water handling mode	71 °C	71 °C	69 °C
Flue gas temperature when over-heating	105 °C	105 °C	105 °C
Released system types	C13, C33, C43, C53	C13, C33, C43, C53	C13, C33, C43, C53
Nominal efficiency at 80/60 °C	99.6 %	99.6 %	99.6 %
Nominal efficiency at 50/30 °C	104.0 %	104.0 %	104.0 %
Nominal efficiency at 40/30 °C	106.0 %	106.0 %	106.0 %
Nominal efficiency in partial load operation (30%) at 40/30 °C	108.5 %	108.5 %	108.5 %
NOx class	5	5	5
Product dimensions, width	390 mm	390 mm	390 mm
Product dimensions, depth	280 mm	280 mm	280 mm
Product dimensions, height	700 mm	700 mm	700 mm
Net weight	31 kg	31 kg	31 kg
Weight when filled with water	35 kg	35 kg	35 kg

Technical data – Electrics

	SUSTAIN 12s -A (H-GB)	SUSTAIN 15s -A (H-GB)	SUSTAIN 18s -A (H-GB)
Electric connection	230 V / 50 Hz	230 V / 50 Hz	230 V / 50 Hz
Built-in fuse (slow-blow)	T2/2A, 250V	T2/2A, 250V	T2/2A, 250V
Max. electrical power consumption	65 W	65 W	66 W
Standby electrical power consumption	2 W	2 W	2 W
Level of protection	IPX4D	IPX4D	IPX4D

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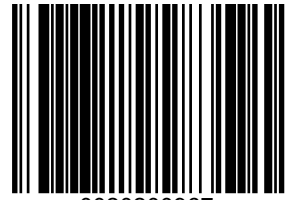
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We reserve the right to make technical changes.

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