

INSTALLATION, COMMISSIONING AND SERVICING INSTRUCTIONS

WALL HUNG RSF GAS FIRED CONDENSING COMBINATION BOILER

GREENSTAR 36LXi

FOR SEALED CENTRAL HEATING SYSTEMS AND MAINS FED DOMESTIC HOT WATER



6720646608-00.1Wc

**The appliance is for use with Natural Gas or
L.P.G. (Cat II 2H3P type C13, C33 & C53)**

	Model	GC Number
Natural Gas	36kW	47-406-30
Liquid Petroleum Gas	36kW	47-406-31

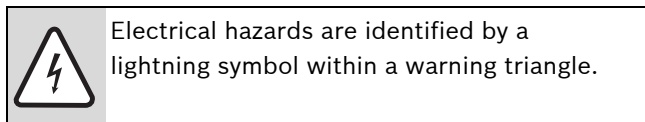
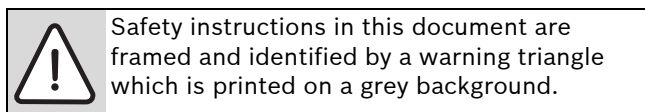
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1 KEY TO SYMBOLS AND SAFETY INSTRUCTIONS

1.1 EXPLANATION OF SYMBOLS

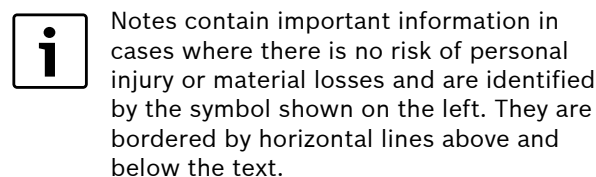
WARNING SYMBOLS



Signal words indicate the seriousness of the hazard in terms of the consequences of not following the safety instructions.

- **NOTICE** indicates possible damage to property or equipment, but where there is no risk of injury.
- **CAUTION** indicates possible injury.
- **WARNING** indicates possible severe injury.
- **DANGER** indicates possible risk to life.

IMPORTANT INFORMATION



ADDITIONAL SYMBOLS

Sym bol	Meaning
1.	a numbered step in an action sequence
▶	a step in an action sequence
①	a reference number to identify or refer to a part or item
•	a list entry
–	a list entry (second level)

Table 1 Symbols

SYMBOLS USED IN THIS MANUAL

	Domestic Hot Water
	Central Heating
	Hot Water Storage Cylinder
	Domestic Cold Water Supply
	Electrical Supply
	Gas Supply

Table 2 Commonly used symbols

PLEASE READ THESE INSTRUCTIONS CAREFULLY BEFORE STARTING INSTALLATION.

These instructions are applicable to the Worcester appliance model(s) stated on the front cover of this manual only and must not be used with any other make or model of appliance.

These instructions apply in the UK and Ireland only and must be followed except for any statutory obligations.

This appliance must be installed by a **GAS SAFE** registered, competent person. Failure to install correctly could lead to prosecution.

If you are in any doubt, contact the Worcester Technical helpline (0844 892 3366).

Please leave these instructions with the completed BENCHMARK CHECKLIST, (or a certificate confirming compliance with IS 813, Eire only) and the user manual with the owner or at the gas meter after installation or servicing.

Distance learning and training courses are available from Worcester.

The BENCHMARK CHECKLIST can be found in the back of this Installation manual.

Table 3 Abbreviations use in this manual

Ø	Diameter
NG	Natural Gas
LPG	Liquid Petroleum Gas
CH	Central Heating
DHW	Domestic Hot Water
DCW	Domestic Cold Water
PRV	Pressure Relief Valve
NTC	Negative Temperature Coefficient (sensor)
IP	Ingress Protection
RCD	Residual Current Device
TRV	Thermostatic Radiator Valve
ECV	Emergency Control Valve
WRAS	Water Regulations Advisory Scheme
SEDBUK	Seasonal Efficiency of Domestic Boilers in the United Kingdom

1.2 SAFETY PRECAUTIONS

IF YOU SMELL GAS:

- ▶ **CALL** NATIONAL GAS EMERGENCY SERVICE ON 0800 111 999
- ▶ **LPG BOILERS** CALL THE SUPPLIER'S NUMBER ON THE SIDE OF THE LPG TANK
- ▶ **TURN OFF** THE ECV (EMERGENCY CONTROL VALVE) AT THE METER/REGULATOR
- ▶ **DO NOT** TURN ELECTRICAL SWITCHES ON OR OFF
- ▶ **DO NOT** STRIKE MATCHES OR SMOKE
- ▶ PUT OUT NAKED FLAMES
- ▶ OPEN DOORS AND WINDOWS
- ▶ KEEP PEOPLE AWAY FROM THE AFFECTED AREA

BOILER OPERATION:

This boiler must only be operated by a responsible adult who has been instructed in, understands, and is aware of the boiler's operating conditions and effects.



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.

The guarantee of this product is dependant on the Benchmark checklist being completed and the actions undertaken.

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

Visit **centralheating.co.uk** for more information.

HEALTH AND SAFETY

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

COMBUSTION AND CORROSIVE MATERIALS

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

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

FITTING AND MODIFICATIONS

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 guarantee. The manufacturer accepts no liability arising from any such actions, excluding statutory rights.

SERVICING

Advise the user to have the system serviced annually by a competent, qualified Gas Safe registered engineer. Approved spares must be used to help maintain the economy, safety and reliability of the appliance.

IMPORTANT

The service engineer must complete the Service Record on the Benchmark Checklist after each service.

INSTALLATION REGULATIONS

Current Gas Safety (Installation & Use) Regulations:

All gas appliances must be installed by a competent person in accordance with the above 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, IEE Regulations, Building Regulations, Building Standards (Scotland) (Consolidation), Building Regulations (Northern Ireland), local water by-laws, Health & Safety Document 635 (The Electricity at Work Regulations 1989) and any other local requirements.

BUILDING REGULATIONS PART L 1A 2010

If the installation is in a new build property or is a first time installation in an existing property, heating systems must conform to current building regulations Part L1a.

All new heating systems in dwellings must have at least two heating zones. Each of these zones will be operated separately by both time and temperature controls.

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

All radiators must have TRVs fitted, where reasonable, in all rooms except bathrooms and rooms with thermostats.

BUILDING REGULATIONS PART L 1B 2010 - BOILER REPLACEMENT

For boiler replacement on an existing system, it is not necessary to zone the system, compliance with the zone requirements can be achieved by a single room thermostat or programmable room thermostat.

BRITISH STANDARDS

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

- BS7074:1 Code of practice for domestic and hot water supply
- BS6891 Installation of low pressure gas pipe work up to 35mm (R1½)
- 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)

Irish Standards

The relevant Irish standards should be followed, including:

- ECTI National rules for electrical installations
- IS 813:2002 for Domestic Gas Installations.

LPG Installations

An appliance using L.P.G. 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 building:

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

Potable water:

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

CH Water:

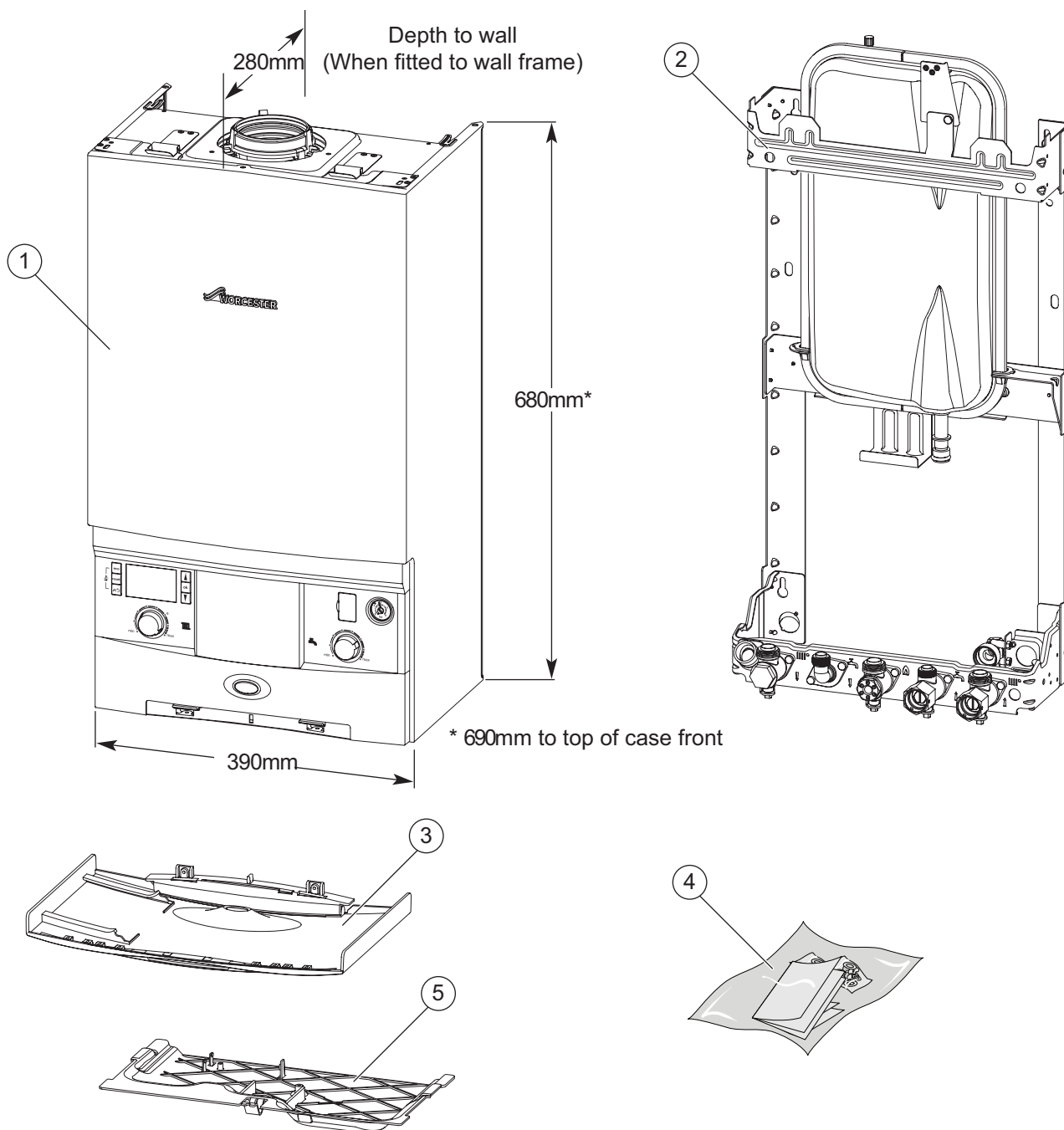
Artificially softened water must not be used to fill the central heating system.

BOILER FEATURES

- High pressure die-cast aluminium heat exchanger
- Low NOx emissions
- Fixed gas valve settings
- Direct burner ignition
- Zero pressure governor gas valve with fully modulating fan
- Display for boiler status and access to diagnostics, system and commissioning parameters
- Digital control system
- Memory retention after power interruption
- Low electrical power consumption during operation and stand-by modes
- Modulating pump
- Condensing in CH and DHW modes
- Three star Hot Water Comfort measured to EN13203 Part 1 in comfort mode with DHW pre-heat ON
- Eco mode to use gas or LPG on demand
- Plate type DHW heat exchanger
- Ability to pre-plumb condensate drain, CH flow, DHW Outlet, Gas, DCW In, PRV and CH Return connections
- Syphonic condensate trap
- Galvanised steel wall mounting frame
- Standard wall frame provides vertical pipe route behind the boiler
- Compatible with all Worcester standard and intelligent controls
- Condensfit II flue systems 60/100 and 80/125 mm allows plume re-direction as standard and ability to attach plume management kits

2 APPLIANCE INFORMATION

2.1 APPLIANCE



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STANDARD PACKAGE

1. Wall hung gas-fired condensing combi boiler for central heating and domestic hot water
2. Wall mounting frame
3. Fascia panel
4. Hardware literature pack:
 - Greenstar LXi Installation, Commissioning and Servicing Instructions
 - User guide
 - Boiler fascia guide
 - Wall mounting template
 - Pressure Relief Valve elbow

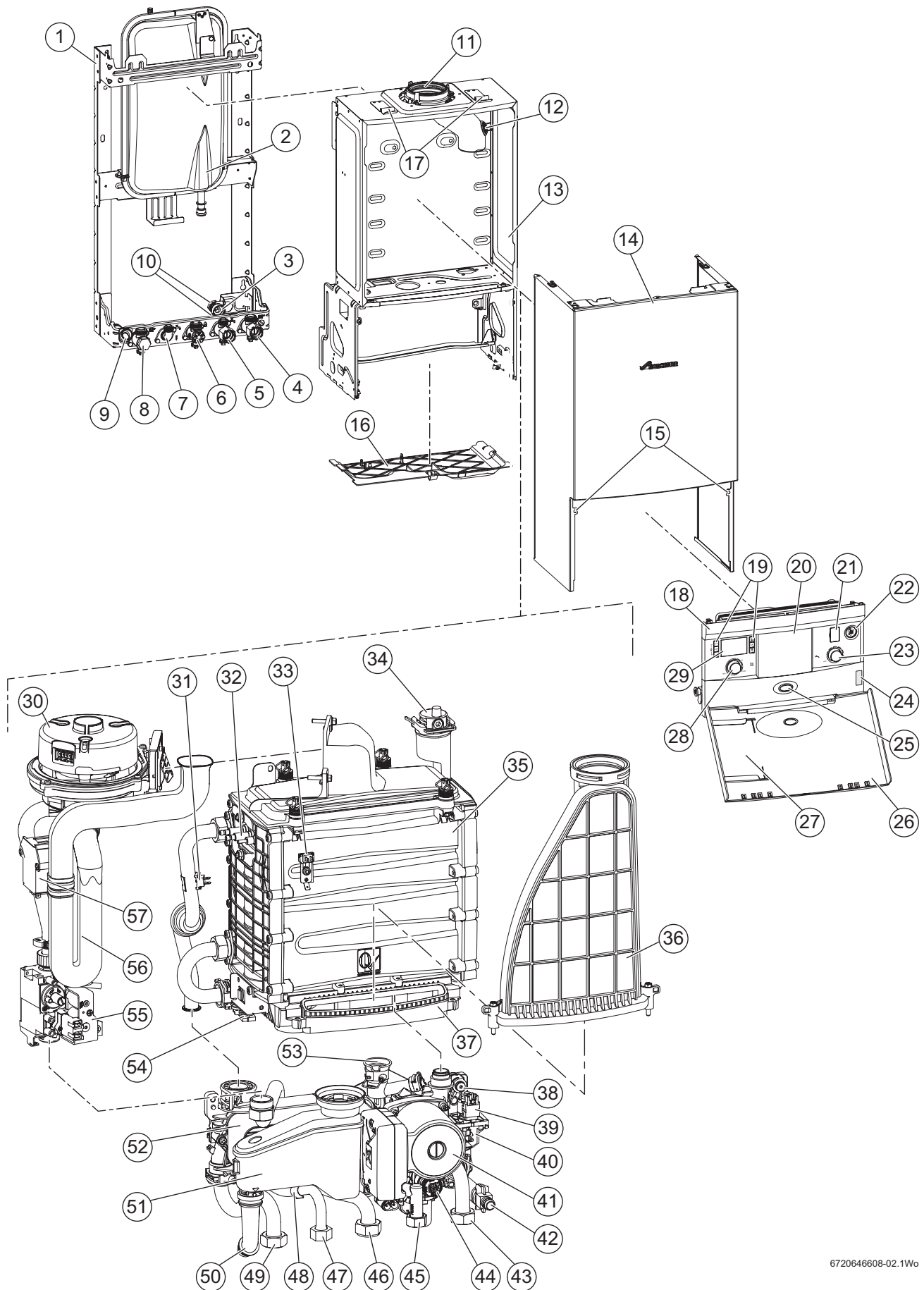
- Consumer Guarantee Card
- Guarantee Return Envelope
- Sealing Pack:
 - 3 off - Compression nut 22mm
 - 3 off - Compression olive 22mm
 - 3 off - Compression nut 15mm
 - 3 off - Compression olive 15mm
 - 2 off - Fibre washer 18.6 x 13.5 x 1.5
 - 2 off - Fibre washer 23.9 x 17.2 x 1.5
 - 1 off - Bonded washer $\frac{3}{4}$ (gas)
- 5. Bottom panel

2.2 TECHNICAL DATA

DESCRIPTION LXI	UNIT	Natural gas 36kW	L.P.G. 36kW
Domestic Hot Water			
Minimum heat input	kW	7.15	7.15
Maximum rated heat output	kW	35.5	35.5
Maximum rated heat input	kW	36.7	36.7
Maximum mains inlet pressure (standing pressure)	bar	10	10
Minimum mains inlet pressure (working) for max. flow	bar	1.5	1.5
Minimum mains inlet pressure (working) for operation	bar	0.2	0.2
Domestic Hot Water temperature range	°C	40 - 60	40 - 60
Domestic Hot Water specific rate - 30 °C rise	l/min.	17.2	17.2
Max. Domestic Hot Water flow rate - 40 °C rise \pm 15%	l/min.	12.73	12.73
Gas flow rate - Max. 10 minutes from lighting			
Natural Gas G20	m ³ /h	3.87	-
Propane Gas (L.P.G.)	kg/h	-	2.87
Central Heating			
Maximum rated heat input (net)	kW	24.62	24.62
Maximum rated heat output 40/30 °C	kW	25.60	25.60
Maximum rated heat output 50/30 °C	kW	25.45	25.45
Maximum rated heat output 80/60 °C	kW	24	24
Maximum flow temperature	°C	82	82
Maximum permissible operating pressure	bar	2.5	2.5
Available pump head at 20 °C system temperature rise	m	2.0	2.0
Flue			
Flue gas temperature 80/60 °C, rated/min. load	°C	78/64	79/65
Flue gas temperature 40/30 °C, rated/min. load	°C	52/36	53/37
CO ₂ level at max. rated heat output (after 10 minutes)	%	9.1	10.5
CO ₂ level at min. rated heat output (after 10 minutes)	%	8.5	10.0
NOx class		5	5
NOx rating	mg/kWh	35	35
Condensate			
Maximum condensate rate	l/h	2.0	2.0
pH value, approx.		4.8	4.8
Electrical			
Electrical power supply voltage	a.c. V	230	230
Frequency	Hz	50	50
Maximum power consumption - running	W	143	143
Maximum power consumption - stand-by	W	<1	<1
General data			
Appliance protection rating	IP	X4D	X4D
Appliance protection rating with mechanical or RF mechanical timer or FW100 module fitted	IP	IP20	IP20
Permissible ambient operating temperatures	°C	0 - 50	0 - 50
Nominal capacity of appliance	litre	2.2	2.2
Total boiler weight	kg	44.0	44.0
Lift weight	kg	28.7	28.7
SEDBUK 2005	Band	A	A
SEDBUK 2009	Band	A	A

Table 4 Technical data 36kW

2.3 LAYOUT



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Fig. 1 Main boiler components

1	Wall mounting frame	30	Fan
2	Expansion vessel	31	Flow temperature sensor (NTC)
3	PRV connection	32	Electrode assembly
4	CH return isolating valve	33	Maximum safety sensor (NTC)
5	DCW mains isolating valve	34	Auto air vent
6	Gas isolating valve	35	Aluminium Silicon Heat exchanger
7	DHW outlet connection	36	Flueway
8	CH flow isolating valve	37	Sump assembly
9	Condensate drain connection	38	Pressure gauge connection point
10	PRV pre-plumbing connection	39	Diverter valve actuator (stepper motor)
11	Flue connector	40	Diverter valve body
12	Flue overheat thermostat	41	Modulating pump
13	Main superstructure	42	Drain point
14	Case	43	CH return connection to isolating valve
15	Case retaining screws	44	PRV
16	Bottom panel	45	DCW in connection to isolating valve
17	Case retaining clips	46	Gas pipe from isolating valve
18	Control panel	47	DHW outlet pipe
19	Control panel menu buttons	48	DHW temperature sensor (NTC)
20	Blank for optional programmer	49	CH flow pipe to isolating valve
21	Diagnostic port - Worcester service engineer	50	Condensate syphon drain pipe
22	Pressure gauge	51	Condensate syphon
23	DHW temperature control	52	DHW Plate heat exchanger
24	Boiler identification label	53	Expansion vessel connection
25	Operation/fault indicator (blue)	54	Return temperature (NTC)
26	Control panel flap	55	Gas valve
27	Boiler fascia guide location	56	Combustion air inlet
28	CH temperature control	57	Ignition transformer
29	Boiler display		

Tab. 5 Boiler components

3 PRE-INSTALLATION

3.1 CLEANING PRIMARY SYSTEMS


CAUTION:

- ▶ ISOLATE THE MAINS SUPPLIES BEFORE STARTING ANY WORK AND OBSERVE ALL RELEVANT SAFETY PRECAUTIONS.


NOTE:

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


NOTE:

- ▶ Debris from the system can damage the boiler 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 recommended that you fit a primary water cleanser to the system. Worcester offers a filter that helps remove both magnetite and non-magnetic debris. Part number 7 716 192 609

BEFORE CLEANING THE SYSTEM:

- ▶ **Ensure that the system and pipe work is in good working order.**
- ▶ **Where possible keep the existing boiler/circulating pump in place when flushing the system.**

FOLLOW THE GUIDANCE OF BS7593:

Treatment of water in domestic hot water central heating and also the flushing guidelines below.



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

FLUSHING THE 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.

The pH value of the system water must be less than 8 or the appliance guarantee will be invalidated.

- ▶ Circulate the flushing agent before the boiler is fired up.
- ▶ Run the boiler/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.
- ▶ It may be necessary to use a power flushing machine to aid the cleansing procedure in some circumstances.
- ▶ Close the drain cocks and refill with fresh water and a suitable inhibitor.
- ▶ Vent any air from the boiler and system.

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.


WARNING: Sealing agents

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

WATER TREATMENT

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

FERNOX	0870 601 5000
	www.fernox.com
SENTINAL	0800 389 4670
	www.sentinal-solutions.net

3.2 MAINS SUPPLY

3.2.1 ELECTRICAL SUPPLY

- Supply: 230V - 50 Hz, 143 Watts
- Cable: PVC insulated 0.75mm² (24 x 0.2mm) temperature rated to 90 °C.
- External 3A fuse to BS1362.
- The boiler must be earthed.
- This boiler must not be connected to a 3 phase supply.
- IPX4D.



NOTE: This is reduced to IP20 if the following mechanical timers are fitted; 7 716 192 036 or 7 716 192 037 or FW100 7 716 192 067

- Wiring must comply with the latest edition of BS 7671 (IEE wiring regulations).

3.2.2 GAS SUPPLY

- Boilers using Natural Gas (NG) must be connected to a governed meter.
- Liquid Petroleum Gas (LPG) must be connected to a regulator.
- Installation and connection of the gas supply to the boiler must be in accordance with BS6891.
- Under no circumstance should the size of the gas supply pipe be less than 22 mm.
- The meter or regulator and pipe work to the meter must be checked, preferably by the gas supplier. This is to ensure that the equipment is in good working order and can meet the gas flow and pressure requirements, in addition to the demand from any other appliance being served.

3.2.3 WATER SUPPLY

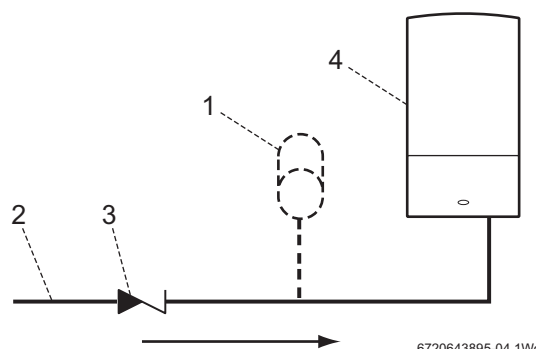
WATER MAINS PRESSURE:

- Minimum mains water pressure for maximum performance: 1.5 bar.
- Maximum mains fed water pressure 10 bar. If necessary fit a pressure reducing valve.



NOTE: 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.

- Where the mains water supply has a non-return, back flow prevention valve fitted, a mini expansion vessel (1) should be connected to the mains water inlet pipe (2) between the non-return valve (3) and the boiler (4) as shown below.



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

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 200 ppm, 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.


3.3 WATER SYSTEMS AND PIPE WORK

PLASTIC PIPE WORK:

- Any plastic pipe work must have a polymeric barrier with 600mm (minimum) length of copper pipe before being connected to the boiler.
- Plastic pipe work used for underfloor heating must be correctly controlled with a thermostatic blending valve limiting the temperature of the circuits to approximately 50°C.

PRIMARY SYSTEMS CONNECTIONS/VALVES:

- All system connections, taps and mixing valves must be capable of sustaining a pressure up to 3 bar.
- Radiator valves should conform to BS2767:10.
- All other valves should conform to BS1010.
- Thermostatic radiator valves (TRV's) must be fitted to all rooms except bathrooms and the room in which the room thermostat is fitted.
- A drain cock is required at the lowest point(s) in the system.
- An air vent is required at the high point(s) in the system.




The boiler is equipped with an internal by-pass.

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-syphon 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.

SEALED PRIMARY SYSTEM:



NOTE: ARTIFICIALLY SOFTENED WATER MUST NOT BE USED TO FILL THE CENTRAL HEATING SYSTEM

- The CH sealed system must be filled using a WRAS approved filling loop or comply with figure 2 for system fill.
- Where the system volume is more than 100 litres or exceeds 2.65 bar at maximum heating temperature, an extra 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 figure as the expansion vessel built into the appliance.
- Do not use galvanised pipes or radiators.**

SYSTEM FILL

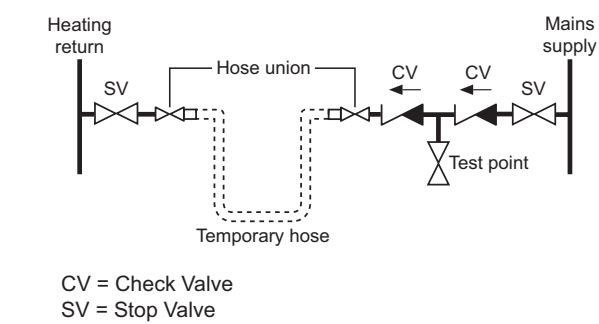


Fig. 2 System fill

TYPICAL SEALED SYSTEM

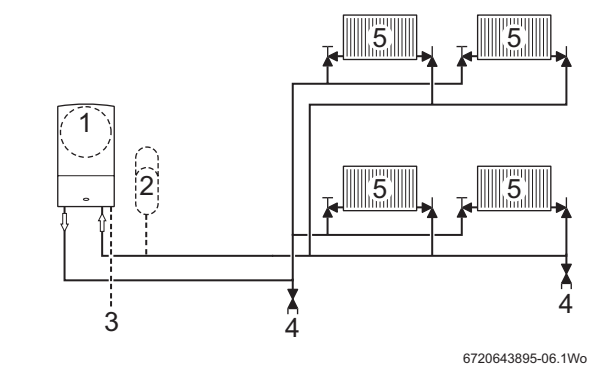


Fig. 3 Sealed system

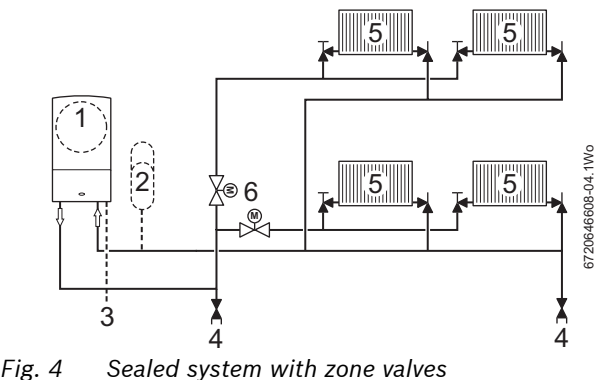


Fig. 4 Sealed system with zone valves

1	Appliance expansion vessel - CH
2	Extra expansion vessel - CH return
3	Pressure relief discharge
4	Drain cock
5	Radiators
6	Zone valves

Tab. 6 Key to figs. 3 and 4

3.4 CONDENSATE PIPE WORK


NOTE:

- ▶ Where a new or replacement boiler is being installed, access to an internal “gravity discharge” point should be one of the factors considered in determining boiler location.
- ▶ The condensate pipe must be nominally 22mm Ø plastic pipe.
- ▶ The condensate pipe work must fall at least 52mm per metre towards the outlet and should take the shortest practicable route.
- ▶ Ensure there are no blockages in the pipe run.

Key to condensate illustrations	
1	Condensate discharge from boiler
2	Soil and vent stack
3	Minimum 450mm and up to three storeys
4	Visible air break at plug hole
5	Sink or basin with integrated overflow
6	75mm sink waste trap
7	Condensate pump
*	Condensate trap of 75mm already incorporated into the boiler

Table 7

3.4.1 INTERNAL CONNECTIONS

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

Wherever possible, the condensate drainage pipe should be routed and terminated so that the condensate drains away from the boiler 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.

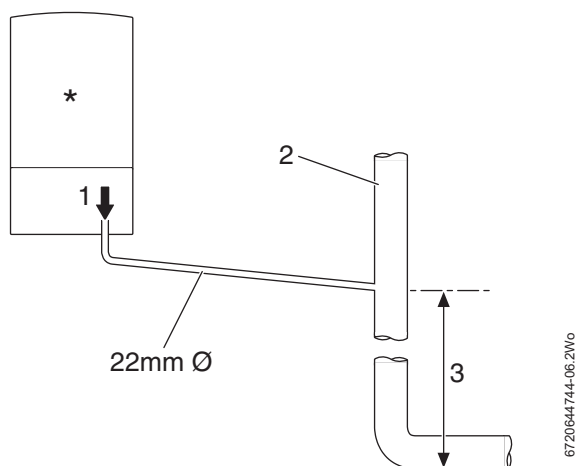


Fig. 5 Disposal to soil vent stack

Alternatively if the first option is not possible an internal kitchen or bathroom waste pipe, washing machine waste pipe etc. can be used.

Ensure that the condensate drain pipe is connected “down stream” of the waste trap.

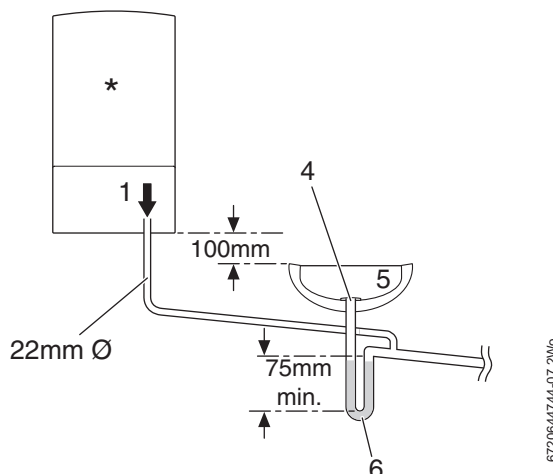


Fig. 6 Disposal to a waste pipe

CONDENSATE PUMP

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

The pump outlet pipe should discharge to a suitable internal foul water discharge point such as an internal soil and vent stack, internal kitchen or bathroom waste pipe, washing machine waste pipe etc. A suitable permanent connection to the foul waste pipe should be used.

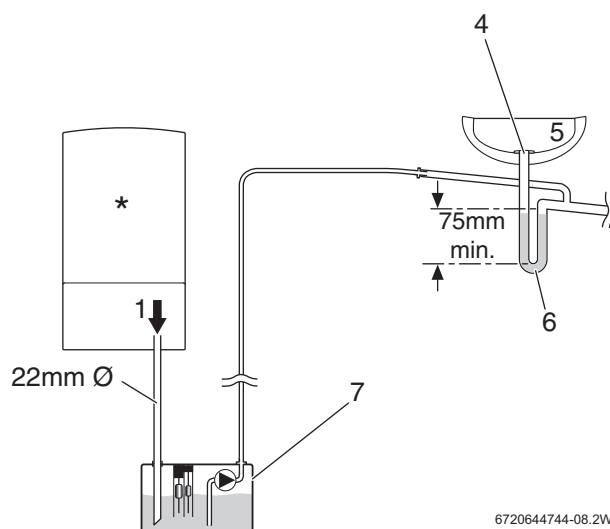




Fig. 7 Condensate pump disposal

3.4.2 EXTERNAL CONNECTIONS



NOTE: Freezing conditions

- ▶ Pipe work length should be kept to a minimum and the route as vertical as possible.
- ▶ Weather proof insulation must be used.



NOTE: Condensate waste

- ▶ Care should be taken when siting a soak-away to avoid obstructing existing services.

Continued - Key to condensate illustrations	
8	PVCu strap on fitting
9	100mm Ø minimum plastic pipe
10	Drainage holes
11	Limestone chippings
12	Bottom of sealed tube
13	Insulate and increase pipe size
14	Pipe work transition
15	External air break
16	Air gap
17	External rain water pipe into foul water
18	43mm 90° male/female bend
*	Condensate trap of 75mm already incorporated into the boiler

Table 8

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 not exceed three metres.
- ▶ The pipe should be run internally as far as possible before going externally and the pipe diameter should be increased to 32mm before it passes through the wall to the exterior. The pipe should be insulated using suitable waterproof and weather resistant insulation.
- ▶ The external pipe should take the shortest and least exposed route to the discharge point, and should "fall" as steeply as possible away from the boiler, with no horizontal runs in which condensate might stand.
- ▶ The use of fittings, elbows etc. should be kept to a minimum and any internal "burrs" on cut pipe work should be removed so that the internal pipe section is as smooth as possible.

FITTING AN EXTERNAL AIR BREAK

- Refer to figure 8 when a rain water down pipe is used to dispose of condensate.
- An air break must be installed in the 43mm pipe work, between the boiler condensate outlet and the drainpipe, outside the property, to avoid flooding during adverse weather conditions.

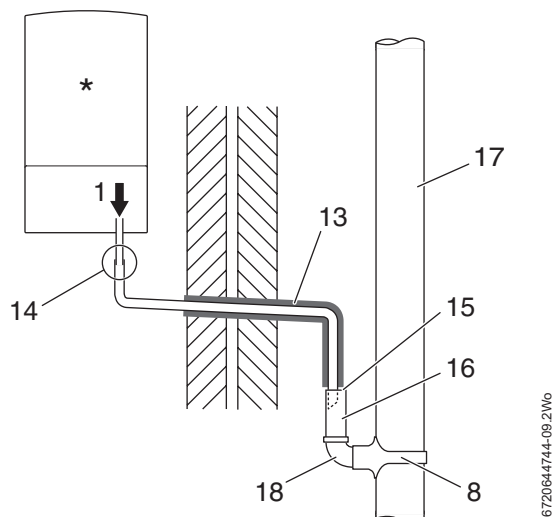


Fig. 8 Disposal into a rainwater down pipe

i Condensate drainage pipe can be run above or below ground.

Where the pipe terminates over an open drain or gully, the pipe should terminate below the grating level, but above water level, in order to minimise "wind chill" at the open end.

The use of a drain cover (such as those used to prevent blockage by leaves) may offer further protection from wind chill.

Pipe drainage will be improved if the end is cut at 45° as opposed to a straight cut.

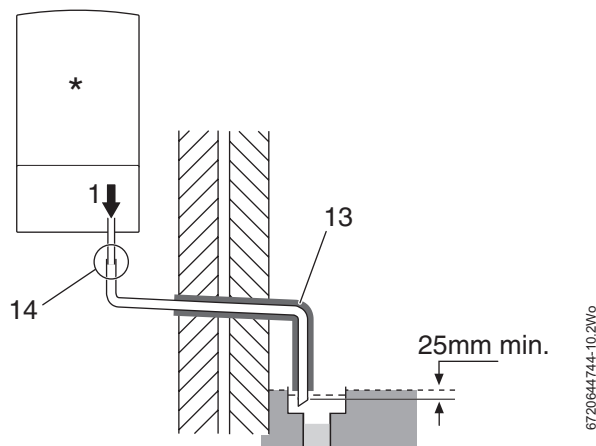


Fig. 9 External disposal

CONDENSATE SOAK AWAY

- The condensate drainage pipe may be run above or below the ground to the soak away. The examples shown on this page run above ground.
- The soak away must use 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.



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

In situations where there are likely to be extremes of temperature or exposure, the use of a proprietary trace-heating system for external pipe work, incorporating an external frost thermostat, should be considered. If such a system is used, the requirement to use 32mm pipe does not apply. However, all other guidance above and the instructions for the trace heating system, should be closely followed.



NOTE: Unheated internal areas.

- ▶ Internal pipe runs in unheated areas such as lofts, basements and garages should be treated as external runs.

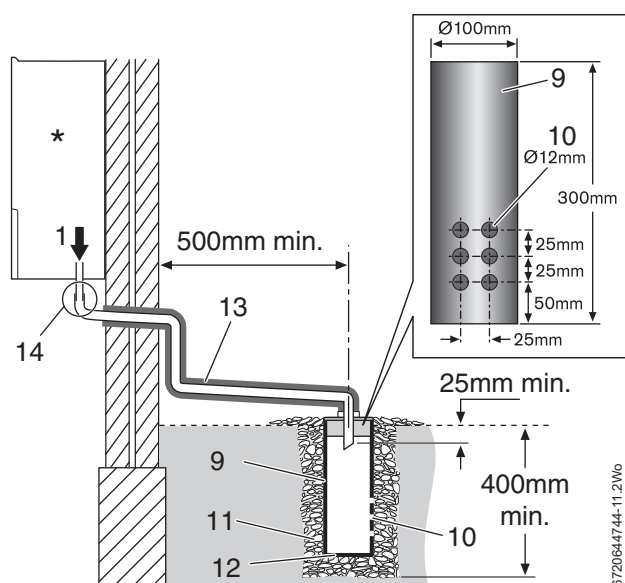


Fig. 10 Soak away

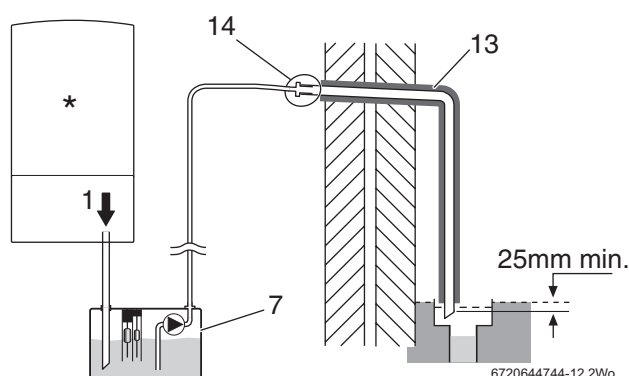


Fig. 11 Condensate pump to external disposal

3.5 PRESSURE RELIEF PIPE WORK



NOTE:

- ▶ The pressure relief valve is a safety device for the boiler and if activated may discharge boiling water or steam through the relief valve drain pipe.
- ▶ Care should be taken when siting the outlet pipe so that it does not cause an obstruction or discharge above a window, entrance or other public access where it could cause a hazard.

- The pressure relief drain pipe (1) from the boiler should be at least 15mm diameter copper pipe and run downwards, away from any electrical equipment or other hazard, preferably to an external drain or soak away.
- The pressure relief drain pipe (1) should be finished with a partial bend, near the outlet to face the external wall (as shown) to help prevent freezing.

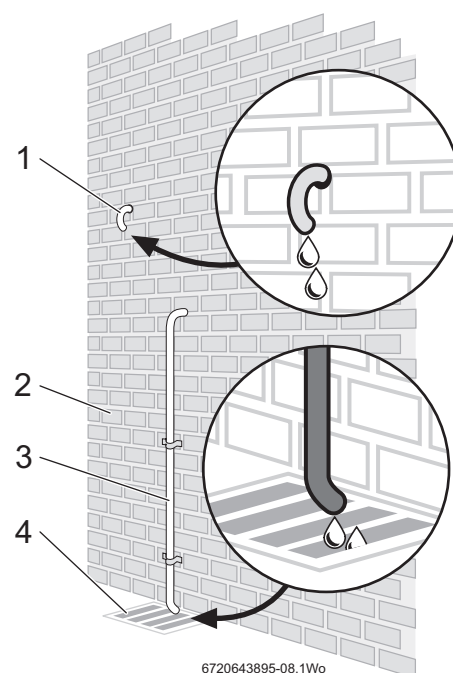


Fig. 12 Pressure relief pipe work

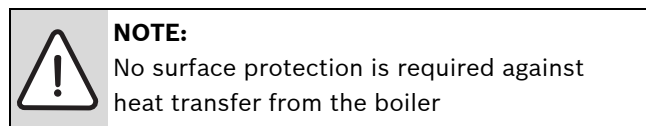
2	Outside wall
1,3	Drain pipe
4	External drain

Table 9 Key to fig 7

3.6 BOILER LOCATION AND CLEARANCES

3.6.1 INSTALLATION

This boiler is only suitable for installing internally within a property at a suitable location onto a fixed, rigid surface at least the same size as the boiler and capable of supporting the boiler weight.



3.6.2 INSTALLATION AND SERVICING CLEARANCES - UNVENTILATED COMPARTMENTS

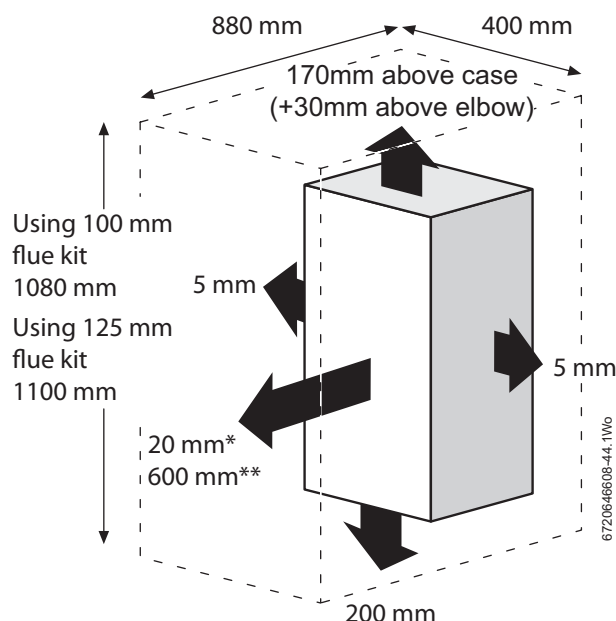


Fig. 13 Unventilated compartment

*	Minimum clearance to removable door
**	Minimum clearance required for servicing

Tab. 10 Minimum clearances

3.6.3 COMPARTMENTS

Follow the requirements of BS6798 and BS5440 Part 2 and note:

- Minimum clearances must be maintained.
- An access door is required to install, service and maintain the boiler and any ancillary equipment.
- If fitting the boiler into an airing cupboard use a non-combustible material to separate the boiler from the airing space.
The material can be perforated up to a maximum hole size of 13mm.

3.6.4 BATHROOMS

A boiler fitted with a mechanical timer or RF mechanical timer (receiver) or FW100 controller may only be installed outside the shaded area.

A boiler with any other timer fitted (or blanking panel) can also be installed in zone 2.

Additional RCD (Residual Current Device) protection may be required.

Consult the latest version of BS7671 (IEE wiring regulations).

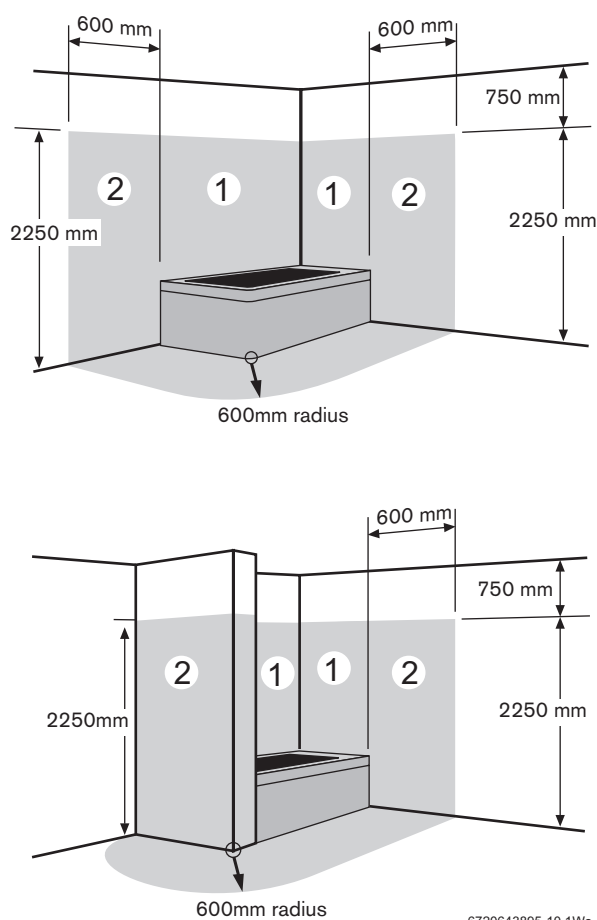


Fig. 14 Bathroom installations

3.7 PLUMBING MANIFOLD

3.7.1 CONNECTIONS

Heating System	22mm compression fittings
DHW	15mm compression fittings
Gas	22mm compression fittings

Tab. 11

Use the fittings supplied in the Hardware literature pack.



Further guidance on pipe routing can be found printed on the boiler template (supplied with the boiler).

- For further ease of fitting, an optional Vertical Pre-piping Assembly kit is available, comprising five pre-formed copper pipes and a cross bonding strip. Part number: 7 716 192 713.
- To cover the pipe work under the boiler, down to the counter top, an optional Worcester accessory Below Boiler Pipe Cover can be used, Part number: 7 716 192 608.

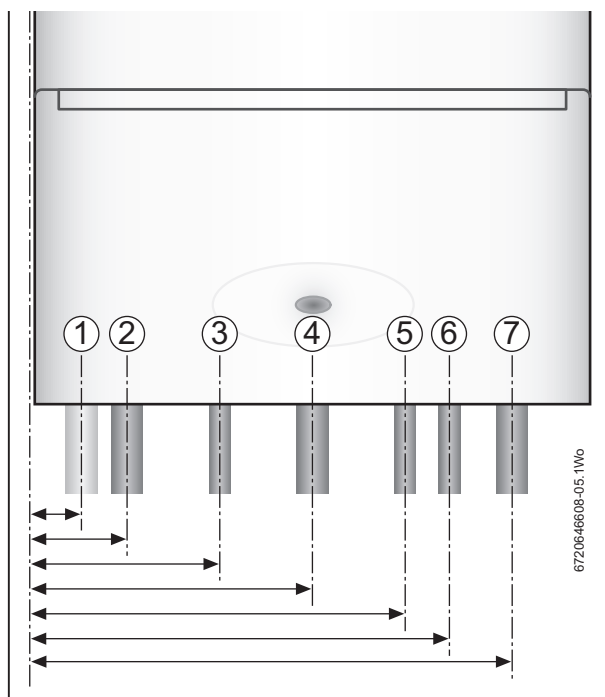


Fig. 15 Pipe dimensions

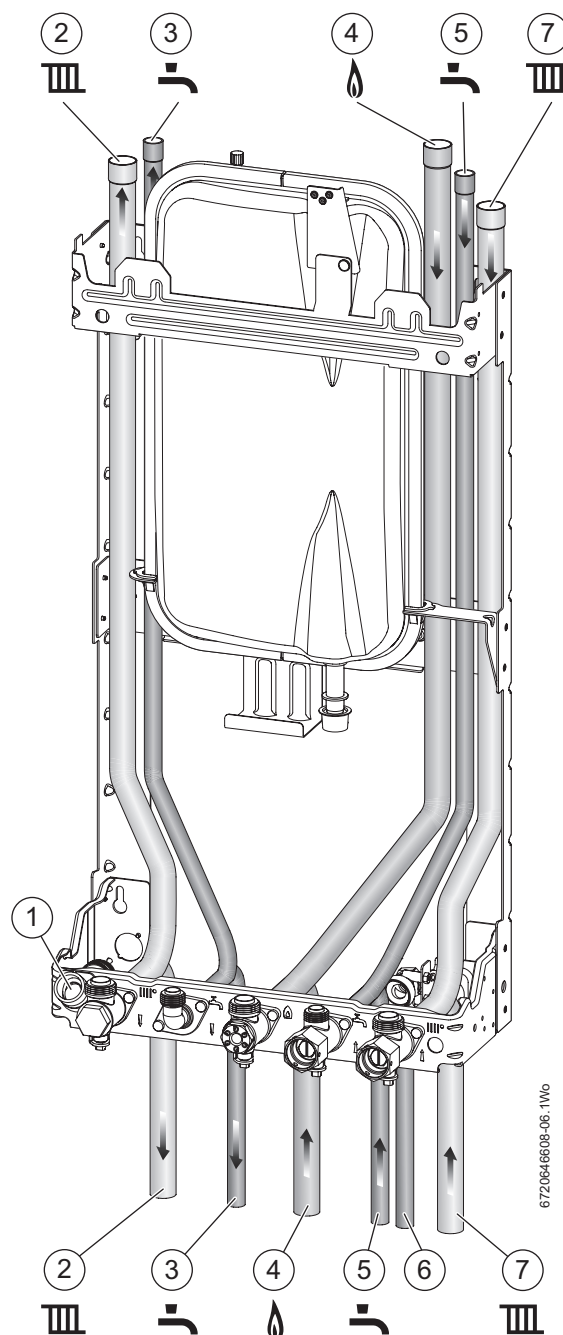


Fig. 16 Plumbing manifold

#	Function	From left case edge	Diameter of pipe
1	Condensate drain	33mm	22mm
2	CH Flow	65mm	22mm
3	DHW Outlet	130mm	15mm
4	Gas	195mm	22mm
5	DCW Mains In	260mm	15mm
6	PRV drain	291mm	15mm
7	CH Return	325mm	22mm

Table 12 Key to figures 15 & 16

3.8 FLUE OPTIONS


CAUTION: Non accessible flue systems:

- ▶ Where a flue system is not going to be accessible, 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.


NOTE: Effective flue lengths:

- ▶ each 90° bend used is equivalent to 2 metres of straight flue
- ▶ each 45° bend used is equivalent to 1 metre of straight flue



Plume management kits are available for the 60/100 horizontal flue system, Part number 7 716 191 086. Refer to the manual supplied with the Plume Management kits for complete installation instructions



LXi boilers		Maximum total flue length L (mm)	
FLUE TYPE		60/100	80/125
1	Telescopic horizontal flue assembly	130 - 570	405 - 600
	Longer telescopic horizontal flue assembly	570- 790	NA
2	Horizontal flue extension	6,000	15,000
3	Horizontal flue with 1 x 90° bend	4,000	13,000
4	Horizontal flue with 2 x 90° bends	2,000	11,000
5	High level horizontal flue	6,000	15,000
6	High level horizontal flue with 2 x 90° bends	4,000	13,000
7	High level horizontal flue with 3 x 90° bends	2,000	11,000
8	Vertical balanced flue assembly	6,000	15,000
9	Vertical balanced flue with 2 x 90° bends	2,000	11,000
10	Vertical balanced flue with 2 x 45° bends	4,000	13,000

Tab. 13 Flue options

The flue systems have different maximum flue lengths

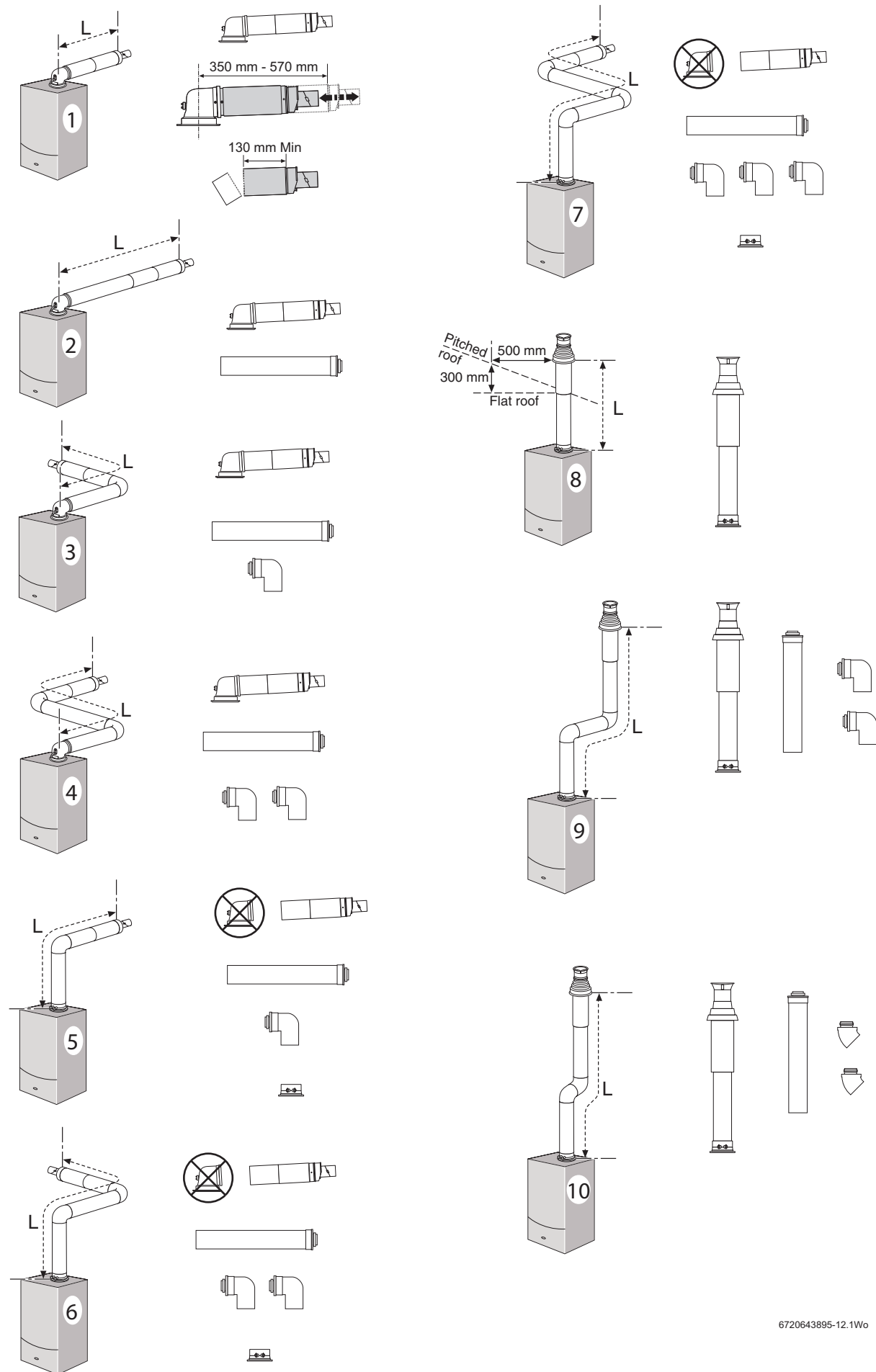
The Greenstar series has the option of two horizontal 60/100 RSF (telescopic and longer telescopic) and one horizontal 80/125 RSF (telescopic) flue system and two vertical RSF (60/100 or 80/125) flue systems:

The next page shows various fluing options.

Refer to the Flue options in table 13 for the straight flue lengths required to achieve the maximum flue length.

Part number	Flue	Description
7 716 191 082	60/100	Telescopic horizontal flue assembly
7 716 191 171	60/100	Longer telescopic horizontal flue assembly
7 719 003 702	80/125	Telescopic horizontal flue assembly
7 719 002 430	60/100	Vertical flue assembly
7 719 002 431	80/125	Vertical flue assembly

Table 14 Flue options



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3.9 FLUE TERMINAL POSITIONS

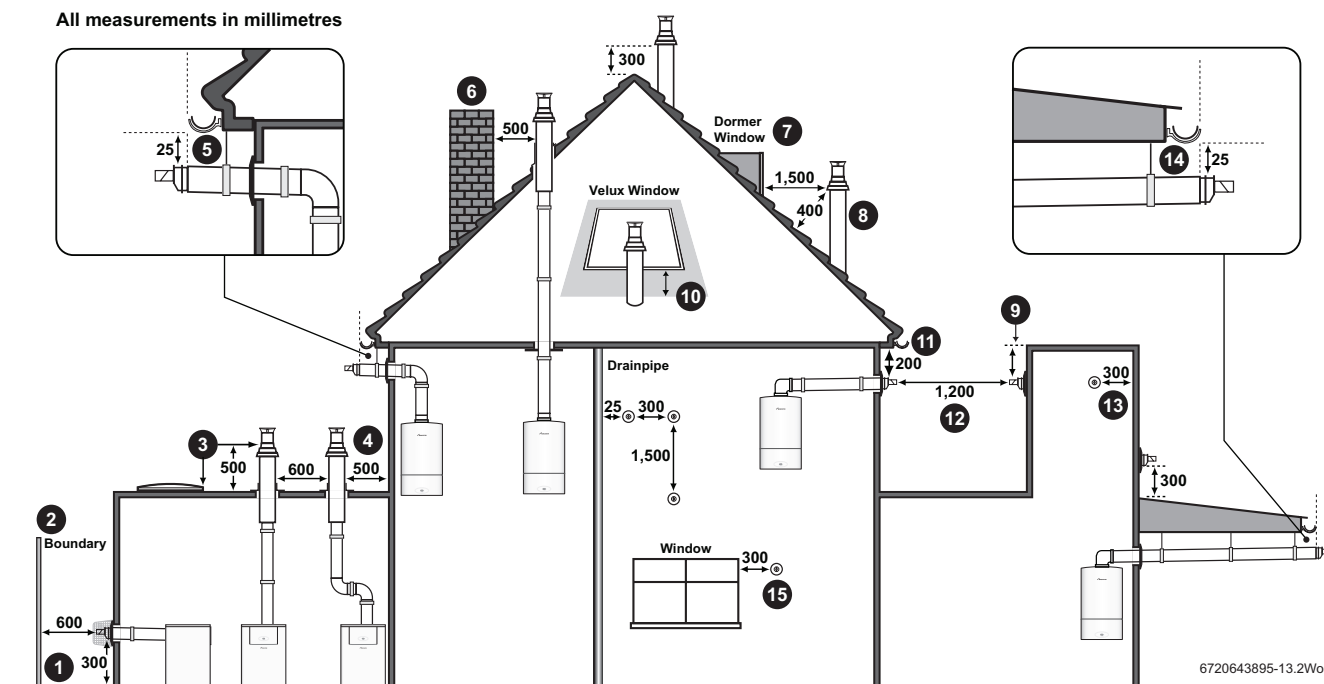


Fig. 17 Flue terminal positions



NOTE:

- All measurements are the minimum clearances required.
- 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 (Flue brackets 100mm x 6 part number: 7 716 191 173, Flue bracket 125mm part number :7 716 191 174).

Key to illustration

1. Flue clearance must be at least 300mm from the ground. Terminal guards must be fitted if the flue is less than 2 metres from the ground or if a person could come into contact with the flue terminal.
2. 600mm distance to a boundary, unless it will cause a nuisance. BS 5440: Part 1 recommends that care is taken when siting terminals in relation to boundaries.
3. 600mm minimum clearance from a skylight to a vertical flue.
4. Vertical flue clearance, 500mm to non-combustible building material, and 1,500mm clearance to combustible building material.
5. The dimension below eaves, gutters, pipes and drains can be reduced to 25 mm, as long as the flue terminal is extended to clear any overhang. Any external flue joints must be sealed with a suitable silicon sealant.
6. 500mm clearance to any vertical structure on a roof, 600mm to room sealed flue or 1,500mm to an open flue.
7. 1,500mm between a vertical flue terminal and a window or dormer window.
8. 400mm from a pitched roof or in regions with heavy snow fall 500mm.
9. The flue cannot be lower than 1,000mm from the top of a light well due to the build up of combustion products.
10. 2,000mm below a Velux window, 600 mm above or to either side of the Velux window.
11. 200mm below eaves and 75 mm below gutters, pipes and drains.
12. 1,200mm between terminals facing each other.
13. 300mm to an internal or external corner.



Installations in car ports are not recommended.

14. 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. Any external flue joints must be sealed with suitable silicon sealant.
15. 300mm above, below and either side of an opening door, air vent or opening window.

3.10 PLUME MANAGEMENT TERMINAL POSITIONS

All measurements in millimetres

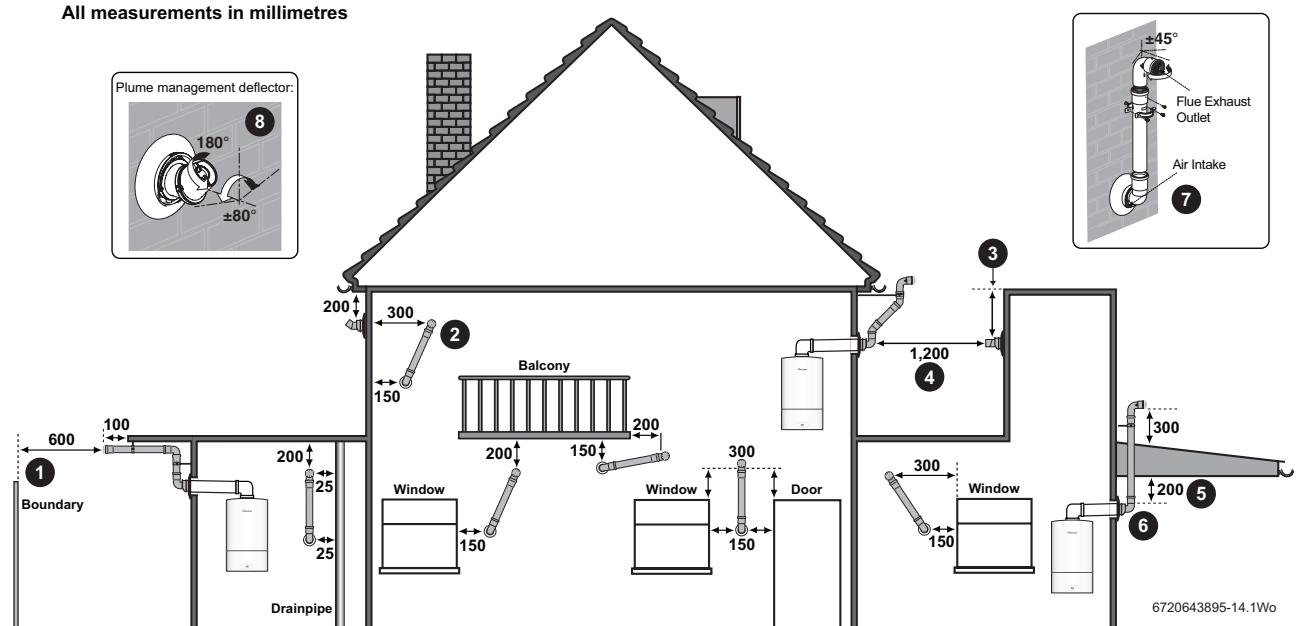


Fig. 18 Plume terminal positions



NOTE:

- ▶ All measurements are the minimum clearances required.
- ▶ Refer to figure 17 for all concentric flue terminal positions unless the flue position is specified on the figure above "Plume 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.

Key to illustration

1. 600 mm distance to a boundary or surface facing a boundary, unless it will cause a nuisance. BS 5440: Part 1 recommends that care is taken when siting terminals in relation to boundaries.
2. Internal/external corners. The air intake clearance can be reduced to 150mm providing the flue exhaust outlet has a 300mm clearance.
3. The flue cannot be lower than 1,000mm from the top of the light well due to the build up of combustion products.
4. 1,200mm between air intake and facing terminal.
5. Clearance no less than 200mm from the lowest point of the balcony or overhang.
6. 1,200mm from an opening in a car port on the same wall i.e. door or window leading into dwelling.
7. Using a Plume Management Kit the air intake measurement can be reduced to 150mm providing the flue exhaust outlet has a 300mm clearance. Plume kits running horizontally must have a 10° fall back to the boiler for proper disposal of condensate. For details on specific lengths see relevant boiler Technical & Specification information.
8. 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 clearance to an opening in direction that the plume management is facing, must be increased to 1,500mm. Where the flue is less than 150mm to a drain pipe and plume re-direction is used the deflector should not be directed towards the drainpipe.



Installations in car ports are not recommended.

4 INSTALLATION



WARNING: All the previous “Pre-Installation” sections must be read and the requirements met before starting boiler or flue installation.

4.1 UNPACKING WALL FRAME & ANCILLARY ITEMS



CAUTION: LIFTING AND CARRYING

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

- ▶ Remove the retaining straps from the carton.
 - ▶ Open the four carton flaps and unpack as follows:
1. Remove items 1 to 5 from the cardboard tray.
 2. Remove the wall mounting frame and cardboard tray together.

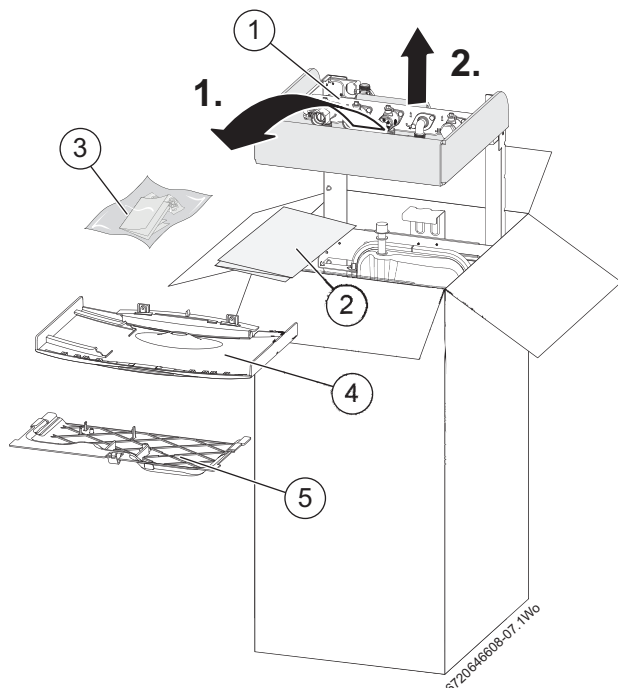


Fig. 19 Unpacking

- 1 Wall mounting frame
- 2 Wall mounting template
- 3 Support packaging - DO NOT REMOVE
- 4 Hardware literature pack
- 5 Front fascia
- 6 Bottom panel

IMPORTANT HANDLING INSTRUCTIONS:

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

Additional requirements for roof space installation:

- The boiler should be first unpacked before ascending ladder to a loft space.
- Two sets of steps should be used.
- Two people should share the lifting of the boiler up to the loft hatch, where the boiler is entered into the loft space tilted and slid on its back into the loft.
- Once the appliance is removed from its packaging check the contents against the packing list.



NOTE:

- ▶ Before installing the appliance, ensure that the system has been cleaned as explained on page 10.

1. Remove straps and open the top of the boiler packaging.
2. Remove the wall mounting frame (1) and wall mounting template (2) and from the packaging.
3. Remove the boiler bottom panel (5), front fascia (6), hardware literature pack (4) from the carton.

4.2 WALL MOUNTING TEMPLATE & FLUE OPENING



WARNING: BEFORE DRILLING ENSURE THAT THERE ARE NO PIPES, ELECTRICAL CABLES, DAMP PROOF COURSES OR OTHER HAZARDS .

SAFETY:

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

FIXING THE WALL MOUNTING FRAME:

- ▶ The boiler wall mounting template shows the relative positions of the flue and the top and bottom fixing points of the wall mounting frame.
- 1. Fix the wall mounting template to the wall in the desired position.
- 2. Drill 4 holes for the wall mounting frame through the template, additional mounting holes can be utilised if required.



The wall mounting template has been sized to allow for minimum clearances of 5mm sides, 200mm base and 170mm above boiler case (which is 30mm above a 100mm diameter flue elbow).

REAR FLUE OUTLET

- ▶ The drawing opposite shows the boiler wall mounting template with the flue centre lines of both the 100mm and 125mm flue systems.
- 3. Mark the centre line of the flue to be used (3); the external diameter of the hole can also be marked if required.
- ▶ If a 100mm diameter flue is to be used, a 125mm diameter hole is required. However, if using the weather sealing collar by pushing it through from inside the property, then a 150mm diameter hole is required to accommodate this.
- ▶ The flue turret of the 100mm flue has an in-built 3° angle.
- ▶ If extensions are to be added then the complete flue must rise at an angle of 3°.
- ▶ Drill the hole, preferably using a core drill.

SIDE OUTLET:

- 4. Mark from the centre line of the wall mounting template to the wall that the flue will pass through (4).
- ▶ Allow for a rise of 52mm per metre length of flue, to give a 3° angle.
- ▶ Clear any debris from the site.

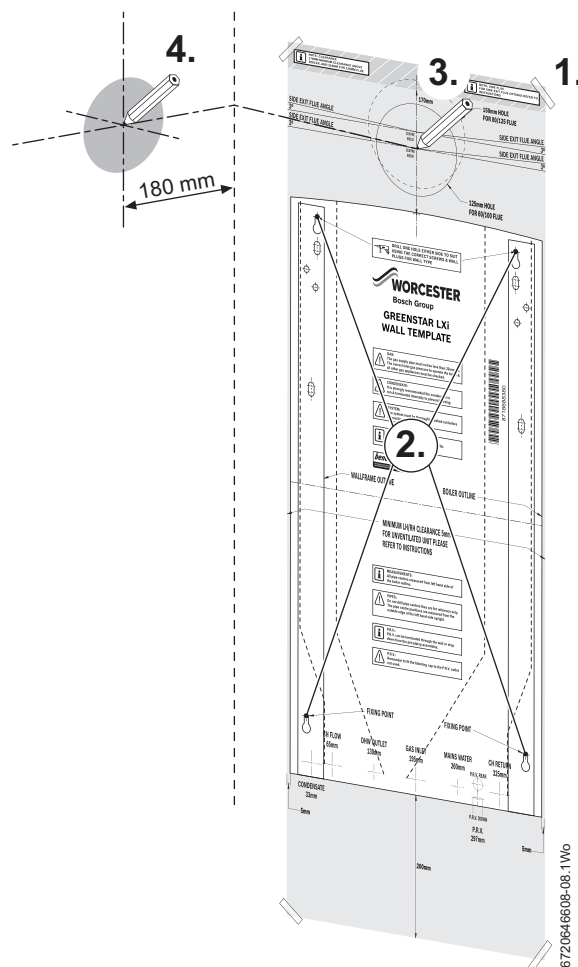


Fig. 20 Marking the flue position

- ▶ Remove wall mounting template.
- ▶ Secure the wall mounting frame to the wall with the appropriate fittings for the boiler weight and wall type.
- ▶ Remove and discard the red plastic dust cap from the expansion vessel pipe before hanging the boiler.

4.3 UNPACKING THE APPLIANCE

1. Remove outer carton (1) and place safely away from the working area.
2. Remove the inner sleeve (2) leaving all other cardboard inserts and base (3) in place.

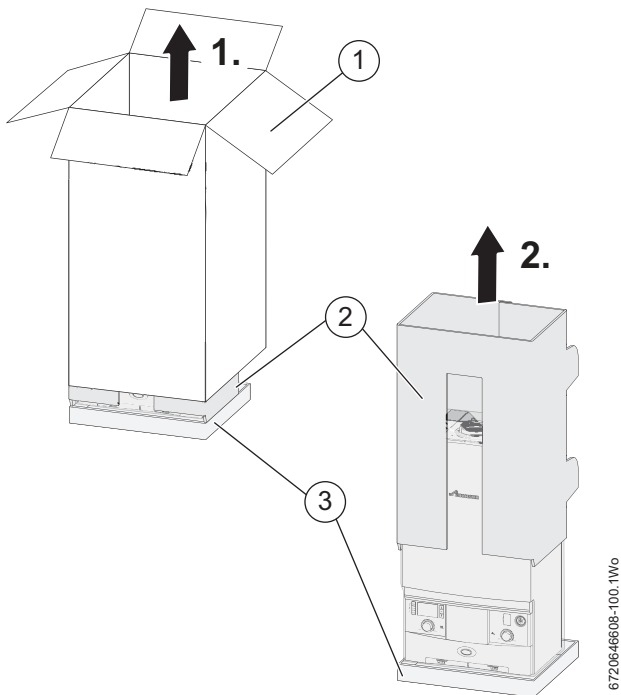


Fig. 21 Remove the carton

3. Remove the protective wrapping (4) from the boiler.
4. Lie the boiler on the floor ensuring that the V shaped cardboard insert (5) is in place.

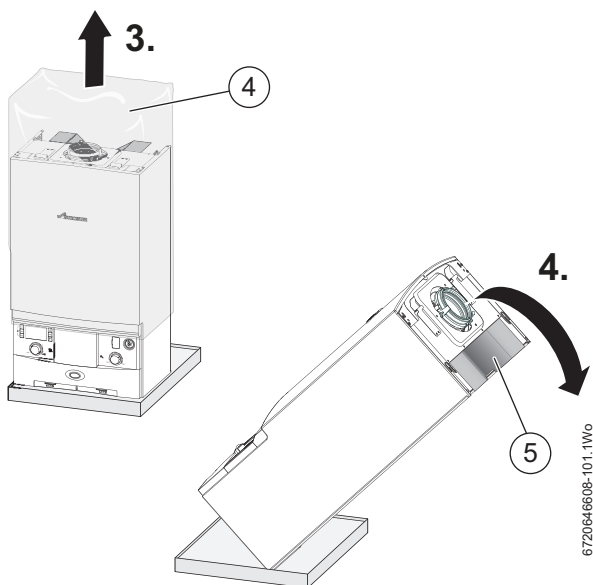


Fig. 22 Finish unpacking

REMOVING THE OUTER CASE

- Before the case can be removed the control panel must be moved into the service position, i.e. hinged open.
1. Remove the two screws underneath the fascia securing the control panel.
 2. Pull the catches forward to release.

3. Pull the bottom of the fascia forward and out to release the top of the control panel.
4. Hinge open the control panel into the service position.
5. Refer to figure 23 and release the two screws securing the lower part of the case.
6. Release the spring clips at the top of the boiler.
7. Slide the case off the frame and store safely out of the way.

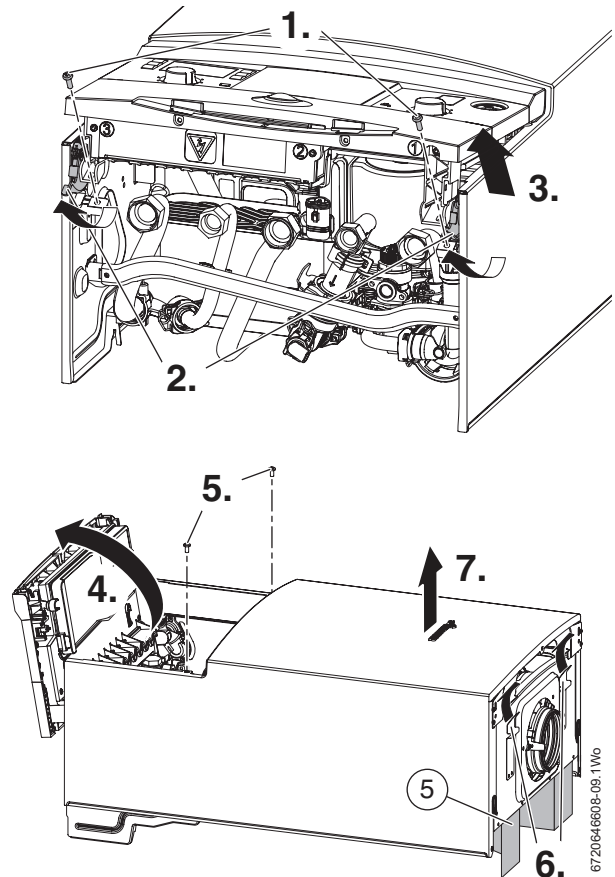


Fig. 23 Releasing the control panel

i Refer to Figure 24. The connector (1) in the wiring harness is provided for the installation of the Hot Water Pre-Heat accessory - 7 716 192 744

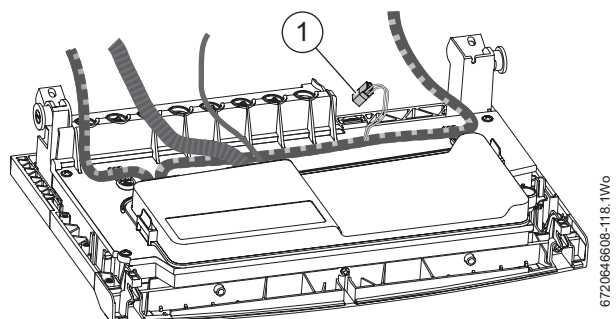


Fig. 24 Unused connector

- Remove any packaging within the boiler and the packaging base (3).
- Leave the V shaped support (5) in place until the boiler is ready to be hung on the wall frame, then remove.

4.4 PRE-PLUMBING BOILER CONNECTIONS



CAUTION:

- ▶ Isolate the mains gas supply before starting any work and observe all relevant safety precautions.
- ▶ Be aware of plastic components when using a naked flame on pipe work.

PRV PRE-PLUMBING CONNECTION

1. The PRV pipe connector fitting has two connection possibilities: rear outlet or vertically down outlet. Blank off the unused connection with the brass cap which is supplied pre-fitted to the rear outlet.
2. Connect the 15mm pressure relief drain pipe using the compression nut and olive supplied in the literature/hardware pack.

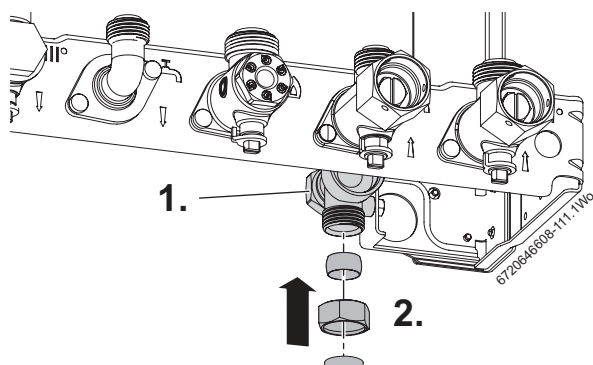


Fig. 25 PRV pipe connection

GAS AND WATER CONNECTIONS



If using the optional Integral Filling Link: 7 716 192 281 (not supplied with the boiler) fit before hanging the boiler on the frame.



WARNING: Bonded washer for gas (3)

- ▶ The bonded washer must be used on the gas pipe isolating valve connection.

- ▶ Connect the system pipes using the compression nuts and olives supplied in the Literature/Hardware pack.

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

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

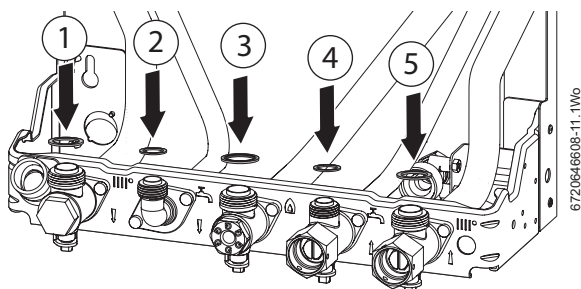


Fig. 26 Sealing washers

PLUMBING THE CONDENSATE DRAIN PIPE

- ▶ Fit the condensate discharge pipe as close to the wall as possible to ensure easy fitting of the boiler bottom panel.
- ▶ Route the condensate pipe to an appropriate discharge point, refer to section 3.4.
- ▶ Plumb up to the wall frame with 22mm pipe.
- ▶ Ensure that there is enough pipe to insert 25mm into the rubber hose connector.
- ▶ Attach the connector to the condensate drain pipe.

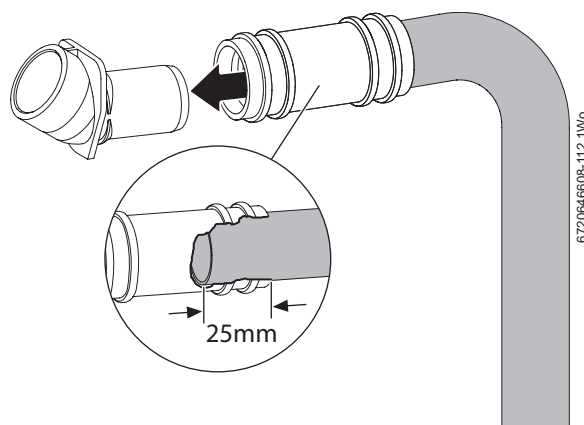


Fig. 27 Condensate connection

FITTING THE PRV ELBOW

Once the wall frame has been mounted the PRV elbow can be fitted.

The elbow is supplied in the Hardware/Literature pack.

1. Insert the elbow into the opening in the PRV pipe fitting (1) at a slight angle until the elbow is clear of the plumbing manifold.
2. Push the elbow (2) firmly into the fitting (1).
3. Twist the bayonet fitting clockwise to secure the PRV elbow onto the PRV pipe fitting.

Fit the O ring into the top flange of the elbow.

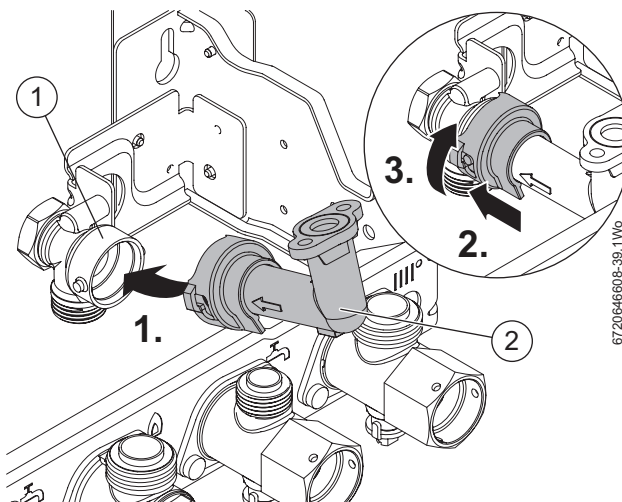


Fig. 28 PRV elbow fitting

4.5 HANGING THE BOILER



CAUTION: Lifting the boiler

- ▶ There are two handling holes incorporated into the inner casing left and right in the lower section of the appliance.
- ▶ Do not lift the boiler using the control panel as a hand hold.



NOTE: Hanging the boiler

- ▶ Remove the plastic strip fitted to pipes before hanging the boiler. Please protect the floor from residual water.



The expansion vessel is secured to a bracket on the wall frame in a "Pre-Installation" position.



Ensure that the control panel is in the closed position before hanging the boiler. There is no requirement to re-fit the bottom screws at this time.

- ▶ Stand the boiler upright to gain access to the rear of the hydraulic manifold.
 - ▶ Release the wire retaining clip securing the orange plastic blanking plug.
1. Remove the blanking plug from the expansion vessel connection at the hydraulic manifold before hanging the boiler.
- ▶ Ensure that the wire retaining clip is still fully released so that the expansion vessel pipe connection can be made into the hydraulic manifold.

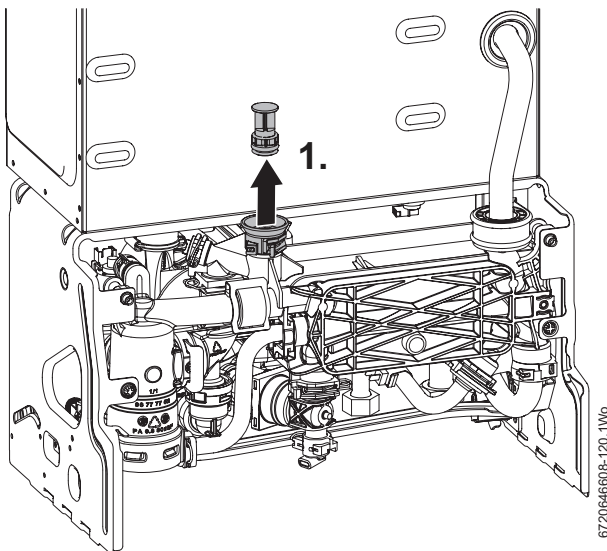


Fig. 29 Removing the blanking plug

1. Ensure that the plastic protection cap is removed from the expansion vessel connection pipe.
- ▶ The boiler is mounted on the wall frame utilising the two mounting points, indicated on figure 30, left and right at the top of the wall frame.

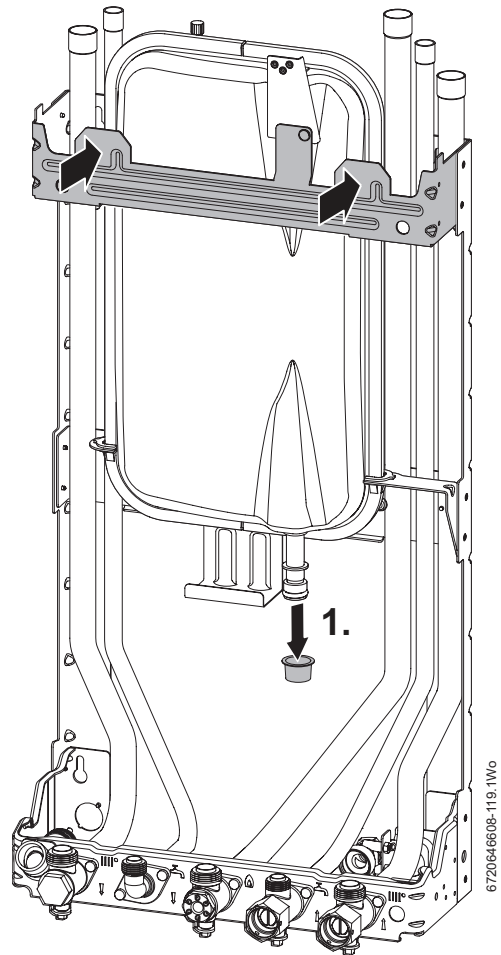


Fig. 30 Mounting points

- ▶ Hang the boiler on to the wall mounting frame by the two brackets positioned left and right at the top rear of the appliance. The expansion vessel is shown removed for clarity.

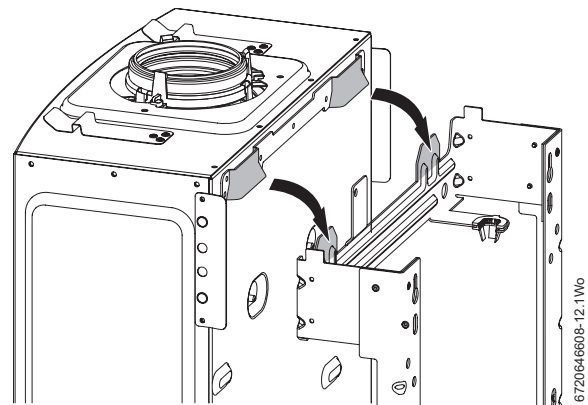


Fig. 31 Hanging the boiler



WARNING: Bonded washer (gas)

- ▶ The bonded washer must be used on the gas pipe isolating valve connection.
- ▶ Ensure that the gas and water connections to the isolating valves are made using the fibre washers supplied in the Literature/Hardware pack.

CONNECTING THE EXPANSION VESSEL

To connect the expansion vessel to the hydraulic pump manifold situated to the left of the pump:

1. Release the expansion tank from the retaining bracket, see fig. 32.
2. Ensure that the wire retaining clip on the pump manifold is fully withdrawn, but do not remove, before inserting the expansion vessel pipe into pump manifold, see fig. 32.
3. Secure in place with the wire retaining clip.

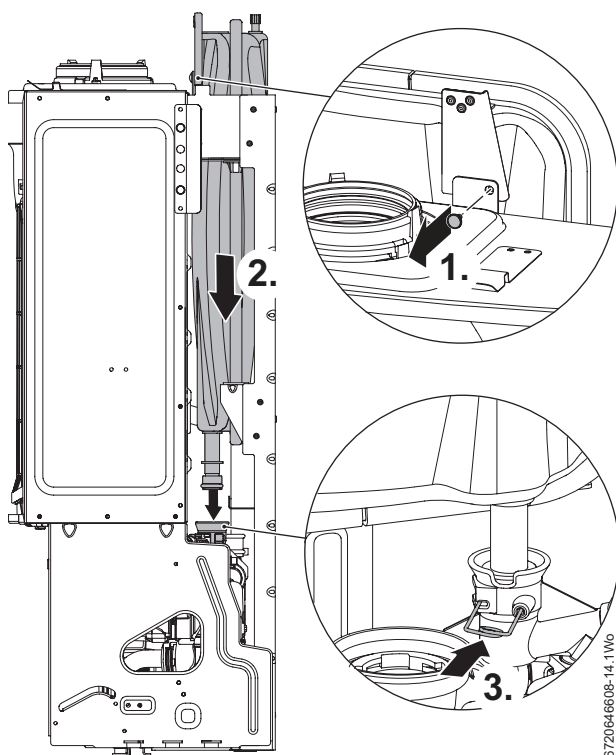


Fig. 32 Expansion vessel connection

PRV CONNECTION

- Ensure that the PRV elbow (2) is firmly attached to the fitting (1) on the wall frame.
- Secure the Pressure relief valve to the top of the elbow (2) with the screws provided.

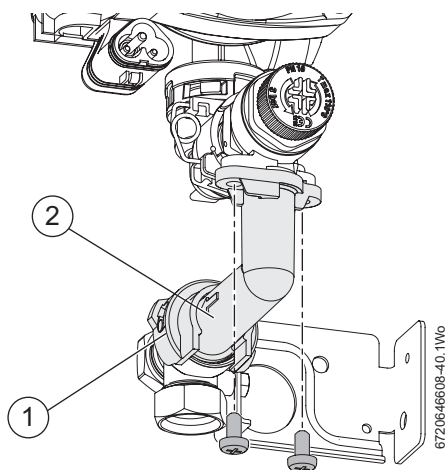


Fig. 33 PRV fitting

CONNECTING THE SYPHON OUTLET

1. Push the black rubber syphon discharge hose, onto the wall frame connector, until fully engaged.

FILLING THE SYPHON

2. Pour 200 to 250 millilitres of clean water through the inner flue opening to fill the syphon before running the boiler.

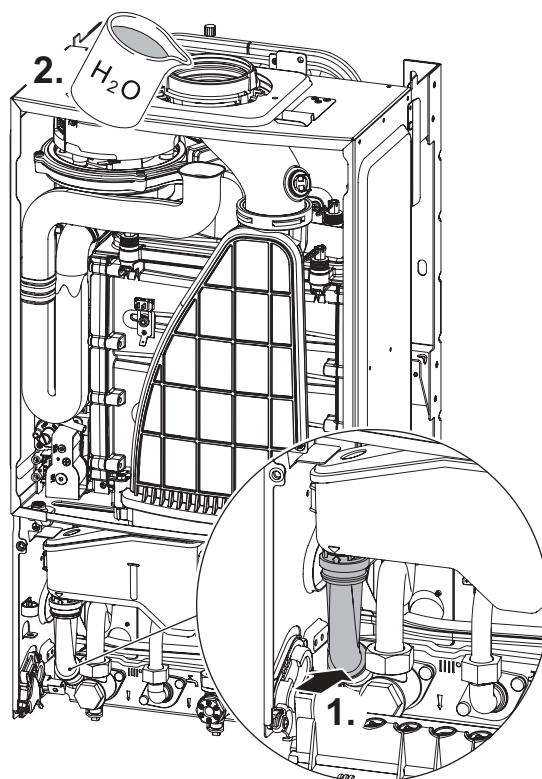


Fig. 34 Syphon fill

4.6 FLUE INSTALLATION

HORIZONTAL FLUE (60/100mm diameter)

For vertical flues and 80/125mm horizontal flues, please refer to separate instructions supplied with the flue kit.



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

Basic instructions for the 60/100mm diameter flue are shown below.

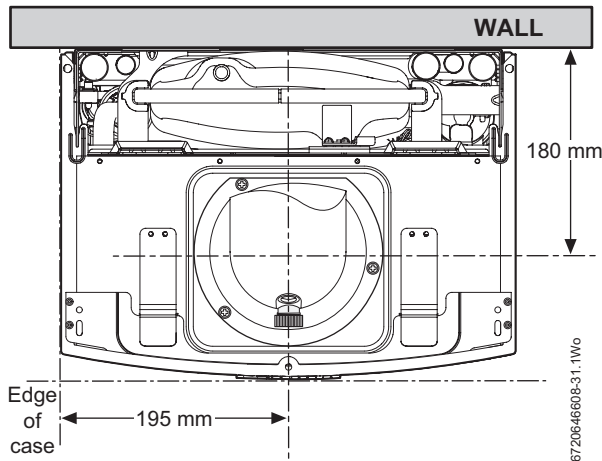


Fig. 35 Flue turret centre

4.6.1 MEASURING THE FLUE (STANDARD FLUE):

- ▶ Measure from the outside of the wall to the centre line of the flue turret to determine length L.
- ▶ Subtract 50mm from the length L to give the correct dimension to the flue elbow connection.
- ▶ If the length L falls within the telescopic range of 350 to 570mm or 570 to 790mm using the longer telescopic flue, then no cutting will be required.
- ▶ If the required length is less than 350mm the standard telescopic flue can be modified, refer to fig. 37.
- ▶ If the required length is greater than 570mm, then the longer telescopic flue, giving a range of 570 - 790mm, can be used
- ▶ If the required length is greater than 790mm, then flue extensions will have to be used. Refer to the 60/100 Horizontal Flue Instruction manual provided in the telescopic flue kit.
- ▶ Refer to section 3.8 for flue options.

Adjusting the telescopic flue length:

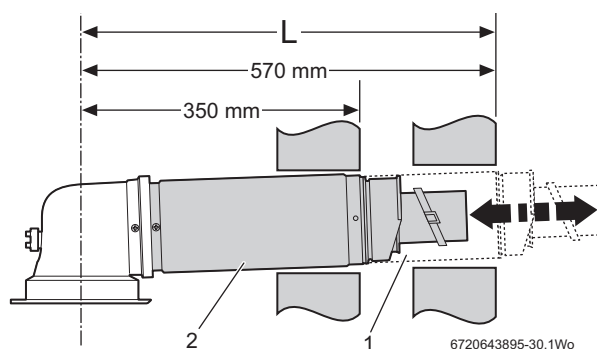


Fig. 36 Standard telescopic flue

Extend tube (1) by withdrawing from tube (2) to achieve the flue length required, between 350 - 570mm or 570 to 790mm if using the longer telescopic flue.

Secure with screw provided and seal joint with the aluminium tape supplied.

4.6.2 REDUCING THE TELESCOPIC FLUE LENGTH



Ensure that the "TOP" label is facing up before securing the flue section to the turret.

The flue terminal **MUST** be fitted with the 'TOP' label uppermost to allow the correct fit and use of the plume management system.

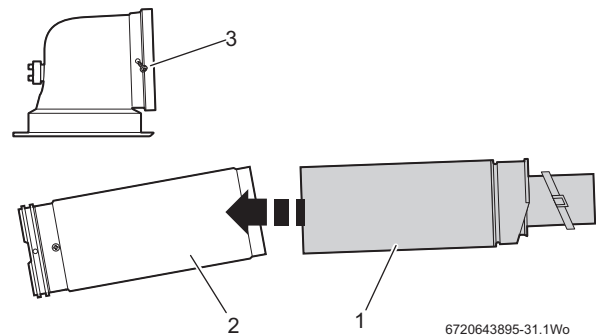


Fig. 37 Reducing the standard terminal

- ▶ Remove securing screws (3) to detach the terminal assembly from the turret.
- ▶ Slide terminal section (2) from the terminal assembly and discard.
- ▶ To use terminal (1) without cutting remove the location lug (4) on the inner flue tube (5) and remove any burrs.
- ▶ Push the terminal fully home into the turret and secure the terminal end with the screws (3).

To reduce the flue length further:

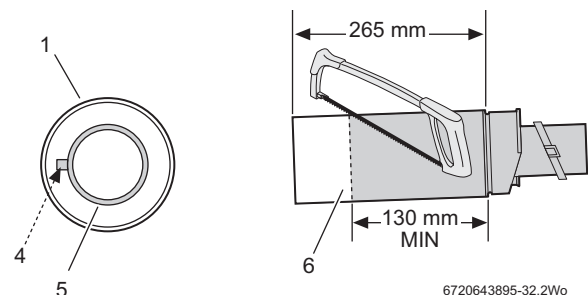


Fig. 38 Further reduction

- ▶ Mark the length required for the terminal as shown (min. 130mm) and cut square, taking care not to damage the tubes.
- ▶ Remove any burrs and chamfer the edges of the tubes to assist ease of connection and prevent seal damage.
- ▶ Push the terminal fully home into the turret and secure the terminal end with the screws (3), ensure that the "TOP" label is facing up.



The aluminium tape is not required when reducing the terminal.

4.6.3 INSTALLING THE TELESCOPIC FLUE:

Refer to figure 39.

1. Set the flue length to the distance required, secure with screws provided.
2. Seal the joint with the aluminium tape provided.
3. Slide the inner wall seal onto the terminal.
4. If fitting from inside the building; slide the outer wall seal onto the terminal.

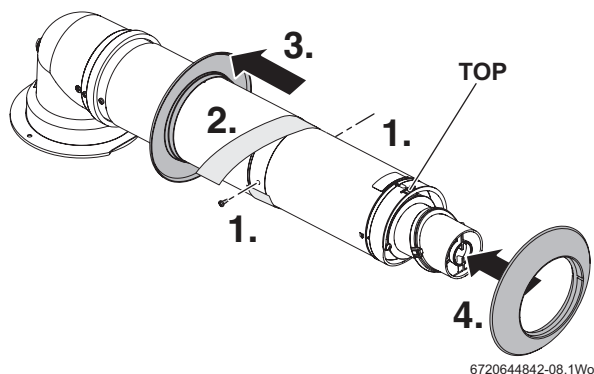


Fig. 39 Telescopic flue



The turret securing screws are from the boiler and are not in flue kit.

Refer to figures 40 & 41.

1. Remove the three inner flue tube retaining screws (2). The inner tube will be held in place in the appliance.
2. Check the boiler flue seal is correctly seated and apply silicone grease.
3. Position terminal through the flue opening in the wall to the outside of the building by the distance shown.
- or -
If the outer seal is already fitted, push the terminal through the hole until the outer seal is outside and then pull the terminal back to the wall to seal.
4. Align the flue turret to the boiler flue outlet with flat facing (1) to the rear of the boiler.
The flue turret should be pushed straight down, on to the boiler.

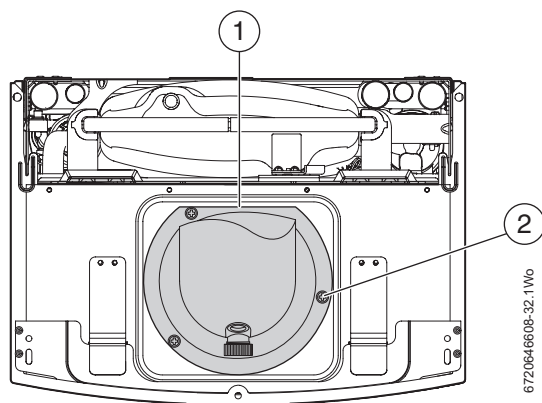


Fig. 40 Aligning the turret

- Fit the screws removed in step 1 to secure flue turret.
- If fitting the outer seal from outside the building, slide the outer wall seal onto the terminal as shown.

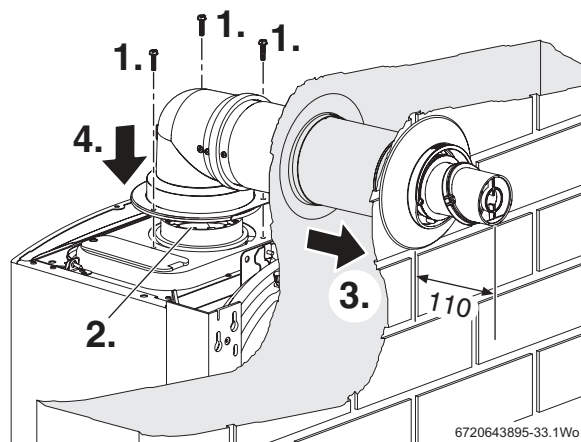


Fig. 41 Telescopic flue installation



For more information refer to the 60/100 Horizontal Flue kit Instruction Manual

ADDITIONAL NOTES AND REMINDERS:

- Ensure that all cut lengths are square and free from burrs.
- The flue is sealed when assembled correctly and the components are pushed fully home and secured by the screws provided.
- The flue is set at an angle of 3° or 52mm per metre length.

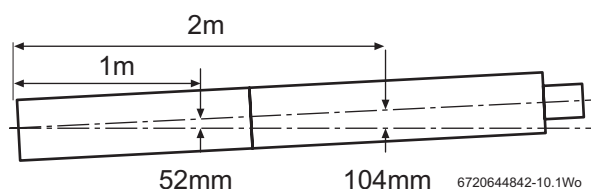



Fig. 42 Slope for condensate disposal

4.6.4 FLUE TERMINAL PLUME RE-DIRECTION:

The flue discharge can be re-directed allowing some plume redirection control, alternatively, a complete plume management system can be fitted to the flue terminal.


RE-DIRECTING THE FLUE DISCHARGE

- 1. Using a suitable tool, unclip (1 & 2) the terminal end and rotate through 180°.



NOTE: DO NOT rotate the complete terminal assembly.

- 2. Refit to the terminal, ensuring that the clips (1 & 2) are engaged and secure.
- 3. Loosen screws (3) and rotate the entire outlet assembly to redirect the plume. Tighten screws (3) to secure in the required position.



The flue terminal outlet has built-in stops to limit rotation for horizontal flues to allow condensate to run back into the boiler for safe disposal. Do not attempt to force beyond the limit stops.

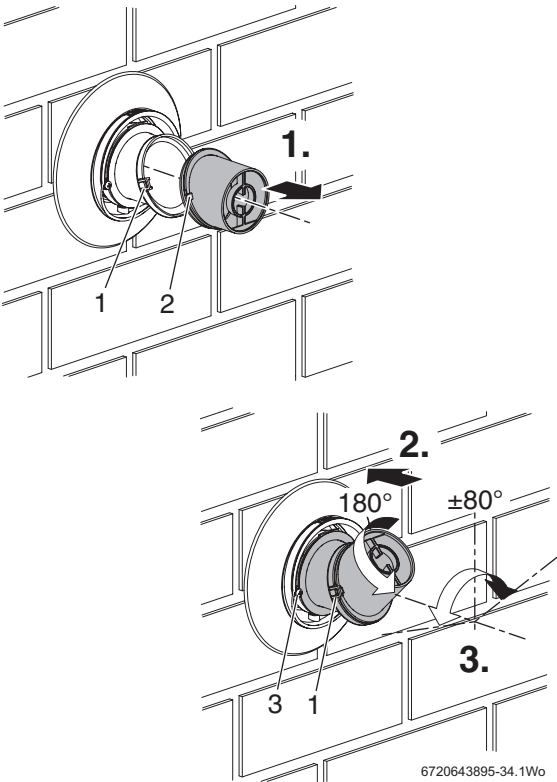


Fig. 43 Plume redirection



NOTE: Outlet position

- The flue terminal outlet position must follow those stated in the relevant appliance instruction manual. When redirecting the flue discharge the outlet terminal must be at least 1500mm from any opening in the direction of the discharge to prevent combustion products from entering the building.

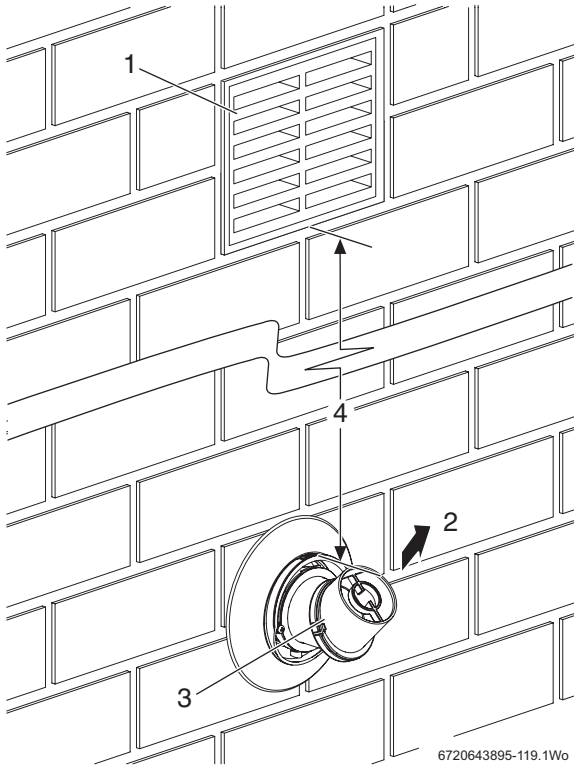


Fig. 44 Plume distance to opening

1	Opening in building
2	Flue discharge
3	Plume deflector
4	Minimum 1500mm from an opening in the building

Table 15 Key to figure 44

4.7 ELECTRICAL



CAUTION: Isolate the mains electrical supply before starting any work and observe all relevant safety precautions.



The boiler is pre-fitted with a mains supply cable. Route the cable through the right hand side of the wall mounting frame.

- The mains electrical supply to the boiler must be through either a fused double pole isolator or a fused three pin plug and unswitched socket situated, where practicable, adjacent to the boiler.
- The isolator must have a contact separation of 3mm minimum in both poles.
- Any additional equipment connected to the boiler must not have a separate electrical supply.
- External fuse rating 3A.

ACCESS TO ELECTRICAL CONNECTIONS:

- Access to all wiring connections are via the Installer access cover at the bottom front of the control panel. No access is required to other parts of the control board.
1. Refer to figure 45 and release the three captive screws securing the Installer access cover.
 2. Remove the Installer access cover.

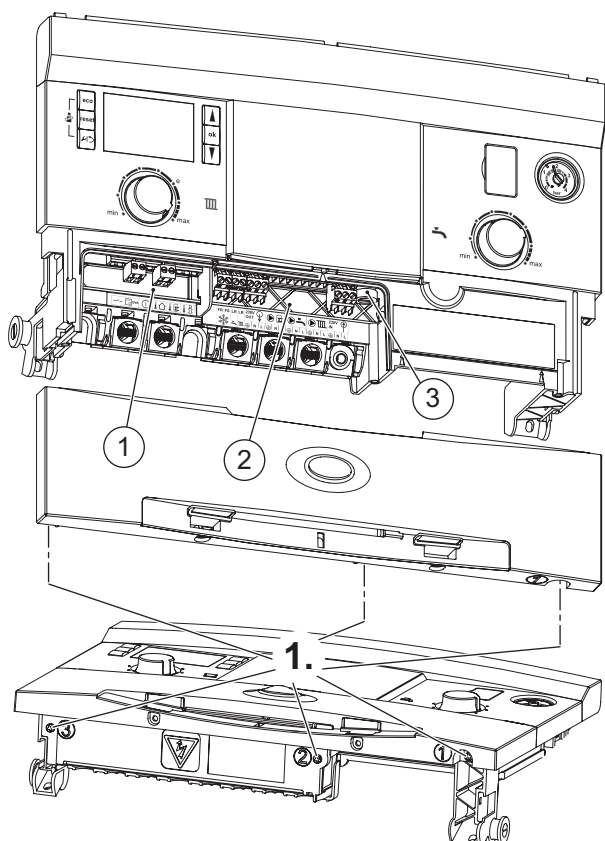


Fig. 45 Removing the installer access cover

1	Low voltage connections
2	Mains voltage connections
3	Fuse carrier - 5A

Low voltage connections

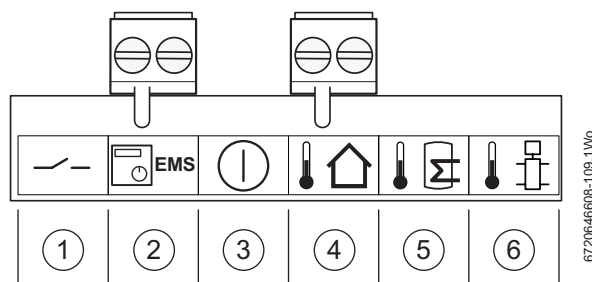


Fig. 46 Low voltage connectors

Low voltage terminal strip

1	Low voltage room thermostat input (NOT USED)
2	EMS bus connections
3	External cut off switch (NOT USED)
4	Outdoor compensation sensor
5	Cylinder sensor (NOT USED on Combi)
6	Low Loss Header sensor (NOT USED)

Table 16 Key to figure 46

Mains voltage connections

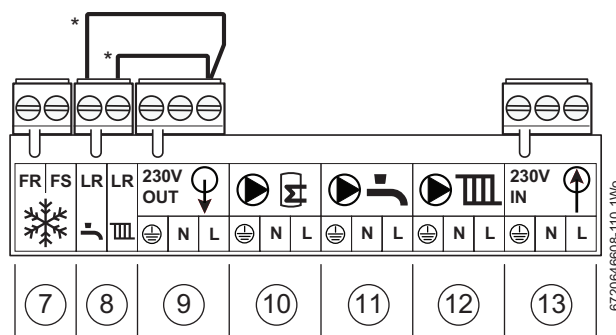


Fig. 47 Mains voltage connectors

Mains voltage terminal strip

7	External frost thermostat
8	230 V A.C. switched live inputs
9	230 V A.C. mains output to wiring centre
10	DHW charge pump (NOT USED on Combi)
11	DHW circulation pump (NOT USED on Combi)
12	CH circulation pump (NOT USED on Combi)
13	Boiler 230 V A.C. mains supply
*	Pre-wired links

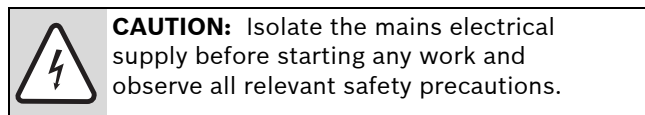
Table 17 Key to figure 47



NOTE: DHW LR switched live

- This input provides connection for a proprietary twin channel control to time the preheat function on the DHW. All Worcester twin channel digital controls provide this functionality.

4.7.1 MOUNTING OPTIONAL PLUG-IN CONTROLS



Refer the to Programmer/Timer manual for set up and operation of the unit.

REMOVING THE BLANKING PLATE

The control panel must be released and swung forward slightly to gain access to the top cover panel, refer to section 6.4 for access to the control panel.

1. Release the captive screws securing the top cover panel.
2. Remove the cover panel to enable the blanking plate to be removed.
3. Release the three captive screws enough to allow the Installer access cover to be lowered by 10mm.
4. Lower the Installer access cover to allow the blanking panel to be removed.
5. Use the tab (1) to lift and also press up on the bottom edge of the blanking plate to release the clips from the slots in the control panel.
6. Pull the blanking plate forward to remove.

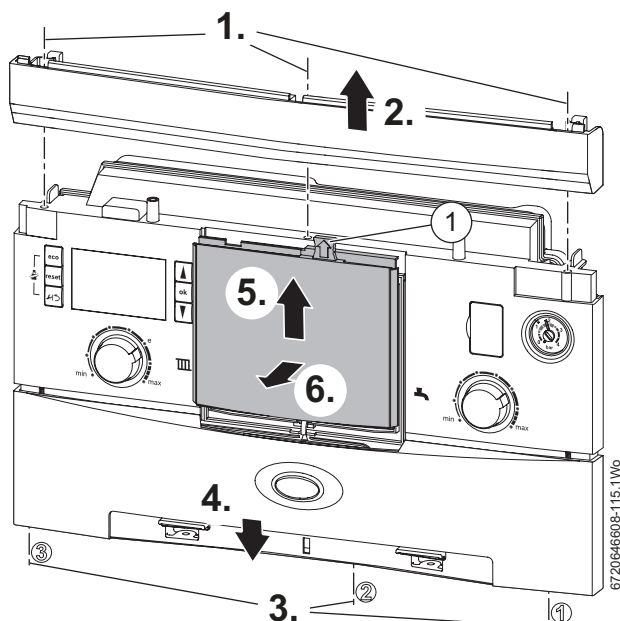


Fig. 48 Removing the blanking plate

FITTING THE PROGRAMMER/TIMER

i When fitting EMS intelligent programmers, step 1 can be ignored.

1. Connect the ribbon cable to the socket (2) in the control panel, ensuring that the cable will fit into the recess (3) in the control panel.
2. Align the clips on the back of the Programmer/Timer with the slots in the control panel.

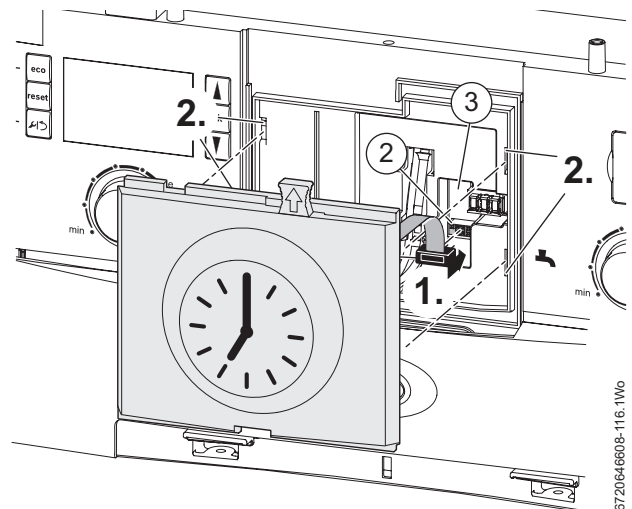


Fig. 49 Connecting the Programmer/Timer

3. Push the Programmer/Timer in to engage with the slots in the control panel.
 4. Pull the Programmer/Timer down to secure with the clips.
 5. Slide the Installer access cover up into position.
 6. Secure with the three captive screws.
 7. Replace the top cover panel.
 8. Secure in position with the captive screws.
- Re-secure the control panel.

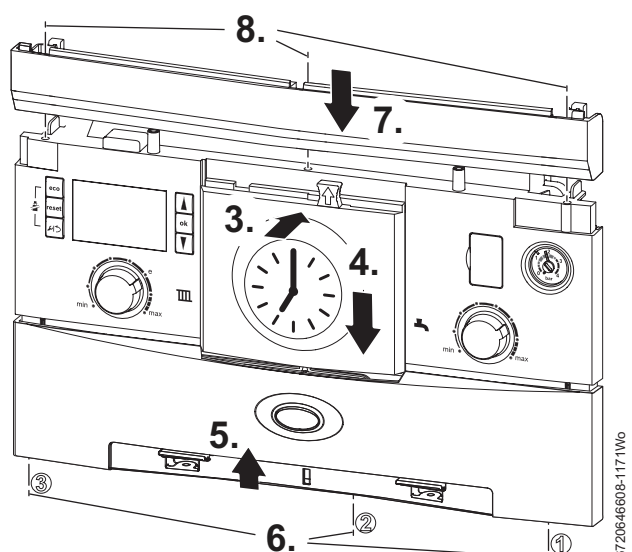


Fig. 50 Fitting the Programmer/Timer

4.7.2 NEW COMPLETE SYSTEM INSTALLATIONS

If a new complete heating system installation is in a new build property or is a first time installation in an existing property, heating systems must conform to current building regulations Part L1a.

All new heating systems in dwellings must have at least two heating zones. Each of these zones will be controlled by a thermostat and zone valve.

An alternative would be individual electronically controlled TRVs. Hot water supplied from a storage system would require separate time and temperature control.

If the dwelling is over 150m², then a separate time and temperature control for each zone is required. All radiators must have TRVs fitted in all rooms except bathrooms and rooms with room thermostats.

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

Figures 51 and 52 give some suggestions regarding zoning the system for a small dwelling, less than 150m², using a third party programmer or a Worcester programmer.

THIRD PARTY EXTERNAL TIMER AND TWO ZONES

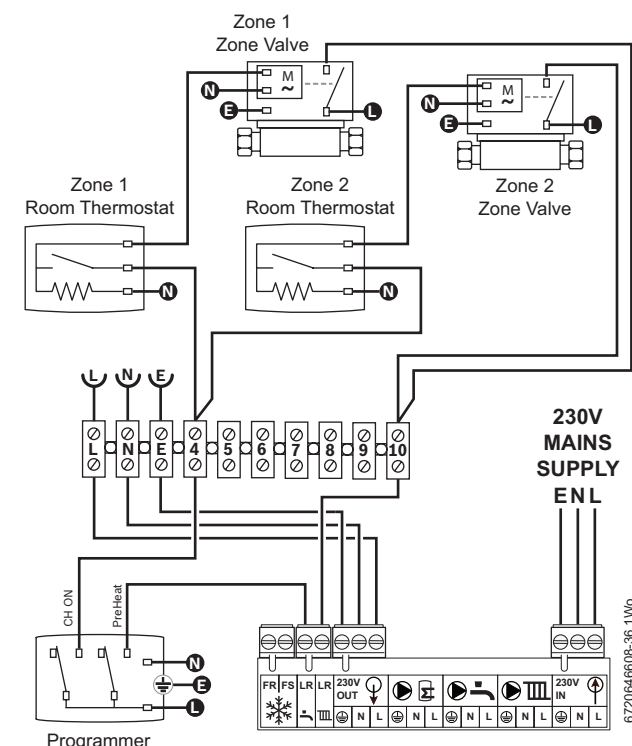


Fig. 51 Two room thermostats, one external timer

INTEGRATED TIMER AND TWO ZONES

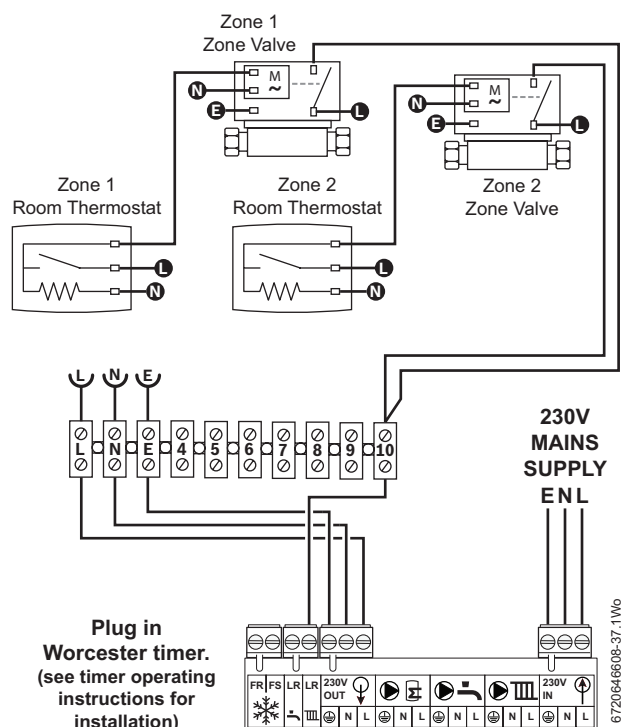


Fig. 52 Two room thermostats, one integrated timer

4.7.3 EXISTING INSTALLATIONS

For boiler 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, TRVs must be fitted to all rooms except the bathrooms and the room with the room thermostat.

The following figures show the options of room thermostat with programmer, room thermostat only or programmable room thermostat.

i The programmable room thermostat may be a hard wired or RF type.
This diagram is applicable for a hard wired unit or the receiver section of the RF pack.

EXTERNAL 230V PROGRAMMER AND ROOM THERMOSTAT

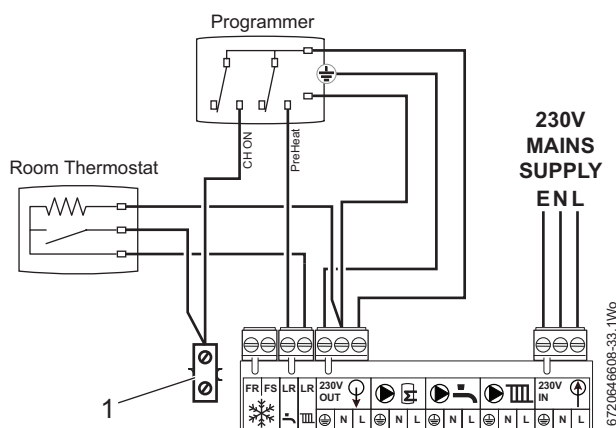


Fig. 53 Room thermostat with programmer

- 1 Series connector, not supplied.
Connector to be made safe.

ROOM THERMOSTAT ONLY

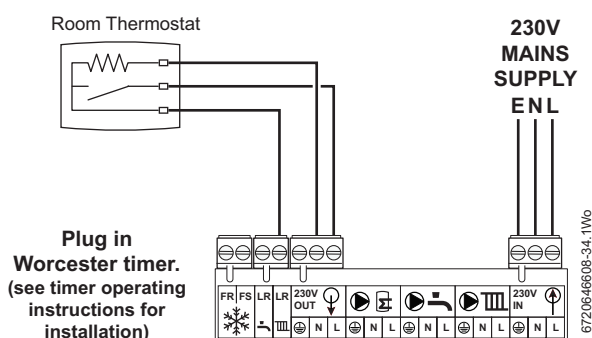


Fig. 54 Room thermostat with plug in timer

PROGRAMMABLE THERMOSTAT

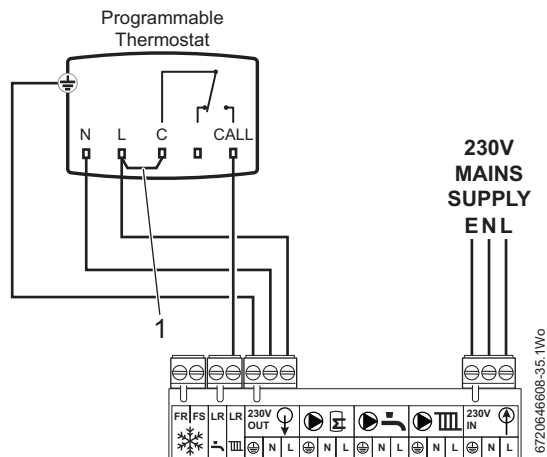


Fig. 55 Programmable thermostat

- 1 The link between the Live (L) and Common (C) may already be fitted as part of the Programmable thermostat, if not then a link must be wired in.
- ▶ Remove the link between L_R (CH) and L at the 230V OUT terminal block connection.
 - ▶ Connect external controls LIVE supply to terminal L at the 230V OUT terminal block connection.
 - ▶ Connect external controls LIVE return to terminal L_R (CH)

i Live Return (L_R) is sometimes referred to as 'Call for Heat' or 'Switched Live'.

- ▶ Connect external controls NEUTRAL to terminal N at the 230V OUT terminal block connection.

i Some devices do not require connection of a neutral i.e. battery powered devices.

OPTIONAL EXTERNAL FROST STAT CONNECTION FOR PROTECTION OF SYSTEM PIPEWORK IN UNHEATED AIR SPACE

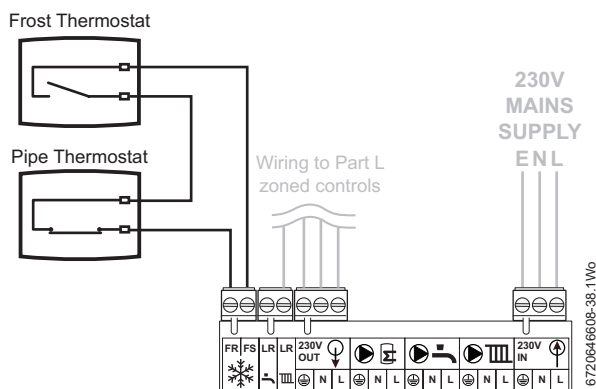


Fig. 56 Frost Thermostat

- ▶ Connect frost thermostat cables to terminals F_S & F_R.
- ▶ These connections are not polarity sensitive.
- ▶ The external frost thermostat only operates the pump.

5 COMMISSIONING

5.1 PRE-COMMISSIONING CHECKS



CAUTION: ISOLATE THE MAINS ELECTRICITY SUPPLY BEFORE STARTING ANY WORK AND OBSERVE ALL RELEVANT SAFETY PRECAUTIONS.

Check that the service and water pipes are connected to the correct positions on the manifold.

Ensure that the washers have been fitted to the water connections and the bonded washer to the gas connection on the manifold, refer to Fig. 26.

1. - CH Flow (22mm)
 2. - DHW (15mm)
 3. - Gas inlet - bonded washer (22mm)
 4. - Domestic cold mains water in (15mm)
 5. - CH Return (22mm)
- ▶ Check the gas type specified on the data label, on the right hand side of the combustion chamber, matches that of the gas supply.
 - ▶ Turn on the main gas supply, carry out a tightness test on the gas pipe work with the boiler gas isolating pipe valve open, and connections. Rectify any leaks.
 - ▶ Check that the condensate pipe has been connected and correctly fitted to the syphon.
 - ▶ Check pressure relief drain pipe is correctly fitted and securely tightened.



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

- ▶ Close the gas valve
- ▶ Close the water shut off valve
- ▶ Isolate the gas supply
- ▶ Isolate the electricity supply
- ▶ Label appropriately

5.2 FILLING THE SYSTEM

1. Turn on the water main and open the system valves.
2. Open all radiator valves.
3. Fill the system via a WRAS approved filling loop or the optional Worcester Integral Filling Link accessory to 1 bar then close the filling loop valve(s).
4. The Automatic Air Vent will release any air trapped in the boiler.
5. Manually vent all radiators, tighten when completed and check the system and correct any leaks.
 - ▶ The boiler integral expansion vessel is pre-charged to 0.75 bar (equal to a static head of 7.5m (22ft)). A Schraeder 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 return, adjust this to the same pressure as the appliance internal expansion vessel, refer to separate instructions with the extra expansion vessel.
6. If required increase system pressure back to 1 bar.
7. Isolate and remove filling loop connection to system or if using the optional integral filling connection (not supplied with the boiler) remove the key and place in its storage position on the bottom cover of the boiler.

5.3 WATER TREATMENT

**NOTE:**

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

**ENSURE THAT THE SYSTEM HAS BEEN CLEANED.
REFER TO SECTION 3.1 OF THESE INSTRUCTIONS.**

FLUSHING (Central Heating):

- ▶ Ensure the boiler is switched off.
- ▶ Open all drain cocks and drain the system while the boiler is hot.
- ▶ Close drain cocks and add a suitable flushing agent at the correct strength for the system condition in accordance with the manufacturer's instructions.
- ▶ Run the boiler/system at normal operating temperature for the time stated by the manufacturer of the flushing agent.
- ▶ Drain and thoroughly flush the system to remove the flushing agent and debris.

INHIBITOR (Central Heating):

- ▶ Check drain cocks are closed and all radiator valves are open before adding a suitable inhibitor compatible with aluminium (or combined inhibitor/anti-freeze if the system is exposed to freezing conditions) to the heating system water in accordance with the manufacturers instructions.



The pH value of the system water must be less than 8 or the appliance guarantee will be invalidated.

- ▶ Fill system via a WRAS approved filling loop to between 1 and 1.5 bar.
- ▶ Vent all radiators; tighten vents when complete.
- ▶ Re-pressurise if necessary to 1bar.
- ▶ Set all controls to maximum.
- ▶ Record the date when the inhibitor was added to the system on the guarantee card and Benchmark checklist.

**NOTE:**

- ▶ The concentration of inhibitor in the system should be checked every 12 months or sooner if system content is lost.
- ▶ The addition of sealing agents to the system water is not recommended as this can cause problems with deposits left in the heat exchanger.

WATER TREATMENT

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

FERNOX	01799 550811
	www.fernox.com
SENTINAL	0800 389 4670
	www.sentinal-solutions.net

5.4 STARTING THE APPLIANCE



CAUTION: RUNNING THE APPLIANCE

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

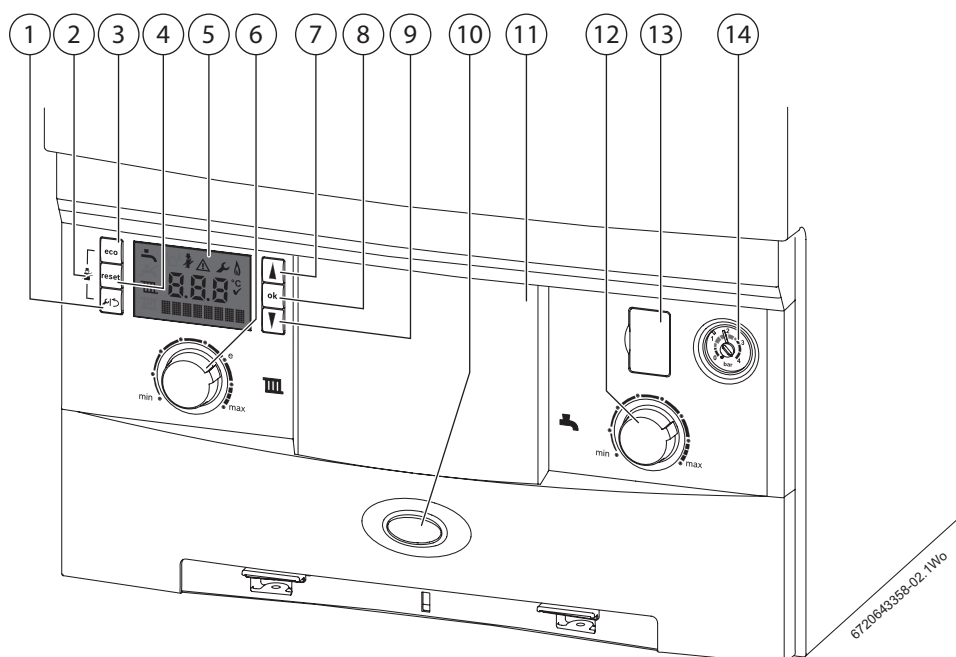


Fig. 57 Control panel

Key to figure 57	
1	Spanner/return button
2	Service engineer symbol
3	Eco button
4	Reset button
5	Boiler display
6	Central heating temperature control
7	Scroll up button
8	OK - Select/confirmation button
9	Scroll down button
10	Operation and fault indicator (blue)
11	Position for optional programmer
12	Hot water temperature control
13	Diagnostic port
14	System pressure gauge

Switching the appliance on/off:

- ▶ Turn on the mains power supply, initially the “Boiler start up screens” will be displayed (refer to figure 58).
- ▶ Turn on any external controls
- ▶ Set the thermostatic radiator controls to maximum temperature
- ▶ Set the clock/programmer to continuously ON and the room thermostat to maximum temperature

The blue Operation and fault indicator light will be illuminated when there is a demand for heat or hot water.

Turn the boiler CH temperature control (6) to maximum.

The “burner on” flame symbol will be shown on the boiler display after a successful ignition sequence.

If the boiler fails to light, a flashing fault code will be displayed.



NOTE: RESET

- ▶ Do not press the blue operation/fault diagnostic indicator (10) to reset the boiler.

To reset the boiler, press the reset button (4), the tick symbol will be displayed briefly for a successful reset.

5.4.1 BOILER START UP SCREENS

On initial start up, the following screens are displayed:

- 1. All the symbols are displayed for approximately two seconds.
- 2. The control will run an internal test
- 3. When the internal test has been successfully performed, this screen is displayed:
 - The boiler is in stand-by.
 - The flow temperature sensor indicates the primary temperature from the heat exchanger (not the target set point).

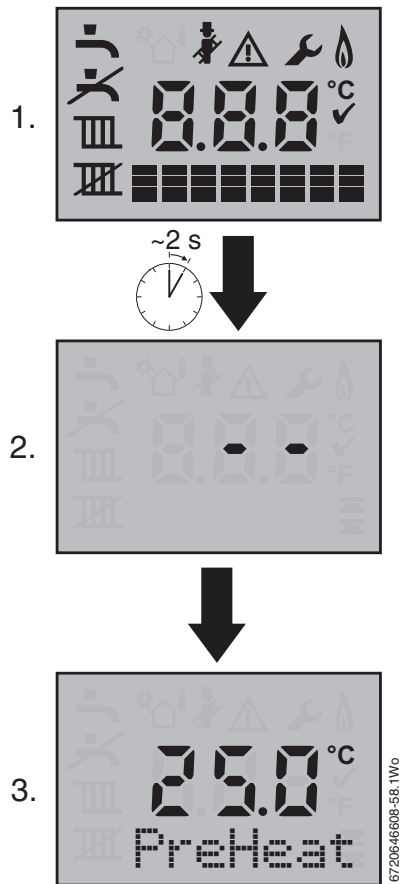



Fig. 58 Boiler start up screen

- If no adjustments are made for 30 seconds the back light is turned off.
- As soon as an adjustment is made, the screen will light up and the relevant information will be displayed.

SCREEN DISPLAY	DESCRIPTION
All possible screen symbols	This screen is displayed briefly during boiler start up and shows all the symbols that could be displayed.
Alpha/Numerical display	Displays a temperature or boiler status code.
Text display	Displays PreHeat or Eco, or diagnostic code
Hot water	Displays this symbol during a DHW demand.
Central Heating	Displays this symbol during a CH demand.
Chimney sweep mode	Displays during service when the boiler is set to maximum or minimum output.
Alert	Displays with the boiler status code and diagnostic code during a fault condition.
Service mode	Displays when a qualified service engineer is in the service menus.
Burner on	The boiler is in operation and the flame is alight.
Centigrade	Displays next to the temperature reading.
Confirmation	This symbol confirms a manual change.

Table 18 Symbol description

STATUS CODES

During normal boiler operation various Status codes can be displayed by pressing the  button.

The first screen of the Information menu displays the current Status code, this will change as the boiler runs through the various modes and sequences.

These are not faults, but provide information concerning the current status of the boiler.

Status code		
200	CH active	The Central Heating system is being heated.
201	DHW active	The Domestic Hot Water is being heated.
202	CH Anti rapid-cycle mode	This is a safety feature and introduces a time delay between firings of the boiler: 10 minutes for CH demand.
203	System stand-by	The boiler has no demands.
204	System waiting	Primary flow temperature is above the set point.
208	Test mode active	The boiler is in a test mode.
265	Stand-by mode forced due to energy transfer	Only displays during the OFF state of proportional burner control. This is not an error, just a boiler state.
268	Component test mode	The boiler is in Component test mode as activated via the test menu.
270	Power up mode	The boiler is ON, warming up and running self check routines. This lasts approximately 35 seconds.
283	Burner starting	The burner has just started firing.
284	Gas valve opened, first safety time started.	Burner firing sequence before the flame is established.
305	CH wait after DHW demand	Time delay from last DHW demand. – adjustable time until next permitted CH demand, the default is set to 60 seconds.
357	Air venting active	Auto air vent of primary heat exchanger in operation, duration approximately 100 seconds.
358	Three way valve anti-seize	Anti seize operation. If the diverter valve has not moved in 24 hours, the valve is operated to prevent seizing, duration approximately 10 seconds.

Table 19 Status codes

5.4.2 SELECTING SERVICE MENUS

1. Press and hold and buttons together for one second, the display will show Menu 1.

Double up or down arrows indicate that the menu can only be scrolled up or down, an up and down arrow combination indicates position in the menu where options can be scrolled either up or down.

2. Scroll up and down through the menus with the and buttons on the right hand side of display.

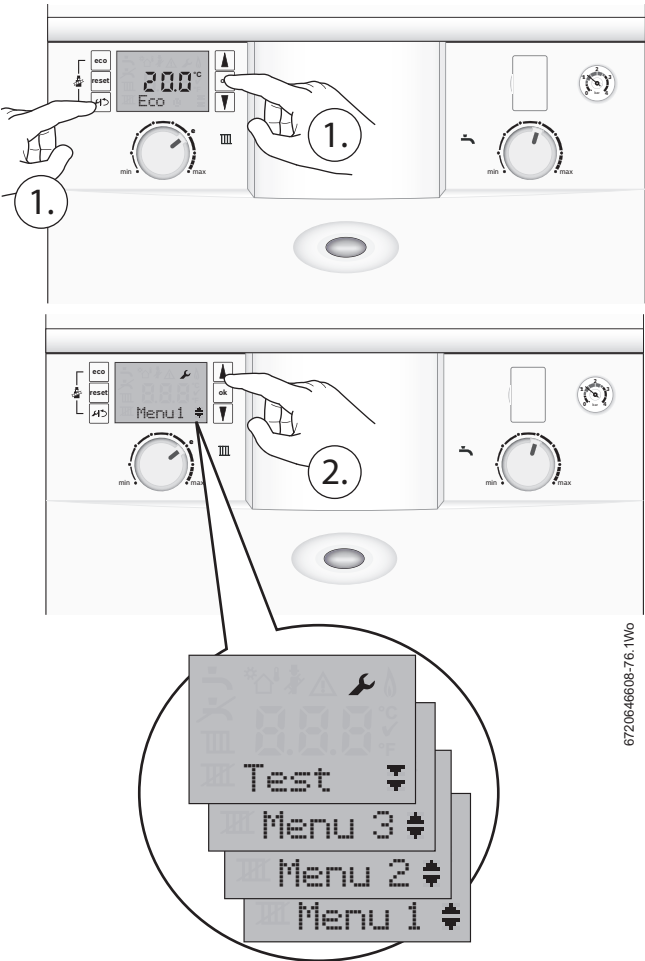


Fig. 59 Service menus

When Solar panels are incorporated into the system then Menu 1 will display the relevant information, otherwise it will be blank.

5.4.3 MENU 2 - BOILER PARAMETERS

1. Select Menu 2 via the and scroll buttons.
2. Press and hold the button for one second to enter Menu 2.

This menu lists the boiler parameters, which can be adjusted in this menu.

To modify setting, select the desired menu option using the arrow buttons (refer to table 20) and press the button, the option will flash.

Adjust the parameter using the and arrow buttons and press the OK button to confirm.

A will display for three seconds to confirm the update of the new value.
The same process is used for adjusting all Menus 1, 2, 3 and Test.

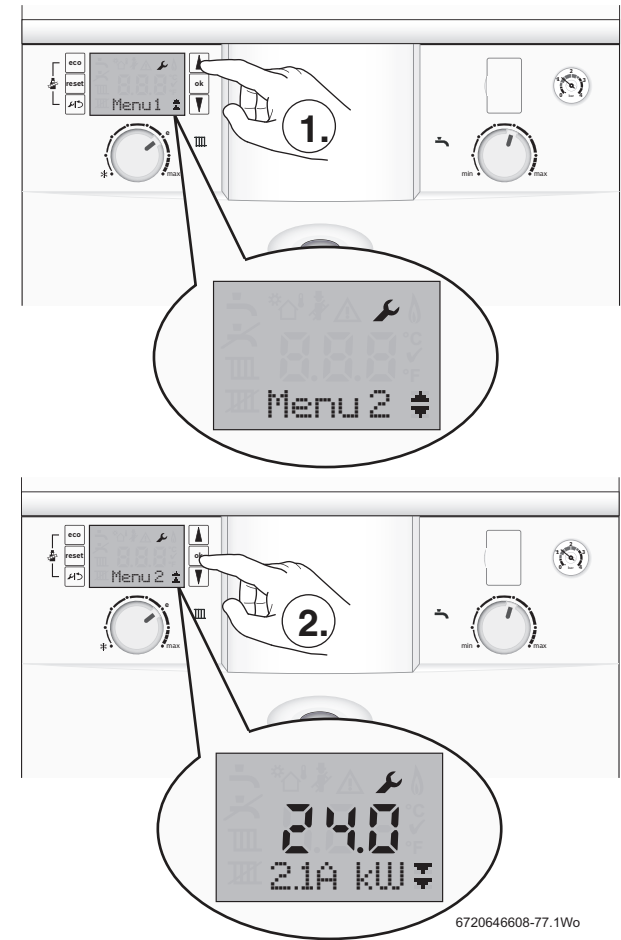


Fig. 60 Menu 2

2.1A	Maximum power CH	Range rate the CH of the boiler. Adjustment in kW. The maximum is 24kW.
2.2C	Air purge mode	This feature can be selected to purge the system and boiler of air. 0 = off, 1 = auto
2.3F	Pre-Heat minimum time (minutes)	Between 0 and 30 minutes can be set for the boiler to keep the DHW heat exchanger hot to provide "instant" hot water.
2.5F	Service reminder time	Between 1 and 72 months can be set
2.7A	Operation/fault indicator (blue light) activation	0 = The blue light will only operate as a flashing fault alert. 1 = The blue light will operate as a boiler operation and fault alert. This is set to 1 by default.

Table 20 Menu 2 parameters

5.4.4 MENU 3 - BOILER MAXIMUM & MINIMUM LIMITS

The menu shows the boiler's maximum limits. These can be adjusted on this menu.

Menu 3 cannot be factory re-set.

1. Select menu 3 via the ▲ and ▼ scroll buttons.
2. Press and hold the **ok** button for at least five seconds to enter Menu 3.

To modify a setting, select the desired menu option (refer to table 21) via the ▲ and ▼ arrow buttons and press the OK button, the option will flash.

Adjust the parameters using the ▲ and ▼ arrow buttons and press the OK button to confirm.

A ✓ symbol will be displayed for three seconds to confirm the update of the new value.

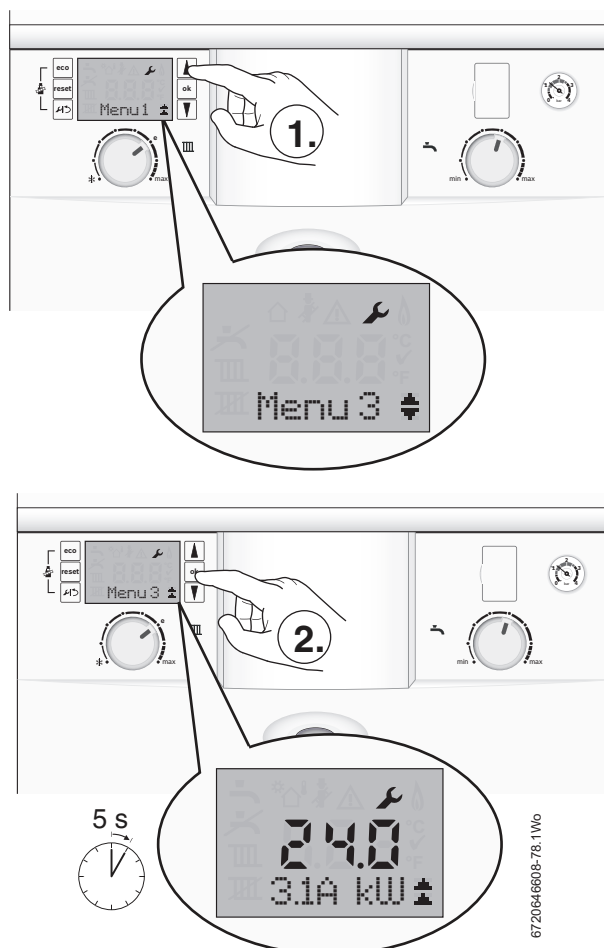


Fig. 61

3.1A	Maximum heating output	The maximum heating output in kW can be set here. The output can be down rated. Note: When maximum boiler output is required for CO/CO ₂ testing, this parameter is ignored and full power is delivered for the duration of the test.
3.2B	Maximum flow temperature	This limits the upper flow temperature of the central heating knob. Which is 82°C as a maximum. This can be down rated.

Table 21 Menu 3 parameters

5.5 COMMISSIONING



NOTE: The combustion settings on this gas-fired boiler have been checked, adjusted and preset at the factory for operation on the gas type defined on the data plate. No measurement of the combustion values is necessary provided there is a meter installed allowing the gas rate to be checked. **DO NOT ADJUST THE AIR/GAS RATIO VALVE.**



When running in the service mode, the boiler will operate both the central heating and the domestic hot water circuits. This is to allow sufficient time for this part of the commissioning procedure. It will be necessary to run water through the domestic hot water circuit to ensure that the boiler will not cycle on low heating demands.

Having checked:

- ▶ That the boiler has been installed in accordance with the installation instructions.
- ▶ The integrity of the flue system and flue seals.

5.5.1 CHECKING THE GAS INLET PRESSURE

The inlet pressure to the appliance must be checked using the following procedure:

MEASURING THE INLET PRESSURE

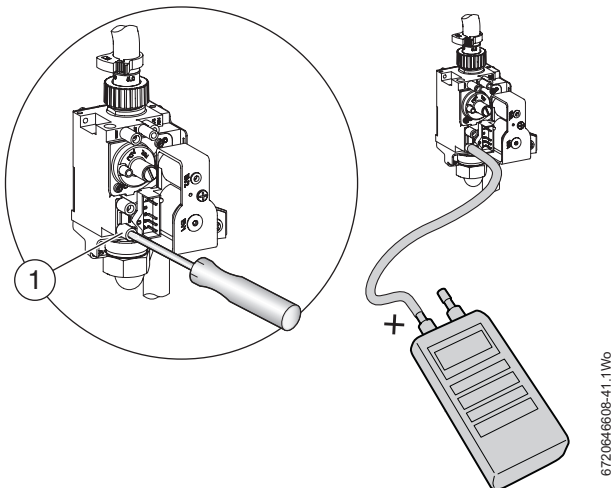


Fig. 62 Inlet pressure test point

- ▶ Close gas isolation valve.
- ▶ Slacken the screw in the inlet pressure test point (1) and connect a manometer.
- ▶ Open gas isolation valve.

- ▶ Measure the pressure with the boiler running at maximum.

- Press the **eco** and **flame** button for at least five seconds and boiler will ramp up to maximum output in approximately 30 to 35 seconds.
- The display will show the chimney sweep symbol and the word MAX will flash.

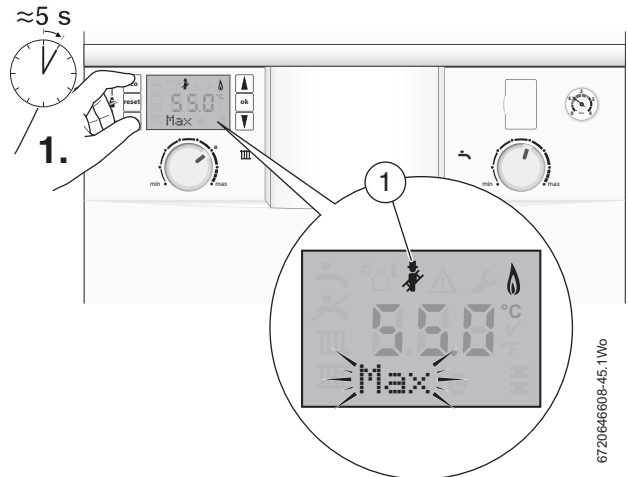


Fig. 63 Setting boiler to maximum

- ▶ Check the gas supply working pressure at the gas valve conforms to values shown in Fig. 64 or Fig. 65.
- ▶ Press the **ok** button to return to normal operation.
- ▶ The boiler will run for 15 minutes in service mode and return to normal if no other inputs are made.



Ensure that the inlet pressure is satisfactory with all other gas appliances working.

GAS PRESSURE WITHIN THE SYSTEM

Refer to the figures below for natural gas or L.P.G gas pressures.

The working pressure at the boiler must not be less than the working pressure read at the meter minus 1mbar for natural gas or minus 2.5mbar for L.P.G.

The pressure drop from the meter to the gas valve must not be more than 2.5mbar for natural gas or 4mbar for L.P.G.

If the pressure drop is greater than shown below, then this would indicate a problem with the supply pipe work which must be rectified.

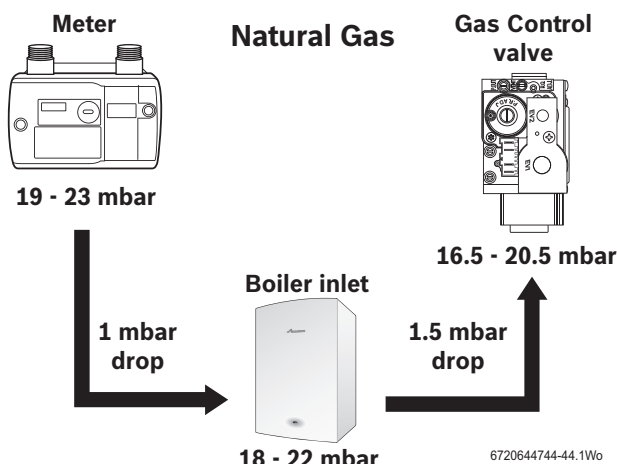


Fig. 64 Natural gas pressures

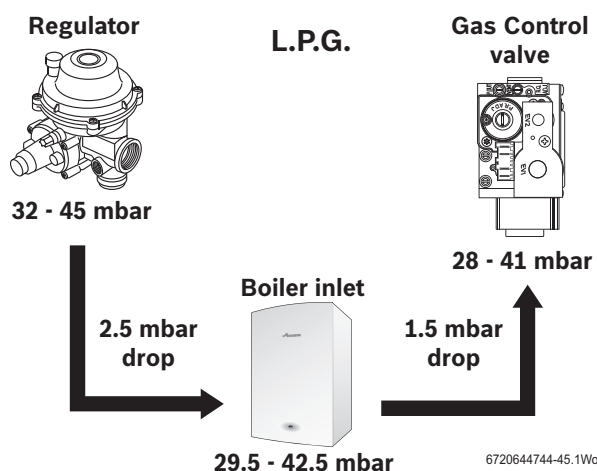


Fig. 65 L.P.G. pressures

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

5.5.2 CHECKING THE GAS RATE

- ▶ The gas rate should be measured at the gas meter after the boiler has been operating for a minimum of 10 minutes at maximum output.
- ▶ See Technical data section on page 7 of this manual for gas rates and CO/CO₂ ratios.
- ▶ Where a gas meter is not available (e.g. L.P.G.) the CO/CO₂ must be checked.

5.5.3 GAS RATING TEST

- ▶ Ensure all other gas appliances are isolated.
- 1. Set the boiler to maximum output by pressing and the button together for at least 5 seconds. The chimney sweep symbol (1) will be displayed at the top of the screen and the word "Max" will flash the bottom of the screen. The boiler will ramp up to maximum output in approximately 30 to 35 seconds.

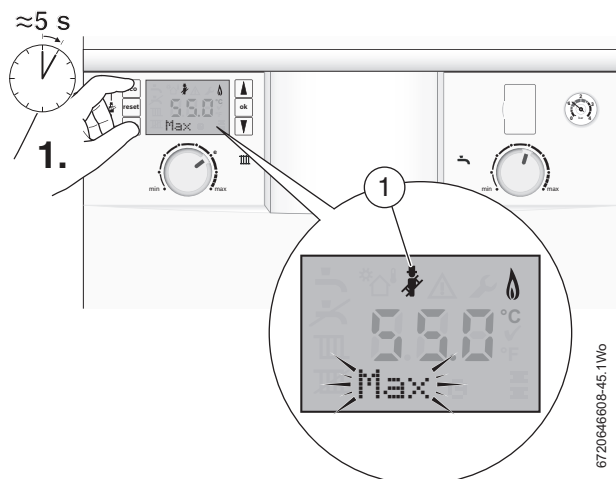


Fig. 66 Setting boiler to maximum

- ▶ Ensure that the boiler has stabilised at maximum output.
- ▶ Carry out Gas rating procedures as described in "Essential Gas Safety" third edition.
- ▶ If pressure and gas rate are satisfactory press the button and the boiler will return to normal operation.
 - If left in the service mode the control will return to normal operation after 15 minutes.

5.5.4 CHECKING FOR LEAKS DURING OPERATION

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

5.6 DOMESTIC HOT WATER

Controlling the hot water temperature:

The hot water temperature can be set to between approximately 40°C and 60°C using the DHW temperature control.

DOMESTIC HOT WATER PRE-HEAT:

Pre-heat reduces the time taken to produce hot water at the tap and is controlled by the ECO button.

- ▶ Press the ECO button to select either state:
 - When Pre-Heat is displayed, the boiler will be in pre-heat mode (which will reduce the time taken to produce hot water at the tap).
 - When ECO is displayed the boiler will be in Economy mode and Pre-Heat will be off.

5.7 FINISHING COMMISSIONING

5.7.1 REPLACING THE BOILER CASE:

1. Replace the boiler case.
2. Make sure that the securing points on top of the case are properly located.
3. Tighten the bottom two screws (2).

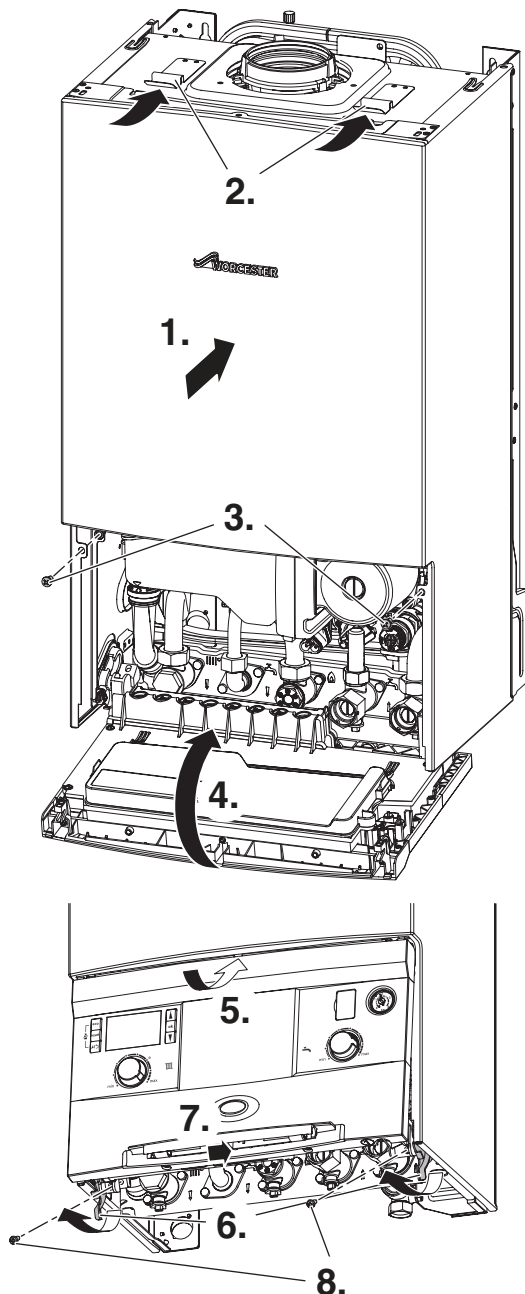


Fig. 67 Fitting case

5.7.2 SECURING THE CONTROL PANEL

4. Raise the control panel.
5. Push the control panel up to engage the top edge under the case.
6. Lift the catches with your fingers.
7. Press the bottom of the control panel back to engage with the catches
8. Secure the catch retaining screws underneath the boiler.

5.7.3 FITTING THE FASCIA FLAP

1. Rotate the hinge to be in-line with the flap and present the flap assembly up to the fascia.
2. Push the pegs on the hinge into the three slots in the front of the fascia and close the flap.
3. Secure the flap to the fascia with the two screws provided.

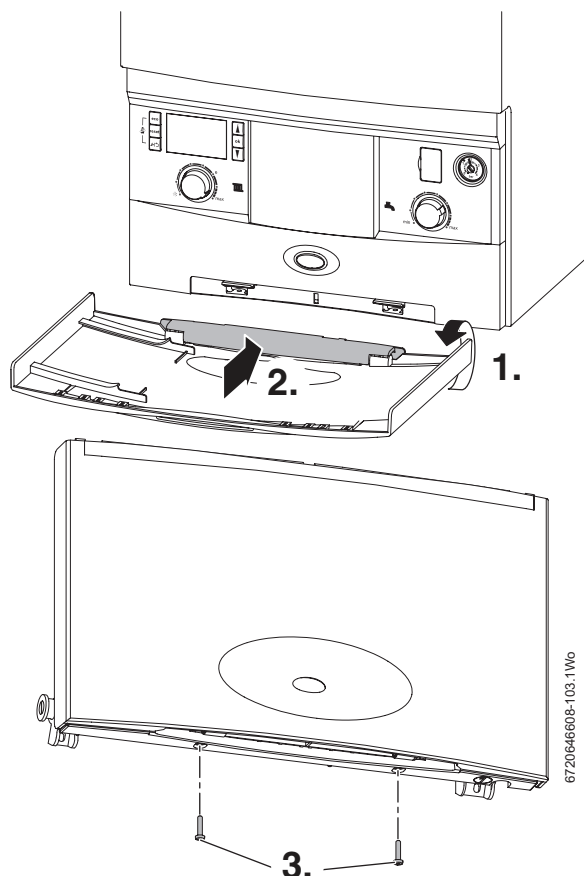


Fig. 68 Installing the fascia flap

5.7.4 INSTALLING BOTTOM PANEL

1. The bottom panel slides onto two ledges either side of the boiler frame.
2. Hold the panel up against the underside of the boiler and slide towards the rear, until there is no more movement.
3. Slide the panel forward until it is fully engaged.

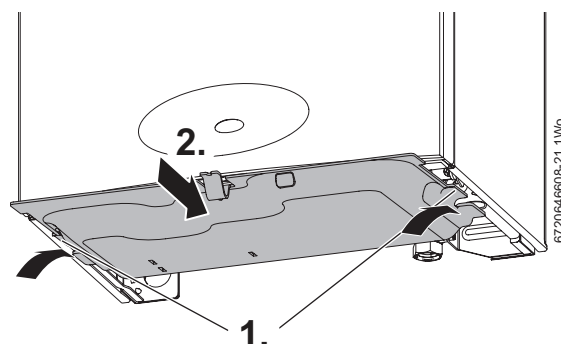


Fig. 69 Bottom panel installation

5.7.5 HAND OVER

- ▶ Complete the Benchmark Gas Boiler Commissioning Checklist.



The Benchmark Checklist can be found at the rear of these instructions.

- ▶ Open the fascia flap by hinging the flap downwards using the curved hand hold in the centre of the flap.
- ▶ Set up the controls and show the customer how to operate all the controls shown in the User Guide plus any external controls.
- ▶ Instruct the customer on:
 - the need to repressurise the boiler occasionally and the pressure expected at the pressure gauge.
 - where to find and store the filling loop key.
 - location of the filling loop and system pressure gauge.
 - the use of the filling loop and how to repressurise the system.
 - how to use the TRVs.
 - how to reset the boiler.
- ▶ Show the customer the fault finding information in the User guide.
- ▶ Show the customer where the serial number/boiler information is when they call in with a problem (Benchmark checklist at the rear of the manual).
- ▶ Have you given the customer details of how to contact the installer/gas emergency numbers.
- ▶ Have you shown the customer how to safely isolate the boiler
- ▶ Have you advised the customer where they can find information on the Worcester, Bosch Group website.
- ▶ Advise the customer that the varying external temperatures will affect the output of the boiler, especially the DHW.
- ▶ Ensure that the User Guide and Installation, Commissioning and Service manual, with the Benchmark checklist and service record, is left with the boiler or homeowner.
- ▶ If the appliance is unused and exposed to freezing conditions, shut off all the mains supplies and drain the system and boiler, label accordingly.

5.7.6 BOILER GUARANTEE

This boiler has a guarantee against faulty materials or workmanship for a period of two years from the date of installation subject to the following terms and conditions:

- During the period of this guarantee any components of the boiler which are proven to be faulty or defective in manufacture will be exchanged or repaired free of charge by Bosch Thermotechnology Ltd.
- The householder may be asked to prove the date of installation, that the boiler was correctly commissioned and, where appropriate, the first year's service has been carried out to the satisfaction of Bosch Thermotechnology Ltd., when requested. These should be documented as a part of the Benchmark Checklist.
- The boiler has been used only for the normal domestic purposes for which it was designed.

This guarantee does not affect your statutory rights.

GUARANTEE REGISTRATION

Your Greenstar boiler carries a two year 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. The Guarantee Registration form is available on this same page and can be completed and submitted electronically.

Alternatively please telephone one of our Guarantee Registration advisors on 0844 892 2552.

Your statutory rights are not affected by the manufacturers guarantee.

6 SERVICE AND SPARES


CAUTION: Mains supplies:

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


CAUTION: Component replacement:

- ▶ After replacement of a gas related component, where a gasket or seal has been disturbed or replaced, check for gas tightness using a gas sniffer/analyser.
- ▶ Also after re-assembly, carry out the following checks:
Fan pressure in section 6.5,
Flue gas analysis in section 6.6,
Offset pressure in section 6.7.


NOTE: Service work

- ▶ Service work must be carried out by a competent engineer, such as British Gas or Gas Safe registered personnel!


NOTE: CO/CO₂ ANALYSER

- ▶ Service work must not be attempted if a CO/CO₂ analyser is not available.

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

6.1 INSPECTION AND SERVICE

1. Check that the terminal and terminal guard, if fitted, are unobstructed and undamaged.
2. If the appliance is in a compartment or cupboard, check that the specified service space around the appliance is clear.
3. 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.
4. Operate the appliance and take note of any irregularities. Refer to the fault finding pages for rectification procedure.

6.2 CHECKING THE GAS INLET PRESSURE


NOTE: Gas inlet pressure

- ▶ Ensure that the gas pressure is satisfactory with all other gas appliances working.
- ▶ Do not continue with the other checks if the correct gas pressure can not be achieved.

- ▶ Check that the gas working pressures in the system conform to the figures shown below:

Allowed mbar pressure drop				
meter/ regulator	across pipework	boiler inlet	across boiler	gas control valve
Natural gas				
19 - 23	1	18 - 22	1.5	16.5 - 20.5
L.P.G.				
32 - 45	2.5	29.5 - 42.5	1.5	28 - 41
mbar range				

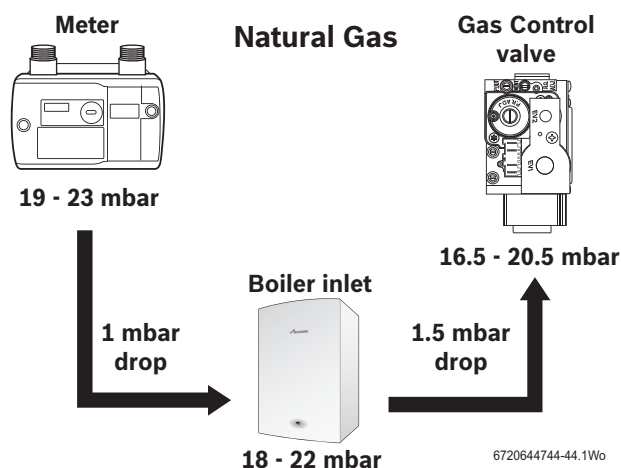


Fig. 70 Natural gas pressure

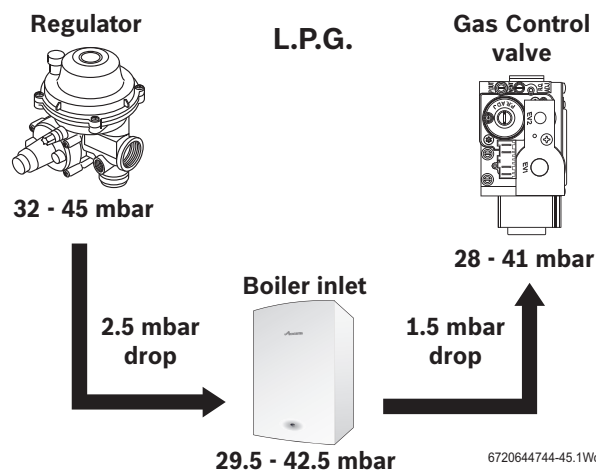


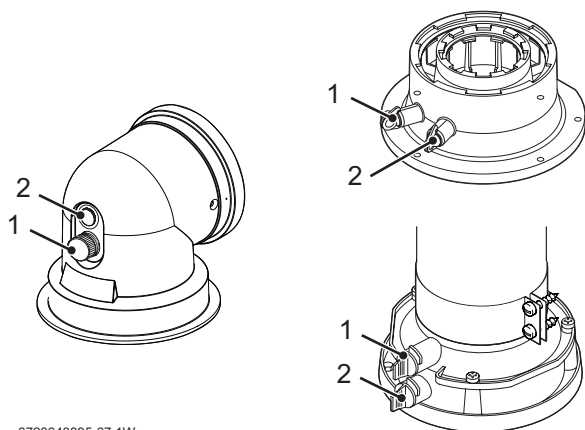
Fig. 71 L.P.G. pressure

6.3 CHECKING FLUE INTEGRITY

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

Flue gas sample point	1
Air inlet sample point	2

Table 22 Key to figure 72



6720643895-67.1Wo

Fig. 72 Flue turret test points

With the boiler case on and the boiler running at maximum output (refer to section 6.5.1 “Setting the boiler maximum”).

- ▶ Insert the analyser probe into the air intake sample point.
- ▶ Ensure that the probe reaches the centre of the air intake, adjust the cone on the probe so that it seals the sample point and correctly positions the end of the probe.
- ▶ Allow the readings to stabilise and check that:
 - O₂ is equal to, or greater than 20.6%.
 - CO₂ 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, e.g. missing or dislodged seals.

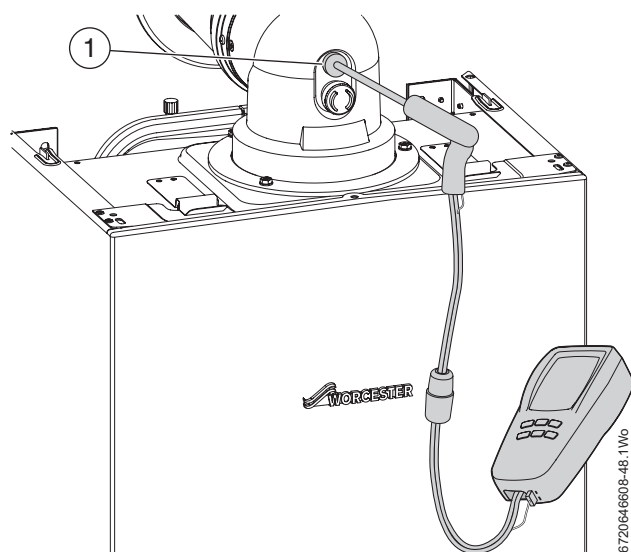
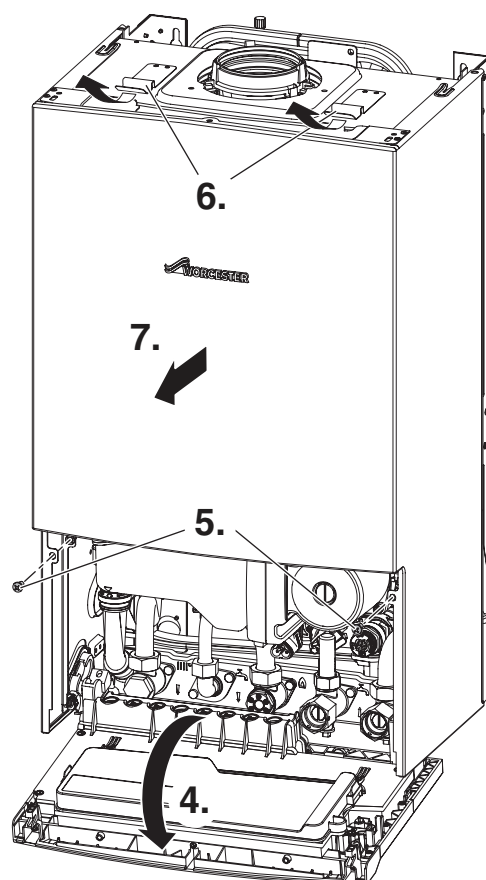
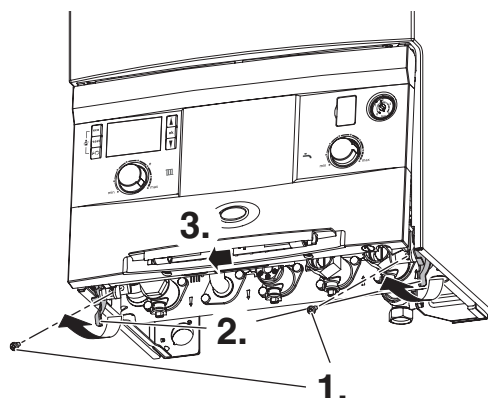


Fig. 73 Flue integrity test

6.4 COMPONENT ACCESS

To gain access to the components, remove the outer case:

1. Remove the two screws securing the control panel.
2. Release the two catches.
3. Pull the bottom of the control panel forward and down.
4. Lower the control panel into the service position
5. Undo and remove the two bottom retaining screws.
6. Lift the spring clips on top of the case.
7. Pull the case towards you to remove.



6720646608-29.1Wo

Fig. 74 Component access

6.5 FAN PRESSURE TEST



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

Before setting the boiler to maximum output for the fan pressure test, refer to figure 76:

- ▶ Switch the boiler off.
- ▶ Remove the combustion air intake pipe (1).
- ▶ Remove the fan pressure test point cover (2).
- ▶ Connect the digital manometer pipe (3) to the fan pressure test point (4).
- ▶ Replace the combustion air intake pipe.
- ▶ Switch the boiler on.
- ▶ Set the boiler to maximum output.

6.5.1 SETTING THE BOILER TO MAXIMUM

To set the boiler to maximum output, refer to figure 75:

1. With the control panel in the operating position, press and hold the and buttons together for at least five seconds.
 - The chimney sweep symbol (1) will be displayed at the top of the screen.
 - The word Max will flash at the bottom of the screen.
 - The boiler will take approximately 30 to 35 seconds to ramp up to maximum output.
 - Allow the boiler to stabilise at maximum output for at least 10 minutes.
- ▶ Ensure that the fan/gas valve do not modulate.

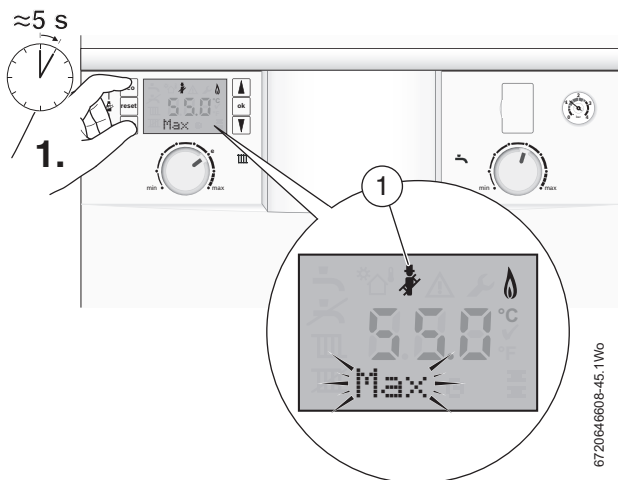


Fig. 75 Set boiler to maximum



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

6.5.2 FAN PRESSURE

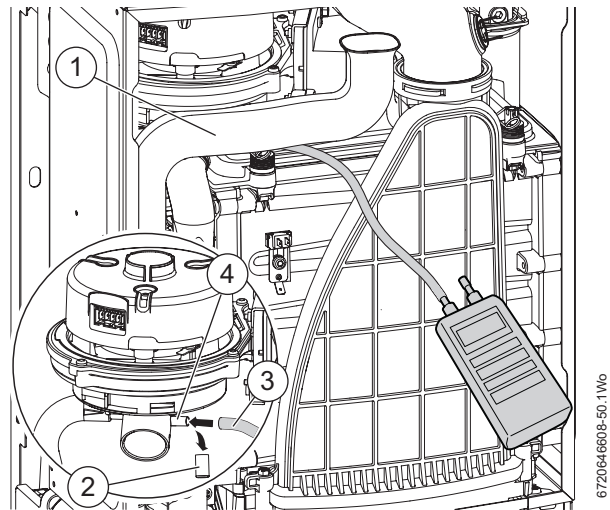


Fig. 76 Fan pressure test point



NOTE: Fan pressure test

- ▶ The boiler must be run at maximum output for the fan pressure test and flue gas analysis.

With the combustion air intake pipe fitted and the boiler running at maximum output, measure the fan pressure:

- ▶ The pressure will read negative, refer to the chart in figure 77 below.

FAN PRESSURE TEST

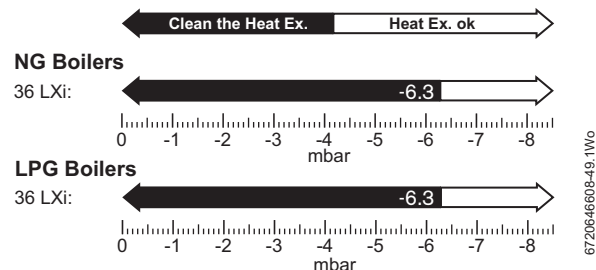


Fig. 77 Fan pressure readings

- ▶ If the manometer reading is in the white area of the chart the heat exchanger/exhaust path/syphon does not require attention.
 - ▶ If the manometer reading is in the black area of the chart then carry out the following checks:
 - Check that the syphon is not blocked.
 - Check the exhaust paths for restrictions.
 - Clean the heat exchanger with a suitable cleaning tool, refer to section 6.8 - Cleaning the heat exchanger.
 - ▶ Re-check the fan pressure readings.
- If the boiler, after completing the above checks, fails the fan pressure test then contact Worcester, Bosch Group for advice.
- ▶ After the measurements are taken switch the boiler off.
 - ▶ Remove the combustion air intake pipe.
 - ▶ Disconnect the manometer and replace the test point cover.
 - ▶ Replace the combustion air intake pipe.

6.6 FLUE GAS ANALYSIS



NOTE: Combustion testing

- ▶ Combustion testing must be carried out by a competent person. Testing must not be attempted unless the person carrying out the combustion check is equipped with a Combustion Analyser conforming to BS 7927 and is competent in its use.





Ensure that the gas inlet pressure has been checked and is satisfactory, refer to section 5.5.1

COMBUSTION TEST



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

- ▶ Connect the flue gas analyser to the flue gas sampling point (1) as shown in the figure below.
- ▶ Ensure that the probe reaches the centre of the flue gas exhaust, adjust the cone on the probe so that it seals the sample point and correctly positions the end of the probe.
- ▶ Press the  and  buttons together
 - The chimney sweep symbol will be displayed at the top of the screen.
 - “Max” will flash at the bottom of the screen.
 - The boiler will ramp up to maximum output in approximately 30 to 35 seconds.
- ▶ Run the boiler at maximum output for at least 10 minutes.
- ▶ Check the CO/CO₂ readings against the information in table 23.

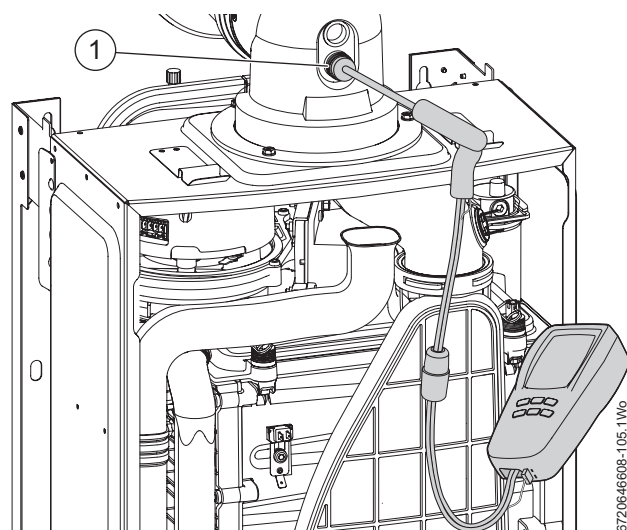



Fig. 78 Combustion test

- ▶ Check CO is less than 200ppm.
- ▶ Set the boiler to minimum power by pressing the down arrow button.
 - “Min” will flash at the bottom left of the screen.
 - The boiler will take 30 to 35 seconds to ramp down to minimum output.
 - Allow the boiler to stabilise at minimum output for at least 10 minutes.
- ▶ Check that the CO is less than 200ppm.
- ▶ Return the boiler to maximum, by pressing the UP arrow button, and re-check the CO/CO₂.
 - “Max” will flash at the bottom left of the screen.
 - The boiler will take approximately 30 to 35 seconds to ramp up to maximum output.
 - Allow the boiler to stabilise at maximum output for at least 10 minutes.
- ▶ If correct, press the  button and the boiler will return to normal operation.
- ▶ Re-assemble and refit boiler case.

CO/CO ₂ settings for Greenstar 36LXi		
CO/CO ₂ should be measured after 10 minutes.		
Gas type	CO ₂ max.	CO ₂ min.
Natural gas	9.1% ± 0.5	8.5% ± 0.5
L.P.G.	10.5% ± 0.5	10.0% ± 0.5
NOTE: When checking an existing appliance the tolerance is ± 0.5.		
CO - less than 200 ppm (0.002 ratio)		

Table 23 CO/CO₂ settings

If the boiler fails the combustion test, check:

1. Air intake for restriction
2. Cleanliness of the heat cell, condition of the burner, plus blockages in the condensate disposal.

6.7 OFFSET PRESSURE



NOTE: Offset Pressure

- ▶ Checking the Offset pressure must be carried out by a competent person. Checking the offset pressure must not be attempted unless the person carrying out the test is equipped with a manometer capable of reading to two decimal places and a combustion analyser conforming to BS7927 and is competent in its use.

6.7.1 CHECKING THE OFFSET PRESSURE

- ▶ Turn the main power off.
- ▶ Remove the boiler casing.
- ▶ Close the gas isolation valve underneath the boiler.
- ▶ Open at least two radiators, ideally more.
- ▶ Loosen the offset pressure testing nipple (2).
- ▶ Set the manometer to zero.
- ▶ Connect a tube from the “+” side of the manometer to the offset pressure testing nipple (2).

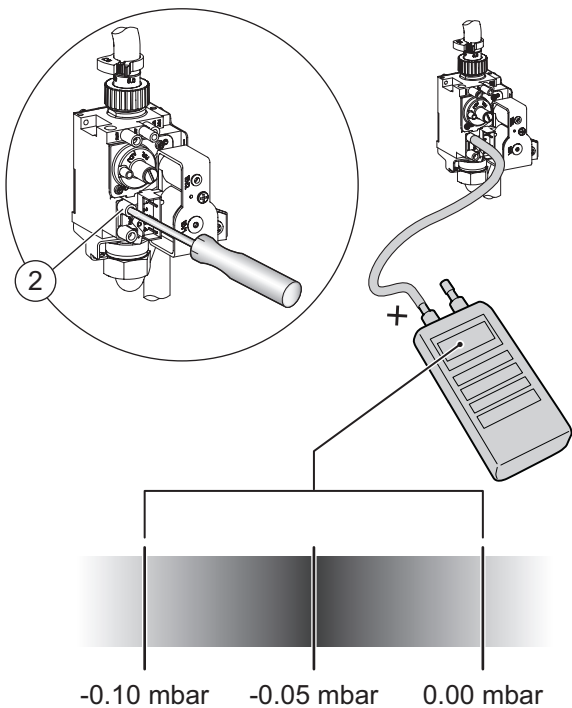


Fig. 79 Checking the air/gas ratio

- ▶ Open the gas isolation valve.
- ▶ Turn the mains power to on.

1. Set the boiler to maximum output by pressing the and buttons for at least five seconds.
2. Select minimum output using the down arrow key.
 - ▶ The Chimney sweep symbol (1) will be displayed on the top middle of the screen and the word “Min” will flash at the bottom of the screen
 - ▶ The boiler will take 30 to 35 seconds to ramp down to minimum output.

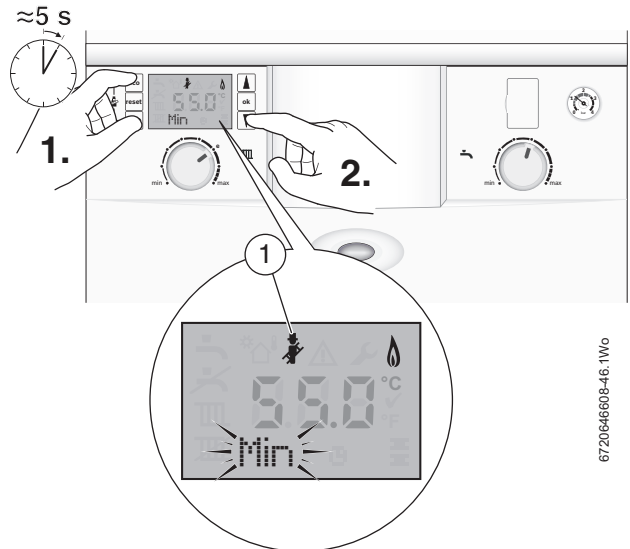


Fig. 80 Setting the boiler to minimum

- ▶ The optimum offset pressure is -0.05 mbar. The pressure difference should be between -0.10 and 0.00 mbar.
- ▶ If this is not the case, then the gas valve must be replaced.
- ▶ Turn the mains power off.
- ▶ Close the gas isolation valve.
- ▶ Remove the tube from the offset pressure testing nipple.
- ▶ Tighten the offset testing nipple screw.
- ▶ Open the gas isolation valve.
- ▶ Turn the mains power on.



CAUTION: Gas leak

- ▶ Check the test nipple for gas tightness.

6.8 CLEANING THE HEAT EXCHANGER



NOTE: Burner gasket

- ▶ Replace the burner gasket after cleaning the heat exchanger.



There is an optional tool available to assist in cleaning the heat exchanger, part number 7 746 901 479

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

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

Refer to sections 6.9.9 to 6.9.13 for instructions on how to remove the items to gain access to the heat exchanger channels so that the heat exchanger can be cleaned

6.8.1 CLEANING THE PRIMARY HEAT EXCHANGER

SINGLE BLADED TOOL

Use a suitable blade to clean the heat exchanger channels.

There is an optional tool available to clean the heat exchanger, part number 7 746 901 479.

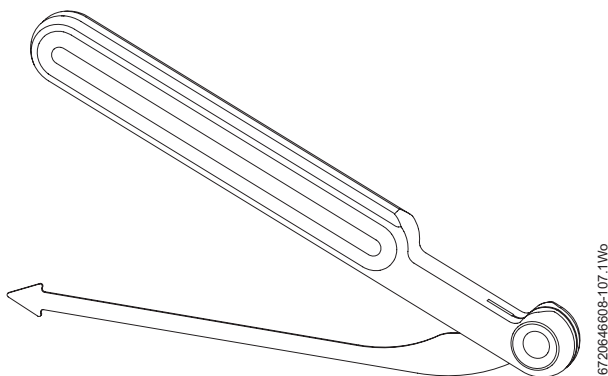


Fig. 81 Single-bladed cleaning tool

- ▶ Visually inspect the inside of the heat exchanger by shining a torch from the top down into the sump area.
 - ▶ When there is little or no light visible this would suggest that those channel(s) are restricted.
 - ▶ It is recommended that all channels are cleaned.
 - ▶ Remove the syphon and place a suitable container under the outlet to catch the water and debris.
 - ▶ Protect the controller from water ingress.
1. Insert the cleaning tool (1) into a channel for cleaning.
 2. Move the cleaning tool in an up and down motion to clean the channel.
- ▶ Once the debris has been dislodged, pour water down the channels to flush out the debris.

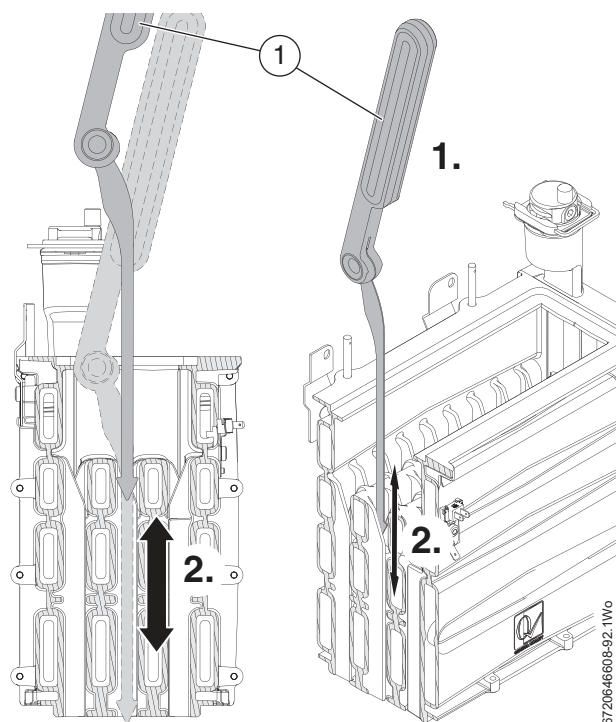


Fig. 82 Heat exchanger cleaning tool

MULTI-BLADED TOOL

This tool is for quick cleaning of multiple channels in the heat exchanger.

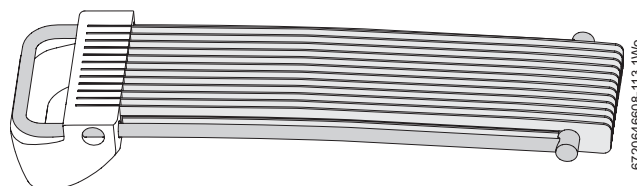


Fig. 83 Multi-bladed cleaning tool

1. Introduce the cleaning tool into the channels and push the steel bar handle (2) down until the white plastic edge (1) is on top of the heat exchanger.
2. The handle (2) can then be moved backwards and forwards (not up and down) to clean the channels.

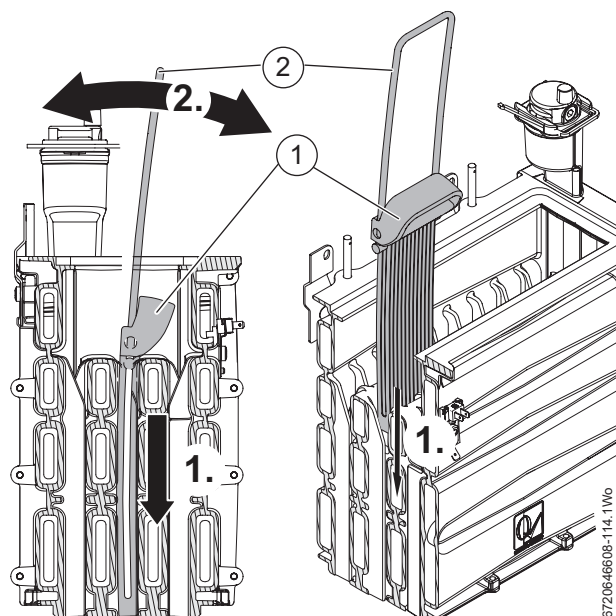


Fig. 84 Cleaning the heat exchanger

6.8.2 CLEANING THE SYPHON

1. Protect the controller from water ingress and disconnect the black discharge hose from the wall frame connector.
 2. Rotate the syphon body clockwise to release the bayonet connection.
 3. Pull the syphon body down and away from the boiler.
- Empty the water and debris into a suitable container.
 - Visually inspect the syphon to ensure that it is clean and free from debris.

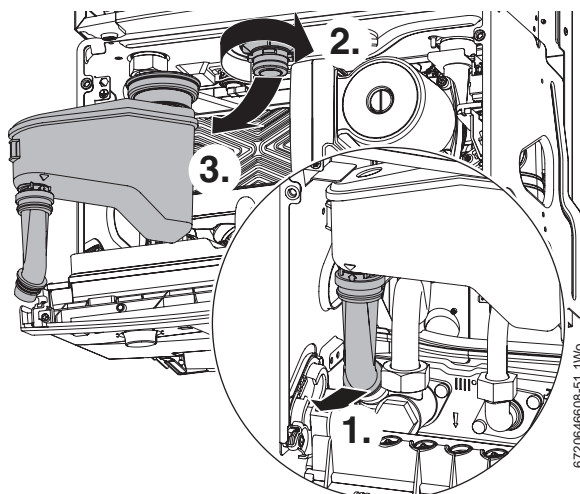


Fig. 85 Cleaning the syphon

REFITTING THE SYPHON

- Fill syphon with 200 to 250 millilitres of water.
1. Push the syphon up onto the sump assembly until it fully engages with the sump connection.



NOTE: Do not use solvents, adhesive or lubricant when pushing the pipe onto the rubber connector.

2. Twist the syphon to the left to secure the bayonet connection.
3. Push the black discharge hose, onto the wall frame connector, until fully engaged.

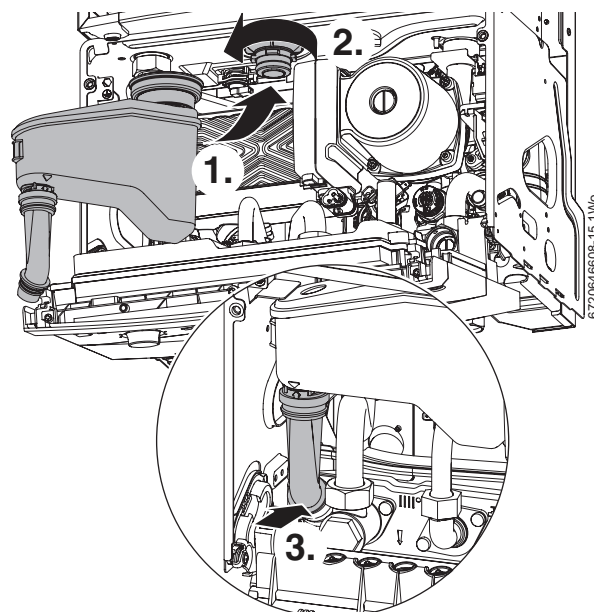


Fig. 86 Fitting syphon



CAUTION: Component replacement:

- After replacement of a gas related component, where a gasket or seal has been disturbed or replaced, check for gas tightness using a gas sniffer/analyser.
- Also after re-assembly, carry out the following checks:
Fan pressure in section 6.5,
Flue gas analysis in section 6.6,
Offset pressure in section 6.7.

6.9 REPLACEMENT OF PARTS



CAUTION: Mains supplies:

- ▶ Turn off the gas supply and isolate the mains supplies before starting any work on the boiler and observe all relevant safety precautions.



CAUTION: Component replacement:

- ▶ After replacement of a gas related component, where a gasket or seal has been disturbed or replaced, check for gas tightness using a gas sniffer/analyser.
- ▶ 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 in section 6.5,
Flue gas analysis in section 6.6,
Offset pressure in section 6.7.

6.9.1 REMOVING THE OUTER CASE

Removing the bottom panel:

1. Pull the catch down.
2. Slide the panel forward and down to remove

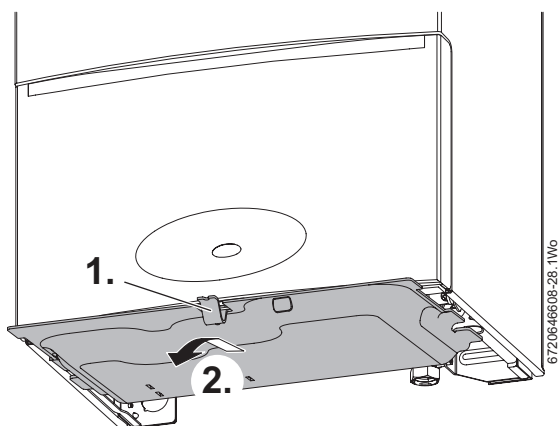


Fig. 87 Bottom panel

Removing the outer case:

1. Locate and remove the two screws under the front of the boiler.
2. Pull the two catches, located under the front of the boiler, down to release the control panel
3. Pull the bottom of the control panel forward slightly and down.
4. Allow the control panel to rotate down on the hinges.
5. Remove the two screws securing the bottom of the case.
6. Release the two catches on top of the boiler.
7. Pull the case towards you and remove.

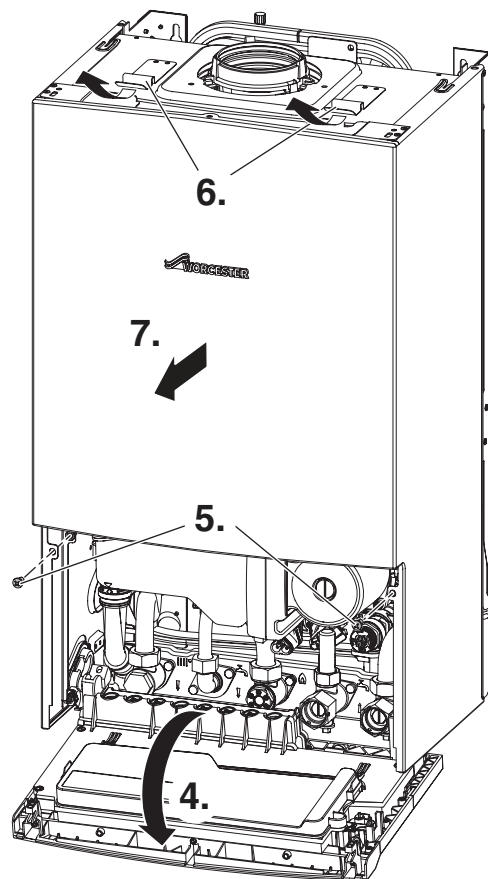
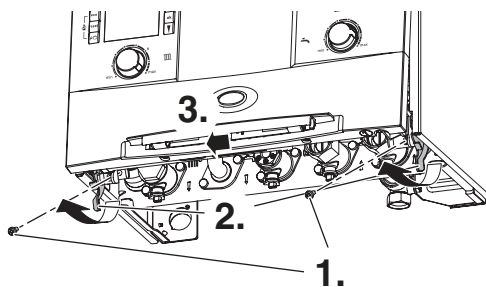


Fig. 88 Removing outer case

6.9.2 DRAINING THE BOILER

Many of the tasks in this section require that the boiler be isolate and drained.

1. Connect a suitable hose firmly to the drain point and run the hose outside to a suitable point or container.
2. Turn the drain valve a $\frac{1}{4}$ turn anticlockwise to open the drain. Turn the valve firmly clockwise to close.

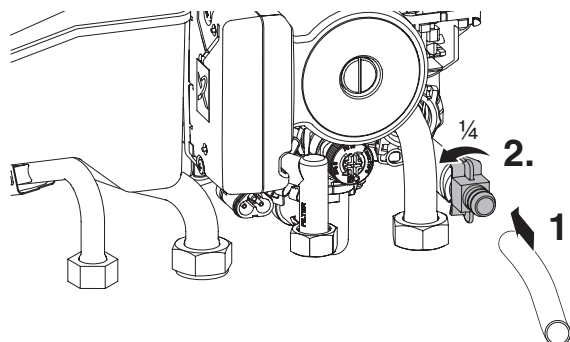


Fig. 89 Draining the boiler

6.9.3 SYPHON REMOVAL

1. Disconnect the discharge hose from the wall frame connector.
2. Rotate the syphon body clockwise to release the bayonet connection.
3. Pull the syphon body down and away from the boiler.

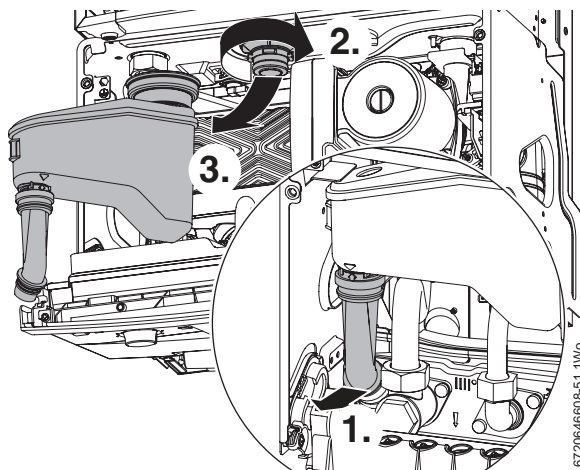


Fig. 90 Syphon removal

6.9.4 PRIMARY SENSOR (CH NTC)

- ▶ Remove the combustion air inlet pipe from the pre-mix unit, rotate anticlockwise and pull away from the fan assembly.
- ▶ Ease the gas pipe to the left.
- ▶ Disconnect the lead to the sensor.
- ▶ Remove the sensor by pulling forward.
- ▶ Replace the sensor onto the flow pipe.
- ▶ Connect the lead to the sensor.
- ▶ Re-fit the combustion air inlet pipe to the pre-mix unit.

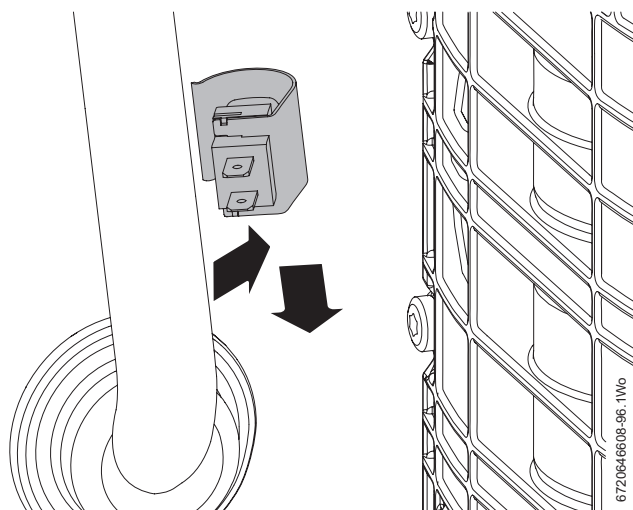


Fig. 91 Primary sensor

6.9.5 MAXIMUM SAFETY SENSOR (NTC)

- ▶ Disconnect the lead to the Maximum safety sensor.
1. Remove the screw securing the sensor.
 2. Remove the sensor from the heat exchanger.
- ▶ When replacing the sensor, ensure that the assembly is properly located on the orientation pin.

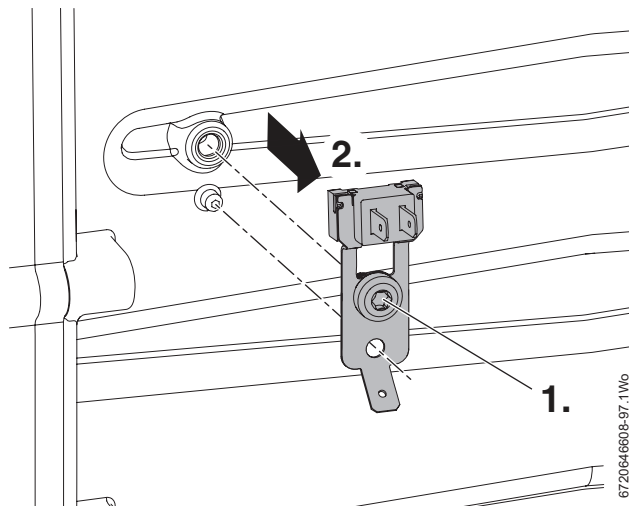


Fig. 92 Overheat sensor

6.9.6 FLUE OVERHEAT THERMOSTAT

- ▶ Disconnect the lead to the flue overheat thermostat.



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

- ▶ Using a small screwdriver, gently prise the thermostat from the housing taking care not to damage the housing or grommet.

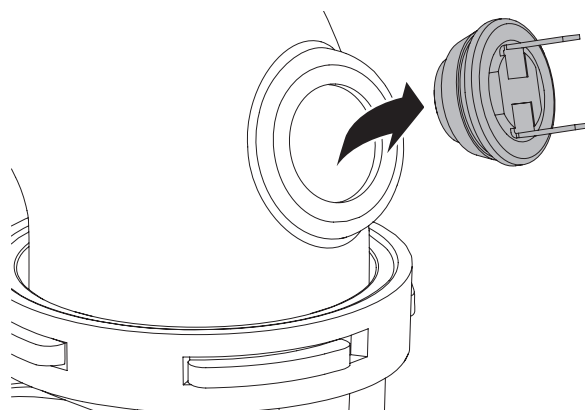


Fig. 93 Flue overheat thermostat

- ▶ To replace, push the thermostat and new grommet gently back into the opening until contact with the locating ridge is felt.
- ▶ The Flueway will have to be removed if the thermostat falls into the housing, refer to section 6.9.9.

6.9.7 AUTO AIR VENT

Ensure that the boiler has been fully drained.

1. Remove the spring clip completely.
2. Lift the air vent out of the housing and remove.

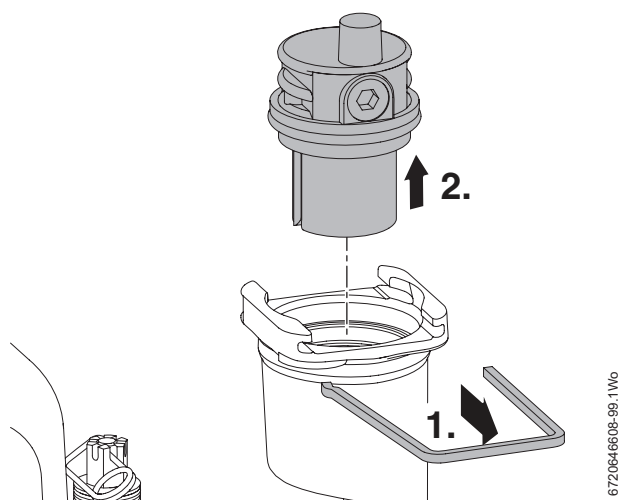


Fig. 94 Auto air vent

When re-assembling ensure that the “O” ring is fitted to the Auto air vent and NOT the heat exchanger, otherwise the Air vent will be difficult to fit.

Apply silicone grease to the “O” ring to ease assembly.

6.9.8 GAS VALVE

- Isolate the mains electrical supply and the gas supply at the boiler gas cock.
 - Remove the combustion air inlet pipe.
 - Disconnect the electrical connector from the valve
1. Remove the gas pipe from the top of the valve.
 2. Undo the bottom gas pipe connection.
 3. Remove the screw securing the gas valve.
 4. Lift the gas valve to clear the bottom gas connection.
 5. Pull the gas valve forward out of the boiler.

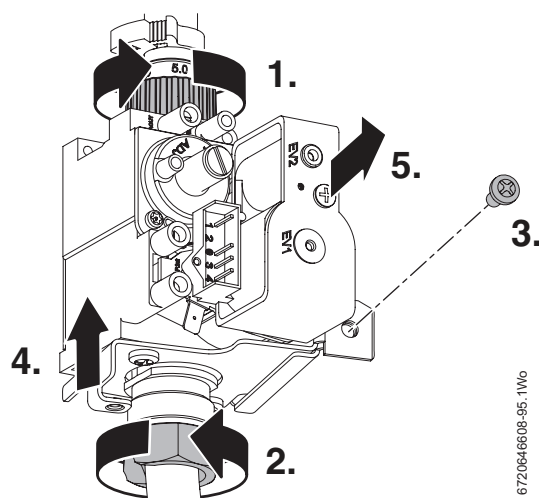


Fig. 95 Gas valve

- When fitting the new valve, start with the bottom gas connection and tighten by hand before making any other connections to the valve.
- Secure the valve with the screw.

- Tighten the bottom connection firmly with a suitable spanner.
- Connect the top gas pipe.
- Reconnect the electrical connector.
- Open the boiler gas isolator.
- Check that all the gas connections for gas tightness.

6.9.9 FAN ASSEMBLY



CAUTION: Component replacement:

- After replacement of a gas related component, where a gasket or seal has been disturbed or replaced, check for gas tightness using a gas sniffer/analyser.
- 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 in section 6.5,
Flue gas analysis in section 6.6,
Offset pressure in section 6.7.

To remove the fan, disconnect the electrical mains and gas supplies, and remove the following components:

- Flueway
- Combustion air inlet pipe and gas pipe

FLUEWAY REMOVAL

1. Release the two screws securing the Flueway to the sump.
2. Using a screwdriver under the tabs (1) next to the screws, lever the Flueway up to clear the seal and pull the Flueway forward.
3. Rotate the exhaust pipe to the left and pull the Flueway down to separate from the exhaust pipe.

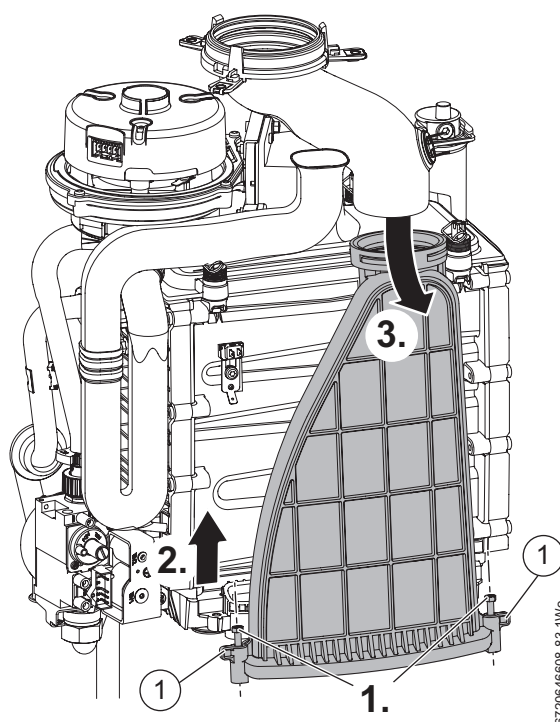


Fig. 96 Flueway removal

COMBUSTION AIR INLET AND GAS PIPE DISCONNECTION

1. Rotate the combustion air inlet pipe anticlockwise to release from the fan assembly and pull away from the fan.
2. Undo the top gas pipe connector at the gas valve.

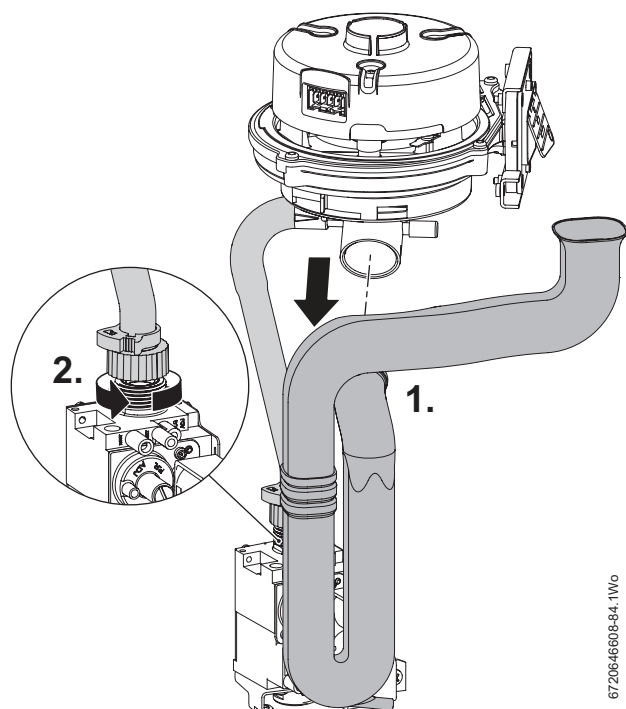


Fig. 97 Combustion air inlet pipe removal

FAN REMOVAL



The boiler case is shown removed to aid clarity.

3. Rotate the exhaust pipe anticlockwise to gain access to the fan assembly securing screws.
4. Support the weight of the fan and remove the two screws securing the fan.

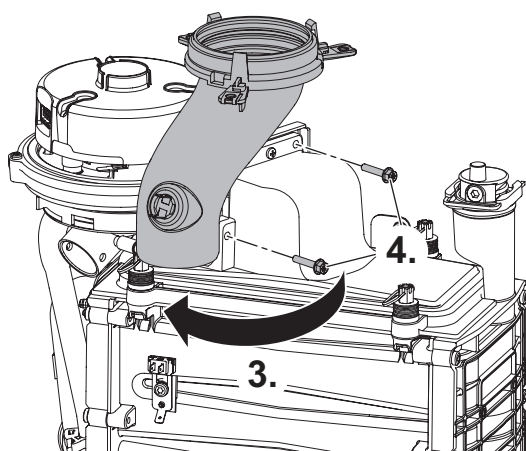


Fig. 98 Fan removal 1

5. Rotate the exhaust pipe clockwise.
6. Pull the fan assembly away from the mount, lift and rotate the fan towards you. Ensure that the front of the fan clears the left hand front castellated nut securing the burner housing.
7. Pull the gas pipe off the fan body connection, the pipe is secured by the interference fit between the pipe and connector.



When refitting the rubber gas pipe, ensure that the pipe is correctly oriented by aligning the notch in the pipe with the lug on the fan connector. Do not kink the pipe. There is a raised arrow on the pipe indicating the location of the notch.

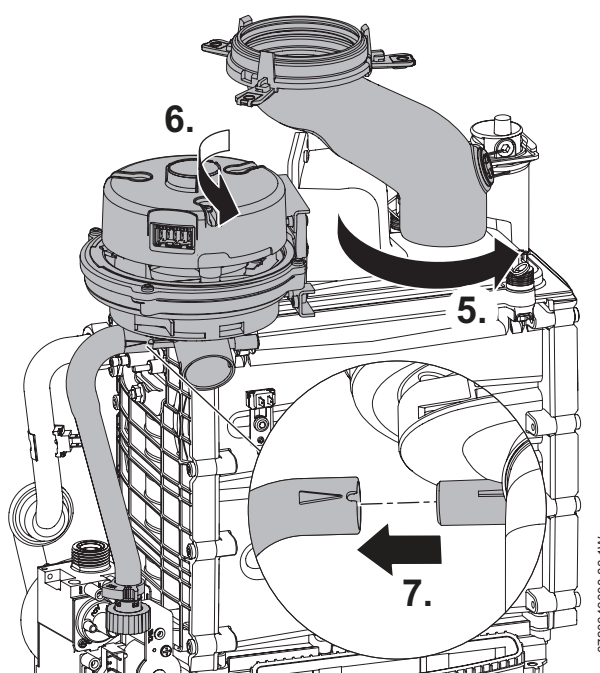


Fig. 99 Fan removal 2

6.9.10 AIR/GAS FLAP VALVE ASSEMBLY

1. Remove the single screw securing the air/gas flap valve assembly.
2. Pull the flap assembly away from the housing.

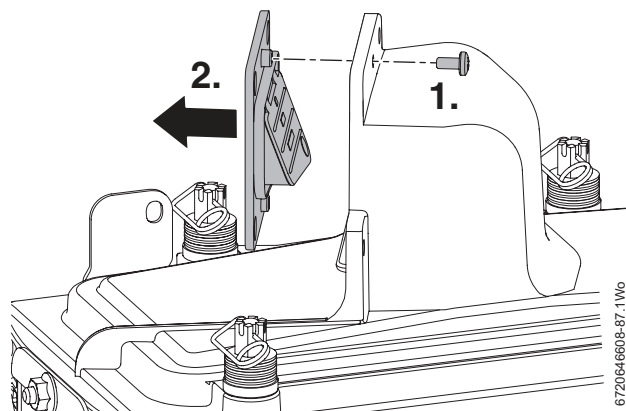


Fig. 100 Air/gas flap valve

6.9.11 IGNITION TRANSFORMER

To remove the ignition transformer

- ▶ Remove the combustion air inlet pipe.
- ▶ Ensure that the harness wires are disconnected from the transformer.
- ▶ Remove the electrode cables.
- ▶ Lift the transformer from the retaining clip.

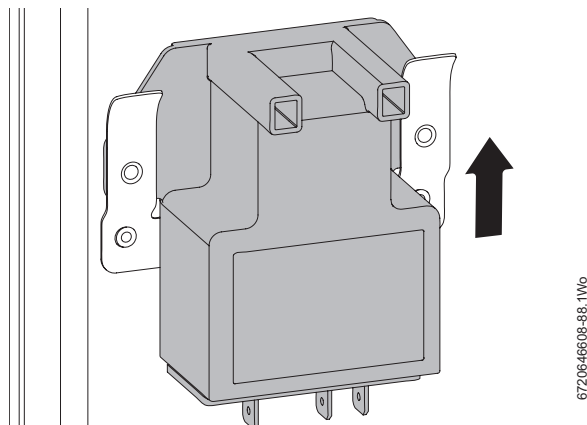


Fig. 101 Ignition transformer

6.9.12 ELECTRODE ASSEMBLY



CAUTION: Component replacement:

- ▶ After replacement of a gas related component, where a gasket or seal has been disturbed or replaced, check for gas tightness using a gas sniffer/analyser.
- ▶ Also after re-assembly, carry out the following checks:
Fan pressure in section 6.5,
Flue gas analysis in section 6.6,
Offset pressure in section 6.7.

To remove the spark electrode assembly:

1. Undo and remove the two nuts securing the electrode assembly
 2. Rotate the electrode assembly down and forward to remove from the Heat exchanger.
- ▶ Inspect the spark electrodes (2), ionisation probe (3) and ceramics for signs of contamination or damage, replace as necessary.
 - ▶ If necessary, clean the spark electrodes and ionisation probe with a plastic scouring pad.
 - ▶ Re-assemble with a new electrode gasket (1),

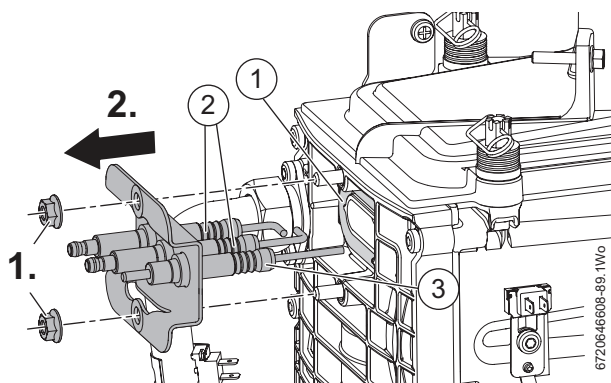


Fig. 102 Electrode assembly

6.9.13 BURNER HOUSING, BURNER/ GASKET



The front two bolts retaining the burner housing are NOT captive and will drop out when the nuts are removed.

To remove the burner housing.

1. Release and remove the four spring pins from the castellated nuts.
2. Undo the front two castellated nuts/springs and remove and retain along with the front two bolts (1). Slacken the two rear castellated nuts/springs, but do not remove.

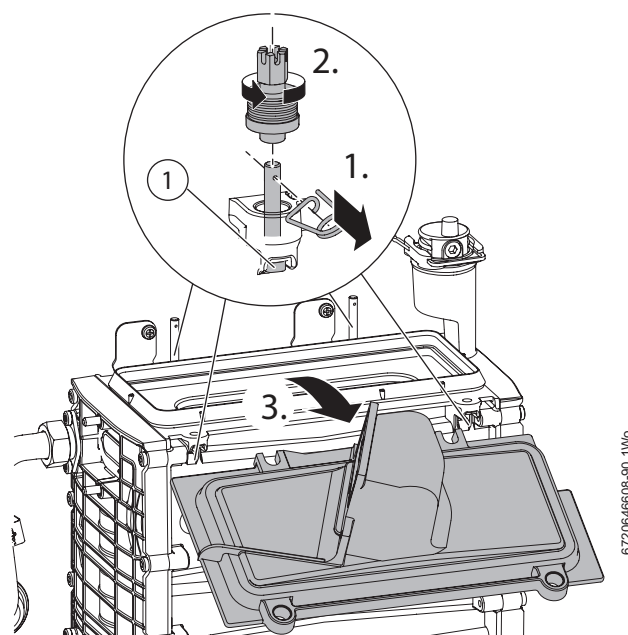


Fig. 103 Burner housing

3. Pull the burner housing up and forward to remove.

To remove the burner and gasket.

1. Lift the gasket (1) and burner mesh (2) from the heat exchanger body.
- ▶ When fitting the burner, ensure that the convex side of the burner faces down into the heat exchanger.
 - ▶ Always fit a new gasket (1) when re-assembling the heat exchanger.

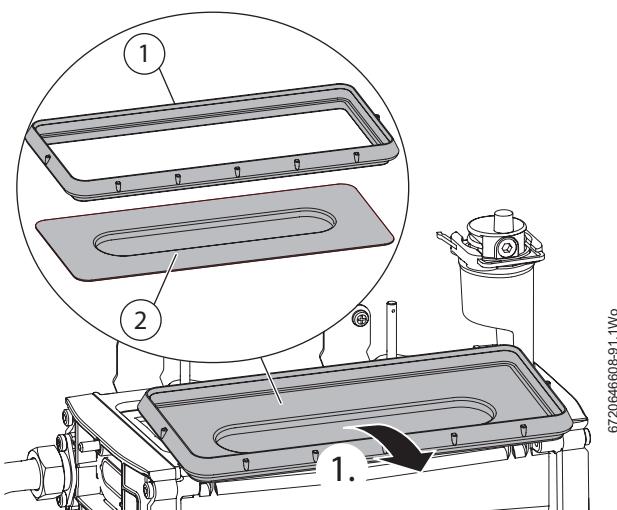


Fig. 104 Burner and gasket

6.9.14 HEAT EXCHANGER



Before removal:

- ▶ Isolate the electrical power to the boiler.
- ▶ Drain the system.

HEAT EXCHANGER DISCONNECTION

1. Undo the flow and return connections.
 2. Pull both the flow and return pipes away from the heat exchanger.
- ▶ Replace the fibre washers (1) when replacing the heat exchanger.

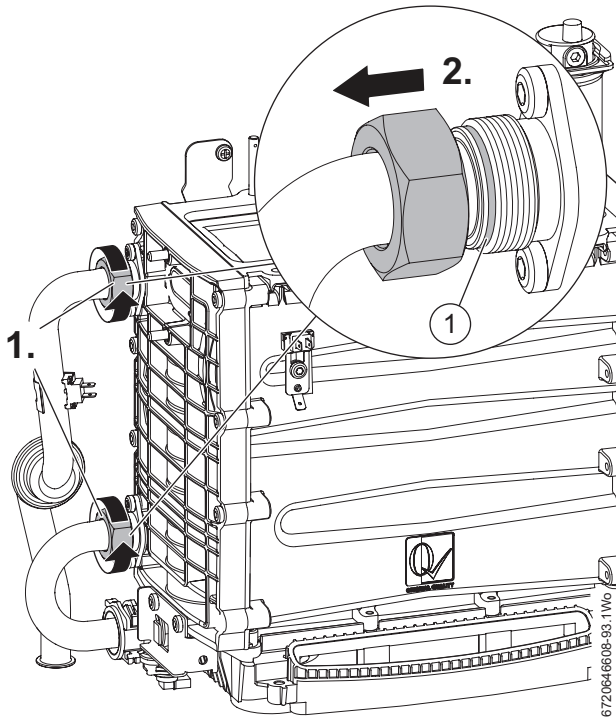


Fig. 105 Heat exchanger disconnection

HEAT EXCHANGER REMOVAL

- ▶ Ensure any electrical wires or connectors are removed.
 - ▶ Remove the Auto air vent (refer to section 6.9.7) to ease removal of the heat exchanger
1. Unscrew the heat exchanger retaining nut.
 2. Remove the heat exchanger retaining nut.
 3. Remove the two screws securing the heat exchanger to the air box.
 4. Lift the heat exchanger until the lower connection clears the hole in the air box.
 5. Pull the heat exchanger towards you to remove.



CAUTION: Component replacement:

- ▶ After replacement of a gas related component, where a gasket or seal has been disturbed or replaced, check for gas tightness using a gas sniffer/analyser.
- ▶ Also after re-assembly, carry out the following checks:
Fan pressure in section 6.5,
Flue gas analysis in section 6.6,
Offset pressure in section 6.7.

- ▶ Re-assemble in the reverse order.

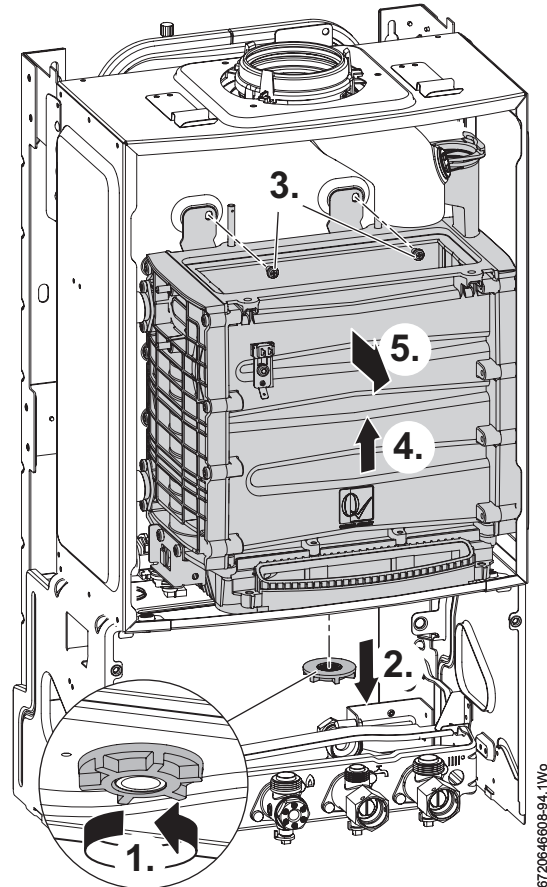


Fig. 106 Heat exchanger removal

6.9.15 DIVERTER VALVE MOTOR AND DIVERTER VALVE REMOVAL

- ▶ Disconnect the lead from the diverter valve motor.
1. Pull the diverter valve motor from the housing.
 2. Undo and remove the two screws from the diverter valve motor housing.
 3. Pull the diverter valve motor housing from the diverter valve assembly.

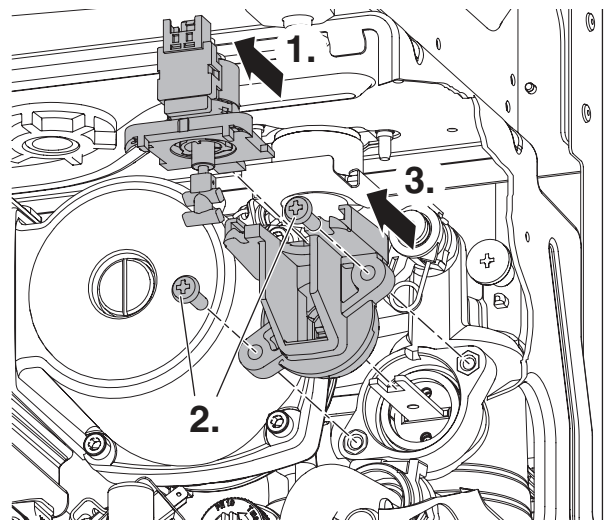


Fig. 107 Diverter valve

6.9.16 DHW TEMPERATURE SENSOR (NTC)

- ▶ Disconnect the electrical connector from the sensor.
- ▶ Unclip the sensor from the pipe.

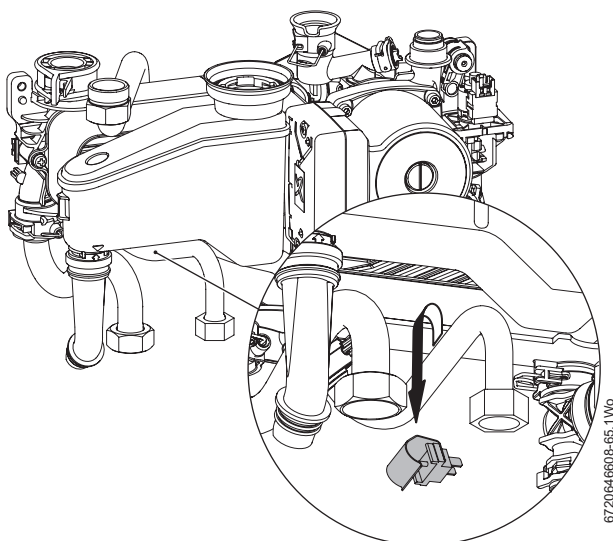


Fig. 108 DHW temperature sensor

6.9.17 PUMP HEAD



Before removal:

- ▶ Isolate the electrical power to the boiler.
- ▶ Drain the system.
- ▶ There may be water inside the pump. Protect any electrical items from water ingress.

1. Disconnect the main electrical connector from the bottom of the pump.
 2. Remove the four screws securing the pump head.
 3. Pull the pump free from the housing.
- ▶ Use a screwdriver to gently disconnect the three wire connector from the bottom of the pump.

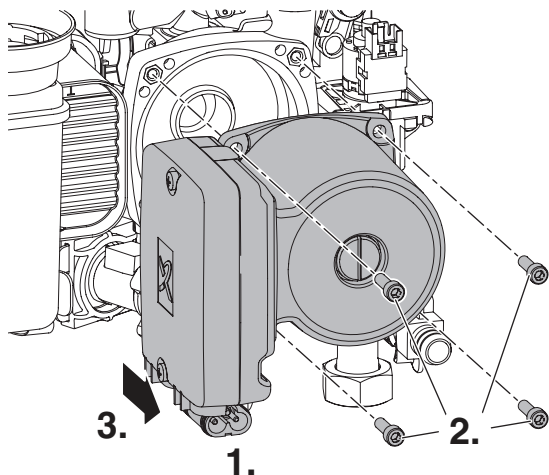


Fig. 109 Pump head removal

6.9.18 FLOW SENSOR, FLOW RESTRICTOR AND FILTER REMOVAL

- ▶ Isolate the cold mains and ensure that the DHW circuit is fully drained.
 - ▶ Disconnect the electrical connection to the turbine.
 - ▶ Undo the nut connecting the flow sensor assembly elbow to the Cold Mains isolating valve.
1. Remove the clip from the housing.
 2. Pull the flow sensor assembly out.
 3. Remove the flow restrictor (1) from the turbine assembly (2).
 4. Remove the clip from the flow sensor assembly.
 5. Separate the elbow (3) from the turbine assembly (2).
 6. Remove the filter (4).

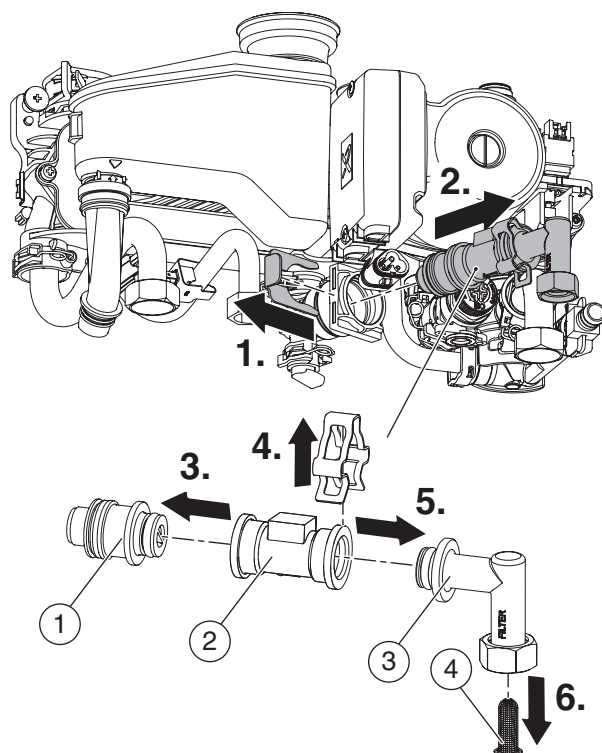


Fig. 110 Flow sensor assembly

6.9.19 FLOW REGULATOR

The flow regulator can be further broken down into:

- 1 - Spacers
- 2 - Flow restrictor
- 3 - Flow regulator housing

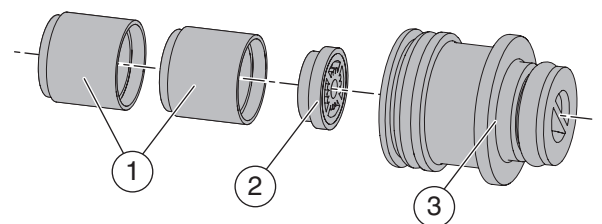


Fig. 111 Flow regulator assembly

6.9.20 PRESSURE GAUGE

- Ensure that the boiler is fully drained.

 1. Remove the securing screw and plate.
 2. Prise the lugs apart and remove the pressure gauge.
 3. Withdraw the spring clip from the pressure sensing head housing.
 4. Remove the pressure sensing head and pressure gauge capillary from the housing.

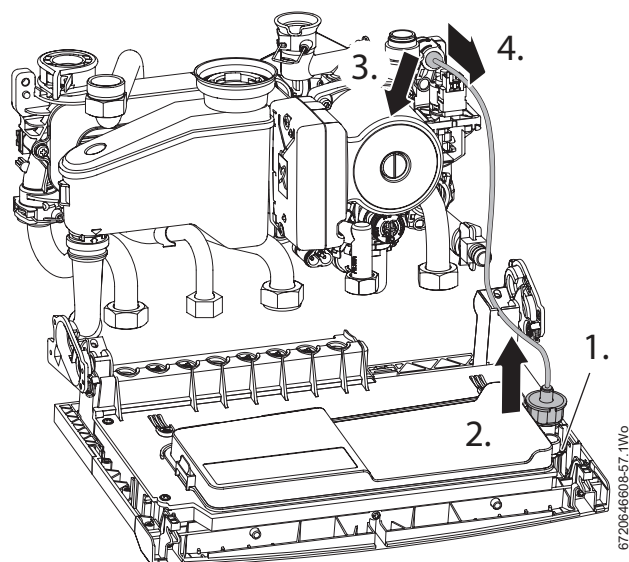


Fig. 112 Pressure gauge removal

6.9.21 BOILER RETURN SENSOR (NTC)

- Isolate the boiler and ensure that the system is fully drained.

 1. Withdraw the spring clip to release the sensor.
 2. Pull the sensor down to remove from the housing.

- To refit follow the above actions in reverse.

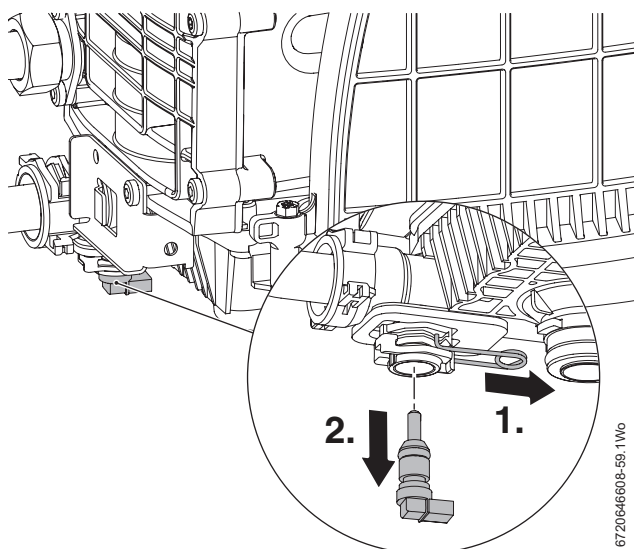


Fig. 113 Boiler return sensor

6.9.22 DRAIN TAP

- Ensure that the system is full drained down.
- The drain tap rotates anticlockwise for a ¼ turn to open.

 1. Rotate the drain tap fully anticlockwise passed the ¼ turn stop point to release.
 2. Push in and withdraw from the housing.

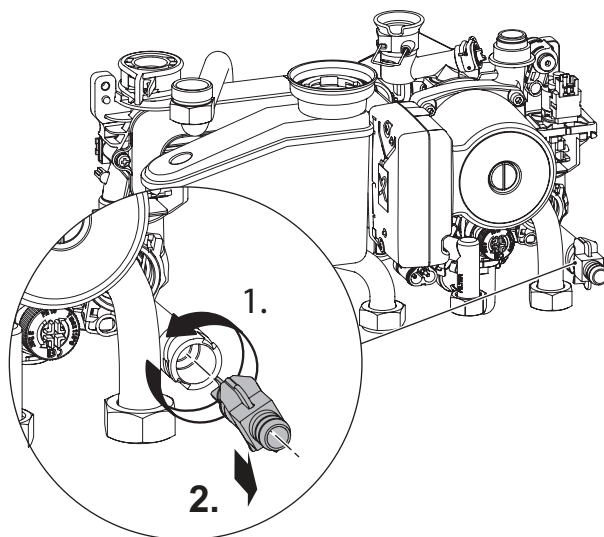


Fig. 114 Drain tap

6.9.23 CH PRESSURE RELIEF VALVE

- Isolate the boiler and ensure that the system is fully drained.

 1. Remove the two retaining screws securing the outlet elbow to the PRV.
 2. Move the PRV housing to the right and pull the captive clip to the left to release.
 3. Pull the Central Heating pressure relief valve out of the housing.

- Replace in reverse order, secure with the clip and mounting screws.

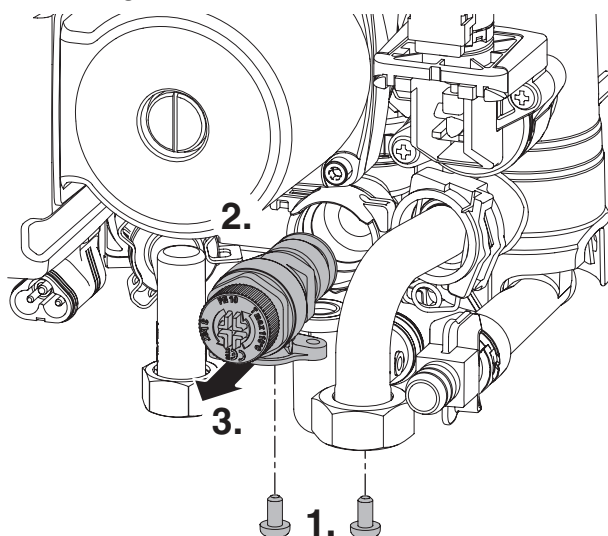


Fig. 115 PRV

6.9.24 DHW PRESSURE RELIEF VALVE



Before removal:

- ▶ Isolate the electrical power to the boiler.
- ▶ Drain the system.
- ▶ Isolate the cold water mains.

1. Release the retaining clip
 2. Pull the pressure relief valve (1) from the housing with the deflector (2).
- ▶ When replacing the DHW pressure relief valve, re-use the deflector from the old PRV.

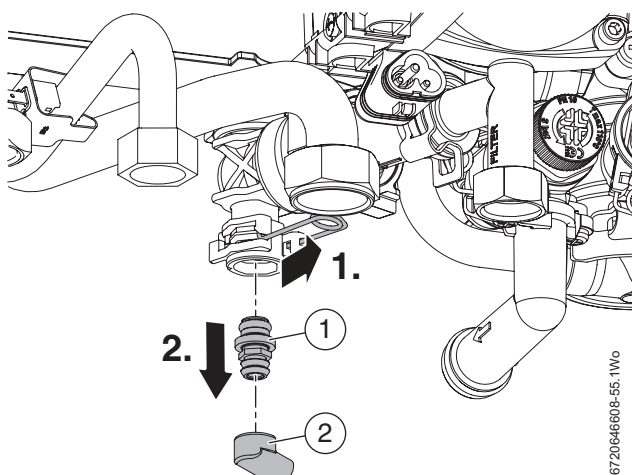


Fig. 116 DHW PRV

6.9.25 DHW PLATE HEAT EXCHANGER



Before removal:

- ▶ Isolate the electrical power to the boiler.
- ▶ Drain the system.
- ▶ Isolate the cold water mains.

1. Undo and remove the retaining screw.
2. Rotate the left hand side of the heat exchanger towards you and slide out to the left.

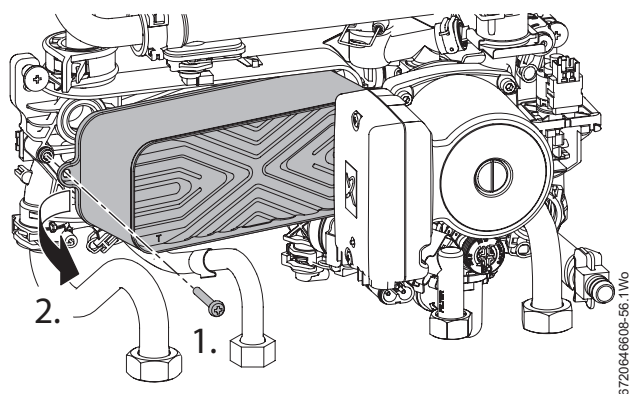


Fig. 117 Remove plate heat exchanger.

- ▶ When replacing the heat exchanger, ensure that any seals that have been disturbed are replaced.

6.9.26 HYDRAULIC BLOCK REMOVAL



Do not remove the hydraulic block assembly unless absolutely necessary.

Before removal:

- ▶ Isolate the electrical power to the boiler.
- ▶ Drain the system.
- ▶ Isolate the cold water mains.

1. Squeeze the ratchet connector and rotate clockwise to release.
2. Release the pin on the expansion vessel connector at the pump assembly.
3. Pull the expansion vessel up and secure in raised position.
4. Remove the clip securing the pump return to the heat exchanger.
5. Remove the two screws securing the CH pressure relief valve mounting.
6. Remove the screws securing the hydraulic block assembly.

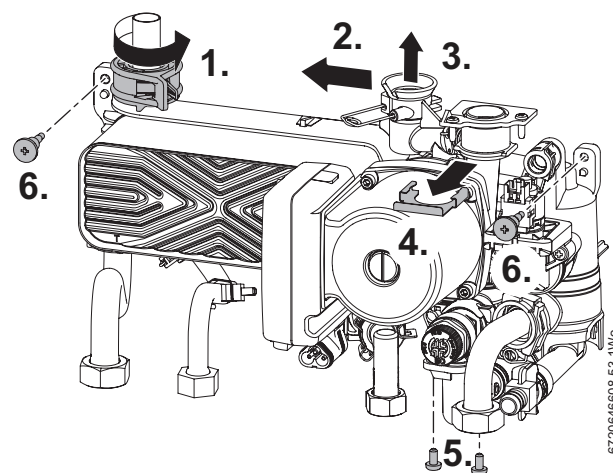


Fig. 118 Hydraulic block

6.9.27 BYPASS VALVE

Remove the hydraulic block from the boiler.

1. Remove the clip on the return connection.
2. Remove the clip on the pump connection.
3. Remove the spring clip retaining the by-pass pipe.
4. Separate the return unit from the flow manifold.
5. Using a pair of pliers remove the by-pass valve.

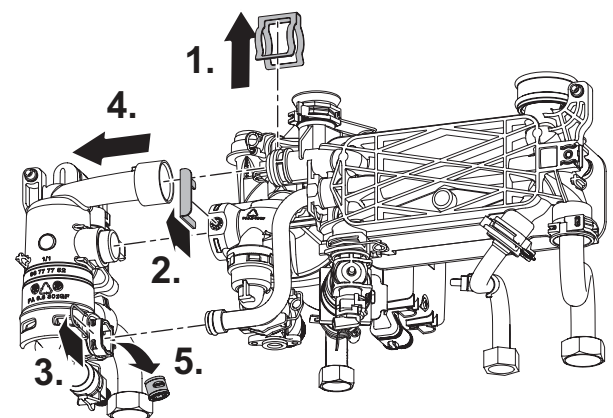


Fig. 119

- ▶ When re-assembling, in reverse order, ensure that any seals that have been disturbed are replaced.

6.9.28 ACCESS TO BOILER CONTROL COMPONENTS

1. Remove the three screws retaining the installer access cover.
2. The access cover can now be removed with the flap.

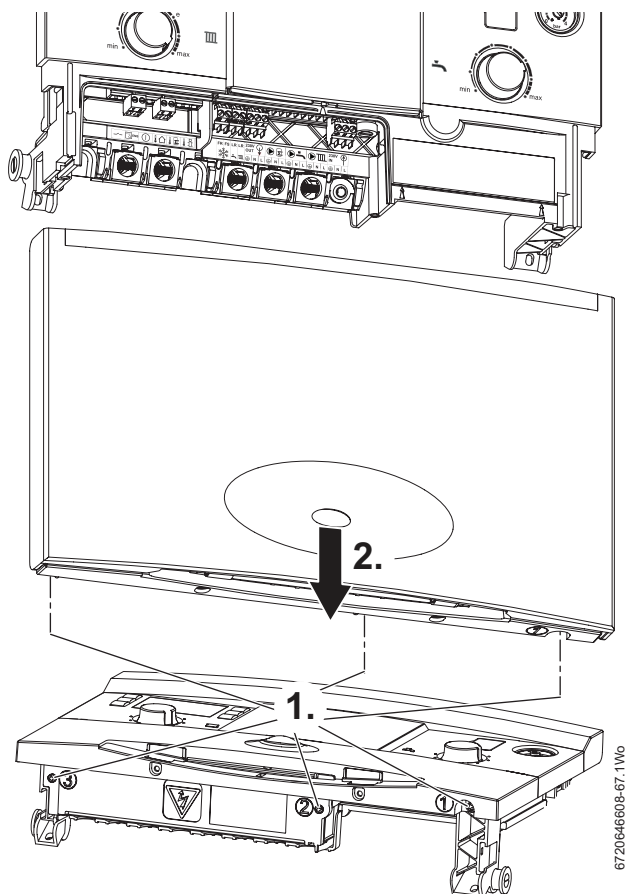


Fig. 120 Installer access cover

PCB FUSE

The fuse is located next to the high voltage connectors and the spare fuse (1) is located on the back of the access cover.

To remove the fuse:

1. Push the top of the fuse holder up.
2. Rotate the top of the fuse holder anti-clockwise and remove.

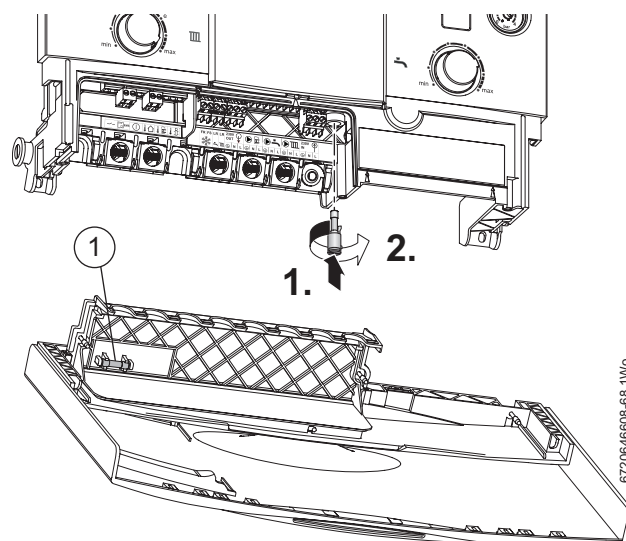


Fig. 121 Fuse holder

6.9.29 REPLACING THE CONTROL UNIT



The control unit is supplied in a plastic housing. The complete unit must be replaced. The HCM must be exchanged from old to the new control unit.

With the installer access cover removed:

1. Remove all the connectors
2. Slide out all the cable strain relief clamps

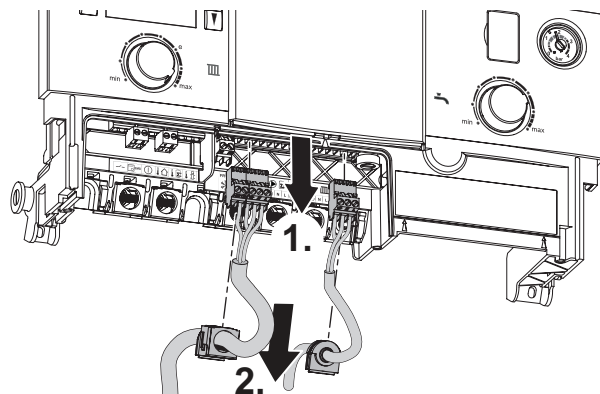


Fig. 122 Disconnect external connections

With the control unit in the service position:

1. Remove the single cover retaining screw.
 2. Release the catches and remove the access cover.
- ▶ Lift the HCM (3) from the retainer and disconnect the cable, keep the HCM to fit into the new control unit.
 - ▶ Disconnect and remove all cables and connectors from the control unit.
 - ▶ Remove the pressure gauge, refer to section 6.9.20.

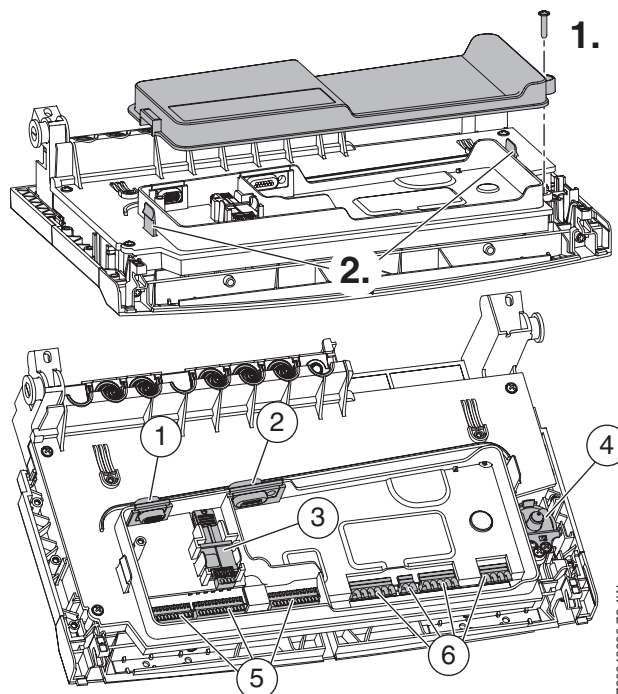
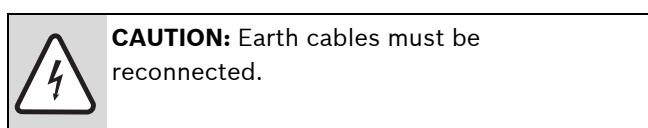


Fig. 123 Access to the cables

- 1 Low voltage cable inlet
- 2 Mains voltage cable inlet
- 3 HCM - Heating Control Module
- 4 Pressure gauge
- 5 Low voltage connectors
- 6 Mains voltage and earth connectors

REMOVING THE CONTROL UNIT

- ▶ Support the control unit and detach the control unit support strap.
- 1. Remove the plastic retaining clips at each hinge.
- 2. Release the two catches underneath the panel.
- 3. Hinge the control unit up to approximately a 45° angle.
- 4. Push inwards and upwards to disengage the control unit from the hinge supports.
- ▶ Remove the support strap from the control unit.
- ▶ Fit the new control unit in the reverse order.
- ▶ Attach support strap to the new control unit.
- ▶ Fit the HCM, removed from the old control unit, into the retainer and reconnect the cable.
- ▶ Reconnect all the cables previously disconnected under the access cover.



- ▶ Replace the access cover and secure with the screw.
- ▶ Reconnect the cables previously disconnected under the installer access cover.
- ▶ Replace the installer access cover and secure with the three screws removed earlier.

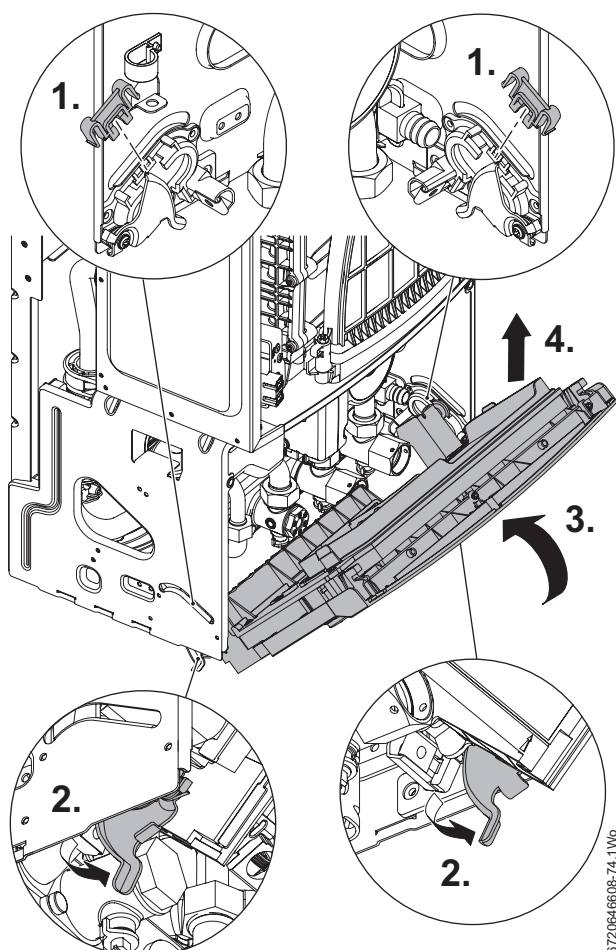


Fig. 124 Removing the controller

6.9.30 EXPANSION VESSEL

The expansion vessel can be replaced with the boiler in place if there is a side exit flue fitted and a minimum clearance of 450mm above the boiler casing. If a vertical flue is fitted then a similar clearance to one side of the flue is required.

If the clearance is not available, then the boiler will need to be removed from the mounting frame to gain access to the expansion vessel.

Alternatively a second vessel of at least the capacity of seven litres can be fitted to the return pipe from the heating system as close as possible to the boiler.

EXPANSION VESSEL REPLACEMENT (BOILER FITTED)

- ▶ Isolate the power from the boiler.
- ▶ Lower the control panel into the service position.
- ▶ Isolate the boiler from the heating system using the service valves.
- ▶ Drain the boiler.
- ▶ At the pump manifold, release the clip and disconnect the expansion vessel.
- ▶ Pull the vessel up and out over the flue system or to one side if a vertical flue is fitted.
- ▶ Fit a new "O" to the replacement vessel
- ▶ Reassemble the expansion vessel into the wall frame and slide down the runners until the end pipe is reconnected into the pump manifold.
- ▶ Secure the pipe with spring clip

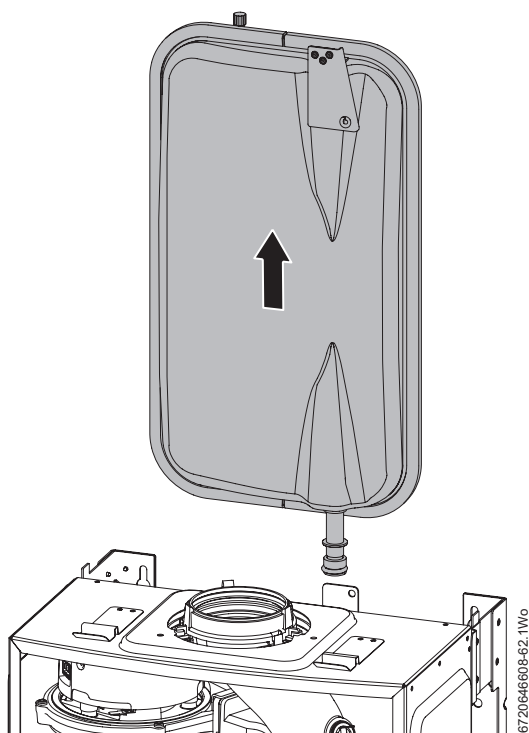


Fig. 125

EXPANSION VESSEL REPLACEMENT (REMOVE BOILER)

- ▶ Isolate the power from the boiler.
- ▶ Isolate the heating systems and gas connection using the service valves.
- ▶ Drain the boiler.

- ▶ Disconnect the electrical supply and any external controls.
 - ▶ Disconnect the flue from the boiler.
 - ▶ Undo the connections to the boiler at the service valves.
 - ▶ Lower the control panel into the service position.
 - ▶ At the pump manifold, release the clip and disconnect the expansion vessel.
 - ▶ Lift the expansion vessel up to clear the pump manifold connection.
 - ▶ Secure the expansion vessel to the wall frame by the bracket at the top.
 - ▶ Undo the two screws at the bottom of the case.
 - ▶ Release the clips at the top of the case and slide the case towards you to remove.
 - ▶ Disconnect the pipes and syphon discharge hose from the plumbing manifold.
 - ▶ Disconnect the PRV.
 - ▶ Lift the boiler off the wall frame.
1. Remove the screw retaining the expansion vessel to the wall frame and lift the expansion vessel to clear the cross beam.
 2. Pull the expansion vessel towards you and down to remove.

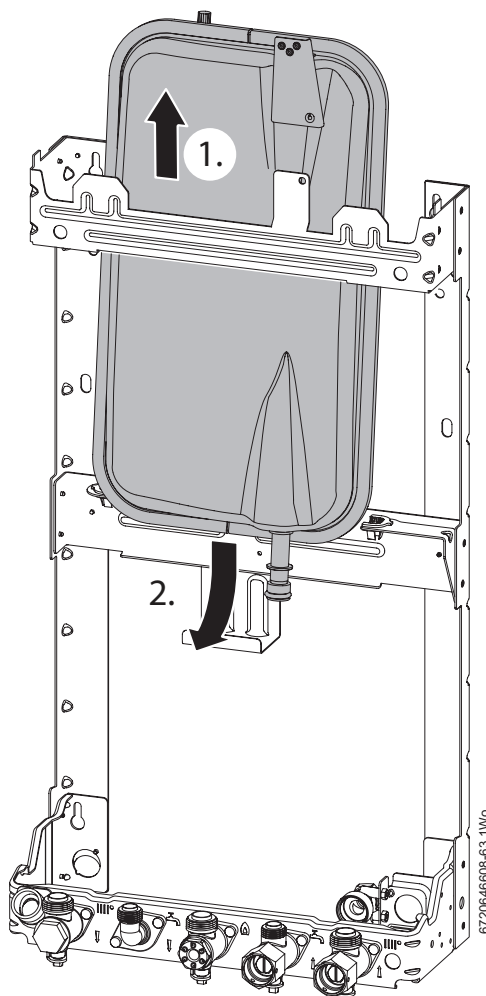
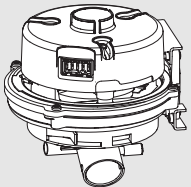
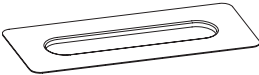
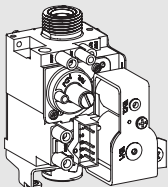
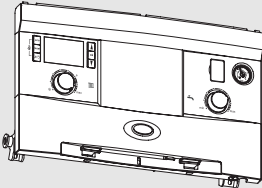
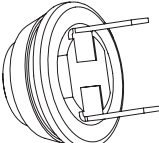
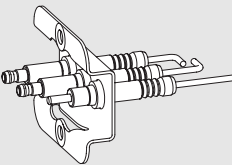

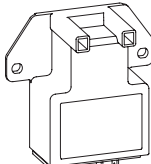
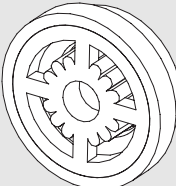
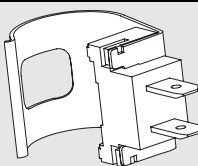
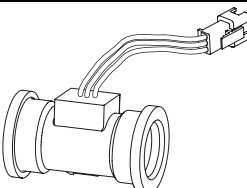
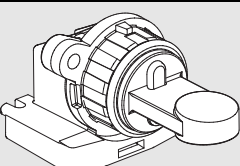
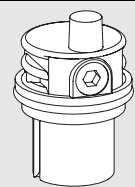
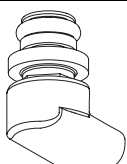
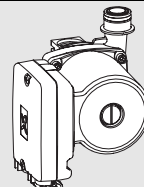
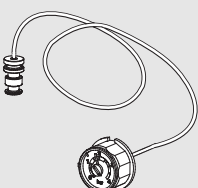
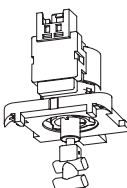
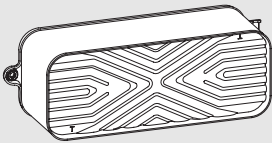
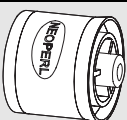
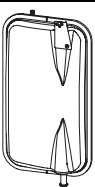
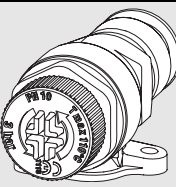
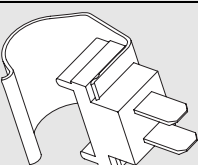
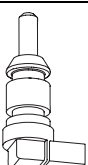
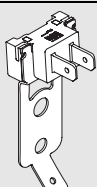


Fig. 126 Removing the expansion vessel

- ▶ Replace the expansion vessel in the reverse order.
- ▶ Follow the procedures in this manual for commissioning this product.

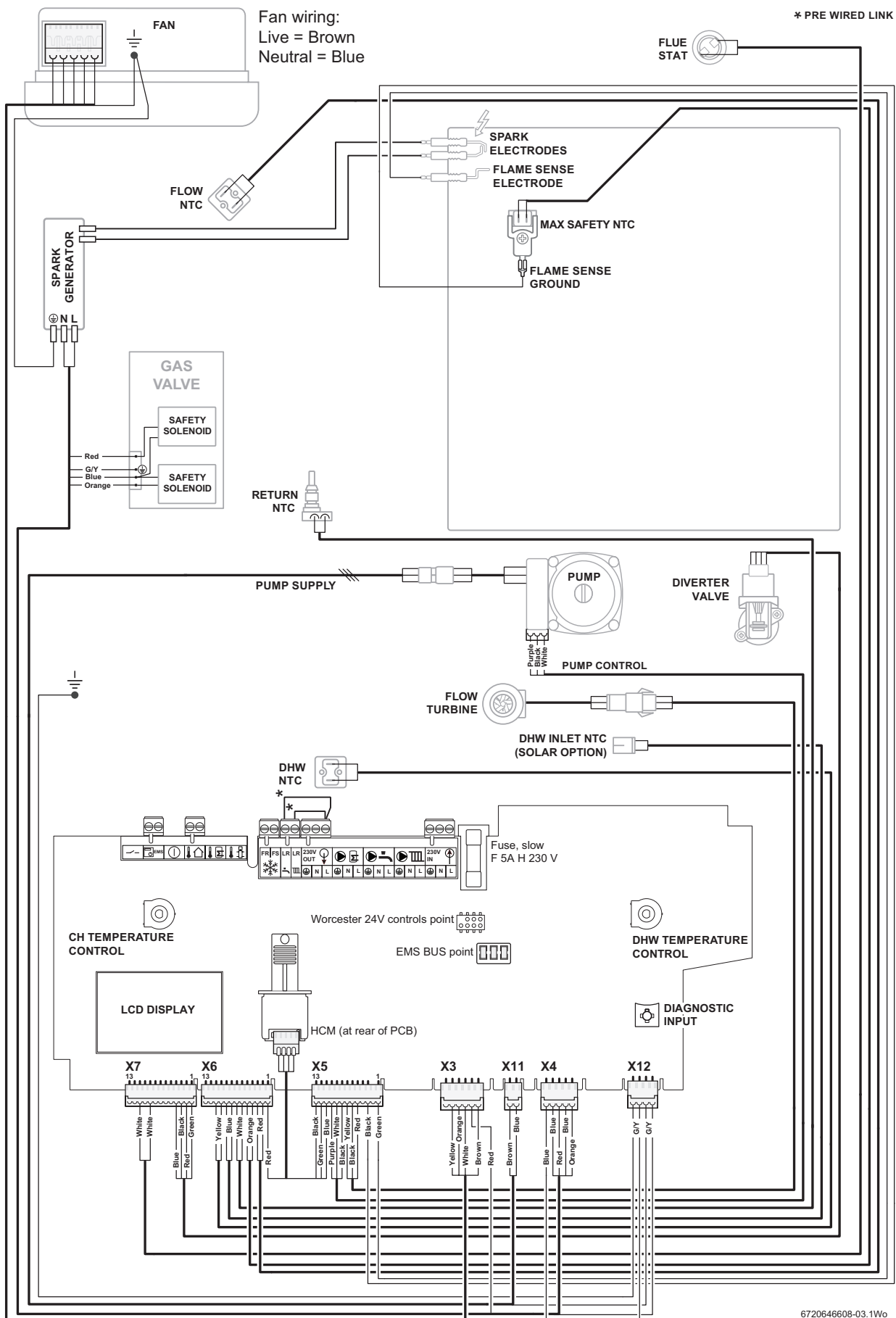
6.10 SHORT PARTS LIST

	Fan 7 746 009 09A 0		Burner 8 718 600 23B 0		Gas Valve 8 718 600 04A 0
	Control panel 8 718 686 274 0		Flue overheat thermostat (grommet type) 8 717 206 213 0		Electrodes (including gasket) 8 718 600 28A 0
	Burner seal 8 718 600 24A 0		Spark generator 8 718 641 334 0		Flow regulator 13 litre low pressure 8 718 688 409 0
	Flow NTC 8 718 688 801 0		Flow turbine 8 717 002 132 0		Diverter valve assembly 8 716 106 845 0
	Auto Air Vent T 005 000 87A 0		Pressure relief valve DHW 8 717 401 029 0		Pump assembly 8 718 685 798 0
	Pressure gauge 8 718 686 513 0		Diverter valve motor 8 718 682 839 0		Heat exchanger 8 718 682 971 0
	By pass valve 8 716 106 434 0		Expansion vessel 8 718 684 945 0		Pressure relief valve 3 bar 8 718 686 205 0
	DHW NTC 8 716 010 809 0		Return temperature sensor - (NTC) 8 718 684 323 0		Max safety sensor NTC 8 718 602 09A 0

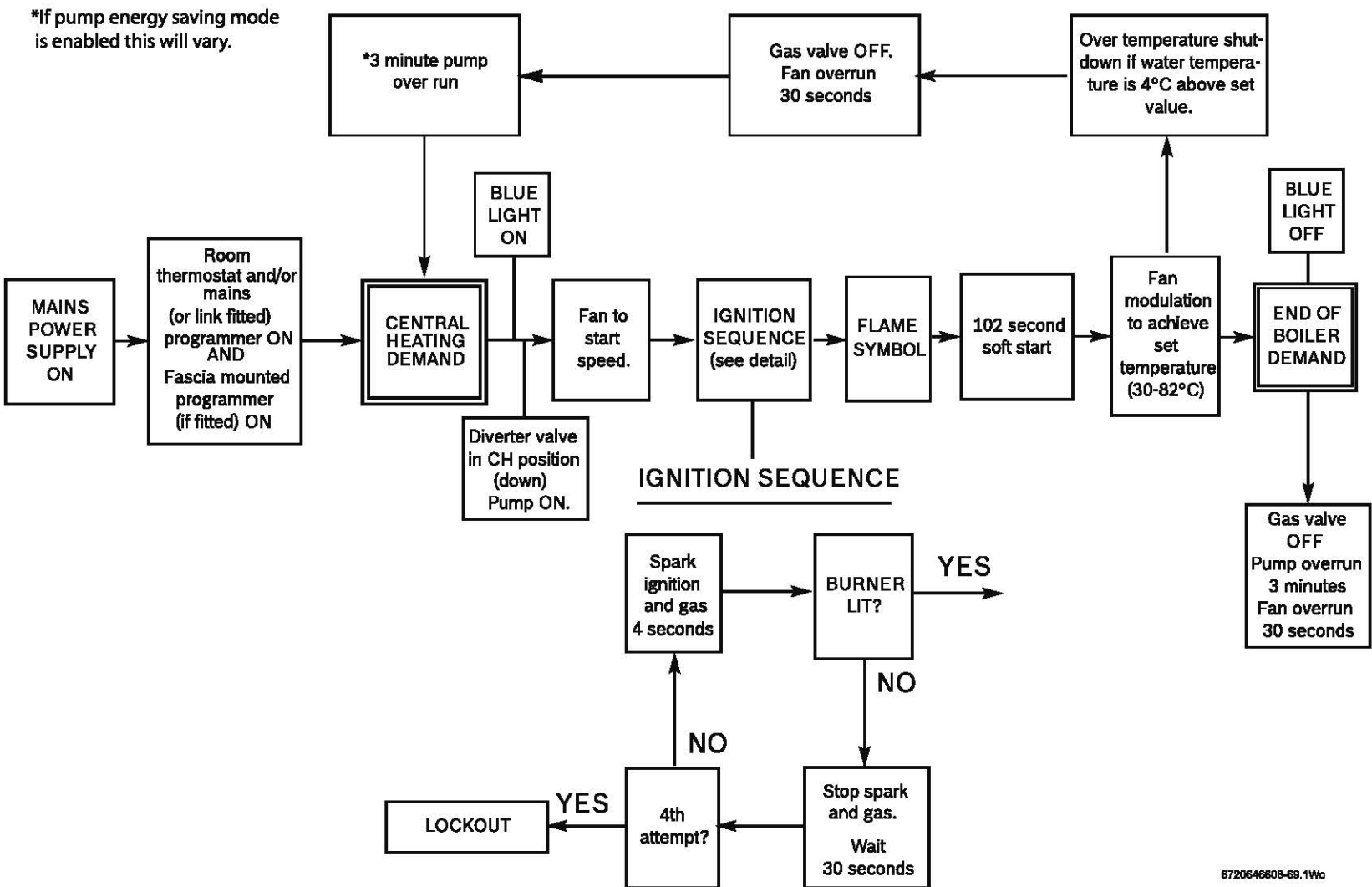
Tab. 24 Short parts list

7 FAULT FINDING AND DIAGNOSIS

7.1 INTERNAL WIRING DIAGRAM



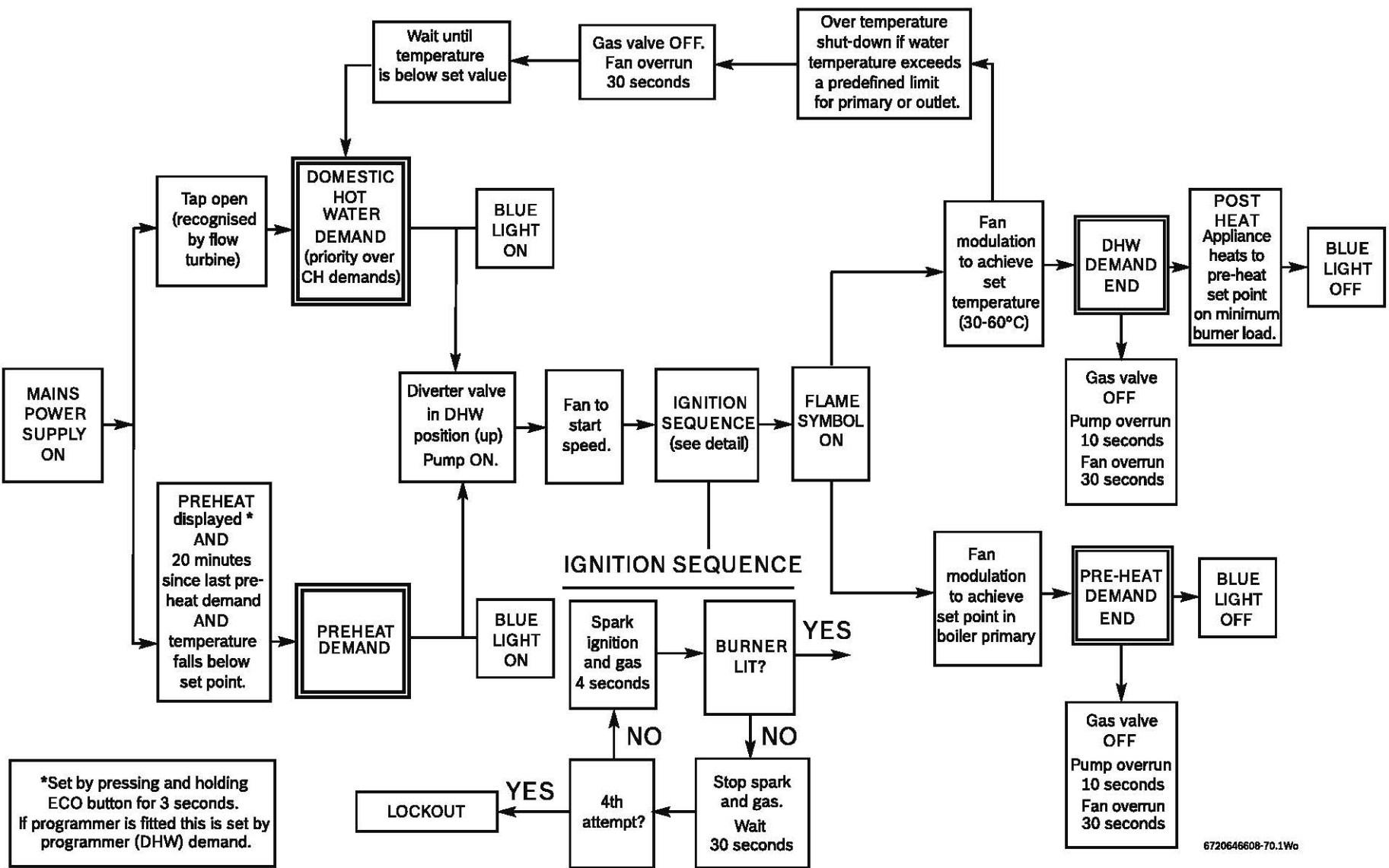
7.2 CENTRAL HEATING FUNCTION



6720646808-69.1Wo

Fig. 127 Central Heating function

7.3 PREHEAT AND DHW FUNCTION

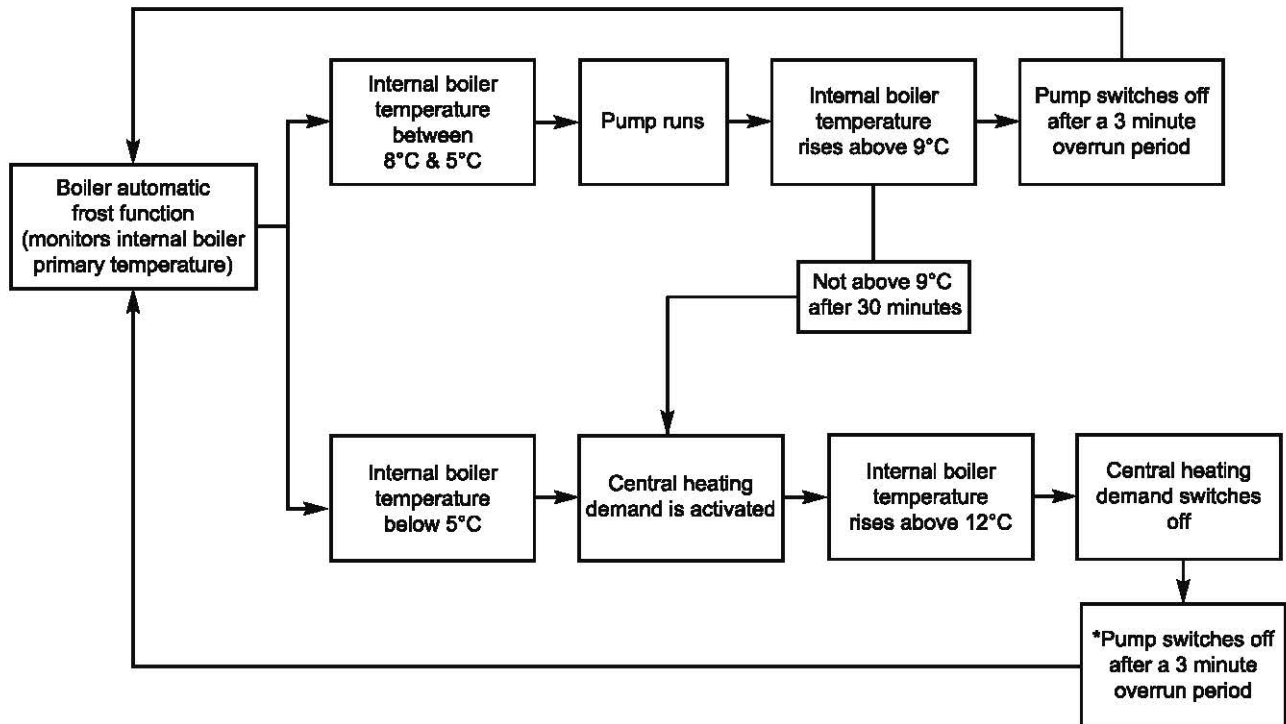


6720646608-70.1W6

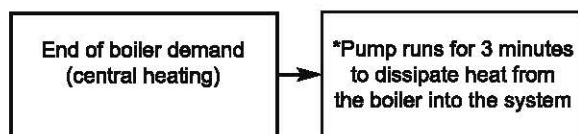
Fig. 128 PreHeat and DHW function

7.4 PROTECTION FUNCTION

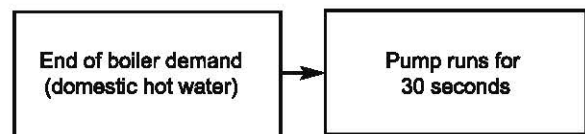
AUTOMATIC INTERNAL FROST FUNCTION



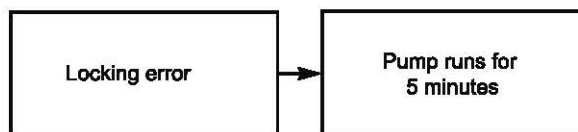
PUMP OVERRUN FUNCTION CH



PUMP OVERRUN FUNCTION DHW

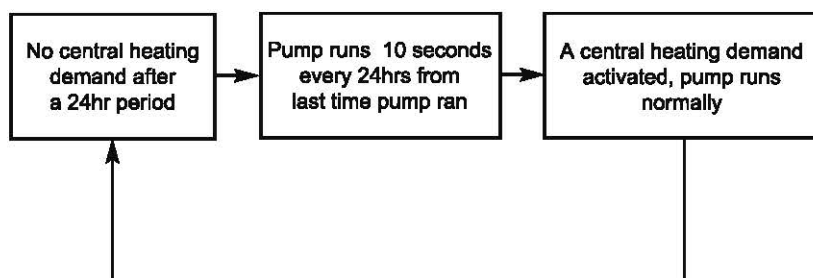


PUMP OVERRUN LOCKING ERROR



* This may vary if the Pump Energy Saving mode is enabled

PUMP ANTISEIZE FUNCTION



6720648608-71.1Wo

Fig. 129 Protection function

7.5 INFORMATION AND SERVICE MENUS





7.5.1 SELECTING THE INFORMATION MENU

The Information Menu is a "read only" menu. Information about the boiler is displayed here, some of the values are updated in real time to give the current status of the boiler.

All menus time-out after two minutes and the display returns to the normal operation display, the display backlight turns off after another 30 seconds and goes into stand-by mode.

Double up or down arrows indicate that the menu can only be scrolled up or down, an up and down arrow combination indicates position in the menu where options can be scrolled either up or down.

To enter Information menu:

1. Press the  button to enter the information menu.
 - ▶ A three figure boiler status code will be displayed along side the information menu number. Refer to table 19 for a description of the boiler status codes.
2. Use the  and  arrow buttons to scroll through the menu items.
- ▶ Press the  button again to exit the Information menu.

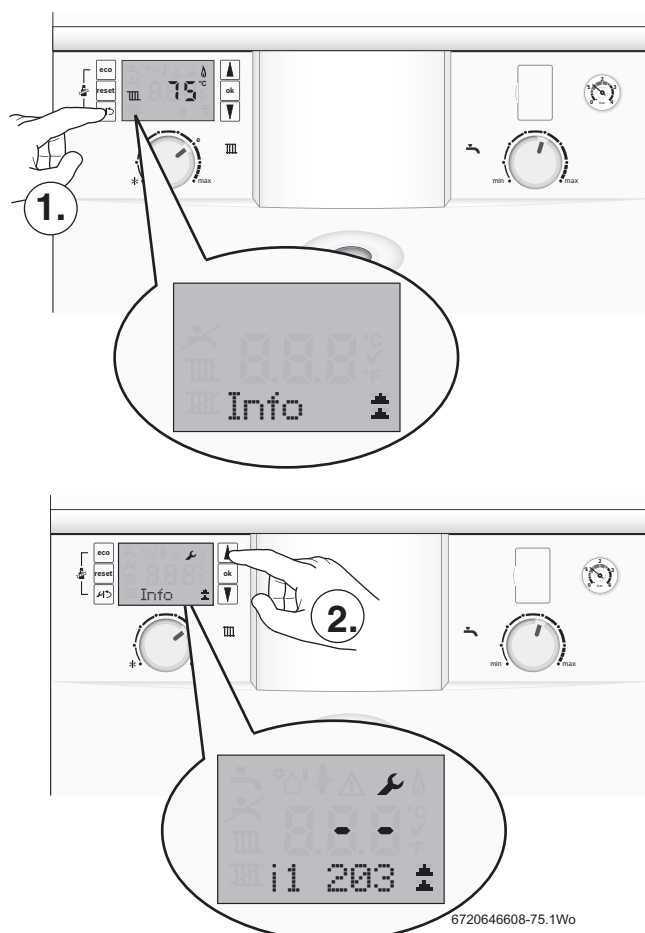


Fig. 130 Accessing the Information menu



i1	Current status	Every operation and mode of the boiler has a related boiler status code. The boiler status code is displayed on the screen as a three figure number. Refer to table 29 or error table for information on the boiler status codes.
i2	Last error	This can be viewed during normal operation. Displays the last diagnostic code with boiler status code.
i3	Maximum heating output	The maximum possible heat output is displayed in kW. The boiler may have the maximum output reduced via Menu 3.1A
i6	DHW flow rate.	The screen displays the current DHW flow rate in litres per minute to one decimal place.
i7	Supply temperature setpoint	This is the temperature set point for the primary flow from the main heat exchanger. (This will be zero during HW demand.)
i8	Ionization current	The ionization current should be equal to or greater than 35 μ Amps.
i9	Flow temperature	This is the actual temperature from the main heat exchanger displayed in real time.
i10	Maximum temperature	This is the current temperature from the "Maximum safety sensor". This sensor is mounted on the front of the heat exchanger.
i11	DHW flow temperature	The current DHW flow temperature.
i12	DHW temperature setpoint	This is the temperature selected via the Hot Water control knob on the fascia.
i14	Return temperature	The current temperature returned to the main heat exchanger.
i15	Outdoor temperature	
i16	Pump modulation	The current pump modulation is displayed as a percentage.
i17	Burner modulation	The current burner modulation is displayed as a percentage.
i18	Fan speed	The current fan speed is displayed in Hertz. The value is up-dated in real time.

Table 25 Information menu listing



i19	Time inputs	This indicates the status of the optional fascia mounted controls: 0 = CH off, DHW off 1 = CH off, DHW on 2 = CH on, DHW off 3 = CH on, DHW on
i20	Software version	Firmware version of the main control board.
i21	Software version	Firmware version of the fascia control display board
i22	Heat Control Module (HCM) number.	The last three digits of the HCM are displayed: 156 = 36kW Combi NG 157 = 36kW Combi LPG
i23	Heat Control Module (HCM) version number.	For example "4"

Table 25 Information menu listing

7.5.2 SELECTING SERVICE MENUS

1. Press and hold  and  buttons together for one second, the display will show Menu 1.

Double up or down arrows indicate that the menu can only be scrolled up or down, an up and down arrow combination indicates position in the menu where options can be scrolled either up or down.

2. Scroll up and down through the menus with the  and  buttons on the right hand side of display.

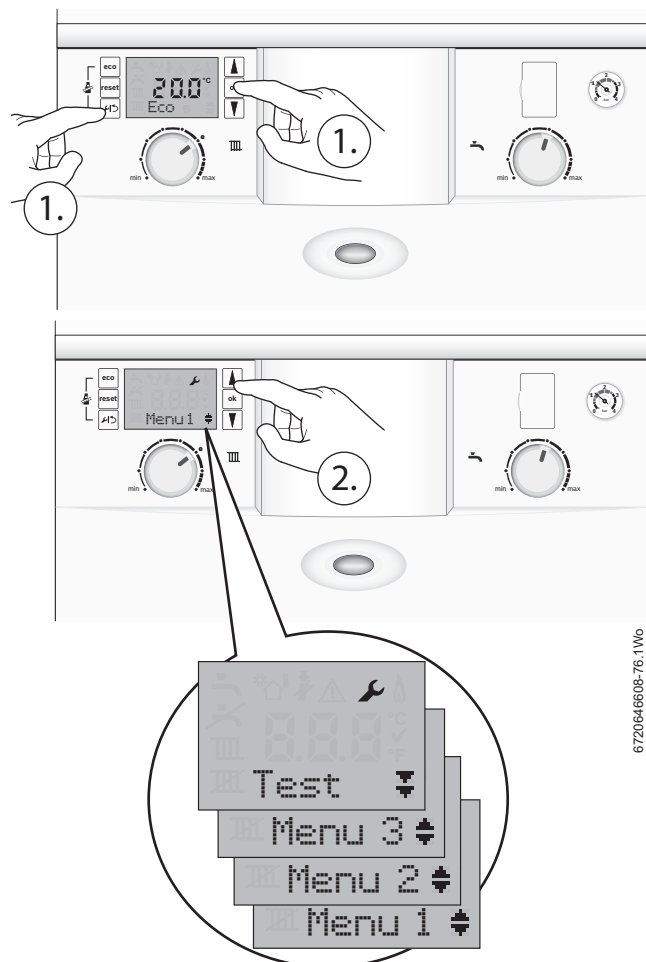


Fig. 131 Service menu selection

7.5.3 MENU 1 - SYSTEM PARAMETERS

Not applicable for Greenstar LXi.


Initially Menu 1 will be displayed, but will contain no options.




Menu 1 options will appear on the display when the Intelligent Solar Module ISM1 is installed on the Greenstar LXi System range only.


7.5.4 MENU 2 - BOILER PARAMETERS

1. Select Menu 2 via the  and  scroll buttons.
2. Press and hold the  button for one second to enter Menu 2.

This menu lists the boiler parameters, which can be adjusted in this menu.

To modify setting, select the desired menu option (refer to table 20) and press the  button, the option will flash.

Adjust the parameter using the  and  arrow buttons and press the  button to confirm.

A  will display for three seconds to confirm the update of the new value.

The same process is used for adjusting all Menus 1, 2, 3 and Test.

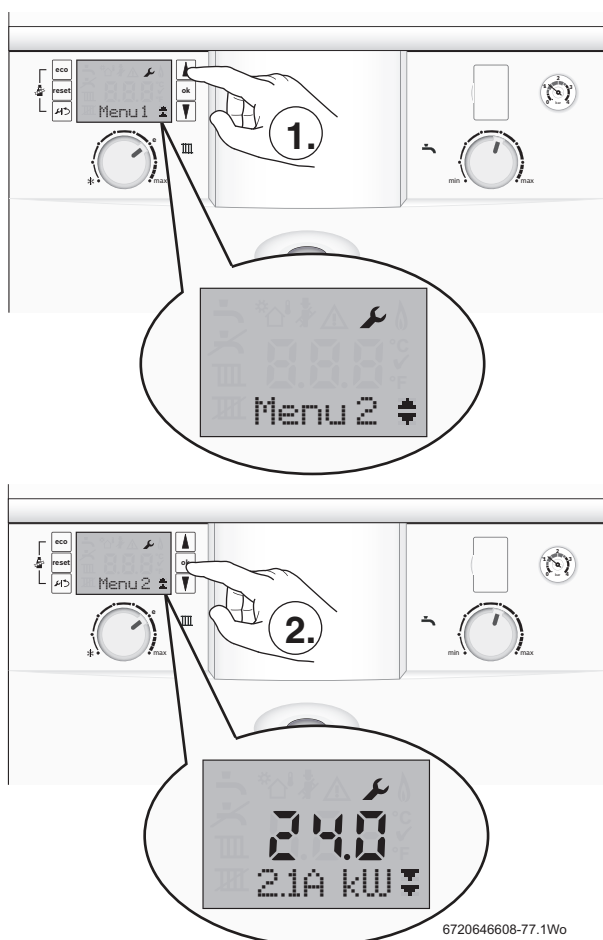


Fig. 132 Menu 2 selection

6720646608-77.1W6

2.1A	Maximum power CH	Range rate the CH of the boiler. Adjustment in kW. The maximum is 24kW.
2.1C	Pump head selection	Select the right pump map (load and modulation percentage) to suit the property. 0 = Variable speed setting 1 to 4 option pump maps
2.1H	Minimum pump speed (pump speed at maximum CH burner load)	This parameter is only visible when 2.1C is set to 0 and 2.1D is set to 1. Then the minimum pump speed can be set.
2.1J	Maximum pump speed (pump speed at maximum burner load)	This parameter is only visible when 2.1C is set to 0 and 2.1D is set to 1. Then the maximum pump speed can be set.
2.1E	Pump energy saving mode	4 = mode ON, 5 = mode OFF
2.2C	Air purge mode	This feature can be selected to purge the system and boiler of air. 0 = off, 1 = auto
2.3B	Anti fast cycle time for CH	This sets the amount of time between stop and starts of the main heat exchanger. The default is 10 minutes, the range is 0 to 60 minutes.
2.3C	Anti fast cycle flow temperature hysteresis (negative tolerance only)	This sets the temperature drop before the burner re-starts, 6°K is the default. This is used in conjunction with the “Anti fast cycle time” The range is from 2 to 15°K in 1°K steps.
2.3F	Keep Hot time	Between 0 and 30 minutes can be set for the boiler to keep the DHW heat exchanger hot to provide “instant” hot water.
2.5F	Service reminder time	Between 1 and 72 months can be set
2.7A	Operation/fault indicator (blue light) activation	0 = The blue light will only operate as a flashing fault alert. 1 = The blue light will operate as a boiler operation and fault alert. This is set to 1 by default.

Table 26 Menu 2 parameters

2.9E	Turbine signal delay	Delay time set to ignore a temporary DHW demand. Maximum delay is three seconds which can be set in ¼ second increments, e.g. 0.5 seconds is displayed as 2 or 1 second as 4.
2.9F	Pump post purge time for CH	The default pump overrun time is 3 minutes. This can be set between 3 and 30 minutes. The actual time will be affected by the Pump Energy Saving mode.

Table 26 Menu 2 parameters

7.5.5 RESET TO FACTORY SETTINGS

To reset any or all changes made in menu 2 back to the factory defaults setting:



NOTE: Menu 3

- Any changes made in Menu 3 are not reset via these actions.

- Press and hold the , and arrow button for at least five seconds.
The screen will then display code 8E with the spanner symbol.
- Press the button and “Reset” will be displayed with the tick symbol for three seconds.
After three seconds the screen will revert to the normal operation screen.

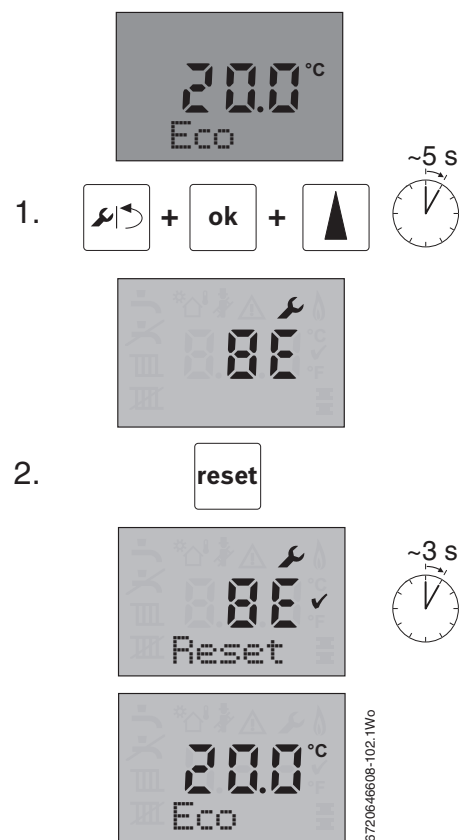


Fig. 133 Reset sequence

7.5.6 MENU 3 -
BOILER MAXIMUM & MINIMUM LIMITS

The menu shows the boiler's minimum and maximum limits. Which can be adjusted in this menu.

The boiler will revert to adjusted settings in Menu 3 following a power interruption.

Menu 3 cannot be factory re-set.

- 1. Select menu 3 via the ▲ and ▼ scroll buttons.
- 2. Press and hold the ok button for at least five seconds to enter Menu 3.

To modify setting, select desired menu option (refer to table 27) via the ▲ and ▼ arrow buttons and press the OK button, the option will flash.

Adjust the parameters using the ▲ and ▼ arrow buttons and press the OK button to confirm.

A ✓ symbol will be displayed for three seconds to confirm the update of the new value.

3.1A	Maximum heating output	The maximum heating output in kW can be set here. The output can be down rated. Note: When maximum boiler output is required for CO/CO ₂ testing, this parameter is ignored and full power is delivered for the duration of the test.
3.2B	Maximum flow temperature	This limits the upper flow temperature of the central heating knob. Which is 82°C as a maximum. This can be down rated.
3.3D	Minimum boiler power for both heating and hot water.	This sets the minimum output, for example 3kW.

Table 27 Menu 3 parameters

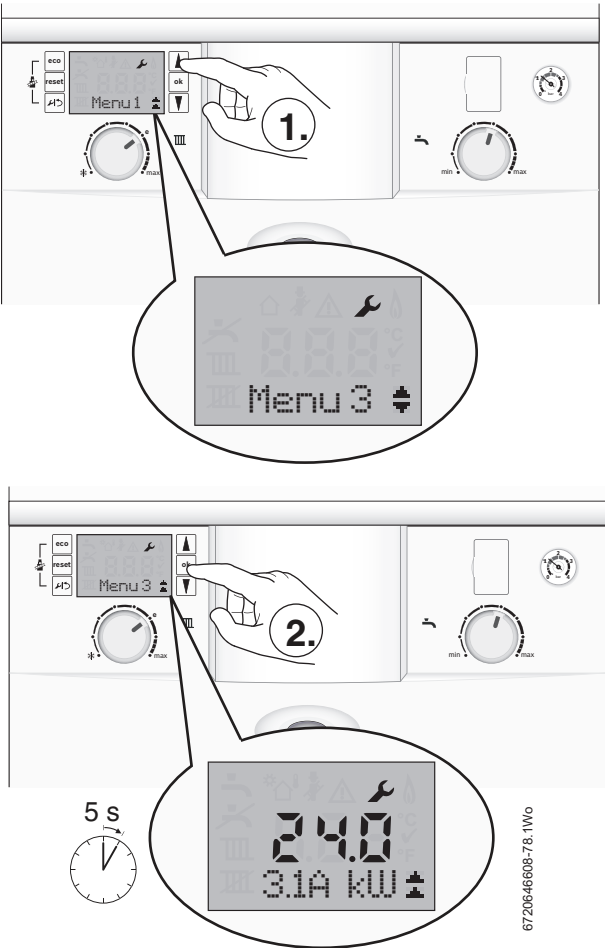





Fig. 134 Menu 3 selection

7.5.7 USING THE TEST MENU

This menu enables the testing of the functionality of components in an ON/OFF mode.

The duration of each test is limited to 30 seconds.

1. Select menu TEST via the  and  scroll buttons.
2. Press the  button for one second to enter TEST.

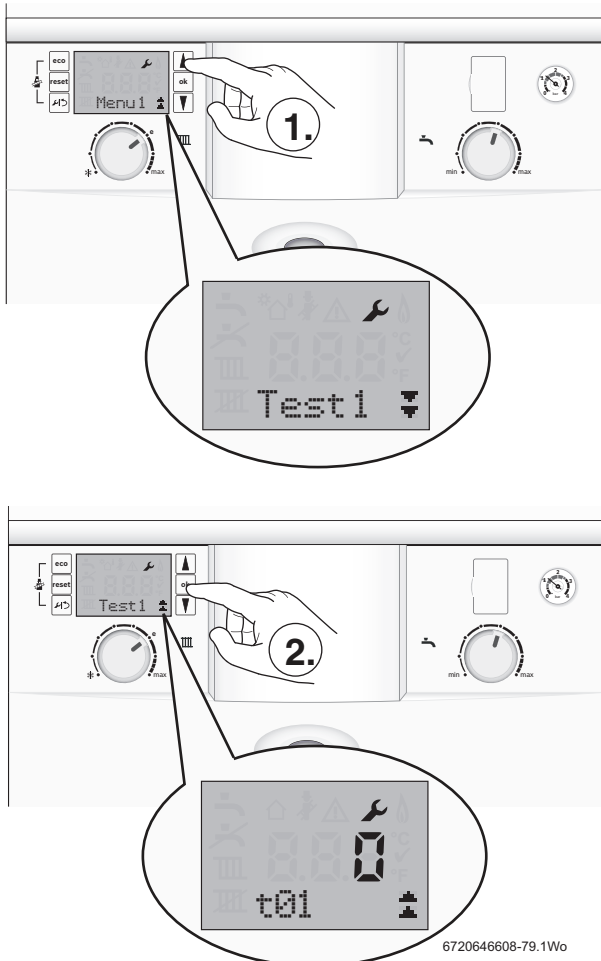




Fig. 135 Selecting test menu

SELECTING A TEST COMPONENT

Refer to table 28 and use the  and  arrow buttons to scroll through the various test options.

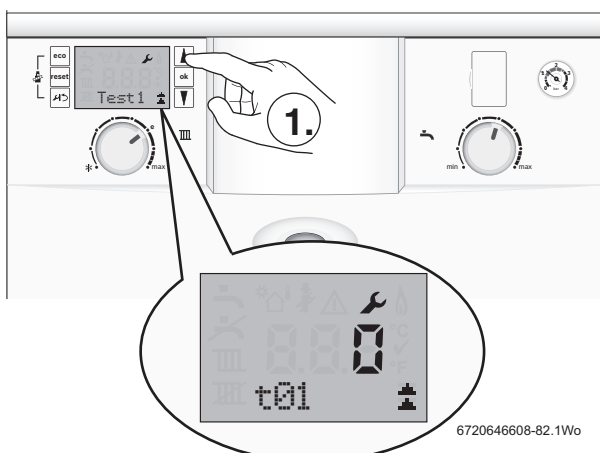






Fig. 136 Scroll through test options

TESTING THE COMPONENT

- ▶ Select a component to test.
- ▶ Press the  button, the value 0 will flash.
- ▶ Use the  arrow button to change the value to a flashing 1.
- ▶ Press  to confirm the change, the value 1 will stop flashing and a  will be displayed for 3 seconds.

The test will run for 30 to 60 seconds unless the value is changed back to 0 before that time.

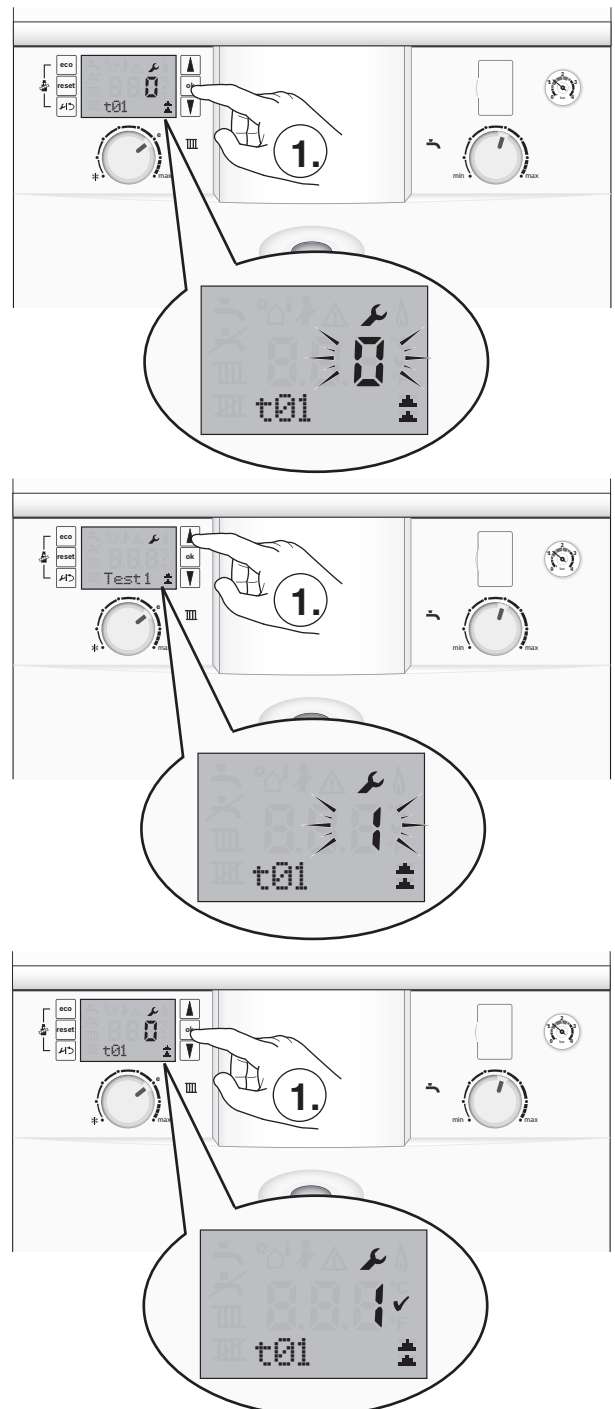


Fig. 137 Testing component

RESETTING THE TEST COMPONENT

After completing the test:

- ▶ Press the **ok** button, the value 1 will flash.
- ▶ Press the **▼** arrow button, the value will change to a flashing 0.
- ▶ Press **ok** to confirm the change, a **✓** will displayed for 3 seconds.

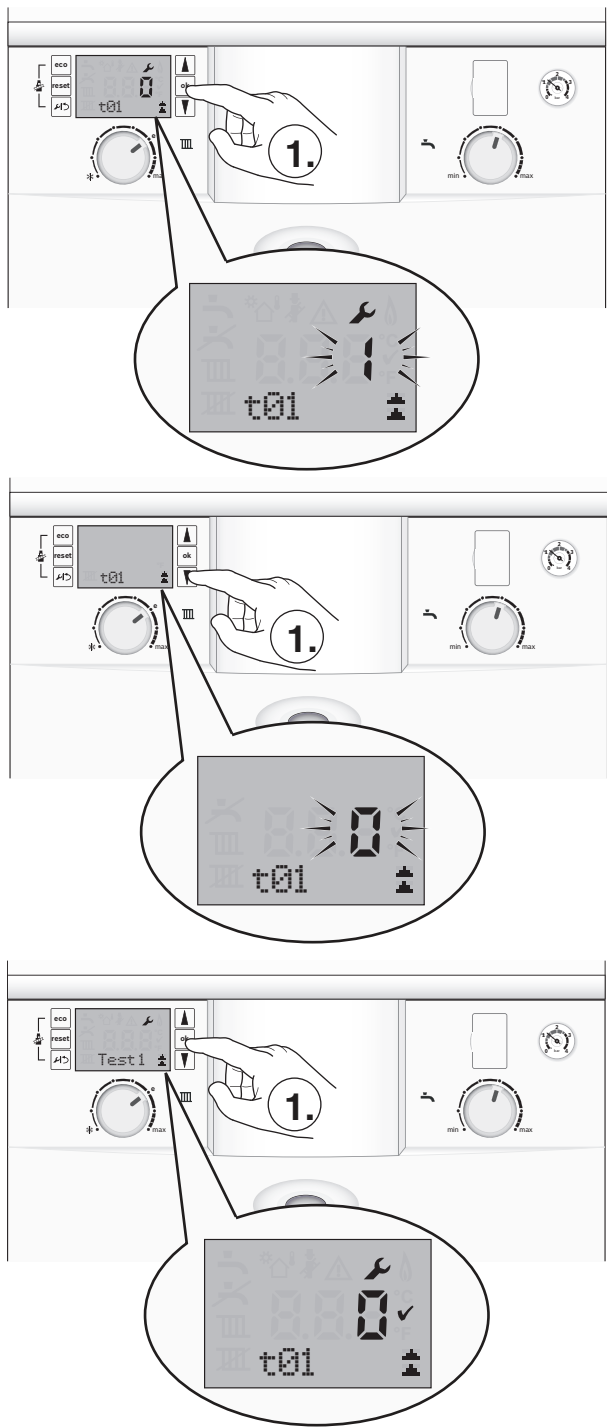


Fig. 138 Resetting test

Test		
t1	Igniter test. Checking the igniter spark.	The igniter will spark for a maximum of 30 seconds. The spark will be audible if the igniter is OK.
t2	Fan test. Checking the basic fan operation.	The fan will run for a maximum of 30 seconds. If the fan is OK then the fan will be heard running.
t3	Pump test. Checking the basic pump operation.	The pump will run for a maximum of 30 seconds. If the pump is OK then the pump will be heard running.
t4	Three way valve test. Test the operation of the diverter valve.	When 1 is selected via the test menu the diverter valve will move to the DHW position. When 0 is selected the valve will move to CH position.
t6	Ionisation oscillator test. Tests the flame detection circuit.	Ionisation circuit is switched on. An a.c. voltage of approximately 150 Volts can be measured between the ionisation probe and earth.

Table 28 Test menu

7.6 FAULT CODES

Should a fault develop with this boiler (or the system), the boiler will enter a locking or blocking condition, and fault code information will be generated as described in this section.

Locking error	The boiler display will flash a warning triangle and fault code. At the same time a (static) cause code will also be displayed. Manual intervention is required following clearance of the fault: ► Press the reset button on the boiler fascia
Blocking error	The boiler will stop operating with no fault data displayed. The fault code, in the info menu, is accessed by pressing the spanner/return button. The condition will clear automatically when the associated fault clears e.g. waiting for an area to cool. In some cases a blocking error has a defined time duration prior to changing to a locking condition.
Fault code	Alpha numeric number indicating the fault group
Cause code	Three digit number. During a blocking error (or normal operating status) it is not displayed, but accessed in the info menu via the spanner/return button. During a locking error the cause code flashes on the display.

LOCKING ERRORS

Fault codes	Cause codes	Description	Reset type	Possible cause
9U	233	HCM (Heat Control Module)	Reset button	Problem with the code plug
b7	257	Internal error		Replace control board.
C6	215	Fan problem	Reset button	Fan running too fast
	216	Fan problem	Reset button	Fan running too slow
C7	214	Fan problem	Reset button	Fan not running
	217	No airflow after a defined period of time	Reset button	Fan not running or airflow blocked
D1	240	Return sensor error	Reset button	Sensor wet or damaged (the boiler will block for 300 secs before this condition).
	241	Return sensor error	Reset button	Sensor disconnected or damaged (the boiler will block for 300 secs before this condition).
	286	Return temperature too high	Reset button	Boiler overheat
E2	222	Flow sensor short circuit	Reset button	Flow sensor shorted or damaged.
	223	Flow sensor open circuit	Reset button	Flow sensor disconnected or damaged.
E5	218	Flow temperature too high	Reset button	Primary flow sensor overheated
	332	Primary flow sensor has exceeded 110°C	Reset button	Primary flow sensor overheated
E9	219	Safety temperature too high	Reset button	The main heat exchanger has overheated. Maximum temperature 105C°
	220	Safety sensor short circuit	Reset button	Maximum temperature sensor on the main heat exchanger has failed.
	221	Safety sensor open circuit	Reset button	Maximum temperature sensor on the main heat exchanger has not been recognised.
	224	Max temperature thermostat activated	Reset button	Flue gas thermostat overheat

Table 29 Locking fault and cause code listing

Fault codes	Cause codes	Description	Reset type	Possible cause
EA	227	No flame detected after ignition	Reset button	Failure of four ignition attempts. The boiler waits 30 seconds before another attempt is made.
	229	Loss of flame signal during operation	Reset button	An established flame has been extinguished. This could be caused by a strong wind into the flue.
	234	Gas valve error	Reset button	Gas valve coil disconnected
	261	Ignition timing error	Reset button	Flame not established during the first 4 seconds ignition period.
F0	237	Internal error		Call Worcester, Bosch Group technical helpline 0844 892 3366
	238	Gas valve error	Reset button	Leaking gas valve
	239 242 - 256 258 259 262 263 267 272 279 290	Internal error		Call Worcester, Bosch Group technical helpline 0844 892 3366
	278	Sensor test failed	Reset button	On power up all safety sensors are checked. Check has failed.
	280	Recycle time error	Reset button	After the burner has stopped, the recycle mode purges gas from the heat exchanger before attempting to burn again. The software has 3.1 seconds to intervene before the boiler goes into this fault condition.
	338	Too many short burner starts without confirmation	Reset button	There is an error where the pump is not detecting water.
F7	228	Flame error	Reset button	False flame. Flame detected before burner start.
	328	Internal error		Replace control board
FA	306	False flame error	Reset button	Flame detected after burner stop
FD	231	Mains power error	Reset button	Electrical power interruption.
FA	364	Gas valve EV2 leak test failed	Reset button	Gas valve leak.
Fb	365	Gas valve EV1 leak test failed	Reset button	Gas valve leak.

Table 29 Locking fault and cause code listing

BLOCKING ERRORS

Fault code	Cause code	Description	Possible cause
A1	281	Pump stuck or running in air	Little or no water in the system.
C1	264	Airflow stopped during operation	Fan has stopped.
C4	273	Airflow present during last 24 hours	Fan has been running continuously during the past 24 hours.
D1	240	Return sensor short circuit	Wet sensor. Blocking for 300 secs before going to Locking error (see table 1).
	241	Return sensor disconnected	Blocking for 300 secs before going to Locking error (see table 1).
D4	271	Temperature difference between flow and safety sensors exceeds limit	The temperature of the primary flow and the safety sensor on the WB7 should be within 15°C of each other.
E9	224	MAX thermostat activated	Flue gas thermostat overheat.
	276	Flow temperature exceeds 95°C	Primary overheat - boiler waits for temperature to reduce; if not it becomes a Locking error.
	277	Safety temperature exceeds 95°C	Main heat exchanger safety sensor overheat - boiler will wait for the temperature to reduce; if not it becomes a Locking error 219.
	285	Return temperature exceeds 95°C	The boiler will stop the burn and wait to see if it cools down. If after 2 seconds there is an increase in temperature the boiler will go to Locking error 286.
EA	227	No ionisation detected after ignition	No flame is detected. The boiler will block during 4 attempts before going to Locking fault.
EF	349	Central heating, boil detect. Large delta T despite minimum burner.	The boiler is operating at minimum burner load and there is a greater than 18°C Flow & Return temperature difference.
No code	212	Safety or flow temperature rises too fast	Air lock or reduced water content.
	213	Temperature difference between supply and return exceeding limit	Air lock or reduced water content.
	260	No temperature rise after burner starts	Sensor disconnected or no water content.
	380	Inlet DHW temperature higher than the DHW outlet temperature.	The output is blocked until the inlet temperature drops below the output temperature.

Table 30 Blocking codes

NOTES

NOTES

Service Record

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

Service Provider

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

Always use the manufacturer's specified spare part when replacing controls.

Service 1

Date:

Engineer Name:

Company Name:

Telephone No.

Gas Safe Register No.

Comments:

Signature:

Service 2

Date:

Engineer Name:

Company Name:

Telephone No.

Gas Safe Register No.

Comments:

Signature:

Service 3

Date:

Engineer Name:

Company Name:

Telephone No.

Gas Safe Register No.

Comments:

Signature:

Service 4

Date:

Engineer Name:

Company Name:

Telephone No.

Gas Safe Register No.

Comments:

Signature:

Service 5

Date:

Engineer Name:

Company Name:

Telephone No.

Gas Safe Register No.

Comments:

Signature:

Service 6

Date:

Engineer Name:

Company Name:

Telephone No.

Operative ID No.

Comments:

Signature:

Service 7

Date:

Engineer Name:

Company Name:

Telephone No.

Gas Safe Register No.

Comments:

Signature:

Service 8

Date:

Engineer Name:

Company Name:

Telephone No.

Gas Safe Register No.

Comments:

Signature:

Service 9

Date:

Engineer Name:

Company Name:

Telephone No.

Gas Safe Register No.

Comments:

Signature:

Service 10

Date:

Engineer Name:

Company Name:

Telephone No.

Gas Safe Register No.

Comments:

Signature:

WORCESTER, BOSCH GROUP:

TECHNICAL SUPPORT: 0844 892 3366

APPOINTMENTS: 0844 892 3000

SPARES: 01905 752571

LITERATURE: 0844 892 9800

TRAINING: 01905 752526

SALES: 01905 752640

Worcester, Bosch Group
Cotswold Way, Warndon, Worcester WR4 9SW.
Tel. 0844 892 9900

Worcester, Bosch Group is a brand name of Bosch Thermotechnology Ltd.

worcester-bosch.co.uk

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