

Installation and Maintenance Instructions

## Gas fired condensing combi boiler

### **Greenstar 8000 Style**

GR8700iW 30 C | GR8700iW 35 C | GR8700iW 40 C | GR8700iW 45 C | GR8700iW 50 C |  
GR8700iW 30 CB | GR8700iW 35 CB | GR8700iW 40 CB | GR8700iW 45 CB | GR8700iW 50 CB



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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 Technical help-line (0330 123 3366).
- Distance learning and training courses are available from Worcester.
- The BENCHMARK Commissioning Checklist can be found on page 77 of this Installation manual.

### **⚠ Notes 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.
- ▶ Observe national and regional regulations, technical rules 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 [centralheating.co.uk](http://centralheating.co.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 150m<sup>2</sup>, 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

### LPG Installations

An appliance using LPG must not be installed in a room or internal space below ground level unless one side of the building is open to the ground.

### 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

### 3.1 About the appliance

The boiler has the following features:

- Pre-wired and pre-plumbed
- Galvanised steel inner frame
- Digital control system
- Automatic ignition
- Direct burner ignition electrodes
- Built-in frost protection
- Built-in fault finding diagnostics
- Automatic gas valve
- Modulating combustion air fan with speed regulator
- CH temperature sensor & control
- Pump anti-seizure protection
- Flue gas temperature sensor
- Condensate siphonic trap
- Plate type DHW heat exchanger
- Low Energy Modulating pump

### 3.2 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.

### 3.3 Scope of delivery

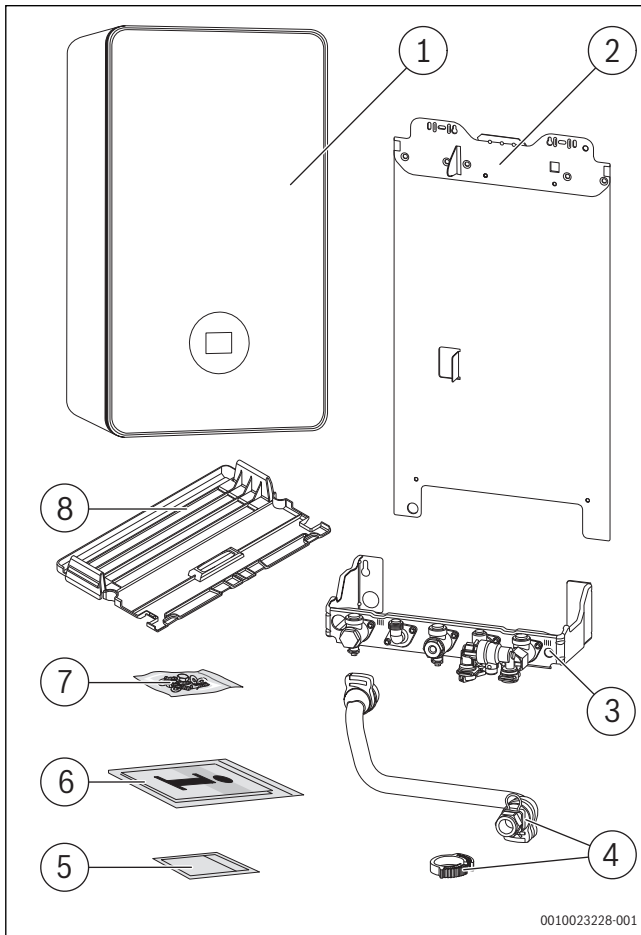


Fig. 1 Scope of delivery

- [1] Wall mounted gas condensing boiler
- [2] Mounting bracket
- [3] Mounting plate with Keyless Filling Link pre-installed
- [4] PRV Discharge pipe (including securing clips)
- [5] Guarantee card
- [6] Set of printed documents for product documentation
- [7] Fixing materials (screws with accessories)
- [8] Lower cover

### 3.4 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.

### 3.5 Appliance type overview

This appliance are for use with:

- Natural Gas or L.P.G. (Cat.II 2H3P type C13, C33 & C53)

This document refers to the following appliance types:

Appliance type	Part number	Gas Council number
GR8700iW 30 C NG	7 738 100 795	47-800-03
GR8700iW 35 C NG	7 738 100 796	47-800-02
GR8700iW 40 C NG	7 738 100 797	47-800-01
GR8700iW 45 C NG	7 738 100 798	47-406-99
GR8700iW 50 C NG	7 738 100 799	47-406-98
GR8700iW 30 CB NG	7 738 100 832	47-406-97
GR8700iW 35 CB NG	7 738 100 833	47-406-96
GR8700iW 40 CB NG	7 738 100 834	47-406-95
GR8700iW 45 CB NG	7 738 100 835	47-406-94
GR8700iW 50 CB NG	7 738 100 836	47-406-93
GR8700iW 30 C LPG	7 738 100 839	47-800-13
GR8700iW 35 C LPG	7 738 100 840	47-800-12
GR8700iW 40 C LPG	7 738 100 841	47-800-11
GR8700iW 45 C LPG	7 738 100 842	47-800-10
GR8700iW 50 C LPG	7 738 100 843	47-800-09
GR8700iW 30 CB LPG	7 738 100 844	47-800-08
GR8700iW 35 CB LPG	7 738 100 845	47-800-07
GR8700iW 40 CB LPG	7 738 100 846	47-800-06
GR8700iW 45 CB LPG	7 738 100 847	47-800-05
GR8700iW 50 CB LPG	7 738 100 848	47-800-04

Table 2 Type overview

The name of the appliance consists of the following parts:

- GR8700iW: Type name
- 30, 35, 40, 45 or 50: Hot water output in kW
- C: Combi appliance
- B: Black front panel
- NG: Gas type (Natural Gas)
- LPG: Gas type (Liquid Petroleum Gas)

### 3.6 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.

### 3.7 Pipe work positions and flue outlet

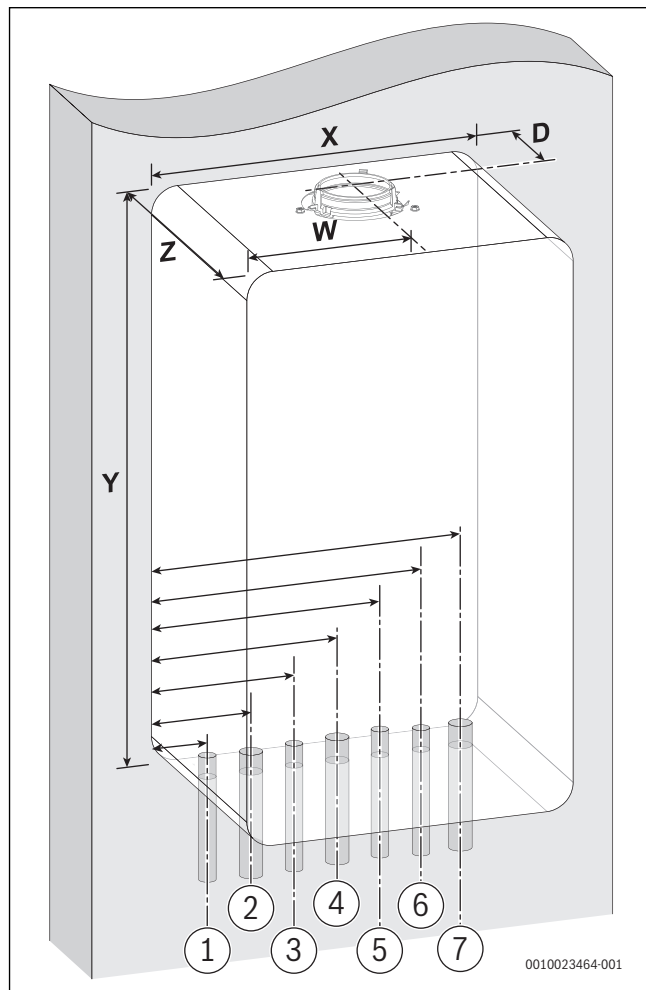


Fig. 2 Pipe and flue outlet dimensions

Description	Dimensions (mm)
X Appliance width	440
Y Appliance height	780
Z Appliance depth	365
W Flue centre from appliance left side	220
D Flue centre from rear of appliance	87

Table 3 Appliance and flue outlet dimensions

#	Function	From left case edge	Diameter of pipe
1	Condensate Outlet	58mm	22mm • Rubber push fit connection
2	CH Flow	90mm	22mm • Compression fitting
3	DHW Outlet	155mm	15mm • Compression fitting
4	Gas Inlet	220mm	22mm • Compression fitting
5	DCW Inlet	285mm	15mm • Compression fitting
6	CH Return	350mm	22mm • Compression fitting
7	PRV Discharge	384mm	15mm • Compression fitting

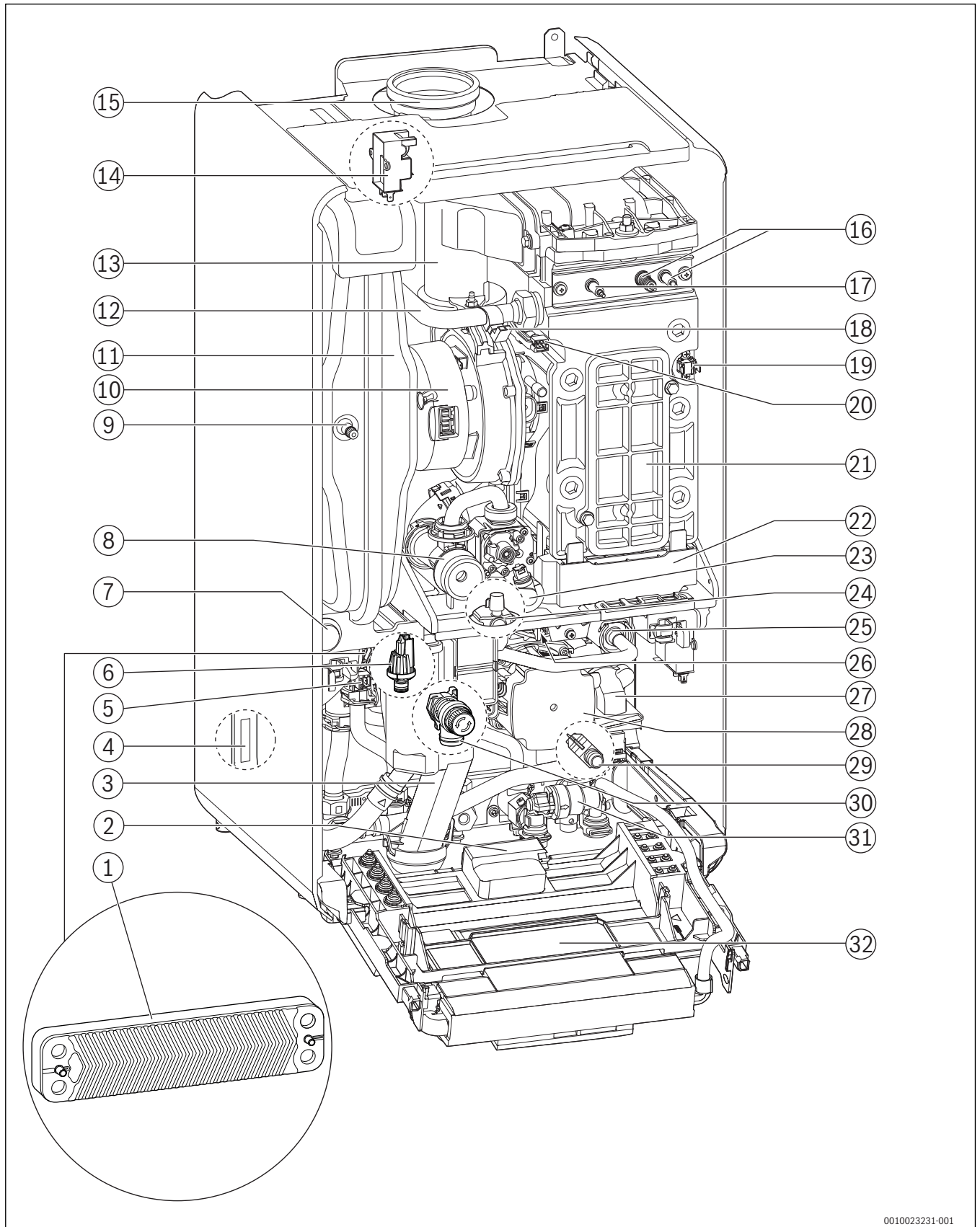
Table 4 Pipe dimensions



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



**3.8 Product overview**



0010023231-001

*Fig. 3 Product overview Combi boilers, combustion cover removed*

- |   |                       |
|---|-----------------------|
| [1] Plate heat exchanger                          | [7] Pressure gauge    |
| [2] KEY accessory housing slot (wireless Gateway) | [8] Venturi (sealed)  |
| [3] Condensate trap                               | [9] Schrader Valve    |
| [4] Data plate 1                                  | [10] Fan              |
| [5] Hot water temperature sensor                  | [11] Expansion vessel |
| [6] Pressure sensor                               | [12] Heating flow     |

- [13] Air-gas manifold with non-return valve
- [14] Ignition transformer
- [15] Flue
- [16] Ignition electrodes
- [17] Flame sensing electrode
- [18] Flow temperature sensor at flow pipe
- [19] Heating block temperature limiter
- [20] Flow temperature sensor at heating block
- [21] Inspection cover
- [22] Condensate sump
- [23] Gas valve
- [24] Automatic air vent valve
- [25] Flow Turbine
- [26] Data plate 2
- [27] Diverter valve
- [28] Heating pump
- [29] Drain point
- [30] Pressure relief valve (heating circuit)
- [31] Filling Link
- [32] Control unit

### **3.9 Product data for energy consumption**

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

## 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.
- If the circulating pump speed is fixed and system circulation can be significantly adjusted or stopped by TRV's or zone valves, a system bypass should be installed to give at least a 3 metre circuit when activated. However; any appliance fitted with a modulating pump may not require a system bypass.
- 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.

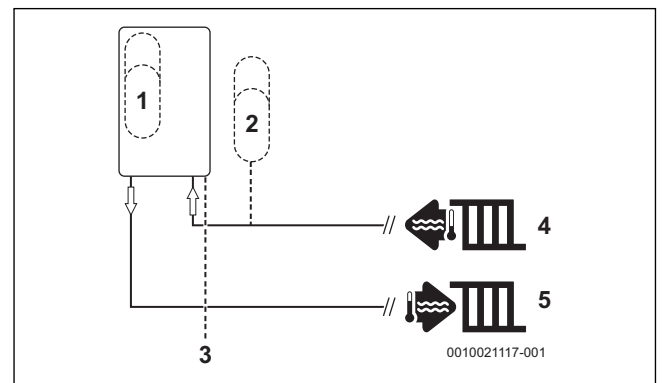


Fig. 4 Additional expansion vessel

- [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). Plotting a line vertically on the chart (→ Fig. 5).
- ▶ Determine the central heating maximum operating flow temperature (73 °C for condensing). 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. (default = 10 metres).
- ▶ Select a curve from the key below (1-5).

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

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

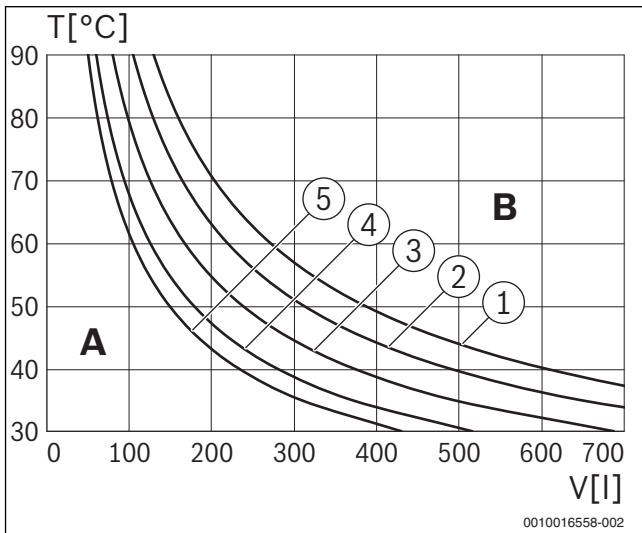


Fig. 5 Curves for the expansion vessel

- 1 Pre-charge pressure 0.5 bar (minimum)
- 2 Pre-charge pressure 0.75 bar
- 3 Pre-charge pressure 1.0 bar (default setting)
- 4 Pre-charge pressure 1.2 bar
- 5 Pre-charge pressure 1.3 bar
- T Maximum operating temperature [ °C]
- V Total System Volume [l]

**4.1.3 System layouts examples**

**Sealed primary system - Single central heating circuit:**

Typical primary system example

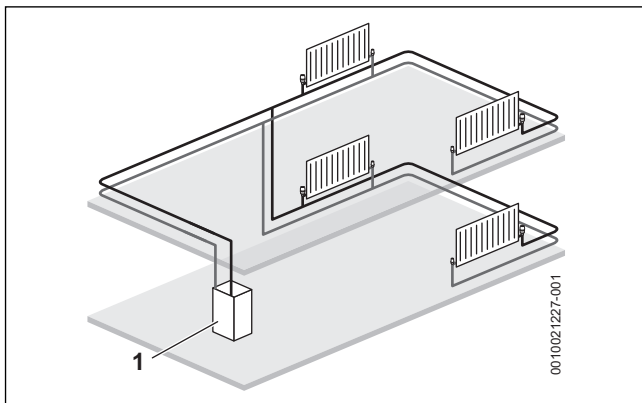


Fig. 6 Single central heating circuit example

- [1] Appliance

**Sealed primary system - 2 x central heating zones:**

- Requirement for new builds if the floor area of a property is over 150m<sup>2</sup>.

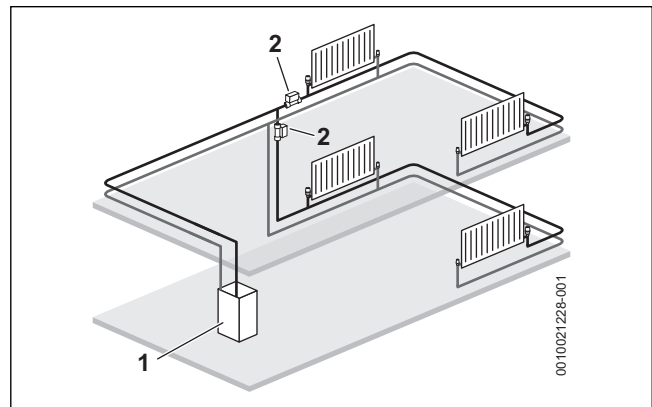


Fig. 7 Separated heating zones

- [1] Appliance
- [2] Zone valves

**4.1.4 System fill**

**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.

**Integral filling link**

- An optional filling link accessory is available to fill the system, (→ section “Integral keyless filling link” on page 40).

**External filling loop**

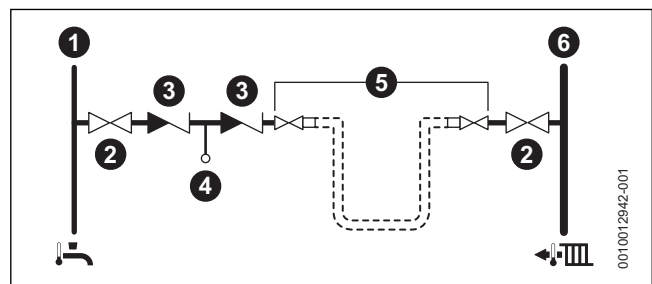



Fig. 8 External filling loop system fill example

- [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.
- Type A RCDs  must be employed where additional protection is required.
- External 3A fuse to BS1362.
- The appliance must be earthed.
- Cable: PVC insulated 0.75mm<sup>2</sup> (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 IP rating - IPX4D

**4.2.2 Gas supply**

- Appliances using Natural Gas (NG) must be connected to a governed meter.
- Appliances using Liquid Petroleum Gas (LPG) must be connected to a regulator.
- Installation and connection of the gas supply to the appliance must be in accordance with BS6891.
- Gas pipe sizing should be calculated to ensure no more than the permitted mbar drop between the meter/governor to the appliance inlet. (→ chapter 12.8).
- The meter or regulator and pipe work to the meter or regulator 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 & LPG)**



Gas pipe work:

- ▶ Gas installation pipe work must be designed to ensure the pressure loss between the meter outlet (NG) or storage and regulator (LPG) and the inlet to each appliance does not exceed 1mbar (NG) 2.5mbar (LPG) → table 16 "Allowed mbar pressure drop".

**Natural Gas (NG):**

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

Discharge rates for Natural Gas (m <sup>3</sup> /hr) with straight horizontal copper tube					
Pipe Length (m)		Pipe Size (mm)			
		15	22	28	35
3	Discharge m <sup>3</sup> /hr	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 5 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. This method is only a estimate - for more complex design please refer to BS6891 2015 and training given in ACS.

**Liquid Petroleum Gas (LPG):**

Discharge rates for copper tube with 2.5mbar differential pressure between the ends for LPG.

Discharge rates for LPG (m <sup>3</sup> /hr & kW) with straight horizontal copper tube						
Tubing Length (m)	Outside diameter					
	15mm		22mm		28mm	
	kW	m <sup>3</sup> /hr	kW	m <sup>3</sup> /hr	kW	m <sup>3</sup> /hr
3	38.4	1.49	207	8.01	412	15.92
6	26.1	1.01	135	5.21	230	8.86
9	20.5	0.79	108	4.19	215	8.33
12	17.9	0.70	94	3.62	187	7.25
15	15.5	0.60	82	3.20	168	6.51
18	13.5	0.53	74	2.86	145	5.61
21	12.9	0.50	67	2.58	135	5.24
24	12.0	0.47	61	2.58	126	4.87

Table 6 Liquid Petroleum Gas (LPG)



Liquid Petroleum Gas (LPG):

- ▶ When using this table to estimate the Gas flow rate in pipe work of a known length, the effective length will be increased by 0.6m for each 90° elbow or tee and by 0.3m for each 90° bend or straight coupler. This method is only a estimate - for more complex design please refer to BS6891 2015 and training given in ACS.

**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.

**Water mains pressure:**

- Minimum mains water pressure, for maximum performance refer to table 69 - Technical data.
- Maximum mains fed water 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.

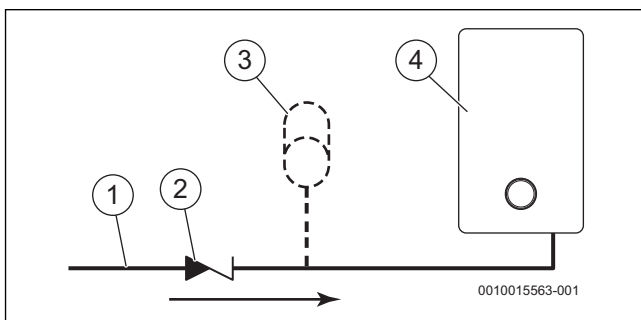


Fig. 9 Mini expansion vessel location

- [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.



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 ambient temperature is above 0 °C and below 35 °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.

- ▶ Install a frost thermostat and pipe thermostat connected in series, to protect the system pipe work. We recommend that the frost thermostat is sited in the coldest unheated area in which pipe work is located and that it is set to call for heat at 5 °C. The Pipe stat should be located on whichever pipe is furthest from the heated area where warmer water will be drawn from considering the direction of flow, and set to end the demand at 15 °C.
- ▶ 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 appliances should be used in accordance with the regulations.
  - Figure 10 is for guidance only.

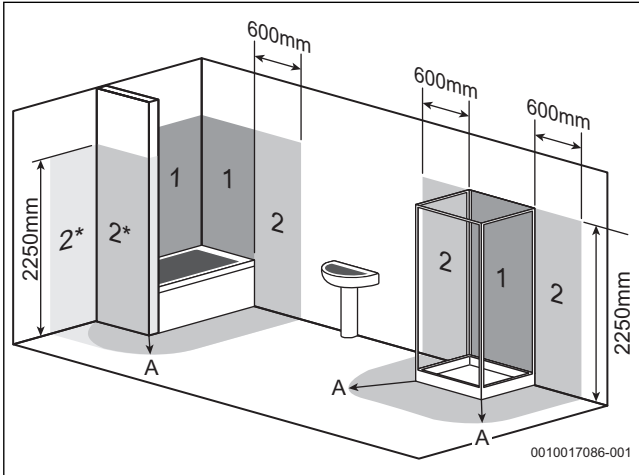


Fig. 10 Bathroom installations

- [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

**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.

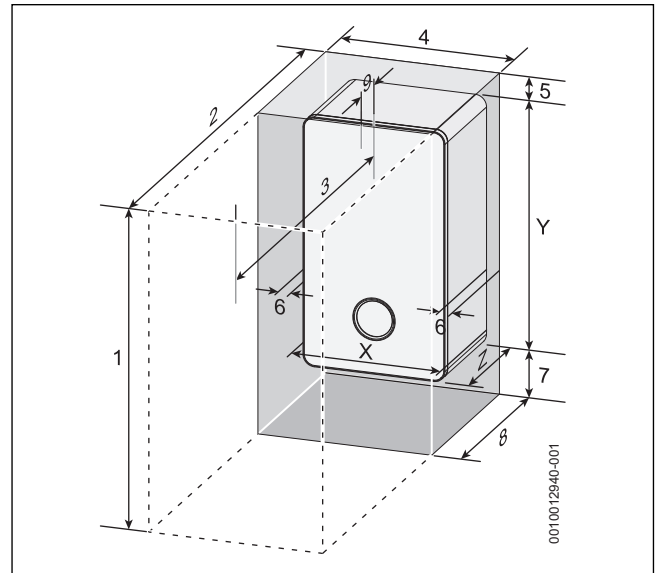


Fig. 11 Appliance minimum clearances

Minimum clearances		
	Description	Dimensions (mm)
X	Appliance width	440
Y	Appliance height	780
Z	Appliance depth	365
Installation/Maintenance		
1	Overall clearance height	1,150/1,190 *
2	Overall clearance depth	965
3	In front of appliance	600
4	Overall clearance width	450
5	Above the appliance	170/210 *
6	Either side of appliance	5
7	Below the appliance	200
8	Compartment depth	385
9	Appliance to removable door	20

Table 7

[\*] Height for either 60/100 flue or 80/125 flue

**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
7 738 112 869	60/100	Telescopic horizontal flue kit (Silver)
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 balance flue kit

Table 8 Flue kit assembly part numbers

##### 4.4.1 Flue length

The maximum flue length will depend on the following factors:

- 60/100mm flue system
  - Vertical/horizontal flue type
  - Appliance output
  - Plume management length
- 80/125mm flue system
  - Vertical/horizontal flue type
  - Appliance output

##### Horizontal maximum flue lengths

Output	Flue length [L] 60/100			Flue length [L] 80/125
	No plume management	+ 500mm of plume management	+ 4500mm of plume management	No plume management available
50 kW	9,000mm	9,000mm	6,200mm	40,000mm
45 kW	8,000mm	8,000mm	5,200mm	35,000mm
40 kW	11,000mm	11,000mm	8,200mm	35,000mm
35 kW	10,000mm	10,000mm	7,200mm	29,000mm
30 kW	17,000mm	17,000mm	14,200mm	25,000mm

Table 9 Maximum flue lengths - Horizontal flues

##### Vertical maximum flue lengths

Output	Flue length [L] 60/100	Flue length [L] 80/125
50 kW	12,000mm	40,000mm
45 kW	12,000mm	35,000mm
40 kW	15,000mm	35,000mm
35 kW	14,000mm	29,000mm
30 kW	21,000mm	25,000mm

Table 10 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 below.

Bend	Effective flue length	
	60/100	80/125
45°	0.5m	0.5m
90°	1.5m	1.5m

Table 11 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

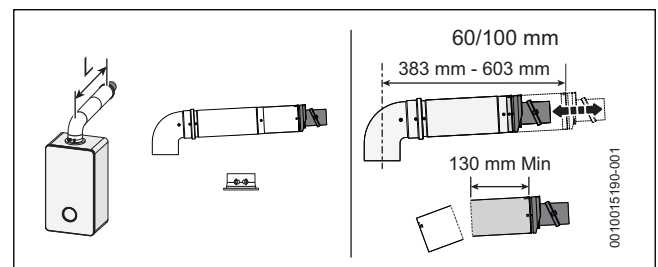


Fig. 12 Horizontal flue option

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



**Telescopic horizontal flue assembly**

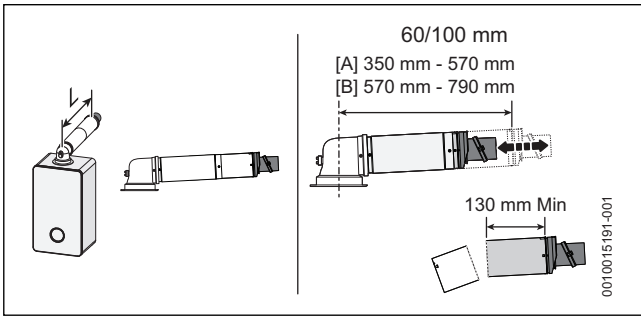


Fig. 13 Horizontal flue option

**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**

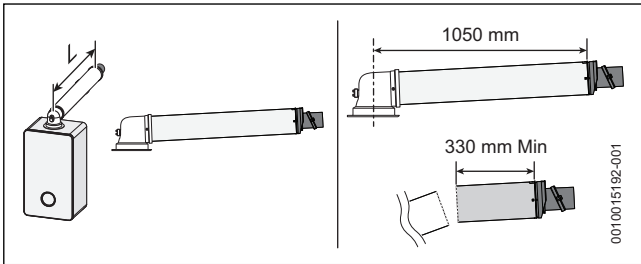


Fig. 14 Horizontal flue option

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

**Extended horizontal flue**

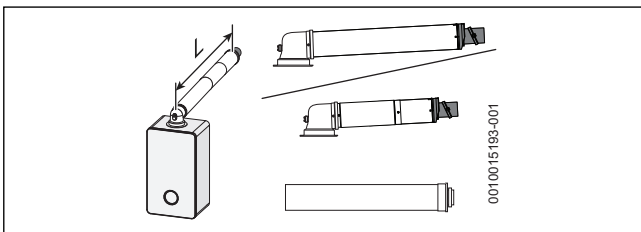


Fig. 15 Horizontal flue option

- 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**

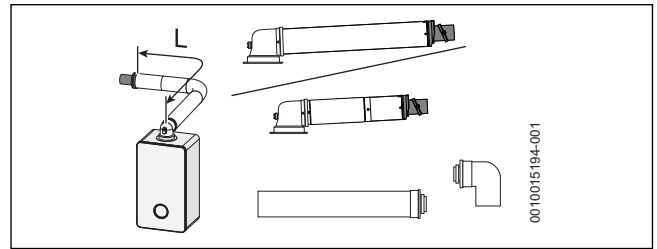


Fig. 16 Horizontal flue option

- 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 11 "Effective length of bends".

**Horizontal flue with additional 90° elbows**

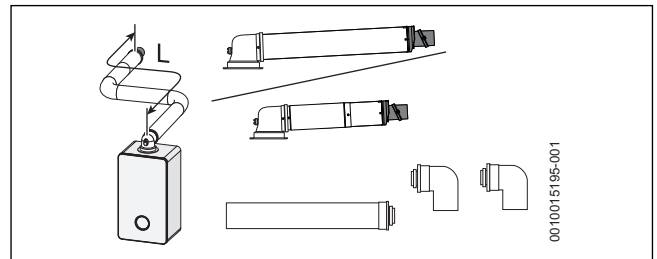


Fig. 17 Horizontal flue option

- 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 11 "Effective length of bends".

**High level horizontal flue**

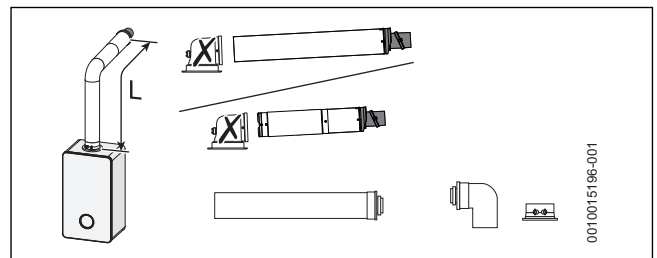


Fig. 18 Horizontal flue option

- 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**

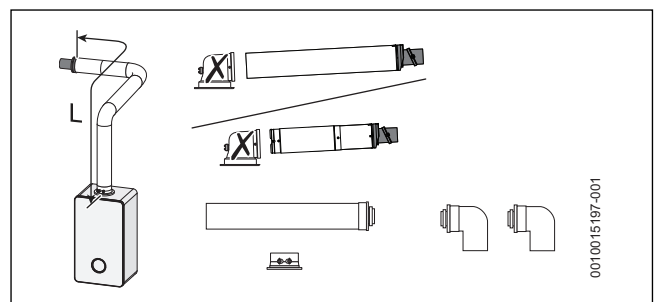


Fig. 19 Horizontal flue option

- 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 11 "Effective length of bends".

### High level horizontal flue with additional 90° elbows

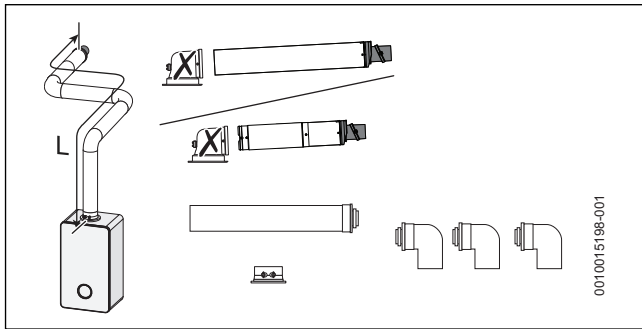


Fig. 20 Horizontal flue option

- 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 11 "Effective length of bends".

### Vertical balanced flue assembly

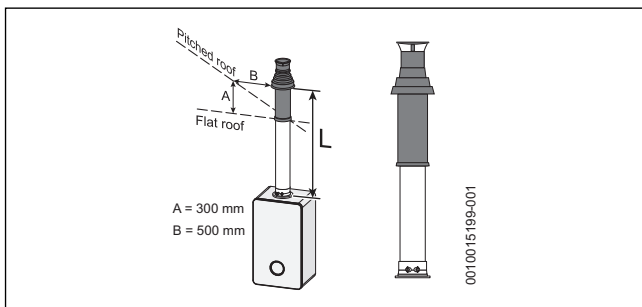


Fig. 21 Vertical flue option

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

### Vertical balanced flue with 90° elbow offset

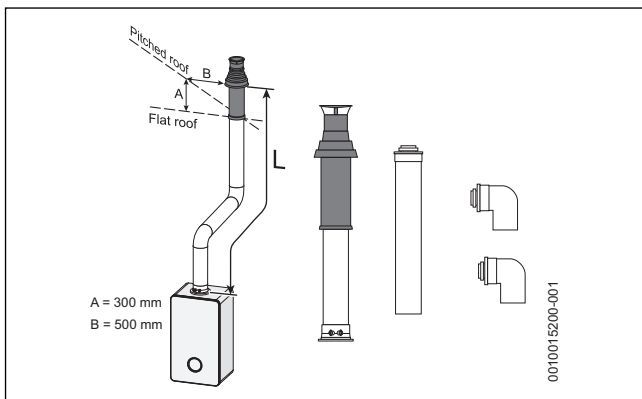


Fig. 22 Vertical flue option

- 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 11 "Effective length of bends".

### Vertical balanced flue with 45° elbow offset

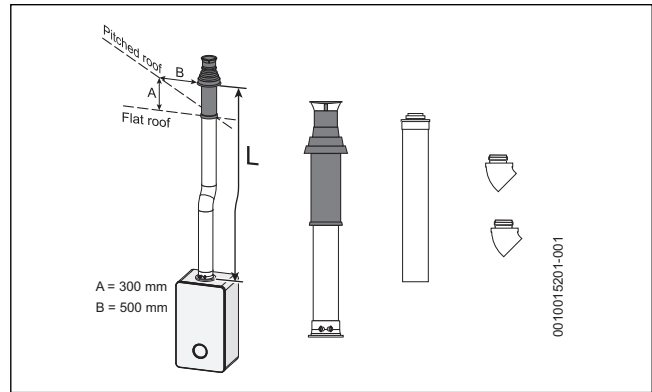


Fig. 23 Vertical flue option

- 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 11 "Effective length of bends".

#### 4.4.3 Plume management system

For every extra 1000mm of plume management after the first 500mm, the internal 60/100 flue length must be reduced by 700mm, up to a maximum of 4500mm of plume management.

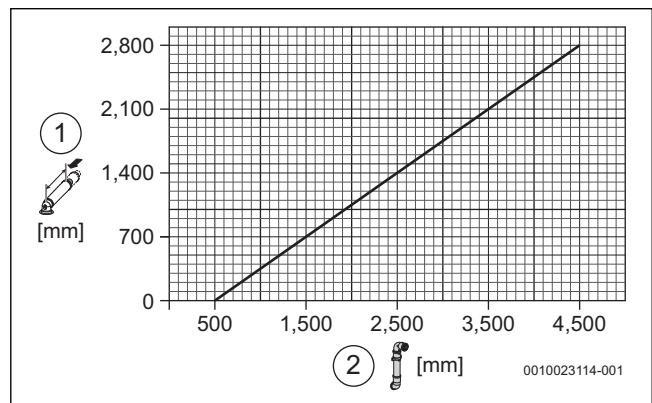


Fig. 24 Reduction to flue length as plume length increases graph

- [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.

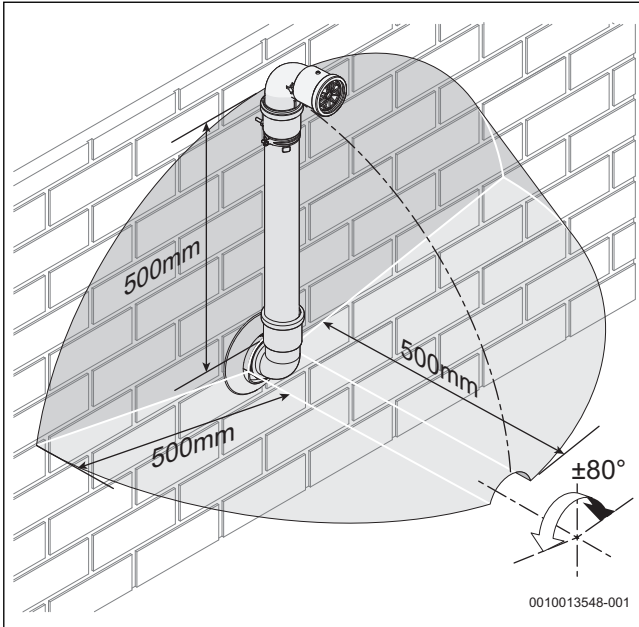


Fig. 25 Terminal exclusion zone

**NOTICE:**

**Cutting the 500mm pipe**

If the 500mm plume management pipe kit is cut, an additional elbow will be required to join the pipe work.

- ▶ 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

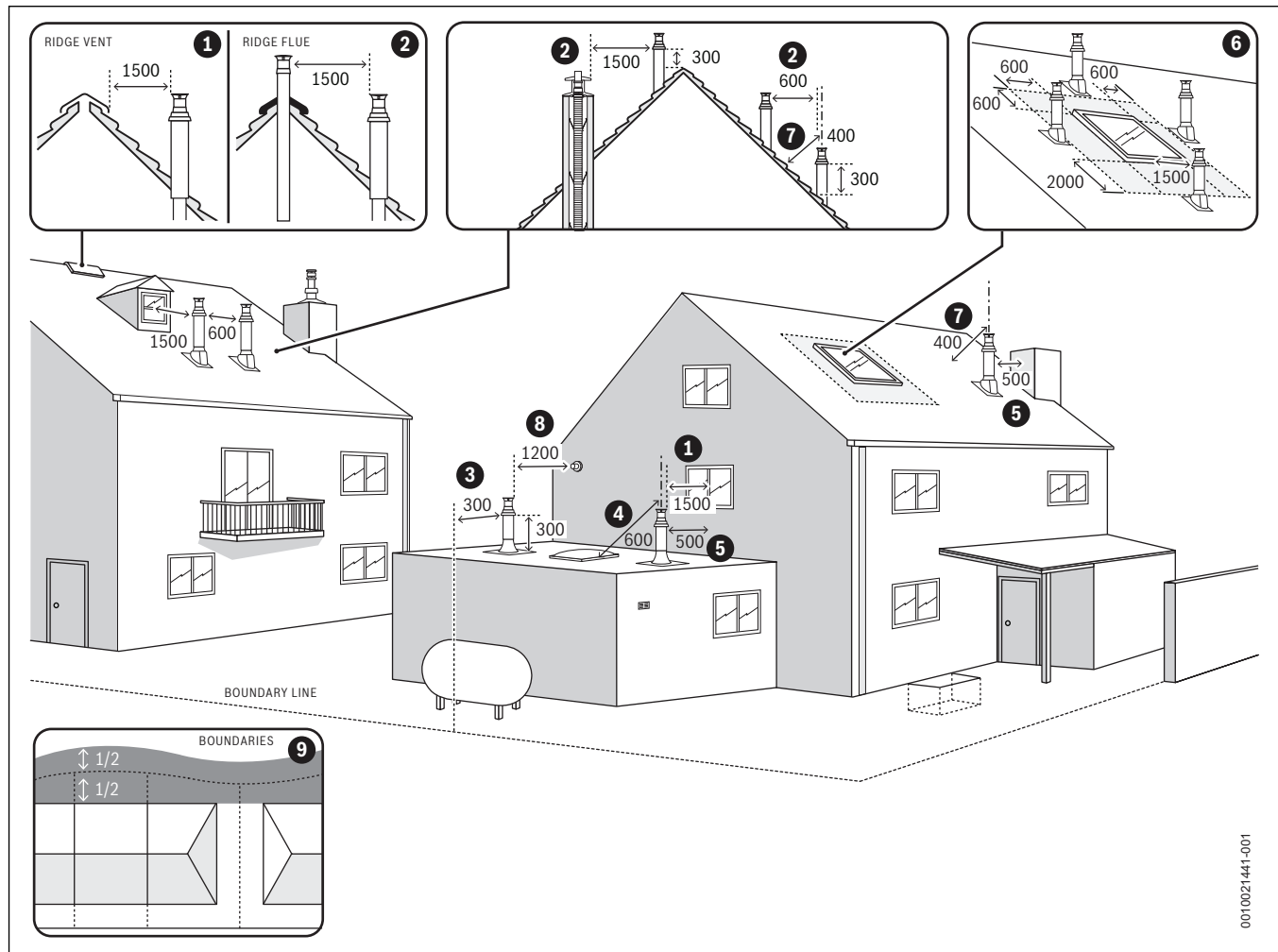


Fig. 26 Vertical flue terminal positions

### Key to figure 26:

- [1] 1,500mm measured horizontally 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.
- [6] The flue must not penetrate the roof in the shaded area. The terminal must be at least 1500mm 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 between a vertical flue measured horizontally and a horizontal flue terminal. Not required if the horizontal flue is 1,200mm above.
- [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.

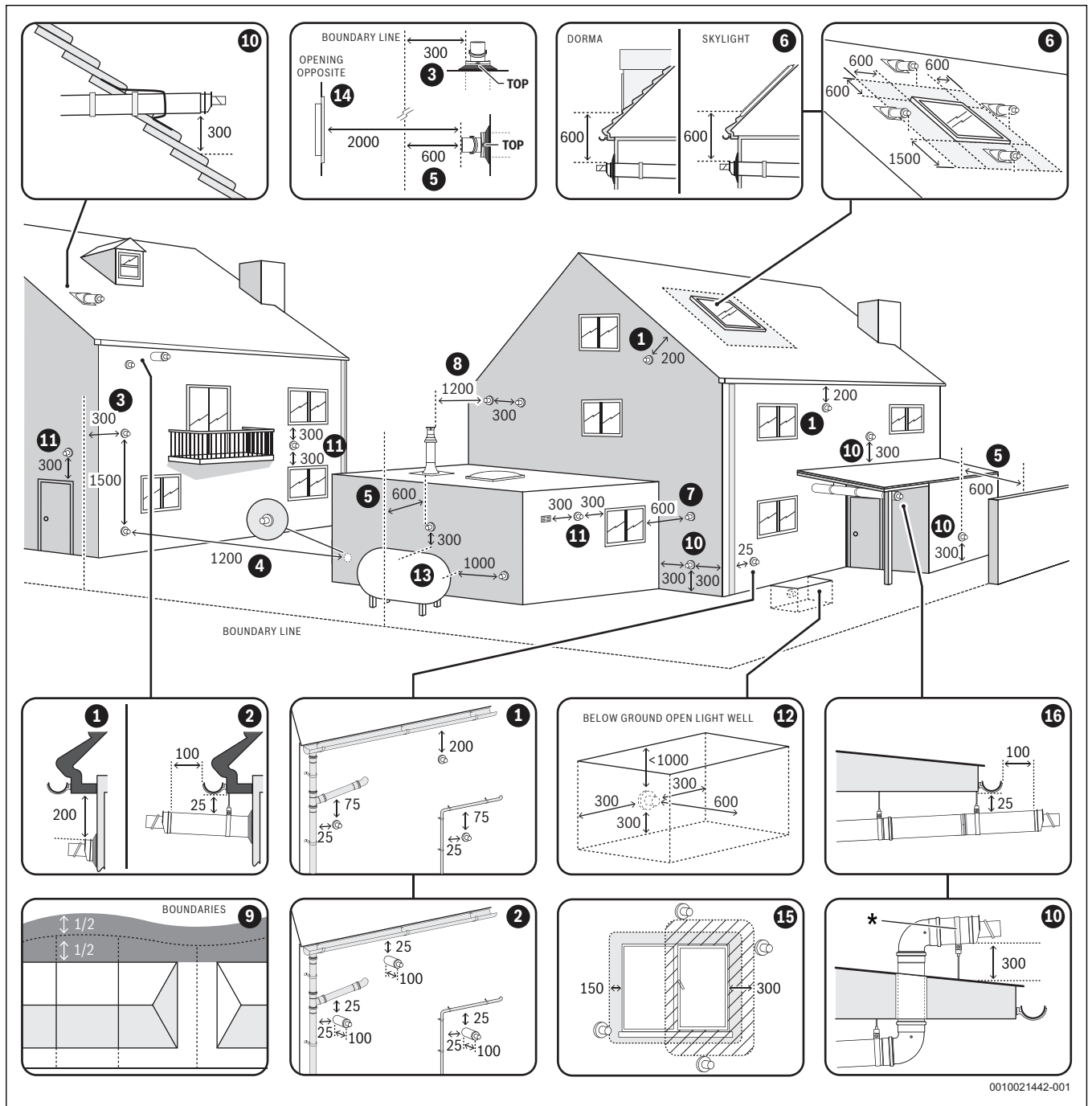


### Note:

- 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.

001002/441-001

**Horizontal flue terminal positions**



0010021442-001

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 1500mm 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 between a vertical flue measured horizontally and a horizontal flue terminal. Not required if the horizontal flue is 1,200mm above.
- [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 1000mm 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, 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.
- [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.

**4.4.5 Plume re-direct and plume management terminal positions**

Maximum and minimum plume management lengths:

- ▶ A minimum distance of 500mm must be maintained between the plume management outlet and the flue air intake.
- ▶ The maximum plume management length is 4.5 metres for the appliances detailed on the front of this manual.
- ▶ The 45° bend is equivalent to 0.5 metres of straight plume management and the 90° bend is equivalent to 1.0 metres.

**NOTICE:**

- ▶ All measurements are the minimum clearances required.
- ▶ Refer to “Horizontal flue terminal positions” for all concentric flue terminal positions unless the flue position is specified in figure 28 “Plume re-direct and plume management terminal positions”.
- ▶ Terminals must be positioned so to avoid combustion products entering the building.
- ▶ Support the flue at approximately one metre intervals and at a change of direction, use suitable brackets and fittings.

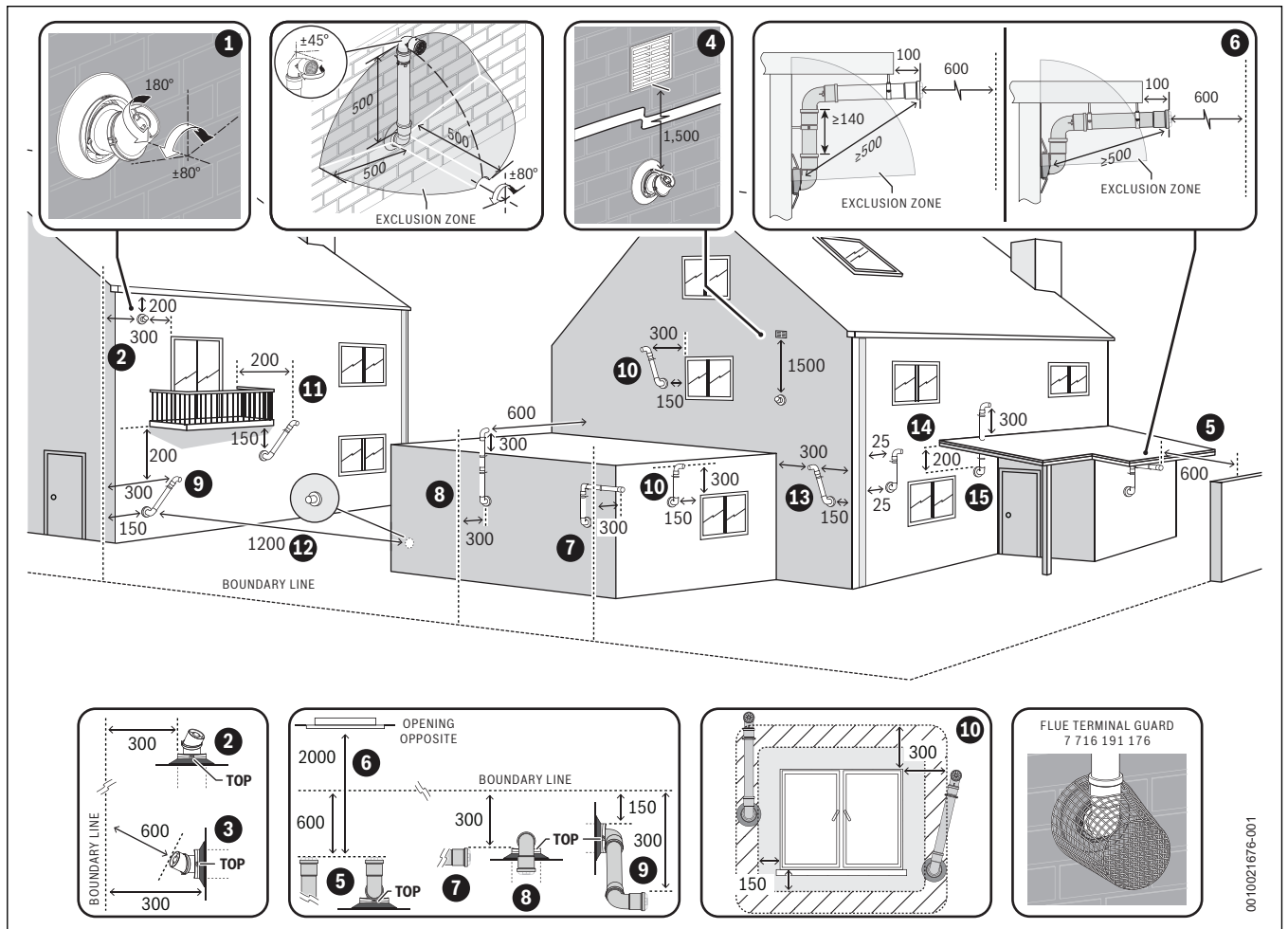


Fig. 28 Plume re-direct and plume management terminal positions

**Key to figure 28 - Plume re-direct terminal positions:**

- [1] This feature allows some basic plume re-direction options on a standard telescopic horizontal flue terminal. 300mm minimum clearances to an 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 other<sup>1)</sup>.
- [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 through 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 for 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.

## 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. **To minimize the risk of freezing, wherever possible: the condensate drain should be installed internally.**
2. All condensate pipe work must 'fall' from the appliance by a minimum of 3° (52mm per metre) to ensure adequate condensate flow.
3. The pipe work route must allow air to be supplied back to the appliance for correct operation.
4. Connection to a rainwater down pipe must include an air break.

Also:

- 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 and do not exceed 3 metres length.  
Unless there is no means of routing the pipe internally. 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), unplasticized (vinyl chloride) (PVC-U), acrylonitrilebutadiene styrene (ABS), polypropylene (PP) or chlorinated poly(vinyl chloride) (PVC.C).

### 4.5.1 Appliance siphonic condensate trap

The appliance has a large capacity condensate trap reducing the risk of condensate discharge pipe work freezing up in prolonged cold temperatures.

The expanded siphonic operation discharges every 10 to 20 minutes. Resulting in:

- Increased velocity and flow rate.
- With less frequent siphonic actions per hour, the condensate pipe work is empty for longer.
- Significantly reducing freezing potential for a 48 hour period at -15°C, provided the installation parameters listed below are followed.

### 4.5.2 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.

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



**Condensate pipe work - Unheated internal areas**

**NOTICE:**

**Unheated internal areas.**

Although the large volume siphon will reduce the risk of freezing, 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.  
For additional information refer to "External Connections" section.

**4.5.3 Internal connections**

**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.

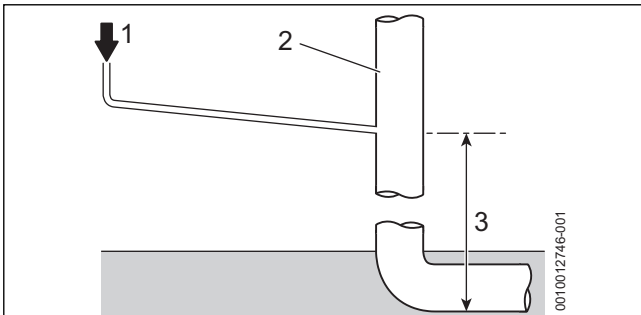


Fig. 29 Disposal to soil vent stack

- [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.

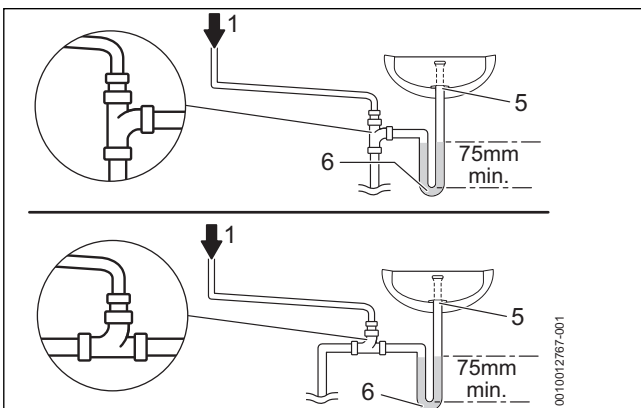


Fig. 30 Waste pipe disposal

- [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.

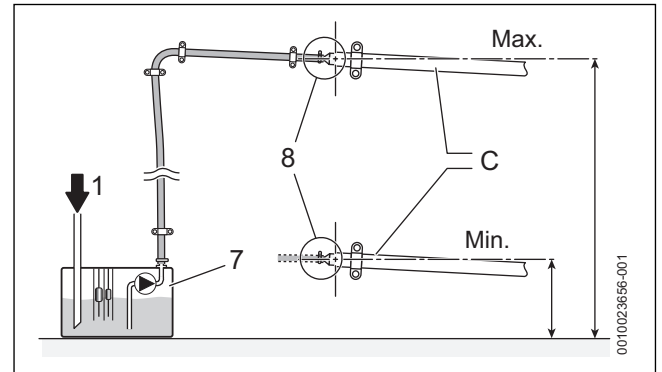


Fig. 31 Condensate pump example

- [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:**

**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 recover 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 route as vertically as possible.

**NOTICE:****Condensate waste disposal**

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

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:

- ▶ The external run be kept as short as possible and should not exceed three metres.  
Additional precaution against freezing must be taken if the external pipe run exceeds 3m.
- ▶ The pipe should be run internally as far as possible before going externally and the pipe diameter should be increased to a minimum diameter of 32mm before it passes through the wall to the exterior. The pipe should be insulated using suitable waterproof and weather resistant insulation.
- ▶ 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 of protecting pipe work that is run externally should be considered to prevent freezing in prolonged periods.
  - Insulation materials can be used, these should be of class "O" grade with an outer coating that is weather proof, bird/animal 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 blockage by leaves) 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 condensate.

**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.

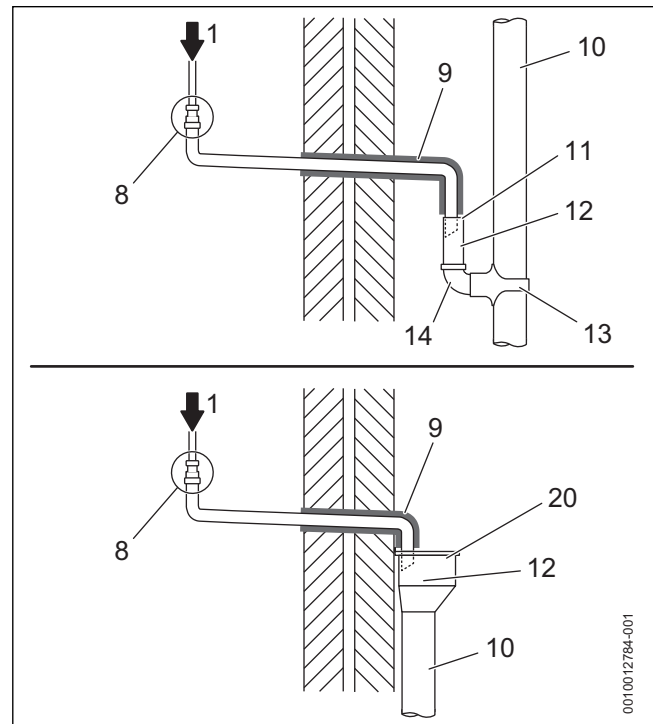


Fig. 32 Disposal into rain water down pipe

- [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.

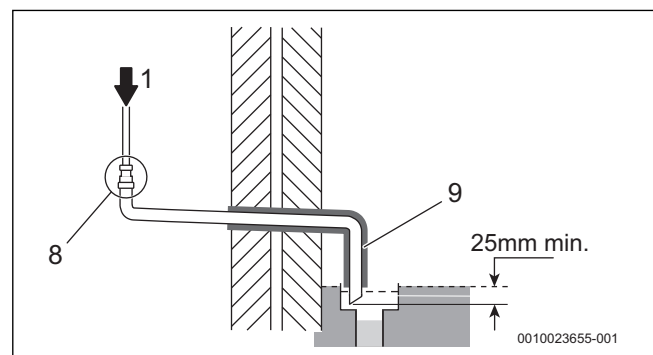


Fig. 33 Disposal to open drain or gully

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

**Open drain or gully with external air break**

→ Figure 34

Where the pipe terminates over an open drain or gully and there is a risk of ground flooding, then the additional requirement below is recommended:

- An air break should 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.

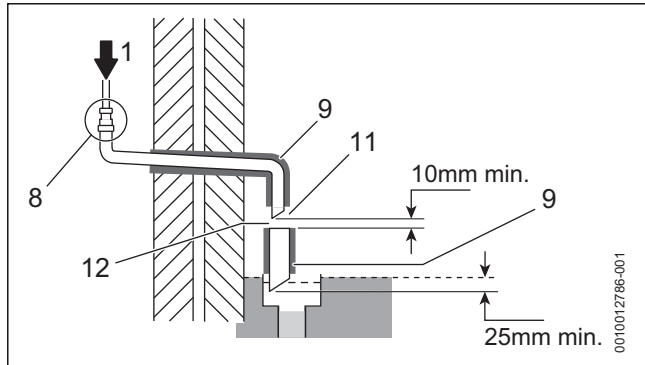


Fig. 34 Disposal to open drain or gully with air break

- [1] Condensate discharge from appliance
- [8] Pipe work transition
- [9] Insulate and increase pipe size
- [11] External air break
- [12] Air gap (minimum 10mm)

**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 an increased risk of freezing causing the condensate pipe to become blocked with 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 35

- 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.

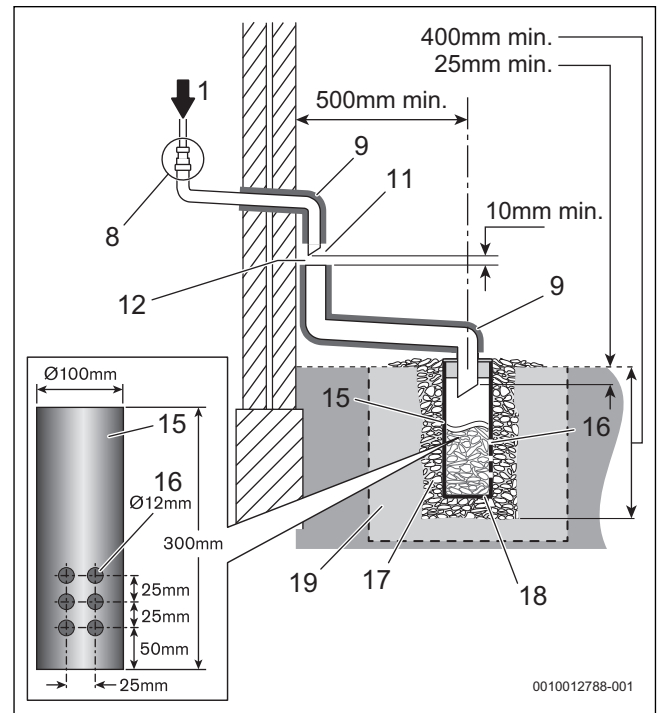


Fig. 35 Disposal to soak-away

- [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.

**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.

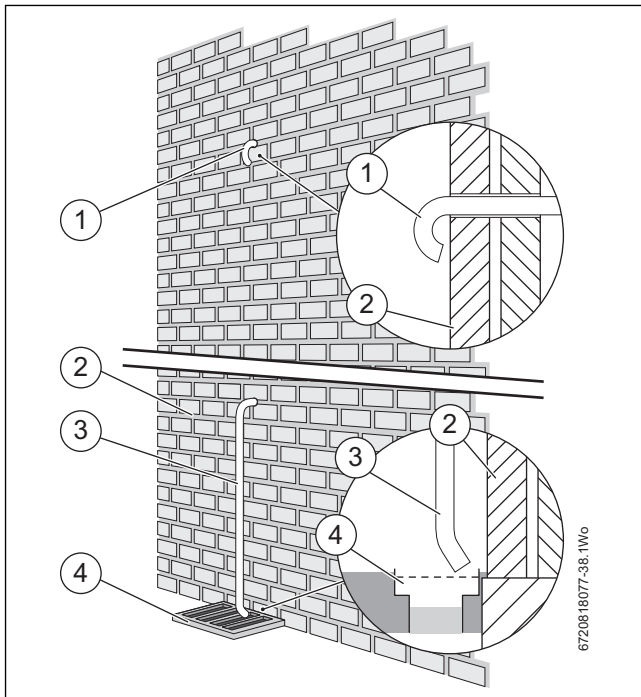


Fig. 36 Pressure relief pipe work

- [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 two filters that helps remove both magnetite and non-magnetic debris; 22mm version, part number 7 733 600 236 and a 28mm version, part number 7 733 600 237.

### 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 12

**4.7.1 Flushing the system**

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

- ▶ 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.



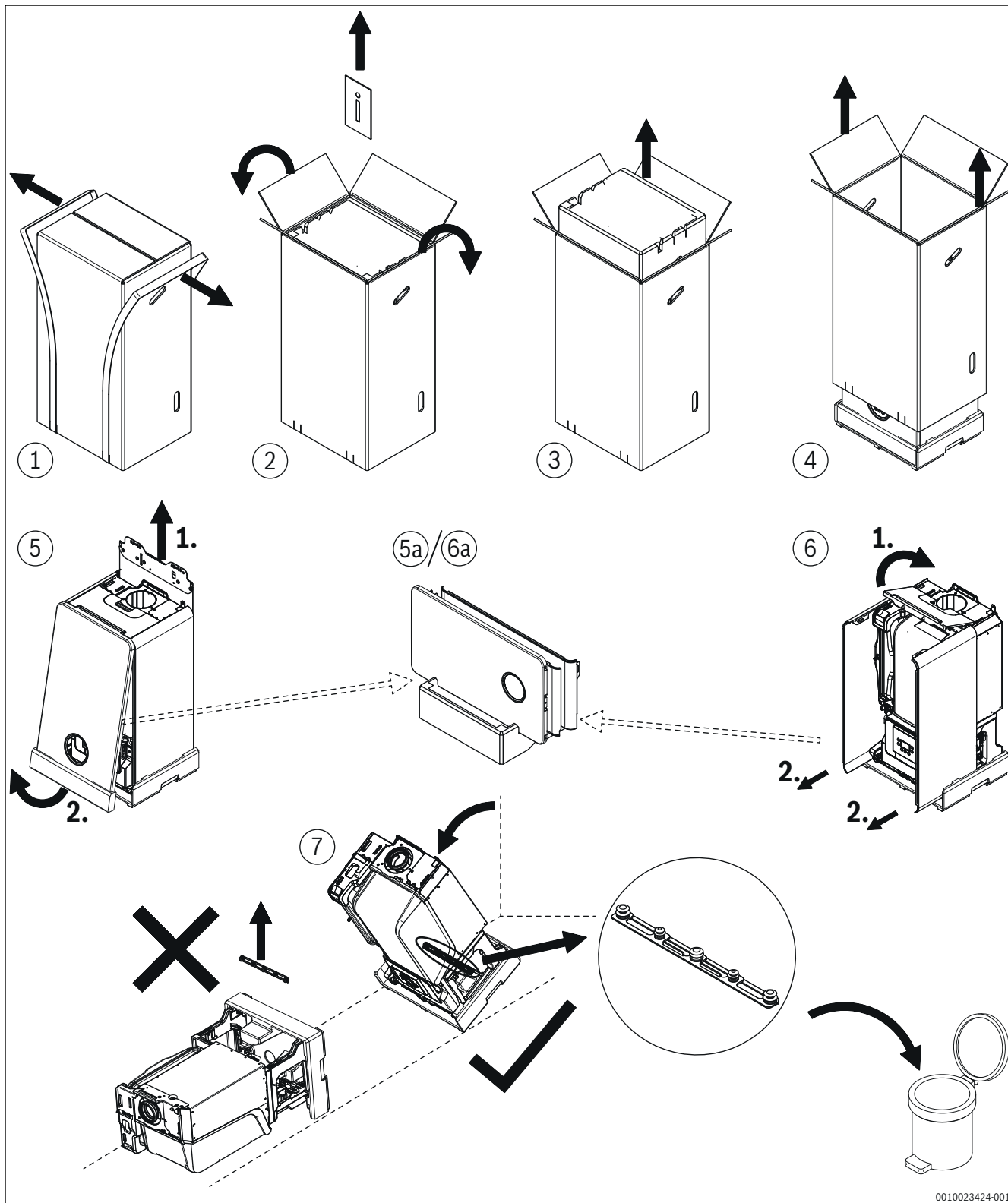
Appliance on site

- ▶ 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.

**Unpacking**



0010023424-001

Fig. 37 Unpacking

**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.

**i**

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 behind the appliance.

- Do not cross a pipe over another.
- The area around a rear flue outlet must be avoided.

#### 5.1.1 Mounting frame fixing

**i**

**simple switch** Existing wall fixings positions (CDi Classic)

- ▶ The existing wall fixings can be used only if they are still deemed by a competent person able to support the new appliance.

**i**

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 38

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

- ▶ 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

**i**

Flue turret

- ▶ The flue turret 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.

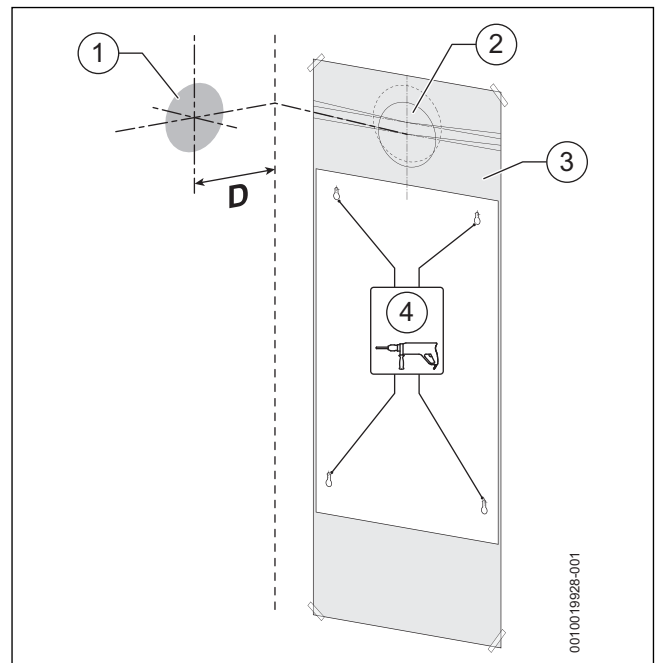


Fig. 38 Wall mounting template

- 1 Side exit flue example
- 2 Rear exit flue example
- 3 Wall mounting template
- 4 Primary fixing points
- D 87mm

### Carry handles

For transportation of the appliance always use the carry handles [1] and [2] (with the control unit in the closed position).

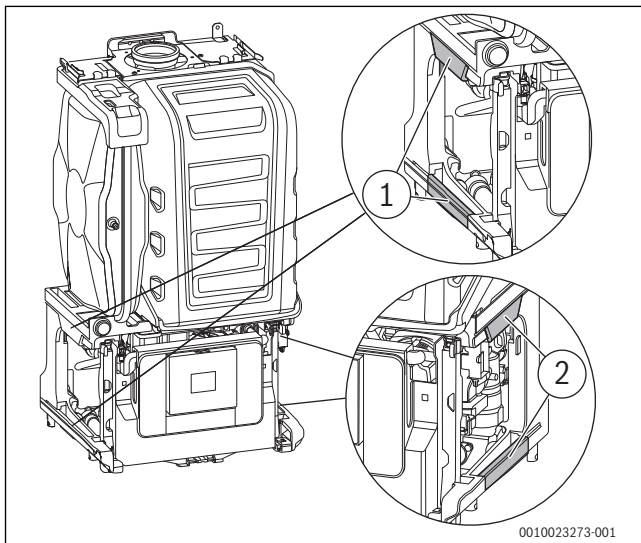


Fig. 39 Transport, lifting and handling

### Preparing the appliance installation

#### NOTICE:

#### Incorrect mounting can cause material damage.

If the appliance is mounted incorrectly, it may fall off the wall.

- ▶ Only install the appliance on a rigid, solid wall. This wall must be able to carry the weight of the appliance and must at least be as large as the bearing surface of the appliance.
  - ▶ Only use screws and wall plugs that are suitable for the wall type and weight of the appliance.
- 
- ▶ Remove the packaging, observing all notices in the packaging.
  - ▶ Make sure that the gas type specified on the data plate is the same as the gas type supplied.
  - ▶ Make sure that the installation location is in the country of destination specified on the data plate.
  - ▶ Affix an installation template (if available) to the wall.
  - ▶ Check whether the screws and wall plugs supplied with the appliance can be used.
  - ▶ Remove installation template from wall.
  - ▶ Drill suitable holes for the selected wall plugs and screws.
  - ▶ Fasten the mounting bracket to the wall using 4 screws and wall plugs (scope of delivery).
  - ▶ Attach the mounting plate to the lower screws and tighten.

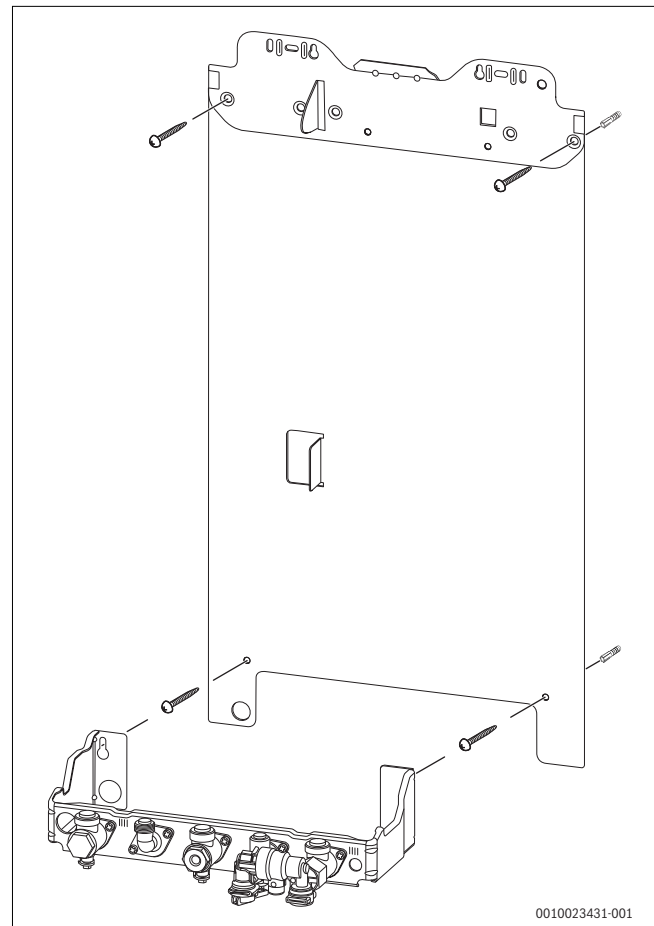


Fig. 40 Fitting the mounting bracket and the mounting plate

## 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, is isolated/drained and observe all relevant safety precautions.
- ▶ Be aware 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.

#### NOTICE:

#### Commissioning without water damages the appliance!

- ▶ Operate this appliance only when filled with water



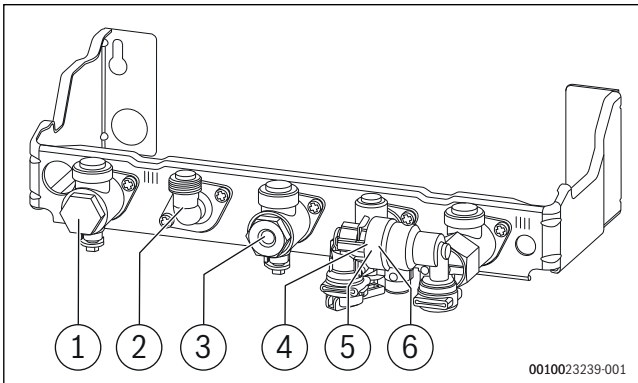


Fig. 41 Connections on the gas and the water side

- [1] Heating flow valve
- [2] Hot water
- [3] Gas isolator
- [4] Cold Water inlet
- [5] Keyless filling link
- [6] Heating return valve

**Preparing the wallframe**

- ▶ Fit sealing washers to service valves before hanging appliance.

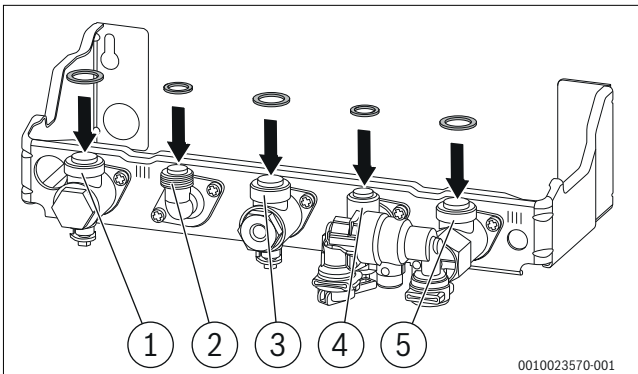


Fig. 42 Fitting the sealing washers

- [1] CH flow (22mm)
- [2] DHW outlet (15mm)
- [3] Gas inlet (22mm bonded washer)
- [4] Domestic Cold Water inlet (15mm)
- [5] CH return (22mm)



Before hanging the appliance onto the wall mounting frame ensure that the pressure relief Drain Pipe is connected securely.

- ▶ Apply a smear of silicone lubricant to the seal to ease connection later.

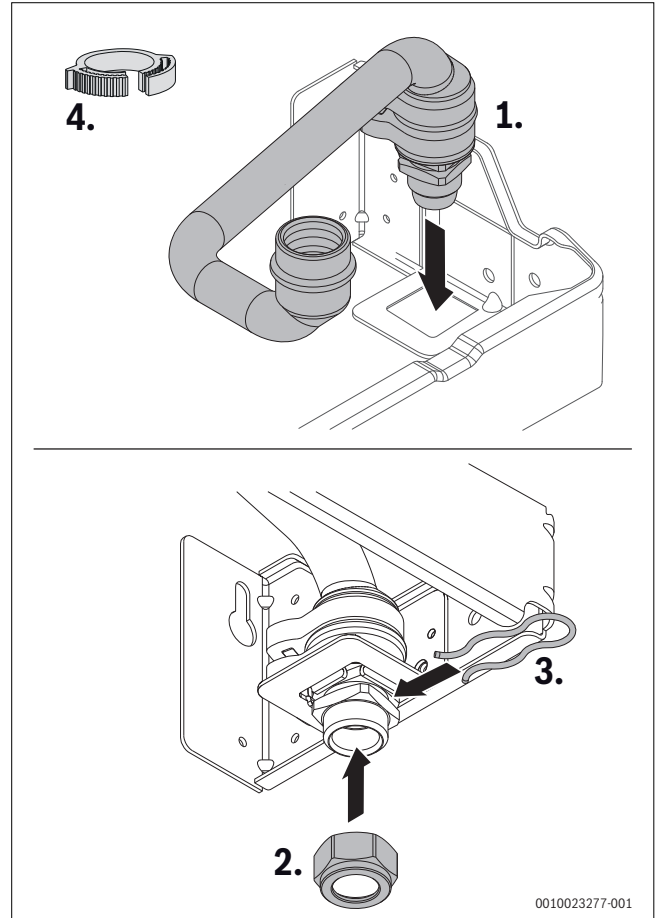


Fig. 43 Connect PRV discharge pipe

**5.3 Hanging the appliance**

**Before hanging the appliance**

1. Remove the orange plastic protective cover strip fitted to the appliance internal pipes by tilting the appliance forward, taking care to protect the floor from residual water. It is not necessary to lay the appliance on its back.
2. After soldering/connecting pipes, ensure that the appliance internal plastic PRV pipe [1] is then connected to the Pre-plumbing manifold (the printing on the pipe must be facing towards you).
3. Ensure that 3 black plastic ratchet clips are securely fixed and tightened. Ratchet clip number 4 must be fitted but left loose until the boiler is hung and connection to the PRV is made (→ Fig. 43 and Fig. 45).
4. The appliance is a 2 person lift. Ensure that the control panel is in its closed position and the top and side panels are removed before lifting the appliance.

**Hanging the appliance**

- ▶ Ensure that top and side panels are removed.
- ▶ Fit the sealing washers to service valves.
- ▶ Hang the appliance on to the wall mounting frame by the centre hook.
- ▶ Unlock the condensate trap and pull it forwards (→ Fig. 90).
- ▶ Check the positioning of the sealing washers on the pipe connections.
- ▶ Tighten the union nuts on the pipe connections starting with the CH return on the right.



It is recommended the lifting operation is carried out by 2 people, observing all precautions for safe lifting of heavy objects

Do not lift by the top case panel. There are two handling holes incorporated into the inner casing left and right in the lower section of the appliance (→ Fig. 39).

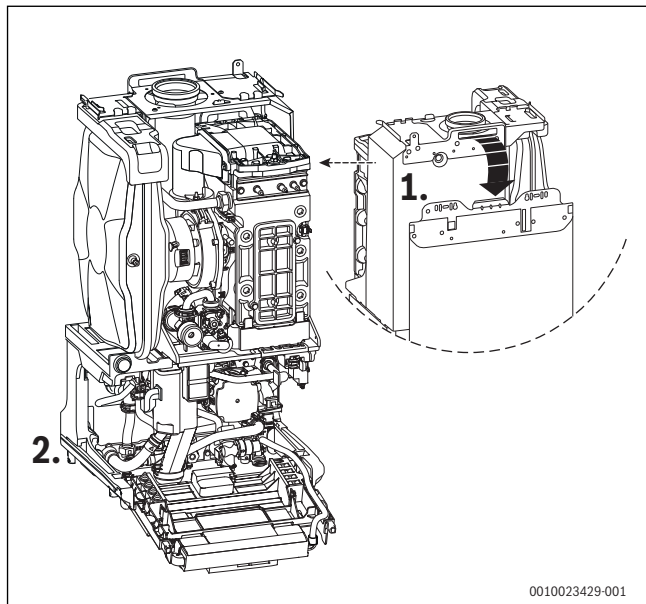


Fig. 44 Hanging the boiler

5. Make connections between the boiler and the pre-plumbing manifold and the pre-plumbing manifold and the system pipes.

- ▶ Connect the CH flow pipes to the boiler's 22mm compression connections.
- ▶ Connect the CH return pipes to the boiler's 22mm compression connections.
- ▶ Connect the gas supply to the boiler gas cock 22mm compression.
- ▶ Connect cold water in and DHW out to the boiler's 15mm compression connectors.
- ▶ Connect the drain pipe to the heating pressure relief valve, ensuring that the black plastic ratchet clip is then tightened securely.
- ▶ Connect the condensate discharge pipe work to the boiler's condensate outlet connections.

**Fitting the drain pipe on the heating pressure relief valve**

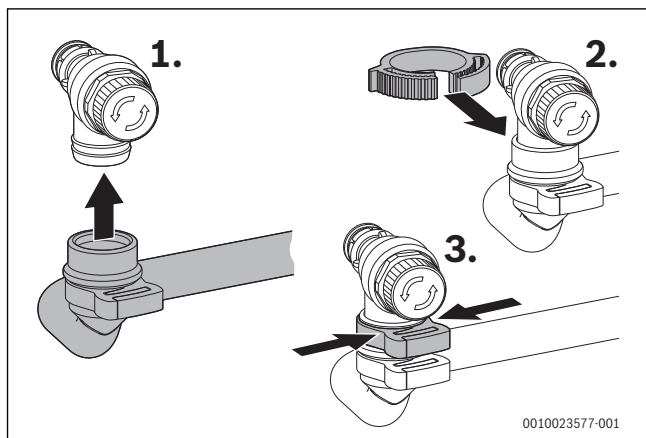


Fig. 45 Fitting the pipe on the (heating) pressure relief valve

**Fitting the condensate pipework**

- ▶ Secure the pipe to the wall at the last joint.
- ▶ Ensure the pipe protrudes through the wall frame by 25mm.
- ▶ If exiting through the wall, to run externally, the pipe must have a 3° fall and be increased to a 32mm insulated pipe.

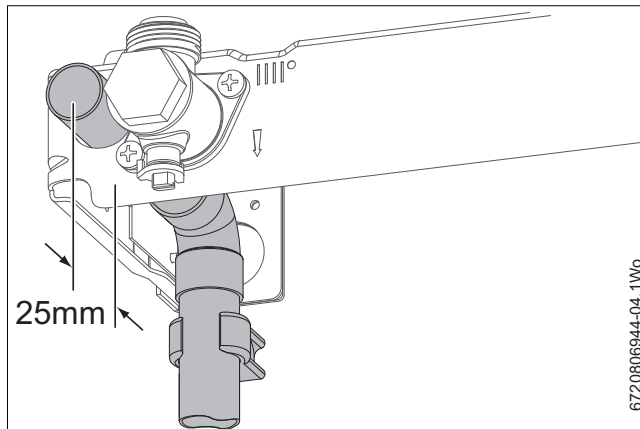


Fig. 46 Fitting the condensate pipes to the mounting plate

**Condensate connection**

**Never terminate or discharge into any open source, including; sink, bath, shower, bidet, toilet etc.**



Any external condensate pipe work of an excessive run should be protected with weather resistant insulation to help prevent freezing → 4.5.

- ▶ Ensure that the condensate drain is 22mm diameter plastic pipe. It must fall at least 52mm per metre towards the outlet.
- ▶ Refer to Fig. 47, condensate connection:
- ▶ Align the installation side plastic pipe work through the pre-plumbing manifold.
- ▶ Connect the installation side plastic pipe work to the end of the condensate hose.
- ▶ Push the plastic pipe work inside the condensate hose at least 25mm.

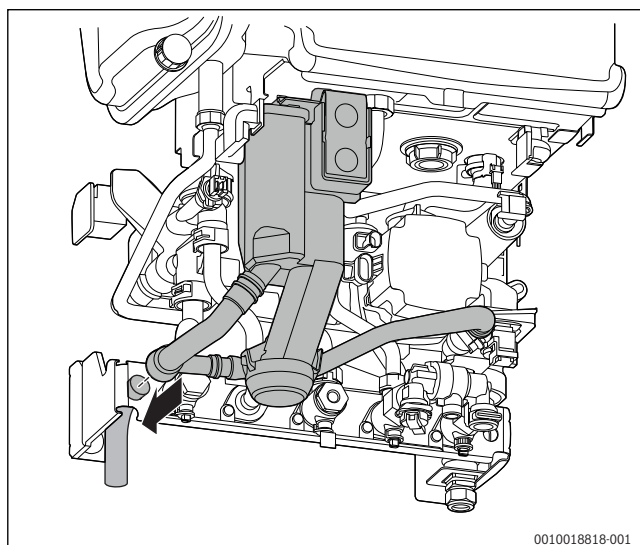


Fig. 47 Condensate connection

### 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 (silver) 100mm part number: 7 738 112 876.
  - Support Bracket Kit (silver) 7 738 112 876.
  - 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.

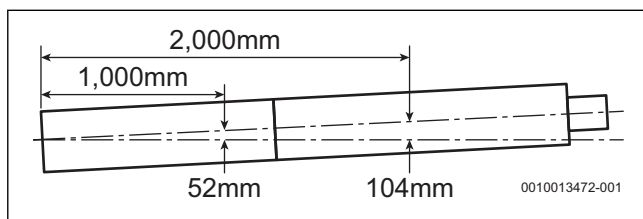


Fig. 48 Slope for condensate disposal

- ▶ 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.

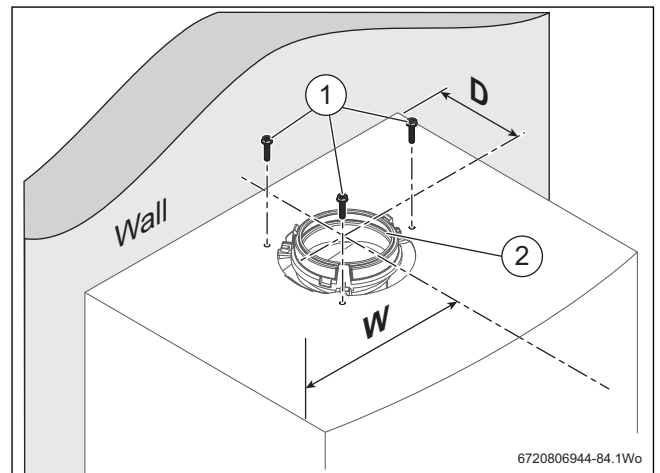


Fig. 49 Flue turret centre

[D] 87mm  
[W] 220mm

- ▶ Align the flue turret/vertical adaptor to the appliance flue outlet with flat facing [3] to the rear of the appliance. The flue turret/adaptor should be pushed straight down, on to the appliance.
- ▶ The three inner flue tube retaining screws [1] are, re-used for the flue turret and replacement retaining screws [4] supplied with the adaptor kit are used to secure turret/adaptor to the appliance.

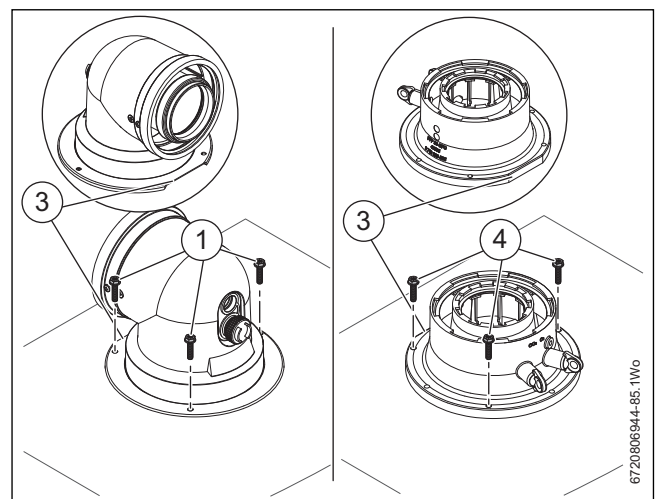


Fig. 50 Flue turret/adaptor connection

## 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.



#### 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 either, a fused double pole isolator or a fused three pin plug and unswitched socket.
- ▶ 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.
- ▶ Type A RCDs  must be employed where additional protection is required.
- ▶ External fuse 3A 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.



#### 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.

If the power cable is of insufficient length, accessing the connection terminal (→ Fig. 51)

- ▶ Replace with the following cable types:
  - H05V2V2F x 0.75 mm<sup>2</sup>
- ▶ Connect the cable so that the protective conductor is longer than the other wires.

### 5.5.1 Installer connections

#### Connect external accessories

- ▶ Flip down the control appliance (→ Fig. 51).
- ▶ Open the cover.

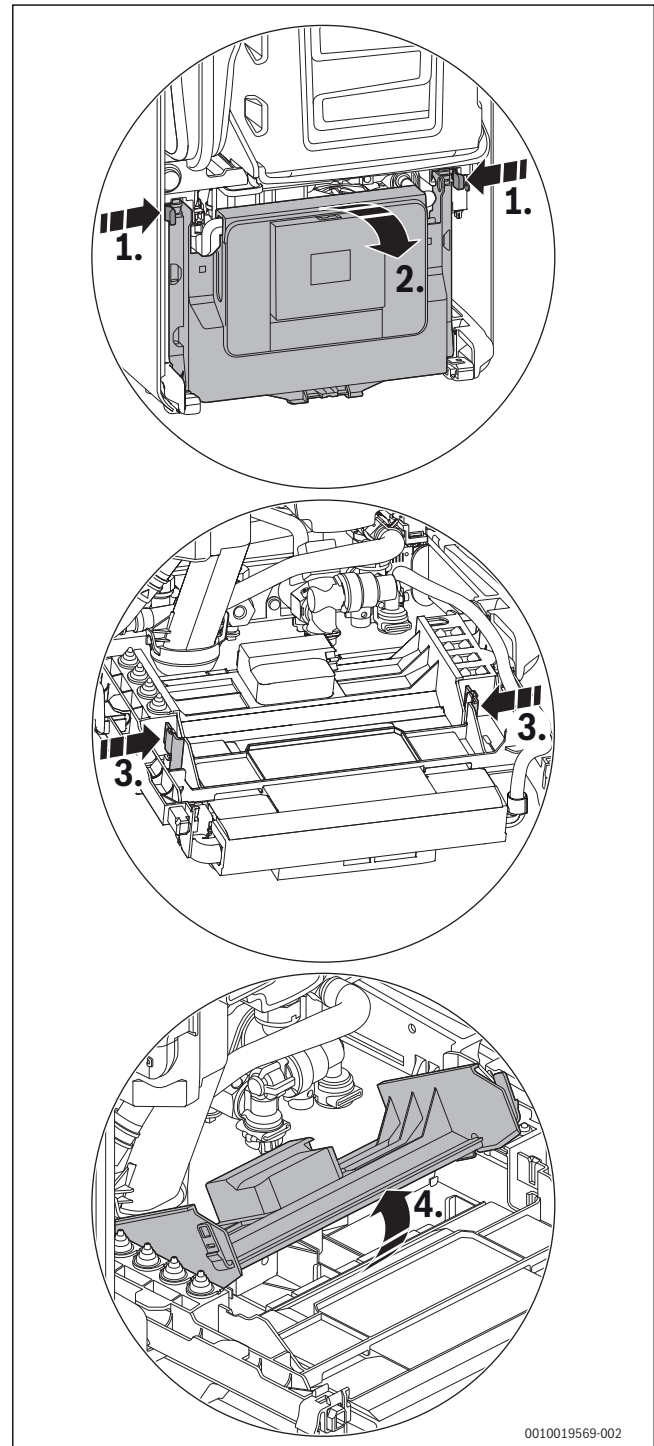


Fig. 51 Opening the cover

Access to the electrical connections once the cover is opened.

- ▶ For splash water protection (IP): cut the strain relief to match the diameter of the cable.

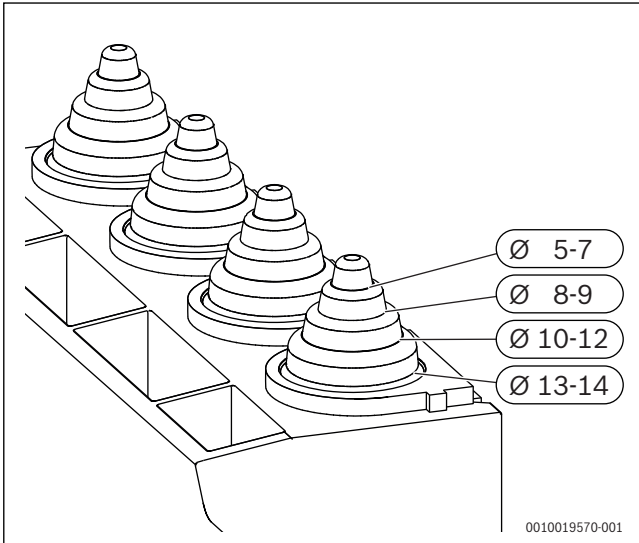


Fig. 52 Adapting the strain relief to the cable diameter

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

**Power supply (power cables) terminal strip**

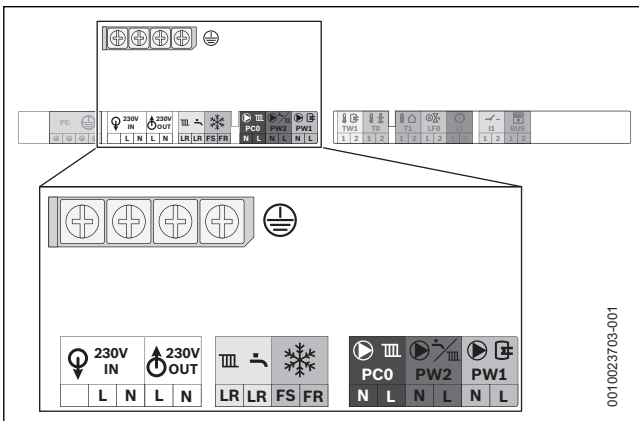


Fig. 53 Power supply (power cables) terminal strip

**Power supply (power cables) connections**

Symbol	Function
	Protective earth bar ▶ Connect the protective earth for power supply.
	Power supply (power cable) Pre-wired cable (Live and Neutral)
	230V mains output to external controls/wiring centre ▶ If required: connect power supply for external controls.
	Switch live (Live Return) to appliance • CH demand input • DHW demand input (pre-heat time control)
	External frost thermostat • FS output (frost thermostat supply) • FR input (frost thermostat return)
	Without function

Symbol	Function
	Without function
	Without function

Table 13 Power supply (power cables) terminal strip for external accessories

**Low voltage (signal cables) terminal strip**

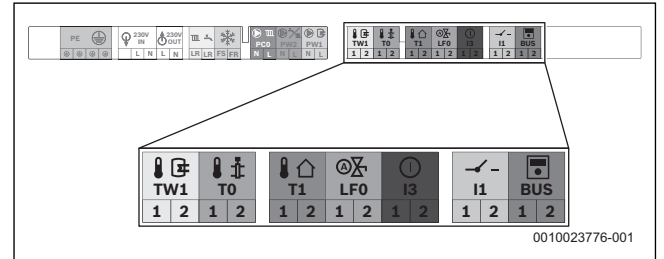


Fig. 54 Low voltage (signal cables) terminal strip

**Low voltage (signal cables) connections**

Symbol	Function
	Without function
	Without function
	Outdoor weather compensation sensor (used when accessory outdoor sensor is connected) ▶ Connect the outside temperature sensor.
	Auto filling link contact. ▶ Connect the auto filling link cable. ▶ Switch on the automatic filling facility in the service menu under Settings > Special function and program it according to the heating system.
	Without function
	Mechanical control accessory and low voltage external room thermostat contact. ▶ Remove link and connect the on/off temperature controller.
	External control system with EMS bus control, Worcester intelligent wall mounted controls, Boiler IQ. ▶ Connect 2 core cable.

Table 14 Low voltage (signal cables) terminal strip for external accessories

**Connecting the automatic filling (accessory)**

- ▶ Flip down the control unit(→ Fig. 51).
- ▶ Plug cables to solenoid valve.



Cables are not polarity sensitive.

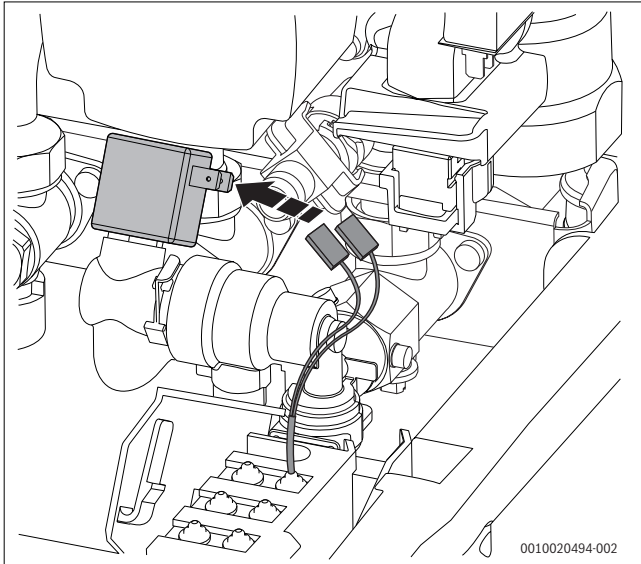


Fig. 55 Connecting the automatic filling facility

**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.

**Mains voltage (power cables), example → figure 56**

- ▶ Ensure the conductors (C) can reach the appropriate terminal connection and that the protective (earth) conductor is longer than the other wires.
  - Power cables connected to the appliance may have different conductor lengths depending on the termination point.

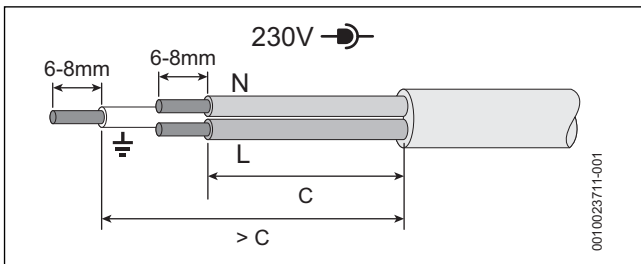


Fig. 56 Mains voltage (power cables) preparation

**Low voltage (signal cables), example → figure 57**

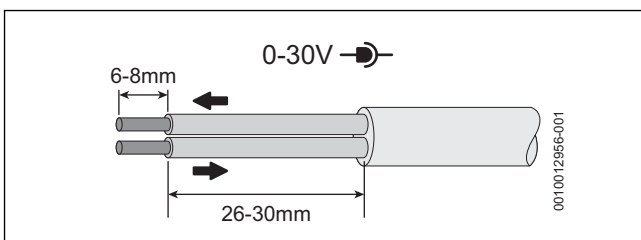


Fig. 57 Low voltage (signal cables) preparation

**5.5.3 External controls - domestic installations**

**Appliance external control connections example**



External 230V single channel timers:

- ▶ Leave DHW pre-wired link in place.
- ▶ The electrical power supply to the external equipment [2] is supplied from 230V OUT - L (Live), N (Neutral) and  $\perp$  (earth) terminals.
- ▶ The Switch Live from the external equipment [3]:
  - Heating/zone controls connects to  $\equiv$  LR terminal, remove CH pre-wired link only.
  - Control for appliance Pre-heat function, optional. Hot water time controller connects to  $\curvearrowright$  LR terminal, remove pre-wired link (only use when a Worcester controller has been fitted that does not have DHW pre-heat time control available or no Worcester controller fitted).
- ▶ External frost thermostat connections [4]:
  - The Live supply is terminal FS
  - The Switch Live is terminal FR

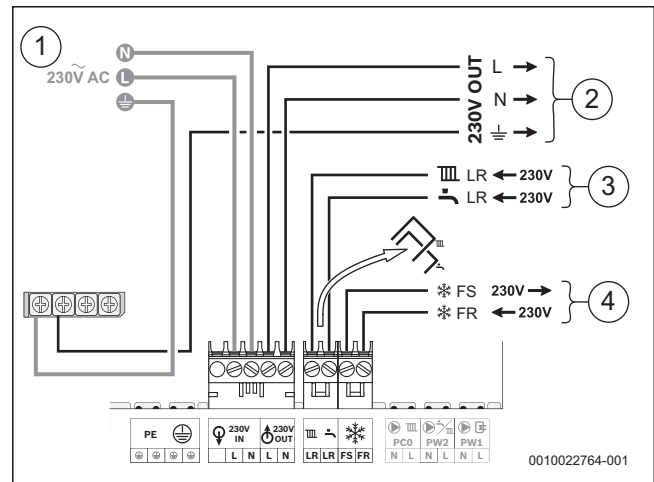


Fig. 58 External controls connections example

- [1] 230V mains supply to the appliance.
- [2] 230V supply from the appliance to the external controls.
- [3] CH & DHW Switch Live (Demand) from the external controls.
- [4] External frost protection Live supply and Switch Live (Demand).

## 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.
- ▶ 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 DWTA 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.**

Additional expansion vessel fitted to the system.

The appliance integral expansion vessel is pre-charged to 1.0bar (equal to a static head of 10.0m (32.8ft)). 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 Integrated filling link accessories.
  - Refer to Integrated 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.



Optional automatic filling link is available as an accessory. It can be used to fill the system.

- ▶ Integrated filling link is supplied with the appliance, see overview → page 7.



The pressure gauge and pressure information within the control panel display menu, will show a different reading. This is due to the accuracy of the digital sensor and is normal. During installation refer to the reading on the pressure gauge

### Integral keyless filling link

Locate the filling link and follow the instructions for re-pressurising the system.

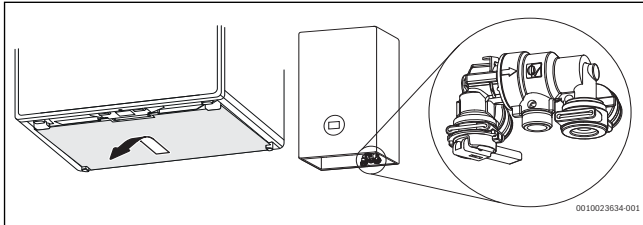


Fig. 59 Enable access to keyless filling link

- ▶ Re-pressurise the system.
  - Pull the lever [1] down to start the filling process.
  - The pressure indicator on the pressure display will start to move towards the green bar.
- ▶ When the pressure indicator reaches the middle of the green bar [2] and the pressure is between 1 and 1.5 bar
  - Release the lever [1] to stop the filling process.
- ▶ Top up the system pressure, if as a result of the air bleeding the pressure drops off.

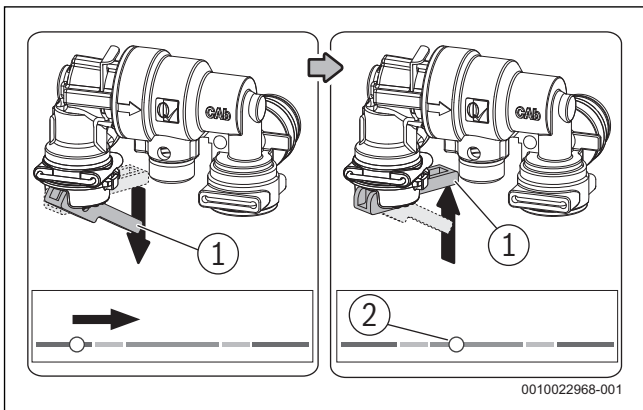


Fig. 60



If the indicator is on the right hand side red pressure zone as a result of over filling:

- ▶ Bleed one radiator until the pressure indicator returns to the green bar.

### 6.2.2 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 15

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 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.

#### 6.3.1 Control panel overview

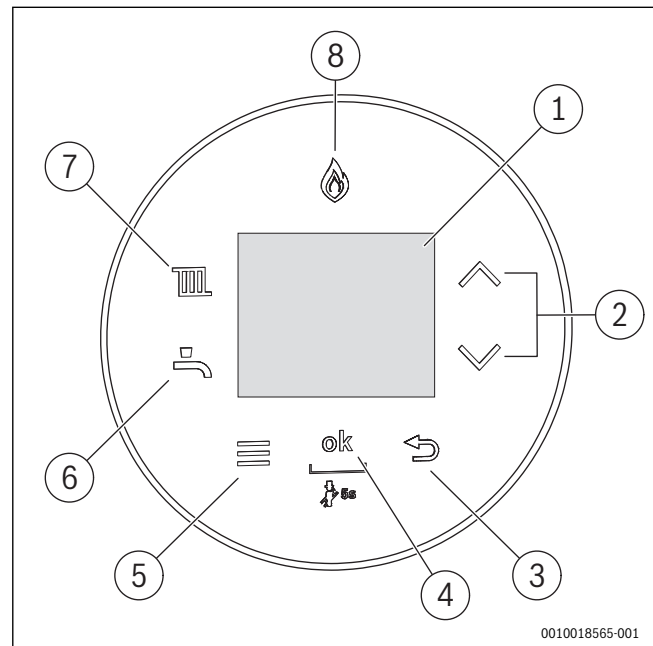


Fig. 61 Control panel

- [1] Display
- [2] ▲ and ▼ keys: To navigate through menus and increase/decrease settings
- [3] ↵ key: Return/back
- [4] OK key: Save settings, Chimney sweeper key: press 5 seconds for chimney sweeper mode
- [5] Menu key
- [6] Hot water key: Hot water mode on/off, adjusting the hot water temperature
- [7] Heating key: Heating mode on/off, set the maximum flow temperature
- [8] Burner display: Illuminates when the burner is alight.



See the operating instructions for a description of the user menus.



### 6.3.2 Turn on the appliance

Set the language the first time the appliance is turned on.

- ▶ To scroll through the languages, press the ▲ or the ▼ key.
- ▶ To select the desired language, press the OK key.



When the display shows **Siphon fill. prog.**, the siphon filling program is active. The condensate siphon in the appliance is filled (→ Chapter 6.3.3).

### 6.3.3 Siphon filling mode

The siphon filling mode is activated automatically or manually by the installer on the appliance in the menu settings. The siphon filling mode is activated in the service menu under > **Settings** > **Special function** > **Siphon fill mode**.

While the siphon filling mode is active, access to the **Hot water** menu, the **Heating** menu and the service menu is possible.

The siphon filling mode is activated automatically in the following cases:

- The appliance is switched on using the On/Off switch.
- The burner was not in use for at least 28 days.
- After conversion from summer to winter mode.

The next time there is a heat requirement for heating, the appliance is held at low thermal output for 15 minutes. The siphon filling mode remains active until the appliance has completed 15 minutes of operation with increased min. capacity.

During the siphon filling program, **Siphon fill. prog.** appears on the display.

The siphon filling mode is interrupted when the chimney sweep mode is started.

### 6.4 Chimney sweep mode



You have 30 minutes to take your measurements or to make your settings. After this time the appliance returns to normal operation. When running in the chimney sweep mode, the appliance will operate both the central heating and the domestic hot water circuits. This is to allow sufficient time for this part of the commissioning procedure. It will be necessary to run water through the domestic hot water circuit to ensure that the appliance will not overheat whilst in chimney sweep mode.

In chimney sweep mode the rated output of the appliance can be selected.

- ▶ Press the OK key when the countdown is completed and **Chimney sweep** is displayed.
- ▶ Confirm the query with Yes.
- ▶ Set the desired rated output using the ▲ or the ▼ keys.  
The value is accepted after 2 seconds and marked with a tick.
- ▶ To exit the chimney sweep mode, press the OK key or the ↔ key.

#### Adjustment with casing removed in chimney sweep mode

1. Set the chimney sweep mode and start up the appliance at maximum rated output.
2. Set the chimney sweep mode and set the appliance at minimum rated output.

### 6.5 Combustion casing removal

- ▶ Remove the combustion cover.

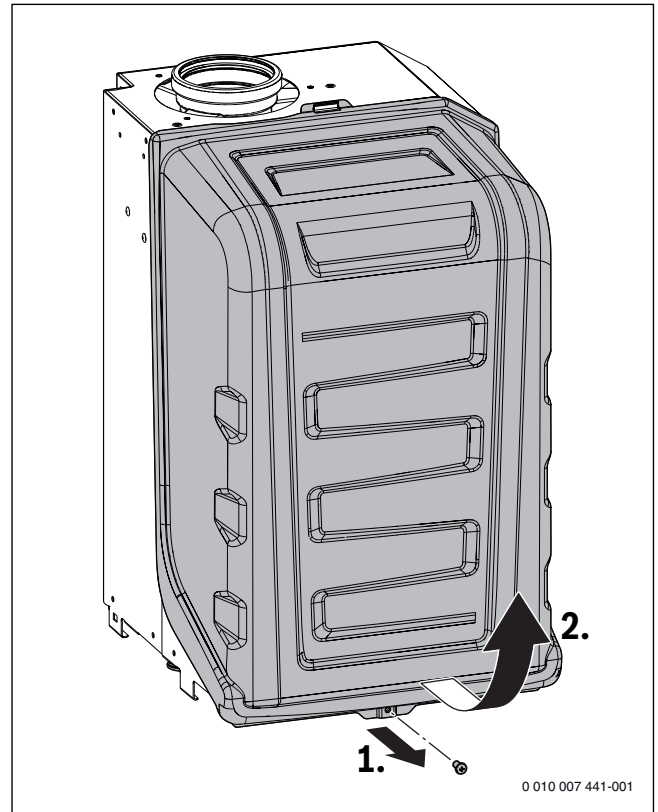


Fig. 62 Removing the combustion cover

## 6.6 Checking gas inlet pressure

### 6.6.1 Checking the gas supply pressure

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

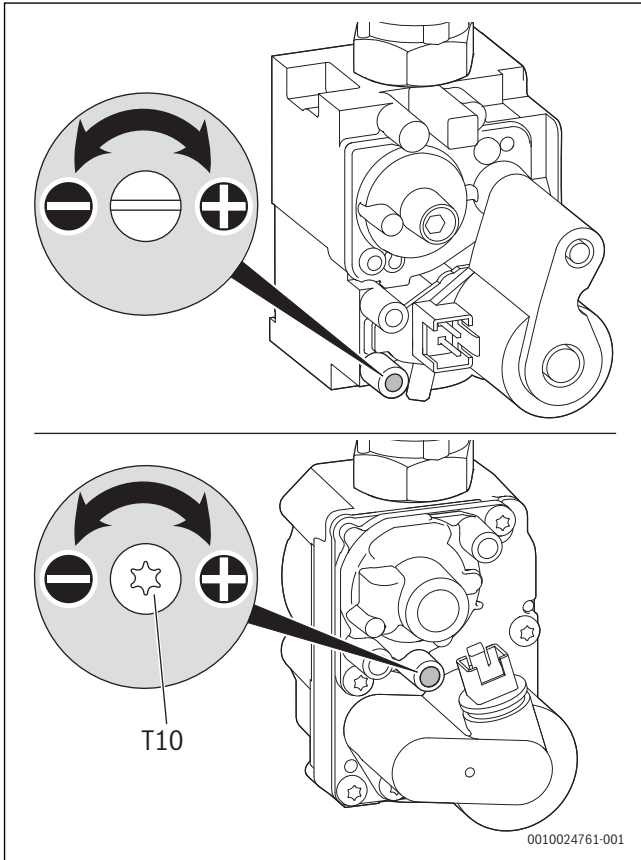


Fig. 63 Gas valve test points (above: SIT valve, below: Honeywell valve)

- ▶ Open the gas isolator and switch on the appliance.
- ▶ Ensure that there is heat transfer by opening the radiator valves and by running a hot tap.
- ▶ Set the chimney sweep mode and start up the appliance at maximum rated output.
- ▶ Check the required gas supply pressure according to table .



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 appliance on the gas side and notify the gas supplier.

- ▶ Exit the chimney sweep mode.
- ▶ Switch off the appliance, close the gas isolator, remove the pressure gauge and tighten the screw.
- ▶ Check for gas tightness.

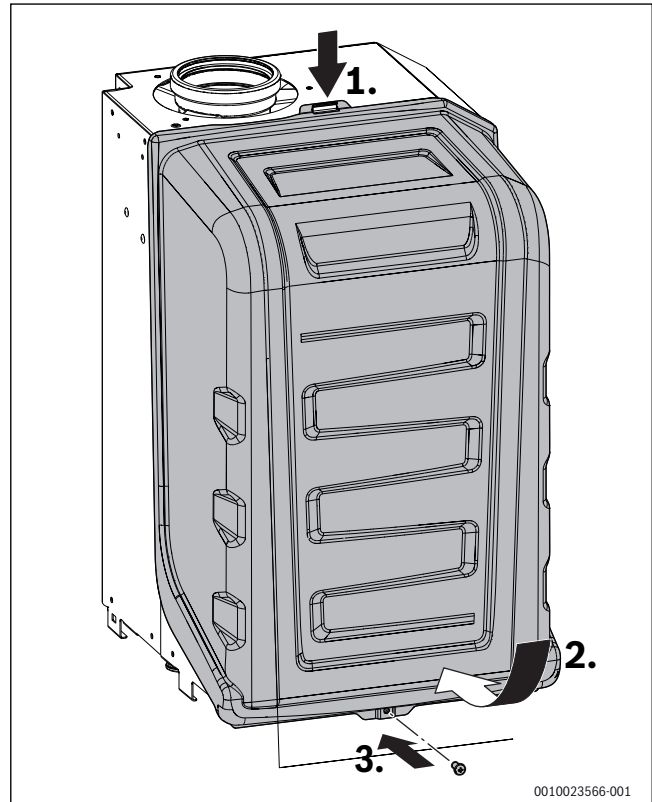


Fig. 64 Refit combustion casing

- ▶ Refit the combustion casing.
- ▶ Ensure this cover is engaged onto top bracket [1] before securing screw [3].

### Gas pressure within the system



The appliance must be running at maximum output rate when performing the gas rate check, (→ chapter 6.4).



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 or L.P.G gas pressures.

The pressure drop from the meter or at the L.P.G. gas supply to the gas valve inlet test point must not be more than:

- 40 kW or below ( $\leq 40$  kw): 2.5 mbar for Natural Gas
- above 40 kW ( $> 40$  kw): 3.5 mbar for Natural Gas
- 4 mbar for L.P.G.

Allowed mbar pressure drop				
Meter/ LPG supply	Across pipe work	Appliance inlet	Across appliance	Gas valve
<b>Natural gas</b>				
19 - 23	1	18 - 22	≤ 40 kW: 1.5 > 40 kW: 2.5	≤ 40 kW: 16.5 - 20.5 > 40 kW: 15.5 - 19.5
<b>L.P.G.</b>				
32 - 45	2.5	29.5 - 42.5	≤ 40 kW: 1.5 > 40 kW: 2.5	≤ 40 kW: 28 - 41 > 40 kW: 27 - 40
mbar range				

Table 16

If the pressure drops are greater than shown below, 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 supply pressure drop

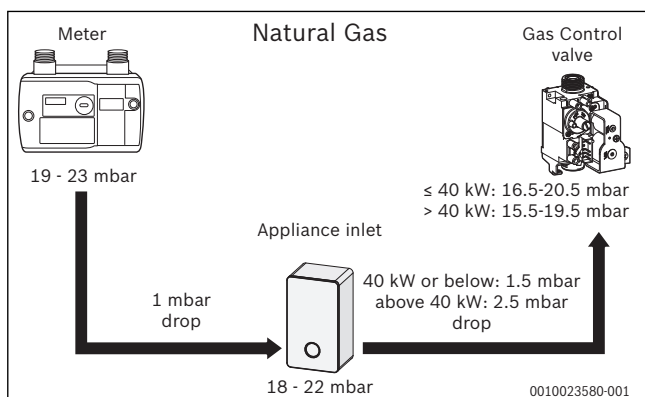


Fig. 65 Natural Gas pressures

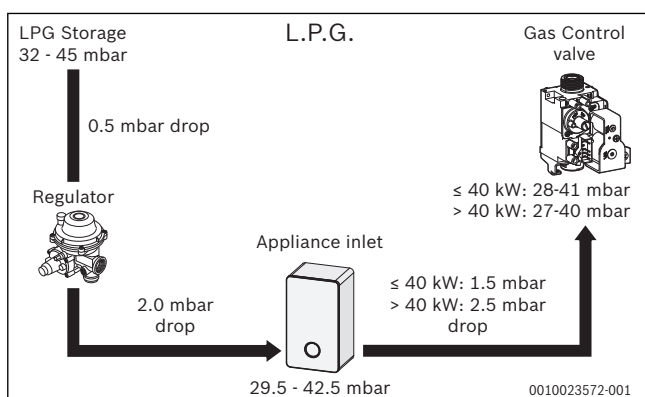


Fig. 66 L.P.G. pressures

[≤] Less than or equal to

**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/CO<sub>2</sub> ratios.
- ▶ Where a gas meter is not available (e.g. L.P.G.) the CO/CO<sub>2</sub> must be checked.
- ▶ 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.

- ▶ Set the chimney sweep mode and start up the appliance at maximum rated output.
- ▶ Where a gas meter is not available (e.g. L.P.G.) the CO/CO<sub>2</sub> must be checked to the units shown in the setting of the air/gas ratio.
- ▶ If pressure and gas rate are satisfactory press the OK key or the d key and the boiler will return to normal operation.
- ▶ 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.
- ▶ Replace the outer case.

**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 check list, 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, (→ chapter 6.10)
- Flue gas analysis, (→ chapter 6.11)

**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.

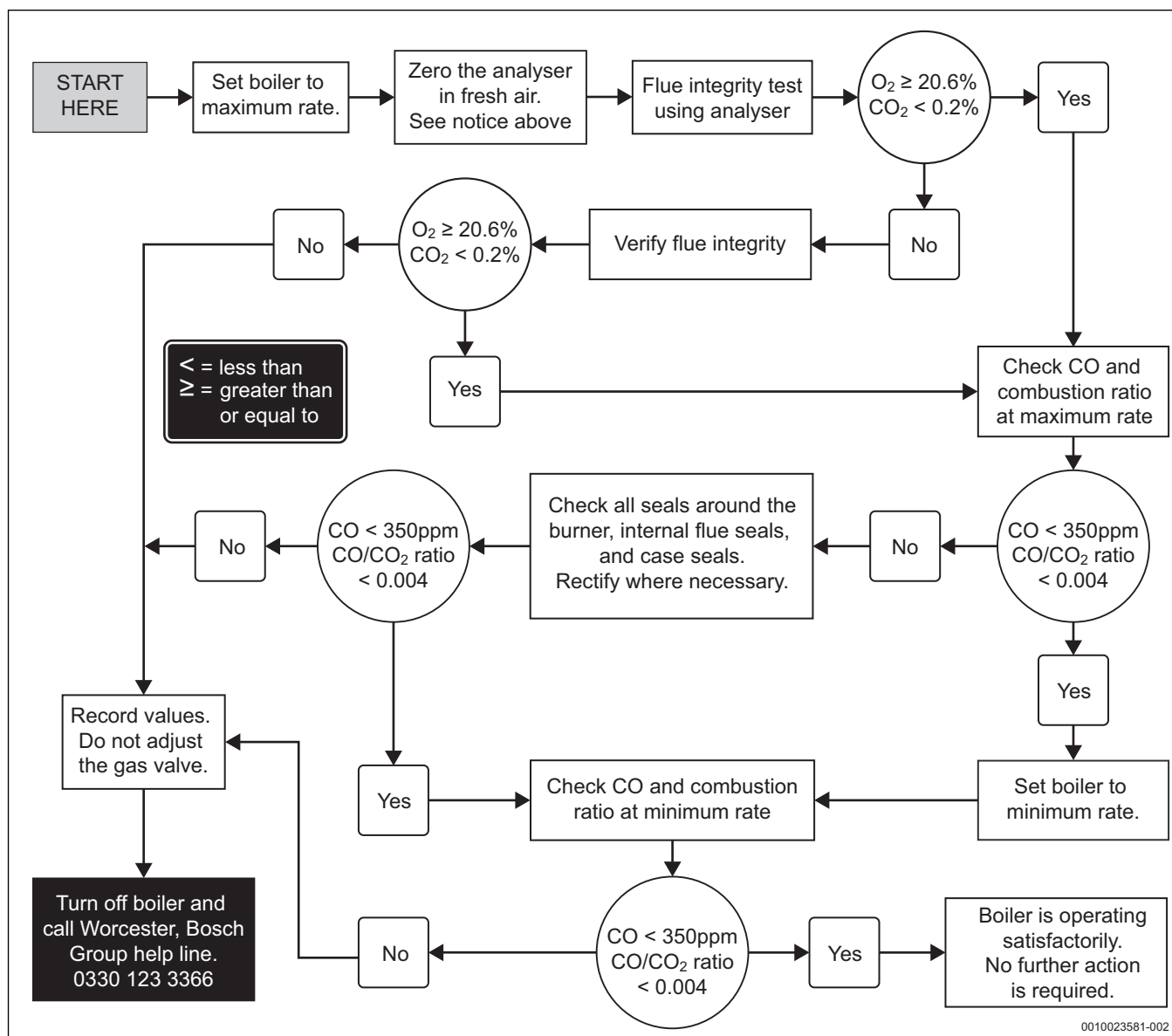


Fig. 67 Commissioning checks flow chart

### 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.

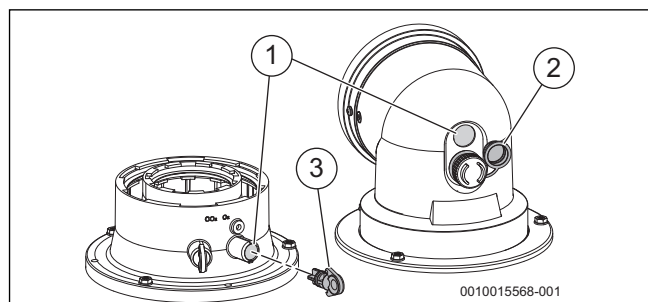


Fig. 68 Flue integrity check test point

- [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 casing on and the appliance running at maximum output in 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<sub>2</sub> is equal to, or greater than 20.6%
  - CO<sub>2</sub> 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.

Flue gas sample point location on flue turret/adaptor.

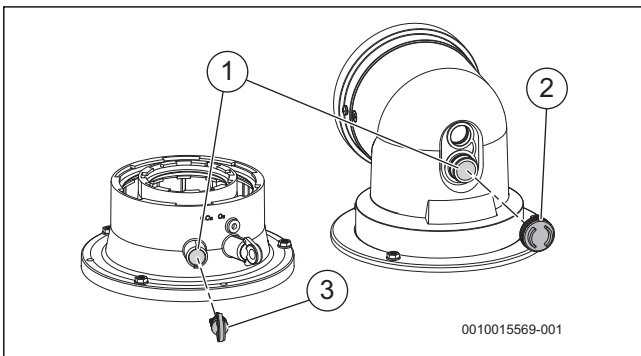


Fig. 69 Combustion test

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

### 6.12 Finishing commissioning

#### 6.12.1 Fitting the combustion casing

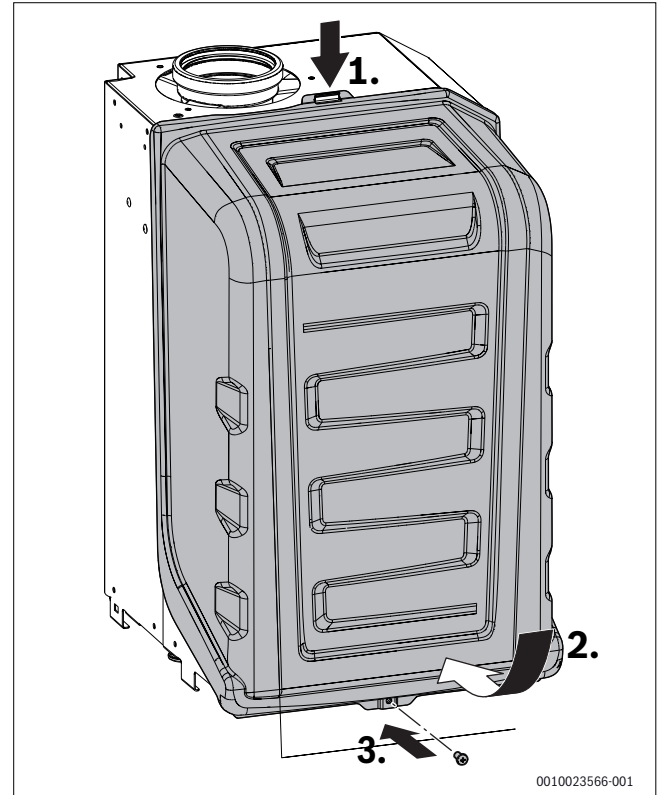


Fig. 70 Fitting the combustion casing

- ▶ Ensure this cover is engaged onto top bracket [1] before securing screw [3].

### 6.12.2 Fitting the appliance casing

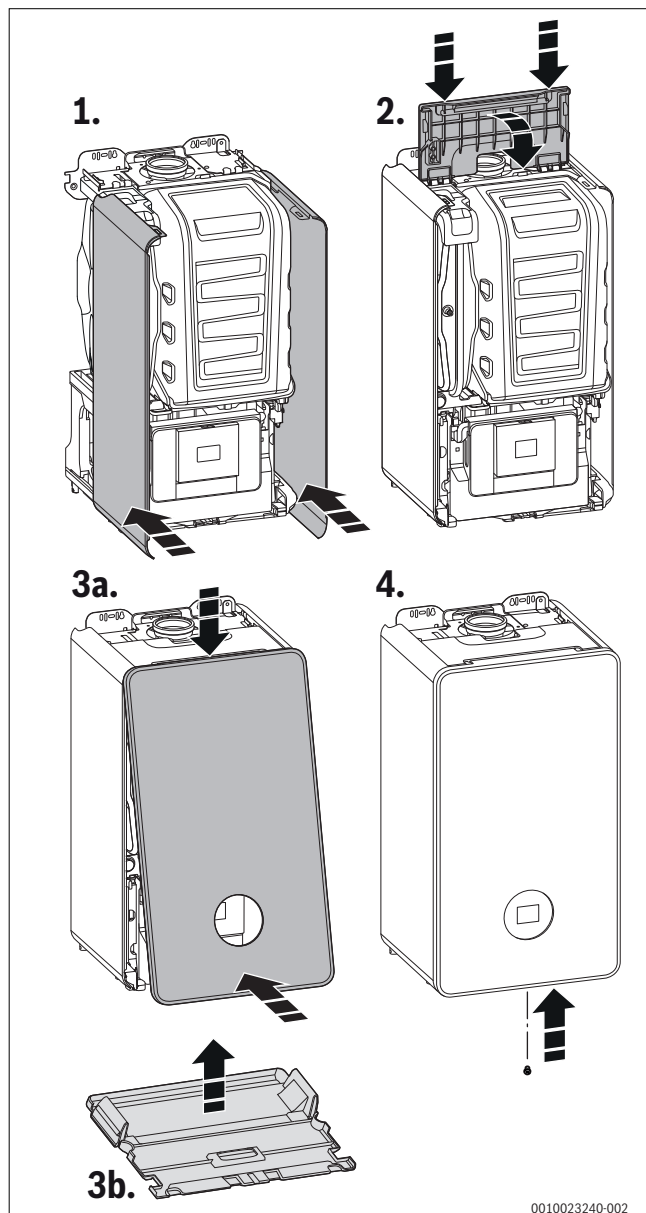


Fig. 71 Fitting the appliance casing

- [1] side covers
- [2] top
- [3] front
- [4] bottom



The front casing is to be secured at the bottom with one screw (as supplied) against unauthorised removal (electrical safety).

- ▶ Always secure the casing with this screw.



- ▶ Remove the protective films from the boiler display and front cover before handing over to the user.



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:
  - the need to occasionally re-pressurise the appliance and the pressure expected on the pressure menu.
  - location of the keyless filling link and system pressure menu.
  - the use of the keyless filling link and how to re-pressurise the system.
  - how to set the TRVs.
  - how to reset the appliance.
- ▶ 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 77 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](http://www.worcester-bosch.co.uk).
- ▶ Advise the customer that outside temperatures will affect the output of the appliance, especially the DHW.
- ▶ 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, shut off 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.

### 6.12.3 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 following terms and conditions.

- The guarantee period for your product/component will vary depending on its type and the accreditation of your installer. To confirm the guarantee period applicable to your product, speak to your installer or call 0330 123 2552.
- The guarantee must be registered within 30 days of installation.
- The householder may be asked to prove the date of installation and that the appliance was correctly commissioned. This should be documented as a part of the Commissioning Checklist.
- The product must be correctly installed and commissioned in accordance with the Installation instruction for your product and meet the requirements of the Benchmark initiative if applicable.
- The product must be maintained, inspected/serviced in accordance with the manufacturer's product instructions by a Bosch Thermotechnology Ltd or other competent Engineer. Proof of inspection/servicing may be required to validate a guarantee.
- During the period of this guarantee any components of the appliance that are proven to be faulty or defective in manufacture will be exchanged or repaired free of charge if repaired directly by Bosch Thermotechnology Ltd.
- Invoices for attendance and repair of this appliance by third parties will not be accepted for payment by Bosch Thermotechnology Ltd.
- That any product or part thereof returned for servicing under the guarantee must be accompanied by a claim stating the Model, Serial Number, Date of Installation.
- That Bosch Thermotechnology Ltd will not accept responsibility for damage caused by faulty installation, neglect, misuse or accidental damage or the nonobservance of the instructions contained in the Installation and Users Instructions leaflets.
- The appliance has been used only for the normal domestic purposes for which it was designed.
- That this guarantee applies only to equipment purchased and used in the United Kingdom of Great Britain and Northern Ireland, the Republic of Ireland, the Isle of Man or the Channel Islands.

**For full terms and conditions, please visit:**

[www.worcester-bosch.co.uk/guarantee-terms-and-conditions](http://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](http://www.worcester-bosch.co.uk/guarantee).

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

## 7 Settings in the service menu

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

- **Info:** viewing information
- **Settings:** general and appliance-specific settings
- **Function check:** settings for function checks and start of function checks
- **Reset:** restoring the factory settings, resetting the maintenance intervals
- **Demo mode:** mode for testing and demonstrating the functions. Power off appliance for exit.

### 7.1 Operating the service menu

**Opening the service menu**

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

**Closing the service menu**

- ▶ Press the Hot water 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 the **OK** key.  
The menu or the menu item is displayed.
- ▶ To return to the next higher menu level, press the ↵ key.

**Changing the setting values**

- ▶ Select the menu item with the OK key.
- ▶ To select the desired value, press the ▲ or the ▼ key.
- ▶ Press the **OK** key.  
The new value is saved.

**Exiting the menu item without saving values**

- ▶ Press the ↵ key.  
The value is not saved.
- ▶ Enter modified settings.
- ▶ Affix label to the appliance in a visible location.

## 7.2 Service menu

### 7.2.1 Overview of the service menu

---

#### Benchmark

---

- Actual temp.
- DHW flow rate
- Hot water temp.

---

#### Info

---

- Current status
- Current fault
- Fault history
- Boiler
  - Mx.heat.outp %
  - Mx.heat.outp kW
  - Actual temp.
  - Set flow temp.
  - Low-loss hdr.tmp
  - Heating mod.
  - Act. burner mod.
  - Burner output
  - Ionisation current
  - Pump mod.
  - Outside temp.
  - HC1 pump
  - Burner starts
  - Hours run
  - System pressure
- Hot water
  - Max. outp.(kW)
  - DHW flow rate
  - DHW act. temp.
  - Hot water temp.
  - DHW set temp.
- Autom. filling
  - System pressure
  - No. of refills
  - Last refill dur.
  - Refilling active
- System
  - Contr.device ver.
  - Progr. unit ver.
  - SW sub-ver.
  - Code plug no.
  - Code plug ver.
  - Key<sup>1)</sup>
- Solar
  - Collector temp.
  - Cyl.temp.bottom
  - Collector pump
  - Solar fault

---

#### Settings

---

- Hydraulics
  - Low-loss header
  - DHW configuration
  - HC1 configuration
  - Pump config.
- Heating

- Mx.heat.outp %
- Standby time
- Clock inh. T. off
- Clock inh. T. on
- Hot water
  - Turbine signal del.
  - DHW start del.
  - Preheat
- Pump
  - Pump range map
  - Pump ctr. mode
  - Min. output
  - Max. output
  - Pump overrun
  - Min.syst.pressure
  - Target pressure
- Special function
  - Ventilation func.
  - Siphon fill. prog.
  - 3-WV mid. pos.
  - Autom. filling
    - Autom. filling
    - Min. Sys. Pres.
    - Target Sys. Pres.
    - Max. refill time
    - Blocking time
    - Max. refills
    - Reset refilling
- Maintenance
  - Maintenance type
    - Without
    - Boiler run time
    - Burner run time
    - Service date<sup>1)</sup>
    - Landlord<sup>1)</sup>
      - End date
      - Maint. reminder
      - Installer tel. no.
- Limit values
  - Max. flow temp.
  - Max. DHW temp.
  - Min. boiler outp.
- Heating curve
  - Req. odr. temp.
  - Htg. curve base
  - Htg. curve end
  - Summer mode
  - Frost prot.
  - Frost temp. limit
- Solar
  - Max. solar temp.
  - Solar pump type
  - Start solar system

---

#### Function check

---

- Activate test
- 

1) Only available with installed Key Timer (accessory)



- Burner
  - Ignition
  - Fan
  - Pump
  - 3-way valve
  - HC1 pump
  - Ionisat. oscill.
  - Solar pump
- 

**Reset**

---

- Default setting
  - Fault history
  - Hidden menu: Reset Maintenance Landlord
- 

**Demo mode**

---

### 7.2.2 Benchmark and Info menu

Menu item	Comment/restriction
Actual temp.	Flow temperature in °C
DHW flow rate	Hot water flow rate in l/min
Hot water temp.Outlet temperature in °C	

Table 17 Benchmark menu

Menu item	Comment/restriction
Current status	
Current fault	→ Tab. 24, page 68
Fault history	
<b>Boiler</b>	
Mx.heat.outp %	Max. heating output in %, Setting value in > Settings > Heating > Mx.heat.outp %
Mx.heat.outp kW	Max. heating output in kW
Actual temp.	Flow temperature in °C
Set flow temp.	Setting value of the flow temperature
Low-loss hdr.tmp	Only if installed. Momentary flow temperature in low loss header in °C
Heating mod.	Burner modulation (heating) in %
Act. burner mod.	
Burner output	Current burner output in kW
Ionisation current	Current ionisation current in µA
Pump mod.	Actual system pump modulation in %
Outside temp.	Current outside temperature in °C
HC1 pump	Current status on/off
Burner starts	Number of burner starts since commissioning
Hours run	Elapsed time of the system since commissioning
System pressure	Current system pressure in bar
<b>Hot water</b>	
Max. outp.(kW)	Max. hot water output in kW
DHW flow rate	Current hot water flow rate in l/min
DHW act. temp.	Actual hot water temperature in °C
Hot water temp.	Current water temperature in °C
DHW set temp.	Setting value of the hot water temperature
<b>Refilling settings</b>	
System pressure	Current system pressure in bar
No. of refills	Number of automatic fillings since last reset
Last refill dur.	Duration of last refill
Refilling active	Automatic filling on
<b>System</b>	
Contr.device ver.	Software version of the control unit
Progr. unit ver.	Software version of the control unit
Code plug no.	Coding plug number
Code plug ver.	Coding plug version
Key	Type of installed key, e.g. "Connect-Key"
<b>Solar</b>	
Collector temp.	Collector temperature
Cyl.temp.bottom	Cylinder temperature at bottom
Collector pump	Collector pump
Solar fault	Current faults

Table 18 Info menu

### 7.2.3 Settings menu

The menu is adapted to your system automatically. Some menu items are only available if the system has been set up accordingly. The menu items are only displayed in systems in which the corresponding system components are installed, e.g. automatic filling facility or Key Timer.



The factory settings are **highlighted** in the following table.

Menu item	Settings/adjustment range	Comment/restriction
<b>Heating</b>		
Max. heat output		Maximum released heating output [%]. On natural gas appliances: ▶ Measure the gas rate. ▶ Compare the measurement with the setting tables (→ Chapter 12.6). ▶ Correct deviations.
Standby time	• 3... <b>10</b> ...60 minutes	The time interval determines the minimum delay between starting and restarting the burner.
Clock inh. T. off	• 2 ... <b>6</b> ... 15 Kelvin	Temperature standby period.
Clock inh. T. on	• -15... <b>-6</b> ...-2 Kelvin	The difference between the current flow temperature and the set flow temperature until the burner is switched on or off.
<b>Hot water</b>		
Turbine signal del.	• <b>0.50</b> ...4.00 seconds	The delay prevents sudden changes in the water supply pressure from causing the burner to briefly operate although no water is drawn off.
DHW start del.	• <b>0</b> ...50 seconds	The delay concerns heating operation in systems in which the DHW outlet of the solar-heated DHW cylinder is connected to the cold water inlet of a combi boiler. DHW heating by the combi boiler will be suppressed expecting that solar thermal DHW will reach the hot water temperature sensor prior eliminating the need to run the boiler. This avoids unnecessary operation of the combi boiler. Set the heating delay in accordance with system conditions.
Preheat	• 0... <b>1</b> ...30 minutes	The heating mode is disabled for this period of time following DHW heating.
<b>Pump</b>		
Pump range map	<ul style="list-style-type: none"> <li>• Output dependent 0: pump rate proportional to thermal output</li> <li>• Delta-P dependent 1: constant pressure 150 mbar</li> <li>• Delta-P dependent 2: constant pressure 200 mbar</li> <li>• <b>Delta-P dependent 3: constant pressure 250 mbar</b></li> <li>• Delta-P dependent 4: constant pressure 300 mbar</li> <li>• Delta-P dependent 5: constant pressure 350 mbar</li> <li>• Delta-P dependent 6: constant pressure 400 mbar</li> </ul>	▶ Set low pump curve to save energy and avoid possible flow noise (→ Chapter 12.5).
Pump ctr. mode	<ul style="list-style-type: none"> <li>• Energy saving</li> <li>• <b>Heat demand</b></li> </ul>	<ul style="list-style-type: none"> <li>• Saving energy: intelligent heating pump stop in heating systems with weather-compensated controller. The heating pump is only switched on when needed.</li> <li>• In case of a heat requirement: the flow temperature controller switches the heating pump. When there is a heat energy demand, the heating pump starts up with the burner.</li> </ul>
Min. output	• <b>10</b> ...100 %	Pump rate at minimum thermal output. Only available with pump characteristic map 0.
Max. output	• 10... <b>100</b> %	Pump rate at maximum thermal output. Only available with pump characteristic map 0.

Menu item	Settings/adjustment range	Comment/restriction
Pump overrun	<ul style="list-style-type: none"> <li>1...<b>2</b>...60 minutes</li> <li>24 h: 24 hours</li> </ul>	Run-on time of the heating pump: pump run-on time begins at the end of the heat requirement.
Min.syst.pressure	<ul style="list-style-type: none"> <li>1...<b>2</b>...3 bar</li> </ul>	
Target pressure	<ul style="list-style-type: none"> <li>0.8...<b>1.3</b>...1.8 bar</li> </ul>	
Special function		
Ventilation func.	<ul style="list-style-type: none"> <li><b>Off</b></li> <li>Auto</li> <li>On</li> </ul>	<p>The ventilation function can be activated after maintenance.</p> <p>During ventilation, the following appears in the info area of the standard display Ventilation func.</p>
Siphon fill. prog.	<ul style="list-style-type: none"> <li>Off (only permissible during maintenance)</li> <li><b>On, boiler min.</b></li> <li>On, heating min.</li> </ul>	<p>The siphon filling program is activated in the following cases:</p> <ul style="list-style-type: none"> <li>On, boiler min.: the appliance is switched on using the On/Off switch.</li> <li>On, heating min.: The burner was not in use for at least 28 days.</li> <li>The operating mode is switched from summer to winter mode.</li> </ul> <p>The next time there is a heat requirement for heating, the appliance is held at low output for 15 minutes. The siphon filling program remains active until the appliance has completed 15 minutes of operation at low output.</p> <p>During the siphon filling program the following appears in the info area of the standard display Siphon fill. prog.</p>
3-WV mid. pos.	<ul style="list-style-type: none"> <li><b>No</b></li> <li>Yes</li> </ul>	The function ensures that the system is fully drained and that the motor can be easily removed. The 3-way valve remains at the centre position for approx. 15 minutes.
Autom. filling	<ul style="list-style-type: none"> <li>Autom. filling: <b>No</b>   Yes</li> <li>Min. Sys. Pres.</li> <li>Target Sys. Pres.: 1.0...<b>1.5</b>...2.5 bar</li> <li>Max. refill time: 5...<b>30</b>...240 seconds</li> <li>Blocking time: 1...<b>12</b>...52 weeks</li> <li>Max. refills: 1...<b>5</b>...20</li> <li>Reset refilling</li> </ul>	<p>The automatic filling function ensures that the operating pressure is maintained. If the operating pressure drops below the set value, the filling valve opens until the set set pressure is reached.</p> <p>To protect against e.g. leakage, the filling valve closes in the following cases:</p> <ul style="list-style-type: none"> <li>No pressure increase can be measured</li> <li>The set filling time is exceeded</li> </ul> <p>The filling valve does not open within the set blocking time or when the maximum number of fillings is reached.</p>
Maintenance		
Maintenance type	<ul style="list-style-type: none"> <li>Without</li> <li>Burner run time</li> <li>Boiler run time</li> <li>Service date</li> <li>Landlord</li> </ul>	<p><b>Landlord:</b></p> <p>This menu item allows a date to be set for annual service/maintenance (End date). The service display appears as a reminder 30 days before the scheduled date. A contact telephone number (Installer tel. no.) is shown together with service display. The tenant should call this number to arrange a suitable maintenance date. A second reminder appears at the scheduled date. If the service display is not reset by the service engineer, the control unit limits the functions 14 days after the scheduled date.</p> <p>Reduced functions are set at Maint. reminder:</p> <ul style="list-style-type: none"> <li>DHW reduced: reduced comfort (max. 35 °C flow temperature)</li> <li>Boiler off: central heating and hot water functions are set off.</li> </ul>
Limit values		
Max. flow temp.	<ul style="list-style-type: none"> <li>30...<b>88 °C</b></li> </ul>	Limits the adjustment range for the flow temperature.
Max. DHW temp.	<ul style="list-style-type: none"> <li>30...<b>60 °C</b></li> </ul>	Limits the adjustment range for the hot water temperature.
Min. boiler outp.	<ul style="list-style-type: none"> <li><b>"Minimum rated output"...</b>"maximum rated output"</li> </ul>	Minimum heat output

Menu item	Settings/adjustment range	Comment/restriction
Heating curve		
Req. odr. temp.	<ul style="list-style-type: none"> <li>• <b>Off</b></li> <li>• On</li> </ul>	When connecting a weather-compensated control unit, no adjustment to the appliance is required. The system control unit optimises this setting. This service function activates a simple, weather-compensated controller with a linear heating curve. Depending on the on/off input, the heating is switched on or off.
Htg. curve base	• <b>20...90</b> °C	This is only displayed if the controller was activated. This can be used to set the base point of the heating curve, which corresponds to a outside temperature of +20 °C.
Htg. curve end	• <b>20...90</b> °C	This is only displayed if the controller was activated. This can be used to set the end point of the heating curve, which corresponds to a outside temperature of -10 °C.
Summer mode	• <b>0...16...30</b> °C	This is only displayed if the controller was activated. This can be used to set the temperature threshold at which outside temperature the heating system is to switch to summer mode.
Frost prot.	<ul style="list-style-type: none"> <li>• <b>Off</b></li> <li>• On</li> </ul>	
Frost temp. limit	• <b>0...5...10</b> °C	Temperature value for the system frost protection. This service function is only available if the frost protection function was activated. If the outside temperature does not exceed the frost threshold temperature, then the heating pump in the heating circuit switches on.

Table 19 Settings menu

#### 7.2.4 Function check menu

Menu item	Settings/adjustment range	Comment/restriction
Activate test		
Burner	• <b>Off...100</b> %	This service function enables testing of the burner.
Ignition	<ul style="list-style-type: none"> <li>• On</li> <li>• <b>Off</b></li> </ul>	Permanent ignition. Test the ignition with permanent ignition without gas supply. ► To prevent damages to the ignition transformer, never leave this function on for longer than 2 minutes.
Fan	<ul style="list-style-type: none"> <li>• On</li> <li>• <b>Off</b></li> </ul>	Permanent fan operation. Fan operation without gas supply or ignition.
Pump	<ul style="list-style-type: none"> <li>• On</li> <li>• <b>Off</b></li> </ul>	Permanent pump run (internal or external pumps).
3-way valve	<ul style="list-style-type: none"> <li>• Hot water</li> <li>• <b>Heating</b></li> </ul>	Permanent position of the 3-way valve.
HC1 pump/DHW circ. pump	<ul style="list-style-type: none"> <li>• On</li> <li>• <b>Off</b></li> </ul>	Permanent HK1 pump run (downstream the low loss header).
Ionisat.oscill.	<ul style="list-style-type: none"> <li>• On</li> <li>• <b>Off</b></li> </ul>	Check the ionisation measurement function at the flame.
Solar pump	<ul style="list-style-type: none"> <li>• On</li> <li>• <b>Off</b></li> </ul>	Permanent pump run.

Table 20 Function check menu

### 7.2.5 Reset menu

Menu item	Settings/adjustment range	Comment/restriction
Default setting	Restore?	All settings of the heat source are reset to the respective default setting. The system needs to be re-commissioned following this reset.
Fault history	Reset?	Reset the maintenance first. The fault history of the heat source is deleted. If currently a fault is present, it is immediately entered again.

Table 21 Reset menu

## 8 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:

- ▶ Turn off the gas supply and isolate the electrical mains 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/CO<sub>2</sub> 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.

### 8.1 Inspection and maintenance considerations

- To ensure continued efficient operation the appliance must be checked at regular interval.
- 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 by 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 that the safety and regulation appliances (3 bar pressure release valve, air bleed, etc.) are operating properly.
- ▶ 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.

### 8.2 Resources for inspection and maintenance

- The following measuring devices are required:
  - Electronic flue gas analyser for CO<sub>2</sub>, O<sub>2</sub>, CO and flue gas temperature
  - Pressure gauge 0 - 30 mbar (minimum resolution 0.1 mbar)
- ▶ Use heat conducting paste 8 719 918 658 0.
- ▶ Use approved greases.

### 8.3 Inspection and maintenance steps

→ chapter 12.9 "Inspection and maintenance checklist".

#### 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.

### 8.4 Component access

#### Removing bottom panel

1. Push in the clip securing the bottom panel.
2. Pull bottom panel sideways to release from service position and remove.

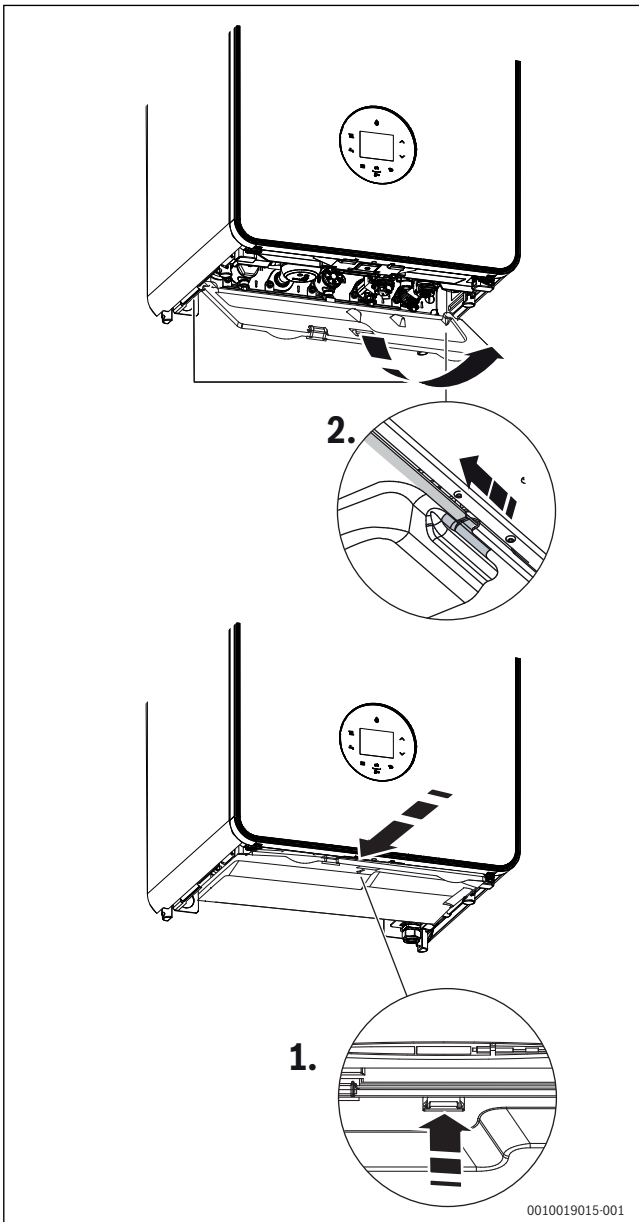


Fig. 72 Removing bottom panel

#### Removing front cover

1. Remove screw from bottom of front panel
2. Push in the green clips securing both sides the outer case.
3. Pull bottom of front cover forwards and upwards to release the clip on top of the boiler and remove outer case.

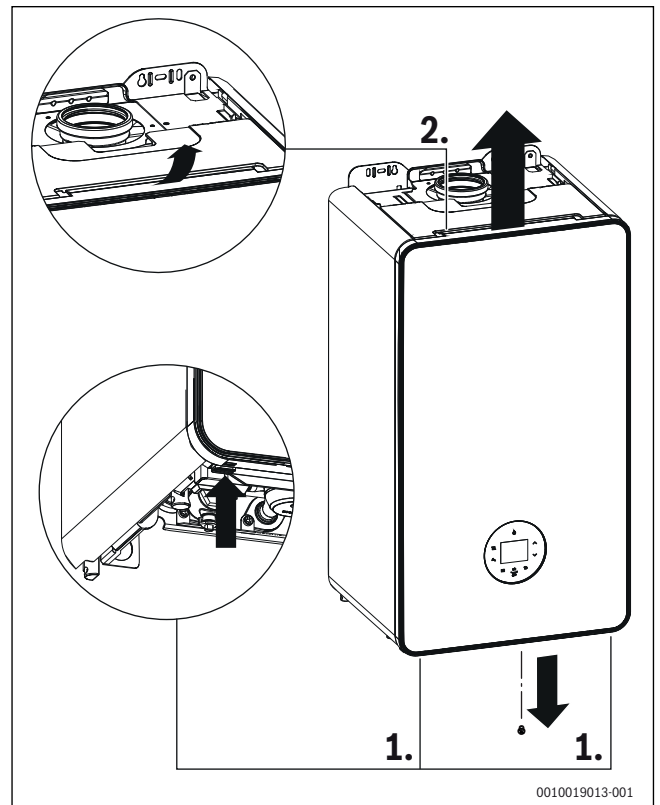


Fig. 73 Removing outer case

### 8.5 Fan pressure test

**NOTICE:**

#### Fan pressure test

- The appliance must be running at maximum output in test mode for the fan pressure test, (→ chapter 6.4).

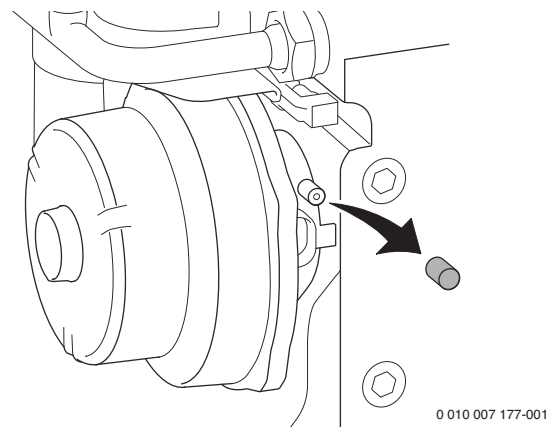


Fig. 74 Fan pressure test point



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



Fan pressure test reading.

- The pressure reading will be in negative values.

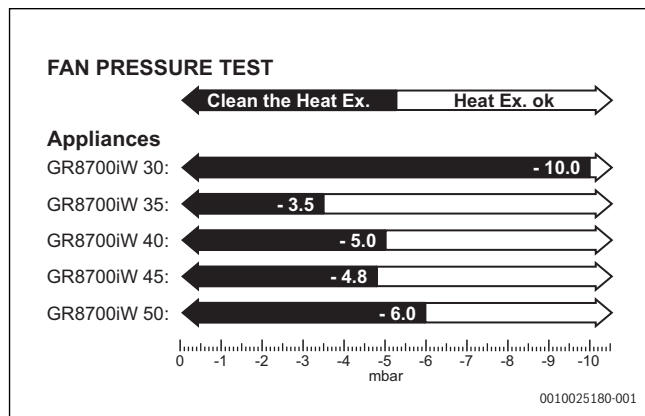


Fig. 75 Fan pressure test values

**If the manometer reading is higher** than the appliance output value [P] mbar.

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

**If the manometer reading is out of tolerance**, between 0 mbar and the appliance output value [P] mbar 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 boiler, after completing the above checks, fails the fan pressure test then contact Worcester, Bosch Group for advice.
- ▶ Replace test point cover after completing pressure check.

### 8.6 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".

### 8.7 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 for the flue gas analysis checks (→ chapter 6.4).
- ▶ Check that the readings conform to those given in the following tables. In addition to CO and CO/CO<sub>2</sub> ratio checks also check the maximum and minimum CO<sub>2</sub> percentage reading.

Gas type	Maximum rated output			Minimum rated output		
	CO <sub>2</sub>	O <sub>2</sub>	CO	CO <sub>2</sub>	O <sub>2</sub>	CO
Natural gas	9.5 % ± 0.4	4.0 %	<250ppm	8.6 % ± 0.4	5.5 %	<75ppm
Liquid propane (LPG)	10.8 % ± 0.4	4.6 %	<250ppm	10.2 % ± 0.4	5.5 %	<75ppm

Table 22 CO<sub>2</sub> and O<sub>2</sub> contents

If the CO<sub>2</sub> 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.
- ▶ CO<sub>2</sub> is correctly adjusted.

The gas valve and venturi are 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.

### 8.8 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.



### 8.9 Cleaning the siphon and heat exchanger

**WARNING:**

#### Gaskets and seals - gas related components

- ▶ Replace gaskets and seals when disturbing gas related components (e.g. burner, electrode assembly etc.), after cleaning the heat exchanger.
- ▶ Do not attempt the cleaning procedure unless new gaskets and seals are available.

**i**

There is an optional tool available to assist in cleaning the heat exchanger, part number 7 719 001 996.

#### 8.9.1 Checking the burner

1. Remove the combustion cover → Fig. 62.
2. Unscrew the screws on the burner cover.
3. Remove the burner cover.

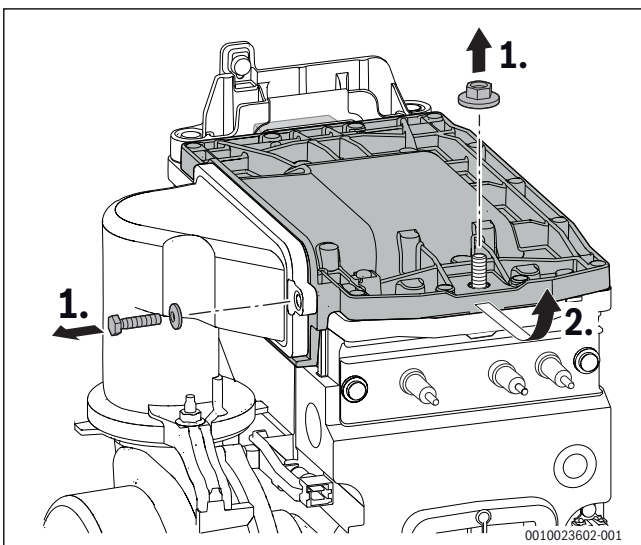


Fig. 76 Removing the burner cover

- ▶ Remove the burner and clean its components.

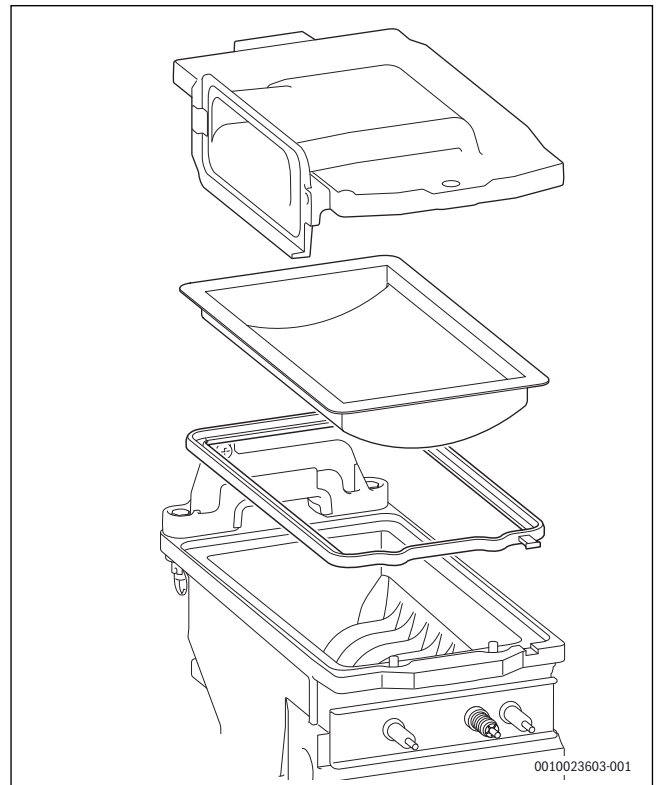


Fig. 77 Burner

- ▶ Reinstall the burner in reverse order, including a new gasket.

**i**

The GR8700iW 45 and 50 appliances have a different gasket.

- ▶ Install the burner and the burner cover.
- ▶ Check the gas/air ratio.

#### 8.9.2 Checking the non-return valve in the air-gas manifold

1. Unscrew the screws at the air-gas manifold.
2. Remove the air-gas manifold.

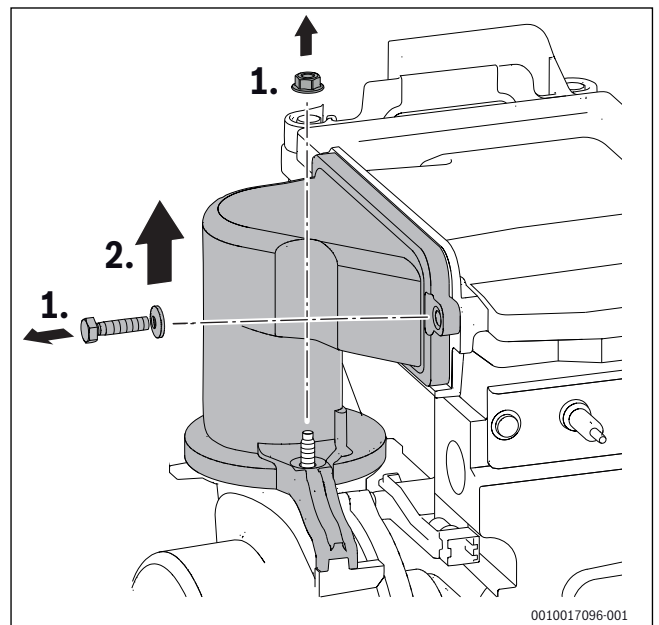


Fig. 78 Removing the air-gas manifold

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

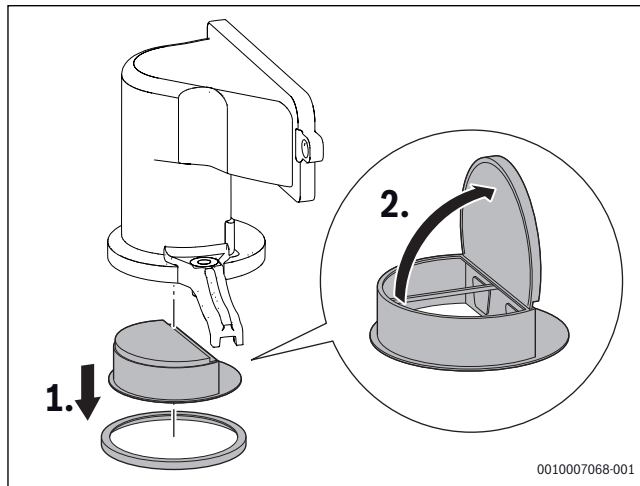


Fig. 79 Non-return valve in the air-gas manifold

- ▶ Install the non-return valve.
- ▶ Install the air-gas manifold.

### 8.9.3 Fan removal

1. Undo connection of venturi.
2. Remove venturi and move pipe to the far right.

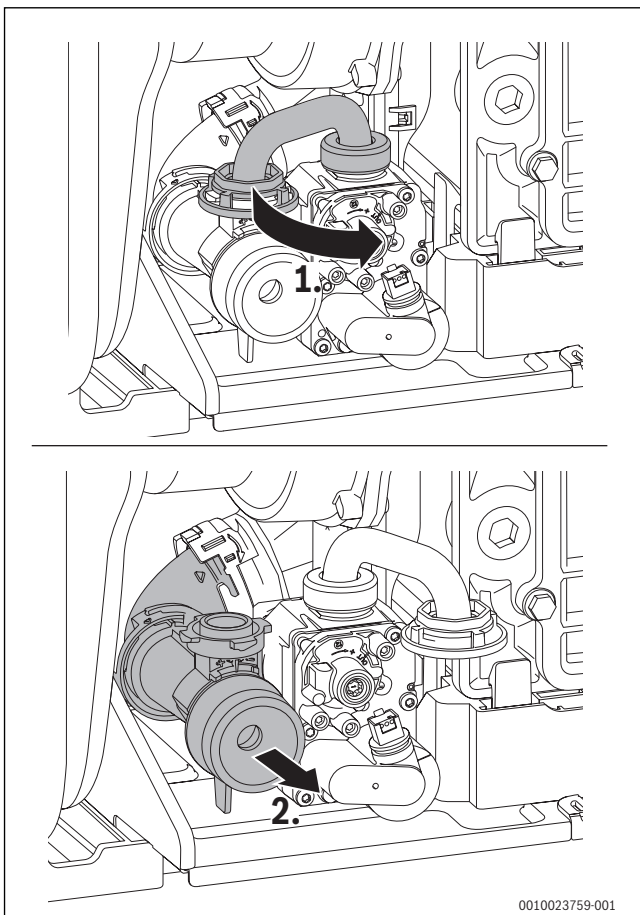


Fig. 80 Venturi removal

3. Remove expansion foam (pull towards you).
4. Undo fan connection and remove screw and seal.
5. Remove fan.

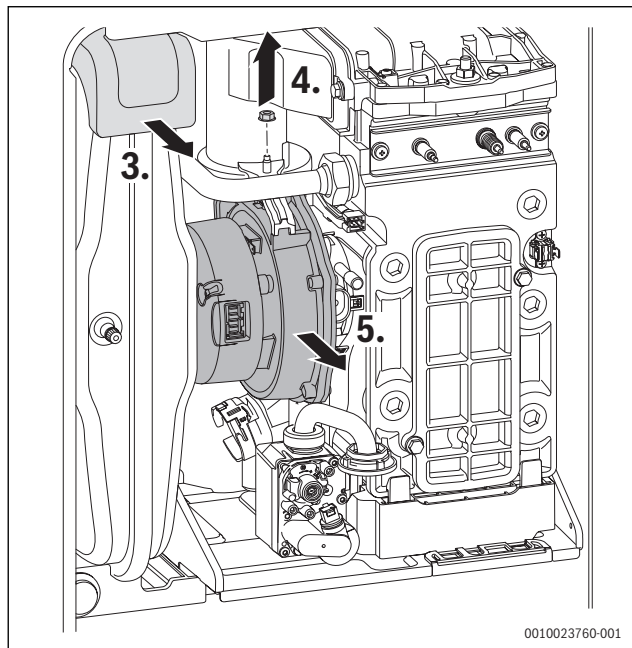


Fig. 81 Fan removal

### 8.9.4 Cleaning the heat exchanger

#### Access to the heat exchanger

The following items will have to be removed to gain access to the heat exchanger for cleaning:

- ▶ Remove the combustion casing.
- ▶ Lower the control panel into the service position.
- ▶ Disconnect electrical wires to the fan, ignition transformer, spark electrodes, flue overheat thermostat, main heat exchanger temperature sensor and flow pipe temperature sensor.
- ▶ Flueway
- ▶ Fan assembly
- ▶ Ignition transformer
- ▶ Spark electrode assembly
- ▶ Burner housing, burner and gasket

#### Cleaning the heat exchanger

- ▶ Remove the siphon and place a suitable container under the outlet to catch the water and debris.
- ▶ Protect the controller from water ingress.



**The heat exchanger does not have to be removed in order to clean.**

The heat exchanger is shown removed from the appliance to illustrate cleaning more clearly.

- ▶ Remove the cleaning access cover [1] and seal [2].

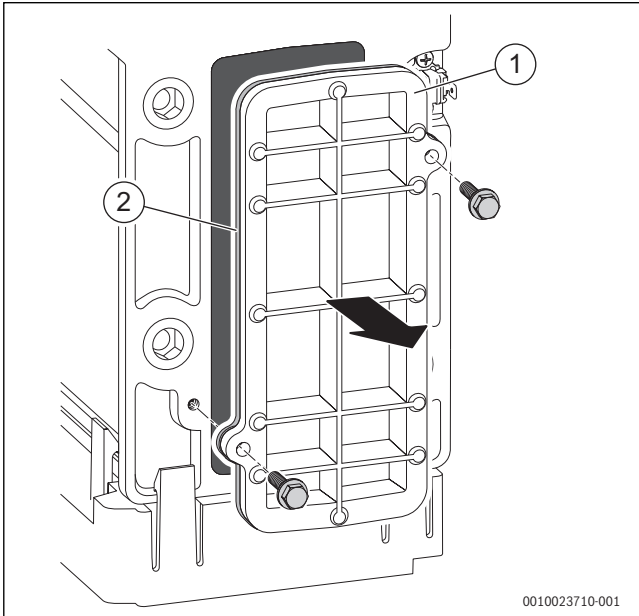


Fig. 82 Access cover removal

- ▶ Using the cleaning blade, working from the bottom to the top, to loosen any deposits in the heat exchanger.

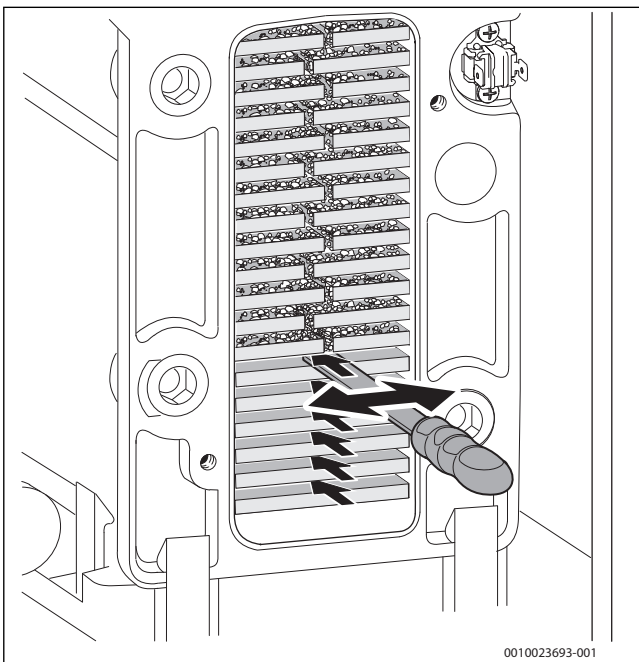


Fig. 83 Cleaning blade

- ▶ Using the brush, clean the heat exchanger from top to bottom.

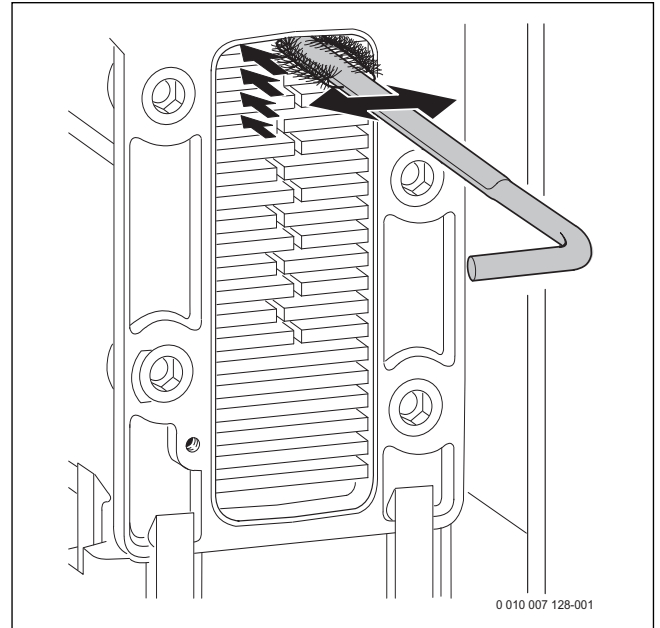


Fig. 84 Cleaning brush

- ▶ Use the handle of the brush to remove debris from the condensate tray.



It is possible to rinse any remaining debris from the heat exchanger either through the access point or alternatively through the top of the heat exchanger when the burner is removed.

- ▶ Pour water into the heat exchanger to rinse the debris through to the suitable container below the outlet to the siphon.

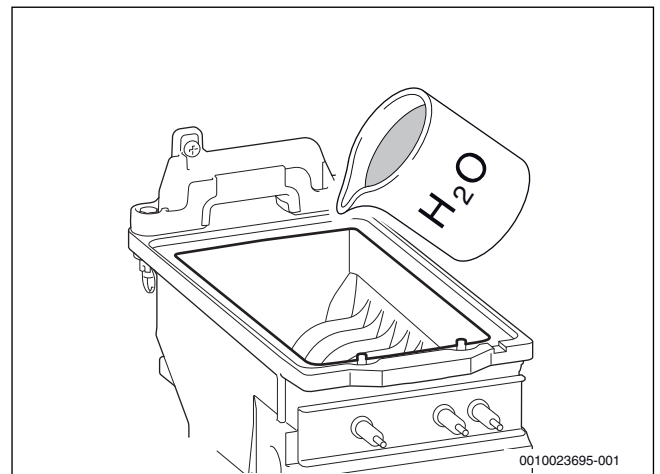


Fig. 85 Pour water into the heat exchanger

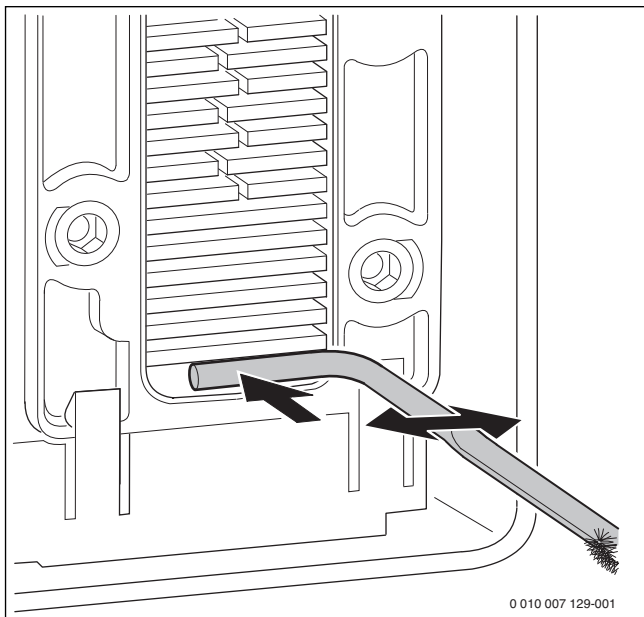


Fig. 86 Cleaning debris

- ▶ Refit the cleaning access cover assembly in reverse order the new seal [2], and the access cover [1].
- ▶ Hand tighten the bolts and then use a spanner to tighten the bolts a further half turn.

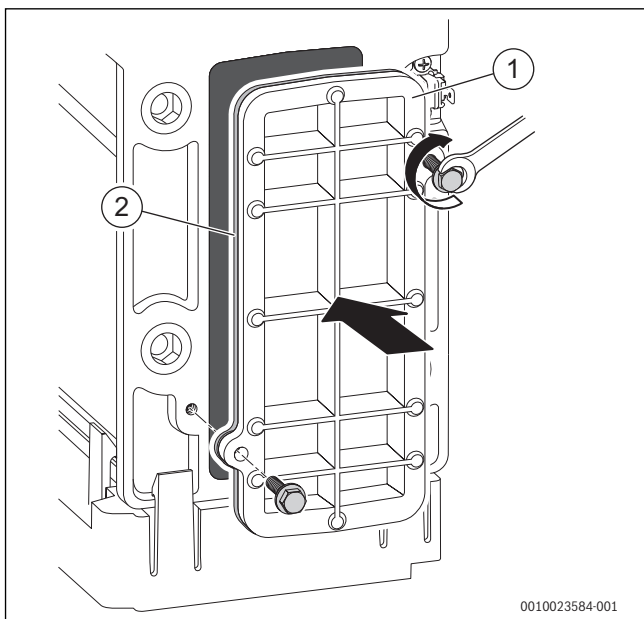


Fig. 87 Re-fitting the access cover

- ▶ Ensure that the convex side of the burner faces down into the heat exchanger when re-fitting the burner.
- ▶ Ensure seal is replaced with new seal and is correctly fitted.
- ▶ Check the siphon unit is clean before refitting to appliance.



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

### 8.9.5 Checking electrodes

- ▶ Remove the electrode set with gasket.
- ▶ Check electrodes for contamination.
- ▶ Clean or replace electrodes if required.
- ▶ Install electrode set with new gaskets.

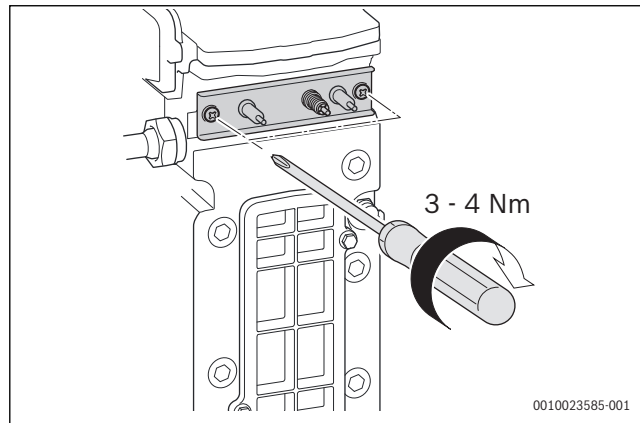


Fig. 88 Installing electrode set

- ▶ Check tightness of electrode set.

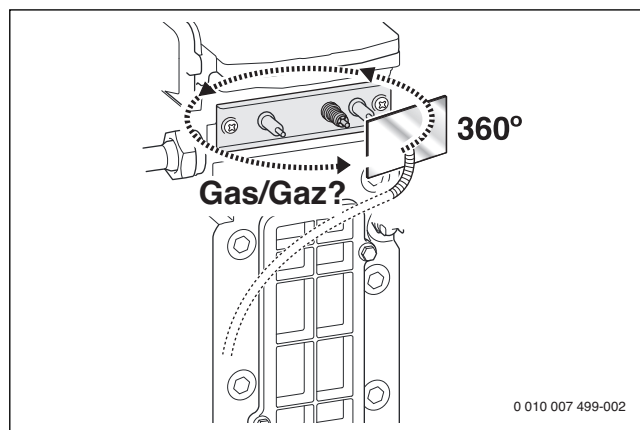


Fig. 89 Checking for leaks

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



Damages resulting from an insufficiently cleaned condensate trap are excluded from the warranty.

- ▶ Clean the condensate trap regularly.

1. Unlock the condensate trap.
2. Pull the condensate trap forwards and tilt to the left for draining.
3. Once empty pull the hose from the condensate trap.

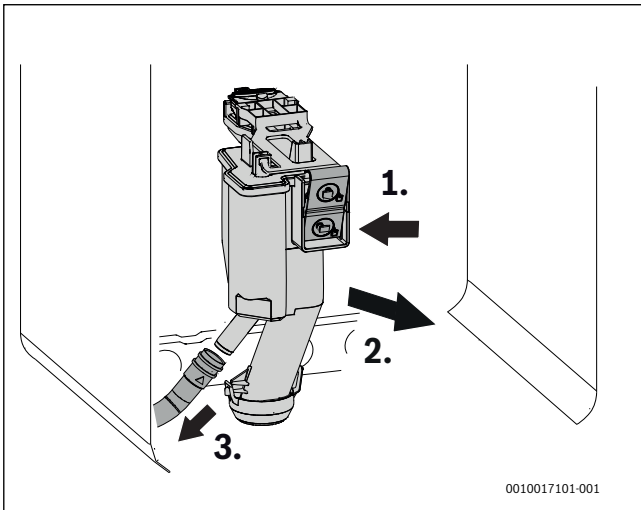


Fig. 90 Removing the condensate trap

- ▶ Removing the condensate trap
- ▶ Clean the condensate trap, and check that the aperture towards the heat exchanger is clear.
- ▶ Remove the gasket on the top of the condensate trap.
- ▶ Check the gasket for cracks, deformation or breakage and replace if required.
- ▶ Align the new gasket correctly with the condensate trap.

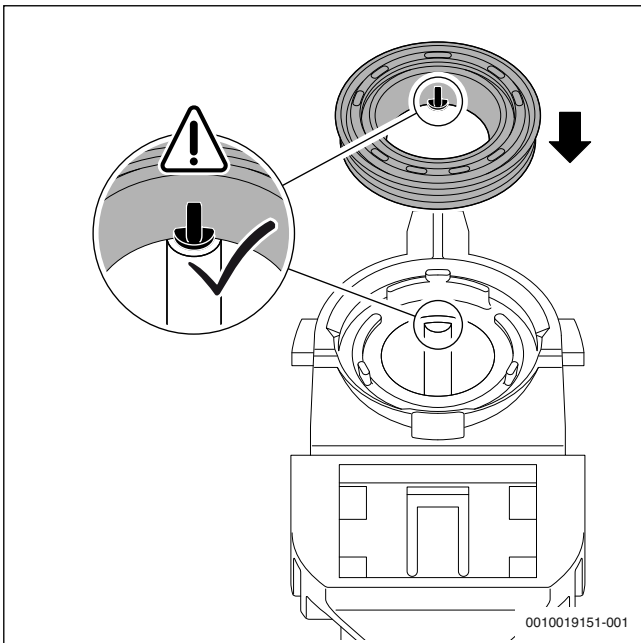


Fig. 91 Aligning the new gasket with the condensate trap

- ▶ Press on the gasket in the required order. When the gasket is correctly inserted, the pin is visible in the recess and is flush with the top edge of the gasket.

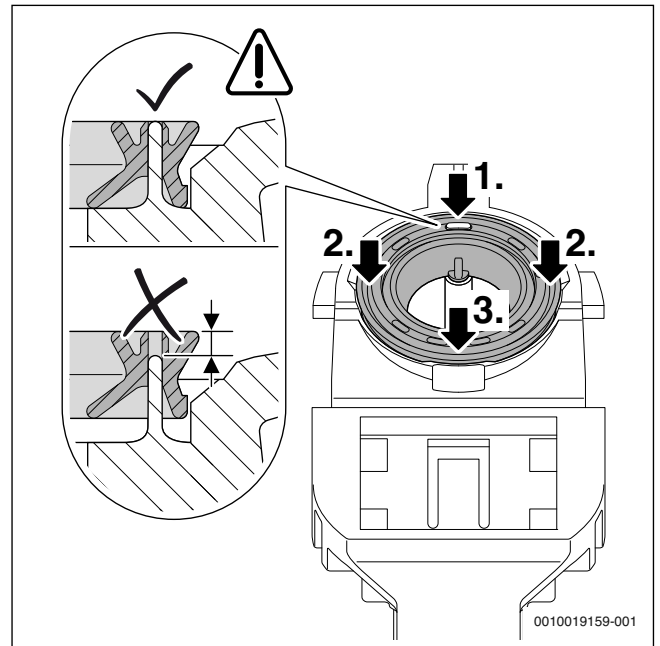


Fig. 92 Pressing on the gasket

- ▶ Check the condensate hose and clean if required.
- ▶ Fill the condensate trap with approx. 250 ml water.
- ▶ Replace the condensate trap and check for tightness.

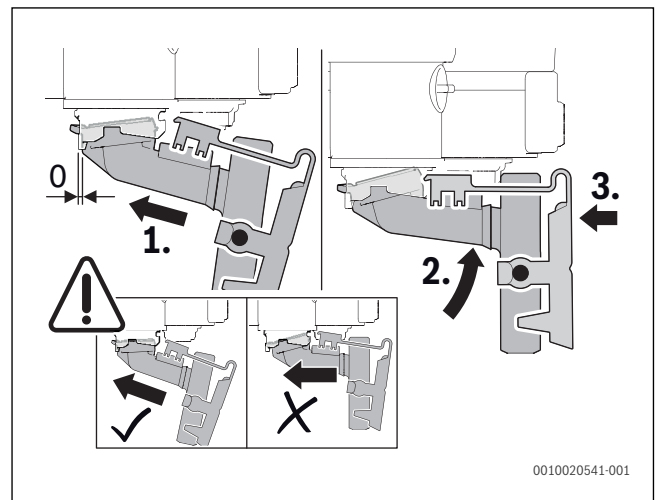


Fig. 93

## 8.10 Setting the air/gas ratio

**NOTICE:**

### Setting the air/gas ratio

- ▶ The gas valve and venturi are 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 setting 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.
- ▶ Setting 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/CO<sub>2</sub> readings must be taken with the combustion chamber cover ON.

Adjustments can only be made with the cover off.



CO<sub>2</sub> should be measured 10 minutes after firing the appliance.

### 8.10.1 Checking and, if required, adjusting the gas/air ratio

- ▶ Switch off the appliance.
- ▶ Remove the front cover.
- ▶ Remove the combustion cover.

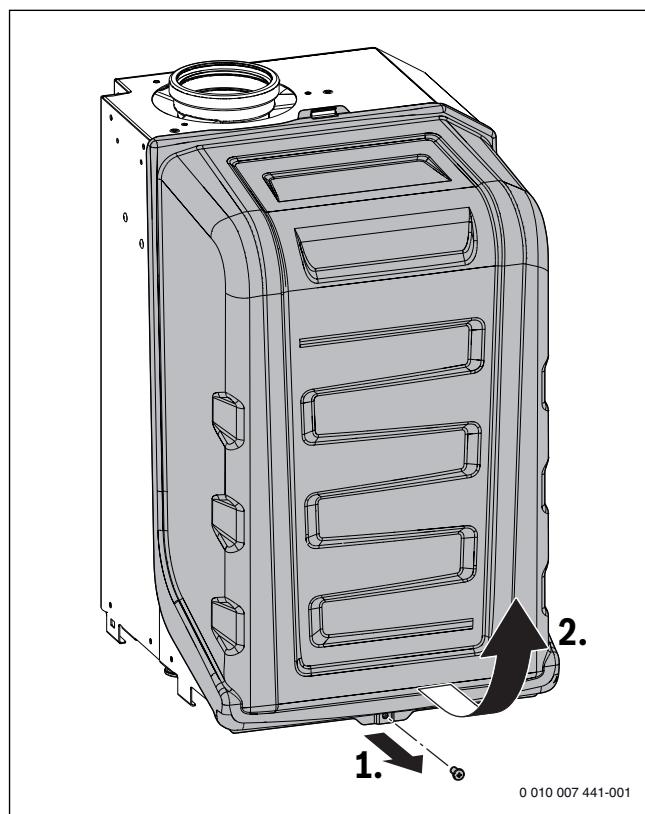


Fig. 94 Removing the combustion cover

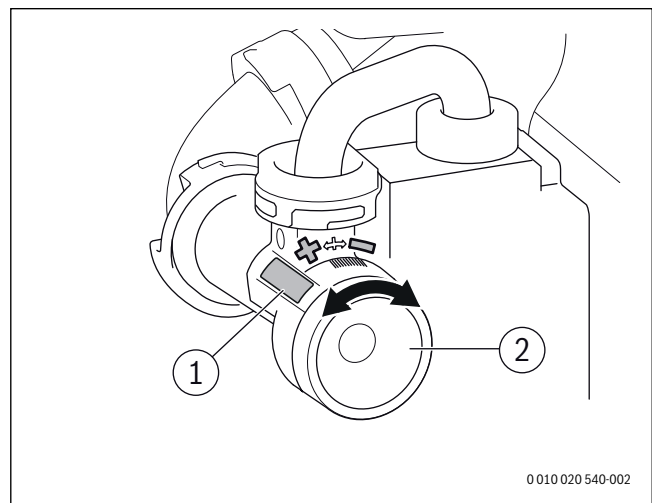


Fig. 95 Setting the adjustable venturi

- [1] Security Seal
- [2] Adjustable venturi

- ▶ Switch on the appliance.
- ▶ Remove the plug from the flue gas test port.
- ▶ Push the flue gas probe centrally into the flue gas test port.
- ▶ Seal the test point.

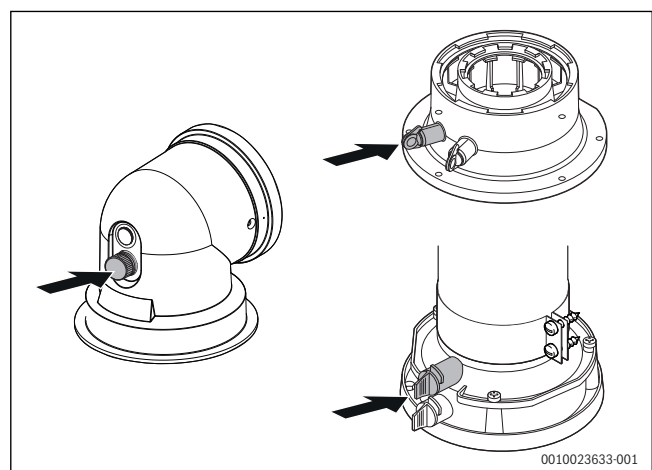


Fig. 96 Flue gas test port

- ▶ To ensure heat transfer: open the radiator valves.
- ▶ Set the chimney sweep mode and start up the appliance at maximum rated output.
- ▶ Measure the CO<sub>2</sub> or O<sub>2</sub> content.
- ▶ Check the CO<sub>2</sub> or O<sub>2</sub> content at maximum rated output according to Tab. 23 and adjust if required.



Security Seal [1] (→ Fig. 95) must be removed before adjusting the Max CO<sub>2</sub> setting. Once adjustment has been made the seal must be replaced with part number 8737708988.

- ▶ To increase the CO<sub>2</sub> content, remove seal [1] and turn the adjustable venturi to the left.
- ▶ To reduce the CO<sub>2</sub> content, remove seal [1] and turn the adjustable venturi to the right.

Gas type	Maximum rated output			Minimum rated output		
	CO <sub>2</sub>	O <sub>2</sub>	CO	CO <sub>2</sub>	O <sub>2</sub>	CO
Natural gas	9.5 % ± 0.4	4.0 %	<250ppm	8.6 % ± 0.4	5.5 %	<75ppm
Liquid propane (LPG)	10.8 % ± 0.4	4.6 %	<250ppm	10.2 % ± 0.4	5.5 %	<75ppm

Table 23 CO<sub>2</sub> and O<sub>2</sub> contents

- ▶ Measure the CO content.  
The CO content must be < 250 ppm.
- ▶ Set the minimum rated output.
- ▶ Measure the CO<sub>2</sub> or O<sub>2</sub> content.
- ▶ Remove the seal from the adjusting screw of the air/gas ratio control valve (only air/gas ratio control valve is shown in the below Fig. 97) and set the CO<sub>2</sub> or O<sub>2</sub> content for minimum rated output.

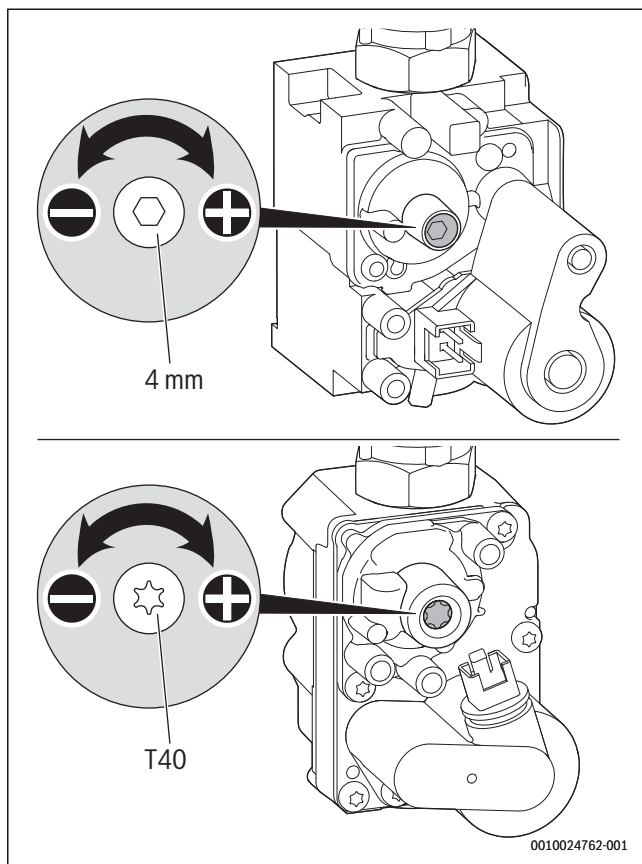


Fig. 97 Setting the CO<sub>2</sub> or O<sub>2</sub> content (above: SIT valve, below: Honeywell valve)

- ▶ Re-check settings at maximum and minimum rated output and re-adjust if required.
- ▶ Seal the air/gas ratio control valve.
- ▶ Seal the adjustable venturi.
- ▶ Exit the chimney sweep mode.
- ▶ Enter the CO<sub>2</sub> contents in the servicing record (→ Chapter 12.8, page 77).
- ▶ Remove the flue gas probe from the flue gas test port and refit the plug.

## 9 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:

- ▶ Replace the burner housing gasket and the Flueway sump seal when re-assembling the heat exchanger. Do not reassemble the heat exchanger and Flueway until new gaskets and seals are available.
- ▶ 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.
- ▶ 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](http://www.worcester-bosch.co.uk/spares)

### 9.1 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.

- ▶ The boiler drain is already connected to the condensate trap for ease of draining.

-or-

- ▶ Connect a suitable hose firmly to the drain point and run the hose outside to a suitable point or container.
- ▶ Turn the drain valve a ¼ turn anti-clockwise to open the drain. Turn the valve firmly clockwise to close.

### 9.2 Overheat thermostat removal

- ▶ Remove two electrical connectors from thermostat.
- ▶ Unscrew [1] the sensor [2].

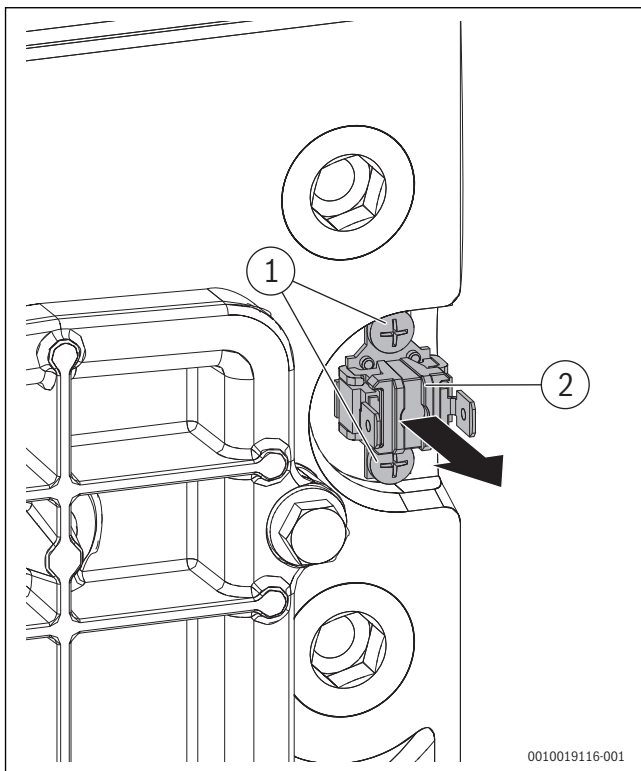
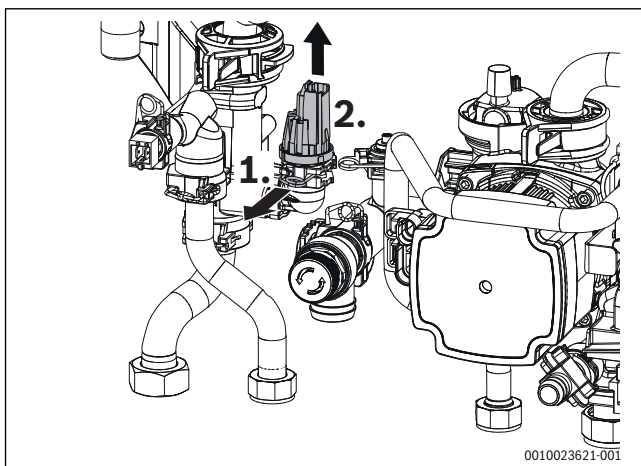


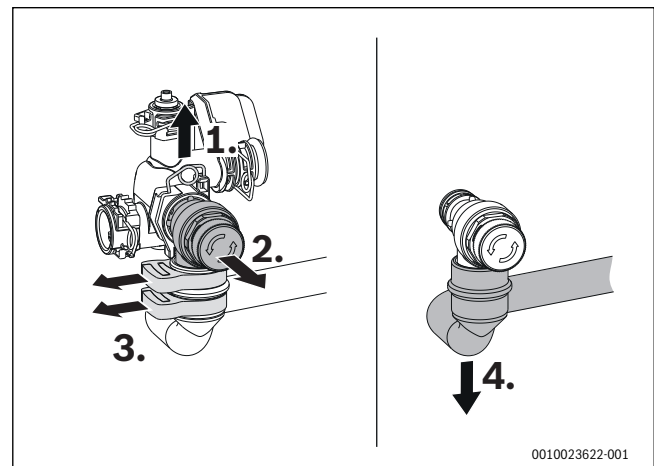
Fig. 98 Removing overheat thermostat

### 9.3 Pressure sensor removal



- ▶ Open the cover → Fig. 51.
- ▶ Remove the condensate trap → Fig. 90.
- ▶ Pull the spring forward [1].
- ▶ Remove the pressure sensor [2].

### 9.4 Pressure relief valve removal



- ▶ Open the cover → Fig. 51.
- ▶ Remove the condensate trap → Fig. 90.
- ▶ Pull the spring up [1].
- ▶ Press the PRV Pipe down lightly [2].
- ▶ Remove the Pressure relief valve [3].

### 9.5 Replacing the gas valve

- ▶ Close the gas isolator.
1. Unscrew the bayonet connection.
  2. Unscrew the union nut.
  3. Remove the gas pipe.

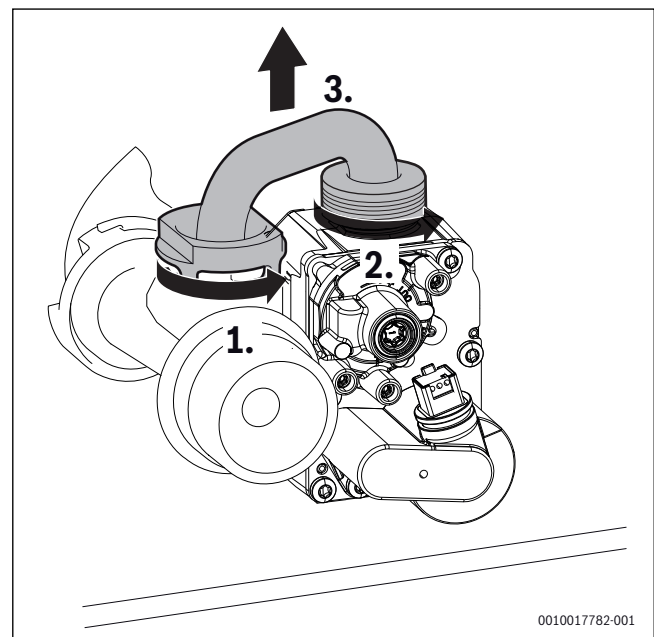


Fig. 99 Removing the gas pipe



1. Unplug the plug.
2. Unscrew the union nut.

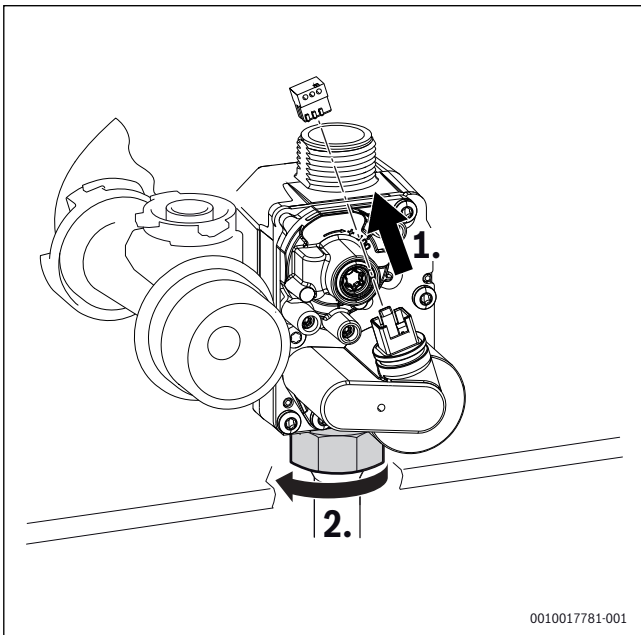


Fig. 100 Unplugging the plug and unscrewing the union nut

1. Remove the 2 screws.
2. Remove the air/gas ratio control valve.

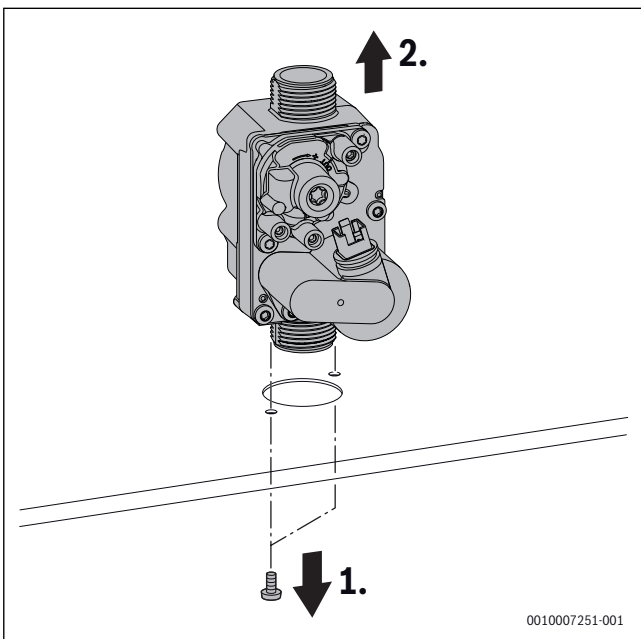


Fig. 101 Removing the gas control valve

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

**9.6 Checking the strainer in the cold water pipe and the flow turbine**

1. Remove the clip.
2. Loosen the cold water pipe.
3. Pull the strainer out of the cold water pipe and check for contamination.

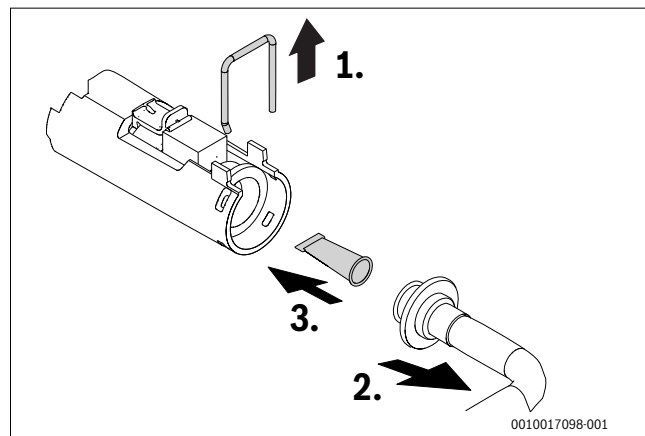


Fig. 102 Removing the strainer from the cold water pipe

1. Pull out the flow turbine.

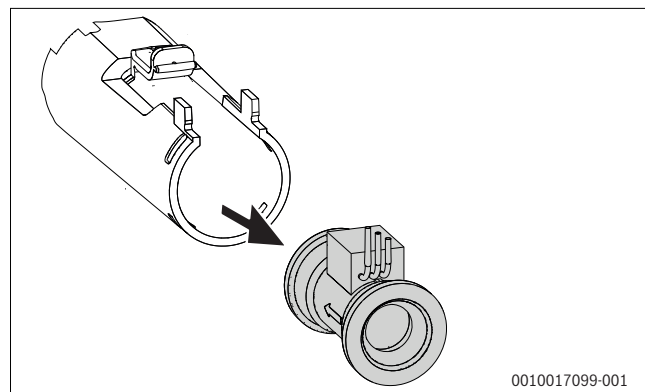


Fig. 103 Removing the flow turbine at the cold water pipe

- ▶ Select in the Service menu > Info > DHW flow rate.
- ▶ Blow in the flow direction of the turbine.
- ▶ If nothing appears on the display, replace the turbine.

**9.7 Checking/replacing the motor of the 3-way valve**

- ▶ Check the motor in the Menu > Function check > Activate test > 3-way valve.
  - ▶ Check/replace the motor of the 3-way valve in the Service menu > Special function > 3-WV mid. pos. > Yes.
1. Pull out the motor.
  2. Press the cable retaining clip.
  3. Unplug the plug.

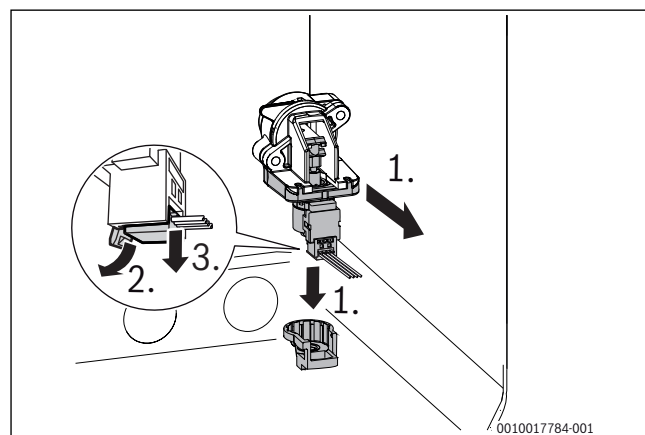


Fig. 104 Removing the motor of the 3-way valve

### 9.8 Replacing the 3-way valve

- ▶ Remove the screws.
- ▶ Pull out the 3-way valve.
- ▶ Press the cable retaining clip.
- ▶ Unplug the plug.

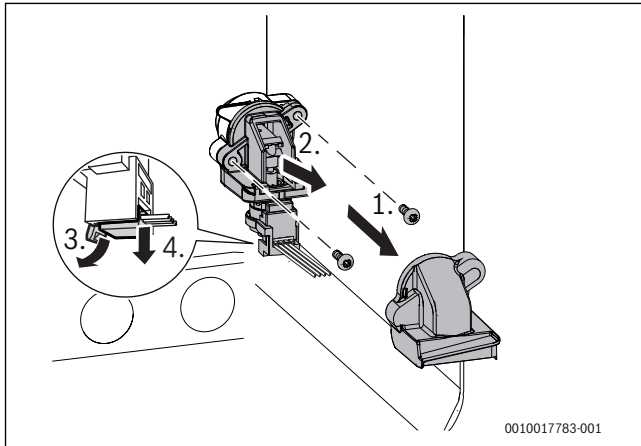


Fig. 105 Removing the 3-way valve

### 9.9 Replacing the plate heat exchanger

- ▶ Check the strainer in the cold water pipe for contamination (→ Chapter 9.6, page 65).

-or-

- ▶ Remove the plate heat exchanger and replace.
1. Remove the screws.
  2. Remove the plate heat exchanger.

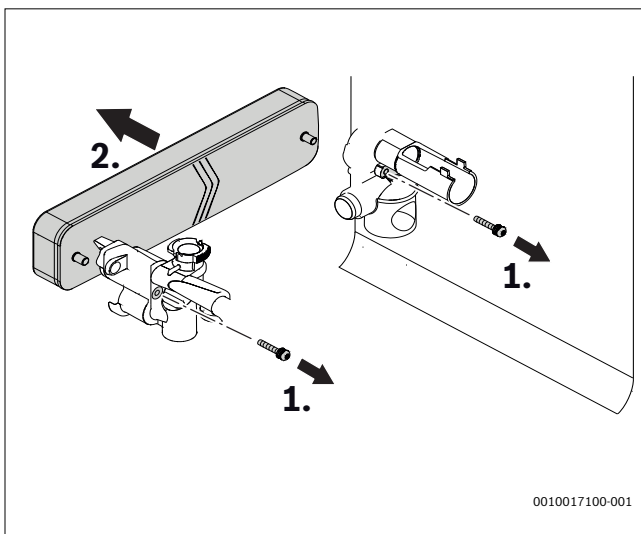


Fig. 106 Removing the plate heat exchanger

- ▶ Install the new plate heat exchanger in reverse order.
- ▶ Make sure that the label "bottom" is facing downwards.

### 9.10 Following inspection/maintenance

- ▶ Re-tighten all the threaded connections that have been released.
- ▶ Restart the appliance.
- ▶ Check tightness of all joints.
- ▶ Check the gas/air ratio.
- ▶ Fit the combustion casing, side-, top panels and front cover.

## 10 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.

## 10.1 Operating and fault displays

### 10.1.1 General information

- **Fault code:** indicates the fault.
- **Fault category:** indicates the fault and its effects.

### Fault category O (operating code)

Operating codes indicate the operating conditions in normal operation.

### Fault category B (blocking faults)

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

### 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.

- ▶ Press the ▲ and ▼ keys, until **Reset** is displayed. The appliance resumes operation.

If a fault persists:

- ▶ Rectify the fault according to 10.1.2 Fault code table

**Fault category W (maintenance codes)**
**10.1.2 Fault code table**

Fault code	Fault category	Fault text on the display, description	Remedy
200	O	Boiler in heating mode	–
201	O	Boiler in hot water mode	–
202	O	Boiler in anti-cycle mode	–
203	O	Boiler in standby, no heat energy demand	–
204	O	Current prim. water temp. higher than set val.	–
208	O	Chimney sweep demand	–
224	V	Safety temp. limiter has tripped	<ol style="list-style-type: none"> <li>1. Open the closed valve in the heating circuit.</li> <li>2. Top up water until the preset pressure is reached.</li> <li>3. Connect the plug correctly to the safety temperature limiter.</li> <li>4. Replace the safety temperature limiter.</li> </ol>
227	V	No flame signal after ignition	<ol style="list-style-type: none"> <li>1. Open the gas isolator.</li> <li>2. Change the gas installation.</li> <li>3. Replace the control unit/burner control unit.</li> <li>4. Replace the ignition electrode.</li> <li>5. Replace the monitoring electrode.</li> <li>6. Replace the ignition cable.</li> <li>7. Replace the ionisation cable.</li> <li>8. Replace the air/gas ratio control valve.</li> <li>9. Correct the burner setting.</li> </ol>
228	V	Flame signal without flame present	<ol style="list-style-type: none"> <li>1. Replace the air/gas ratio control valve.</li> <li>2. Replace the ionisation cable.</li> <li>3. Replace the control unit/burner control unit.</li> </ol>
305	O	Boiler in hot water anti-cycle mode	–
306	V	Flame signal after closing the fuel supply	<ol style="list-style-type: none"> <li>1. Replace the air/gas ratio control valve.</li> <li>2. Replace the ionisation cable.</li> <li>3. Replace the control unit/burner control unit.</li> </ol>
815	B	Low loss header temp. sensor faulty	<ol style="list-style-type: none"> <li>1. Check the sensor port.</li> <li>2. Check the differential sensor for incorrect installation position or breakage.</li> </ol>
1017	W	Water pressure too low	<ol style="list-style-type: none"> <li>1. Top up water and vent the system.</li> <li>2. Replace the pressure sensor.</li> </ol>
1021	B	Hot water temperature sensor is defective	<ol style="list-style-type: none"> <li>1. Connect the plug to the hot water temperature sensor correctly.</li> <li>2. Mount the hot water temperature sensor correctly.</li> <li>3. Replace the hot water temperature sensor.</li> <li>4. Replace the connecting lead to the hot water temperature sensor.</li> </ol>
1037	W	Outside temperature sensor defective	Check the connecting lead.
1065	B	Pressure sensor defective or not connected	<ol style="list-style-type: none"> <li>1. Connect the plug to the pressure sensor correctly.</li> <li>2. Replace the connecting lead to the pressure sensor.</li> <li>3. Replace the pressure sensor.</li> <li>4. Replace the control unit.</li> </ol>
1068	W	Outside temperature sensor defective	Check the connecting lead.
1073	W	Short circuit of the flow temperature sensor	<ol style="list-style-type: none"> <li>1. Replace the temperature sensor.</li> <li>2. Replace the connecting lead to the temperature sensor.</li> <li>3. Replace the control unit.</li> </ol>
1074	W	No signal from the flow temperature sensor available	<ol style="list-style-type: none"> <li>1. Connect the plug to the flow temperature sensor correctly.</li> <li>2. Replace the flow temperature sensor.</li> <li>3. Replace the connecting lead to the flow temperature sensor.</li> <li>4. Replace the control unit.</li> </ol>
1075	W	Short circuit of the temperature sensor at the heating block	<ol style="list-style-type: none"> <li>1. Replace the temperature sensor.</li> <li>2. Replace the connecting lead to the temperature sensor.</li> <li>3. Replace the control appliance.</li> </ol>
1076	W	No signal from the temperature sensor at the heating block available	<ol style="list-style-type: none"> <li>1. Replace the temperature sensor.</li> <li>2. Replace the connecting lead to the temperature sensor.</li> <li>3. Replace the control unit.</li> </ol>

Fault code	Fault category	Fault text on the display, description	Remedy
2920	V	Fault in flame monitoring	–
2927	B	Flame failed during burner operation	<ol style="list-style-type: none"> <li>1. Open the main shut-off valve.</li> <li>2. Open the appliance shut-off valve.</li> <li>3. Shut down the appliance and check the gas line.</li> <li>4. Signal evaluation on printed circuit board defective.</li> <li>5. Replace the ionisation electrode.</li> <li>6. Establish protective conductor connection (PE) in the control unit.</li> <li>7. Replace the ignition cable.</li> <li>8. Replace the connecting lead to the ionisation electrode.</li> <li>9. Replace the air/gas ratio control valve.</li> <li>10. Set the burner correctly.</li> <li>11. Set the burner at minimum rated load.</li> <li>12. Check the integrity flue system.</li> <li>13. The interconnected room air supply is too small or the size of the ventilation opening is too small.</li> <li>14. Clean the heating block on the flue gas side.</li> <li>15. Replace the control unit/burner control unit.</li> </ol>
2946	V	Incorrect code plug detected	Replace the code plug.
2948	B	No flame signal with low output	The burner starts automatically after cleaning. <ol style="list-style-type: none"> <li>1. If the fault occurs repeatedly: check the settings of the CO<sub>2</sub> values.</li> </ol>
2950	B	No flame signal following starting procedure	The burner starts automatically after cleaning. <ol style="list-style-type: none"> <li>1. Set the correct gas/air ratio correctly.</li> </ol>
2963	B	Signal from flow and heat exchanger temperature sensor outside the permissible range	Connect the connecting lead correctly.
2964	B	Flow rate in heat exchanger too low	–
2965	B	Flow temperature too high	–
2966	B	Flow temperature rise in heat exchanger too rapid	–
2967	B	Flow/ heat exchanger temperature sensor differential too great	–
2970	B	Pressure drop in heating system too rapid	–
2971	B	System pressure too low	<ol style="list-style-type: none"> <li>1. Vent the heating system.</li> <li>2. Top up water until the preset pressure is reached.</li> <li>3. Replace the cable to the pressure sensor.</li> <li>4. Replace the pressure sensor.</li> </ol>

Table 24 Indicators and fault displays

### 10.1.3 Faults that are not displayed

Appliance faults	Remedy
Combustion noises too loud; rumbling noises	<ul style="list-style-type: none"> <li>▶ Check the gas type.</li> <li>▶ Check the gas supply pressure.</li> <li>▶ Check the flue system; clean or repair if required.</li> <li>▶ Check the gas/air ratio.</li> <li>▶ Check the air/gas ratio control valve; replace if required.</li> </ul>
Flow noises	<ul style="list-style-type: none"> <li>▶ Set the pump rate or pump characteristic map correctly and match to the maximum output.</li> </ul>
Heat-up takes too long.	<ul style="list-style-type: none"> <li>▶ Set the pump rate or pump characteristic map correctly and match to the maximum output.</li> </ul>
Flue gas values incorrect; CO content too high.	<ul style="list-style-type: none"> <li>▶ Check the gas type.</li> <li>▶ Check the gas supply pressure.</li> <li>▶ Check the flue system; clean or repair if required.</li> <li>▶ Check the gas/air ratio.</li> <li>▶ Check the air/gas ratio control valve; replace if required.</li> </ul>

Appliance faults	Remedy
Violent ignition, poor ignition.	<ul style="list-style-type: none"> <li>▶ Check the ignition transformer with service function t01 for misfiring, replace if required.</li> <li>▶ Check the gas type.</li> <li>▶ Check the gas supply pressure.</li> <li>▶ Check the power supply.</li> <li>▶ Check the electrodes with cable; replace if required.</li> <li>▶ Check the flue system; clean or repair if required.</li> <li>▶ Check the gas/air ratio.</li> <li>▶ For natural gas: check the external gas flow monitor, replace if required.</li> <li>▶ Check the burner, replace if required.</li> <li>▶ Check the air/gas ratio control valve; replace if required.</li> </ul>
Condensate in air box	▶ Check the non-return valve in the mixing appliance, replace if required.
Combi boilers: hot water outlet temperature is not reached.	<ul style="list-style-type: none"> <li>▶ Check the turbine, replace if required.</li> <li>▶ Check the gas/air ratio.</li> </ul>
Combi boilers: DHW volume is not reached.	▶ Check the plate heat exchanger.
No function, the display remains dark.	<ul style="list-style-type: none"> <li>▶ Check the electrical wiring for damage.</li> <li>▶ Replace defective cables.</li> <li>▶ Check the fuse, replace if required.</li> </ul>

Table 25 Faults that are not shown on the display

## 11 Environmental protection and disposal

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

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

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

### Packaging

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

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

### Used appliances

Used appliances contain valuable materials that can be recycled.

The various assemblies can be easily dismantled. Synthetic materials are

marked accordingly. Assemblies can therefore be sorted by composition and passed on for recycling or disposal.

### Old electrical and electronic appliances



Electrical or electronic appliances that are no longer serviceable must be collected separately and sent for environmentally compatible recycling (in accordance with the European Directive on Waste Electrical and Electronic Equipment).

To dispose of old electrical or electronic appliances, you should use the return and collection systems put in place in the country concerned.

### Batteries

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

## 12 Technical Specifications/Logs

### 12.1 Technical data

#### 12.1.1 Specifications Combi

##### Greenstar 8000 Style

	Unit	GR8700iW 30		GR8700iW 35	
		Natural gas	Propane <sup>1)</sup>	Natural gas	Propane <sup>1)</sup>
<b>Gas flow maximum rate – 10 minutes from lighting</b>					
Natural Gas <sup>2)</sup>	m <sup>3</sup> /h	3.2	–	3.6	–
Propane Gas (LPG)	kg/h	–	2.3	–	2.7
<b>Central Heating (CH)</b>					
Maximum rated heat input (net) (Q <sub>max</sub> )	kW	30.2	30.2	34.4	34.4
Maximum rated heat output 40/30 °C	kW	31.2	31.2	35.2	35.2
Maximum rated heat output 50/30 °C (P <sub>cond, max</sub> )	kW	31.0	31.0	35.0	35.0
Maximum rated heat output 80/60 °C (P <sub>max</sub> )	kW	29.6	29.6	33.7	33.7
Minimum rated heat input (net) (Q <sub>min</sub> )	kW	3.0	3.0	5.1	5.1
Minimum rated heat output 40/30 °C	kW	3.3	3.3	5.5	5.5
Minimum rated heat output 50/30 °C (P <sub>cond, min</sub> )	kW	3.2	3.2	5.5	5.5

	Unit	GR8700iW 30		GR8700iW 35	
		Natural gas	Propane <sup>1)</sup>	Natural gas	Propane <sup>1)</sup>
Minimum rated heat output 80/60 °C (P <sub>min</sub> )	kW	2.9	2.9	5.0	5.0
Maximum flow temperature	°C	70	70	70	70
Maximum flow temperature possible	°C	82	82	82	82
Maximum permissible operating pressure (PMS)	bar	2.5	2.5	2.5	2.5
Available pump head at 20 K (°C) system temperature rise	m	2.0	2.0	2.0	2.0
<b>Domestic Hot Water DHW</b>					
Minimum heat input	kW	3.0	3.0	5.1	5.1
Maximum rated heat input (net) (Q <sub>n</sub> W)	kW	30.2	30.2	34.4	34.4
Maximum rated heat output (P <sub>n</sub> W)	kW	30.2	30.2	34.4	34.4
Maximum mains inlet pressure (standing pressure PMW)	bar	10	10	10	10
Minimum mains inlet pressure (working) for max. flow	bar	2.3	2.3	3.2	3.2
Minimum mains inlet pressure (working) for operation	bar	0.2	0.2	0.2	0.2
Minimum required flow to activate DHW demand	l/min	1.9	1.9	1.9	1.9
DHW temperature range	°C	35-60	35-60	35-60	35-60
Maximum cold water inlet temperature	°C	60	60	60	60
Maximum DHW flow rate - 40 °C rise ± 15% <sup>3)</sup>	l/min	11	11	13	13
<b>Flue</b>					
Flue gas temperature max. load DHW demand	°C	67/56	67/56	72/56	72/56
Flue gas temperature 80/60 °C, max./min load	°C	67/56	67/56	72/56	72/56
Flue gas temperature 40/30 °C, max./min load	°C	49/31	49/31	52/31	52/31
CO <sub>2</sub> level at max. rated heat output (after 10 minutes)	%	9.5	10.8	9.5	10.8
CO <sub>2</sub> level at min. rated heat output (after 10 minutes)	%	8.6	10.2	8.6	10.2
NO <sub>x</sub> class	-	6	6	6	6
NO <sub>x</sub> rating (EN 15502-1)	mg/kWh	≤ 40	≤ 40	≤ 40	≤ 40
<b>Condensate</b>					
Maximum condensate rate	l/h	3.5	3.5	4.1	4.1
pH value, approx.	-	4.5 – 5.0	4.5 – 5.0	4.5 – 5.0	4.5 – 5.0
<b>Electrical</b>					
Electrical power supply voltage	a.c. V	230	230	230	230
Frequency	Hz	50	50	50	50
Maximum power consumption (running)	W	150	150	108	108
Maximum power consumption (stand-by)	W	1	1	1	1
Energy efficiency index (EEI) heating pump	-	≤ 0.23	≤ 0.23	≤ 0.23	≤ 0.23
<b>General data</b>					
Expansion vessel capacity	l	10.0	10.0	10.0	10.0
Expansion vessel pre-charge pressure	bar	1.0	1.0	1.0	1.0
Appliance protection rating <sup>4)</sup>	IP	X4D	X4D	X4D	X4D
Permissible ambient temperature short time/long time	°C	0-50/40	0-50/40	0-50/40	0-50/40
Nominal capacity of the appliance	l	5.2	5.2	5.2	5.2
Total packaged weight	kg	55	55	55	55
Total appliance weight (excluding packaging)	kg	47	47	47	47
Lift weight (without front and side panels)	kg	41	41	41	41

1) Propane/butane mixture for fixed containers with capacity up to 15 000 l

2) The Gas Rate provided assumes the accepted NG average calorific value of 34.9 MJ/m<sup>3</sup> net .

3) Appliances are fitted with a flow regulator set to achieve a 40 °C temperature rise. This ensures comfortable bathing during the colder winter months.

4) Protection rating may change depending on the control unit/s used on this appliance.

Table 26 GR8700iW 30/35

	Unit	GR8700iW 40		GR8700iW 45	
		Natural gas	Propane <sup>1)</sup>	Natural gas	Propane <sup>1)</sup>
<b>Gas flow maximum rate – 10 minutes from lighting</b>					
Natural Gas <sup>2)</sup>	m <sup>3</sup> /h	4.3	-	4.6	-
Propane Gas (LPG)	kg/h	-	3.2	-	3.4
<b>Central Heating (CH)</b>					

	Unit	GR8700iW 40		GR8700iW 45	
		Natural gas	Propane <sup>1)</sup>	Natural gas	Propane <sup>1)</sup>
Maximum rated heat input (net) ( $Q_{max}$ )	kW	34.4	34.4	34.4	34.4
Maximum rated heat output 40/30 °C	kW	35.2	35.2	35.7	35.7
Maximum rated heat output 50/30 °C ( $P_{cond, max}$ )	kW	35.0	35.0	36.0	36.0
Maximum rated heat output 80/60 °C ( $P_{max}$ )	kW	33.7	33.7	33.8	33.8
Minimum rated heat input (net) ( $Q_{min}$ )	kW	5.1	5.1	5.1	5.1
Minimum rated heat output 40/30 °C	kW	5.5	5.5	5.5	5.5
Minimum rated heat output 50/30 °C ( $P_{cond, min}$ )	kW	5.5	5.5	5.5	5.5
Minimum rated heat output 80/60 °C ( $P_{min}$ )	kW	5.0	5.0	5.0	5.0
Maximum flow temperature	°C	70	70	70	70
Maximum flow temperature possible	°C	82	82	82	82
Maximum permissible operating pressure (PMS)	bar	2.5	2.5	2.5	2.5
Available pump head at 20 K (°C) system temperature rise	m	2.0	2.0	2.0	2.0
<b>Domestic Hot Water DHW</b>					
Minimum heat input	kW	5.1	5.1	6.3	6.3
Maximum rated heat input (net) ( $Q_{nW}$ )	kW	40.8	40.8	43.5	43.5
Maximum rated heat output ( $P_{nW}$ )	kW	40.8	40.8	43.5	43.5
Maximum mains inlet pressure (standing pressure PMW)	bar	10	10	10	10
Minimum mains inlet pressure (working) for max. flow	bar	3.0	3.0	3.4	3.4
Minimum mains inlet pressure (working) for operation	bar	0.2	0.2	0.2	0.2
Minimum required flow to activate DHW demand	l/min	1.9	1.9	1.9	1.9
DHW temperature range	°C	35-60	35-60	35-60	35-60
Maximum cold water inlet temperature	°C	60	60	60	60
Maximum DHW flow rate - 40 °C rise $\pm$ 15% <sup>3)</sup>	l/min	14	14	15	15
<b>Flue</b>					
Flue gas temperature max. load DHW demand	°C	77/56	77/56	69/56	69/56
Flue gas temperature 80/60 °C, max./min load	°C	77/56	77/56	69/56	69/56
Flue gas temperature 40/30 °C, max./min load	°C	56/31	56/31	52/30	52/30
CO <sub>2</sub> level at max. rated heat output (after 10 minutes)	%	9.5	10.8	9.5	10.8
CO <sub>2</sub> level at min. rated heat output (after 10 minutes)	%	8.6	10.2	8.6	10.2
NO <sub>x</sub> class	-	6	6	6	6
NO <sub>x</sub> rating (EN 15502-1)	mg/kWh	≤ 40	≤ 40	≤ 40	≤ 40
<b>Condensate</b>					
Maximum condensate rate	l/h	4.1	4.1	4.1	4.1
pH value, approx.	-	4.5 – 5.0	4.5 – 5.0	4.5 – 5.0	4.5 – 5.0
<b>Electrical</b>					
Electrical power supply voltage	a.c. V	230	230	230	230
Frequency	Hz	50	50	50	50
Maximum power consumption (running)	W	130	130	130	130
Maximum power consumption (stand-by)	W	1	1	1	1
Energy efficiency index (EEL) heating pump	-	≤ 0.23	≤ 0.23	≤ 0.23	≤ 0.23
<b>General data</b>					
Expansion vessel capacity	l	10.0	10.0	10.0	10.0
Expansion vessel pre-charge pressure	bar	1.0	1.0	1.0	1.0
Appliance protection rating <sup>4)</sup>	IP	X4D	X4D	X4D	X4D
Permissible ambient temperature short time/long time	°C	0–50/40	0–50/40	0–50/40	0–50/40
Nominal capacity of the appliance	l	5.2	5.2	5.9	5.9
Total packaged weight	kg	55	55	57	57
Total appliance weight (excluding packaging)	kg	47	47	49	49
Lift weight (without front and side panels)	kg	41	41	43	43

1) Propane/butane mixture for fixed containers with capacity up to 15 000 l

2) The Gas Rate provided assumes the accepted NG average calorific value of 34.9 MJ/m<sup>3</sup> net.

3) Appliances are fitted with a flow regulator set to achieve a 40 °C temperature rise. This ensures comfortable bathing during the colder winter months.

4) Protection rating may change depending on the control unit/s used on this appliance.

Table 27 GR8700iW 40/45

	Unit	GR8700iW 50	
		Natural gas	Propane <sup>1)</sup>
<b>Gas flow maximum rate – 10 minutes from lighting</b>			
Natural Gas <sup>2)</sup>	m <sup>3</sup> /h	5.1	–
Propane Gas (LPG)	kg/h	–	3.8
<b>Central Heating (CH)</b>			
Maximum rated heat input (net) (Q <sub>max</sub> )	kW	34.4	34.4
Maximum rated heat output 40/30 °C	kW	36.0	36.0
Maximum rated heat output 50/30 °C (P <sub>cond, max</sub> )	kW	35.7	35.7
Maximum rated heat output 80/60 °C (P <sub>max</sub> )	kW	33.8	33.8
Minimum rated heat input (net) (Q <sub>min</sub> )	kW	5.1	5.1
Minimum rated heat output 40/30 °C	kW	5.5	5.5
Minimum rated heat output 50/30 °C (P <sub>cond, min</sub> )	kW	5.5	5.5
Minimum rated heat output 80/60 °C (P <sub>min</sub> )	kW	5.0	5.0
Maximum flow temperature	°C	70	70
Maximum flow temperature possible	°C	82	82
Maximum permissible operating pressure (PMS)	bar	2.5	2.5
Available pump head at 20 K (°C) system temperature rise	m	2.0	2.0
<b>Domestic Hot Water DHW</b>			
Minimum heat input	kW	6.3	6.3
Maximum rated heat input (net) (Q <sub>nW</sub> )	kW	48.9	48.9
Maximum rated heat output (P <sub>nW</sub> )	kW	48.9	48.9
Maximum mains inlet pressure (standing pressure PMW)	bar	10	10
Minimum mains inlet pressure (working) for max. flow	bar	2.5	2.5
Minimum mains inlet pressure (working) for operation	bar	0.2	0.2
Minimum required flow to activate DHW demand	l/min	1.9	1.9
DHW temperature range	°C	35-60	35-60
Maximum cold water inlet temperature	°C	60	60
Maximum DHW flow rate - 40 °C rise ± 15% <sup>3)</sup>	l/min	18	18
<b>Flue</b>			
Flue gas temperature max. load DHW demand	°C	73/56	73/56
Flue gas temperature 80/60 °C, max./min load	°C	73/56	73/56
Flue gas temperature 40/30 °C, max./min load	°C	55/30	55/33
CO <sub>2</sub> level at max. rated heat output (after 10 minutes)	%	9.5	10.8
CO <sub>2</sub> level at min. rated heat output (after 10 minutes)	%	8.6	10.2
NO <sub>x</sub> class	–	6	6
NO <sub>x</sub> rating (EN 15502-1)	mg/kWh	≤ 40	≤ 40
<b>Condensate</b>			
Maximum condensate rate	l/h	4.1	4.1
pH value, approx.	–	4.5 – 5.0	4.5 – 5.0
<b>Electrical</b>			
Electrical power supply voltage	a.c. V	230	230
Frequency	Hz	50	50
Maximum power consumption (running)	W	143	143
Maximum power consumption (stand-by)	W	1	1
Energy efficiency index (EEI) heating pump	–	≤ 0.23	≤ 0.23
<b>General data</b>			
Expansion vessel capacity	l	10.0	10.0
Expansion vessel pre-charge pressure	bar	1.0	1.0
Appliance protection rating <sup>4)</sup>	IP	X4D	X4D
Permissible ambient temperature short time/long time	°C	0–50/40	0–50/40
Nominal capacity of the appliance	l	5.9	5.9
Total packaged weight	kg	57	57
Total appliance weight (excluding packaging)	kg	49	49
Lift weight (without front and side panels)	kg	43	43

1) Propane/butane mixture for fixed containers with capacity up to 15 000 l



- 2) The Gas Rate provided assumes the accepted NG average calorific value of 34.9 MJ/m<sup>3</sup> net .
- 3) Appliances are fitted with a flow regulator set to achieve a 40 °C temperature rise. This ensures comfortable bathing during the colder winter months.
- 4) Protection rating may change depending on the control unit/s used on this appliance.

Table 28 GR8700iW 50

**12.2 Ionisation current**

Type	Gas type	When the burner is running at a minimum rated heat	
		OK	Faulty
GR8700iW 30 C	Natural gas	≥ 3 µA	< 3 µA
	LPG	≥ 3 µA	< 3 µA
GR8700iW 35 C , GR8700iW 40 C , GR8700iW 45 C GR8700iW 50 C	Natural gas	≥ 7 µA	< 7 µA
	LPG	≥ 10 µA	< 10 µA

Table 29 Ionisation current

**12.3 Component resistance characteristics**

**12.3.1 Sensor values**

Temperature [°C ± 10 %]	Resistance [Ω]
-20	2 392
-16	2 088
-12	1 811
-8	1 562
-4	1 342
0	1 149
4	984
8	842
12	720
16	616
20	528
24	454

Table 30 Outside temperature sensor (for weather-compensated control units, accessory)

Temperature [°C ± 10 %]	Resistance [Ω]
20	14 772
25	11 981
30	9 786
35	8 047
40	6 653
45	5 523
50	4 608
55	3 856
60	3 243
65	2 744
70	2 332
75	1 990
80	1 704
85	1 464
90	1 262
95	1 093
100	950

Table 31 Flow temperature sensor

**12.4 Code plug**

Type	Gas type	Number
GR8700iW 30 C	Natural gas	20017
GR8700iW 35 C	Natural gas	20018
GR8700iW 40 C	Natural gas	20019
GR8700iW 45 C	Natural gas	20020
GR8700iW 50 C	Natural gas	20021

Table 32 Coding plug

**12.5 Pump characteristic map of the heating pump**

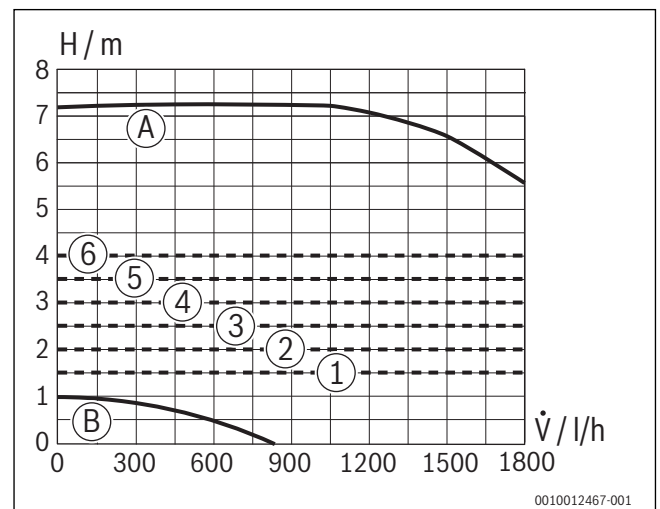


Fig. 107 Pump characteristic maps and pump curves

- [1] Pump characteristic map, constant pressure 150 mbar
- [2] Pump characteristic map, constant pressure 200 mbar
- [3] Pump characteristic map, constant pressure 250 mbar
- [4] Pump characteristic map, constant pressure 300 mbar
- [5] Pump characteristic map, constant pressure 350 mbar
- [6] Pump characteristic map, constant pressure 400 mbar
- [A] Pump curve at maximum pump rate
- [B] Pump curve at minimum pump rate
- H Residual head
- V̇ Flow rate

### 12.6 Setting values for central heating output

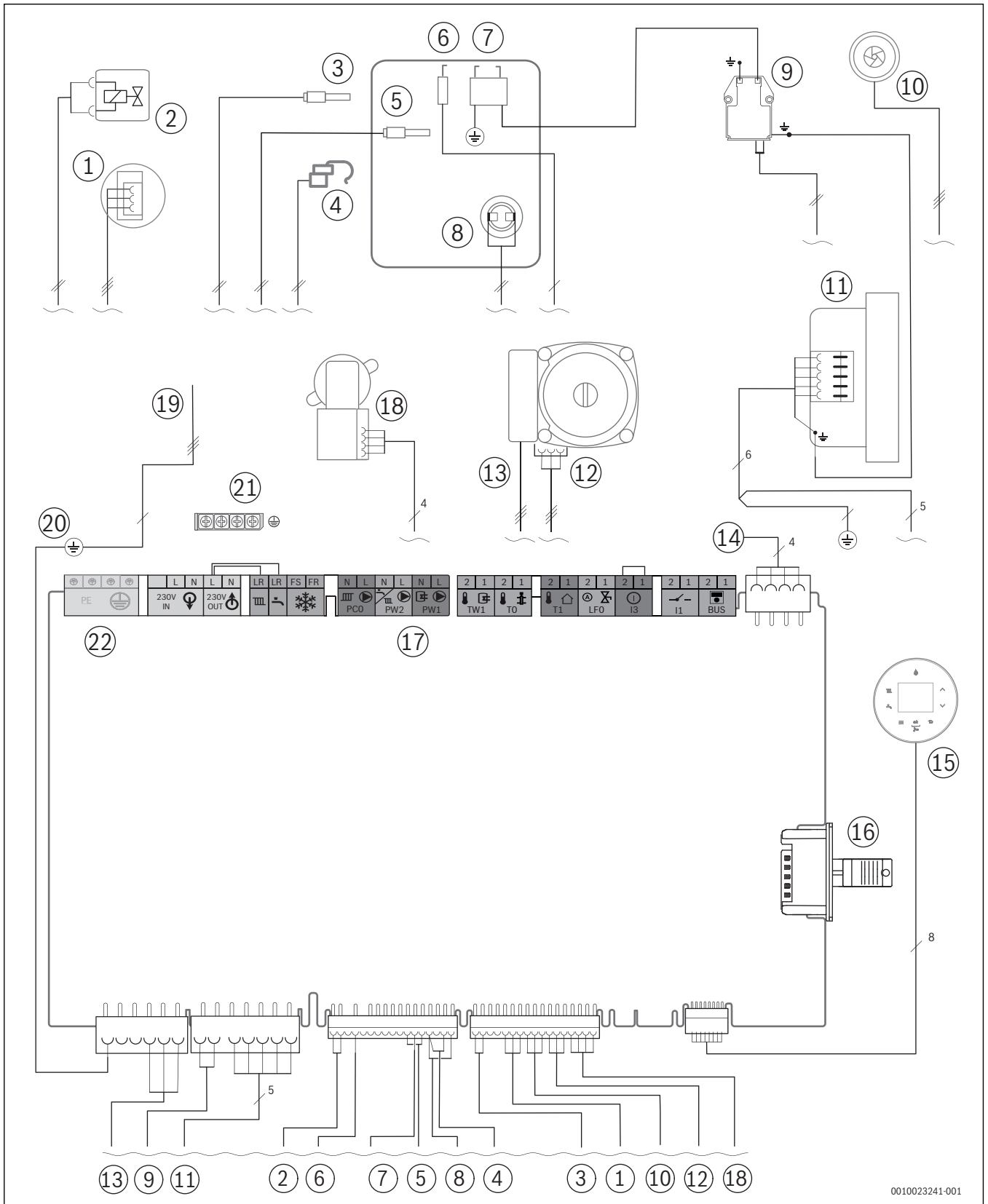
Gross calorific value Net calorific value Performance [kW]	$H_{S(0^{\circ}C)}$ [kWh/m <sup>3</sup> ] $H_{i(15^{\circ}C)}$ [kWh/m <sup>3</sup> ] Load [kW]	Display [%]	G20 (20 mbar) 11.2  9.5 Gas volume [l/min at $T_V/T_R$ = 80/60 °C]
			9 11 13 15 17 19 21 22 24 26 28 30 32 34 36 38 41 43 45 47 49 51 53
<b>4.9</b>	5.1	17	9
<b>6.0</b>	6.3	21	11
<b>7.0</b>	7.3	24	13
<b>8.0</b>	8.4	28	15
<b>9.0</b>	9.5	31	17
<b>10.0</b>	10.6	35	19
<b>11.0</b>	11.7	39	21
<b>12.0</b>	12.8	42	22
<b>13.0</b>	13.9	46	24
<b>14.0</b>	15.0	50	26
<b>15.0</b>	16.2	54	28
<b>16.0</b>	17.3	57	30
<b>17.0</b>	18.5	61	32
<b>18.0</b>	19.6	65	34
<b>19.0</b>	20.8	69	36
<b>20.0</b>	21.9	73	38
<b>21.0</b>	23.1	77	41
<b>22.0</b>	24.3	80	43
<b>23.0</b>	25.5	84	45
<b>24.0</b>	26.7	88	47
<b>25.0</b>	27.9	92	49
<b>26.0</b>	29.1	96	51
<b>26.9</b>	30.2	100	53

Table 33 GR8700iW 30 C

Gross calorific value Net calorific value Performance [kW]	$H_{S(0^{\circ}C)}$ [kWh/m <sup>3</sup> ] $H_{i(15^{\circ}C)}$ [kWh/m <sup>3</sup> ] Load [kW]	Display [%]	G20 (20 mbar) 11.2  9.5 Gas volume [l/min at $T_V/T_R$ = 80/60 °C]
			11 13 15 16 18 20 22 23 25 27 29 31 32 34 36 38 40 41 43 45 47 49 50 52 54 56 57 59 60
<b>6.1</b>	6.3	18	11
<b>7.0</b>	7.2	21	13
<b>8.0</b>	8.3	24	15
<b>9.0</b>	9.3	27	16
<b>10.0</b>	10.3	30	18
<b>11.0</b>	11.3	33	20
<b>12.0</b>	12.4	36	22
<b>13.0</b>	13.4	39	23
<b>14.0</b>	14.4	42	25
<b>15.0</b>	15.4	45	27
<b>16.0</b>	16.5	48	29
<b>17.0</b>	17.5	51	31
<b>18.0</b>	18.5	54	32
<b>19.0</b>	19.5	57	34
<b>20.0</b>	20.5	60	36
<b>21.0</b>	21.6	63	38
<b>22.0</b>	22.6	66	40
<b>23.0</b>	23.6	69	41
<b>24.0</b>	24.6	72	43
<b>25.0</b>	25.6	74	45
<b>26.0</b>	26.6	77	47
<b>27.0</b>	27.6	80	49
<b>28.0</b>	28.7	83	50
<b>29.0</b>	29.7	86	52
<b>30.0</b>	30.7	89	54
<b>31.0</b>	31.7	92	56
<b>32.0</b>	32.7	95	57
<b>33.0</b>	33.7	98	59
<b>33.7</b>	34.4	100	60

Table 34 GR8700iW 35 C, GR8700iW 40 C, GR8700iW 45 C, GR8700iW 50 C

**12.7 Electrical wiring**



0010023241-001

**Fig. 108 Electrical wiring**

- |  |  |
|--|--|
| [1] pressure sensor                          | [8] Heating block temperature limiter  |
| [2] Air/gas ratio control valve              | [9] Ignition transformer               |
| [3] Hot water temperature sensor             | [10] Flow Turbine                      |
| [4] Flow temperature sensor at flow pipe     | [11] Fan                               |
| [5] Flow temperature sensor at heating block | [12] Control cable of the heating pump |
| [6] Flame sensing electrode                  | [13] Heating pump 230 V                |
| [7] Ignition electrode                       | [14] Connecting lead for KEY slot      |

- [15] Display
- [16] Code plug
- [17] Terminal strip for external accessories (→ terminal assignment  
Tab. 5.5.1, page 36)
- [18] 3-way valve
- [19] Connecting lead
- [20] Earth (PE)
- [21] Earth bar
- [22] Not used

## 12.8 Gas boiler system commissioning checklist

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

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

Customer name:	Telephone number:
Address:	
Boiler make and model	
Boiler serial number:	
Commissioned by (PRINT NAME):	Gas Safe register number:
Company name:	Telephone number:
Company address:	
Commissioning date:	
<b>To be completed by the customer on receipt of a Building Regulations Compliance Certificate*</b>	
Building Regulations Notification Number (if applicable):	

### Controls: Tick the appropriate boxes

Time and temperature control to heating	Room thermostat and programmer/timer <input type="checkbox"/>	Programmable room thermostat <input type="checkbox"/>
	Load/Weather compensation <input type="checkbox"/>	Optimum start control <input type="checkbox"/>
Time and temperature control hot water	Cylinder thermostat and programmer/timer <input type="checkbox"/>	Combination boiler <input type="checkbox"/>
Heating zone valves	Fitted <input type="checkbox"/>	Not required <input type="checkbox"/>
Hot water zone valves	Fitted <input type="checkbox"/>	Not required <input type="checkbox"/>
Thermostatic radiator valves	Fitted <input type="checkbox"/>	Not required <input type="checkbox"/>
Automatic by-pass valve fitted to system	Fitted <input type="checkbox"/>	Not required <input type="checkbox"/>
Boiler interlock		Provided <input type="checkbox"/>

### All Systems

The system has been flushed and cleaned in accordance with BS7593 and boiler manufacturer's instructions	Yes <input type="checkbox"/>
What system cleaner was used?	
What inhibitor was used?	Quantity litres
Has a primary water system filter been installed?	Yes <input type="checkbox"/> No <input type="checkbox"/>
The condensate drain has been installed in accordance with the manufacturer's instructions and/or BS5546/BS6798	Yes <input type="checkbox"/>

### CENTRAL HEATING MODE measure and record

Gas rate	m <sup>3</sup> /hr	<b>OR</b>	ft <sup>3</sup> /hr
Burner operating pressure (if applicable)	mbar	<b>OR</b> Gas inlet pressure	mbar
Central heating temperatures	Flow temperature °C	<b>OR</b> Return temperature	°C

### COMBINATION BOILERS ONLY

Is the installation in a hard water area (above 200ppm)?	Yes <input type="checkbox"/> No <input type="checkbox"/>
If yes, and if required by the manufacturer, has a water scale reducer been fitted?	Yes <input type="checkbox"/> No <input type="checkbox"/>
What type of scale reducer has been fitted?	

### HOT WATER MODE measure and record

Gas rate	m <sup>3</sup> /hr	<b>OR</b>	ft <sup>3</sup> /hr
Burner operating pressure (if applicable)	mbar	<b>OR</b> Gas inlet pressure	mbar
Cold water inlet temperature			°C
Hot water has been checked at all outlets	Yes <input type="checkbox"/>	<b>OR</b> Temperature	°C
Water flow rate			l/min

### All INSTALLATIONS - Record the following:

Flue integrity check: Pass <input type="checkbox"/>	At max. rate: CO	ppm	<b>AND</b>	CO/CO <sub>2</sub>	Ratio
	Fail <input type="checkbox"/>	At max. rate: (where possible) CO	ppm	<b>AND</b>	CO/CO <sub>2</sub>
The heating and hot water system complies with the appropriate Building Regulations					Yes <input type="checkbox"/>
The boiler and associated products have been installed and commissioned in accordance with the manufacturer's instructions					Yes <input type="checkbox"/>
The operation of the boiler and system controls have been demonstrated to and understood by the customer					Yes <input type="checkbox"/>
The manufacturer's literature, including Benchmark Checklist and Service Record, has been explained and left with the customer					Yes <input type="checkbox"/>

Commissioning Engineer's Signature

Customer's Signature

(To confirm satisfactory demonstration and receipt of manufacturer's literature)

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

[www.centralheating.co.uk](http://www.centralheating.co.uk)



### 12.9 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"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>
2	Visual Inspection:- Check compliance of appliance, system and components	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>
3	Internal visual inspection Check for signs of leaking, corrosion and distress	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>
4	Appliance performance checks:															
4.1	Check Fan pressure test was cleaning required?	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>
		No <input type="checkbox"/>	No <input type="checkbox"/>	No <input type="checkbox"/>	No <input type="checkbox"/>	No <input type="checkbox"/>	No <input type="checkbox"/>	No <input type="checkbox"/>	No <input type="checkbox"/>	No <input type="checkbox"/>	No <input type="checkbox"/>	No <input type="checkbox"/>	No <input type="checkbox"/>	No <input type="checkbox"/>	No <input type="checkbox"/>	No <input type="checkbox"/>
		Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>
4.2	Check and clean syphon	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>
4.3	Correct working gas inlet pressure	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>
4.4	Fine gas analysis															
	Check combustion settings: Min/Max test modes	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>
4.5	Gas rate appliance at maximum output in test mode	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>
4.6	Check flame failure appliance	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>
4.7	Fit casing	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>
4.8	Check flue integrity	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>
6	Gas Safe/Benchmark documentation updated	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>
8	Appliance left to customer settings	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>
9	Gas Safe registration number	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>	Yes <input type="checkbox"/>
	Gas Safe Engineers Signature															

Table 35 Inspection and maintenance checklist

## 12.10 Service record

It is recommended that your heating system is serviced annually and that the Service record is completed.

### Service Provider

Before completing the Service record below, please ensure that you have carried out the service as described in the manufacturer's instructions.

Always use the manufacturer's recommended spare parts.

<b>SERVICE 01</b>					Date:
Engineer name:					
Company name:					
Telephone No:					
Gas safe register No:					
Record	At max. rate	CO	ppm	<b>AND</b>	CO <sub>2</sub> %
	At min. rate (Where possible)	CO	ppm	<b>AND</b>	CO <sub>2</sub> %
Comments:					
Signature					

<b>SERVICE 02</b>					Date:
Engineer name:					
Company name:					
Telephone No:					
Gas safe register No:					
Record	At max. rate	CO	ppm	<b>AND</b>	CO <sub>2</sub> %
	At min. rate (Where possible)	CO	ppm	<b>AND</b>	CO <sub>2</sub> %
Comments:					
Signature					

<b>SERVICE 03</b>					Date:
Engineer name:					
Company name:					
Telephone No:					
Gas safe register No:					
Record	At max. rate	CO	ppm	<b>AND</b>	CO <sub>2</sub> %
	At min. rate (Where possible)	CO	ppm	<b>AND</b>	CO <sub>2</sub> %
Comments:					
Signature					

<b>SERVICE 04</b>					Date:
Engineer name:					
Company name:					
Telephone No:					
Gas safe register No:					
Record	At max. rate	CO	ppm	<b>AND</b>	CO <sub>2</sub> %
	At min. rate (Where possible)	CO	ppm	<b>AND</b>	CO <sub>2</sub> %
Comments:					
Signature					

<b>SERVICE 05</b>					Date:
Engineer name:					
Company name:					
Telephone No:					
Gas safe register No:					
Record	At max. rate	CO	ppm	<b>AND</b>	CO <sub>2</sub> %
	At min. rate (Where possible)	CO	ppm	<b>AND</b>	CO <sub>2</sub> %
Comments:					
Signature					

<b>SERVICE 06</b>					Date:
Engineer name:					
Company name:					
Telephone No:					
Gas safe register No:					
Record	At max. rate	CO	ppm	<b>AND</b>	CO <sub>2</sub> %
	At min. rate (Where possible)	CO	ppm	<b>AND</b>	CO <sub>2</sub> %
Comments:					
Signature					

<b>SERVICE 07</b>					Date:
Engineer name:					
Company name:					
Telephone No:					
Gas safe register No:					
Record	At max. rate	CO	ppm	<b>AND</b>	CO <sub>2</sub> %
	At min. rate (Where possible)	CO	ppm	<b>AND</b>	CO <sub>2</sub> %
Comments:					
Signature					

<b>SERVICE 08</b>					Date:
Engineer name:					
Company name:					
Telephone No:					
Gas safe register No:					
Record	At max. rate	CO	ppm	<b>AND</b>	CO <sub>2</sub> %
	At min. rate (Where possible)	CO	ppm	<b>AND</b>	CO <sub>2</sub> %
Comments:					
Signature					

<b>SERVICE 09</b>					Date:
Engineer name:					
Company name:					
Telephone No:					
Gas safe register No:					
Record	At max. rate	CO	ppm	<b>AND</b>	CO <sub>2</sub> %
	At min. rate (Where possible)	CO	ppm	<b>AND</b>	CO <sub>2</sub> %
Comments:					
Signature					

<b>SERVICE 10</b>					Date:
Engineer name:					
Company name:					
Telephone No:					
Gas safe register No:					
Record	At max. rate	CO	ppm	<b>AND</b>	CO <sub>2</sub> %
	At min. rate (Where possible)	CO	ppm	<b>AND</b>	CO <sub>2</sub> %
Comments:					
Signature					

\* 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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RENEWABLE SUPPORT: 0330 123 9229  
CONTROLS AND CONNECTIVITY TEAM: 0330 123 3641  
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