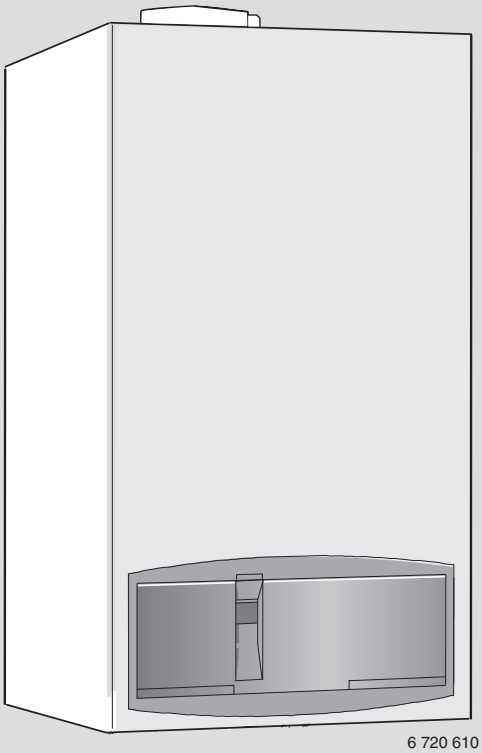
Installation and Servicing Instructions

GREENSTAR 29 HE Conventional

Wall mounted condensing boiler



6 720 610 577-00.10

HE Conventional

GC-Number Natural Gas: 41 311 56
GC-Number LPG: 41 311 57

benchmark

6 720 611 137 GB (03.02) OSW

WORCESTER
Bosch Group

Contents

Safety precautions

If you smell gas
- Turn off gas service cock at the meter.
- Open windows and doors.
- Do not operate any electrical switches.
- Extinguish any naked flames.
- Telephone your gas company.

If you smell fumes from the appliance
- Switch off appliance (see page 24).
- Open windows and doors.

Fitting and modifications
- Fitting of the appliance or any controls to the appliance may only be carried out by a competent engineer in accordance wth the Gas Safety (Installation and Use) Regulations.
- Flue systems must not be modified in any ways other than as described in the fitting instructions.
- This appliance is supplied for fitting to fully pumped, sealed and open vent systems only.

Maintenance
- **The user is recommended:** to have the system regularly serviced in order to ensure that it functions reliably and safely.
- Use only original spare parts!

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

Health and safety
- This appliance contains no asbestos products.
- There is no potential hazard due to the appliance being electrically unsafe.
- There are no substances used in the construction that are a potential hazard in relation to the COSHH Regulations (Control of Substances Hazardous to Health Regulations).

Combustion air/Ambient atmosphere
- The combustion air/ambient atmosphere should be kept free of chemically aggressive substances (e.g. halogenated hydrocarbons which contain chlorine or fluorine compounds). This will prevent corrosion.

Instructions to the customer
- Explain to the customer how the appliance works and how to operate it.
- Advise the user that he/she must not make any modifications to the appliance or carry out any repairs on it.
- These instructions are to be left with the user or at the Gas meter.
- Important: These instructions apply in the UK only.

Symbols

Safety instructions in this document are identified by a warning-triangle symbol and are printed on a grey background.

Notes containing important information are identified by the symbol shown on the left. They are bordered by horizontal lines above and below the text.

1 Details of the appliance

1.1 EC Declaration of Conformity

This appliance is in accordance with the applicable requirements of the Gas Appliance Directive, Boiler Efficiency Directive, Electromagnetic Compatibility Directive and the Low Voltage Directive.

PIN	CE-0085 BL 0507
Category UK	$II_{2H\ 3P}$
Appliance Type	C_{13}, C_{33}

Table 1

1.2 Standard package

- Gas condensing boiler
- Wall mounting frame
- Clamp for securing flue duct kit
- Fixings (screws etc.)
- Set of documentation for appliance
- Pre-plumbing manifold
- Condensate drain pipe.

1.3 Description of appliance

- Wall-mounted appliance, siting not dependent on room size
- Natural gas models are low-emission appliances
- Multifunction display
- Bosch Heatronic control system
- Automatic ignition
- Modulating control
- Full safety systems incorporating Bosch Heatronic with flame ionisation monitoring, solenoid valves and temperature sensors
- Concentric flue/air duct with testing point for CO_2/CO
- Regulated speed fan
- Pre-mix burner
- Temperature control for boiler flow
- Safety temperature limiter in 24 V electrical circuit
- Flue gas temperature limiter (105 °C)
- Condensate Trap
- Connecting possibility for 3 port or 2 x 2 port motorised valve systems
- Suitable for fully pumped sealed and open vent systems.

1.4 Accessories

- Standard horizontal flue kit at 100 mm outside diameter for flues upto 4 m in length.
- Flue duct kits for horizontal (125 mm outside diameter) for flue lengths upto 13 m and vertical flue systems for flue lengths upto 15 m. Fitting instructions are sent with these kits.
- Security kit.

1.5 Casing dimensions

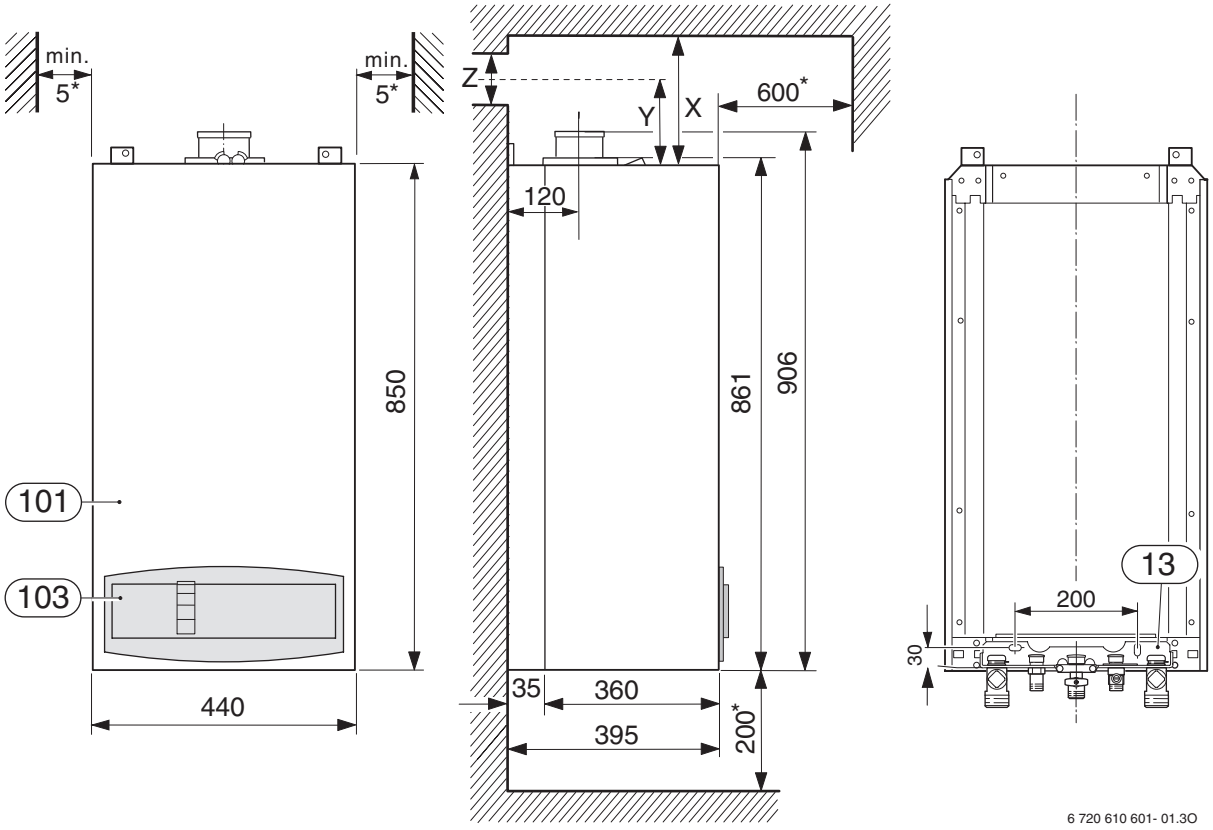


Fig. 1

13 Wall mounting frame and Manifold assembly
101 Outer case
103 Facia cover
X Standard Concentric Horizontal Flue System: (Ø 100 mm) min. 310 mm
Alternative Concentric Flue System: (Ø 125 mm) min. 250 mm
Y Standard Concentric Horizontal Flue System: 158 mm
Alternative Concentric Flue System: 121 mm
Z Standard Concentric Horizontal Flue System: 105 mm
Alternative Concentric Flue System: 130 mm
* For servicing the appliance

1.6 Layout of appliance

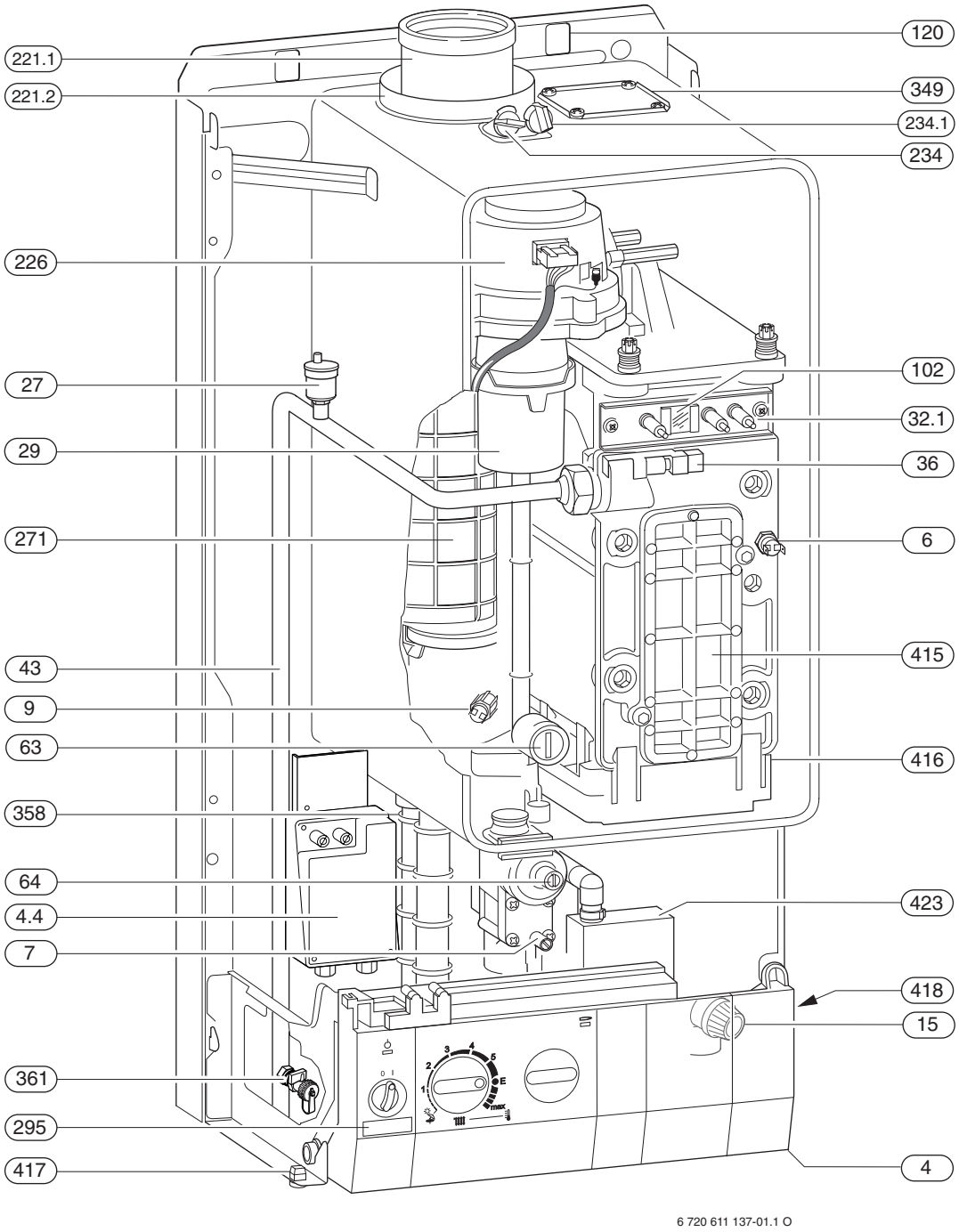


Fig. 2

4 Heatronic control
4.4 Y-S-module
6 Heat exchanger safety temperature limiter
7 Testing point for gas supply pressure
9 Flue gas temperature limiter
15 Safety valve
27 Automatic air vent
29 Air gas Mixer unit
32.1 Electrode assembly
36 Temperature sensor in boiler flow
43 Flow pipe
63 Adjustable gas flow restrictor
64 Adjusting screw for min. gas flow volume
102 Inspection window
120 Fixing points
221.1 Flue duct
221.2 Combustion air intake
226 Fan assembly
295 Appliance type sticker
234 Testing point for combustion products
234.1 Testing point for combustion air
271 Flue duct
349 Cover plate for twin flue duct connection
358 Condensate trap
361 Drain valve
415 Cover plate for cleaning access
416 Condensate collector
417 Clip for fixing outer case
418 Data plate
423 Siphon

1.7 Function

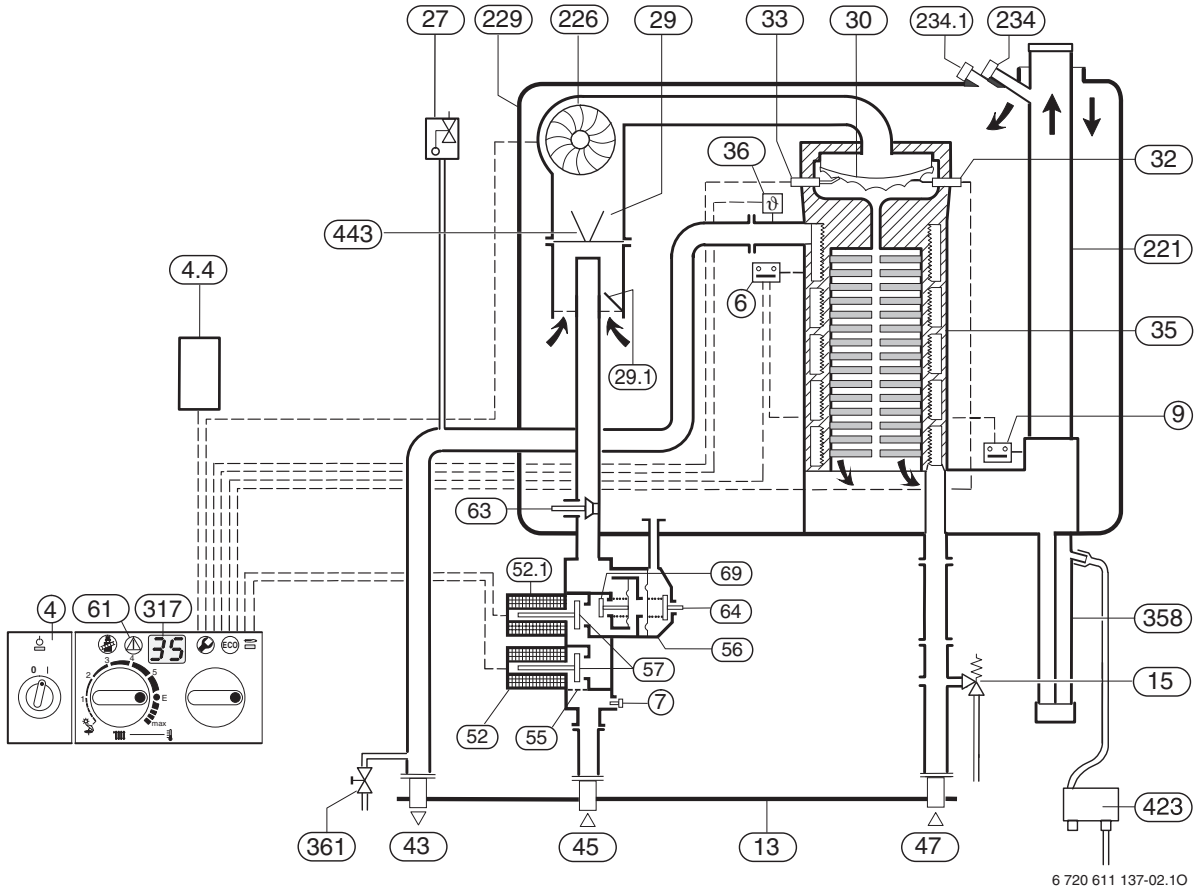


Fig. 3

4 Bosch Heatronic control
4.4 Y-S-module
6 Temperature limiter, heat exchanger
7 Testing point for gas supply pressure
9 Flue gas temperature limiter
13 Manifold
15 Safety valve
27 Automatic air vent
29 Mixer unit
29.1 Bi-metallic thermostat for combustion air compensation
30 Burner
32 Flame sensing electrode
33 Igniter electrode
35 Heat exchanger with cooled combustion chamber
36 Temperature sensor in boiler flow
43 Boiler flow
45 Gas inlet
47 Return
52 Solenoid valve 1
52.1 Solenoid valve 2
55 Filter
56 Gas valve CE 427
57 Main valve disc
61 Reset button
63 Adjustable gas flow restrictor
64 Adjusting screw for min. gas inlet flow volume
69 Control valve
84 Motor (optional extra)
88 3-way valve (optional extra)
221 Flue duct
226 Fan
229 Inner casing
234 Testing point for flue gas
234.1 Testing point for combustion air
317 Display
358 Condensate trap
361 Drain valve
423 Siphon
443 Diaphragm

1.8 Electrical wiring diagram

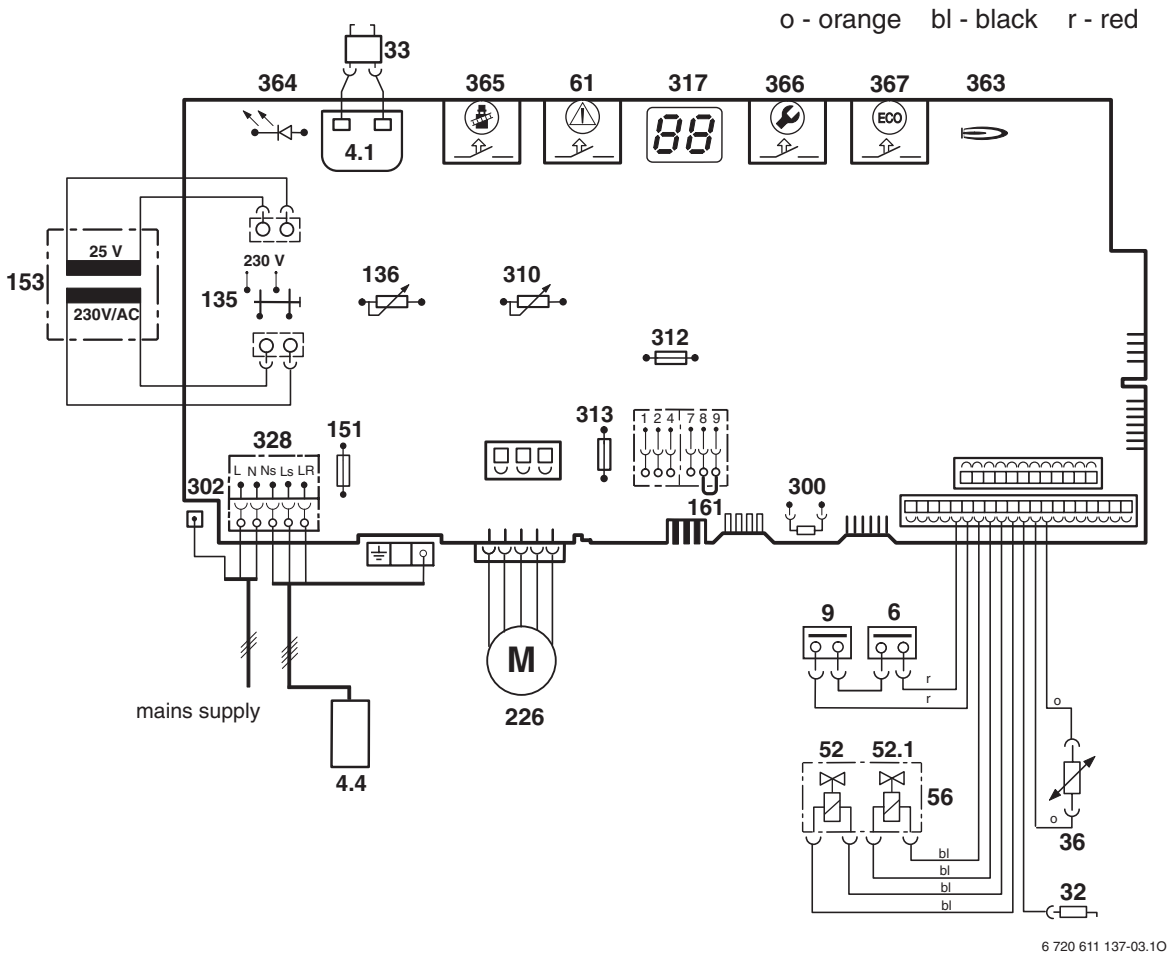


Fig. 4

4.1 Ignition transformer
4.4 Y-S-module
6 Temperature limiter, heat exchanger
9 Flue gas temperature limiter
32 Flame sensing electrode
33 Ignition electrode
36 Temperature sensor in primary flow
52 Solenoid valve 1
52.1 Solenoid valve 2
56 Gas valve CE 427
61 Reset button
135 Master switch
136 Temperature control for boiler flow
151 Fuse, slow 2.5 A, AC 230 V
153 Transformer
161 Link
226 Fan
300 Code plug
302 Earth connection
310 Function control (Service only)
312 Fuse, slow T 1,6 A
313 Fuse, slow T 0,5 A
317 Digital display
328 Terminal block for AC 230 V Mains supply
363 Indicator lamp for burner
364 Indicator lamp for power supply
365 “Chimney sweep” button
366 Service button
367 No function

1.9 Technical data

	Units	Natural gas	Propane
Max. rated heat output net 40/30°C central heating Max. rated heat output net 50/30°C central heating Max. rated heat output net 80/60°C central heating	kW kW kW	29.3 29.0 27.4	29.3 29.0 27.4
Max. rated heat input net	kW	27.7	27.7
Min. rated heat output net 40/30°C Min. rated heat output net 50/30°C Min. rated heat output net 80/60°C	kW kW kW	8.4 8.3 7.4	11.6 11.4 10.5
Min. rated heat input net	kW	7.6	10.8
Maximum gas flow rate - After 10 minutes from lighting			
Natural Gas G20 (CVnet 34.02 MJ/m^3)	m^3/h	2.9	-
LPG G31 (CVnet 88 MJ/m^3)	kg/h	-	2.1
Gas supply pressure			
Natural Gas G20 (CVnet 34.02 MJ/m^3)	mbar	20	-
LPG G31 (CVnet 88 MJ/m^3)	mbar	-	37
Flue			
Flue gas temp. 80/60°C, rated/min. load	°C	67/55	67/55
Flue gas temp. 40/30°C, rated/min. load	°C	43/32	43/32
Residual delivery pressure (inc. pressure drop in air intake duct)	Pa	80	80
CO_2 level at max. rated heat output CO_2 level at min. rated heat output	% %	9.2 8.8	10.8 10.5
NO_x-class		5	5
SEDBUK figure, Band A [1)]	%	90.7	90.7
Condensate			
Max. condensation rate ($t_R = 30°C$)	l/h	2.3	2.3
pH-value, approx.		4.8	4.8
General Data			
Electrical power supply voltage	AC ... V	230	230
Frequency	Hz	50	50
Max. power consumption	W	43	43
Noise output level	dB(A)	36	36
Appliance protection rating	IP	X4D	X4D
Max. flow temperature	°C	nom. 90	nom. 90
Minimum static head	m	1.0	1.0
Maximum static head	m	30.0	30.0
Permissible ambient temperatures	°C	0 - 50	0 - 50
Nominal capacity of appliance	l	3.75	3.75
Weight (excluding packing)	kg	38	38

Table 2

1) The value is used in the UK Government Standard Assessment Procedure (SAP) for the energy rating of dwellings. The test data from which it has been calculated have been certified by DVGW.

Condensate analysis, mg/l

Ammonium	1.2	Nickel	0.15
Lead	≤ 0.01	Mercury	≤ 0.0001
Cadmium	≤ 0.001	Sulphate	1
Chromium	≤ 0.005	Zinc	≤ 0.015
Halogenated hydrocarbons	≤ 0.002	Tin	≤ 0.01
Hydrocarbons	0.015	Vanadium	≤ 0.001
Copper	0.028	pH-value	4.8

Table 3

Flue system

HORIZONTAL 100 mm – Standard			
Overall Diameter of Duct	mm	100	Max. 4 m
Flue Terminal / Duct Assembly Length	mm	600	
Extension Duct Length	mm	1000	

Table 4

VERTICAL 100 mm – Standard			
Overall Diameter of Duct	mm	100	Max. 6.4 m (incl. flue assembly)
Flue Terminal / Duct Assembly	mm	600	
Extension Duct Assembly	mm	1000	

Table 5

ALTERNATIVE HORIZONTAL 125 mm FLUE SYSTEM			
Overall Diameter of Duct	mm	125	Max. 13 m (including turret)
Flue Terminal / Duct Assembly	mm	1030	
Extension Duct Length	mm	1000	

Table 6

VERTICAL 125 mm FLUE SYSTEM			
Overall Diameter of Duct	mm	125	Max. 15 m
Flue Terminal / Duct Assembly	mm	1360	
Extension Duct Length	mm	1000	

Table 7

Elbow - 90 ° Equivalent length 2 m
Bend - 45 ° Equivalent length 1m

Gas supply

Total length of gas supply pipe (metres)			**Pipe diameter (mm)**
3	6	9	
Gas discharge rate (m^3/h)			
8.7	5.8	4.6	22
18.0	12.0	9.4	28

Table 8

2 Installation regulations

Gas Safety (Installation & Use) Regulations: All gas appliances must be installed by a competent person. Failure to install correctly could lead to prosecution. The manufacturers notes must not be taken, in any way, as overriding statutory obligations.
The appliance must be installed in accordance with the current IEE Wiring Regulations, local Building Regulations, Building Standards (Scotland) (Consolidation), bye-laws of the local Water Company, Health and Safety Document 635 (Electricity at Work Regulations 1989) and any other local requirements.
Product Liability regulations indicate that, in certain circumstances, the installer can be held responsible, not only for mistakes on his part but also for damage resulting from the use of faulty materials. We advise the installer to avoid any risk by using only quality approved branded fittings.
The relevant British Standards should be followed i.e.

- BS 6798: Specification for the installation of gas fired hot water boilers of rated input not exceeding 60kW
- BS 5449: Central Heating for Domestic Premises
- BS 5546: Installation of gas hot water supplies for domestic purposes
- BS 5440:1: Flues and ventilation for gas appliances of rated input not exceeding 70 kW (net): Flues
- BS 5440:2: Flues and ventilation for gas appliances of rated input not exceeding 70 kW (net): Air Supply
- BS 6891: Installation of low pressure gas pipework installations up to 28mm (R1).
- BS 6700: Domestic water supply (when relevant)
- BS 7671: Requirements for Electrical Installation.

These instructions must be followed.

3 Installation

- Always turn off the gas cock before carrying out any work on components which carry gas.

Fixing of the appliance, gas and flue connections, commissioning of the system and electrical connections may only be carried out by competent persons authorised by CORGI.

3.1 Important remarks

- Appliance is prepared to be installed in fully pumped sealed and open vent central heating systems.
- To avoid gas formation in the system, galvanised radiators or pipes must not be used.
- If a room thermostat is used: do not fit a thermostatic radiator valve on the radiator in the primary room.
- Add a suitable anti-freeze fluid compatible with aluminium to the water in the central heating system. Suitable products are available from Betz-Dearborn Tel.: 0151 4209563 and Fernox Tel.: 01799 550811. All system cleaners must be removed before adding any inhibitor.
- In our experience, the addition of sealing agents to the water in the central heating system can cause problems (deposits in the heat exchanger). For that reason we advise against their use.

3.2 System

The system must comply with the requirements of BS 6798 and BS 5449.

General
The appliance is only suitable for connection to indirect fully pumped sealed and open-vent systems. The minimum static head is 1.0 m and the maximum is 30m. The controls must be wired to ensure that the boiler does not cycle when the electronically controlled zone valves are closed.
Note 1: An automatic by-pass is required if the controls i.e. 2-port valves, can result in the closure of the CH and DHW circuits when the boiler is hot. If mechanically operated thermostatically controlled valves are fitted on all radiators then an automatic by-pass located at least 2m from the boiler is required.
Note 2: A by-pass is generally unnecessary on a system using a 3-way diverter valve as one port will be open to flow at all times. However if TRV's are used throughout then an automatic by-pass may be necessary. Refer to the current Building Regulations or the Good Practise Guide 302 which lists all the above requirements.
Plastic pipes must not be directly connected to the appliance. A copper to plastic transition piece should be positioned a minimum of 600mm from the appliance. Some plastice pipes are permeable to oxygen and must be avoided. a pipe with a polymer barrier should be used.

Sealed System
A sealed system must include an expansion vessel, pressure gauge and pressure relief valve set operate at 3bar - these are available as proprietary kits. The expansion vessel and fittings must be connected at the neutral point of the system on the entry to the pump. A pump and diverter valves are also required as appropriate to the system. Refer to Fig. 5, 6, 7. The sealed system must be filled through a WRAS approved filling kit. Refer to Fig. 8. For system wiring please refer to Fig. 12 and the controls manufacturers details.
The appliance must not be operated without the system being full of water and correcetly pressurised.
All connections in the system must withstand a pressure of up to 3 bar. The system and appliance must be properly vented. Repeated venting loses water from the system and usually indicates that there is a leak. A drain cock to BS 2879 must be fitted to the lowest point of the system.
No galvanised radiators or pipes must be used.
If any system water treatment is required then only products suitable for use with aluminium shall be used i.e. Fernox Super Concentrate or Sentinel X100, in accordance with the manufacturers instructions. The use of any other substances will invalidate the guarantee. The pH value of the system water must be less than 8 or the appliance guarantee will be invalidated.
Important: Check that no dirt is left in the water pipework as this could damage the appliance. Thoroughly flush the heating system and the mains water supply before fitting the appliance to the wall in accordance with the recommendations of BS 7593.

Domestic Hot Water
The appliance is NOT suitable for direct water supply.
Do not connect to a direct cylinder.
The appliance can be connected to any indirect cylinder i.e unvented or thermal store, and all the benefits of a "dry loft" can be realised. For more information contact Worcester Heat Systems Helpline 08705 266241.
Note: Indirect coil type or a direct cylinders with an immersion calorifier that is suitable for a pressure of 0.35 bar above the setting of the pressure relief valve may be used. **Single feed indirect cylinders are NOT suitable for sealed systems**. Any connection to the mains water supply must conform to the relevant Building and Water Regulations and be approved by the local water company.

Typical system layout if using Honeywell 'Y' plan

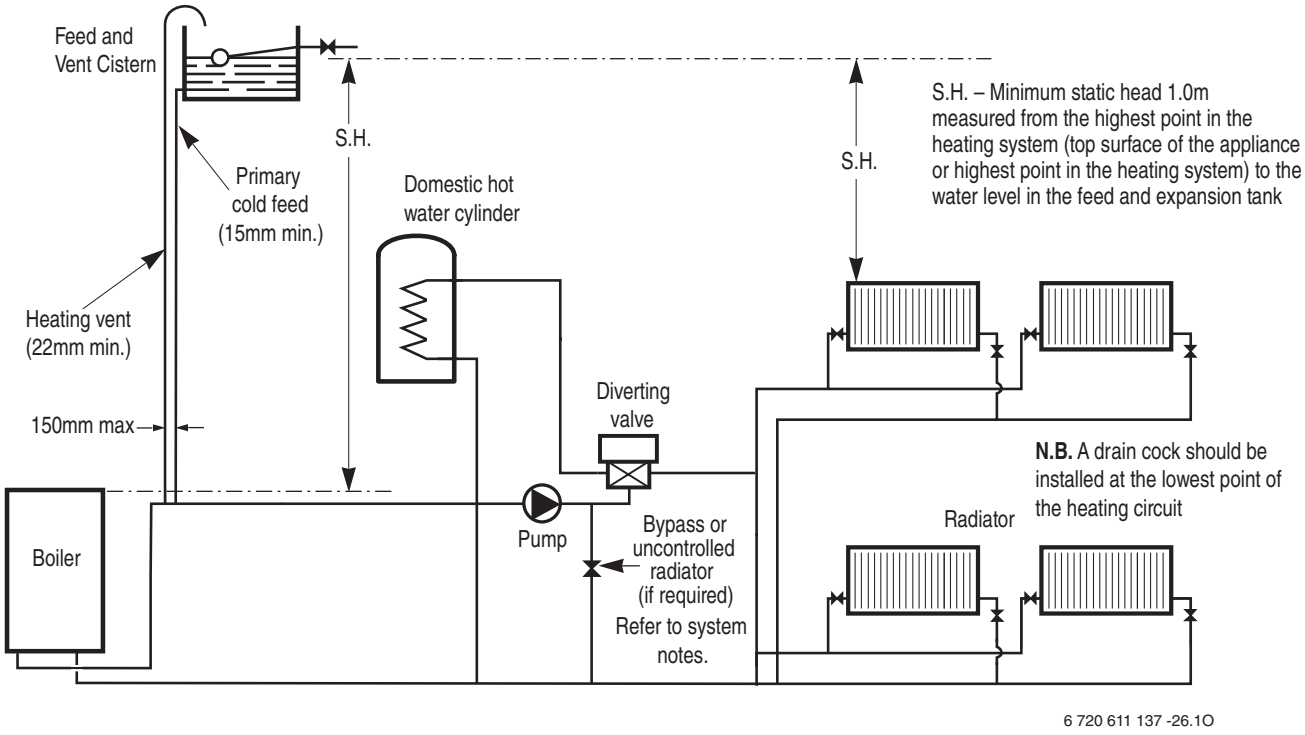


Fig. 5

Typical system layout if using Honeywell 'S' plan

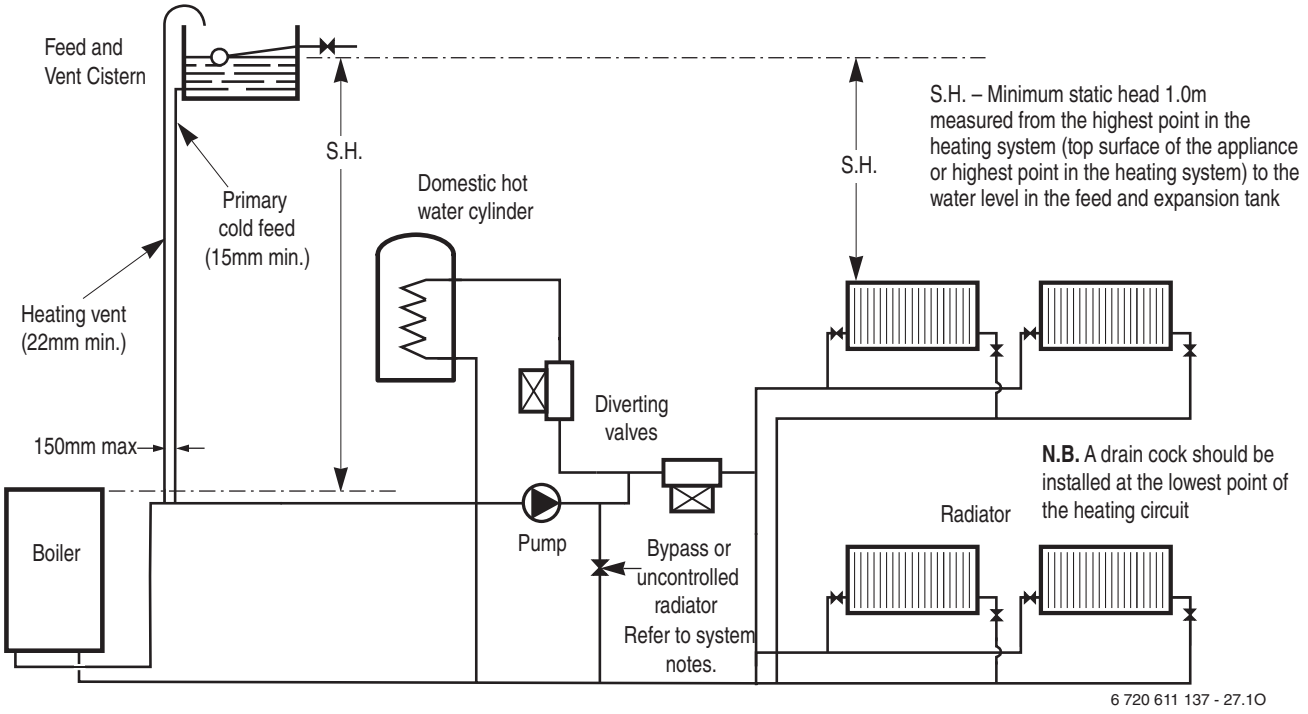


Fig. 6

Fully pumped sealed system

Note:
A drain cock should be fitted at the lowest point of the heating circuit and beneath the appliance

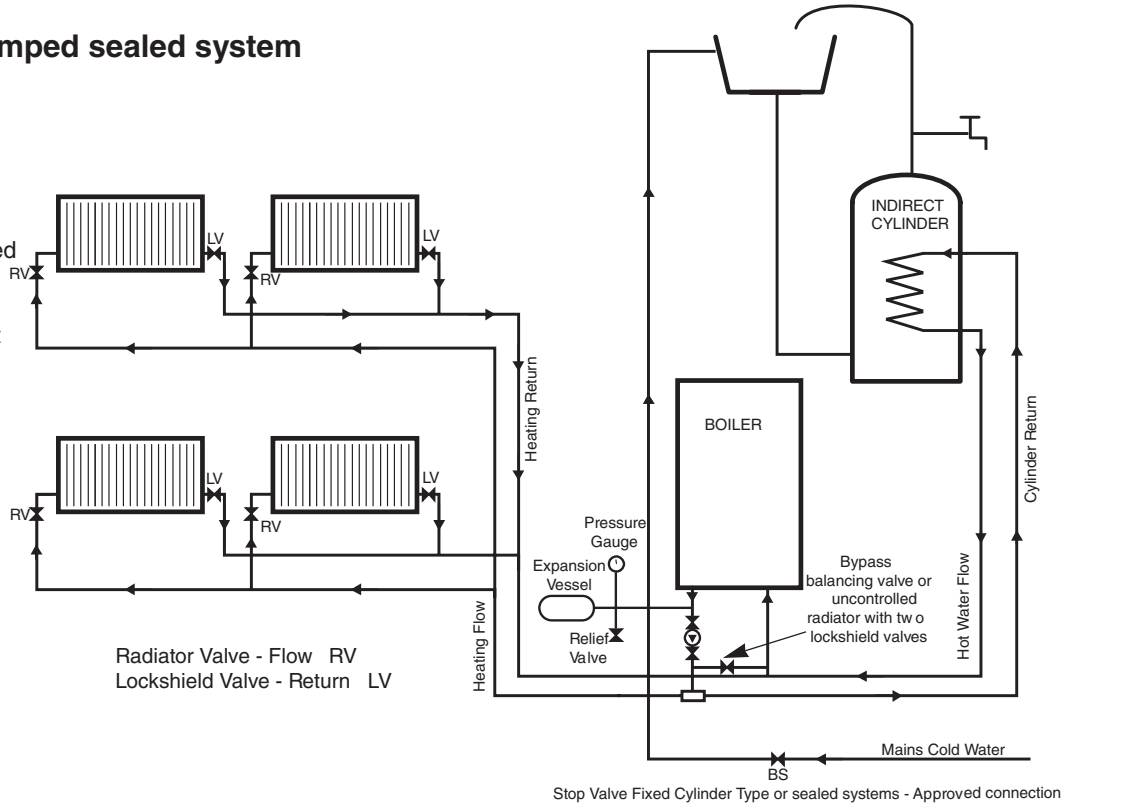


Fig. 7

Sealed system filling and make up

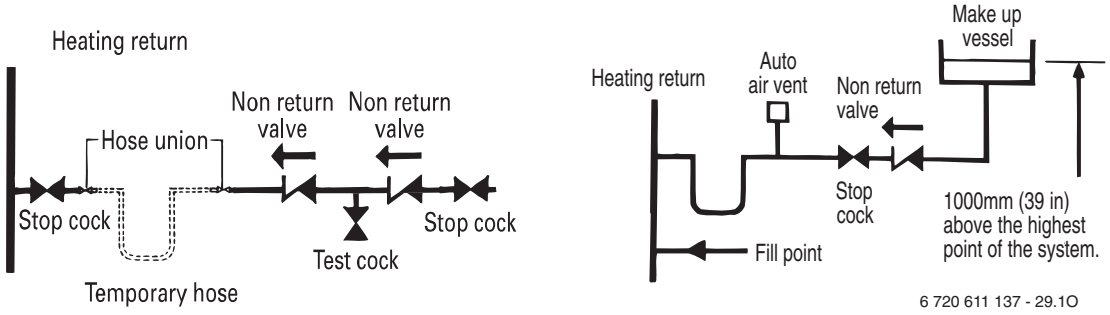


Fig. 8

3.3 Siting the appliance

Regulations concerning the Installation Site

- Relevant national regulations must be complied with section 3.8.1.
- Consult the installation instructions for details of minimum clearances required.

Combustion air

In order to prevent corrosion, the combustion air must not contain any corrosive substances.
Substances classed as corrosion-promoting include halogenated hydrocarbons which contain chlorine and fluorine compounds and are contained in some solvents, paints, adhesives, aerosol propellants and household cleaners, for example.

Surface temperature

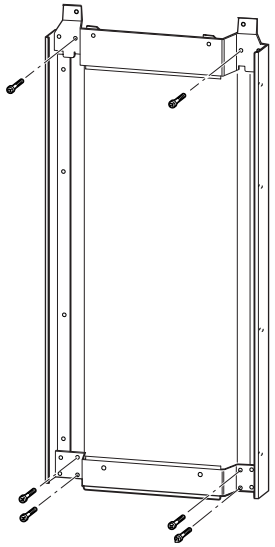
The max. surface temperature of the casing and the flue is less than 85 °C.
This means that, no special safety precautions are required with regard to flammable building materials and fitted furniture. The specified clearences must be maintained.

Cupboard/Compartment

The appliance can be installed in a cupboard/compartment need for airing clothes providing that the requirements of BS6798 and BS5440:2 are followed. The low casing losses from the appliance eliminate the need for ventilation openings in the compartment. Refer to Fig. 1 for the required clearences around the appliance.

3.4 Wall mounting frame assembly

- Take the wall mounting frame out of the package and screw together with 6 screws as shown in fig. 9. Use the inner lugs on the top and bottom horizontal sections for the appliances that are 440 mm wide.



6 720 610 576-04.1O

Fig. 9

- Hold the wall-mounting frame against the wall ensuring that it is vertical.
- Mark the position of the flue duct hole if a rear flue is to be used. Refer to fig. 1 and 18.
- Mark the holes for the wall mounting frame onto the wall, drill and plug the holes and screw the wall mounting frame to the wall with the screws provided.

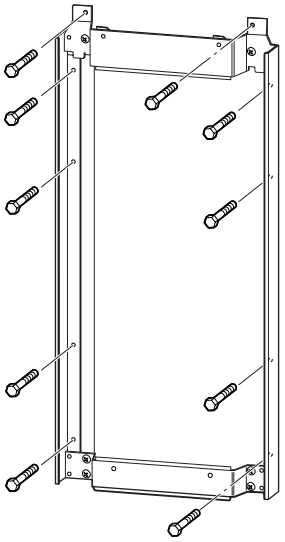


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Fig. 10

- Screw the pre-plumbing manifold with two screws to the wall mounting frame.

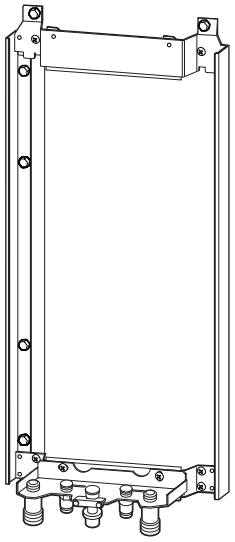

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Fig. 11

3.5 Pre-piping the system

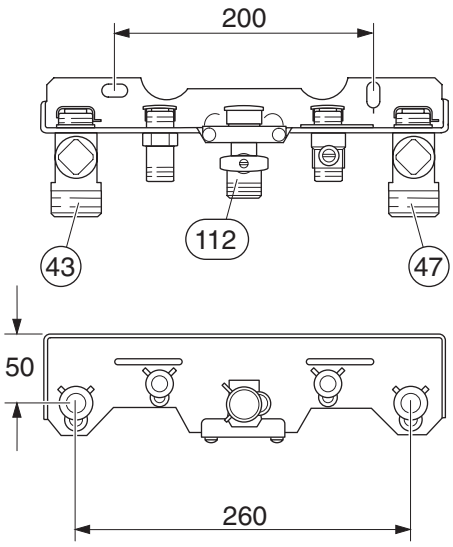

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Fig. 12 Manifold

43 Primary flow
47 Primary return
112 Gas cock

- Remove the domestic hot water and cold water inlet valves from the manifold and discard.
- A drain tap should be fitted at the lowest point of the central heating system.

Condensate Termination and Route

The condensate connection on the Greenstar appliances is in 22 mm plastic. The pipe should be extended and run away from the appliance with a constant fall of 2.5 ° or 40 mm in every metre.
The condensate pipe can terminate into any of four areas:

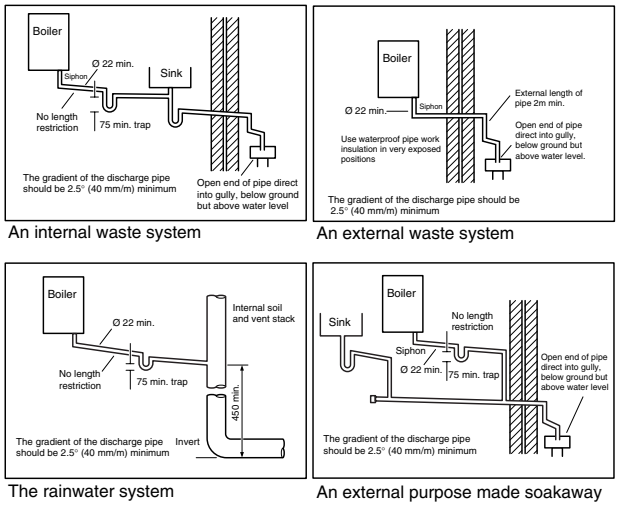


Fig. 13

Whilst all of the above methods are acceptable it is always the best practice to terminate the condense pipe via an internal waste system.This will eliminate the need for any external condensate pipe runs which can be susceptible to freezing in extreme weather.

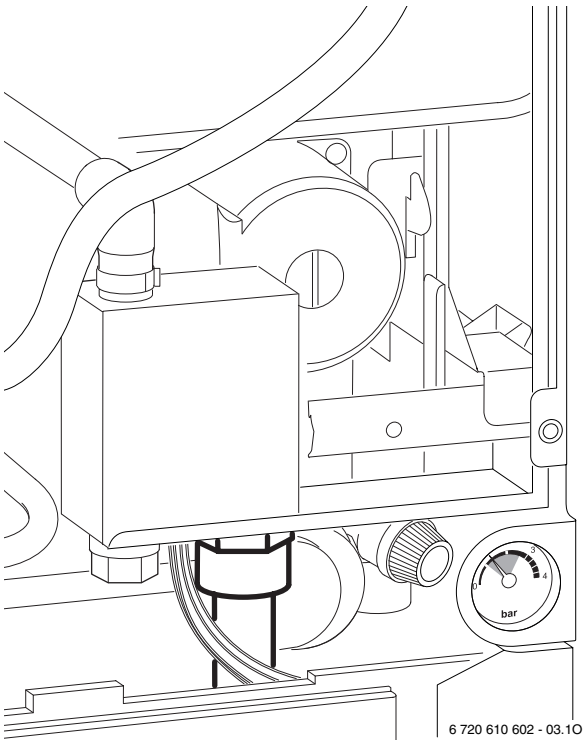


Fig. 14 Position of the condensate drain

External condensate pipework

All Greenstar condensing boilers have within a syphonic condensate trap. Rather than the condensate constantly dripping into the discharge pipe, the condensate is collected into a trap which releases it in 100 ml quantities.
This will help prevent freezing occurring.
If there is no alternative and the condensate pipe has to be externally run, the following should be considered:

- The pipe run should take the shortest practical route.
- The pipework should be insulated with weather resistant insulation.
- The pipe should terminate as close as possible to the ground or drain, whilst still allowing the condensate to safely disperse.This would prevent wind blowing up the pipe.
- The pipework should be installed with the minimum of horizontal runs and with a downward slope of at least 2.5 °.

3.6 Fitting the appliance

Benchmark: For optimum performance after installation, this boiler and its associated central heating system must be flushed in accordance with the guidelines given in BS5793:1992 “Treatment of water in domestic hot water central heating systems”.

- ▶ Remove packing, taking care to observe the instructions on the packing.
- ▶ Lie the boiler on its back.

Removing the outer case

The outer case is secured against unauthorised removal by two clips (electrical safety).
Always secure the outer case with those clips again after refitting.

- ▶ Turn the clips with a screwdriver (1.).
- ▶ Slide the outer case upwards and then forwards to remove (2.).

- Remove the plastic caps from the boiler connections.

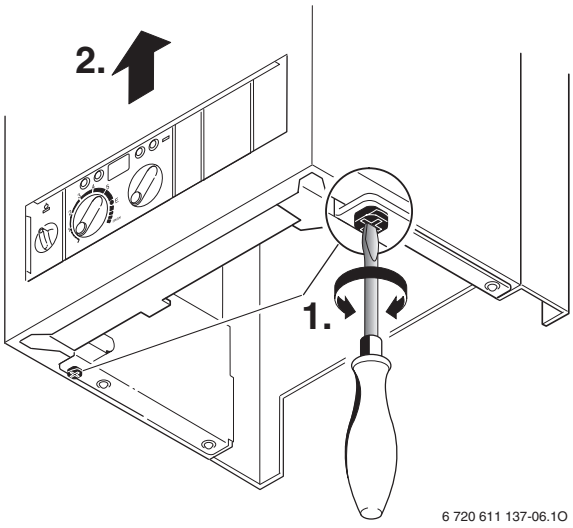


Fig. 15

Fixing the appliance

- Fit the washers onto the gas and water connections.
- Lift the boiler onto the wall-mounting frame. The lugs pass through the rectangular holes in the boiler back panel.
- Take care not to disturb the washers on the connections.

Connecting the flue duct

- Fit flue duct connector onto appliance flue spigot.
- Secure with the two screws supplied.

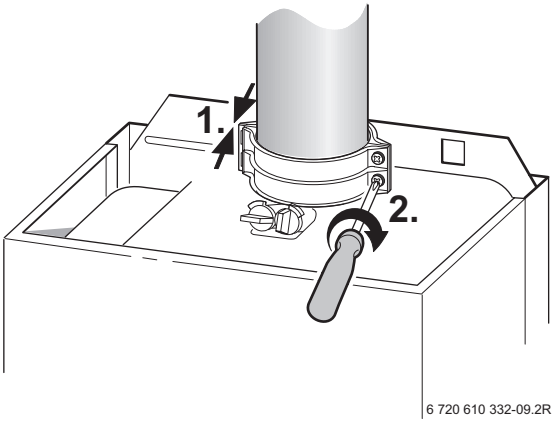


Fig. 16

- For remaining installation of flue assembly, refer to the relevant installation instructions.

3.7 Checking the connections

Water connections

- Check that the O-rings or seals are in place before tightening the connection.
- Turn on the service valves for boiler flow and return.
- Check all seals and unions for leaks.

Open vent systems: It is not necessary to connect a drain pipe to the pressure relief valve outlet as it is not operational.

Gas supply pipe

- Check that the seal is in place before tightening the connection.
- Turn off gas cock to protect gas valve against damage from excessive pressure.
- Check gas supply pipe.
- Release the pressure on the gas supply pipe.

3.8 Flue Systems

The only flue systems that may be used are those supplied by Worcester Heat Systems.
The flue system must be installed in accordance with the requirements of BS5440:1.

Standard 100 mm flue system
The standard concentric flue system provides for a horizontal length of upto 4 m. Full instructions for fitting this flue are in Subsection 3.8.2 “Installation of the flue”.

Alternative 125 mm diameter flue systems
Installation instructions for the alternative flue systems are sent with the appropriate flue kit.
Systems are available to give a maximum horizontal length of 13 m.
A vertical flue system upto a height of 15 metres is available.
45° and 90° flue bends can be used with a corresponding reduction in flue length of 2 m for each 90° bend and 1 m for each 45° bend used.

IMPORTANT: Any horizontal flue system fitted to a condensing boiler must incline towards the appliance at an angle of 3 % (30 mm per metre length) to prevent condensate dripping from the flue terminal. **This means that the clearance above the appliance must be increased to match the duct length. Refer to fig. 1 on page 5.**

3.8.1 Siting the Flue Terminal

The flue must be installed in accordance with BS 5440:1 and the Building Regulations. Flue terminals in carports and under balconies are to be avoided. The terminal must be positioned so that it does not cause an obstruction nor the combustion products a nuisance. See fig. 17 and table 9.

The terminal will, at times, give out a plume of water vapour and consideration must be given to this when choosing a terminal position. Keep clear of security lighting, activated by passive infra-red sensing heads.

If the terminal is less than 2 m above a surface to which people have access then a guard must be fitted. The guard must be evenly spaced about the terminal with a space of 50 mm in each direction and fixed with plated screws.

A guard Type K6 for the standard horizontal flue, can be obtained from Tower Flue Components, Vale Rise, Tonbridge TN9 1TB.

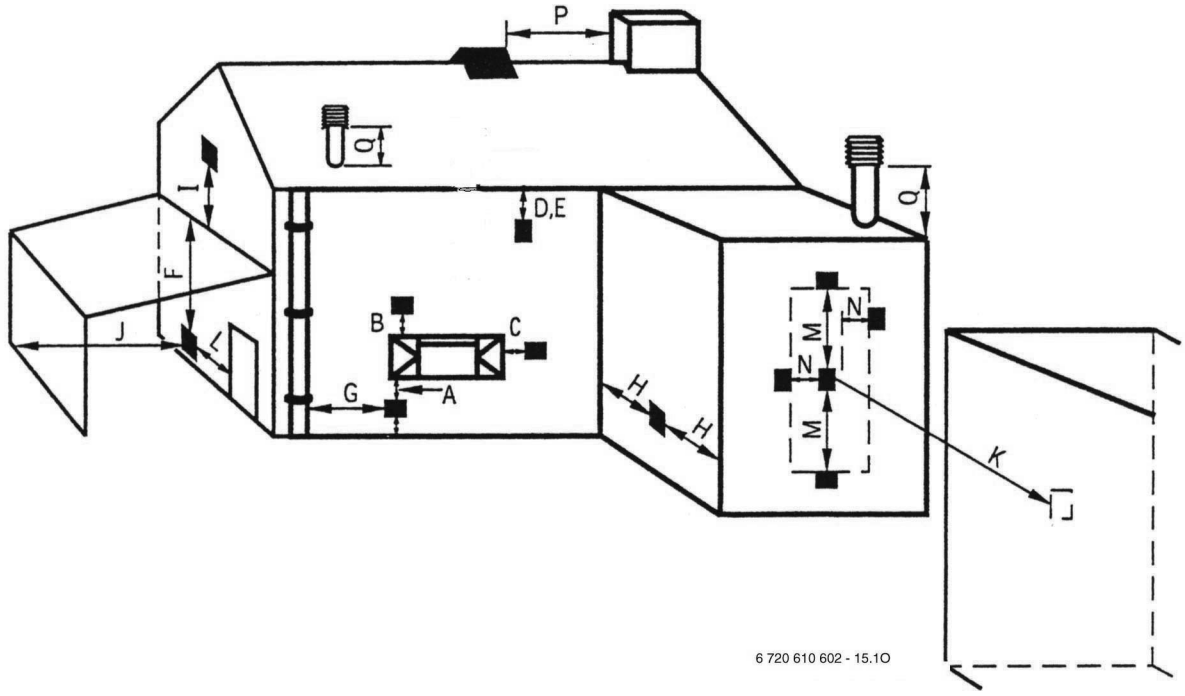


Fig. 17

Minimum dimensions of flue terminal positions (all types) (see fig. 17)

Dimension	Terminal Position (kW input expressed in net)	Balanced flues room sealed: Fanned draught
A[1)]	Directly below an opening, air brick, opening windows, etc.	300 mm
B[1)]	Above an opening, air brick, opening window, etc.	300 mm
C[1)]	Horizontally to an opening, air brick, opening window, etc.	300 mm
D	Below gutters, soil pipes or drain pipes	75 mm
E	Below eaves	200 mm
F [2)]	Below balconies or car port roof (lowest point)	200 mm
G	From a vertical drain pipe or soil pipe	150 mm
H	From an internal or external corner	300 mm
I	Above ground roof or balcony level	300 mm
J	From a surface facing the terminal	600 mm
K	From a terminal facing the terminal	1200 mm
L	From an opening in the car port (e. g. door, window) into the dwelling	Not recommended
M	Vertically from a terminal on the same wall	1500mm
N	Horizontally from a terminal on the same wall	300 mm
O	From the wall on which the terminal is mounted	Not applicable
P	From a vertical structure on the roof	Not applicable
Q	Above intersection with roof	Not applicable

Table 9

1) In addition, the terminal should not be nearer than 150 mm (fanned draught) to an opening in the building fabric formed for the purpose of accommodating a built-in element such as a window frame.

2) Not recommended.

3.8.2 Installation of the flue

The standard 100 mm diameter horizontal flue system is suitable for lengths upto 4 m.
Flues upto 650 mm do not require an extension duct assembly.
Flues between 600 mm and 4000 mm require extension duct assemblies.
NOTE: Flue lengths between 650 mm and 730 mm cannot be accomodated. Refer to fig. 19, 20, 21.

Standard system comprise: Flue turret - Flue turret clamp - Terminal assembly - Wall sealing - plates.
Extension kit comprises: Air duct - Flue duct - Duct clamp. Refer to fig. 22.
Instructions for fitting other flue systems are packed with the relevant flue kit.
Check that the position chosen for the appliance is satisfactory. Refer to fig. 18.

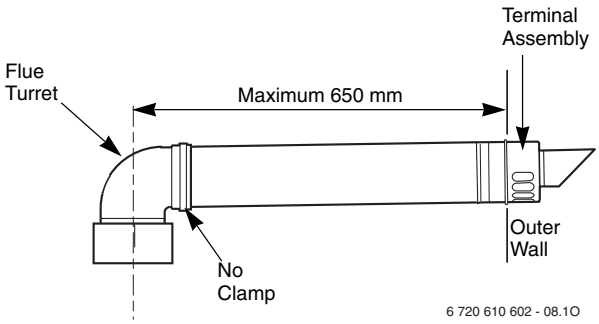


Fig. 19 Standard Flue

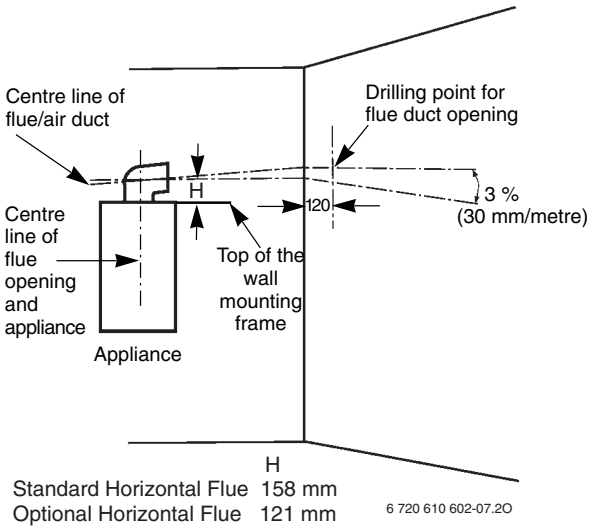


Fig. 18 Marking the position of the side flue opening

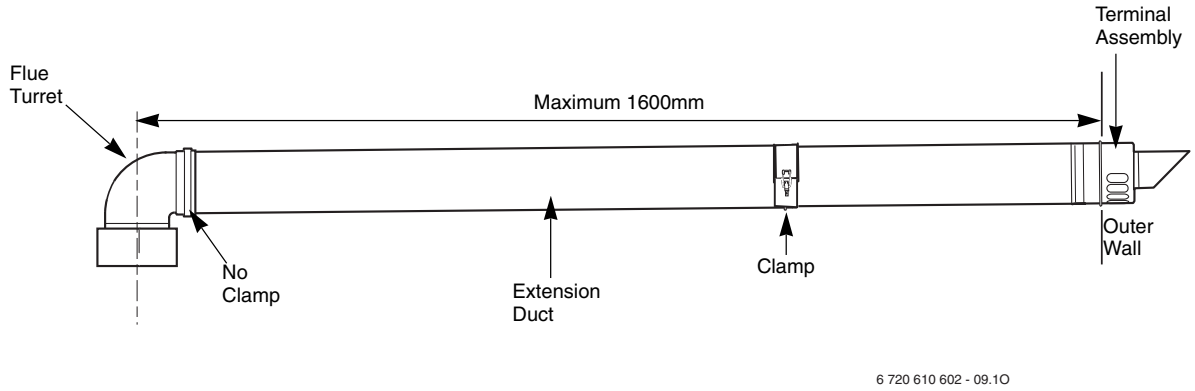


Fig. 20 Flue with one extension

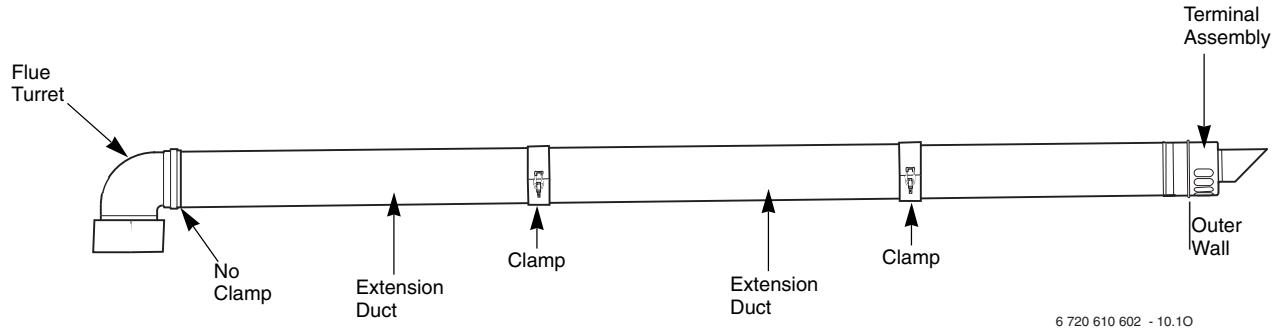


Fig. 21 Flue with extensions

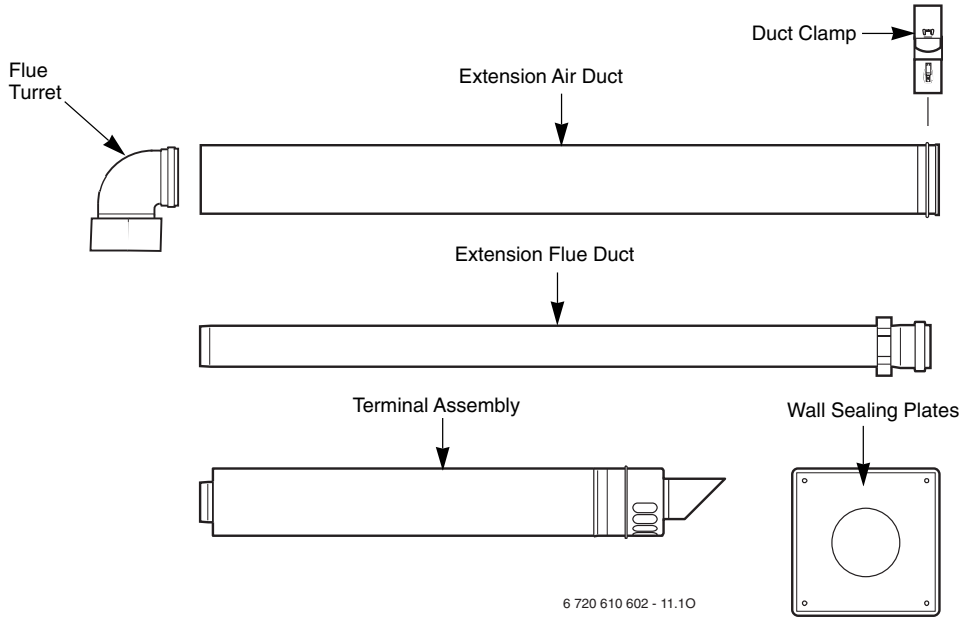


Fig. 22 Flue components

3.8.3 Flue duct preparation and assembly

Measure the flue length L. Refer to fig. 23, 24.

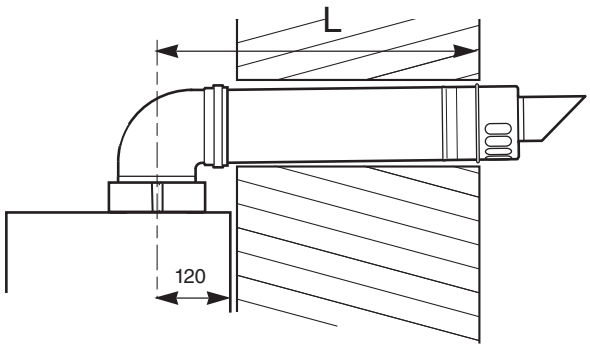


Fig. 23 Flue length - rear

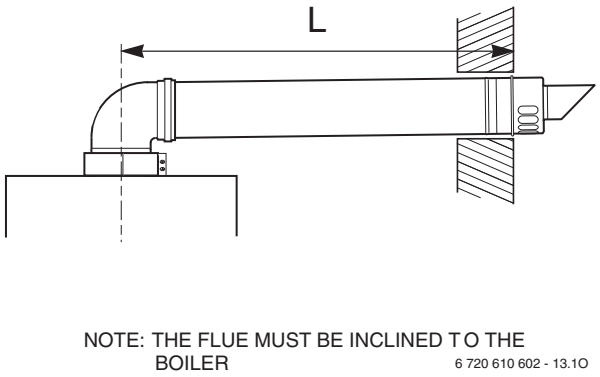


Fig. 24 Flue length - side

Mark off the lengths shown onto the ducts and cut to length. The cuts must be square and free from burrs. Terminal assembly outer (air) duct -L- 70 mm, inner (flue) duct -L- 50 mm.The measurement is made from the ridge at the terminal indicating the outer face of the wall. Refer to fig. 25.
Extension air duct -L- 70mm, flue duct -L- 50 mm. The measurement is from the formed end.

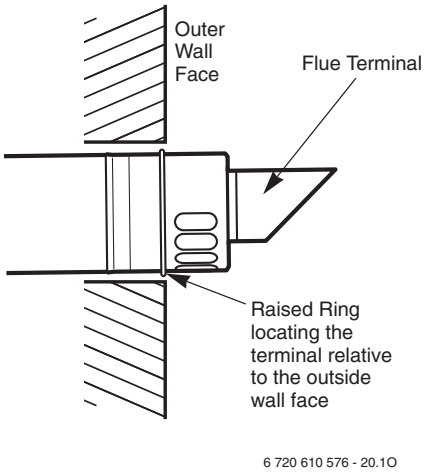


Fig. 25 Flue terminal position

Assemble flue system completely. Push the ducts fully together and clamp in the positions. The slope of the terminal outlet must face downwards.
The assembly will be made easier if a solvent free grease is lightly applied i.e Vaseline, to the male end of the ducts.
NOTE: An inner wall sealing plate is provided which should be fitted to the ducts before assembly.
Push the assembly through the wall and fix the turret to the appliance with the clamp. Refer to fig. 26.

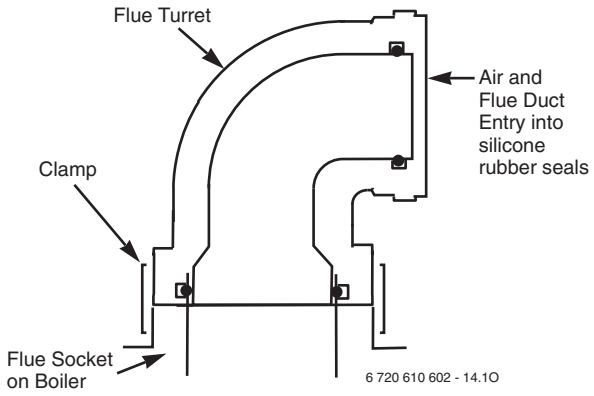


Fig. 26 Flue turret

Ensure that the turret is fully entered into the socket on the boiler. From the outside fix the outer wall plate to the terminal and, after ensuring the duct is properly i nclined towards the boiler, fix the plate to the wall.
If the terminal is within 2 m of the ground where there is access then an approved terminal guard must be fitted. The guard must give a clearance of at least 50 mm around the terminal an be fixed with corrosion resistant screws.

4 Electrical connections

▶ Always disconnect the power supply to the appliance at the mains before carrying out any work on the electrical systems and components.

All control and safety systems are built into the appliance.

- ▶ Allow mains cable to protrude at least 50 cm from wall.
- ▶ To make splash-water proof (IP): cut the cable grommet hole size to match diameter of cable, see Fig. 29.

It must be possible to isolate the appliance. The appliance must be earthed.
The appliance must be connected to the mains through a double pole isolator with a contact separation 3 mm in all poles and supplying the appliance and controls only. The wiring must comply with the current requirements of the IEE Wiring Regulations and any local regulations which apply.

- Supply: 230 V ~ 50 Hz, 43 Watts
- Mains cable: PVC insulated 0.75 mm^2 (24 x 0.20 mm) to BS6500-Table 6. Temperature rated 100°C.
- Water protection IPX4D
- External fuse 3 A to BS 1362.

4.1 Connecting the appliance

To gain access to the mains connection remove the drop down facia cover. The drop down cover is removed by lowering it to the horizontal position and pushing firmly upwards at the rear of the supports to release the cover. Lift cover from the appliance.
After installation (or in the event of an electrical fault) the electrical system shall be checked for short circuits, fuse failure, incorrect polarity of connections, earth continuity and resistance to earth.

- ▶ Pull out cover panel at the bottom and remove. Refer to fig. 27.

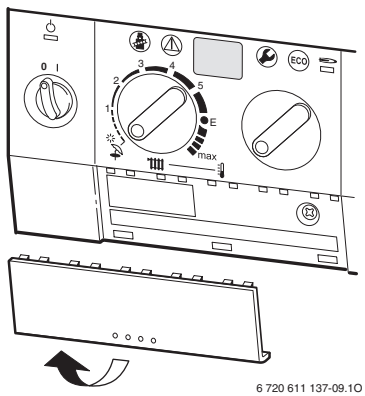


Fig. 27

- ▶ Remove screw and slide terminal cover forwards to remove. Refer to fig. 28.

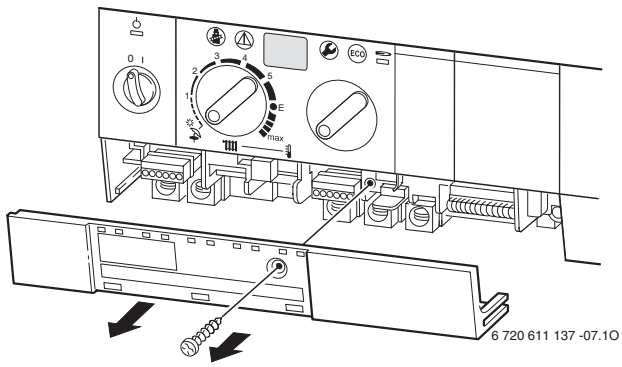


Fig. 28

- ▶ Cut cable grommet to diameter of cable.

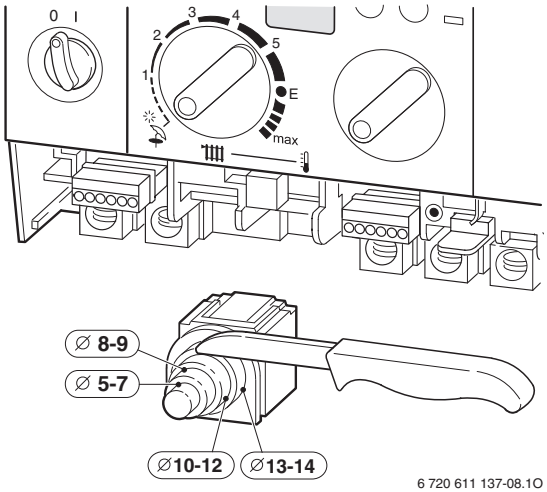


Fig. 29

- ▶ Feed cable through cable grommet and connect the mains supply cable, see Fig. 30.
- ▶ Secure cable in cable grommet by means of cable grip.

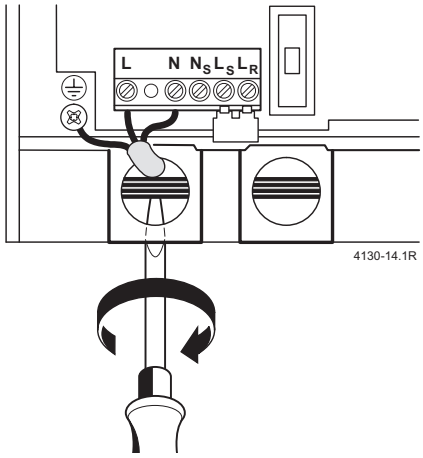


Fig. 30

4.2 Wiring to your system

Mains electrical supply: The boiler should be connected to the permanent mains supply as described in section 4.1. This also provides the electrical supply to the system.

Note: This must be the only electrical supply to the system. This ensures the safety of a single fused supply.

The boiler can only be wired to a remote system junction box.

Note: A pump is not built into the boiler and must be fitted externally.

The diagram shows the overall wiring details. A factory fitted cable is fitted between the boiler control panel and the Y-S-module. This module is designed to provide the correct voltage interface.

The other connector in the module must be used for wiring to the remote junction box as shown. It is the responsibility of the installer to connect all other system components i.e water valve/s, pump, programmer etc. to the proprietary junction box according to the instructions supplied with the box. Worcester Heat Systems cannot be held responsible for any incorrect wiring to these parts of the system.

If a room thermostat and/or frost thermostat is required, these must also be connected to the junction box according to the proprietary instructions.

Upon completion of the electrical connections check for earth continuity, correct polarisation and resistance to earth.

Note:

Y-S-Module	Remote Junction Box
LS	L
NS	N
PE	E (Earth)
DV	Demand (Switched live)

Table 10

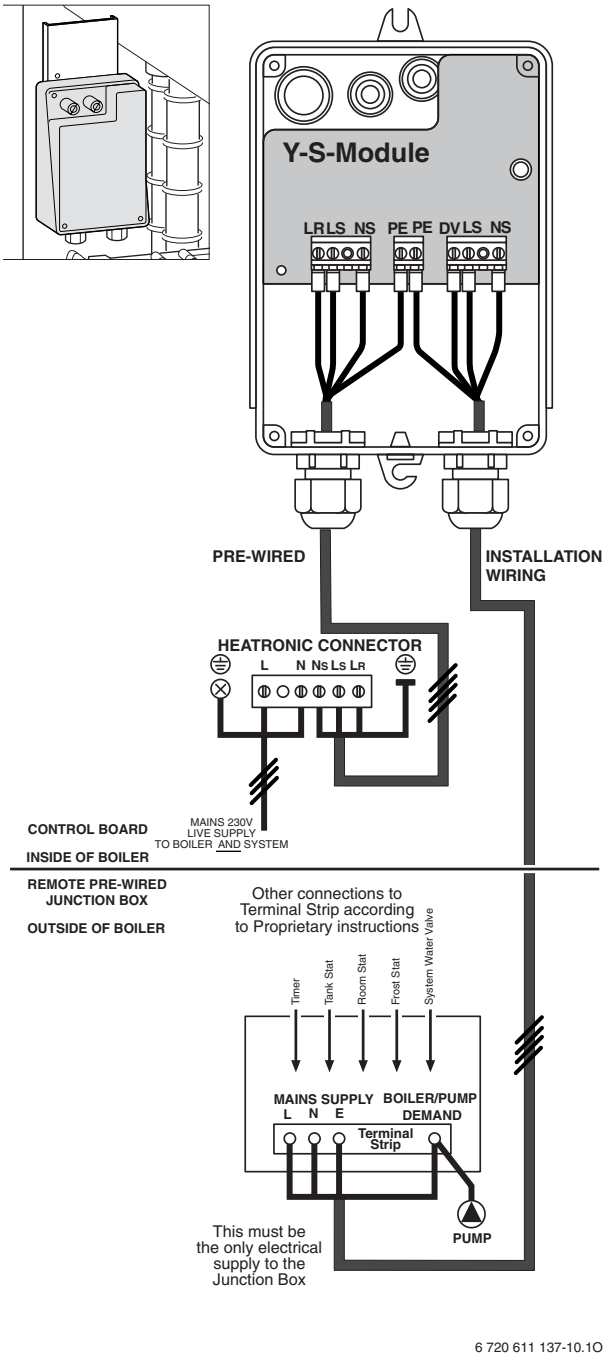


Fig. 31

5 Commissioning

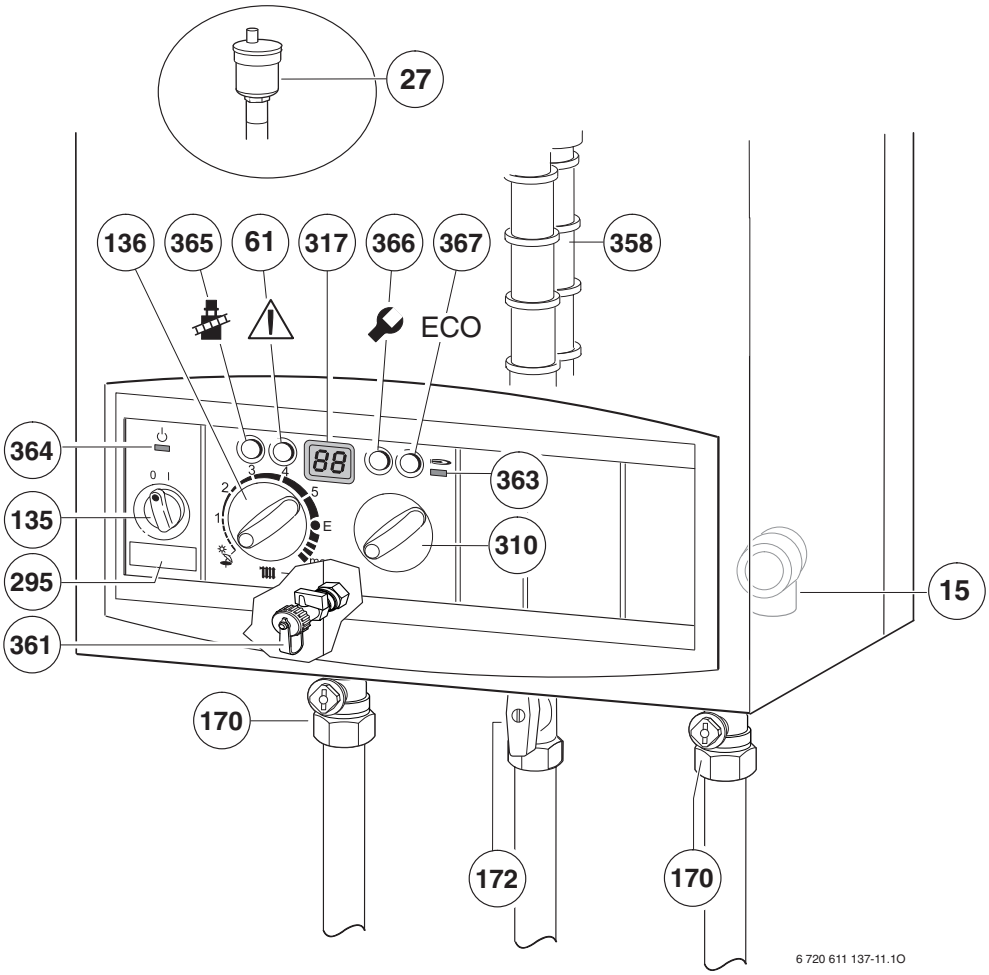


Fig. 32

15 Safety valve
27 Automatic vent
61 Reset button
135 Master switch
136 Temperature control for central heating
170 Service cocks on flow and return
172 Gas cock (shown in on position)
295 Appliance type sticker
310 Function control (Service only)
317 Multifunction display
358 Condensate trap
361 Drain valve
363 Indicator lamp for burner
364 Indicator lamp for power supply
365 “Chimney sweep” button
366 Service button
367 No function

5.1 Commissioning

Never run the appliance when empty or, with sealed systems, unpressurised.

The operational CO_2 level is set at the factory and no adjustment is necessary when installing a natural gas fired appliance.

Benchmark Water Treatment: For optimum performance after installation, this boiler and its associated central heating system should be flushed in accordance with the guidelines given in BS7593:1992 - Treatment of water in domestic hot water systems. Full instructions are supplied with proprietary cleansers sold for this purpose. If an inhibitor is to be used after flushing, it should be used in accordance with the inhibitor manufacturers instructions. The inhibitor must not be added until all the cleaner has been removed.

To drain the appliance shut the system valves and open the drain valve.
Suitable flushing agents and inhibitors are available from Betz/Dearborn Tel.: 0151 4209563 and Fernox Tel.: 01799 550811. Instructions for use are supplied with the these products.

- ▸ **Before commissioning, the gas supply pressure must be checked at the gas supply pressure test point (see page 6, fig. 2, item 7). Natural gas appliances must not be operated if the gas supply pressure is below 18 mbar or above 24 mbar. LPG appliances must not be operated if the supply pressure is not 37 mbar at the inlet to the appliance**.
- ▸ Unscrew the condensation trap (358) and pull out, fill with approx. 1/4 l of water and refit. Refer to fig. 32.
- ▸ Open all system radiator valves.
- ▸ Turn on service valves (170), fill central heating system.
- ▸ Vent radiators.
- ▸ Check that the gas type specified on the identification plate matches that of the gas supply.
- ▸ Turn on gas cock (172). Refer to fig. 32.
- ▸ If a domestic hot water cylinder is fitted set the boiler temperature control and the hot water cylinder thermostat to 60 °C.

5.2 Switching the appliance on/off

Switching on

- ▸ Switch on the appliance at the master switch (**I**). The indicator lamp shows green and the display will show the boiler flow temperature.

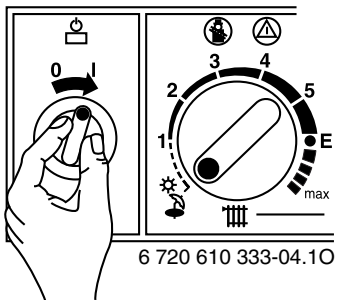


Fig. 33

If the display alternates between **-II-** and the boiler flow temperature, the trap filling programme is active.

The trap filling programme ensures that the condensation trap is filled after the appliance has been installed or after the appliance has been out of use for a long period or the mains supply has been interrupted. For that reason, the appliance remains at minimum heating output for 15 minutes.

Switching off the appliance

- ▸ Set the master switch to (**0**). The green indicator lamp goes out.

- ▸ Always disconnect the appliance from the power supply (fuse, circuit breaker) before carrying out any work on the electrical systems or components.

5.3 Switching on the System

The boiler flow temperature is adjustable between 35°C and 88°C. Refer to table 11, page 26.

- ▸ Turn the temperature control to set the flow temperature to a level appropriate to the type of central heating system:
  - – Low-temperature heating: setting **“E”** (approx. 75°C)
  - – Central heating systems for flow temperatures up to 88 °C: limited “**max**” setting for low-temperature operation (see page 26).

  When the burner is alight, the **red** indicator lamp lights up.

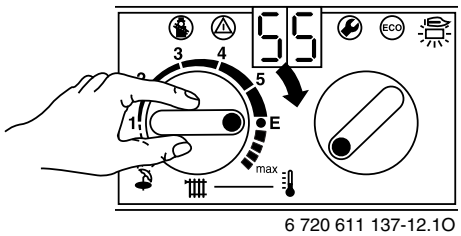


Fig. 34

5.4 System controls

- ▸ Set room thermostat to the desired room temperature.
- ▸ Set the external time clock to the desired time periods.
- ▸ Set the thermostatic radiator valves to the desired settings.

5.5 Frost protection

Frost protection is only guaranteed from the external room temperature thermostat.

- ▸ Leave master switch switched on.

If the appliance is to be left for long periods switch the central heating off:

- ▸ Add a suitable anti-freeze fluid to the water in the central heating system.
  Suitable products are available from Betz-Dearborn Tel.: 0151 4209563 and Fernox Tel.: 01799 550811.

5.6 Fault Condition

A list of faults that may occur is given on page 40.

In the unlikely event of a fault occuring while the appliance is in operation:
The display then shows a fault code and the button ⚠ may also flash.
If the button ⚠ flashes:

- Press and hold the button ⚠ until the display shows "**– –**".
  The appliance will then start up again and the display will show the central heating flow temperature.

If the button ⚠ does not flash:

- Switch the appliance off and then on again at the master switch.
  The appliance will start up again and the central heating flow temperature will be displayed.

6 Individual settings

6.1 Mechanical settings

6.1.1 Setting the boiler flow temperature

The central heating flow temperature can be set to between 50°C and 88°C.

Limited maximum setting for low-temperature operation

The temperature control is factory limited to setting **E**, giving a maximum flow temperature of 75°C.
Adjustment of the heating output to the calculated heat demand is not required by the heating systems regulations.

Removing the maximum setting limit

For heating systems which require higher flow temperatures, the maximum setting limit can be removed.

- Lift off the yellow button on the temperature control with a screwdriver.

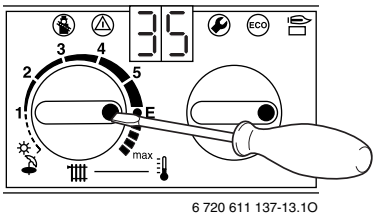


Fig. 35

- Rotate yellow button through 180° and replace (dot facing inwards).
  The CH flow temperature is no longer limited.

Control setting	CH flow temperature
1	approx. 50°C
2	approx. 55°C
3	approx. 60°C
4	approx. 65°C
5	approx. 70°C
E	**approx. 75°C**
max	approx. 88°C

Table 11

6.2 Settings on the Bosch Heatronic

6.2.1 Operating the Bosch Heatronic

The Bosch Heatronic enables easy setting and checking of a large number of appliance functions.
This description is limited to those functions required for commissioning.
For a full description of all available functions, please refer to the Service booklet for the Engineer, order no. 7 181 465 346.

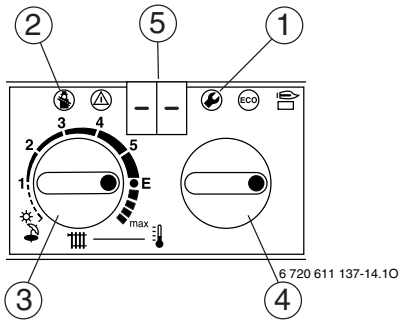


Fig. 36 Appliance controls

1 Service button
2 "Chimney sweep" button
3 Temperature control for boiler flow
4 Function control
5 Display

Selecting service function:

Note the positions of the temperature control. After completing the settings, return the temperature controls to their original positions.

The service functions are subdivided into two levels: **Level 1** comprises service functions up to function **4.9**, while **Level 2** consists of the service functions from **5.0** upwards.

- To select a service function on Level 1: press and hold the button until the display shows **– –**.
- To select a service function on Level 2: press and hold the buttons and simultaneously until the display shows **= =**.
- Then turn the flow temperature control to select the required function.

Service function	Code no.	See page
Anti-cycle time	**2.4**	27
Max. flow temperature	**2.5**	27
Switching difference	**2.6**	27
Max. heating output	**5.0**	27

Table 12
The service function **5.0** may be reset.

Entering a setting

- To enter the setting for a function, turn the function control.

Storing a setting

- Level 1: press and hold the button until the display shows **[ ]**.
- Level 2: press and hold the and buttons simultaneously until the display shows **[ ]**.

After completing the settings

- Reset the temperature control and the function control to their original positions.

6.2.2 Setting the anti-cycle time (Service Function 2.4)

This service function is only active if Service Function 2.7, automatic anti-cycle time, is deactivated.
The anti-cycle time can be set to between 0 and 15 minutes (is **factory set** to 3 minutes).
If the setting 0 is entered, the anti-cycle time is inactive.
The shortest possible anti-cycle time is 1 minute (recommended for single-pipe and hot-air heating systems).

If the appliance is connected to an outside-temperature controlled heating programmer, the anti-cycle time does not need to be set on the appliance and is optimised by the programmer instead.

6.2.3 Setting the maximum flow temperature (Service Function 2.5)

The maximum flow temperature can be set to between 35°C and 88°C (**factory setting**).

6.2.4 Setting the switching difference (Service Function 2.6)

If the appliance is connected to an outside-temperature controlled programmer, the programmer sets the switching difference.
It does not need to be set on the appliance.

The switching difference is the permissible divergence from the specified flow temperature. It can be set in increments of 1 K. The adjustment range is 1 to 30 K (is **factory set** to 0 K). The minimum flow temperature is 30°C.

6.2.5 Setting the heating output (Service Function 5.0)

The heating output can be set to any level between min. rated heat output and max rated heat output to limit it to the specific heat requirements.

The full rated heat output is still available for hot water or charging the hot water cylinder even if the heating output has been limited.

The factory setting is the max. rated heat output.

- Set the room thermostat and thermostatic radiator valves to max. temperature.
- Press and hold the and buttons simultaneously until the display shows **= =**.
  The and buttons will light up.

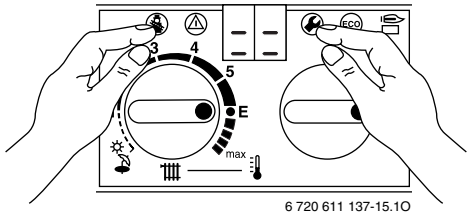


Fig. 37

- Turn the temperature control until the display shows **5.0**.
  After a short delay, the display then shows the set heating output in percent.

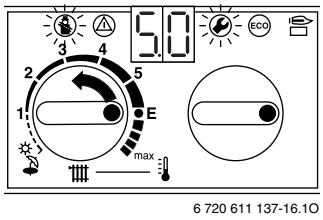


Fig. 38

- Refer to the settings tables for heating and cylinder charging output to obtain the relevant code for the desired heating output in kW (see page 41).
- Turn the function control until the display shows the desired code number.
  The display and the and buttons will flash.

- ▶ Measure the gas flow rate and compare with the figures specified for the code number displayed. If figures do not match, adjust the code number!
- ▶ Press and hold the and buttons simultaneously until the display shows **[ ]**.
  The heating output is now stored.

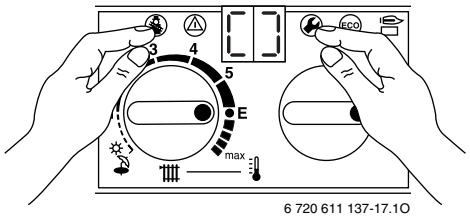


Fig. 39

- ▶ Return the temperature control and the function control to their original positions.
  The display will revert to the boiler flow temperature.

6.3 Setting the gas/air ratio

The appliance is set at the factory and adjustment is not necessary.

7 Converting the appliance to different gas types

The setting is factory sealed at maximum. Adjustment to the rated heat input and min. heat input is not necessary.

Checking the gas supply pressure

▶ Check the gas supply pressure at the gas supply pressure testing point.

Natural gas appliances must not be operated if the gas supply pressure is below 18 mbar or above 24 mbar.
LPG appliances must not be operated if the supply pressure is below or above 37 mbar.

Natural gas

- Appliances for **natural gas type G20** are factory set to Wobbe-Index 15 kWh/m^3 and 20 mbar supply pressure and sealed.

Conversion kits

Model	For conversion from ...	Order no.
ZB 7-29 HE	N.G to L.P.G	7 710 149 083
ZB 11-29 HE	L.P.G to N.G	7 710 239 109

Table 13

- Instructions are sent with each conversion kit.

7.1 Setting the gas/air ratio

The gas/air ratio may only be adjusted on the basis of a CO_2 measurement at max. heat output and min. heat output using an electronic tester.

▶ Switch off the appliance at the master switch (**O**).
▶ Remove the outer case (see page 16, refer to fig. 15).
▶ Switch on the appliance at the master switch (**I**).
▶ Set room thermostat to maximum temperature.
▶ Open thermostatic radiator valves.
▶ Unscrew sealing plug from flue gas testing point (234). Refer to fig. 40.
▶ Insert testing probe about 135 mm into the flue gas testing point and seal testing point.

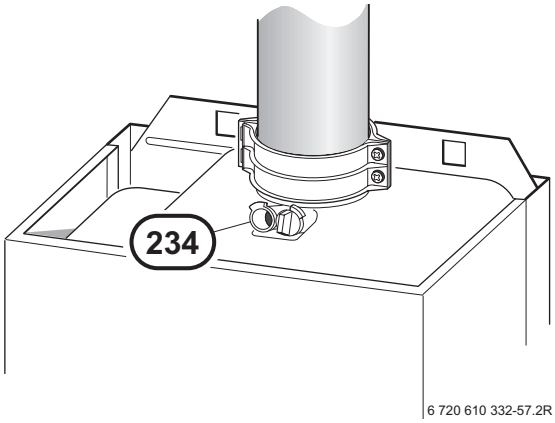


Fig. 40

▶ Press and hold 🔧 button until the display shows **– –**. The 🔧 button will light up.

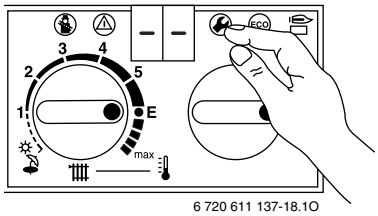


Fig. 41

▶ Turn the temperature control until the display shows **2.0** .
After a short delay, the current operating mode setting will be displayed (**0.** = Normal mode).

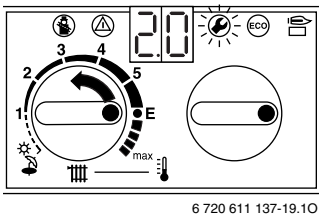


Fig. 42

- Turn the function control until the display shows **2.** (= max. rated heat output).
  The display and the button will flash.

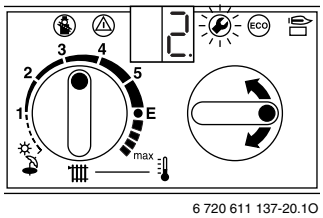


Fig. 43

- Measure the CO_2 level.
- Prise off the seal on the gas flow restrictor.
- Adjust the gas flow restrictor (63) to obtain the CO_2 level given in Table 14. Refer to fig. 44.

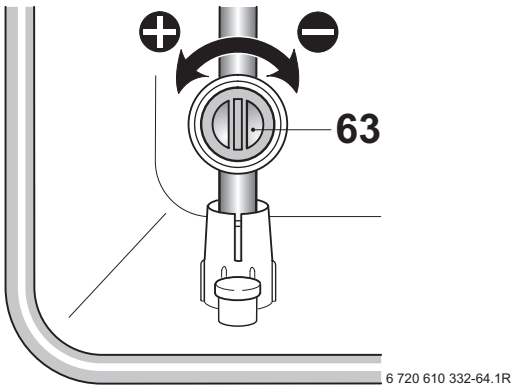


Fig. 44

Gas Type	CO_2 reading at max. rated heat output	CO_2 reading at min. rated heat output
Natural gas type (G20)	9.2 %	8.8 %
LPG (G31) (propane)	10.8 %	10.5 %

Table 14

- Turn the function control anti-clockwise until the display shows **1.** (= min. rated heat output).
  The display and the button will flash.

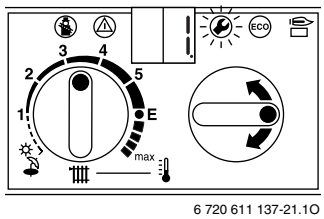


Fig. 45

- Measure the CO_2 level.
- Remove the seal from the gas valve adjusting screw (64) and adjust the CO_2 level to the figure given in Table 14 for min. rated heat output.

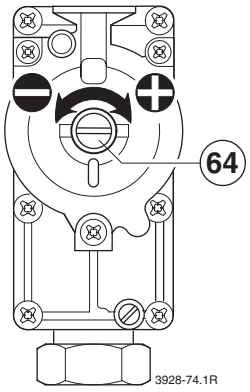


Fig. 46

- Recheck the levels at min. and max. rated heat output and re-adjust if necessary.
- Turn the function control anti-clockwise as far as the stop so that the display shows **0.**
  (= Normal operating mode).
  The display and the button will flash.
- Press and hold the button until the display shows **[ ]**.
- Reset the temperature control and the function control to their original positions.
  The display will revert to the boiler flow temperature.
- Remove testing probe from the flue gas testing point (234) and refit sealing plug.
- Re-seal gas valve adjusting screw and gas flow restrictor.
- Replace outer case and secure.
- Set room thermostat and thermostatic radiator valves to the desired temperature.

7.2 Testing combustion air/flue gas at set heat output

7.2.1 Testing the O_2 or CO_2 level in the combustion air

By testing the O_2 or CO_2 level in the combustion air the gas tightness of a type C_{13} or C_{33} **flue system** can be checked. The O_2 level must not be less than 20,6 %. The CO_2 level must not exceed 0,2 %.

- Press and hold the button until the display shows **– –**.
  "Chimney sweep" mode is now active.
  The button will light up and the display shows the CH flow temperature.

In "chimney sweep" mode, the appliance switches to max. rated heat output or the set heating output. You then have 15 minutes in which to measure the levels. After that, the appliance switches back from "chimney sweep" mode to normal mode.

- Remove sealing plug from combustion air testing point (234.1, fig. 47).
- Insert testing probe about 80 mm into the testing point and seal testing point.

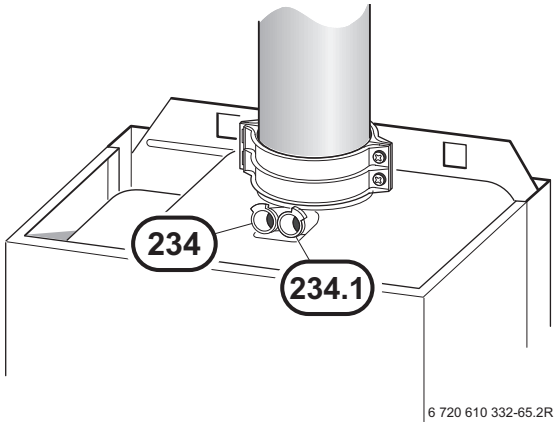


Fig. 47

- Measure O_2 and CO_2 levels.
- Refit sealing plug.
- Press and hold button until the display shows **– –**.
  The button will stop flashing and the display shows the boiler flow temperature.

7.2.2 Testing CO and CO_2

- Press and hold the button until the display shows **– –**.
  "Chimney sweep" mode is now active.
  The button will light up and the display shows the CH flow temperature.

You have 15 minutes in which to measure the levels. After that, the appliance switches back from "chimney sweep" mode to normal mode.

- Remove sealing plug from flue gas testing point (234, fig. 47).
- Insert testing probe about 135 mm into the testing point and seal testing point.

- CO- and CO_2 levels.
- Refit sealing plug.
- Press and hold button until the display shows **– –**.
  The button will stop flashing and the display shows the boiler flow temperature.

8 Maintenance

- Always disconnect the appliance from the electrical power supply (fuse, circuit breaker) before carrying out any work on the electrical systems or components.

- Always turn off the gas cock before carrying out any work on components which carry gas.

There is a special Service booklet for the Engineer, order no. 7 181 465 346, available to competent persons.

All safety and control systems are monitored by the Bosch Heatronic. In the event of a component fault, the display shows a fault code.

- The User should be recommended to have the appliance serviced regularly by a competent person (see Maintenance Contract).
- Use only genuine spare parts
- Refer to the Spare Parts List when ordering spare parts.
- Always renew seals and O-rings removed during servicing or repair work.
- Use only the following types of grease:
  - Water valve: WRAS approved silicon based grease
  - Unions: approved sealant.
- To drain the appliance shut the system valves and open the drain valve.
- Upon completion of any electrical work check for earth continuity, correct polarisation and resistance to earth.

8.1 Pre-Service Check List

			Date								
1	Call up the last fault stored by the Bosch Heatronic, Service Function **.0,** (see page 34).										
2	Check ionisation current, Service Function **3.3**, (see page 34).										
3	Perform visual check of air/flue duct.Visual check of diaphragm for soiling and splits (see page 36).										
4	Check gas supply pressure (see page 29).	mbar									
5	Test combustion air/flue gas (see page 31).										
6	Check CO_2 setting for min./ max. (gas/air ratio) (see page 29).	min. % max. %									
7	Check gas and water systems for leaks (see page 16).										
8	Check heat exchanger (see page 34).	mbar									
9	Check burner (see page 35).										
10	Clean condensation trap (see page 35).										
11	Check electrical wiring for damage.										
12	Check heating programmer settings.										
13	Check appliances that are part of the heating system.										

Table 15

8.2 Description of servicing operations

The combustion performance must be checked before and after any servicing work on the combustion and burner components. Refer to section 7.2.

Check “Last fault stored”:

- Select Service Function **.0** (see page 26 “Selecting Service Function”).

There is a list of the fault codes in the Appendix (see page 40.
To delete “Last fault stored”:

- Turn function control anti-clockwise as far as the stop.
- Press and hold the button until the display shows **[ ]**.
  The last fault stored has now been deleted.

Checking the ionisation current, Service Function 3.3

- Select Service Function **3.3** (see page 26 “Selecting Service Function”).

If the display shows 2 or 3, the ionisation current is OK.
If the display shows 0 or 1, the electrode assembly (32.1, page 6) must be cleaned or replaced.

Primary Heat exchanger
There is a special accessory kit (no. 840) for cleaning the heat exchanger, order no. 7 719 001 996.

- Check control pressure on the air - gas mixer unit at max. rated heat output using an electronic manometer.

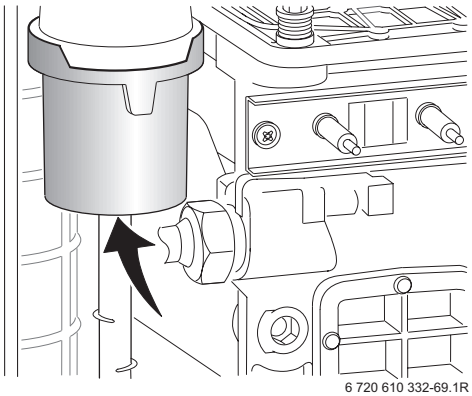


Fig. 48

The heat exchanger should only be cleaned if the control pressure is **2.2 mbar** (depression) or less.

- Remove cleaning access cover (415, page 6) and the metal plate below it, if present. Refer to fig. 2.
- Unscrew condensation trap and place suitable container underneath. Refer to fig. 49.
- Remove the fan and the burner as described in the text headed “Burner” (see page 35).

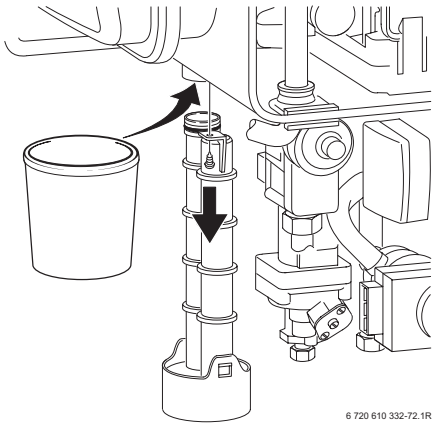


Fig. 49

- Loosen any deposits in the heat exchanger from top to bottom using the cleaning blade. Refer to fig. 50.

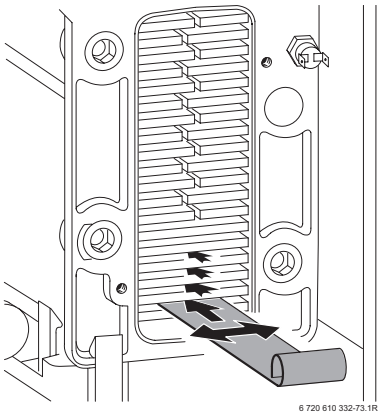


Fig. 50

- Clean the heat exchanger from top to bottom using the brush. Refer to fig. 51.

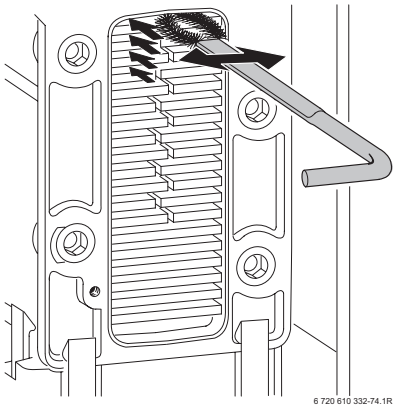


Fig. 51

- Flush the heat exchanger from the top. Refer to fig. 52.

- Clean out the condensate collector and trap connection (with other end of brush).

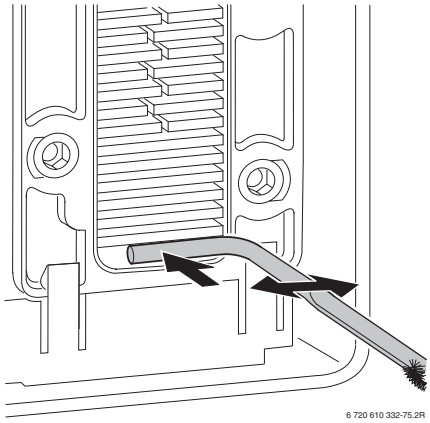


Fig. 52

- Refit the clean-out cover using a new seal and tighten screws to torque of approx. 5 Nm.

Burner

- Check that the gas cock is turned off and the master switch is in the OFF position.
- Remove the clips (1) and unscrew the two bolts (2). Refer to fig. 53.
- Unscrew and remove the two hexagon screws securing the fan (3).
- Slacken fully the rear securing bolt (4).
- Remove the burner coverplate.

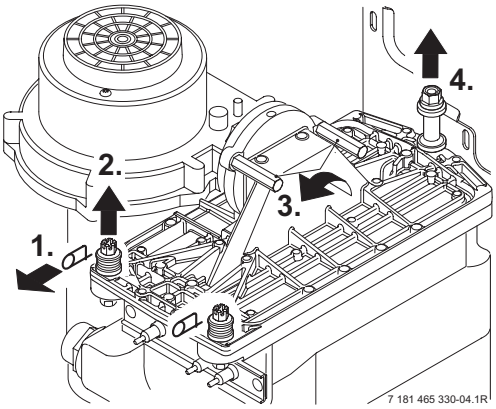


Fig. 53

- Remove the burner skin and clean components. Do not use a wire brush. Refer to fig. 54.

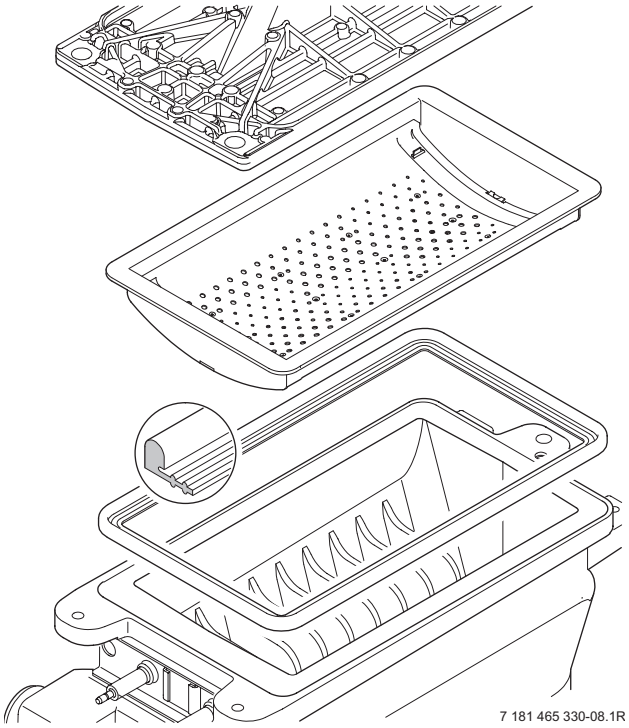


Fig. 54

- Re-assemble burner in reverse order using a new seal.
- Adjust gas/air ratio. Refer to section 7.2.

Condensation trap

In order to prevent spillage of condensate, the condensation trap should be completely removed, (see page 34, fig. 49).

- Unscrew condensation trap and check connection to heat exchanger is clear.
- Remove condensation trap cover and clean.
- Fill condensation trap with approx. 1/4 l of water and refit.

Electrode assembly

- Switch off the master switch.
- Pull off the leads from the electrodes. Refer to fig. 2.
- Unscrew the two fixing screws and carefully remove the electrode assembly. Refer to fig. 48.
- Clean the electrodes with a non-metallic brush. (The spark gap should be 4,5 mm ± 0,5 mm.)
- Replace and re-connect the assembly taking care not to mislay the inspection window.

Diaphragm in mixer unit

▶ Take care not to damage diaphragm (443) when removing and refitting it.

- ▶ Open mixer unit (29).
- ▶ Carefully withdraw diaphragm (443) from fan intake tube and check for soiling and splits.

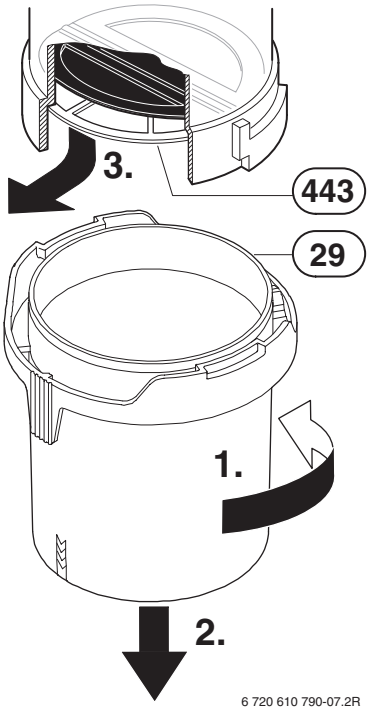


Fig. 55

- ▶ Carefully refit diaphragm (443) the correct way round into the fan intake tube.

The flaps of the diaphragm (443) must open upwards.

- ▶ Seal the mixer unit (29).

Siphon

- ▶ Unscrew the clip and disconnect the pipe to the siphon.
- ▶ Remove the yellow plug to drain the siphon.
- ▶ Unscrew the securing nut from beneath the side facia and remove the siphon. Refer to figure below.
- ▶ Refit and prime the siphon.

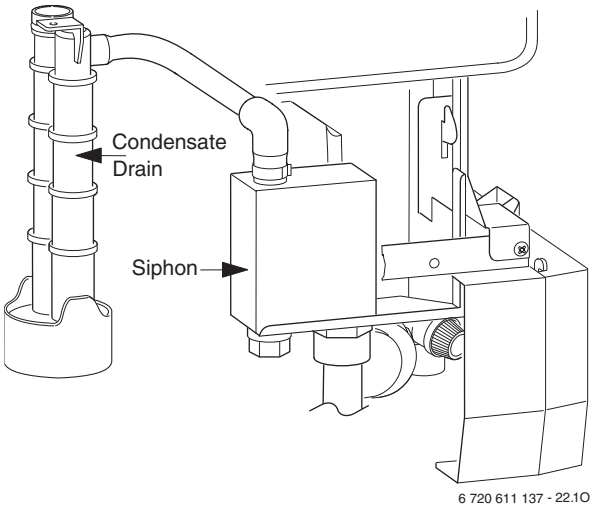


Fig. 56

Electrical wiring

- ▶ Check the electrical wiring for physical damage and replace any damaged wires.

8.3 Replacement of Parts

Before changing any components check that the gas is turned off and that the appliance is electrically isolated. When necessary close the system valves and drain the appliance.
Refitting is a reverse of the procedure for removal using new seals or o-rings as appropriate.

8.3.1 PCB control board and transformer

- ▶ Switch off the appliance.
- ▶ Disconnect appliance from the power supply.
- ▶ Unplug all connectors from the control box (inc. keyed plug). Access is gained by removing the covers. Refer to fig. 27, 28.
- ▶ Remove screw holding power connector earth lead and remove earth lead.
- ▶ Remove two top fixing screws from the control box. Refer to fig. 57.

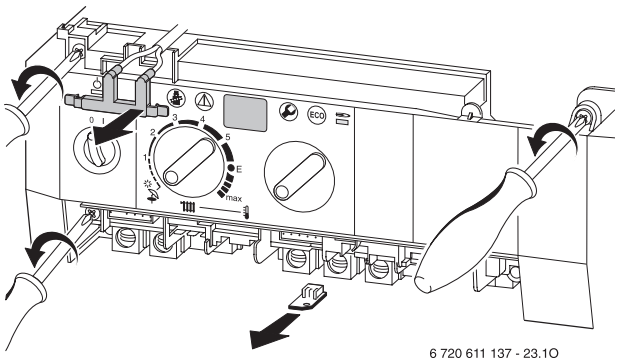


Fig. 57

- ▶ Lower the control box.
- ▶ Unscrew earth lead.
- ▶ Unscrew four fixing screws from cover plate. Refer to fig. 58.
- ▶ Prise off cover plate.
- ▶ Pull off transformer.
- ▶ Remove pcb holder.
- ▶ Remove the pcb control board.

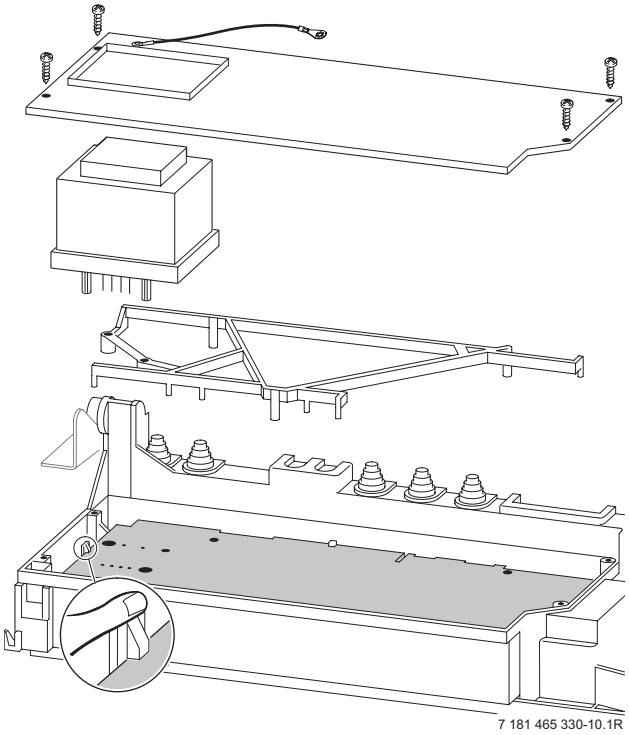


Fig. 58

Fuses

- ▶ Remove the connections covers. Refer to fig. 27, 28.

The fuses are located adjacent to the mains connector block and connector ST18. Refer to fig. 4.
Fuse, item 312, is only replaceable by removing the pcb.
Spare fuses are fixed to the connections cover.
A fuse pack is available: Part number 8 744 503 010 0.
The external fuse must be to BS 1362.

8.3.2 Fan Assembly

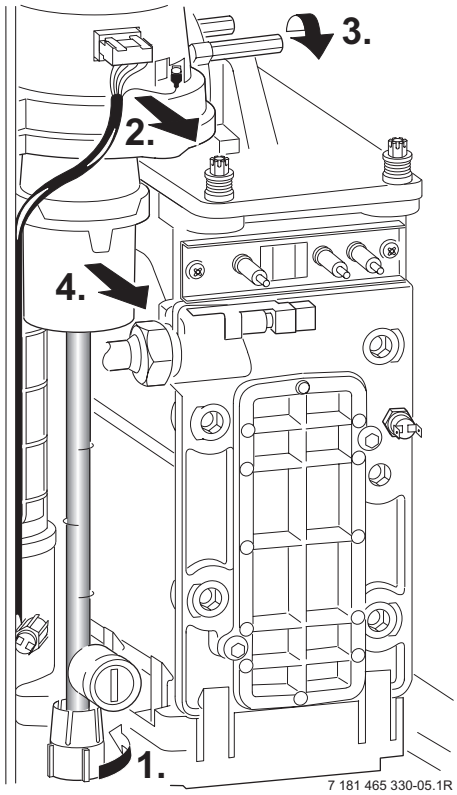


Fig. 59

- Switch off the appliance.
- Disconnect the appliance from the power supply.
- Undo lower pipe union on gas pipe (1.). Refer to fig. 59.
- Remove fan lead and earth connector (2.). The earth connector has a positive clip fixing.
- Remove fixing screws attaching fan to the burner cover (3.).
- Remove fan together with gas pipe and mixer unit.
- Separate the fan from the pipe and mixer unit by twisting the mixer unit to release it (4.).

8.3.3 Sensors

- Check that the appliance is electrically isolated.

Central Heating Flow Temperature Sensor – Item 36, fig. 2, 57

- Pull-off the connector.
- Release the sensor clip and withdraw the sensor.
- Apply heat transfer paste to the replacement sensor.

Safety Temperature Limiter – Item 6, fig. 2, 57

- Pull-off the connectors.
- Unscrew the sensor.

Flue Temperature Limiter – Item 9, fig. 2, 57

- Pull-off the connectors.
- Unscrew the sensor.

8.3.4 Gas Valve

- Check that the gas cock is turned off.
- Lower the control panel. Refer to fig. 60.

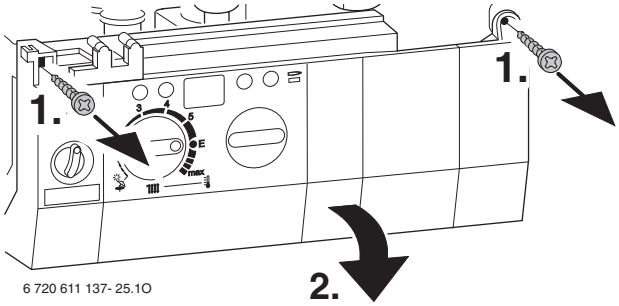
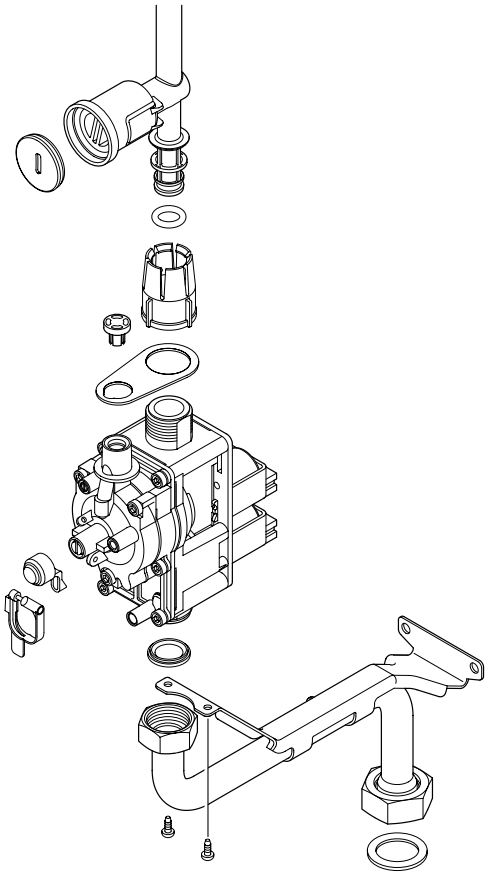


Fig. 60

- Pull off the solenoid connections at the rear of the valve.
- Undo the union, within the inner casing, securing the valve to the gas/air tube. Refer to fig. 59.
- Remove the white plastic cap from the gas valve.
- Release the gas inlet union at the manifold assembly.
- Unscrew the two screws securing the gas valve assembly bracket to the back panel and withdraw the assembly.
- Transfer the bracket and inlet pipe assembly to the new gas valve.
- Check for gas soundness when the new gas valve has been fitted.
- Recheck the combustion performance as described in section 7.1.



6 720 610 602 - 04.1O

Fig. 61

8.3.5 Electrode assembly

- Refer to section 8.2.
- Use a new seal if the existing seal is damaged.

8.3.6 Pressure Relief Valve

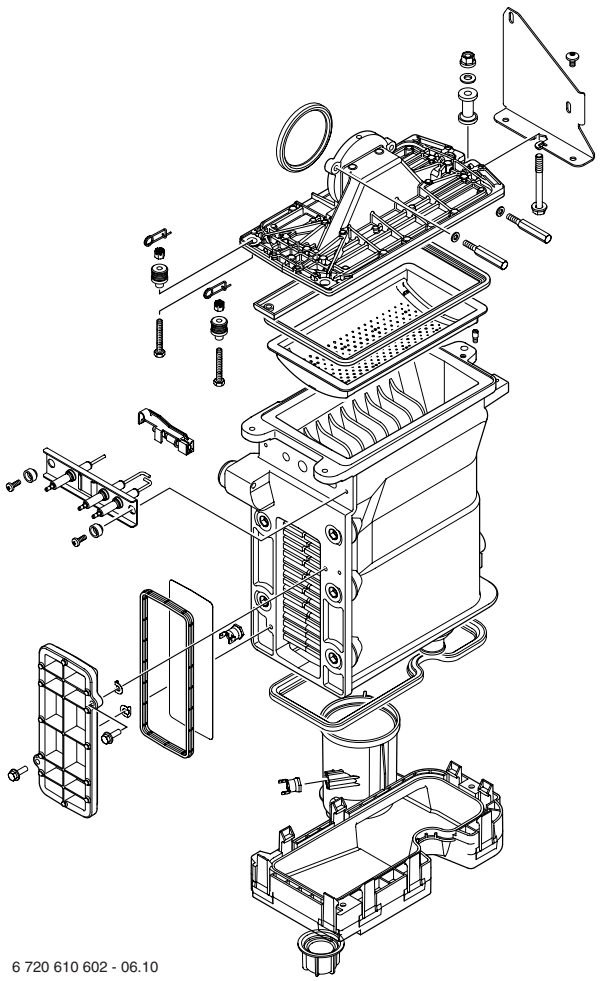
- Drain the appliance.
- Disconnect the drain pipe from the valve. Refer to fig. 32.
- Pull-out the clip securing the valve.
- Pull-out the valve.
- Ensure that the replacement valve is fully entered before fitting the clip.

8.3.7 Burner

- Refer to section 8.2.

8.3.8 Primary Heat Exchanger

- Drain the appliance.
- Check that the gas supply is turned off.
- Check that the appliance is electrically isolated.
- Remove the fan assembly complete with the gas/air tube and mixer assembly. Refer to section 8.3.2.
- Remove the burner. Refer to section 8.2.
- Disconnect the sensors. Refer to section 8.3.3.
- Undo the central heating flow union.
- Undo the grey plastic cap at the base of the heat exchanger.
- Unscrew and remove the condensate trap. Refer to section 8.2.
- Unscrew and remove the two screws securing the heat exchanger top bracket to the rear panel.
- Lift up the flue duct, item 271, refer to fig. 2.
- Pull forward from the top and lift the heat exchanger from the casing.
- Transfer components, as necessary, to the new heat exchanger.
- Ensure that all the seals are in place and all of the connections are tight before re-commissioning the appliance.



6 720 610 602 - 06.10

Fig. 62

9 Appendix

9.1 Fault Codes

More detailed fault finding procedures are described in the Service booklet for the Engineer number 7 181 465 346.

Display code	Description	Remedy
A8	Break in communication	Check connecting lead to programmer
AC	Module not detected.	Check connecting lead between TA211E/ TR212E and Heatronic
b1	Keyed plug not detected.	Insert keyed plug correctly, test and replace if necessary.
C1	Fan speed too low.	Check fan lead and connector, and fan; replace as necessary.
d3	Jumper 8-9 not detected.	Connector not connected, link missing, under-floor heating limiter tripped.
E2	CH flow NTC sensor defective	Check CH flow NTC sensor and connecting lead.
E9	Safety temp. limiter in CH flow has tripped.	Check system pressure, check safety temp. limiters, check external pump operation, check fuse on pcb, bleed appliance.
EA	Flame not detected.	Is gas cock turned on? Check gas supply pressure, power supply, igniter electrode and lead, ionisation sensing electrode and lead, flue duct and CO_2 level.
F0	Internal error.	Check electrical connector contacts, programmer interface module ignition leads are not loose; replace pcb if necessary.
F7	Flame detected even though appliance switched off.	Check electrode assembly, dry pcb. Flue clear?
FA	Flame detected after gas shut off.	Check gas valve and wiring to gas valve. Clean condensation trap and check electrode assembly. Flue clear?
Fd	Reset button pressed by mistake.	Press reset button again
P1, P2, P3, P1...	Please wait, initialisation in progress.	24 V fuse blown. Replace fuse.

Table 16

9.2 Short parts list

Key	Description	Qty GC	Spare part number
1	Sensor - Flue gas temp.	1	8 729 000 144 0
2	Sensor - CH flow temp.	1	8 714 500 087 0
3	Control board	1	8 748 300 418 0
4	Gas valve	1	8 747 003 516 0
5	Fan assembly	1	8 717 204 373 0
6	Fan washer	1	8 729 000 183 0
7	Relief valve	1	8 717 401 012 0
8	Electrode assembly	1	8 718 107 077 0
9	Electrode lead	1	8 714 401 999 0
10	Burner skin seal	1	8 711 004 168 0
11	Transformer - facia	1	8 747 201 358 0
12	Heat exchanger washer	1	8 710 103 153 0
13	Washer set Condensation Trap	1	8 710 103 154 0
14	Fuse set	1	8 744 503 010 0
15	Primary heat exchanger	1	8 715 406 615 0

Table 17

9.3 Heating settings (N.G)

Display code	Heat output, kW	Heat input, kW	Natural gas G20 Gas vol. flow rate (l/min at $t_V/t_R = 80/60$ C)
30	8.2	8.3	14.5
40	11.0	11.1	19.4
50	13.7	13.9	24.2
60	16.5	16.6	29.1
70	19.2	19.4	33.9
80	21.9	22.2	38.8
90	24,7	24.9	43.6
100	27.4	27.7	48.5

Table 18

9.4 Heating settings (L.P.G)

Display code	Propane	
	Heat output kW	Heat input kW
40	11.0	11.1
50	13.7	13.9
60	16.5	16.6
70	19.2	19.4
80	21.9	22.2
90	24,7	24.9
100	27.4	27.7

Table 19

9.5 Operational Flow diagram

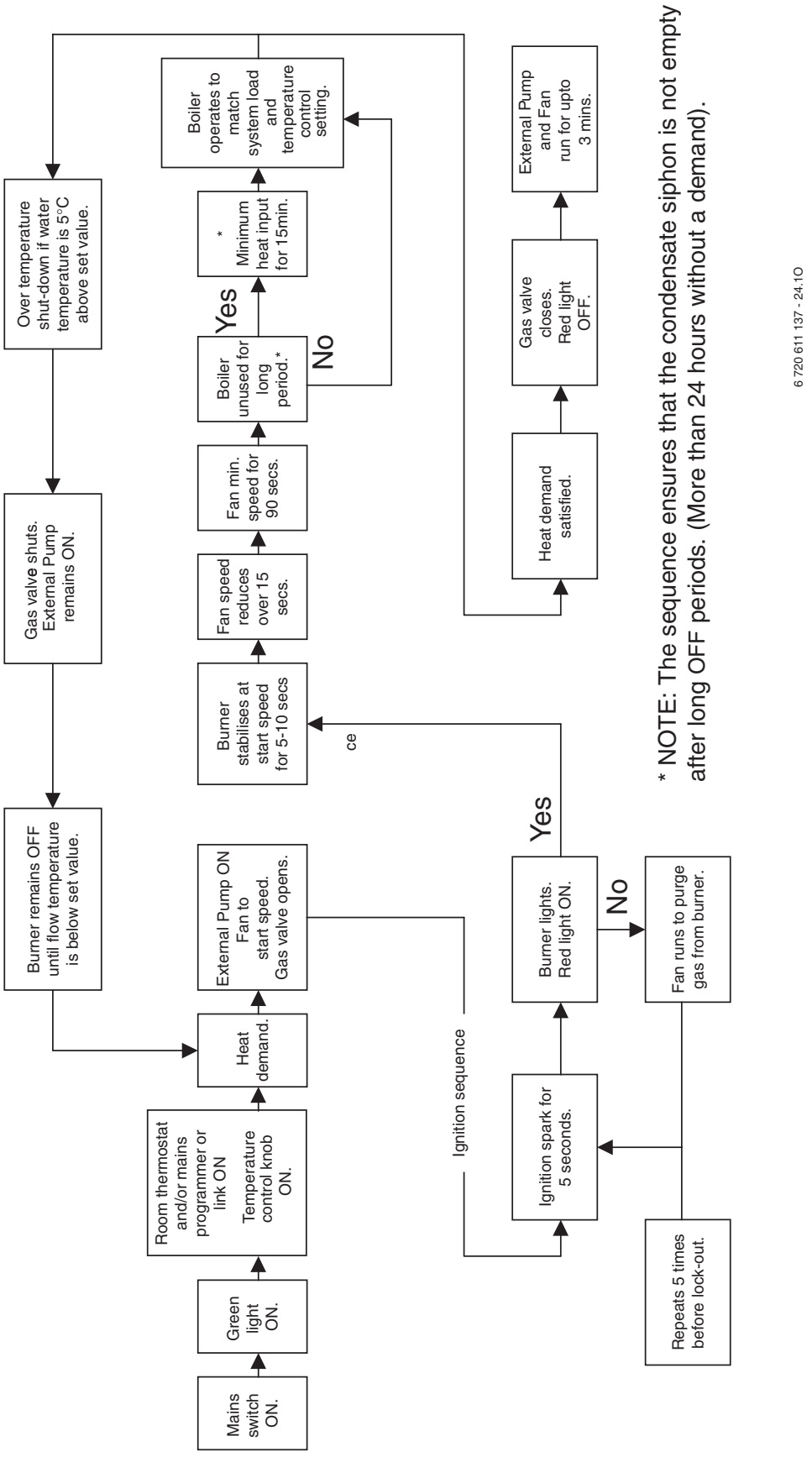


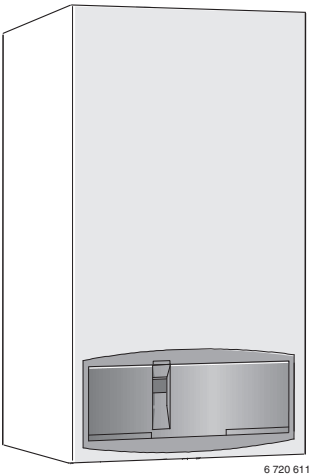
Fig. 63

EXCELLENCE COMES AS STANDARD

Worcester Heat Systems Limited, Cotswold Way, Warndon, Worcester WR4 9SW.
Telephone: (01905) 754624 Fax: (01905) 754619

Users Instructions and Customer Care Guide

R 29 / R 40 HE conventional Condensing boiler



6 720 611 441-00.1O

ZB 7-28 R 29 HE GC-Number: 41 311 60
ZB 11-40 R 40 HE GC-Number: 41 311 61

GB/IE

benchmark

WORCESTER
Bosch Group

6 720 611 138 GB (04.05) OSW

Contents

Excellence comes as standard

Thank you for purchasing a Worcester Greenstar condensing appliance.
The Worcester Greenstar Series has been developed by the Bosch Group and the strictest quality control standards are demanded throughout every stage of production.
Indeed, the Bosch Group have led the field in innovative appliance design and performance for many years.
The result is that your new Greenstar appliance offers you the very best of everything – quality, efficiency, economical running costs, proven reliability and value for money.
What's more, you also have the assurance of our no nonsense 2 year parts and labour guarantee.
And it's backed up by Worcester Care Call a complete maintenance scheme to keep your boiler operating at peak condition and efficiency.
No wonder that more and more people are agreeing that when it comes to gas, it has to be a Worcester Bosch appliance.

Benchmark

The "Benchmark" initiative is the new code of practice to encourage the correct installation, commissioning and servicing of domestic central heating boilers and system equipment.

The "log-book" is a vital document that must be completed by the installer at the time of installation. It confirms that the boiler has been installed and commissioned according to the manufacturers instructions and is one of the methods of demonstrating compliance with the Building Regulations.

Without the completion of the "log-book", manufacturers may refuse to respond to a call–out from a householder, who will be advised that he or she must call back the installer, who has not fulfilled his obligations to record the information required by the initiative.

EIRE ONLY

The CE mark to indicates manufacture to EU safety requirements.

This appliance must be installed only by a competent person to the requirements of IS 813.

Make sure your installer hands you a certificate confirming compliance with IS 813 and that you read carefully the instruction book suppplied with this appliance.

Keep the instruction book and compliance certificate for future reference.

Safety precautions

Gas Safety (Installation and Use) Regulations

It is the law that all gas appliances are installed by a competent person in accordance with the above regulations. Failure to install appliances correctly could lead to prosecution. It is in your interest, and that of safety, to ensure compliance with the law.

If you smell gas:

- Turn off gas service cock at the meter.
- Open all doors and windows.
- Do not operate any electrical switches.
- Do not smoke.
- Extinguish any naked flames.
- Call your gas company.

If you smell fumes from the appliance:

- Switch off appliance.
- Open windows and doors.
- Inform your heating engineer.

Fitting and modifications

- Fitting of the appliance or any modifications to the appliance may only be carried out by a competent person.
- Flue systems must not be modified in any way.

Maintenance

- We **recommend that you** take out a maintenance contract with a competent installer and have the appliance serviced at regular intervals.
- Ensure that your Service Engineer uses only genuine spare parts!

Combustible materials

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

Health and safety

- This appliance contains no asbestos products.
- There is no potential hazard due to the appliance being electrically unsafe.
- There are no substances used in the construction that are a potential hazard in relation to the COSHH Regulations (Control of Substances Hazardous to Health Regulations).

Combustion Air/Ambient Air

- Keep combustion air/ambient air free of corrosive substances (e.g. halogenated hydrocarbons which contain chlorine or fluorine compounds). In this way corrosion can be prevented.

1 General notes

To get the best from your appliance please read these instructions carefully.

Central heating systems

During the first few hours of operation of the central heating system, check that all radiators are being heated at an even rate. If the top of a radiator is at a lower temperature than the bottom then it should be vented by releasing air through the venting screw at the top of the radiator. Ask your installer to show you how this is done. Repeated venting will reduce the quantity of water in the system and this must be replenished for safe and satisfactory operation of the appliance. An open vented system will re-fill automatically.

Should water leaks be found in the system or excessive venting is required then a service engineer must be contacted to inspect the installation and rectify any fault.

Only additives that are compatible with aluminium may be used in the system. Any incompatible additive used will invalidate the guarantee. Contact Fernox or Sentinel for further details.

Condensate drain

This is a condensing appliance and the terminal will, at times, give out a plume of water vapour. This is quite normal.

The appliance produces quantities of condense which is discharged regularly through the siphon.

Ventilation

This is a room sealed appliance and does not require any air for combustion from inside the house. If the appliance is fitted into a cupboard or a compartment is built around the appliance after installation then the compartment must be separated from the boiler space by a perforated non-combustible partition as described in BS6798.

Notwithstanding the requirements of BS6798, there is no need for ventilation openings to be provided in the compartment because of the low heat loss from the casing.

Do not allow the flue terminal fitted on the outside wall to become obstructed or damaged.

Clearances

Your installer will have provided adequate space around the appliance for safety and servicing access. Do not restrict this space with the addition of cupboards, shelves etc. next to the appliance.

Left-hand side	10 mm
Right-hand side	10 mm
In Front	600 mm
Above Casing (Vertical Flue)	200 mm
Above Flue Turret	30 mm
Below	200 mm

Table 1

Room thermostat

A room thermostat should be fitted to control the central heating. Refer to the instructions supplied with the thermostat for information on siting and setting.

Thermostatic radiator valves

It is recommended that this type of valve is fitted to all the radiators. It is a requirement that they are fitted, at least, in the sleeping areas.They should conform to the requirements of BS2767:10.

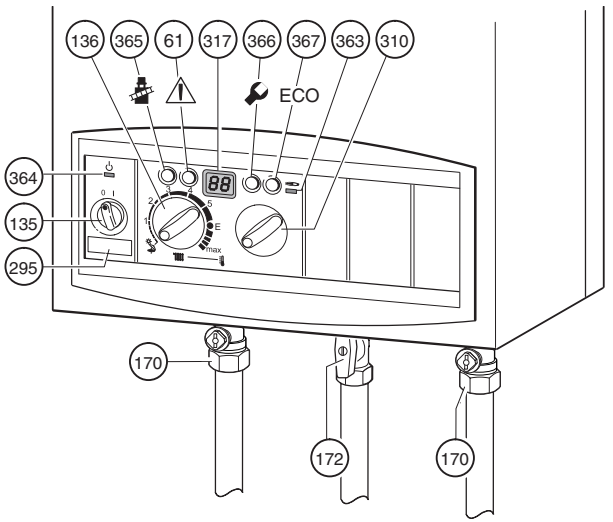
Time Control

Separate time control of the space heating and the hot water system is required using a twin-channel programmer or two or more separate timers.

Cylinder Thermostat

A cylinder thermostat must be fitted to the cylinder which, when used with a motorised valve, will give close control of the water temperature.

2 Controls



61 Reset button
135 Master switch
136 Boiler temperature control
170 Service valves in boiler flow and return
172 Gas isolation valve (open)
295 Identification sticker
310 Function control (Service only)
317 Display
363 Indicator lamp for “burner on”
364 Indicator lamp for “off/on”
365 “Chimney sweep” button
366 Service button
367 No function

3 Operating the Appliance

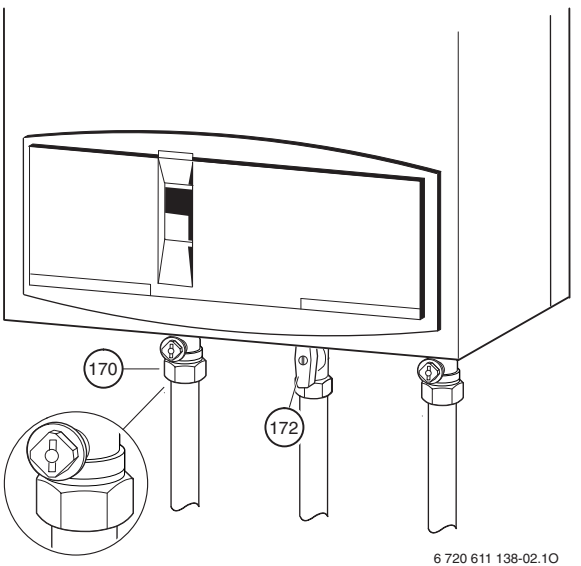
3.1 Preparation

Turn on the gas cock (172).

- Press in the handle and turn it anti-clockwise as far as the stop (when handle is in line with direction of flow, the cock is open).

Central heating system valves (170)

- Using a spanner, turn square nut until groove is in line with direction of flow (see detail).
  Groove at right angles to direction of flow = off.

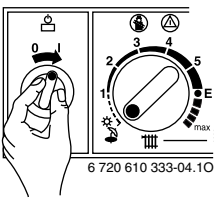


6 720 611 138-02.1O

3.2 Switching the Appliance On/Off

Switching on

- Switch on the appliance at the master switch (**I**).
  The indicator lamp shows green and the display will show the primary flow temperature.



If the display alternates between **-II-** and the boiler flow temperature, the trap filling programme is active.

The trap filling programme ensures that the condensation trap is filled after the appliance has been installed or after the appliance has been out of use for a long period. For that reason, the appliance remains at minimum heating output for 15 minutes.

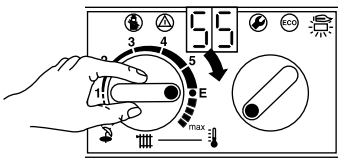
Switching off

- Switch off the appliance at the master switch (**0**).
  The green indicator lamp goes out.

3.3 Switching on the System

- Turn the temperature control to the desired level:
  - "**Min**" setting: 35°C
  - Low-temperature heating: setting "**E**" (approx. 75°C)
  - "**Max**" setting: 88°C

  When the burner is lit, the **red** indicator lamp is illuminated.



6 720 611 138-05.1O

3.4 Controlling

- Set room thermostat to the desired room temperature.
- Set the external time clock to the desired time periods.
- Set the thermostatic radiator valves to the desired settings.

3.5 Setting the Hot Water Temperature of a Cylinder

Hot water temperature

The hot water temperature can be set to between approx. 40°C and 60°C using the thermostat on the cylinder.

The domestic hot water temperature is not shown on the display.

3.6 Frost protection

▶ Leave master switch switched on.

If the appliance is to be left for long periods switch the central heating off:

▶ Add a suitable anti-freeze fluid to the water in the central heating system.
Suitable products are available from Betz-Dearborn Tel.: 0151 4209563 and Fernox Tel.: 01799 550811.

3.7 Fault Condition

In the unlikely event of a fault occuring while the appliance is in operation:

The display then shows a fault code and the button ⚠ may also flash.

If the button ⚠ flashes:

▶ Press and hold the button ⚠ until the display shows "**– –**". The appliance will then start up again and the display will show the boiler flow temperature.

If the button ⚠ does not flash:

▶ Switch the appliance off and then on again at the master switch.
The appliance will start up again and the boiler flow temperature will be displayed.

If the fault remains and can not be cleared:

▶ Call your approved installer or Worcester Bosch Customer Services for assistance, giving a description of the fault and, if possible, the fault code from the facia display.

4 Tips on saving energy

Heating economically

The boiler is designed to provide a high level of comfort while keeping gas consumption and the resulting environmental effect as low as possible. The gas supply to the burner is controlled according to the level of demand for heat. The boiler continues to operate with a low flame if the demand for heat reduces. The technical term for this process is modulating control. Modulating control keeps temperature fluctuations small and provides even distribution of heat throughout the home. This means that the boiler may stay on for relatively long periods but will use less gas than an appliance that continually switches on and off.

Central heating systems with room thermostats/thermostatic radiator valves

The temperature control on the boiler should be set to the maximum rated temperature of the central heating system or to position "**E**", when the maximum central heating water temperature obtained is 75°C.
The temperature can be set individually in each room (except primary room with the room thermostat) using the thermostatic radiator valves. If you wish to have a lower temperature in the primary room than in the other rooms, leave the room thermostat at the set temperature and turn down the radiator using the radiator valve.

Reduced-output operation

Considerable fuel savings can be made by slightly reducing the room temperature. Lowering the temperature by 1 °C can bring about energy savings of up to 5 %. However, it is not advisable to allow the room temperature to fall below +15 °C. The room temperature for reduced-output mode can be set separately on the room thermostat. Instructions are given in the control unit operating instructions.

Hot water

A lower setting on the hot water cylinder thermostat can result in considerable energy savings.

Now you know how to heat your home economically with the Greenstar gas condensing boiler. If you have any other questions, please contact your installer – or write to us.

5 General Information

Cleaning the Outer Case

Wipe down the outer case with a damp cloth. Do not use abrasive or caustic cleaning agents.

Appliance details

If you ever need to call Customer Services it helps us a great deal if you can provide precise details of your appliance.

The information is printed on the appliance identification plate/ sticker (see page 9, item 295).

Your installer will have completed the Benchmark "log-book" giving details of the boiler together with name, address and registration number. Have the "log-book" to hand when calling a Service Engineer.

6 Maintaining your appliance

Your new Worcester Greenstar gas-fired appliance represents a long-term investment in a reliable, high quality product.

In order to realise its maximum working life, and to ensure it continues to operate at peak efficiency and performance, it is essential that your boiler receives regular, competent servicing and maintenance checks beyond the initial 2 year guarantee period.

If you would like to know more about Worcester's extended warranty options please tick the appropriate box on your warranty registration card.

7 Service

If your R29/R40 should fail to operate correctly or requires servicing, please call Worcester Heat Systems on: 08457 256206.

8 Fault or breakdown

This product is supported in the UK by Worcester Heat Systems Ltd. – part of the Bosch Group.

A specialist factory trained field SERVICE ENGINEER is available to attend a breakdown or manufacturing fault occuring on this appliance.

No charge will be made for parts and/or labour providing:

- An appliance fault is found and the appliance has been installed within the past 24 months. Reasonable evidence of this must be supplied on request i. e. the Benchmark "log-book".
- 2nd year warranty is dependent on annual servicing.

A call-out charge will be made where:

- The appliance has been installed for over 24 months.
  OR
- Our Field Service Engineer finds no fault with the appliance (see **NOTE**).
  OR
- The cause of breakdown is misuse or with other parts of your plumbing/heating system, or with equipment not supplied by Worcester.

NOTE: No appliance fault is found on over 30 % of all service call outs.

If in doubt contact our Technical Helpline on 08705 266241.

IN THE EVENT OF AN APPLIANCE FAULT OR BREAKDOWN please contact your Service Centre. Your service administrator will arrange for an engineer to call with the minimum of delay; under normal circumstances this will be within the period 1-3 working days (excluding weekends) for priority breakdown situations (no hot water and/or heating service).

INVOICES FOR ATTENDANCE AND REPAIR WORK CARRIED OUT ON THIS APPLIANCE BY ANY THIRD PARTY WILL NOT BE ACCEPTED.

9 Your Bosch guarantee

This appliance is guaranteed against faulty material or workmanship for a period of 24 calendar months from the date of installation subject to the following conditions and exceptions.

- That during the currency of this guarantee any components of the unit which are proved to be faulty or defective in manufacture will be exchanged or repaired free of material charges and free of labour charges by Worcester Heat Systems Limited.
- That the householder may be asked to prove the date of installation, that the appliance was correctly commissioned and, where appropriate, the first 2 year service has been carried out to the satisfaction of Worcester Heat Systems Limited when requested.
- That any product or part thereof returned for servicing under the guarantee must be accompanied by a claim stating the Model, Serial Number, Date of Installation.
- That Worcester Heat Systems Limited will not accept responsibility for damage caused by faulty installation, neglect, misuse or accidental damage, the non observance of the instructions contained in the Installation and Users Instructions Leaflets.
- That the appliance has been used only for normal domestic purposes for which it was designed.
- That this guarantee applies only to equipment purchased and used in Great Britain.

This guarantee is given in addition to all your normal statutory rights.

10 Guarantee registration

You should complete and return the postpaid Guarantee Registration Card within 14 days of purchase.

The card will register you as the owner of your new Worcester Greenstar appliance and will assist us in maintaining an effective and efficient customer service by establishing a reference and permanent record for your boiler.

This will not affect your statutory rights in any way.

Important:

For your own record:

Model

. . . . . .

Serial number: . . . . . .

Copy the number of the Guarantee Card: . . . . . .

Type/size: . . . . . .

Date of installation: . . . . . .

Check that the Benchmark "log-book" has been completed by your installer or service engineer.

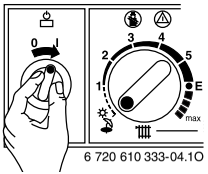
EXCELLENCE COMES AS STANDARD

Worcester Heat Systems, Cotswold Way, Warndon, Worcester WR4 9SW.
Telephone: (01905) 754624 Fax: (01905) 754619

SERIAL NUMBER. Copy the number off the Guarantee Card.

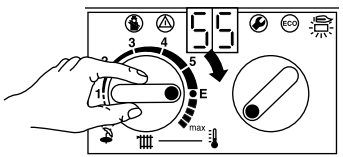
11 Operating Instructions Quick Reference

Switching on



6 720 610 333-04.1O

Switching the system on



6 720 611 138-05.1O

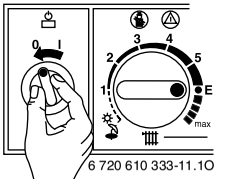
Controlling the system temperature

Set room thermostat to desired temperature or the outside-temperature control unit to the appropriate setting.

Fault Condition

If the ⚠ button flashes, press and hold-in to reset the appliance. Refer to page 13.

Switching off



6 720 610 333-11.1O

Installation and Servicing Instructions

R29 & R40 HE conventional

Wall mounted condensing boiler for central heating

6 720 611 441-00.1O

ZB 7-28 R29 HE GC-Number: 41 311 60
ZB 11-40 R40 HE GC-Number: 41 311 61

GB/IE

benchmark

6 720 611 445 GB (04.05) OSW

WORCESTER
Bosch Group

Contents

Safety precautions

If you smell gas

- Turn off gas service cock at the meter.
- Open windows and doors.
- Do not operate any electrical switches.
- Extinguish any naked flames.
- Telephone your gas company.

If you smell fumes from the appliance

- Switch off appliance (see page 24).
- Open windows and doors.

Fitting and modifications

- Fitting of the appliance or any controls to the appliance may only be carried out by a competent engineer in accordance with the Gas Safety (Installation and Use) Regulations 1998.
- Flue systems must not be modified in any ways other than as described in the fitting instructions.
- This appliance is for use with fully pumped, sealed and open vent systems only.

Maintenance

- **The user is recommended:** to have the system regularly serviced in order to ensure that it functions reliably and safely.
- Use only original spare parts!

Combustible materials

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

Health and safety

- This appliance contains no asbestos products.
- There is no potential hazard due to the appliance being electrically unsafe.
- There are no substances used in the construction that are a potential hazard in relation to the COSHH Regulations (Control of Substances Hazardous to Health Regulations 1988).

Combustion air/Ambient atmosphere

- The combustion air/ambient atmosphere should be kept free of chemically aggressive substances (e.g. halogenated hydrocarbons which contain chlorine or fluorine compounds). This will prevent corrosion.

Instructions to the customer

- Explain to the customer how the appliance works and how to operate it.
- Advise the user that he/she must not make any modifications to the appliance or carry out any repairs on it.
- These instructions are to be left with the user or at the Gas meter.
- Important: These instructions apply in the UK only.

EIRE ONLY

The CE mark to indicates manufacture to EU safety requirements.

This appliance must be installed only by a competent person to the requirements of IS 813.

Make sure your installer hands you a certificate confirming compliance with IS 813 and that you read carefully the instruction book suppplied with this appliance.

Keep the instruction book and compliance certificate for future reference.

Unpacking

IMPORTANT HANDLING INSTRUCTIONS

- Two people should transfer the packaged appliance from the van to the point of installation
- Open the top of the carton, remove and place the component tray and both side bars of the wall mounting frame to one side
- Lie the packaged appliance on its back. (The back has “TRUCK HERE” printed on the carton)
- One person firmly holds the packaging while the other straddles the boiler and slides it from the packaging
- Two persons are then required to lift one end and stand the appliance upright with the flue at the top

Additional requirements for roof space installation

- Two people should use two step ladders and share lifting the unpacked boiler up to the loft hatch
- Where the boiler enters the loft space, tilt and slide the boiler on its back to the point of installation

Check the contents against the packing list.

Symbols

Safety instructions in this document are identified by a warning-triangle symbol and are printed on a grey background.

Notes containing important information are identified by the symbol shown on the left. They are bordered by horizontal lines above and below the text.

1 Details of the appliance

1.1 EC Declaration of Conformity

This appliance is in accordance with the applicable requirements of the Gas Appliance Directive, Boiler Efficiency Directive, Electromagnetic Compatibility Directive and the Low Voltage Directive.

PIN	CE-0085 BL 0507
Category UK	$II_{2H\ 3P}$
Appliance Type	C_{13}, C_{33}

Table 1

1.2 Standard package

- Gas condensing boiler for central heating
- Wall mounting frame
- Fixings (screws etc.)
- Set of documentation for appliance
- Pre-plumbing manifold
- Condensate drain pipe.

1.3 Description of appliance

- Wall-mounted appliance
- Natural gas models are low-emission appliances
- Multi function display
- Bosch Heatronic control system
- Automatic ignition
- Modulating control
- Full safety systems incorporating Bosch Heatronic with flame ionisation monitoring, solenoid valves and temperature sensors
- Concentric flue/air duct with testing point for CO_2/CO
- Regulated speed fan
- Pre-mix burner
- Temperature control for boiler flow
- Safety temperature limiter in 24 V electrical circuit
- Flue gas temperature limiter (105 °C)
- Condensate Trap
- Connecting possibility for 3 port or 2 x 2 port motorised valve systems
- Suitable for fully pumped sealed and open vent systems.

1.4 Accessories

- Standard horizontal flue kit at 100 mm outside diameter for flues up to 4 m in length (3.5m for the R 40 HE).
- Flue duct kits for horizontal (125 mm outside diameter) for flue lengths up to 13m (R 29 HE) or 10m (R 40 HE) and vertical flue systems for flue lengths up to 15 m (R 29 HE) or 12 m (R 40 HE). Fitting instructions are sent with these kits.

1.5 Casing dimensions

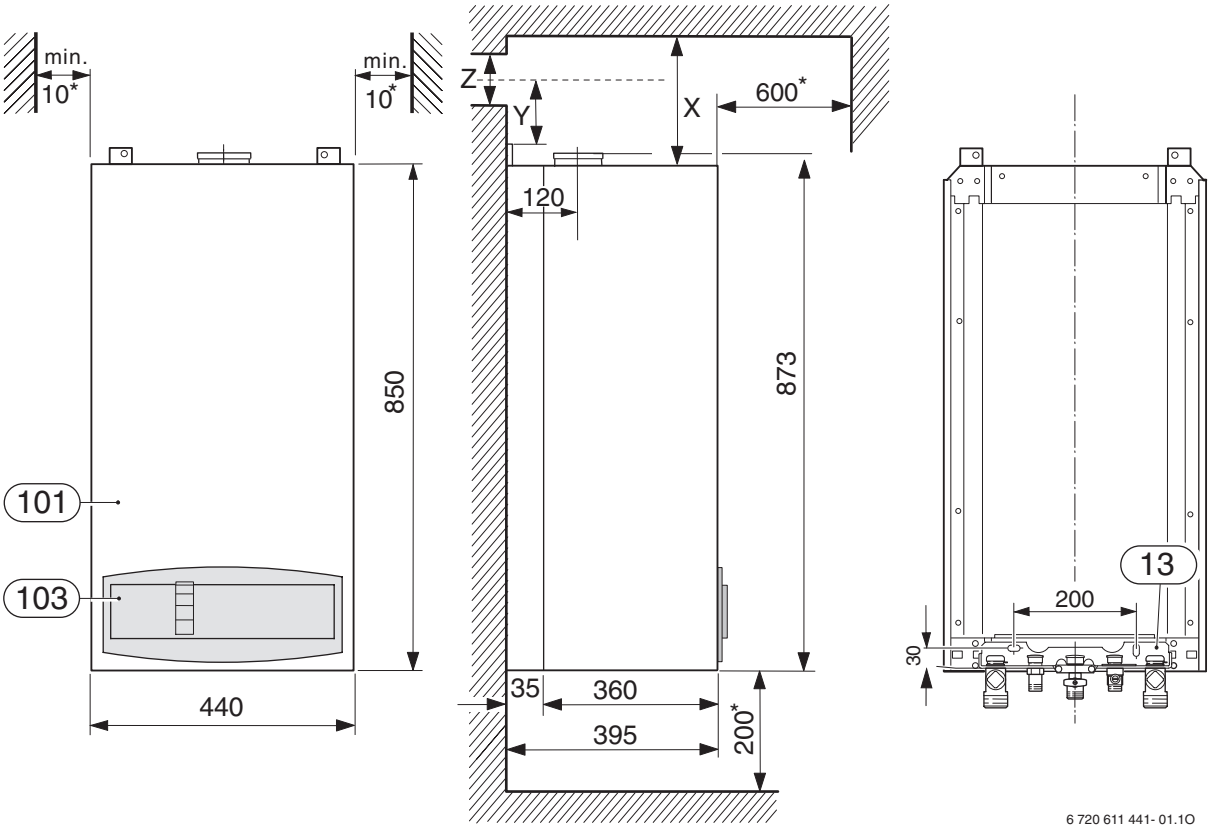


Fig. 1

13 Manifold assembly
101 Outer case
103 Facia cover
X Standard Concentric Horizontal Flue System: min. 160 mm
Alternative Concentric Flue System: min. 220 mm
Y Standard Concentric Horizontal Flue System: 40 mm
Alternative Concentric Flue System: 70 mm
Z Standard Concentric Horizontal Flue System: 105 mm
Alternative Concentric Flue System: 130 mm
***** For servicing the appliance
Note: Horizontal flue only: dimension X may need to increase due to the incline of the flue.

1.6 Layout of appliance

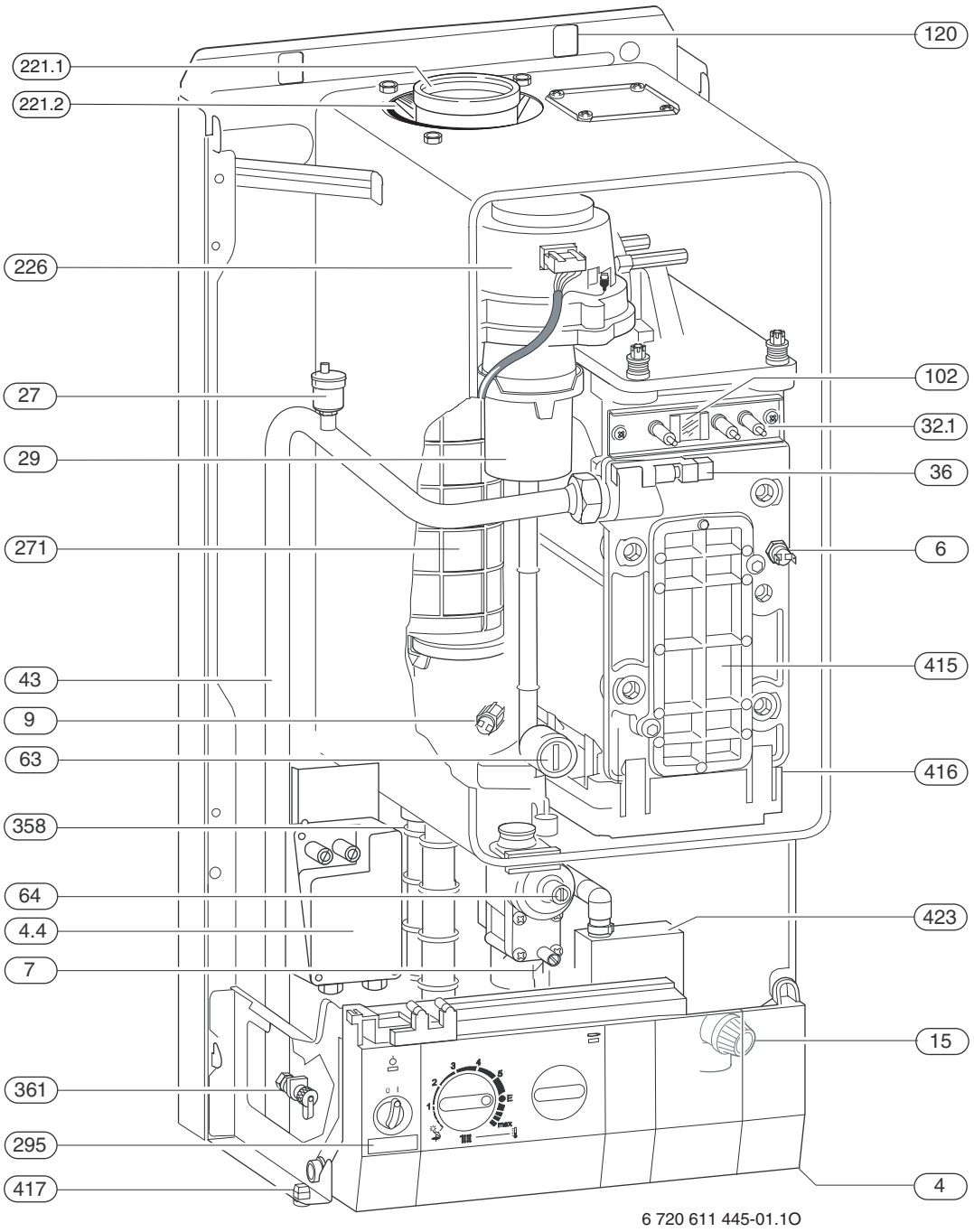


Fig. 2

4 Heatronic control
4.4 Y-S module
6 Heat exchanger safety temperature limiter
7 Testing point for gas supply pressure
9 Flue gas temperature limiter
15 Relief valve
27 Automatic air vent
29 Air gas Mixer unit
32.1 Electrode assembly
36 Temperature sensor in boiler flow
43 Flow pipe
63 Adjustable gas flow restrictor
64 Adjusting screw for min. gas flow volume
102 Inspection window
120 Fixing points
221.1 Flue duct
221.2 Combustion air intake
226 Fan assembly
295 Appliance type sticker
271 Flue duct
358 Condensate trap
361 Drain valve
415 Cover plate for cleaning access
416 Condensate collector
417 Clip for fixing outer case
423 Siphon

1.7 Function

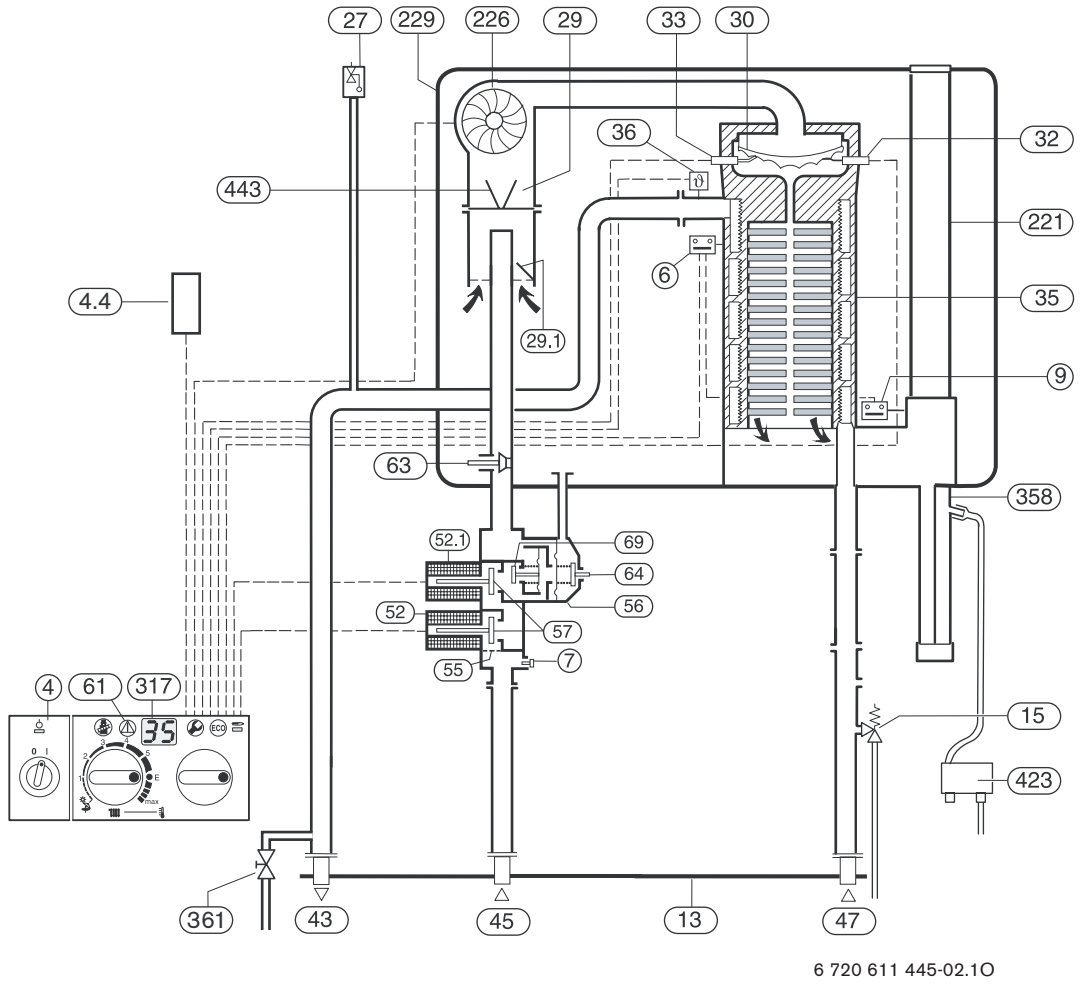


Fig. 3

4 Bosch Heatronic control
4.4 Y-S module
6 Temperature limiter, heat exchanger
7 Testing point for gas supply pressure
9 Flue gas temperature limiter
13 Manifold
15 Safety valve
27 Automatic air vent
29 Mixer unit
29.1 Bi-metallic thermostat for combustion air compensation
30 Burner
32 Flame sensing electrode
33 Igniter electrode
35 Heat exchanger with cooled combustion chamber
36 Temperature sensor in boiler flow
43 Boiler flow
45 Gas inlet
47 Return
52 Solenoid valve 1
52.1 Solenoid valve 2
55 Filter
56 Gas valve CE 427
57 Main valve disc
61 Reset button
63 Adjustable gas flow restrictor
64 Adjusting screw for min. gas inlet flow volume
69 Control valve
221 Flue duct
226 Fan
229 Inner casing
317 Display
358 Condensate trap
361 Drain valve
423 Siphon
443 Diaphragm

1.8 Electrical wiring diagram

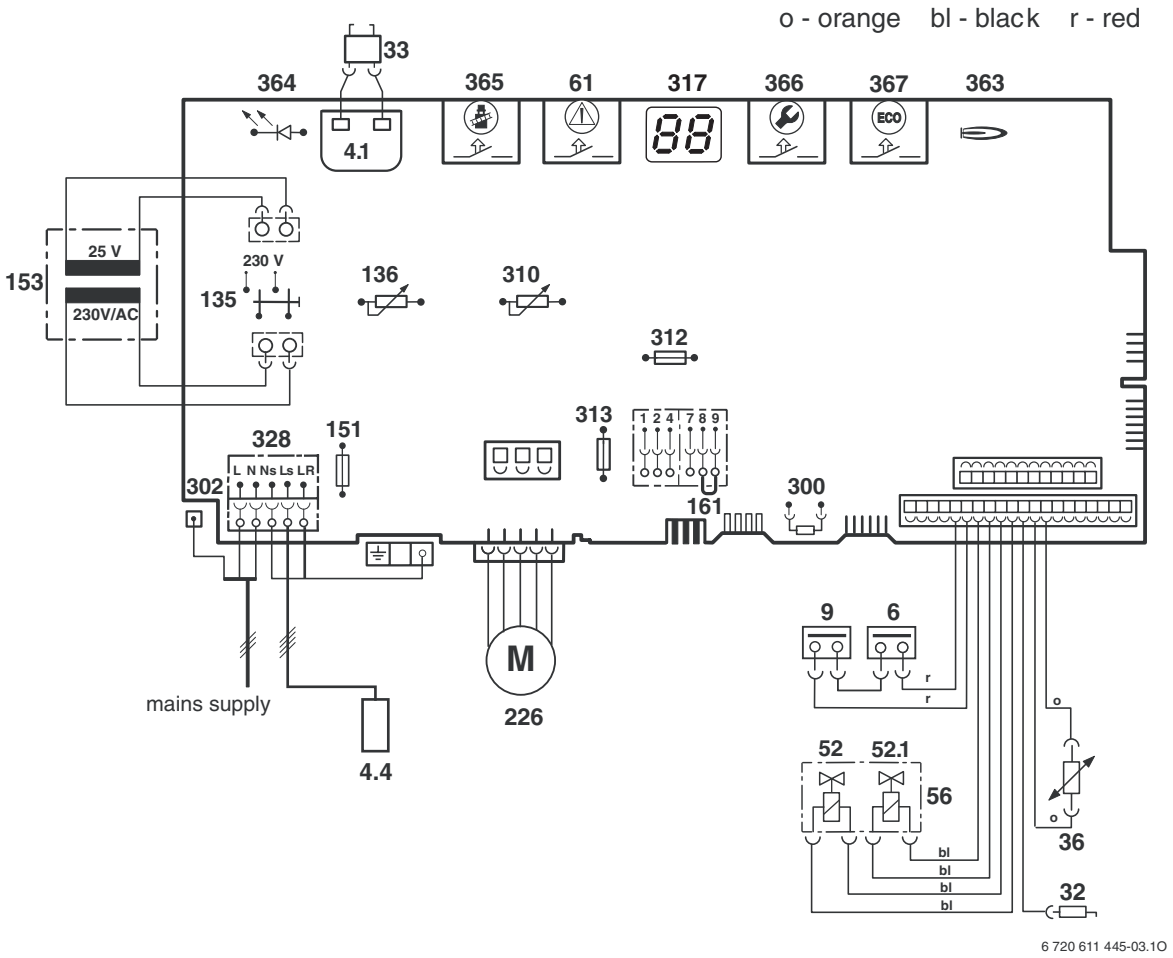


Fig. 4

4.1 Ignition transformer
4.4 Y-S module
6 Temperature limiter, heat exchanger
9 Flue gas temperature limiter
32 Flame sensing electrode
33 Ignition electrode
36 Temperature sensor in boiler flow
52 Solenoid valve 1
52.1 Solenoid valve 2
56 Gas valve CE 427
61 Reset button
135 Master switch
136 Temperature control for boiler flow
151 Fuse, slow 2.5 A, AC 230 V
153 Transformer
161 Link
226 Fan
300 Code plug
302 Earth connection
310 Function control (Service only)
312 Fuse, slow T 1,6 A
313 Fuse, slow T 0,5 A
328 Terminal block for AC 230 V Mains supply
363 Indicator lamp for burner
364 Indicator lamp for power supply
365 “Chimney sweep” button
366 Service button
367 No function

1.9 Technical data

	Units	R 29 HE Natural gas	R 29 HE Propane	R 40 HE Natural gas	R 40 HE Propane
Max. rated heat output net 40/30°C central heating	kW	29.3	29.3	41.4	41.4
Max. rated heat output net 50/30°C central heating	kW	29.0	29.0	41.4	41.4
Max. rated heat output net 80/60°C central heating	kw	27.4	27.4	39.1	39.1
Max. rated heat input net	kW	27.7	27.7	40	40
Min. rated heat output net 40/30°C	kW	8.4	11.6	12.9	16.2
Min. rated heat output net 50/30°C	kW	8.3	11.4	12.8	16.1
Min. rated heat output net 80/60°C	kW	7.4	10.5	11.4	14.3
Min. rated heat input net	kW	7.6	10.8	11.8	14.8
Maximum gas flow rate – After 10 minutes from lighting					
Natural gas G20 (CVnet 34.02 MJ/m^3)	m^3/h	2.9	-	4.2	-
LPG (CVnet 88 MJ/m^3)	kg/h	-	2.1		3.2
Gas supply pressure					
Natural gas G20 (CVnet 34.02 MJ/m^3)	mbar	20	-	20	-
LPG (CVnet 88 MJ/m^3)	mbar	-	37	-	37
Flue					
Flue gas temp. 80/60°C, rated/min. load	°C	67/55	67/55	87/58	87/58
Flue gas temp. 40/30°C, rated/min. load	°C	43/32	43/32	65/43	65/43
Residual delivery pressure (inc. pressure drop in air intake duct)	Pa	80	80	100	100
CO_2 level at max. rated heat output	%	9.2	10.8	9.2	10.8
CO_2 level at min. rated heat output	%	8.8	10.5	9.2	10.8
NO_x-class		5	5	5	5
SEDBUK figure	Band	A	A	A	A
Condensate					
Max. condensation rate (t_R = 30°C)	l/h	2.3	2.3	3.5	3.5
pH-value, approx.		4.8	4.8	4.8	4.8
General Data					
Electrical power supply voltage	AC ... V	230	230	230	230
Frequency	Hz	50	50	50	50
Max. power consumption	W	43	43	113	113
Noise output level	dB(A)	36	36	42	42
Appliance protection rating with blanking plate fitted	IP	X4D	X4D	X4D	X4D
Max. boiler flow temperature	°C	nom. 90	nom. 90	nom.90	nom.90
Max. permissible operating pressure (boiler)	bar	3	3	3	3
Permissible ambient temperatures	°C	0 - 50	0 - 50	0 - 50	0 - 50
Nominal capacity of appliance	l	3.75	3.75	3.75	3.75
Weight (excluding packaging)	kg	43	43	43	43

Table 2

Condensate analysis, mg/l

Ammonium	1.2	Nickel	0.15
Lead	≤ 0.01	Mercury	≤ 0.0001
Cadmium	≤ 0.001	Sulphate	1
Chromium	≤ 0.005	Zinc	≤ 0.015
Halogenated hydrocarbons	≤ 0.002	Tin	≤ 0.01
Hydrocarbons	0.015	Vanadium	≤ 0.001
Copper	0.028	pH-value	4.8

Table 3

Flue system

HORIZONTAL 100 mm – Standard FLUE SYSTEM			
Overall Diameter of Duct	mm	100	Max. R29 4m R40 3.5m (including turret)
Flue Terminal / Duct Assembly Length	mm	600	
Extension Duct Length	mm	1000	

Table 4

VERTICAL 100mm FLUE SYSTEM			
Overall Diameter of Duct	mm	100	Max. (Incl. terminal) R29 6.4 m R40 5.4 m
Flue Terminal / Duct Assembly Length	mm	1140	

Table 5

HORIZONTAL 125 mm FLUE SYSTEM			
Overall Diameter of Duct	mm	125	Max. R29 13m R40 10m (including turret)
Flue Terminal / Duct Assembly Length	mm	1030	

Table 6

VERTICAL 125 mm FLUE SYSTEM			
Overall Diameter of Duct	mm	125	Max. (Incl. terminal) R29 15 m R40 12 m
Flue Terminal / Duct Assembly Length	mm	1365	

Table 7

Elbow - 90 ° Equivalent length 2 m
Bend - 45 ° Equivalent length 1m

Gas supply

Total length of gas supply pipe (metres)			**Pipe diameter (mm)**
3	6	9	
Gas discharge rate (m^3/h)			
8.7	5.8	4.6	22
18.0	12.0	9.4	28

Table 8

2 Installation regulations

Gas Safety (Installation & Use) Regulations 1998: All gas appliances must be installed by a competent person. Failure to install correctly could lead to prosecution.
The manufacturers notes must not be taken, in any way, as overriding statutory obligations.
The appliance must be installed in accordance with the current IEE Wiring Regulations, local Building Regulations, Building Standards (Scotland) (Consolidation), bye-laws of the local Water Company, Health and Safety Document 635 (Electricity at Work Regulations 1989) and any other local requirements.
Product Liability regulations indicate that, in certain circumstances, the installer can be held responsible, not only for mistakes on his part but also for damage resulting from the use of faulty materials. We advise the installer to avoid any risk by using only quality approved branded fittings.
The relevant British Standards should be followed i.e.

- BS 6798: Specification for the installation of gas fired hot water boilers of rated input not exceeding 60kW
- BS 5449: Central Heating for Domestic Premises
- BS 5546: Installation of gas hot water supplies for domestic purposes
- BS 5440:1: Flues and ventilation for gas appliances of rated input not exceeding 70 kW (net): Flues
- BS 5440:2: Flues and ventilation for gas appliances of rated input not exceeding 70 kW (net): Air Supply
- BS 6891: Installation of low pressure gas pipe work installations up to 28 mm (R1).
- BS 7074:1: Code of practice for domestic heating and hot water supply
- BS 7671: Requirements for Electrical Installation.

These instructions must be followed.

3 Installation

▶ Always turn off the gas cock before carrying out any work on components which carry gas.

Fixing of the appliance, gas and flue connections, commissioning of the system and electrical connections may only be carried out by competent persons authorised by CORGI.

3.1 Important remarks

- ▶ Appliance should only be installed in fully pumped sealed and open vent central heating systems.
- ▶ To avoid gas formation in the system, galvanised radiators or pipes must not be used.
- ▶ Do not fit a thermostatic radiator valve on the radiator in the primary room where a room thermostat is used.
- ▶ Add a suitable anti-freeze fluid compatible with aluminium to the water in the central heating system. Suitable products are available from Betz-Dearborn Tel: 0151-4209563 and Fernox Tel: 01799-550811.
- ▶ In our experience, the addition of sealing agents to the water in the central heating system can cause problems (deposits in the heat exchanger). For that reason we advise against their use.

3.2 System

The system must comply with the requirements of BS 6798 and BS 5449.

General

The appliance is only suitable for connection to indirect fully pumped sealed and open vented systems. The minimum static head is 1m and the maximum is 30m.

The controls must be wired to ensure that the boiler does not cycle when the electronically controlled zone valves are closed.

Note 1: An automatic bypass is required if the controls i.e. 2-port valves, can result in the closure of the CH and DHW circuits when the boiler is hot. If mechanically operated thermostatic control valves are fitted on all radiators an automatic bypass is required, located at least 2m from the boiler.

Note 2: A bypass is not usually required for systems using a 3-way diverter valve (with one valve is open to flow at all times) unless TRV's are used throughout the system. Refer to the current Building Regulations or the Good Practice Guide 302 which lists all the above requirements.

Plastic pipes must not be directly connected to the appliance. A copper to plastic transition piece should be positioned a minimum of 600mm from the appliance.

Some plastics are permeable to oxygen and must be avoided, a pipe with a polymer barrier should be used.

Sealed System

A sealed system must include an expansion vessel, pressure gauge and pressure relief valve set to operate at 3 bar - these are available as proprietary kits. The expansion vessel and fittings must be connected at the neutral point of the system on the entry to the pump. Suitable pump and diverter valves are also required. Refer to Fig. 5 & Fig. 6. The sealed system must be filled through a WRAS approved filling kit. Refer to Fig. 7.

The appliance must not be operated without the system being full of water and correctly pressurised.

All connections in the system must be able to withstand a pressure up to 3 bar. The system and appliance must be properly vented. Repeated venting loses water from the system and usually indicates a leak. A drain cock to BS 2879 must be fitted to the lowest point on the system.

No galvanised radiators or pipes must be used.

If any system water treatment is required then only products suitable for use with Aluminium shall be used i.e Fernox- Copal or Super concentrate or Sentinal X100, in accordance with the manufacturers instructions. The use of any other substances will invalidate the guarantee. The pH value of the system water must be less than 8 or the appliance guarantee will be invalidated.

Suitable products are available from Betz-Dearborn Tel: 0151-4209563 and Fernox Tel: 01799-550811.

IMPORTANT: Check that no dirt is left in the water pipe work as this could damage the appliance. Thoroughly flush the heating system and the mains water supply before fitting the appliance to the wall in accordance with the recommendations of BS7593:1992.

Domestic Hot Water

The appliance is NOT suitable for direct water supply.

Do not connect to a direct cylinder.

The appliance can be connected to any indirect cylinder i.e. unvented or thermal store to realise the benefits from a “dry loft”. For more information contact Worcester Heat Systems Helpline 08705 266241.

Note: Indirect coil type cylinders with an immersion calorifier suitable for a pressure of 0.35 bar above the setting of the pressure relief valve may be used. **Single feed indirect cylinders are not suitable for sealed systems.** Any connection to the mains water supply must conform to the relevant Buildings and Water Regulations and be approved by the local water company.

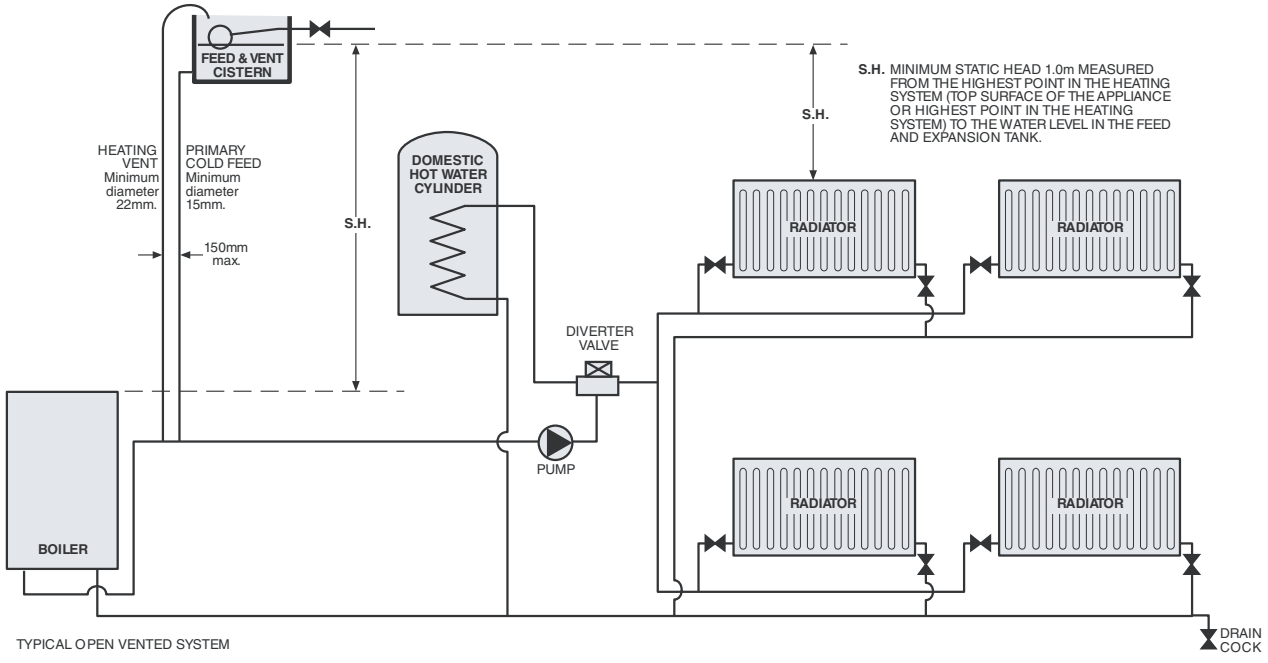


Fig. 5

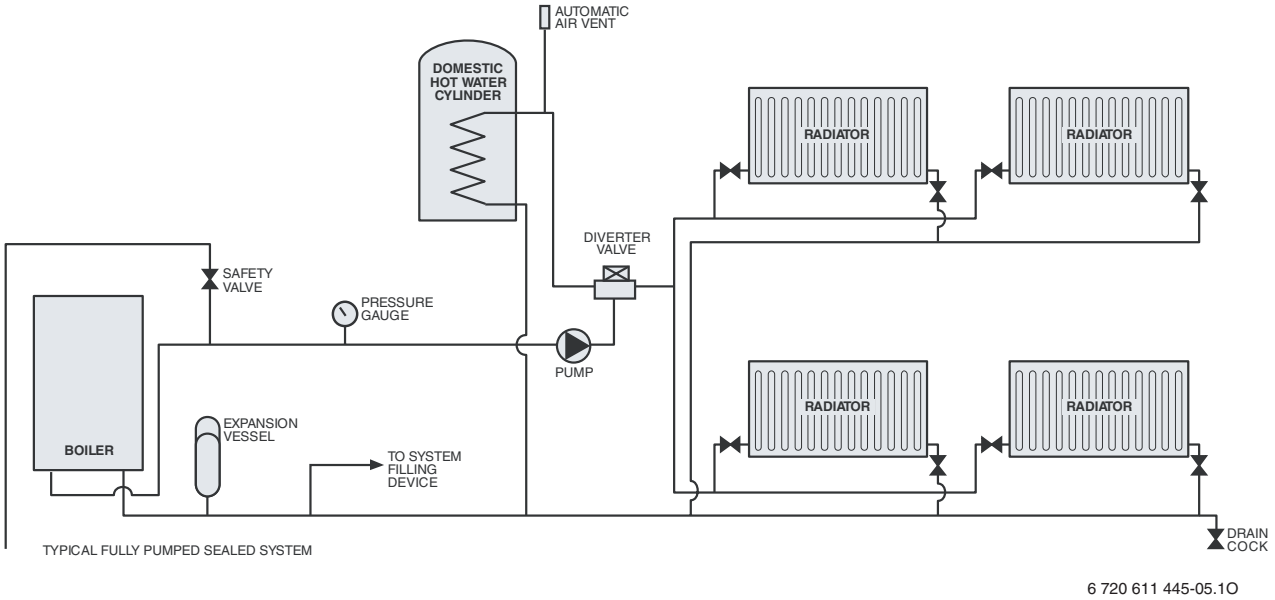


Fig. 6

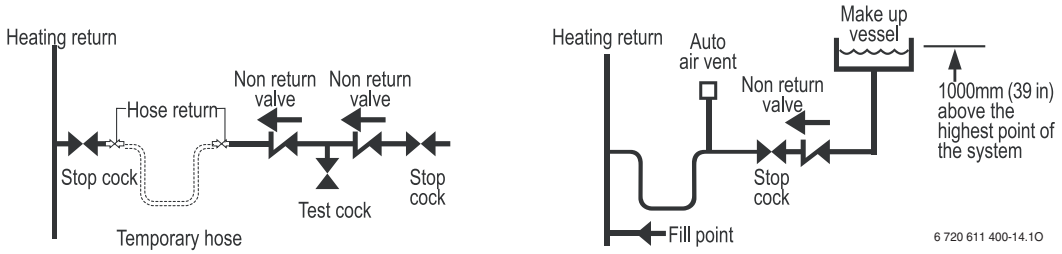


Fig. 7

3.3 Siting the appliance

Regulations concerning the Installation Site

- Relevant national regulations must be complied with section 3.8.1.
- Consult the installation instructions for details of minimum clearances required.

Combustion air

In order to prevent corrosion, the combustion air must not contain any corrosive substances.

Substances classed as corrosion-promoting include halogenated hydrocarbons which contain chlorine and fluorine compounds and are contained in some solvents, paints, adhesives, aerosol propellants and household cleaners, for example.

Surface temperature

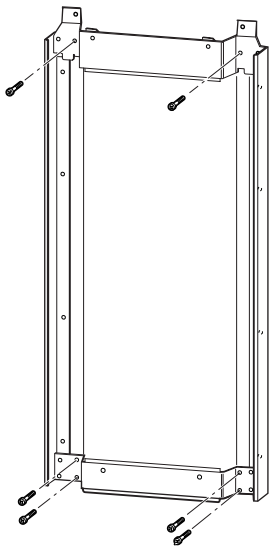
The max. surface temperature of the casing and the flue is less than 85 °C.
This means that, no special safety precautions are required with regard to flammable building materials and fitted furniture. The specified clearances must be maintained.

Cupboard/Compartment

The appliance can be installed in a cupboard/compartment need for airing clothes providing that the requirements of BS 6798 and BS 5440:2 are followed. The low casing losses from the appliance eliminate the need for ventilation openings in the compartment.

3.4 Wall mounting frame assembly

- Take the wall mounting frame out of the package and screw together with 6 screws as shown in fig. 8. Use the inner lugs on the top and bottom horizontal sections.



6 720 610 576-04.1O

Fig. 8

- Hold the wall-mounting frame against the wall ensuring that it is vertical.
- Mark the holes for the wall mounting frame onto the wall, drill and plug the holes and screw the wall mounting frame to the wall with the screws provided.
- Mark the position of the flue duct hole if a rear flue is to be used. Refer to fig. 1 and 17.

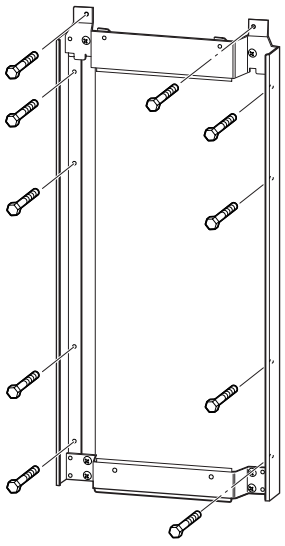


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Fig. 9

- Screw the pre-plumbing manifold with two screws to the wall mounting frame.

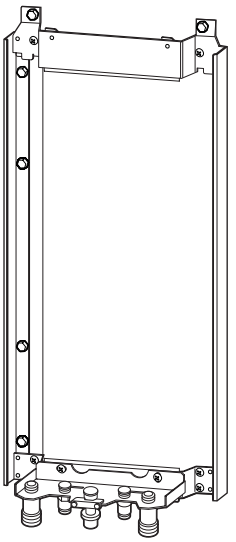

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Fig. 10

3.5 Pre-piping the system

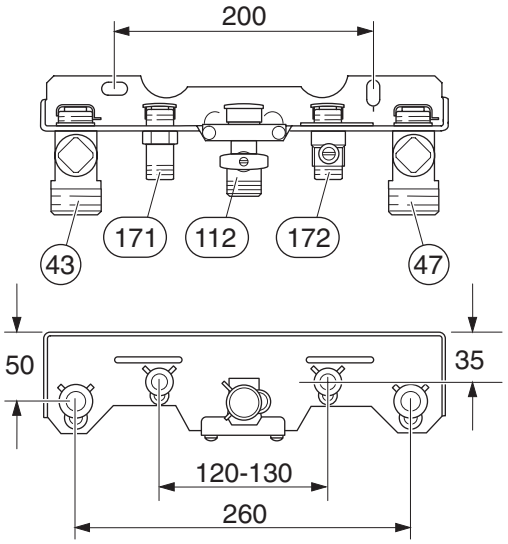

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Fig. 11 Manifold

43 Boiler flow
47 Boiler return
112 Gas cock
171 Not used
172 Not used

- Remove valves 171 and 172 from manifold, see Fig. 11.
- A drain tap should be fitted at the lowest point of the central heating system.

Condensate Termination and Route

The appliance has a built-in syphonic condensate trap eliminating the need for external traps. Connect to the 22mm plastic drain pipe and extend the pipe run away from the control panel and appliance with a constant fall of 2.5° or 45mm in every metre. See Fig. 13.

The condensate pipe can terminate into any of four areas:

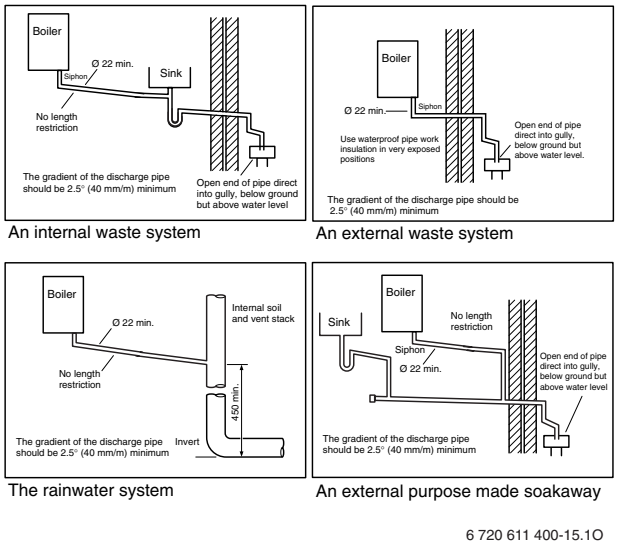


Fig. 12

Whilst all of the above methods are acceptable it is always the best practice to terminate the condense pipe via an internal waste system.This will eliminate the need for any external condensate pipe runs which can be susceptible to freezing in extreme weather.

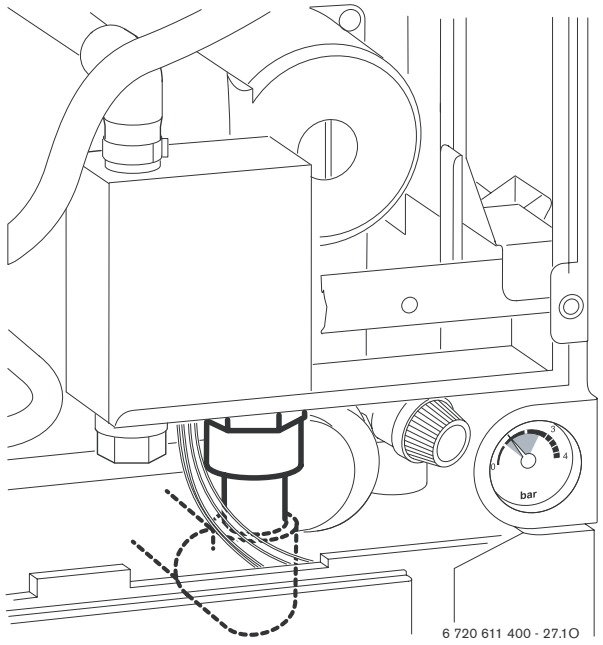


Fig. 13 Recommended route of the condensate drain

External condensate pipework

The syphonic condensate trap collects condensate into a trap which releases it in 100 ml quantities. This helps to prevent the discharge from freezing.

If there is no alternative and the condensate pipe has to be externally run, the following should be considered:

- The pipe run should take the shortest practical route.
- The pipework should be insulated with weather resistant insulation.
- The pipe should terminate as close as possible to the ground or drain, whilst still allowing the condensate to safely disperse. This would prevent wind blowing up the pipe.
- The pipework should be installed with the minimum of horizontal runs and with a downward slope of at least 2.5 °.

3.6 Fitting the appliance

Benchmark: For optimum performance after installation, this boiler and its associated central heating system must be flushed in accordance with the guidelines given in BS5793:1992 “Treatment of water in domestic hot water central heating systems”.

Removing the outer case

The outer case is secured against unauthorised removal by two screws (electrical safety).Always secure the outer case with those screws again after refitting.

- ▶ Remove retaining screws (1.).
- ▶ Slide the outer case upwards and then forwards to remove (2.).

- Remove the plastic caps from the boiler connections.

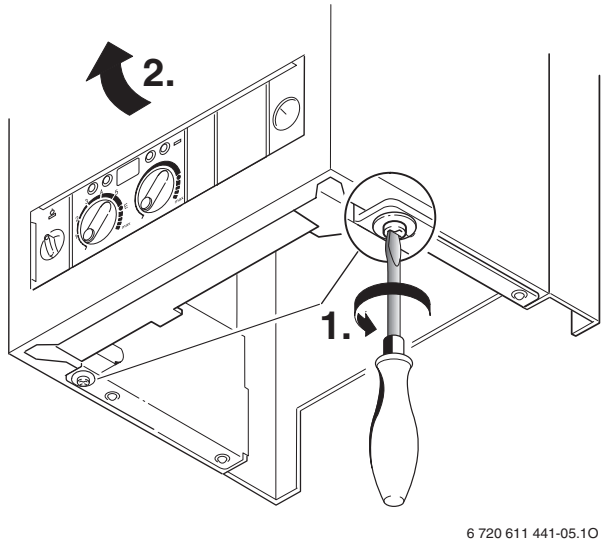


Fig. 14

Fixing the appliance

- Fit the washers onto the gas and water connections.
- Lift the boiler onto the wall-mounting frame. The lugs pass through the rectangular holes in the boiler back panel.
- Take care not to disturb the washers on the connections.

Connecting the flue assembly

- Fit flue duct connector onto appliance flue spigot.
- Secure with screws pre-fitted to flue outlet on boiler unless additional screws are provided with flue system.

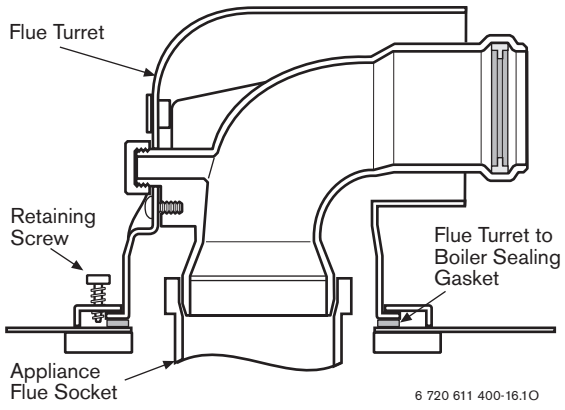


Fig. 15

- For remaining installation of flue assembly, refer to the relevant installation instructions.

3.7 Checking the connections

Water connections

- Check that the O-rings or seals are in place before tightening the connection.
- Turn on the service valves for boiler flow and return.
- Check all seals and unions for leaks.

Open vent systems: It is not necessary to connect a drain pipe to the pressure relief valve outlet as it is not operational and should be blanked off.

Gas supply pipe

- Check that the seal is in place before tightening the connection.
- Turn off gas cock to protect gas valve against damage from excessive pressure.
- Check gas supply pipe.
- Release the pressure on the gas supply pipe.

3.8 Flue Systems

The only flue systems that may be used are those supplied by Worcester Heat Systems.
The flue system must be installed in accordance with the requirements of BS 5440:1.

Standard 100 mm flue system

The standard concentric flue system provides for a horizontal length of up to 4m (R29) and 3.5m (R40). Full instructions for fitting this flue are in Subsection 3.8.2 “Installation of the flue”.

Alternative 125 mm diameter flue systems

Installation instructions for the alternative flue systems are sent with the appropriate flue kit.

Systems are available to give a maximum horizontal length of 13m (R29) and 10m (R40).

A vertical flue system up to a height of 15 m (12 m R40) is available.

45° and 90° flue bends can be used with a corresponding reduction in flue length of 2 m for each 90° bend and 1 m for each 45° bend used.

IMPORTANT: Any horizontal flue system fitted to a condensing boiler must incline from the appliance at an angle of 1,6 ° (30 mm per metre length) to prevent condensate dripping from the flue terminal.

Note, the standard 100mm horizontal flue requires only a 0.5° incline from the boiler as the inner exhaust pipe is inclined at 2.5° inside the outer pipe.

This means that the clearance above the appliance must be increased to match the duct length. Refer to fig. 1 on page 5.

3.8.1 Siting the Flue Terminal

The flue must be installed in accordance with BS 5440:1 and the Building Regulations. Flue terminals in carports and under balconies are to be avoided. The terminal must be positioned so that it does not cause an obstruction nor the combustion products a nuisance. See fig. 16 and table 9.
The terminal will, at times, give out a plume of water vapour and consideration must be given to this when choosing a terminal position. Keep clear of security lighting, activated by passive infra-red sensing heads. If the terminal is less than 2 m above a surface to which people have access then a guard must be fitted. The guard must be evenly spaced about the terminal with a space of 50 mm in each direction and fixed with plated screws.
A guard Type K6 for the standard horizontal flue, can be obtained from Tower Flue Components, Vale Rise, Tonbridge TN9 1TB.

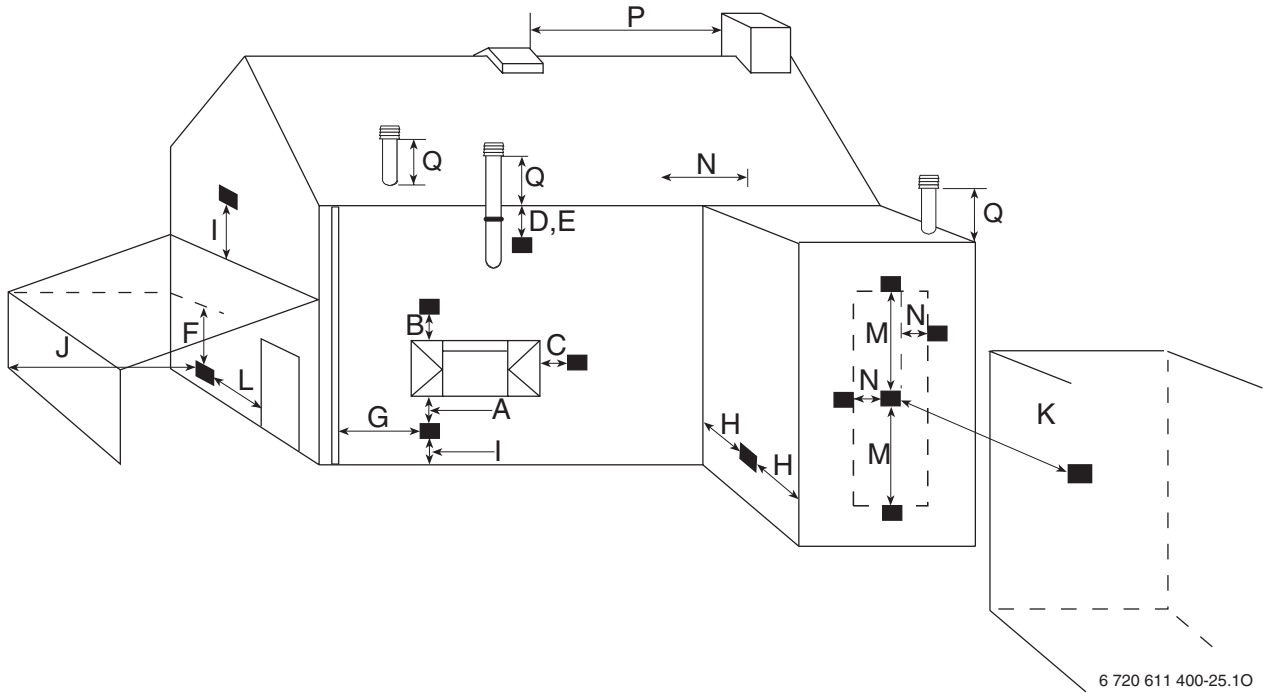


Fig. 16

Minimum dimensions of flue terminal positions (all types) (see fig. 16)

Dimension	Terminal position (kW input expressed in net)	Balanced flues room sealed: Fanned draught
A[1)]	Directly below an opening, air brick, opening windows, etc.	300 mm
B[1)]	Above an opening, air brick, opening window, etc.	300 mm
C[1)]	Horizontally to an opening, air brick, opening window, etc.	300 mm
D	Below gutters, soil pipes or drain pipes	75 mm
E	Below eaves	200 mm
F[2)]	Below balconies or car port roof (lowest point)	200 mm
G	From a vertical drain pipe or soil pipe	75 mm
H	From an internal or external corner or	300 mm
I	Above ground roof or balcony	300 mm
J	From a surface or facing the terminal or boundary	600 mm
K	From a terminal facing the terminal	1200 mm
L [2)]	From an opening in the car port (e. g. door, window) into the dwelling	1200 mm
M	Vertically from a terminal on the same wall	1500mm
N	Horizontally from a terminal on the same wall	300 mm
P	From a vertical structure on the roof	500 mm
Q	Above intersection with roof	300 mm

Table 9

1) In addition, the terminal should not be nearer than 150 mm (fanned draught) to an opening in the building fabric formed for the purpose of accommodating a built-in element such as a window frame.
2) Not recommended

3.8.2 Installation of the flue

The standard 100 mm diameter horizontal flue system is suitable for lengths up to 4m (R29) & 3.5m (R40). Flues up to 730 mm do not require an extension duct assembly.
Flues between 1700 mm and 4000 mm require extension duct assemblies.

Standard 100mm system comprise:

- Flue turret
- Flue turret clamp
- Terminal assembly
- Wall sealing gasket and cover plate.

Refer to fig. 21.

Instructions for fitting other flue systems are packed with the relevant flue kit.
Check that the position chosen for the appliance is satisfactory. Refer to fig. 17.

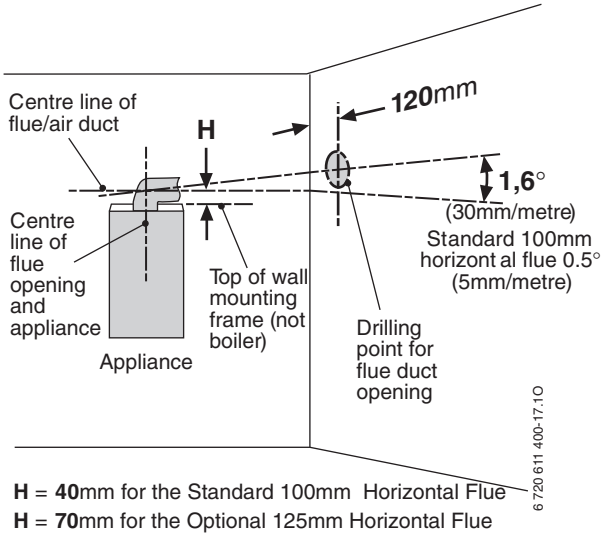


Fig. 17 Marking the position of the side flue opening. Note: ensure there is adequate access to the air/flue sampling points in the flue turret.

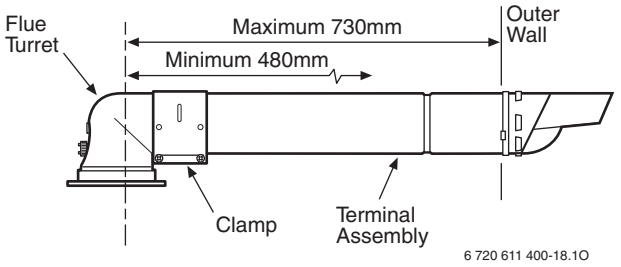


Fig. 18 Standard Flue

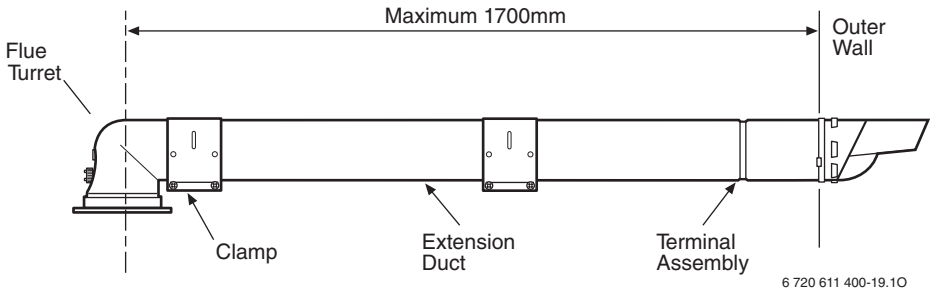


Fig. 19 Flue with one extension

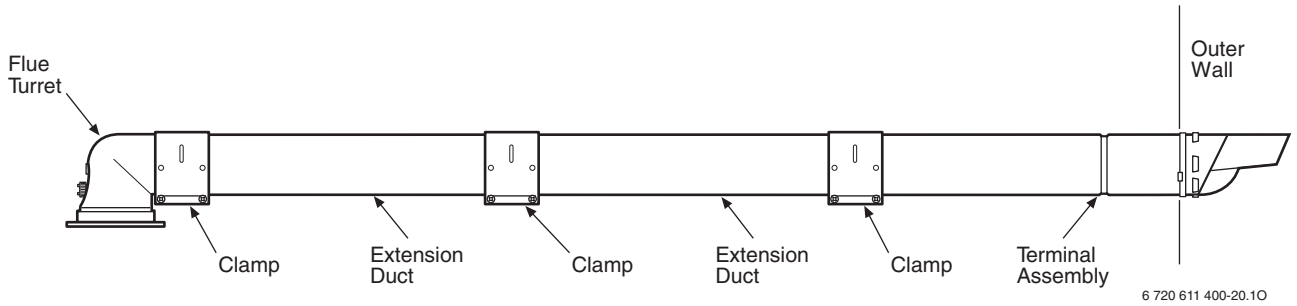


Fig. 20 Flue with extensions

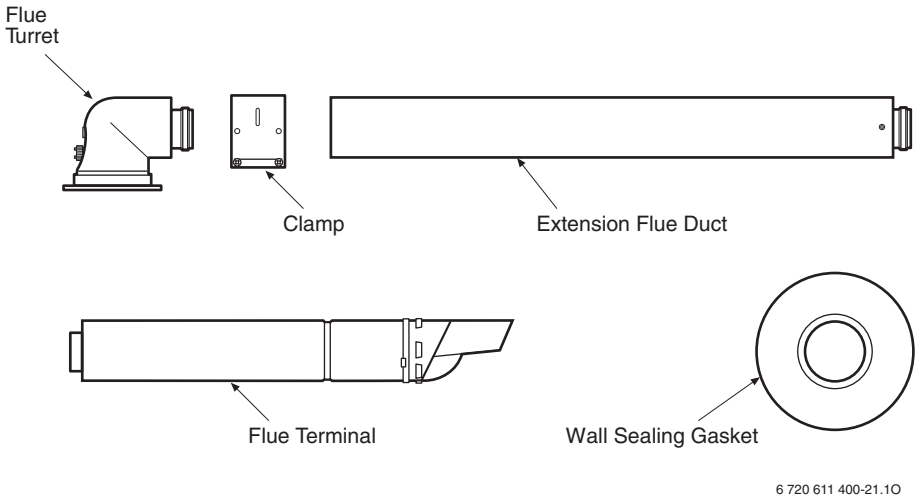


Fig. 21 Flue components

3.8.3 Flue duct preparation and assembly

Measure the flue length L. Refer to fig. 22, 23.

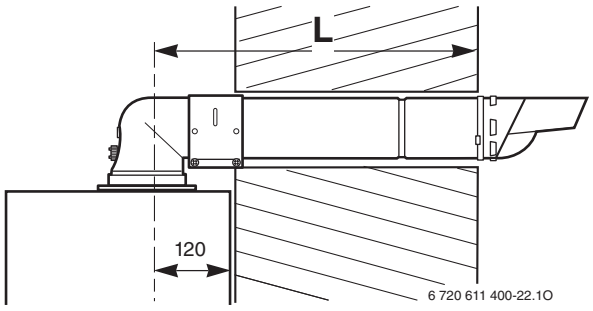


Fig. 22 Flue length - rear

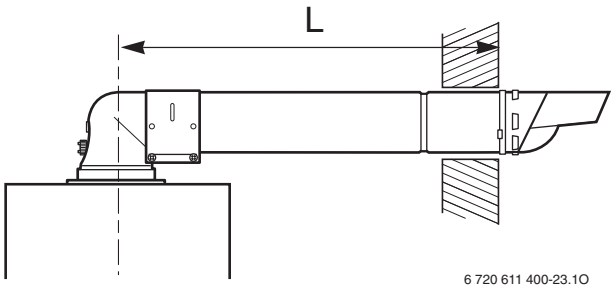


Fig. 23 Flue length - side

Measure 'L' from the end of the metal section of the flue terminal to the centre of the flue outlet on the boiler as shown in Fig. 22 & Fig. 23 and deduct 90mm from that measurement.

Cut both inner and outer flue pipe square at the opposite end to the terminal without creasing the tubes.

Remove any burrs before fitting the terminal to the turret.

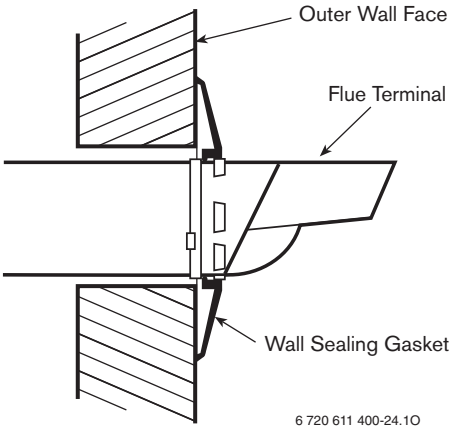


Fig. 24 Flue terminal position

Assemble flue system completely. Push the ducts fully together and clamp in the positions. The slope of the terminal outlet must be directed as per Fig. 24.

The assembly will be made easier if a solvent free grease is lightly applied i.e Silicone lubricant, to the male end of the ducts.

NOTE: An inner wall sealing plate is provided which should be fitted to the ducts before assembly.

Push the assembly through the wall and fix the turret to the appliance using the screws prefitted to the boiler flue outlet. Refer to fig. 25.

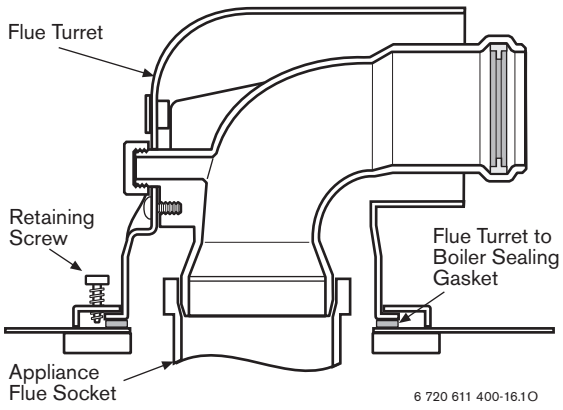


Fig. 25 Flue turret

Ensure that the turret is fully entered to the socket on the boiler.

If the terminal is within 2 m of the ground where there is access then an approved terminal guard must be fitted. The guard must give a clearance of at least 50 mm around the terminal and fixed with corrosion resistant screws.

4 Electrical connections

- ▶ Always disconnect the power supply to the appliance at the mains before carrying out any work on the electrical systems and components.

All control and safety systems are built into the appliance.

- ▶ Allow mains cable to protrude at least 50 cm from wall.
- ▶ To maintain the splash-proof (IP) design: cut the cable grommet hole size to match the diameter of the cable, see fig. 28.
- ▶ The appliance must be earthed.
- ▶ It must be possible to completely isolate the appliance with at least 3mm contact separation in both poles.

The wiring between the appliance and the electrical supply shall comply with current IEE Wiring Regulations (and any local regulations which apply) for fixed wiring to a stationary appliance.

- Supply: 230 V ~ 50 Hz, 150 Watts
- External fuse 3 A
- The system connected to the boiler must NOT have a separate electrical supply
- Water Protection IPX4D (with fascia blanking plate fitted or IP20 without blanking plate).

4.1 Connecting the appliance

To gain access to the mains connection remove the drop down facia cover. The drop down cover is removed by lowering it to the horizontal position and pushing firmly upwards at the rear of the supports to release the cover. Lift cover from the appliance.

After installation (or in the event of an electrical fault) the electrical system shall be checked for short circuits, fuse failure, incorrect polarity of connections, earth continuity and resistance to earth.

- ▶ Pull out cover panel at the bottom and remove. Refer to fig. 26.

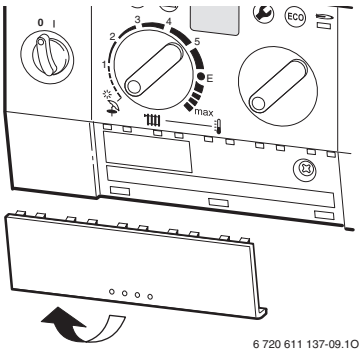


Fig. 26

- ▶ Remove screw and slide terminal cover forwards to remove. Refer to fig. 27.

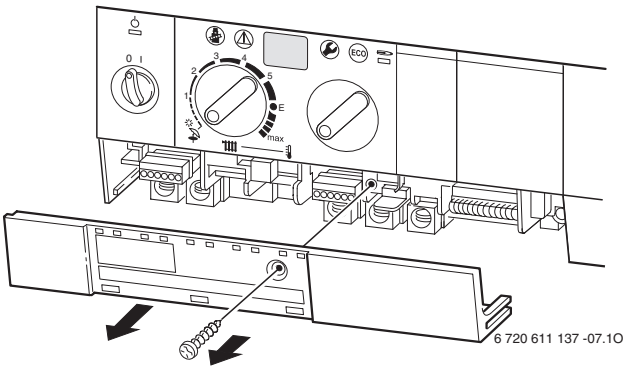


Fig. 27

- ▶ Cut cable grommet to diameter of cable.

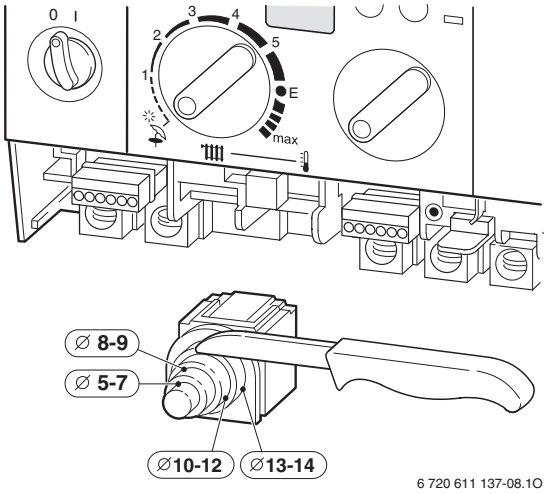


Fig. 28

- ▶ Feed cable through cable grommet and connect the mains supply cable, see fig. 29.
- ▶ Secure cable in cable grommet by means of cable grip.

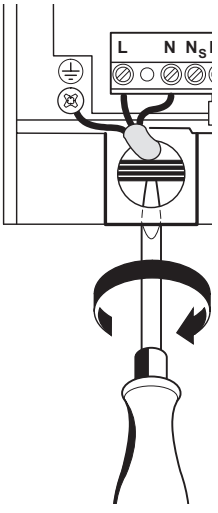


Fig. 29

4.2 Wiring to your system

Mains electricity supply: The boiler should be connected to the permanent mains supply as described in section 4.1 This also provides the electrical supply to the system.

Note: This must be the only electrical supply to the system. This ensures the safety of a single fused supply.

The boiler can only be wired to a remote system junction box.

Note: A pump is not built into the boiler and must be fitted externally.

The diagram shows the overall wiring details. A cable is fitted at the factory, between the boiler control panel and the Y-S module. This module is designed to provide the correct voltage interface.

The other connector in the module must be used for wiring to the remote junction box as shown. It is the responsibility of the installer to connect all other system components i.e. water valve/s, pump, programmer etc. to the proprietary junction box according to the instructions supplied with the box. Worcester Heat Systems cannot be held responsible for any incorrect wiring to these parts of the system.

If a room thermostat and/or frost thermostat is required, these must also be connected to the junction box according to the proprietary instructions.

Upon completion of the electrical connections check for earth continuity, correct polarisation and resistance to earth.

Note:

Y-S Module	Remote Junction Box
LS	L
NS	N
PE	E (Earth)
DV	Demand (Switched Live)

Table 10

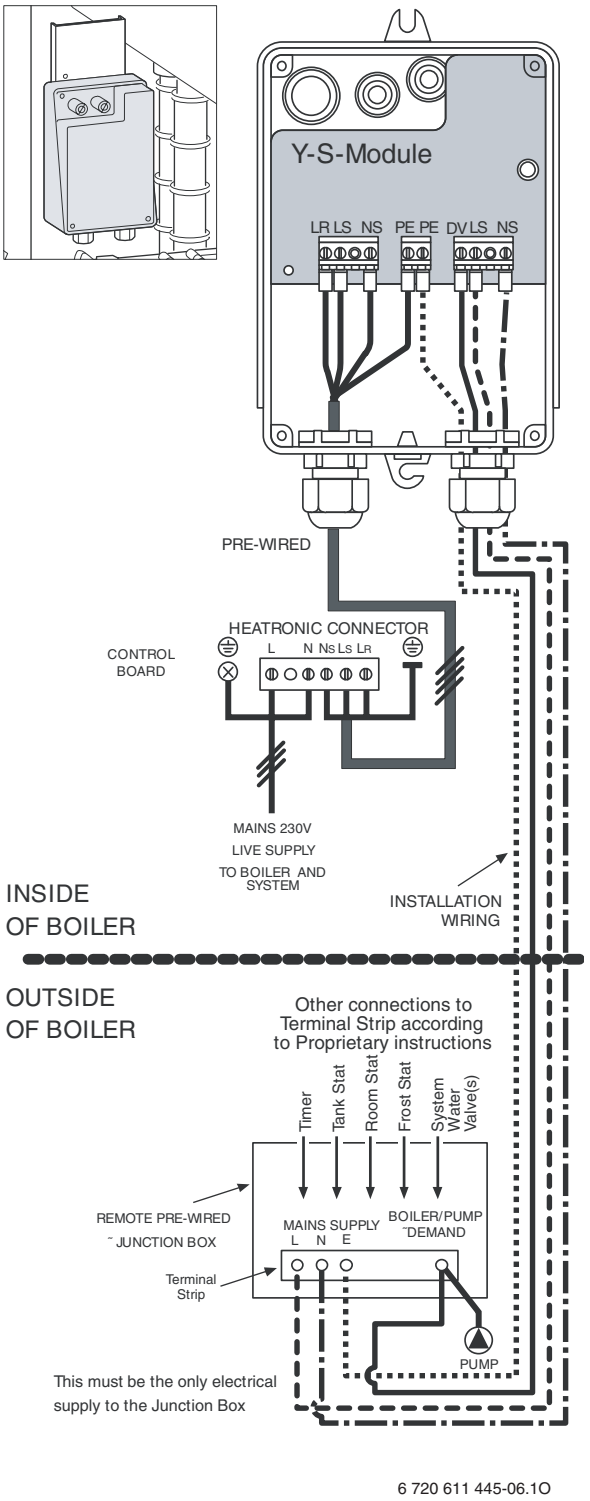


Fig. 30 Wiring to the Y-S module

5 Commissioning

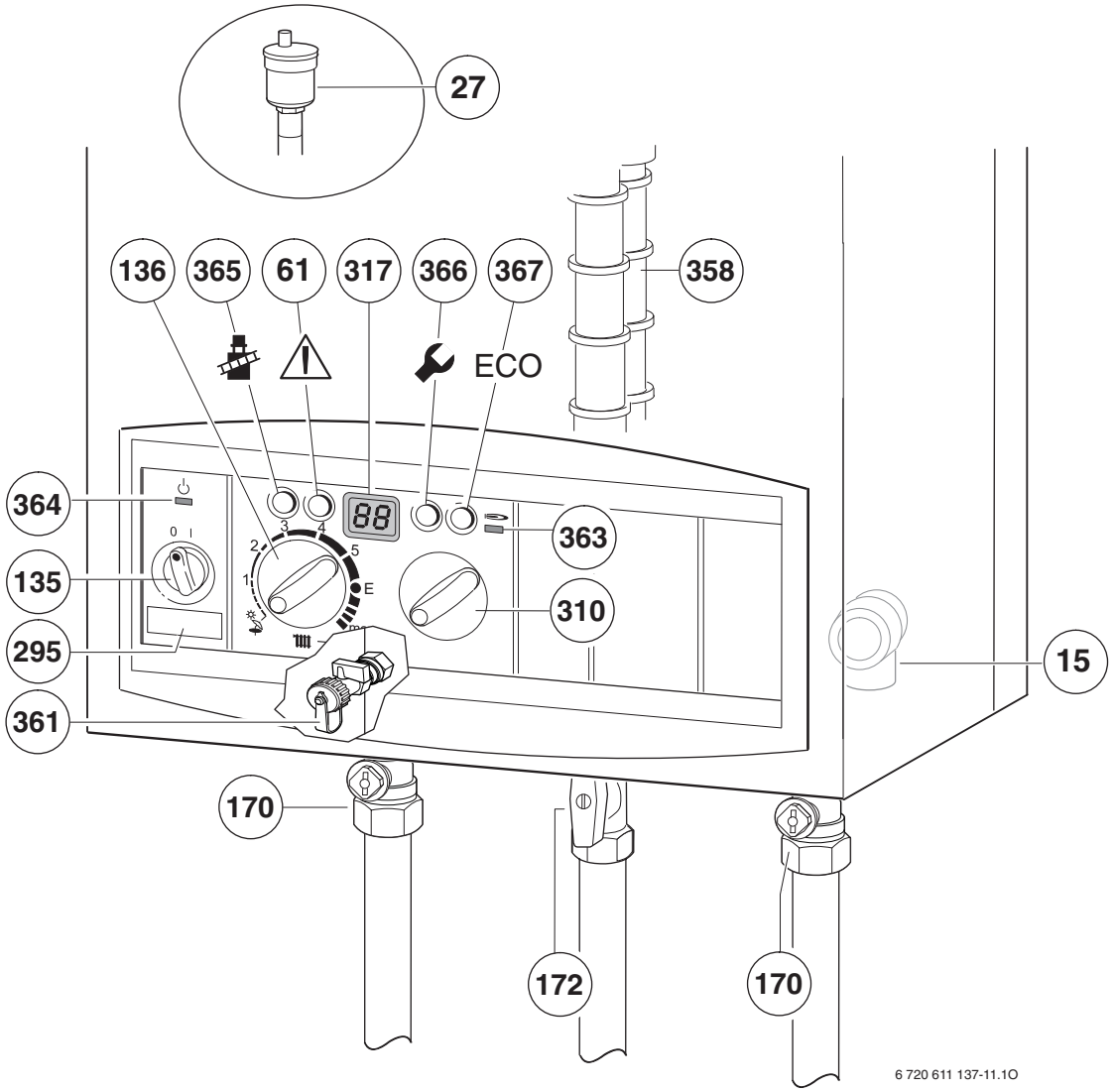


Fig. 31

15 Safety valve
27 Automatic vent
61 Reset button
135 Master switch
136 Temperature control for boiler
170 Service cocks on boiler flow and return
172 Gas cock (shown in on position)
295 Appliance type sticker
310 Function control (Service only)
317 Multi function display
358 Condensate trap
361 Drain valve
363 Indicator lamp for burner
364 Indicator lamp for power supply
365 “Chimney sweep” button
366 Service button
367 No function

5.1 Commissioning

Never run the appliance when empty or unpressurised.

The operational CO_2 level is set at the factory and no adjustment is necessary when installing a natural gas fired appliance.

Benchmark Water Treatment: For optimum performance after installation, this boiler and its associated central heating system should be flushed in accordance with the guidelines given in BS 7593:1992 - Treatment of water in domestic hot water systems. Full instructions are supplied with proprietary cleansers sold for this purpose. If an inhibitor is to be used after flushing, it should be used in accordance with the inhibitor manufacturers instructions. The inhibitor must not be added until all the cleaner has been removed.

To drain the appliance shut the system valves and open the drain valve.

Suitable flushing agents and inhibitors are available from Betz-Dearborn Tel: 0151-4209563 and Fernox Tel: 01799-550811. Instructions for use are supplied with the these products.

- **Before commissioning, the gas supply pressure must be checked at the gas supply pressure test point (see page 6, fig. 2, item 7). Natural gas appliances must not be operated if the gas supply pressure is below 18 mbar or above 24 mbar. LPG appliances must not be operated if the supply pressure is not 37 mbar at the inlet to the appliance**.
- Unscrew the condensation trap (358) and pull out, fill with approx. 1/4 l of water and refit. Refer to fig. 31.
- Open all system radiator valves.
- Check the automatic air vent is open (27) see Fig. 31
- Turn on service valves (170), fill central heating system.
- Vent radiators.
- Check that the gas type specified on the identification plate matches that of the gas supply.
- Turn on gas cock (172). Refer to fig. 31.
- If a domestic hot water cylinder is fitted, set the hot water cylinder thermostat to 60°C.

5.2 Switching the appliance on/off

Switching on

- Switch on the appliance at the master switch (**I**). The indicator lamp shows green and the display will show the boiler flow temperature.

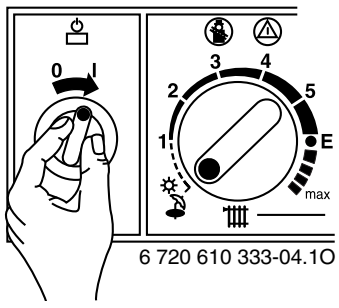


Fig. 32

If the display alternates between **-II-** and the boiler flow temperature, the trap filling programme is active.

The trap filling programme ensures that the condensation trap is filled after the appliance has been installed or after the appliance has been out of use for a long period or the mains supply has been interrupted. For that reason, the appliance remains at minimum heating output for 15 minutes.

Switching off the appliance

- Set the master switch to (**0**). The green indicator lamp goes out.

- Always disconnect the appliance from the power supply (fuse, circuit breaker) before carrying out any work on the electrical systems or components.

5.3 Switching on the Boiler

The central heating flow temperature is adjustable between 50°C and 88°C. refer to table 11, page 26.

- Turn the temperature control to set the flow temperature to a level appropriate to the type of central heating system:
  - Low-temperature heating: setting **“E”** (approx. 75°C)
  - Central heating systems for flow temperatures up to 88 °C: limited “**max**” setting for low-temperature operation (see page 26).

  When the burner is alight, the **red** indicator lamp lights up.

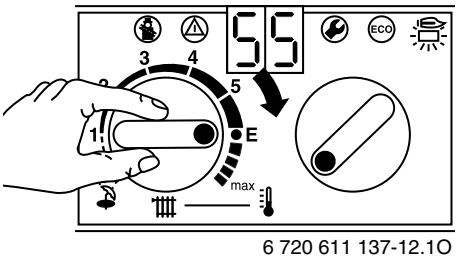


Fig. 33

5.4 System controls

- Set room thermostat to the desired room temperature.
- Set time clock and the on/off periods. Refer to the instructions with the control.
- Set the thermostatic radiator valves to the desired settings.

5.5 Frost protection

The appliance has an in-built frost protection device which is generally suitable for most applications.

- Leave master switch switched on.

If the appliance is to be left for long periods switch the central heating off:

- Add a suitable anti-freeze fluid to the water in the central heating system.
  Suitable products are available from Betz-Dearborn Tel: 0151-4209563 and Fernox Tel: 01799-550811.

5.6 Fault Condition

A list of faults that may occur is given on page 40.

In the unlikely event of a fault occurring while the appliance is in operation:

The display then shows a fault code and the button ⚠ may also flash.

If the button ⚠ flashes:

- Press and hold the button ⚠ until the display shows "– –".
  The appliance will then start up again and the display will show the boiler flow temperature.

If the button ⚠ does not flash:

- Switch the appliance off and then on again at the master switch.
  The appliance will start up again and the boiler flow temperature will be displayed.

6 Individual settings

6.1 Mechanical settings

6.1.1 Setting the boiler flow temperature

The central heating flow temperature can be set to between 50°C and 88°C.

Limited maximum setting for low-temperature operation

The temperature control is factory limited to setting **E**, giving a maximum flow temperature of 75°C.

Adjustment of the heating output to the calculated heat demand is not required by the heating systems regulations.

Removing the maximum setting limit

For heating systems which require higher flow temperatures, the maximum setting limit can be removed.

- Lift off the yellow button on the temperature control with a screwdriver.

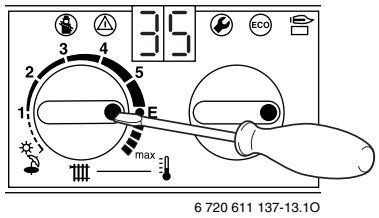


Fig. 34

- Rotate yellow button through 180° and replace (dot facing inwards).
  The boiler flow temperature is no longer limited.

Control setting	boiler flow temperature
1	approx. 50°C
2	approx. 55°C
3	approx. 60°C
4	approx. 65°C
5	approx. 70°C
E	**approx. 75°C**
max	approx. 88°C

Table 11

6.2 Settings on the Bosch Heatronic

6.2.1 Operating the Bosch Heatronic

The Bosch Heatronic enables easy setting and checking of a large number of appliance functions.

This description is limited to those functions required for commissioning.

For a full description of all available functions, please refer to the Service booklet for the Engineer, order no. 7-181-465-346.

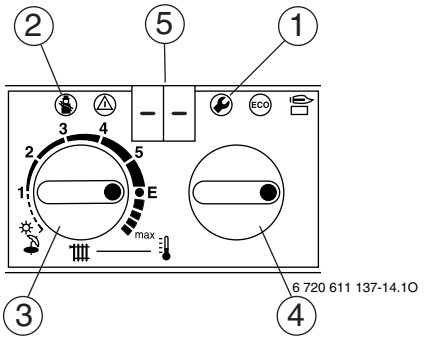


Fig. 35 Appliance controls

1 Service button
2 “Chimney sweep” button
3 Temperature control for boiler flow
4 Function control
5 Display

Selecting service function:

Note the positions of the temperature controls and . After completing the settings, return the temperature controls to their original positions.

The service functions are subdivided into two levels:
Level 1 comprises service functions up to function **4.9**,
Level 2 consists of service functions from **5.0** upwards.

- To select a service function on Level 1: press and hold the button until the display shows **– –**.
- To select a service function on Level 2: press and hold the buttons and simultaneously until the display shows **= =**.
- Then turn the temperature control to select the required function.

Service function	Code no.	See page
Anti-cycle time	**2.4**	27
Max. boiler flow temperature	**2.5**	27
Switching difference	**2.6**	27
Max. heating output	**5.0**	27

Table 12

The service function **5.0** may be reset.

Entering a setting

- To enter the setting for a function, turn the function control.

Storing a setting

- Level 1: press and hold the button until the display shows **[ ]**.
- Level 2: press and hold the and buttons simultaneously until the display shows **[ ]**.

After completing the settings

- Reset the temperature controls and the function control to their original positions.

6.2.2 Setting the anti-cycle time (Service Function 2.4)

This service function is only active if Service Function 2.7, automatic anti-cycle time, is deactivated.

The anti-cycle time can be set to between 0 and 15 minutes (is **factory set** to 3 minutes).

If the setting 0 is entered, the anti-cycle time is inactive.

The shortest possible anti-cycle time is 1 minute (recommended for single-pipe and hot-air heating systems).

6.2.3 Setting the maximum boiler flow temperature (Service Function 2.5)

The maximum flow temperature can be set to between 50°C and 88°C (**factory setting**).

6.2.4 Setting the switching difference (Service Function 2.6)

If the appliance is connected to an outside temperature controlled programmer, the programmer sets the switching difference. It does not need to be set on the appliance.

The switching difference is the permissible divergence from the specified flow temperature. It can be set in increments of 1°C. The adjustment range is 1 to 30°C (is **factory set** to 0°C). Minimum flow temperature is 30°C.

6.2.5 Setting the heating output (Service Function 5.0)

The heating output can be set to any level between min. rated heat output and max rated heat output to limit it to the specific heat requirements.

The full rated heat output is still available for hot water or charging the hot water cylinder even if the heating output has been limited.

The factory setting is the max. rated heat output.

- Set the room thermostat and thermostatic radiator valves to max. temperature.
- Press and hold the and buttons simultaneously until the display shows = =.
  The and buttons will light up.

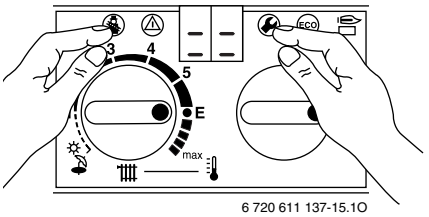


Fig. 36

- Turn the temperature control until the display shows **5.0**.
  After a short delay, the display then shows the set heating output in percent.

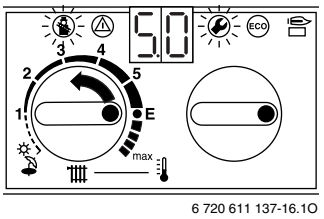


Fig. 37

- Refer to the settings tables for heating and cylinder charging output to obtain the relevant code for the desired heating output in kW (see page 41).
- Turn the function control until the display shows the desired code number.
  The display and the and buttons will flash.
- Measure the gas flow rate and compare with the figures specified for the code number displayed. If figures do not match, adjust the code number!
- Press and hold the and buttons simultaneously until the display shows **[ ]**.
  The heating output is now stored.

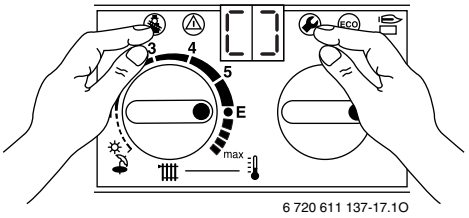


Fig. 38

- Return the temperature controls and to their original positions.
  The display will revert to the boiler flow temperate.

6.3 Setting the gas/air ratio

The appliance is set at the factory and adjustment to the CO_2 settings (gas/air ratio) is only required where the appliance has been stripped down and assembled or if the fan, burner or gas valve are replaced or the appliance has been converted to a different gas type, see section 7.

7 Converting the appliance to different gas types

The setting is factory sealed at maximum. Adjustment to the rated heat input and min. heat input is not necessary.

Checking the gas supply pressure

▶ Check the gas supply pressure at the gas supply pressure testing point.

Natural gas appliances must not be operated if the gas supply pressure is below 18 mbar or above 24 mbar.
LPG appliances must not be operated if the supply pressure is below or above 37 mbar.

Natural gas

- Appliances for **natural gas type G20** are factory set to Wobbe-Index 15 kWh/m^3 and 20 mbar supply pressure and sealed.

Conversion kits

Model	For conversion from ...	Order no.
R 29 HE	N.G to L.P.G	7 710 149 049
R 40 HE	N.G to L.P.G	7 716 192 299

Table 13

- Instructions are sent with each conversion kit.

7.1 Setting the gas/air ratio

The gas/air ratio may only be adjusted on the basis of a CO_2 measurement at max. heat output and min. heat output using an electronic tester.

▶ Switch off the appliance at the master switch (**O**).
▶ Remove the outer case (see page 16, refer to fig. 14).
▶ Switch on the appliance at the master switch (**I**).
▶ Set room thermostat to maximum temperature.
▶ Open thermostatic radiator valves.
▶ Unscrew sealing plug from flue gas testing point (234). Refer to fig. 39.
▶ Insert testing probe about 135 mm into the flue gas testing point and seal testing point.

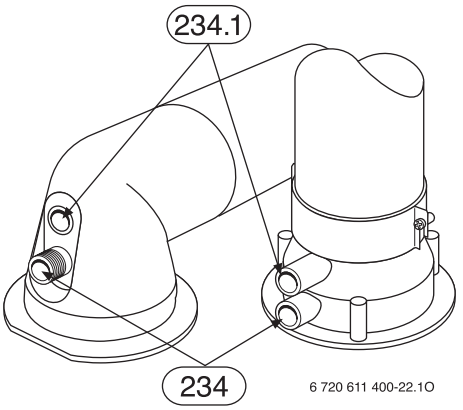


Fig. 39

▶ Press and hold button until the display shows **– –**. The button will light up.

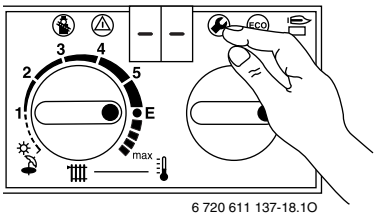


Fig. 40

▶ Turn the temperature control until the display shows **2.0** .
After a short delay, the current operating mode setting will be displayed (**0.** = Normal mode).

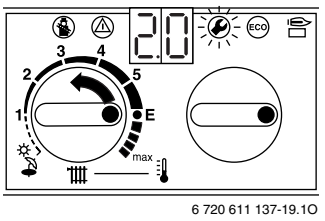


Fig. 41

- Turn the function control until the display shows **2.** (= max. rated heat output).
  The display and the button will flash.

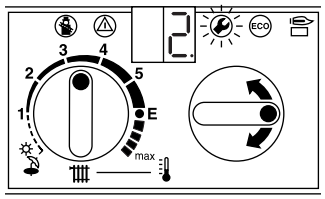


Fig. 42

- Measure the CO_2 level.
- Prise off the seal on the gas flow restrictor.
- Adjust the gas flow restrictor (63) to obtain the CO_2 level given in Table 14. Refer to fig. 43.

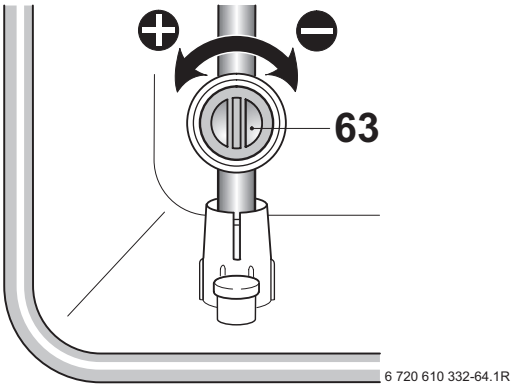


Fig. 43

Gas Type	CO_2 reading at max. rated heat output	CO_2 reading at min. rated heat output
Natural gas type G20	9.2 %	8.8 %
LPG G31 (propane)	10.8 %	10.5 %

Table 14

- Turn the temperature control anti-clockwise until the display shows **1.** (= min. rated heat output).
  The display and the button will flash.

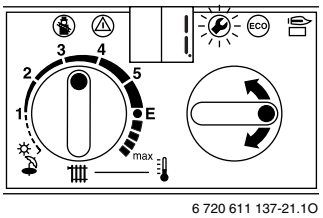


Fig. 44

- Measure the CO_2 level.
- Remove the seal from the gas valve adjusting screw (64) and adjust the CO_2 level to the figure given in Table 14 for min. rated heat output.

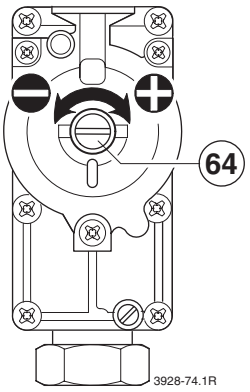


Fig. 45

- Re check the levels at min. and max. rated heat output and re-adjust if necessary.
- Turn the temperature control anti-clockwise as far as the stop so that the display shows **0.**
  (= Normal operating mode).
  The display and the button will flash.
- Press and hold the button until the display shows **[ ]**.
- Reset the temperature controls and function control to their original positions.
  The display will revert to the boiler flow temperature.
- Remove testing probe from the flue gas testing point (234) and refit sealing plug.
- Re-seal gas valve adjusting screw and gas flow restrictor.
- Replace outer case and secure.
- Set room thermostat and thermostatic radiator valves to the desired temperature.

7.2 Testing combustion air/flue gas at set heat output

7.2.1 Testing the O_2 or CO_2 level in the combustion air

By testing the O_2 or CO_2 level in the combustion air the gas tightness of a type C_{13} or C_{33} **flue system** can be checked. The O_2 level must not be less than 20,6 %. The CO_2 level must not exceed 0,2 %.

- Press and hold the button until the display shows **– –**.
  "Chimney sweep" mode is now active.
  The button will light up and the display shows the boiler flow temperature.

In "chimney sweep" mode, the appliance switches to max. rated heat output or the set heating output. You then have 15 minutes in which to measure the levels. After that, the appliance switches back from "chimney sweep" mode to normal mode.

- Remove sealing plug from combustion air testing point (234.1, Fig. 46).
- Insert testing probe about 80 mm into the testing point and seal testing point.

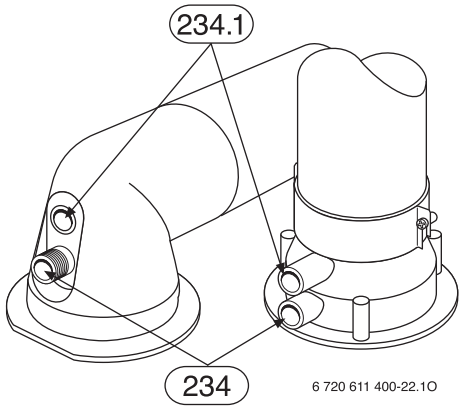


Fig. 46

- Measure O_2 and CO_2 levels.
- Refit sealing plug.
- Press and hold button until the display shows **– –**.
  The button will stop flashing and the display shows the boiler flow temperature.

7.2.2 Testing CO and CO_2

- Press and hold the button until the display shows **– –**.
  "Chimney sweep" mode is now active.
  The button will light up and the display shows the boiler flow temperature.

You have 15 minutes in which to measure the levels. After that, the appliance switches back from "chimney sweep" mode to normal mode.

- Remove sealing plug from flue gas testing point (234, fig. 46).
- Insert testing probe about 135 mm into the testing point and seal testing point.
- Measure CO- and CO_2 levels.
- Refit sealing plug.
- Press and hold button until the display shows **– –**.
  The button will stop flashing and the display shows the boiler flow temperature.

8 Maintenance

- Always disconnect the appliance from the electrical power supply (fuse, circuit breaker) before carrying out any work on the electrical systems or components.

- Always turn off the gas cock before carrying out any work on components which carry gas.

There is a special Service booklet for the Engineer, order no. 7-181-465-346, available to competent persons.

All safety and control systems are monitored by the Bosch Heatronic. In the event of a component fault, the display shows a fault code.

- The User should be recommended to have the appliance serviced regularly by a competent person (see Maintenance Contract).
- Use only genuine spare parts
- Refer to the Spare Parts List when ordering spare parts.
- Always renew seals and O-rings removed during servicing or repair work.
- Use only the following types of grease:
  - Water valve: WRAS approved silicon based grease
  - Unions: approved sealant.
- To drain the appliance shut the system valves and open the drain valve.
- Upon completion of any electrical work check for earth continuity, correct polarisation and resistance to earth.

8.1 Pre-Service Check List

			Date								
1	Call up the last fault stored by the Bosch Heatronic, Service Function **.0,** (see page 34).										
2	Check ionisation current, Service Function **3.3**, (see page 34).										
3	Perform visual check of air/flue duct.Visual check of diaphragm for soiling and splits (see page 36).										
4	Check gas supply pressure (see page 29).	mbar									
5	Test combustion air/flue gas (see page 31).										
6	Check CO_2 setting for min./ max. (gas/air ratio) (see page 29).	min. % max. %									
7	Check gas and water systems for leaks (see page 16).										
8	Check heat exchanger (see page 34).	mbar									
9	Check burner (see page 35).										
10	Clean condensation trap (see page 35).										
11	Check electrical wiring for damage.										
12	Check heating programmer settings.										
13	Check appliances that are part of the heating system.										

Table 15

8.2 Description of servicing operations

The combustion performance must be checked before and after any servicing work on the combustion and burner components. Refer to section 7.1.

Check “Last fault stored”:

- Select Service Function **.0** (see page 26 “Selecting service function”).

There is a list of the fault codes in the Appendix (see page 40).

To delete “Last fault stored”:

- Turn function control anti-clockwise as far as the stop.
- Press and hold the button until the display shows **[ ]**.
  The last fault stored has now been deleted.

Checking the ionisation current, Service Function 3.3

- Select Service Function **3.3** (see page 26 “Selecting service function”).

If the display shows 2 or 3, the ionisation current is OK. If the display shows 0 or 1, the electrode assembly (32.1, page 6) must be cleaned or replaced.

Primary Heat exchanger

There is a special accessory kit (no. 840) for cleaning the heat exchanger, order no. 7 719 001 996.

- Check control pressure on the air - gas mixer unit at max. rated heat output using an electronic manometer.

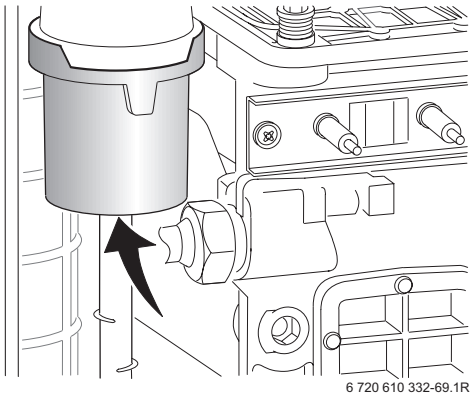


Fig. 47

The heat exchanger should only be cleaned if the control pressure is
4.2 mbar (R29 HE)
6.2 mbar (R40 HE)
(depression) or less.

- Remove cleaning access cover (415, page 6) and the metal plate below it, if present. Refer to fig. 2.
- Unscrew condensation trap and place suitable container underneath. Refer to fig. 48.
- Remove the fan and the burner as described in the text headed “Burner” (see page 35).

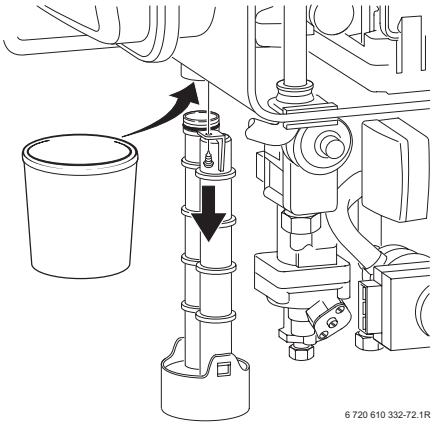


Fig. 48

- Loosen any deposits in the heat exchanger from top to bottom using the cleaning blade. Refer to fig. 49.

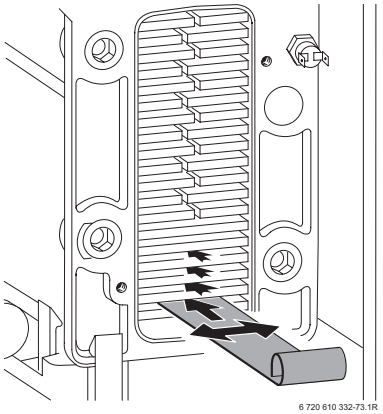


Fig. 49

- Clean the heat exchanger from top to bottom using the brush. Refer to fig. 50.

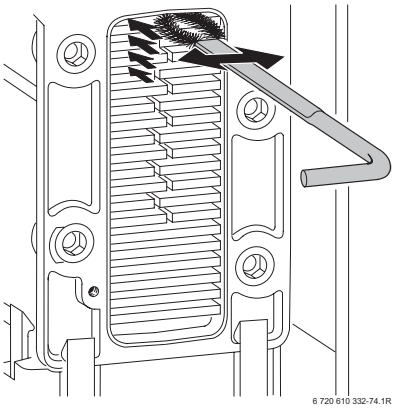


Fig. 50

- Flush the heat exchanger from the top.

- Clean out the condensate collector and trap connection (with other end of brush).

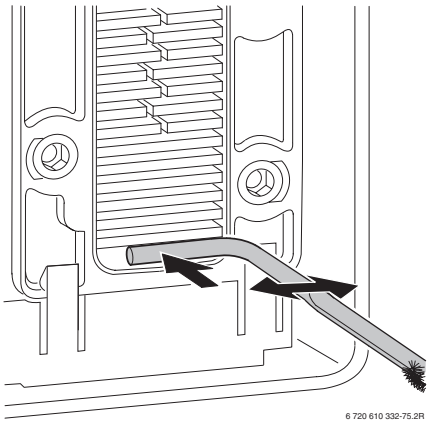


Fig. 51

- Refit the clean-out cover using a new seal and tighten screws to torque of approx. 5 Nm.

Burner

- Check that the gas cock is turned off and the master switch is in the OFF position.
- Remove the clips (1.) and unscrew the two bolts (2.). Refer to fig. 52.
- Unscrew and remove the two hexagon screws securing the fan (3.).
- Slacken fully the rear securing bolt (4.).
- Remove the burner coverplate.

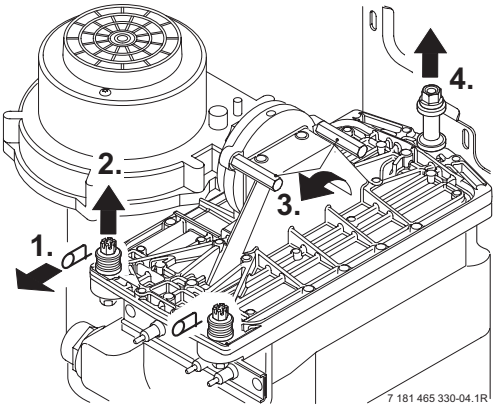


Fig. 52

- Remove the burner skin and clean components. Do not use a wire brush. Refer to fig. 53.

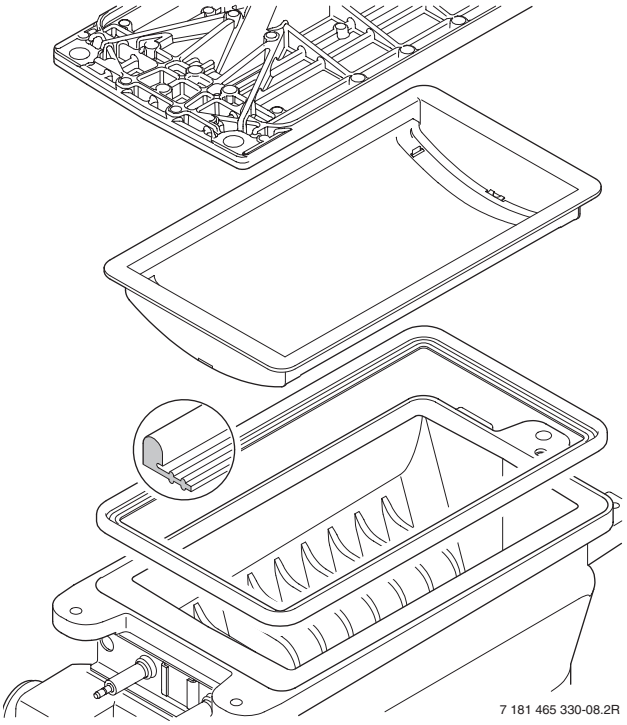


Fig. 53

- Re-assemble burner in reverse order, inspect seal for damage and replace if necessary.
- Adjust gas/air ratio. Refer to section 7.2.

Condensation trap

In order to prevent spillage of condensate, the condensation trap should be completely removed, (see page 34, fig. 48).

- Unscrew condensation trap and check connection to heat exchanger is clear.
- Remove condensation trap cover and clean.
- Fill condensation trap with approx. 1/4 l of water and refit.

Electrode assembly

- Switch off the master switch.
- Pull off the leads from the electrodes. Refer to fig. 2.
- Unscrew the two fixing screws and carefully remove the electrode assembly. Refer to fig. 47.
- Clean the electrodes with a non-metallic brush. (The spark gap should be 4 mm ± 0.5 mm.)
- Replace and re-connect the assembly taking care not to mislay the inspection window.

Diaphragm in mixer unit

Take care not to damage diaphragm (443) when removing and refitting it.

- Open mixer unit (29).
- Carefully withdraw diaphragm (443) from fan intake tube and check for soiling and splits.

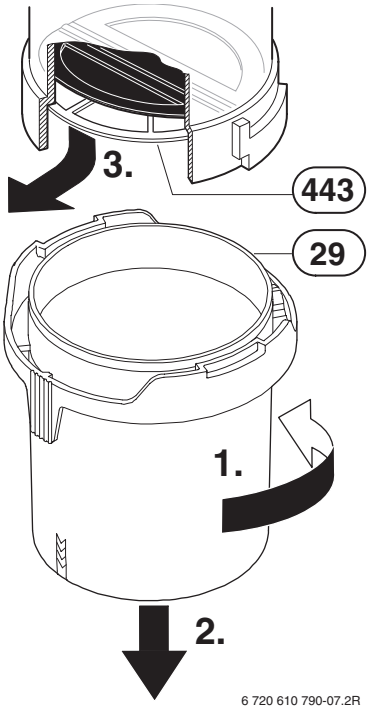


Fig. 54

- Carefully refit diaphragm (443) the correct way round into the fan intake tube.

The flaps of the diaphragm (443) must open upwards.

- Seal the mixer unit (29).

Siphon

- Unscrew the clip and disconnect the pipe to the siphon.
- Remove the drain plug to drain the siphon.
- Unscrew the securing nut from beneath the side facia and remove the siphon. Refer to figure below.
- Refit and prime the siphon.

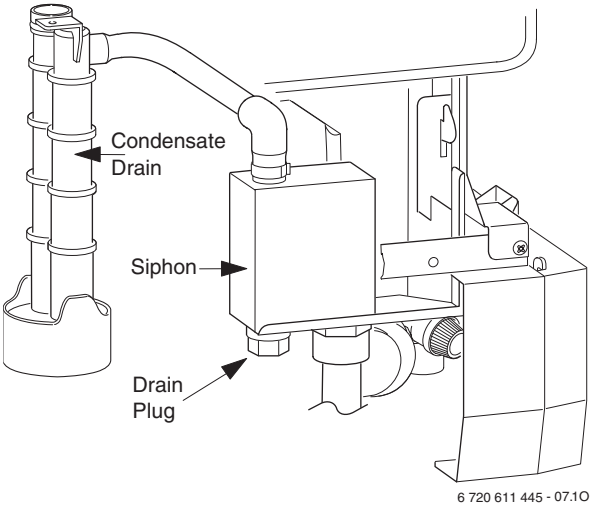


Fig. 55

Electrical wiring

- Check the electrical wiring for physical damage and replace any damaged wires.

8.3 Replacement of Parts

Before changing any components check that the gas is turned off and that the appliance is electrically isolated. When necessary close the system valves and drain the appliance.

Refitting is a reverse of the procedure for removal using new seals or o-rings as appropriate.

8.3.1 PCB control board and transformer

- ▶ Switch off the appliance.
- ▶ Disconnect appliance from the power supply.
- ▶ Unplug all connectors from the control box (inc. keyed plug). Access is gained by removing the covers. Refer to fig. 26, 27.
- ▶ Remove screw holding power connector earth lead and remove earth lead.
- ▶ Remove two top fixing screws from the control box. Refer to fig. 56.

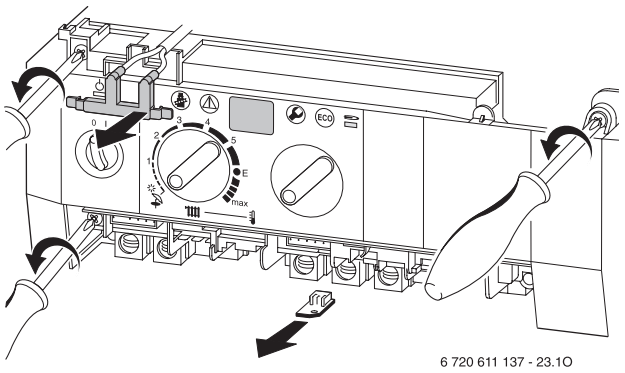


Fig. 56

- ▶ Lower the control box.
- ▶ Unscrew earth lead.
- ▶ Unscrew four fixing screws from cover plate. Refer to fig. 57.
- ▶ Prise off cover plate.
- ▶ Pull off transformer.
- ▶ Remove pcb holder.
- ▶ Remove the pcb control board.

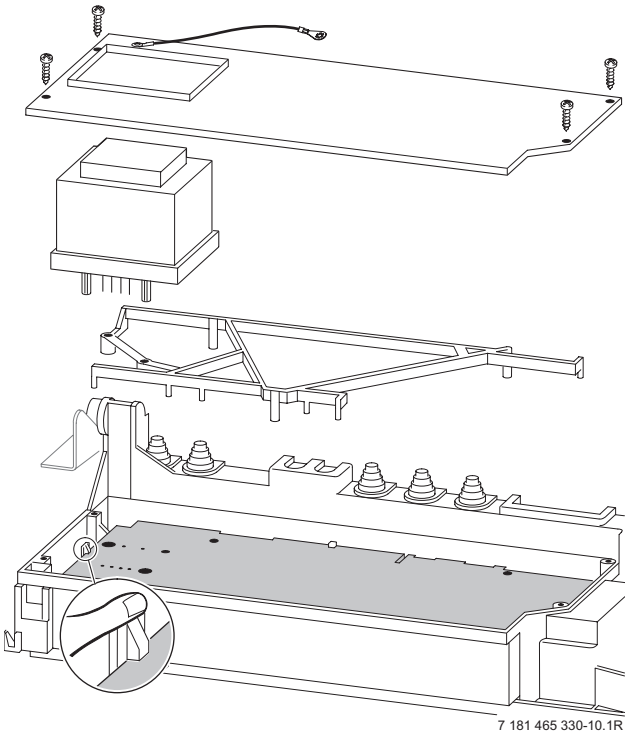


Fig. 57

Fuses

- ▶ Remove the connections covers. Refer to fig. 26, 27.

The fuses are located adjacent to the mains connector block and connector ST18. Refer to fig. 4.

Fuse, item 312, is only replaceable by removing the pcb.

Spare fuses are fixed to the connections cover.

A fuse pack is available: Part number 8 744 503 010 0.

8.3.2 Fan Assembly

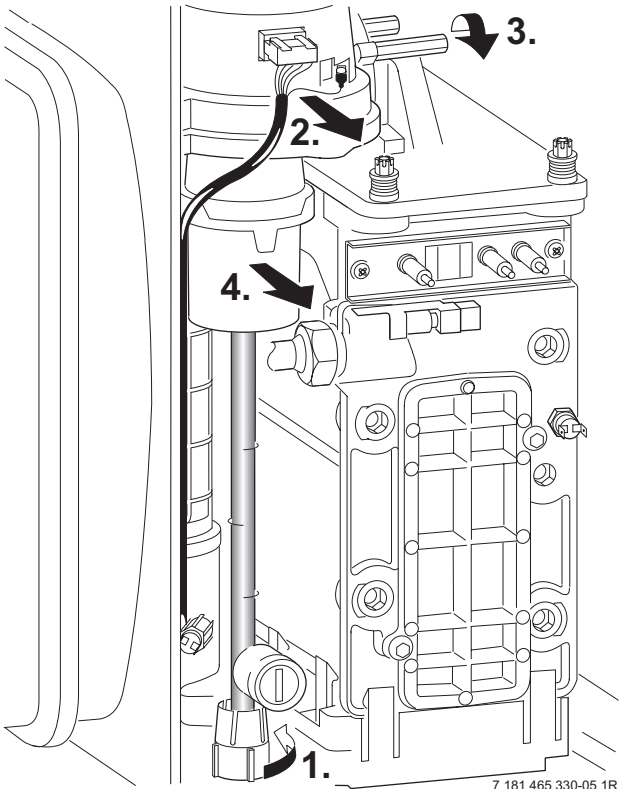


Fig. 58

- Switch off the appliance.
- Disconnect the appliance from the power supply.
- Undo lower pipe union on gas pipe (1.). Refer to fig. 58.
- Remove fan lead and earth connector (2.). The earth connector has a positive clip fixing.
- Remove fixing screws attaching fan to the burner cover (3.).
- Remove fan together with gas pipe and mixer unit.
- Separate the fan from the pipe and mixer unit by twisting the mixer unit to release it (4.).

8.3.3 Sensors

- Check that the appliance is electrically isolated.

Central Heating Flow Temperature Sensor – Item 36, fig. 2

- Pull-off the connector.
- Release the sensor clip and withdraw the sensor.
- Apply heat transfer paste to the replacement sensor.

Safety Temperature Limiter – Item 6, fig. 2

- Pull-off the connectors.
- Unscrew the sensor.

Flue Temperature Limiter – Item 9, fig. 2

- Pull-off the connectors.
- Unscrew the sensor.

8.3.4 Gas Valve

- Check that the gas cock is turned off.
- Lower the control panel. Refer to fig. 59.

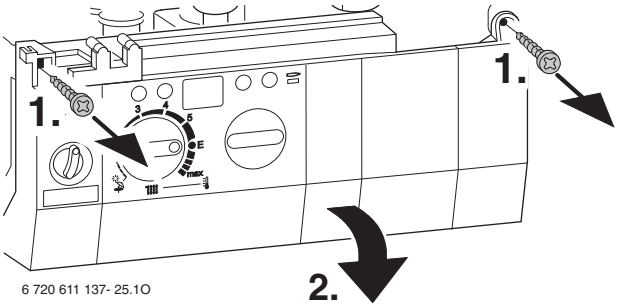
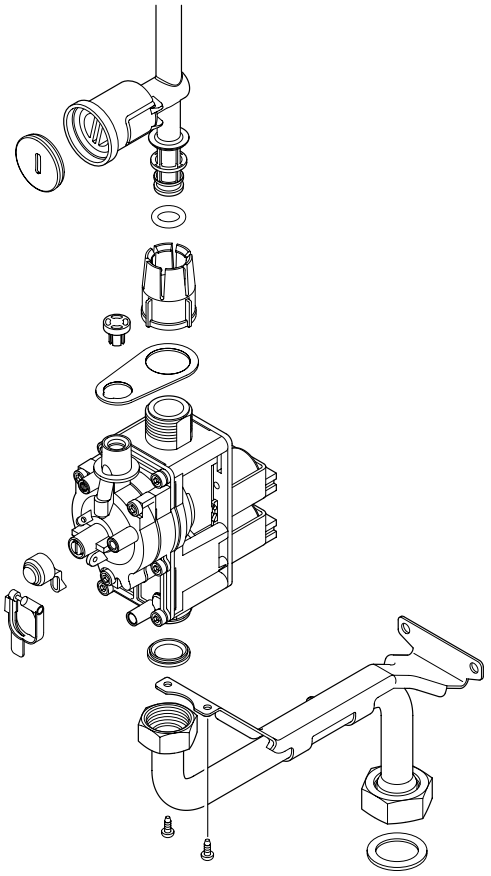


Fig. 59

- Pull off the solenoid connections at the rear of the valve.
- Undo the union, within the inner casing, securing the valve to the gas/air tube. Refer to fig. 58.
- Remove the white plastic cap from the gas valve.
- Release the gas inlet union at the manifold assembly.
- Unscrew the two screws securing the gas valve assembly bracket to the back panel and withdraw the assembly.
- Transfer the bracket and inlet pipe assembly to the new gas valve.
- Check for gas soundness when the new gas valve has been fitted.
- Recheck the combustion performance as described in section 7.1.



6 720 610 602 - 04.1O

Fig. 60

8.3.5 Electrode assembly

- Refer to section 8.2.
- Use a new seal if the existing seal is damaged.

8.3.6 Pressure Relief Valve

- Drain the appliance.
- Disconnect the drain pipe from the valve. Refer to fig. 31.
- Pull-out the clip securing the valve.
- Pull-out the valve.
- Ensure that the replacement valve is fully entered before fitting the clip.

8.3.7 Burner

- Refer to section 8.2.

8.3.8 Primary Heat Exchanger

- Drain the appliance.
- Check that the gas supply is turned off.
- Check that the appliance is electrically isolated.
- Remove the fan assembly complete with the gas/air tube and mixer assembly. Refer to section 8.3.2.
- Remove the burner. Refer to section 8.2.
- Disconnect the sensors. Refer to section 8.3.3.
- Undo the central heating flow union.
- Undo the grey plastic cap at the base of the heat exchanger.
- Unscrew and remove the condensate trap. Refer to section 8.2.
- Unscrew and remove the two screws securing the heat exchanger top bracket to the rear panel.
- Lift up the flue duct, item 271, refer to fig. 2.
- Pull forward from the top and lift the heat exchanger from the casing.
- Transfer components, as necessary, to the new heat exchanger.
- Ensure that all the seals are in place and all of the connections are tight before re-commissioning the appliance.

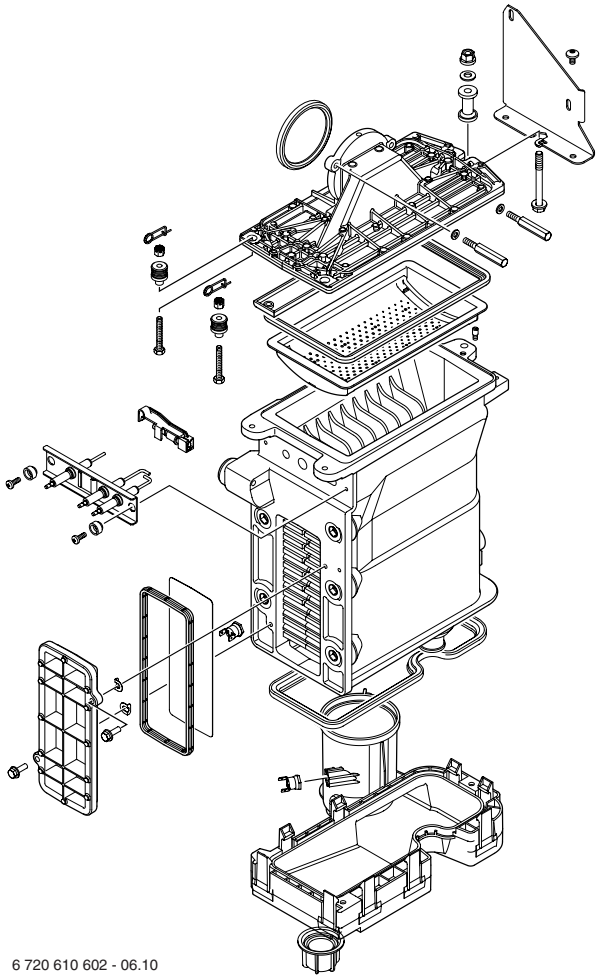


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Fig. 61

9 Appendix

9.1 Fault Codes

More detailed fault finding procedures are described in the Service booklet for the Engineer number 7 181 465 346.

Display code	Description	Remedy
b1	Code plug not detected.	Insert code plug correctly, test and replace if necessary.
C1	Fan speed too low.	Check fan lead and connector, and fan; replace as necessary.
d3	Jumper 8-9 not detected.	Connector not connected, link missing, underfloor heating limiter tripped.
E2	boiler flow NTC sensor defective	Check boiler flow NTC sensor and connecting lead.
E9	Safety temp. limiter in boiler flow has tripped.	Check system pressure, check safety temp. limiters, check pump operation, check fuse on pcb, bleed appliance.
EA	Flame not detected.	Is gas cock turned on? Check gas supply pressure, power supply, igniter electrode and lead, ionisation sensing electrode and lead, flue duct and CO_2 level.
F0	Internal error.	Check electrical connector contacts, programmer interface module ignition leads are not loose; replace pcb if necessary.
F7	Flame detected even though appliance switched off.	Check electrode assembly, dry pcb. Flue clear?
FA	Flame detected after gas shut off.	Check gas valve and wiring to gas valve. Clean condensation trap and check electrode assembly. Flue clear?
Fd	Reset button pressed by mistake.	Press reset button again
P1, P2, P3, P1...	Please wait, initialisation in progress.	24 V fuse blown. Replace fuse.

Table 16

9.2 Short parts list

Key	Description	Qty GC	Spare part number
1	Sensor - Flue gas temp.	1	8 729 000 144 0
2	Sensor - boiler flow temp.	1	8 714 500 087 0
3	Control board	1	8 748 300 418 0
4	Gas valve	1	8 747 003 516 0
5	Fan assembly	1	8 717 204 373 0
6	Fan washer	1	8 729 000 183 0
7	Relief valve	1	8 717 401 012 0
8	Electrode assembly	1	8 718 107 077 0
9	Electrode lead	1	8 714 401 999 0
10	Burner skin seal	1	8 711 004 168 0
11	Transformer - facia	1	8 747 201 358 0
12	Heat exchanger washer	1	8 710 103 153 0
13	Washer set Condensation Trap	1	8 710 103 154 0
14	Fuse set	1	8 744 503 010 0
15	Primary heat exchanger	1	8 715 406 615 0

Table 17

9.3 Heating/hot water output settings (N.G)

Display code	Heat output, kW	Heat input, kW	Natural gas G20 Gas vol. flow rate (l/min at $t_V/t_R = 80/60°C$)
30	8.2	8.3	14.5
40	11.0	11.1	19.4
50	13.7	13.9	24.2
60	16.5	16.6	29.1
70	19.2	19.4	33.9
80	21.9	22.2	38.8
90	24,7	24.9	43.6
100	27.4	27.7	48.5

Table 18

9.4 Heating/hot water output settings (L.P.G)

Display code	Propane Heat output kW	Heat input kW
40	11.0	11.1
50	13.7	13.9
60	16.5	16.6
70	19.2	19.4
80	21.9	22.2
90	24,7	24.9
100	27.4	27.7

Table 19

9.5 Operational Flow diagrams

9.5.1 Central heating function

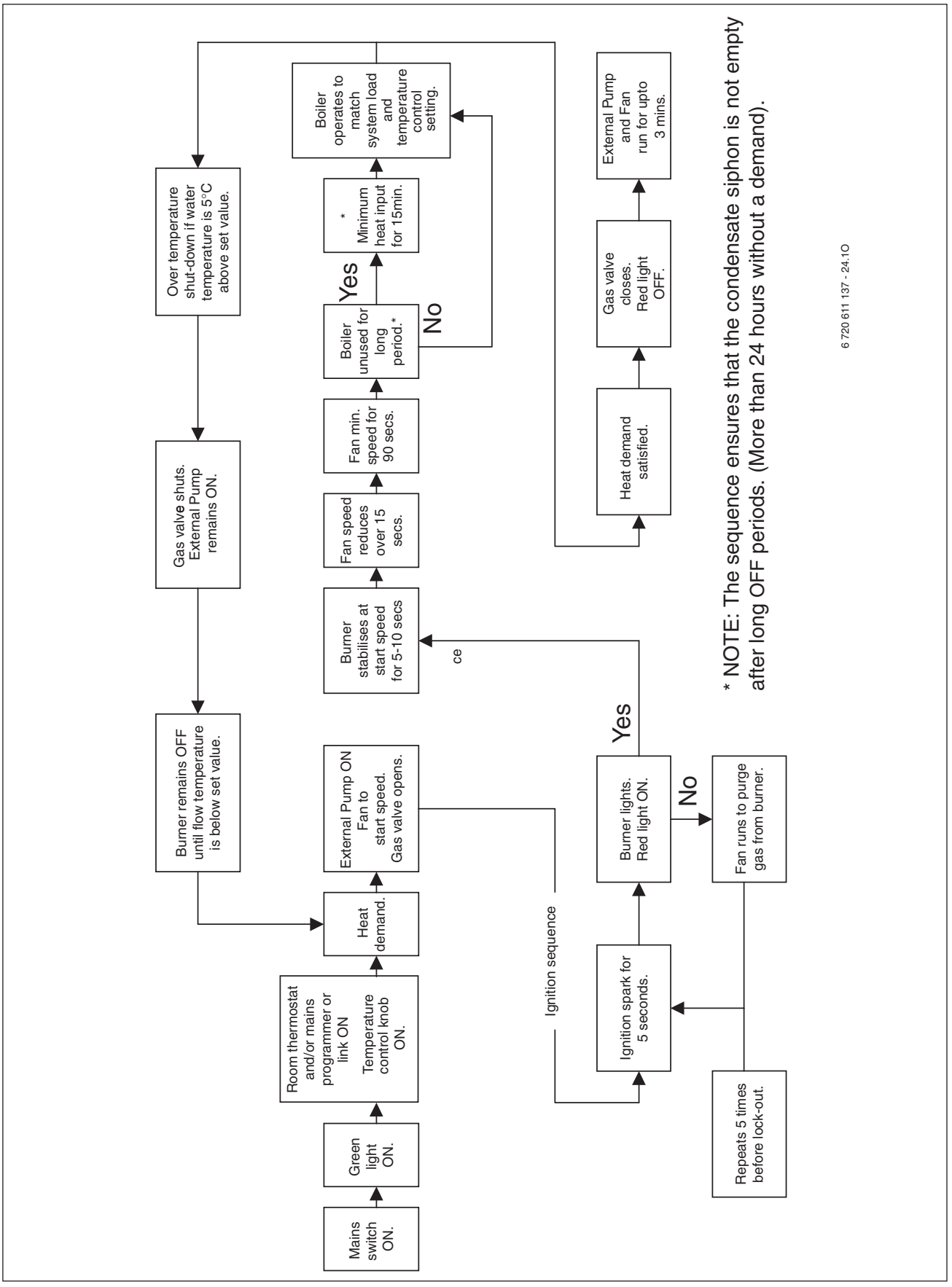


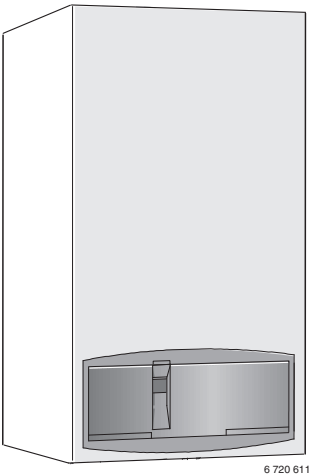
Fig. 62

EXCELLENCE COMES AS STANDARD

Manufactured exclusively for British Gas by The Bosch Group
Bosch Group, Worcester Heat Systems, Cotswold Way, Warndon, Worcester WR4 9SW.
Telephone: (01905) 754624 Fax: (01905) 754619

Users Instructions and Customer Care Guide

R 29 / R 40 HE conventional Condensing boiler



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ZB 7-28 R 29 HE GC-Number: 41 311 60
ZB 11-40 R 40 HE GC-Number: 41 311 61

GB/IE

benchmark

WORCESTER
Bosch Group

6 720 611 138 GB (04.05) OSW

Contents

Excellence comes as standard

Thank you for purchasing a Worcester Greenstar condensing appliance.
The Worcester Greenstar Series has been developed by the Bosch Group and the strictest quality control standards are demanded throughout every stage of production.
Indeed, the Bosch Group have led the field in innovative appliance design and performance for many years.
The result is that your new Greenstar appliance offers you the very best of everything – quality, efficiency, economical running costs, proven reliability and value for money.
What's more, you also have the assurance of our no nonsense 2 year parts and labour guarantee.
And it's backed up by Worcester Care Call a complete maintenance scheme to keep your boiler operating at peak condition and efficiency.
No wonder that more and more people are agreeing that when it comes to gas, it has to be a Worcester Bosch appliance.

Benchmark

The "Benchmark" initiative is the new code of practice to encourage the correct installation, commissioning and servicing of domestic central heating boilers and system equipment.

The "log-book" is a vital document that must be completed by the installer at the time of installation. It confirms that the boiler has been installed and commissioned according to the manufacturers instructions and is one of the methods of demonstrating compliance with the Building Regulations.

Without the completion of the "log-book", manufacturers may refuse to respond to a call–out from a householder, who will be advised that he or she must call back the installer, who has not fulfilled his obligations to record the information required by the initiative.

EIRE ONLY

The CE mark to indicates manufacture to EU safety requirements.

This appliance must be installed only by a competent person to the requirements of IS 813.

Make sure your installer hands you a certificate confirming compliance with IS 813 and that you read carefully the instruction book suppplied with this appliance.

Keep the instruction book and compliance certificate for future reference.

Safety precautions

Gas Safety (Installation and Use) Regulations

It is the law that all gas appliances are installed by a competent person in accordance with the above regulations. Failure to install appliances correctly could lead to prosecution. It is in your interest, and that of safety, to ensure compliance with the law.

If you smell gas:

- Turn off gas service cock at the meter.
- Open all doors and windows.
- Do not operate any electrical switches.
- Do not smoke.
- Extinguish any naked flames.
- Call your gas company.

If you smell fumes from the appliance:

- Switch off appliance.
- Open windows and doors.
- Inform your heating engineer.

Fitting and modifications

- Fitting of the appliance or any modifications to the appliance may only be carried out by a competent person.
- Flue systems must not be modified in any way.

Maintenance

- We **recommend that you** take out a maintenance contract with a competent installer and have the appliance serviced at regular intervals.
- Ensure that your Service Engineer uses only genuine spare parts!

Combustible materials

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

Health and safety

- This appliance contains no asbestos products.
- There is no potential hazard due to the appliance being electrically unsafe.
- There are no substances used in the construction that are a potential hazard in relation to the COSHH Regulations (Control of Substances Hazardous to Health Regulations).

Combustion Air/Ambient Air

- Keep combustion air/ambient air free of corrosive substances (e.g. halogenated hydrocarbons which contain chlorine or fluorine compounds). In this way corrosion can be prevented.

1 General notes

To get the best from your appliance please read these instructions carefully.

Central heating systems

During the first few hours of operation of the central heating system, check that all radiators are being heated at an even rate. If the top of a radiator is at a lower temperature than the bottom then it should be vented by releasing air through the venting screw at the top of the radiator. Ask your installer to show you how this is done. Repeated venting will reduce the quantity of water in the system and this must be replenished for safe and satisfactory operation of the appliance. An open vented system will re-fill automatically.

Should water leaks be found in the system or excessive venting is required then a service engineer must be contacted to inspect the installation and rectify any fault.

Only additives that are compatible with aluminium may be used in the system. Any incompatible additive used will invalidate the guarantee. Contact Fernox or Sentinel for further details.

Condensate drain

This is a condensing appliance and the terminal will, at times, give out a plume of water vapour. This is quite normal.

The appliance produces quantities of condense which is discharged regularly through the siphon.

Ventilation

This is a room sealed appliance and does not require any air for combustion from inside the house. If the appliance is fitted into a cupboard or a compartment is built around the appliance after installation then the compartment must be separated from the boiler space by a perforated non-combustible partition as described in BS6798.

Notwithstanding the requirements of BS6798, there is no need for ventilation openings to be provided in the compartment because of the low heat loss from the casing.

Do not allow the flue terminal fitted on the outside wall to become obstructed or damaged.

Clearances

Your installer will have provided adequate space around the appliance for safety and servicing access. Do not restrict this space with the addition of cupboards, shelves etc. next to the appliance.

Left-hand side	10 mm
Right-hand side	10 mm
In Front	600 mm
Above Casing (Vertical Flue)	200 mm
Above Flue Turret	30 mm
Below	200 mm

Table 1

Room thermostat

A room thermostat should be fitted to control the central heating. Refer to the instructions supplied with the thermostat for information on siting and setting.

Thermostatic radiator valves

It is recommended that this type of valve is fitted to all the radiators. It is a requirement that they are fitted, at least, in the sleeping areas.They should conform to the requirements of BS2767:10.

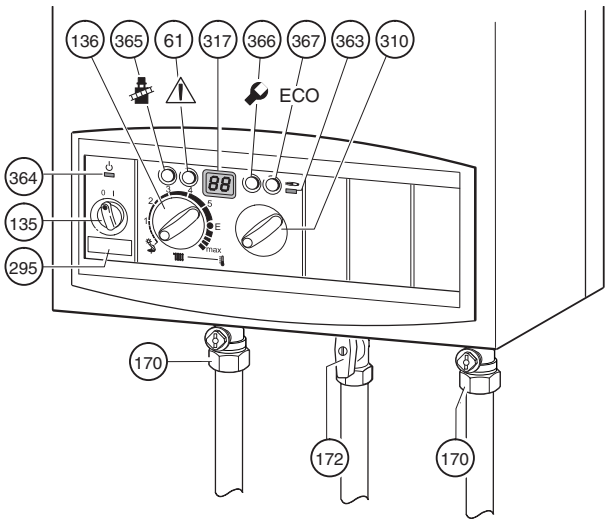
Time Control

Separate time control of the space heating and the hot water system is required using a twin-channel programmer or two or more separate timers.

Cylinder Thermostat

A cylinder thermostat must be fitted to the cylinder which, when used with a motorised valve, will give close control of the water temperature.

2 Controls



61 Reset button
135 Master switch
136 Boiler temperature control
170 Service valves in boiler flow and return
172 Gas isolation valve (open)
295 Identification sticker
310 Function control (Service only)
317 Display
363 Indicator lamp for “burner on”
364 Indicator lamp for “off/on”
365 “Chimney sweep” button
366 Service button
367 No function

3 Operating the Appliance

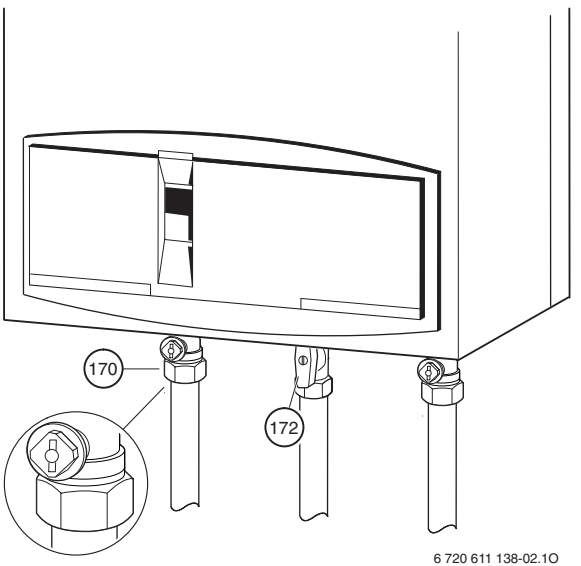
3.1 Preparation

Turn on the gas cock (172).

- Press in the handle and turn it anti-clockwise as far as the stop (when handle is in line with direction of flow, the cock is open).

Central heating system valves (170)

- Using a spanner, turn square nut until groove is in line with direction of flow (see detail).
  Groove at right angles to direction of flow = off.



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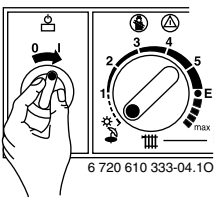
3.2 Switching the Appliance On/Off

Switching on

- Switch on the appliance at the master switch (**I**).
  The indicator lamp shows green and the display will show the primary flow temperature.



If the display alternates between **-II-** and the boiler flow temperature, the trap filling programme is active.

The trap filling programme ensures that the condensation trap is filled after the appliance has been installed or after the appliance has been out of use for a long period. For that reason, the appliance remains at minimum heating output for 15 minutes.

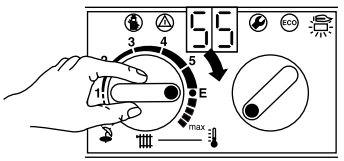
Switching off

- Switch off the appliance at the master switch (**0**).
  The green indicator lamp goes out.

3.3 Switching on the System

- Turn the temperature control to the desired level:
  - "**Min**" setting: 35°C
  - Low-temperature heating: setting "**E**" (approx. 75°C)
  - "**Max**" setting: 88°C

  When the burner is lit, the **red** indicator lamp is illuminated.



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3.4 Controlling

- Set room thermostat to the desired room temperature.
- Set the external time clock to the desired time periods.
- Set the thermostatic radiator valves to the desired settings.

3.5 Setting the Hot Water Temperature of a Cylinder

Hot water temperature

The hot water temperature can be set to between approx. 40°C and 60°C using the thermostat on the cylinder.

The domestic hot water temperature is not shown on the display.

3.6 Frost protection

▶ Leave master switch switched on.

If the appliance is to be left for long periods switch the central heating off:

▶ Add a suitable anti-freeze fluid to the water in the central heating system.
Suitable products are available from Betz-Dearborn Tel.: 0151 4209563 and Fernox Tel.: 01799 550811.

3.7 Fault Condition

In the unlikely event of a fault occuring while the appliance is in operation:

The display then shows a fault code and the button ⚠ may also flash.

If the button ⚠ flashes:

▶ Press and hold the button ⚠ until the display shows "**– –**". The appliance will then start up again and the display will show the boiler flow temperature.

If the button ⚠ does not flash:

▶ Switch the appliance off and then on again at the master switch.
The appliance will start up again and the boiler flow temperature will be displayed.

If the fault remains and can not be cleared:

▶ Call your approved installer or Worcester Bosch Customer Services for assistance, giving a description of the fault and, if possible, the fault code from the facia display.

4 Tips on saving energy

Heating economically

The boiler is designed to provide a high level of comfort while keeping gas consumption and the resulting environmental effect as low as possible. The gas supply to the burner is controlled according to the level of demand for heat. The boiler continues to operate with a low flame if the demand for heat reduces. The technical term for this process is modulating control. Modulating control keeps temperature fluctuations small and provides even distribution of heat throughout the home. This means that the boiler may stay on for relatively long periods but will use less gas than an appliance that continually switches on and off.

Central heating systems with room thermostats/thermostatic radiator valves

The temperature control on the boiler should be set to the maximum rated temperature of the central heating system or to position "**E**", when the maximum central heating water temperature obtained is 75°C.
The temperature can be set individually in each room (except primary room with the room thermostat) using the thermostatic radiator valves. If you wish to have a lower temperature in the primary room than in the other rooms, leave the room thermostat at the set temperature and turn down the radiator using the radiator valve.

Reduced-output operation

Considerable fuel savings can be made by slightly reducing the room temperature. Lowering the temperature by 1 °C can bring about energy savings of up to 5 %. However, it is not advisable to allow the room temperature to fall below +15 °C. The room temperature for reduced-output mode can be set separately on the room thermostat. Instructions are given in the control unit operating instructions.

Hot water

A lower setting on the hot water cylinder thermostat can result in considerable energy savings.

Now you know how to heat your home economically with the Greenstar gas condensing boiler. If you have any other questions, please contact your installer – or write to us.

5 General Information

Cleaning the Outer Case

Wipe down the outer case with a damp cloth. Do not use abrasive or caustic cleaning agents.

Appliance details

If you ever need to call Customer Services it helps us a great deal if you can provide precise details of your appliance.

The information is printed on the appliance identification plate/ sticker (see page 9, item 295).

Your installer will have completed the Benchmark "log-book" giving details of the boiler together with name, address and registration number. Have the "log-book" to hand when calling a Service Engineer.

6 Maintaining your appliance

Your new Worcester Greenstar gas-fired appliance represents a long-term investment in a reliable, high quality product.

In order to realise its maximum working life, and to ensure it continues to operate at peak efficiency and performance, it is essential that your boiler receives regular, competent servicing and maintenance checks beyond the initial 2 year guarantee period.

If you would like to know more about Worcester's extended warranty options please tick the appropriate box on your warranty registration card.

7 Service

If your R29/R40 should fail to operate correctly or requires servicing, please call Worcester Heat Systems on: 08457 256206.

8 Fault or breakdown

This product is supported in the UK by Worcester Heat Systems Ltd. – part of the Bosch Group.

A specialist factory trained field SERVICE ENGINEER is available to attend a breakdown or manufacturing fault occuring on this appliance.

No charge will be made for parts and/or labour providing:

- An appliance fault is found and the appliance has been installed within the past 24 months. Reasonable evidence of this must be supplied on request i. e. the Benchmark "log-book".
- 2nd year warranty is dependent on annual servicing.

A call-out charge will be made where:

- The appliance has been installed for over 24 months.
  OR
- Our Field Service Engineer finds no fault with the appliance (see **NOTE**).
  OR
- The cause of breakdown is misuse or with other parts of your plumbing/heating system, or with equipment not supplied by Worcester.

NOTE: No appliance fault is found on over 30 % of all service call outs.

If in doubt contact our Technical Helpline on 08705 266241.

IN THE EVENT OF AN APPLIANCE FAULT OR BREAKDOWN please contact your Service Centre. Your service administrator will arrange for an engineer to call with the minimum of delay; under normal circumstances this will be within the period 1-3 working days (excluding weekends) for priority breakdown situations (no hot water and/or heating service).

INVOICES FOR ATTENDANCE AND REPAIR WORK CARRIED OUT ON THIS APPLIANCE BY ANY THIRD PARTY WILL NOT BE ACCEPTED.

9 Your Bosch guarantee

This appliance is guaranteed against faulty material or workmanship for a period of 24 calendar months from the date of installation subject to the following conditions and exceptions.

- That during the currency of this guarantee any components of the unit which are proved to be faulty or defective in manufacture will be exchanged or repaired free of material charges and free of labour charges by Worcester Heat Systems Limited.
- That the householder may be asked to prove the date of installation, that the appliance was correctly commissioned and, where appropriate, the first 2 year service has been carried out to the satisfaction of Worcester Heat Systems Limited when requested.
- That any product or part thereof returned for servicing under the guarantee must be accompanied by a claim stating the Model, Serial Number, Date of Installation.
- That Worcester Heat Systems Limited will not accept responsibility for damage caused by faulty installation, neglect, misuse or accidental damage, the non observance of the instructions contained in the Installation and Users Instructions Leaflets.
- That the appliance has been used only for normal domestic purposes for which it was designed.
- That this guarantee applies only to equipment purchased and used in Great Britain.

This guarantee is given in addition to all your normal statutory rights.

10 Guarantee registration

You should complete and return the postpaid Guarantee Registration Card within 14 days of purchase.

The card will register you as the owner of your new Worcester Greenstar appliance and will assist us in maintaining an effective and efficient customer service by establishing a reference and permanent record for your boiler.

This will not affect your statutory rights in any way.

Important:

For your own record:

Model

. . . . . .

Serial number: . . . . . .

Copy the number of the Guarantee Card: . . . . . .

Type/size: . . . . . .

Date of installation: . . . . . .

Check that the Benchmark "log-book" has been completed by your installer or service engineer.

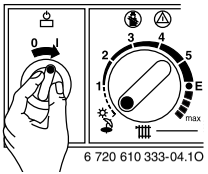
EXCELLENCE COMES AS STANDARD

Worcester Heat Systems, Cotswold Way, Warndon, Worcester WR4 9SW.
Telephone: (01905) 754624 Fax: (01905) 754619

SERIAL NUMBER. Copy the number off the Guarantee Card.

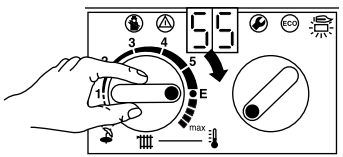
11 Operating Instructions Quick Reference

Switching on



6 720 610 333-04.1O

Switching the system on



6 720 611 138-05.1O

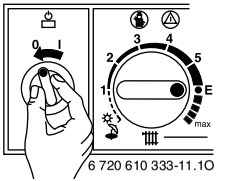
Controlling the system temperature

Set room thermostat to desired temperature or the outside-temperature control unit to the appropriate setting.

Fault Condition

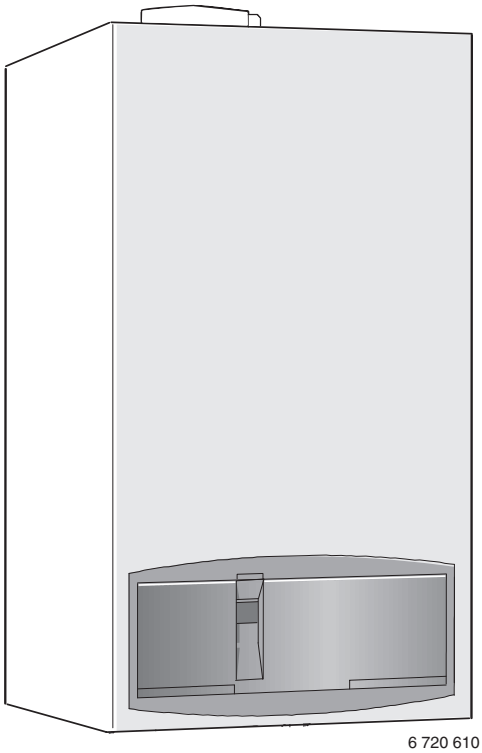
If the ⚠ button flashes, press and hold-in to reset the appliance. Refer to page 13.

Switching off



6 720 610 333-11.1O

Service booklet for the Engineer for Gas Condensing Boilers



6 720 610 577-00.10

ZWB 7-29 CC1 GC-Number: 47 108 05
ZB 7-28 CS1 GC-Number: 41 108 02
ZWB 7-27 HE combi GC-Number: 47 311 55
ZWB 7-25 HE combi GC-Number: 47 311 73
ZWB 7-30 HE combi GC-Number: 47 311 74
ZB 7-27 HE system GC-Number: 41 311 49
ZB 7-28 HE system GC-Number: 41 311 58
Greenstar 29 HE Conventional GC-Number: Natural Gas: 41 311 56; LPG: 41 311 57

7 181 465 346 GB (03.02) OSW

WORCESTER
Bosch Group

Table of contents

Warnings

Repairs

- ▶ Repairs may only be carried out by an approved installer!
- ▶ Before carrying out any work on the appliance, switch it off at the master switch!
- ▶ Even when the appliance is switched off at the master switch, some components on the PCB control board inside the control box are still live. Therefore:
- ▶ Before carrying out any work on the electrical parts of the appliance fully disconnect it from the power supply (e. g. by means of fuse or circuit breaker)!
- ▶ Flue ducting must not be modified in any way.
- ▶ Use only original spare parts!

Instructions to the customer

- ▶ Explain to the customer how the appliance works and how to operate it.
- ▶ Advise the customer that he/she must not make any modifications to the appliance or carry out any repairs on it.

Symbols

Safety instructions in this document are identified by a warning-triangle symbol and are printed on a grey background.

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

- **Caution** indicates that minor damage to property could result.
- **Warning** indicates that minor personal injury or serious damage to property could result.
- **Danger** indicates that serious personal injury could result. In particularly serious cases, lives could be at risk.

Notes are identified by the symbol shown on the left. They are bordered by horizontal lines above and below the text.

Notes contain important information in cases where there is no risk of personal injury or damage to property.

1 Layout of Appliance

1.1 combi

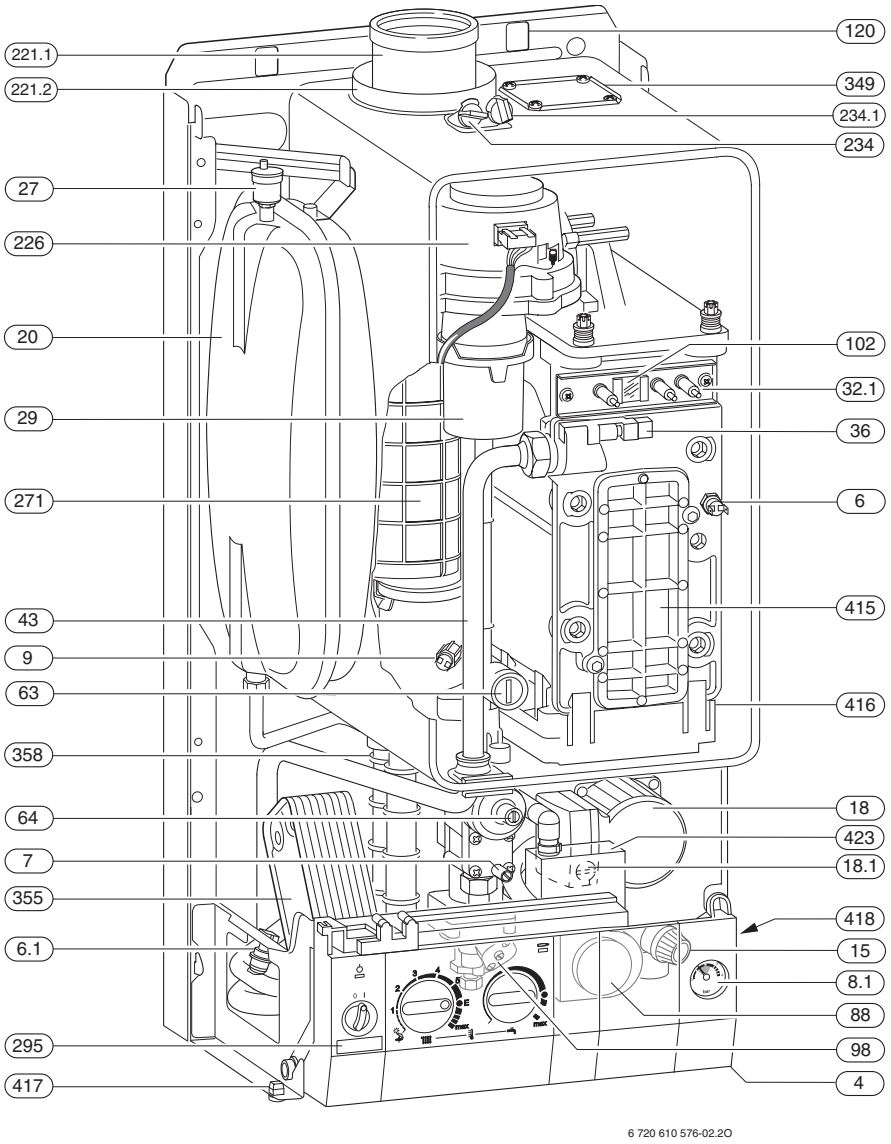


Fig. 1

4 Heatronic control
6 Heat exchanger safety temperature limiter
6.1 Hot water NTC sensor
7 Testing point for gas supply pressure
8.1 Pressure gauge
9 Flue gas temperature limiter
15 Relief valve
18 Pump
18.1 Pump speed selector switch
20 Expansion vessel
27 Automatic air vent
29 Air gas Mixer unit
32.1 Electrode assembly
36 Temperature sensor in CH flow
43 CH flow
63 Adjustable gas flow restrictor
64 Adjusting screw for min. gas flow volume
88 3-way valve (combi)
98 DHW flow switch (combi)
102 Inspection window
120 Fixing points
221.1 Flue duct
221.2 Combustion air intake
226 Fan assembly
295 Appliance type sticker
234 Testing point for combustion products
234.1 Testing point for combustion air
271 Flue duct
349 Cover plate for twin flue duct connection
355 Plate-type domestic hot water heat exchanger
358 Condensate trap
415 Cover plate for cleaning access
416 Condensate collector
417 Clip for fixing outer case
418 Data plate
423 Siphon

1.2 system

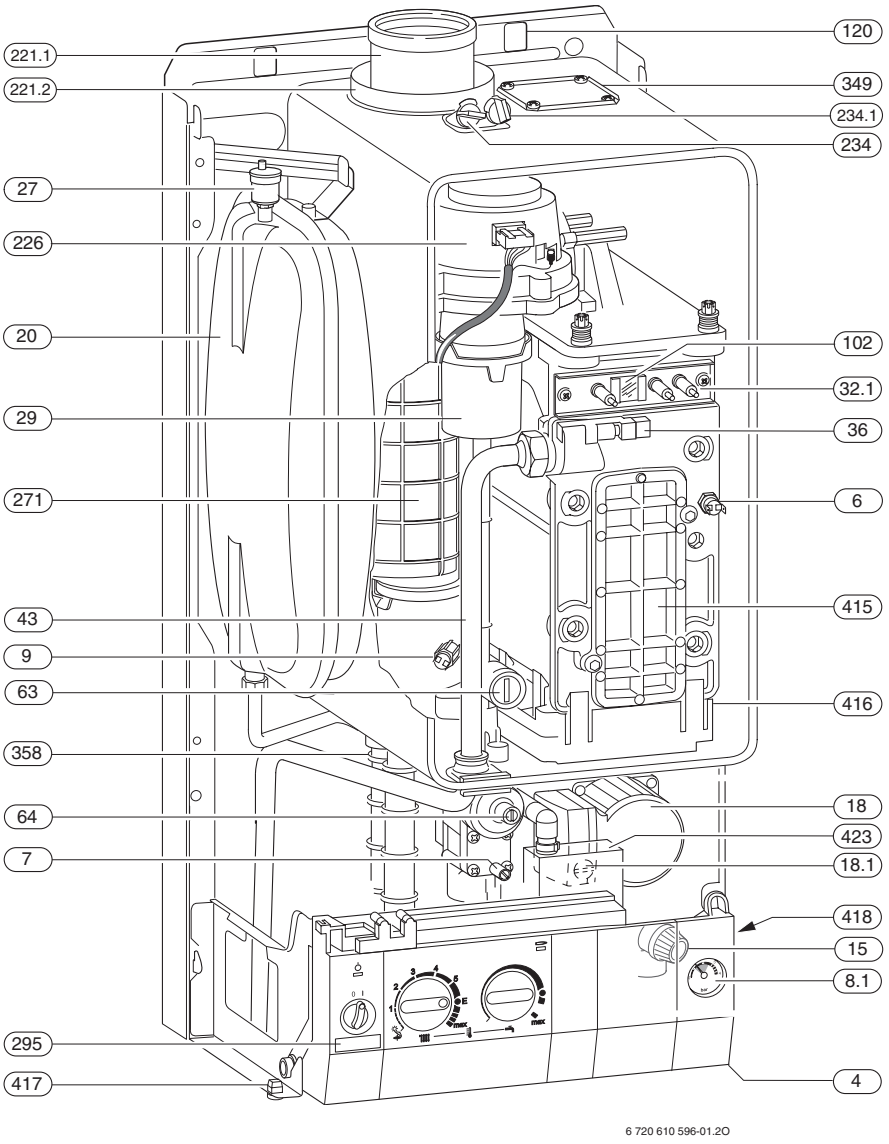


Fig. 2

4 Heatronic control
6 Heat exchanger safety temperature limiter
7 Testing point for gas supply pressure
8.1 Pressure gauge
9 Flue gas temperature limiter
15 Relief valve
18 Pump
18.1 Pump speed selector switch
20 Expansion vessel
27 Automatic air vent
29 Air gas Mixer unit
32.1 Electrode assembly
36 Temperature sensor in CH flow
43 CH flow
63 Adjustable gas flow restrictor
64 Adjusting screw for min. gas flow volume
102 Inspection window
120 Fixing points
221.1 Flue duct
221.2 Combustion air intake
226 Fan assembly
295 Appliance type sticker
234 Testing point for combustion products
234.1 Testing point for combustion air
271 Flue duct
349 Cover plate for twin flue duct connection
358 Condensate trap
415 Cover plate for cleaning access
416 Condensate collector
417 Clip for fixing outer case
418 Data plate
423 Siphon

2 Bosch Heatronic board functions

2.1 Initialisation

When it is switched on, the appliance performs a self-test which takes about 5 seconds. While the test is in progress, the display shows the following sequence of codes:

P1 -> **P2** -> **P3** -> **P4** -> **P5** -> **P6**

On completion of the test sequence the appliance is ready for operation.

2.2 Temperature display

The display shows the current flow temperature in central heating and hot water modes. The display range extends from 00 °C to 99 °C.

If a service function requires the display of a temperature greater than 99 °C, the display alternates between initially showing the first digit and then the remaining two digits.
E.g.: display showing **1.** followed by **69.** indicates **169°C**.

For outside temperatures, the display shows a minus sign followed by the negative temperature in alternation.

2.3 Indication of faults

Faults are indicated by a letter code. This helps to identify and eliminate the cause of the fault quickly and reliably.

The fault codes displayed are grouped into four categories:

- **Category 1:**
  The appliance is disabled until it has been switched off and then on again.
- **Category 2:**
  The appliance is disabled until the cause of the fault has been eliminated.
- **Category 3:**
  The appliance continues to operate with limited function.
- **Category 4:**
  The appliance is disabled and locked (⚠ flashes) until the cause of the fault has been eliminated and the appliance unlocked.

Unlocking the appliance:

▶ Press and hold the ⚠ button until the display shows **– –** .

2.4 Special programme visualisation

The display shows for example 45 _ _ 45 (continuous working at the minimum sanitary/heating power)

The display shows alternatively the temperature and _ _. The function is memorised in the Service mode.

- The appliance works continuously at the sanitary or heating minimum power.

▶ Press the button 🔧 until the symbol _ _ appears on the display.
The button 🔧 is lighted.

▶ Turn the temperature control until function **2.0** appears on the display.
After a short delay, the display shows **1** for minimum output.

▶ Turn the temperature control completely anti-clockwise until the display shows **0** .

▶ Press the button 🔧 until the symbol **[ ]** appears on the display.
The display shows the heating outlet temperature.

The display shows for example 55 ¯ ¯ 55 (continuous working at the maximum power)

The display shows alternatively the temperature and ¯ ¯. The function is memorised in the Service mode.

- The appliance works continuously at the maximum power.

▶ Press the button 🔧 until the symbol ¯ ¯ appears on the display.
The button 🔧 is lighted.

▶ Turn the temperature control until function **2.0** appears on the display.
After about 5 seconds the display will show **2** for the maximum power.

▶ Turn the temperature control completely anti-clockwise until the display shows **0** .

▶ Press the button 🔧 until the symbol **[ ]** appears on the display.
The display shows the heating outlet temperature.

Display shows 45 -II- 45 (trap filling programme)

The trap filling programme ensures that the condensation trap is filled after the appliance is first installed or if it has been switched off for a long period.

The trap filling programme is activated if:

- the appliance is switched on at the master switch
- the burner has not been in operation for at least 48 hours
- the appliance is switched from summer to winter mode.

The next time the central heating or heat store calls for heat, the appliance is held at a low heat output for 15 minutes. The display shows **-II-** in alternation with the CH flow temperature.The factory setting is **1** (enabled).

If the condensation trap is not filled with water, flue gas can escape!

- The trap filling programme should only be disabled in order to carry out servicing work.
- Always re-enable the trap filling programme after completing servicing work.

To switch off the trap filling programme to carry out servicing work:

- Press and hold the and buttons simultaneously until the display shows **= =**.
  The and buttons will light up.
- Turn the temperature control until the display shows **8.5**.
  After a short delay, the display then shows the trap filling programme setting (**1.** = Enabled).
- Turn the temperature control until the display shows **0.** (= Disabled).
  The display and the and buttons will flash.
- Press and hold the and buttons simultaneously until the display shows **[ ]**.
  The trap filling programme is now disabled.
- Regulate the temperature control and the temperature control on the previously set positions.
  The display shows the heating outlet temperature.

Display shows $_0{}^0$ (venting function)

The first time the appliance is switched on, it automatically activates a one-off venting sequence in which the heating pump switches on and off at intervals for about 8 minutes.

This function can be activated on Service Level 2, Service Code 7.3, if it is required at any other time.

2.5 Boiler service functions

2.5.1 First Service Level

Operating

In order to change or check the values of the service functions:

- Press the button until the symbol - - appears on the display.
  The button is lighted.
- Turn the temperature control until the desired function number appears on the display.

Once changed or checked the function value:

- Press the button until the symbol **[ ]** appears on the display.
  The display shows the heating outlet temperature.
- Regulate the temperature control and the temperature control on the previously set positions.

In order to reset the main menu function values to their default values:

- Power OFF the appliance.
- Press the button and keep it pressed.
- Switch on the appliance, press and hold the button until the
  display shows **r1** followed by **[ ]**.

Values that can be modified:

	Description	Display	Reset Value
.0	Show the last error code.	0 - FF	Clear only
2.0	Identification of the function mode (0 = normal, 1= min, 2 = max)	0 - 2	0
2.2	Identification of the pump function mode	1 - 3	2
2.3	Max. output in heat store heating mode	28 - 99	99
2.4	Anti-cycle time[1)]	0 - 15 min	3 min
2.5	Max. CH flow temperature	35 - 88°C	88°C
2.6	Minimum hysteresis in heating mode (ΔT)	0 - 30 K	0 K
2.7	Activation of automatic anti-cycle time (0 = Disabled; 1 = Enabled)	0, 1	1
3.4	Pump mode	0 - 3	2)

Table 1 First Service Level; Values that can be modified

1) If appliance is used in conjunction with type TA... programmer, only effective if Service Code 2.7 is set to “0” (= "Disabled")!
2) The reset value is dependent on the code plug.

Values that can only be read:

i	Description	Display	Reset Value
.1	Heating outlet temperature.	0 - 99°C	-
.2	Sanitary outlet temperature.	0 - 99°C	-
.3	Heat store NTC sensor (ZSB.)	0 - 99°C	
.4	Constant hot water NTC sensor (ZWB.)	0 - 99°C	-
1.2	Order no. for code plug: 8 714 411 XXX	0 - 255	-
1.4	Temperature voltage signal (Terminal 2) from room thermostat (eg. TRQ 21, TR 100)	5 - 22 VDC	-
1.5	Specified CH flow temperature from programmer	0 - 99°C	-
1.6	Outside temperature from TA 211 E or room temperature from TR 212 E	-20 +30°C	-
1.7	Status TR 2 (0 = Not present 1 = Frost protection 3 = Auto 4 = Day, Night 5=Error)	0 - 4	-
1.8	Terminal 2 on programmer interface module	0 - 24 VDC	-
1.9	Identification code for the external module: 0, 2, 4, 5 = no module connected, 3 = ADM, 6 = TA 211E, 53 = ADM, 56 = TR 212 E).	0 - 8, 53, 56	-
2.9	Instantaneous power.	0 - 99 %	-
3.0	Fan speed	0 - 105	-
3.3	Quality of the ionisation signal: 0 = no ionisation, 1 = weak ionisation, 2 = medium ionisation, 3 = high ionisation.	0 - 3	-
3.6	Software version	3 x 2 positions	-

Table 2 First Service Level; Values that can only be read

Values that can only be read - only left display digit:

i	Description	Display XY	Reset Value
3.9	External switch (points 8 - 9).	0 = closed 1 = Heating demand	-
4.1	External demand for heat via LSM	0 = closed 1 = Heating demand	-
4.2	Programmable clock: 1st channel (Heating).	0 = closed 1 = Heating demand	-
4.3	Automatic pump shut OFF with RAM module (point 5)	0 = closed 1 = Heating demand	-
4.4	Heating demand.	0 = closed 1 = Heating demand	-
4.5	Sanitary demand.	0 = closed 1 = Heating demand	-

Table 3 First Service Level; Values that can only be read - only left display digit

Values that can only be read - only right display digit:

i	Description	Display XY	Reset Value
3.9	External 2-point demand for heat via 230 V AC (Terminals Ls - Lr)	0 = closed 1 = Heating demand	-
4.0	Heat store demand for heat via heat store thermostat (Terminals 7-9)	0 = closed 1 = Heating demand	-
4.1	LSM Enable	0 = closed 1 = Heating demand	-
4.2	Programmable clock: 2nd channel (DHW – Maintaining).	0 = closed 1 = Heating demand	-
4.3	Heating demand from TA 211 E	0 = closed 1 = Heating demand	-
4.4	Heat store demand for heat via heat store NTC sensor	0 = closed 1 = Heating demand	-
4.5	Sanitary heat exchanger temperature maintaining.	0 = closed 1 = Heating demand	-
4.6	Anti-cycle time	0 = closed 1 = Heating demand	-

Table 4 First Service Level; Values that can only be read - only right display digit

2.5.2 Secondary Service Level

Operation

In order to change or check the values of the service functions:

- Press buttons and simultaneously until the symbol = = appears on the display.
  The buttons and are lighted.
- Turn the temperature control until the desired function number appears on the display.

Once changed or checked the function value:

- Press buttons and simultaneously until the symbol **[ ]** appears on the display.
  The display shows the heating outlet temperature.
- Regulate the temperature control and the temperature control on the previously set positions.

To reset all settings on Service Levels **1 and 2** to the factory setting:

- Power OFF the appliance.
- Press buttons and simultaneously and keep them pressed.
- Switch on appliance, press and hold the and buttons until the display shows **r2** followed by **[ ]**.

Values that can be modified:

	Description	Display	Reset Value
5.0	Reduced max. heating output	0 - 99 % and sealed	99
5.1	Continuous ignition (for testing ignition without gas)	0 = off 1 = on	0
5.5	Increased min. heating and heat store charging output	0 - 99 %	0
5.9	Starting speed option (if flame propagation is poor, set high starting speed)	0 = First start at low speed; 1 = First start at high speed)	0
6.7	Pump deactivation in HW mode, ZW only.	0 = off, 1 = on	1
6.8	Cycle time for heat exchanger constant hot water function on ZW model.	0 - 60 min	0
6.9	Constant hot water	0 - 30 min	3
7.3	Venting function	0 = off, 1 = On for 8 cycles then permanently off (i.e. set to 0) 2 = on	1
7.7	Temperature-dependent output reduction	0 = off; 1 = Heating on 2 = Hot water on 3 = Heating and hot water on	3
8.5	Trap filling programme	0 = off 1 = on	1

Table 5 Secondary Service Level; Values that can be modified

Values that can only be read:

i	Description	Display	Reset Value
5.2	Automatic gas igniter status and/or fault	00 - FF	-
9.3	Automatic gas igniter Asic fault code	00 - FF	-

Table 6 Secondary Service Level; Values that can only be read

3 Failure identification procedure

3.1 Notes on using the fault code tables

The procedure is best described with the aid of an example:

- Work through the table from top to bottom and from left to right.
- First make a note of the present settings and restore them before leaving the appliance.
- Read question **1.** (Check column)and depending on the answer (yes or no) read the action required from the relevant box and carry out the instruction given; ignore the other answer. **For example:** if the burner flame is visible, follow the instructions for **yes**, i.e. ↓5.!
- ↓5. means go to number 5., ignoring the steps in between.

In this example: check the flue is clear by testing the CO_2 level.

- If the appliance is locked (button is flashing), press the button. **Important:** after unlocking the appliance, **always** restart it (i.e. switch off and then on again). Only then is it possible to say whether or not the fault has been eliminated.
- If the fault has been rectified, the appliance will then start up without indicating a fault and the fault isolation procedure is complete.
- If the fault is still present after performing the action specified and, if necessary, restarting the appliance, move on to the next step in the fault isolation procedure.
- If another fault code is displayed, work through the fault code table for that code.

EA and flashing.

Flame not detected

	Check		Action
			▶ Note the setting of the temperature controls and .
1.	Is a burner flame visible?	**yes:**	↓ 5.
		no:	↓ 2.
2.	Is the gas cock turned on?	**yes:**	↓ 5.
		no:	▶ Open the gas cock. ▶ Press , restart the appliance. EA? ↓3.
3.	Has the thermal cut-out on the gas cock tripped?	**yes:**	...
		no:	↓ ...
4. ...	...		
5. ...	Problem with flue? ▶ Check CO_2 level in combustion air. Is CO_2 level above 0,2 % ?	**yes:**	Check flue.
		no:	↓ ...
			Return to normal operation: ▶ Press the button until the symbol **[ ]** appears on the display. ▶ Regulate the temperature control and the temperature control on the previously set positions.

Table 7

3.2 Summary

3.2.1 Appliance faults

Appliance faults	Category	ZB ...A	ZB ...A Conventional	ZWB ...A	Page
A5	3			X	15
A7	3			X	17
A8	3	X	X	X	19
AC	3	X	X	X	20
Ad	3	X			22
b1	2	X	X	X	24
C1	2	X	X	X	25
CC	3	X	X	X	26
d3	2	X	X	X	27
E2	2	X	X	X	28
E9	4	X	X	X	30
EA	4	X	X	X	32
F0	4/ 2	X	X	X	37
F7	4	X	X	X	38
FA	4	X	X	X	39
Fd	4	X	X	X	41

Table 8

3.2.2 Faults that are not displayed

Appliance faults	ZB ...A	ZWB ...A	Page
Excessive burner noise, rumbling noises	X	X	42
Flue gas levels incorrect, CO level too high	X	X	43
Ignition too harsh, ignition poor.	X	X	44
Boiler indicates P1, P2, P3 at start-up and then restarts with P1,...	X	X	46
Loose or broken contact on heat store NTC sensor	X	X	46
Specified CH flow temperature from TA... programmer exceeded	X	X	47

Table 9

Programmer faults	TR 2 and TR 212 E	TA 211E and DT 2	Page
Set room temperature not reached.	X		48
Set room temperature exceeded.	X		
Set room temperature not reached.		X	49
Set room temperature exceeded by large amount.		X	50
Excessive fluctuations in room temperature	X	X	50
Temperature rises instead of falling	X	X	51
Room temperature too high in Economy mode	X	X	50
Incorrect or no modulation	X	X	51
Heat store fails to heat up		X	

Table 10

3.3 Error codes on the display

A5 flashing.

Heat store NTC sensor 2 defective

	Check		Action
			▶ Note the setting of the temperature controls and .
1.	▶ Press button . ▶ Select service function **.3** . Is a temperature between **0.** and **5.** displayed?	**yes:**	▶ Flue gas connector corroded[1)], damaged or dirty?. Change relative parts. ↓2.
		no:	↓3.
2.	Heat store NTC: ▶ Unplug connector. ▶ Short circuit the connector. Display changes to temperature between **99.** and **95.**	**yes:**	▶ Power OFF the appliance. ▶ Change NTC sensor. ▶ Plug the connection wire. ▶ Turn ON the appliance. A5? ↓3.
		no:	▶ Change the 20-pin connector lead assembly. ↓3.
3.	Temperature between **95.** and **99.** is displayed. ▶ Unplug connector. After max. 60 sec.: Does the displayed code change to a value between **0.** and **5.**?	**yes:**	▶ Power OFF the appliance. ▶ Change NTC sensor. ▶ Plug the connection wire. ▶ Turn ON the appliance. A5? ↓4.
		no:	↓4.
4.	▶ Unplug 20-pin connector from PCB. After max. 60 sec.: Does the displayed code change to a value between **0.** and **5.**?	**yes:**	▶ Power OFF the appliance. ▶ Disconnect the boiler electrical connection. ▶ Change the 20-pin connector lead assembly. ▶ Reconnect the boiler electrical connection. ▶ Turn ON the appliance. ↓5.
		no:	▶ Make a note of the altered service settings (see table 1, "First Service Level; Values that can be modified" at page 8 and table 5, "Secondary Service Level; Values that can be modified" at page 11). ▶ Power OFF the appliance. ▶ Disconnect the boiler electrical connection. ▶ Change PCB control board. ▶ Reconnect the boiler electrical connection. ▶ Turn ON the appliance. ▶ Restore service settings previously noted down.

A5 flashing.

Heat store NTC sensor 2 defective

	Check		Action
5.			To return to normal function mode: ▶ Press buttons and simultaneously. ▶ Regulate the temperature control and the temperature control on the previously set positions.

1) For notes, refer to Appendix

A7 flashing.

Hot water NTC sensor defective

	Check		Action
			▶ Note the setting of the temperature controls and .
1.	▶ Press button . ▶ Select service function **.2** . Is a temperature between **0.** and **5.** displayed?	**yes:**	▶ Flue gas connector corroded[1)], damaged or dirty? Change relative parts. ↓2.
		no:	↓3.
2.	Hot water NTC sensor: ▶ Unplug connector. ▶ Short circuit the connector. Display changes to temperature **99.**	**yes:**	▶ Power OFF the appliance. ▶ Drain the hot water circuit. ▶ Disconnect the boiler electrical connection. ▶ Change NTC sensor. ▶ Plug the connection wire. ▶ Reconnect the boiler electrical connection. ▶ Turn ON the appliance. A7? ↓3.
		no:	▶ Change the 20-pin connector lead assembly. ↓3.
3.	Temperature between **95.** and **99.** is displayed. ▶ Unplug connector. After max. 60 sec.: Does the displayed code change to a value between **0.** and **5.**?	**yes:**	▶ Power OFF the appliance. ▶ Disconnect the boiler electrical connection. ▶ Change NTC sensor. ▶ Refill the hot water circuit. ▶ Check the built-in NTC sensor for leaks. ▶ Plug the connection wire. ▶ Reconnect the boiler electrical connection. ▶ Turn ON the appliance. A7? ↓4.
		no:	↓4.

A7 flashing.

Hot water NTC sensor defective

	Check		Action
4.	▶ Unplug 20-pin connector from PCB. After max. 60 sec.: Does the displayed code change to a value between **0.** and **5.**?	**yes:**	▶ Power OFF the appliance. ▶ Disconnect the boiler electrical connection. ▶ Change the 20-pin connector lead assembly. ▶ Reconnect the boiler electrical connection. ▶ Turn ON the appliance. ↓5.
		no:	▶ Make a note of the altered service settings (see table 1, "First Service Level; Values that can be modified" at page 8 and table 5, "Secondary Service Level; Values that can be modified" at page 11). ▶ Power OFF the appliance. ▶ Disconnect the boiler electrical connection. ▶ Change PCB control board. ▶ Reconnect the boiler electrical connection. ▶ Turn ON the appliance. ▶ Restore service settings previously noted down. ↓5.
5.			To return to normal function mode: ▶ Press buttons and simultaneously. ▶ Regulate the temperature control and the temperature control on the previously set positions.

1) For notes, refer to Appendix

A8 flashing.

No correct electrical connection

	Check		Action
1.	TR 2 connected?	**yes:**	A8? ↓2.
		no:	▶ Power OFF the appliance. ▶ Connect TR 2. ▶ Turn ON the appliance. A8? ↓2.
2.	Mode selector switch is between two settings		▶ Turn switch until it clicks into position. A8? ↓3.
3.	▶ Power OFF the appliance. Wiring between TR 2 and TR 212 E OK? • Terminal 3 on TR 2 connected to Terminal 3 on TR 212 E? • Terminal 4... Terminal 4....	**yes:**	▶ Turn ON the appliance. ↓4.
		no:	▶ Rewire correctly as specified in the installation instructions. ▶ Turn ON the appliance. After 90 sec.: A8? ↓4.
4.	TR 2 defective		▶ Power OFF the appliance. ▶ Change TR 2. ▶ Turn ON the appliance.

AC flashing.

Module not detected.
(Constant CH flow temperature according to CH temperature control on boiler.)

	Check		Action
			▶ Note the setting of the temperature controls and .
1.	▶ Press button . ▶ Select service function **1.9** . Code **0.**, **2.**, **4.**, **5.** is displayed.	**yes:**	No modul detected. ▶ Disconnect connecting lead between PCB control board and TA 211 E or TA 212 E. ▶ Re-connect connecting lead. AC? ↓3.
		no:	↓2.
2.	Are 24 V DC cables routed alongside 230 V AC cables?	**yes:**	▶ Ensure cable separation conforms to minimum requirements as per installation instructions and/or use shielded cable.
		no:	↓3.
3.	Connecting lead between PCB control board and TA 211 E or TA 212 E defective.		▶ Power OFF the appliance. ▶ Replace connecting lead between PCB control board and programmer interface module or TA 211 E. ▶ Turn ON the appliance. AC? ↓4.
4.	TA 211 E connected?	**yes:**	↓5.
		no:	↓8.
5.	▶ Select service function **1.6** . Outside temperature between -20 and +30 °C is displayed. Does temperature displayed match true outside temperature?	**yes:**	↓7.
		no:	▶ Power OFF the appliance. ▶ Replace outside temperature sensor. ▶ Turn ON the appliance. AC? ↓7.
6.	If remote control installed: ▶ Select service function **1.7** . Remote control status **0.** is displayed .	**yes:**	▶ Power OFF the appliance. ▶ Plug the connection wire. ▶ Turn ON the appliance. AC? ↓7.
		no:	↓7.

AC flashing.

Module not detected.
(Constant CH flow temperature according to CH temperature control on boiler.)

	Check		Action
7.	Remote control status still **0.**?	**yes:**	▶ Power OFF the appliance. Remote control: ▶ Replace top section. ▶ Turn ON the appliance. AC? ↓8.
		no:	↓8.
8.	The PCB control board is damaged.		▶ Make a note of the altered service settings (see table 1, "First Service Level; Values that can be modified" at page 8 and table 5, "Secondary Service Level; Values that can be modified" at page 11). ▶ Power OFF the appliance. ▶ Disconnect the boiler electrical connection. ▶ Change PCB control board. ▶ Reconnect the boiler electrical connection. ▶ Turn ON the appliance. ▶ Restore service settings previously noted down.
			To return to normal function mode: ▶ Press buttons and simultaneously. ▶ Regulate the temperature control and the temperature control on the previously set positions.

Ad flashing.

Heat store NTC sensor 1 not detected (ZB...).

	Check		Action
			▶ Note the setting of the temperature controls and .
1.	Is connecting lead for heat store NTC sensor 1 correctly routed, i.e. **not** through cable grommet?	**yes:**	↓2.
		no:	▶ Route connecting lead for heat store temperature sensor as specified in installation instructions.
2.	▶ Press button . ▶ Select service function **.3** . Is a temperature between **0.** and **5.** displayed?	**yes:**	Is NTC sensor connector corroded, damaged or dirty? ▶ Power OFF the appliance. ▶ Change NTC sensor. ▶ Turn ON the appliance. ▶ Press button . Ad? ↓3.
		no:	↓4.
3.	Heat store -NTC 1: ▶ Unplug connector from PCB control board. ▶ Short circuit the connector using wire jumper. After max. 60 sec: Display changes to temperature between **99.** and **95.**	**yes:**	▶ Power OFF the appliance. ▶ Change NTC sensor. ▶ Turn ON the appliance. ▶ Press button . ↓4.
		no:	▶ Make a note of the altered service settings (see table 1, "First Service Level; Values that can be modified" at page 8 and table 5, "Secondary Service Level; Values that can be modified" at page 11). ▶ Power OFF the appliance. ▶ Disconnect the boiler electrical connection. ▶ Change PCB control board. ▶ Reconnect the boiler electrical connection. ▶ Turn ON the appliance. ▶ Restore service settings previously noted down. ↓4.

Ad flashing.

Heat store NTC sensor 1 not detected (ZB...).

	Check		Action
4.	Temperature between **99.** and **95.** is displayed. ▶ Unplug connector. After max. 60 sec.: Does the displayed code change to a value between **0.** and **5.**?	**yes:**	▶ Power OFF the appliance. ▶ Change NTC sensor. ▶ Turn ON the appliance.
		no:	▶ Make a note of the altered service settings (see table 1, "First Service Level; Values that can be modified" at page 8 and table 5, "Secondary Service Level; Values that can be modified" at page 11). ▶ Power OFF the appliance. ▶ Disconnect the boiler electrical connection. ▶ Change PCB control board. ▶ Reconnect the boiler electrical connection. ▶ Turn ON the appliance. ▶ Restore service settings previously noted down.
			To return to normal function mode: ▶ Press buttons and simultaneously. ▶ Regulate the temperature control and the temperature control on the previously set positions.

b1 flashing.

The Heatronic does not recognise the code key.

	Check		Action
1.			▶ Power OFF the appliance.
2.	Code plug loose, incorrect or defective.		▶ Replace code plug, check code number is correct. ▶ Turn ON the appliance. b1? ↓3.
3.	The PCB control board is damaged.		▶ Make a note of the altered service settings (see table 1, "First Service Level; Values that can be modified" at page 8 and table 5, "Secondary Service Level; Values that can be modified" at page 11). ▶ Power OFF the appliance. ▶ Disconnect the boiler electrical connection. ▶ Change PCB control board. ▶ Reconnect the boiler electrical connection. ▶ Turn ON the appliance. ▶ Restore service settings previously noted down.

C1 flashing.

Fan speed too low

	Check		Action
1.	Fan lead connector properly connected?	**yes:**	↓2.
		no:	▶ Power OFF the appliance. ▶ Plug in connector. ▶ Turn ON the appliance. C1? ↓2.
2.	Is fan lead defective? ▶ Is impedance reading between the two connectors for one of the cores infinity?	**yes:**	▶ Power OFF the appliance. ▶ Replace fan lead. ▶ Turn ON the appliance. C1? ↓3.
		no:	↓3.
3.	Are the differential pressure switch contacts closed? ▶ Press button 🔧. ▶ Select service function **3.8** . Is left digit of display showing **1**?	**yes:**	↓4.
		no:	↓4.
4.	Fan defective?	**yes:**	▶ Power OFF the appliance. ▶ Plug the connection wire. ▶ Replace fan. ▶ Plug the connection wire. ▶ Turn ON the appliance. C1? ↓5.
		no:	↓5.
5.	The PCB control board is damaged.		▶ Make a note of the altered service settings (see table 1, "First Service Level; Values that can be modified" at page 8 and table 5, "Secondary Service Level; Values that can be modified" at page 11). ▶ Power OFF the appliance. ▶ Disconnect the boiler electrical connection. ▶ Change PCB control board. ▶ Reconnect the boiler electrical connection. ▶ Turn ON the appliance. ▶ Restore service settings previously noted down.

CC flashing.

Outside temperature NTC sensor not detected.
(Boiler heating as if outside temperature is -20°C)

	Check		Action
1.	Outside temperature sensor AF2 connected to Terminals A and F on TA 211 E?	**yes:**	↓2.
		no:	▶ Power OFF the appliance. ▶ Connect outside temperature sensor to Terminals A and F on TA 211 E. ▶ Turn ON the appliance. CC? ↓2.
2.	▶ Power OFF the appliance. ▶ Disconnect outside temperature sensor and test resistance R = ∞ or R = 0?		▶ Change the external sensor. ▶ Turn ON the appliance.

d3 flashing.

Wrong signal from pin 8-9 (open?).

	Check		Action
1.	▶ Turn ON the appliance. ▶ Measure voltage between Terminal 4 and Terminal 8. Voltage ≅ 24 V DC?	**yes:**	↓2.
		no:	↓3.
2.	Existing heat store thermostat connected to Terminals 7, 8 and 9?	**yes:**	▶ Power OFF the appliance. ▶ Fix the additional bridge 8-9 in the right position and close the screws. ▶ Turn ON the appliance. d3? ↓3.
		no:	↓4.
3.	Break in connecting lead?	**yes:**	▶ Power OFF the appliance. ▶ Plug the connection wire. ▶ Turn ON the appliance. d3? ↓4.
		no:	↓4.
4.	The PCB control board is damaged.		▶ Make a note of the altered service settings (see table 1, "First Service Level; Values that can be modified" at page 8 and table 5, "Secondary Service Level; Values that can be modified" at page 11). ▶ Power OFF the appliance. ▶ Disconnect the boiler electrical connection. ▶ Change PCB control board. ▶ Reconnect the boiler electrical connection. ▶ Turn ON the appliance. ▶ Restore service settings previously noted down.

E2 flashing.

The heating outlet NTC sensor is damaged.

	Check		Action
			▶ Note the setting of the temperature controls and .
1.	▶ Press button . ▶ Select service function **.1** . Is a temperature between **0.** and **5.** displayed?	**yes:**	The heating outlet NTC sensor is in short circuit: ▶ Power OFF the appliance. ▶ Replace CH flow NTC sensor; observe fitting instructions for NTC sensor when doing so. ▶ Turn ON the appliance. E2? ↓2.
		no:	↓2.
2.	Temperature for heating outlet NTC sensor between **95.** and **99.** is displayed.	**yes:**	The CH flow NTC sensor is interrupted : ▶ Power OFF the appliance. ▶ Replace CH flow NTC sensor; observe fitting instructions for NTC sensor when doing so. ▶ Turn ON the appliance. E2? ↓3.
		no:	↓3.
3.	Check if the 20-pin connector lead assembly is damaged.		▶ Power OFF the appliance. ▶ Disconnect the boiler electrical connection. ▶ Change the 20-pin connector lead assembly. ▶ Reconnect the boiler electrical connection. ▶ Turn ON the appliance. E2? ↓4.
4.	The PCB control board is damaged.		▶ Make a note of the altered service settings (see table 1, "First Service Level; Values that can be modified" at page 8 and table 5, "Secondary Service Level; Values that can be modified" at page 11). ▶ Power OFF the appliance. ▶ Disconnect the boiler electrical connection. ▶ Change PCB control board. ▶ Reconnect the boiler electrical connection. ▶ Turn ON the appliance. ▶ Restore service settings previously noted down.

E2 flashing.

The heating outlet NTC sensor is damaged.

	Check		Action
			To return to normal function mode: ▶ Press buttons and simultaneously. ▶ Regulate the temperature control and the temperature control on the previously set positions.

E9 and ⚠ flashing.

Safety temperature limiter has tripped.

	Check		Action
1.	Is the heating pressure between 1 and 2 bar?	**yes:**	↓2.
		no:	▶ Top up system. ▶ Vent appliance. ▶ Press ⚠, restart the appliance. E9? ↓2.
2.	Is the pump blocked?	**yes:**	▶ Unblock the pump. If pump won't start: ▶ Power OFF the appliance. ▶ Disconnect the boiler electrical connection. ▶ Change the pump. ▶ Reconnect the boiler electrical connection. ▶ Turn ON the appliance. ▶ Press ⚠, restart the appliance. E9? ↓3.
		no:	↓3.
3.	Lead disconnected from safety temperature limiters?	**yes:**	▶ Power OFF the appliance. ▶ Connect lead. ▶ Turn ON the appliance. ▶ Press ⚠, restart the appliance. E9? ↓4.
		no:	↓4.
4.	▶ Power OFF the appliance. ▶ Unplug the connector from the cut-off device. ▶ Measure the NTC electrical resistance. R = ∞?	**yes:**	▶ Change the over heating cut-off device. ▶ Connect flue gas safety temperature limiter lead. ▶ Turn ON the appliance. ▶ Press ⚠, restart the appliance. E9? ↓5.
		no:	▶ Connect flue gas safety temperature limiter lead. ▶ Turn ON the appliance. ↓5.

E9 and ⚠ flashing.

Safety temperature limiter has tripped.

	Check		Action
5.	Is lead disconnected from CH flow safety temp. limiter?	**yes:**	▶ Power OFF the appliance. ▶ Reconnect lead. ▶ Turn ON the appliance. ▶ Press ⚠, restart the appliance. ↓6.
		no:	↓6.
6.	▶ Power OFF the appliance. ▶ Disconnect lead to CH flow safety temperature limiter. ▶ Measure the CH flow safety temperature limiter. R = ∞?	**yes:**	▶ Change CH flow safety temperature limiter. ▶ Connect CH flow safety temperature limiter lead. ▶ Turn ON the appliance. ▶ Press ⚠, restart the appliance. E9? ↓7.
		no:	▶ Connect CH flow safety temperature limiter lead. ▶ Turn ON the appliance. ↓7.
7.	▶ Power OFF the appliance. ▶ Remove fuse SI 3 from appliance PCB control board and test for continuity. R = ∞?	**yes:**	▶ Change the fuse. ▶ Turn ON the appliance. ▶ Press ⚠, restart the appliance. E9? ↓8.
		no:	▶ Remount the fuse. ▶ Turn ON the appliance. ↓8.
8.	The PCB control board is damaged.		▶ Make a note of the altered service settings (see table 1, "First Service Level; Values that can be modified" at page 8 and table 5, "Secondary Service Level; Values that can be modified" at page 11). ▶ Power OFF the appliance. ▶ Disconnect the boiler electrical connection. ▶ Change PCB control board. ▶ Reconnect the boiler electrical connection. ▶ Turn ON the appliance. ▶ Restore service settings previously noted down.

EA and ⚠ flashing.

No flame ionisations signal

	Check		Action
			▶ Note the setting of the temperature controls and .
1.	Is the flame present?	**yes:**	↓6.
		no:	↓2.
2.	Is the gas cock open?	**yes:**	↓3.
		no:	▶ Open the gas cock. ▶ Press ⚠, restart the appliance. EA? ↓3.
3.	Is there air in the supply pipe?	**yes:**	▶ Vent supply pipe. ▶ Press ⚠, restart the appliance. EA? ↓4.
		no:	↓4.
4.	Did the thermal security of the gas cock lock out?	**yes:**	▶ Reset security. ▶ Press ⚠, restart the appliance. EA? ↓5.
		no:	↓5.

EA and ⚠ flashing.

No flame ionisations signal

	Check		Action
5.	**Natural gas models**: does the building have a supply pressure regulator?	**yes:**	▶ Check that it is fitted correctly and functioning properly and correct if necessary. ▶ Check supply pressure, inform gas company if outside correct range. ▶ Is correct code plug fitted? ▶ Press ⚠, restart the appliance. EA? ↓6.
		no:	↓6.
	LPG models: is the flow rate of the gas supply to the appliance correct?	**yes:**	↓6.
		no:	▶ Is there enough gas in the supply cylinder? ▶ Is there air in the supply pipe? ▶ Is the solenoid valve in the "meter cabinet" opening? ▶ Is the supply pressure OK? (if the supply pressure is too high, check the pressure regulator in the “meter cabinet” and on the LPG supply cylinder). ▶ Press ⚠, restart the appliance. EA? ↓6.
6.	Is the ground connection correct?	**yes:**	↓7.
		no:	▶ Correct the electrical ground connection. ▶ Press ⚠, restart the appliance. EA? ↓7.
7.	Two phase net: Is there a resistor fitted between Pe and N?	**yes:**	↓8.
		no:	▶ Power OFF the appliance. ▶ Disconnect the boiler electrical connection. ▶ Insert a 2 MΩ resistance between the ground and the N connection. ▶ Reconnect the boiler electrical connection. ▶ Turn ON the appliance. ▶ Press ⚠, restart the appliance. EA? ↓11.

EA and ⚠ flashing.

No flame ionisations signal

	Check		Action
8.	Is diaphragm in the mixer unit correctly fitted and functional? ▶ Open mixer unit (29). ▶ Check diaphragm for correct orientation, soiling and splitting. Is diaphragm OK?	**yes:**	▶ Close mixer unit. ↓9.
		no:	▶ Insert diaphragm in the fan intake duct as per installation instructions so that the flaps open upwards. ▶ Close mixer unit. EA? ↓9.
9.	Is the condensation trap blocked?	**yes:**	▶ Clean out condensation trap discharge pipe. ▶ Press ⚠, restart the appliance. EA? ↓13.
		no:	↓10.
10.	Check the gas valve? ▶ Power OFF the appliance. ▶ Unplug the connectors from the gas valve. ▶ Measure the gas valve coils **I** and **II** electrical resistance. R = 164 ± 40Ω ?	**yes:**	▶ Reconnect the gas valve. ▶ Turn ON the appliance. ▶ Press ⚠, restart the appliance. EA? ↓11.
		no:	▶ Change the gas valve. ▶ Reconnect the gas valve. ▶ Turn ON the appliance. ▶ Press ⚠, restart the appliance. EA? ↓11.
11.	Problem with flue? ▶ Check CO_2 level in combustion air. Is CO_2 level above 0,2 % ? ▶ Open up heat exchanger - is it dirty?	**yes:**	▶ Check flue and clean if necessary. ▶ Press ⚠, restart the appliance. EA? ↓12.
		no:	↓12.
12.	Is flue gas CO_2 level incorrect[1)]?	**yes:**	▶ Adjust to correct level. ▶ Press ⚠, restart the appliance. EA? ↓13.
		no:	↓13.

EA and ⚠ flashing.

No flame ionisations signal

	Check		Action
13.	▸ Press buttons 🔧 and 🧹 simultaneously. ▸ Select service-function **5.1**. Continuous ignition (without gas) OK?	**yes:**	▸ Press buttons 🔧 and 🧹 simultaneously. ↓14.
		no:	▸ Press buttons 🔧 and 🧹 simultaneously. ↓17.
14.	Ignition lead connected to ignition electrodes?	**yes:**	↓15.
		no:	▸ Connect cable to ignition electrode. ▸ Press ⚠, restart the appliance. EA? ↓15.
15.	Ignition cable connector engaged in switchbox?	**yes:**	↓16.
		no:	▸ Power OFF the appliance. ▸ Engage ignition cable connector in switchbox. ▸ Turn ON the appliance. ▸ Press ⚠, restart the appliance. EA? ↓16.
16.	Is the ignition electrical wire damaged?	**yes:**	▸ Power OFF the appliance. ▸ Change the ignition electrical wire. ▸ Turn ON the appliance. ▸ Press ⚠, restart the appliance. EA? ↓17.
		no:	↓17.
17.	▸ Press button 🔧. ▸ Select service-function **3.3**. Is the ionisation quality **2.** or **3.** ?	**yes:**	↓19.
		no:	↓18.
18.	Electrode assembly defective? ▸ Power OFF the appliance. ▸ Remove electrode assembly. Electrodes worn out?	**yes:**	▸ Replace electrode assembly. ▸ Turn ON the appliance. ▸ Press ⚠, restart the appliance. EA? ↓19.
		no:	▸ Refit electrode assembly. ▸ Turn ON the appliance. ▸ Press ⚠, restart the appliance. EA? ↓19.

EA and ⚠ flashing.

No flame ionisations signal

	Check		Action
19.	Check if the 20-pin connector lead assembly is damaged.		▶ Power OFF the appliance. ▶ Disconnect the boiler electrical connection. ▶ Change the 20-pin connector lead assembly. ▶ Turn ON the appliance. ▶ Reconnect the boiler electrical connection. ▶ Press ⚠, restart the appliance. EA? ▶ Power OFF the appliance. ↓20.
20.	The PCB control board is damaged.		▶ Make a note of the altered service settings (see table 1, "First Service Level; Values that can be modified" at page 8 and table 5, "Secondary Service Level; Values that can be modified" at page 11). ▶ Power OFF the appliance. ▶ Disconnect the boiler electrical connection. ▶ Change PCB control board. ▶ Reconnect the boiler electrical connection. ▶ Turn ON the appliance. ▶ Restore service settings previously noted down.
			To return to normal function mode: ▶ Press buttons 🔧 and 🧹 simultaneously. ▶ Regulate the temperature control and the temperature control on the previously set positions.

1) See installation instructions

F0 (and possibly ⚠) flashing.

Internal failure

	Check		Action
			▶ Note the setting of the temperature controls and .
1.	▶ Press buttons and simultaneously. ▶ Select service function **9.3** . A service code is displayed.		▶ Enter figure displayed in customer service record. ↓2.
2.	▶ Select service function **5.2** . A service code is displayed.		▶ Enter figure displayed in customer service record. ↓3.
3.	⚠ flashing?	**yes:**	▶ Press button ⚠. ▶ Initiate demand for heat by pressing button and then press again after 30 seconds to cancel. ▶ Initiate two more demands for heat as above. F0? ↓4.
		no:	↓4.
4.	The PCB control board is damaged.		▶ Make a note of the altered service settings (see table 1, "First Service Level; Values that can be modified" at page 8 and table 5, "Secondary Service Level; Values that can be modified" at page 11). ▶ Power OFF the appliance. ▶ Disconnect the boiler electrical connection. ▶ Change PCB control board. ▶ Reconnect the boiler electrical connection. ▶ Turn ON the appliance. ▶ Restore service settings previously noted down.
			To return to normal function mode: ▶ Press buttons and simultaneously. ▶ Regulate the temperature control and the temperature control on the previously set positions.

F7 and ⚠ flashing.

Although appliance switches off, flame still detected

	Check		Action
1.	Electrode(s) dirty or defective.		▶ Power OFF the appliance. ▶ Replace electrode assembly. ▶ Turn ON the appliance. ▶ Press ⚠, restart the appliance. F7? ↓2.
2.	▶ Power OFF the appliance. ▶ Disconnect the boiler electrical connection. ▶ Remove PCB control board. PCB control board damp?	**yes:**	▶ Dry PCB control board (e.g. with hair dryer). ▶ Look for point where damp is entering switchbox and seal as necessary (cable grommets properly fitted, ...?). ▶ Refit PCB control board. ▶ Reconnect the boiler electrical connection. ▶ Turn ON the appliance. ▶ Press ⚠, restart the appliance. F7? ↓3.
		no:	↓3.
3.	Problem with flue? ▶ Check CO_2 level in combustion air. Is CO_2 level above 0,2 % ?	**yes:**	▶ Check flue and repair or replace if necessary.
		no:	↓4.
4.	The PCB control board is damaged.		▶ Make a note of the altered service settings (see table 1, "First Service Level; Values that can be modified" at page 8 and table 5, "Secondary Service Level; Values that can be modified" at page 11). ▶ Power OFF the appliance. ▶ Disconnect the boiler electrical connection. ▶ Change PCB control board. ▶ Reconnect the boiler electrical connection. ▶ Turn ON the appliance. ▶ Restore service settings previously noted down.

FA and ⚠ flashing.

Although appliance switches off, flame still detected

	Check		Action
			▶ Note the setting of the temperature controls and . ▶ Power OFF the appliance.
1.	Condensation trap blocked?	**yes:**	▶ Clean condensation trap discharge pipe. ▶ Press ⚠, restart the appliance. FA? ↓2.
		no:	↓2.
2.	Electrode assembly defective? ▶ Power OFF the appliance. ▶ Remove electrode assembly. Electrode assembly burnt out?	**yes:**	▶ Replace electrode assembly. ▶ Turn ON the appliance. ▶ Press ⚠, restart the appliance. FA? ▶ Power OFF the appliance. ↓3.
		no:	▶ Refit electrode assembly. ▶ Turn ON the appliance. ▶ Press ⚠, restart the appliance. FA? ↓3.
3.	Problem with flue? ▶ Check CO_2 level in combustion air. Is CO_2 level above 0,2 % ?	**yes:**	▶ Check flue and repair or replace if necessary. ▶ Press ⚠, restart the appliance. FA? ▶ Power OFF the appliance. ↓4.
		no:	↓4.
4.	The gas valve is damaged.		▶ Change the gas valve. ▶ Turn ON the appliance. ▶ Press ⚠, restart the appliance. FA? ▶ Power OFF the appliance. ↓5.

FA and ⚠ flashing.

Although appliance switches off, flame still detected

	Check		Action
5.	Check if the 20-pin connector lead assembly is damaged.		▶ Power OFF the appliance. ▶ Disconnect the boiler electrical connection. ▶ Change the 20-pin connector lead assembly. ▶ Turn ON the appliance. ▶ Reconnect the boiler electrical connection. ▶ Press ⚠, restart the appliance. FA? ▶ Power OFF the appliance. ↓6.
6.	The PCB control board is damaged.		▶ Make a note of the altered service settings (see table 1, "First Service Level; Values that can be modified" at page 8 and table 5, "Secondary Service Level; Values that can be modified" at page 11). ▶ Power OFF the appliance. ▶ Disconnect the boiler electrical connection. ▶ Change PCB control board. ▶ Reconnect the boiler electrical connection. ▶ Turn ON the appliance. ▶ Restore service settings previously noted down.

Fd and ⚠ flashing.

Button ⚠ pressed without necessity

	Check		Action
1.	Button ⚠ is flashing.		▶ Press ⚠, restart the appliance. Fd? ↓2.
2.	The PCB control board is damaged.		▶ Make a note of the altered service settings (see table 1, "First Service Level; Values that can be modified" at page 8 and table 5, "Secondary Service Level; Values that can be modified" at page 11). ▶ Power OFF the appliance. ▶ Disconnect the boiler electrical connection. ▶ Change PCB control board. ▶ Reconnect the boiler electrical connection. ▶ Turn ON the appliance. ▶ Restore service settings previously noted down.

3.4 Faults that are not displayed

3.4.1 Appliance faults

Excessive burner noise, rumbling noises			
	Check		**Action**
			▶ Note the setting of the temperature controls and .
1.	Does the gas supply type match the specifications on the appliance identification plate?	**yes:**	↓2.
		no:	▶ Convert appliance to correct gas type. ↓2.
2.	▶ Test gas supply pressure - OK? Does pressure match figure specified in installation instructions?	**yes:**	↓3.
		no:	▶ Decommission appliance. For natural gas: ▶ Notify gas company.
3.	Problem with flue? ▶ Check CO_2 level in combustion air. Is CO_2 level above 0,2 % ?	**yes:**	▶ Check flue and repair or replace if necessary.
		no:	↓3.
4.	Cascade system: Is the appliance min. output high enough to open the shut-off device?	**yes:**	↓5.
		no:	▶ Press buttons and simultaneously. ▶ Select Service Function **5.5** . ▶ Increase min. output.
5.	Is appliance's internal air/flue channel leaking or blocked? ▶ Open up heat exchanger and inspect. ▶ Remove silencer, flue duct and air flow limit. ▶ Open trap and inspect. Air channels dirty/clogged, seals defective or not correctly fitted?	**yes:**	▶ Repair or replace components. ▶ Grease seal before fitting. ▶ Make sure it is fitted in correct position.
		no:	↓6.
6.	▶ Measure CO_2 levels. CO_2 levels in flue gas at min and max output do not match figures specified in installation instructions.	**yes:**	▶ Adjust CO_2 level as per installation instructions.
		no:	▶ Turn off gas cock. ▶ Power OFF the appliance. ▶ Change the gas valve. ▶ Open the gas cock. ▶ Turn ON the appliance. ▶ Check appliance for leaks.

Excessive burner noise, rumbling noises			
	Check		**Action**
7.	▶ Press buttons (wrench) and (chimney sweep) simultaneously. ▶ Select service-function **5.9**. **0** is displayed.		▶ Set to **1** for high start-up speed.

Flue gas levels incorrect, CO level too high			
	Check		**Action**
1.	Does the gas supply type match the specifications on the appliance identification plate?	**yes:**	↓2.
		no:	▶ Convert appliance to correct gas type. ↓2.
2.	▶ Test gas supply pressure - OK?	**yes:**	↓3.
		no:	▶ Decommission appliance. ▶ Notify gas company.
3.	Problem with flue? ▶ Check CO_2 level in combustion air. Is CO_2 level above 0,2 % ?	**yes:**	▶ Check flue and repair or replace if necessary.
		no:	↓4.
4.	Flue gas CO_2 levels measured at min. and max. load do not match specified levels? ▶ Measure CO_2 levels.	**yes:**	▶ Adjust CO_2 levels.
		no:	↓5.
5.	Gas volumetric flow too high when CO_2 level correctly set.	**yes:**	▶ Reduce gas volumetric flow rate by means of adjusting screw on gas valve and/or gas flow restrictor. ▶ Check CO_2 adjustment.
		no:	↓6.
6.			▶ Turn off gas cock. ▶ Power OFF the appliance. ▶ Change the gas valve. ▶ Open the gas cock. ▶ Turn ON the appliance. ▶ Check appliance for leaks.

Ignition too harsh, ignition poor			
	Check		**Action**
			▶ Note the setting of the temperature controls and .
1.	▶ Press buttons and simultaneously. ▶ Select service-function **5.1**. Continuous ignition (without gas) OK?	**yes:**	↓6.
		no:	↓2.
2.	Ignition lead connected to ignition electrodes?	**yes:**	↓3.
		no:	▶ Connect cable to ignition electrodes. ▶ Press button . Ignition poor? ↓3.
3.	Ignition cable connector engaged in switchbox?	**yes:**	↓4.
		no:	▶ Power OFF the appliance. ▶ Engage ignition cable connector in switchbox. ▶ Turn ON the appliance. ▶ Press button . Ignition poor? ▶ Power OFF the appliance. ↓4.
4.	Is the ignition electrical wire damaged?	**yes:**	▶ Power OFF the appliance. ▶ Change the ignition electrical wire. ▶ Turn ON the appliance. ▶ Press button . Ignition poor? ▶ Power OFF the appliance. ↓5.
		no:	↓5.
5.	Electrode assembly defective? ▶ Power OFF the appliance. ▶ Remove electrode assembly. Electrodes worn out?	**yes:**	▶ Replace electrode assembly. ▶ Turn ON the appliance. ▶ Press , restart the appliance. Ignition poor? ↓6.
		no:	▶ Refit electrode assembly. ▶ Turn ON the appliance. ▶ Press , restart the appliance. Ignition poor? ↓6.

Ignition too harsh, ignition poor			
	Check		**Action**
6.	Does the gas supply type match the specifications on the appliance identification plate?	**yes:**	↓7.
		no:	▶ Carry out gas type conversion as described in installation instructions.
7.	▶ Test gas supply pressure - OK?	**yes:**	↓8.
		no:	▶ Decommission appliance. ▶ Notify gas company.
8.	Problem with flue? ▶ Check CO_2 level in combustion air. Is CO_2 level above 0,2 % ?	**yes:**	▶ Check flue and repair or replace if necessary. ↓9.
		no:	↓9.
9.	Flue gas CO_2 levels measured at min. and max. load do not match specified levels. ▶ Measure CO_2 levels.	**yes:**	▶ Adjust CO_2 level as per installation instructions.
		no:	↓10.
10.	Burner not correctly fitted or defective? ▶ Remove burner. Cover fixings not tight or seal defective or not correctly fitted or burner defective!		▶ Replace burner and seal if necessary. ▶ Ensure seal is fitted in correct position.
			To return to normal function mode: ▶ Press buttons and simultaneously. ▶ Regulate the temperature control and the temperature control on the previously set positions.

Loose or broken contact on heat store NTC sensor			
	Check		**Action**
1.	Heat store NTC sensor lead is **not** fitted as described in the installation instructions (i.e. the cable does not pass through the cable grip in the switchbox).		▶ Record condition of appliance as found in customer service record. ▶ Route cable as specified in installation instructions.

Boiler indicates P1, P2, P3 at start-up and then restarts with P1..			
	Check		**Action**
1.	Fuse T 1,6 A (312) defective.	**yes:**	▶ Turn ON the appliance. ▶ Change the fuse. ▶ Power OFF the appliance. Start sequence not completed? ↓2.
		no:	↓2.
2.	The PCB control board is damaged.		▶ Make a note of the altered service settings (see table 1, "First Service Level; Values that can be modified" at page 8 and table 5, "Secondary Service Level; Values that can be modified" at page 11). ▶ Power OFF the appliance. ▶ Disconnect the boiler electrical connection. ▶ Change PCB control board. ▶ Reconnect the boiler electrical connection. ▶ Turn ON the appliance. ▶ Restore service settings previously noted down.

Specified CH flow temperature from TA... programmer exceeded			
	Check		**Action**
			▶ Note the setting of the temperature controls and .
	If outside-temperature controlled programmer (TA...) is connected to boiler: • The anti-cycle time is adjusted by the programmer to the suit the system. • The factory setting for the anti-cycle time (3 min.) and the heating mode hysteresis setting, if applicable, are deactivated. • In cyclic mode, the switching of the boiler on or off is subject to a time delay in order to prevent divergence between the average CH flow temperature and the specified CH flow temperature. As a result (depending on the heat draw), the specified CH flow temperature is briefly exceeded. In extreme cases, it can happen that the burner does not switch off until the maximum CH flow temperature is reached even though a lower CH flow temperature has been specified.		
1.	▶ Press button . ▶ Select service-function **2.7**. Read off status of automatic anti-cycle time (0 = Disabled, 1 = Enabled).		▶ Disable automatic anti-cycle time, i.e. change setting to 0.
2.	▶ Select service-function **2.4**. Read off anti-cycle time setting (0 ... 15 min).		▶ Set anti-cycle time as required, e.g. factory setting 3 min.
			To return to normal function mode: ▶ Press buttons and simultaneously. ▶ Regulate the temperature control and the temperature control on the previously set positions.

Hot water has unpleasant odour or is dark colour			
	Check		**Action**
This is generally caused by the formation of hydrogen sulphide by sulphate-reducing bacteria. Such bacteria are found in water which is very low in oxygen and live off the hydrogen produced by the anode.			
1.			▶ Clean the hot water cylinder. ▶ Replace the sacrificial anode. ▶ Heat cylinder to a temperature ≥60 °C
2.			▶ Replace magnesium sacrificial anode with impressed-current anode. The conversion costs are payable by the operator!

Condensation in the flue pipe			
	Check		**Action**
1.	Is diaphragm in mixer unit fitted correctly (see installation instructions)? ▶ Open mixer unit (29). ▶ Check diaphragm for correct orientation, soiling and splitting.		▶ Fit diaphragm as per installation instructions or replace. ▶ Close mixer unit.

3.4.2 Programmer faults

Set room temperature not reached (TR 2 and TR 212 E)			
	Check		**Action**
1.	Thermostatic valve(s) set too low?	**yes:**	▶ Turn up thermostatic valve(s). ↓2.
		no:	↓2.
2.	CH flow temperature control on boiler set too low?	**yes:**	▶ Turn up CH flow temperature control.
		no:	↓3.
3.	Air in the heating system.		▶ Power OFF the appliance. ▶ Check appliance and system for water leaks and repair as necessary. ▶ Top up system. ▶ Select Service Function **7.3** . Select **1** (on, automatically deactivated) and confirm. ▶ Vent appliance. ▶ Vent radiators. ▶ Turn ON the appliance.

Set room temperature not reached (TA 211 E und DT 2)			
	Check		**Action**
1.	Thermostatic valve(s) set too low?	**yes:**	▶ Turn up thermostatic valve(s). ↓2.
		no:	↓2.
2.	Heating characteristic set too low?	**yes:**	▶ Correct heating characteristic. ↓3.
		no:	↓3.
3.	CH flow temperature control on boiler set too low?	**yes:**	▶ Turn up CH flow temperature control. ↓4.
		no:	↓4.
4.	Is heat store temperature unreachable (CH flow temperature control set too low)?	**yes:**	▶ Turn up CH flow temperature control. ↓5.
		no:	↓5.
5.	Air in the heating system.		▶ Power OFF the appliance. ▶ Check appliance and system for water leaks and repair as necessary. ▶ Top up system. ▶ Select Service Function **7.3** . Select **1** (on, automatically deactivated) and confirm. ▶ Vent appliance ▶ Vent radiators. ▶ Turn ON the appliance.

Set room temperature exceeded by large amount

	Check		Action
1.	Do radiators get too hot?	**yes:**	TR 2: ▶ Decrease setting of “Heating” control TA 211 E: ▶ Correct heating characteristic. ↓2.
		no:	↓2.
2.	Bad choice of location for programmer, e.g. outside wall, near window, in draught, on hollow wall, etc.	**yes:**	▶ Select better installation location. **-or-** ▶ Fit external room thermostat. ↓3.
		no:	↓3.
3.			▶ Turn down thermostatic valve(s).

Excessive fluctuations in room temperature (TA 211 E)

	Check		Action
1.	Periodic effect of external heat on room, e.g. from sunshine, lighting, TV, separate stove, fire, etc.	**yes:**	▶ Eliminate external heat sources if possible. ↓2.
		no:	↓2.
2.	Bad choice of location for programmer, e.g. outside wall, near window, in draught, on hollow wall, etc.		▶ Select better installation location. **-or-** ▶ Fit external room thermostat.

Room temperature too high in Economy mode

	Check		Action
	Building retains heat well	**yes:**	▶ Set economy temperature lower . or ▶ Set to Frost Protection instead of Economy. or ▶ Set start time for Frost protection/Economy earlier.

Temperature rises instead of falling			
	Check		**Action**
	Timer clock (DT 2) incorrectly set		▶ Check setting and correct as necessary.

Incorrect or no modulation			
	Check		**Action**
	Programmer incorrectly wired		▶ Check wiring against wiring diagram and correct as necessary.

4 Appendix

4.1 NTC values

4.1.1 Outside temperature sensor

Outside temperature (°C) Measurement tolerance ±10%	Resistance (Ω)
-20	2 392
-16	2 088
-12	1 811
-8	1 562
-4	1 342
0	1 149
4	984
8	842
10	781
15	642
20	528
25	436

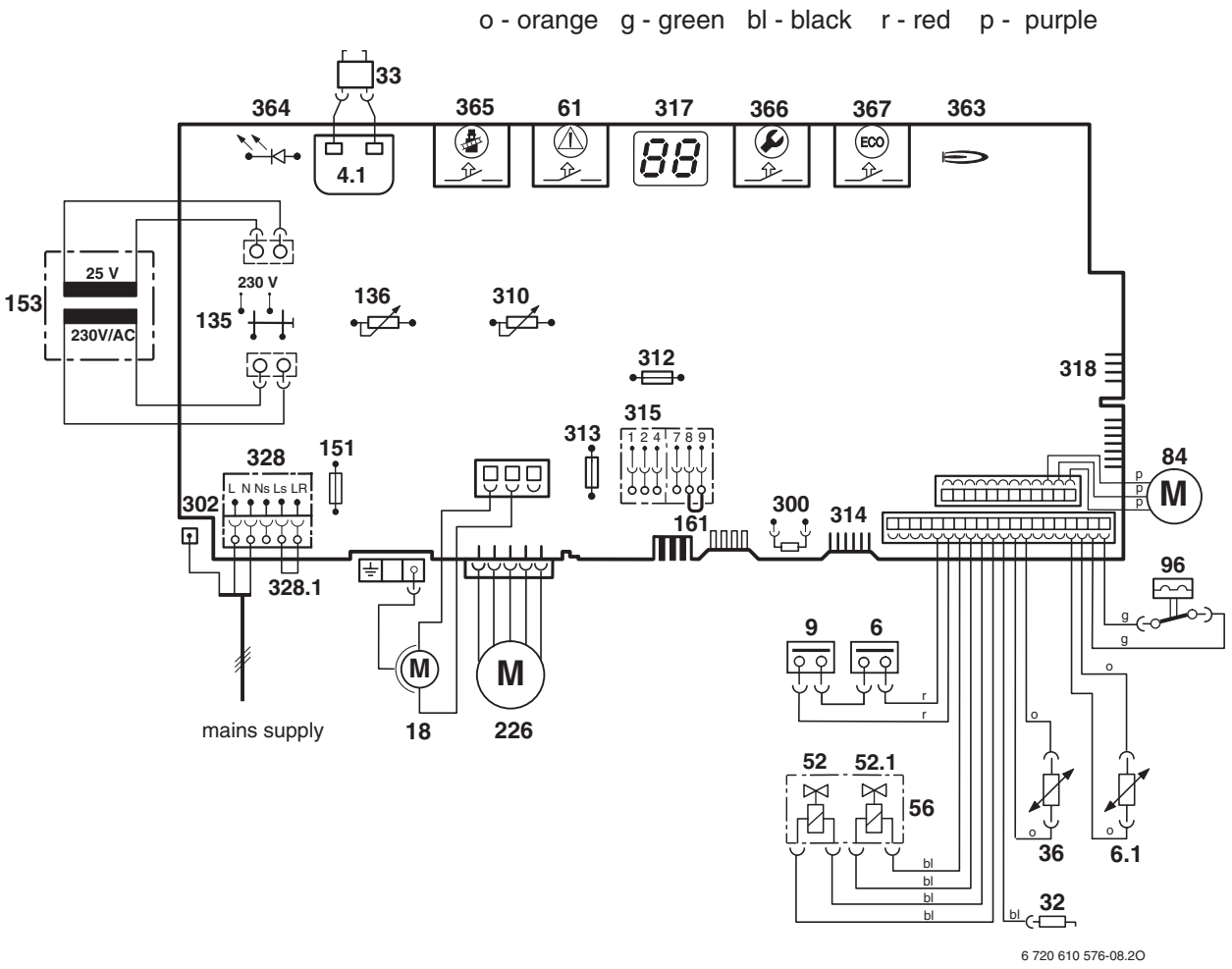
Table 11

4.1.2 CH flow NTC sensor, heat store NTC sensor, constant hot water NTC sensor and hot water NTC sensor

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

Table 12

4.2 Electronic schemes



4.1 Ignition transformer
6 Heat exchanger overheat cut-out
6.1 Flue gas NTC sensor
6.3 Hot water sensor
18 Central heating pump
32 Flame sensing electrode
33 Spark electrodes
36 Temperature sensor in CH flow
52 Safety gas valve 1
52.1 Safety gas valve 2
56 CE 428 gas valve
61 Reset button
84 Motor (ZWB/ZB)
96 Microswitch, water switch (ZWB)
135 Main power switch
136 Heating outlet temperature potentiometer
151 Fuse T 2,5 A, 230 V AC
153 Transformer
161 Bridge
226 Fan
300 Code key
302 Ground electrical connection
310 Sanitary outlet temperature potentiometer
312 Fuse T 1,6 A, 24 V DC
313 Fuse T 0,5 A, 5 V DC
314 Strip connector for TA 211 E fitted programmer
315 Terminal block for programmer
317 Digital display
318 Internal programmable clock connection
328 230 V AC connection
328.1 Bridge
363 Flame presence led
364 Electrical power led (0/I)
365 Chimney cleaner button
366 Technique service button
367 ECO button

4.3 List of most important replacement parts

Component	Order no.	Remarks
Switchbox		
PCB control board	8 748 300 385	
Transformer	8 747 201 358	
Ignition lead	8 714 401 999	
20-pin connector lead assembly	8 714 402 087	ZB...
20-pin connector lead assembly	8 714 402 086	ZWB...
Fuse	1 904 552 730	T 0,5 A
Fuse	1 904 552 740	T 1,6 A
Fuse	1 904 521 342	T 2,5 A
Set of fuses	8 744 503 010	
Switchbox kpl.	8 717 207 514	with DT 2
Switchbox kpl.	8 717 207 513	without DT 2
Code plug included in		
Conversion kit G20 -> G31	7 710 149 048	ZWB 7/11-29 A
Conversion kit G31 -> G20	7 710 239 084	ZWB 7/11-29 A
Conversion kit G20 -> G31	7 710 149 049	ZB 7/11-28 A
Conversion kit G31 -> G20	7 710 239 085	ZB 7/11-28 A
Conversion kit G20 -> G31	7 710 149 044	ZWB 7/11-27 A
Conversion kit G31 -> G20	7 710 239 080	ZWB 7/11-27 A
Conversion kit G20 -> G31	7 710 149 045	ZB 7/11-27 A
Conversion kit G31 -> G20	7 710 239 081	ZB 7/11-27 A
Heat exchanger		
Temperature limiter	8 729 000 144	110°C

Table 13

Component	Order no.	Remarks
Temperature sensor, CH flow	8 714 500 087	NTC
Electrode assembly	8 718 107 077	
Gas valve		
Gas valve	8 747 003 516	CE 427
Other components		
Fan	8 717 204 343	
Gas supply pipe	8 710 725 500	
Plate-type heat exchanger	8 715 406 651	ZWB...
Overflow trap	8 710 725 328	
Diaphragm in the mixer unit	8 715 505 801	

Table 13

4.4 Approved corrosion inhibitors and anti-freeze fluids for central heating water

If any system water treatment is required then only products suitable for use with Aluminium shall be used i.e Fernox- Copal or Superconcentrate or Sentinal X100, in accordance with the manufacturers instructions. The use of any other substances will invalidate the guarantee. The pH value of the system water must be less than 8 or the appliance guarantee will be invalidated.

4.4.1 Frost protection

- Add a suitable anti-freeze fluid to the water in the central heating system.
  Suitable products are available from Betz-Dearborn Tel.: 0151 4209563, Fernox Tel.: 01799 550811 and Salamander Tel.: 0121 378 0952.

4.4.2 Sealing agents

- In our experience, the addition of sealing agents to the water in the central heating system can cause problems (deposits in the heat exchanger). For that reason we advise against their use.

4.5 Summary of BDH Information Sheet on Identifying Corrosion by CFCs

The presence of halogenated hydrocarbons in the combustion air causes surface corrosion on affected metals. Particularly susceptible is the combustion chamber and the heat exchanger surfaces (including stainless steel) as well as the metal components in the flue socket, flue pipe connections and in the chimney.

The halogen compounds present in the combustion air produce highly corrosive hydrochloric acid in the flame and in some cases - depending on the precise composition of the combustion air - hydrofluoric acid, both of which accumulate in the boiler and remain active over long periods.

In order to limit the damage, the source of the air contamination must be located and sealed off. If this is not possible, the combustion air must be drawn from an alternative clean source.

Halogens can occur in the following locations:

Commercial and industrial sources	
Dry cleaners	Trichloroethylene, tetrachloroethylene, fluorinated hydrocarbons
Degreasing baths	Perchloroethylene, trichloroethylene, methyl chloroform
Printers	Trichloroethylene
Hairdressers	Aerosol spray propellants, hydrocarbons containing fluorine and chlorine (freons)
Sources in the home	
Cleaning and degreasing agents	Perchloroethylene, methyl chloroform, trichloroethylene, methylene chloride, carbon tetrachloride, hydrochloric acid
Home workshops	
Solvents and thinners	Various chlorinated hydrocarbons
Spray cans	Chlorofluorohydrocarbons (freons)

Table 14

Worcester Heat Systems Ltd.
Cotswold Way
Warndon
Worcester WR4 9SW
Great Britain

www.thermotechnik.com