

Installation and Maintenance Instructions

Gas-fired condensing combi appliance

Worcester 2000

GC2000iW C

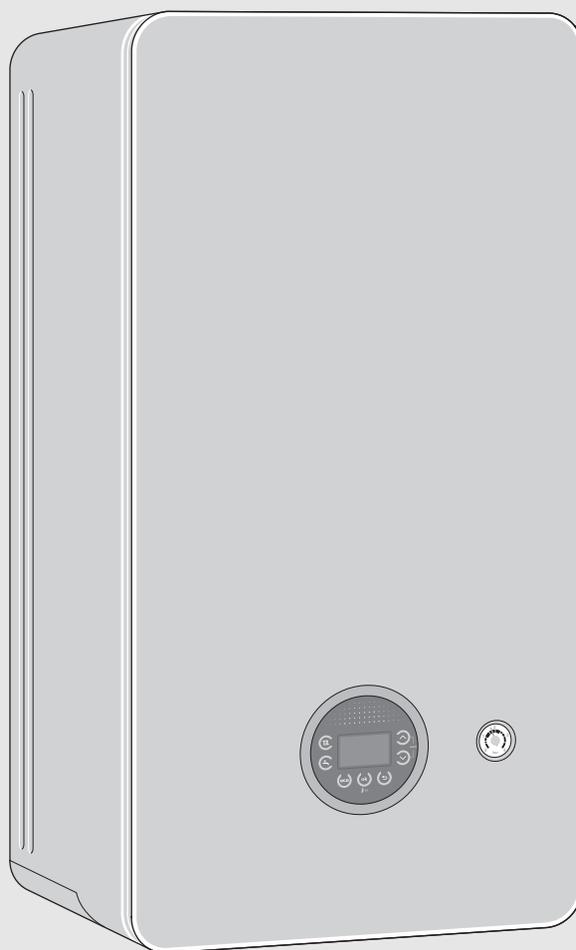


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1 Explanation of symbols and safety instructions

1.1 Explanation of symbols

Warnings

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

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

DANGER:

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

WARNING:

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

CAUTION:

CAUTION indicates that minor to medium personal injury may occur.

NOTICE:

NOTICE indicates that material damage may occur.

Important information



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

Additional symbols

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

Table 1

1.2 General safety instructions

⚠ Please read these instructions carefully before starting installation.

- These instructions are applicable to the Worcester appliance model(s) stated on the front cover of this manual only and must not be used with any other make or model of appliance.
- These instructions apply in the UK and Ireland only and must be followed except for any statutory obligations.
- This appliance must be installed by a competent registered gas engineer, such as a **Gas Safe** registered engineer including a **British Gas** engineer. Failure to install correctly could lead to prosecution.
- If you are in any doubt, contact the Worcester, Bosch Group help line (0330 123 3366).
- Distance learning and training courses are available from Worcester.
- The BENCHMARK Commissioning Checklist can be found on page 73 of this Installation manual.

⚠ Notices for the target group

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

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

⚠ Intended use

The appliance may only be used for heating water or domestic hot water in domestic properties.

- ▶ Observe the details on the data plate and the specifications (installation manual) to ensure correct use of this appliance.
- ▶ Worcester Bosch offer flue gas systems which are suitable for use with the appliance. It is the responsibility of the designer/installer of the flue to ensure this flue gas system operates correctly and in a safe manner.

⚠ If you smell gas

A gas leak could potentially cause an explosion. If you smell gas, observe the following rules:

- ▶ Prevent flames or sparks:
 - Do not smoke, use a lighter or strike matches.
 - Do not operate any electrical switches or unplug any equipment.
 - Do not use the telephone or ring doorbells.
- ▶ Turn off the gas at the meter or regulator.
- ▶ Open windows and doors.
- ▶ Warn your neighbours and leave the building.
- ▶ Prevent anyone from entering the building.
- ▶ Move well away from the building: call the National Gas Emergency Service on 0800 111 999.
- ▶ L.P.G. boilers: Call the supplier's number on the side of the gas tank.

⚠ Risk to life from carbon monoxide poisoning

There is a risk to life from escaping flue gases

- ▶ Do not modify the flue gas system.
- ▶ Ensure that flue pipes and gaskets are undamaged.

If flue pipes are damaged or leaking:

- ▶ Turn off and isolate the appliance.
- ▶ Open windows and doors.
- ▶ If necessary, leave the building and warn your neighbours.
- ▶ Prevent anyone from entering the building.
- ▶ Rectify any damage to the flue system immediately.

⚠ Installation and maintenance

Installation and maintenance must only be carried out by a competent registered gas engineer, such as Gas Safe registered engineer or British Gas engineer.

- ▶ Carry out a gas tightness test after completing work on gas-carrying components.
- ▶ Only use original spares.

⚠ Electrical work

Electrical work must only be carried out by a qualified electrician:

- ▶ Before starting electrical work;
 - Ensure that the electricity supply is safely isolated and secured to prevent inadvertent re-connection.
Information on safe isolation can be found in the Health and Safety Executive guidance HSG85.
 - Using test equipment approved to GS38 to confirm that the electricity supply is disconnected.
- ▶ Refer to the manufacturer's information when installing non Worcester components and systems to the Worcester appliance.

⚠ Handover to the user

When handing over, instruct the user how to operate the heating system and inform the user about its operating conditions.

- ▶ Explain how to operate the heating system and draw the user's attention to any safety relevant action.
- ▶ Explain that modifications and repairs must only be performed by a competent, registered gas engineer, such as a Gas Safe registered engineer or British Gas engineer.
- ▶ Leave the installation instructions with the completed Benchmark Checklist (or a certificate confirming compliance with IS 813, Eire only) and the operating instructions with the user or at the gas meter.

⚠ Servicing

Advise the user to have the system serviced annually by a competent, registered gas engineer, such as a Gas Safe registered engineer or British Gas engineer. Approved spares must be used to help maintain the efficiency, safety and reliability of the appliance.

⚠ Benchmark Service Record

The service engineer must complete the Benchmark Service Record at the back of this manual after each service.



Benchmark places responsibilities on both manufacturers and installers.

The purpose is to ensure that customers are provided with the correct equipment for their needs, that it is installed, commissioned and serviced in accordance with the manufacturer's instructions by competent persons and that it meets the requirements of the appropriate Building Regulations. The Benchmark Checklist can be used to demonstrate compliance with Building Regulations and should be provided to the customer for future reference.

Installers are required to carry out installation, commissioning and servicing work in accordance with the Benchmark Code of Practice which is available from the Heating and Hot water Industry Council who manage and promote the scheme.

Visit hhic.org.uk for more information.

⚠ Health and safety

The appliance contains no asbestos and no substances have been used in the construction process that contravene the COSHH Regulations

(Control of Substances Hazardous to Health Regulations 1988).

⚠ Combustion and corrosive materials

Do not store or use any combustible materials (paper, thinners, paints etc.) inside or within the vicinity of the appliance.

Chemically aggressive substances can corrode the appliance and invalidate any warranty.

⚠ Fitting and modification

Fitting the appliance and any controls to the appliance may only be carried out by a competent engineer in accordance with the current Gas Safety (Installation and Use) Regulations.

Flue systems must not be modified in any way other than as described in the fitting instructions. Any misuse or unauthorised modifications to the appliance, flue or associated components and systems could invalidate the warranty. The manufacturer accepts no liability arising from any such actions, excluding statutory rights.

⚠ General manual handling guidelines

- ▶ Only remove packaging at the time of the final installation.
- ▶ Always use Health and Safety guidance for manual handling of an appliance.
 - Never lift or carry more than the safe guidance limit on your own.
 - Always use appropriate methods and equipment when lifting/carrying an appliance.
- ▶ Never lift or carry packages by the shipping straps.
- ▶ During handling and unpacking, wear safety gloves to prevent injuries to your hands through sharp-edged appliance components.
- ▶ Dispose of packing materials appropriately.

⚠ Important handling instructions

Care should be taken when transporting, lifting and carrying the appliance.

- ▶ Use a means of transport suitable for handling appliances (e.g. sack truck with strap, stair climbing or step trolley).
- ▶ When handling appliances, secure them against a fall.
- ▶ Let only trained personnel undertake the handling.
- ▶ The correct method for handling heavy objects should be strictly observed, at all times.

2 Regulations

Installation regulations

Current Gas Safety (Installation and Use) Regulations:

All gas appliances must be installed by a competent, registered gas engineer, such as a Gas Safe registered engineer or British Gas engineer in accordance with the current regulations.

Failure to install appliances correctly could lead to prosecution.

The appliance must be installed in accordance with, and comply to, the current:

Gas Safety Regulations, IET Regulations, Building Regulations, Building Standards (Scotland) (Consolidation),

Building Regulations (Northern Ireland), local water by-laws,

Health and Safety Document 635 (The Electricity at Work Regulations 1989) and any other local requirements.

EU Regulations No. 811/2013 - Energy Labelling.

Building Regulations Part L1A 2013 - new dwellings

If the installation is in a new build property or it is a first time installation in an existing property, the heating systems must conform to current building regulations Part L1A.

The exception to this are single storey, open plan dwellings where the living area is more than 70% of the total usable floor area. Then this type of dwelling can be controlled as one zone.

An alternative would be individual electronically controlled TRVs.

For dwellings with a floor area over 150m², separate time and temperature control for each zone is required. It is best practice to fit Thermostatic Radiator Valves (TRV's) to all radiators except the area where the room thermostat is sited.

Building Regulations Part L1B 2010 - existing dwellings

For appliance replacements on an existing system, it is not necessary to zone the upstairs and downstairs separately, compliance with the zone requirements can be achieved by a single room thermostat or programmable room thermostat.

While the system is drained down, it is best practice to fit Thermostatic Radiator Valves (TRV's) to all radiators except the area where the room thermostat is sited.

British Standards

Where no specific instruction is given, reference should be made to the relevant British Standard codes of Practice.

- BS7074:1
 - Code of practice for domestic and hot water supply
- BS6891
 - Installation of low pressure gas pipe work up to 28mm (R1)
- BS5546
 - Installation of gas hot water supplies for domestic purposes
- EN12828
 - Central heating for domestic premises
- BS5440:1
 - Flues and ventilation for gas appliances of rated heating not exceeding 70kW (net): Flues
- BS5440:2
 - Flues and ventilation for gas appliances of rated heating not exceeding 70kW (net): Air Supply
- BS7593
 - Treatment of water in domestic hot water central heating systems
- BS6798
 - Installation of gas fired boilers of rated input up to 70kW (net)
- BS7671
 - IET Wiring Regulations

Irish Standards

The current relevant Irish standards should be followed, including:

- ECTI
 - National rules for electrical installations
- IS 813
 - Domestic Gas Installations

Timber framed buildings

Where the appliance is to be fitted to a timber framed building the guidelines laid down in BS5440: Part 1 and IGE "Gas Installations in Timber Frame Buildings" should be adhered to.

Potable water

All seals, joints and compounds (including flux and solder) and components used as part of the secondary domestic water system must be approved by WRAS.

CH Water

Salt based artificially softened water must not be used to fill the central heating system.

3 Product Information

Appliance features

- Aluminium-silicon heat exchanger, which has an extra-large surface area for enhanced heat exchanger efficiency.
- NOx emissions 39mg/kWh.
- Direct burner ignition.
- Zero pressure governor gas valve with fully modulating fan.
- Display for appliance status and access to diagnostics, system and commissioning parameters.
- 1 hour memory retention after power interruption.
- Low electrical power consumption during operation and stand-by modes.
- Modulating pump.
- Condensing in CH and DHW modes.
- Two star Hot Water Comfort measured to EN13203 Part 1 in comfort mode with DHW pre-heat ON.
- Eco mode, to use gas on demand.
- Plate type DHW heat exchanger.
- Galvanised steel wall mounting bracket.
- Only Worcester controls, see accessories list for available controls.
 - Worcester Comfort+ II RF control included with every 2000 boiler.
- Condensfit II flue systems 60/100 and 80/125 mm allows plume re-direction.
- Condensfit II flue systems 60/100 allows the ability to attach plume management kit.
- Front accessible components for maintenance.

3.1 Misuse

Appliance must be used as per the intended use statement. Operation outside the parameters of the intended use is considered misuse and could cause harm to people and damage to property.

Accessories should be as per accessories list. Minimum operational parameters are included in this document.

Using the appliance outside of its intended use may also invalidate the manufacturer's guarantee.

3.2 Scope of delivery

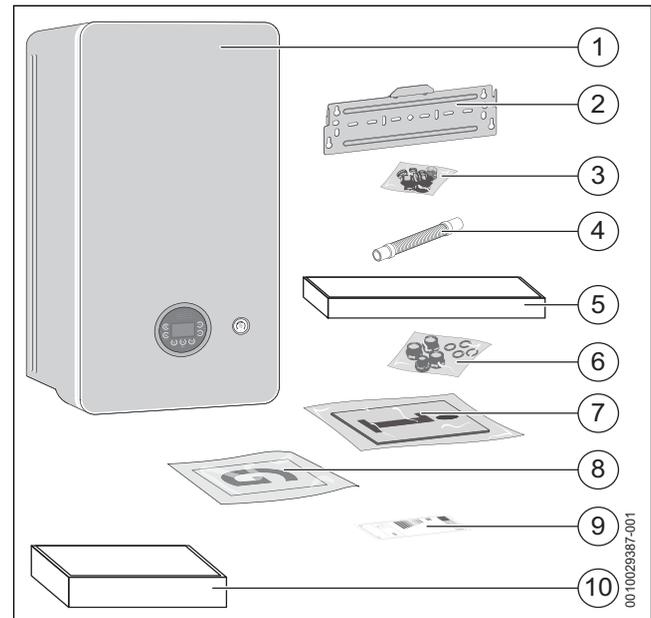


Fig. 1

- [1] Wall mounted gas-fired condensing combi appliance.
- [2] Wall mounting bracket.
- [3] Fittings pack.
- [4] Condensate hose connector.
- [5] Valves set.
- [6] Compression fitting adapters set.
- [7] Literature pack:
 - Installation and Maintenance Instructions,
 - User Instructions,
 - Wall mounting template.
- [8] Guarantee card
- [9] ErP labels and system fiche.
- [10] Comfort+ II RF controller and Key

3.3 Declaration of Conformity

The design and operation of this product comply with European Directives and the supplementary national requirements. Conformity has been demonstrated by the CE marking.

You can ask for a copy of the declaration of conformity for this product. For this see the contact address on the back cover of these instructions.

3.4 Appliance type overview

This appliance are for use with:

- Natural Gas (Cat.II 2H type C13, C33 & C53)

This document refers to the following appliance types:

Appliance type	Part number	Gas Council number
GC2000iW 25 C NG	7 736 902 027	47-800-25
GC2000iW 30 C NG	7 736 902 028	47-800-24

Table 2 Type overview

The name of the appliance consists of the following parts:

- GC2000iW: Type name
- 25 or 30: Hot water output in kW
- C: Combi appliance
- NG: Gas type (Natural Gas)

3.5 Product identification

Data plate

The data plate includes the product performance information, approval data and serial number. The data plate location can be found in the product overview.

Additional type plate

The product name and the most important product data are shown on the additional data plate. The additional type plate can be found on the outside of the product in an easily accessible location.

3.6 Pipe work positions and flue outlet

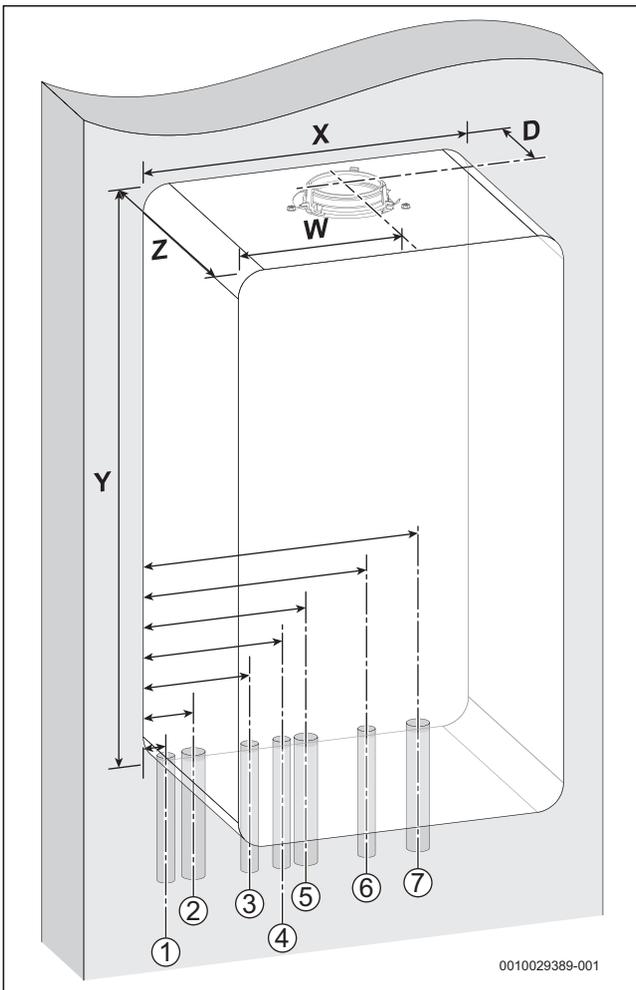


Fig. 2 Pipe and flue outlet dimensions

Description	Dimensions (mm)
X Appliance width	400
Y Appliance height	724
Z Appliance depth	300
W Flue centre from appliance left side	200
D Flue centre from rear of appliance	125

Table 3 Appliance and flue outlet dimensions

#	Function	From left case edge	Diameter of pipe
1	Condensate Outlet	60mm	22mm • Rubber push fit connection
2	CH Flow	68mm	22mm • Compression fitting (via adaptor)

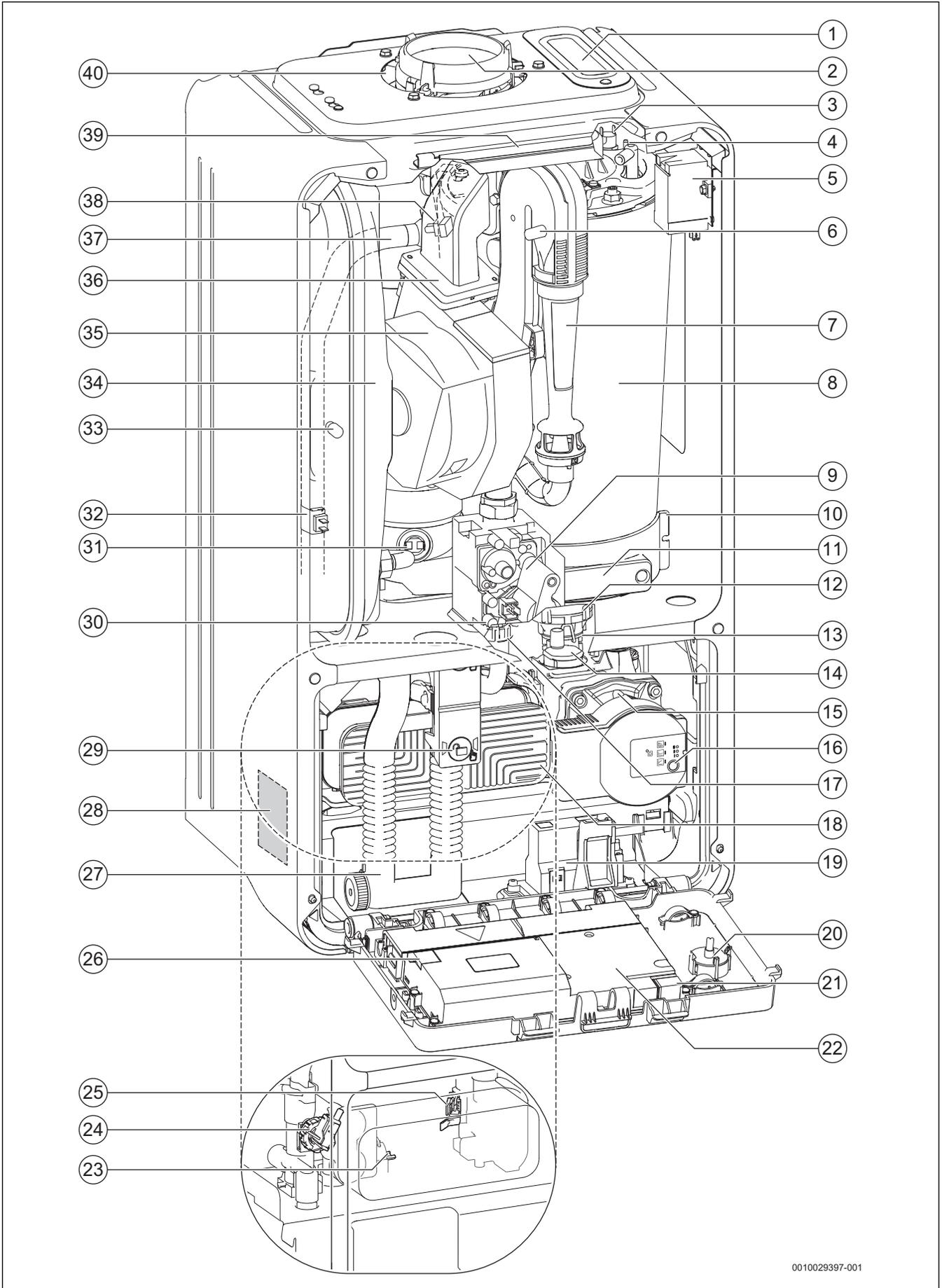
#	Function	From left case edge	Diameter of pipe
3	DHW Outlet	133mm	15mm • Compression fitting (via adaptor)
4	PRV Discharge	172.5mm	15mm • Fittings not supplied
5	Gas	200mm	22mm • Compression fitting (via adaptor)
6	DCW Inlet	267mm	15mm • Compression fitting (via adaptor)
7	CH Return	332mm	22mm • Compression fitting (via adaptor)

Table 4 Pipe dimensions



For servicing purposes, keep condensate and pressure release valve discharge pipes away from other hydraulic components.

3.7 Product overview



0010029397-001

Fig. 3 Product overview

Legend to figure 3:

- [1] Inspection aperture
- [2] Flue connection
- [3] Heating block temperature limiter
- [4] Electrode set
- [5] Ignition transformer
- [6] Control pressure test point
- [7] Gas-air mixing chamber
- [8] Heating block
- [9] Gas valve
- [10] Condensate sump
- [11] Cover for inspection aperture
- [12] Diverter valve motor
- [13] Diverter valve
- [14] Automatic air vent
- [15] Heating pump
- [16] Pump speed adjuster and LED indicator
- [17] Pressure relief valve (heating circuit)
- [18] Plate heat exchanger
- [19] KEY accessory housing (wireless gateway)
- [20] Pressure gauge
- [21] Position for code plug (KIM)
- [22] Control unit
- [23] DHW temperature sensor
- [24] Pressure switch
- [25] Flow turbine
- [26] Fuse (replacement)
- [27] Condensate trap
- [28] Data plate
- [29] Condensate trap locking mechanism
- [30] Gas supply pressure test point
- [31] Flue gas temperature limiter
- [32] Flow temperature sensor
- [33] Schrader valve
- [34] Expansion vessel
- [35] Fan
- [36] Air-gas manifold with non-return valve
- [37] Heating flow
- [38] Flow temperature sensor at heating
- [39] Bracket
- [40] Combustion air intake

3.8 Product data for energy consumption

The product data on energy consumption can be found in the operating instructions for the user.

3.9 Standard accessories**3.9.1 Appliance accessories**

Part number	Description
7 716 192 746	Worcester CondenseSure
7 733 600 236	Greenstar System filter (22mm)
7 733 600 237	Greenstar System filter (28mm)
7 733 600 266	Greenstar System filter mini (22mm)
7 733 600 476	Greenstar Brass system filter (22mm)
7 716 192 610	Worcester keyless filling link
7 733 600 091	Heat exchanger cleaning kit

Table 5 Appliance accessories

3.9.2 Programmer/timer accessories

The programmers/timers listed can be used with the appliances stated on the front of this manual.

Part number	Description
7 738 112 324	Comfort +II RF (programmable room thermostat) ^{1) 2)3)}
7 738 111 064	Sense II weather compensation controller ¹⁾

1) Preheat time control available

2) Landlord function is not compatible with the Worcester 2000

3) Power and gas consumption will not display accurately on the Comfort+ II RF. The electricity consumption for both CH and DHW assumes the pump is running at 100% speed permanently. As a result the indicated consumption will be the highest possible. Actual consumption is likely to be less.

Table 6 Control accessories

Bosch EasyControl smart control system

Part number	Description
7 736 701 341	EasyControl (white)
7 736 701 392	EasyControl (black)
7 736 701 555	EasyControl TRV set (white)
7 736 701 556	EasyControl TRV set (black)

Table 7 EasyControl accessories

4 Pre-Installation

NOTICE:

Risk of damage to system or appliance!

Before installation

- ▶ All the following Pre-Installation sections must be read and requirements met before starting appliance or flue installations.

4.1 System preparation

4.1.1 Artificially softened water

It is possible to have an ion exchange water softener fitted to the cold water system of the property. However, the appliance requires an untreated cold water connection taken from the mains supply, before the water softener, to the primary water filling point of the heating system.

Alternatively there are water softening/treatment appliances that do not adjust or alter the pH levels of the water. With these appliances it may not be necessary to provide an untreated water by-pass to the primary water filling point of the heat system.

NOTICE:

- ▶ Salt based softened water must not be used to fill the central heating system.

4.1.2 Water systems and pipe work

Primary system plastic pipework:

- Any plastic pipe work must have a polymeric barrier, complying with BS 7921 and installed to BS 5955 with 600mm (minimum) length of copper connected to the appliance.
- Plastic pipe work used for under-floor heating must be correctly controlled with a thermostatic blending valve limiting the temperature of the circuits to approximately 50°C with 1000mm (minimum) length of copper or steel pipe connected to the appliance.

Primary system/connections/valves:

- Do not use galvanised pipes or radiators.
- All system connections, taps and mixing valves must be capable of sustaining a pressure of 3 bar.
- Radiator valves should conform to BS 2767:10.
- All other valves should conform to BS 1010.
- It is best practice to fit Thermostatic Radiator Valves (TRV's) to all radiators, except the area where the room thermostat is sited which must be fitted with lockshield valves that are left open.
- **The circulating pump speed is fixed therefore as system circulation can be significantly adjusted or stopped by TRV's or zone valves, a system bypass must be installed to give at least a 3 metre circuit when activated.**
- Drain cocks are required at all the lowest points on the system.
- Air vents are required at all high points on the system.

Showers/Bidets:

- If a shower head can be immersed in water or comes closer than 25mm from the top edge of a bath or shower tray spill-over level then an anti-siphon appliance must be fitted to the shower hose.
- Bidets with direct hot and cold mains water can be used (with the approval of the local water authority) and must be the over rim flushing type with shrouded outlets to prevent the fitting of hand held sprays.

Hot water:

- Taps and mixing valves must be capable of sustaining a pressure up to 10 bar.
- Hot water temperature and flow rate are affected by the size and insulation of pipe work making up the distribution system and are controlled by the hot water tap and the water main inlet pressure. A mixing valve can be fitted if a more permanent temperature setting is required.
- If using more than one outlet at once causes water flow starvation, fit flow balancing valves or Ball-O-Fix valves to the appropriate outlets.

Primary system considerations - Combi & System appliances

Sealed system

- The CH sealed system must be filled using a WRAS approved filling loop or comply with examples in 4.1.4 "System fill" section.
- Where the system volume is more than 100 litres or exceeds 2.5 bar at maximum heating temperature an additional expansion vessel [2] must be fitted as close as possible to the appliance in the central heating return.
- Pressurise the extra expansion vessel [2] to the same value as the built-in expansion vessel - refer to the Technical data page.

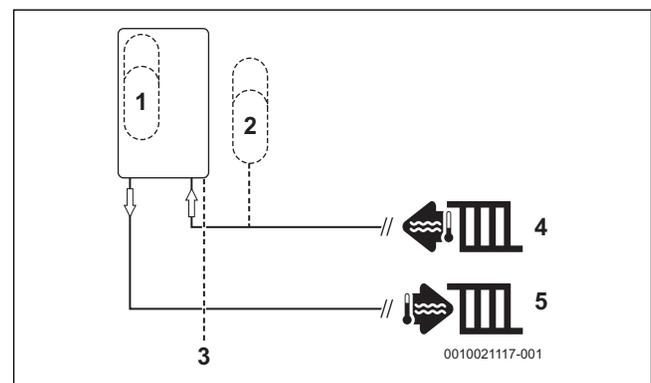


Fig. 4 Additional expansion vessel

- [1] Appliance expansion vessel
- [2] Additional expansion vessel
- [3] Pressure relief discharge
- [4] Heating return
- [5] Heating flow

Checking the size of the expansion vessel

To determine whether an additional expansion vessel is required: Follow the steps below:

- ▶ Calculate the total system volume (litres).
 - Plot a line vertically on the chart (→ Fig. 5).
- ▶ Determine the central heating maximum operating flow temperature.
 - Plot a line horizontally on the chart (→ Fig. 5).
- ▶ Determine the pre-charge in the expansion vessel based on static head, 1 meter = 0.1 bar.
 - Static head should be measured between the expansion vessel and the highest point on the system (top of the highest radiator).
- ▶ Select a curve from the key below (1-5).
- ▶ System pressure should be set at 0.1 - 0.25 bar higher than the vessel pre-charge.
 - It must be at least to the minimum on appliances with an analogue gauge.
 - Minimum pressure settings may need to be adjusted to suit on, appliances with a digital gauge, in the applicable menu function.
 - Intelligent filling settings may need to be adjusted to suit on, appliances with the automatic filling accessory, in the applicable menu function.

If the dissected lines are in area A then no additional expansion is required.

If the dissected line is in are B then an additional expansion vessel must be installed (→ Fig. 4).

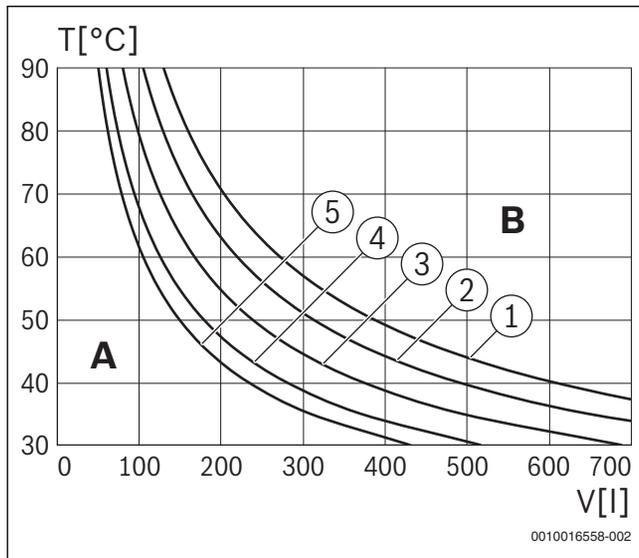


Fig. 5 Curves for the expansion vessel

- 1 Pre-charge pressure 0.5 bar (minimum)
- 2 Pre-charge pressure 0.75 bar
- 3 Pre-charge pressure 1.0 bar
- 4 Pre-charge pressure 1.2 bar
- 5 Pre-charge pressure 1.3 bar
- A Operational capacity of the expansion vessel (left of the relevant curve)
- B Additional expansion vessel required (right of the relevant curve)
- T Maximum operating temperature [°C]
- V Total System Volume [l]



The default pre-charge pressure for the appliance is 0.75 bar

4.1.3 System layouts examples

Sealed primary system - Single central heating circuit:

Typical primary system example

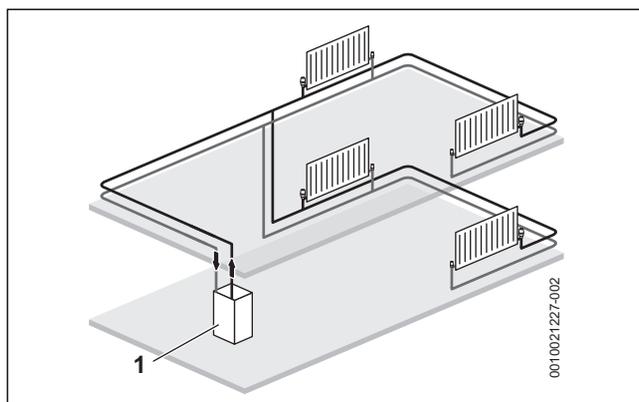


Fig. 6 Single central heating circuit example

- [1] Appliance

Sealed primary system - 2 x central heating zones:

- Requirement for new builds if the floor area of a property is over 150m².

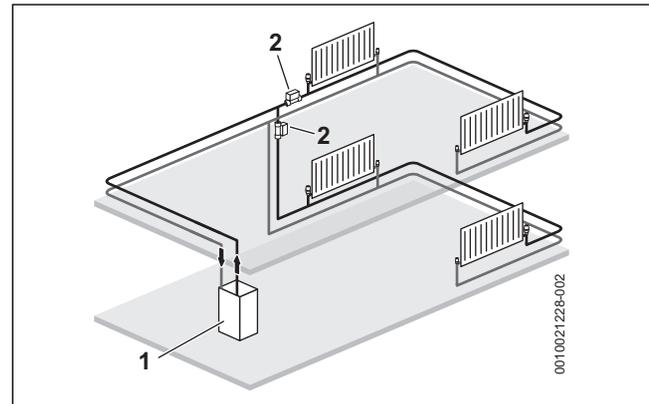


Fig. 7 Separated heating zones

- [1] Appliance
- [2] Zone valves

4.1.4 System fill

Integral filling link

- An optional filling link accessory is available to fill the system.
 - Refer to filling link instructions for fitting and operation.

Filling primary sealed systems

NOTICE:

Filling the primary sealed system

The system must not be filled with salt based softened water.

- ▶ Ensure the primary water filling point uses an untreated cold water connection from the mains supply, before a water softener.

- Filling the system must comply with one of the following methods shown.
- The filling point must be at low level and must never be a permanent connection to the mains water supply.
- Filling loops must be WRAS approved.
- If the external filling link is sited away from the appliance, then a pressure gauge should be installed at the filling point.

External filling loop

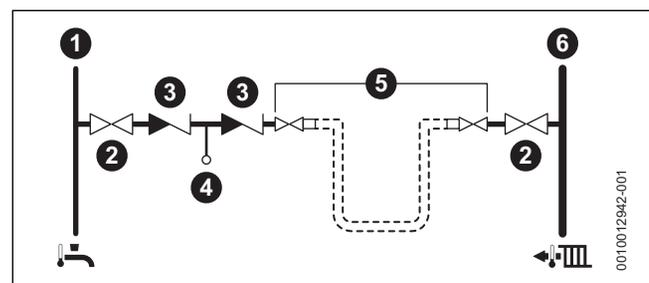


Fig. 8 External filling loop system fill example

- [1] Cold mains inlet pipe
- [2] Stop valve
- [3] Check valve
- [4] Test point
- [5] Hose union
- [6] Central heating flow pipe

4.2 Mains supply

4.2.1 Electrical supply

- Supply: 230V AC - 50 Hz
- This appliance must **not** be connected to a three phase supply.
- The wiring between the appliance and the electrical supply must comply with the latest IET wiring regulations that apply to wiring a fixed appliance for Class 1 equipment.
- The correct type of RCD must be employed where additional protection is required that is suitable for a low energy DC modulating pump according to IET wiring regulations.
- External 3 A fuse to BS1362.
- The appliance must be earthed.
- Cable: PVC insulated 0.75mm² (24 x 0.2mm) temperature rated to 90 °C, to BS EN50525.
- Any additional components that are connected to the appliance with mains electrical supply must not have a separate supply.
- Additional equipment wired to the appliance must comply with the latest IET wiring regulations.
- Appliance protection rating - IPX4D

4.2.2 Gas supply

- Appliances using Natural Gas (NG) must be connected to a governed meter.
- Installation and connection of the gas supply to the appliance must be in accordance with the latest version of BS6891.
- Gas pipe sizing should be calculated to ensure no more than the permitted mbar drop between the meter to the appliance inlet. (→ chapter 6).
- The meter and pipe work to the meter must be checked, preferably by the gas supplier. This is to ensure that the equipment is in good working order and can meet the gas flow and pressure requirements, in addition to the demand from any other appliance being served.

Pipe sizing (NG)



Gas pipe work:

- ▶ Gas installation pipe work must be designed to ensure the pressure loss between the meter outlet (NG) → table 20 "Allowed mbar pressure drop".

Basic pipe sizing calculation



Basic pipe sizing calculation.

- ▶ **This method is only a guide - for more complex design please refer to latest version of BS6891 and training given in ACS.**

Natural Gas (NG):

Discharge rates for copper tube with 1mbar differential pressure between the ends for Natural Gas.

Discharge rates for Natural Gas (m ³ /hr) with straight horizontal copper tube					
Pipe Length (m)	Discharge m ³ /hr	Pipe Size (mm)			
		15	22	28	35
3		2.9	8.7	18	32
6		1.9	5.8	12	22
9		1.5	4.6	9.4	17
12		1.3	3.9	8	15
15		1.1	3.4	7	13
20		0.95	2.9	5.9	11
25		0.92	2.5	5.2	9.5
30		0.88	2.3	4.7	8.5

Table 8 Natural Gas



Natural Gas:

- ▶ When using this table to estimate the gas flow rate in pipe work of a known length, the effective length will be increased by 0.5m for each 90° elbow and tee fitted and by 0.3m for each 90° bend.

4.2.3 Water supply

Use in hard water areas:

Normally there is no need for water treatment to prevent scale formation as the maximum temperature of the HW heat exchanger is limited by the electronic control.

In areas where temporary water hardness exceeds 200ppm, consideration may need to be given to the fitting of a scale prevention appliance. In such circumstances, the advice of the local water authority should be sought.

Keyless filling link accessory



Minimum static pressure.

- ▶ A minimum static pressure of 1.75bar is recommended for correct operation of the Keyless filling link.

Water mains pressure:

- Minimum mains water pressure, for maximum performance refer to section 13.1 "Technical data".
- Maximum mains fed water static pressure 10 bar.
If necessary fit a pressure reducing valve.

NOTICE:

Non return, back flow prevention appliances (including those associated with water meters) fitted to the mains water supply can cause a pressure build up which could damage the appliance and other household appliances.

NOTICE:

Non return valves in the cold water feed system.

If a non return valve is fitted on the mains inlet, then pressure can increase significantly over normal standing pressure when the appliance carries out a HW preheat or due to fast acting valves closing on other appliances/outlets.

- ▶ To ensure water pressure stays at a level that will not damage the appliance or other household appliances, we would recommend that a 3bar pressure reducing valve and mini expansion vessel are fitted.
- Where the mains water supply has a non-return, back flow prevention valve fitted, a mini expansion vessel [3] should be connected to the mains water inlet pipe [1] between the non-return valve [2] and the appliance [4] as shown below.

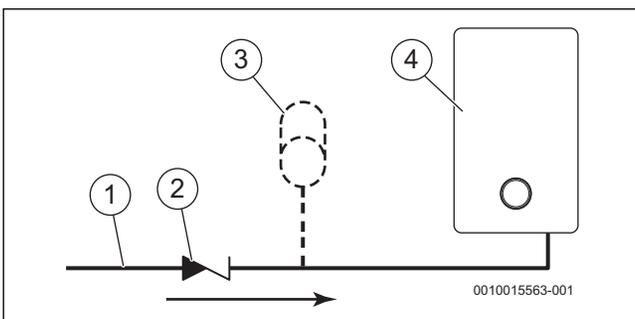


Fig. 9 Mini expansion vessel location

- [1] Mains water inlet pipe
- [2] Non-return valve
- [3] Mini expansion vessel - part no. 7 716 192 105
- [4] Appliance

4.3 Appliance location and clearances

4.3.1 Appliance location

- Follow local regulations for the location within the property that the appliance is to be installed.
- This appliance is only suitable for installing internally within a property at a suitable location onto a flat, fixed rigid surface capable of supporting the appliance weight.
- The appliance is not suitable for external installation.
- Protect installation area against dust and moisture.
- Provide fresh air.



No surface protection is required against heat transfer from the appliance



DANGER:

Danger from explosive and flammable materials:

Storage of explosive and flammable materials.

- ▶ Do not store flammable materials (paper, curtains, clothing, primer, paint, ...) in proximity to the appliance.

NOTICE:

Damage to appliance:

Contaminated combustion air.

- ▶ Do not use any cleaners containing chlorine or hydrogen halide (i.e. spray cans, primers, cleaners, paint and glue).
- ▶ Do not store or use these substances in the appliance, room.
- ▶ Avoid the build up of dust.

NOTICE:

Damage to appliance:

Extreme temperatures may cause damage to the heating system.

- ▶ Ensure the appliance location's ambient temperature is above 0 °C and below 50 °C.

NOTICE:

Damage to system:

The heating system pipe work can be damaged by frost if installed in an internal unheated area, such as a loft, basement or garage.

The appliance internal frost protection only monitors the system water temperature within the appliance to provide protection for the appliance.

- ▶ No system frost protection available.
- ▶ The system pipe work in the internal unheated area should be insulated.
- ▶ If the appliance is to be shut down for an extended period, drain the central heating system.



The appliance must be installed where:

- ▶ The area is well lit, allowing to clearly see the appliance to carry out any work or checks.
- ▶ An engineer can gain clear and safe access to work on the product or component, including making adequate provision for visual inspection of flues in voids.
- ▶ The homeowner can gain clear and safe access to the controls, check, top up or reset the appliance.
- ▶ Roof space installations must fully conform to BS 5410 part 1: roof space installations.
- ▶ Products in roof spaces must have permanent fixed lighting, a permanent fixed retractable ladder and a fixed floor area sufficient to allow access for normal use and servicing around the product and between and the access hatch.
We would also recommend that a remote pressure gauge and filling loop are sited where the customer can gain easy access for checking and topping up.

4.3.2 Rooms containing a bath or shower

CAUTION:

Risk of electric shock

► Any switch or appliance control using mains electricity must not be within reach of a person using the bath or shower.

- In all cases the installation **must be in accordance with the latest amendments to the latest edition of the IET Wiring Regulations (BS7671)**.
- Check the IP rating of any control units to be used on this appliance.
- Circuit breaking devices should be used in accordance with the regulations.
- Figure 10 is for guidance only.

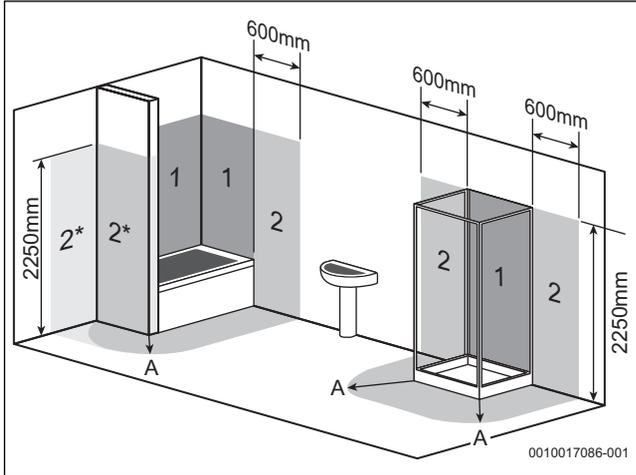


Fig. 10 Bathroom installations

- [1] Zone 1
- [2] Zone 2
- [2*] Without the end wall, zone 2 must extend 600mm from the bath
- [A] 600mm radius from the bath or shower

• Appliance protection rating - IPX4D

4.3.3 Appliance clearances

Appliance clearances

- The following details covering the installation, service and maintenance clearances for the appliance.

CAUTION:

Risk of damage to appliance or property

The appliance will overheat if the clearance space around the appliance is restricted by objects.

- Do not restrict this space with the addition of cupboards, shelves etc. next to or around the appliance.
- Do not store any combustible materials on or next to the appliance, such as clothes, towels, paper or plastic bags.

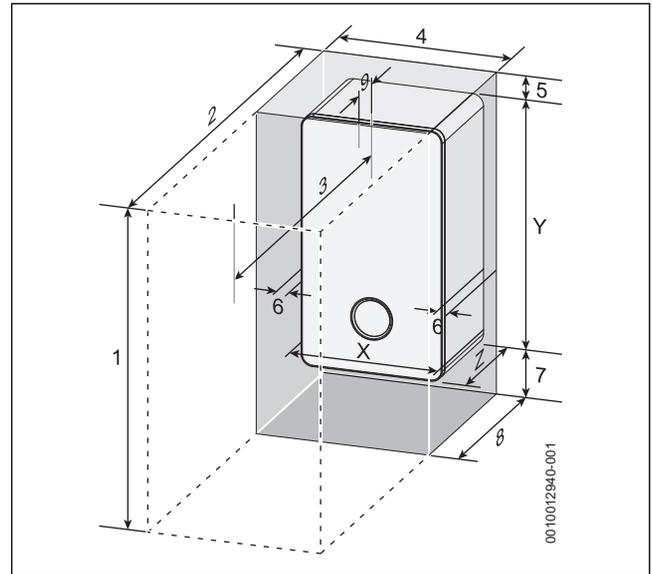


Fig. 11 Appliance minimum clearances

Minimum clearances		
	Description	Dimensions (mm)
X	Appliance width	400
Y	Appliance height	724
Z	Appliance depth	300
Installation/Maintenance		
1	Overall clearance height	1115/1155 ¹⁾
2	Overall clearance depth	850
3	In front of appliance	600
4	Overall clearance width	410
5	Above the appliance	191/231 ¹⁾
6	Either side of appliance	5
7	Below the appliance	200
8	Compartment depth	320
9	Appliance to removable door	20

1) Height for either 60/100 flue or 80/125 flue

Table 9 Appliance minimum clearances

Appliances in compartments

Follow the latest requirements of BS6798 and BS5440 and note:

- Minimum clearances must be maintained.
- An access door is required to install, service and maintain the appliance and any ancillary equipment.
- If the appliance is installed in an unventilated airing/storage cupboard, there is no requirement to make a partition between the appliance and the storage space as long as the minimum clearances around the appliance are maintained.

4.4 Flue systems considerations

WARNING:

Flue systems

Possible flue gas escape

- ▶ Use Worcester, Bosch Group approved Condensfit II flue systems only, no other manufacturer's flue have been tested or approved for use with Worcester, Bosch Group appliances.



CAUTION:

Concealed flue systems:

- ▶ Where a flue system is going to be concealed, provision must be made for service and inspection.
- ▶ Voids containing concealed flues must have at least one inspection hatch no less than 300mm square.
- ▶ Flue joints within the void must not be more than 1.5 metres from the edge of the inspection hatch.
- ▶ Inspection hatches should be located at changes of direction.
- ▶ If this is not possible, bends should be viewable from both directions.



Refer to the manual supplied with the Worcester, Bosch Group flue kit for complete installation instructions.

Flue kit part numbers

Part number	Flue Ø	Description
7 716 191 082	60/100	Telescopic horizontal flue kit
7 716 191 171	60/100	Extended telescopic horizontal flue kit
7 733 600 048	60/100	Horizontal high level telescopic flue kit
7 719 003 702	80/125	Telescopic horizontal flue kit
7 719 002 430	60/100	Vertical balanced flue kit
7 719 002 431	80/125	Vertical balanced flue kit

Table 10 Flue kit assembly part numbers

4.4.1 Flue length

Horizontal maximum flue lengths

Appliance	Flue length [L]	
	60/100	80/125
GC2000iW 25 C	9,000mm	12,000mm
GC2000iW 30 C	9,000mm	12,000mm

Table 11 Maximum flue lengths - Horizontal flues

Vertical maximum flue lengths

Appliance	Flue length [L]	
	60/100	80/125
GC2000iW 25 C	12,000mm	15,000mm
GC2000iW 30 C	12,000mm	15,000mm

Table 12 Maximum flue lengths - Vertical flues

Flue system bends

NOTICE:

Effective flue lengths of bends:

Each bend used has an equivalent straight flue length.

- ▶ Refer to the table 13.

Bend	Effective flue length	
	60/100	80/125
45°	1m	1m
90°	2m	2m

Table 13 Effective length of bends

4.4.2 Flue options

The systems have different maximum flue lengths, refer to the following example flue options for those maximum flue lengths.

Horizontal high level flue assembly

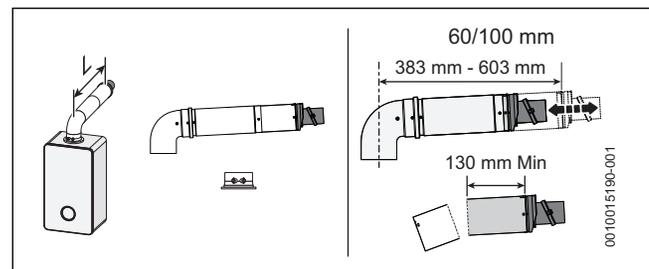


Fig. 12 Horizontal flue option

- Flue length [L] (initial bend included in length calculation)
 - 60/100 = 202 - 603mm
 - 80/125 = N/A

Telescopic horizontal flue assembly

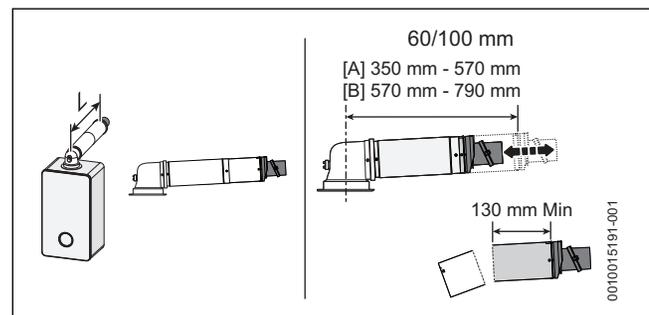


Fig. 13 Horizontal flue option

Telescopic horizontal flue assembly [A]

- Flue length [L] (adaptor bend included in length calculation)
 - 60/100 = 180 - 570mm
 - 80/125 = 405 - 600mm

Extended telescopic horizontal flue assembly [B]

- Flue length [L] (adaptor bend included in length calculation)
 - 60/100 = 570 - 790mm
 - 80/125 = N/A

Horizontal fixed length flue assembly

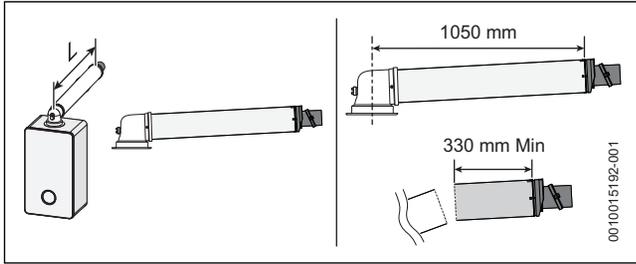


Fig. 14 Horizontal flue option

- Flue length [L] (adaptor bend included in length calculation)
 - $60/100 = 330 - 1,050\text{mm}$
 - $80/125 = \text{N/A}$

Extended horizontal flue

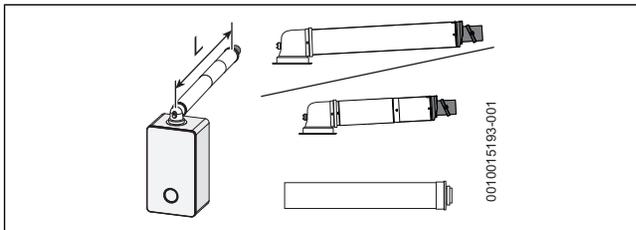


Fig. 15 Horizontal flue option

- Flue length [L] (adaptor bend included in length calculation)
 - Maximum flue length as stated in "Horizontal maximum flue lengths".

Horizontal flue with additional 90° elbow

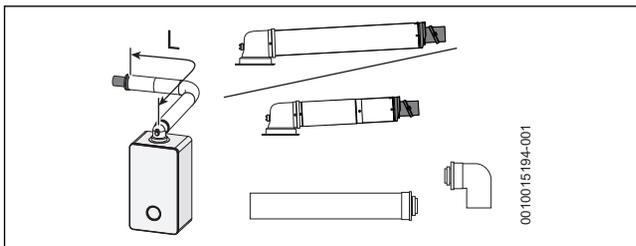


Fig. 16 Horizontal flue option

- Flue length [L] (adaptor bend included in length calculation)
 - Maximum flue length as stated in "Horizontal maximum flue lengths" minus the 90° bend equivalent straight flue length as stated in Table 13 "Effective length of bends".

Horizontal flue with additional 90° elbows

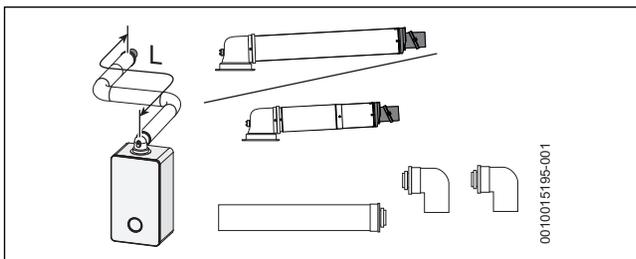


Fig. 17 Horizontal flue option

- Flue length [L] (adaptor bend included in length calculation)
 - Maximum flue length as stated in "Horizontal maximum flue lengths" minus 2 x 90° bends equivalent straight flue length as stated in Table 13 "Effective length of bends".

High level horizontal flue

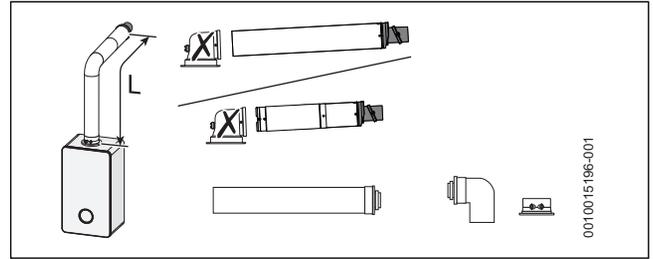


Fig. 18 Horizontal flue option

- Flue length [L] (initial bend included in length calculation)
 - Maximum flue length as stated in "Horizontal maximum flue lengths".

High level horizontal flue with additional 90° elbow

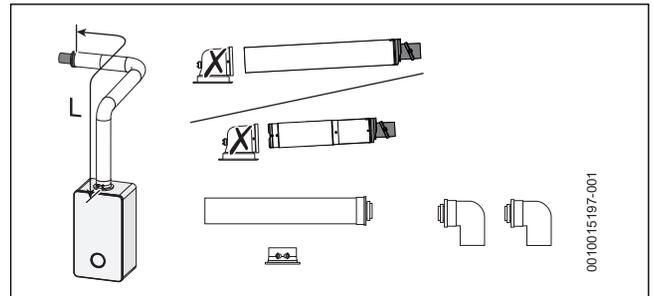


Fig. 19 Horizontal flue option

- Flue length [L] (initial bend included in length calculation)
 - Maximum flue length as stated in "Horizontal maximum flue lengths" minus the 90° bend equivalent straight flue length as stated in Table 13 "Effective length of bends".

High level horizontal flue with additional 90° elbows

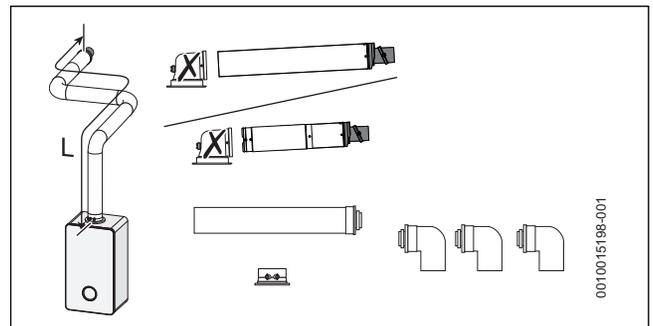


Fig. 20 Horizontal flue option

- Flue length [L] (initial bend included in length calculation)
 - Maximum flue length as stated in "Horizontal maximum flue lengths" minus 2 x 90° bends equivalent straight flue length as stated in Table 13 "Effective length of bends".

Vertical balanced flue assembly

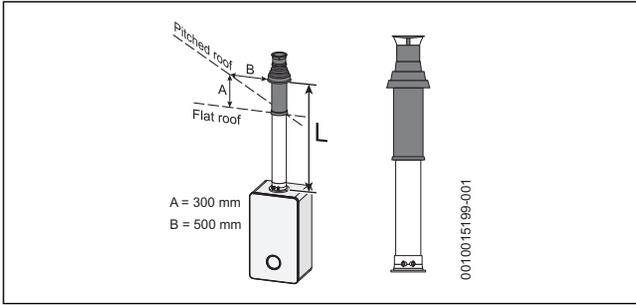


Fig. 21 Vertical flue option

- Flue length [L]
 - Maximum flue length as stated in "Vertical maximum flue lengths".

Vertical balanced flue with 90° elbow offset

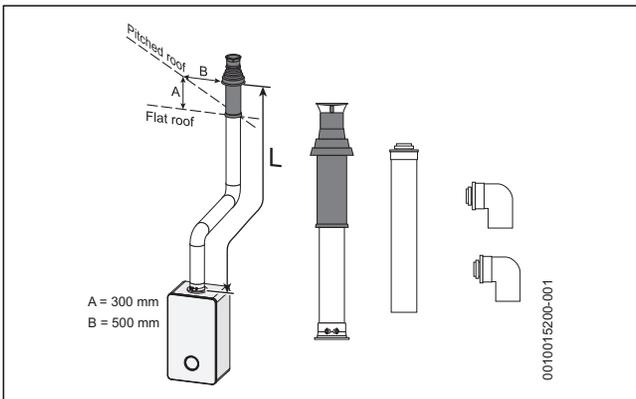


Fig. 22 Vertical flue option

- Flue length [L]
 - Maximum flue length as stated in "Vertical maximum flue lengths" minus 2 x 90° bends equivalent straight flue length as stated in Table 13 "Effective length of bends".

Vertical balanced flue with 45° elbow offset

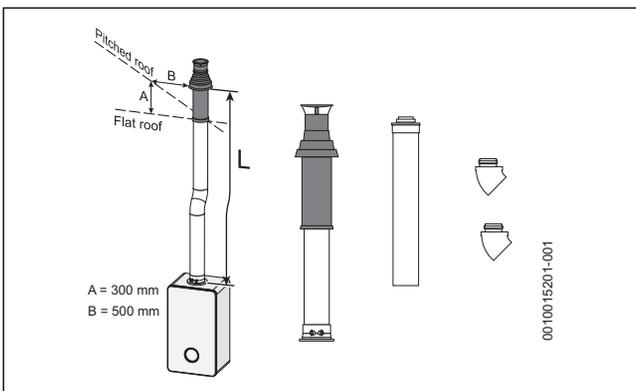


Fig. 23 Vertical flue option

- Flue length [L]
 - Maximum flue length as stated in "Vertical maximum flue lengths" minus 2 x 45° bends equivalent straight flue length as stated in Table 13 "Effective length of bends".

4.4.3 Plume management system

For every extra 1,000mm of plume management after the first 500mm, the internal 60/100 flue length must be reduced by 700mm, up to a maximum of 4,500mm of plume management.

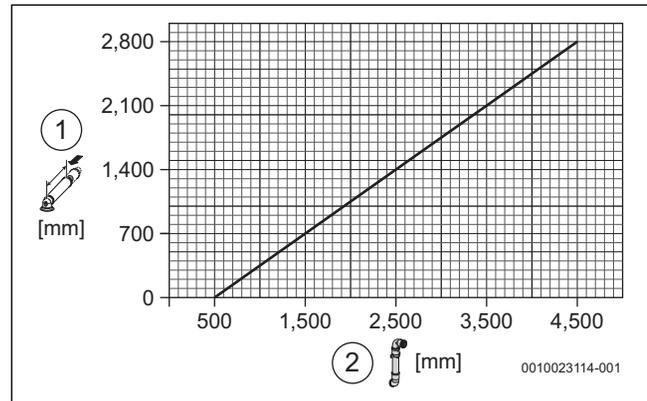


Fig. 24 Reduction to flue length as plume length increases graph

- [1] Reduction to flue length [mm] (maximum reduction 2,800mm)
- [2] Plume length [mm] (maximum plume length 4,500mm)

NOTICE:

Plume management length:

- ▶ The plume management length must be a minimum of 500mm and must not exceed the maximum straight length for a horizontal Ø 60/100mm flue with a 60mm plume management system as stated previously.



Horizontal plume management runs

- ▶ The initial horizontal run from the terminal elbow must have a minimum 10° fall back, (stop tabs in the elbow prevent less than 10°) to the appliance for proper disposal of condensate.
- ▶ Any further horizontal runs after an elbow can be 3°.



WARNING:

Minimum plume management length:

The minimum distance of 500mm must be maintained between air inlet and exhaust.

- ▶ Do not terminate the plume management inside the terminal exclusion zone (shaded area) shown in figure 25.

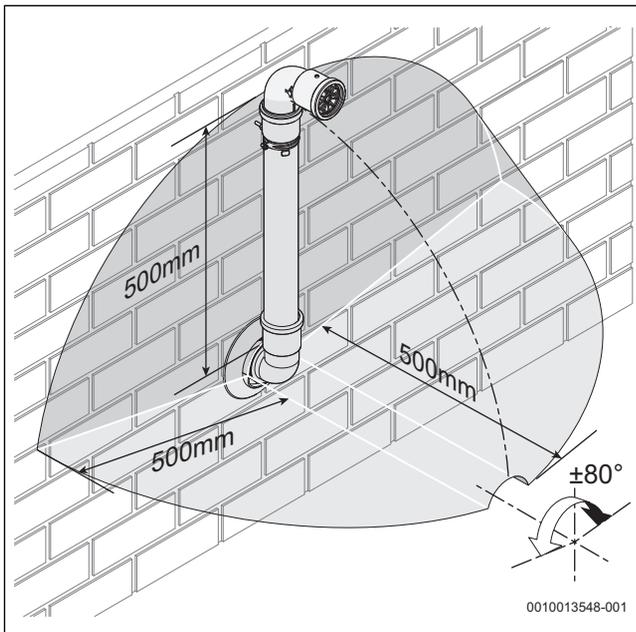


Fig. 25 Terminal exclusion zone

NOTICE:

Cutting the 500mm pipe

- ▶ The Plume management extension kit contains the components required for such a configuration.

4.4.4 Flue terminal positions



CAUTION:

Flue terminal positions

- ▶ All measurements are the minimum clearances required.
- ▶ Terminals must be positioned so to avoid combustion products entering the building.

Vertical flue terminal positions

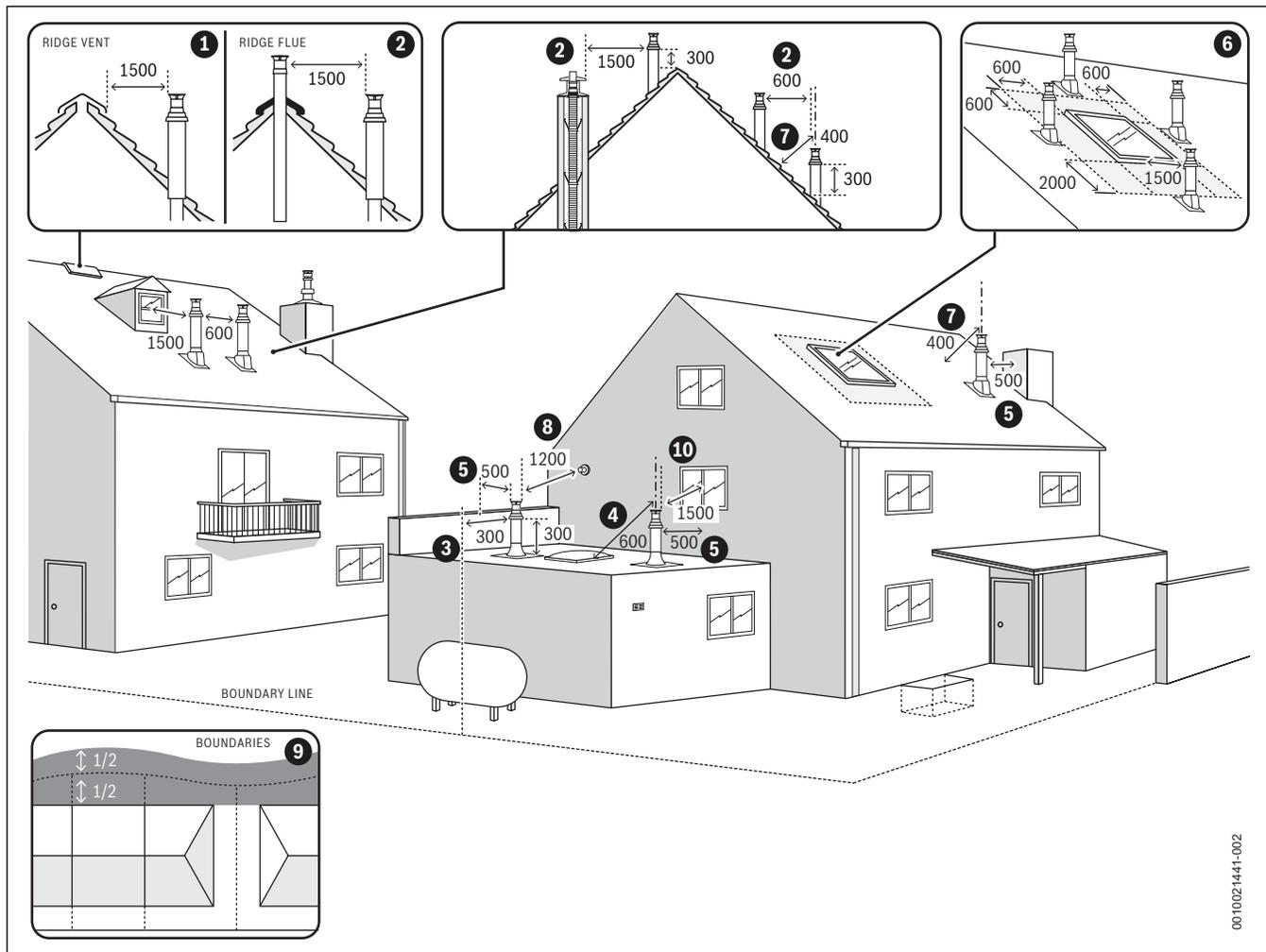


Fig. 26 Vertical flue terminal positions

Key to figure 26:

- [1] 1,500mm measured between a vertical flue terminal and an opening or vented window. 500mm measured horizontally between a vertical flue terminal and an opening or vented window providing the flue terminal is at least 300mm above the opening.
- [2] Minimum clearance to an additional flue, 600mm to a room sealed flue or 1,500mm to an open flue.
- [3] 300mm clearance from a vertical flue terminal adjacent to a boundary line, unless it will cause a nuisance. BS 5440: Part 1 recommends that care is taken when siting a terminal in relation to boundary lines.
- [4] 600mm minimum clearance measured from an opening or vented skylight to a vertical flue terminal. If the terminal is within 1,500mm of the opening or vented skylight then it must be at least 300mm above the opening.
- [5] 500mm clearance measured horizontally from a vertical flue to a vertical structure.
Not required if the terminal is 300mm above the structure.
- [6] The flue must not penetrate the roof in the shaded area.
The terminal must be at least 1,500mm from the opening or vent when sited below the window or 600mm when sited to either side or above.
- [7] 400mm measured diagonally from a pitched roof or 500mm in regions with heavy snow fall. 300mm measured vertically from the air intake to the closest intersection with the roof.
- [8] 1,200mm separation measured between a vertical flue and a horizontal flue terminal.
- [9] For the purpose of determining suitable flue terminal positions for gas appliances, the boundary can be considered to extend to the

centre line of any adjacent routes or waterways e.g. paths, streets, rights of way, canals, rivers or railways.

- [10] 1,500mm measured between a vertical flue terminal and an opening or vented window. 500mm measured horizontally between a vertical flue terminal and an opening or vented window providing the flue terminal is at least 300mm above the opening.

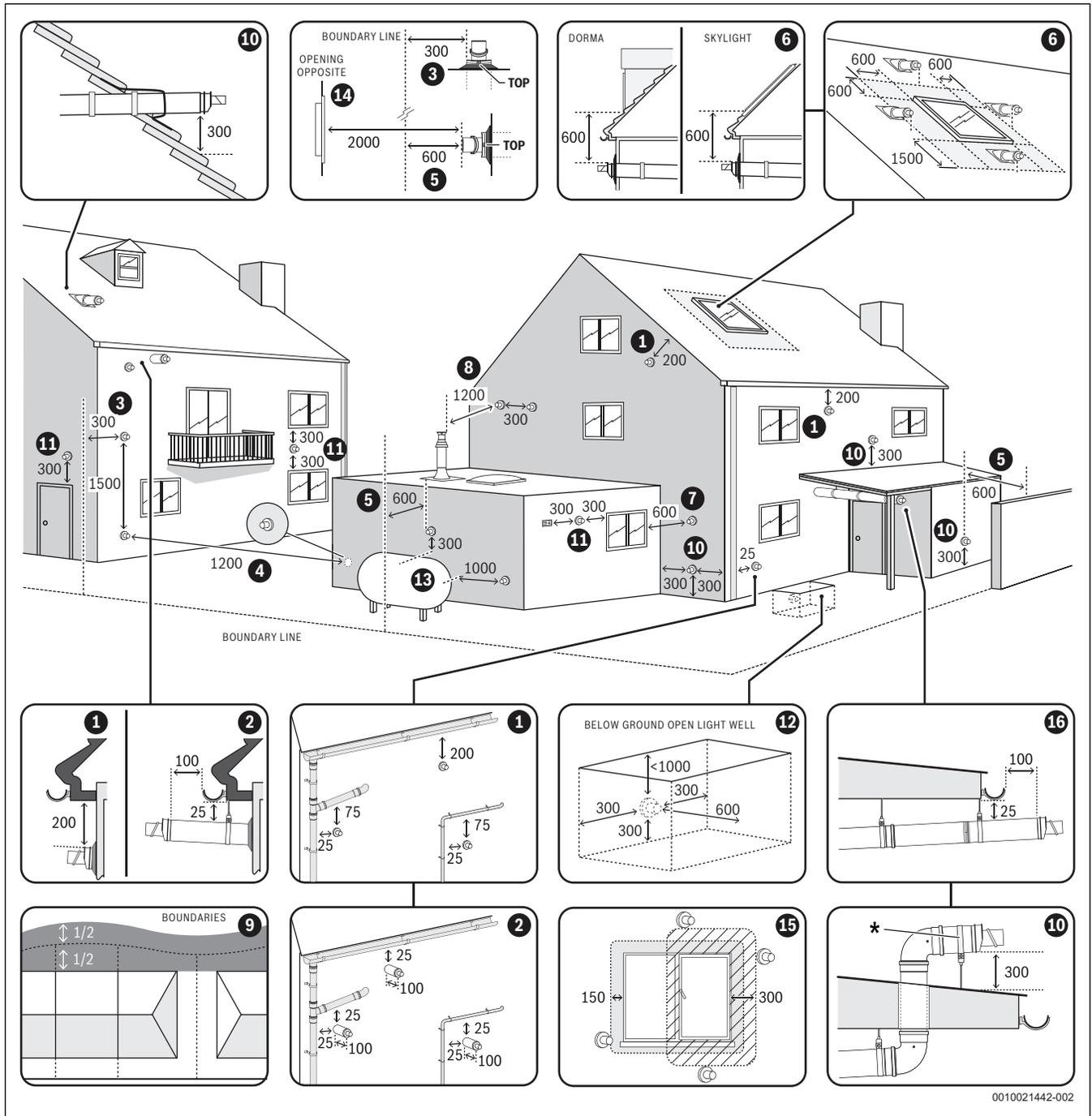


Note:

- ▶ Where a vertical flue terminates in an area that is enclosed on 3 sides, the flue must be no more than 1,000mm below the lowest roof line. You must ensure that all clearances are maintained and that products of combustion disperse safely from the area.

0010021441-002

Horizontal flue terminal positions



0010021442-002

Fig. 27 Horizontal flue terminal positions

Key to figure 27:

- [1] 200mm below eaves and 75mm below gutters, pipe and drains.
- [2] The dimension below eaves, gutters, pipes and drains can be reduced to 25mm, as long as the flue terminal is extended by 100mm past any overhang. The telescopic flue joint must be sealed with suitable silicone sealant if it is external to the building.
- [3] 300mm adjacent to a boundary line, unless it will cause a nuisance. BS 5440: Part 1 recommends that care is taken when siting terminal in relation to surfaces or boundary lines.
- [4] 1,200mm separation measured between terminals facing each other.
- [5] 600mm distance to a surface or boundary line facing a terminal, unless it will cause a nuisance. BS 5440: Part 1 recommends that care is taken when siting terminal in relation to surfaces or boundary lines.
- [6] The terminal must be at least 1,500mm from the opening or vent when sited below the window or 600mm when sited to either side or above.
- [7] 600mm diagonally to an opening door, air vent or opening window.
- [8] 1,200mm separation measured between a vertical flue and a horizontal flue terminal.
- [9] For the purpose of determining suitable flue terminal positions for gas appliances, the boundary can be considered to extend to the centre line of any adjacent routes or waterways e.g. paths, streets, rights of way, canals, rivers or railways.
- [10] 300mm to an internal or external corner. 300mm above a surface, such as the ground/ floor level or roof surface.
* If the terminal section is less than 150mm and has two screws securing it to the elbow, the terminal section will not require a supporting bracket.
- [11] 300mm above, below and either side of an opening door, air vent or opening window.
- [12] Below ground level in an open lightwell. The flue must be at least 600mm from the opposing surface and have at least 300mm clearance either side and below. The flue terminal must be no more than 1,000mm from the top of the lightwell.
- [13] Flues should clear any LPG storage by 1,000mm horizontally and 300mm above.
- [14] Proximity of flue duct outlet to boundaries, 2,000mm distance to an opening in adjacent building facing a terminal. BS 5440: Part 1 recommends that care is taken when siting terminal in relation to boundary lines.
- [15] 300mm from an opening or vented window, 150mm to a fixed unvented window.
- [16] The dimension below eaves, balconies and car ports can be reduced to 25mm, as long as the flue terminal is extended to clear any overhang. The telescopic flue joint of the terminal must be sealed with suitable silicon sealant if it is external to the building.

**Note:**

- ▶ Installations in car ports are not recommended.
- ▶ The flue cannot be lower than 1,000mm from the top of a light well due to the build up of combustion products.
- ▶ Dimensions from a flue terminal to a fanned air inlet to be determined by the ventilation equipment manufacturer.
- ▶ A flue terminal guard shall be fitted whenever a terminal or air inlet is fitted less than 2,000mm above ground, above a balcony or above a flat roof to which people have access.

Key to figure 28 - Plume re-direction terminal positions:

- [1] This feature allows some basic plume re-direction options on a standard telescopic horizontal flue terminal.
300mm minimum clearances to a opening e.g. window.
However the minimum clearances to an opening in the direction that the plume management is facing, must be increased to 1,500mm.
Where the flue is less than 150mm to a drainpipe and plume redirection is used the deflector should not be directed towards the drainpipe.
- [2] 300mm adjacent to a boundary line, unless it will cause a nuisance. BS 5440: Part 1 recommends that care is taken when siting terminal in relation to surfaces or boundary lines.
- [3] Where the flow of products of combustion is not at right angles to the boundary, the 600mm dimension may be measured in the direction of flow as long as the terminal is not less than 300mm from the boundary.
- [4] When redirecting the flue discharge the terminal end must be at least 1,500mm from any opening in the direction of the discharge to prevent combustion products from entering the building.

Key to figure 28 - Plume management terminal positions:

- [5] 600mm distance facing a surface or a boundary line, unless it will cause a nuisance. BS 5440:Part 1 recommends that care is taken when siting a terminal in relation to surfaces or boundary lines.
- [6] Proximity of flue duct outlet to boundaries, 2000mm distance to an opening in adjacent building facing a terminal. BS 5440: Part 1 recommends that care is taken when siting terminal in relation to boundary lines.
- [7] 300mm adjacent to a boundary line, unless it will cause a nuisance. BS 5440: Part 1 recommends that care is taken when siting terminal in relation to surfaces or boundary lines.
- [8] 300mm distance from a boundary line to the air intake as long as the exhaust terminal faces away from the boundary line. The exhaust terminal must have a minimum 300mm clearance to a surface below and there must be at least 600mm clearance when measured horizontally in a straight line from the exhaust terminal to any other surface.
- [9] Plume Management kit air intake can be reduced to 150mm providing the flue exhaust outlet is no less than 300mm adjacent to a boundary line.
- [10] Above, below and either side of an opening door, air vent or opening window.
Using a Plume Management kit the air intake measurement can be reduced to 150mm providing the flue exhaust outlet has a 300mm clearance.
- [11] Below balcony or overhang. The air intake clearance can be reduced to 150mm providing the flue exhaust outlet has a 200mm clearance.
- [12] 1,200mm between terminals facing each other¹⁾.
- [13] Internal/external corners. The air intake clearance can be reduced to 150mm providing the flue exhaust outlet has a 300mm clearance.
- [14] Clearances no less than 200mm from the lowest point of the balcony or overhang.
- [15] If a plume management kit is installed within the confines of a carport or other covered, partially enclosed extension, then the exhaust terminal must be positioned at least 1200mm away from any opening into the building which is sited within the footprint of the carport.
If the exhaust terminal is extended at least 300mm beyond the footprint of the carport then the distance from the terminal to an opening within the carport can be reduced to 600mm.

The exhaust terminal can also be routed though the roof of the carport providing 25mm clearance is provided around the flue pipe to any flammable material and that it extends at least 300mm above the roof.

The air intake must have a minimum 150mm clearance to any opening in the building in order to ensure the integrity of the structure is maintained. If the exhaust terminates within the footprint of the carport then the carport must have at least 2 sides completely open. If the exhaust terminates at least 300mm beyond the footprint of the carport then the carport must have at least one completely open side. The exhaust terminal must be positioned to ensure that plume will not cause nuisance or damage to vehicles and that minimum clear distances in front of the terminal will not be impeded by vehicles.


Note:

- ▶ Installations in car ports are not recommended.
- ▶ The flue cannot be lower than 1,000mm from the top of a light well due to the build up of combustion products.
- ▶ Dimensions from a flue terminal to a fanned air inlet to be determined by the ventilation equipment manufacturer.
- ▶ Plume kits running horizontally must have at least a 3° fall back to the appliance for proper disposal of condensate, except or the initial horizontal run from the terminal.
The initial plume kit horizontal run will have at least a 10° fall back to the appliance, due to the terminal elbow design, for proper disposal of the condensate.

1) 600mm in case two plume management kits are used on opposing terminals. Each terminal should use a minimum length of 500mm plume management.

4.5 Condensate discharge



Full details on condensate discharge.

- ▶ Follow the latest version of **BS6798** and HHIC guidance.

For correct installation and trouble free operation of the appliance the following advice should be followed:

1. **It is a requirement that the condensate drain is installed internally.**
2. **If external disposal is the only means of condensate discharge, then the CondenseSure siphon or a condensate pump must be fitted.**
3. All condensate pipe work must 'fall' from the appliance by a minimum of 3° (52mm per metre) to ensure adequate condensate flow.
4. The pipe work route must allow air to be supplied back to the appliance for correct operation.
5. Connection to a rainwater down pipe must include an air break.

Also:

- Assessment of the risk of the condensate pipe freezing must be carried out and appropriate precautions taken where necessary. This must take into account the specific site conditions.
- The condensate pipe work connected to the condensate drain outlet on the appliance should have a minimum internal diameter (ID) of 19mm.
- Keep external pipe work as short as possible. Further precautions against freezing must be taken if external pipe runs exceed 3m.
- External pipe work should have a minimum internal diameter (ID) of 30mm.
- Minimise the number of bends and connectors.
- Remove burrs after cutting pipe.
- Remove surplus solvent from the interior of the pipe.
- The condensate pipe work shall be run in standard drainpipe material, e.g. poly(vinyl chloride) (PVC), unplasticised (vinyl chloride) (PVC-U), acrylonitrilebutadiene styrene (ABS), polypropylene (PP) or chlorinated poly(vinyl chloride) (PVC.C).

4.5.1 Condensate pipe work

NOTICE:

General consideration

- ▶ Where a new or replacement appliance is being installed, access to an internal "gravity discharge" point should be one of the factors considered in determining appliance location.
- ▶ Condensate pipe connection at the appliance:
The condensate pipe must have a nominally outside diameter of 22mm plastic pipe.
- ▶ Ensure there are no blockages in the pipe run.
- ▶ Ensure that the discharge method for the installation can effectively handle the condensate waste from the appliance.

NOTICE:

Unheated internal areas.

The condensate discharge may freeze in areas during prolonged cold temperatures.

- ▶ Internal pipe runs in unheated areas such as lofts, basements and garages should be treated as external runs and consideration should be given to using a CondenseSure siphon.

4.5.2 Condensate production

When the appliance is in operation it can produce between 1 to 2 litres of condensation per hour.

This discharge is a constant drip feed during the production of condensate and does not release in frequent large volume discharges repeatedly.

4.5.3 Internal connections



Good Practice

- ▶ The following guidance indicates the good practices that must be maintained for the Installation and Maintenance of a product.

Soil stack connection

→ Figure 29

In order to minimise risk of freezing during prolonged cold spells, the following methods of installing condensate drainage pipe should be adopted.

Wherever possible, the condensate drainage pipe should be routed and terminated so that the condensate drains away from the appliance under gravity to a suitable internal foul water discharge point such as an internal soil and vent stack. A suitable permanent connection to the foul waste pipe should be used.

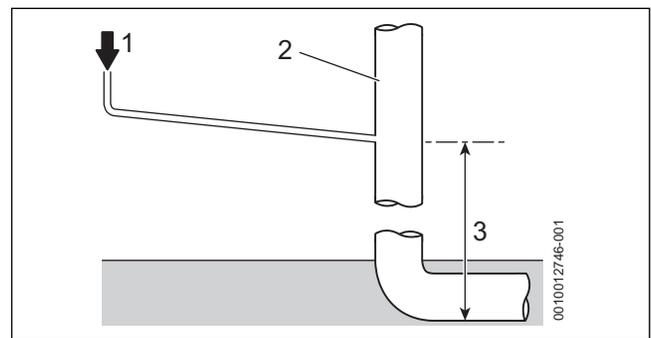


Fig. 29 Disposal to soil vent stack

- [1] Condensate discharge from appliance
- [2] Soil and vent stack
- [3] Minimum 450mm and up to 3 storeys

Waste pipe connection

→ Figure 30

Alternatively if the first option is not possible an internal kitchen, bathroom or washing machine waste pipe etc. can be used. Ensure that the condensate drain pipe is connected “down stream” of the waste trap and that the condensate drain enters into the top of the pipe using a swept tee.

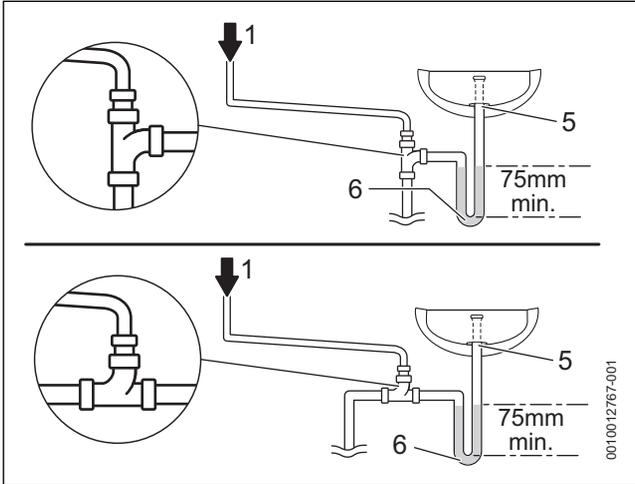


Fig. 30 Waste pipe disposal

- [1] Condensate discharge from appliance
- [5] Visible air break at plug hole
- [6] 75mm sink waste trap

Condensate pump

→ Figure 31

Where direct connection to a “gravity discharge” pipe work is not physically possible, or where very long internal runs would be required to reach a suitable discharge point, condensate should be removed using a proprietary condensate pump, of a specification recommended by the condensate pump manufacturer.

- The pump outlet should discharge to a suitable “gravity discharge” outlet.
 - The condensate then flows, by gravity, through the 22mm plastic pipe to the condensate discharge point.

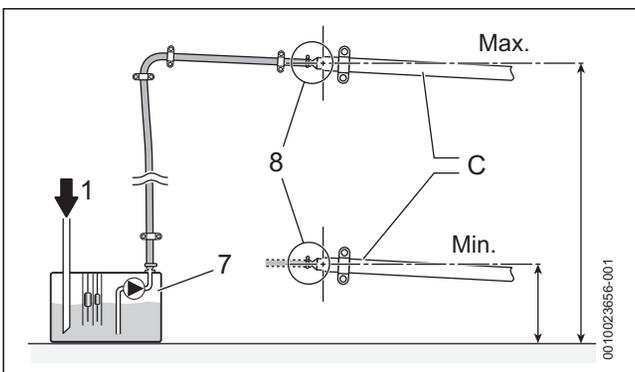


Fig. 31 Condensate pump example

- [1] Condensate discharge from appliance
- [7] Condensate pump
- [8] Pipe work transition
- [C] Gravity discharge pipe work



Proprietary condensate pump

- ▶ Ensure minimum and maximum pump lifting heights are followed as per condensate pump manufacturers instructions.

4.5.4 External connections

NOTICE:

Risk of condensate discharge freezing

- ▶ No external disposal of condensate unless the CondenseSure siphon or a condensate pump is fitted.

NOTICE:

Rainwater down pipe or external drain disposal

Untreated condensate must not be allowed to flow into streams or rivers

- ▶ A rainwater down pipe or an external drain shall only be used for condensate disposal if the down pipe or external drain is connected to a combined foul and rainwater drainage system
- ▶ Refer to BS 6798 for more information on condensate disposal

NOTICE:

Grey water recovery system

Contamination of recovered water

- ▶ Condensate disposal shall not be allowed into a grey water recovery system that is intended for re-use

External disposal considerations

NOTICE:

Freezing conditions

Frozen condensate will block the condensate drain pipe and stop the appliance from running

- ▶ Pipe lengths should be kept to a minimum and the routed as vertically as possible.

NOTICE:

Condensate waste disposal

- ▶ Care should be taken when siting a soak-away to avoid causing damage to existing services and building footings.

If no other discharge method is possible then the use of an externally run condensate drainage pipe terminating at a suitable foul water discharge point, or purpose-designed soak away, may be considered. If this method is chosen then the following measures should be adopted:

- ▶ **A CondensSure external siphon accessory (part number: 7716192746) or third party condensate pump must be used.**
- ▶ The external run be kept as short as possible and ideally should not exceed three metres. Additional precaution against freezing must be taken if the external pipe run does exceed three metres.
- ▶ The pipe should be run internally as far as possible before going externally and the pipe diameter should be increased to a minimum internal diameter (ID) of 30mm before it passes through the wall to the exterior. The pipe should be insulated externally using suitable waterproof and weather resistant insulation.
- ▶ The hole through the wall for the condensate pipe should be sealed to the building fabric on the internal and external face using a suitable building material.

- ▶ The external pipe should take the shortest and least exposed route to the discharge point, and should "fall" as steeply as possible away from the appliance, with no horizontal runs in which condensate might stand.
- ▶ The use of fittings, elbows etc. should be kept to a minimum and any internal burrs on cut pipe work should be removed so that the internal pipe section is as smooth as possible.
- ▶ All external pipe drainage will be improved if the end is cut at 45° as opposed to a straight cut.
- ▶ In situations where there are likely to be extremes of temperature or exposure, the use of a proprietary trace-heating system for external pipe work, incorporating an external frost thermostat, should be considered. All other guidance above and the instructions for the trace heating system, should be closely followed.
- ▶ As well as trace heating, other methods for protecting pipe work that are run externally should be considered to prevent freezing during prolonged periods.
 - Insulation materials can be used, these should be of class "O" grade with an outer coating that is weather proof and have a UV resistant finish. A minimum of 19mm thick insulation is recommended for 32mm external pipes.
 - The use of a drain cover (such as those to prevent leaf blockage) may offer further protection from wind chill.
 - An air break on the external pipe work can reduce the risk of the appliance being inoperable due to the blocking and backing up of the condensate.



Good Practice

- ▶ The following guidance indicates the good practices that must be maintained for the Installation and Maintenance of a product.

Rain water down pipe with external air break

→ Figure 32

- Refer to following example to dispose of condensate to a rain water down pipe.
- An air break or rain water hopper must be utilised, between the appliance condensate outlet and the drainpipe, outside the property, to avoid flooding of the appliance should the downpipe become obstructed.

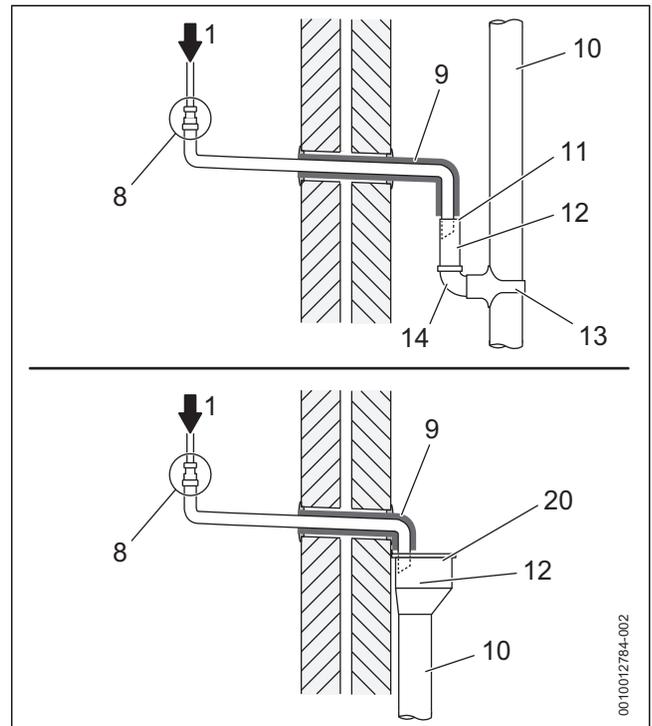


Fig. 32 Disposal into rain water down pipe

- [1] Condensate discharge from appliance
- [8] Pipe work transition
- [9] Insulate and increase pipe size
- [10] External rain water pipe to foul water
- [11] External air break
- [12] Air gap
- [13] Strap-on fitting
- [14] 43mm 90° male/female bend
- [20] Rain water hopper

Open drain or gully

→ Figure 33

Where the pipe terminates over an open drain or gully:

- Refer to following example to dispose of condensate to an open drain or gully.
- The pipe should terminate below the grating level, but above water level, in order to minimise "wind chill" at the open end.
- The use of a drain cover (such as those used to prevent blockage by leaves) may offer further protection from wind chill.

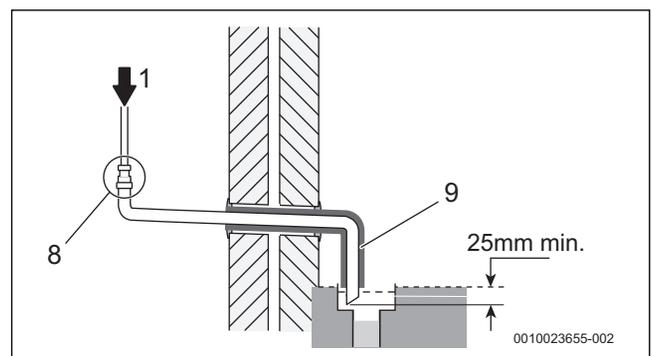


Fig. 33 Disposal to open drain or gully

- [1] Condensate discharge from appliance
- [8] Pipe work transition
- [9] Insulate and increase pipe size

Condensate soak away considerations

Before deciding to use a purpose-made soak away the history of the locality and the ability of the surrounding area to disperse the condensate should be taken into account, e.g. areas prone to flooding and ground with a high clay content can result in poor drainage with an increased risk of water logging or freezing causing the condensate pipe to become obstructed by water or ice and the boiler to shut down,

Although it is possible to increase the size of the soak away and the area with limestone chippings in clay soil areas, if the clay content is high and prevents effective dispersal of the condensate then a soak away may not be a suitable means of condensate disposal and an alternative method should be used.

Condensate soak away with external air break

→ Figure 34

- Refer to following example to dispose of condensate to a soak away.
- The condensate soak away must be sited at least 500mm away from building footings.
- The condensate drainage pipe may be run above or below the ground to the soak away. The following example shows drainage pipe run above ground.
- The soak away must use a minimum of a 100mm Ø plastic tube with two rows of three 12mm holes on 25mm centres and 50mm from the bottom of the tube. The holes must face away from the house.
- The tube must be surrounded by at least 100mm of limestone chippings to a depth of 400mm.
- An air break must be installed in the external pipe work as shown to avoid an airlock during ground flooding/adverse weather conditions which could prevent the condensate from discharging.



Minimum hole size for the condensate soak away must be 400mm deep by Ø 300mm.

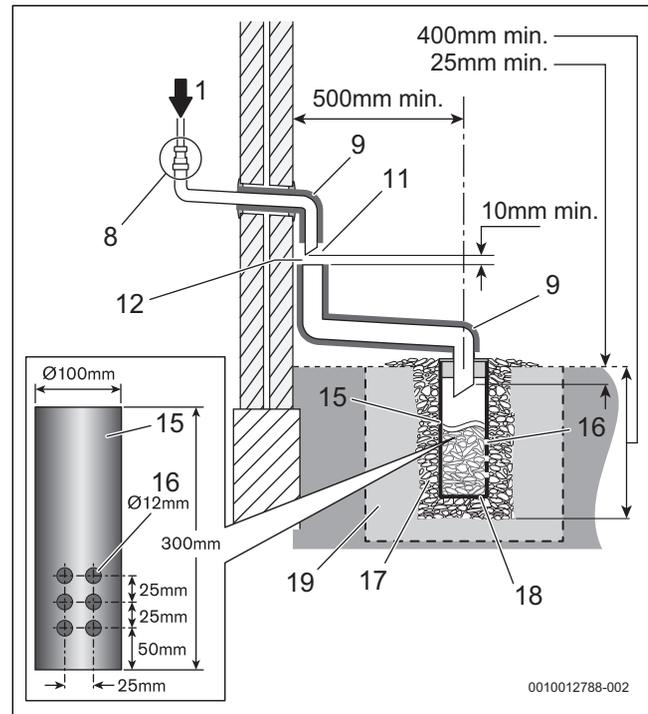


Fig. 34 Disposal to soak-away

- [1] Condensate discharge from appliance
- [8] Pipe work transition
- [9] Insulate and increase pipe size
- [11] External air break
- [12] Air gap (minimum 10mm)
- [15] 100mm minimum Ø plastic pipe
- [16] Drainage holes
- [17] Limestone chippings
- [18] Bottom of sealed tube
- [19] Increase size of soak away size and the area with limestone chippings if in clay soil area.
Not recommended for high clay soil areas.



Minimum Standard

- ▶ The following guidance indicates the minimum standards that must be maintained for the Installation and Maintenance of a product.

Appliances with condensate pump, CondenseSure accessory or have trace heating fitted.

The need to insulate the pipe work through the wall is not normally required for appliances with a condensate pump or CondenseSure/trace heating fitted for external runs under three metres.

Trace heating fitted:

- Check with trace heating manufactures instructions for additional requirements.

Condensate pump or CondenseSure fitted to the appliance:

- External pipe work exceeding three metres in length or installation with increased risk of freezing due to environmental factors:
 - Additional protection of insulating the entire run of external pipe work [5] should be carried out, with a recess in the external face allowing better insulation protection coverage [4] as it transitions to the outside of the building.
 - The hole through the wall must be sealed to the building fabric on the internal [1] and external [3] face using a suitable building material, (use a 40mm sleeve [2] to pass the condensate discharge through and then seal the internal and external faces).

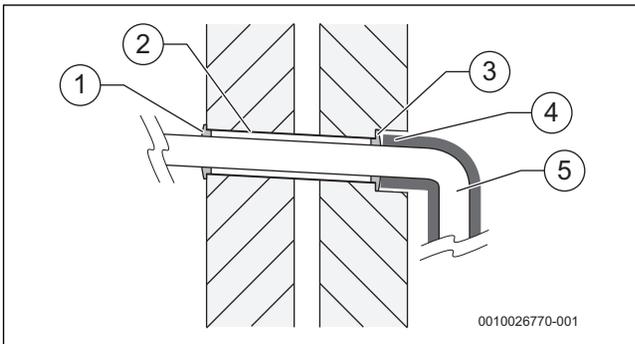


Fig. 35 Additional protection for transition through wall

- [1] Internal face sealed (32mm pipe sealed to sleeve)
- [2] 40mm sleeve
- [3] External face sealed (32mm pipe sealed to sleeve)
- [4] Insulation recessed into the wall
- [5] Condensate discharge pipe

4.6 Pressure relief discharge

4.6.1 Pressure relief pipe work



CAUTION:

Scalding risk from hot water or steam!

- ▶ The pressure relief valve (PRV) is an appliance safety device and may discharge hot water or steam when activated.
- ▶ The outlet pipe should be sited in such a way that it does not cause a hazard or an obstruction when discharging, for example above a window, entrance door or other public access way.

- The pressure relief discharge pipe [1 or 3] should be run in at least 15mm diameter copper pipe or pipe made of a material that will withstand PRV discharge temperatures and pressures and which complies with BS 5254 or BS EN 1451.
- Plastic pipe work must be properly supported with a maximum of 300mm between supports to prevent sagging and run downwards away from the appliance.

- The pressure relief should discharge away from any electrical or other hazard, preferably to an external drain or soak-away.
- The pipe [1 or 3] should be finished with a partial bend, near the outlet to face the external wall (as shown) to help prevent freezing.
- In all normal circumstances a PRV discharge pipe installation as described above is suffice to meet all but the most exceptional circumstances.
 - Where the PRV discharge pipe could be susceptible to damage, vandalism, freezing etc that could cause either a blockage or restriction in the ability to discharge safely then a tundish should be considered. The tundish should be sited in a position where damage to the property or occupants cannot occur from any spillage or discharge.

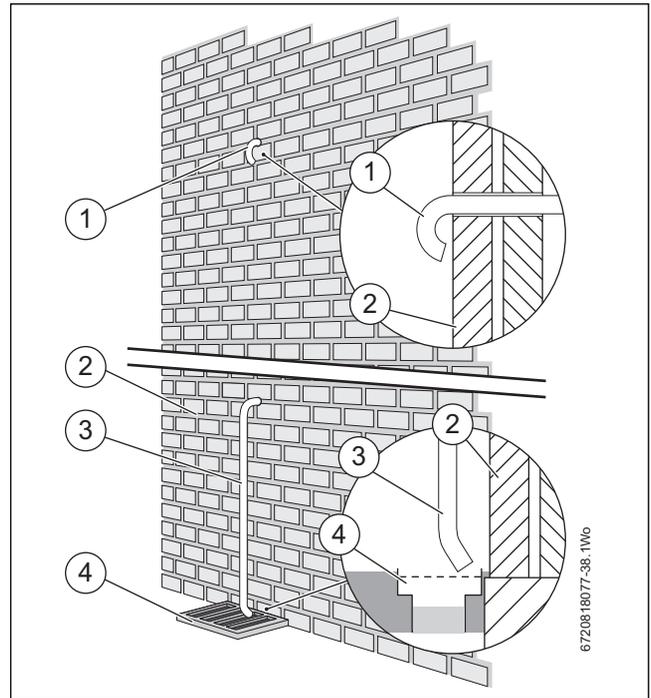


Fig. 36 Pressure relief pipe work

- [1] Discharge pipe (turned back onto external wall example)
- [2] Outside wall
- [3] Discharge pipe (into drain or gully example)
- [4] External drain

4.6.2 Alternative PRV connections - Combined PRV/condensate

The PRV or a combined PRV/ condensate discharge can be connected into a suitable internal waste system, the installer must ensure that all the pipe work, including the waste pipe, is capable of withstanding PRV temperatures and pressures.

Connection to a waste water pipe is possible by using either:

- A shielded tundish with non-return valve can be used to discharge upstream of a trap (there must not be a trap directly in the PRV discharge pipe without a tundish).
- A PRV can discharge directly into a suitable waste pipe downstream of a trap. Connections must be on top of the pipe to ensure they do not block. A Hotun (or similar) can be fitted for visual indication if desired but is not necessary.

The guidance of BS 6798 sections 6.3.5 and 6.4.3.2a must be followed.

4.7 Cleaning primary systems

NOTICE:

Risk of damage to system or appliance!

Debris from the system can damage the appliance and reduce efficiency. Failure to comply with the guidelines for the use of water treatment with the appliance will invalidate the appliance guarantee and contravene the Building Regulations.

- ▶ It is a requirement of the Building Services Compliance Guide which is a second tier document to the Building Regulations to flush and inhibit the primary water system in accordance with BS 7593.
- ▶ The Building Services Compliance Guide recommends that a primary water cleanser is fitted to the system.
- ▶ Worcester Bosch recommend fitting a filter that will help remove both magnetite and non-magnetic debris. Worcester offers various filters that help remove both magnetite and non-magnetic debris; see accessories list for available options.

NOTICE:

Risk of damage to system or appliance!

Artificially softened water must not be used to fill the central heating system.

- ▶ Salt based, artificially softened water **MUST NOT** be used to fill the system

NOTICE:

Sealing agents

Normally the addition of sealing agents to the system water is not permitted as this can cause problems with deposits left in the heat exchanger.

- ▶ Heating systems may lose small amounts of water over time. In cases where all attempts to find a system micro leak have failed, Worcester, Bosch Group supports the use of Fernox F4 leak sealer.

Before cleaning the system:

- ▶ Ensure that the system and pipe work is in good working order.
- ▶ **Where possible keep the existing appliance/circulating pump in place when flushing the system before installing the new appliance. Alternatively use an after market power flushing system or similar to remove magnetite and other debris from the central heating system.**
 - Even new central heating systems contain contaminants that need to be removed before treating the system with inhibitor/anti-freeze.
 - When an appliance is installed onto a new system then it is possible to use the appliance whilst cleaning the system. A system filter must be fitted to the return to reduce the risk of contaminants entering the appliance.
- ▶ **Follow the guidance of BS7593.**

Inhibitor

Add a suitable inhibitor or combined inhibitor/anti-freeze, if the system is exposed to freezing conditions, to the heating system in accordance with the DWTA code of practice and manufacturer's guidelines.

Products approved to the BuildCert standard are deemed as compatible with the components and equipment within the appliance and system.



WARNING:

Sealing agents

- ▶ In cases where all attempts to find a micro leak have failed, Worcester, Bosch Group supports the use of Fernox F4 leak sealer.

Water treatment products

Suitable water treatment products can be obtained from the following manufacturers:

ADEY	01242 546717 www.adey.com
FERNOX	0870 601 5000 www.fernox.com
SENTINEL	0800 389 4670 www.sentinel-solutions.net

Table 14

4.7.1 Flushing the system

Flushing the system using existing appliance/circulating pump or new appliance.



New appliances

- ▶ A new appliance must only be used to assist the cleaning of a newly installed system.
-
- ▶ Fill the system with cold water and check for leaks.
 - ▶ Open all drain cocks and drain the system.
 - ▶ Close drain cocks and add a suitable flushing agent **compatible with aluminium** at the correct strength for the system conditions in accordance with the manufacturer's instructions.
 - ▶ Mark the position of the lockshield valves and open them fully.
 - ▶ Fully open all TRVs.
 - ▶ Circulate the flushing agent before the appliance is fired up.
 - ▶ Run the appliance/system at normal operating temperature as directed by the manufacturer of the flushing agent.
 - ▶ Drain and thoroughly flush the system to remove the flushing agent and debris. Do not drain the system through the PRV of new appliances.
 - ▶ It may be necessary to use a power flushing machine to aid the cleansing procedure in some circumstances.
 - ▶ Close the drain cocks and manual air vents.
 - ▶ **Existing appliance/circulating pump if continuing to use before new appliance is installed.**
 - Add a suitable inhibitor to the system in accordance with the manufacturer's instructions.
 - Fill the system to between 1 and 1.5 bar via a WRAS approved filling loop.
 - Vent any air from the appliance and system.
 - ▶ **New appliance.**
 - Once the new appliance has been installed follow the guidance in Filling the appliance and adding inhibitor section.

5 Installation

NOTICE:

Risk of damage to appliance or accessories.

- ▶ All the previous pre-installation sections must be read and requirements met before starting the appliance or flue installations.



CAUTION:

Risk of injury through incorrect lifting and carrying!

- ▶ Only lift a manageable weight, or ask for help.
- ▶ Bend the knees and keep the back straight with feet apart, when lifting or putting down heavy objects.
- ▶ DO NOT lift and twist at the same time.
- ▶ Lift and carry object close to the body.



Appliance on site

- ▶ Check contents of delivery are undamaged.
- ▶ Remove the appliance from its packaging check the contents against the scope of delivery.
- ▶ Once the appliance is unpacked the installation can commence.

Important handling instructions

- It is advised that two people are used to carry the carton from the van to the point of delivery.
- Once the carton has been delivered, the outer carton is removed first. Care should be taken when releasing the straps. If a sharp implement is used make sure the outer carton is not pierced and that the implement is used in such a way so that it may not cause personal injury.
- All sharp objects must be covered or the blade retracted after use and put away in a safe place. Care should be taken when lifting the appliance from the base and the proper technique for safe lifting of any heavy object should be strictly observed.

Additional requirements for roof space installations

- The unpacked appliance can now be moved into the loft space
- Two sets of steps should be used.
- Two people should share the lifting of the appliance up to the loft hatch, tilt and slid on its back into the loft space.
- Ensure that the roof space has permanent fixed lighting, a permanent fixed retractable ladder and a fixed floor area, from the hatch to the appliance installation point. This will allow access for installation, normal use and servicing.



Before installing the appliance, ensure that the system has been cleaned

5.1 Position the appliance



WARNING:

- ▶ **Ensure the mains gas supply is isolated before starting any work and follow all relevant safety precautions.**



Appliance positioning

- ▶ Ensure the appliance is mounted onto a flat, fixed rigid surface capable of supporting the appliance weight.
- ▶ Ensure all aspects of the installation are considered when positioning the appliance, flue run and discharge, condensate disposal, PRV discharge etc.



WARNING:

Damage to property!

Damage caused by drilling into pipes, electrical cables, damp proof course or other hazards.

- ▶ Before drilling ensure that there are no obstructions or other hazards.

NOTICE:

Damage to appliance!

Residue, metal shavings, and contaminants in the system pipe work can damage the appliance.

- ▶ Flush the system pipe work thoroughly to remove all residue.
- ▶ Follow the instructions with respect to cleaning primary systems.

Running pipes to the appliance.

- The area around a rear flue outlet must be avoided.

5.1.1 Mounting bracket fixing



Wall mounting template

- ▶ The wall mounting template has been sized to allow for the minimum clearances around the appliance, (→ section 4.3.3 "Appliance clearances").

→ figure 37

The appliance wall mounting template shows the relative positions of the flue and the top fixings of the wall mounting bracket.

- ▶ Fix the wall mounting template [3] to the wall in the desired position.
- ▶ Drill the holes [4] through the template for the primary fixing points as indicated on the template.
 - Additional fixing points for the appliance will be indicated on the wall mounting template.

Flue outlet position.

The appliance wall mounting template has the flue centre lines for the following flue systems:

- 60/100mm
- 80/125mm



Flue turret adapter

- ▶ The flue turret adaptor has an in-built 3° angle giving the flue assembly the rise from the appliance to ensure the condensate flows back to the appliance.

Rear flue outlet [2].

- ▶ Mark centre line of flue to be used; the external diameter of the hole can also be marked if required.
- ▶ If extensions are to be added then the complete flue must rise at an angle of 3° from the appliance.

Side flue outlet [1].

- ▶ Mark from the centre line of the wall mounting template to the wall which the flue will pass through.
- ▶ Allow for a rise of 52mm per metre length of flue, to give a 3° angle.

Example hole size.

- If a 60/100mm diameter flue is to be used, a 125mm diameter hole is required.
- If using the weather sealing collar by pushing it through from inside the property, then a 150mm diameter hole is required to accommodate this.

Flue outlet position marked and ready to drill hole.

- ▶ Drill hole using a core drill or similar.
- ▶ Clear any debris from the site.

Appliance fixings and flue outlet drilled and ready.

- ▶ Remove the wall mounting template.

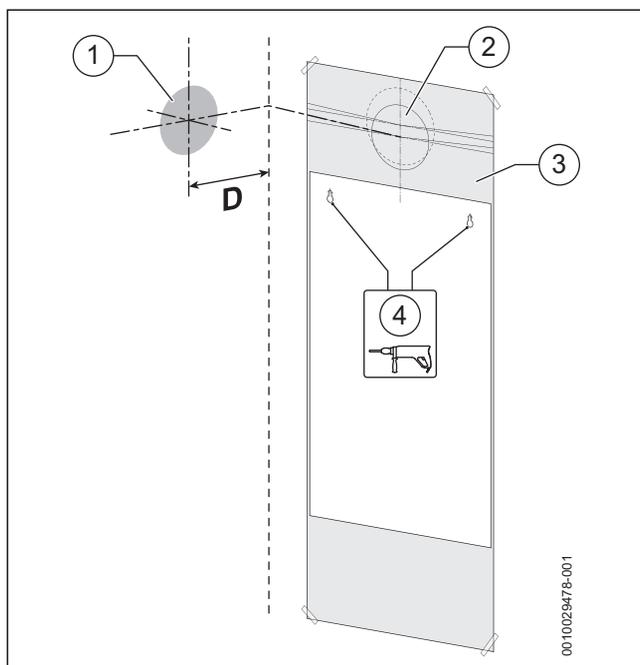


Fig. 37 Wall mounting template

- 1 Side exit flue example
- 2 Rear exit flue example
- 3 Wall mounting template
- 4 Primary fixing points
- D 125mm

5.2 Appliance connections



WARNING:

Appliance - gas connection

- ▶ Ensure the mains gas supply is isolated before starting any work and follow all relevant safety precautions.

NOTICE:

Appliance - hydraulic connections

- ▶ Ensure all water pipe work, to be connected, are isolated/drained and follow all relevant safety precautions.
- ▶ Be careful of plastic components when using a naked flame on pipe work.



Surplus water may be present inside the appliance due to factory testing.



External condensate pipe work or internal pipe runs in unheated areas such as lofts, basements and garages exposed to prolonged cold temperatures should be protected → chapter 4.5.

Connection sets fitting

Installing the connection sets

Refer to figure 38.

- ▶ Ensure the sealing washers are fitted in the connection sets before installing the connection sets.

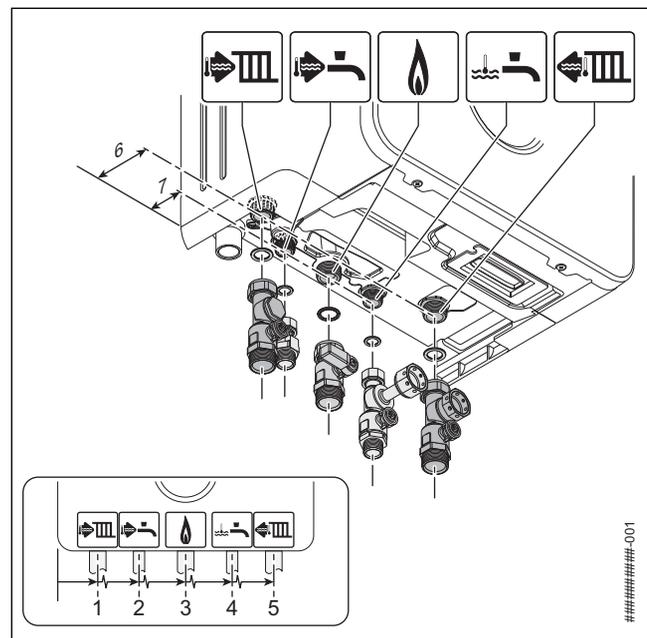


Fig. 38 Fitting the connection sets

Description	#	From left case edge	#	From wall
CH flow	1	68mm	6	60mm
DHW outlet	2	133mm	7	30mm
Gas	3	200mm	7	30mm
DCW Inlet	4	267mm	7	30mm
CH return	5	332mm	6	60mm

Table 15

- ▶ Connect the heating, domestic water and gas pipe work to the respective compression adaptor on the connection sets.

Fitting the hose to the condensate trap

- ▶ Take the cap off the drain on the condensate trap.
- ▶ Fit the condensate hose on the condensate trap.

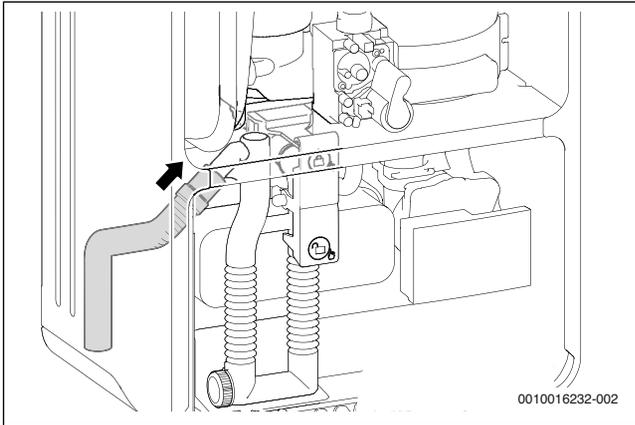


Fig. 39 Fitting the hose to the condensate trap

- ▶ Only route the condensate hose with a slope and connect it to the drain line.
- ▶ Check tightness of connection at condensate trap.

5.3 Hanging the appliance

NOTICE:

Transport protection covers

- ▶ Remove the internal transport packaging and protection covers from the appliance where applicable.

Removing the front casing



The front casing is secured with two screws to prevent unauthorised removal (electrical safety).

- ▶ Always secure the casing with these screws.
- ▶ Loosen the two screws [1] and pull the bottom of the casing forward.
- ▶ Lift off the casing.

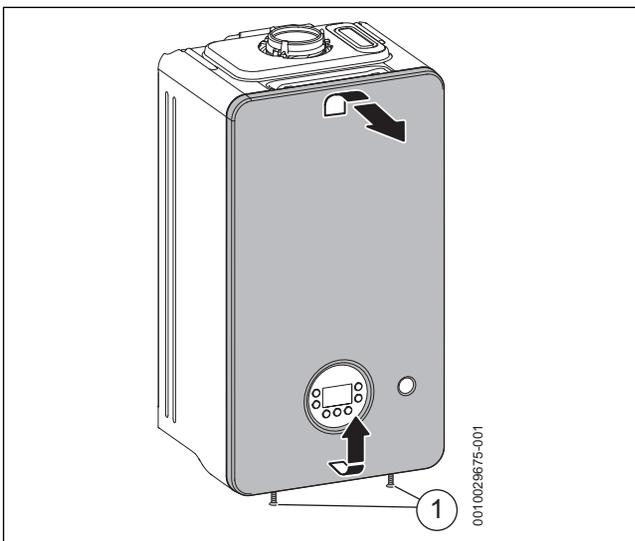


Fig. 40 Removing the front casing

Installing pipework

! DANGER:

Contaminated heating water can damage the appliance!

Residue in the pipe work can damage the appliance.

- ▶ Flush the pipe work before installing the appliance.
- ▶ Determine internal diameter for the gas supply.
- ▶ All pipe connections in the heating system must be able to withstand a pressure of 3 bar, and 10 bar in the DHW circuit.
- ▶ Install service valves and gas isolator.
- ▶ To fill and drain the heating system, install a drain valve at the lowest point of the system.
- ▶ Install the Pressure Relief Valve discharge pipe to the latest advice in BS6798.
- ▶ Always route discharge pipes with a continuous fall.

Appliance connections

NOTICE:

Commissioning without water damages the appliance!

- ▶ Only operate the appliance when filled with water.

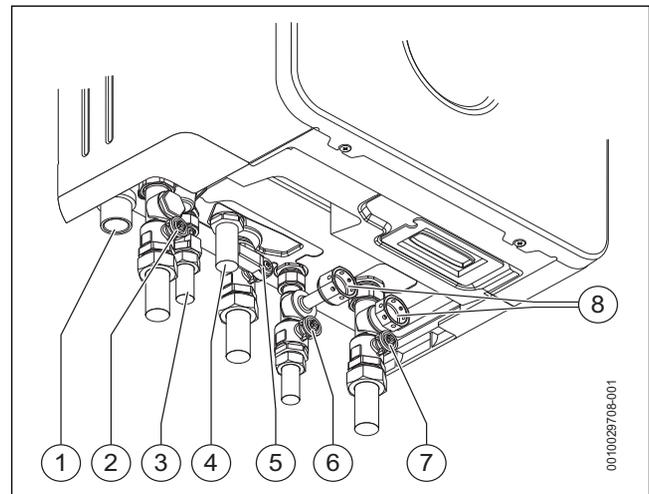


Fig. 41 Connections on the gas and water side

- [1] Condensate hose connection
- [2] CH flow valve
- [3] DHW outlet connection
- [4] PRV tail connection (heating circuit)
- [5] Gas isolator
- [6] Cold Mains inlet valve
- [7] CH return valve
- [8] Connections for keyless filling link accessory

- ▶ Connect the CH flow pipe to the appliance 22mm compression connection.
- ▶ Connect the CH return pipe to the appliance 22mm compression connection.
- ▶ Connect the gas supply to the appliance gas cock 22mm compression connection.
- ▶ Connect the Cold Mains inlet to the appliance 15mm compression connection.
- ▶ Connect the DHW outlet to the appliance 15mm compression connection.

Connect condensate discharge pipe

- ▶ Connect the condensate discharge pipe to the appliance condensate hose outlet connection.

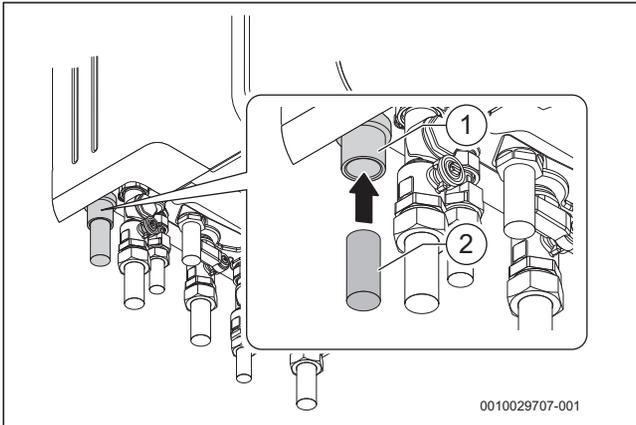


Fig. 42 Connecting to the condensate outlet connection

- [1] Condensate hose outlet connection
- [2] Condensate discharge pipe

Connect PRV discharge pipe



CAUTION:

Risk of damage to appliance!

Only use compression fitting when connecting to the PRV tail.

- ▶ Do not solder to the PRV tail connection.
- ▶ Connect the PRV discharge pipe to the appliance PRV tail via compression fitting (not supplied).

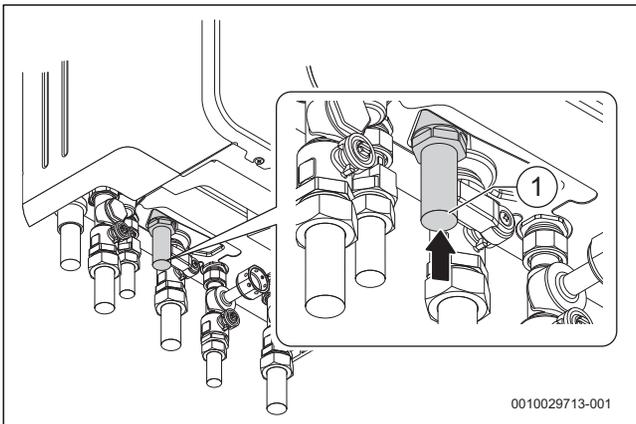


Fig. 43 Connecting to the PRV tail connection

- [1] PRV tail connection

5.4 Flue turret/adaptor installation

NOTICE:

Flue installation

- ▶ Refer to the Flue Kit Installation instructions provided with your flue kit to correctly install the flue with this appliance.
- ▶ Do not exceed the maximum straight length for a horizontal or vertical flue or a 60mm plume management system (if used) as stated in the relevant Installation and Maintenance Instructions manual or addendum.



Telescopic flue

- ▶ Cutting the flue to an exact measurement is not required as the telescopic flue terminal can allow for some adjustment.



Apply silicone lubricant to sealing surfaces, to ease assembly of flue components.

Refer to the manual supplied with the flue kit for complete installation instructions.

- ▶ For plume management effective lengths and the effective flue lengths, → chapter 4.4.

Additional notes and reminders:

- Ensure that all cut lengths are square and free from burrs.
- Ensure that the flue and seals are not damaged.
- The flue is sealed when assembled correctly, the components are pushed fully home and secured.
- The flue rises from the appliance at an angle of 3° or 52mm per metre length.
- Support the flue at each flue extension joint and at each change of direction, use suitable brackets and fittings:
 - Flue bracket 100mm part number: 7 716 191 177.
 - Flue brackets 100mm x 6 part number: 7 716 191 178.
 - Flue bracket 125mm part number: 7 716 191 179.

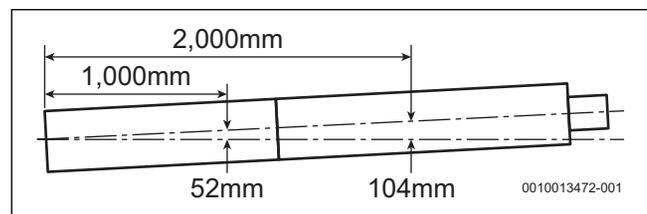


Fig. 44 Slope for condensate disposal

Refer to figure 45.

- ▶ Remove the three inner flue tube retaining screws [1].
 - The inner tube will be held in place in the appliance.
- ▶ Check the appliance flue seal [2] is correctly seated and apply silicone grease.

Flue turret [A] fitting

- ▶ Align the flue turret [A] to the appliance flue outlet with flat facing [3] to the rear of the appliance.
 - This should be pushed straight down, on to the appliance.
- ▶ The three inner flue tube retaining screws [1] are, re-used to secure the flue turret [A].

Vertical adaptor [B] fitting

- ▶ Align the vertical adaptor [B] to the appliance flue outlet with flat facing [3] to the rear of the appliance.
 - This should be pushed straight down, on to the appliance.

- ▶ The three replacement retaining screws [4] supplied with the adaptor kit are used to secure the vertical adaptor [B].

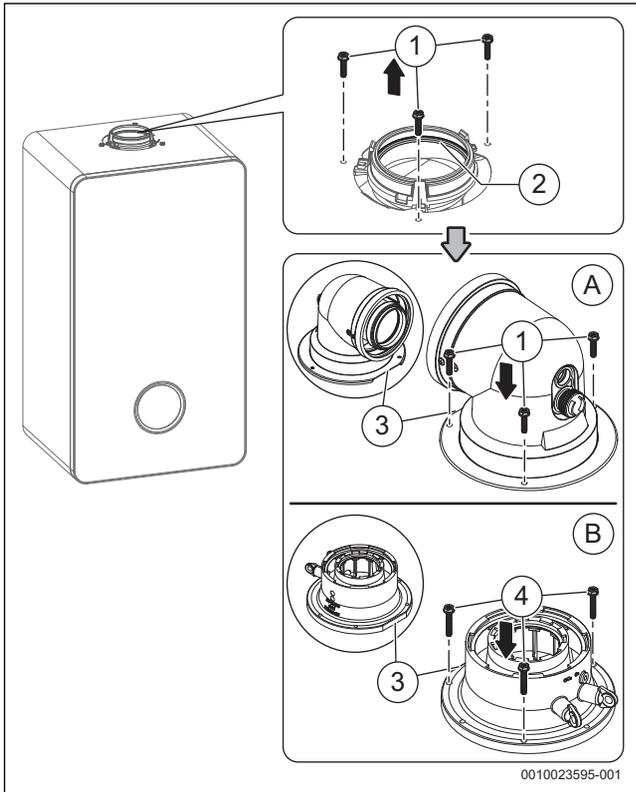


Fig. 45 Flue turret/adaptor connection

5.5 Electrical connection

! DANGER:

Risk of electric shock!

- ▶ Isolate electrical components from the power supply (230 V AC) (fuse, circuit breaker) and secure against unintentional re-connection before carrying out any work. Information on safe isolation can be found in the Health and Safety Executive guidance HSG85.
- ▶ Check for zero potential before proceeding with work, using test equipment approved to GS38 to confirm that the electricity supply is disconnected.

i

Electrical considerations:

- ▶ All electrical work must be carried out by a competent and authorised person.
- ▶ All work must comply with the current IET Wiring Regulations.
- ▶ The isolator shall be situated next to the appliance for new systems and, where practicable, replacement appliances.
- ▶ The mains electrical supply to the appliance must be through a fused double pole isolator.
- ▶ The isolator must have contact separation of 3mm minimum between poles. Any system connected to the appliance must not have a separate electrical supply.
- ▶ Any additional components that are connected to the appliance that require 230 Volts must be connected to the same supply as the appliance.
- ▶ The correct type of RCD must be employed where additional protection is required that is suitable for a low energy DC modulating pump according to IET wiring regulations.
- ▶ External fuse 3 Amps.
- ▶ When stripping the wires, ensure copper strands do not fall into the control box.

NOTICE:

Risk of damage from hot appliance components.

Hot appliance components can damage electrical cables.

- ▶ Ensure all electrical cables are in the correct cable guides and away from hot appliance components.

NOTICE:

Risk of damage to control board!

Mains/230V damage to low voltage control board.

- ▶ **Do not connect mains/230V to the control board other than power supply cable provided with the appliance.**
- ▶ **Time and temperature controls are low voltage.** Use Comfort+ II RF provided or approved controller listed in 3.9.2 "Programmer/timer accessories".

i

Cable routing

- ▶ Route cables through support guides and retaining clips.
- ▶ Run power cables separately from signal cables. Interference from power cables can induce spurious faults on signal cables, ensure that there is at least 100mm separation from each other.
- ▶ Ensure the cables are of sufficient length to allow the control box to be moved to the service position.

5.5.1 Installer connections

Component access

- ▶ Release catch and hinge open the control panel into the service position.

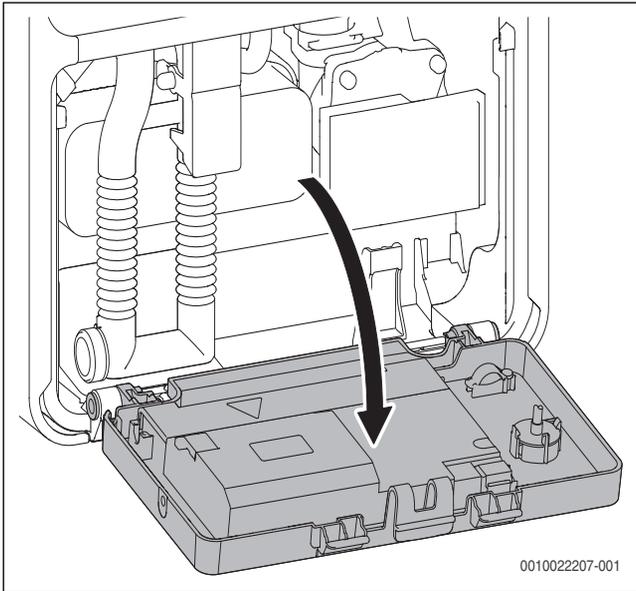


Fig. 46 Moving control panel into service position

Connect external accessories

- ▶ Release the latches using a thin bladed screwdriver. Arrows on the electrical cover indicate the position where the screw driver must be inserted to release the catches.
- ▶ Open the rear cover.

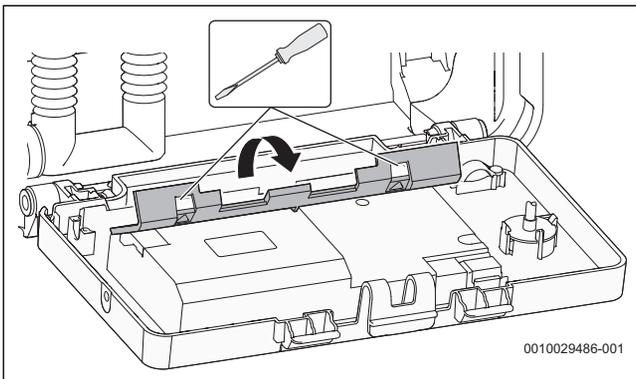


Fig. 47 Open the cover

- ▶ For splash protection (IP): Cut the strain relief according to the diameter of the cable.

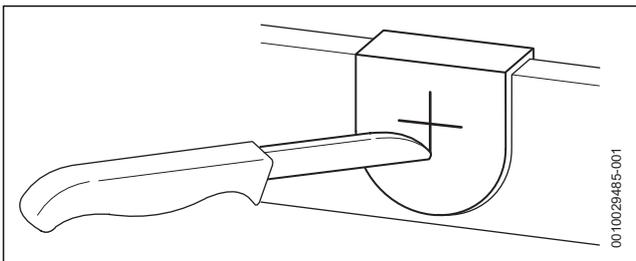


Fig. 48 Cable feed

- ▶ Guide the cable through the strain relief.
- ▶ Connect the cable to the terminal block for external accessories.
- ▶ Secure the cable to the strain relief.

External accessories terminal strip

Symbol	Function
	Outside temperature sensor or ON/OFF temperature controller. The outside temperature sensor for the user interface is connected to the device. ▶ Connect the outside temperature sensor.
	ON/OFF temperature controller No functionality; not used
	No functionality; not used (link factory fitted)
	External user interface/external module with 2-wire BUS. ▶ Connect communication cable.
	Mains connection (power cable)
	Fuse

Table 16 Terminal strip for external accessories

5.5.2 Cable preparations

NOTICE:

Damage to control unit!

Small pieces of wire can cause shorts and damage to electronics.

- ▶ When stripping wires always ensure copper strands do not fall into the control box.

Low voltage (signal cables), example → figure 49

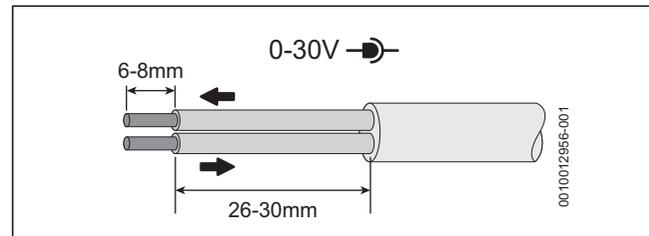


Fig. 49 Low voltage (signal cables) preparation

5.5.3 Key (accessories)



Key is supplied with Comfort+ II RF are pre-paired.

Installing the Key



Installing the Key will enable time and temperature control for the appliance. For Pairing refer to the compatible control manual.

Always turn off the power to the appliance before installing Key (accessories).

- ▶ If installing an EasyControl please ensure that the EasyControl Key is also purchased and installed. Follow EasyControl setup before inserting Key into Key housing.
- ▶ Plug Key [2] into Key housing [1].

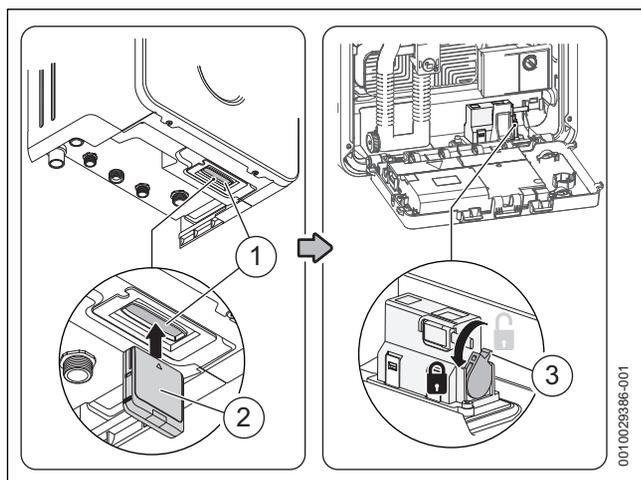


Fig. 50 Installing the Key

- ▶ The lever [3] of the locking mechanism is located on the right hand side of the Key housing. Ensure that it is in its Open position before pulling lever [2] towards front.
- ▶ Turn on the power. LED [1] starts blinking green.
- ▶ Wait until LED is constantly yellow.

Key LED status

The LED [1] on the Key displays different states with flashing or constant colours.

Description of the LED displays	Example
<p>Flashing red: Fault, e.g. no communication between the Key and appliance: ▶ Install the key again, restore the last functioning status.</p>	
<p>Flashing yellow: No fault, user please wait.</p>	
<p>Flashing green: No fault, initialisation process is running.</p>	
<p>Constant red: Temporary fault: ▶ Wait for normal operating condition to be resumed.</p>	
<p>Constant yellow: ▶ Keys with touch-sensitive indicator: Press touch-sensitive indicator on key to start pairing.</p>	

Description of the LED displays	Example
<p>Constant green: No fault, normal operating condition.</p>	
<p>LED Off: No fault, power-saving mode or appliance without power.</p>	

Table 17 LED status

6 Commissioning

6.1 Pre-Commissioning checks

⚠ DANGER:

Risk of electric shock!

- ▶ Isolate electrical components from the power supply (230 V AC) (fuse, circuit breaker) and secure against unintentional re-connection before carrying out any work. Information on safe isolation can be found in the Health and Safety Executive guidance HSG85.
- ▶ Check for zero potential before proceeding with work, using test equipment approved to GS38 to confirm that the electricity supply is disconnected.

Checks before commissioning:

- ▶ Check that the service and water pipes are connected correctly.
- ▶ Check the gas type specified on the identification plate matches that of the gas supply and that the gas supply is properly purged.
- ▶ Check that the appliance is filled with water and under pressure (1.5 bar) and that there are no leaks.
- ▶ Check that the electrical connections of the appliance are correct:
 - Mains electrical supply - 230V, 50Hz
 - Compliant earth connection
 - Correct polarities.
 - External equipment and controls are wired in correctly.
- ▶ Check that the flue is correctly fitted, airtight, free from any obstruction and the connections are secure.
- ▶ Check that the condensate pipe work is connected properly and that there are no leaks.

NOTICE:

If the appliance is not to be commissioned immediately then, after successfully completing all of the checks and any rectification work:

- ▶ Isolate the electricity supply.
- ▶ Isolate the gas supply.
- ▶ Close the shut-off valve for the cold water inlet.
- ▶ Close the water shut-off valves to the appliance.
- ▶ Label appropriately.

6.2 Water treatment

Primary system flushing (Central Heating)

Ensure that the system has been cleaned:

- Following the guidance of BS 7593:
 - Code of Practice for treatment of water in hot water central heating systems.
- Overview available in Pre-installation, Cleaning primary systems section.

Inhibitor (Central Heating):

Add a suitable inhibitor that is compatible with aluminium (or combined inhibitor/anti-freeze, if the system is exposed to freezing conditions), to the heating system in accordance with the DWT code of practice and manufacturer's guidelines.



The pH value of the system water must be between 6.5 and 8 or the appliance warranty will be invalidated.



The inhibitor or combined inhibitor/anti-freeze must not cause damage to the materials within the appliance (aluminium, mild steel, stainless steel, copper and brass) and any other materials/components within the system.

- ▶ Record the date when the inhibitor was added to the system on the guarantee card.
- ▶ The concentration level of inhibitor in the system should be checked every 12 months or sooner if system content is lost.

NOTICE:

Sealing agents

Normally the addition of sealing agents to the system water is not permitted as this can cause problems with deposits left in the heat exchanger.

- ▶ In cases where all attempts to find a system micro leak have failed, Worcester, Bosch Group supports the use of Fernox F4 leak sealer.

6.2.1 Filling the appliance and adding Inhibitor



Before pressurising the system.

The appliance integral expansion vessel is pre-charged to 0.75 bar (equal to a static head of 7.5m (24.6ft)). A Schrader type valve is fitted to the expansion vessel to allow for pressure adjustment if required.

- ▶ If an extra expansion vessel is fitted to the central heating system, ensure that it is set to the same pressure as the appliance internal expansion vessel, refer to separate instructions supplied with the extra expansion vessel.

Filling the system - Sealed systems

NOTICE:

- ▶ Salt based softened water must not be used to fill the central heating system.
- ▶ Check drain cocks and manual air vents are closed and all radiator valves are open. Add a suitable inhibitor or combined inhibitor/anti-freeze, if the system is exposed to freezing conditions, to the heating system water in accordance with the manufacturers instructions.
- ▶ Turn on the water main and open the system valves.
- ▶ Fill the system to between 1 and 1.5 bar via a WRAS approved filling loop or one of the filling link accessories.
 - Refer to filling link accessory instructions for operation and use.
- ▶ The Automatic Air Vent will release any air trapped in the appliance.
- ▶ Manually vent all radiators, tighten when completed and check the system for any leaks and correct if required.
- ▶ Top up the system pressure if the pressure drops below 1 bar.
- ▶ Isolate and remove filling loop connections to the system.
 - Refer to Integrated filling link accessory instructions for any further actions required after filling the system.



An optional filling link is available as an accessory. This can be used to fill the system.

- ▶ Refer to Scope of delivery to check if an filling link is supplied with the appliance.



Keyless filling link

- ▶ An additional 0.75bar static mains pressure is required above required system pressure to ensure the effective operation of the keyless filling link accessory.

Adjusting the operating pressure of the heating system

Display on the pressure gauge

1 bar	Minimum charge pressure (when system is cold)
1 - 1.5 bar	Optimal charge pressure
3 bar	Maximum charge pressure at maximum heating water temperature must not be exceeded (pressure relief valve opens).

Table 18

If the indicator is below 1 bar when the system is cold:

- ▶ Top up the water until the indicator is between 1 bar and 1.5 bar again.

If pressure is not being maintained:

- ▶ Check tightness of expansion vessel and heating system.

6.3 Circulation pump

Controller module overview

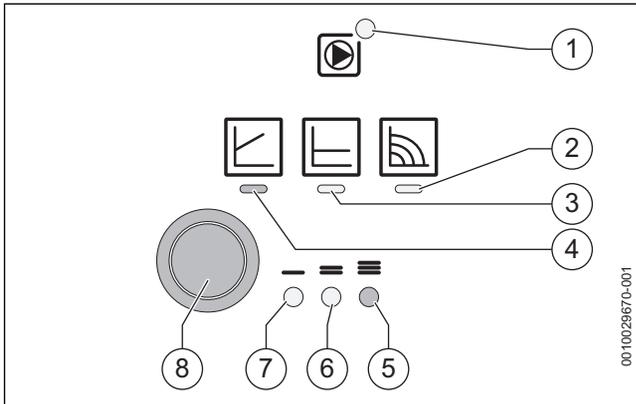


Fig. 51 Overview

- [1] Operation/fault indicator
- [2] Constant speed mode indicator
- [3] Constant pressure (Δp -c) mode indicator
- [4] Self modulating (Δp -v) mode indicator
- [5] Pump curve 3 selection indicator
- [6] Pump curve 2 selection indicator
- [7] Pump curve 1 selection indicator
- [8] Selection button



Default setting

- ▶ Constant speed mode - curve III

Selection button



The circulating pump must be left in factory default setting (Constant speed mode - curve III) to ensure hot water performance.

To return to the default factory setting, should there be an instance where an alternative setting is entered, please follow this advice:

- ▶ Press
 - Select constant speed control mode.
 - Select pump curve III.

For additional pump functions:

- ▶ Press and hold to:
 - Activate the pump venting function (press for 3 seconds).
 - Activate manual restart (press for 5 seconds).
 - Lock/unlock button (press for 8 seconds).

6.4 Starting the appliance

NOTICE:

Damage to appliance or system!

Running the appliance:

- ▶ Never run the appliance when the appliance/system is empty or partially filled.

6.4.1 Control panel overview

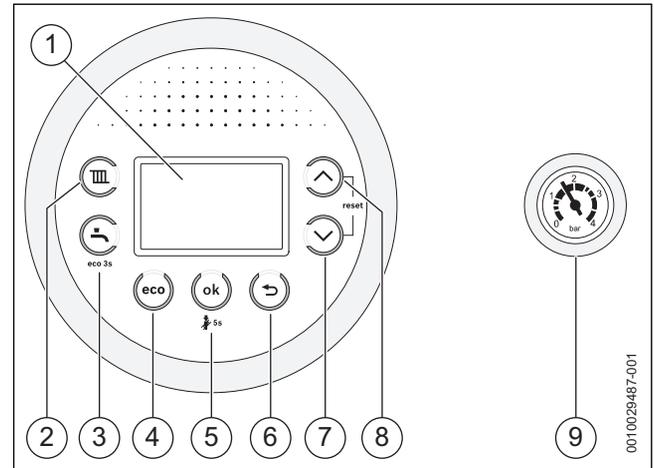


Fig. 52

- [1] Display
- [2] **III** key: Heating mode on/off, set the maximum flow temperature
- [3] **Hot water** key: Hot water mode, adjusting the hot water temperature
- [4] **eco** key: Toggle economy mode (pre-heat off)
- [5] **ok** key: Save settings, Chimney sweeper key: press 5 seconds for chimney sweep mode
- [6] **Return/back** key: Return/back
- [7] **▼** key: To navigate through menus and decrease settings
- [8] **▲** key: To navigate through menus and increase settings
- [9] Pressure gauge

6.4.2 Screen display

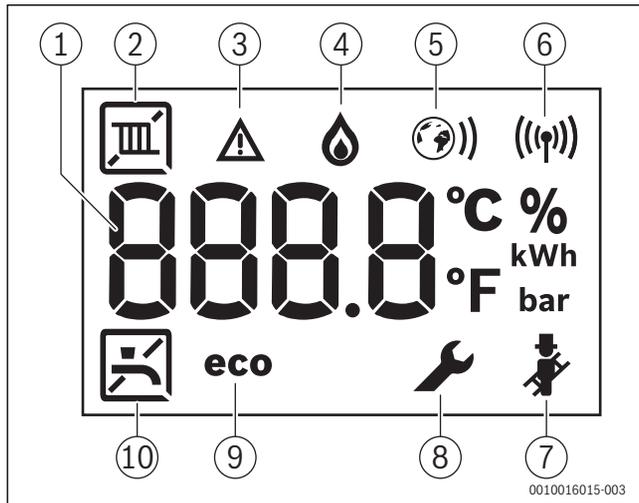


Fig. 53 Screen display

Key	Explanation
[1]	Digital display <ul style="list-style-type: none"> Displays a temperature or appliance status/diagnostic code.
[2]	Central heating (CH) <ul style="list-style-type: none">  Heating mode On  Heating mode Off
[3]	Fault indicator <ul style="list-style-type: none"> Displays during a fault condition.
[4]	Burner operation <ul style="list-style-type: none"> Displays when the appliance is firing during a CH/DHW mode.
[5]	Internet connected (accessory) <ul style="list-style-type: none"> Displays when compatible controller is connected to the appliance (not used).
[6]	Radio link connected (accessory) <ul style="list-style-type: none"> Displays when compatible controller is connected to the appliance.
[7]	Chimney sweep mode <ul style="list-style-type: none"> Displays during service when the appliance is set to maximum or minimum output.
[8]	Service mode <ul style="list-style-type: none"> Displays when a qualified service engineer is in the service menus.
[9]	Eco mode active <ul style="list-style-type: none"> Displays when in Economy mode (DHW Pre-heat/comfort function is turned off)
[10]	Domestic hot water (DHW) <ul style="list-style-type: none">  Hot water mode On

Table 19

6.4.3 Switching on the device



The appliance is vented after initial power-up. This involves the heating pump switching on and off at intervals (for approx. 4 minutes).  and the flow temperature appear alternately in the display.

- ▶ Open automatic air vent valve.



Automatic siphon fill mode will begin when the appliance is first powered-up.

When the flow temperature and the  symbol appear alternately on the display, the siphon filling program is active.

6.4.4 Setting the flow temperature

The maximum flow temperature can be adjusted between 30 °C and 82 °C. The current flow temperature is shown on the display.

- ▶ Press the  key. The set maximum flow temperature is displayed.
- ▶ Press arrow key  or  to set the required maximum flow temperature.
- ▶ Press the **OK** key to save. Otherwise the setting will be saved automatically after 3 seconds. The display shows the current flow temperature.

The  symbol flashes in the display in heating mode. The  symbol also appears if the burner is active.

6.4.5 Setting the DHW heating

Set DHW temperature

DHW temperature:

- ▶ Press the  key. The set DHW temperature is displayed.
- ▶ Press arrow key  or  to set the required DHW temperature
- ▶ Press the **OK** key to save. Otherwise the setting will be saved automatically after 3 seconds. The display shows the current flow temperature.

The  symbol flashes in the display in DHW mode. The  symbol also appears if the burner is active.

Setting comfort mode or ECO mode

In comfort mode, the appliance is continually maintained at the set temperature (→ service function 3-CA). This means there will be a short delay when drawing DHW. However, the device will switch on even if no DHW is being drawn.

In ECO mode, heating-up to the set temperature begins as soon as the DHW is being drawn.



In Eco mode, to reduce water usage:

- ▶ Briefly open and close the DHW tap. The water is heated once to the set temperature.

- ▶ To set ECO mode: press  until **eco** appears in the display.
- ▶ To return to comfort mode: press the  key until **eco** vanishes from the display.

6.4.6 Setting the heating control device



Observe the operating instructions of the heating controller. This shows you:

- ▶ how to set the room temperature.
- ▶ how to heat economically and save energy.

6.4.7 After commissioning

- ▶ Complete commissioning report (→ page 73).

6.4.8 Setting summer mode

The heating pump and consequently the heating are switched off in summer mode. The DHW supply and also the power supply for heating controls and timer remain active.

NOTICE:

Risk of the system freezing.

Frost protection is not available in summer mode.

- ▶ If there is a risk of frost, exit summer mode (→ Chapter 7.1).

To activate summer mode:

- ▶ Press the **III** key.
- ▶ Keep pressing the arrow key **▼** until **OFF** appears in the display.
- ▶ Press the **OK** key to save. Otherwise the setting will be saved automatically after 3 seconds.
- ▶ **III** is permanently displayed.

Further notices can be found in the operating instructions for the heating control.

6.5 Chimney sweep mode



You have 30 minutes to take your measurements or to check or adjust the appliance settings. After this time the appliance returns to normal operation.

Whilst the appliance is in chimney sweep mode, the chimney sweep symbol () will be displayed on the screen.

6.5.1 Setting the appliance to maximum



Maximum output mode

- ▶ A hot water outlet can be opened to prevent the appliance from shutting down due to high temperature during testing.
- ▶ Press the **ok** button for at least 5 seconds.
 - The appliance enters chimney sweep mode and automatically enters maximum output.
 - The display shows the maximum percentage of the power **100%** alternating with the flow temperature.
 - The appliance will ramp up to maximum output in approximately 30 to 35 seconds.

6.5.2 Setting the appliance to minimum

Whilst the appliance is already in chimney sweep mode - maximum output.

- ▶ Press the **▼** button to set the appliance to minimum output.
 - The display shows the minimum percentage of the power alternating with the flow temperature.
 - The appliance will take approximately 30 to 35 seconds to ramp down to minimum output.
 - Allow the appliance to stabilise at minimum output.

6.5.3 Exiting chimney sweep mode

To exit the chimney sweep mode:

- ▶ Press the **ok** button and the appliance will return to normal operation.
 - If left in the chimney sweep mode the control will return to normal operation after 30 minutes.

6.6 Checking gas inlet pressure

Measuring the inlet pressure

- ▶ Switch off the appliance and close the gas isolator.
- ▶ Unscrew the screw on the test nipple for the gas supply pressure and connect a pressure gauge.

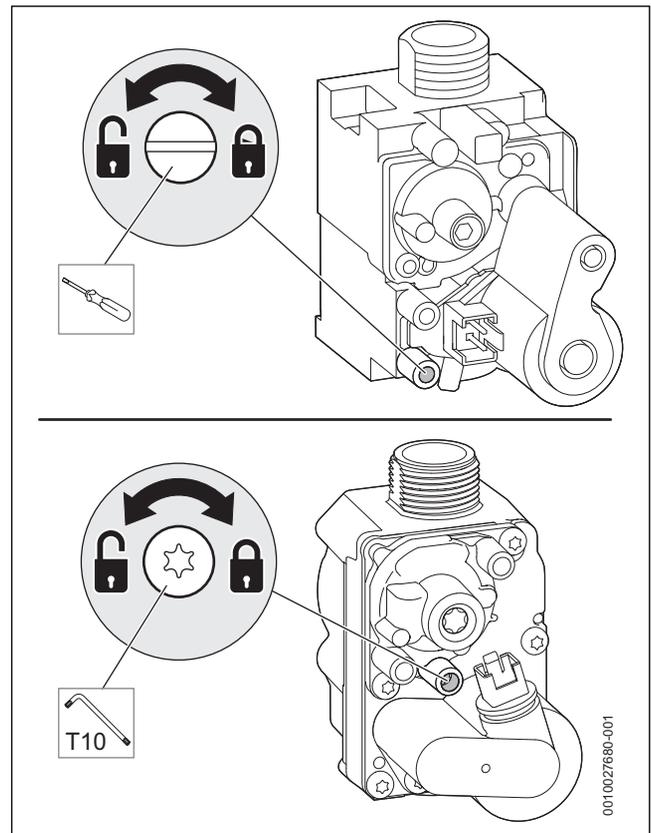


Fig. 54 Checking the gas supply pressure

- ▶ Open the gas isolator and switch on the appliance.
- ▶ Ensure that there is heat transfer by opening the radiator valves.
- ▶ Set the appliance running at maximum output in chimney sweep mode (→ 6.5 "Chimney sweep mode").
- ▶ Check the required gas supply pressure according to following section "Gas pressure within the system".



Commissioning must not take place outside of the permissible pressure range.

- ▶ Identify the cause and rectify the fault.
- ▶ If this is not possible: isolate the device on the gas side and notify the gas supplier.
- ▶ Exit the chimney sweep mode.
- ▶ Switch off the device, close the gas isolator, remove the pressure gauge and tighten the screw.
- ▶ Refit the casing.

Gas pressure within the system

i The appliance must be running at maximum output rate when performing the gas rate check, (→ chapter 6.5.1).

i Combi appliances

- ▶ Running a hot water tap does not guarantee the boiler will operate at maximum output throughout the test.

Refer to the figures below for Natural Gas pressures.
 The pressure drop from the meter to the gas valve inlet test point must not be more than the values stated in table 20.
 If the pressure drops are greater than shown in table 20, then this would indicate a problem with the pipe work or connections within the system.

NOTICE:
Do not continue commissioning until the correct gas pressure is achieved.

Gas Type	Meter	Across pipe work	Appliance inlet	Across appliance [A]	Gas valve inlet test point [B]
Allowed mbar pressure drop					
NG	19 - 23	1	18 - 22	1.5	16.5 - 20.5
mbar range					

Table 20 Allowed mbar pressure drop

Gas supply pressure drop

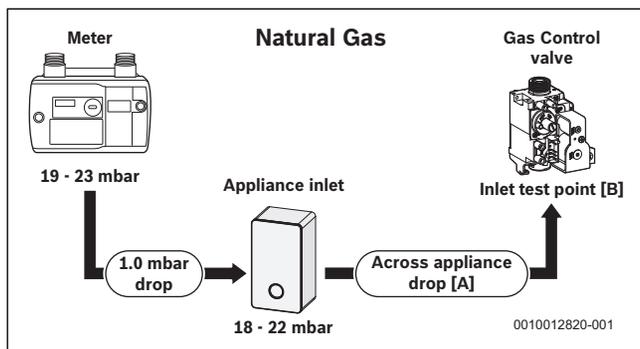


Fig. 55 Natural Gas pressures

- [A] Pressure loss across the appliance
- [B] Pressure reading at inlet test point

6.7 Checking the gas rate

- ▶ The gas rate should be measured at the gas meter after the appliance has been operating for a minimum of 10 minutes at maximum output.
- ▶ Refer to Technical data section of this manual for the appliance gas rates and CO/CO₂ ratios.
- ▶ Gas rate must be checked with the appliance in service, maximum output test mode.
- ▶ Carry out Gas rating procedures as described in current edition of the "Essential Gas Safety".
- ▶ Ensure all other gas appliances are isolated when carrying out the gas rate check on the appliance.

i Maximum output mode

- ▶ A hot water outlet can be opened to prevent the appliance from shutting down due to high temperature during testing.

- ▶ Ensure all other gas appliances are isolated.
- ▶ Press the **ok** button until the symbol appears on the display. The display shows the maximum percentage of the power **100%** alternating with the flow temperature.
- ▶ Ensure that the appliance has stabilised at maximum output.
- ▶ If pressure and gas rate are satisfactory press the **ok** button and the appliance will return to normal operation.
 - If left in the service mode the control will return to normal operation after 30 minutes.
- ▶ Close the gas isolation valve.
- ▶ Remove the manometer.
- ▶ Re-seal the screw in the gas inlet pressure test point.
- ▶ Open the gas isolation valve.
- ▶ Ensure that there are no gas leaks.

6.8 Checking for gas leaks during operation

- ▶ Use an approved gas leak detector to check all connections for possible leaks. The product must be certified as a gas leak testing agent.
- ▶ Do not allow the product to come into contact with the electrical wiring.

6.9 CO and combustion check

The following combustion and flue integrity checks are mandatory and these values must be recorded on the Benchmark checklist, at the end of these instructions.

Once the gas rate and pressure have been confirmed as acceptable then the CO and combustion checks can be undertaken.

The flow chart is given for guidance, the details of the checks are given in the following sections:

- Checking flue integrity, (→ 6.10 "Checking flue integrity")
- Flue gas analysis, (→ 6.11 "Flue gas analysis")

NOTICE:

Before CO and combustion checks:

- ▶ Verify the appliance is connected to the correct gas type.
- ▶ Ensure the appliance is supplied with the correct gas inlet pressure and gas rate as specified previously in the Commissioning section.
- ▶ Visually check the integrity of the whole flue system and confirm that all the components are correctly assembled, fixed and supported.
- ▶ The flue gas analyser must be the correct type as specified in BS 7967. Before use the analyser must have been calibrated as specified by the manufacturer. The installer must be competent in the use of the analyser.
- ▶ Check and zero the analyser in fresh air as specified by the manufacturer.
- ▶ The air/gas ratio valve is factory set and must not be adjusted during commissioning unless this action is recommended following contact with the Worcester, Bosch Group help line 0330 123 3366.

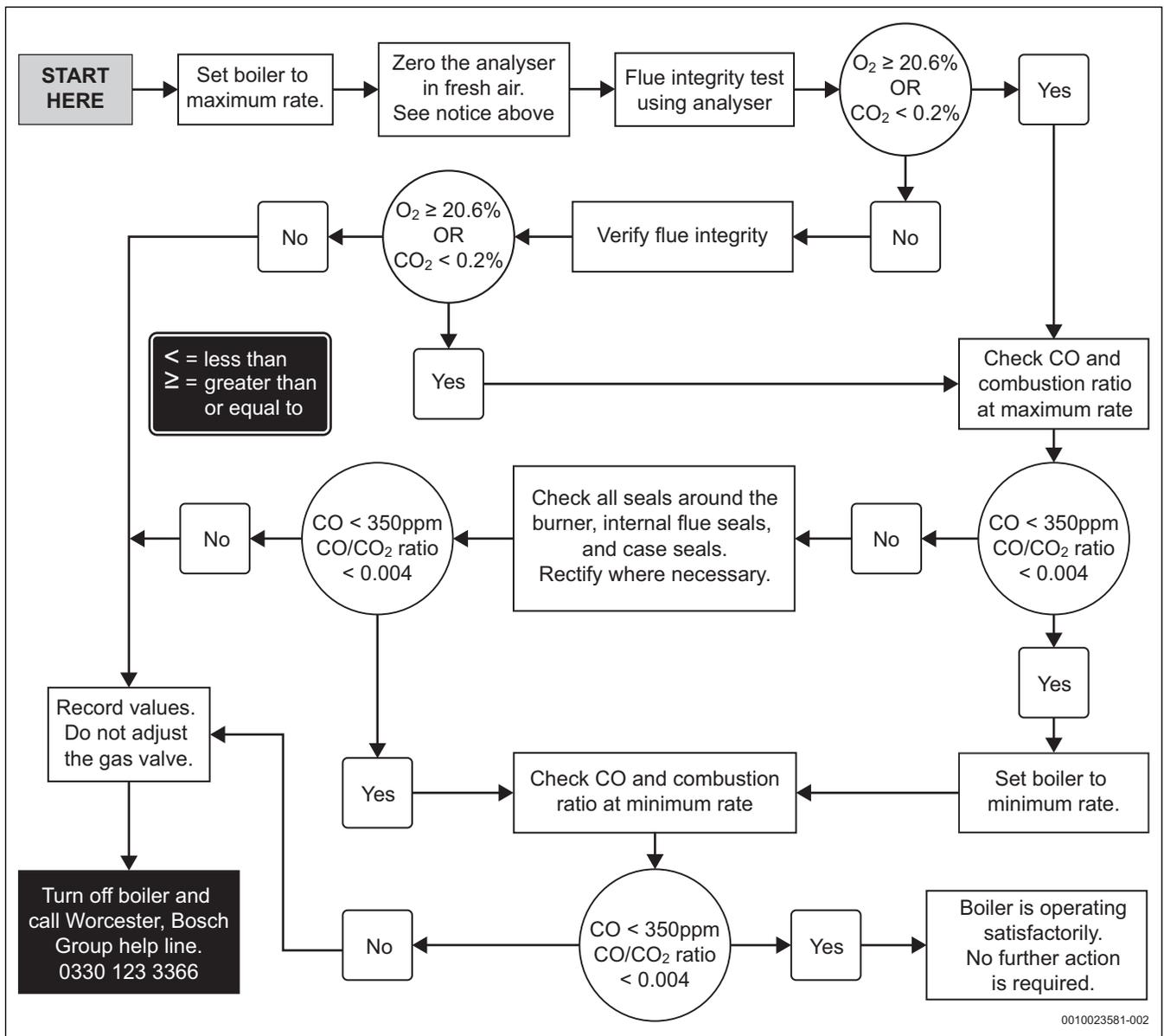


Fig. 56 Commissioning checks flow chart

6.10 Checking flue integrity



Flue integrity check

- ▶ The combustion casing must be fitted whilst this test is carried out.
- ▶ Refit the test point plugs after the test has been completed.

The integrity of the flue system and performance of the appliance can be checked via the flue turret/adaptor sample points.

Air inlet sample point location on flue turret/adaptor.

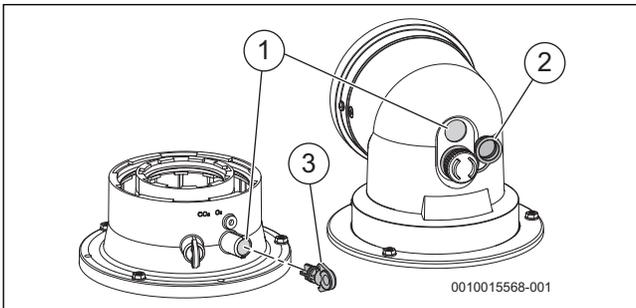


Fig. 57 Flue integrity check test point

- [1] Air inlet sample point
- [2] Flue turret air inlet blank plug (with retaining ring)
- [3] Flue adaptor air inlet blank plug

- ▶ With the appliance combustion casing on and the appliance running at maximum output in chimney sweep mode (→ chapter 6.5 "Chimney sweep mode"), remove the blanking plug [2 or 3] for the air inlet sample point [1].
- ▶ Insert the analyser probe into the air inlet sample point [1].
- ▶ Allow the readings to stabilise and check that:
 - O_2 is equal to, or greater than 20.6%
 - CO_2 is less than 0.2%
- ▶ If the readings are outside these limits then this indicates that there is a problem with the flue system or combustion circuit.

6.11 Flue gas analysis

NOTICE:

Combustion testing

- ▶ Combustion testing must be carried out by a competent qualified person. Testing must not be attempted unless the person carrying out the combustion check is equipped with a calibrated Flue Gas Analyser conforming to BS 7967 and is competent in its use.



Flue gas analysis

- ▶ Ensure that the gas inlet pressure has been checked and is satisfactory.
- ▶ Refit the test point plugs after the test has been completed.

The flue gas analysis performance of the appliance can be checked via the flue turret/adaptor sample points.

Refer to figure 58 for the location of the flue gas sample point on flue turret/adaptor.

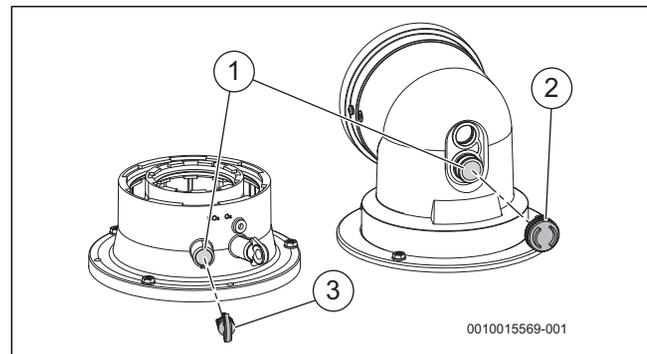


Fig. 58 Combustion test

- [1] Flue gas sample point
- [2] Flue turret flue gas blank plug
- [3] Flue adaptor flue gas blank plug

The CO and combustion ratio are checked;

- In chimney sweep mode at maximum output.
- In chimney sweep mode at minimum output.

Appliance to maximum output

- ▶ Set the appliance running at maximum output in chimney sweep mode (→ chapter 6.5 "Chimney sweep mode").

Appliance to minimum output

- ▶ Set the appliance running at minimum output in chimney sweep mode (→ chapter 6.5 "Chimney sweep mode").
 - Allow the appliance to stabilise at minimum output.

Measuring the CO and combustion ratio.

- ▶ Remove the blanking plug [2 or 3] for the flue gas sample point [1].
- ▶ Insert the analyser probe into the flue gas sample point [1].
 - Ensure that the probe reaches the centre of the flue gas exhaust, adjust the cone on the probe so that it seals the sample point and correctly positions the end of the probe.
- ▶ Check the CO and combustion readings.

6.12 Finishing commissioning

6.12.1 Fitting the front panel

- ▶ Fit the front panel making sure that the securing points are properly located.
 - Lift the front panel onto the locating bracket on the top of the appliance.
 - Push the bottom of the panel into position and tighten the bottom two screws [1].

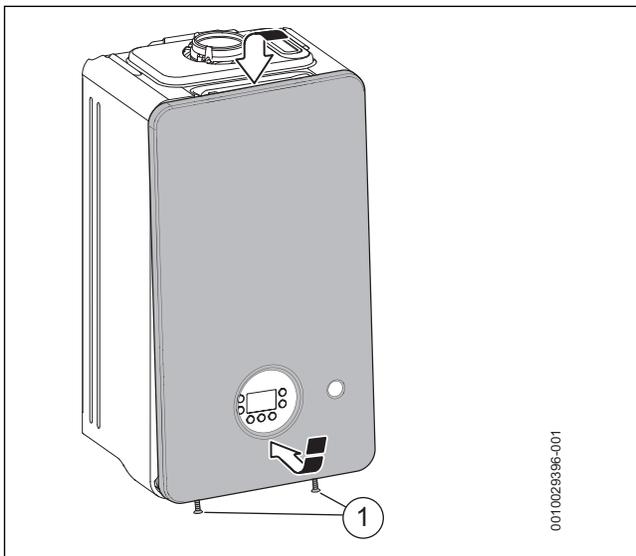


Fig. 59 Fitting the front panel



At the time of commissioning, complete all relevant sections of the Benchmark Checklist located at the end of this chapter.

Appliance handover:

- ▶ Complete the Benchmark Gas Boiler Commissioning Checklist.
- ▶ Set up the appliance controls and show the customer how to operate all the control unit/s for central heating operation.
 - Also show where in the appliance/controls documentation where this information can be found.
- ▶ Where applicable, instruct the customer on:
 - how to check the system pressure and re-pressurise if necessary.
 - how to set the TRVs.
 - how to reset the appliance.
- ▶ Show the customer the fault finding section in the User Instructions.
- ▶ Show the customer where the serial number/appliance information is located, they will need this information if they call in with a problem (Benchmark Commissioning checklist on page 73 contains all relevant appliance information).
- ▶ Give the customer details of how to contact the installer/ gas emergency numbers.
- ▶ Show the customer how to safely isolate the appliance.
- ▶ Advise the customer where they can find information on the Worcester, Bosch Group website www.worcester-bosch.co.uk.
- ▶ Ensure that all documentation, is left with the appliance or homeowner.
 - Appliance documentation.
 - Controls documentation.
 - Any other equipment documentation that is connected to the appliance or system.
- ▶ Appliance not in use
 - If the appliance is not going to be used immediately and may be exposed to freezing conditions, advise the customer of the precautions necessary to prevent damage to the appliance, system and building.
 - If the appliance is unused and exposed to freezing conditions, safely isolate all the mains supplies and drain the system and appliance, label accordingly.
- ▶ Show the customer the location of the condensate pipe run in unheated or external areas that may be at risk of freezing during prolonged cold spells.
- ▶ **User recommendation:** Arrange an inspection/maintenance contract with an approved heating contractor.

6.12.2 Appliance/product guarantee

This appliance/product has a guarantee against faulty materials or workmanship for a period from the date of installation subject to the terms and conditions.

For full terms and conditions, please visit:

www.worcester-bosch.co.uk/guarantee-terms-and-conditions

Guarantee registration

Your appliance/product carries a guarantee against faulty material or manufacture subject to Terms and Conditions.

To read the full Terms & Conditions please visit us on-line at www.worcester-bosch.co.uk/guarantee.

Your statutory rights are not affected by the manufacturer's guarantee

7 Shutdown

7.1 Setting frost protection

NOTICE:

Risk of damage to the system from frost!

The heating system can freeze up after a prolonged period (e.g. during a power failure, switching off the power supply, faulty fuel supply, boiler fault etc.).

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

Frost protection for the heating system:

Always follow the latest advice in BS7593 for system frost protection.

Frost protection for the heating system is only ensured if the heating pump is operational and is pumping heating water through the entire system.

- ▶ Leave the heating switched on.
- ▶ Set the time control to constant ON and set the room thermostat to 12 °C.
- or- If you want to leave the appliance switched off:
- ▶ Mix Worcester-approved anti-freeze into the heating water (→ Water treatment products, page 28) and drain the DHW circuit.



For further information, see the heating controller operating instructions.

Appliance frost protection:

The appliance frost protection function switches the burner and heating pump on when the appliance temperature falls below 5 °C. This prevents the appliance from freezing.

7.2 Anti-seize protection



This function prevents the heating pump and the diverter valve seizing up following long periods of inactivity.

The anti-seizing function remains active during standby mode.

The pump is briefly activated automatically after 24 hours of inactivity.

8 Settings in the service menu

Many appliance functions can be set and checked in the service menu. It includes:

- Menu 1: information menu
- Menu 2: not used in UK/IE
- Menu 3: factory settings
- Menu 4: special features
- Menu 5: limit values
- Menu 6: function checks
- Menu 0: manual operation

8.1 Operating the service menu

Selecting and setting the service function



If a key is not pressed for 30 minutes, the system exits the selected service function automatically.

- ▶ To select a service function, press arrow key ▲ or ▼.
The display shows the service function.
- ▶ To confirm the selection: press **OK** key.
The current setting starts to flash.
- ▶ To change the setting: press arrow key ▲ or ▼.
- ▶ To save: press **OK** key.
- or-
- ▶ If you do not want to save the setting: press ↶ key.
The value currently set is displayed.
- ▶ Press the ↶ key.
The service function is displayed.
- ▶ Press ↶ key again.
The higher level menu is displayed.
- ▶ Press ↶ key again.
The device reverts to normal operation.

Documenting the settings

- ▶ Record the change the settings in the commissioning report (→ Section 13.6).

Settings in the service menu

Many appliance functions can be set and checked in the service menu.

Opening the service menu

- ▶ Press the DHW key and the Heating key simultaneously until the service menu appears.

Closing the service menu

- ▶ Press the DHW key or the Heating key.

-or-

- ▶ Press the ↶ key.

Navigating through the menu

- ▶ To highlight a menu or a menu item, press the ▲ key or the ▼ key.
- ▶ Press **OK** key.
The menu or the menu item is displayed.
- ▶ To return to the next higher menu level, press the ↶ key.

Changing the settings values

- ▶ Select the menu item with the **OK** key.
- ▶ To select the desired value, press the ▲ key or the ▼ key.
The new value will be saved after 5s or after pressing the **OK** key.

Exiting the menu item without saving values

- ▶ Press the ↶ key.
The value is not saved.

8.2 Service functions overview

8.2.1 Menu 1

- ▶ Press the  key and  key at the same time until **L.1** appears.
- ▶ To confirm the selection: press **OK** key.
- ▶ Selecting and setting the service function.

Service function	Unit	Further information
1-A1	Current operating status	Status code, → Section 11.2
1-A2	Current fault	Error code, → Section 11.2
1-A3	Upper limit of the maximum heat output	% The maximum heat output can be decreased via the service function 3-b1.
1-A4	Upper limit of the maximum DHW output	% The maximum DHW output can be decreased via the service function 3-C1.
1-A5	Temperature at flow temperature sensor	°C –
1-A6	Set flow temperature	°C –
1-b2	Current turbine flow rate	l/min –
1-b3	Current DHW temperature	°C –
1-b4	Current DHW outlet temperature	°C –
1-b5	Current temperature at the cylinder	°C –
1-b7	Set DHW temperature	°C –
1-b8	Current thermal output as a % of the maximum rated heat output in heating mode	% During DHW heating, values greater than 100 % may be displayed.
1-C1	Ionisation current	µA • While the burner is operating: ≥ 2 µA = OK, < 2 µA = faulty • While the burner is switched off: < 2 µA = OK, ≥ 2 µA = faulty
1-C2	Current pump output as % of rated pump output	–
1-C4	Current outside temperature with outside temperature sensor connected	°C –
1-C5	Temperature at the solar buffer cylinder	°C Only displayed when a solar module is connected.
1-C6	Operating pressure	bar –
1-d1	Collector temperature	°C Only displayed when a solar module is connected.
1-d2	Temperature at the solar buffer cylinder (bottom)	°C Only displayed when a solar module is connected.
1-d3	Solar pump	% Only displayed when a solar module is connected.
1-d4	Solar unit fault	Only displayed when a solar module is connected. Error code
1-E1	Software version of the control panel (main version)	–
1-E2	Software version of the control panel (secondary version)	–
1-E3	Coding plug number	–
1-E4	Coding plug version	–
1-EA	Software version of device electronics (main version)	–
1-Eb	Software version of device electronics (secondary version)	–

Table 21 Menu 1: display of information

8.2.2 Menu 2

- ▶ Press the  key and  key at the same time until **L.1** appears.
- ▶ Press arrow key  until **L.2** is displayed.
- ▶ To confirm the selection: press **OK** key.
- ▶ Selecting and setting the service function.



The basic settings are depicted as **highlighted** in the following table.

Service function	Settings/adjustment range	Remark/restriction	
2-A1	Low-loss header	<ul style="list-style-type: none"> • 0: no low loss header installed • 1: (not available) • 2: low loss header connected to the module 	This setting defines where the sensor of the low loss header is connected.

Table 22 Menu 2: hydraulic settings

8.2.3 Menu 3

- ▶ Press the **III** key and **↵** key at the same time until **L.1** appears.
- ▶ Press arrow key **▲** until **L.3** is displayed.
- ▶ To confirm the selection: press **OK** key.
- ▶ Selecting and setting the service function.



The basic settings are depicted as **highlighted** in the following table.

Service function	Settings/adjustment range	Remark/restriction
3-b1 Maximum approved heat output	<ul style="list-style-type: none"> • GC2000iW 25 C : 50 ... 80 % • GC2000iW 30 C : 50 ... 68 % 	<ul style="list-style-type: none"> ▶ Set heat output in percent. ▶ Measure gas flow rate. ▶ Compare measured result with the setting tables (→ page 72). Correct the setting in the case of any deviation.
3-b2 Time interval between stopping and starting the burner in heating mode	• 3 ... 10 ... 60 minutes	<p>The time interval specifies the minimum waiting time between switching on the burner and switching it on again.</p> <p>If a weather-compensated heating controller is connected, this setting is optimised by the heating controller.</p>
3-b3 Temperature interval for switching the burner off and back on	• -15 ... -6 ... -2 K (°C)	<p>The difference between the current flow temperature and the set flow temperature until the burner is switched on.</p> <p>If a weather-compensated heating controller is connected, this setting is optimised by the heating controller.</p>
3-C1 Maximum released DHW output	• 50 ... 100 %	<p>On natural gas devices:</p> <ul style="list-style-type: none"> ▶ Set heat output in percent. ▶ Measure gas flow rate. ▶ Compare measured result with the setting tables (→ page 72). Correct the setting in the case of any deviation.
3-C4 Turbine signal delay	• 2 ... 16 × 0.25 seconds	The delay prevents sudden changes in the water supply pressure from causing the burner to briefly operate although no water is drawn off.
3-C5 Delay of DHW mode (solar mode)	• 0 (not active) ... 50 seconds	<p>DHW mode will be suppressed until the DHW temperature sensor detects that the water preheated by solar energy has reached the desired DHW temperature.</p> <ul style="list-style-type: none"> ▶ Set the DHW mode delay according to the system conditions.
3-C6 Time interval between stopping and restarting the burner for DHW heating (only in comfort mode and summer mode)	• 0 ... 30 minutes	After DHW is drawn off, the DHW heating remains disabled for this period.
3-C8 Thermal disinfection up to draw-off point	<ul style="list-style-type: none"> • OFF: switched off • ON: switched on 	<p>If too much water is drawn off, the required temperature may not be reached.</p> <ul style="list-style-type: none"> ▶ Only draw off enough water to allow the DHW temperature of 70 °C to be reached. ▶ Perform thermal disinfection (→ Instructions for the user).
3-CA DHW mode	<ul style="list-style-type: none"> • 0: comfort mode, the device is continually kept at the set temperature. • 1: ECO mode, only heat-up to the selected temperature when hot water is being drawn. • 2: (not available) • 3: (not available) 	Short waiting time in comfort mode, when domestic hot water is extracted. The device therefore switches on, even if no domestic hot water is extracted.
3-d6 Overrun time of the heating pump in heating mode	<ul style="list-style-type: none"> • 1 ... 3 ... 60 minutes • 61: 24 hours 	The pump overrun begins at the end of the heat demand by the heating controller.

Table 23 Menu 3: factory settings

8.2.4 Menu 4

- ▶ Press the  key and  key at the same time until **L.1** appears.
- ▶ Press arrow key  until **L.4** is displayed.
- ▶ To confirm the selection: press **OK** key.
- ▶ Selecting and setting the service function.



The basic settings are depicted as **highlighted** in the following table.

Service function	Settings/adjustment range	Remark/restriction
4-A1 Venting function	<ul style="list-style-type: none"> • 0: switched off • 1: automatic (Ventilation is carried out once. At the end of ventilation, the setting reverts to the "Deactivated" status.) • 2: permanently switched off (The setting is retained until the operation mode changes.) 	The venting function can be switched on after maintenance work. During ventilation, the  symbol and flow temperature appear alternately in the display.
4-A2 Siphon filling program	<ul style="list-style-type: none"> • 0: switched off (only permissible during maintenance) • 1: switched on with minimum power • 2: switched on with minimum heat output 	The siphon filling program is activated in the following cases: <ul style="list-style-type: none"> • The device is switched on at the On/Off switch. • The burner was not in operation for at least 28 days. • The operating mode is switched from summer to winter mode. The next time there is a heat demand in heating or cylinder mode, the heat output of the device is kept low for 15 minutes. The  symbol and flow temperature appear alternately in the display for the duration of the siphon filling program.
4-A4 Service display	<ul style="list-style-type: none"> • 0: switched off • 1: acc. to hours run • 3: acc. to elapsed time 	
4-A5 Inspection interval according to hours run	<ul style="list-style-type: none"> • 10 ... 60 × 100 hours 	This service function is only available if service function 4-A4 is activated. (=01) After this interval has expired, the display indicates that an inspection is due via the service display 1018 .
4-A6 Inspection interval according to elapsed time	<ul style="list-style-type: none"> • 1 ... 72 months 	This service function is only available if service function 4-A4 is activated. (=03) After this interval has expired, the display indicates that an inspection is due via the service display 1018 .
4-b1 Device-internal weather-compensated control	<ul style="list-style-type: none"> • OFF: not active • ON: active 	This service function is only available if an outside temperature sensor is detected in the system. This service function is no longer available when a weather-compensated control unit with EMS connection is connected.
4-b2 Outside temperature limit for automatic changeover between summer and winter mode.	<ul style="list-style-type: none"> • 0 ... 16 ... 30 °C 	This service function is only available if service function 4-b1 is activated. If the outside temperature exceeds the set temperature limit, the heating is switched off (summer mode). If the outside temperature falls to at least 1 K (°C) below the setting, the heating is switched back on (winter mode).
4-b3 End point of the heating curve for weather-compensated control	<ul style="list-style-type: none"> • 20 ... 90 °C 	This service function is only available if service function 4-b1 is activated. Set flow temperature for an outside temperature of - 10 °C (→ heating curve, page 70).
4-b4 Base point of the heating curve for weather-compensated control	<ul style="list-style-type: none"> • 20 ... 90 °C 	This service function is only available if service function 4-b1 is activated. Set flow temperature for an outside temperature of + 20 °C (→ heating curve, page 70).

Service function		Settings/adjustment range	Remark/restriction
4-b5	Device frost protection	<ul style="list-style-type: none"> • OFF: switched off • ON: switched on 	<p>This service function is only available if service function 4-b1 is activated.</p> <p>The device frost protection function switches the burner and heating pump on when the outside temperature falls below 5 °C. This prevents the wall mounted boiler freezing.</p>
4-b6	Temperature value for the system frost protection	• 0 ... 5 ... 10 °C	<p>This service function is only available if the frost protection function (service function 4-b1) was activated.</p> <p>If the outside temperature does not exceed the frost threshold temperature, then the heating pump in the heating circuit switches on (system frost protection).</p>
4-E1	LCD backlighting	<ul style="list-style-type: none"> • OFF: backlighting switches off 2 minutes after the last time a key was pressed • ON: backlighting permanently on 	
4-E2	Unit of temperature	<ul style="list-style-type: none"> • °C • °F 	
4-F1	Reset device to basic setting	• YES: device is reset to factory settings	
4-F2	Reset the fault display	<ul style="list-style-type: none"> • NO: fault is retained • YES: fault is reset 	

Table 24 Menu 4: settings

8.2.5 Menu 5

- ▶ Press the **III** key and **↵** key at the same time, until **L.A** is displayed.
- ▶ Keep pressing the arrow key **▲**, until **L.5** is displayed.
- ▶ To confirm the selection: Press the **OK** key.
- ▶ Select and set the service function.



The basic settings are depicted as **highlighted** in the following table.

- ▶ These settings will not be reset during a factory reset.

Service function L.5		Settings/adjustment range	Remark/restriction
5-A1	Maximum flow temperature	• 30 ... 82 °C	Limits the adjustment range for the flow temperature.
5-A2	Maximum DHW temperature	• 35... 60 ... 80 °C	Limits the adjustment range for the hot water (not applicable on combination appliances.).
5-A3	Minimum boiler output (heating and DHW)	<ul style="list-style-type: none"> • GC2000iW 25 C : 19 ... 49% • GC2000iW 30 C : 16 ... 49% 	Minimum heat output.

Table 25 Menu 5: Limit values

8.2.6 Menu 6

- ▶ Press the **||||** key and **↵** key at the same time until **L.1** appears.
- ▶ Press arrow key **▲** until **L.6** is displayed.
- ▶ To confirm the selection: press **OK** key.
- ▶ Selecting and setting the service function.



The basic settings are depicted as **highlighted** in the following table.

Service function	Settings/adjustment range	Remark/restriction
6-t1 Permanent ignition	<ul style="list-style-type: none"> • OFF: switched off • ON: switched on 	Testing the ignition by means of permanent ignition without gas supply. <ul style="list-style-type: none"> ▶ To prevent damage to the ignition transformer: Leave the function switched on for a maximum of 2 minutes.
6-t2 Permanent fan operation	<ul style="list-style-type: none"> • 0 ... 100 % 	Fan running without gas supply or ignition.
6-t3 Permanent pump operation (heating pump)	<ul style="list-style-type: none"> • 0 ... 100 % 	If a value >0 is set, the pump runs with 100 %.
6-t5 3-way valve permanently in the DHW heating position	<ul style="list-style-type: none"> • 0: heating • 1: DHW • 2: (not available) 	
6-tA Ionisation oscillator	<ul style="list-style-type: none"> • OFF: switched off • ON: switched on 	
6-tb Burner test	<ul style="list-style-type: none"> • 0 ... 100 % 	The burner test is ended by resetting the setting value to 0, or by exiting L.5.

Table 26 Menu 6: function checks

8.2.7 Menu 0

- ▶ Press the **||||** key and **↵** key at the same time until **L.1** appears.
- ▶ Press arrow key **▲** until **L.0** is displayed.
- ▶ To confirm the selection: press **OK** key.
- ▶ Selecting and setting the service function.



The basic settings are depicted as **highlighted** in the following table.

Service function	Settings/adjustment range	Remark/restriction
0-A1 Manual operation	<ul style="list-style-type: none"> • OFF: switched off • ON: switched on 	
0-A2 Set temperature in manual operation	<ul style="list-style-type: none"> • 30 ... 60 ... 82 °C 	

Table 27 Menu 0

9 Inspection and maintenance

DANGER:

Risk of electric shock!

- ▶ Isolate electrical components from the power supply (230 V AC) (fuse, circuit breaker) and secure against unintentional re-connection before carrying out any work. Information on safe isolation can be found in the Health and Safety Executive guidance HSG85.
- ▶ Check for zero potential before proceeding with work, using test equipment approved to GS38 to confirm that the electricity supply is disconnected.

CAUTION:

Mains supplies:

- ▶ Safely isolate both the gas and electrical supply before starting any work on the appliance and observe all relevant safety precautions.

NOTICE:

Personnel and equipment

- ▶ Any service work must be carried out by competent registered engineers.
- ▶ Service work must not be attempted if a calibrated CO/CO₂ analyser and manometer are not available.

WARNING:

Hot surfaces!

If the appliance has been operating components may be hot.

- ▶ Ensure precautions are taken when working on the appliance.

CAUTION:

Component replacement:

- ▶ After replacement of a gas related component, where a gasket or seal has been disturbed or replaced, check for gas tightness using a gas sniffer/analyser.
- ▶ Also after re-assembly, carry out the following checks:
 - Fan pressure.
 - Flue gas analysis.

9.1 Inspection and maintenance considerations

- To ensure continued efficient operation the appliance must be checked at regular intervals.
- The frequency of servicing will depend upon the particular installation conditions and usage, however, normally an annual service is recommended.
- The extent of the service work required on the appliance is determined by the operating condition of the appliance when tested by qualified engineers.
- After each service, the service interval record sheet at the rear of this manual, must be completed.

See the following instructions for detail of some of the service requirements:

- ▶ Check all joints and connections in the system and remake any that show signs of leakage. Refill and re-pressurise if applicable as described in the commissioning section.
- ▶ When it is frequently necessary to add water to maintain pressure in the installation, even though no leaks have been discovered, perform an expansion vessel check.

- ▶ Check that the condensate system is not obstructed, clean and refill the condensate siphon.
- ▶ If the appliance is in a compartment or cupboard check that the specified clearances around the appliance is clear.
- ▶ Check that the flue system is unobstructed and undamaged, clean/replace as necessary.
 - If fitted ensure the flue terminal guard is also unobstructed and undamaged.
- ▶ Operate the appliance and take note of any irregularities.
 - Refer to the fault finding pages for rectification procedure.

Maximum system pressure

- ▶ 2.5 bar must not be exceeded when the heating system water is at maximum temperature. If this pressure is exceeded then an additional expansion vessel must be fitted into the system return as close as possible to the appliance.
- ▶ If the system does not retain the pressure, the pressure relief valve (PRV) and the heating system should be checked for leaks.

9.2 Service functions

9.2.1 Calling up the last fault saved



An overview of the faults can be found from page 59.

- ▶ Select service function 1-A2 (→ Chapter 8.2 from page 43).

9.3 Component access

Removing the front casing



The front casing is secured with two screws to prevent unauthorised removal (electrical safety).

- ▶ Always secure the casing with these screws.
- ▶ Loosen the two screws [1] and pull the bottom of the casing forward.
- ▶ Lift off the casing.

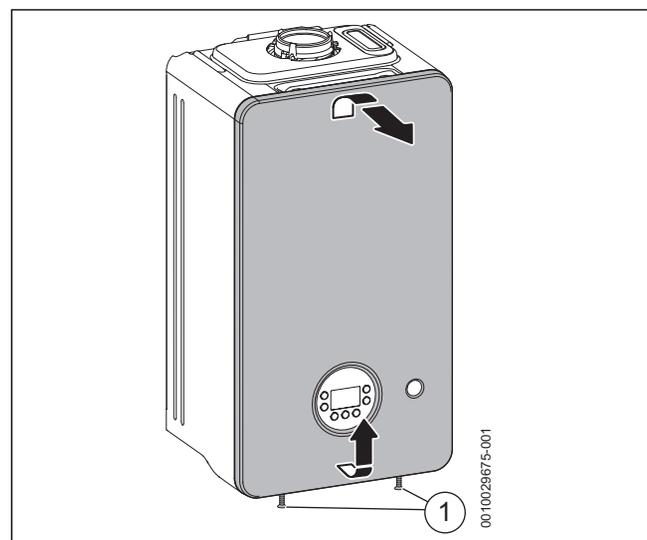


Fig. 60 Removing the front casing

9.4 Fan pressure test

NOTICE:

Fan pressure test

- ▶ The appliance must be running at maximum output in chimney sweep mode for the fan pressure test, (→ Setting the appliance to maximum).



This test is to determine if the heat exchanger requires cleaning or additional actions.



Fan pressure test reading.

- ▶ The pressure reading will be in negative values.

9.4.1 Checking heating block

- ▶ Remove the front casing.
- ▶ Remove the cap from the test nipple, and connect a pressure gauge.

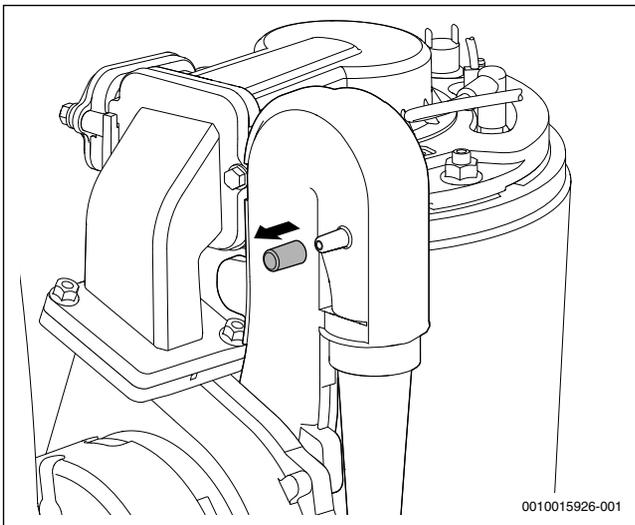


Fig. 61 Test nipple at the mixing device

Appliance fan pressure test values

Natural Gas appliances

Appliance output	Cleaning required		No cleaning required	
	Value			
30kW	0 mbar	↔ -4.7 mbar	-4.8 mbar	⇒ -12 mbar
25kW	0 mbar	↔ -3.2 mbar	-3.3 mbar	⇒ -12 mbar

Table 28 Natural Gas values

If the manometer reading is within tolerance, in the white area of the table values.

- ▶ The heat exchanger/exhaust path/siphon does not require attention.

If the manometer reading is out of tolerance, in the shaded area of the table values then carry out the following checks.

- ▶ Check that the siphon is not restricted or blocked.
- ▶ Check the exhaust paths for restrictions.
- ▶ Clean the heat exchanger with a suitable cleaning tool, refer to cleaning section.
- ▶ Re-check the fan pressure readings.
If the appliance, after completing the above checks, fails the fan pressure test then contact Worcester, Bosch Group for advice.
- ▶ Switch the appliance off after completing pressure check.

- ▶ Disconnect the digital manometer and replace the test point cover.
- ▶ Replace the combustion air intake pipe after completing pressure check.

9.5 Check working gas inlet pressure

NOTICE:

Gas inlet pressure

- ▶ Do not continue with the other checks if the correct gas inlet pressure can not be achieved.

- ▶ Check the gas supply working pressures in the system conform to the readings shown in the table shown in section 6.6 "Checking gas inlet pressure".

9.6 Flue gas analysis

NOTICE:

Combustion testing

- ▶ Combustion testing must be carried out by a competent person. Testing must not be attempted unless the person carrying out the combustion check is equipped with a calibrated flue gas analyser conforming to BS 7967 and is competent in its use.



Flue gas analysis

- ▶ Ensure that the gas inlet pressure has been checked and is satisfactory.
- ▶ Refit the test point plugs after the test has been completed.
- ▶ Set the appliance to maximum and minimum output in chimney sweep mode (→ 6.5 "Chimney sweep mode") for the flue gas analysis checks.
- ▶ Check that the readings conform to those given in the following tables. In addition to CO and CO/CO₂ ratio checks also check the maximum and minimum CO₂ percentage reading.

Appliance combustion contents settings

CO ₂ Reading	CO Reading	O ₂ Reading
Natural Gas - Maximum rated Output ¹⁾		
Between 9.0 and 10.8%	<250ppm	4.0 %
Natural Gas - Minimum rated Output ¹⁾		
A minimum of 0.6 lower than the maximum reading taken but above 8.2%	<250ppm	5.5 %

1) Should be measured 10 minutes after firing the appliance

Table 29 CO₂ and O₂ settings

If the CO₂ is out of tolerance then please check:

- ▶ The gas inlet pressure.
- ▶ The gas rate.
- ▶ The fan test pressure.
- ▶ The flue and air intake, plus any possible blockages in the condensate disposal.
- ▶ The condition of burner.
- ▶ For leaks or obstructions in the exhaust paths.
- ▶ That the injector is clean.

After all checks have been completed and the CO₂ is still out of tolerance then contact Worcester, Bosch Group helpline 0330 123 3366.

9.7 Checking the flue integrity

NOTICE:

- ▶ Check flue joints are secure, the terminal and the terminal guard, if fitted are clear and undamaged.
- ▶ Combustion testing must be carried out by a competent person. Testing must not be attempted unless the person carrying out the combustion check is equipped with a calibrated Flue Gas Analyser conforming to BS 7967 and is competent in its use.



Flue gas analysis

- ▶ Ensure that the gas inlet pressure has been checked and is satisfactory.
 - ▶ Refit the test point plugs after the test has been completed.
-
- ▶ Refer to section 6.10 "Checking flue integrity" and check that the readings conform to those given, confirming flue system and combustion circuit are ok.

9.8 Cleaning the siphon and heat exchanger



WARNING:

Gaskets and seals - gas related components

- ▶ Burner/electrode assembly gasket must be replaced if disturbed
- ▶ Other gaskets/seals must be checked and replaced where necessary
- ▶ Do not attempt the cleaning procedure unless new gaskets and seals are available.

9.8.1 Cleaning the heat exchanger



There is an optional tool available to assist in cleaning the heat exchanger, part number 7 733 600 091.

Checking the electrodes and cleaning the heat exchanger



CAUTION:

Risk of burns due to hot surfaces!

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

- ▶ Before working on the appliance: Allow the appliance to cool down.
- ▶ If necessary, wear protective gloves.

1. Unplug plug from the fan.
2. Remove the gas hose from the venturi nozzle.
3. Remove the screw on the mixing device.

4. Remove the fan with mixing device.

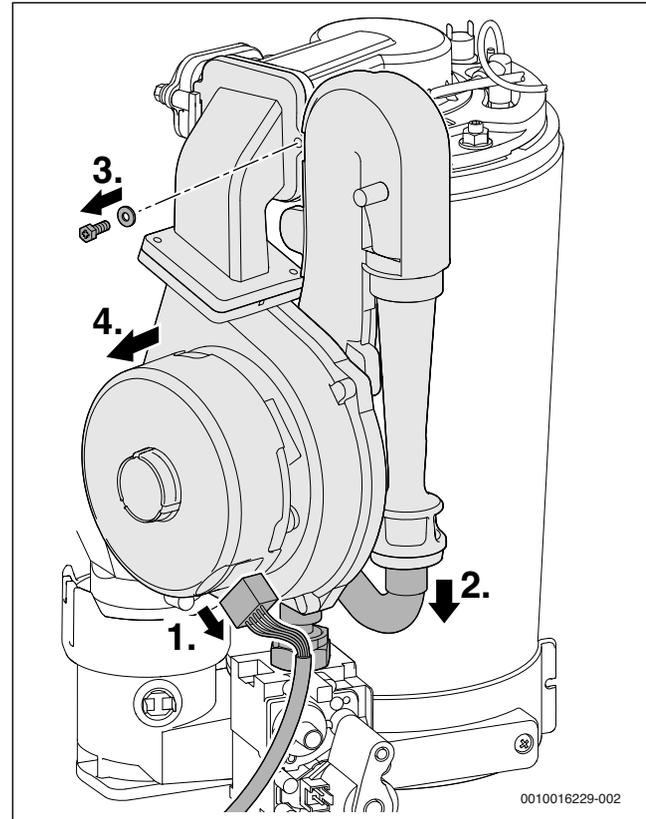


Fig. 62 Removing the fan with mixing device

- ▶ Pull off cable from the ignition and flame sense electrode.
- ▶ Remove the burner cover.



To ensure full tightness when assembling the burner once the maintenance is complete, tighten the M8 nut as far as it will go.

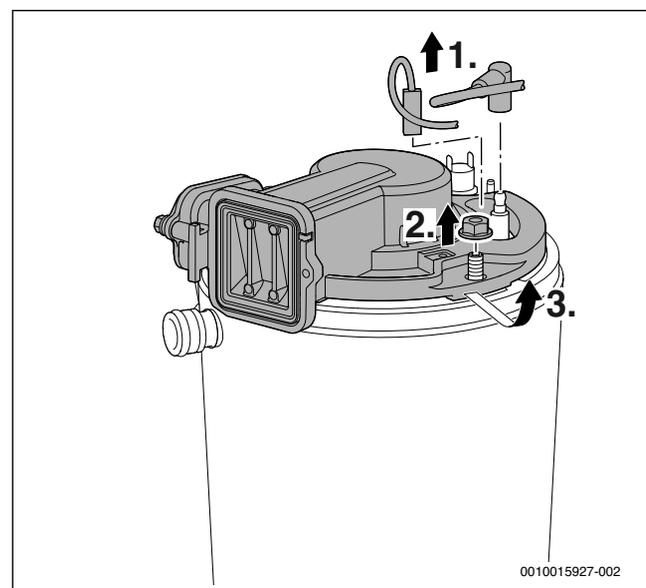


Fig. 63 Remove the burner cover

- ▶ Remove the non-return valve.
- ▶ Check the non-return valve for contamination and cracks.

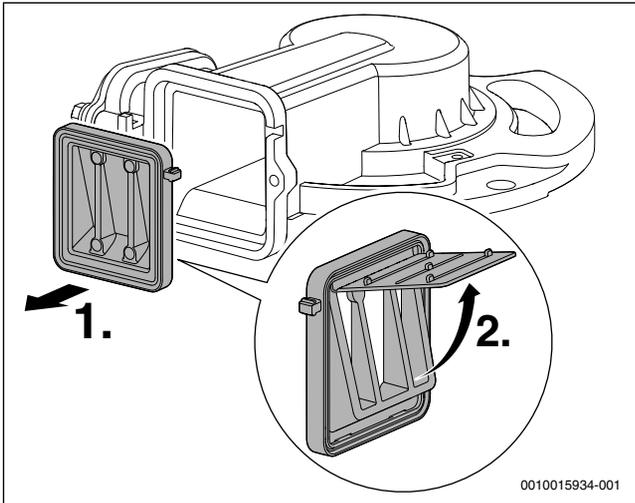


Fig. 64 Non-return valve in the mixing device

1. Remove the gasket.
2. Remove electrode set and check electrodes for contamination, clean or replace, if required.
3. Remove the burner.

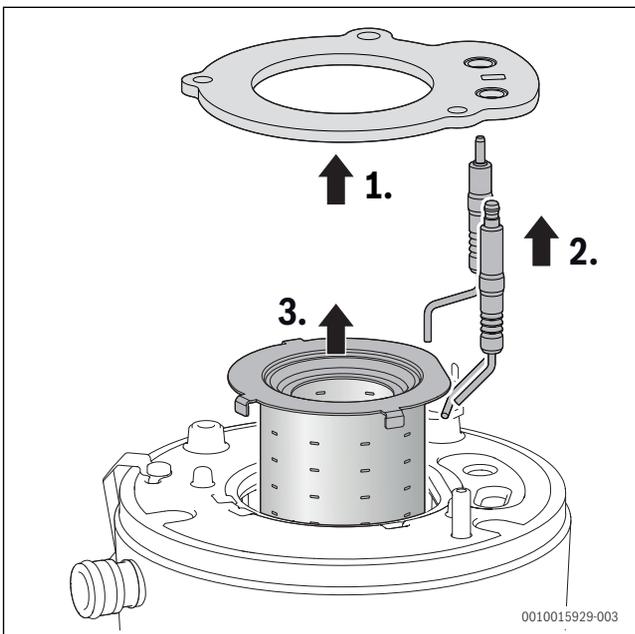


Fig. 65 Removing the burner

- ▶ Remove the top baffle using the lifting device.

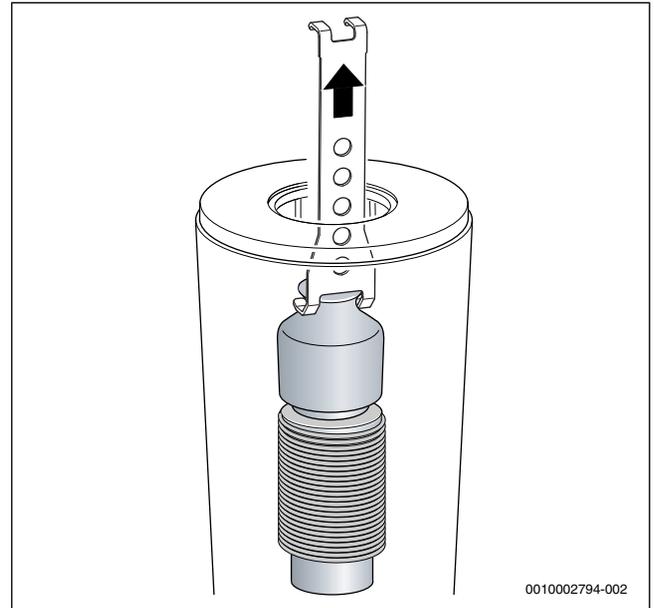


Fig. 66 Remove the top baffle

- ▶ Remove the bottom baffle using the lifting device.

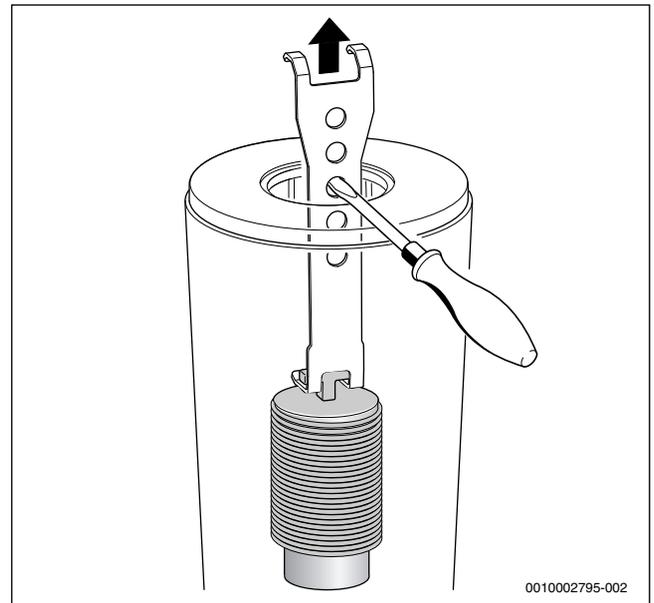


Fig. 67 Removing the bottom baffle

- ▶ Clean both baffles.
- ▶ Clean the heating block with the brush:
 - by rotating in both directions
 - from top to bottom up to the catch
- ▶ Remove the screws from the cover of the inspection aperture and remove the cover.

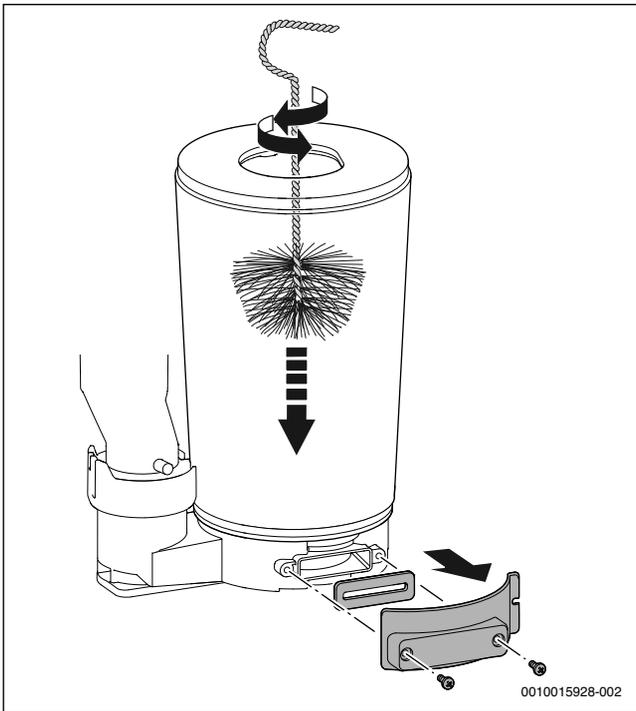


Fig. 68 Cleaning the heat exchanger

- ▶ Vacuum out residue and close the inspection aperture again.
- ▶ The heat exchanger can be inspected for residue with the aid of a torch and mirror.

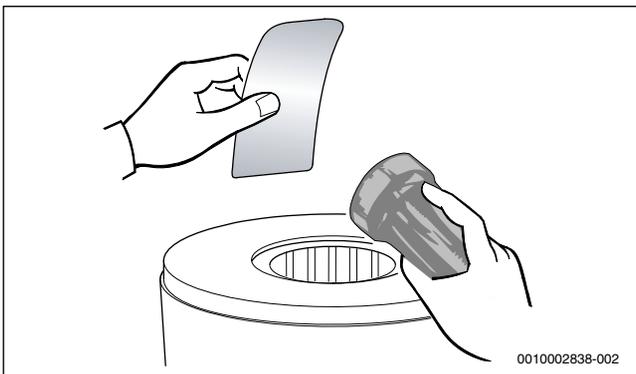


Fig. 69 Checking the heat exchanger for residue

- ▶ Refit the baffles.
- ▶ Remove the condensate trap and place a suitable container underneath.
- ▶ Rinse the heat exchanger with water from the top.

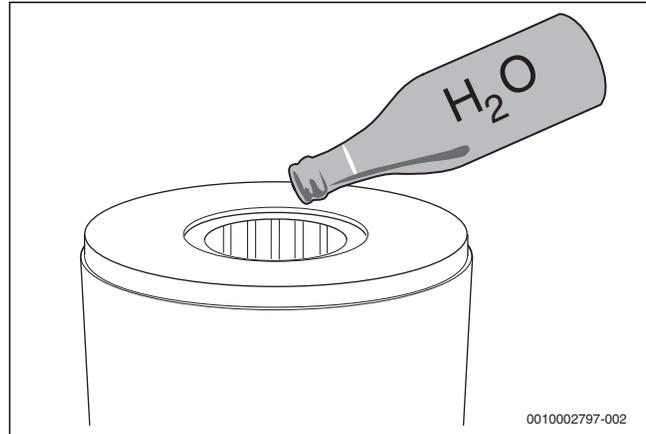


Fig. 70 Purge the heat exchanger with water

- ▶ Reopen inspection aperture and clean the condensation catch pan and condensate connection.

NOTICE:

Material damage due to hot flue gas!

Hot flue gas can leak through defective gaskets, damage the devices and endanger safe operation.

- ▶ Each time the burner is opened, replace the burner gasket (→ Fig. 65, item [1]) and all other gaskets affected by the measure.
- ▶ Ensure that the gaskets are seated exactly.

- ▶ Check and adjust if required the gas/air ratio.

NOTICE:

Material damage due to chemicals!

Using chemicals during purging, cleaning the drain or carrying out maintenance can damage the EPDM rubber materials. This can cause exhaust gas to escape during operation.

- ▶ Do not use chemicals to purge the heating block.



On completion of the heat exchanger cleaning and reassembly, perform the fan pressure test.

9.8.2 Cleaning the siphon

Cleaning the condensate trap

! WARNING:

Danger to life due to poisoning!

If the condensate trap is not filled, poisonous flue gas can escape.

- ▶ Only turn off the trap filling program during maintenance, and turn it back on at the end of maintenance.
- ▶ Make sure that the condensate drains off properly.

i

Damage resulting from an insufficiently cleaned siphon are excluded from the warranty.

- ▶ Clean the siphon regularly.

1. Remove the hose on the left of the condensate trap.
2. Actuate the locking lever at the bottom to release the siphon.
3. Pull the condensate trap down to remove it and drain it.

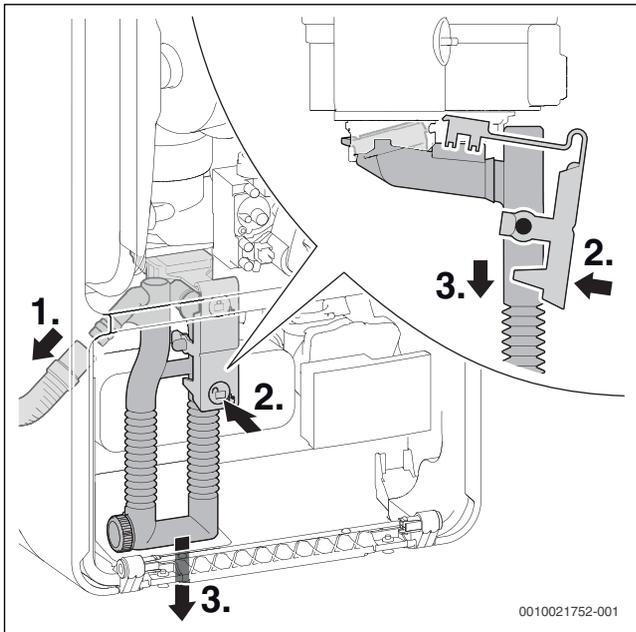


Fig. 71 Removing the condensate trap

1. Unscrew the cleaning cap.
2. Check the gasket for cracks, deformation or breakage and replace if required.
3. Clean the condensate trap, and check that the aperture towards the heat exchanger is clear.
4. Insert a new gasket if required.
5. Tighten the cleaning cap up to the locking position.

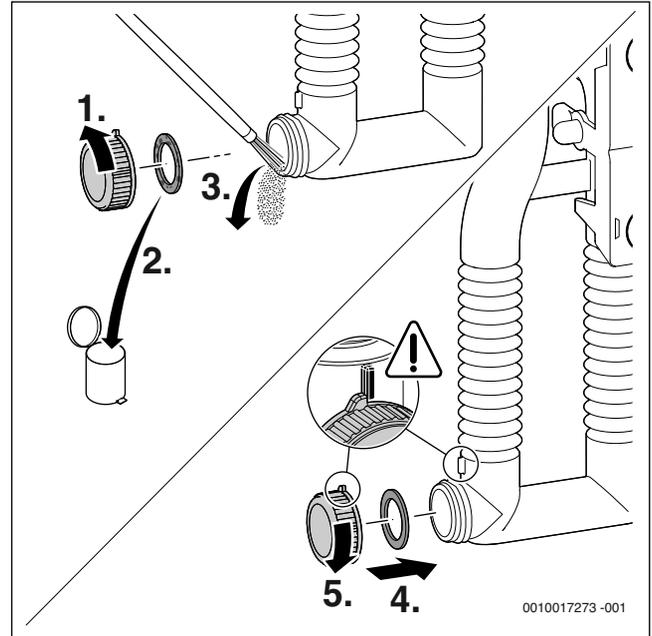


Fig. 72 Cleaning the condensate trap

- ▶ Remove and check the gasket for cracks, deformation or breakage and replace if required.

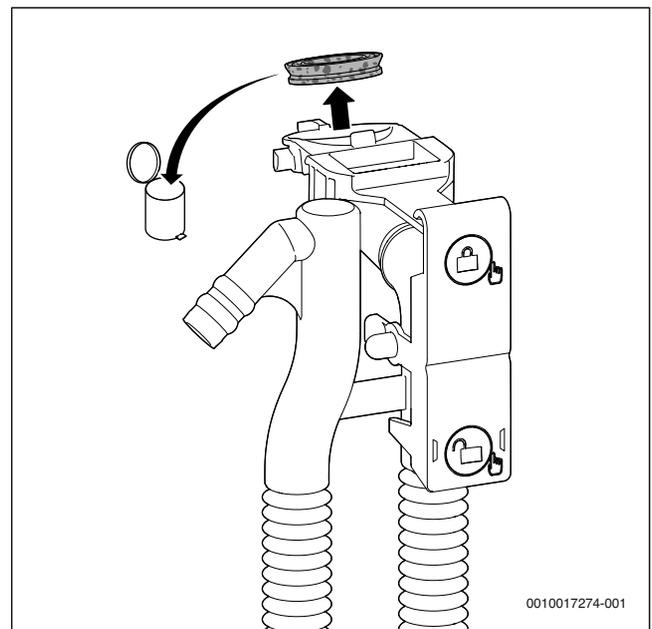


Fig. 73 Removing the gasket on the top of the condensate trap

- ▶ Align the gasket correctly with the condensate trap.

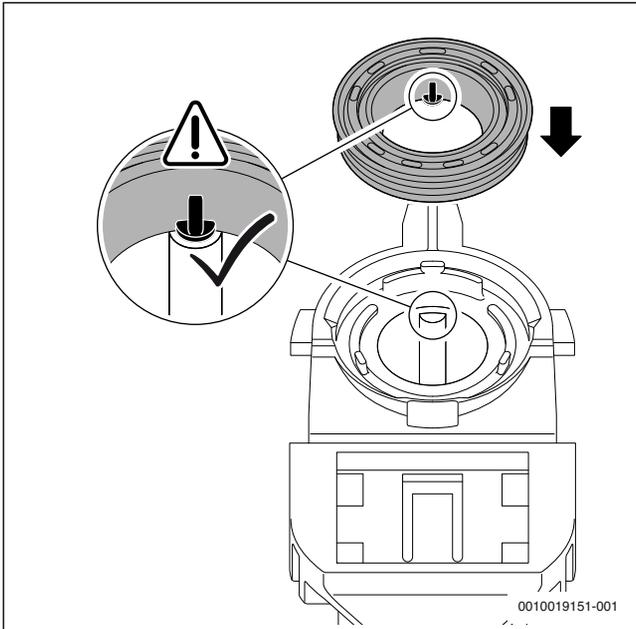


Fig. 74 Aligning the gasket with the condensate trap

- ▶ Push on the gasket in the sequence shown. When the gasket is correctly inserted, the pin is visible in the recess and is flush with the top edge of the gasket.

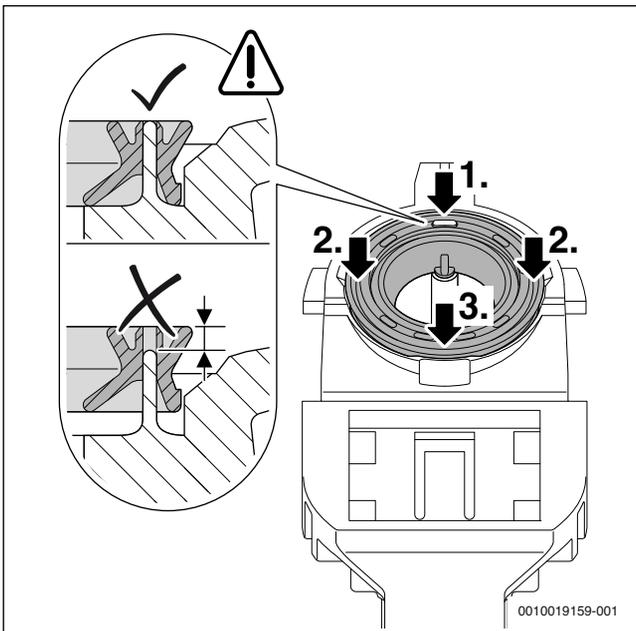


Fig. 75 Pressing on the gasket

- ▶ Replace the condensate trap and check for tightness.
- ▶ Check the condensate hose and clean if required.
- ▶ Grease the hose during assembly and check tightness of connection.

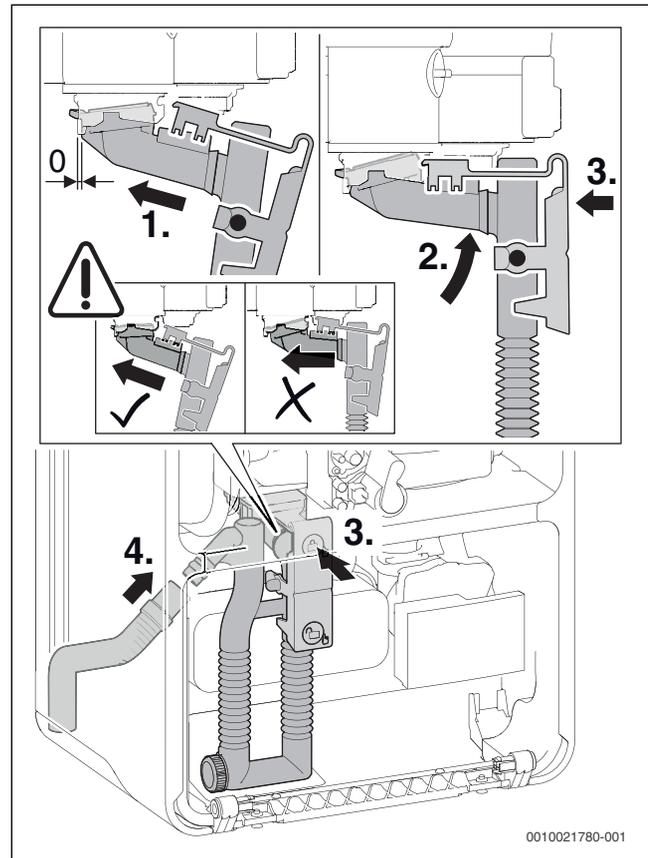


Fig. 76 Inserting the condensate trap

- ▶ Fill the condensate trap with approximately 150 ml water.

9.9 Setting the air/gas ratio

NOTICE:

Setting the air/gas ratio

- ▶ The air/gas ratio is factory set and should not need to be adjusted. If found to be out of tolerance and when all other possible causes have been checked, please contact the Worcester Bosch Group helpline 0330 123 3366.

NOTICE:

Combustion testing

- ▶ The checking of the air/gas ratio **must** be carried out by a competent registered gas engineer, such as a Gas Safe registered engineer or British Gas engineer.
- ▶ Checking of the air/gas ratio **must not** be attempted unless the person carrying out the test is equipped with a flue gas analyser conforming to BS7927 and is competent in its use.



All CO/CO₂ readings must be taken with the combustion chamber cover ON.
Adjustments can only be made with the cover off.



CO₂ should be measured 10 minutes after firing the appliance.

Adjusting the minimum rated output settings

With the appliance in minimum rated output.

- ▶ Remove the seal from the adjusting screw of the gas valve (only gas valve is shown in the below Figure 77) and set the CO₂ or O₂ content for minimum rated output.

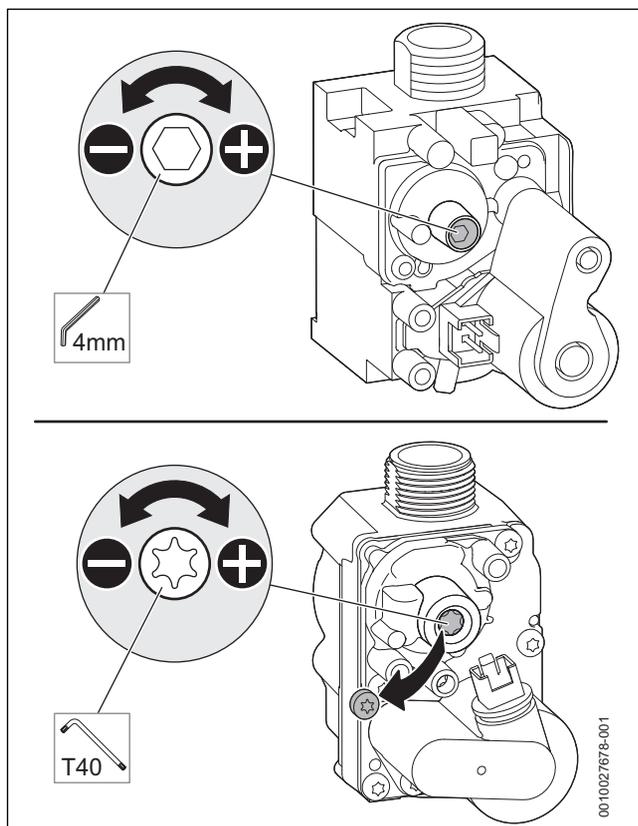


Fig. 77 Setting the CO₂ or O₂ content (above: SIT valve, below: Honeywell valve)

- ▶ Re-check settings at maximum and minimum rated output and re-adjust if required.
- ▶ Seal the gas valve minimum adjustment.
- ▶ Exit the chimney sweep mode.
- ▶ Enter the CO₂ contents in the servicing record.

10 Replacement parts



WARNING:

Mains supplies - Isolate the appliance

- ▶ Turn off the gas supply and isolate the mains electrical supply before starting any work and observe all relevant safety precautions.
- ▶ Drain the appliance/system where necessary and protect any electrical equipment from water ingress during component replacement.



WARNING:

Component replacement:

- ▶ After replacement of a gas carrying component, where a gasket or seal has been disturbed or replaced, check for gas tightness using a gas sniffer/leak detection fluid.
- ▶ On re-assembly check all affected seals for cracks, hardness and deterioration.
 - If damaged or in any doubt the seal must be replaced.
- ▶ Also after re-assembly, carry out the following checks:
 - Fan pressure.
 - Flue gas analysis.



Only use Worcester, Bosch Group original spare parts with this appliance. Non Worcester, Bosch Group original spare parts will invalidate the guarantee (if applicable) and any warranty.

- ▶ A comprehensive list of appliance spares can be found on the website www.worcester-bosch.co.uk/spares

10.1 Component access

Removing the front casing



The front casing is secured with two screws to prevent unauthorised removal (electrical safety).

- ▶ Always secure the casing with these screws.
- ▶ Loosen the two screws [1] and pull the bottom of the casing forward.
- ▶ Lift off the casing.

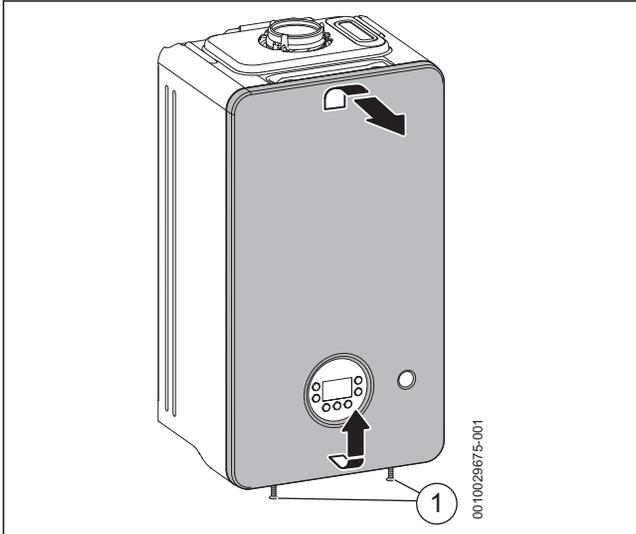


Fig. 78 Removing the front casing

10.2 Draining the appliance

NOTICE:

Risk of water damage to appliance or property!

Damage from disconnecting water pathways which may have retained some water.

- ▶ Take care after draining the appliance to protect equipment/property from residual water content within components.

Many of the tasks in this section require that the appliance be isolated and drained. This will be indicated in the manual if required.

Refer to figure 79.

- ▶ Open the drain plug using a 8mm hex key; use a suitable container to collect any water.

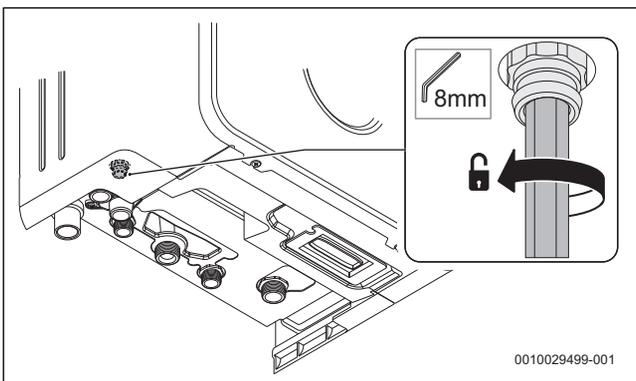


Fig. 79 Drain point

10.3 Checking the strainer in the cold water pipe

1. Remove the clip.
2. Pull out the pressure relief valve.

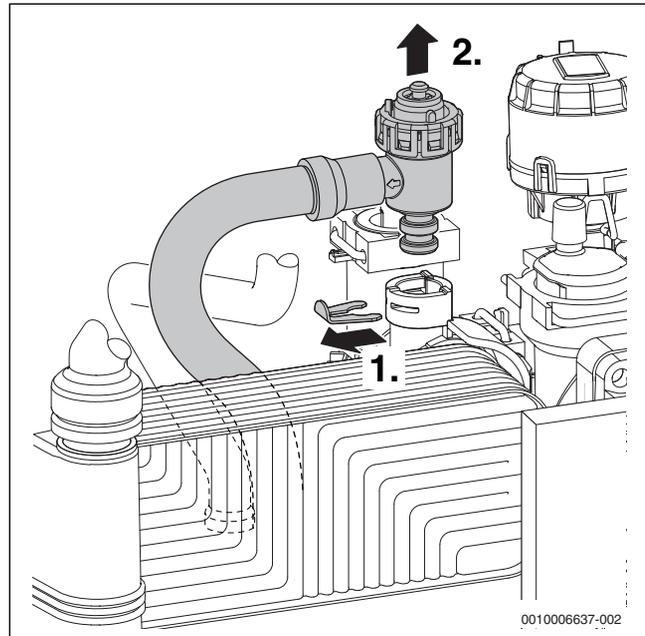


Fig. 80 Remove the pressure relief valve (heating circuit)

1. Remove the clip.
2. Pull out the insert.
3. Check strainer for contamination.

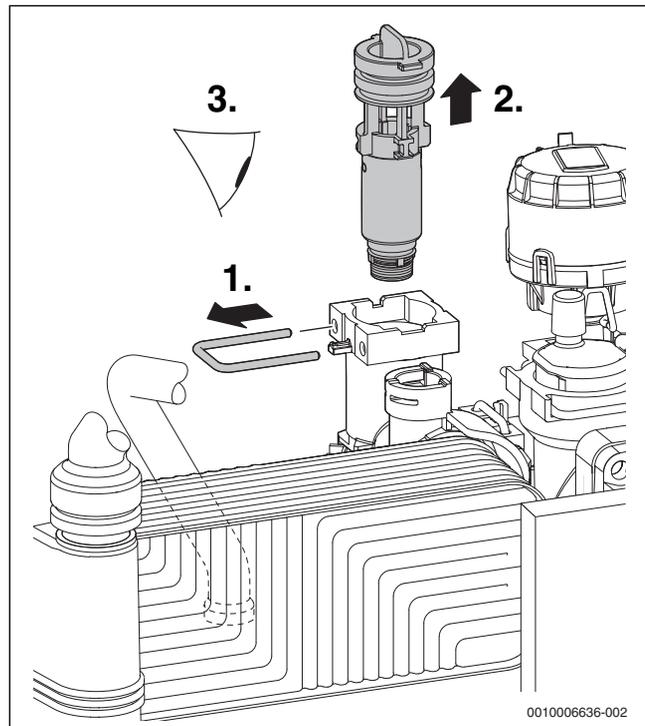


Fig. 81 Checking the strainer in the cold water pipe

10.4 Checking the plate heat exchanger

If the DHW output is insufficient:

- ▶ Check the strainer in the cold water pipe for contamination.
- ▶ Remove the plate heat exchanger and replace if necessary.

1. Remove the screw.
2. Remove the plate heat exchanger.

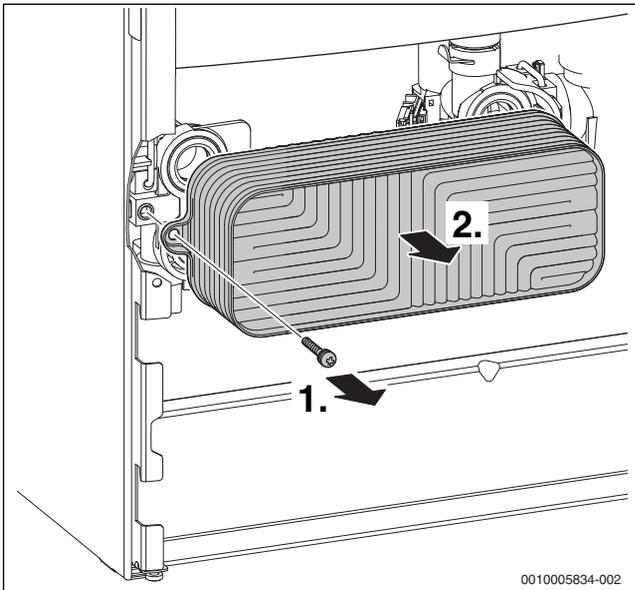


Fig. 82 Removing the plate heat exchanger

10.5 Checking the expansion vessel

The expansion vessel must be checked every year.

- ▶ If necessary, adjust the expansion vessel pre-charge pressure to the static head of the heating system.

10.6 Adjusting the operating pressure of the heating system

Display on the pressure gauge	
1 bar	Minimum charge pressure (when system is cold)
1 - 1.5 bar	Optimal charge pressure
3 bar	Maximum charge pressure at maximum heating water temperature must not be exceeded (pressure relief valve opens).

Table 30

If the indicator is below 1 bar when the system is cold:

- ▶ Top up the water until the indicator is between 1 bar and 1.5 bar again.

If pressure is not being maintained:

- ▶ Check tightness of expansion vessel and heating system.

10.7 Removing the gas valve

- ▶ Close gas isolator.
- ▶ Unplug the plug.
- ▶ Undo the union nut on the top of the gas valve.
- ▶ Pull off the gas hose and pressure reducer.
- ▶ Undo the union nut on the bottom of the gas valve.

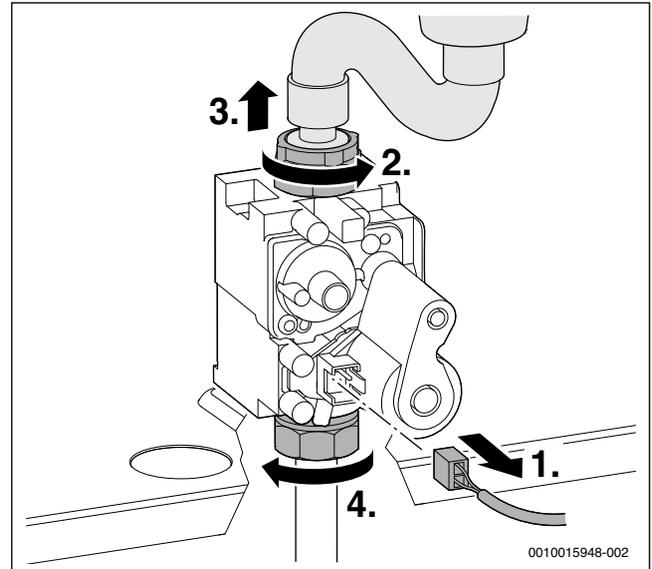


Fig. 83 Pull of the plug and undo the union nuts

- ▶ Remove 2 screws and take off gas valve.

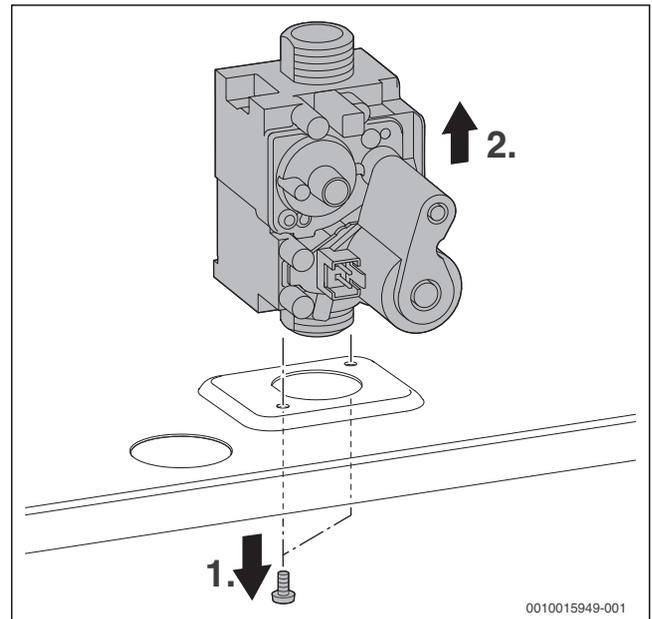


Fig. 84 Removing the gas valve

- ▶ Install the gas valve in reverse order, and check the gas/air ratio.

10.8 Removing the pump

- ▶ Unplug the electrical plug [5].
- ▶ Disconnect nut connection [1] between pump and heatcell.
- ▶ Remove clip [3] between diverter valve manifold and pump assembly.
- ▶ Remove 2 x T20 (Torx) screws [4] from the bottom plate of the appliance.
- ▶ Remove pump assembly [2].

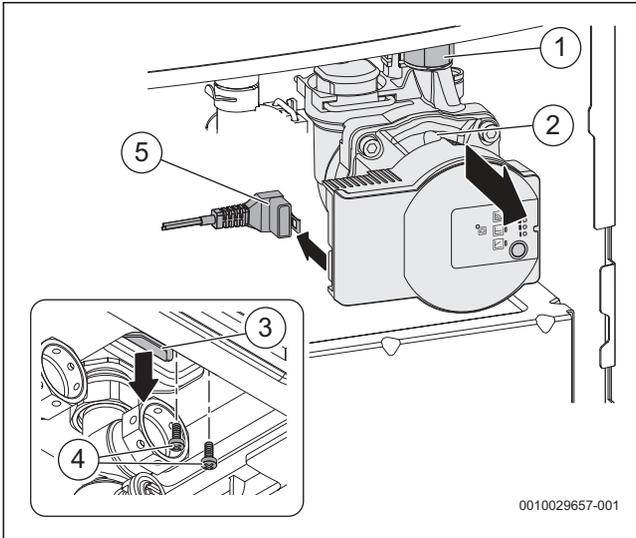


Fig. 85 Removing the pump

10.9 Removing the automatic air vent valve

1. Remove the clip.
2. Pull out the automatic air vent valve.

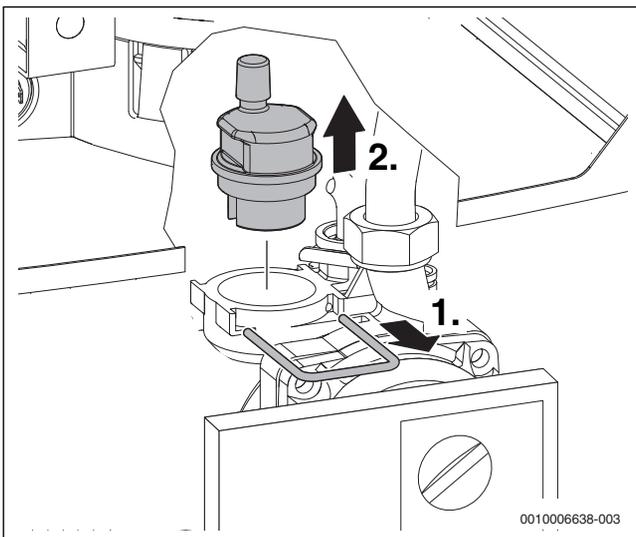


Fig. 86 Removing the automatic air vent valve

10.10 Removing the motor of the diverter valve

- ▶ Removing the automatic air vent valve
- ▶ Removing the motor of the diverter valve:
 1. Undo clip.
 2. Remove the motor of the diverter valve.

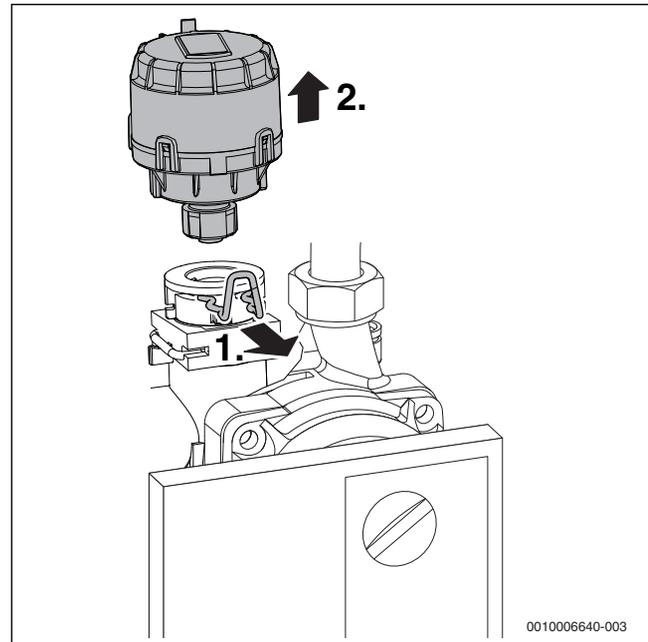


Fig. 87 Removing the motor of the diverter valve

- ▶ Press the cable retaining clip and remove the plug.

10.11 Removing the heat exchanger

- ▶ Remove the fan, gas hose and mixing device (→ Chapter , page 50).
- 1. Remove the clip.
- 2. Detach the flow pipe.
- 3. Disconnect the cable from the flow temperature sensor on the heat exchanger.
- 4. Disconnect the cable from the flue gas temperature limiter.
- 5. Remove the nut.

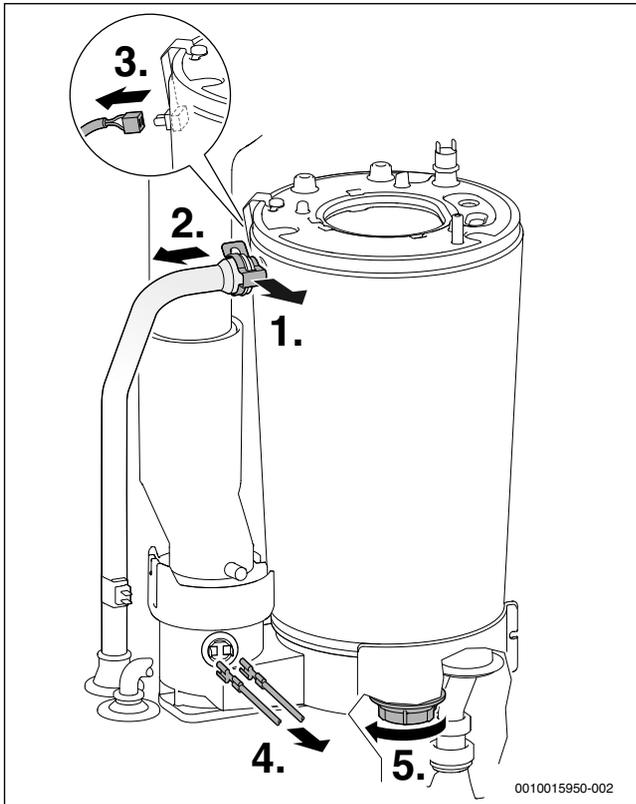


Fig. 88 Detach the flow pipe and disconnect the cable

- 1. Unclip the flue pipe.
- 2. Push the flue pipe up.
- 3. Remove the heat exchanger.

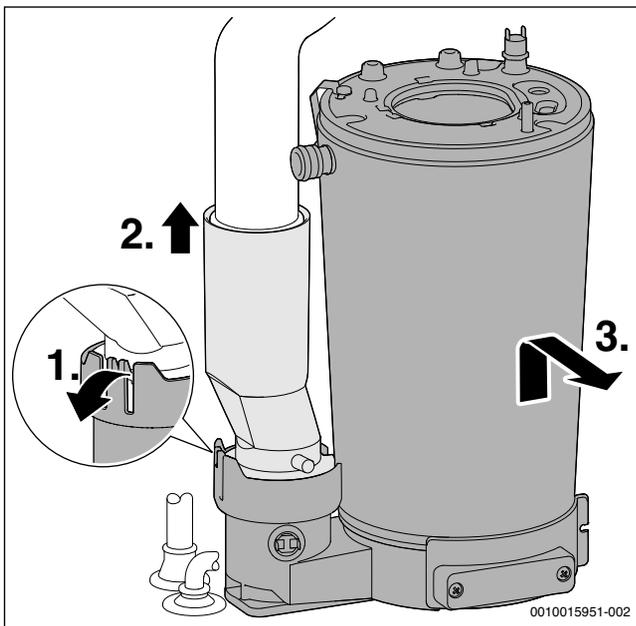


Fig. 89 Removing the heat exchanger

10.12 Replacing the control unit



The devices are delivered without code plug.

- ▶ When replacing the control unit, ensure the code plug supplied is used.
- ▶ Flip the electronics panel down (→ Fig. 46 page 34).
- ▶ Replace the control unit.

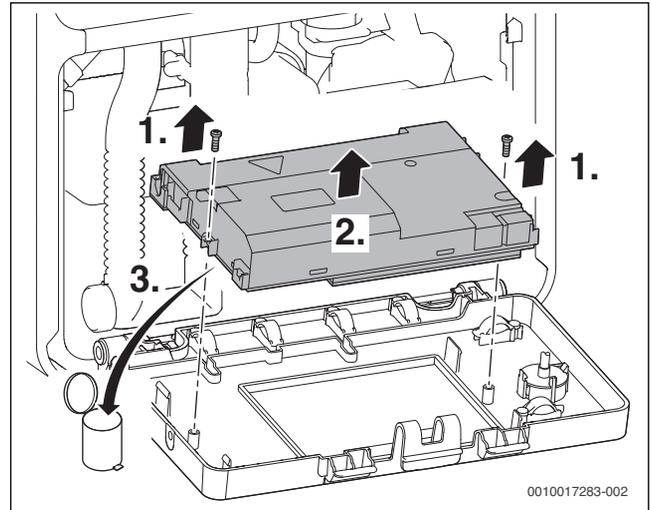


Fig. 90 Replacing the control unit

- ▶ Open the cover on the enclosure of the appliance electronics.
- ▶ Insert the code plug.

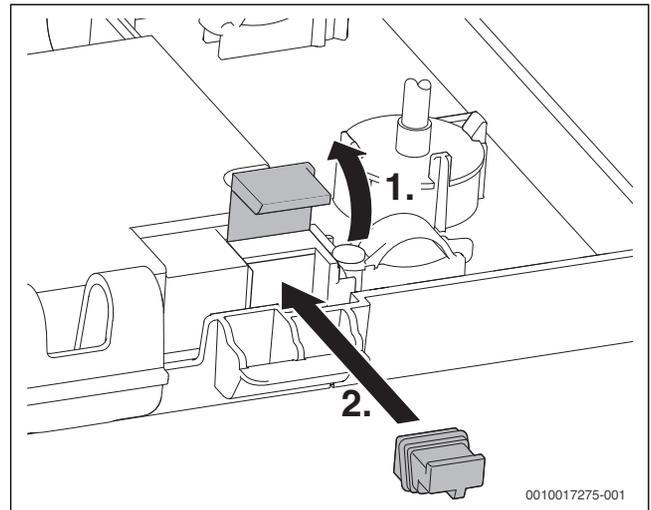


Fig. 91 Inserting the code plug

10.13 Reattaching the casing on the side

- ▶ Align the side panel so that the underside can be guided along the flange.
- ▶ Push the side panel towards the rear.
- ▶ Tighten the fixing screws.

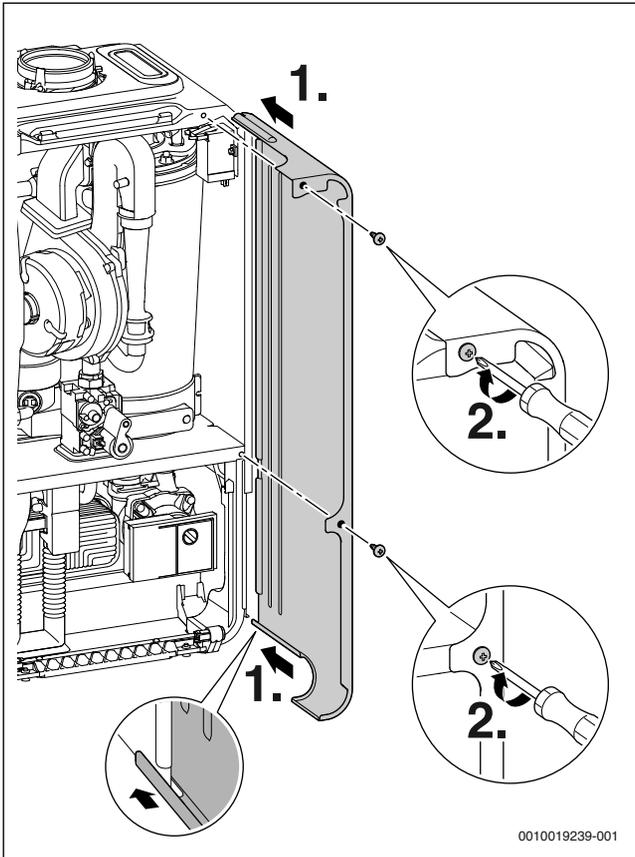


Fig. 92 Attaching the side panel

11 Fault finding and diagnosis



This fault finding information is for guidance only. Worcester cannot be held responsible for costs incurred by persons not deemed to be competent.



This fault finding system assumes that the appliance has been operating normally until the time of failure (i.e. not a first time installation error).

Basic checks

- Ensure that there is 230V power supply and the polarity is correct to the appliance.
- Ensure that the appliance settings and functionality is correct.
- Ensure the CH/DHW programmer/timer is functioning.
- Ensure the room thermostat is functioning.
- Ensure the cylinder thermostat (if fitted) is functioning.
- Ensure the cold water mains is turned on.
- Ensure the primary system has adequate pressure/system content for the system type.
- Ensure there is gas to the appliance.
 - Are other gas appliances working, gas cooker/hob for example?
 - Has the credit run out on the gas pre-payment meter?

NOTICE:

On completion of the Service/Fault-Finding task which has required the breaking and remaking of electrical connections, check:

- ▶ Earth continuity,
- ▶ Short circuit check,
- ▶ Polarity
- ▶ Resistance to earth.

11.1 General information

Indicators (fault category O)

Indicators signal operating conditions during normal operation. Indicators can be read out with the service function 1-A1.

Non-blocking faults (fault category R)

The heating system remains in operation with non-blocking faults. The symbol is shown on the display.

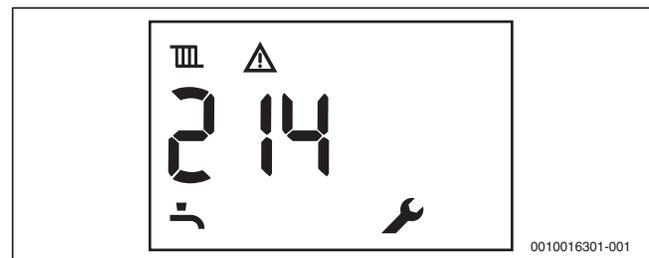


Fig. 93 Example: non-blocking fault

Resetting a non-blocking fault

- ▶ Press the key until the and symbols are displayed. The fault code with the smallest number is displayed.
- ▶ To select a fault code: press arrow key or .
- ▶ To delete the fault code: press the **OK** key.
- ▶ Follow the same procedure to delete further fault codes.

Blocking faults (fault category B)

Blocking faults result in the heating system being shut down temporarily. The heating system restarts automatically as soon as the blocking fault is removed.

The fault code of a blocking fault can be read out with the service function 1-A2.

Fault category V: locking faults

Locking faults result in the heating system being shut down, and the system can only be restarted after a reset.

The fault code of a locking fault flashes together with the on the display.

- ▶ Turn the power to the boiler off and on again.

-or-

- ▶ Press the arrow keys and at the same time until the symbols and disappear. The device resumes operation. The flow temperature is displayed.

If a fault persists:

- ▶ Check PCB, replace if required.
- ▶ Adjust the service functions as directed on the “Settings in the service menu” label.

11.2 Table of operation and fault displays

Fault code	Fault category	Description	Remedy
200	O	The device is in central heating mode.	–
201	O	The appliance is in DHW mode.	–
202	O	The appliance is in optimised switching mode: the interval for restarting the burner has not yet expired (→ service function 3-b2).	–
203	O	The appliance is on standby, there is no heat demand.	–
204	O	The current flow temperature is higher than the set flow temperature. The burner has been switched off.	–
207	–	Operating pressure too low.	<ul style="list-style-type: none"> ▶ Fill and vent the system, check the system for leaks. ▶ Replace pressure sensor if necessary.
208	O	The appliance is in chimney sweep mode. Chimney sweep mode is deactivated automatically after 30 minutes.	–
212	–	Temperature increase for safety or flow temperature sensor too fast.	<ul style="list-style-type: none"> ▶ Open the shut-off valves.
214	V	The fan stops during the safety time.	<ul style="list-style-type: none"> ▶ Check fan, replace if necessary. ▶ Check mains voltage.
215	V	Fan too fast.	<ul style="list-style-type: none"> ▶ Replace fan. ▶ Mains voltage must correspond to the default value. ▶ Check PCB and fan harness, replace if necessary.
224 224	B V	Flue gas temperature limiter or heat exchanger temperature limiter has tripped.	<p>If the blocking fault persists for a prolonged period, it becomes a locking fault.</p> <ul style="list-style-type: none"> ▶ Check position of isolation valve in heating circuit, open if required. ▶ Check water pressure, if necessary top up until the preset pressure is reached. ▶ Check the temperature limiter and connecting lead of the heat exchanger for breaks, replace if required. ▶ Check the flue gas temperature limiter and the connecting lead for breaks, replace if required. ▶ Vent appliance with service function 4-A1 (→ page 45).
227 227	B V	No flame detected.	<p>After the 5th ignition attempt, the blocking fault becomes a locking fault.</p> <ul style="list-style-type: none"> ▶ Check whether the gas isolator is open. ▶ Check the gas supply pressure. ▶ Check ionisation signal. ▶ Check the power supply. ▶ Check the electrodes with cable, replace if required. ▶ Check the flue system, clean or repair if required. ▶ Check gas/air ratio, adjust if necessary. ▶ Clean heat exchanger. ▶ Check the gas valve, replace if required. ▶ Check burner setting, correct if necessary.
228	V	Flame signal is present although burner is switched off.	<ul style="list-style-type: none"> ▶ Check if there is a flame present. ▶ Check electrodes and connecting leads, replace if required. ▶ Check the gas valve, replace if required. ▶ Check appliance electronics, replace if necessary.

Fault code	Fault category	Description	Remedy
229	B	Flame lost during burner operation.	<ul style="list-style-type: none"> ▶ Check the main shut-off valve, open if necessary. ▶ Check the appliance isolation valve, open if necessary. ▶ Measure the gas supply pressure at the rated heat input. If necessary, shut down the appliance and check the gas line. ▶ Check flame sense electrode and connecting lead, replace if required. ▶ Check venturi/injector for potential blockage. ▶ Measure the ionisation current. ▶ Check the protective conductor connection in the control unit. ▶ Check the ignition cable for damage, replace if necessary. ▶ Check functionality of gas valve and replace if necessary. ▶ Check burner setting value at rated heat input. ▶ Check burner setting value at the lowest output. ▶ Check flue system. ▶ Check combustion air supply. ▶ Check the heat exchanger on the flue gas side for deposits, clean if necessary.
232	B	Heat source locked by external switching contact.	<ul style="list-style-type: none"> ▶ Connect the plug for the external switching contact. ▶ Install jumper/check condensate pump according to manufacturer's specifications. ▶ Adapt switching point of the external temperature switch to the system. ▶ Replace connecting lead to the external temperature switch. ▶ Replace external temperature switch.
233	V	Fault in code plug or appliance electronics.	<ul style="list-style-type: none"> ▶ Check whether code plug is installed. ▶ Check appliance electronics, replace if necessary.
234	V	Electrical fault in gas valve.	<ul style="list-style-type: none"> ▶ Check the connecting lead, replace if required. ▶ Check the gas valve, replace if required.
235	V	Version conflict between appliance electronics and code plug.	<ul style="list-style-type: none"> ▶ Check software version of appliance electronics and code plug. ▶ Replace appliance electronics or code plug.
237	V	System fault.	<ul style="list-style-type: none"> ▶ Check and replace code plug. ▶ Check and replace the appliance electronics.
238	V	appliance electronics faulty.	<ul style="list-style-type: none"> ▶ Check and replace the appliance electronics.
242	V	System fault, appliance electronics.	<ul style="list-style-type: none"> ▶ Reset control appliance / burner control unit - factory reset. ▶ Reconnect electrical connections at control unit / burner control unit correctly. ▶ Replace the control unit/burner control unit.
244	V	System fault, appliance electronics / basic controller.	<ul style="list-style-type: none"> ▶ Reset control unit / burner control unit - factory reset. ▶ Reconnect electrical connections at control unit / burner control unit correctly. ▶ Replace the control unit/burner control unit.
246 247 257	-	Internal burner control fault.	<ul style="list-style-type: none"> ▶ Reset burner control - factory reset. ▶ Check electrical connections of burner control. ▶ Replace burner control.
245 249 250 251 252 253 254	V	System fault, appliance electronics.	<ul style="list-style-type: none"> ▶ Reset appliance electronics - factory reset. ▶ Check electrical connections. ▶ Replace the appliance electronics.
256	V	System fault, appliance electronics / basic controller.	<ul style="list-style-type: none"> ▶ Reset control unit / burner control unit - factory reset. ▶ Reconnect electrical connections at control unit / burner control unit correctly. ▶ Replace the control unit/burner control unit.
258	V	Internal fault in control unit.	<ul style="list-style-type: none"> ▶ Reset control unit - factory reset. ▶ Reconnect electrical connections at control unit correctly. ▶ Replace control unit.
259 262 263	V	System fault, appliance electronics.	<ul style="list-style-type: none"> ▶ Reset appliance electronics - factory reset. ▶ Check electrical connections. ▶ Replace the appliance electronics.

Fault code	Fault category	Description	Remedy
264	B	Air feed failed during operating phase.	<ul style="list-style-type: none"> ▶ Reconnect the fan plug properly, perform reset. ▶ Replace fan. ▶ Mains voltage must correspond to the default value. ▶ Remove any blockages in the flue system. ▶ Check venturi/injector for potential blockage.
265	BC	Heat energy demand lower than energy supplied.	–
268	–	Component test mode.	Not applicable, is status message.
269	V	Flame monitoring.	<ul style="list-style-type: none"> ▶ Reset appliance electronics - factory reset. ▶ Replace the appliance electronics. ▶ Check flame sense electrodes and connections. ▶ Check earth connections.
270	BC	The heat source has started up.	–
273	O	Operation interrupted: safety inspection following 24 hours of continuous operation.	–
275	O	Test code plug detected.	–
281	–	Pump stuck or running dry.	<ul style="list-style-type: none"> ▶ Replace the pump. ▶ Vent the system. ▶ Check operating pressure. ▶ Check low pressure switch. ▶ Check pump connections (hydraulic and electrical).
305	BC	Boiler cannot start temporarily following DHW priority.	System appliance only.
306	V	After switching gas off: Flame is detected.	<ul style="list-style-type: none"> ▶ Check the gas valve, replace if required. ▶ Check electrodes and connecting leads, replace if required. ▶ Replace the appliance electronics.
323	–	Control communication fault.	–
328	V	Mains voltage briefly interrupted.	▶ Check for voltage interruption between electrical wiring system of the building and the appliance.
341	B	Heat source temperature increase too rapid.	<ul style="list-style-type: none"> ▶ Open isolation valves. ▶ Connect plug to pump. ▶ Replace pump. ▶ Ensure circulating pump is set on Constant speed mode - curve III.
342	BC	Temperature increase in DHW mode too rapid.	<ul style="list-style-type: none"> ▶ If the water pressure is too low, top up with water and vent the system. ▶ Open service valves in the cylinder charging circuit. ▶ Replace the diverter valve / cylinder primary pump.
350	B	Flow temperature sensor short circuit.	<ul style="list-style-type: none"> ▶ Check and replace flow temperature sensor and harness → Section 13.2.1. ▶ Check and replace the connecting lead to the flow temperature sensor. ▶ Check and replace control unit/burner control unit.
351	B	Flow temperature sensor failure.	<ul style="list-style-type: none"> ▶ Connect the plug to the flow temperature sensor. ▶ Check and replace flow temperature sensor and harness → Section 13.2.1. ▶ Check and replace the connecting lead to the flow temperature sensor. ▶ Check and replace control unit/burner control unit.
356	B	Supply voltage for heat source too low.	▶ Establish supply voltage of at least 196 VAC.
357	BC	Venting program	–
358	BC	Active anti-seizing function.	Blocking protection for the heating pump and diverter valve active
360	V	Incorrect code plug.	▶ Check code plug, replace if necessary.
362	V	Service code plug detected.	▶ Check code plug, replace if necessary.
363	V	System fault, appliance electronics: fault when testing the ionisation signal.	<ul style="list-style-type: none"> ▶ Check earthing connections. ▶ Reset appliance electronics, replace if necessary.
364	V	Solenoid valve EV2 leaking.	<ul style="list-style-type: none"> ▶ Check the gas valve, replace if required. ▶ Check electrodes and connecting leads, replace if required. ▶ Check and replace the appliance electronics.
365	V	Solenoid valve EV1 leaking.	<ul style="list-style-type: none"> ▶ Check the gas valve, replace if required. ▶ Check electrodes and connecting leads, replace if required. ▶ Check and replace the appliance electronics.

Fault code	Fault category	Description	Remedy
604	V	System fault, burner control unit.	<ul style="list-style-type: none"> ▶ Reset appliance - factory reset. ▶ If the fault persists following a reset, the burner control unit is faulty and must be replaced.
810	–	DHW temperature has not increased for 2 hours.	<ul style="list-style-type: none"> ▶ Prevent water from escaping. ▶ Position DHW temperature sensor correctly. ▶ If no voltage can be measured, then the MC10 control panel is faulty and must be replaced. ▶ If power is being supplied to the DHW cylinder charge pump but it is still not running, it is faulty and must be replaced. ▶ If power cannot be supplied to the DHW cylinder charge pump, then there is a problem in the cable between the control panel and pump. Check screw terminals and cables. ▶ If current is not being supplied to the 3-way valve, there is a problem in the cable between the control panel and valve. Check screw terminals and cables. ▶ If current is being supplied to the 3-way valve but it is still not working, the valve is faulty and must be replaced. ▶ If a voltage of approx. 230 V is measured at the terminals and the pump is not running, the pump is faulty and must be replaced. ▶ Eliminate all faults in the cables. Vent if necessary. ▶ Replace the pump if there are any deviations whatsoever. ▶ Set the DHW heating to "Priority". ▶ If readings are different to the values in the table, replace the sensor.
815	R	Faulty low loss header temperature sensor.	<ul style="list-style-type: none"> ▶ Check the sensor port. ▶ Check the temperature sensor for incorrect installation position or breakage.
1013	R	Maximum combustion point reached.	<ul style="list-style-type: none"> ▶ Check plausibility of displayed cylinder temperature. ▶ Check plug-in connectors and cable harness for contact. ▶ Replace cylinder temperature sensor.
1014	–	Ionisation current is too low.	–
1017	R	Water pressure too low.	<ul style="list-style-type: none"> ▶ Check water pressure, if necessary top up until the preset pressure is reached. ▶ Check pressure sensor, replace if required.
1018	W	Service time expired.	▶ Carry out maintenance.
1021	R	DHW temperature sensor faulty.	<ul style="list-style-type: none"> ▶ Check plug, connect correctly. ▶ Check installation position of temperature sensor, mount correctly if required. ▶ Check temperature sensor, replace if necessary (→ Tab. 36, page 70). ▶ Check connecting lead for breaks or short circuits, replace if required. ▶ Check and replace the appliance electronics.
1022	–	DHW temperature sensor is faulty.	–
1023	R	Maximum operation time including standby is reached.	▶ Perform inspection.
1065	R	Pressure sensor faulty or not connected.	<ul style="list-style-type: none"> ▶ Check plug, connect correctly. ▶ Check pressure sensor, replace if required. ▶ Check connecting lead for breaks or short circuits, replace if required. ▶ Check and replace the appliance electronics.
1068	R	Outside temperature sensor faulty.	<ul style="list-style-type: none"> ▶ Remedy contact problem. ▶ Replace the sensor.
1073	R	Flow temperature sensor short circuit.	<ul style="list-style-type: none"> ▶ Check flow temperature sensor, replace if necessary. ▶ Check connecting lead for short circuits, replace if required. ▶ Check and replace the appliance electronics.
1074	R	No signal from the flow temperature sensor.	<ul style="list-style-type: none"> ▶ Check plug, connect correctly. ▶ Check flow temperature sensor, replace if necessary. ▶ Check connecting lead for breaks, replace if required. ▶ Check and replace the appliance electronics.
1075	R	Short circuit in heat exchanger temperature limiter.	<ul style="list-style-type: none"> ▶ Check heat exchanger temperature limiter, replace if required. ▶ Check connecting lead for short circuits, replace if required. ▶ Check and replace the appliance electronics.

Fault code	Fault category	Description	Remedy
1076	R	No signal from heat exchanger temperature limiter.	<ul style="list-style-type: none"> ▶ Check plug, connect correctly. ▶ Check heat exchanger temperature limiter, replace if required. ▶ Check connecting lead for breaks, replace if required. ▶ Check and replace the appliance electronics.
2051	–	Internal fault.	<ul style="list-style-type: none"> ▶ Disconnect power from the system for 30 seconds. ▶ Check and replace control unit. ▶ Notify customer service.
2085	V	Internal fault in burner control unit.	▶ Reset appliance.
2908	V		▶ If the fault persists following a reset, the burner control unit is faulty and must be replaced.
2909	–	System fault, appliance electronics / basic controller	▶ If the fault persists following a reset, the burner control unit or Key (including interconnecting leads) is faulty and must be replaced.
2910	V	Fault in flue system.	<ul style="list-style-type: none"> ▶ Check whether a flue system is connected, install if required. ▶ Check for unobstructed cross-section of flue system, remove deposits if required.
2911	–	Calibration failed.	▶ Replace faulty component.
2912	–	No flame signal during calibration.	▶ Replace faulty component.
2913	–	Flame signal too low during calibration.	▶ Check and replace flame sense electrodes (and interconnecting leads).
2914	–	System fault, appliance electronics.	▶ If the fault persists following a reset, the appliance control unit is faulty and must be replaced.
2915	V	System fault, appliance electronics.	<ul style="list-style-type: none"> ▶ Reset appliance. ▶ If the fault persists following a reset, the control unit is faulty and must be replaced.
2916	V	System fault, appliance electronics.	<ul style="list-style-type: none"> ▶ Reset appliance. ▶ Trigger heat demand. ▶ End heat demand. If the fault persists, the control unit is defective and must be replaced.
2917	V	No flame signal when checking the combustion control.	<ul style="list-style-type: none"> ▶ Disconnect power and then reconnect. ▶ Trigger heat demand. ▶ Wait 5 minutes. ▶ If the fault re-occurs within that time, reset the appliance without disconnecting the supply voltage. This triggers a calibration of the ionisation circuits. ▶ If the fault is still present after the calibration, the control unit is faulty and must be replaced.
2918	–	Fault in the flue.	▶ Clean the siphon and drain water out of the appliance (gas side).
2920	V	Flame monitoring fault.	<ul style="list-style-type: none"> ▶ Check electrodes and connecting leads, replace if required. ▶ Check earthing connections. ▶ Check appliance electronics, replace if necessary.
2921	B	The appliance is in test mode (→ Menu 5, page 46).	–
2922	–	Internal burner control fault.	▶ Check and replace control unit.
2923	V	System fault, appliance electronics.	▶ Reset appliance - factory reset.
2924	V		▶ If the fault persists following a reset, the appliance electronics are faulty and must be replaced.
2925	V	System fault, appliance electronics.	▶ Check the gas valve, replace if required.
2926	V		▶ Check appliance electronics, replace if necessary.

Fault code	Fault category	Description	Remedy
2927	B	No flame detected during ignition.	<ul style="list-style-type: none"> ▶ Check the main shut-off valve, open if necessary. ▶ Check the appliance isolation valve, open if necessary. ▶ Measure the gas supply pressure at the rated heat input. If necessary, shut down the appliance and check the gas line. ▶ Check flame sense electrode and connecting lead, replace if required. ▶ Check venturi/injector for potential blockage. ▶ Measure the ionisation current. ▶ Check the protective conductor connection in the control unit. ▶ Check the ignition cable for damage, replace if necessary. ▶ Check functionality of gas valve and replace if necessary. ▶ Check burner setting value at rated heat input. ▶ Check burner setting value at the lowest output. ▶ Check flue system. ▶ Check combustion air supply. ▶ Check the heat exchanger on the flue gas side for deposits, clean if necessary.
2932	-	Internal fault.	<ul style="list-style-type: none"> ▶ Restart the appliance.
2928	V	Internal fault in burner control unit.	<ul style="list-style-type: none"> ▶ Reset appliance - factory reset.
2930	V		<ul style="list-style-type: none"> ▶ If the fault persists following a reset, the burner control unit is faulty and must be replaced.
2931	V		
2940	V		
2941	B	Insufficient flow rate in heat source.	<ul style="list-style-type: none"> ▶ Check plug of flow temperature sensor, connect correctly if required. ▶ Check flow temperature sensor, replace if necessary. ▶ Check pump for blockage, clear if required. ▶ Check pump settings, correct if required. ▶ Check water pressure, if necessary top up until the preset pressure is reached.
2942	-	No fan speed feedback.	<ul style="list-style-type: none"> ▶ Connect plug for speed control to the fan. ▶ Connect plug for power supply to the fan. ▶ Check fan harness. ▶ Check and replace control unit.
2943	-	Mains voltage too low.	<ul style="list-style-type: none"> ▶ Establish supply voltage of at least 196 VAC.
2945	V	Too many short heat demands in a short time.	<ul style="list-style-type: none"> ▶ Reset appliance - factory reset. ▶ Increase restart blocking time. ▶ Make sure that at least one thermostatic valve is open. ▶ Check and replace faulty heating pump. ▶ Check diverter valve functionality, replace if necessary.
2946	V	Incorrect code plug.	<ul style="list-style-type: none"> ▶ Check code plug, replace if necessary.
2947	R	Anti-seizing function is activated.	The function stops automatically.
2948	B	No flame signal with low output.	<p>The burner restarts automatically after purging.</p> <ul style="list-style-type: none"> ▶ Check CO₂ settings.
2949	B	No flame signal with high output.	<p>The burner restarts automatically after purging.</p> <ul style="list-style-type: none"> ▶ Check burner gaskets, replace if required. ▶ Check CO₂ settings.
2950	B	No flame signal following starting procedure.	<ul style="list-style-type: none"> ▶ Check CO₂ settings, adjust if necessary. ▶ Check Burner and heat exchanger gaskets ▶ Check gas pressure during burning at full load ▶ Burner restarts automatically after purging
2951	V	Loss of flame too frequent.	<ul style="list-style-type: none"> ▶ Refer to the blocking error(s) that lead to this locking error. Check the fault history on appliance. ▶ Possible purging of gas pipe incomplete. ▶ Could also indicate a wide variety of issues such as pipework undersized or gas pressure dropping off, incorrectly routed condensate drains, incorrectly sited flues, incorrectly wired etc.
2952	V	Internal fault when testing the ionisation signal.	<ul style="list-style-type: none"> ▶ Restart appliance to see if problem re-occurs. ▶ If the fault remains after resetting, the burner controller (PCB) is defective

Fault code	Fault category	Description	Remedy
2953	B	No flame signal with low output.	The burner starts automatically after cleaning (purge). Possible cause high winds. <ul style="list-style-type: none"> ▶ If the fault occurs repeatedly, check the settings of the CO₂ values. ▶ Check Flue integrity. ▶ Check flue terminal.
2954	B	No flame signal with high output.	Burner restarts automatically after purging. <ul style="list-style-type: none"> ▶ Check and replace burner gaskets. ▶ Reduce burner load. ▶ If the fault occurs repeatedly, check the settings of the CO₂ values. ▶ Check Flue integrity. ▶ Check flue terminal.
2955	B	The heat source does not support the specified parameters for the hydraulic configuration.	<ul style="list-style-type: none"> ▶ Check hydraulic configuration, correct if necessary. ▶ Check menu L2, default setting 0 required.
2956	O	Hydraulic configuration at the heat source is activated.	–
2957 2958	V V	System fault, appliance electronics.	<ul style="list-style-type: none"> ▶ Reset appliance electronics. ▶ Check electrical connections. ▶ Check and replace the control unit.
2959 2960	B B	System fault, appliance electronics.	<ul style="list-style-type: none"> ▶ Check and replace the control unit and code plug.
2961 2962	V V	No signal from fan.	<ul style="list-style-type: none"> ▶ Check mains voltage to fan. ▶ Check fan harness for continuity, replace if required. ▶ Check the Pulse width modulation (PWM). ▶ Check and replace the fan. ▶ Check and replace the PCB.
2963	R	The signal from the heat exchanger temperature limiter and flow temperature sensor is outside the permissible range.	<ul style="list-style-type: none"> ▶ Check flow through appliance and system is filled. ▶ Check for air locks in the system. Purge if required. ▶ Check Heat exchanger sensor (primary thermistor) and plug connected to stat. ▶ Check resistance of stat. Replace if required. ▶ Check continuity of harness. Replace if required.
2964	B	Insufficient flow rate in heat exchanger.	<ul style="list-style-type: none"> ▶ Supply sensor is not assembled on the supply pipe. ▶ Supply sensor does not make proper contact to the supply pipe. ▶ System is not filled with water. ▶ No water flow, because CH system is closed. ▶ No water flow, because pump is not operating correctly.
2965	B	Flow temperature too high.	<ul style="list-style-type: none"> ▶ Check flow through appliance and system pressure. ▶ Check for air locks in the system. Purge if required. ▶ Check isolation valves.
2966	B	Flow temperature increase in heat exchanger too rapid.	<ul style="list-style-type: none"> ▶ Check flow through appliance and system pressure. ▶ Check for air locks in the system. Purge if required. ▶ Check isolation valves. ▶ Check pump is operating freely, check voltage to pump
2967	B	Temperature differential between flow temperature sensor and heat exchanger temperature limiter is too great.	<ul style="list-style-type: none"> ▶ Check flow through appliance and system filled. ▶ Check for air locks in the system. Purge if required. ▶ Check isolation valves. ▶ Check pump is operating, check voltage to pump. ▶ Check heat exchanger sensor and flow sensor are making contact with the pipe work. ▶ Check heat exchanger sensor and resistance of stat. replace if required. ▶ Check continuity of harness. Replace if required.
2968	–	Refilling of system in progress.	Not applicable in the UK/IE
2969	–	Maximum number of refills reached.	Not applicable in the UK/IE
2971	V	Operating pressure too low.	<ul style="list-style-type: none"> ▶ Vent the heating system. ▶ Check water pressure, if necessary top up the system pressure. ▶ Check pressure sensor, replace if required.
2972	V	Mains voltage too low.	<ul style="list-style-type: none"> ▶ Check mains supply voltage on appliance L and N connections.

Fault code	Fault category	Description	Remedy
2973	-	System fault, appliance electronics / basic controller	<ul style="list-style-type: none"> ▶ Perform reset - factory reset. ▶ Check and replace control unit.
2974	-	Internal error	<ul style="list-style-type: none"> ▶ Restart the appliance and check if fault remains. ▶ Check and replace control unit.

Table 31 Indicators and fault displays

11.3 Pump operation and diagnosis

The operation/fault indicator () will indicate the status of the pump including any errors detected.

LED colour	Description	Diagnostic	Potential cause	Remedy
Green - continuous	Normal operation	Pump runs as expected	Normal operation	--
Green/Red - blinking	Warning mode (pump operating in an abnormal condition, no risk for the pump functionality).	The pump is running but sent a warning message.	<ul style="list-style-type: none"> • Dry run: <ul style="list-style-type: none"> – The pump is operating without water. • Overload of motor: <ul style="list-style-type: none"> – Friction due to particles and /or impeller blocked with debris and /or too high viscosity. • Generator operation: <ul style="list-style-type: none"> – The pump rotor is driven by an external flow. 	<ul style="list-style-type: none"> ▶ Check appliance system pressure and top up as required. ▶ Check installation water quality, clean system if debris is present. ▶ The pump will operate normally when the external flow will be stopped.
Red - blinking	Abnormal running mode (pump stopped but still functioning).	<p>The pump has stopped due to external failure.</p> <p>The pump will restart itself after the disappearance of the external failure.</p>	<ul style="list-style-type: none"> • Under or Over voltage: <ul style="list-style-type: none"> – Mains supply voltage $U < 160V$ or $U > 280V$. • Overload of motor: <ul style="list-style-type: none"> – Friction due to particles and/or impeller blocked with debris and/or too high viscosity. • Over speed: <ul style="list-style-type: none"> – The pump rotor is driven by an external flow above the maximum allowed value. • Over current: <ul style="list-style-type: none"> – Abnormal current exceeding the limit. • Module over temperature: <ul style="list-style-type: none"> – Temperature inside the motor is too high. • Turbine mode: <ul style="list-style-type: none"> – The pump is driven by external flow ($> 1200l/h$) in opposite direction of its flow. 	<ul style="list-style-type: none"> ▶ Check mains voltage supply to pump: $160V < U < 280V$. ▶ Check installation water quality, clean system if debris. ▶ Ensure that there is no other external flow (additional secondary pump running) on the system. ▶ Check for leakage on appliance. ▶ Check for evidence of dry running, low system pressure and ambient temperature. ▶ Ensure that the external flow is less than 1200l/h.
Red - continuous	Pump stopped	The pump has stopped due to permanent failure.	<ul style="list-style-type: none"> • Faulty electronic module and/or faulty motor. 	<ul style="list-style-type: none"> ▶ Restart the appliance and wait 30 seconds before switching back ON. ▶ Replace pump if LED is still red after power restart.
No LED	No power supply	No voltage on electronics	<ul style="list-style-type: none"> • Pump is not connected to mains supply • Faulty LED • Faulty electronics 	<ul style="list-style-type: none"> ▶ Check cable connection and supply to pump. ▶ Check if pump is running. ▶ Replace pump.

Table 32 Pump operation and diagnosis

11.4 Faults that are not displayed

Appliance faults	Remedy
Combustion noises too loud; rumbling noises	<ul style="list-style-type: none"> ▶ Check the gas type. ▶ Check the gas supply pressure. ▶ Check the flue system; clean or repair if required. ▶ Check the gas/air ratio. ▶ Check the ratio control valve; replace if required. ▶ Check condense drain is clear. ▶ Check fan depression.
Flow noises	<ul style="list-style-type: none"> ▶ Set the pump rate or pump characteristic map correctly and match to the maximum output.
Heat-up takes too long.	<ul style="list-style-type: none"> ▶ Set the pump rate or pump characteristic map correctly and match to the maximum output. ▶ Check system is balanced. ▶ Check anti-cycle time.
Flue gas values incorrect; CO content too high.	<ul style="list-style-type: none"> ▶ Check the gas type. ▶ Check the gas supply pressure. ▶ Check the flue system; clean or repair if required. ▶ Check the gas/air ratio. ▶ Check the ratio control valve; replace if required.
Delayed ignition, poor ignition.	<ul style="list-style-type: none"> ▶ Check the ignition transformer function for misfiring in Menu 6, replace if required. ▶ Check the gas type. ▶ Check the gas supply pressure. ▶ Check operation of meter governor. ▶ Check the power supply. ▶ Check the electrodes; replace if required. ▶ Check the flue system; clean or repair if required. ▶ Check the gas/air ratio. ▶ Check the burner, replace if required. ▶ Check the air/gas ratio control valve; replace if required.
Condensate in air box	<ul style="list-style-type: none"> ▶ Check the non-return valve in the air/gas manifold, replace if required.
No hot water.	<ul style="list-style-type: none"> ▶ Check the turbine, replace if required. ▶ Check diverter valve ▶ Check for cross-piping.
DHW volume is not reached.	<ul style="list-style-type: none"> ▶ Check the plate heat exchanger. ▶ Check flow device. ▶ Check silencer body.
No function, the display remains dark.	<ul style="list-style-type: none"> ▶ Check the electrical wiring for damage. ▶ Replace defective cables. ▶ Check the fuse, replace if required.

Table 33 Faults that are not shown on the display

12 Environmental protection/disposal

Environmental protection is a fundamental corporate strategy of the Bosch Group.

The quality of our products, their economy and environmental safety are all of equal importance to us and all environmental protection legislation and regulations are strictly observed.

We use the best possible technology and materials for protecting the environment taking account of economic considerations.

Packaging

Where packaging is concerned, we participate in country-specific recycling processes that ensure optimum recycling.

All of our packaging materials are environmentally compatible and can be recycled.

Used appliances

Used appliances contain valuable materials that can be recycled.

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

Old electrical and electronic appliances



This symbol indicates that the product must not be disposed of with other waste, but be taken to the waste collection centers for treatment, collection, recycling and disposal procedure.

The symbol applies to countries with electronic waste regulations, for example the European Waste Electrical and Electronic Equipment Directive 2012/19/EU. These regulations determine the framework for the return and recycling of used electronic appliances as applicable within each country.

As electronic equipment may contain hazardous substances, it needs to be recycled responsibly in order to minimize any potential harm to the environment and human health. Furthermore, recycling of your electronic waste will help to conserve natural resources.

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

For additional information, please visit:

www.weee.bosch-thermotechnology.com/

Batteries

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

13 Technical Specifications/Logs

13.1 Technical data

Technical data table - Worcester 2000

Worcester 2000 Description	Unit	7 736 902 027 25kW N.G.	7 736 902 028 30kW N.G.
Gas flow maximum rate - 10 minutes from lighting			
Gas inlet pressure (nominal) ¹⁾	mbar	20.0	20.0
Natural gas ²⁾	m ³ /h	2.60	3.05
Central Heating (CH)			
Maximum rated heat input (net) (Q _{max})	kW	20.4	20.4
Maximum rated heat output 40/30 °C	kW	21.4	21.4
Maximum rated heat output 50/30 °C (P _{cond, max})	kW	21.2	21.2
Maximum rated heat output 80/60 °C (P _{max})	kW	20.0	20.0
Minimum rated heat input (net) (Q _{min})	kW	4.9	4.9
Minimum rated heat output 40/30 °C	kW	5.3	5.3
Minimum rated heat output 50/30 °C (P _{cond, min})	kW	5.3	5.3
Minimum rated heat output 80/60 °C (P _{min})	kW	4.8	4.8
Maximum flow temperature	°C	86	86
Maximum flow temperature possible	°C	82	82
Maximum permissible operating pressure (PMS)	bar	3.0	3.0
Available pump head at 20 °C system temperature rise	m	2	2
Domestic Hot Water (DHW)			
Minimum heat input	kW	4.9	4.9
Maximum rated heat input (net) (Q _n W)	kW	25.5	30
Maximum rated heat output (P _n W)	kW	25.0	29.5
Maximum mains inlet pressure (standing pressure PMW)	bar	10	10
Minimum mains inlet pressure (working) for max. flow	bar	1.5	1.5
Minimum mains inlet pressure (working) for operation	bar	0.3	0.3
Minimum required flow to activate DHW demand	l/min	2.5	2.5
DHW temperature range	°C	35 - 60	35 - 60
Maximum cold water inlet temperature	°C	23	23
Maximum DHW flow rate - 35 °C rise ± 15% ³⁾	l/min	10	12
Maximum DHW flow rate - 40 °C rise ± 15%	l/min	9	10.8
Flue			
Flue gas temperature max. load DHW demand	°C	70	75
Flue gas temperature 80/60 °C, rated/min. load	°C	66/58	66/58
Flue gas temperature 40/30 °C, rated/min. load	°C	48/35	48/35
CO ₂ level at max. rated heat output (after 10 minutes)	%	9.6	9.6
CO ₂ level at min. rated heat output (after 10 minutes)	%	8.6	8.6
NOx Class	–	6	6
NOx rating (EN 15502-1)	mg/kWh	39	39
Condensate			
Maximum condensate rate	l/h	1.7	1.7
pH value, approx.	–	4.8	4.8
Electrical			
Electrical power supply voltage	a.c. V	230	230
Frequency	Hz	50	50
Maximum power consumption (running)	W	90	110
Maximum power consumption (stand-by)	W	3	3
Energy efficiency index (EEI) heating pump	–	≤ 0.2	≤ 0.2
General data			
Expansion vessel capacity	l	6	6
Expansion vessel pre-charge pressure	bar	0.75	0.75
Appliance protection rating ⁴⁾	IP	X4D	X4D
Permissible ambient temperature short-term/long-term	°C	0-50/40	0-50/40
Nominal capacity of the appliance	l	7	7
Total package weight	kg	40	40
Total appliance weight (excluding packaging)	kg	36	36

Worcester 2000 Description	Unit	7 736 902 027 25kW N.G.	7 736 902 028 30kW N.G.
Lift weight (without front panel)	kg	33.4	33.4
SEDBUK 2009	%	89.1	89.1

- 1) For minimum and maximum permissible pressure refer to "Gas pressure within the system", section 6.6.
- 2) The Gas Rate provided assumes the accepted NG averaged calorific value of 34.9 MJ/m³ net.
- 3) Appliances are fitted with a flow regulator set to achieve a 35°C temperature rise. A 40°C temperature rise is possible at lower flow rates.
- 4) Protection rating may change depending on the control unit/s used on this appliance.

Table 34 Technical data Worcester 2000

13.2 Component resistance characteristics

13.2.1 Sensor values

Temperature [°C ± 10%]	Resistance [Ω]
0	33 404
5	25 902
10	20 247
15	15 950
20	12 657
25	10 115
30	8 138
35	6 589
40	5 367
45	4 398
50	3 624
55	3 002
60	2 500
65	2 092
70	1 759
75	1 486
80	1 260
85	1 074
90	918
95	788
100	680

Table 35 Flow temperature sensor

Temperature [°C]	Resistance [Ω]
0	33 242
10	19 947
20	12 394
30	7 947
40	5 242
50	3 548
60	2 459
70	1 740
80	1 256
90	923

Table 36 DHW temperature sensor

Temperature [°C]	Resistance [Ω]
-40	≥ 4 111
-30	3 218
-20	2 360
-10	1 650
0	1 122
10	759
20	515
30	354
40	247
50	≤ 174

Table 37 Outside temperature sensor (for weather-compensated controllers, accessory)

13.3 Heating curve

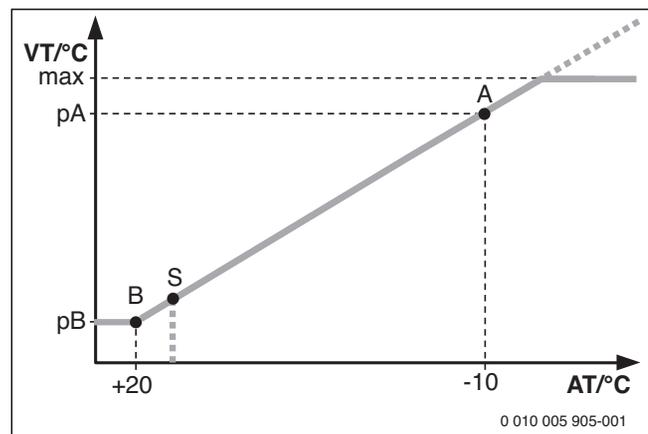


Fig. 94 Heating curve

- A End point (at the outside temperature - 10 °C)
- AT Outdoor ambient temperature
- B Base point (at the outside temperature + 20 °C)
- max Maximum flow temperature
- pA Flow temperature at the end point of the heating curve
- pB Flow temperature at the foot point of the heating curve
- S Automatic heating switch-off (summer mode)
- VT Supply temperature

13.4 Internal wiring of the appliance

13.4.1 Electrical wiring

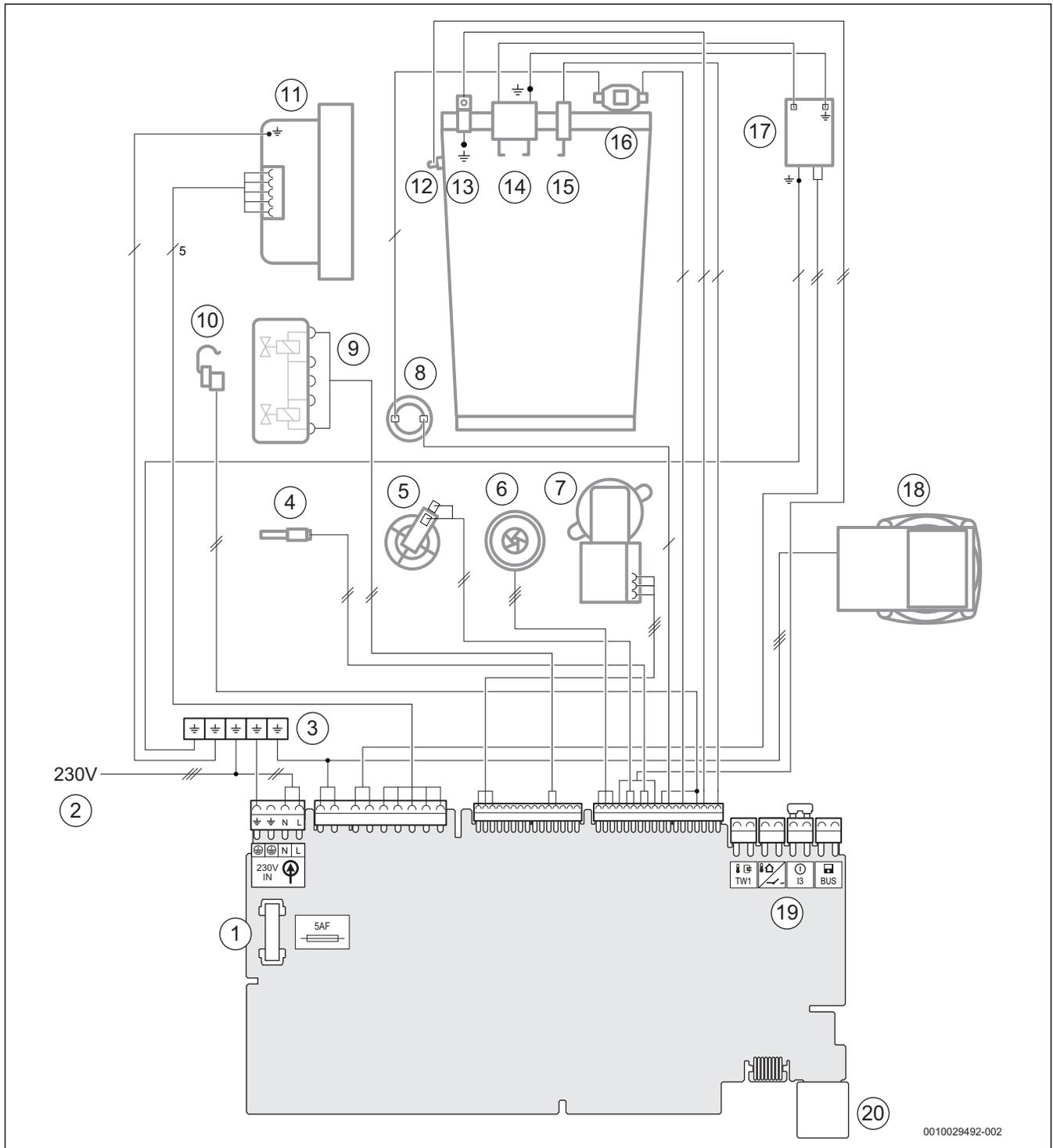


Fig. 95 Electrical wiring

Legend to figure 95:

- | | |
|-------------------------------------|---|
| [1] Fuse | [12] Heat exchanger flow temperature sensor |
| [2] Mains cable | [13] Earth connection |
| [3] Earth connections | [14] Ignition electrode |
| [4] DHW temperature sensor | [15] Flame sense electrode |
| [5] Low water pressure switch | [16] Heat exchanger high limit stat |
| [6] Flow limiter cartridge | [17] Ignition transformer |
| [7] Diverter valve | [18] Pump |
| [8] Exhaust gas temperature limiter | [19] Low voltage I/Os for controls |
| [9] Gas valve | [20] Code plug interface - Not used |
| [10] Flow temperature sensor | |
| [11] Fan | |

13.5 Setting values for output

The maximum rated heat output can be reduced to up to 50 % of the output range (→service function 3-b1).

The minimum rated heat output can be increased to up to 50 % of the output range (→service function 5-A3).

13.5.1 Gas setting values

GC2000iW 25 C

Display percentage %	Heat Output [kW]	Heat input [kW]	Gas flow rate [l/min]
80	20.0	20.40	35.0
75	18.7	19.13	32.8
70	17.5	17.85	30.6
65	16.2	16.58	28.4
60	15.0	15.30	26.3
55	13.7	14.03	24.1
50	12.5	12.75	21.9
45	11.2	11.48	19.7
40	10.0	10.20	17.5
35	8.7	8.93	15.3
30	7.5	7.65	13.1
25	6.2	6.38	10.9
20	5.0	5.10	8.8
19	4.8	4.92	8.4

Table 38 GC2000iW 25 C

GC2000iW 30 C

Display percentage %	Heat Output [kW]	Heat input [kW]	Gas flow rate [l/min]
68	20.0	20.4	35.0
65	19.1	19.5	33.5
60	17.6	18.0	30.9
55	16.2	16.5	28.3
50	14.7	15.0	25.7
45	13.2	13.5	23.2
40	11.7	12.0	20.6
35	10.3	10.5	18.0
30	8.8	9.0	15.4
25	7.3	7.5	12.9
20	5.9	6.0	10.3
16	4.8	4.92	8.4

Table 39 GC2000iW 30 C

GAS BOILER SYSTEM COMMISSIONING CHECKLIST & WARRANTY VALIDATION RECORD

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

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

13.7 Inspection and maintenance checklist

Inspection and maintenance checklist		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Date:																
1	Check appliance operation (CH & DHW) and fault history	Yes <input type="checkbox"/>														
2	Visual inspection:- Check compliance of appliance, system and components	Yes <input type="checkbox"/>														
3	Internal visual inspection Check for signs of leaking, corrosion and distress	Yes <input type="checkbox"/>														
4	Appliance performance checks:															
4.1	Check Fan pressure test was cleaning required?	Yes <input type="checkbox"/>														
4.2	Check and clean syphon	No <input type="checkbox"/>														
4.3	Correct working gas inlet pressure	Yes <input type="checkbox"/>														
4.4	Flue gas analysis															
	Check combustion settings: Min/Max test modes	Yes <input type="checkbox"/>														
4.5	Gas rate appliance at maximum output in test mode	Yes <input type="checkbox"/>														
4.6	Check flame failure appliance	Yes <input type="checkbox"/>														
4.7	Fit casing	Yes <input type="checkbox"/>														
4.8	Check flue integrity	Yes <input type="checkbox"/>														
6	Gas Safe/Benchmark documentation updated	Yes <input type="checkbox"/>														
8	Appliance left to customer settings	Yes <input type="checkbox"/>														
9	Gas Safe registration number	Yes <input type="checkbox"/>														
Gas Safe Engineers Signature		_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____

Table 40 Inspection and maintenance checklist

SERVICE & INTERIM BOILER WORK RECORD

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

Service provider

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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SERVICE & INTERIM BOILER WORK RECORD

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

Service provider

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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