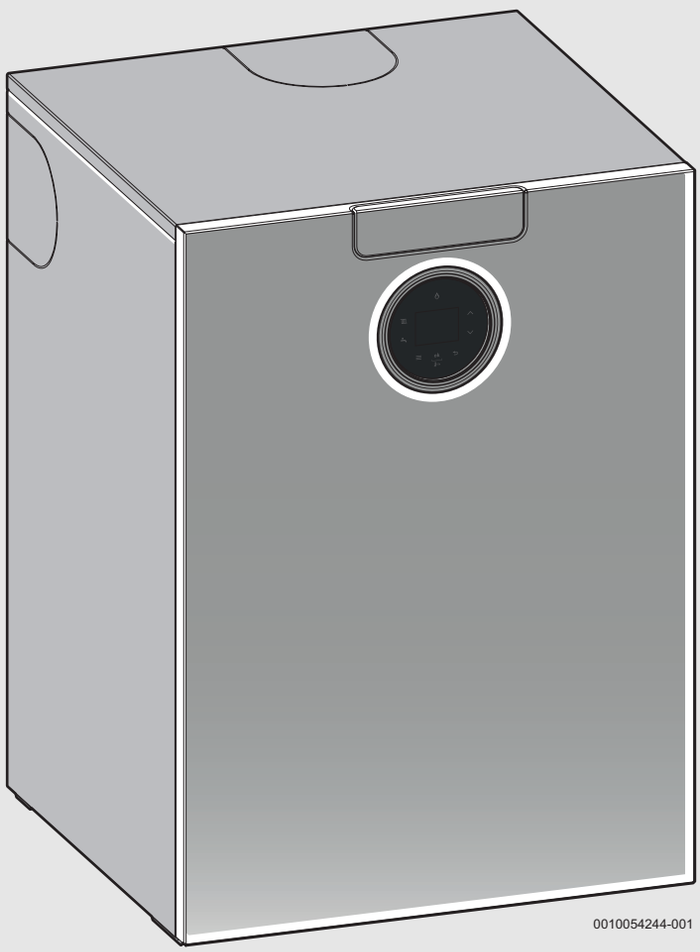
Installation and Maintenance Instructions

Floor standing gas fired condensing appliance

Greenstar 8000 F Combi

GR8700iF 35 C | GR8700iF 50 C



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6721106419 (2024/11) UK

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1 Explanation of symbols and safety instructions

1.1 Explanation of symbols

Warnings

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

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

DANGER

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

WARNING

WARNING indicates a hazardous situation which, if not avoided, could result in serious personal injury or danger to life.

CAUTION

CAUTION indicates a hazardous situation which, if not avoided, could result in minor to moderate personal injury.

NOTICE

ATTENTION indicates that material damage may occur.

Important information

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

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 only and must be followed except for any statutory obligations.
- This appliance must be installed by a competent registered gas engineer, such as a **Gas Safe** registered engineer including a **British Gas** engineer. Failure to install correctly could lead to prosecution.
- If you are in any doubt, contact the Worcester, Bosch Group help line (0330 123 3366).
- Distance learning and training courses are available from Worcester.
- The BENCHMARK Commissioning Checklist can be found on page 99 of this Installation manual.

⚠ Notices for the target group

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

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

⚠ 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 Group offer flue gas systems which are suitable for use with the appliance. It is the responsibility of the installer of the flue to ensure this flue gas system operates correctly and in a safe manner.

⚠ 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.

⚠ 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.

⚠ Danger to life from explosion

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

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

⚠ 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.

⚠ Danger of death from poisoning by flue gas due to inadequate combustion

Danger of death due to flue gas leak. If flues are damaged or leaking, or if you smell flue gas, observe the following rules.

- ▶ Close the fuel infeed.
- ▶ Open doors and windows.
- ▶ If necessary, warn all residents and leave the building.
- ▶ Prevent third parties from entering the building.
- ▶ Rectify any damage to the flue gas pipe immediately.
- ▶ Check the combustion air supply.

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

⚠ Installation and maintenance

Installation and maintenance must only be carried out by a competent registered gas engineer, such as a 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.
  - – Before touching live parts: Wait at least five minutes to discharge the capacitors.
- ▶ 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.
- ▶ In particular:
  - – Advise that alterations, servicing and repairs must only be carried out by a competent, registered gas engineer, such as a Gas Safe registered engineer or British Gas engineer.
  - – Advise the user to have the appliance and system serviced annually to help ensure economy, safety and reliability.
  - – The heat generator may only be operated with the casing fitted and closed.
- ▶ Point out the possible consequences (including personal injury, danger to life and material damage) of improper or inadequate inspection, cleaning and maintenance.
- ▶ Point out the dangers of carbon monoxide (CO) and recommend the use of CO detectors.
- ▶ Leave the installation instructions with the completed Benchmark Checklist and the operating instructions with the user or at the gas meter.

⚠ Servicing

Advise the user to have the appliance and heating system thoroughly serviced annually by a competent, registered gas engineer, such as a Gas Safe registered engineer or British Gas engineer.

Approved spares must be used to help maintain the efficiency, safety and reliability of the appliance.

⚠ Benchmark Service Record

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

Benchmark places responsibilities on both manufacturers and installers.

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

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

⚠ Health and safety

The appliance contains no asbestos and no substances have been used in the construction process that contravene the COSHH Regulations (Control of Substances Hazardous to Health Regulations 1988).

⚠ Combustion and corrosive materials

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

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

⚠ Fitting and modification

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

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

⚠ General manual handling guidelines

- ▶ Only remove packaging at the time of the final installation.
- ▶ Always use Health and Safety guidance for manual handling of an appliance.
  - – Never lift or carry more than the safe guidance limit on your own.
  - – Always use appropriate methods and equipment when lifting/ carrying an appliance.
- ▶ Never lift or carry packages by the shipping straps.
- ▶ During handling and unpacking, wear safety gloves to prevent injuries to your hands.
- ▶ 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 (England)
- Building Regulations (Wales)
- Building Standards (Scotland) (Consolidation)
- Health and Safety Document 635 (The Electricity at Work Regulations 1989) and any other local requirements
- EU Regulations No. 2017/1369 - Energy Labelling (as retained in UK law and amended)
- EU Regulations No. 811/2013 - Energy Labelling (as retained in UK law and amended)

Building Regulations Part L1A (Current version) - 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^2, 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 (Current version) - 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 pipework 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

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.

Water supply:

All seals joints and compounds (including flux and solder) and components used as part of the secondary domestic water system must meet the requirements of the WRC and hold approval by a notified body, e.g. WRAS. The installation must also comply with the requirements of Part G of the Building Regulations.

CH Water

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

3 Product Information

3.1 Information about your product on the Internet

We want to actively provide you with suitable information about your product relevant to your situation. We therefore recommend you use the information provided on our web pages. You can find the Internet address on the back of these instructions.

3.2 Scope of delivery

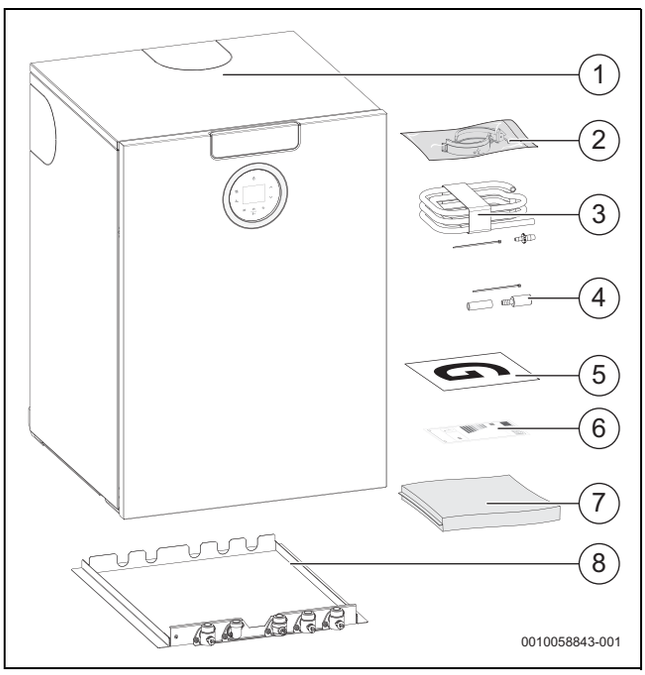

Fig. 1 Scope of delivery

[1] Gas-fired condensing appliance.
[2] Horizontal flue adaptor clamp.
[3] Condensate waste pipe and pipe adaptor.
[4] Condensate discharge to waste pipe adaptor kit.
[5] Guarantee card.
[6] ErP label.
[7] Hardware and literature pack:
- Installation and Maintenance Instructions,
- User Instructions,
- Fittings pack.

[8] Mounting frame with pre-plumbing manifold assembly.

3.3 Declaration of Conformity

3.3.1 Declaration of Conformity

The design and operating characteristics of this product comply with the British, European and supplementary national requirements.

The UKCA and CE markings declare that the product complies with all the applicable British and European legislation, which is stipulated by attaching these markings.

You can request the complete text of the Declaration of Conformity from the UK address indicated in this document.

3.4 Product identification

Data plate

The data plate contains performance data, approval data and the serial number of the product.

The position of the data plate can be found in the product overview in this chapter.

Additional type plate

The additional type plate contains information on the product name and the most important product data.

It is located in an easily accessible place on the outside of the product.

3.5 Type Overview

These appliances are for use with:
- Natural Gas or LPG (Cat.II 2H3P type C13, C33 & C53)
- Sealed heating systems

This document refers to the following appliance types:

Appliance type	Part number	Gas Council number
GR8700iF 35 C NG	7 731 600 297	47-800-56
GR8700iF 50 C NG	7 731 600 299	47-800-58
GR8700iF 35 C LPG	7 731 600 298	47-800-57
GR8700iF 50 C LPG	7 731 600 300	47-800-59

Table 1 Type overview

The name of the appliance consists of the following parts:
- GR8700iF: Type name
- 35 or 50 Heat and Hot water output in kW
- C: Combi appliance
- NG: Gas type (Natural Gas)
- LPG: Gas type (Liquid Petroleum Gas)

3.6 Pipework positions and flue outlet

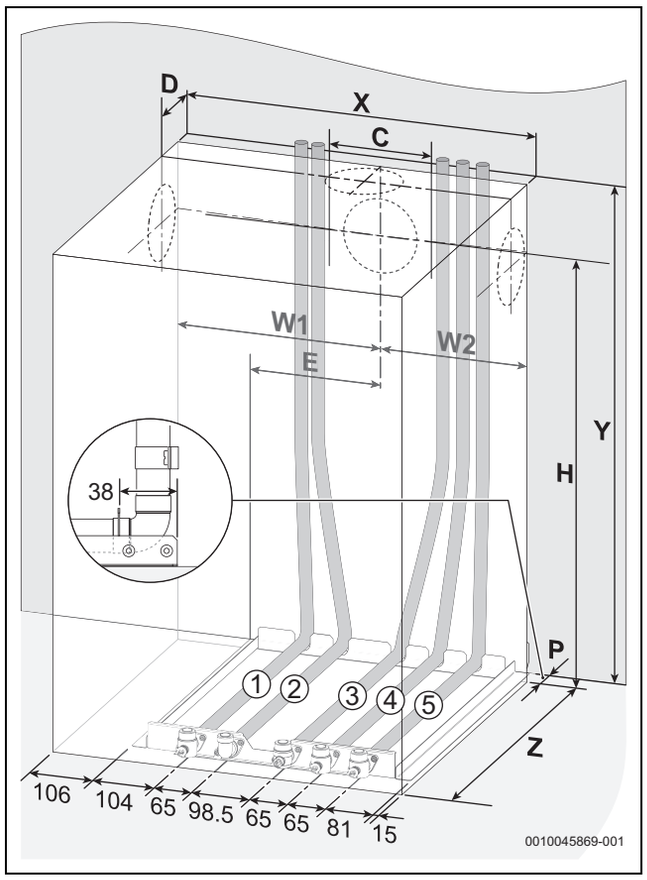

Fig. 2 Pipe and flue outlet dimensions

	Description	Dimensions (mm)
X	Appliance width	600
Y	Appliance height	850
Z	Appliance depth	600
H	Flue centre from floor [1)]	730
W1	Flue centre from appliance left side	343
W2	Flue centre from appliance right side	267
E	Flue centre from mounting frame left edge	237
D	Flue centre from rear of appliance [2)]	123
C	Clearance for flue outlet	200
P	Minimum pipework gap at rear of appliance. Depends on the type of bends employed. [3)]	38

1) **IMPORTANT**: for the side exit flues, increase this height by 5.3mm per 100mm of horizontal length that the flue opening is away from the appliance.

2) This depth is increased if pipework gap at rear of appliance is increased.

3) If the pipe work gap at the rear of the appliance is increased by more than 38mm. This will increase the position of the flue centres by that extra amount of pipe work gap.

Table 2 Appliance and flue outlet dimensions

#	Function	From left case edge	From left mounting frame edge	Diameter of pipe
1	CH Flow	210mm	104mm	22mm • Compression fitting
2	DHW Outlet	275mm	169mm	22mm • Compression fitting
3	Gas	373.5mm	267.5mm	22mm • Compression fitting
4	DCW Inlet	438.5mm	332.5mm	22mm • Compression fitting
5	CH Return	503.5mm	397.5mm	22mm • Compression fitting

Table 3 Pipe dimensions

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

3.7 Product overview

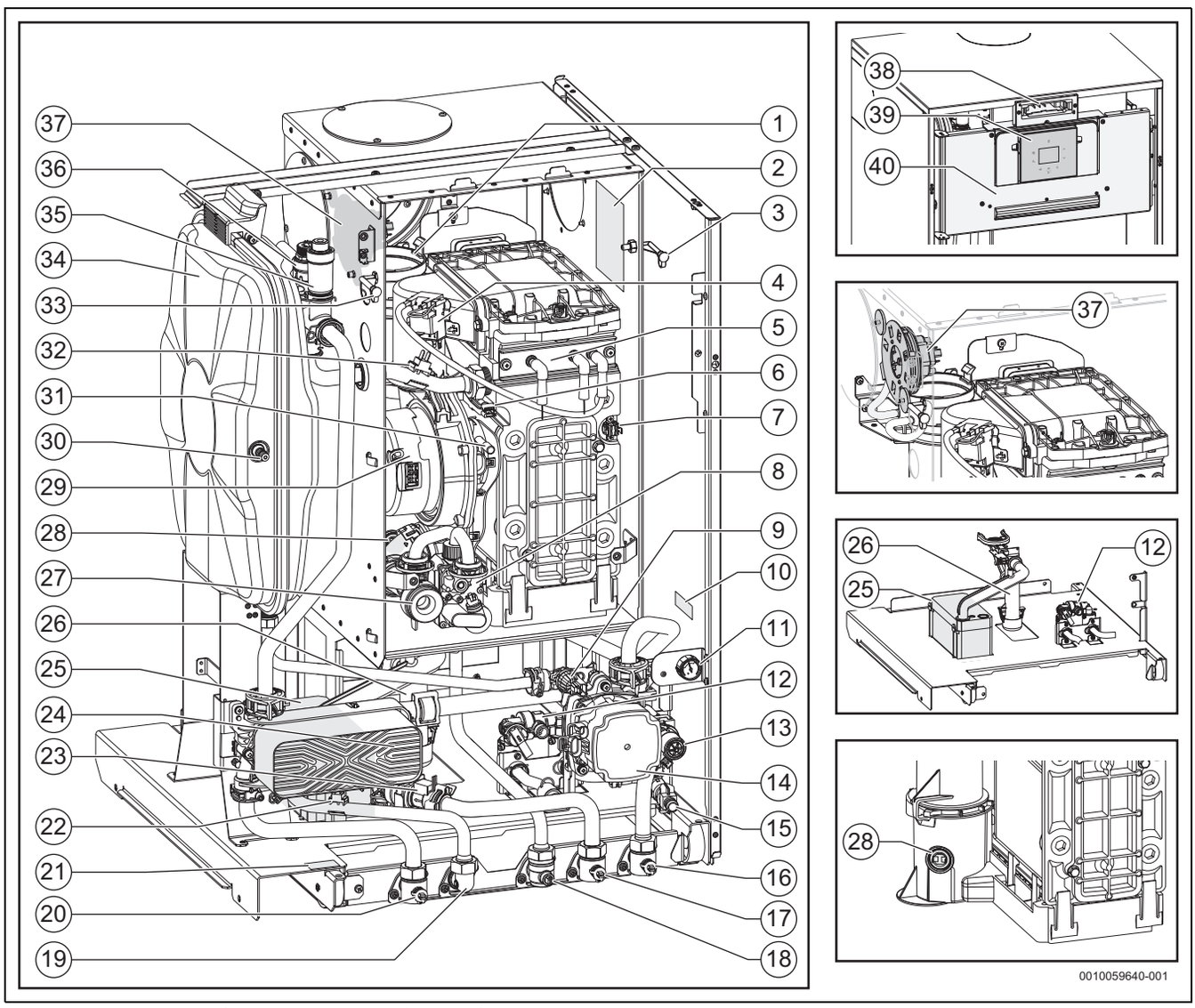

Fig. 3 Product overview (some panels removed for clarity)

Legend to figure 3:

[1] Flue system connection
[2] Data plate
[3] Air inlet sample point
[4] Ignition transformer
[5] Electrode set
[6] Flow temperature sensor at heat exchanger assembly
[7] Heat exchanger assembly temperature limiter
[8] Gas valve
[9] Pressure sensor
[10] Product identification label
[11] Pressure gauge
[12] Keyless filling link
[13] 3-Way Valve
[14] Pump
[15] Drain valve
[16] CH return connection
[17] DCW inlet connection
[18] Gas connection
[19] DHW outlet connection
[20] CH flow connection
[21] Product identification label
[22] DHW temperature sensor
[23] Flow turbine
[24] Plate heat exchanger
[25] Condensate pump
[26] Condensate trap
[27] Venturi (sealed)
[28] Flue gas temperature limiter
[29] Fan
[30] Schraeder valve
[31] Fan pressure test point
[32] Flow temperature sensor (supply sensor) at flow pipe
[33] Flue gas sample point
[34] Expansion vessel
[35] Automatic air vent
[36] Pressure-relief valve (heating circuit)
[37] Differential pressure switch
[38] Key control (accessory) housing
[39] Control unit
[40] Control panel

3.8 Standard accessories

3.8.1 Appliance accessories

Part number	Description
7 733 600 266	Greenstar System filter (22mm mini)
7 733 600 236	Greenstar System filter (22mm) 1)
7 733 600 237	Greenstar System filter (28mm)
7 716 912 105	Mini expansion vessel
7 716 192 614	Low Loss Header
7 724 001 983	DHW Solar Pre Heat kit
7 733 601 314	Remote PRV kit
7 724 001 982	Automatic filling link
7 738 113 979	35kW Heat exchanger cleaning kit
7 738 113 980	50kW Heat exchanger cleaning kit

1) System filter can be fitted within the appliance.

Table 4 Appliance accessories

3.8.2 Controls accessories

The controls listed can be used with the appliances stated on the front of this manual.

Part number	Description
7 738 112 963	CR11
7 738 114 081	CR400 1)

1) Preheat time control available

Table 5 Control accessories

Bosch EasyControl smart control system

Part number	Description
7 736 701 341	EasyControl (white)
7 736 701 392	EasyControl (black)
7 738 113 610	EasyControl RF key
7 736 701 555	EasyControl TRV set (white)
7 736 701 556	EasyControl TRV set (black)
8 750 000 270	EasyConstrol smart TRV (individual)

Table 6 EasyControl accessories

Basic weather compensation sensor

Outdoor weather sensor (to activate on-board simple Weather Compensation).

Part number	Description
7 716 192 764	Outdoor weather sensor

Table 7 Control accessories

Weather compensation is available with the EasyControl without the need for a physical outdoor sensor, however, it can improve control accuracy for installations in isolated micro-climates or highly sheltered locations such as valleys.

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 General notes

- Observe all the current applicable national and regional regulations as well as all technical rules and guidelines.
- Obtain all approvals required before installation (gas supplier, etc.).
- Observe the building regulations, e.g. for the use of a neutraliser unit (accessories).
- Convert open heating systems to sealed systems.
- Do not use galvanised radiators or pipes.
- In the case of LPG, install a pressure regulator with a pressure relief valve.

4.2 System preparation

4.2.1 Artificially softened water

The heating system must not be filled with water which has been treated using an ion exchange (salt based) water softener. Where these water softeners are installed, a permanent untreated water supply should be provided to maintain pressure in the heating system.

A bypass must be provided at the water softener to comply with BS:14743. Where a permanent untreated supply cannot be provided, the system must be initially filled using the bypass provided at the water softener. Occasional topping up of the system with artificially softened water is acceptable. Inhibitor must be added to the system. The pH levels must be between 6.5 and 8.0 at the time of commissioning. When a permanent untreated supply is not provided to the heating system filling point, the pH levels must be checked annually and recorded in the service record.

NOTICE

Risk of damage to appliance!

- The heating system must not be filled with water which has been treated using an ion exchange water softener.
- If the system is partially drained for maintenance or repair work, the system must be refilled by utilising the bypass valve at the water softener. The pH and inhibitor levels should be checked.

4.2.2 Water systems and pipework

Primary system plastic pipework:

- Any plastic pipework 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 pipework 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 and components 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 by TRV's or zone valves, an auto bypass should be installed and adjusted to provide constant pump head pressure to the heating circuits. If flow to the heating circuits can be stopped completely by zone valves, an auto bypass must be installed and adjusted to open during pump over-run and should provide a minimum 3 metre circuit when activated. If a constant pressure pump setting is selected, and circulation cannot be completely stopped by zone valves, an auto bypass will not be required.
- 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 device 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 pipework 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.
- Thermostatic mixing valves (TMVs) must be fitted at the point of use as specified in G3 of the building regulations and if specific, accurate temperature control is required by the user.

Primary system considerations - Combi appliances
Sealed system

- The CH sealed system must be filled using a WRAS approved filling loop or comply with examples in 4.4 "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.

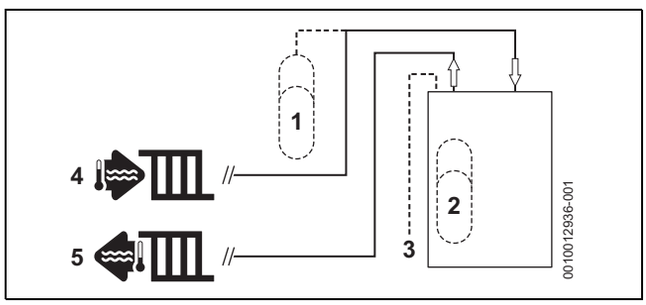

Fig. 4 Additional expansion vessel

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

Check the size of the expansion vessel

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

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

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

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

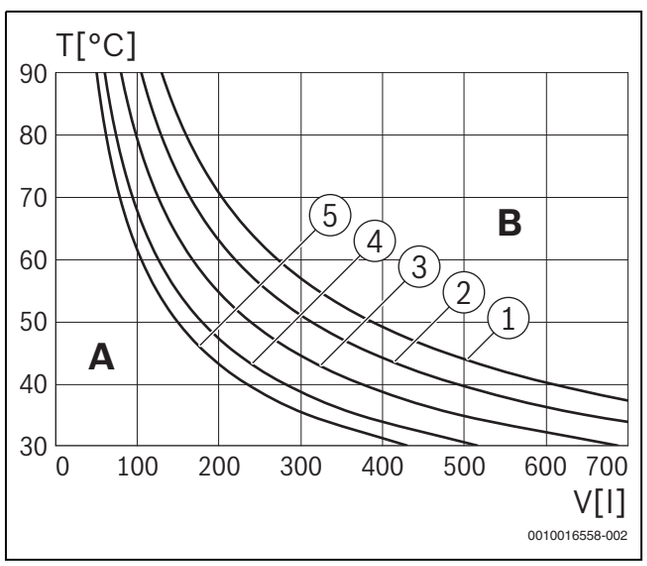

Fig. 5 Curves for the expansion vessel

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

The default pre-charge pressure for the expansion vessel is 0.75 bar

4.3 System layouts examples

System loads above 35kW

- ▶ Heating systems that exceed 35kW will require a low loss header and secondary pump sized to accommodate the heating system.

Sealed primary system - Single central heating circuit:

Typical primary system example

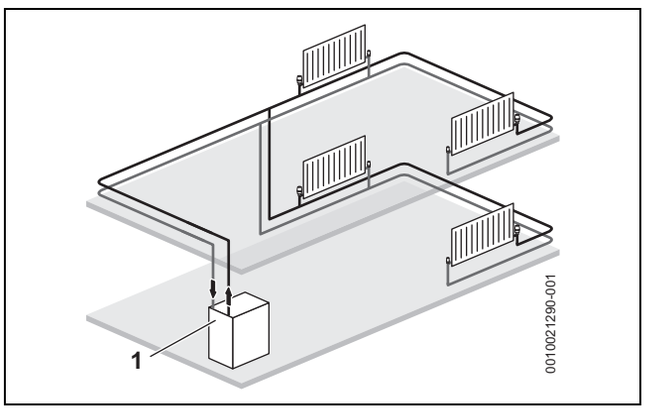

Fig. 6 Single central heating circuit example

[1] Appliance

Sealed primary system - 2 x central heating zones:

- Requirement for new builds if the floor area of a property is over 150m^2.

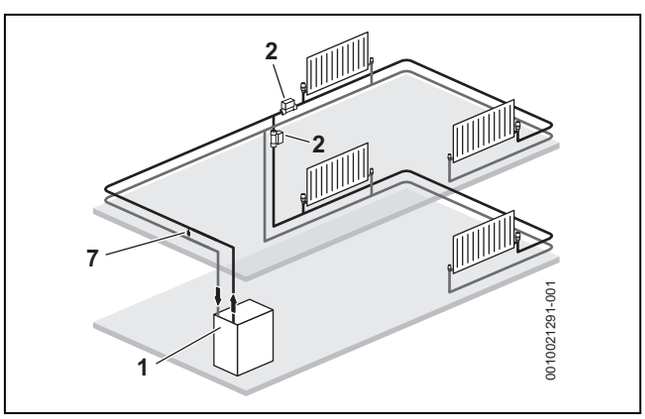

Fig. 7 Separated heating zones

[1] Appliance
[2] Zone valves
[7] Auto bypass across flow and return to be at least 1.5m away from the appliance (3m loop of pipe)

4.4 System fill

Integral filling link

- The appliance is supplied with a pre fitted Keyless filling link.
  - See Operating Instructions for topping up the system pressure.

Minimum static pressure.

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

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.

The pressure shown on the gauge may differ from that shown on the digital display. Final system pressure adjustments must be made whilst referencing the digital display.

External filling loop

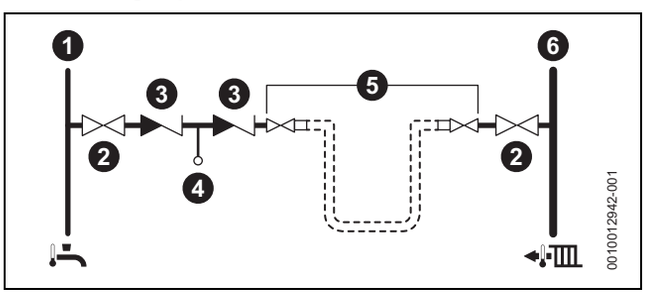

Fig. 8 External filling loop system fill example

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

4.5 Mains supply

4.5.1 Electrical supply

- Supply: Single phase, 230V AC - 50 Hz
- The power supply and wiring for the appliance must comply with the current applicable national and regional regulations as well as all technical rules and guidelines for electrical installations.
- The wiring between the appliance and the electrical supply must comply with the current applicable national and regional regulations as well as all technical rules and guidelines for electrical installations.
- The appliance should be connected through a switched, fused connection unit. A 3 Amp fuse must be installed in the connection unit.
- The appliance must have a permanently connected earth.
- Cable: Flexible PVC insulated cable, 1.5mm^2 temperature rated to 90 °C, in accordance with regulations as well as all technical rules and guidelines for appliance power supply installations.
- Any additional components that are connected to the appliance must be connected through the same isolator as the appliance.
- Additional equipment wired to the appliance must comply with the current applicable national and regional regulations as well as all technical rules and guidelines.
- Appliance IP rating - IPX4D

4.5.2 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 the latest version of 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 6).
- The meter or regulator and its pipework 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 pipework:

▶ Gas installation pipework 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 23 ”Allowed mbar pressure drop”).

Basic pipe sizing calculation

Basic pipe sizing calculation.

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

Natural Gas (NG):

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

Discharge rates for Natural Gas (m^3/hr) with straight horizontal copper tube					
Pipe length (m)		Pipe size (mm)			
		15	22	28	35
3	Discharge m^3/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 8 Natural Gas (NG)

Natural Gas:

- ▶ When using this table to estimate the gas flow rate in pipework 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 45° bend.

Liquid Petroleum Gas (LPG):

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

Discharge rates for LPG (m^3/hr & kW) with straight horizontal copper tube						
Tubing length (m)	Outside diameter					
	15mm		22mm		28mm	
	kW	m^3/hr	kW	m^3/hr	kW	m^3/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 9 Liquid Petroleum Gas (LPG)

Liquid Petroleum Gas (LPG):

- ▶ When using this table to estimate the Gas flow rate in pipework 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 45° bend or straight coupler.

4.5.3 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 DHW 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 device. 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 section 13.1 "Technical data".
- If mains fed water static pressure is greater than 3 bar, fitting a pressure reducing valve is recommended.

NOTICE

Non-return, back flow prevention devices (including those associated with water meters) fitted to the mains water supply can cause a pressure build up which could damage the boiler 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 DHW 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 boiler or other household appliances, we would recommend on installations where standing pressure exceeds 3 bar, that a 3 bar pressure reducing valve and mini expansion vessel are fitted.

- Where the mains water supply has a non-return, flow back 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 boiler [4] as shown below.

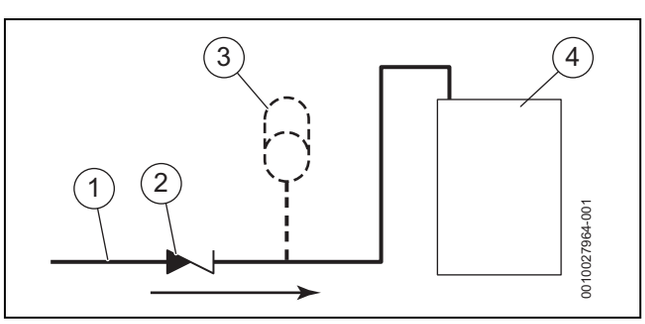

Fig. 9 Mini expansion vessel location

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

4.6 Appliance location and clearance

Floor installation

- Follow local regulations for the location within the property that the appliance is to be installed.
- This appliance is only suitable for installing internally.
  - It should be installed at a suitable location within the property and the installation area must be level and has sufficient load-bearing capacity.
  - It should be installed on the floor, with the back against a solid surface in the property.
- The appliance is not suitable for external installation.
- Protect installation area against dust and moisture.
- Provide fresh air.

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.

DANGER

Danger to life from explosion!

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

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

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 or room.
▶ Avoid the build-up of dust.

NOTICE

Damage to system:

The heating system pipework 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 pipework.
We recommend that the frost thermostat is sited in the coldest unheated area in which pipework 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 pipework 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 standing space access in front of the appliance 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 standing space access in front of the appliance to gain access to the controls or to check, top up or reset the appliance.

4.6.1 Locations 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.

- Installations in locations containing a bath or shower should only be considered if there is no other option.
  - Observe all the current applicable national and regional regulations as well as all technical rules and guidelines.
  - These may contain additional or deviating requirements for installations in wet rooms.
- Circuit breaking devices should be used in accordance with the regulations as well as all technical rules and guidelines.
- Check the IP rating of any control units to be used on this appliance.
- Figures 10 and 11 are for guidance only.

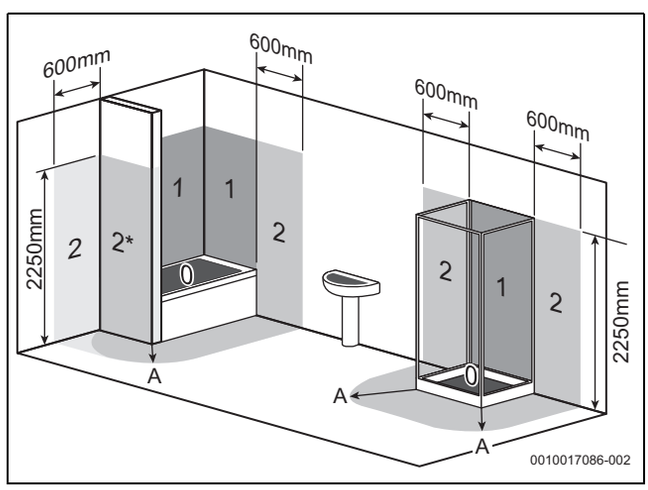

Fig. 10 Bathroom installations

[0] Zone 0
[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.

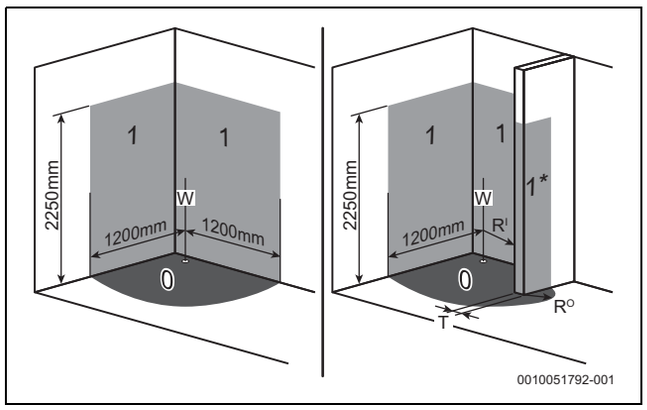

Fig. 11 Wet room installations

[0] Zone 0:
The floor area where you will stand in water which would replace what is usually the bath or shower tray. This is measured from the centre of the fixed water outlet (waste).

[1] Zone 1:
The same floor area as zone 0 but extending 2.25m above zone 0.

[1*] With permanent fixed partitions, zone 0 must extend around the partition to maintain the 1200mm clearance from the fixed water outlet (waste) ($R^I + T + R^O$ = 1200mm).

[W] Fixed water outlet (waste).

[R^I] Radial distance from the fixed water outlet (waste) to the inner corner of the partition.

[T] Thickness of the partition.

[R^O] Radial measurement from the outer corner of the partition.

Example calculation for how far zone 0 extends around the partition.

- ▶ $R^O = 1200 - (R^I + T)$
- ▶ If R^I is 750mm and T is 120mm
  - $R^O = 1200 - (750 + 120)$, then R^O = 330mm

- Appliance protection rating - IPX4D
  - Appliances must not be installed in zone 1.

When using a control Key product the appliance rating is maintained at IPX4D.

4.6.2 Appliance clearances

Appliance clearances

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

- The appliance is suitable for an under work surface installation providing that the minimum clearance is maintained.
- There is clear standing space in front of the appliance.

CAUTION

Risk of damage to appliance or property

The appliance may 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.

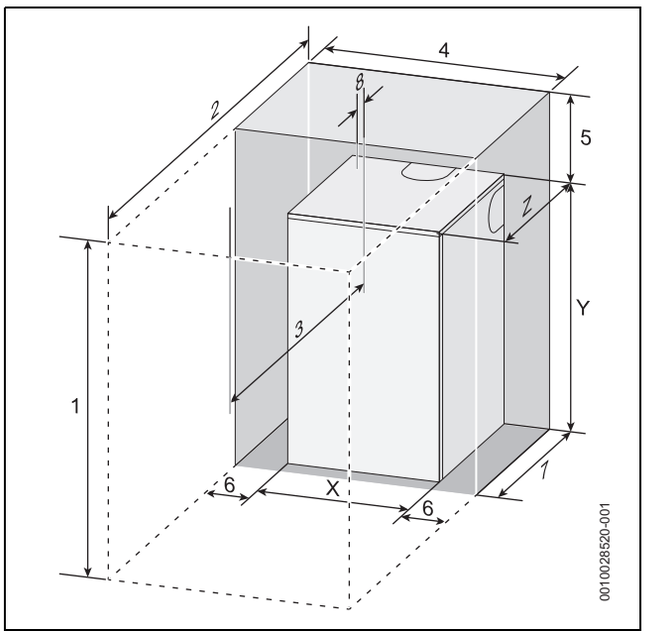

Fig. 12 Appliance minimum clearances

Minimum clearances			
	Description	**Dimensions (mm)**	
X	Appliance width	600	
Y	Appliance height	850	
Z	Appliance depth	600	
	Description	**Installation**	**Maintenance**
1	Overall clearance height	1450	865
2	Overall clearance depth	1200	1200
3	Clear standing space in front of appliance	600 [1)]	600 [1)]
4	Overall clearance width	610	610
5	Above the appliance	600	15
6	Either side of appliance	5	5
7	Compartment depth	625	625
8	Appliance to removable door	25	25

1) The minimum front clearance must be maintained down to the working surface in front of the appliance. This area should not be obstructed in any way that may prevent standing or kneeling within that space.

Table 10 Appliance minimum clearances (Unventilated compartment)

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.

4.7 Flue systems considerations

⚠ WARNING

Flue systems

Possible flue gas escape

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

Condensfit II FLOOR STANDING

⚠ 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
7 724 001 996	60/100	Telescopic horizontal flue kit
7 724 001 997	60/100	Vertical balanced flue kit
7 724 001 998	80/125	Horizontal flue kit
7 724 001 999	80/125	Vertical balance flue kit

Table 11 Flue kit assembly part numbers

4.7.1 Flue length

Maximum horizontal flue lengths

Appliance	Flue length [L] 60/100	Flue length [L] 80/125
GR8700iF 35 C	4m	13m
GR8700iF 50 C	4m	13m

Table 12 Maximum flue lengths - Horizontal flues

Maximum vertical flue lengths

Appliance	Flue length [L] 60/100	Flue length [L] 80/125
GR8700iF 35 C	6.4m	15m
GR8700iF 50 C	6.4m	15m

Table 13 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 table 14.

Bend	Effective flue length 60/100	80/125
45°	0.75m	1.0m
90°	1.5m	2.0m

Table 14 Effective length of bends

4.7.2 Flue options

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

Telescopic horizontal flue assembly

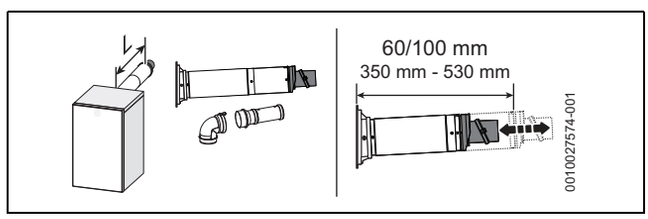

Fig. 13 Horizontal flue option

- Flue length [L] (internal bend included in length calculation)
  - 60/100 = 140[1] - 530mm
  - 80/125 = 350 - 1,200mm

Extended horizontal flue

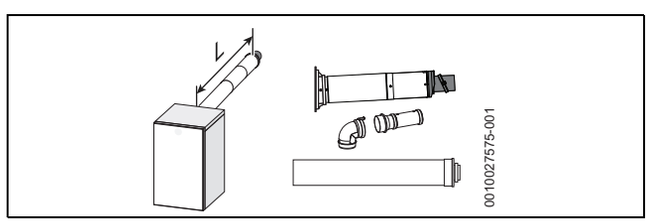

Fig. 14 Horizontal flue option

- Flue length [L] (internal bend included in length calculation)
  - Maximum flue length as stated in "Maximum horizontal flue lengths".

Horizontal flue with 90° elbow

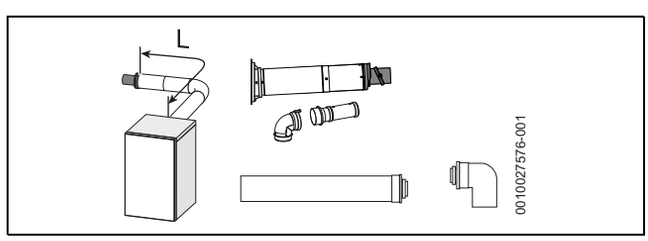

Fig. 15 Horizontal flue option

- Flue length [L] (internal bend included in length calculation)
  - Maximum flue length as stated in "Maximum horizontal flue lengths" minus the 90° bend equivalent straight flue length as stated in Table 14 "Effective length of bends".

1) Flue is cut to a minimum of 130mm, flue connector adds the additional 10mm.

Horizontal flue with 2 x 90° elbows

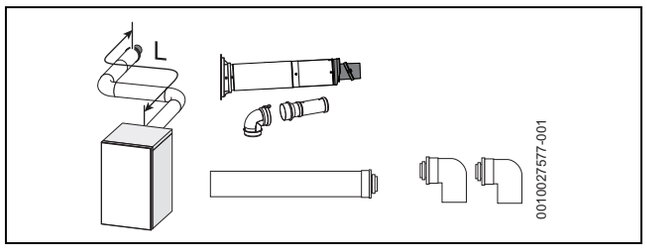

Fig. 16 Horizontal flue option

- Flue length [L] (internal bend included in length calculation)
  - Maximum flue length as stated in "Maximum horizontal flue lengths" minus 2 x 90° bends equivalent straight flue length as stated in Table 14 "Effective length of bends".

High level horizontal flue

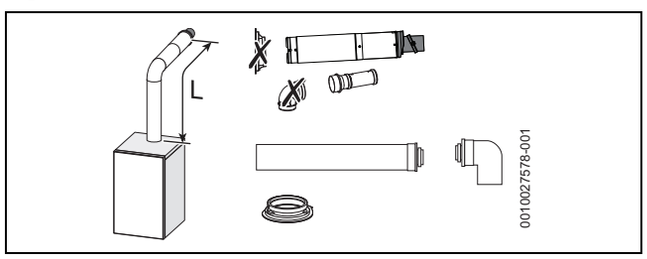

Fig. 17 Horizontal flue option

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

High level horizontal flue with 2 x 90° elbows

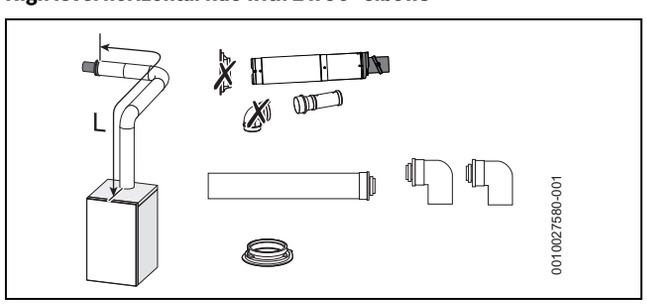

Fig. 18 Horizontal flue option

- Flue length [L]
  - Maximum flue length as stated in "Maximum horizontal flue lengths" minus the 90° bend equivalent straight flue length as stated in Table 14 "Effective length of bends".

High level horizontal flue with 3 90° elbows

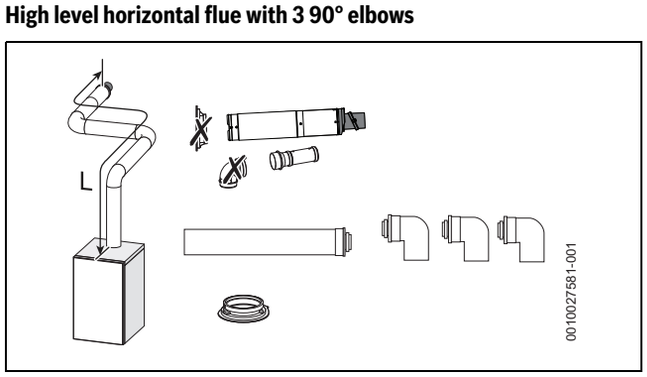

Fig. 19 Horizontal flue option

- Flue length [L]
  - Maximum flue length as stated in "Maximum horizontal flue lengths" minus 2 x 90° bend equivalent straight flue length as stated in Table 14 "Effective length of bends".

Vertical balanced flue assembly

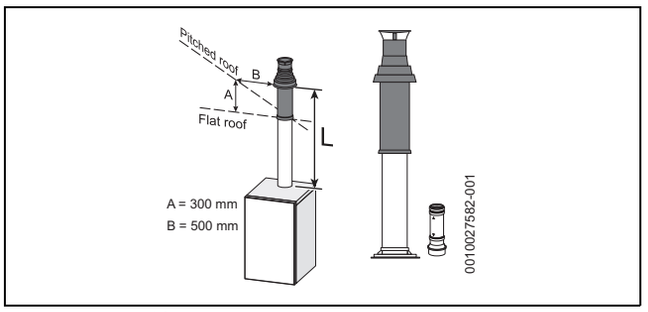

Fig. 20 Vertical flue option

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

Vertical balanced flue with 90° elbow offset

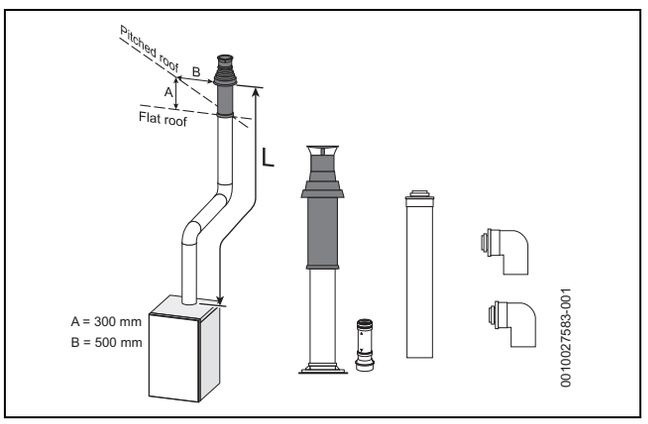

Fig. 21 Vertical flue options

- Flue length [L]
  - Maximum flue length as stated in "Maximum vertical flue lengths" minus 2 x 90° bends equivalent straight flue length as stated in Table 14 "Effective length of bends".

Vertical balanced flue with 45° elbow offset

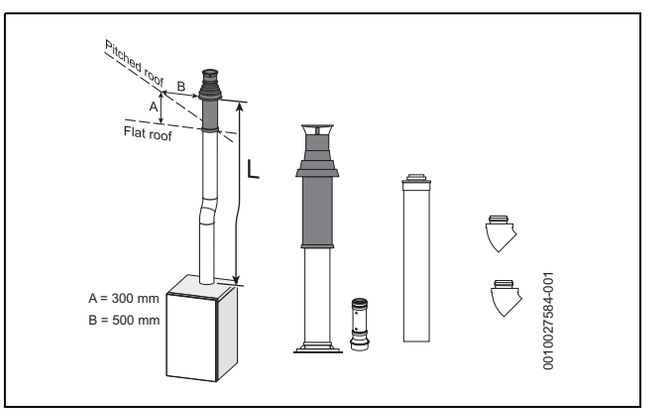

Fig. 22 Vertical flue options

- Flue length [L]
  - Maximum flue length as stated in "Maximum vertical flue lengths" minus 2 x 45° bends equivalent straight flue length as stated in Table 14 "Effective length of bends".

4.7.3 Plume management system

The maximum flue length allowed for 0.5m of plume is 4m, each additional 1m of plume reduces the flue length by 700mm, up to a maximum of 4.5m of plume management with 1.2m of flue.

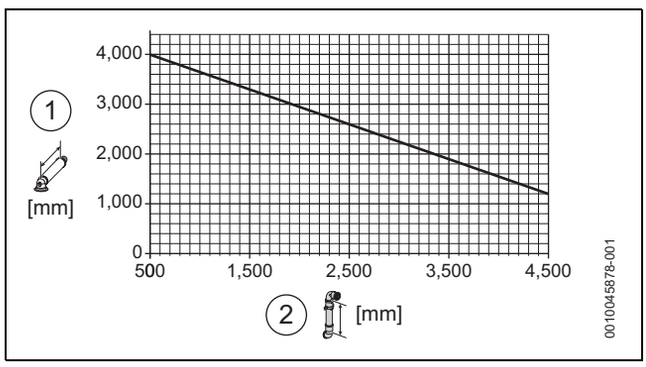

Fig. 23 Plume length to flue length graph

[1] Flue length [mm] (maximum 4,000mm with minimum 500mm plume)
[2] Plume length [mm] (maximum plume length 4,500mm)

NOTICE

Plume management terminal:

- The plume management terminal must not be sited within 500mm of the air intake, and must not exceed the maximum straight length for a horizontal Ø 60/100mm flue with a 60mm plume management system.

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 24.

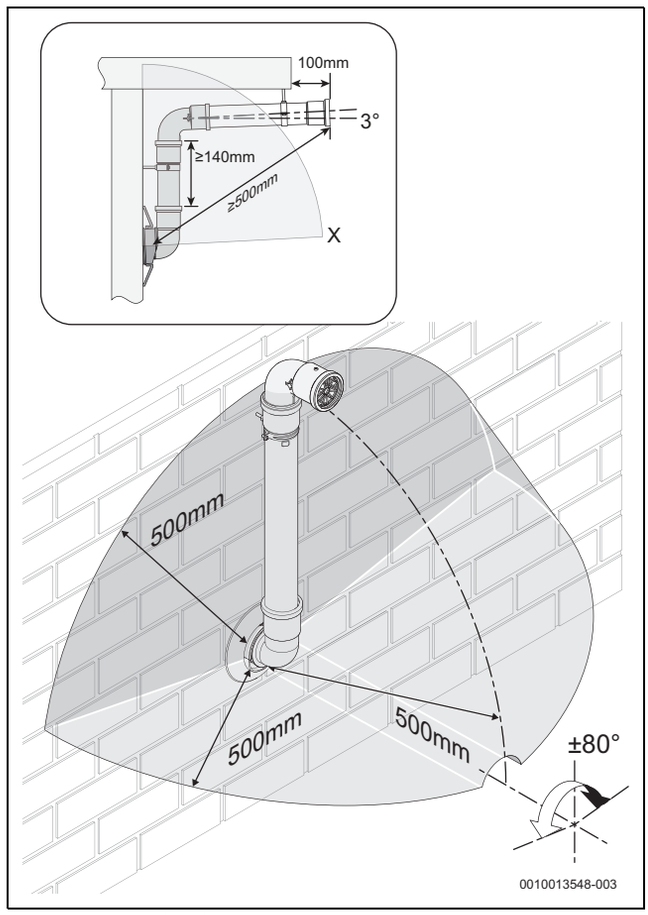

Fig. 24 Terminal exclusion zone

NOTICE

Cutting the 500mm pipe

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

Plume management bends

NOTICE

Effective plume management lengths of bends:

Each bend used has an equivalent straight plume management length.

- Refer to the table 15.

Bend	Effective plume management length
45°	0.75 metres
90°	1.5 metres

Table 15 Effective length of bends

4.7.4 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

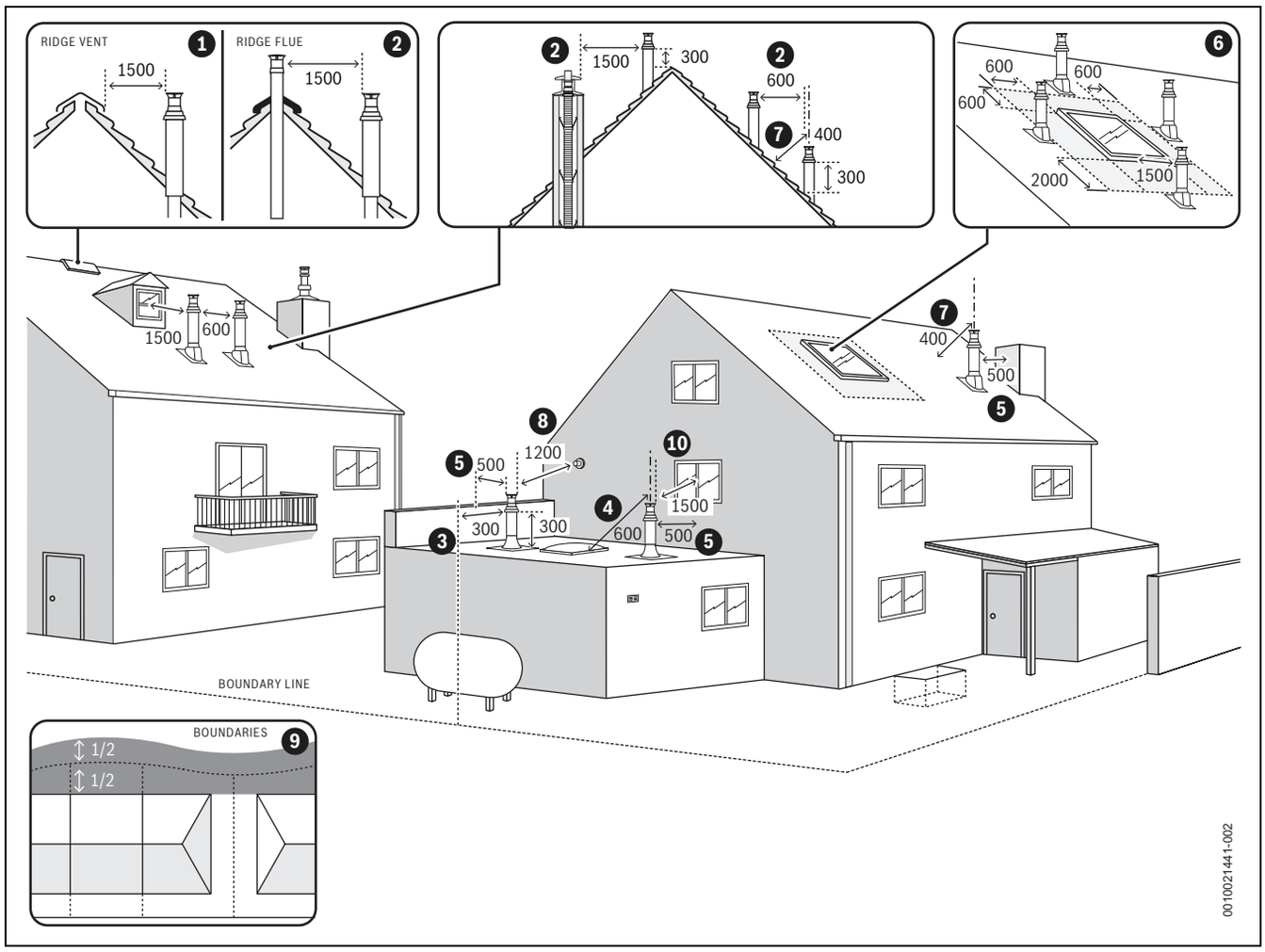

Fig. 25 Vertical flue terminal positions

Key to figure 25:

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

[2] Minimum clearance to an additional flue, 600mm to a room sealed flue or 1,500mm to an open flue.

[3] 300mm clearance from a vertical flue terminal adjacent to a boundary line, unless it will cause a nuisance. BS 5440: Part 1 recommends that care is taken when siting a terminal in relation to boundary lines.

[4] 600mm minimum clearance measured from an opening or vented skylight to a vertical flue terminal. If the terminal is within 1,500mm of the opening or vented skylight then it must be at least 300mm above the opening.

[5] 500mm clearance measured horizontally from a vertical flue to a vertical structure.
Not required if the terminal is 300mm above the structure.

[6] The flue must not penetrate the roof in the shaded area.
The terminal must be at least 1,500mm from the opening or vent when sited below the window or 600mm when sited to either side or above.

[7] 400mm measured diagonally from a pitched roof or 500mm in regions with heavy snow fall. 300mm measured vertically from the air intake to the closest intersection with the roof.

[8] 1,200mm separation measured between a vertical flue and a horizontal flue terminal.

[9] For the purpose of determining suitable flue terminal positions for gas appliances, the boundary can be considered to extend to the centre line of any adjacent routes or waterways e.g. paths, streets, rights of way, canals, rivers or railways.

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

Note:

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

Horizontal flue terminal positions

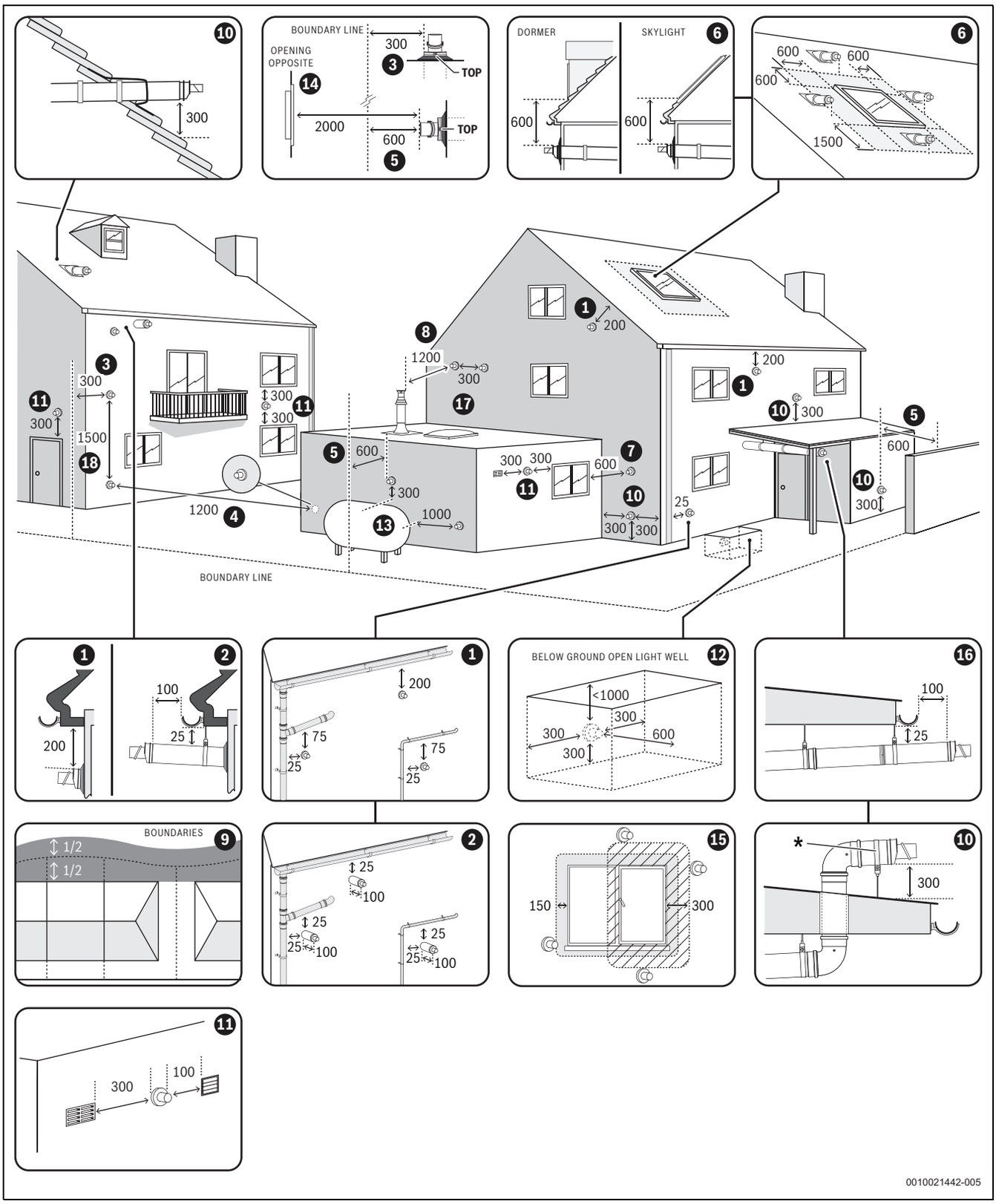

Fig. 26 Horizontal flue terminal positions

Key to figure 26:

[1] 200mm below eaves and 75mm below gutters, pipe and drains.
[2] The dimension below eaves, gutters, pipes and drains can be reduced to 25mm, as long as the flue terminal is extended by 100mm past any overhang. The telescopic flue joint must be sealed with suitable silicone sealant if it is external to the building.
[3] 300mm adjacent to a boundary line, unless it will cause a nuisance. BS 5440: Part 1 recommends that care is taken when siting terminal in relation to surfaces or boundary lines.
[4] 1,200mm separation measured between terminals facing each other.
[5] 600mm distance to a surface or boundary line facing a terminal, unless it will cause a nuisance. BS 5440: Part 1 recommends that care is taken when siting terminal in relation to surfaces or boundary lines.
[6] The terminal must be at least 1,500mm from the opening or vent when sited below the window or 600mm when sited to either side or above.
[7] 600mm diagonally to a door, air vent or opening window.
If the flue terminal is at least 300mm above the adjacent door, air vent or opening window, then the diagonal measurement does not apply.
[8] 1,200mm separation measured between a vertical flue and a horizontal flue terminal.
[9] For the purpose of determining suitable flue terminal positions for gas appliances, the boundary can be considered to extend to the centre line of any adjacent routes or waterways e.g. paths, streets, rights of way, canals, rivers or railways.
[10] 300mm to an internal or external corner. 300mm above a surface, such as the ground/ floor level or roof surface.
* If the terminal section is less than 150mm and has two screws securing it to the elbow, the terminal section will not require a supporting bracket.
[11] 300mm above, below and either side of an door, air vent or opening window.
Extractor fan outlets are not considered as an opening into the building providing there is a mechanical means of preventing flue gasses entering the property through the fan duct. This can be non return flaps either at the fan outlet, in line or at the fan unit. If the fan outlet is sited within minimum clearances permitted from the flue terminal to a opening, then a risk assessment should be carried out to confirm the non-return flaps are present and operational. We advise that a minimum of 100mm is maintained between the flue terminal and fan outlet.
[12] Below ground level in an open lightwell. The flue must be at least 600mm from the opposing surface and have at least 300mm clearance either side and below. The flue terminal must be no more than 1,000mm from the top of the lightwell.
[13] Flues should clear any LPG storage by 1,000mm horizontally and 300mm above.
[14] Proximity of flue duct outlet to boundaries, 2,000mm distance to an opening in adjacent building facing a terminal. BS 5440: Part 1 recommends that care is taken when siting terminal in relation to boundary lines.
[15] 300mm from an opening or vented window, 150mm to a fixed unvented window.
[16] The dimension below eaves, balconies and car ports can be reduced to 25mm, as long as the flue terminal is extended to clear any overhang. The telescopic flue joint of the terminal must be sealed with suitable silicon sealant if it is external to the building.
[17] 300mm Horizontally from a terminal on the same wall.
[18] 1500mm Vertically from a terminal on the same wall.

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.

4.7.5 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 0.75 metres of straight plume management and the 90° bend is equivalent to 1.5 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 27“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.

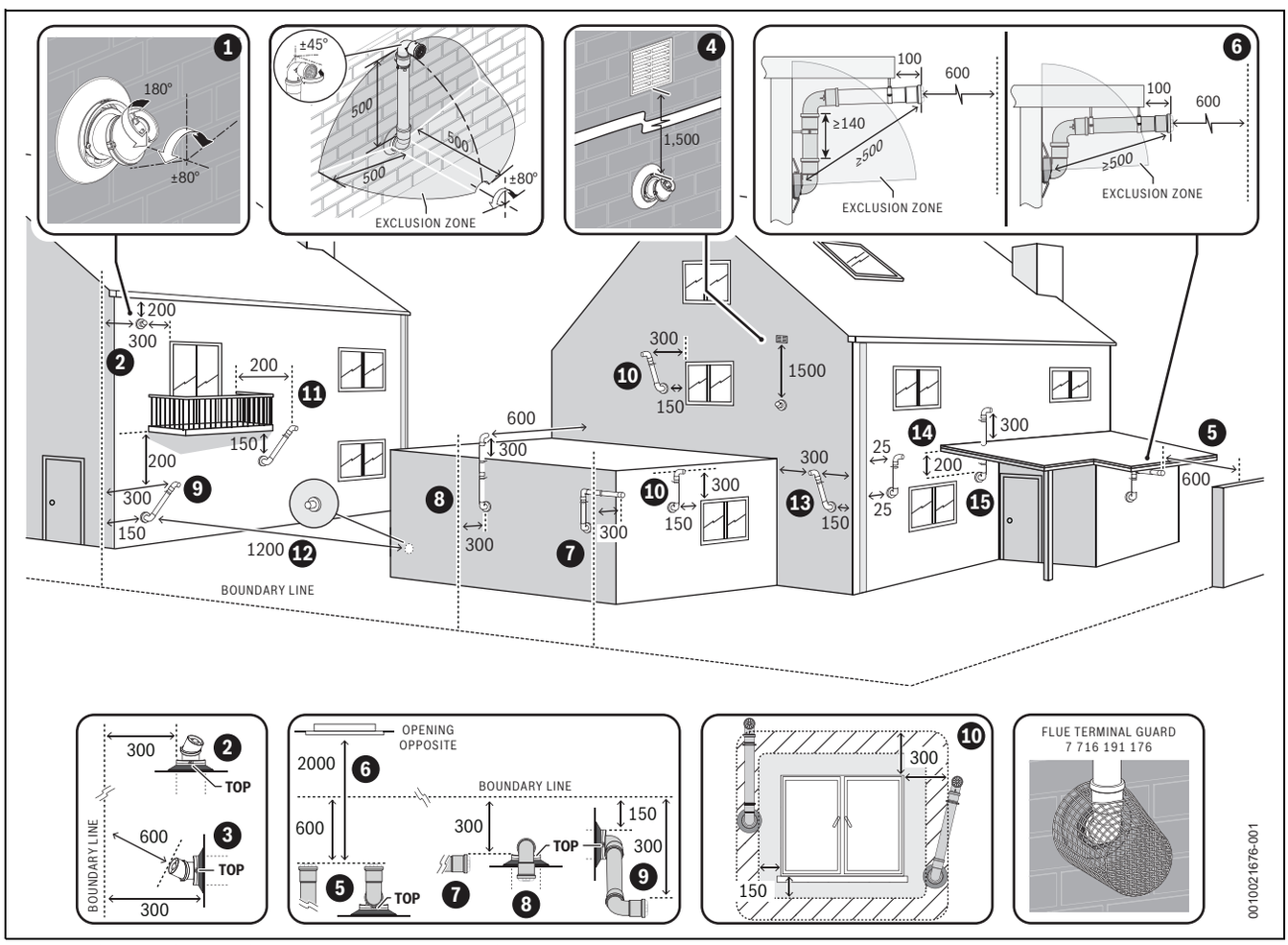

Fig. 27 Plume re-direct and plume management terminal positions

Key to figure 27 - 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 a opening e.g. window.
However the minimum clearances to an opening in the direction that the plume management is facing, must be increased to 1,500mm.
Where the flue is less than 150mm to a drainpipe and plume redirection is used the deflector should not be directed towards the drainpipe.

[2] 300mm adjacent to a boundary line, unless it will cause a nuisance. BS 5440: Part 1 recommends that care is taken when siting terminal in relation to surfaces or boundary lines.

[3] Where the flow of products of combustion is not at right angles to the boundary, the 600mm dimension may be measured in the direction of flow as long as the terminal is not less than 300mm from the boundary.

[4] When redirecting the flue discharge the terminal end must be at least 1,500mm from any opening in the direction of the discharge to prevent combustion products from entering the building.
Extractor fan outlets are not considered as an opening into the building providing there is a mechanical means of preventing flue gasses entering the property through the fan duct. This can be non return flaps either at the fan outlet, in line or at the fan unit. If the fan outlet is sited within minimum clearances permitted from the flue terminal to an opening, then a risk assessment should be carried out to confirm the non-return flaps are present and operational. We advise that a minimum of 100mm is maintained between the flue terminal and fan outlet.

Key to figure 27 - 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.
Extractor fan outlets are not considered as an opening into the building providing there is a mechanical means of preventing flue gasses entering the property through the fan duct. This can be non return flaps either at the fan outlet, in line or at the fan unit. If the fan outlet is sited within minimum clearances permitted from the flue terminal to an opening, then a risk assessment should be carried out to confirm the non-return flaps are present and operational. We advise that a minimum of 100mm is maintained between the flue terminal and fan outlet.

[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[1)].

[13] Internal/external corners. The air intake clearance can be reduced to 150mm providing the flue exhaust outlet has a 300mm clearance.

[14] Clearances no less than 200mm from the lowest point of the balcony or overhang.

[15] If a plume management kit is installed within the confines of a carport or other covered, partially enclosed extension, then the exhaust terminal must be positioned at least 1200mm away from any opening into the building which is sited within the footprint of the carport.
If the exhaust terminal is extended at least 300mm beyond the footprint of the carport then the distance from the terminal to an opening within the carport can be reduced to 600mm.
The exhaust terminal can also be routed though the roof of the carport providing 25mm clearance is provided around the flue pipe to any flammable material and that it extends at least 300mm above the roof.
The air intake must have a minimum 150mm clearance to any opening in the building in order to ensure the integrity of the structure is maintained. If the exhaust terminates within the footprint of the carport then the carport must have at least 2 sides completely open. If the exhaust terminates at least 300mm beyond the footprint of the carport then the carport must have at least one completely open side. The exhaust terminal must be positioned to ensure that plume will not cause nuisance or damage to vehicles and that minimum clear distances in front of the terminal will not be impeded by vehicles.

Note:

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

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

4.8 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 minimise the risk of freezing, wherever possible: the condensate drain should be installed internally.**
2. All condensate pipework must 'fall' from the appliance by a minimum of 3° (52mm per metre) to ensure adequate condensate flow.
3. Connection to a rainwater down pipe must include an external air break.

Also:

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

4.8.1 Condensate pipework

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.

4.8.2 Condensate pump

The condensate pump connects to the condensate pipework via a supplied adaptor and flexible discharge hose.

The condensate pump [4] fills up with condensate and periodically discharges through the flexible discharge hose [2] to the gravity disposal pipe work [3]. The condensate then flows, by gravity, through the 22mm plastic pipe to the condensate disposal point, refer to the following sections for information on condensate disposal.

▶ Cut the flexible discharge hose to length, keeping the run as short and straight as possible. Ensure it is properly supported throughout its length.

▶ Secure the flexible discharge hose [2] at either side of a change of direction to prevent the pipe from becoming kinked.

▶ The gravity disposal pipe work [3] can be mounted between 200mm to 3500mm from floor level.

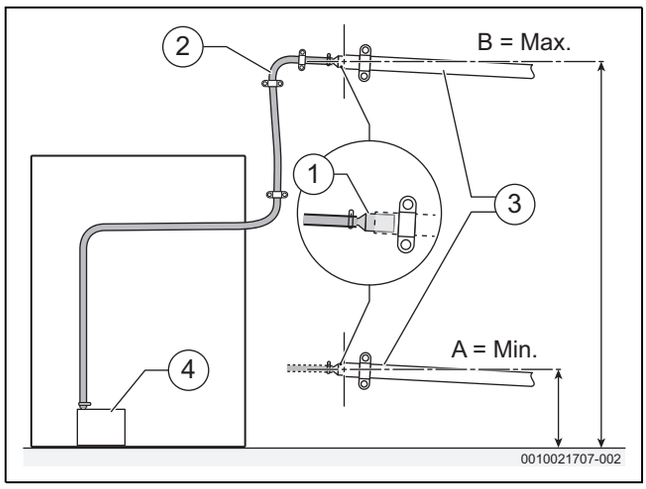

Fig. 28 Condensate pump flexible discharge hose installation

[A] 200mm
[B] 3500mm
[1] Condensate discharge from appliance
[2] Flexible discharge hose
[3] Condensate pipework (installation disposal pipework)
[4] Condensate pump

4.8.3 Internal connections

Good Practice

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

Soil stack connection

→ Figure 29

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

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

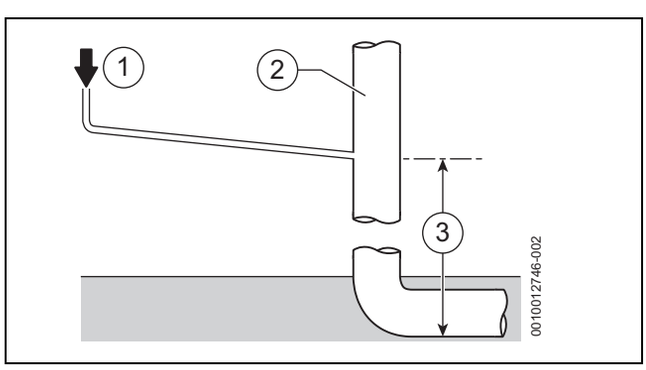

Fig. 29 Disposal to soil vent stack

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

Waste pipe connection

→ Figure 30

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

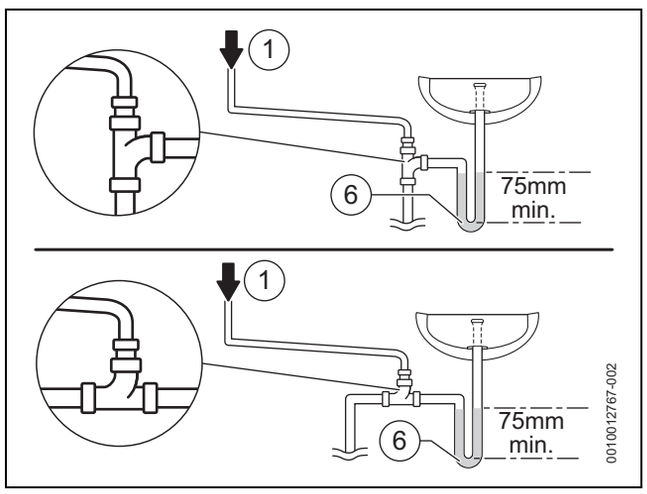

Fig. 30 Waste pipe disposal

[1] Condensate discharge from appliance
[6] 75mm sink waste trap

4.8.4 External connections

NOTICE

Septic tanks

Untreated condensate must not be allowed into septic tanks.

- Connection to systems which drain into a septic tank should be avoided due to the risk of affecting anaerobic bacteria.

NOTICE

Rainwater down pipe or external drain disposal

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

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

NOTICE

Grey water recovery system

Contamination of recovered water

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

External disposal considerations

NOTICE

Freezing conditions

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

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

NOTICE

Condensate waste disposal

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

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

- The external run be kept as short as possible and ideally should not exceed three metres.
  Additional precaution against freezing must be taken if the external pipe run does exceed three metres.
- The pipe should be run internally as far as possible before going externally and the pipe diameter should be increased to a minimum internal diameter (ID) of 30mm before it passes through the wall to the exterior.
- The hole through the wall for the condensate pipe should be sleeved and be sealed to the building fabric on the internal and external face using a suitable building material.
- The external pipe should take the shortest and least exposed route to the discharge point, and should "fall" as steeply as possible away from the appliance, with no horizontal runs in which condensate might stand.
- The use of fittings, elbows etc. should be kept to a minimum and any internal burrs on cut pipework 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 pipework, incorporating an external frost thermostat, should be considered. All other guidance above and the instructions for the trace heating system, should be closely followed.
- As well as trace heating, other methods for protecting pipework that are run externally should be considered to prevent freezing during prolonged cold periods.
  - Insulation materials can be used, these should be of class “O” grade with an outer coating that is weather proof and have a UV resistant finish. A minimum of 19mm thick insulation is recommended for 32mm external pipes.
  - The use of a drain cover (such as those to prevent leaf blockage) may offer further protection from wind chill.

Additional protection for transition through a wall.

The external pipework can be insulated to help prevent freezing during prolonged cold periods.

- Where insulation is required, the entire run of external pipework [5] should be insulated with a recess in the external face allowing better insulation protection coverage [4] as it transitions to the outside of the building.
- The hole through the wall must be sealed to the building fabric on the internal [1] and external [3] face using a suitable building material, (use a 40mm sleeve [2] to pass the condensate pipework through and then seal the internal and external faces).

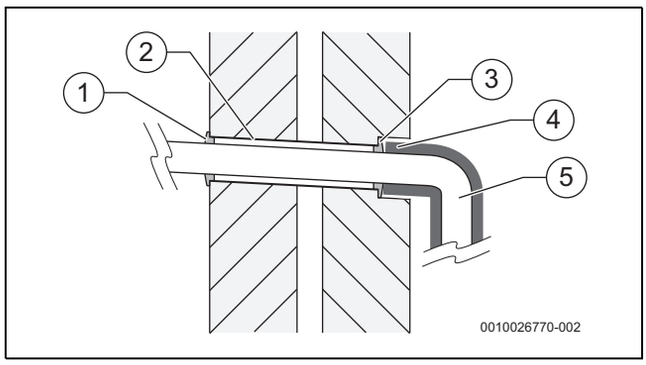

Fig. 31 Additional protection for transition through a wall

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

Good Practice

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

Rain water down pipe with external air break

→ Figure 32

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

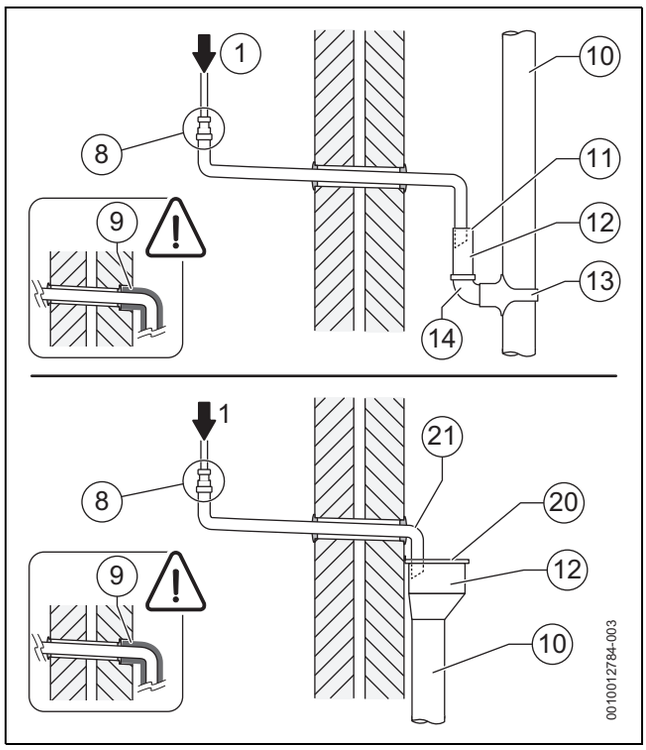

Fig. 32 Disposal into rain water down pipe

[1] Condensate discharge from appliance
[8] Pipework transition
[9] Additional protection for transition through a wall. (→ page 27)
[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
[21] Increase pipe size

Open drain or gully with external air break

→ Figure 33

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 pipework as shown to avoid an airlock during ground flooding/adverse weather conditions which could prevent the condensate from discharging.

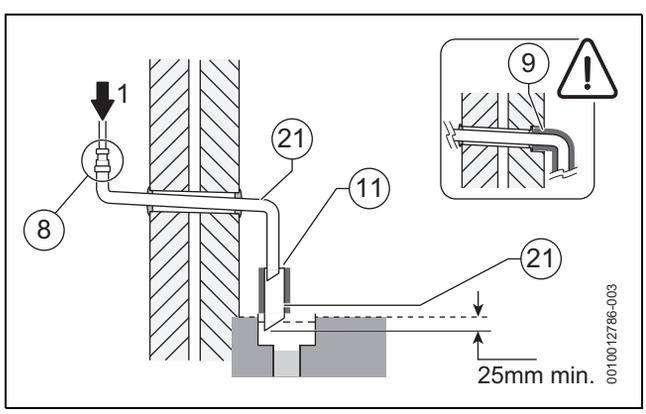

Fig. 33 Disposal to open drain or gully with air break

[1] Condensate discharge from appliance
[8] Pipework transition
[9] Additional protection for transition through a wall. (→ page 27)
[11] External air break
[21] Increase pipe size

Condensate soak away considerations

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

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

Condensate soak away with external air break

→ Figure 34

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

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

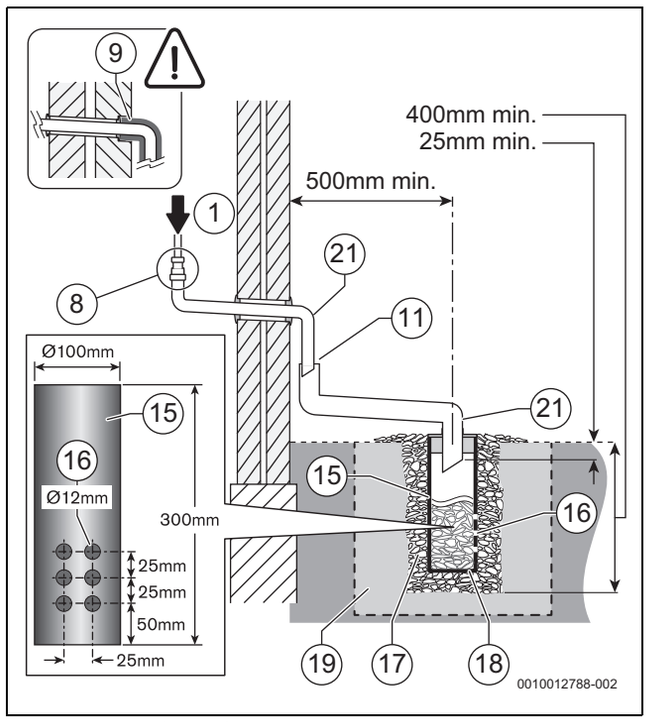

Fig. 34 Disposal to soak-away

[1] Condensate discharge from appliance
[8] Pipework transition
[9] Additional protection for transition through a wall. (→ page 27)
[11] External air break
[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.
[21] Increase pipe size

Minimum Standard

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

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

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

Trace heating fitted:

- Check with trace heating manufactures instructions for additional requirements.

Condensate pump or CondenseSure fitted to the appliance:

- External pipe work exceeding three metres in length or installation with increased risk of freezing due to environmental factors:
  - Additional protection of insulating the entire run of the condensate pipework [2] should be carried out. The pipe should be insulated externally using suitable waterproof and weather resistant insulation.
  - The hole through the wall must be sealed to the building fabric on the internal [1] and external [3] face using a suitable building material.

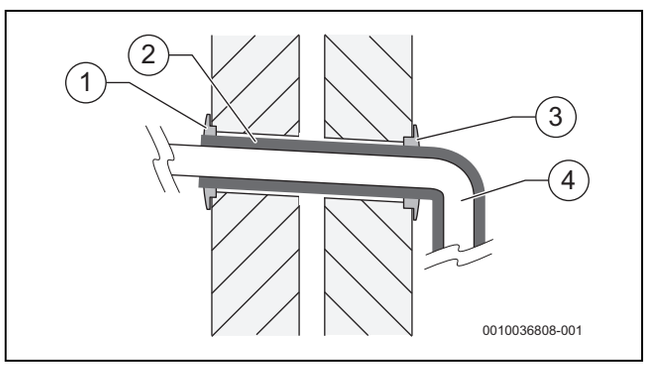

Fig. 35 Through the wall lagging example

[1] Internal face sealed
[2] Insulation
[3] External face sealed
[4] Condensate discharge pipe

4.9 Pressure relief discharge

4.9.1 Pressure relief pipework

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 point of termination should provide a visual indicator in case the PRV discharges.

- The pressure relief discharge pipe [1 or 3] should be run in pipe which has a diameter of at least 15mm, that is made of copper or a material that will withstand PRV discharge temperatures and pressures, and which complies with BS 5254 or BS EN 1451.
- Plastic pipework must be properly supported with a maximum of 300mm between supports to prevent sagging.
- The PRV discharge pipe must run continuously downwards away from the appliance to a safe point of discharge.
- 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, to face the external wall (as shown) to ensure safe discharge of hot water.
- In all normal circumstances a PRV discharge pipe installation as described above sufficiently meets 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 injury to occupants cannot occur from any spillage or discharge.

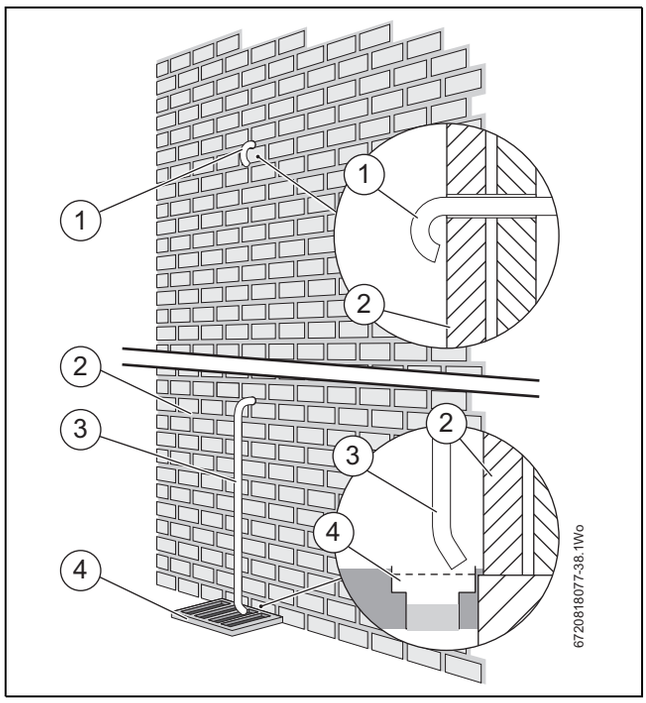

Fig. 36 Pressure relief pipework

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

4.9.2 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 pipework, 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 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.

For installations where it is not possible to run the PRV discharge pipe continuously downwards away from the appliance, the remote PRV kit can be used to remove the PRV from the appliance and relocate it to a higher position.

4.10 Cleaning primary systems

NOTICE

Risk of damage to system or appliance!

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

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

NOTICE

Risk of damage to system or appliance!

- ▶ Salt based, artificially softened water that adjusts the pH value MUST NOT be used to fill the system.
- ▶ Alternatively there are water softening/treatment products that do not adjust or alter the pH levels of the water.
  With these products it may not be necessary to provide an untreated water by-pass to the primary water filling point of the heat 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 pipework 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.

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.

- ▶ The concentration level of inhibitor in the system should be checked every 12 months or sooner if system content is lost.

Water treatment products

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

ADEY	01242 546700
	www.adey.com
FERNOX	0330 100 7750
	www.fernox.com
SENTINEL	01928 704330
	www.sentinelprotects.com/uk

Table 16

4.10.1 Flushing the system

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

Existing appliances/circulation pumps

- ▶ An existing appliance/circulating pump should be used to flush the system before the new appliance is installed.

New appliances

- ▶ A new appliance must only be used to assist the cleaning of a **newly installed** system.

- ▶ Fill the system with cold water and check for leaks.
- ▶ Open all drain cocks and drain the system.
- ▶ Close drain cocks and add a suitable flushing agent **compatible with aluminium** at the correct strength for the system conditions in accordance with the manufacturer's instructions.
- ▶ Mark the position of the lockshield valves and open them fully.
- ▶ Fully open all TRVs.
- ▶ Circulate the flushing agent before the appliance is fired up.
- ▶ Run the appliance/system at normal operating temperature as directed by the manufacturer of the flushing agent.
- ▶ Drain and thoroughly flush the system to remove the flushing agent and debris. Do not drain the system through the PRV of new appliances.
- ▶ It may be necessary to use a power flushing machine to aid the cleansing procedure in some circumstances.
- ▶ Close the drain cocks and manual air vents.

For existing appliance/circulating pump actions.

- ▶ Add a suitable inhibitor to the system in accordance with the manufacturers instructions.
- ▶ Fill the system to between 0.8 and 1.7 bar via a WRAS approved filling loop.
- ▶ Vent any air from the appliance and system.

For new appliance.

- ▶ Once the new appliance has been installed follow the guidance in Filling the appliance and adding inhibitor section.

5 Installation

5.1 Safety instructions

⚠ Risk of explosion from escaping gas!

Escaping gas can cause an explosion.

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

⚠ Risk of poisoning due to escaping flue gases!

Flue gases can escape from incorrectly assembled flue system.

▶ Ensure the flue system is correctly installed in accordance to the flue installation instructions.

▶ Ensure you carry out a flue integrity check when commissioning the appliance.

⚠ CAUTION

Roof space

▶ This appliance is not suitable for roof space installations.

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

Appliance handling

Heavy appliance

▶ The correct method for handling heavy objects should be strictly observed, at all times.

▶ Take care not to damage the appliance panels or the floor.

▶ The appliance may contain some water due to factory testing.

▶ Store the appliance in a dry area prior to installation.

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.

⚠ 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.

- The appliance mounting fame should sit from the rear wall to allow enough room for the pipe work.
  - The mounting frame provides a gap of 38mm behind the appliance for running pipes behind.
- Skirting board may need to be removed to allow appliance to fit comfortably in installation space.
- Do not cross a pipe over another.
- The area around a rear flue outlet must be avoided.

5.2 Installing the appliance

5.2.1 Preparatory work

Unpacking the appliance

Lifting and carrying precautions:

▶ Lift only a manageable weight, or ask for help.

▶ When lifting or putting things down, bend the knees, and keep the back straight and feet apart.

▶ Do not lift and twist at the same time.

▶ Lift and carry objects close to the body.

▶ Wear protective clothing and gloves to protect from any sharp edges.

Unpacking:

It is advised that two or more persons are involved in the transfer of the packaged boiler from the van to the point of delivery.

▶ Once the packaged boiler 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.

▶ Lift carton up and away from the boiler.

▶ Remove the plastic bag and upper front protection cover from the boiler and place safely aside.

Front panel removal

Refer to figure 37

▶ Grip the top outer sides of the front panel [1] pull forward to release the ball catches [2].

▶ Lift front panel upwards slightly to disengage from the lip on the baseplate.

▶ Store safely away from the working area.

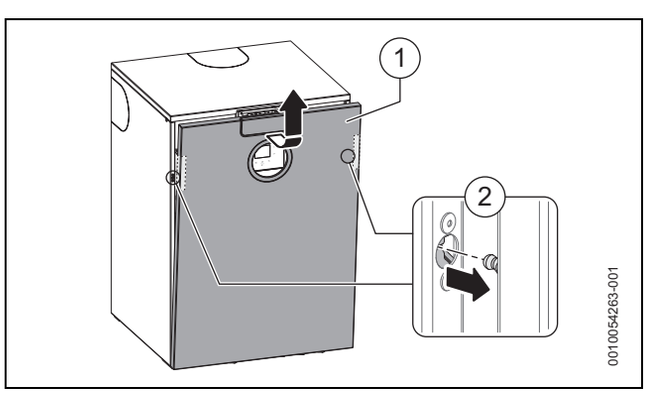

Fig. 37 Front panel removal

Now remove the front casing and set safely aside. This is to protect the casing from damage during installation.

Removing the appliance from transport pallet

Removing transport retaining screws:

The appliance is mounted on small wheels and two people are recommended to move the appliance from the pallet taking care not to damage the panels or the floor.

- ▶ Remove the front and rear retaining screws securing the boiler to the transport pallet.
- ▶ Carefully slide the appliance off the transport pallet onto the floor.

NOTICE

The correct method for handling heavy objects should be strictly followed, at all times.

5.2.2 Position the appliance

Appliance positioning

- ▶ Ensure the appliance is mounted onto a level, 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.

NOTICE

Risk of damage to appliance or property!

Damage caused by insufficient load bearing or unsuitability of the appliance room floor

- ▶ Ensure the floor area is suitable for installing a appliance and can take the “wet weight” of the appliance.

NOTICE

Risk of damage to appliance!

Damaged caused by mechanical strain on the hydraulic and flue gas connections when adjusting the position of the appliance.

- ▶ Do not apply any strain to the connections when adjusting the appliance position.

Safety

- ▶ All relevant safety precautions must be undertaken. Protective clothing, footwear, gloves and safety goggles must be worn as appropriate.

NOTICE

Transport protection covers

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

NOTICE

Risk of damage to appliance/mounting frame!

- ▶ Ensure the area in and around the mounting frame is clear of debris.

Mounting frame fixing

Consideration of the flue outlet position should be carried out before fixing the mounting frame in the final position.

- ▶ Refer to details found in following section Flue outlet position.

→ Figure 38

- ▶ Position the mounting frame [4] on the floor against the wall [1] with manifold connections facing away from the wall ensuring there is enough space for the pipe work [P].
  - – Additional depth maybe required depending on the bends/ fittings used.
- ▶ Allow the minimum space from each side of the frame [4] for the appliance casing footprint [3] and minimum service clearance.
- ▶ Ensure the mounting frame is level, mark and drill fixing points [2].
- ▶ Secure mounting frame [4] to the floor using appropriate fittings (not supplied).
- ▶ Clear any debris from the site.

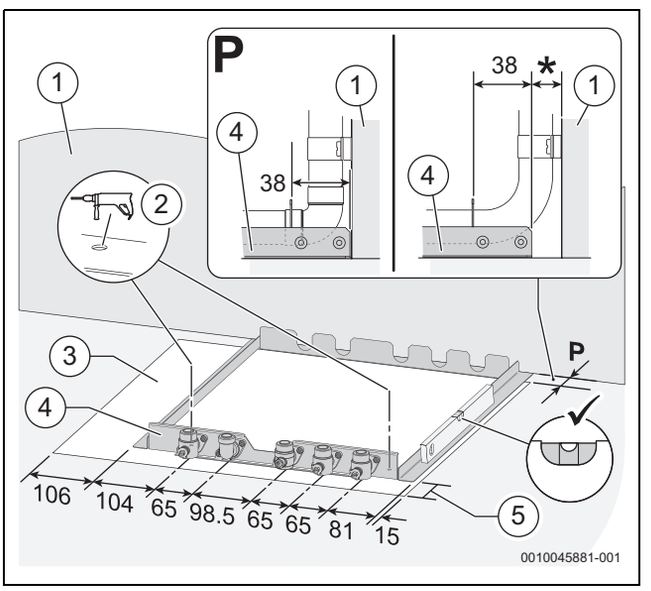

Fig. 38 Mounting frame positioning (dimension in mm)

[1] Wall
[2] Fixing point
[3] Appliance casing footprint
[4] Mounting frame
[5] 64mm (dimension at the front of the jig to where appliance finishes after the jig)
P Pipe work gap at rear of appliance (minimum 38mm)
* Additional depth for pipe work depending on bends [1)]

1) The overall depth of the appliance is increased from 600mm if the pipe work gap at rear of appliance is increased from 38mm [P]. This also increases the depth of the flue centre for vertical/side exit flue outlet.

Flue outlet position

Horizontal flue sections

- ▶ All horizontal flue sections must rise away from the appliance by 52mm per metre to ensure that condensate flows back into the appliance for safe discharge via the condensate waste pipe.

- ▶ Cover the mounting frame manifold assembly to protect the manifold connections.

→ Figure 39

- ▶ Mark the centre of the flue outlet required.
  - – Vertical exit [1]
  - – Rear exit [2]
  - – Side exit [3] (left exit example shown)
- ▶ Make an opening for horizontal flues through the wall using a core drill or similar at a size relative to the wall thickness as shown in Table 18.

Flue terminal installation that can only be fitted from inside the building.

- ▶ Increase the opening to 150mmØ to allow the optional weather collar to fit through the opening for 60/100mm flue.

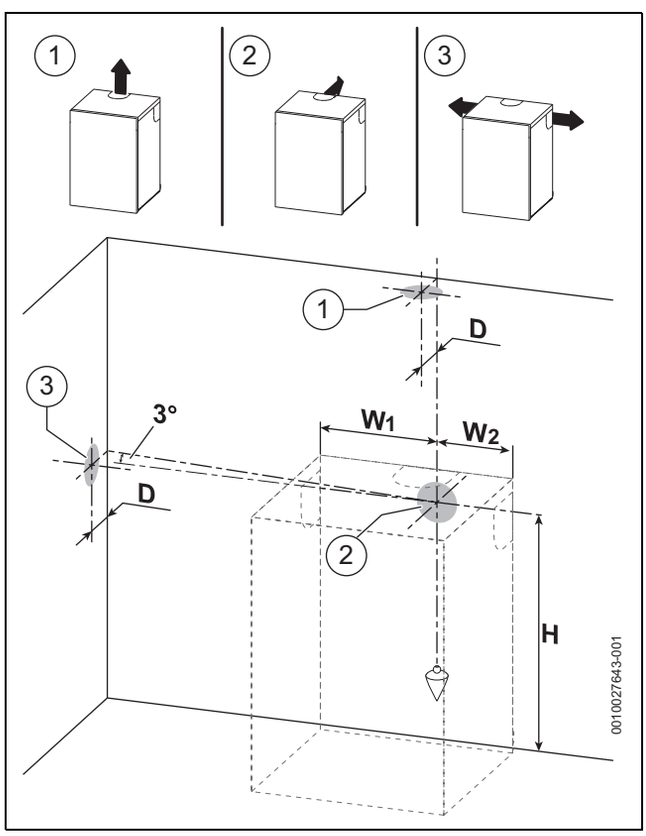

Fig. 39 Flue outlet positions

[1] Vertical exit flue
[2] Rear exit flue
[3] Side exit flue

	Description	Dimension (mm)
W1	Flue centre from appliance left side	343
W2	Flue centre from appliance right side	267
D	Flue centre to rear of mounting frame [1)]	123
H	Flue centre from floor [2)]	730

1) This depth increased if pipework gap at rear of appliance is increased

2) **IMPORTANT:** for the side exit flues, increase this height by 5.3mm per 100mm of horizontal length that the flue opening is away from the appliance

Table 17 Dimensions

Wall thickness	Flue outlet diameter for Accessory	
	60/100mmØ	80/125mmØ
150 - 240mm	127mmØ	152mmØ
240 - 330mm	127mmØ	152mmØ
330 - 420mm	127mmØ	162mmØ
420 - 500mm	140mmØ	162mmØ

Table 18 Wall thickness depending on the diameter of the flue accessory

- ▶ Clear any debris away from the site.
- ▶ Remove cover protecting the manifold connections.

Manifold connections

- ▶ Ensure all pipe work is clean and each pipe is in the correct position (→ 5.2.3 "Appliance connections").
- ▶ Push in each pipe in turn and tighten the fitting to secure.

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

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

External condensate pipework or internal pipe runs in unheated areas such as lofts, basements and garages exposed to prolonged cold temperatures should be protected (→ chapter 4.8).

Appliance connections

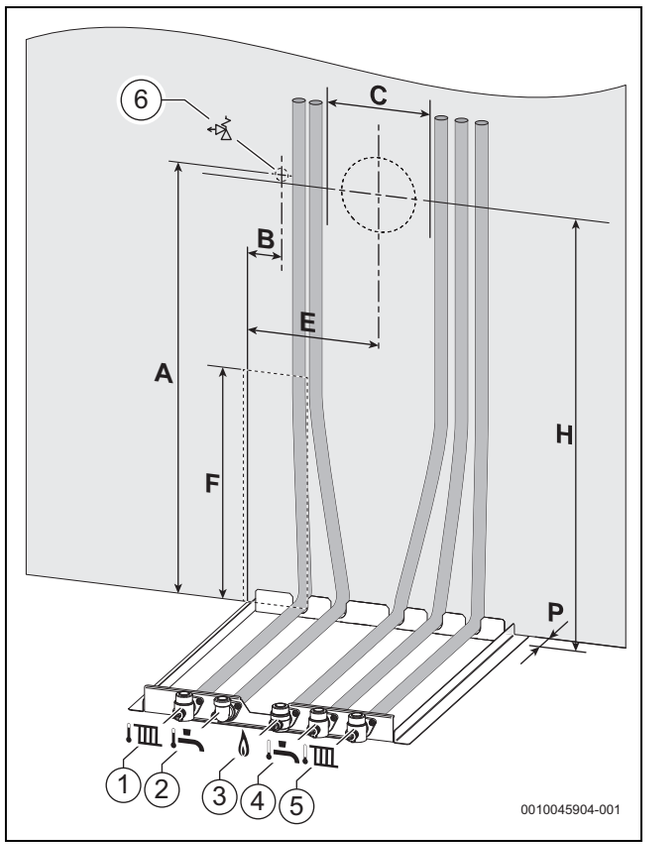

Fig. 40 Connections on the gas and water side

[1] CH flow (22mm)
[2] DHW outlet (22mm)
[3] Gas inlet (22mm)
[4] DCW inlet (22mm)
[5] CH return (22mm)
[6] PRV (15mm)
A PRV centre from floor - 728mm or can be installed below this height.
B PRV centre from mounting frame left edge - 68mm.
C Clearance for flue outlet - 200mm.
E Flue centre from mounting frame left edge - 237mm.
F Filter can be installed - From floor to top of filter 400mm ± 25mm (for filter orientation see figure 41)[1)]
H Flue centre from floor [2)] - 730mm
P Minimum pipework gap at rear of appliance. Depends on the type of bends employed. [3)] - minimum 38mm.

1) The filter can be fitted on the flow pipe facing directly forwards. The valves must be installed on the filter with the levers to the right.
For other pipework arrangements the filter can also be installed on the return pipe, but must be at the indicated position F when installed within the appliance.

2) **IMPORTANT**: for the side exit flues, increase this height by 5.3mm per 100mm of horizontal length that the flue opening is away from the appliance.

3) If the pipe work gap at the rear of the appliance is increased by more than 38mm. This will increase the position of the flue centres by that extra amount of pipe work gap.

Greenstar system filter (22mm) orientation within the appliance

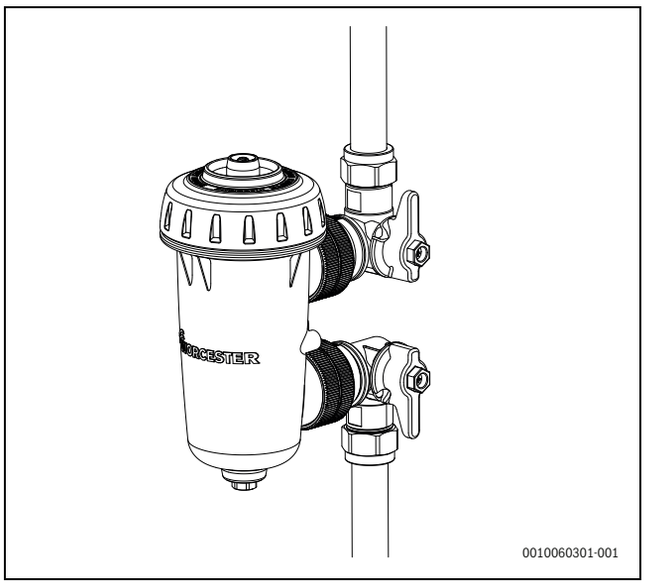

Fig. 41 Orientation of the Greenstar system filter (22mm) within the appliance

Condensate and PRV connection

The Condensate and PRV connections can only be made once the appliance is located in final position.

▶ Connection details are described later in this chapter after the appliance has been fitted in position on the mounting frame.

5.2.4 Locate appliance onto mounting frame

NOTICE

Transport protection covers

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

Preparing the service valves

The bonded washer supplied is for the Gas connection only.

▶ Fit the sealing washers to the service valves before installing the appliance onto the mounting frame

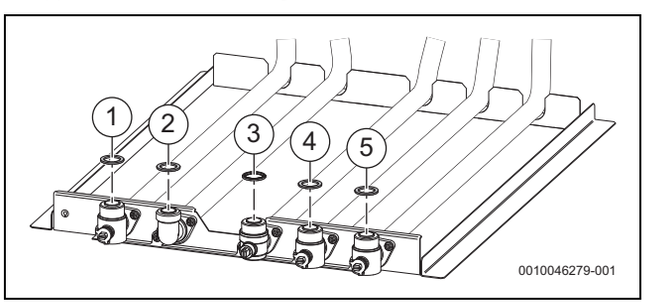

Fig. 42 Fitting the sealing washers

[1] Central Heating Flow (22mm)
[2] Domestic Hot Water (22mm)
[3] Gas Inlet (22mm bonded washer)
[4] Domestic Cold Water Inlet (22mm)
[5] Central Heating Return (22mm)

Locating the appliance onto the mounting frame

- ▶ Ensure that the transit bung has been removed from the gas and water connections on the appliance.
- ▶ Ensure the area is clear of debris.

Rear exit flue installations

The flue connector will need to be aligned and loosely fitted before appliance is located in final position to aid flue installation.
Refer to figure 43, A, B and C.

Rear exit flue configuration.

- ▶ Locate the flue into the hole so that the flue connector can be aligned with the securing points in the combustion chamber before the appliance is fully pushed back onto the mounting frame.

- ▶ Manoeuvre the appliance rear wheels [1] onto the outer rails of the mounting frame [2].
- ▶ Slide the appliance onto the mounting frame, taking care to position the front wheels [3] onto the rails and align the gas/water connections and the flue connection.
  - – Leave enough of a gap [G] between the appliance and the wall to allow access to connect the bottom fixing point [5] on the flue connector [4] (→ "Rear exit configuration" in the “Appliance flue connection” section of this chapter).
  - – Connect the remaining two fixing points.
  - – Carefully slide the appliance with rear exit flue the remaining distance onto the mounting frame until fully located in position (the stop tabs [6] on the appliance are against the mounting frame).
    The appliance does not sit flush to the wall, but has clearance [P] for the installation pipework.
- ▶ Secure appliance to mounting frame with the left hand stop tab [6] and screw [7], supplied in the hardware pack.

Vertical/Side exit flue installations

Refer to figure 43, A and C.

Vertical/Side exit flue configuration.

- ▶ The appliance is supplied ready to fit a rear flue outlet.
- ▶ To convert the exit point from rear to side or top, the flue outlet blanking plate will need to be moved from the required exit point and fitted to the rear exit point.
- ▶ This will need to be carried out before the appliance is located onto the mounting frame (→ Converting from rear exit flue in the “Appliance flue connection” section of this chapter).

- ▶ Manoeuvre the appliance rear wheels [1] onto the outer rails of the mounting frame [2].
- ▶ Slide the appliance back onto the mounting frame, taking care to position the front wheels [3] onto the rails and align the gas/water connections and the flue connection.
  - – The appliance is fully located in position when the stop tabs [6] on the appliance are against the mounting frame.
    The appliance does not sit flush to the wall, but has clearance [P] for the installation pipework.
- ▶ Secure appliance to mounting frame with the left hand stop tab [6] and screw [7], supplied in the hardware pack.

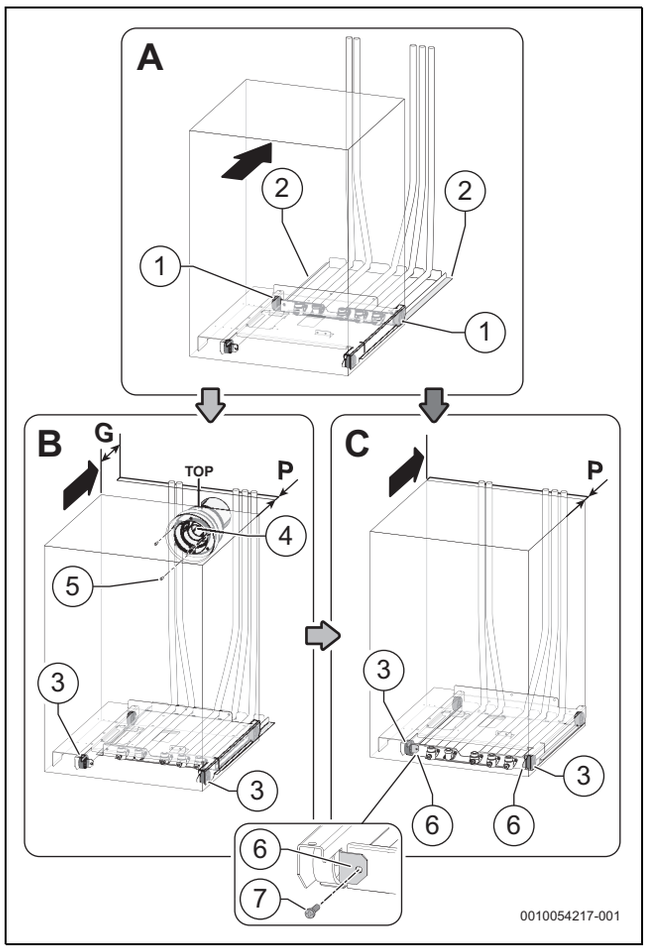

Fig. 43 Locating the appliance onto the mounting frame

- ▶ Ensure the sealing washers are correctly seated on the appropriate service valves.
- ▶ Connect and tighten the gas and water connections firmly.

Condensate discharge connection

Refer to the Pre-Installation section on Condensate pipe work running from the adaptor to the discharge point.

External condensate pipe work should be increased in diameter and be protected with weather resistant insulation to prevent freezing.

- ▶ The flexible hose must only be used internally within the property.

The condensate pump fills up and periodically discharges through the flexible condensate hose between 200mm to 3500mm from floor level. After this point the condensate flows, due to gravity, down the 22mm plastic pipe to the outlet.

Flexible discharge hose routing

- ▶ Route the flexible discharge hose through the appliance to connect to the 22mm plastic pipe of the condensate discharge installation pipework.
  - – Route the flexible discharge hose avoiding any hot components.
  - – Ensure it is supported adequately and prevent kinking or restriction along the routing.

Flexible discharge hose connection

Preparing the condensate pump for flexible discharge hose connection.
Refer to figure 45.

- ▶ Remove the condensate trap discharge pipe from the condensate pump

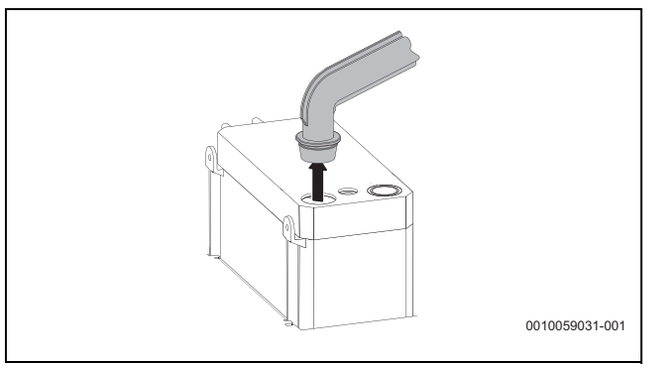

Fig. 44 Condensate trap discharge pipe disconnection

- ▶ Remove the condensate pump to just in-front of the appliance.
  - – There is adequate harness length to accomplish this.

Discharge hose installation.

Refer to figure 45.

- ▶ Fit the discharge pipe adaptor kit to the Ø 8mm flexible discharge hose connector in the sequence shown.
  - – Insert the thin end of the discharge hose connector into Ø 8mm hose.
  - – Secure with the cable tie provided.
  - – Insert the discharge hose connector with Ø 8mm hose into the Ø 10mm hose.
  - – Secure with the cable tie provided.
  - – Fit the Ø 10mm hose onto the adaptor.
  - – Connect adaptor to 22mm plastic pipe of the condensate discharge installation pipework connect point

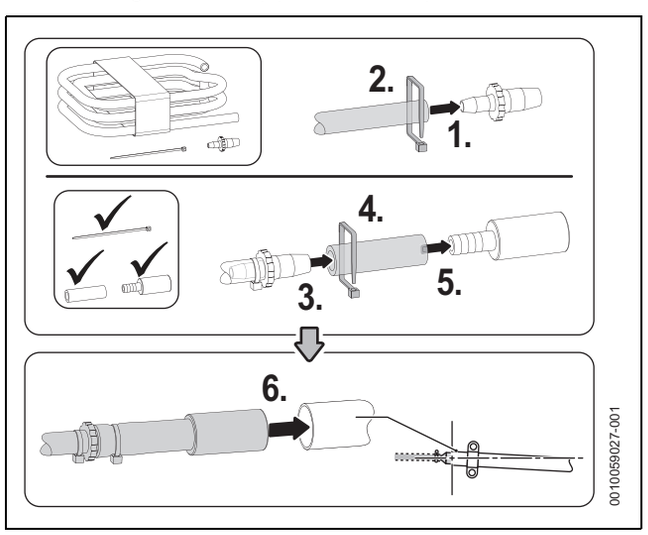

Fig. 45 Condensate discharge flexible hose connection

- ▶ Ensure the routed flexible discharge hose is adequately secured with clips supplied to prevent kinking or restriction.
- ▶ Cut off any excess pipe.

Condensate pump flexible discharge hose connection.

Refer to figure 46.

- ▶ Fit the Ø 8mm flexible discharge hose to the condensate pump in the sequence shown.
  - – Remove cover (a slot on the right side between lid and base to aid in separation) and pass flexible discharge hose through outlet hole.
  - – Remove locking nut and slide onto flexible discharge hose.
  - – Insert the flexible discharge hose onto the outlet connection.
  - – Secure flexible discharge hose with the locking nut.
  - – Refit cover.

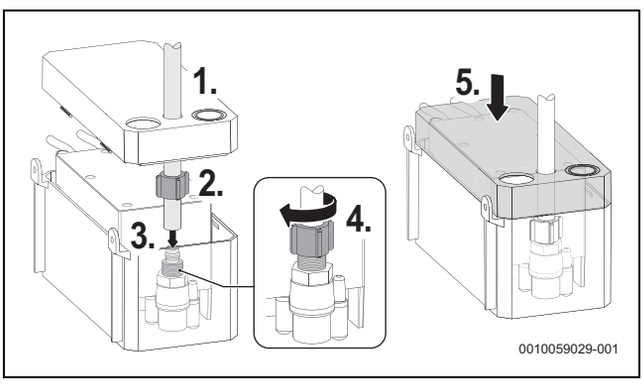

Fig. 46 Condensate pump connection

- ▶ Refit the condensate pump in the appliance.

Refitting condensate trap discharge pipe connection.

Refer to figure 47.

- ▶ Refit the condensate trap discharge pipe to the condensate pump in the sequence shown.
  - – Refit condensate trap discharge pipe to the condensate pump.
  - – Ensure that connection at condensate trap is fitted correctly (flat edges should indicate that the hose is not twisted).

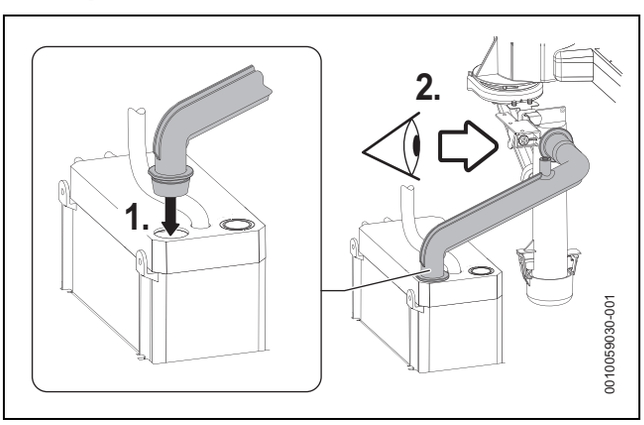

Fig. 47 Condensate trap connection hose refitting

Pressure Relief Valve outlet connection

Fitting the PRV installer connection pipe.

Refer to figure 48, figure 40 for location of the discharge point through wall option.

CAUTION

Risk of damage to property or components during PRV discharge pipe installation!

Do not solder the final connection to the supplied PRV installer connection pipe.

- ▶ The final connection must be a non soldered connector such as compression or push fit coupler.

- ▶ Connect the PRV installer connection pipe (supplied in fittings pack) to the PRV outlet.
  - – Ensure the sealing washer [1] is fitted before connecting the PRV installer connection pipe onto the PRV outlet, and tighten securing nut [2] firmly (hand tight only).
- ▶ The PRV discharge pipe can be routed as required and connects to the PRV installer connection pipe [3] via a non soldered connector.
  - – The PRV discharge pipe should be at least 15mm diameter and run down away from any electrical or other hazards.

NOTICE

- ▶ The Pressure Relief Valve is a safety device for the appliance and if activated may discharge boiling water or steam through the PRV drain pipe.

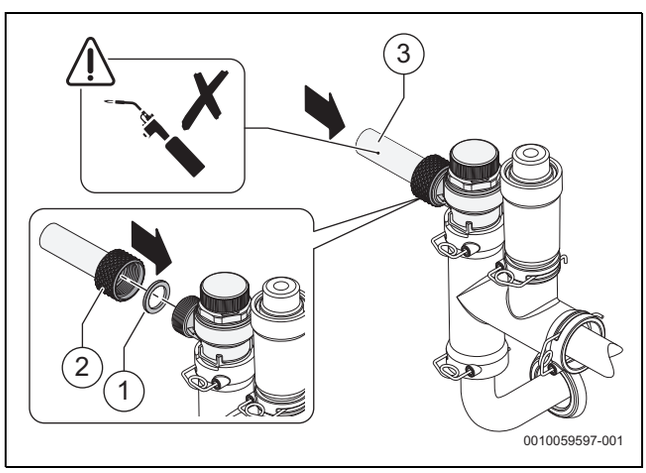

Fig. 48 PRV discharge pipe connection

5.2.5 Appliance flue connection

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, Maintenance Instructions or addendum.

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

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

- ▶ For plume management effective lengths and the effective flue lengths, → 4.7 "Flue systems considerations".

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 is set at an angle of 3° or 52mm per metre length.
- Support the flue at approximately one metre intervals and at a change of direction, use suitable brackets and fittings:
  - – Flue bracket 100mm part number: 7 716 191 177.
  - – Flue brackets 100mm x 6 part number: 7 716 191 178.
  - – Flue bracket 125mm part number: 7 716 191 179.

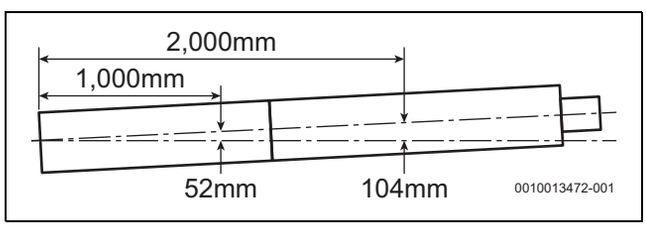

Fig. 49 Slope for condensate disposal

Flue adaptor clamps

The flue adaptor clamps are supplied with the appliance to ensure that the flue components are secure.

- ▶ Clamp [M] is factory fitted to the appliance exhaust outlet.
- ▶ Clamp [L] is supplied in the top tray of the appliance packaging.

The flue adaptor clamp for Vertical options ensures that the flue components are secure.

- ▶ Clamp [S] is supplied with the Vertical flue kit.

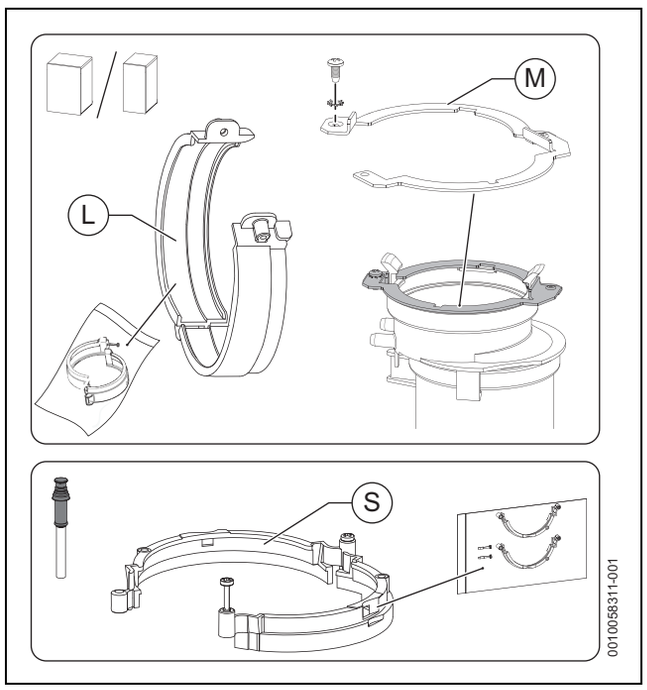

Fig. 50 Flue adaptor clamps

L Large clamp (used to connect the adaptor elbow and modified flue adaptor together).
M Metal clamp (used to connect the adaptor elbow to the appliance exhaust outlet).
S Small clamp (used to connect the flue adaptor to the appliance exhaust outlet).

Clamp Usage

- ▶ Clamp [L] is only required for horizontal flue installation, vertical flue configurations do not require clamp [L].
- ▶ Clamp [M] MUST be used in all horizontal flue configurations.
- ▶ Clamp [S] MUST be used in all vertical flue configurations.

Flue adaptor configuration options

The connection to the appliance exhaust outlet will depend on the exit point from the appliance for the flue installation.
Refer to figure 51.

- ▶ Choose the adaptor elbow/flue adaptor combination or flue adaptor to suit the installation flue requirement.

Horizontal exit configurations.

- ▶ 60/100 Flue options: 80/60 flue adaptor must be cut to suit all horizontal exit flue configurations.
- ▶ 80/125 Flue options: 80/80 flue adaptor must be cut to suit rear and left exit horizontal flue configurations.

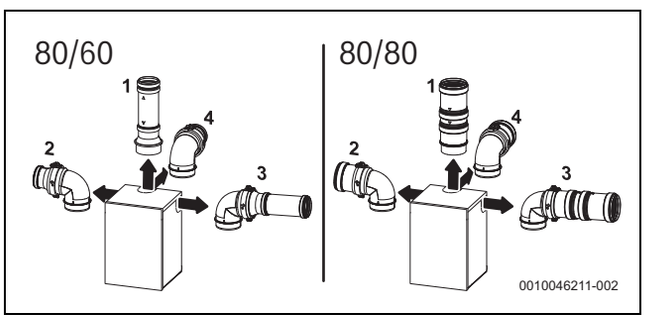

Fig. 51 Flue adaptor configuration options

[1] **Vertical exit**
Unmodified 80/60 flue adaptor
Unmodified 80/80 flue adaptor
[2] **Left exit**
93° adaptor elbow and modified 80/60 flue adaptor - short
93° adaptor elbow and modified 80/80 flue adaptor - short
[3] **Right exit**
93° adaptor elbow and modified 80/60 flue adaptor - long
93° adaptor elbow and unmodified 80/80 flue adaptor - long
[4] **Rear exit**
93° adaptor elbow and modified 80/60 flue adaptor - short
93° adaptor elbow and modified 80/80 flue adaptor - short

Adaptor elbow and flue adaptor assembly

Adaptor elbow and modified flue adaptor short.

Refer to figure 52.

- ▶ Remove the seal [1] from the flue adaptor.
- ▶ Cut the excess [2] off the adaptor square along the mark as shown, de-burr and clean the adaptor face.
- ▶ Replace the seal [1] in the adaptor.
- ▶ Push the adaptor [3] into the elbow [4] until secured with the clip.
- ▶ Engage the hinge end [5] onto the pivot [6] of the clamp.
- ▶ Test fit the clamp [L] around the flue adaptor/elbow to determine in which clamp half to fit the screw, this will depend upon which flue exit is chosen, left or rear.
  - – The screw needs to be accessible for tightening.
  - – Ensure that the arrow points in the direction of the exhaust flow.
  - – Ensure that the slot in the clamp engages with the tab on the top the adaptor elbow [4].
- ▶ Secure the clamp [L] in position.
  - – Tighten the screw [7] sufficiently to close up the clamp, do not over-tighten as this will damage the clamp material.

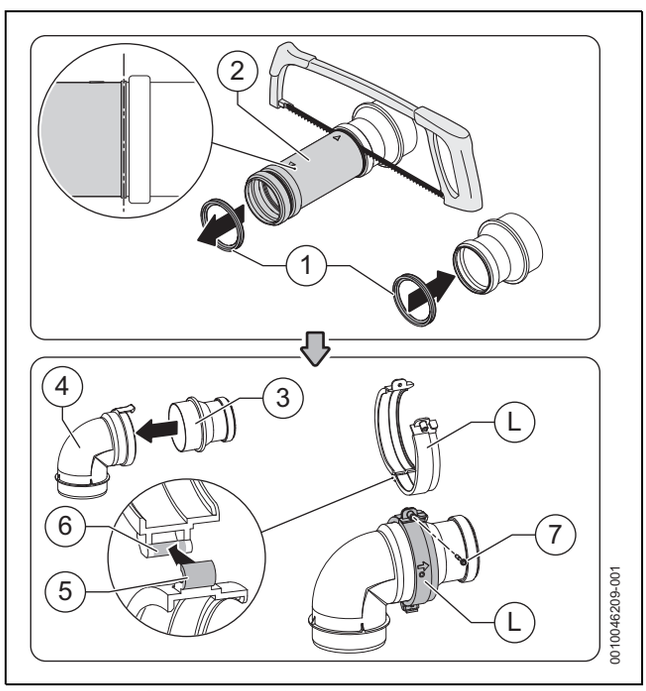

Fig. 52 Short flue adaptor and elbow configuration

Adaptor elbow and modified flue adaptor long.

Refer to figure 53.

- ▶ Remove the seal [1] from the flue adaptor.
- ▶ Cut the excess [2] off the adaptor square along the mark as shown, de-burr and clean the adaptor face.
- ▶ Replace the seal [1] in the adaptor.
- ▶ Push the adaptor [3] into the elbow [4] until secured with the clip.
- ▶ Engage the hinge end [5] onto the pivot [6] of the clamp.
- ▶ Test fit the clamp [L] around the flue adaptor/elbow to determine in which clamp half to fit the screw.
  - – The screw needs to be accessible for tightening.
  - – Ensure that the arrow points in the direction of the exhaust flow.
  - – Ensure that the slot in the clamp engages with the tab on the top the adaptor elbow [4].
- ▶ Secure the clamp [L] in position.
  - – Tighten the screw [7] sufficiently to close up the clamp, do not over-tighten as this will damage the clamp material.

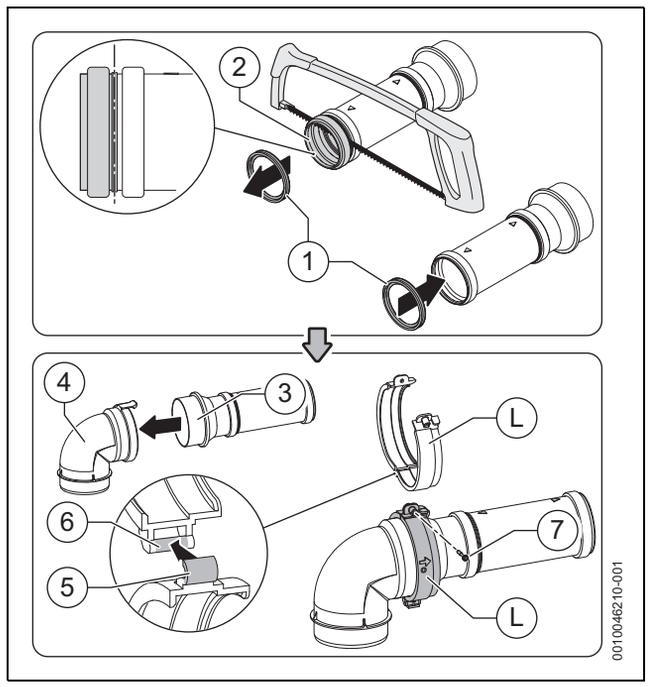

Fig. 53 Long flue adaptor and elbow configuration

Flue measuring and cutting

NOTICE

Flue installation

- ▶ Refer to the Flue Kit Installation instructions provided with your flue kit to correctly install the flue with this Floor standing boiler

NOTICE

Flue length

- ▶ 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, Commissioning and Servicing Instructions manual or addendum.

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

GR8700iF 35 C/GR8700iF 50 C Maximum effective flue length	L max. (mm)
60/100 horizontal	4,000
60/100 vertical	6,400
80/125 horizontal	13,000
80/125 vertical	15,000

Table 19 maximum flue lengths

Flue length guide

Flue length range (mm)	Cut	Number of extensions
140 [1] - 265	Y	None
319 - 530	N	None
530 - 750	N	None
750 - 1260	Y	1
1260 - 1480	N	1
1480 - 2210	Y	2
2210 - 2430	N	2
2430 - 3160	Y	3
3160 - 3380	N	3
3380 - 4000	Y	4

1) The flue is cut to a minimum of 130mm the flue connector adds the additional 10mm.

Table 20 Flue extension guidance up to 4 metres

Flue connection

Refer to the Flue kit installation instructions supplied with the flue kit to correctly install the flue to this appliance.

Cutting the flue to the exact length should not be necessary as the telescopic flue terminal can allow for the final adjustment.

Ensure that the flue rises away from the boiler by at least 3° or 52mm per metre of flue length.

Rear exit configuration

Apply silicone lubricant supplied in the flue kit to the seals to aid fitting.

Fitting the flue connector to the appliance.
Refer to figure 54.

- ▶ Slide the appliance onto the mounting frame, leaving enough of a gap between the appliance and the wall to allow access to connect the fixing points on the flue connector.
- ▶ Position the flue connector [1] with 'TOP' uppermost to align with the three holes in the appliance inner casing.
- ▶ Secure the flue connector [1] from inside the appliance case using three hexagonal bolts [2].

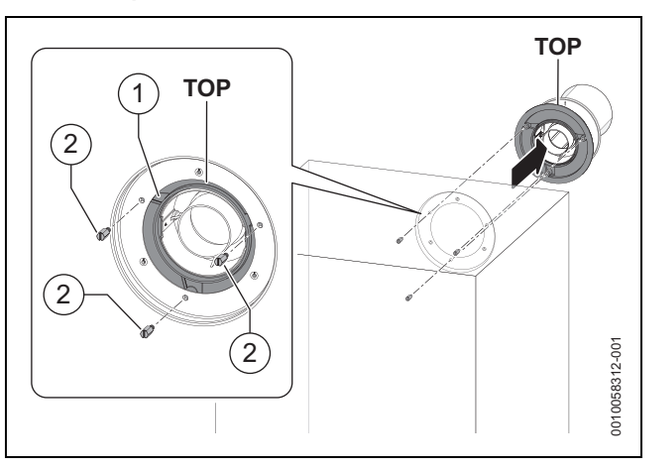

Fig. 54 Rear flue connection

- ▶ Carefully slide the appliance with rear exit flue the remaining distance onto the mounting frame until fully located in position.
- ▶ Secure appliance to mounting frame with screw (left hand side rail).

Fitting the adaptor assembly.
Refer to figure 55.

- ▶ Remove the adaptor clamp [M], already fitted to the appliance exhaust outlet.
  - – Remove securing screw [1].
  - – Open the clamp utilising the pivot point and remove.
- ▶ Fit the adaptor assembly.
  - – Slide the flue adaptor into the inner flue tube.
  - – Slide the elbow into the appliance exhaust outlet [3], ensuring that the clips either side [2] secure the elbow into position.
- ▶ Re-fit the adaptor clamp [M] around the appliance exhaust outlet and adaptor joint.
  - – Ensure that the adaptor clamp [M] is fully located over the clips [2] of the appliance exhaust outlet [3].
- ▶ Pinch the adaptor clamp [M] halves together to close the clamp and align the screw fittings. Secure with screw [1] to retain the clamp.

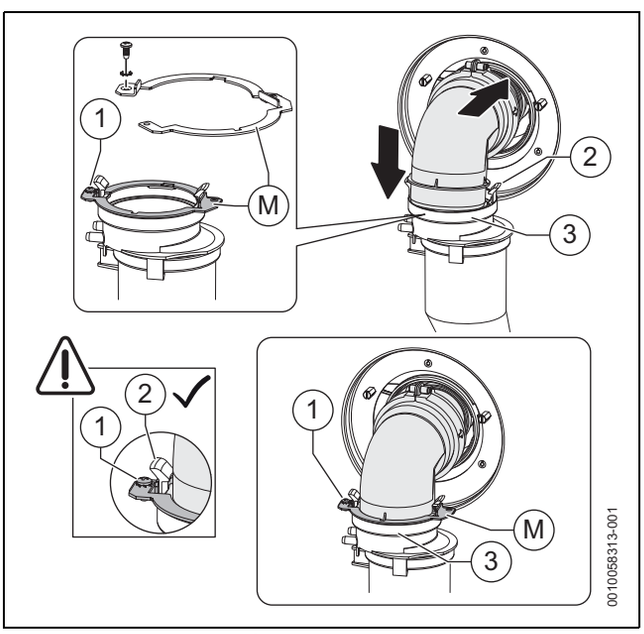

Fig. 55 Adaptor assembly fitting to appliance exhaust outlet

Converting from rear exit flue

The appliance is supplied ready to fit a rear flue outlet. To convert the flue outlet from rear to side or top, the following actions need to be completed:

- ▶ Select the required outlet position for the flue configuration.

Refer to figure 56, right hand side example shown.

- ▶ Remove the knock-out panel [1] from the outer casing.
- ▶ Remove the flue outlet blanking plate, comprising the three screws [2] and the cover plate [3] and gasket [4].

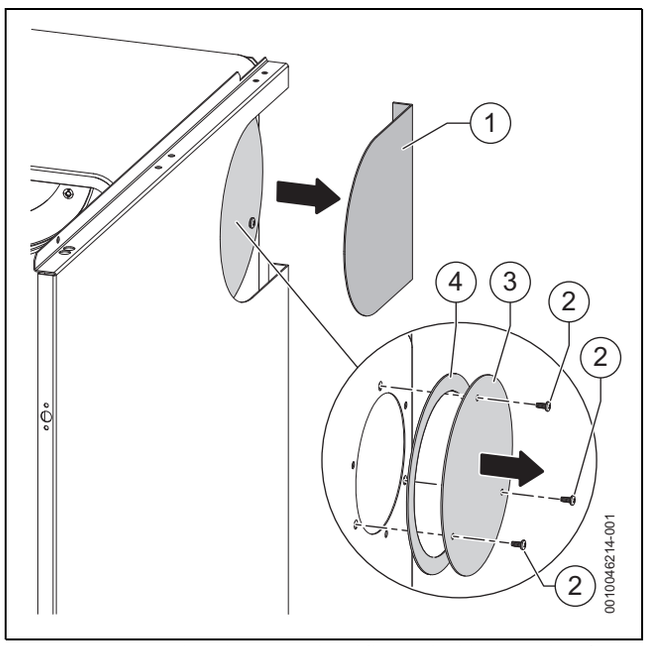

Fig. 56 Removing knock-out panel and flue outlet blanking plate (right hand side example)

- ▶ Refit the flue outlet blanking plate to the rear exit outlet.
  - – Ensure gasket is in good condition and secured with the three screws.

Side exit configuration

Apply silicone lubricant supplied in the flue kit to the seals to aid fitting.

Fitting the flue connector to the appliance.

Refer to figure 57, right hand side example shown.

- ▶ Position the flue connector [1] with 'TOP' uppermost to align with the three holes in the appliance inner casing.

50kW output appliances for right hand side exit configurations.
Supplied in the flue kit screw pack is a short hexagonal bolt for the lower fixing point of the flue connector.

- ▶ Pre fit the lower fixing point with the short head hexagonal bolt into the flue connector and slide into lower slot [5] before securing with remaining two hexagonal bolts.

- ▶ Secure the flue connector [1] from inside the appliance case using three hexagonal bolts [2].
- ▶ Push the flue [3] firmly into the flue connector [1].
- ▶ Drill two 3mm holes through the connector and into the outer sleeve of the flue and secure with the screws [4] provided.

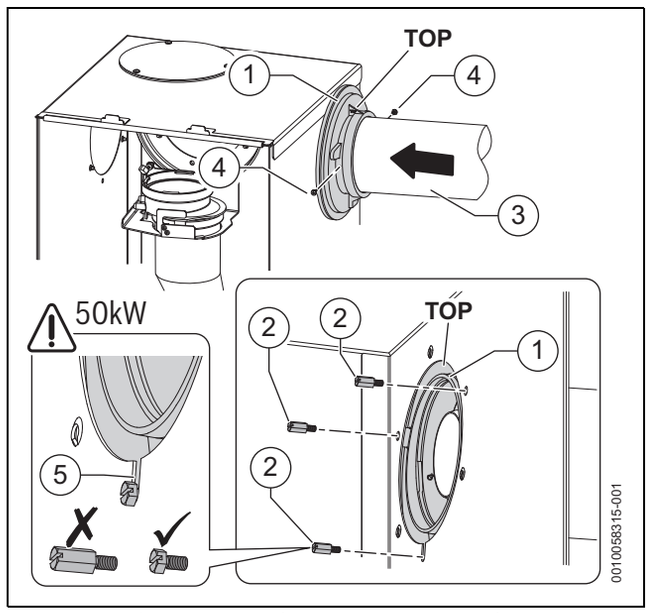

Fig. 57 Side flue connection (right hand side example)

Fitting the adaptor assembly.

Refer to figure 58.

- ▶ Remove the adaptor clamp [M], already fitted to the appliance exhaust outlet.
  - – Release securing screw [1].
  - – Open the clamp utilising the pivot point and remove.
- ▶ Fit the adaptor assembly.
  - – Slide the flue adaptor into the inner flue tube.
  - – Slide the elbow into the appliance exhaust outlet [3], ensuring that the clips either side [2] secure the elbow into position.
- ▶ Re-fit the adaptor clamp [M] around the appliance exhaust outlet and adaptor joint.
  - – Ensure that the adaptor clamp [M] is fully located over the clips [2] of the appliance exhaust outlet [3].
- ▶ Pinch the adaptor clamp [M] halves together to close the clamp and align the screw fittings. Secure with screw [1] to retain the clamp but do not over-tighten as this will damage the clamp material.

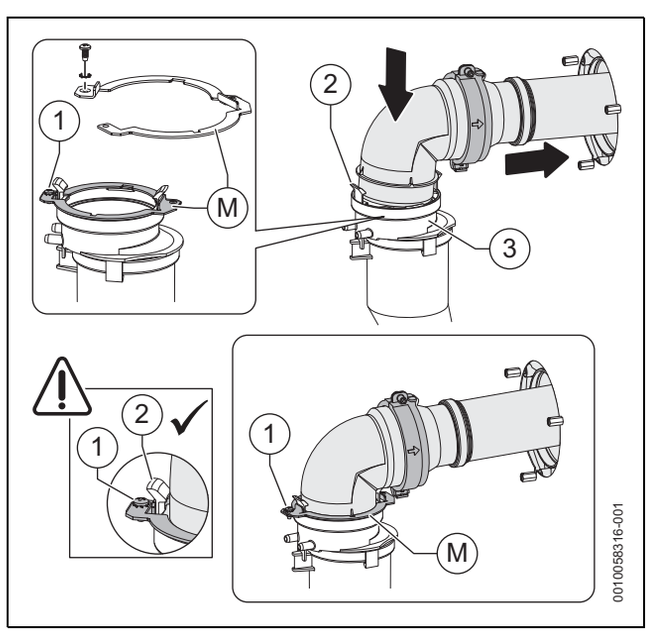

Fig. 58 Adaptor assembly fitting to appliance exhaust outlet

Vertical exit configuration

Vertical flue connector

- **High level horizontal flue options:**
  The vertical flue connector is available separately.
- **Vertical flue options:**
  The vertical flue connector is supplied as part of the vertical flue kit.

Apply silicone lubricant supplied in the flue kit to the seals to aid fitting.

Fitting the flue connector to the appliance.
Refer to figure 59.

- Slide the vertical flue adaptor [2] over the inner flue tube of the vertical flue section [1].
  - Push the adaptor almost all the way into the flue, leaving enough of the adaptor showing to be able to pull the adaptor down later.
- Align the holes in the vertical flue connector [3] with the holes in the case and secure from inside the case with the three bolts [4] provided.
- Fit the vertical flue section [1] into the vertical flue connector [3].
- Using the two indents, drill two 3mm holes through the connector and into the outer sleeve of the flue and secure with the screws [5] provided.

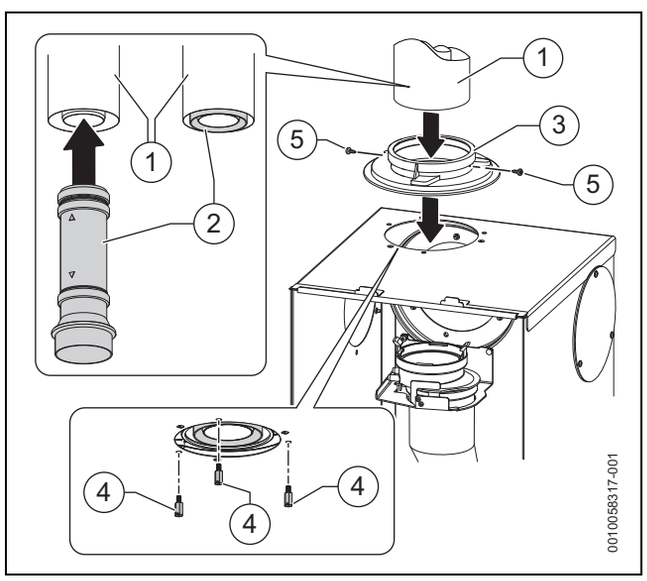

Fig. 59 Top exit flue connection

Fitting the vertical flue adaptor.
Refer to figure 60.

- Remove the adaptor clamp [M], already fitted to the appliance exhaust outlet.
  - Release securing screw.
  - Open the clamp utilising the pivot point and remove.
  - This component is swapped for vertical exit configurations.
- Connect the vertical flue adaptor.
  - Slide the flue adaptor [2] down into the appliance exhaust outlet [4].
  - Ensure that the clips either side [3] secure the adaptor into position.
- Fit the adaptor clamp [S] (supplied in the Vertical flue kit/vertical flue connector) around the appliance exhaust outlet and adaptor joint.
  - Ensure that the adaptor clamp [S] is fully located over the clips [3] of the appliance exhaust outlet [4].
- Pinch the adaptor clamp [S] halves together to close the clamp and align the screw fittings. Secure with screw [1] to retain the clamp but do not over-tighten as this will damage the clamp material.

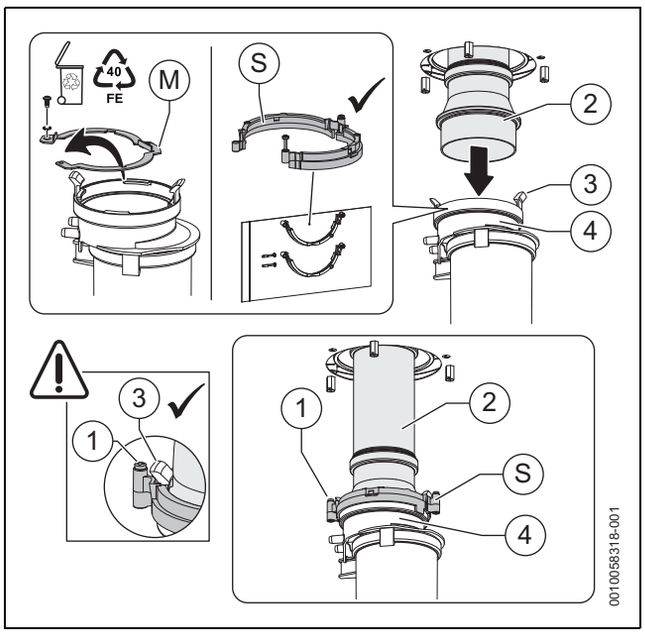

Fig. 60 Vertical flue adaptor fitting to appliance exhaust outlet

5.2.6 Accessories

Prepare for accessory filling device installation - Keyless filling link removal

Refer to figure 61.

- Remove the securing screws and lock washers [1].
- Remove the keyless filling link [2] from the connections.

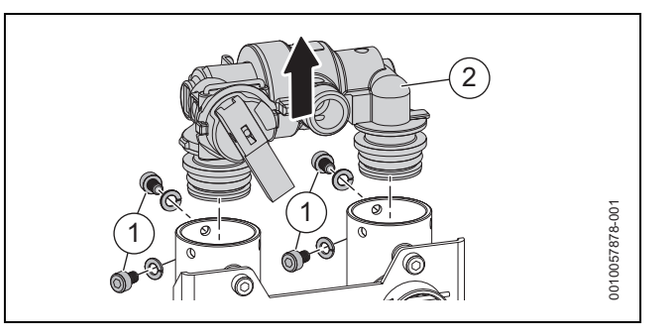

Fig. 61 Keyless filling link removal

Automatic filling device accessory fitting

Refer to figure 62.

- ▶ Ensure the filter on the cold inlet (supplied with accessory) is fitted before installing the automatic filling device.
- ▶ Assemble the automatic filling device [2] into the cold inlet and CH return connections.
- ▶ Fit two screws and lock washers [1] in each of the connections.

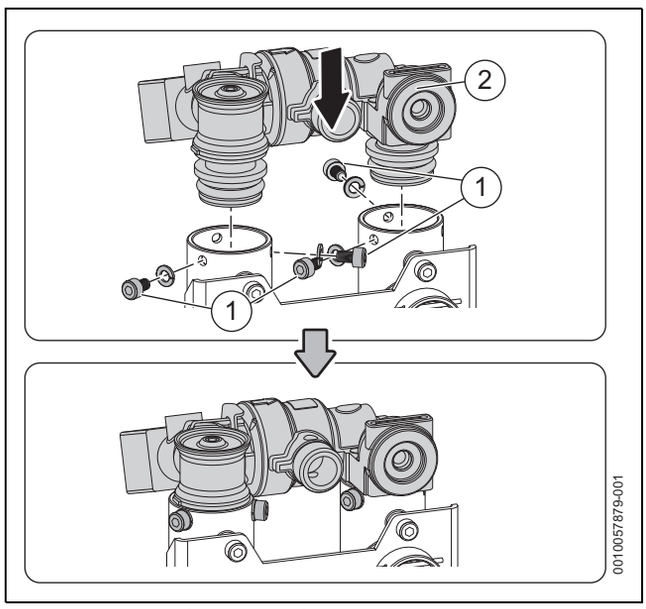

Fig. 62 Automatic filling device fitting

Keyed filling link accessory fitting

Refer to figure 63.

- ▶ Ensure the filter on the cold inlet (supplied with accessory) is fitted before installing the keyed filling link.
- ▶ Assemble the keyed filling link [2] into the cold inlet and CH return connections.
- ▶ Fit two screws and lock washers [1] in each of the connections.

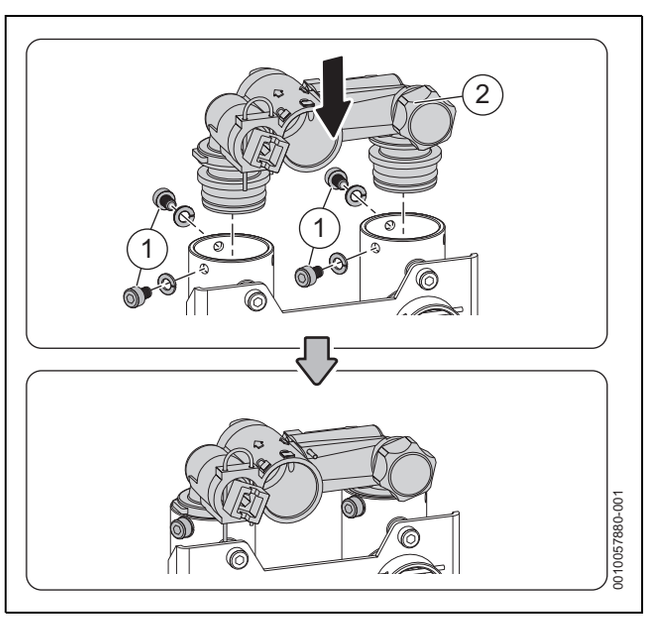

Fig. 63 Keyed filling link fitting

Ensure the key is handed over to the End User and advise to store in a safe place.

5.3 Electrical connection

5.3.1 Safety instructions

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 national and regional regulations as well as all technical rules and guidelines for the country of installation.
- ▶ Check for zero potential (conductors proved to be dead) before proceeding with work, using approved test equipment.

Electrical considerations:

- All electrical work must be carried out by a competent and authorised person.
- All work must comply with the current national and regional regulations, technical regulations and guidelines for electrical installations.
- The mains electrical supply to the appliance must be through a fused double pole isolator.
- An isolator shall be situated next to the appliance for new systems and, where practicable, replacement appliances (this could be the fused double pole isolator).
- Any additional components/equipment that are connected to the appliance that require 230 Volts must be connected through the same isolator as the appliance.
- External fuse 3 Amps.
- When stripping the wires, ensure copper strands do not fall into the control box.

NOTICE

Risk of damage from hot appliance components.

Hot appliance components can damage electrical cables.

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

Cable routing:

- ▶ 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 between power and signal cables.
- ▶ 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 and is to be replaced, access the connection terminal (→ Fig. 65)

- ▶ Replace with the following cable type:
  - Flexible PVC insulated, 1.5mm^2 temperature rated to 90 °C, in accordance to regulations as well as all technical rules and guidelines for appliance power supply installations.
  - A spare strain relief is supplied in the hardware pack, if required.
- ▶ Connect the cable so that the protective conductor (earth) is longer than the other wires.

5.3.2 Installer wiring connections

Control unit to service position

Refer to figure 64.

▶ Move to control unit to the service position in the sequence shown.
  – Release the control unit securing screw.
  – Swing the control unit into service position.
    The dimple on the lower bracket will hold the control unit in place.

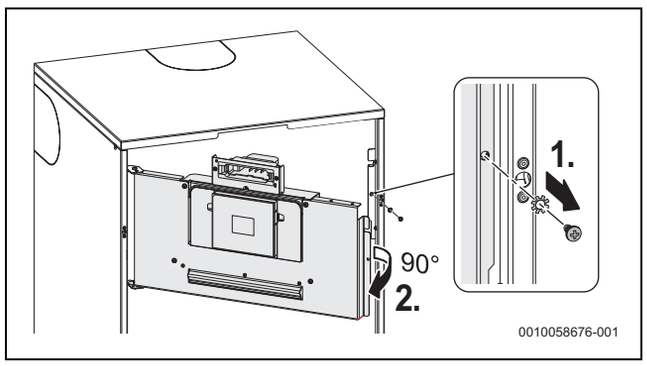

Fig. 64 Service position for the control unit

Access to electrical connections

Refer to figure 65.

▶ Remove the cover bracket in the sequence shown.
  – Remove the screws whilst supporting the bracket.
  – Remove the bracket.

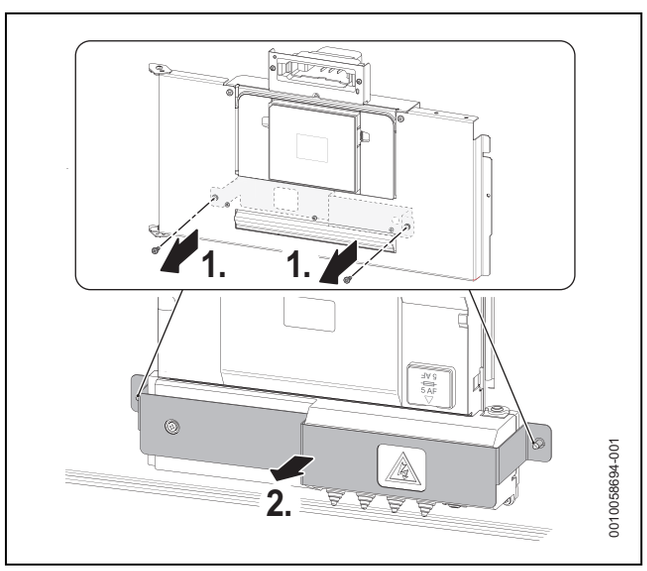

Fig. 65 Bracket removal

Refer to figure 66.

▶ Accessing the electrical connections in the sequence shown.
  – Remove the screws.
  – Remove the cover.

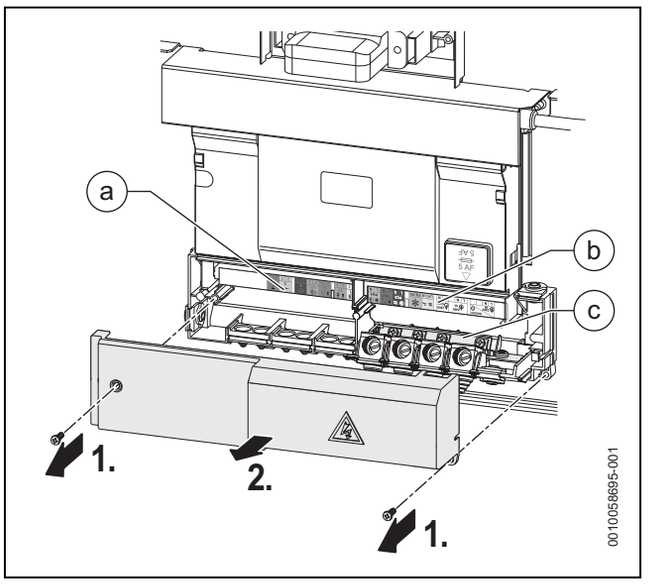

Fig. 66 Cover removal

Stepped cable grommets

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

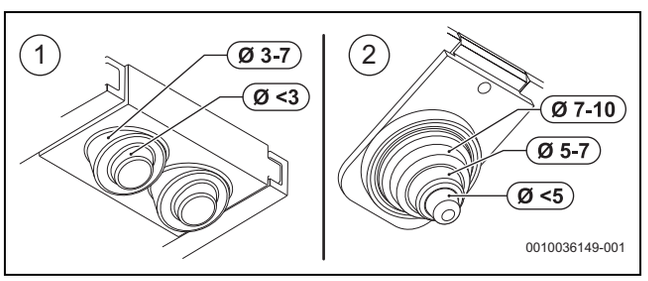

Fig. 67 Adapting the grommets to the cable diameter

[1] Low voltage (signal cables) grommet
[2] Power supply (power cables) grommet with strain relief

[1] Low voltage (signal cables)

▶ Guide the cable through the grommet.
▶ Connect the cable to the terminal strip for external accessories.

[2] Power supply (power cables)

▶ Guide the cable through the grommet.
▶ Connect the cable to the terminal strip for external accessories and the protective conductor (PE) to the ⏚ rail.
▶ Secure the cable on the strain relief.

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.

Power supply (power cables), example → figure 68

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

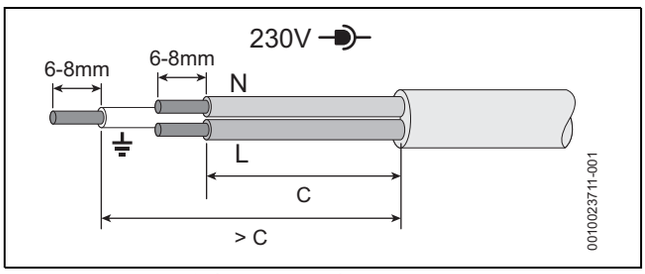

Fig. 68 Power supply (power cables) preparation

Low voltage (signal cables), example → figure 69

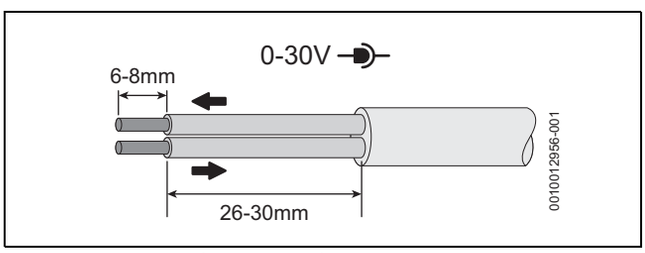

Fig. 69 Low voltage (signal cables) preparation

Power supply (power cables) terminal strip

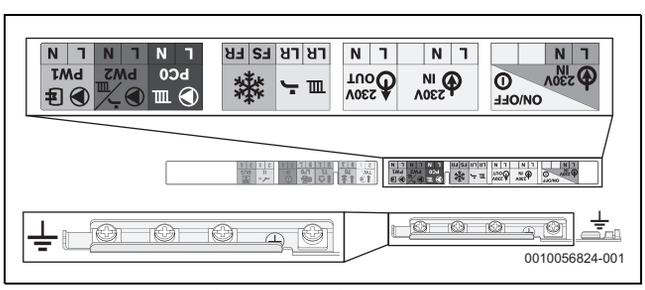

Fig. 70 Power supply (power cables) terminal strip

Power supply (power cables) connections

Symbol	Function
	Protective conductor (PE) ⏚ rail. ▶ Connect the protective conductor (PE) (⏚) for power supply and external devices.
ON/OFF 230V IN L N	Internal condensate pump power supply. • Factory fitted, not rewireable.
230V IN L N	Power supply (power cable). Pre-wired cable (Live and Neutral).
230V OUT L N	230V mains output to external controls/wiring centre. ▶ If required: connect power supply for external controls.
LR LR	Switch live (Live Return) to appliance. • CH demand input. • DHW demand input (pre-heat time control).
FS FR	External frost thermostat. • FS output (frost thermostat supply). • FR input (frost thermostat return).
PC0 L N	No functionality; not used.

PW2 L N	Additional circulation pump (max. 100W).
	▶ Connect power supply for external pump.
	  – L output (Live supply to pump)
	  – N output (Neutral supply to pump)
	▶ Connect the pump protective conductor (PE) to the ⏚ rail.

PW1 L N	No functionality; not used.

Table 21 Power supply (power cables) terminal strip for external accessories

Low voltage (signal cables) terminal strip

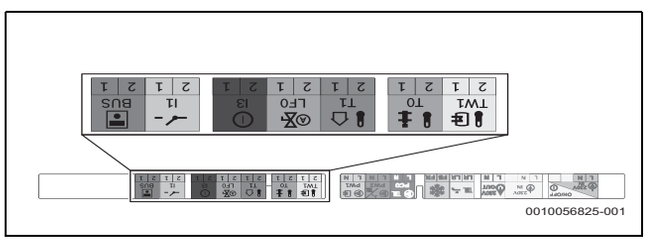

Fig. 71 Low voltage (signal cables) terminal strip

Low voltage (signal cables) connections

Symbol	Function
TW1 2 1	Combi DHW Pre-heat Kit (accessory) ▶ Connect the 2-core cable supplied with the accessory.
T0 2 1	No functionality; not used
T1 2 1	Outdoor weather compensation sensor (used when outdoor sensor is connected, optional accessory) ▶ Connect the outside temperature sensor via a 2-core cable.
LF0 2 1	Automatic filling device contact (accessory). ▶ Connect the Intelligent filling system cable supplied. ▶ Switch on the automatic filling facility in the service menu under Settings > Special function and program it according to the heating system.
I3 2 1	Internal condensate pump high level sensor. • Terminals pre wired to Internal condensate pump.
I1 2 1	Volt-free CH switching contact input (CH). ▶ Remove link and connect CH controller via 2-core volt-free cable.
BUS 2 1	Communication BUS connection for hard-wired Worcester/Bosch EMS controls. Low voltage power supply for hard-wired Worcester mechanical controls accessories. ▶ Connect 2-core cable.

Table 22 Low voltage (signal cables) terminal strip for optional accessories

5.3.3 Accessories

Automatic filling device electrical connection

- ▶ Move the control unit to the service position (→ Fig. 64).
- ▶ For splash-water protection (IP): cut the low voltage cable grommet to match the diameter of the cable.
- ▶ Guide the cable through the grommet.
- ▶ Connect the automatic filling device in the sequence shown.
  - – Fit the cable to the connections on the solenoid.
  - – Connect the cable to the plug connector supplied.
  - – Fit the plug connector into the automatic filling device connection point.

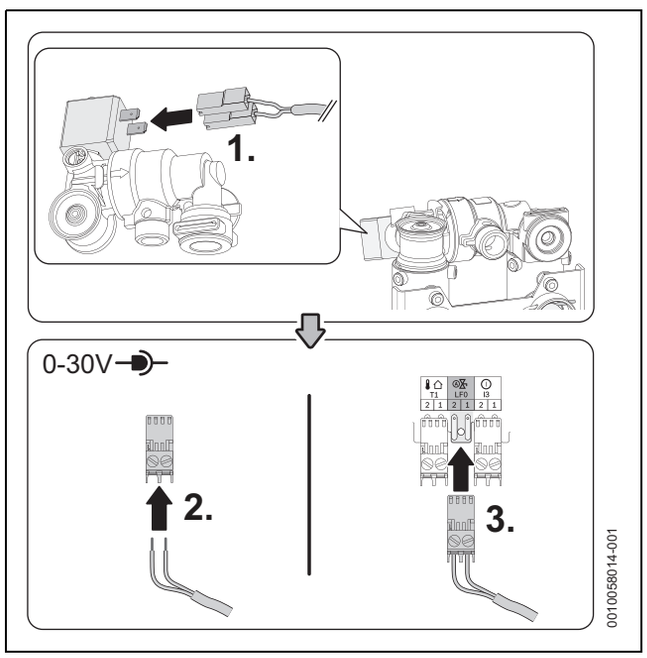

Fig. 72 Automatic filling device electrical connection

WARNING

Servicing: Risk of skin burns!

Solenoid coil can be a hot surface.

- ▶ Do not touch.
- ▶ Wear protective equipment.

Automatic filling device setup

- ▶ Refer to the appliance Settings menu for activation and setup parameters of the automatic filling device.

5.3.4 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 PE - ⏚ (earth) terminals.
- ▶ The Switch Live from the external equipment [3]:
  - – Heating/zone controls connects to LR terminal, remove CH pre-wired link only.
  - – Control for appliance Pre-heat function, optional. Hot water time controller connects to 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
- ▶ Additional external heating pump [5] (50kW heating circuits):
  - – The Live supply is terminal L to the Pump Live
  - – The Neutral supply is terminal N to the Pump Neutral
  - – The Earth connection is the Protective conductor (PE) ⏚ rail to the Pump Earth

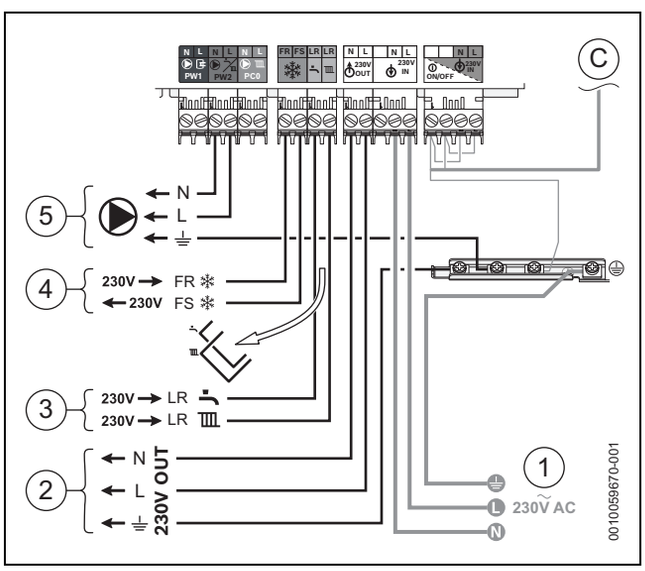

Fig. 73 External controls connections example

[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).
[5] 230V mains supply to the additional external heating pump (50kW heating circuits).
[C] Condensate pump power supply (pre-wired connection).

6 Commissioning

6.1 Safety instructions

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 national and regional regulations as well as all technical rules and guidelines for the country of installation.
- ▶ Check for zero potential (conductors proved to be dead) before proceeding with work, using approved test equipment.

WARNING

Risk of scalding!

- ▶ This appliance is supplied with the CH control set at approximately 60 °C, a temperature that should be suitable for most installations. When the boiler switches from CH to DHW, the temperature of the hot water may briefly exceed the DHW set point if the CH temperature is set higher than the DHW temperature. If the CH temperature is changed to 65 °C or above, it is advisable to fit a thermostatic mixing valve (TMV) at the point of use (e.g. before the bath hot tap or shower) to protect vulnerable people from scalding.

6.2 Pre-Commissioning checks

Checks before commissioning:

- ▶ Check that the service and water pipes are connected correctly.
- ▶ Inspect the entire gas installation, including the meter and conduct a tightness test in accordance to the latest gas safety technical regulations and guidelines (e.g. UK standards advice found in BS 6891).
- ▶ Check the gas type specified on the identification plate matches that of the gas supply and that the gas supply is properly purged.
- ▶ Check that the appliance is filled with water and under pressure (0.8 to 1.7 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 pipework 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.
- ▶ Disconnect the appliance from the gas supply.
- ▶ Close the water shut-off valves to the appliance.
- ▶ Label appropriately.

6.3 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.

6.3.1 Filling the appliance and adding Inhibitor

Before pressurising the system.
The appliance integral expansion vessel is pre-charged to 0.75 bar (equal to a static head of 7.5m (22ft)). 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 that the drain cocks and any manual air vents are closed and all radiator valves are open.
- ▶ Add a suitable inhibitor or combined inhibitor/anti-freeze, if the system might be 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 0.8 and 1.7 bar via a WRAS approved filling loop or one of the filling link accessories.
  - – Refer to filling link accessory instructions for operation and use.
- ▶ The Automatic Air Vent and any manual air vents will release any air trapped in the appliance.
- ▶ Manually vent all manual vents including radiators, tighten the vent screws when completed
- ▶ Check the system for any leaks and correct if required.
- ▶ Top up the system pressure if the pressure has dropped below 0.8 bar.
- ▶ Isolate and remove the filling loop connections to the system.
  - – Refer to Integrated filling link accessory instructions for any further actions required after filling the system.

The analogue pressure gauge [1] within the appliance is for indication purposes only, and is intended to assist when initially filling the system before the appliance is powered.

- ▶ Pressure shown on this gauge should not be compared to readings shown in the boiler status menu on the digital display as they will differ, especially when the circulation pump is running.
- ▶ Final adjustments to system pressure must be made whilst referring to the digital pressure display [2].

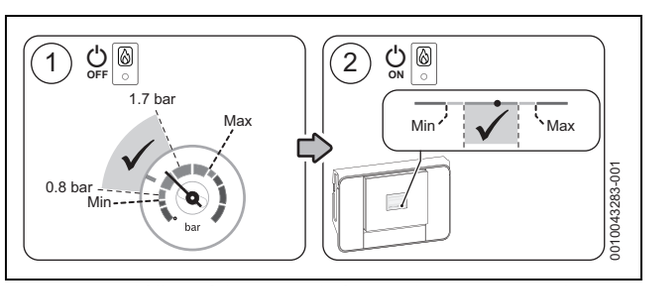

Fig. 74 Initial filling of the system before appliance is powered

Integral filling link

- The appliance is supplied with a pre fitted Keyless filling link.
  - – See Operating Instructions for topping up the system pressure.

Minimum static pressure.

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

Filling the system for the first time

The system is filled manually for the first time installation of the automatic filling device.

This can be done before or after the appliance has been connected to the electrical mains power supply.

- ▶ Ensure that the service valves are open before commencing the manual first fill of the system.
- ▶ Fill the appliance and system in the sequence shown.
  - – Turn the manual override screw 90° gently to open the valve.
  - – Monitor the pressure indicator as it begins to move.
  - – Close the manual override screw 90° gently to stop the filling process when the pressure indicator is within the area of the green zone shown in figure 75.

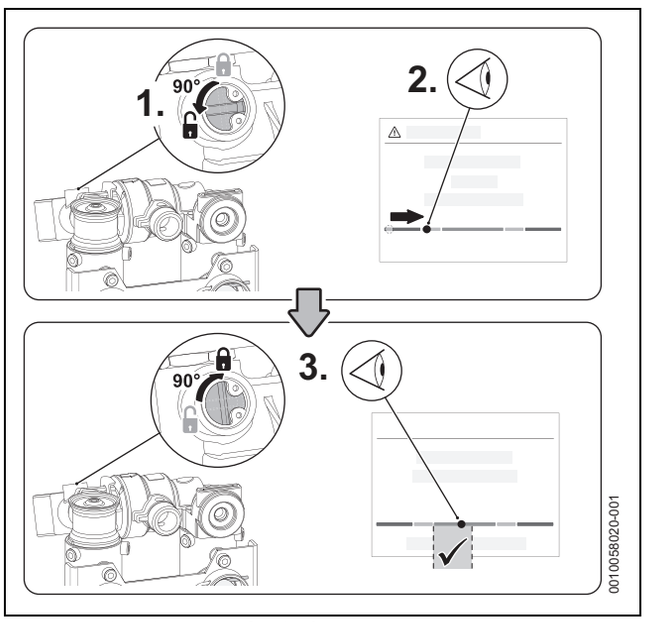

Fig. 75 Filling the system for the first time

Automatic filling device setup

- ▶ Refer to the appliance Electrical connection chapter for connecting the automatic filling device.
- ▶ Refer to the appliance Settings menu for activation and setup parameters of the automatic filling device.

It is recommended that the mid position of the 3-way valve is used to fill/drain the system.

For initial fill, the boiler automatically selects the mid-position when first powered up. If power is not yet connected, the 3-way valve will also be in the mid-position.

For future fills to set the 3-way valve to mid position:

- ▶ **Service menu** > **Settings** > **Special function** > **3-WV mid. pos.**> **Yes**.

The 3-way valve remains at the middle position for approx. 15 minutes.

- ▶ Ensure that any external zone valves are open, if installed.
- ▶ Fill/drain the system.

6.4 Starting the appliance

NOTICE

Damage to appliance or system!

Running the appliance:

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

6.4.1 Turning on the appliance

- ▶ Turn on the appliance at the power supply isolator.

6.5 Chimney sweep mode

You have 15 minutes to take your measurements or to make your settings. After this time the appliance returns to normal operation.
You can re-enter chimney sweep mode if necessary.
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 sufficient hot 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 and hold the **ok** key for 5 seconds until **Chimney sweep** is displayed.
- ▶ Confirm you have read and understood the alert message, press **ok**.
- ▶ Set the desired rated output using ▲ or ▼ for Max. and Min. respectively.
  The value is accepted after 2 seconds and marked with a tick.
- ▶ To exit the chimney sweep mode, press **ok** or ⮌.

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.

6.5.1 Setting the appliance to maximum

Maximum output mode

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

- ▶ Press the **ok** key for 5 seconds until **Chimney sweep** is displayed.
- ▶ Confirm you have read and understood the alert message, press **ok**.
  - – The appliance enters chimney sweep mode and automatically enters maximum output.
  - – The display shows “Max.” (power output) and the flow temperature.
  - – The appliance will ramp up to maximum output in approximately 30 to 35 seconds.

6.5.2 Setting the appliance to minimum

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

- ▶ Press the ▼ button to set the appliance to minimum output.
  - – The display shows “Min.” (power output) and the flow temperature.
  - – The appliance will take approximately 30 to 35 seconds to ramp down to minimum output.
  - – Wait a further 30 seconds to allow the appliance to stabilise at minimum output.

6.5.3 Exiting chimney sweep mode

To exit the chimney sweep mode:

- ▶ Press **ok** or ⮌ and the appliance will return to normal operation.
  - – If left in the chimney sweep mode the boiler will return to normal operation after 15 minutes.

When exiting chimney sweep mode the pump will continue to run in order to cool the heat exchanger. Boiler status code 208 will be visible during this operation.

6.6 Checking gas inlet pressure

Measuring the inlet pressure

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

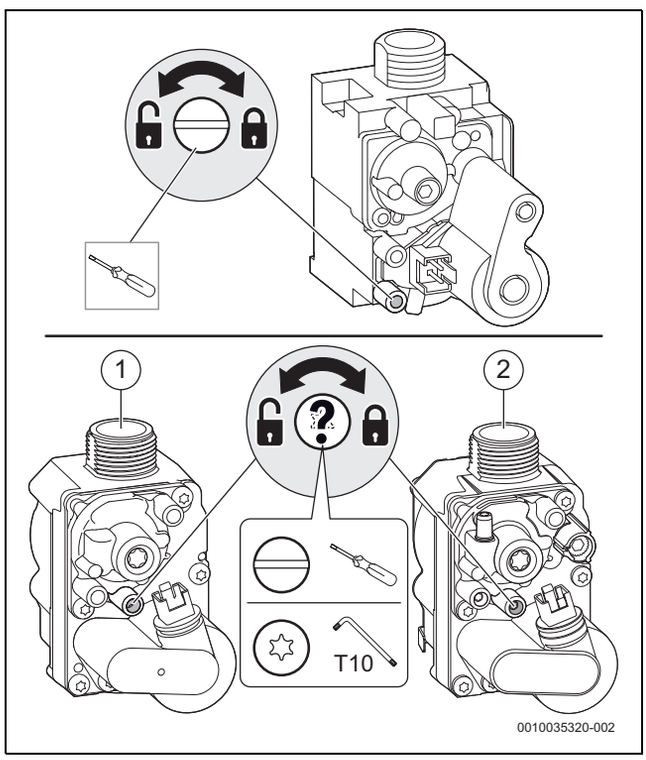

Fig. 76 Checking the gas supply pressure (above: SIT valve, below: Resideo valves)

[1] Gas valve - NG
[2] Gas valve - LPG

- ▶ Open the gas isolator and switch on the appliance.
- ▶ Ensure that there is heat transfer by opening the radiator valves and any zone valves fitted. A hot water tap can also be opened for additional heat transfer.
- ▶ Set the appliance running at maximum output in chimney sweep mode (→ 6.5 "Chimney sweep mode").
- ▶ Check the required gas supply pressure according to following section "Gas pressure within the system".

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

- ▶ Identify the cause and rectify the fault.
- ▶ If this is not possible: isolate the device on the gas side and notify the gas supplier.

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

Gas pressure within the system

Combi appliances

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

Natural Gas or LPG pressures.

The pressure drop from the meter or at the LPG gas supply to the gas valve inlet test point must not be more than the values stated in table 23.

If the pressure drops are greater than shown in table 23, then this would indicate a problem with the pipework or connections within the system.

NOTICE

- **Do not continue commissioning until the correct gas pressure is achieved with the appliance running at maximum output.**

Gas pressure within the system

The appliance must be running at maximum output rate when performing the gas rate check (→ chapter 6.5).

Combi appliances

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

The pressure drop from the meter or at the LPG gas supply to the gas valve inlet test point must not be more than the values stated in table 23:

If the pressure drops are greater than shown in table 23, then this would indicate a problem with the pipe work or connections within the system.

Description	Gas Type	
	Natural Gas	LPG
NG Meter/LPG Supply pressure from the final stage regulator outlet [A] (mbar range)	18.5 -23	32 - 45
Final stage regulator when fitted after the ECV or meter [A1] (mbar) 1)	–	32 - 45
Permitted pressure drop [A & A1] (mbar) 2)	–	0.5
Primary meter outlet or ECV outlet when the ECV is fitted after the final stage regulator [A & A1] (mbar) 2)	–	31.5 - 44.5
Across pipework permitted pressure drop [B] (mbar)	1	2
Appliance inlet [C] (mbar range)	17.5 - 22	30 - 43 1) 29.5 - 42.5 2)
Across appliance permitted pressure drop [D] (mbar)	< 40kW: 1.5 ≥ 40kW: 2.5	< 40kW: 1.5 ≥ 40kW: 2.5
Gas valve inlet test point [E] (mbar range)	< 40kW: 16 - 20.5	< 40kW: 28 - 41 1) < 40kW: 28.5 - 41.5 2)
	≥ 40kW: 15 -19.5	≥ 40kW: 27 - 40 1) ≥ 40kW: 27.5 -40.5 2)

1) When no primary meter is installed, and the final stage regulator is installed after the ECV, The pressure at the outlet of the final stage regulator shall be between 32 – 45 mbar.

2) When a primary meter is installed or when no primary meter is installed and the ECV is fitted after the final stage regulator, you are permitted a 0.5 mbar pressure drop to the meter outlet or to the outlet of the ECV.

Table 23 Allowed mbar pressure drop

NOTICE

- **Do not continue commissioning until the correct gas pressure is achieved with the appliance running at maximum output.**

Gas supply pressure drop - Natural Gas

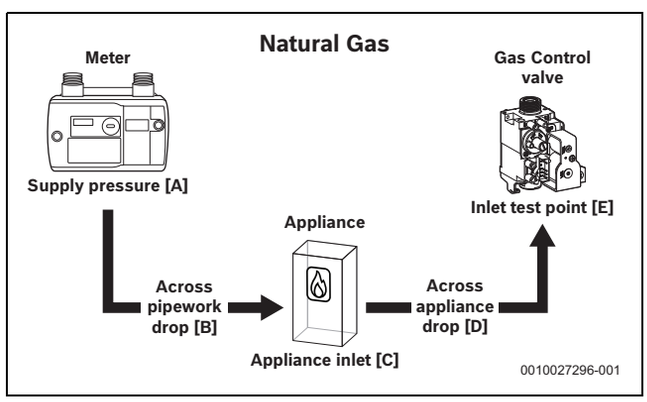

Fig. 77 Natural Gas pressures

Gas supply pressure drop - LPG

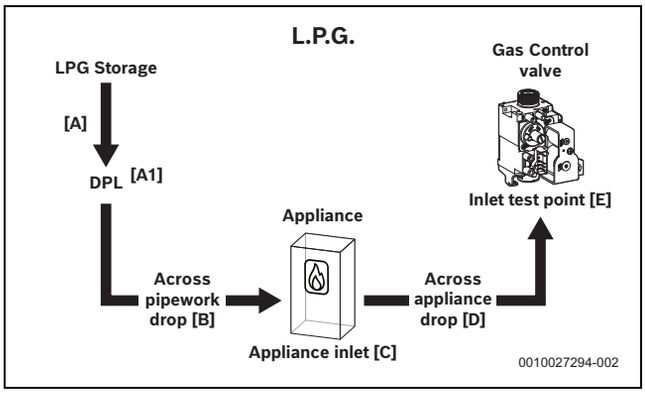

Fig. 78 L.P.G. pressures

[DPL] The design pressure loss between the outlet of the primary meter installation or where no meter is installed the outlet of the ECV or the outlet of the final stage regulator when fitted after the ECV and the point to be connected on any appliance inlet shall not exceed 2 mbar at design installation flow rate.

6.7 Checking the gas rate

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

- 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_2 ratios and O_2 values.
- Where a gas meter is not available (e.g. LPG) the CO/CO_2 and O_2 must be checked.
- Gas rate must be checked with the appliance in chimney sweep mode at maximum output.
- Carry out gas rating as per the latest advice in the Gas Safety (Installation and Use) Regulations.
- 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.
  - Ensure that the appliance has stabilised at maximum output.
- Where a gas meter is not available (e.g. LPG) the $CO/CO_2/O_2$ must be checked to the units shown in the setting of the air/gas ratio.
- If pressure and gas rate are satisfactory press **ok** or ⮌ and the boiler will return to normal operation.
  - If left in the service mode the control will return to normal operation after 15 minutes.
- Close the gas isolation valve.
- Remove the manometer.
- Re-seal the screw in the gas inlet pressure test point.
- Open the gas isolation valve and ensure there are no gas leaks.

6.8 Checking for gas leaks during operation

- Use an approved gas sniffer or leak detection fluid to check all connections for possible leaks. Leak detection fluid must be certified as a gas leak testing agent.
- Do not allow leak detection fluid to come into contact with the electrical components.

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).

CO and combustion check: Gas type - Natural Gas/LPG

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 EN 50379. 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.

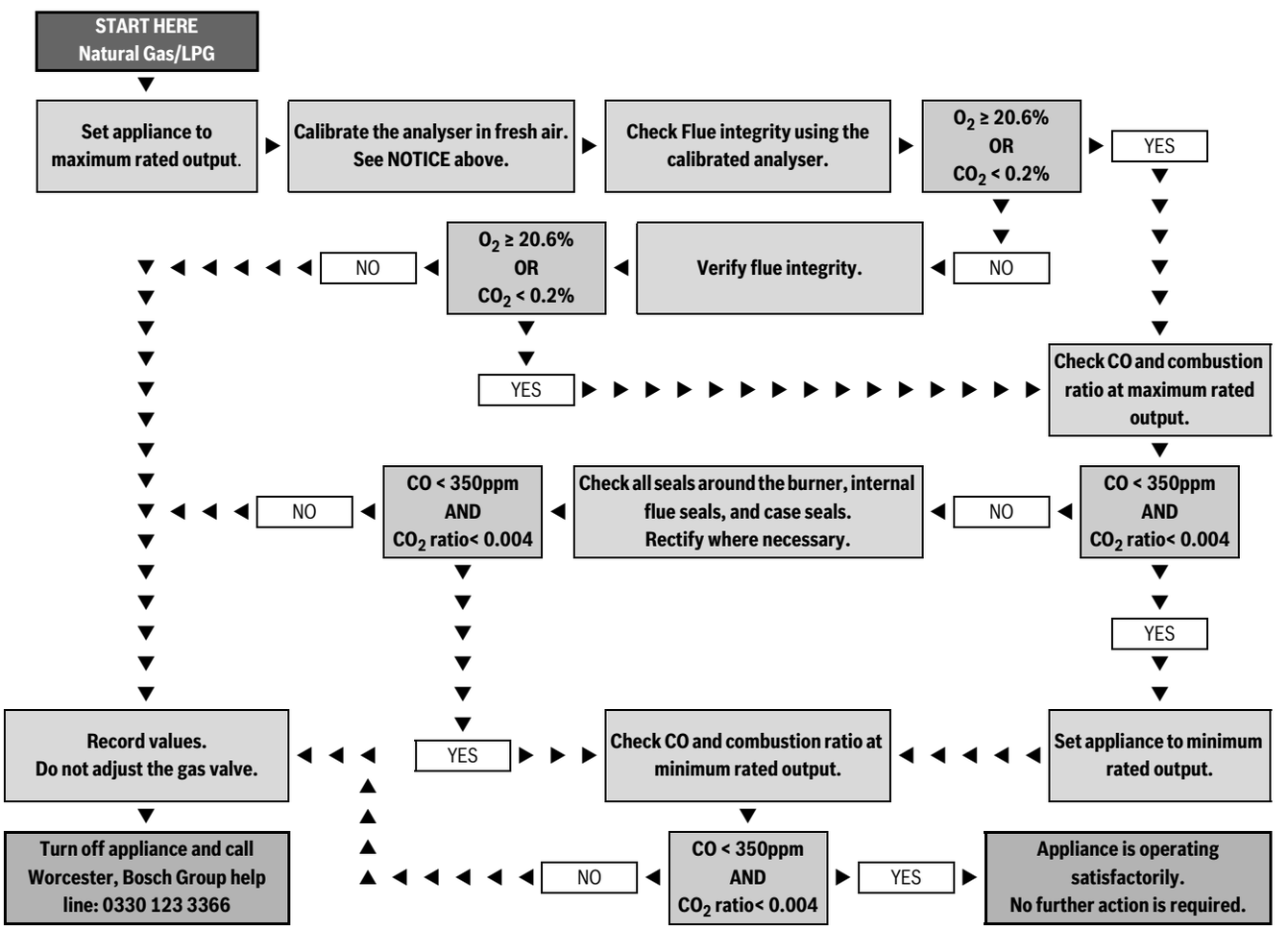

Table 24 Commissioning checks flow chart

[<] Less than
[≥] Greater than or equal to

6.10 Checking flue integrity

Flue integrity check

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

The integrity of the flue system can be checked via the sample point to the top right hand side of the combustion chamber (→ Fig. 79).

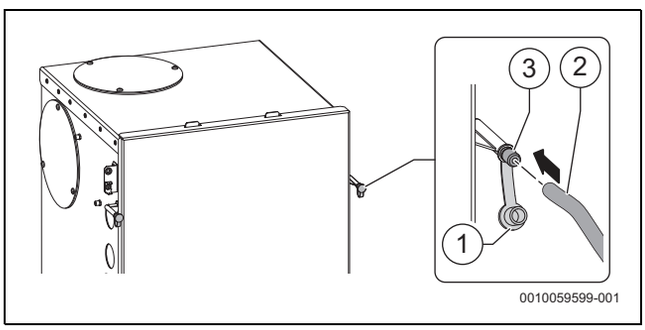

Fig. 79 Flue integrity check test point

[1] Air inlet test point cap
[2] Analyser probe sampling hose
[3] Air inlet test point

- ▶ With the appliance combustion casing on and the appliance running at maximum output in chimney sweep mode (→ chapter 6.5 "Chimney sweep mode"), remove the test point cap [1] for the air inlet sample point [3].
- ▶ Connect the analyser probe to the air inlet sample point [3].
  - – You may need to connect a piece of rubber hose [2] between the analyser probe and the test point depending on the type of analyser.
- ▶ Allow the readings to stabilise and check that:
  - – O_2 is equal to, or greater than 20.6%
  - – CO_2 is less than 0.2%
- ▶ If the readings are outside these limits then this indicates that there is a problem with the flue system or combustion circuit.

6.11 Flue gas analysis

NOTICE

Combustion testing

- ▶ Combustion testing must be carried out by a competent qualified person. Testing must not be attempted unless the person carrying out the combustion check is equipped with a calibrated Flue Gas Analyser conforming to BS EN 50379 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 performance of the appliance can be checked via the sample point to the top left hand side of the combustion chamber (→ Fig. 80).

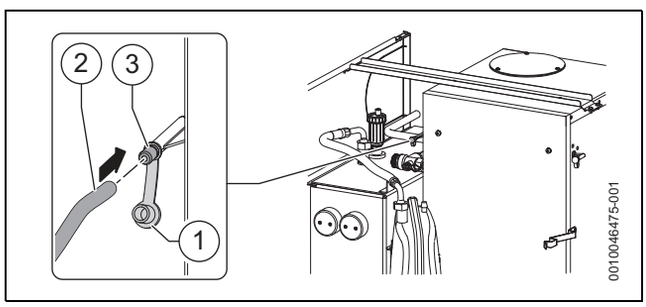

Fig. 80 Combustion test point

[1] Flue gas test point cap
[2] Analyser probe sampling hose
[3] Flue gas test point

The CO and combustion ratio are checked;

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

Appliance to maximum output

- ▶ Set the appliance running at maximum output in chimney sweep mode (→ chapter 6.5.1 "Setting the appliance to maximum").

Appliance to minimum output

- ▶ Set the appliance running at minimum output in chimney sweep mode (→ chapter 6.5.2 "Setting the appliance to minimum").
  - – Allow the appliance to stabilise at minimum output.

Measuring the CO and combustion ratio.

- ▶ Remove the test point cap[1] for the flue gas sample point [3].
- ▶ Connect the analyser probe to the flue gas sample point [3].
  - – You may need to connect a piece of rubber hose [2] between the analyser probe and the test point depending on the type of analyser.
- ▶ Check the CO and combustion ratio.

When running in maximum output in test mode, and the water temperature is 74°C or less, the appliance will operate both the central heating and DHW circuits with the internal diverter valve in the mid position. It will be necessary to run sufficient water through the DHW circuit to ensure that the appliance will not cycle on low heating demands. This is to allow sufficient time for the setting procedure. When the water temperature reaches 75°C the diverter valve will switch to CH only and will only return to the mid position if the temperature is 65°C or less.

6.12 Finishing commissioning

At the time of commissioning, complete all relevant sections of the Benchmark Checklist located in the Technical Specifications/Logs section of this document.

Benchmark menu

- ▶ Press and hold the and keys for approximately 3 seconds to enter the **Service menu**.
- ▶ Press the **ok** key to select the **Benchmark** menu.

Benchmark menu information:

- **Flow temp.**
- **DHW flow rate**
- **DHW act. temp.**

Appliance handover:

- ▶ Complete the Benchmark Gas Boiler Commissioning Checklist.
- ▶ Show the customer the special features of the appliance.
- ▶ Show the customer the efficiency tips in the User Instructions.
- ▶ Set up the appliance controls and show the customer how to operate all the control unit/s for central heating and DHW operation.
  - Also show where in the appliance/controls documentation where this information can be found.
- ▶ Where applicable, instruct the customer on:
  - How to check the system pressure and re-pressurise if necessary.
  - How to set the TRVs.
  - How to reset the appliance.
- ▶ Show the customer the fault finding section in the User Instructions.
- ▶ Show the customer where the serial number/appliance information is located, they will need this information if they call in with a problem (Benchmark Commissioning checklist on page 99 contains all relevant appliance information).
- ▶ Give the customer details of how to contact the installer/ gas emergency numbers.
- ▶ Show the customer how to safely isolate the appliance.
- ▶ Advise the customer where they can find information on the Worcester, Bosch Group website www.worcester-bosch.co.uk.
- ▶ Ensure that all documentation, is left with the appliance or homeowner.
  - Appliance documentation.
  - Controls documentation.
  - Any other equipment documentation that is connected to the appliance or system.
- ▶ Appliance not in use
  - If the appliance is not going to be used immediately and may be exposed to freezing conditions, advise the customer of the precautions necessary to prevent damage to the appliance, system and building.
  - If the appliance is unused and exposed to freezing conditions, safely isolate all the mains supplies and drain the system and appliance, label accordingly.
- ▶ Show the customer the location of the condensate pipe run in unheated or external areas that may be at risk of freezing during prolonged cold spells.
- ▶ **User recommendation:**
  - Advise the user to have the appliance and heating system thoroughly serviced annually by a competent, registered gas engineer, such as a Gas Safe registered engineer or British Gas engineer.
  - Present, where relevant, maintenance aids and reminders within the appliance menus.
  - Arrange an inspection/maintenance contract with an approved heating contractor.

CH control set point temperature set above the factory default of 60 °C.

If the factory default CH temperature has been adjusted.

- ▶ Note the change of temperature in the Benchmark Gas Boiler Commissioning Checklist.
- ▶ Inform the customer that the factory default CH temperature has been adjusted 65 °C or above and if a thermostatic mixing valve (TMV) at the point of use (e.g. before the bath hot tap or shower) to protect vulnerable people from scalding has been fitted.

6.12.1 Appliance/product guarantee

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

For full terms and conditions, please visit:

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

Guarantee registration

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

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

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

7 Operation

7.1 Safety instructions

NOTICE

Damage to appliance or system!

Running the appliance:

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

WARNING

Risk of scalding!

- ▶ This appliance is supplied with the CH control set at approximately 60 °C, a temperature that should be suitable for most installations. When the boiler switches from CH to DHW, the temperature of the hot water may briefly exceed the DHW set point if the CH temperature is set higher than the DHW temperature. If the CH temperature is changed to 65 °C or above, it is advisable to fit a thermostatic mixing valve (TMV) at the point of use (e.g. before the bath hot tap or shower) to protect vulnerable people from scalding.

7.2 Control panel

7.2.1 Control panel overview

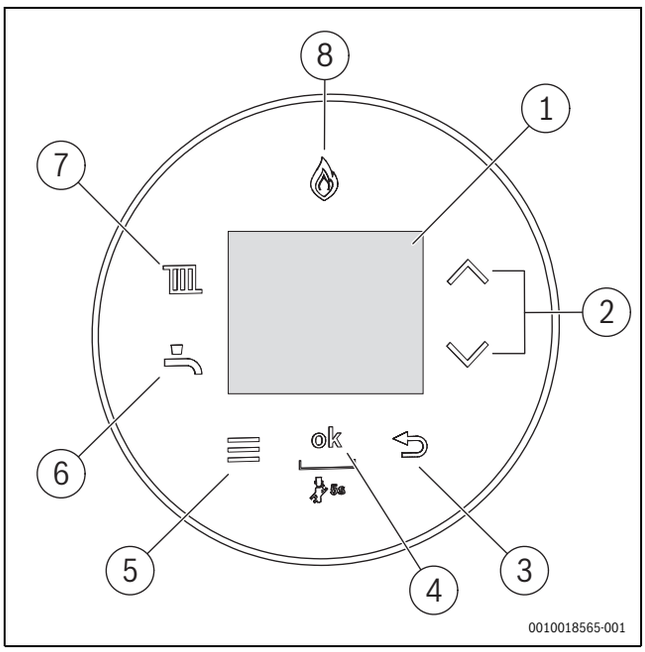

Fig. 81 Overview

[1] Display.
[2] ▲ and ▼ buttons: To navigate through menus and increase/decrease settings.
[3] ⮌ button: Return/back.
[4] **ok** button[1]:
– Confirm/save settings.
– Toggle between Eco and preheat mode.
– Chimney sweep button:
Press and hold for 5 seconds for chimney sweep mode.
[5] Menu button.
[6] Hot water button: Hot water mode home screen.
[7] Heating button: Heating mode home screen.
[8] Burner display: Illuminates when the burner is alight.

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

7.2.2 Temperature adjustment

Detailed operating settings

Appliance operation

▶ Refer to Operating Instructions for full details on setting the CH flow temperature, DHW temperature set point and the operating settings menu information.

Temperature adjustment overview
Central heating flow temperature adjustment.

With underfloor heating systems observe the maximum permissible flow temperature.

▶ Press the key.
The set maximum flow temperature appears.
▶ Press the ▲ or ▼ keys to set the desired maximum flow temperature.
▶ The setting is saved automatically after two seconds.
Then the ✓ symbol is briefly displayed.

Hot water temperature adjustment.

▶ Press the key.
The set DHW temperature appears.
▶ To set the desired DHW temperature, press the ▲ or ▼ keys.
▶ The setting is saved automatically after two seconds.
Then the ✓ symbol is briefly displayed.

7.3 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.

7.3.1 Operating the service menu

Opening the service menu

▶ Press the key and the key simultaneously until the service menu appears.

Closing the service menu

▶ Press the key or the 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.

1) When the display is in power save mode the **ok** button will re-activate the screen

7.3.2 Overview of the Service menu

Benchmark

- Flow temp.
- Return temp.
- DHW flow rate
- Hot water temp.

Info

- Current status
- Current fault
- Fault history
- Boiler
  - Max. heat output
  - Flow temp.
  - Set flow temp.
  - HEx temperature
  - Low-loss hdr.tmp [1]
  - Act. burner mod.
  - Burner output
  - Ionisation current
  - Pump mod.
  - Outside temp.
  - HC1 pump [1]
  - Burner starts
  - Hours run
  - System pressure
- Hot water
  - Max. DHW output
  - DHW flow rate
  - DHW act. temp.
  - Hot water temp.
  - Inlet temp.
  - DHW set temp.
- Autom. filling [2]
  - System pressure
  - Last refill dur.
  - Status
  - Refilling active
- System
  - Contr.device ver.
  - Progr. unit ver.
  - Code plug no.
  - Code plug ver.
  - Key [3]

Settings

- Hydraulics
  - Low-loss header
  - DHW configuration
  - HC1 configuration
  - Pump config.
- Heating
  - Max. heat output
  - Standby time
  - Anticyc. temp. off
  - Anticycle temp. on
- Hot water
  - Turbine signal del.
  - DHW start del.
  - CH delay
  - Man. TD line
  - TD-Temperature
  - Max. TD duration
- Pump
  - Pump range map
  - Pump ctr. mode
  - Min. output [4]
  - Max. output [4]
  - Pump overrun
  - Min. Sys. Pres. [5]
  - Target Sys. Pres. [1]
  - Pump outp. overr.
- Special function
  - Ventilation func.
  - Siphon fill. prog.
  - 3-WV mid. pos.
  - Filling valve avail. [2]
    - Autom. filling
    - Min. Sys. Pres.
    - Target Sys. Pres.
    - Max. refill time
    - Htg. sys.type
    - Reset refilling
- Maintenance
  - Maintenance type
    - Without
    - Burner run time
    - Service date [6]
    - Boiler run time
  - Landlord [6]
    - End date
    - Maint. reminder
    - Installer tel. no.
- Limit values
  - Max. flow temp.
  - Max. DHW temp.
  - Min. boiler outp.
- Heating curve
  - Enable
  - Htg. curve base
  - Htg. curve end
  - Summer mode
  - Frost prot.
  - Frost temp. limit

1) Only Visible if **Low-loss header** and **HC1 pump** activated in settings menu.
2) Menu items only visible if automatic filling facility fitted
3) Only available with installed Key Timer (accessory)
4) Available when **Pump range map** has been changed to **Output dependent**
5) Menu item only visible if automatic filling facility not fitted
6) Only available with compatible heating controller (accessory), e.g. Key Timer

Function check

- Activate test [1)]
  - Burner
  - Ignition
  - Fan
  - Pump
  - 3-way valve
  - DHW circ. pump
  - Ionisat.oscill.

Reset

- Default setting
- Service display [2)]
- Fault history
- Hidden menu: Reset Maintenance Landlord

Demo mode

- Yes
- No

1) When the Function Check menu is entered only **Burner** will be visible for the first 10 seconds, after this period of time the other components that can be tested will appear in the menu. Components such as HC1 pump, DHW circulation pump and Solar pump will show if connected to the control board.

2) Available when **Maintenance** has been activated

7.3.3 Benchmark Menu

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

Table 25 Benchmark menu

7.3.4 Service Info Menu

Menu item		Remark/restriction
Current status		→ 10.2 "Operating and fault displays", page 80 for operating codes.
Current fault		→ 10.2 "Operating and fault displays", page 80 for fault codes.
Fault history		Last 10 faults in chronological order
Boiler		
	Max. heat output	Maximum heating output in kW
	Flow temp.	Current flow temperature in °C
	Set flow temp.	Target flow temperature in °C
	HEx temperature	Primary heat exchanger temperaturei n °C
	Low-loss hdr.tmp [1]	Temperature in low loss header in °C
	Act. burner mod.	Current burner modulation %
	Burner output	Current burner output in kW
	Ionisation current	Current ionisation current in µA
	Pump mod.	Current pump modulation %
	Outside temp. [2]	Current outside temperature in °C
	HC1 pump [3]	
	Burner starts	Number of burner starts since commissioning
	Hours run	Run time of the system since commissioning
	System pressure	Current system pressure in bar
Hot water		
	Max. DHW output	Maximum DHW Output in kW
	DHW flow rate	Current DHW flow rate in l/min
	DHW act. temp.	Current domestic hot water temperature in °C
	Hot water temp.	Current domestic hot water temperature in °C
	Inlet temp.	Cold mains inlet temperature in °C
	DHW set temp.	DHW target temperature in °C
Autom. filling[4]		
	System pressure	Current operating pressure in bar
	Last refill dur.	Duration of last refill in seconds
	Status	Not ready/Ready
	Refilling active	Automatic filling On/Off
System		
	Contr.device ver.	Software version of the control device
	Progr. unit ver.	Software version of the control unit
	Code plug no.	Coding plug number
	Code plug ver.	Code plug version
	Key [5]	Type of control Key installed (→ accessory list)

1) Menu item only visible if activated

2) Menu item only visable if outdoor temperature sensor fitted.

3) Only Visible if Low-loss header and HC1 pump activated in settings menu.

4) Menu items only visible if automatic filling facility fitted

5) Only available with installed Key Timer (accessory)

Table 26 Info menu

7.3.5 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. Key Timer.

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

Menu item		Settings/adjustment range	Remark/restriction
Hydraulics			
	Low-loss header		Connection of temperature sensor on the low loss header • Low loss header installed, minimum pump output must be increased to 60% to ensure correct functionality (→ Pump > Min. output).
		• **Off**	• Low loss header not installed in the system
		• NTC on device	• Low loss header installed, temperature sensor connected to appliance
		• NTC on module	• Low loss header installed, temperature sensor connected to heating circuit module
		• NTC off	• Low loss header installed, but no temperature sensor connected
	DHW configuration	**3-way valve installed**	
	HC1 configuration	• Not installed (HC1 not available or not connected via the heating circuit module) • Dedicated pump inst. after low loss hdr. (only available if Low loss header is installed) • **No dedicated pump installed** (flow rate for HC1 is determined by the heating pump)	
	Pump config.	• None • **Heating pump**	
Heating			
	Max. heat output	• Dependent on the appliance output – 35kW: 50…**100**% – 50kW: 50…**100**%	Maximum released heat output [%]. Where applicable: ▶ Measure the gas rate. ▶ Compare the measurement with the appliance values (→ Chapter 13.1, page 93). ▶ Correct deviations.
	Standby time	• 3…**5**…60 min	The time interval specifies the minimum waiting time between switching on the burner and switching it on again in central heating mode. [1)]
	Anticyc. temp. off	• 2…**6**…15 K	The difference between the current flow temperature and the set flow temperature until the burner is switched off. [1)]
	Anticycle temp. on	• -15…**-6**…-2 K	The difference between the current flow temperature and the set flow temperature until the burner is switched on.
Hot water			
	Turbine signal del.	• **0.50**…4.00 s	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.	• **0**…50 s	The delay concerns heating mode 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 so that solar system DHW will reach the DHW temperature sensor earlier. This avoids unnecessary operation of the combi boiler. Set the heating mode delay in accordance with system conditions.
	CH delay	• 0…**1**…30 min	The heating mode is disabled for this period of time following DHW heating.

Menu item		Settings/adjustment range	Remark/restriction
Pump			
	Pump range map	• Output dependent (this is only option when LLH is installed) • Delta- P Dependent: – 1: constant pressure 150 mbar – 2: constant pressure 200 mbar – **3: constant pressure 250 mbar** – 4: constant pressure 300 mbar – 5: constant pressure 350 mbar – 6: constant pressure 400 mbar – 7: constant pressure 450 mbar	▶ In order to save energy and to keep potential flow noises to a minimum, set a low pump curve (→ Chapter 13.5, page 96).
	Pump ctr. mode	• Energy saving • **Heat demand**	• Save energy: intelligent shutdown of heat pump for heating systems with weather-compensated controller. The heating pump is only switched on if required. • With heat demand: the flow temperature controller switches the heating pump. If there is heat energy demand, the heating pump starts up with the burner.
	Min. output	• **10** ... 100 %	Pump output at minimum heat output. Only available with pump characteristic map 0. • Low loss header installed, minimum pump output must be increased to 60% to ensure correct functionality (→ Pump > Min. output).
	Max. output	• Min. output ... **100%**	Pump output at maximum heat output. Only available with pump characteristic map 0. • Can only be reduced to value set in Min. output.
	Pump overrun	• 1 ... **2** ... 60 min • 24 h	Overrun time of the heating pump: pump overrun begins when heat demand ends.
	Pump outp. overr.	• **10** ... 100%	Output of pump during pump overrun
Special function			
	Ventilation func.	• **Off** • Auto • On	The venting function can be switched on after maintenance work. During ventilation, the following appears in the info area of the standard display **Ventilation func.**
	Siphon fill. prog.	• Off (only permitted during maintenance) • **On, boiler min.** • On, heating min.	The siphon filling program is activated in the following cases: • Once the device is switched on using the On/Off switch • Once the burner was not in operation for at least 28 days • Once the operating mode is switched from summer to winter mode • Once the factory settings of the device have been restored The next time there is a heat demand, the device is held at low heat output for 15 minutes. The siphon filling program remains active until the device was in operation with low heat output for 15 minutes. During the siphon filling program the following appears in the info area of the standard display **Siphon fill. prog.**
	3-WV mid. pos.	• **No** • Yes	
	Filling valve avail.	• Yes • **No**	

Menu item		Settings/adjustment range	Remark/restriction
	Autom. filling [2]	• Autom. filling – Yes – **No** • Min. Sys. Pres.: 0.6 … **0.7** … 0.8 bar • Target Sys. Pres.: **1.0** … 1.7 bar • Max. refill time: **120** … 240 s • Htg. sys.type – **Small** – Medium – Large • Reset refilling – **No** – Yes	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 target pressure is reached. To protect against e.g. leakage, the filling valve closes in the following cases: • No pressure increase can be measured • The set filling time is exceeded If the maximum number of fillings is reached within the set blocking time, the filling valve does not open. Selecting the correct heating system size ensures the end user has enough manual fill operations available to them via the "Start filling" menu Htg. sys.type sizing: • Small, <8 radiators • Medium, 8 - 15 radiators • Large, >15 radiators Reset refilling. When selecting "Yes", the manual filling count is set to zero, providing the homeowner a full quota of available manual fill operations.
Maintenance			
	Maintenance type	• **Without** (off) – No reminder. • Burner run time: 1000 … **6000** h – Service reminder based on the number of hours the burner has been active, (1000 hours up to 6000 hours, default value in bold text. • Service date [3] – Service reminder where a specific calendar date can be selected. • Boiler run time: 1 … **12** … 72 months [3] – Service reminder based no the number of months the boiler has been operating, (1 month up to 72 months (6 years), default value in bold text). • Landlord [3] – Operates in the same way as service date with the additional option of reducing CH and DHW comfort.	**Landlord**: 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. Reduced functions are set at Maint. reminder: • DHW reduced: reduced comfort (max. 35 °C flow temperature) • Boiler off: central heating and hot water functions are set off.
Limit values			
	Max. flow temp.	• 30 … **60** … 82 °C	Limits the adjustment range for the flow temperature.
	Max. DHW temp.	• 35 … **55** °C	Limits the adjustment range for the domestic hot water temperature.
	Min. boiler outp.	• **“Minimum rated output”** … increases up to – 35kW: 14 - 50% – 50kW: 12 - 50%	Minimum heat output depending on code plug, Max = – 35kW: 14 - 50% – 50kW: 12 - 50%%.
Heating curve			
	Enable	• Yes • **No**	To turn this function on, when connecting a weather sensor, select **Yes** to enable. 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	• **20** … 90 °C	This is only displayed if the control unit was activated. This can be used to set the base point of the heating curve, which corresponds to an outside temperature of +20 °C.
	Htg. curve end	• 20 … **90** °C	This is only displayed if the control unit was activated. This can be used to set the end point of the heating curve, which corresponds to an outside temperature of -10 °C.

Menu item		Settings/adjustment range	Remark/restriction
	Summer mode	• 0…**16**…30 °C	This is only displayed if the control unit was activated. This can be used to set the outside temperature threshold at which the heating system switches to summer mode.
	Frost prot.	• **Yes** • No	The appliance and the optional weather sensor frost protection provide the required functionality.
	Frost temp. limit	• 0…**5**…10 °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.

1) This setting is optimised by the outside temperature-controlled heating controller when connected

2) Menu items only visible if automatic filling facility fitted

3) Only available with compatible heating controller (accessory), e.g. Key Timer

Table 27 Settings menu

7.3.6 Function check Menu

Visibility of the **Activate test** sub-menus.

▶ The **Burner** test will appear instantly in the sub-menu and after a further 10 seconds the other components that can be tested will appear in the menu.

Menu item		Settings/adjustment range	Remark/restriction
Activate test			
	Burner	• **Off** …100 %	This service function enables you to test the burner by adjusting the appliance output.
	Ignition	• On • **Off**	Permanent ignition. Testing the ignition by means of permanent ignition without gas supply. ▶ To prevent damage to the ignition transformer: leave the function switched on for a maximum of **2 minutes**.
	Fan	• On • **Off**	Permanent fan operation. Fan runs without gas supply or ignition.
	Pump	• On • **Off**	Permanent primary circulation pump operation.
	3-way valve	• **Heating** • Hot water	Permanent position of the 3-way valve.
	Ionisat.oscill.	• On • **Off**	Check the ionisation measurement function at the flame.
	HC1 pump [1]	• On • **Off**	Selecting "On" will permanently run the pump until switched off.
	DHW circ. pump [2]	• On • **Off**	Selecting "On" will permanently run the pump until switched off.
	Solar pump [2]	• On • **Off**	Selecting "On" will permanently run the pump until switched off.

1) Menu item only visible if Low-loss header and HC1 configuration activated with a pump connected to the corresponding appliance control unit connection.

2) Menu item only visible if a pump is connected to the corresponding appliance control unit connection.

Table 28 Function check Menu

7.3.7 Reset menu

Menu item	Settings/adjustment range	Remark/restriction
Default setting	Restore?	Restore factory settings. ▶ The system needs to be re-commissioned following this reset!
Service display[1)]	Reset?	Reset maintenance period.
Fault history	Delete?	▶ Reset the maintenance first. The fault history is deleted. Unresolved faults will re-appear after fault history reset

1) Service display sub-menu only avaialble if maintnenace options have been selected.

Table 29 Reset menu

7.3.8 Demo mode Menu

Demo mode enables users to navigate through the appliance menus without gas or water supplied to the appliance. Demo mode is designed to increase product familiarity in a pre-sales environment.

Menu item	Settings/adjustment range	Remark/restriction
Demo mode	• Yes • **No**	▶ To exit Demo mode: switch the appliance power off and back on.

Table 30 Menu Demo mode

7.4 Automatic filling device daily operation

- No operator intervention is required when filling the system using the automatic filling device. The automatic filling device automatically maintains the desired system pressure.
- Additionally, the automatic filling device is capable of diagnosing low sanitary water pressure or a leak in the heating system.
  - Refer to appliance Service menu and Troubleshooting sections for information on the function and fault codes.

A few drops of water may leak from the back-flow preventer drain due to pressure fluctuations in the heating system and sanitary water circuit. This is a safety feature.
In case of continuous leakage please contact your service representative.

8 Decommissioning

8.1 Safety instructions

⚠ Switching off the appliance - Anti-seizing function

The anti-seizing function prevents the heating pump and the 3-way valve from seizing up following long periods of inactivity. The anti-seizing function is not active when the appliance is switched off.

- ▶ Switch off the appliance.
- ▶ During longer shut-down periods: observe the frost protection.

⚠ Damage caused by frost

The system can freeze if it is switched off:

- ▶ Observe the notices regarding frost protection.
- ▶ Due to the additional functions, e.g. DHW heating or pump anti-seizure protection, the system should always be left on.
- ▶ Have faults rectified immediately.

8.2 Temporary Decommissioning

8.2.1 Setting frost protection

Appliance frost protection:

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

Frost protection for the heating system

Frost protection with the appliance switched on.

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

- ▶ Leave the heating switched on.
- ▶ Set the room thermostat to 12 °C.
  - – This limits the appliance to only fire if the property is below 12 °C but still maintains a safe temperature level, protecting the property and appliance from frost damage.

For further information, see the heating controller operating instructions.

Frost protection can also be achieved for systems with Worcester weather compensating controls installed.

- ▶ Refer to controller instructions for more details.

If installed in an internal unheated area, such as a basement or garage, additional protection is recommended to protect the pipework.
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 pipework.
  It is recommend that the frost thermostat is sited in the coldest unheated area in which pipework is located and that it is set to call for heat at 5 °C. The Pipe thermostat 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 pipework in the internal unheated area should be insulated.

Frost protection when the appliance is switched off.

- ▶ Mix Worcester approved anti-freeze into the heating water (→ Chapter Cleaning primary systems, page 30) and drain the DHW circuit.

-or-

- ▶ Drain the heating system and DHW pipework at the lowest point.

8.3 Recommissioning after Standstill

Recommission the appliance.

- ▶ Following temporary decommissioning an approved contractor must recommission the appliance following the details covered in section 6 "Commissioning".

8.4 Final Decommissioning

Decommission the appliance.

⚠ WARNING

Risk of scalding

Hot water can cause severe burns.

- ▶ Ensure the water content of the primary system and appliance has cooled before draining water content.

- ▶ Switch off the appliance.
- ▶ Isolate from the power supply (230V AV) and secure against unintentional reconnection.
  - – Disconnect the appliance from the power supply.
- ▶ Isolate the main gas supply.
- ▶ Isolate from the gas supply via the appliance gas isolator.
  - – Disconnect the appliance from gas supply.

Primary system side

- ▶ Drain the primary system and appliance.
  - – Drain from the lowest point.
  - – This includes the primary system side of the hot water cylinder if fitted.

Domestic hot water side

- ▶ Close shut-off valve for cold water inlet.
- ▶ Drain the domestic hot water side.
  - – Drain from the lowest point.
- ▶ Close shut-off valves.

With the appliance disconnected, the system and appliance drained:

- ▶ Remove the old appliance in preparation for the replacement appliance.

9 Inspection and maintenance

9.1 Safety instructions

⚠ Notes for the target group

Only approved contractors may carry out inspection, cleaning and maintenance in compliance with the system-relevant instructions. Improper execution may result in personal injury, including danger to life or material damage.

- ▶ Inform the user of the possible consequences of non-existent or improper inspection, cleaning and maintenance.
- ▶ Inspect the heating system at least once a year.
- ▶ Carry out any required cleaning or maintenance work according to the checklist (→ page 100).
- ▶ Remedy all defects immediately.
- ▶ Check the heat exchanger assembly once a year, and if necessary clean it.
- ▶ Use only original spare parts.
- ▶ Observe the service life of gaskets.
- ▶ Replace removed gaskets and O-rings with new ones.
- ▶ Record any work carried out.

⚠ Annual maintenance checks

Annual maintenance checks have to be conducted to ensure the continued safe and reliable operation of the appliance.

- ▶ During each maintenance check, the gas valve, all gas joints and test points should be checked for leakage using an analyser/gas sniffer/ leak detection fluid.
- ▶ If a leak is found on the gas valve then it needs replacing as a gas valve is a non-repairable component.

⚠ Danger to life through electric shock!

Touching live parts can result in an electric shock.

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

⚠ Risk of death from escaping flue gas!

Escaping flue gas can cause poisoning.

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

⚠ Risk of explosion from escaping gas!

Escaping gas can cause an explosion.

- ▶ Close the gas isolator prior to working on gas-carrying components.
- ▶ Carry out tightness test.

⚠ 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.

⚠ Risk of injury from Hot surfaces!

If the appliance has been operating components may be hot.

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

⚠ Risk of scalding from hot water!

Hot water can lead to severe scalding.

- ▶ Make residents aware of the risk of scalding prior to activating the chimney sweep mode or a thermal disinfection.
- ▶ Carry out thermal disinfection outside the normal hours of use.
- ▶ Do not change the maximum domestic hot water temperature set.

⚠ Escaping water can damage the device.

The control device can be damaged by escaping water.

- ▶ Cover the control device prior to work on parts routing water.

⚠ Resources for inspection and maintenance

- The following measuring devices are required:
  - Electronic flue gas analyser for CO_2, O_2, 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.

⚠ Gaskets and seals - gas related components!

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

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

⚠ Material damage due to chemicals!

Using chemicals during the cleaning of the heat exchanger assembly and associated parts or carrying out maintenance can damage the sealing components. This can cause exhaust gas to escape during operation.

- ▶ Do not use chemicals to flush the heat exchanger assembly and associated gas carrying components.

⚠ Prior to inspection/maintenance

- ▶ Depressurise the appliance on the heating and DHW side before working on water routing components.

⚠ After the inspection/maintenance

- ▶ Re-tighten all the threaded connections that have been released.
- ▶ Restart the appliance (→ chapter 6.4, page 48).
- ▶ Check all joints for leaks.
- ▶ Check the gas/air ratio.

⚠ Maintenance of gas components

Maintenance should be performed by a qualified professional.

- ▶ When carrying out any work on the gas components, make sure that the appliance is no longer supplied with gas. The gas valve does not require any particular maintenance.
- ▶ When performing any operation near gas components, make sure that they are in good visual condition.

If a gas component is dismantled, the seals must be replaced with new seals supplied by Worcester.

- ▶ Do not repair, manipulate or deactivate the elements necessary for safety.
- ▶ Use only original spare parts.
- ▶ After any intervention on gas components, check for leaks.

⚠ Component replacement

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

9.1.1 Safety-relevant components

Safety-relevant components (e.g. air/gas ratio control valves) have a limited service life, which depends on their operating time in switching cycles or years.

If the operating time is exceeded or due to increased wear, the affected component may fail and the system safety may be lost.

- ▶ Do not repair, manipulate or disable safety-relevant components.
- ▶ Check safety-relevant components during every inspection and maintenance to determine the continued safety of the system.
- ▶ Replace safety-relevant components in the event of increased wear or at the latest when they have reached the end of their service life.
- ▶ Only use new and undamaged original spare parts for replacement.

Component	Check
Air/gas ratio control valve	▶ Check the air/gas ratio control valve housing for external gas tightness using an analyser certified for gas testing. ▶ Confirm the external gas tightness of the air/gas ratio control valve separately in the inspection and maintenance log.

Table 31 Checking safety-relevant components

CAUTION

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

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

- ▶ Do not use cleaning agent with flammable propellants.

⚠ Resources for inspection and maintenance

- The following measuring devices are required:
  - Electronic flue gas analyser for CO_2, O_2, 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.

9.2 Inspection and maintenance considerations

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

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

- ▶ Check all joints and connections in the system and remake any that show signs of leakage. Refill and re-pressurise if applicable as described in the commissioning section.
- ▶ When it is frequently necessary to add water to maintain pressure in the installation, even though no leaks have been discovered, perform an expansion vessel check.
- ▶ Check ancillary system equipment and appliance accessories are working as intended and any maintenance requirements are carried out according to manufactures instructions.
- ▶ Check that the condensate system is not obstructed, is clean and functioning correctly, including pipework, condensate trap, condensate pump where applicable. Ensuring that correct cleaning and maintenance is carried out for the condensate discharge device according to manufactures instructions.
- ▶ 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.

Maintenance reminder options

Accessing the maintenance reminder options.

- ▶ **Service menu** > **Settings** > **Special function** > **Maintenance**.

Options available.

- **Without** (off)
  - No reminder.
- **Burner run time**
  - Service reminder based on the number of hours the burner has been active, (1000 hours up to 6000 hours, default 6000 hours).
- **Boiler run time**
  - Service reminder based on the number of months the boiler has been operating, (1 month up to 72 months (6 years), default 12 months).
- **Service date** (Only available with installed Key Timer (accessory))
  - Service reminder where a specific calendar date can be selected.
- **Landlord function** (only available with installed Key Timer (accessory).
  - Operates in the same way as service date with the additional option of reducing CH and DHW comfort.

Maximum system pressure

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

9.3 Component access

Front panel removal

Refer to figure 82

- ▶ Grip the top outer sides of the front panel [1] pull forward to release the ball catches [2].
- ▶ Lift front panel upwards slightly to disengage from the lip on the baseplate.
- ▶ Store safely away from the working area.

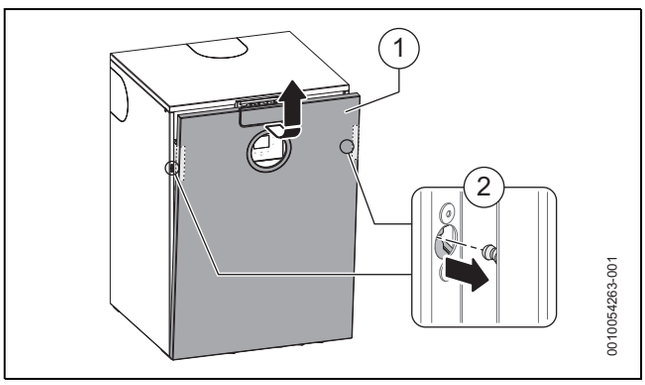

Fig. 82 Front panel removal

9.4 Checking the heat exchanger assembly

Fan pressure test

- ▶ Remove the cap from the test nipple, and connect a pressure manometer.

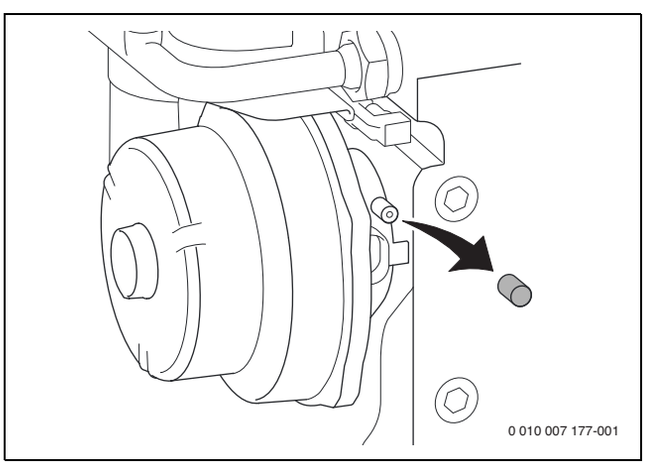

Fig. 83 Test nipple at the mixing device

- ▶ Check fan pressure at mixing device with appliance set to **maximum rated output** in chimney sweep mode.

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

The measurements in the following table/s will indicate if the heat exchanger assembly must be cleaned.

- ▶ Clean heat exchanger assembly if necessary (→ Section 9.9.3).
- ▶ Remove the pressure manometer.
- ▶ Attach cap to test nipple.
- ▶ Check the gas/air ratio.

Appliance values - Fan pressure test

Pressure check reading

- ▶ The pressure reading will be in negative values.

Natural Gas appliances

Appliance output	Cleaning required ⇦		No cleaning required ⇨	
	Value			
50kW	0 mbar ⇦	-6.0 mbar	-6.1 mbar ⇨	-12 mbar
35kW	0 mbar ⇦	-3.5 mbar	-3.6 mbar ⇨	-12 mbar

Table 32 Natural Gas values

LPG appliances

Appliance output	Cleaning required ⇦		No cleaning required ⇨	
	Value			
50kW	0 mbar ⇦	-6.0 mbar	-6.1 mbar ⇨	-12 mbar
35kW	0 mbar ⇦	-3.5 mbar	-3.6 mbar ⇨	-12 mbar

Table 33 LPG values

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

- ▶ The heat exchanger/exhaust path/condensate discharge device does not require attention.

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

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

9.5 Check working gas inlet pressure

NOTICE

Gas inlet pressure

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

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

9.6 Flue gas analysis

NOTICE

Combustion testing

- Combustion testing must be carried out to BS 7967 by a competent person. Testing must not be attempted unless the person carrying out the combustion check is equipped with a calibrated Combustion Analyser conforming to BS EN 50379 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 caps after the test has been completed.

- Set the appliance to maximum and minimum output in chimney sweep mode (→ 6.5 "Chimney sweep mode") for the flue gas analysis checks.
- Check that the readings conform to those given in the following tables. In addition to CO and CO/CO_2 ratio checks, also check the maximum and minimum CO_2 and O_2 percentage readings.

Appliance combustion contents settings

Gas type	Maximum rated output [1]			Minimum rated output [1]		
	CO_2	O_2	CO	CO_2	O_2	CO
Natural gas	9.5 % ± 0.2	4.0 %	<250ppm	8.6 % ± 0.2	5.5 %	<75ppm
Liquid propane (LPG)	10.8 % ± 0.2	4.6 %	<250ppm	10.2 % ± 0.2	5.5 %	<75ppm

1) Should be measured 10 minutes after firing the appliance

Table 34 Combustion contents settings

If the values are out of tolerance then please check:

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

After all checks have been completed and the values are still out of tolerance then contact Worcester, Bosch Group helpline 0330 123 3366 before making any adjustment to the gas valve.

9.7 Checking the flue integrity

NOTICE

- Check flue joints are secure, the terminal and the terminal guard, if fitted are clear and undamaged.
- Combustion testing must be carried out to BS 7967 by a competent person. Testing must not be attempted unless the person carrying out the combustion check is equipped with a calibrated Combustion Analyser conforming to BS EN 50379 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 cap after the test has been completed.

- Refer to chapter 6.10 "Checking flue integrity" and check that the readings conform to those given, confirming flue system and combustion circuit are ok.

9.8 Filter serving info

- Inspect and clean the system filter.
  - Refer to system filter instructions.

If access is difficult to the filter inlet valve.

- Use the flow isolation value to isolate the inlet into the filter.

9.9 Cleaning the condensate trap and heat exchanger

CAUTION

Risk of burns due to hot surfaces!

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

- Allow the appliance to cool down before carrying out any work.
- If necessary, wear protective gloves.

WARNING

Material damage due to hot flue gas! - Gaskets and seals - gas related components

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

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

NOTICE

Material damage due to chemicals

Using chemicals during the cleaning of the heat exchanger assembly and associated parts or carrying out maintenance can damage the sealing components. This can cause exhaust gas to escape during operation.

- Do not use chemicals to flush the heat exchanger assembly and associated gas carrying components.

Access to the heat exchanger

- ▶ Move the control panel into the service position.
- ▶ Remove the combustion door.
- ▶ Disconnect electrical wires to the fan, ignition transformer, spark electrodes, flue overheat thermostat, main heat exchanger temperature sensor and flow pipe temperature sensor.

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

- ▶ Flue way
- ▶ Fan assembly
- ▶ Ignition transformer
- ▶ Spark electrode assembly
- ▶ Burner housing, burner and gasket

9.9.1 Checking the burner

Refer to figure 84.

- ▶ Remove the burner cover in the sequence shown.
  - – Disconnect electrical wires from burner cover ground point.
  - – Unscrew the burner cover securing screws.
  - – Remove the burner cover.

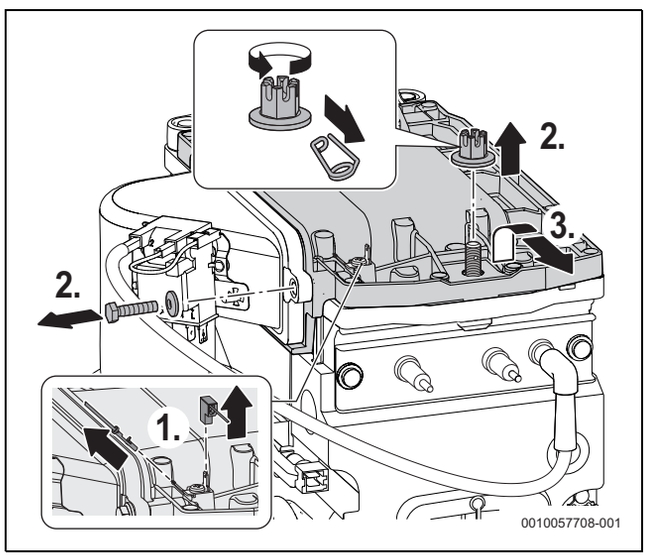

Fig. 84 Removing the burner cover

Refer to figure 85.

- ▶ Remove the burner and clean its components.
  - – Check for damage/cracks or deformation and for contamination, replace if required.
  - – Remove the gasket.

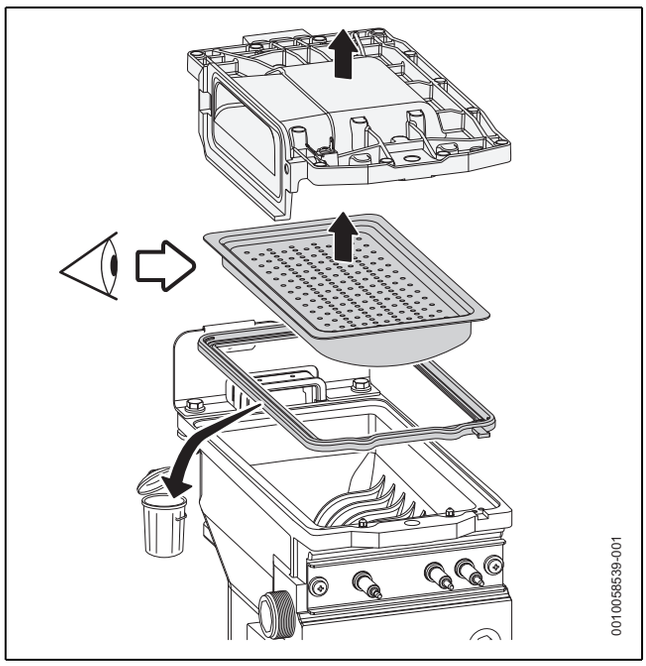

Fig. 85 Burner removal

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

With the burner and the burner cover refitted.

Refer to figure 86.

On re-assembly, to ensure a full gas tight seal, tighten the M8 nut down firmly, without over tightening.

- ▶ Tighten the securing nut in the sequence shown.
  - – Tighten the nut until the gap in front of the bolt is completely closed and the nut stops turning when the metal surfaces just touch.
  - – Ensure the spring clip is refitted through the castellated nut.

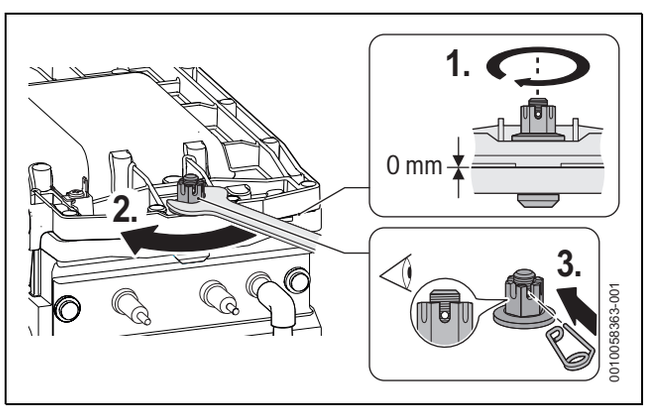

Fig. 86 Burner cover securing nut tightening

- ▶ Check the gas/air ratio.

9.9.2 Checking the non-return valve in the mixing device

Mixing device removal.

Refer to figure 87.

- ▶ Remove the mixing device in the sequence shown.
  - – Disconnect the cables from the ignition transformer.
  - – Loosen the screw [1] and nut [2] on the mixing device.
  - – Remove the mixing device.

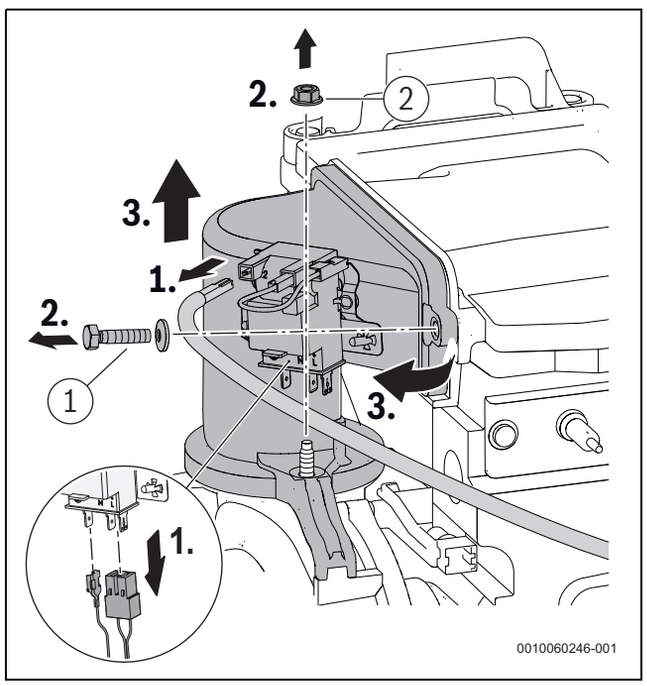

Fig. 87 Removing the mixing device

Non-return valve check.

Refer to figure 88.

- ▶ Remove and check the non-return valve in the sequence shown.
  - – Remove the non-return valve and seal.
  - – Ensure non-return valve moves freely.

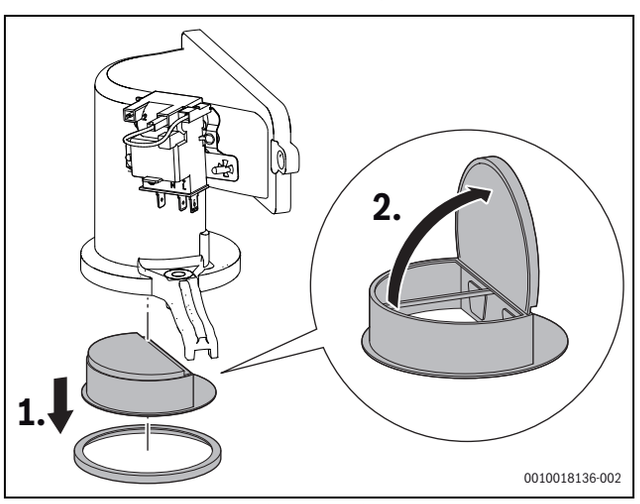

Fig. 88 Non-return valve in the mixing device

- ▶ Check for damage/cracks or deformation and for contamination, replace if required.
- ▶ Refit the non-return valve and seal.
- ▶ Refit the mixing device.
- ▶ Tighten the screw and nut ([1] and [2], Fig. 87) on the mixing device.
- ▶ Refit ignition transformer cables.

9.9.3 Cleaning the heat exchanger assembly

Cleaning the heat exchanger

- ▶ Remove the condensate trap and place a suitable container under the outlet to catch the water and debris.

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].

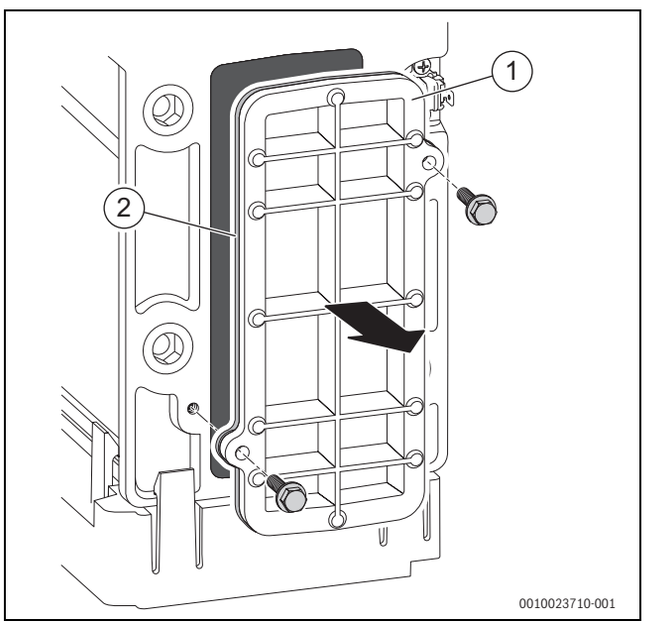

Fig. 89 Access cover removal

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

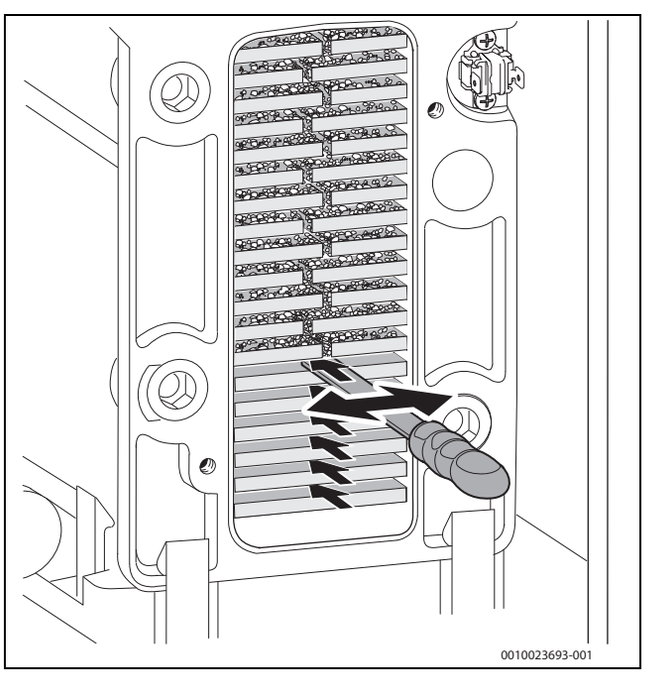

Fig. 90 Cleaning blade

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

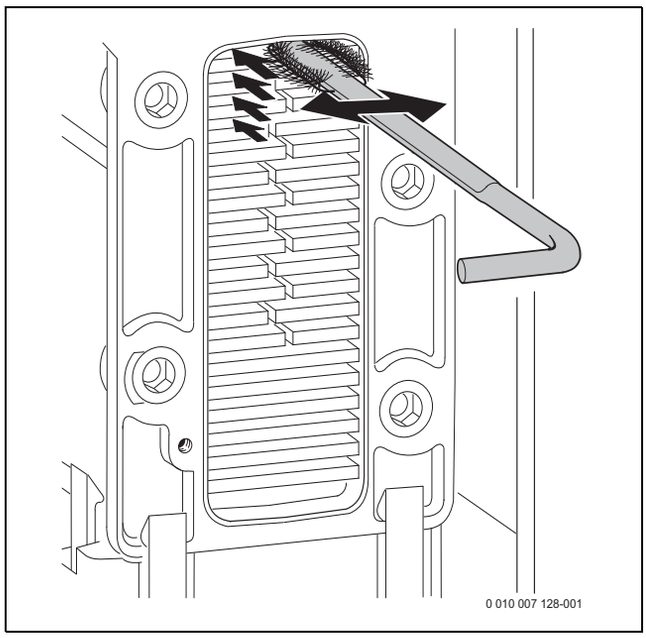

Fig. 91 Cleaning brush

▶ Use the handle of the brush to remove debris from the condensate tray (→ figure 93.).

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 condensate trap.

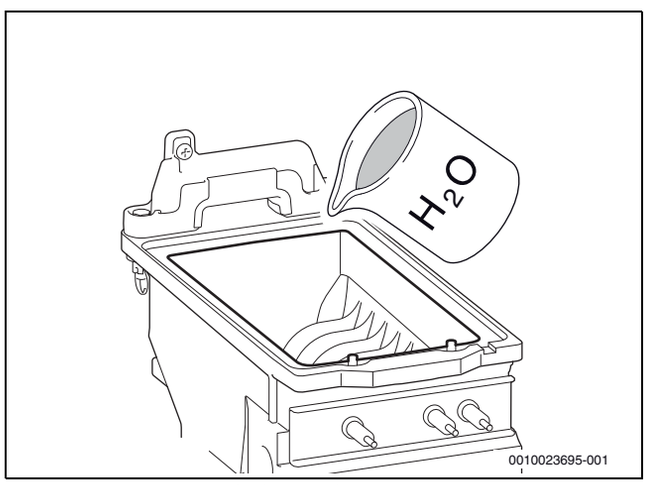

Fig. 92 Pour water into the heat exchanger

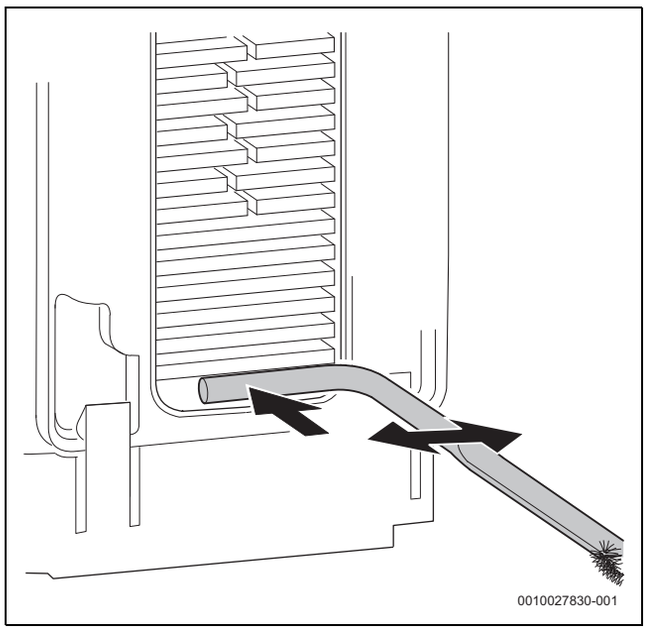

Fig. 93 Cleaning debris

▶ Refit the cleaning access cover assembly in reverse order the new seal [2], and the access cover [1].

▶ Fully tighten the bolts.

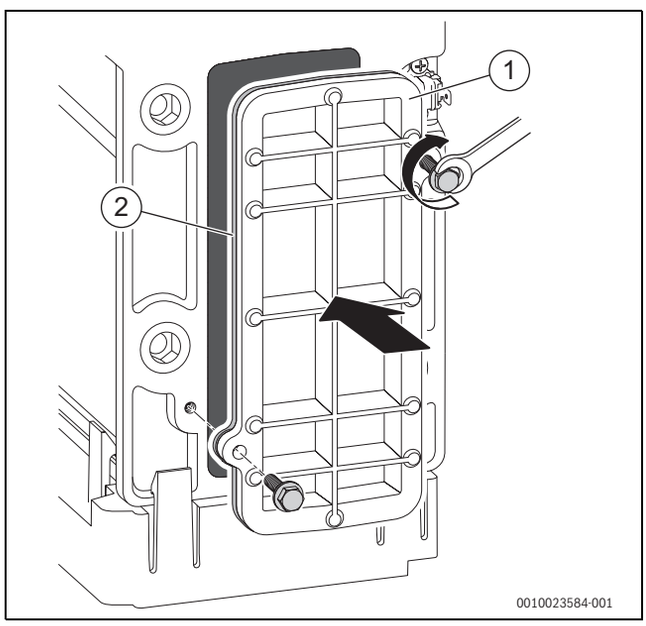

Fig. 94 Re-fitting the access cover

▶ Ensure that the convex side of the burner faces down into the heat exchanger when re-fitting the burner (→ section 9.9.1.

▶ Ensure seal is replaced with new seal and is correctly fitted.

▶ Check the condensate trap is clean before refitting to appliance.

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

9.9.4 Checking electrodes

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

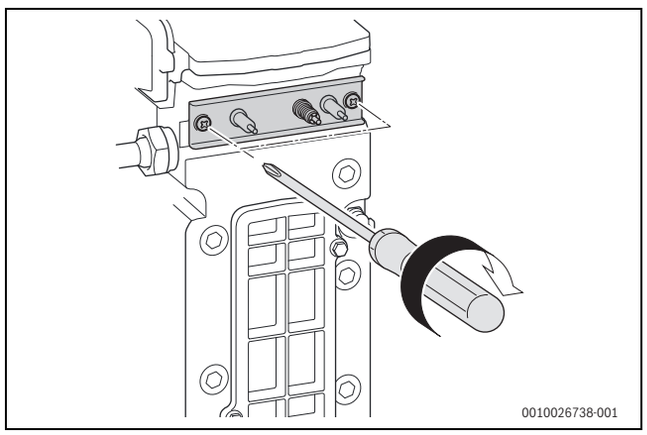

Fig. 95 Installing electrode set

- ▶ Check integrity of seal of electrode set.

NOTICE

To check the electrode seal, use either a mirror or a temperature probe:

Maintain a distance of about 10mm between the electrode seal and the mirror or temperature probe during the check. Do not use flue gas analysers or sniffers, as they may give false readings due to the heating of the gasket material.

- ▶ **Using a Mirror:** Move the mirror slowly around the perimeter of the electrode set and look for any misting on the glass.
- ▶ **Using a Temperature Probe:** Move the probe slowly around the perimeter and ensure there are no spikes in temperature.

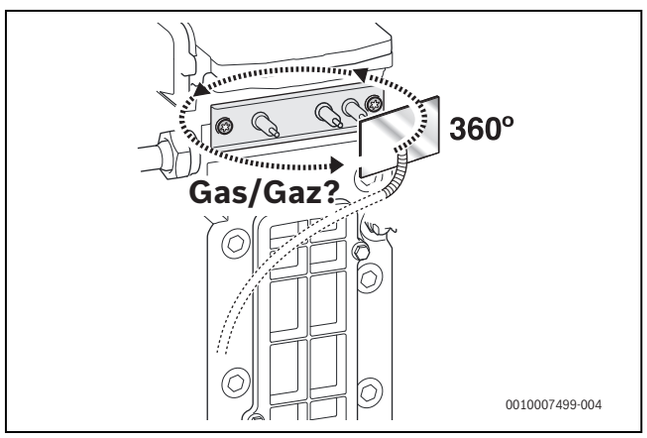

Fig. 96 Checking for leaks with an inspection mirror. Observe for misting.

9.9.5 Cleaning the condensate trap and pump

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.
- ▶ Ensure that the condensate discharge drains off properly.

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

- ▶ Check and clean the condensate trap during regular maintenance.

Refer to figure 97.

To remove the condensate trap for cleaning, you need to move the condensate discharge pump out of the way.

- ▶ Disconnect the condensate pipe [1] from the condensate trap(move the condensate pump to the back of the appliance or lift it out onto the floor).
- ▶ Remove the retaining screw [2].
- ▶ Release the locking spring [3].
- ▶ Pull the condensate trap [4] forwards to release it from the sump connection.

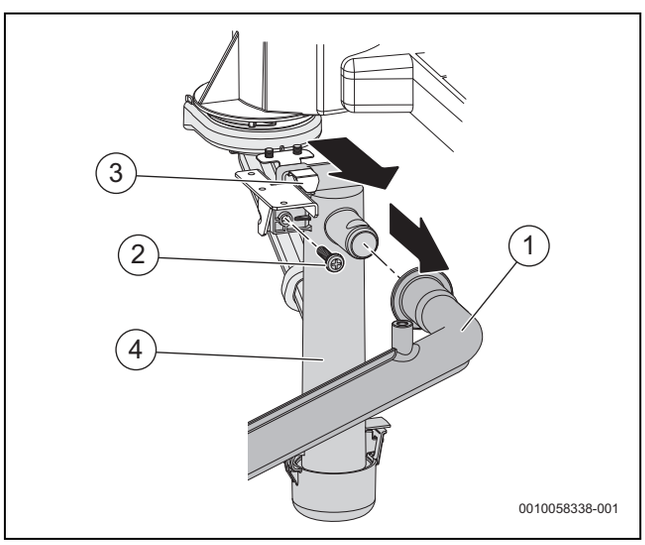

Fig. 97 Removing the condensate trap

- ▶ Tilt the condensate trap sideways and lift it out through the gap where the pump was sited.
- ▶ Clean the condensate trap.
  - The cleaning cap can be released and removed for cleaning.
  - 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.

Refer to figure 98.

- ▶ Fit replacement gasket [1] if required.
- ▶ Check the condensate pipe [5] and clean if required.
- ▶ Replace the condensate trap [2] and check for tightness.
  - – Ensure the locking spring [3] is engaged.
- ▶ Move the condensate pump back into position.
- ▶ Fit the condensate pipe [5] to the condensate trap.
- ▶ Secure with retaining screw [4].

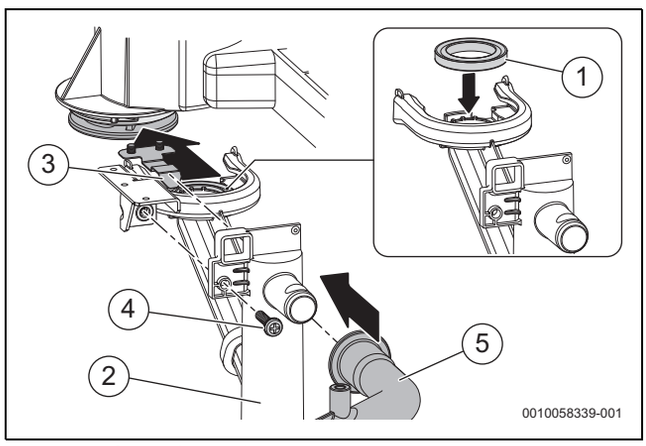

Fig. 98 Refitting the condensate trap

Cleaning the condensate pump

- ▶ Disconnect Hoses/Piping: Carefully disconnect inlet hose from the condensate trap. Refer to figure 44.
- ▶ Access Pump Reservoir:
  - – Locate the pump's lid or cover. Using a screwdriver, gently pry off the lid. Exercise caution to avoid over-stressing the material.
- ▶ Clean Reservoir/Base Tray:
  - – Carefully empty any remaining water from the pump's base tray.
  - – Using a damp cloth and a mild detergent, thoroughly clean the interior surfaces of the base tray to remove any sludge, mold, or debris.
  - – Rinse with clean water and wipe dry.
- ▶ Reassemble Pump:
  - – Replace the lid or cover, ensuring it is securely fastened.
  - – Reconnect Hoses/Piping: Reconnect the inlet hose to the condensate trap securely.Refer to figure 47.
- ▶ Check any connections in the discharge hose

9.10 Setting the air/gas ratio

NOTICE

Setting the air/gas ratio

- ▶ The combustion is factory set and should not 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 BS EN 50379 and is competent in its use.

All $CO/CO_2/O_2$ readings must be taken with the combustion chamber cover ON. Adjustments can only be made with the cover off.

CO_2/O_2 should be measured 10 minutes after firing the appliance.

Setting the minimum CO_2/O_2 content

- ▶ Set the appliance to minimum output in chimney sweep mode, (→ Chapter 6.5).
  With the appliance in minimum rated output.
- ▶ Remove the seal from the adjusting screw of the gas valve and set the CO_2/O_2 content for minimum rated output.

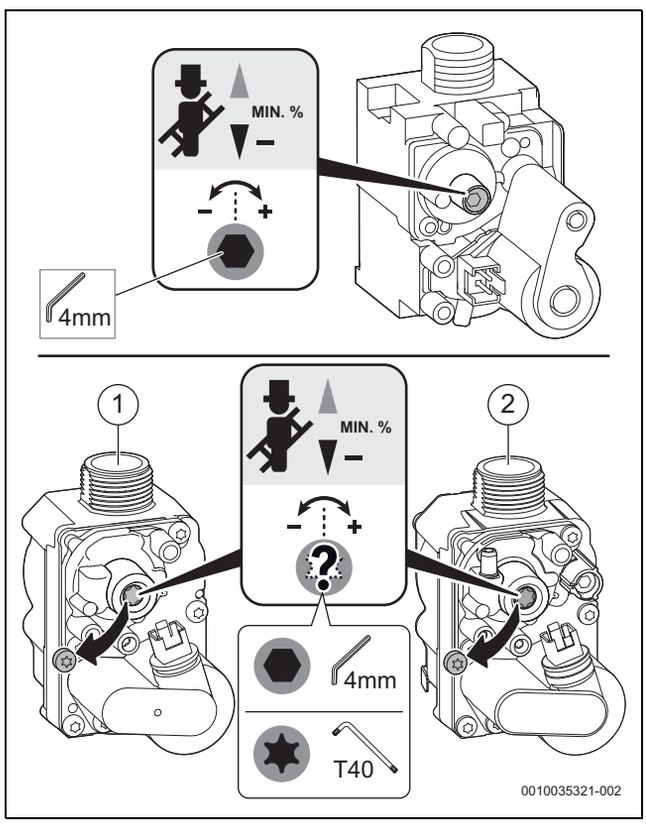

Fig. 99 Setting the CO_2/O_2 content (above: SIT valve, below: Resideo valves)

- ▶ Re-check settings at maximum and minimum rated output and re-adjust if required.
- ▶ Replace the security seal on the minimum adjustment point.
- ▶ Exit the chimney sweep mode.
- ▶ Enter the CO_2/O_2 contents in the servicing record.
- ▶ Remove the flue gas probe from the flue gas test port and refit the cap.

Setting the maximum CO_2/O_2 content

Adjustable venturi security seal

- Security Seal [2] (→ Fig. 100) must be removed before adjusting the Max CO_2/O_2 setting. Once adjustment has been made the seal must be replaced with part number 8 737 708 988.

- Set the appliance to maximum output in chimney sweep mode, (→ Chapter 6.6).
  With the appliance in minimum rated output.

Refer to figure 100.

- Remove the security seal [2] from the adjustable venturi [1] and set the CO_2/O_2 content for maximum rated output.

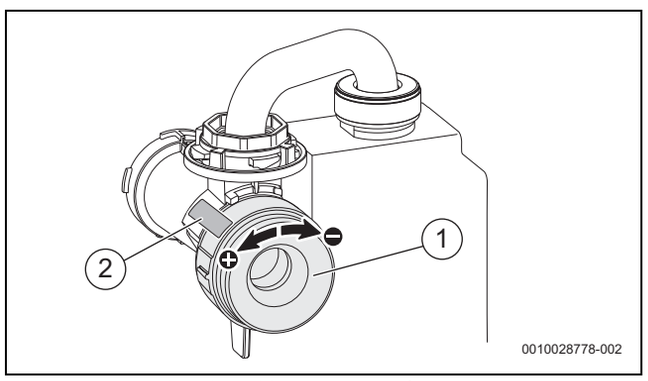

Fig. 100 Setting the adjustable venturi - CO_2/O_2 content

- Re-check settings at minimum and maximum rated output and re-adjust if required.
- Replace the security seal on the maximum adjustment point.
- Exit the chimney sweep mode.
- Enter the CO_2/O_2 contents in the servicing record.
- Remove the flue gas probe from the flue gas test port and refit the plug.

WARNING

Mains supplies - Isolate the appliance

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

WARNING

Component replacement:

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

Component locations within the appliance.

- Refer to Product overview for component locations (→page 9).

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

9.11 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.

- Before working on any water carrying pipework and components drain the appliance.

- 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.

9.12 Heat exchanger temperature limiter removal

Refer to figure 101.

- Remove the heat exchanger temperature limiter in the sequence shown.
  – Disconnect the cable from the heat exchanger temperature limiter.
  – Remove heat exchanger assembly temperature limiter.

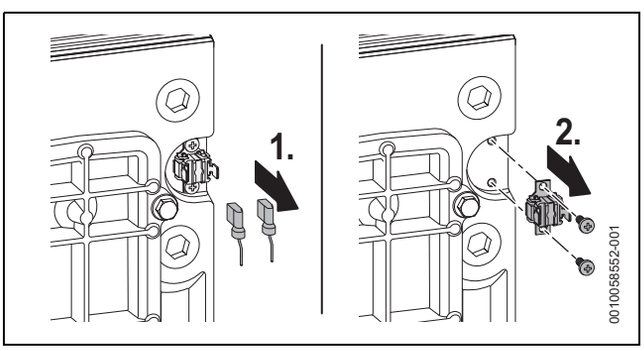

Fig. 101 Heat exchanger assembly temperature limiter removal

- Refit in reverse order.
  – Ensure that heat conductive paste is used when refitting.

9.13 Heat exchanger temperature sensor removal

Refer to figure 102.

▶ Remove the heat exchanger temperature sensor in the sequence shown.
  – Disconnect the cable from the heat exchanger temperature sensor.
  – Remove heat exchanger temperature sensor.

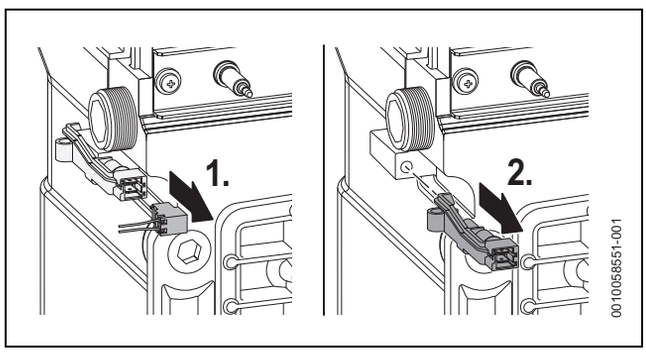

Fig. 102 Heat exchanger temperature sensor removal

▶ Refit in reverse order.
  – Ensure that heat conductive paste is used when refitting.

9.14 Flow temperature sensor removal

Refer to figure 103.

▶ Remove the flow temperature sensor in the sequence shown.
  – Disconnect the cable from the flow temperature sensor.
  – Remove flow temperature sensor.

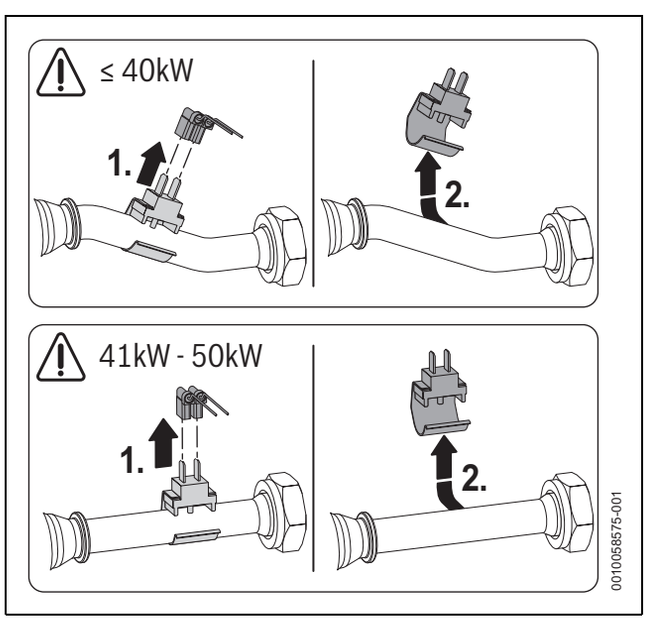

Fig. 103 Flow temperature sensor removal

▶ Refit in reverse order.

9.15 Venturi removal

Refer to figure 104.

▶ Remove the venturi in the sequence shown.
  – Undo venturi pipe connection.
  – Rotate the pipe connection to the right.
  – Twist to unlock venturi from mixing assembly.
  – Remove venturi.

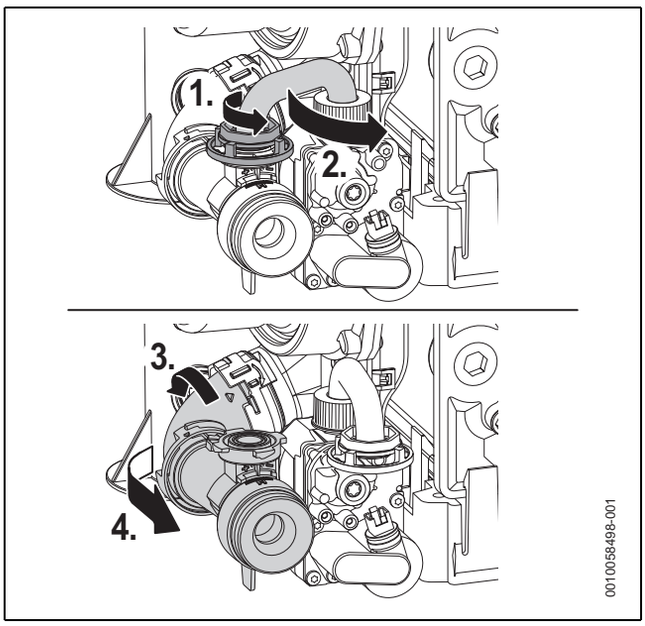

Fig. 104 Venturi removal

▶ Refit in reverse order.
  – Follow component replacement procedure for gas carrying components → 9.1.

9.16 Fan removal

Ensure the venturi is removed before removing the fan assembly (→ 9.15).

Refer to figure 105.

▶ Remove the fan in the sequence shown.
  – Disconnect fan cable and earth connector (the earth connector has a positive clip fixing).
  – Undo fan connection.
  – Lower fan assembly.
  – Tilt and lift fan over the gas valve to remove.

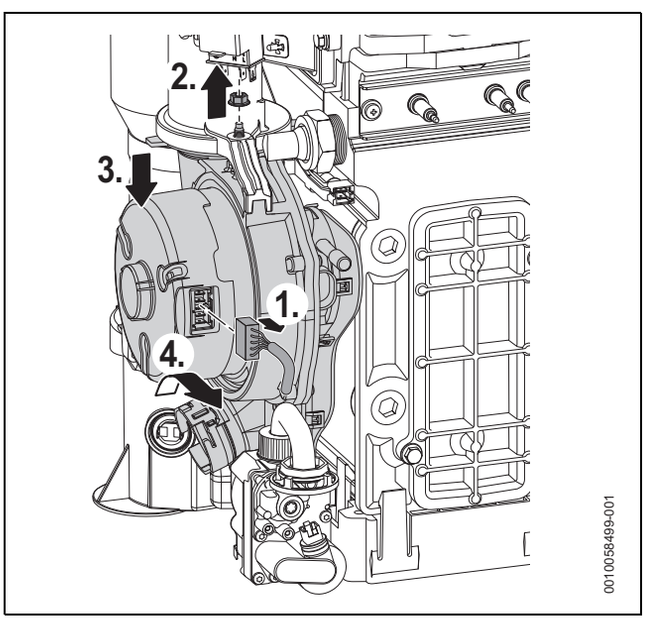

Fig. 105 Fan removal

▶ Refit in reverse order.
  – Follow component replacement procedure for gas carrying components → 9.1.

9.17 Ignition transformer removal

Refer to figure 106.

- ▶ Remove the ignition transformer in the sequence shown.
  - – Disconnect the cables from the ignition transformer.
  - – Remove ignition transformer.

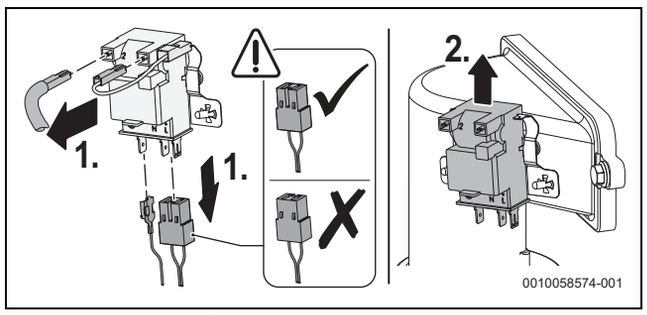

Fig. 106 Ignition transformer removal

- ▶ Refit in reverse order.
  - – Ensure the power connection plug is the correct orientation when refitting.

9.18 Heat exchanger assembly removal

NOTICE

Risk of water damage to appliance or property!

Damage from disconnecting water pathways.

- ▶ Ensure the appliance has been drained before removing component.

The following actions will have to be carried out to gain access and remove the heat exchanger assembly:

- ▶ The appliance is isolated and fully drained.
- ▶ Move the control unit into the service position.
- ▶ Remove the combustion cover.
- ▶ Disconnect electrical wires to the fan, electrode assembly, flue gas temperature limiter, temperature limiter and flow temperature sensor.
- ▶ Remove the heat exchanger temperature sensor.
- ▶ Remove the heat exchanger temperature limiter.
- ▶ Remove Fan assembly.
- ▶ Remove electrode assembly.
- ▶ Remove burner housing, burner and gasket.
- ▶ Disconnect the horizontal/vertical flue adaptor depending on flue exit configuration (Reverse the order of installing for the flue exit configuration → 5.2.5 "Appliance flue connection".
- ▶ Removal of condensate trap.

Separating components from the heat exchanger assembly.

Refer to figure 107.

- ▶ Disconnection of heat exchanger assembly in the sequence shown.
  - – Release the flow pipe union nut and detach the flow connection.
  - – Disconnect the cables from the flue gas temperature limiter.
  - – Remove the plastic nut from the base of the inner casing.
  - – Release the return pipe clip at the base of the heat exchanger.
  - – Release the return pipe union at the base of the heat exchanger.

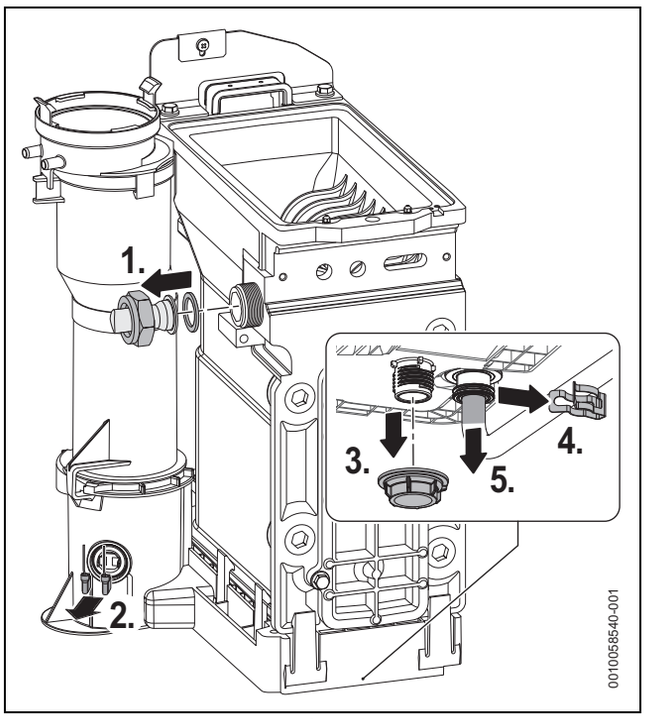

Fig. 107 Separating components from the heat exchanger assembly

Removing the heat exchanger assembly

Refer to figure 108.

- ▶ Ensure any electrical wires or connectors are safely out of the way before removing the heat exchanger assembly.
- ▶ Ensure he horizontal/vertical flue adaptor depending on flue exit configuration has been disconnected.
- ▶ Remove the heat exchanger assembly in the sequence shown.
  - – Remove securing screw of vertical locking bracket and rotate release.
  - – Remove securing screw of horizontal bracket plate and rotate to release.
  - – Release the exhaust pipe clip.
  - – Remove the exhaust pipe from the condensate catch pan (sump).
  - – Undo the securing bracket captive screw.
  - – Remove the heat exchanger assembly.
- ▶ Ensure that heat conductive paste is used on sensors when refitting.
- ▶ Check the seals and replace if necessary.

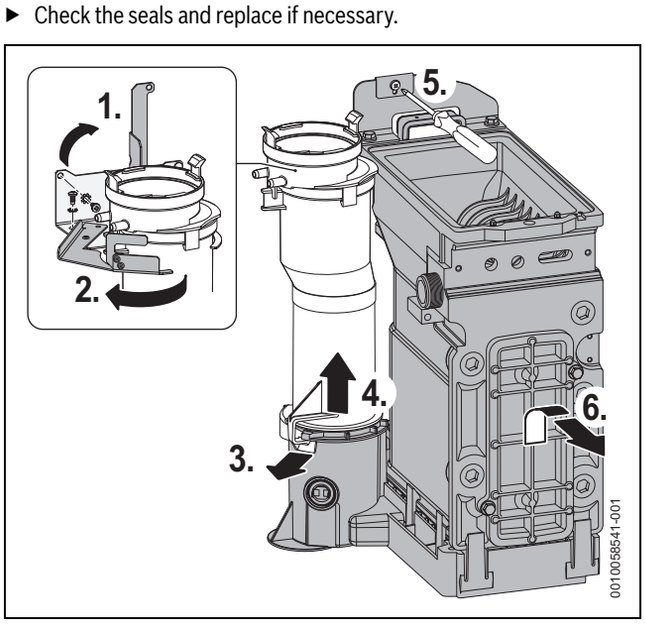

Fig. 108 Removing the heat exchanger assembly

9.19 Flue gas temperature limiter removal

NOTICE

Risk of component damage

▶ Take care not to damage the housing when removing the thermostat.

Refer to figure 109.

▶ Remove the flue gas temperature limiter in the sequence shown.
  – Disconnect the cables from the flue gas temperature limiter.
  – Using a small screwdriver, gently prise the thermostat from the housing taking care not to damage the housing or grommet.

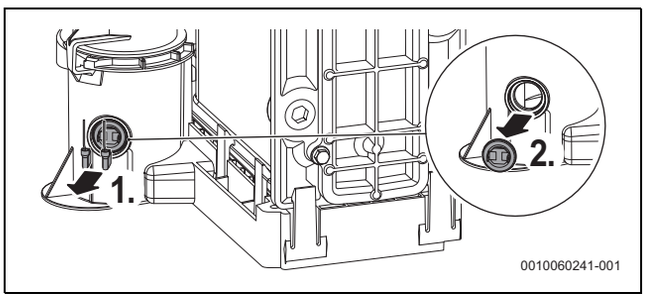

Fig. 109 Removing the flue gas temperature limiter

▶ To replace, push the thermostat and new grommet gently back into the opening until contact with the locating ridge is felt.

▶ The exhaust pipe will have to be removed if the thermostat falls into the housing, refer to figure 108, removing the exhaust pipe from the condensate catch pan (sump).

9.20 Gas valve removal

▶ Close the gas isolator.

Removing the gas pipe.

Refer to figure 110.

▶ Remove the gas pipe in the sequence shown.
  – Disconnect the cable.
  – Undo venturi pipe connection.
  – Unscrew union nut.
  – Remove gas pipe.

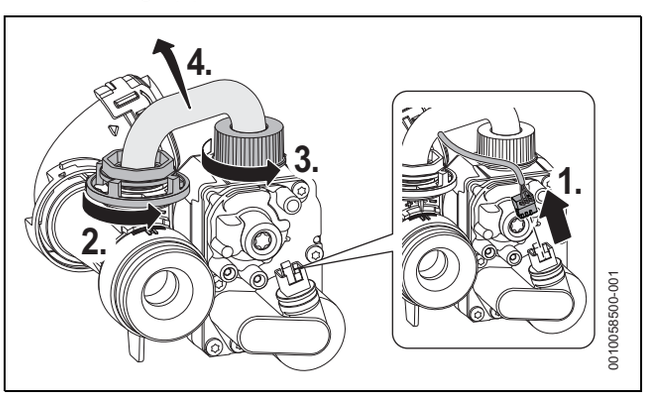

Fig. 110 Gas pipe removal

Removing the gas valve.

Refer to figure 111.

▶ Remove the gas valve in the sequence shown.
  – Unscrew union nut.
  – Remove the 2 screws.
  – Remove the gas valve.

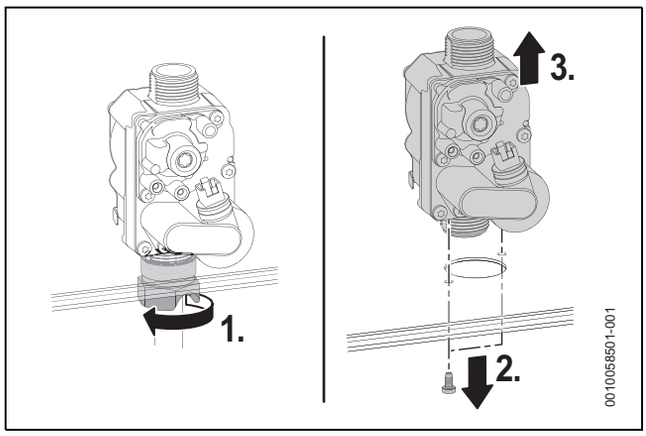

Fig. 111 Gas valve removal

▶ Install the gas valve in reverse order, and check the gas/air ratio.
  – Follow component replacement procedure for gas carrying components → 9.1.

9.21 DHW temperature sensor removal

Refer to figure 112.

▶ Remove the DHW temperature sensor in the sequence shown.
  – Disconnect the cable from the DHW temperature sensor.
  – Remove DHW temperature sensor.

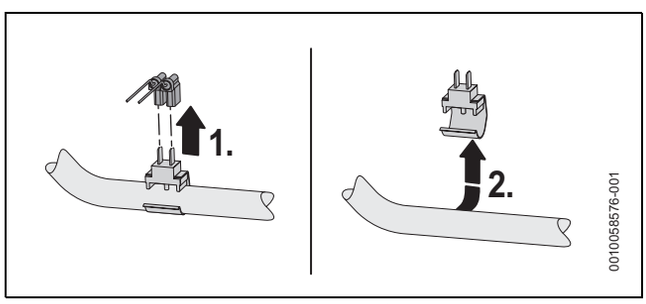

Fig. 112 DHW temperature sensor removal

▶ Refit in reverse order.

9.22 Checking the strainer in the cold water pipe and the flow turbine operation

Checking the strainer.

Refer to figure 113.

▶ Remove the clip [1].

▶ Loosen the cold water pipe nut [3] and disengage the pipe from the flow turbine.

▶ Pull the strainer [2] out of the cold water pipe [4].
  – Check for contamination and clean thoroughly.

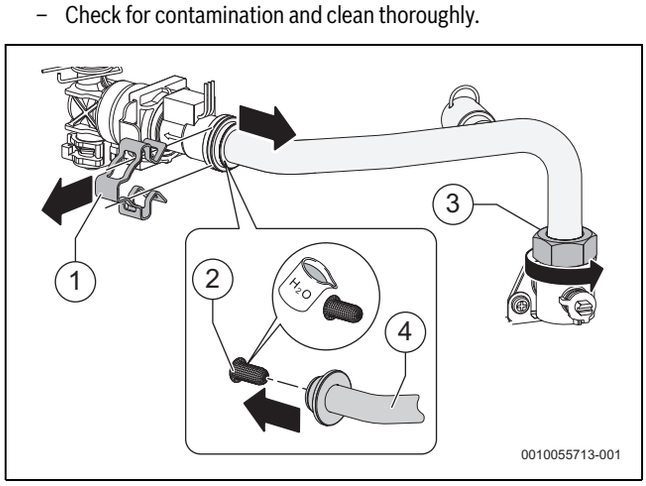

Fig. 113 Removing the strainer from the cold water pipe

Checking the flow turbine operation.
Refer to figure 114.

- ▶ Remove the clip [1].
- ▶ Pull out the flow turbine [2].
- ▶ Select in the **Service menu**> **Info** > **DHW flow rate**.
- ▶ Blow in the flow direction of the turbine [3],ensuring that the turbine spins.
- ▶ If nothing appears on the display, check the harness for damage and replace the turbine.
  - – Disconnect the electrical connection from the turbine and reconnect to replacement turbine.

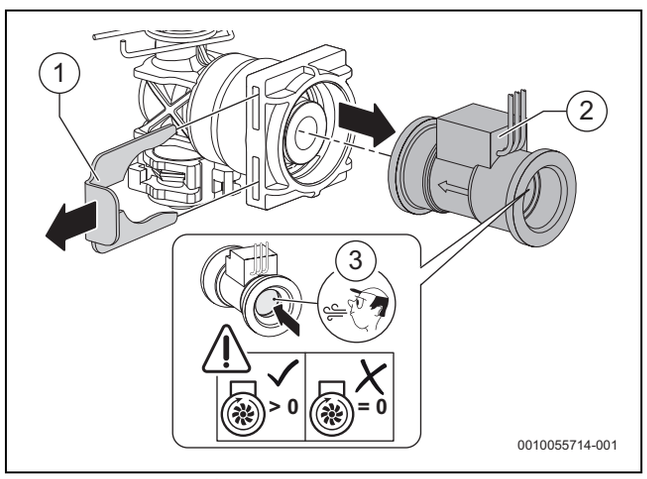

Fig. 114 Checking the flow turbine operation

9.23 Removing the pump

- ▶ Unplug the electrical connections [4].
- ▶ Release the ratchet connection [2] between pump and heat exchanger assembly.
- ▶ Loosen the securing screws [1].
- ▶ Remove pump assembly [3].

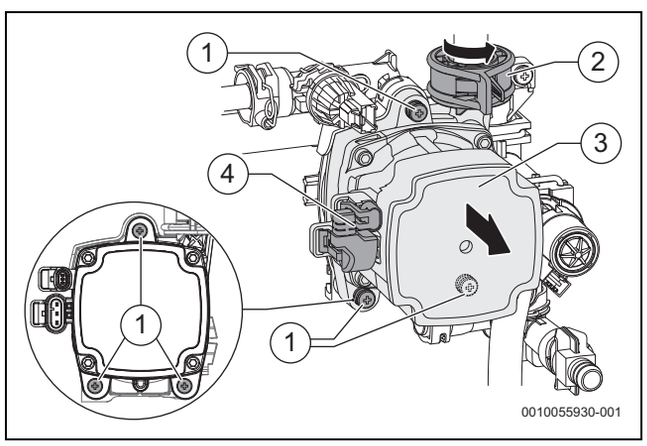

Fig. 115 Removing the pump

- ▶ Install the pump in reverse order.

9.24 Checking/replacing the motor of the 3-way valve

Checking 3-way valve motor.

- ▶ Carry out function check of 3-way valve motor in **Function check** menu.
  - – **Service menu** > **Function check** > **Activate test** [1)] > **3-way valve** > **Hot water**.

3-Way Valve removal

Detaching the motor.

- ▶ Set the 3-way valve to mid position.
  - – **Service menu** > **Settings** > **Special function** > **3-WV mid. pos.**> **Yes**.

The 3-way valve remains at the middle position for approx. 15 minutes.

- ▶ Detach the motor in the sequence shown.
  - – Disconnect the plug.
  - – Remove the screws.
  - – Pull on the motor gently and lift it up.
  - – Remove the motor.

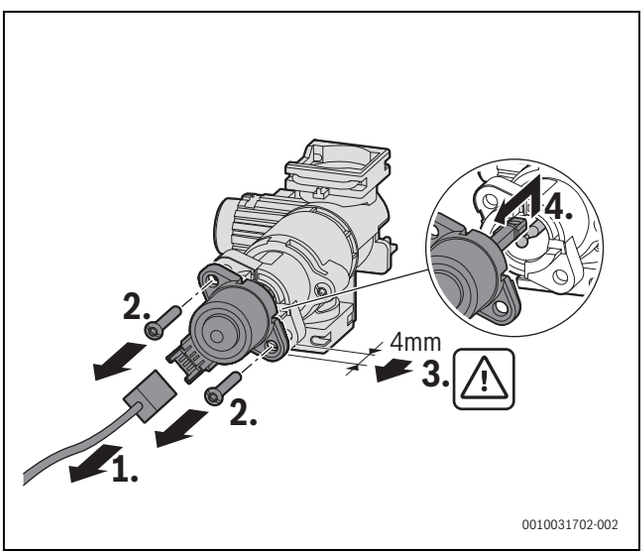

Fig. 116 Detaching the motor from the 3-way valve (variant with screws)

Installing the motor.

When suspending the motor, do not push against the ball head, as it will be hard to pull it out again.

- ▶ Install the motor in the sequence shown.
  - – Insert the motor and align above the ball head. Push down to engage.
  - – Pull gently on the motor to ensure it has properly engaged onto the ball.
  - – Push the motor in and fasten it in place using 2 screws.
  - – Connect the plug.

1) When the Function Check menu is entered only **Burner** will be visible for the first 10 seconds, after this period of time the other components that can be tested will appear in the menu. Components such as HC1 pump, DHW circulation pump and Solar pump will show if connected to the control board.

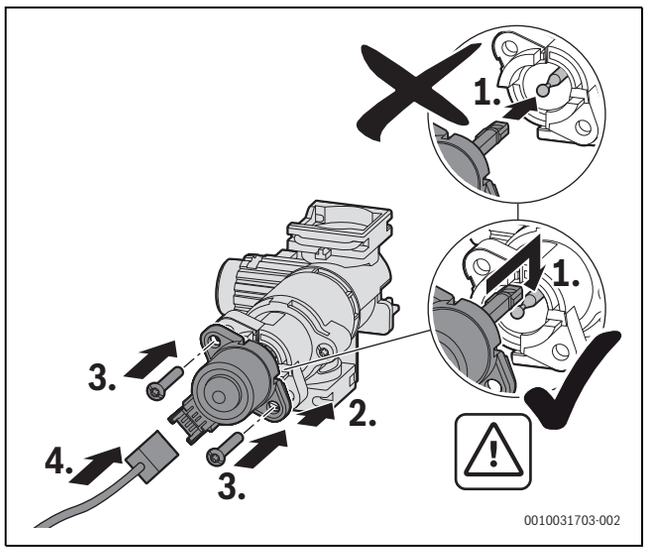

Fig. 117 Installing the motor in the 3-way valve (variant with screws)

9.25 Combi boilers: checking the plate heat exchanger

- ▶ Check the strainer in the cold water pipe for contamination (→ Chapter 9.22, page 77).
- ▶ Descale the plate heat exchanger with scale removal agent approved for stainless steel.

-or-

- ▶ Remove the plate heat exchanger [1] and replace.
- ▶ Remove the screw [2].
- ▶ Remove the plate heat exchanger [1].

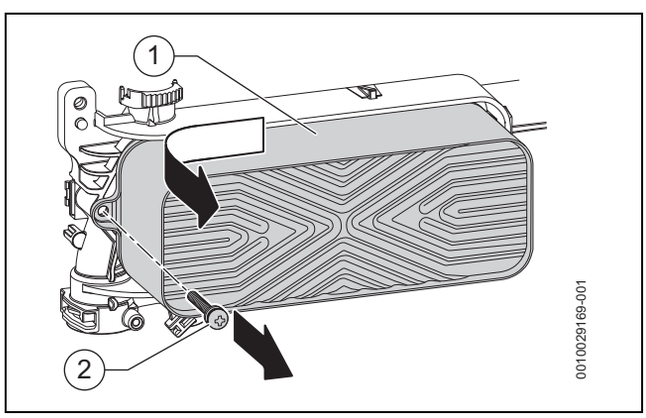

Fig. 118 Removing the plate heat exchanger

- ▶ Install the new plate heat exchanger in reverse order.
  - – Make sure that the lugs are fully inserted into the retaining points on the right.

9.26 Checking the expansion vessel

The expansion vessel must be checked every year.

- ▶ Depressurise the appliance.
- ▶ Adjust the pre-charge pressure of the expansion vessel to the static head of the heating system, if necessary.

9.27 Expansion vessel removal

Access to expansion vessel.

Refer to figure 119.

To simplify replacement of the expansion vessel, it is easier to remove the control box assembly.

- ▶ Hold the plastic bush [2] on the top hinge and undo the top screw [1], allowing the bush [2] to move down as the screw [1] is loosened.
- ▶ Remove the bush [2], support the control box [3] and withdraw the screw [1]. Lift the control box off the bottom hinge screw and set aside.
- ▶ Undo the two screws [4] that secure the hinge [5] to the side panel and remove the hinge [5].

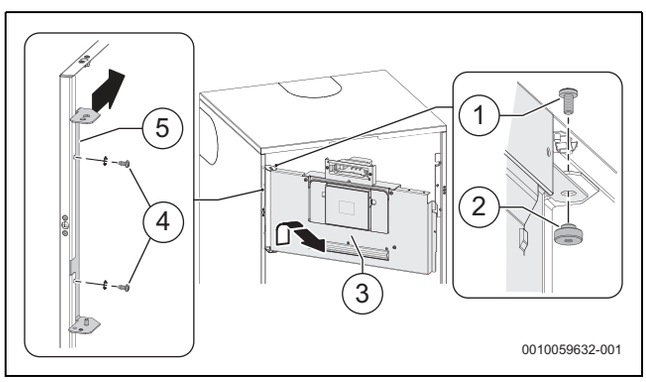

Fig. 119 Expansion vessel removal

Removal of expansion vessel

Refer to figure 120.

- ▶ Disconnect the pipe union nut [2].
- ▶ Slacken the screw on the clamp, top [1] of the expansion vessel.
- ▶ Slide the expansion vessel [3] towards you to remove.

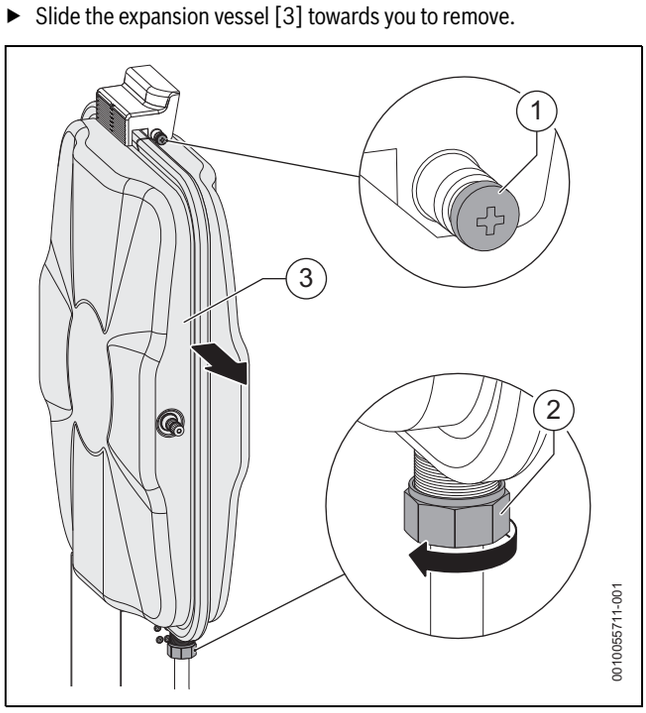

Fig. 120 Expansion vessel removal

- ▶ Replace the expansion vessel in the reverse order

9.28 Replacing the pressure sensor

Pressure sensor is a wet pocket sensor, therefore the appliance must be drained down.

- ▶ Remove the pressure sensor in the sequence shown.
  - – Release the electrical connection clip [1].
  - – Disconnect the electrical connection [2].
  - – Release the clip [3].
  - – Pull the pressure sensor forward to release [4].

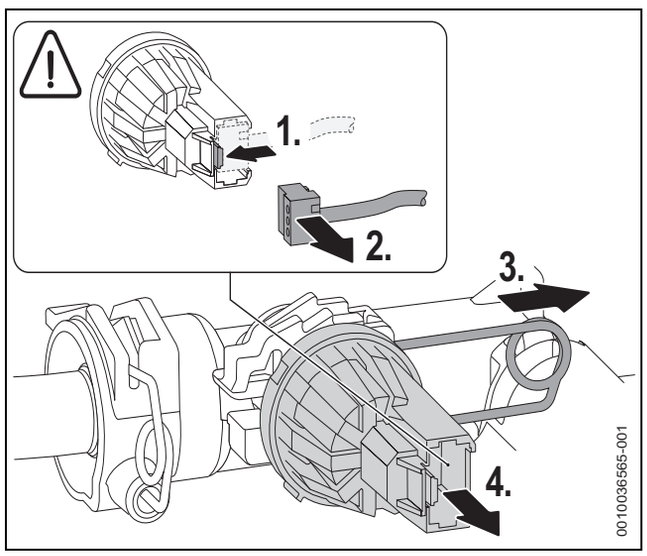

Fig. 121 Pressure sensor removal

- ▶ Replace the pressure sensor in the reverse order

⚠ After the inspection/maintenance

- ▶ Re-tighten all the threaded connections that have been released.
- ▶ Restart the appliance (→ chapter 6.4, page 48).
- ▶ Check all joints for leaks.
- ▶ Check the gas/air ratio.

10 Troubleshooting

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 Fault and event history

Fault history

To view the last 10 faults in chronological order.

- ▶ Enter the service menu.
  - – Press the key and the key simultaneously until the service menu appears.
- ▶ Navigate to **Info** menu item.
  - – Keep pressing the ▼ key, until **Info** is displayed and press **ok** key to confirm selection.
- ▶ Navigate to **Fault history** menu item.
  - – Keep pressing the ▼ key, until **Fault history** is displayed and press **ok** key to confirm selection.

10.2 Operating and fault displays

10.2.1 General information

- **Fault code**: indicates which fault is present.
- **Fault category**: indicates what kind of fault is present 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)

10.2.2 Fault code table

Fault code	Fault category	Fault text on the display/description	Remedy
200	O	Boiler in heating mode	Operating message, is not a fault. • Heating circuit is being heated.
201	O	Boiler in hot water mode	Operating message, is not a fault. • Hot water circuit is being heated.
202	O	Boiler in anti-cycle mode	Operating message, is not a fault. • Anti-cycle mode - this is the standby time between heating demands - default 5 minutes. – For example, if there is heating demand for 1 minute, the boiler will wait for 4 minutes after the heating demand before firing for a subsequent heating demand. Fault code 202 will be present during anti-cycle mode.
203	O	Boiler in standby, no heat energy demand	Operating message, is not a fault. • Appliance in standby, awaiting a demand request.
204	O	Current prim. water temp. higher than set val.	Operating message, is not a fault. • System waiting. The actual boiler water temperature is higher than the target boiler water temperature. The boiler heat demand is switched off.
208	O	Chimney sweep demand	Operating message, is not a fault. • Chimney sweep mode active.
214	V	Fan shut down during safety time	▶ Reset appliance electronics (factory reset). ▶ Create a heat demand; check if the boiler fires up. ▶ Check the voltage to the fan and the continuity of the fan harness. ▶ Check the power modulation on the fan. ▶ Control unit may be defective.
224 224	B V	Maximal flue gas thermostat or heat exchanger maximal thermostat has activated	If the blocking fault persists for a prolonged period, it becomes a locking fault. ▶ Check if the lead is disconnected from the safety temperature limiter/thermostat or the flue thermostat or the air pressure switch (overpressure) has tripped. ▶ Check the high limit of the safety temperature limiter/thermostat or the flue thermostat and the harness for continuity. ▶ Check the flow temperature to confirm actual temperature (may have tripped out at lower temperature, leading to a safety temperature limiter/thermostat or the flue thermostat fault). ▶ Check the system pressure and top up as required. ▶ Check if air is trapped in the system and in the boiler. ▶ Pump seized/not running: check the pump for failure or blockage. ▶ Check if a blockage/restriction within boiler/pipework is restricting the flow. ▶ Check the air inlet or exhaust is not blocked.
227	V	No flame signal after ignition	Tip: Check the ceramic insulator is not damaged, this can cause the spark to earth, twist and pull the ceramic insulator to ensure it is not broken. ▶ Check the gas supply to property and the inlet on the gas valve. – Has the gas supply pipework been purged? ▶ Check for low pressure when the gas valve opens. ▶ Gas valve failing to open: check for voltage to the valve and for possible blockage on inlet filter of the gas valve. ▶ Check spark is present,. – If there Is no spark, check the plug connection or replace the faulty ignition transformer. ▶ Obstruction in the air intake to the fan leading to incorrect O_2 levels. Check if non-return valve (bearing plate) is damaged or stuck. ▶ Check the spark electrode or the lead failure. ▶ Check the flame sense or the lead failure. ▶ Check the rectification ground (black wire to heat exchanger). ▶ Check the burner for damage. ▶ Heat exchanger is blocked or restricted. ▶ Condensate trap is blocked or restricted. Condensate pipe is frozen. ▶ Flue is blocked or restricted.

Fault code	Fault category	Fault text on the display/description	Remedy
228	V	Flame signal without flame present	Tip: Check the ceramic insulator is not damaged, this can cause the spark to earth, twist and pull the ceramic insulator to ensure it is not broken. ▶ Check the flame sense and the lead and replace if required. ▶ Check electrode assembly for damage and replace if required. ▶ Check the earth tags on the appliance and on the electrodes. ▶ Check the operation of the condensate trap and that no water is collecting in the sump. ▶ Replace the electrode assembly. ▶ Replace the gas valve. ▶ Replace the control unit.
229	B	Flame failed during burner operation	Tip: Check the ceramic insulator is not damaged, this can cause the spark to earth, twist and pull the ceramic insulator to ensure it is not broken. ▶ Check the gas supply to the property and check the working pressure on the gas valve inlet. ▶ Check the O_2 combustion levels. ▶ Check electrode assembly for damage and replace if required. ▶ Check UV sensor cable for damage and replace if required.
232	B	Boiler locked by external switching contact	External cut off switch used for condensate pump. ▶ Connection plug for condensate pump is not plugged into control unit. ▶ There is no continuity across the I3 connection. ▶ Check there is no blockage in condensate discharge system.
233	V	Boiler identification module or device electronics faulty	▶ Wrong HCM is inserted. ▶ Check the HCM is not damaged. ▶ Replace the HCM if required.
234	V	Gas valve electrical fault	▶ Check the gas supply to the property and the inlet on the gas valve (check drop on inlet). ▶ Check the connections on the gas valve and the board (loose connection). ▶ Check the continuity down harness and replace if required. ▶ Check the voltage to the gas valve (19–24 V DC approx. when demand). ▶ Check for water on the gas valve connections. ▶ Check the resistance on the gas valve coils pins 1–2 (SIT; 55…**66.8**…85 Ω / Resideo; 110…**114.5**…120 Ω). – Replace the gas valve if resistances are incorrect. ▶ If all tests are correct: replace the control unit.
235	V	Conflicting versions of boiler electr. and boiler identification	▶ Replace the HCM or the burner control.
237	V	System fault	▶ Check the HCM is not damaged. ▶ Replace the HCM if required. ▶ Replace the control unit.
238	V	Boiler electronics faulty	▶ Check the gas supply to the property and the inlet on the gas valve (check drop on inlet). ▶ Check the connections on the gas valve and the board (loose connection). ▶ Check the continuity down harness and replace if required. ▶ Check the voltage to the gas valve (19–24 V DC approx. when demand). ▶ Check for water on the gas valve connections. ▶ Check the resistance on the gas valve coils pins 1–2 (SIT; 55…**66.8**…85 Ω / Resideo; 110…**114.5**…120 Ω). – Replace the gas valve if resistances are incorrect. ▶ If all tests are correct: replace the control unit.
242	V	Boiler electr. system fault	▶ Reset appliance electronics (factory reset). ▶ Check the electrical connections on the board (check for loose wires etc.). ▶ Replace the control unit.
244	V	System fault boiler electronics / basic controller	▶ Reset appliance electronics (factory reset). ▶ Check the electrical connections on the board (check for loose wires etc.). ▶ Check the HCM is not damaged, replace if required. ▶ Replace the control unit.
245	V	System fault boiler electronics / basic controller	▶ Reset appliance electronics (factory reset). ▶ Check the electrical connections on the board (check for loose wires etc.). ▶ Check the HCM is not damaged, replace if required. ▶ Replace the control unit.

Fault code	Fault category	Fault text on the display/description	Remedy
249	V	System fault boiler electronics / basic controller	▶ Reset appliance electronics (factory reset). ▶ Check the electrical connections on the board (check for loose wires etc.). ▶ Check the HCM is not damaged, replace if required. ▶ Replace the control unit.
250	V	System fault boiler electronics / basic controller	▶ Reset appliance electronics (factory reset). ▶ Check the electrical connections on the board (check for loose wires etc.). ▶ Check the HCM is not damaged, replace if required. ▶ Replace the control unit.
251	V	System fault boiler electronics / basic controller	▶ Reset appliance electronics (factory reset). ▶ Check the electrical connections on the board (check for loose wires etc.). ▶ Check the HCM is not damaged, replace if required. ▶ Replace the control unit.
252	V	System fault boiler electronics / basic controller	▶ Reset appliance electronics (factory reset). ▶ Check the electrical connections on the board (check for loose wires etc.). ▶ Check the HCM is not damaged, replace if required. ▶ Replace the control unit.
253	V	System fault boiler electronics / basic controller	▶ Reset appliance electronics (factory reset). ▶ Check the electrical connections on the board (check for loose wires etc.). ▶ Check the HCM is not damaged, replace if required. ▶ Replace the control unit.
254	V	System fault boiler electronics / basic controller	▶ Reset appliance electronics (factory reset). ▶ Check the electrical connections on the board (check for loose wires etc.). ▶ Check the HCM is not damaged, replace if required. ▶ Replace the control unit.
257	V	System fault boiler electronics / basic controller	▶ Reset appliance electronics (factory reset). ▶ Check the electrical connections on the board (check for loose wires etc.). ▶ Check the HCM is not damaged, replace if required. ▶ Replace the control unit.
258	V	System fault boiler electronics / basic controller	▶ Reset appliance electronics (factory reset). ▶ Check the electrical connections on the board (check for loose wires etc.). ▶ Check the HCM is not damaged, replace if required. ▶ Replace the control unit.
259	V	System fault boiler electronics / basic controller	▶ Reset appliance electronics (factory reset). ▶ Check the electrical connections on the board (check for loose wires etc.). ▶ Check the HCM is not damaged, replace if required. ▶ Replace the control unit.
262	V	System fault boiler electronics / basic controller	▶ Reset appliance electronics (factory reset). ▶ Check the electrical connections on the board (check for loose wires etc.). ▶ Check the HCM is not damaged, replace if required. ▶ Replace the control unit.
263	V	System fault boiler electronics / basic controller	▶ Reset appliance electronics (factory reset). ▶ Check the electrical connections on the board (check for loose wires etc.). ▶ Check the HCM is not damaged, replace if required. ▶ Replace the control unit.
265	B	Heat demand lower than energy supplied	Operating message, is not a fault. • The boiler's ignition sequence alone is sufficient enough to maintain room temperature. • The modulating heat demand is higher than the minimum modulation factor of the unit. The unit switches to proportional control.
268	O	Relay test was activated	Operating message, is not a fault. • Appliance in component test mode.
269	V	Flame monitoring	▶ Reset appliance electronics (factory reset). ▶ Check the electrical connections on the board (check for loose wires etc.). ▶ Replace the control unit.
273	B	Operation of burner and fan interrupted	Operating message, is not a fault. • The burner and fan have been running continuously for 24 hours and have been shut down briefly for an appliance electronic inspection

Fault code	Fault category	Fault text on the display/description	Remedy
281	B	Pump stuck or running in air	▶ Check primary system water pressure. ▶ Check for air in the system and vent the pump. ▶ Check for circulation within heating system. ▶ Check hydraulic connections to the pump. ▶ Check wiring and operation of the pump, replace if necessary.
283	O	Burner starting	Operating message, is not a fault. • Burner is starting.
284	O	Opening air/gas ratio control valve/oil solenoid valves	Operating message, is not a fault. • Gas valve is opening.
305	O	Boiler in hot water anti-cycle mode	Operating message, is not a fault. • Anti-cycle mode, domestic hot water post-heat function. Following a domestic hot water demand the boiler runs for 30 seconds or until the target temperature is met. – Diverter valve is held in the hot water position for a period of time. – If no domestic hot water demand is requested then check for false demands on the cold water inlet.
306	V	Flame signal after closing the fuel supply	Tip: Ensure the working pressure returns immediately to the standing pressure when the gas valve closes. ▶ Check if there is a flame present. – Check the gas supply to the property and the inlet on the gas valve (check drop on inlet). – Check the gas valve is not passing and replace if required. ▶ Check electrode assembly for damage and replace if required. ▶ Check UV sensor cable and connector and replace if required. ▶ Replace the control unit.
357	O	Ventilation program	Operating message, is not a fault. • Venting/air purge program has been automatically activated.
358	O	Anti-seizing functn. active	Operating message, is not a fault. • Blocking protection for the heating pump and diverter valve active. – The purpose of component kick is to ensure that hydraulic components such as pumps will not get stuck by giving these functional components a “kick”, i.e. they are briefly turned on after a period of inactivity. – After power up every 24 hours the appliance will do a component kick, where the pump will run for 10 seconds. – If the appliance is already in a CH or DHW heat request, these heat demands will be prioritised over component kick. But once the heat demand has ended the component kick will take place. – If this causes nuisance then please power the appliance off and on again at a more suitable time; the daily kick will then occur at the time the appliance is turned on again.
360	V	System fault boiler electronics / basic controller	▶ Wrong HCM is inserted. ▶ Check the HCM is not damaged. ▶ Replace the HCM if required.
362	V	Boiler identification module or boiler electronics faulty	▶ Wrong HCM is inserted. ▶ Check the HCM is not damaged. ▶ Replace the HCM if required.
363	V	System fault boiler electronics / basic controller	▶ Check and replace the ionisation cable. ▶ Check and replace the electrodes if required. ▶ Check and replace the control unit and/or burner control unit.
604	V	System fault burner control unit	▶ Reset appliance electronics (factory reset). ▶ Check the electrical connections on the board (check for loose wires etc.). ▶ Replace the control unit.
815	W	Low loss header temp. sensor faulty	Tip: Check menu has not been accidentally switched on. ▶ Moisture on the connectors – control unit fault.

Fault code	Fault category	Fault text on the display/description	Remedy
1010	O	No communication via EMS BUS connection	▶ Check the HMI for display and remove the HMI and the test voltage to the HMI. ▶ Check the white HMI plug on far right of the control unit (low voltage connection). ▶ If using the Key: Check the Key connections (black, white, red, green) are plugged in to the correct position on the control unit. (Next to orange BUS connection leaving one space.) Check the pins on the plug. ▶ Check that the Key is pushed fully home. ▶ Check the batteries of the room control. ▶ For wired room controls check the EMS BUS Voltage to the remote control is 12 - 15V DC. ▶ Check the bridging links are fitted at LR & 230 V out. ▶ Occasionally the Key connection (green flap) can cause this. ▶ Check the 230 V external wiring does not run alongside the BUS connections, thus causing interference. ▶ Replace the control unit.
1013	W	Max. combustion point reached	▶ Check the maintenance menu. ▶ Reset the maintenance code via the reset menu.
1017	W	System pressure too low	▶ Top up water and vent the system. ▶ Check the voltage to the pressure sensor and the signal back from the pressure sensor. ▶ Replace the pressure sensor.
1018	W	Maintenance interval expired	▶ Check the maintenance date set in the menu. ▶ Reset the maintenance code via the reset menu.
1019	W	Incorrect pump type detected	▶ Pump communication failure or wrong pump is fitted (non-ErP). ▶ Check the pump communication wire is connected and has continuity. ▶ Replace the pump for correct modulating pump.
1021	B	Cylinder charging or hot water temperature sensor faulty	▶ Check the domestic hot water temperature sensor is connected and the harness is fitted securely to the sensor. ▶ Check the resistance of the temperature sensor and replace if required. ▶ Check the continuity of harness and replace if required. When a faulty sensor/wiring issue is fixed the appliance will not need to be reset. The appliance will operate with a faulty sensor with fault 1021 displayed, estimating the DHW temperature from the supply sensor but with a reduced outlet temperature. If the fault was the sensor falling off the pipe then a power cycle of the appliance will be needed to reset the fault.
1023	W	Maximum run time including standby time reached	▶ Check the maintenance menu. ▶ Reset the maintenance code via the reset menu.
1025	W	Return temp. sensor is faulty	▶ Check the temperature sensor plug is connected. ▶ Check the resistance of sensor and replace if required. ▶ Check the continuity of harness and replace if required. ▶ Replace the temperature sensor. ▶ Replace the control unit.
1037	W	Outside temp. sensor faulty - heating back-up operation active	Tip: Check the weather compensation is applicable and the menu has not been accidentally switched on in the menu. ▶ Check the positioning of the outside weather sensor. ▶ Check the weather sensor connections on the control board. ▶ Check the resistance of the sensor and the continuity down the cable and replace if required.
1065	B	System pressure sensor faulty or not connected	▶ Check the water pressure sensor plug is connected. ▶ Plug the connection plug on the water pressure sensor correctly. ▶ Check the continuity of harness and replace if required. ▶ Check the voltage to the pressure sensor and the return voltage to the pressure sensor. ▶ Replace the pressure sensor.
1068	W	Outside temp. sensor or lambda probe faulty.	▶ Check the outdoor sensor plug is connected. ▶ Check the resistance of the sensor and replace if required. ▶ Check the continuity of harness and replace if required. ▶ Replace the outdoor sensor.

Fault code	Fault category	Fault text on the display/description	Remedy
1070	W	Maintenance is due on <dd.mm.yyyy> please call your service engineer	Advanced service reminder warning. ▶ Check the maintenance menu. ▶ Reset the maintenance code via the reset menu.
1071	W	Maintenance is now due please call your service engineer	▶ Check the maintenance menu. ▶ Reset the maintenance code via the reset menu.
1072	W	Maintenance is overdue please call your service engineer	▶ Check the maintenance menu. ▶ Reset the maintenance code via the reset menu.
1075	W	Heat exchanger temp sensor short circuit	▶ Check the temperature sensor plug is connected. ▶ Check the resistance of sensor and replace if required. ▶ Check the continuity of harness and replace if required. ▶ Replace the temperature sensor. ▶ Replace the control unit.
1076	W	Heat exchanger temp sensor disconnected	▶ Check the temperature sensor plug is connected. ▶ Check the resistance of sensor and replace if required. ▶ Check the continuity of harness and replace if required. ▶ Replace the temperature sensor. ▶ Replace the control unit.
2085	V	Internal fault	▶ Reset the appliance. ▶ Switch off the appliance for 30 s then turn back on. ▶ Check the incoming mains voltage. ▶ Check the polarity. ▶ Replace the control unit.
2908	V	System fault boiler electronics / basic controller	▶ Reset appliance electronics (factory reset). ▶ Check the electrical connections on the board (check for loose wires etc.). ▶ Replace the control unit.
2910	V	Fault in flue system	▶ Check the flue for obstructions and remove any found. ▶ Check the flue integrity test. ▶ Check for water in the sump and check the condensate trap operation.
2914	–	Boiler electr. system fault	▶ Reset appliance electronics (factory reset). ▶ Check the electrical connections on the board (check for loose wires etc.). ▶ Replace the control unit.
2915	V	Boiler electr. system fault	The fan keeps running after the post purge. ▶ Reset the appliance. ▶ Create a heat demand to test the boiler's ignition sequence. ▶ Check the voltage to the fan and the continuity of the fan harness. ▶ Check the power modulation on the fan. ▶ Control unit may be defective.
2916	V	Boiler electr. system fault	Gas valve was detected as open during post-purge. ▶ Carry out a gas tightness test on the gas valve and replace if required. ▶ Check the voltage to gas valve. ▶ The gas valve or the control unit may be defective
2920	V	Fault in flame monitoring	▶ Check cabling ▶ Check electrode assembly for damage and replace if required. ▶ Check UV sensor cable for damage and replace if required. ▶ Check fan ▶ Replace the control unit.
2923	V	Boiler electr. system fault	Unexpected feedback from the modulating/current controlled gas valve. ▶ Check the voltage to the gas valve. ▶ Check the continuity of harness and replace if required. ▶ Check the resistance on the gas valve coils pins 1–2 (SIT; 55...**66.8**...85 Ω / Resideo; 110...**114.5**...120 Ω). ▶ The gas valve or the appliance electronics (control unit) may have a fault.

Fault code	Fault category	Fault text on the display/description	Remedy
2924	V	Boiler electr. system fault	No feedback from the modulating/current controlled gas valve. ▶ Check the voltage to the gas valve. ▶ Check the continuity of harness and replace if required. ▶ Check the resistance on the gas valve coils pins 1–2 (SIT; 55...**66.8**...85 Ω / Resideo; 110...**114.5**...120 Ω). ▶ The gas valve or the appliance electronics (control unit) may have a fault.
2925	V	Boiler electr. system fault	Unexpected feedback from the modulating/current controlled gas valve. ▶ Check the voltage to the gas valve. ▶ Check the continuity of harness and replace if required. ▶ Check the resistance on the gas valve coils pins 1–2 (SIT; 55...**66.8**...85 Ω / Resideo; 110...**114.5**...120 Ω). ▶ The gas valve or the appliance electronics (control unit) may have a fault.
2926	V	Boiler electr. system fault	Unexpected feedback from the modulating/current controlled gas valve. ▶ Check the voltage to the gas valve. ▶ Check the continuity of harness and replace if required. ▶ Check the resistance on the gas valve coils pins 1–2 (SIT; 55...**66.8**...85 Ω / Resideo; 110...**114.5**...120 Ω). ▶ The gas valve or the appliance electronics (control unit) may have a fault.
2927	V	Flame failed during burner operation	No ionisation detected after ignition. ▶ Check the main shut-off valve, open if necessary. ▶ Check the appliance isolation valve, open if necessary. ▶ Measure the gas supply pressure at the rated heat input. If necessary, shut down the appliance and check the gas line. ▶ Check flame sense electrode and connecting lead, replace if required. ▶ Check venturi/injector for potential blockage. ▶ Measure the ionisation current. ▶ Check the protective earth conductor connection (PE) in the control unit. ▶ Check the ignition cable for damage, replace if necessary. ▶ Check functionality of gas valve and replace if necessary. ▶ Check CO_2 and O_2 settings at min and max output. ▶ Check flue system. ▶ Check combustion air supply. ▶ Check the heat exchanger on the flue gas side for deposits, clean if necessary.
2928	V	Internal fault	▶ Restart appliance. ▶ If the fault persists following a reset, the burner control unit is faulty and must be replaced, (replace control unit).
2931	V	System fault boiler electronics / basic controller	Illegal instruction. ▶ Restart appliance. ▶ If the fault persists following a reset, the burner control unit is faulty and must be replaced, (replace control unit).
2940	V	System fault burner control unit	Low voltage. ▶ Restart appliance. ▶ If the fault persists following a reset, the burner control unit is faulty and must be replaced, (replace control unit).
2946	V	Incorrect code plug detected	▶ Check the HCM and the part number. ▶ Check the HCM connections for damage. ▶ Replace the HCM.
2948	B	No flame signal with low output	Burner starts automatically after purging. This can be caused by strong winds. If this fault occurs frequently: ▶ Check the CO_2 and O_2 settings. ▶ Check flue outlet position for effects of excessive wind pressure. ▶ Check flue integrity.

Fault code	Fault category	Fault text on the display/description	Remedy
2949	B	No flame signal with high output	May be caused by strong winds or flue gas recirculation. The burner starts automatically after purging. ▶ Check the flue integrity. ▶ Check the flue terminal position. ▶ Check the CO_2 and O_2 settings, adjust if necessary. ▶ Check the burner and the heat exchanger gaskets and the inner flue gaskets. ▶ Check the gas pressure during burning at full load (working pressure, dropping low).
2950	B	No flame signal following starting procedure	Burner starts automatically after purging. ▶ Check gas pressure whilst burning at full load. ▶ Check the CO_2 and O_2 settings, adjust if necessary. ▶ Check Burner and heat exchanger gaskets.
2951	V	Loss of flame too many times	Maximum unexpected flame losses exceeded. Note: Combustion cover off can cause this. ▶ Refer to the blocking error(s) that lead to this locking error. Check the fault history on appliance. ▶ Possible incomplete purging of gas pipe. ▶ Could also indicate a wide variety of issues such as undersized pipework or gas pressure dropping off, incorrectly routed condensate discharge, incorrectly sited flues, incorrectly wired etc.
2952	V	Internal fault when testing the ionisation signal	▶ Reset appliance electronics (factory reset). ▶ If the fault remains after resetting: – Replace the electrode assembly. – If the fault still remains, the burner controller (control unit) is defective.
2955	B	Boiler does not support the parameters set for the hydraulic configuration	Verify that the following settings are correct. This can only be reset by powering off the appliance. ▶ Low loss header setting = OFF ▶ Internal DHW hydraulic = 1/ON ▶ Heat circuit 1 hydraulic = 1/ON ▶ CH hydraulic = 1/ON
2956	O	Hydraulic configuration at the boiler activated	Verify that the following settings are correct. This can only be reset by powering off the appliance. ▶ Low loss header setting = OFF ▶ Internal DHW hydraulic = 1/ON ▶ Heat circuit 1 hydraulic = 1/ON ▶ CH hydraulic = 1/ON
2957	V	Boiler electr. system fault	▶ Reset appliance electronics (factory reset). ▶ Check the electrical connections on the board (check for loose wires etc.). ▶ Replace the control unit.
2961	V	No fan signal available	▶ Check the mains voltage to the fan. ▶ Check the fan harness for continuity and replace if required. ▶ Check the pulse width modulation (PWM). ▶ Replace the fan. ▶ Replace the control unit.
2962	V	No fan signal available	▶ Check the mains voltage to the fan. ▶ Check the fan harness for continuity and replace if required. ▶ Check the pulse width modulation (PWM). ▶ Replace the fan. ▶ Replace the control unit.
2963	B	The heat exchanger sensor or both supply and heat exchanger sensors are defect	▶ Check the flow through the appliance and the system is filled. ▶ Check for air locks in the system and purge if required. ▶ Check the resistance of the temperature sensor and replace if required. ▶ Check the continuity of the temperature sensor harness and replace if required.

Fault code	Fault category	Fault text on the display/description	Remedy
2965	B	Flow temperature too high	▶ System is not filled with water or low system pressure. ▶ No water flow, because CH system is closed. ▶ No water flow, because pump is not operating correctly. ▶ Check flow through appliance and system. ▶ Check for air locks in the system. Purge if required. ▶ Check isolation valves.
2966	B	Flow temperature rise in heat exchanger too rapid	▶ System is not filled with water or low system pressure. ▶ No water flow, because CH system is closed. ▶ No water flow, because pump is not operating correctly. ▶ Check pump is operating freely check voltage to pump. ▶ Check the isolation valves. ▶ Check for air locks in the system, purge if required. ▶ Check flow through appliance and system pressure.
2968	O	Refilling system pressure	The auto filling function is active. The filling valve opens in order to feed fresh water to the heating system automatically.
2969	–	Maximum number of refills reached	The maximum number of refills has been reached.
2970	B	Pressure drop in heating system too rapid	Too many unexpected pressure drops within a short time period. Cause code can appear if system is pressurised and the intelligent filling loop is activated and the system then vented. ▶ Switch off the intelligent fill in the system menu, re-pressurise manually and vent the system. ▶ Ensure the correct pressure. If cause code does not clear, power off appliance.
2971	B	System pressure too low	System pressure is very or extremely low. This is triggered when the pressure falls to between 0.6 and 0.3 bar. Top up water until the target pressure is reached. **Intelligent filling loop** ▶ Check in Main menu if **Start filling** option is available and select **Yes** option to start filling. ▶ If **Start filling** option not available, switch off the automatic filling function (**Autom. filling > No**) in the system menu, re-pressurise manually and vent the system. ▶ Ensure the correct pressure then factory reset appliance. If cause code does not clear, power off appliance. **Other filling loop** ▶ Vent the heating system and top up water until the target pressure is reached. **Pressure sensor** ▶ Check the continuity down harness for the pressure sensor and replace if required. ▶ Check the voltage at the pressure sensor and replace if required.
2972	V	Mains voltage too low	▶ Establish supply voltage of at least 196 V AC. ▶ Replace control unit.
2980	V	Locking fault: To unlock Hold up and down arrow keys pressed simultaneously for 3 s. For more information see operating instr. (Boiler locked. Contact a qualified heating engineer)	Boiler is in the super lock-out condition. Super lock-out (2980) occurs when a potential safety-critical condition is detected and 5 locking faults are reset within a 15-minute period. If the fault is not remedied and the complete system is not checked, there is a risk of personal injury: ▶ Follow remedy actions for fault code 2981.
2981	V	Locking fault: To unlock Hold up and down arrow keys pressed simultaneously for 3 s. For more information see operating instr. (Boiler locked. Contact a qualified heating engineer) The appliance power was switched off and on again with an existing super lock-out (fault code 2980).	▶ Diagnose and remedy the locking fault. Check the complete system, including sensors and harnesses. ▶ When remedied and system checked, turn the boiler power off and on again. ▶ Fault condition 2981 will appear, the boiler is still in super lock-out ▶ Press the up and down arrows simultaneously for 3 seconds. ▶ Immediately after 22 seconds have elapsed, perform an additional reset by pressing the up and down arrows simultaneously for 3 seconds. ▶ Super lock-out is remedied, boiler returns to normal operating condition. ▶ Fault history is now available, double check the last 10 faults to confirm the fault has been remedied

Table 35 Indicators and fault displays

10.3 Faults that are not displayed

Appliance faults	Remedy
Combustion noises too loud; rumbling noises	▶ Check the gas type. ▶ Check the gas supply pressure. ▶ Check the flue system; clean or repair if required. ▶ Check the gas/air ratio. ▶ Check the gas valve; replace if required. ▶ Check condense discharge pipework and drain is clear. ▶ Check fan pressure at test point.
Flow noises	▶ Set the pump rate or pump characteristic map correctly and match to the maximum output.
Heat-up takes too long.	▶ Set the pump rate or pump characteristic map correctly and match to the maximum output.
Flue gas values incorrect; CO content too high.	▶ Check the gas type. ▶ Check the gas supply pressure. ▶ Check the flue system; clean, repair or replace if required. ▶ Check the gas/air ratio. ▶ Check the gas valve; replace if required.
Delayed ignition, poor ignition.	▶ Check the ignition transformer function for misfiring in the **Function check** menu **Ignition** test, replace if required. ▶ Check the gas type. ▶ Check the gas supply pressure. ▶ Check the power supply. ▶ Check the electrodes with cable; replace if required. ▶ Check the flue system; clean or repair if required. ▶ Check the gas/air ratio. ▶ For natural gas: check the external gas flow monitor, replace if required. ▶ Check the burner, replace if required. ▶ Check the gas valve; replace if required.
Condensate in air box	▶ Check the non-return valve in the burner hood assembly, replace if required.
Combi boilers: hot water outlet temperature is not reached.	▶ Check the turbine, replace if required. ▶ Check the gas/air ratio. ▶ Check for reversed pipework or cross leaking mixing units such as showers.
Combi boilers: DHW volume is not reached.	▶ Check the plate heat exchanger.
No function, the display remains dark.	▶ Check the electrical wiring for damage. ▶ Replace defective cables. ▶ Check the fuse, replace if required. One spare fuse is supplied.

Table 36 Faults that are not shown on the display

10.4 System Gassing Topic

WARNING

If you suspect the heating system is gassing, you must exercise caution when carrying out testing or remedial work as the gasses produced can be flammable.
Do not vent air from radiators whilst the central heating is switched on. Allow 30mins after venting the radiators before using the central heating or hot water.

- Whilst venting radiators, do not allow the pressure on the boiler to drop below the point at which it is normally set.
- If the system is to be drained, the boiler must be electrically isolated.

CAUTION

If system pressure is repeatedly increasing, even when the appliance is not operating, you should first check that the filling link is fully closed and confirm that it is not passing. If radiators are also not heating to the top of the panels and repeatedly need venting, the heating system may be suffering from gassing. This is an indication that corrosion is taking place and requires the system being cleaned and treated to BS7593.

- This should be confirmed by taking water samples to check pH levels and turbidity.
- Failure to properly maintain the heating system may result in damage to the system and appliance, and may affect the boiler warranty.

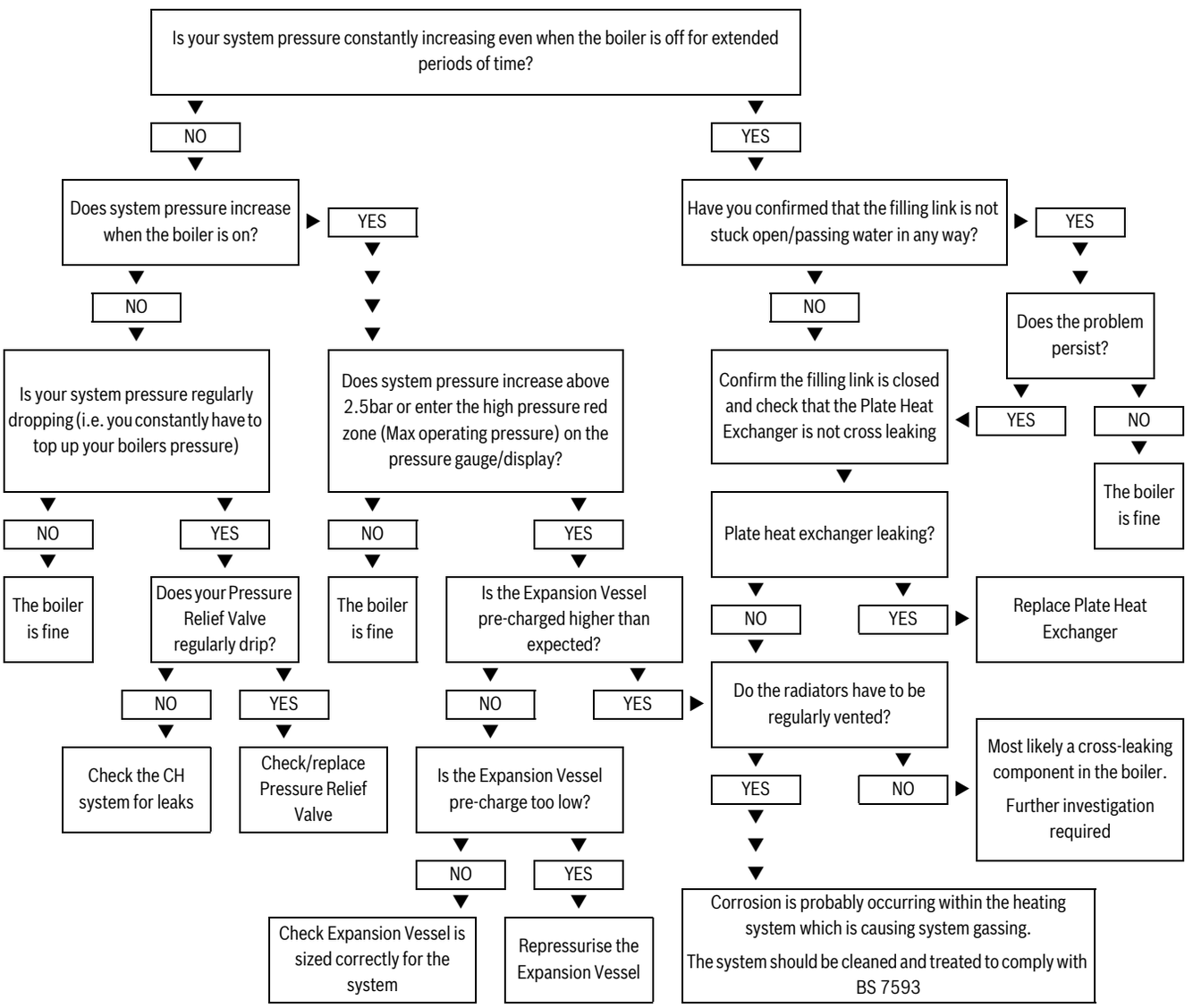

Table 37 System gassing flow chart

Appliances converted to sealed primary system

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 devices

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

The symbol is valid for countries that have directives on electronic waste, e.g. "European Union Directive 2012/19/EC on end-of-life electrical and electronic appliances". These provisions define the regulatory framework of the directive valid for the return and recycling of used electronic appliances in each country.

Electronic appliances that may contain hazardous substances must be recycled responsibly in order to minimise possible damage to the environment and dangers to people's health. To this end, the recycling of electronic waste contributes to the preservation of natural resources.

For more information on the environmentally safe disposal of used electrical and electronic appliances, please contact the local authorities, waste disposal company or distributor from which you purchased the product.

You can find more information here:
www.bosch-homecomfortgroup.com/en/company/legal-topics/weee/

Batteries

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

12 Data Protection Notice

We, **Bosch Termotecnologia, S.A., with registered office at Av. Infante D. Henrique Lotes 2E-3E, 1800-220 Lisbon, Portugal**, process product and installation information, technical and connection data, communication data, product registration and client history data to provide product functionality (art. 6 §1.1 (b) GDPR), to fulfil our duty of product surveillance and for product safety and security reasons (art. 6 §1.1 (f) GDPR), to safeguard our rights in connection with warranty and product registration questions (art. 6 §1.1 (f) GDPR) and to analyse the distribution of our products and to provide individualized information and offers related to the product (art. 6 §1.1 (f) GDPR). To provide services such as sales and marketing, contract management, payment management, programming, data hosting and hotline services, we may request and transfer data to external service providers and/or Bosch affiliates. In some cases, but only if adequate data protection is ensured, personal data may be transferred to recipients located outside the European Economic Area. Additional information is provided upon request. You can contact our Data Protection Officer under: Data Protection Officer for Information Security and Privacy (C/ISP), Robert Bosch GmbH, Postfach 30 02 20, 70442 Stuttgart, GERMANY.

You have the right to object to the processing of your personal data at any time on the basis of Art. 6 §1.1 (f) GDPR on grounds relating to your particular situation or if your data is used for direct marketing purposes. To exercise your rights, please contact us at **privacy.ttpo@bosch.com.** For more information, follow the QR code.

13 Technical information and reports

13.1 Technical data

Technical data table - Greenstar 8000 F Combi

Greenstar 8000 F Combi		GR8700iF 35 C		GR8700iF 50 C	
Description	Unit	NG	LPG	NG	LPG
Gas flow maximum rate - 10 minutes from lighting					
Gas inlet pressure (nominal) [1]	mbar	20.0	37.0	20.0	37.0
Natural gas [2]	m^3/h	3.7	–	5.1	–
Propane Gas (LPG) [3]	kg/h	–	2.7	–	3.8
Heat output/load					
Modulation range, heat input Q	kW	5.1 - 34.4	5.1 - 34.4	6.3 - 48.9	6.3 - 48.9
Heat input of heating Q_n	kW	34.4	34.4	48.9	48.9
Heat input of DHW Q_{nW}	kW	34.4	34.4	48.9	48.9
Heat output (80/60 °C) P_n	kW	33.8	33.8	47.8	47.8
Heat output (50/30 °C) P_{cond}	kW	35.0	35.0	49.9	49.9
Heat output of DHW P_{nW}	kW	33.7	33.7	47.9	47.9
Maximum flow temperature	°C	60	60	60	60
Maximum flow temperature possible	°C	82	82	82	82
Maximum permissible operating pressure (PMS)	bar (MPa)	2.5 (0.25)	2.5 (0.25)	2.5 (0.25)	2.5 (0.25)
Available pump head at 20 °C system temperature rise	m	2	2	2 [4]	2 [4]
Domestic Hot Water (DHW)					
Rated heat input, DHW (net) (Q_{nW})	KW	34.4	34.4	48.9	48.9
Minimum heat input	kW	5.1	5.1	6.3	6.3
Minimum required flow to activate DHW demand	l/min	1.9	1.9	1.9	1.9
DHW temperature range	°C	35-55	35-55	35-55	35-55
Maximum cold water inlet temperature (without additional accessories)	°C	60	60	60	60
Maximum mains inlet pressure (standing pressure PMW)	bar (MPa)	10 (1.0)	10 (1.0)	10 (1.0)	10 (1.0)
Minimum mains inlet pressure (working) for max. flow	bar (MPa)	2.0 (0.2)	2.0 (0.2)	2.0 (0.2)	2.0 (0.2)
Minimum mains inlet pressure (working) for operation	bar (MPa)	0.2 (0.02)	0.2 (0.02)	0.2 (0.02)	0.2 (0.02)
Maximum DHW flow rate - 40 °C rise ± 15% [5]	l/min	12	12	17	17
Maximum DHW flow rate - 35 °C rise (for industry comparison)	l/min	14.2	14.2	19.8	19.8
Flue					
Flue gas temperature max. load DHW demand	°C	74/55	70/55	70/54	68/51
Flue gas temperature 80/60 °C, rated/min. load	°C	74/55	70/55	70/54	68/51
Flue gas temperature 50/30 °C, rated/min. load	°C	58/48	55/57	55/43	50/46
CO_2 level at max. rated heat output (after 10 minutes)	%	9.5	10.8	9.5	10.8
CO_2 level at min. rated heat output (after 10 minutes)	%	8.6	10.2	8.6	10.2
O_2 level at max. rated heat output (after 10 minutes)	%	4	5.5	4	5.5
O_2 level at min. rated heat output (after 10 minutes)	%	4.6	5.5	4.6	5.5
NOx rating (EN 15502-1)	mg/kWh	37	49	35	56
NOx Class	–	6	6	6	6
Condensate					
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
Electrical					
Electrical power supply voltage	a.c. V	230	230	230	230
Frequency	Hz	50	50	50	50
Maximum power consumption (stand-by)	W	3.5	3.5	3.5	3.5
Maximum power consumption (heating)	W	116	115	152	148
Maximum power consumption (Domestic Hot Water)	W	116	115	152	148
Energy efficiency index (EEI) heating pump	–	≤ 0.20	≤ 0.20	≤ 0.20	≤ 0.20
Approval data					
Gas group classification (gas type) UK		CATII $_{2H/3P}$			
Installation type		C_{13}, C_{33}, C_{53}			
General data					
Expansion vessel capacity	l	10	10	10	10
Expansion vessel pre-charge pressure	bar	0.75	0.75	0.75	0.75
Appliance protection rating [6]	IP	X4D	X4D	X4D	X4D

Greenstar 8000 F Combi		GR8700iF 35 C		GR8700iF 50 C	
Description	Unit	NG	LPG	NG	LPG
Permissible ambient temperature	°C	0-50/40 (Long time)	0-50/40 (Long time)	0-50/40 (Long time)	0-50/40 (Long time)
Nominal capacity of the appliance	l	5.2	5.2	5.2	5.2
Total package weight	kg	83	83	85	85
Total appliance weight (excluding packaging)	kg	73	73	75	75

1) For minimum and maximum permissable pressure refer to “Gas pressure within the system”, section 6.6.
2) The Gas Rate provided assumes the accepted NG averaged calorific value of 34-9 MJ/m^3 net.
3) Propane/butane mixture for fixed containers with capacity up to 15 000 litres.
4) If a 20K differential is required then a Low Loss Header or additional pump must be installed
5) Appliances are fitted with a flow regulator set to achieve a 40°C temperature rise. This ensures comfortable bathing during the colder winter months.
6) Protection rating may change depending on the control unit/s used on this appliance.

Table 38 Technical data Greenstar 8000 F Combi

13.2 Energy consumption

13.2.1 Product data on energy consumption

The following product data comply with the requirements of the EU Regulations No. 811/2013, No. 812/2013, No. 813/2013 and No. 814/2013 supplementing the Regulation (EU) 2017/1369.

Product data	Symbol	Unit	7731600297/7731600298	7731600299/7731600300
Product type	–	–	GR8700iF 35 C NG/LPG	GR8700iF 50 C NG/LPG
Condensing boiler	–	–	✓	✓
Low temperature boiler	–	–	×	×
B1 boiler	–	–	×	×
Cogeneration space heater	–	–	×	×
Equipped with a supplementary heater?	–	–	–	–
Combination heater	–	–	✓	✓
Rated heat output	P_{rated}	kW	35	50
Seasonal space heating energy efficiency	η_s	%	92	93
Energy Efficiency Class	–	–	A	A
Useful heat output				
At rated heat output and high temperature regime [1]	P_4	kW	32.6	46.3
At 30 % of rated heat output and low temperature regime [2]	P_1	kW	11.1	15.6
Efficiency				
At rated heat output and high temperature regime [1]	η_4	%	87.9	86.9
At 30 % of rated heat output and low temperature regime [2]	η_1	%	97.3	97.6
Auxiliary electricity consumption				
At full load	el_{max}	kW	0.050	0.086
At part load	el_{min}	kW	0.014	0.015
In standby mode	P_{SB}	kW	0.004	0.004
Other items				
Standby heat loss	P_{stby}	kW	0.134	0.147
Ignition burner power consumption	P_{ign}	kW	–	–
Emissions of nitrogen oxides (only gas- or oil fired)	NO_x	mg/kWh	37	35
Annual energy consumption	Q_{HE}	kWh	–	–
Annual energy consumption	Q_{HE}	GJ	105	147
Sound power level, indoors	L_{WA}	dB	52	55
Additional data for combination heaters				
Declared load profile	–	–	XL	XL
Water heating energy efficiency	η_{wh}	%	82	82
Water heating energy efficiency class	–	–	A	A
Daily electricity consumption (average climate conditions)	Q_{elec}	kWh	0.232	0.225
Annual electricity consumption	AEC	kWh	51	50
Daily fuel consumption	Q_{fuel}	kWh	23.627	23.753
Annual fuel consumption	AFC	GJ	19	19
Indication about ability working only during off-peak hours	–	–	×	×
Other load profiles	–	–	–	–
Standing loss	S	W	–	–
Storage volume	V	l	–	–
Non-solar storage volume (Vbu)	Vbu	l	–	–

1) High-temperature regime means 60 °C return temperature at heater inlet and 80 °C feed temperature at heater outlet.

2) Low temperature means for condensing boilers 30 °C, for low-temperature boilers 37 °C and for other heaters 50 °C return temperature (at heater inlet).

Table 39 Product data on energy consumption Greenstar 8000 F Combi

13.3 Component resistance characteristics

The temperature sensors (flow temperature sensor at flow pipe and the DHW temperature sensor) share the same resistance values.

▶ Refer to table 40.

13.3.1 Sensor values - Flow and DHW temperature sensor

Temperature [°C ± 10 %]	Resistance [Ω]
0	33 404
5	25 902
10	20 247
15	15 950
20	12 657
25	10 115
30	8 138
35	6 589
40	5 367
45	4 398
50	3 624
55	3 002
60	2 500
65	2 092
70	1 759
75	1 486
80	1 260
85	1 074
90	918.3
95	788.5

Table 40 Flow and DHW temperature sensor

13.3.2 Sensor values - Heat exchanger assembly temperature limiter

Normally closed thermostat	Temperature (°C)
Opening temperature	≥ 105
Close temperature	≤ 88

Table 41 Heat exchanger assembly temperature limiter

13.3.3 Sensor values - Outside temperature sensor

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

13.4 Code Plug

Type	Gas type	Number
GR8700iF 35 C	Natural gas	20655
GR8700iF 35 C	Liquid propane (LPG)	20659
GR8700iF 50 C	Natural gas	20656
GR8700iF 50 C	Liquid propane (LPG)	20660

Table 43 Code plug

13.5 Pump characteristic map of the heating pump

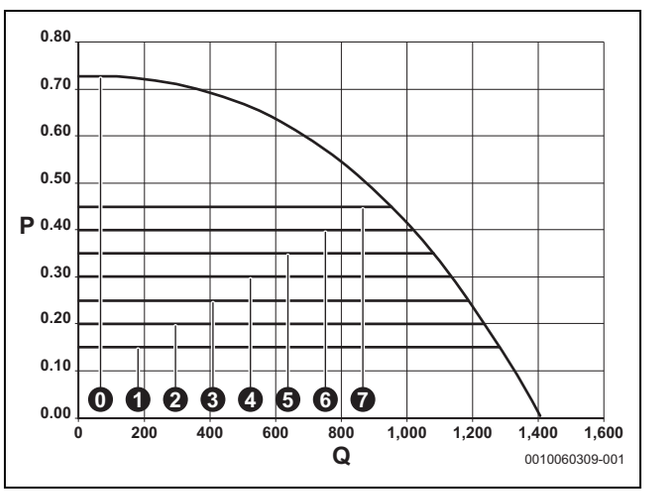

Fig. 122 Pump characteristic maps and pump curves

[0] Pump curve at maximum pump rate

[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
[7] Pump characteristic map, constant pressure 450 mbar

P Pressure (bar)
Q Volumetric flow rate (l/hr)

Constant pressure

If the constant pressure **Pump range map** (1 - 7) is chosen, the differential pressure between the CH flow and return will be kept at the corresponding value. When the CH system is cold and the radiator TRVs are fully open, the pump will be running faster to try and maintain the pressure differential. When the TRVs start to close and the resistance of the CH system increases, the pump speed reduces to maintain the pressure.

The setting (1 - 7) to be selected is dependent upon the resistance and heat load of the CH system. The higher these are, the higher the pressure constant.

13.6 Internal wiring of the appliance

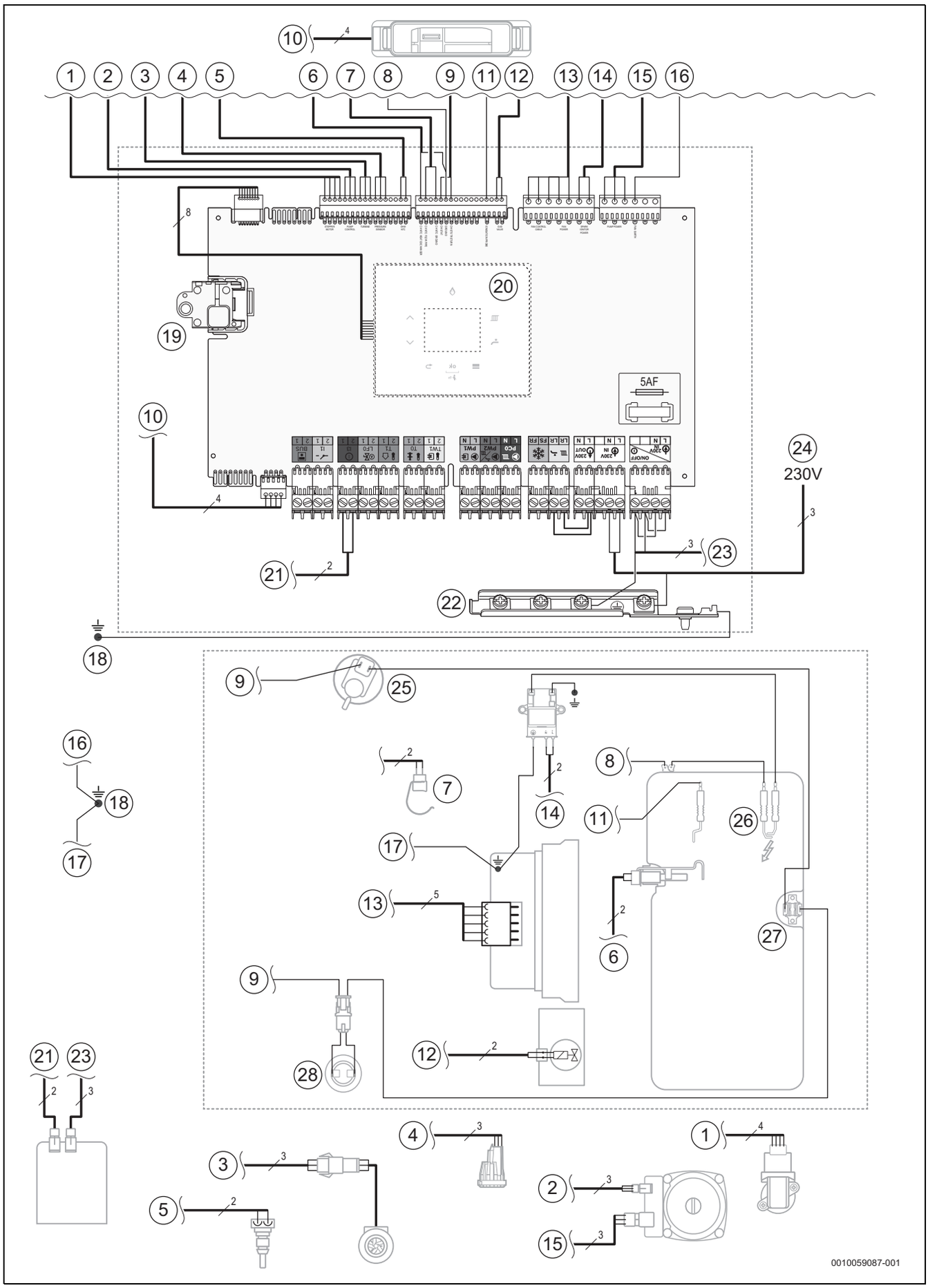

Fig. 123 Electrical wiring

Legend to figure 123:

[1] 3-way valve
[2] Pump control cable
[3] Turbine
[4] Pressure sensor
[5] DHW temperature sensor
[6] Flow temperature sensor at the heat exchanger assembly
[7] Flow temperature sensor at flow pipe
[8] Ground
[9] Temperature limiter safety circuit cables
[10] Key accessory housing (wireless gateway)
[11] Flame sense electrode
[12] Gas valve
[13] Fan power and control cable
[14] Ignition transformer
[15] Pump power cable (230V)
[16] Cable between PCB and chassis earth
[17] Fan earth
[18] Chassis earth
[19] HCM (code plug)
[20] Display
[21] Condensate pump high limit cut-off
[22] Earth rail
[23] Condensate pump power cable (230V)
[24] Appliance mains cable (230V)
[25] Air Pressure Switch
[26] Electrode set
[27] Heat exchanger assembly temperature limiter
[28] Flue gas temperature limiter

GAS BOILER SYSTEM COMMISSIONING CHECKLIST & WARRANTY VALIDATION RECORD

Address:					
Boiler make and model:					
Boiler serial number:					
Commissioned by (PRINT NAME):			Gas Safe registration number:		
Company name:			Telephone number:		
Company email:			Company address:		
				Commissioning date:	
Heating and hot water system complies with the appropriate Building Regulations?				Yes	
Optional: Building Regulations Notification Number (if applicable):					
Time, temperature control and boiler interlock provided for central heating and hot water				Yes	
Boiler Plus requirements (tick the appropriate box(s))					
Boiler Plus option chosen for combination boiler in ENGLAND	Weather compensation			Smart thermostat with automisation and optimisation	
	Load compensation			Flue Gas Heat Recovery	
Time and temperature control to hot water	Cylinder thermostat and programmer/timer			Combination boiler	
Zone valves	pre-existing		Fitted	Not required	
Thermostatic radiator valves	pre-existing		Fitted	Not required	
Automatic bypass to system	pre-existing		Fitted	Not required	
Underfloor heating	pre-existing		Fitted	Not required	
Water quality					
The system has been flushed, cleaned and a suitable inhibitor applied upon final fill, in accordance with BS7593 and boiler manufacturers' instructions				Yes	
What system cleaner was used?			Brand:	Product:	
What inhibitor was used?			Brand:	Product:	
Primary water system filter	pre-existing		Fitted	Not required	
CENTRAL HEATING MODE measure and record (as appropriate)					
Gas rate (for combination boilers complete DHW mode gas rate)			m^3/hr	or	ft^3/hr
Central heating output left at factory settings?			Yes	No	
If no, what is the maximum central heating output selected?					kW
Dynamic gas inlet pressure					mbar
Central heating flow temperature					°C
Central heating return temperature					°C
System correctly balanced/rebalanced?				Yes	
COMBINATION BOILERS ONLY					
Is the installation in a hard water area (above 200ppm)?			Yes	No	
Water scale reducer/softener	pre-existing		Fitted	Not required	
What type of scale reducer/softener has been fitted?			Brand:	Product:	
Water meter fitted?			Yes	No	
If yes- DHW expansion vessel	pre-existing		Fitted	Not required	
Pressure reducing valve	pre-existing		Fitted	Not required	
DOMESTIC HOT WATER MODE Measure and record					
Gas rate			m^3/hr	or	ft^3/hr
Dynamic gas inlet pressure at maximum rate					mbar
Cold water inlet temperature					°C
Hot water has been checked at all outlets			Yes	Temperature	°C
CONDENSATE DISPOSAL					
The condensate drain has been installed in accordance with the manufacturers' instructions and/or BS5546/BS6798				Yes	
Point of termination			Internal	External (only where internal termination impractical)	
Method of disposal			Gravity	Pumped	
ALL INSTALLATIONS					
Record the following	At max rate:	CO ppm	CO_2 %	CO/CO_2 Ratio	
	At min rate (where possible)	CO ppm	CO_2 %	CO/CO_2 Ratio	
Where possible, has a flue integrity check been undertaken in accordance with manufacturers' instructions, and readings are correct?				Yes	
The operation of the boiler and system controls have been demonstrated to and understood by the customer				Yes	
The manufacturers' literature, including Benchmark Checklist and Service Record, has been explained and left with the customer				Yes	
Commissioning Engineer's signature					
Customer's signature (To confirm satisfactory demonstration and receipt of manufacturers' literature)					

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

benchmark COLLECTIVE MARK
THE MARK OF QUALITY FOR THE INSTALLATION, COMMISSIONING AND SERVICING OF DOMESTIC HEATING AND HOT WATER SYSTEMS

13.8 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 ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐
2	Visual Inspection:-	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐
	Check compliance of appliance, system and components															
3	Internal visual inspection	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐
	Check for signs of leaking, corrosion and distress															
4	Appliance performance checks:															
4.1	Check Fan pressure test	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐
	was cleaning required?	No ☐	No ☐	No ☐	No ☐	No ☐	No ☐	No ☐	No ☐	No ☐	No ☐	No ☐	No ☐	No ☐	No ☐	No ☐
		Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐
4.2	Check and clean condensate discharge device, including condensate pump if fitted	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐
4.3	Correct working gas inlet pressure	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐
4.4	Flue gas analysis															
	Check combustion settings: Min/Max test modes	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐
4.5	Gas rate appliance at maximum output in test mode	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐
4.6	Check flame failure appliance	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐
4.7	Fit casing	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐
4.8	Check flue integrity	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐
6	Gas Safe/Benchmark documentation updated	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐
8	Appliance left to customer settings	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐
9	Gas Safe registration number	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
	Gas Safe Engineers Signature	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____

Table 44 Inspection and maintenance checklist

SERVICE & INTERIM BOILER WORK RECORD

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

Service provider

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

SERVICE/INTERIM WORK ON BOILER delete as appropriate			Date:
Engineer name:	Company name:		
Telephone Nº:	Gas Safe registration Nº:		
Max rate	CO ppm	CO_2 %	CO/CO_2
Min rate	CO ppm	CO_2 %	CO/CO_2
Where possible, has a flue integrity check been undertaken in accordance with manufacturers' instructions, and readings are correct?"		yes	
Gas rate:	m^3/h	OR	ft^3/h
Were parts fitted? delete as appropriate		Yes	No
Parts fitted:			
System inhibitor concentration has been checked and appropriate action taken, in accordance with BS 7593 and boiler manufacturers' instructions. *		yes	n/a
Comments:			
Signature:			

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

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SERVICE & INTERIM BOILER WORK RECORD

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