

# Installation and Servicing Instructions

# R 28 HE system



Wall mounted condensing boiler for central heating



6 720 611 441-00.10

**ZB 7-28 R 28 HE System** GC Number: 41 311 62



6 720 611 443 GB (05.04) OSW



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## 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 25).
- ▶ 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 on sealed primary 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 supplied 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.

<b>PIN</b>	CE-0085 BL 0507
<b>Category UK</b>	II <sub>2H</sub> 3P
<b>Appliance Type</b>	C <sub>13</sub> , C <sub>33</sub>

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.

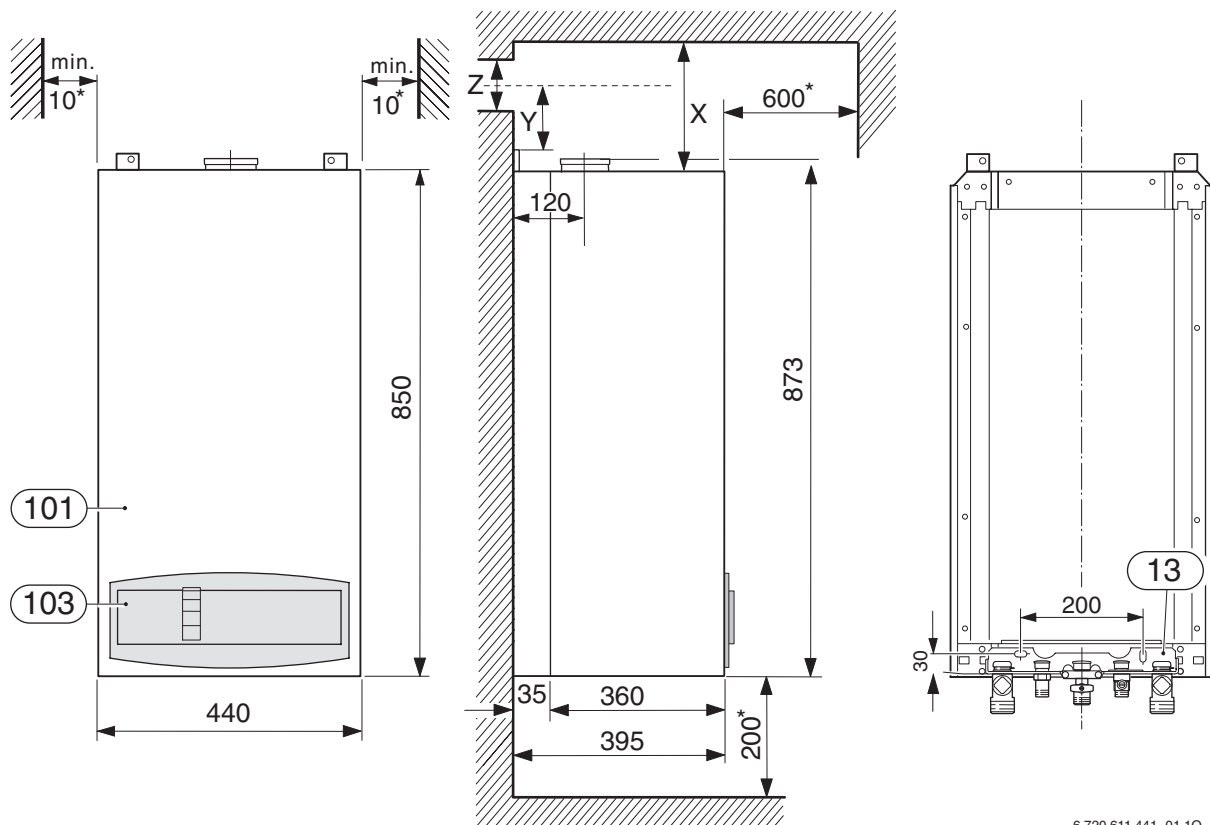
### 1.3 Description of appliance

- Wall-mounted appliance, siting not dependent on room size
- 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<sub>2</sub>/CO
- Regulated speed fan
- Pre-mix burner
- Temperature control for central heating
- Safety temperature limiter in 24 V electrical circuit
- Three-speed central heating pump
- Relief valve, pressure gauge, expansion vessel, automatic air vent
- Flue gas temperature limiter (105 °C)
- Condensate Trap
- Connecting possibility for S-Plan System.

## 1.4 Accessories

- Standard horizontal flue kit at 100 mm outside diameter for flues up to 4 m in length.
- Flue duct kits for horizontal (125 mm outside diameter) for flue lengths up to 13 m and vertical flue systems for flue lengths up to 15 m. Fitting instructions are sent with these kits.
- Heating programmers
- Timer
- Motorised valve is available as an optional extra. If this option is used then an integral programmer, Night Set Back Module and TR2 Optimising Room Thermostat will be required.

## 1.5 Casing dimensions

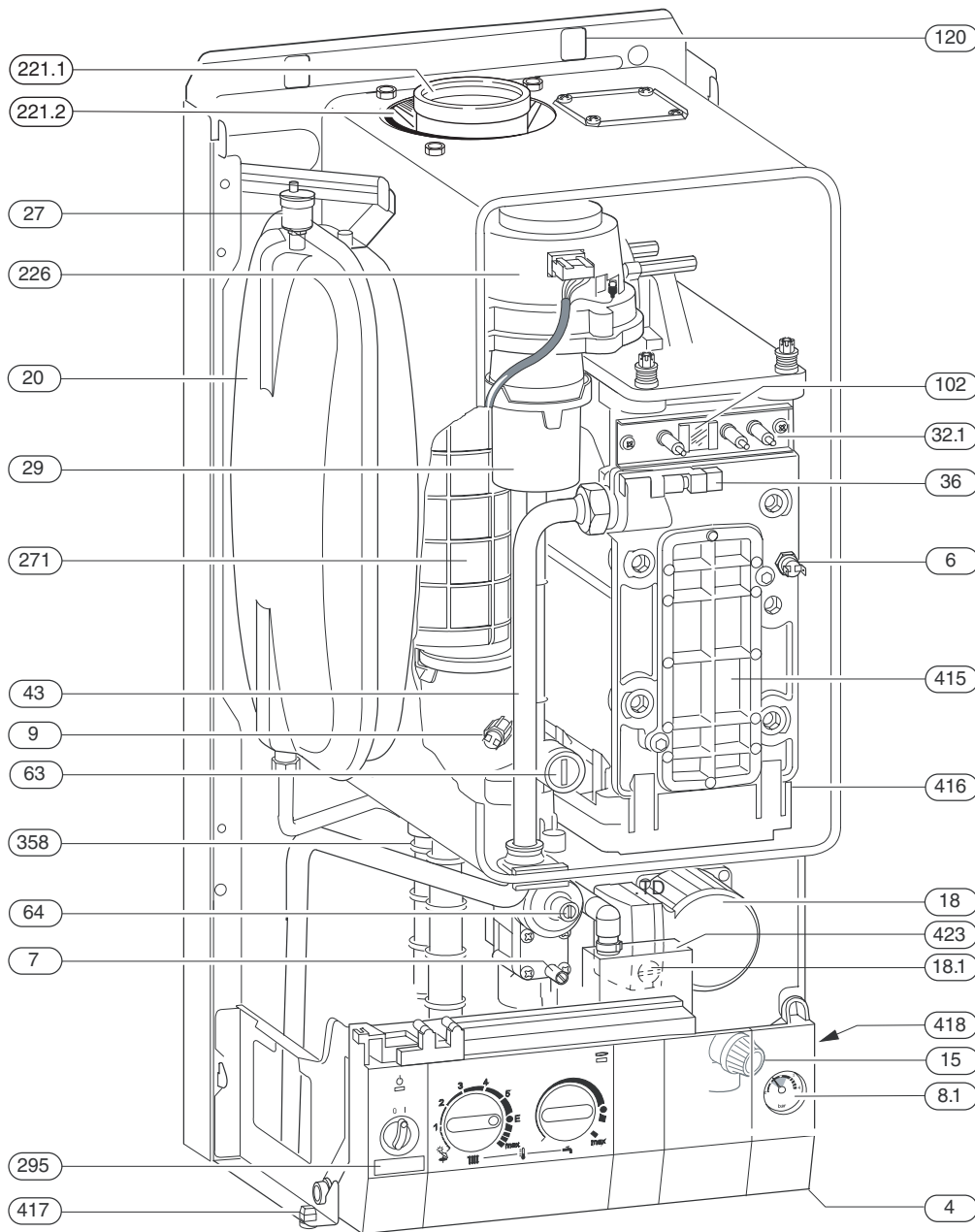


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Fig. 1

- 13** Manifold assembly
- 101** Outer case
- 103** Fascia cover
- X** Standard Concentric Horizontal Flue System: min. 160 mm  
Alternative Concentric Flue System: min. 220 mm
- Y** Standard Concentric Horizontal Flue System: 40mm  
Alternative Concentric Flue System: 70mm
- 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

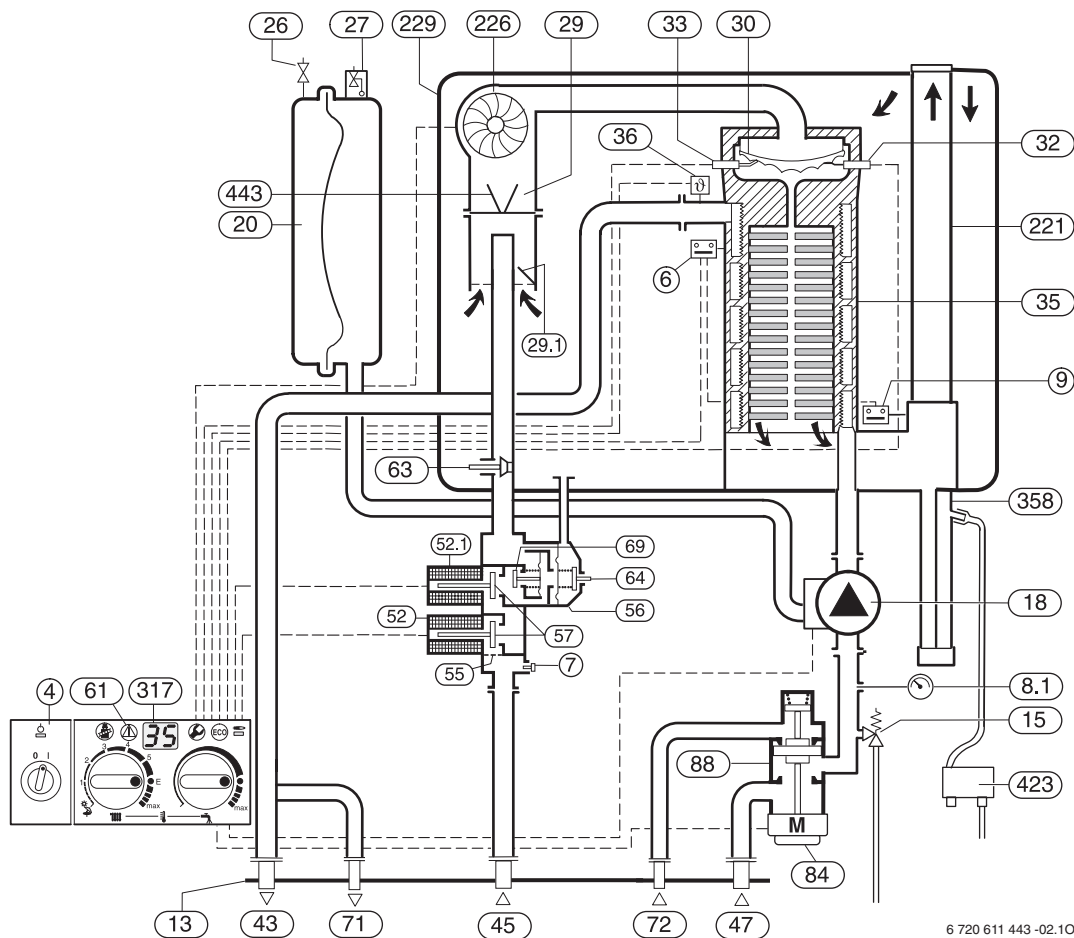


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Fig. 2

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

### 1.7 Function (with optional extra motorised valve)

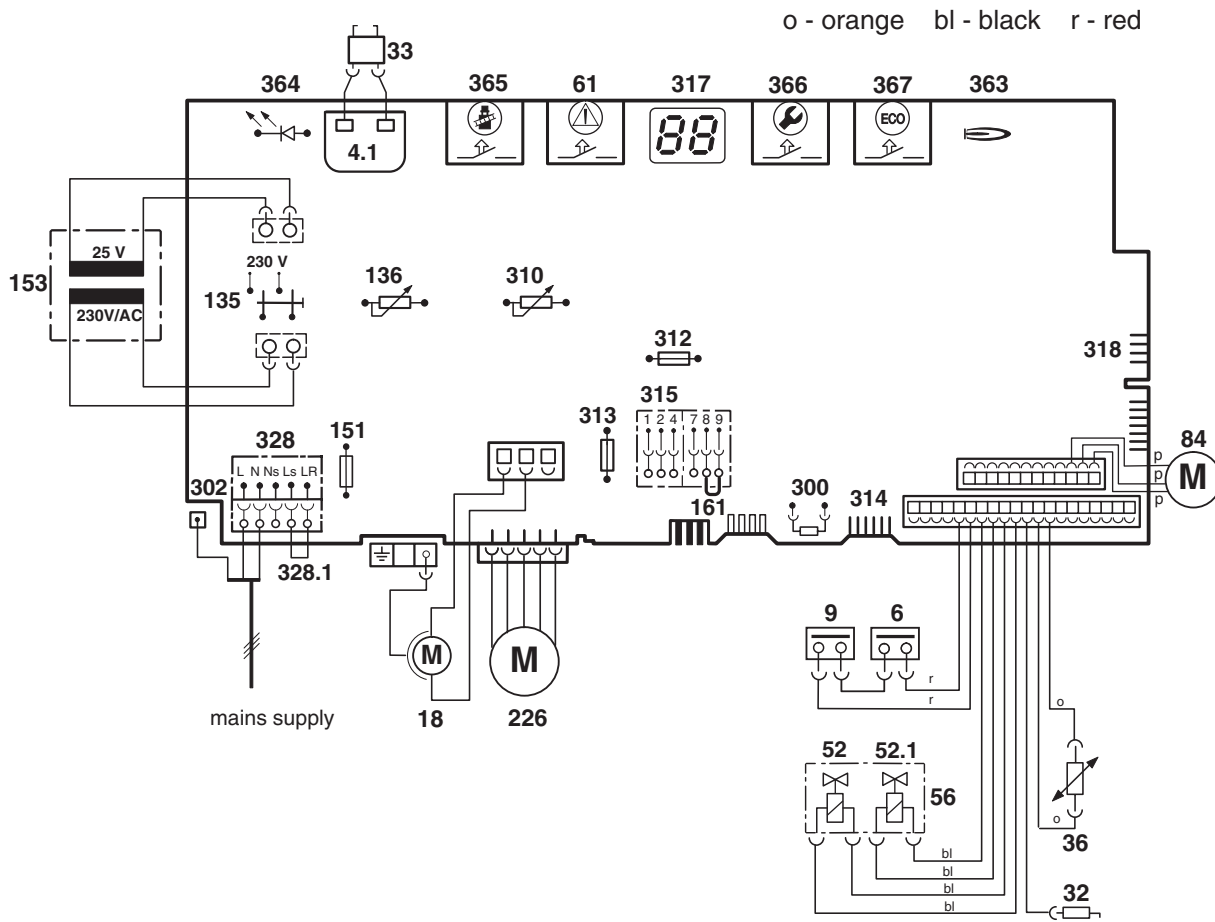


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Fig. 3

- |             |  |            |   |
|-------------|--|------------|---|
| <b>4</b>    | Bosch Heatronic control                                | <b>71</b>  | Storage water heater outflow (only with optional motorised valve) |
| <b>6</b>    | Temperature limiter, heat exchanger                    | <b>72</b>  | Storage water heater return (only with optional motorised valve)  |
| <b>7</b>    | Testing point for gas supply pressure                  | <b>84</b>  | Motor (optional extra)  |
| <b>8.1</b>  | Pressure gauge   | <b>88</b>  | 3-way valve (optional extra)                                      |
| <b>9</b>    | Flue gas temperature limiter                           | <b>221</b> | Flue duct   |
| <b>13</b>   | Manifold   | <b>226</b> | Fan   |
| <b>15</b>   | Safety valve   | <b>229</b> | Inner casing  |
| <b>18</b>   | Central heating pump                                   | <b>317</b> | Display   |
| <b>20</b>   | Expansion vessel                                       | <b>358</b> | Condensate trap   |
| <b>26</b>   | Charging valve   | <b>423</b> | Siphon  |
| <b>27</b>   | Automatic vent   | <b>443</b> | Diaphragm   |
| <b>29</b>   | Mixer unit   |            |   |
| <b>29.1</b> | Bi-metallic thermostat for combustion air compensation |            |   |
| <b>30</b>   | Burner   |            |   |
| <b>32</b>   | Flame sensing electrode                                |            |   |
| <b>33</b>   | Igniter electrode                                      |            |   |
| <b>35</b>   | Heat exchanger with cooled combustion chamber          |            |   |
| <b>36</b>   | Temperature sensor in CH flow                          |            |   |
| <b>43</b>   | CH flow  |            |   |
| <b>45</b>   | Gas inlet  |            |   |
| <b>47</b>   | CH return  |            |   |
| <b>52</b>   | Solenoid valve 1                                       |            |   |
| <b>52.1</b> | Solenoid valve 2                                       |            |   |
| <b>55</b>   | Filter   |            |   |
| <b>56</b>   | Gas valve CE 427                                       |            |   |
| <b>57</b>   | Main valve disc  |            |   |
| <b>61</b>   | Reset button   |            |   |
| <b>63</b>   | Adjustable gas flow restrictor                         |            |   |
| <b>64</b>   | Adjusting screw for min. gas inlet flow volume         |            |   |
| <b>69</b>   | Control valve  |            |   |

## 1.8 Electrical wiring diagram



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Fig. 4

- |              |   |            |                        |
|--------------|---|------------|------------------------|
| <b>4.1</b>   | Ignition transformer                        | <b>365</b> | "Chimney sweep" button |
| <b>6</b>     | Temperature limiter, heat exchanger         | <b>366</b> | Service button         |
| <b>9</b>     | Flue gas temperature limiter                | <b>367</b> | ECO button             |
| <b>18</b>    | Pump  |            |                        |
| <b>32</b>    | Flame sensing electrode                     |            |                        |
| <b>33</b>    | Ignition electrode                          |            |                        |
| <b>36</b>    | Temperature sensor in CH flow               |            |                        |
| <b>52</b>    | Solenoid valve 1                            |            |                        |
| <b>52.1</b>  | Solenoid valve 2                            |            |                        |
| <b>56</b>    | Gas valve CE 427                            |            |                        |
| <b>61</b>    | Reset button                                |            |                        |
| <b>84</b>    | Diverter valve motor (optional extra)       |            |                        |
| <b>135</b>   | Master switch                               |            |                        |
| <b>136</b>   | Temperature control for CH flow             |            |                        |
| <b>151</b>   | Fuse, slow 2.5 A, AC 230 V                  |            |                        |
| <b>153</b>   | Transformer                                 |            |                        |
| <b>161</b>   | Link  |            |                        |
| <b>226</b>   | Fan   |            |                        |
| <b>300</b>   | Code plug                                   |            |                        |
| <b>302</b>   | Earth connection                            |            |                        |
| <b>310</b>   | Temperature control for hot water           |            |                        |
| <b>312</b>   | Fuse, slow T 1,6 A                          |            |                        |
| <b>313</b>   | Fuse, slow T 0,5 A                          |            |                        |
| <b>314</b>   | Connector for Night Set Back Module TA21 2E |            |                        |
| <b>318</b>   | Connector for integral programmer           |            |                        |
| <b>328</b>   | Terminal block for AC 230 V Mains supply    |            |                        |
| <b>328.1</b> | Link  |            |                        |
| <b>363</b>   | Indicator lamp for burner                   |            |                        |
| <b>364</b>   | Indicator lamp for power supply             |            |                        |

## 1.9 Technical data

	Units	Natural gas	Propane
Max. rated heat output net 40/30°C central heating	kW	29.3	29.3
Max. rated heat output net 50/30°C central heating	kW	29.0	29.0
Max. rated heat output net 80/60°C central heating	kW	27.4	27.4
Max. rated heat input net	kW	27.7	27.7
Min. rated heat output net 40/30°C	kW	8.4	11.6
Min. rated heat output net 50/30°C	kW	8.3	11.4
Min. rated heat output net 80/60°C	kW	7.4	10.5
Min. rated heat input net	kW	7.6	10.8
<b>Maximum gas flow rate – After 10 minutes from lighting</b>			
Natural gas G20 (CVnet 34.02 MJ/m <sup>3</sup> )	m <sup>3</sup> /h	2.9	-
LPG (CVnet 88 MJ/m <sup>3</sup> )	kg/h	-	2.1
<b>Gas supply pressure</b>			
Natural gas G20 (CVnet 34.02 MJ/m <sup>3</sup> )	mbar	20	-
LPG (CVnet 88 MJ/m <sup>3</sup> )	mbar	-	37
<b>Expansion vessel</b>			
Charge pressure	bar	0.75	0.75
Total capacity	l	10	10
<b>Flue</b>			
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 <sub>2</sub> level at max. rated heat output	%	9.2	10.8
CO <sub>2</sub> level at min. rated heat output	%	8.8	10.5
NO <sub>x</sub> -class		5	5
SEDBUK figure	Band	A	A
<b>Condensate</b>			
Max. condensation rate (t <sub>R</sub> = 30°C)	l/h	2.3	2.3
pH-value, approx.		4.8	4.8
<b>General Data</b>			
Electrical power supply voltage	AC ... V	230	230
Frequency	Hz	50	50
Max. power consumption	W	102	102
Noise output level	dB(A)	36	36
Appliance protection rating with blanking plate fitted	IP	X4D	X4D
Max. CH flow temperature	°C	nom. 90	nom. 90
Max. permissible operating pressure (CH)	bar	3	3
Permissible ambient temperatures	°C	0 - 50	0 - 50
Nominal capacity of appliance	l	3.75	3.75
Weight (excluding packaging)	kg	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**

<b>HORIZONTAL 100 mm - Standard FLUE SYSTEM</b>			
Overall Diameter of Duct	mm	100	Max. 4 m
Flue Terminal / Duct Assembly Length	mm	600	
Extension Duct Length	mm	1000	

Table 4

<b>HORIZONTAL 125 mm FLUE SYSTEM</b>			
Overall Diameter of Duct	mm	125	Max. 13 m (including turret)
Flue Terminal / Duct Assembly	mm	1030	

Table 5

<b>VERTICAL 100 mm FLUE SYSTEM</b>			
Overall Diameter of Duct	mm	100	Incl. terminal Max. 6.4m
Flue Terminal / Duct Assembly	mm	1140	

Table 6

<b>VERTICAL 125 mm FLUE SYSTEM</b>			
Overall Diameter of Duct	mm	125	Incl. terminal Max. 15 m
Flue Terminal / Duct Assembly	mm	1365	

Table 7

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

**Gas supply**

<b>Total length of gas supply pipe (metres)</b>			<b>Pipe diameter (mm)</b>
3	6	9	
Gas discharge rate (m <sup>3</sup> /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 pipework 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 sealed 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, Fernox Tel.: 01799 550811 and Salamander Tel: 0121 378 0952.
- ▶ 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 Sealed systems

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

The expansion vessel has a volume of 10 litres and is charged to a pressure of 0.75 bar.

The water capacity of the system is shown in table 12, page 27. If a greater capacity is required then an additional expansion vessel must be fitted into the system return as close to the appliance as possible. The system pressure can be set up to a maximum of 1.5 bar with 1 bar being the normal setting.

If the system pressure is greater than 2.5 bar when the appliance is operating at maximum temperature then an additional expansion vessel must be fitted into the system return as close to the appliance as possible.

The filling point must be at low level and arranged as shown in fig. 8.

The pressure relief valve is set to operate at 3 bar.

There must be no connection to the mains without the approval of the local water company. All connections in the system must be capable of withstanding a pressure of up to 3 bar and the radiator valves conform to the requirements of BS 2767:10.

Fit Thermostatic Radiator Valves to radiators in the sleeping accommodation and not to the radiator where the room thermostat is sited, this must be left open.

Repeated venting probably indicates a leak and this must be rectified to ensure the proper operation of the appliance.

**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 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.**

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

A drain cock to BS2879 must be fitted to the lowest point of the system.

**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 BS7593:1992.**

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

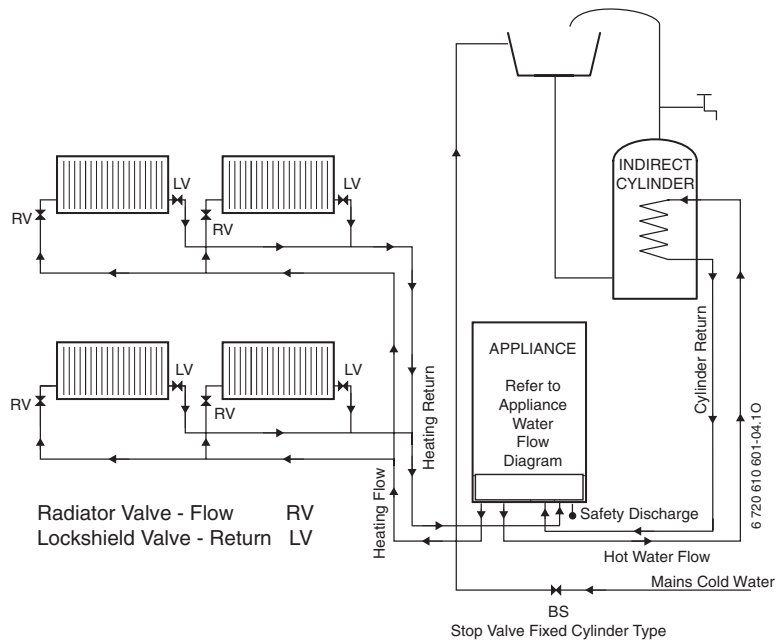


Fig. 5 System layout if using optional built-in diverter valve (This must be used in conjunction with an integral programmer, Night Set Back Module and TR2 Optimising Room Thermostat)

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

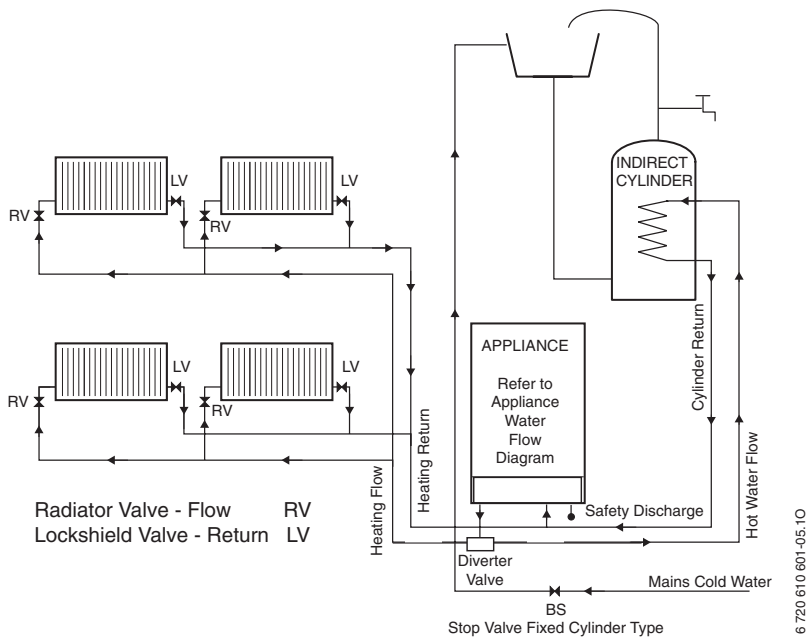


Fig. 6 System layout if using external diverter valve (excludes using a Honeywell 'Y' plan valve).

**Note:**

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

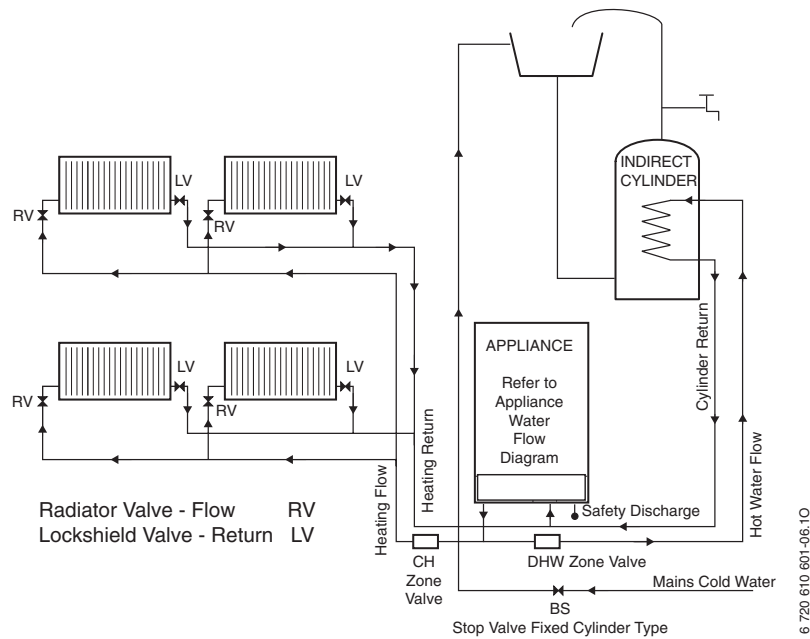


Fig. 7 System layout if using twin zone valves (S) plan

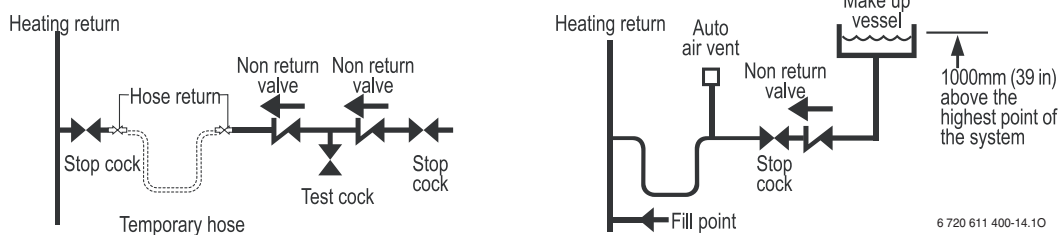


Fig. 8

### 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.

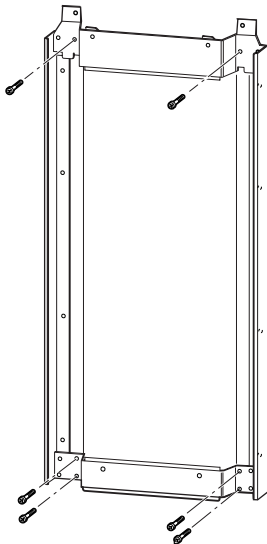
This means that, no special safety precautions are required with regard to flammable building materials and fitted furniture. The specified clearances must be maintained.

#### 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

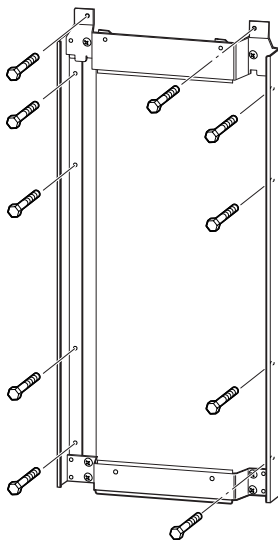
- ▶ Take the wall mounting frame out of the package and screw together with 6 screws as shown in fig. 9. Use the inner lugs on the top and bottom horizontal sections.



6 720 610 576-04.10

Fig. 9

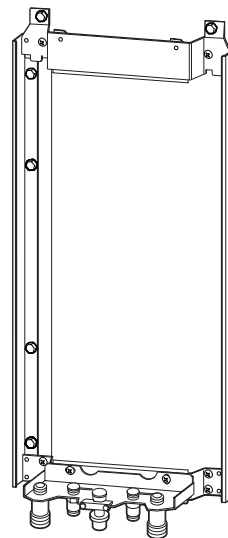
- ▶ Hold the wall-mounting frame against the wall ensuring that it is vertical.
- ▶ Mark the holes for the wall mounting frame onto the wall, drill and plug the holes and screw the wall mounting frame to the wall with the screws provided.
- ▶ Mark the position of the flue duct hole if a rear flue is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



6 720 610 576-05.10

Fig. 10

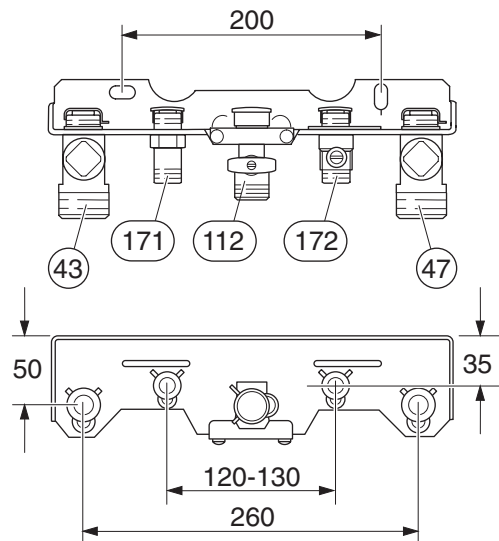
- ▶ Screw the pre-plumbing manifold with two screws to the wall mounting frame.



6 720 610 576-11.10

Fig. 11

### 3.5 Pre-piping the system



6 720 610 576-06.10

Fig. 12 Manifold

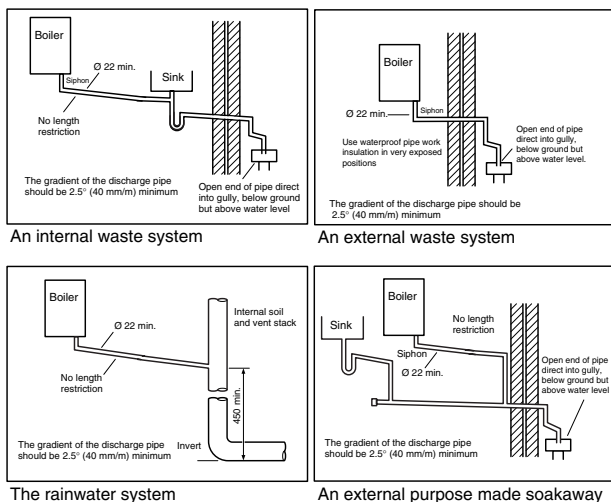
- 43** CH flow
- 47** CH return
- 112** Gas cock
- 171** Optional cylinder flow (used only with motorised valve)
- 172** Optional cylinder return (used only with motorised valve)

- ▶ A drain tap should be fitted at the lowest point of the central heating system.
- ▶ WRAS approved filling loop must be fitted.

### 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. 14.

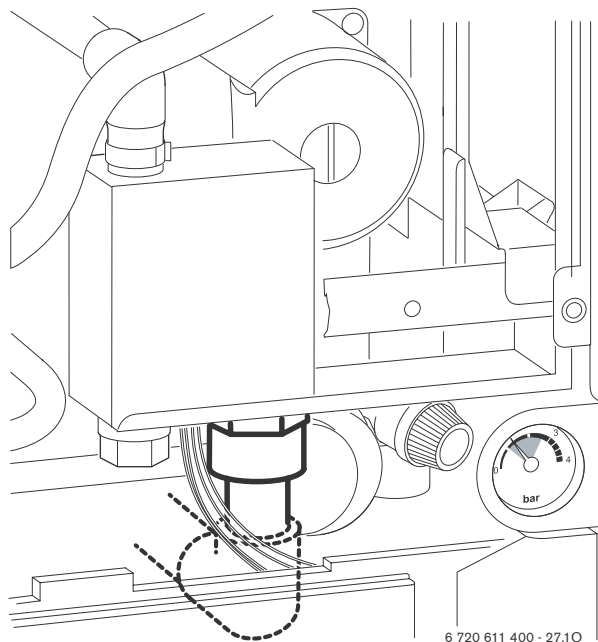
The condensate pipe can terminate into any of four areas:



6 720 611 400-15.10

Fig. 13

Whilst all of the above methods are acceptable it is always the best practice to terminate the condensate 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.



6 720 611 400 - 27.10

Fig. 14 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



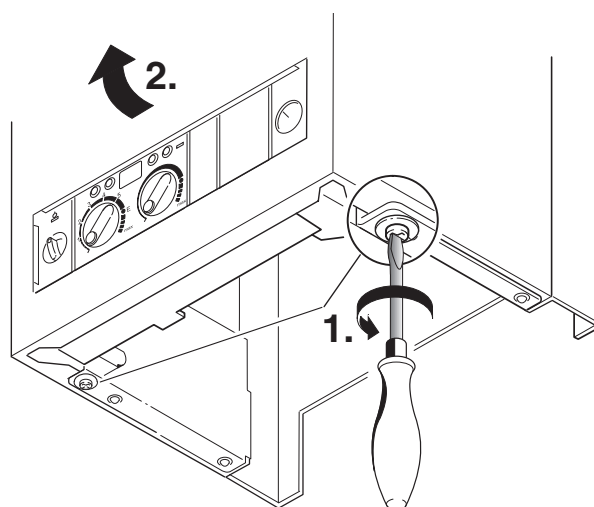
**Benchmark:** For optimum performance after installation, this boiler and its associated central heating system must be flushed in accordance with the guidelines given in BS5793:1992 "Treatment of water in domestic hot water central heating systems".

### 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.



6 720 611 441-05.10

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 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.

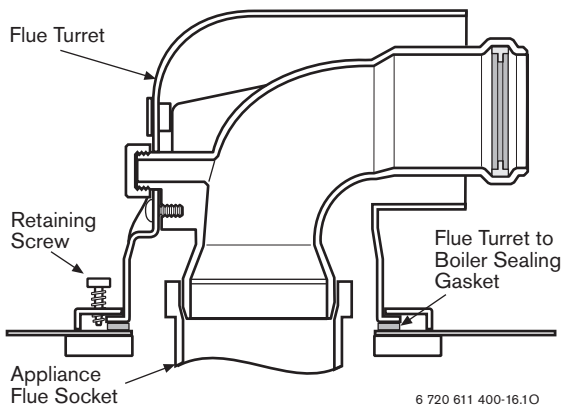


Fig. 16

- ▶ 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 central heating flow and return and fill the heating system through a WRAS approved filling loop.
- ▶ Check all seals and unions for leaks (testing pressure max. 3.0 bar as indicated by pressure gauge).
- ▶ Check all connections for leaks.

### 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 with the boiler.

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 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 up to 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 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. 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.

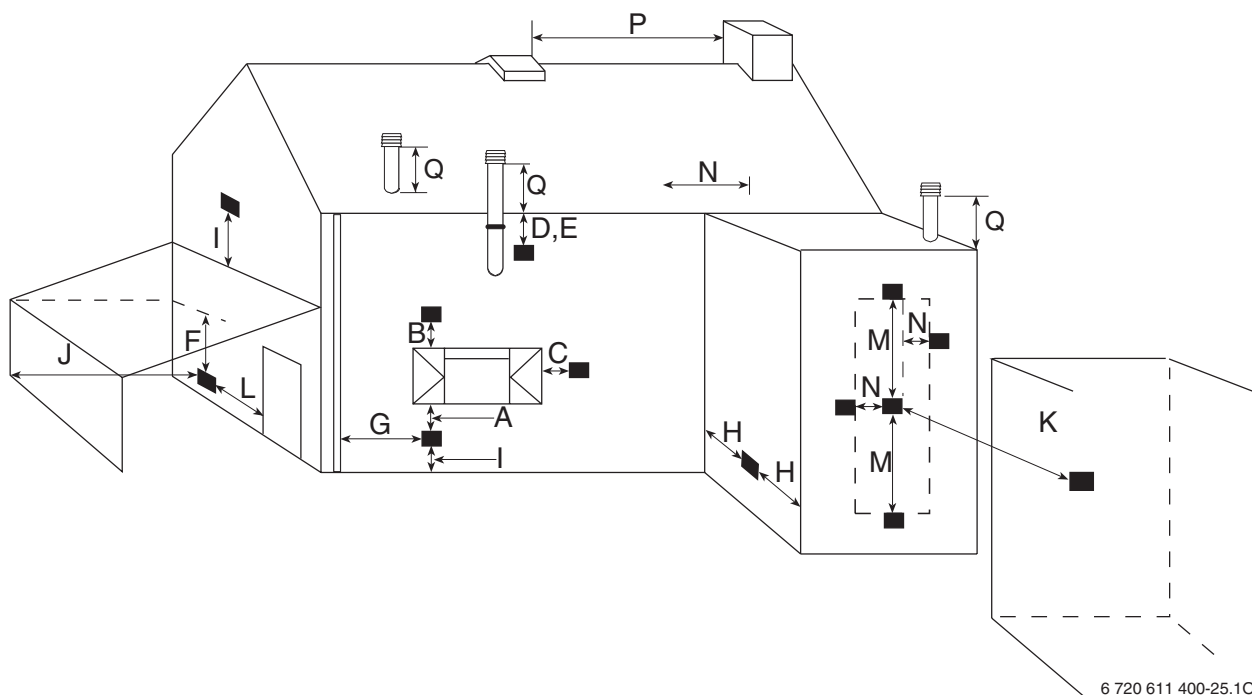


Fig. 17

#### 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 <sup>1)</sup>	Directly below an opening, air brick, opening windows, etc.	300 mm
B <sup>1)</sup>	Above an opening, air brick, opening window, etc.	300 mm
C <sup>1)</sup>	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 <sup>2)</sup>	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 <sup>2)</sup>	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 4 m.

Flues up to 730 mm do not require an extension duct assembly.

Flues between 1700 mm and 4000 mm require extension duct assemblies.

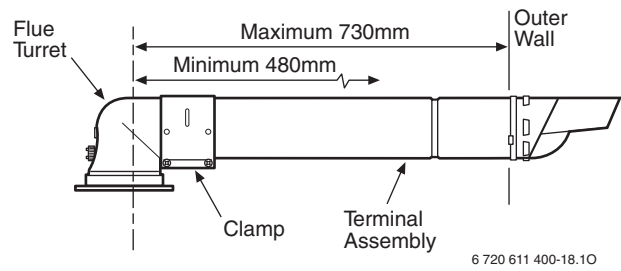
#### Standard 100mm system comprise:

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

Refer to fig. 22.

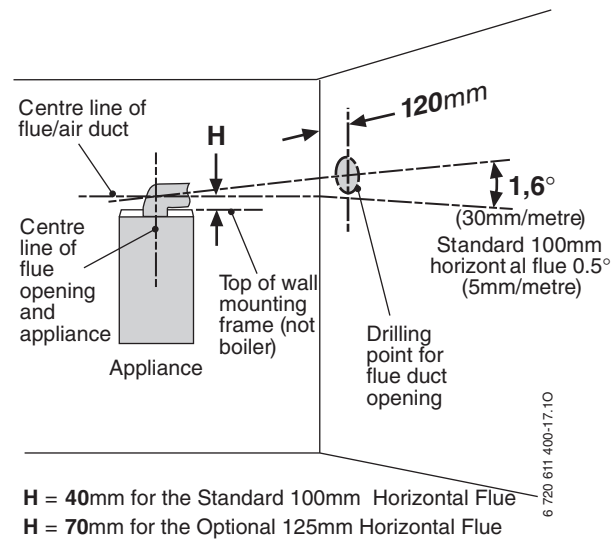
Instructions for fitting other flue systems are packed with the relevant flue kit.

Check that the position chosen for the appliance is satisfactory. Refer to fig. 18.



6 720 611 400-18.10

Fig. 19 Standard Flue



6 720 611 400-17.10

Fig. 18 Marking the position of a side flue opening.  
Note: ensure there is adequate access to the air/flue sampling points in the flue turret.

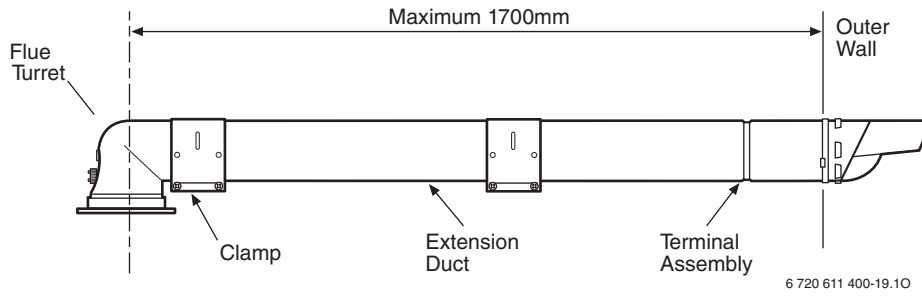


Fig. 20 Flue with one extension

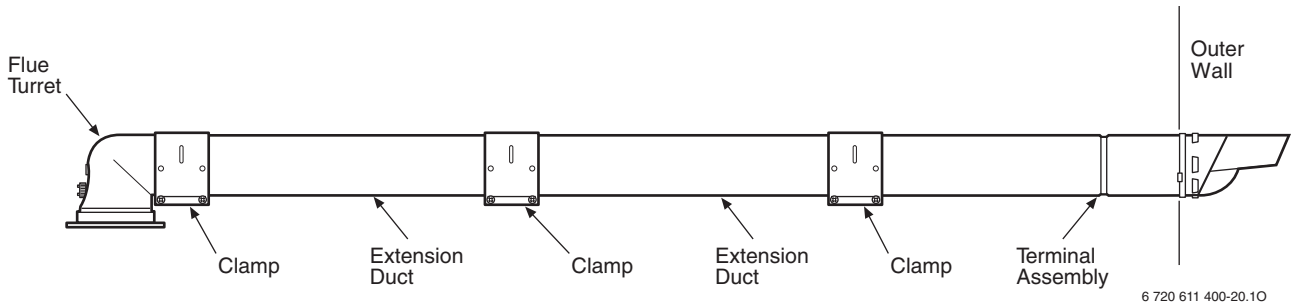


Fig. 21 Flue with extensions

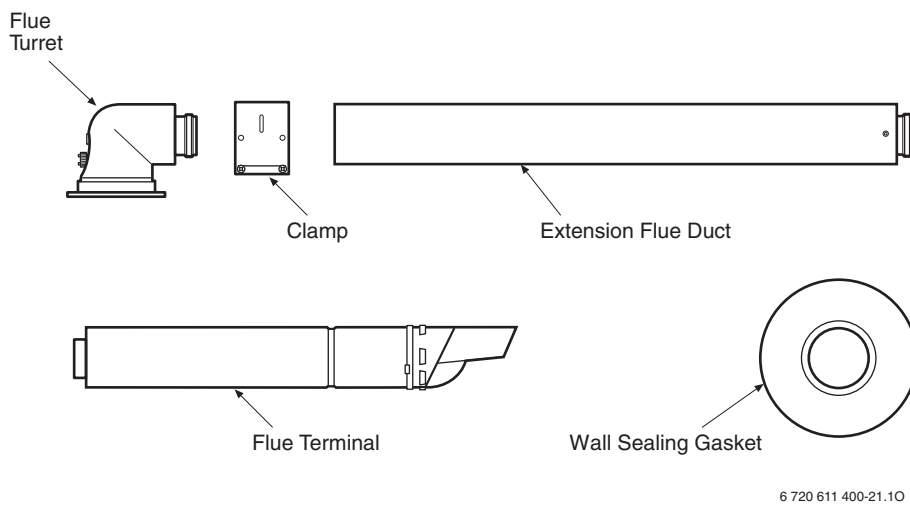


Fig. 22 Flue components

### 3.8.3 Flue duct preparation and assembly

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

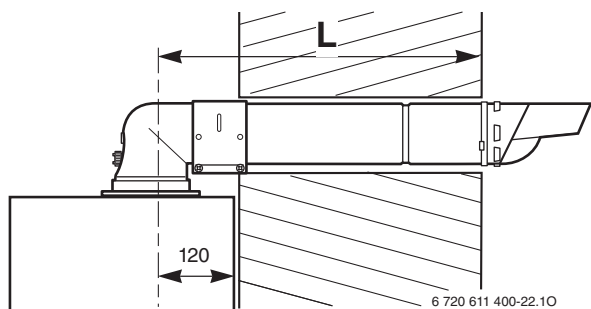


Fig. 23 Flue length - rear

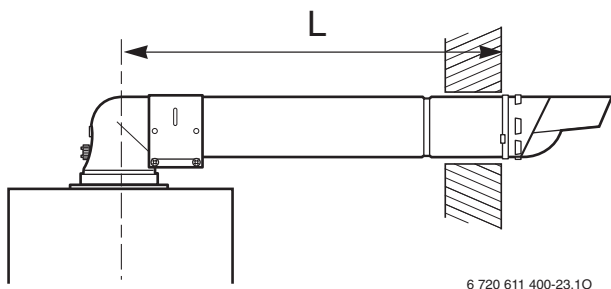


Fig. 24 Flue length - side

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. 23 & Fig. 24 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.

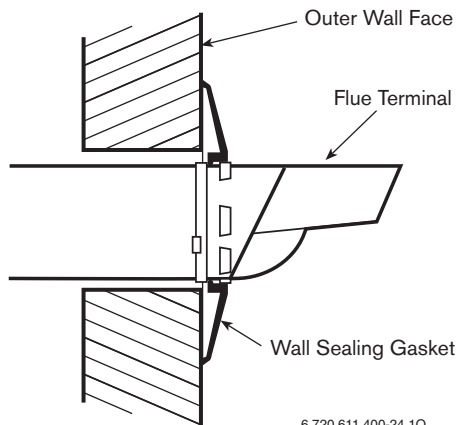


Fig. 25 Flue terminal position

Assemble flue system completely. Push the ducts fully together and clamp in the positions. The slope of the terminal outlet must be directed as per Fig. 25.

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. 26.

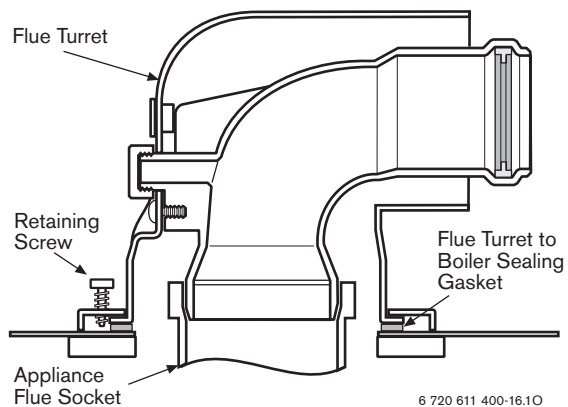


Fig. 26 Flue turret

Ensure that the turret is fully secured 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. 29.
- ▶ 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 fascia 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.

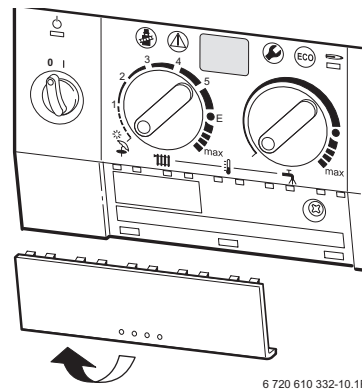


Fig. 27

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

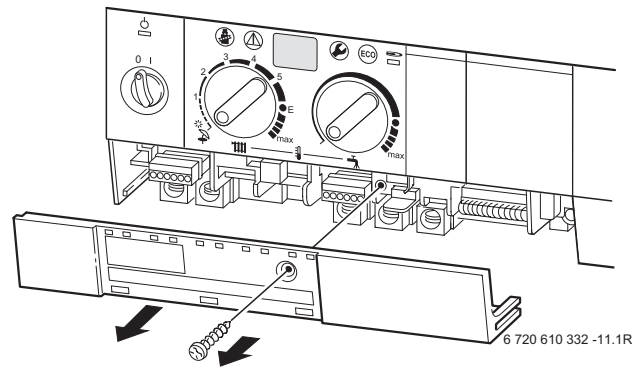


Fig. 28

- ▶ Cut cable grommet to diameter of cable.

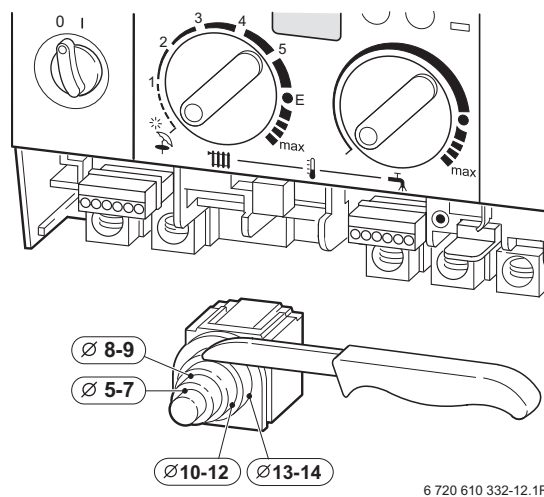


Fig. 29

- ▶ Feed cable through cable grommet and connect the mains supply cable, see fig. 30.

- ▶ Secure cable in cable grommet by means of cable grip.

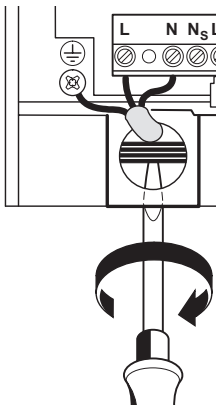


Fig. 30

## 4.2 Wiring to your system

The boiler is fitted with an internal pump and there are two recommended ways of connecting a system, external 230v or internal 24v depending on the choice of diverter valve(s).

### 4.2.1 External 230v

Non-supplied parts required: external 230v conventional terminal block or wiring centre, pre-wired to the 230v diverter valve(s) and all other 230v system components.

**Note:** Honeywell and Siemens Y plan valves require a capacitor to be wired across the switch wire and neutral of the external wiring centre or across the  $L_R$  and  $N_S$  terminals on the boiler. The capacitor required is a 0.47 microfarad capacitor 275 vac class X2 type. This can be obtained from an electronics wholesalers such as Farnell Tel. 0870 1200 202. The Farnell part number for this capacitor is 869-491.

- See section 4.1 to gain access to the boiler mains wiring centre
- Remove the connecting link from  $L_S$  and  $L_R$  terminals and connect the system to the boiler. Two typical examples of this are shown in Fig. 31 and Fig. 32.
- Any other components (including frost thermostats) cannot be connected to the boiler and should instead be connected to the external terminal block or wiring centre in accordance with the manufacturers proprietary instructions. No liability is accepted arising from or by any wiring external to the boiler.

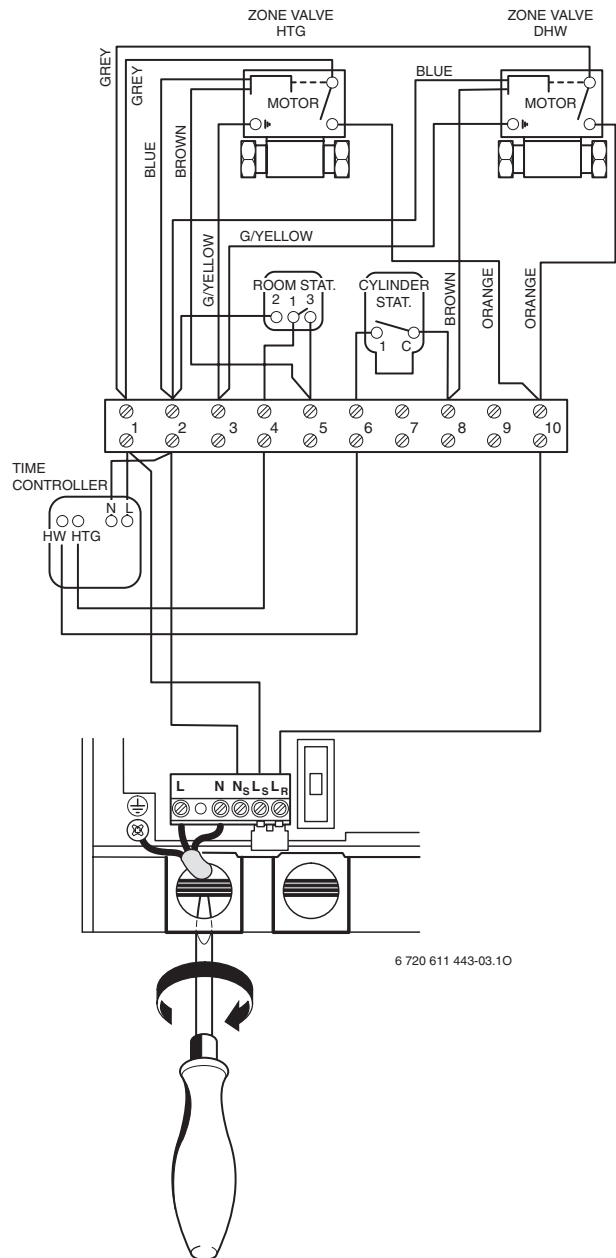
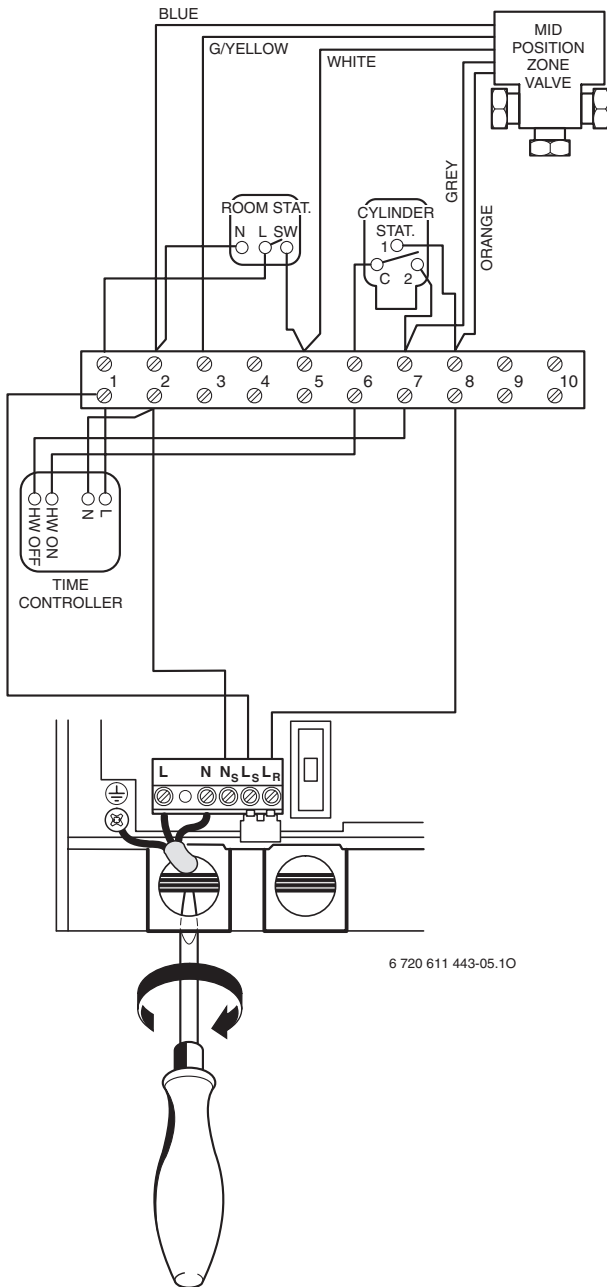


Fig. 31 A typical example of external 230v connection using 2 zone valves



6 720 611 443-05.10

Fig. 32 A typical example of external 230v connection using a mid-position zone valve

#### 4.2.2 Internal 24v

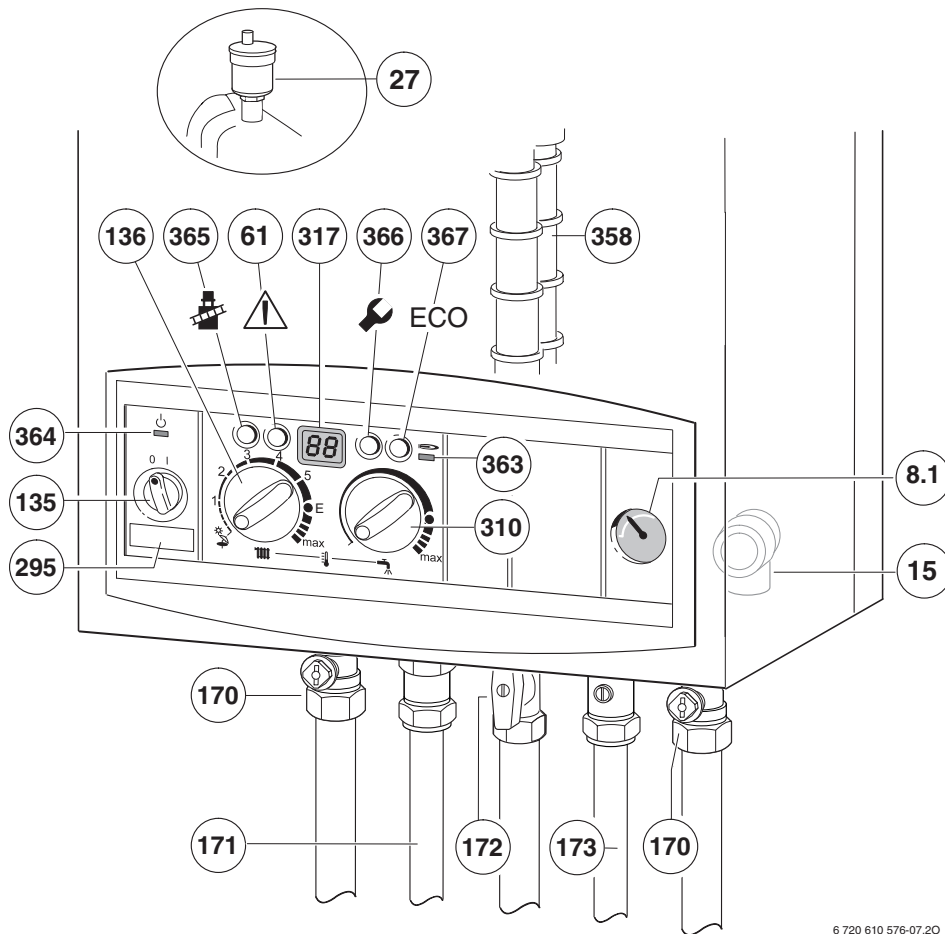
Non-supplied Worcester Bosch parts required:

Description	Part Number
24v Diverter valve (including tank NTC)	7 719 002 090
TR2 room thermostat	7 774 901 137
Night set back module	7 744 901 136
Twin channel programmer	7 716 192 032

Table 10

- See section 4.1 to gain access to the boiler mains wiring centre
- Keep the link connecting the **L<sub>S</sub>** and **L<sub>R</sub>** terminals
- Refer to instructions supplied with each part
- Externally wired frost protection is not required as this is provided by the boiler's internal frost thermostat and the TR2 room thermostat.

## 5 Commissioning



6 720 610 576-07.20

Fig. 33

- 8.1** Pressure gauge
- 15** Safety valve
- 27** Automatic vent
- 61** Reset button
- 135** Master switch
- 136** Temperature control for central heating
- 170** Service cocks on CH flow and return
- 171** Optional cylinder flow (used only with motorised valve)
- 172** Gas cock (shown in on position)
- 173** Optional cylinder return (used only with motorised valve)
- 295** Appliance type sticker
- 310** Temperature control for hot water
- 317** Multi function display
- 358** Condensate trap
- 363** Indicator lamp for burner
- 364** Indicator lamp for power supply
- 365** "Chimney sweep" button
- 366** Service button
- 367** ECO button

### 5.1 Commissioning



**Never** run the appliance when empty or unpressurised.



The operational CO<sub>2</sub> 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.

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

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. 33.
- ▶ Adjust charge pressure of expansion vessel to static head of the central heating system (see page 27).
- ▶ Open all system radiator valves.
- ▶ Check automatic air vent is open (27) fig. 33
- ▶ Turn on service valves (170), fill central heating system to pressure of 1 - 2 bar through the WRAS approved filling loop. Refer to fig. 33.
- ▶ Vent radiators.
- ▶ Refill heating system and set the pressure to 1 bar.
- ▶ Turn on cold water service cock (173). Refer to fig. 33.
- ▶ Check that the gas type specified on the identification plate matches that of the gas supply.
- ▶ Turn on gas cock (172). Refer to fig. 33.

## 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 central heating flow temperature, when the appliance is operating in the central heating mode.

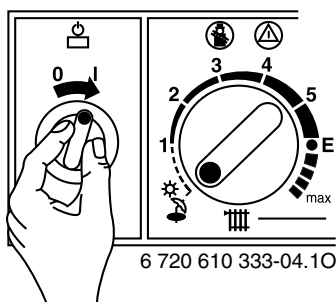


Fig. 34



If the display alternates between **-II-** and the central heating 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 central heating

The central heating flow temperature is adjustable between 35°C and 88°C. Refer to table 13, page 27.

- ▶ Turn the temperature control to set the flow temperature to a level appropriate to the type of central heating system:
  - Underfloor heating: e.g. setting “**3**” (approx. 50°C)
  - 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 27).

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

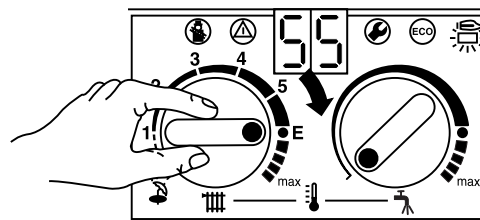



Fig. 35

## 5.4 System controls

- ▶ Set room thermostat to the desired room temperature.
- ▶ Set room temperature controller, if fitted. Refer to the instructions with the control.
- ▶ Set the thermostatic radiator valves to the desired settings.

### 5.5 Appliances with optional plug-in diverter valve: Setting hot water temperature

- ▶ Do not set the temperature higher than 60°C for normal operation.
- ▶ Only use temperatures of up to 70°C temporarily for thermal disinfection purposes.

▶ Set the hot water temperature by means of the temperature control  on the appliance.

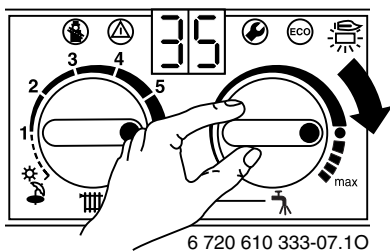


Fig. 36

Control Setting	Water Temperature
Anti-clockwise limit	approx. 10°C (frost protection)
●	approx. 60°C
Clockwise limit	approx. 70°C

Table 11

#### ECO button

Pressing and holding the ECO button  switches from **Comfort mode** to **ECO-mode**.

#### Comfort mode, ECO button is not lit (factory setting)

Comfort mode the hot water tank has priority. The hot water cylinder is first heated up to the set temperature. The appliance then switches to central heating mode.

#### ECO mode, button is lit

In ECO mode the appliance switches between central heating mode and cylinder charging mode every 12 minutes.

### 5.6 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.

### 5.7 Pump anti-seize function


 This function prevents the central heating pump seizing after long periods of inactivity.


Every time the pump is switched off, a timer is started. If after 24 hours the pump has not run again, it is switched on for a period of 5 minutes.


### 5.8 Fault Condition

 A list of faults that may occur is given on page 42.

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 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 Checking the size of the expansion vessel

Maximum pressure at maximum CH flow temperature is 2.5 bar. If the pressure is greater than this then fit an extra expansion vessel. Refer to table 12.

#### System Capacity – BS 7074:1

Expansion Vessel Pressure and System Capacity			
Expansion Vessel	litres	10	
Expansion Vessel Charge Pressure	bar	0.75	
System pressure and capacity	1 bar	litres	82
	1.5 bar	litres	46

Table 12

#### 6.1.2 Setting the central heating flow temperature

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



With underfloor heating systems, observe the maximum permissible flow temperatures.


#### Limited maximum setting for low-temperature operation

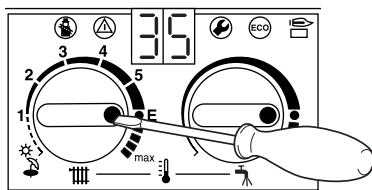
The temperature control is factory limited to setting **E**, giving a maximum flow temperature of 75°C.

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.



6 720 610 332-27.10

Fig. 37

- ▶ 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
<b>E</b>	<b>approx. 75°C</b>
max	approx. 88°C

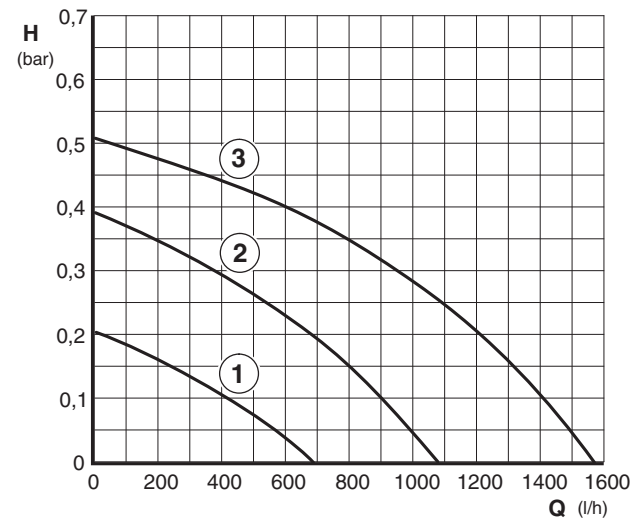
Table 13

#### 6.1.3 Changing the heating pump characteristic

The speed of the central heating pump can be altered on the pump terminal box.



At switch position 1, maximum output is not delivered if hot water mode is active. Position 1 must not be used on combi appliances.



6 720 610 576-23.20

Fig. 38

- 1** Pump characteristic for switch position 1
- 2** Pump characteristic for switch position 2
- 3** Pump characteristic for switch position 3
- H** Residual delivery pressure
- Q** Water circulation rate

## 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.

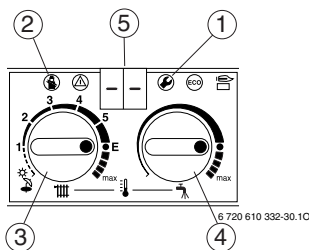


Fig. 39 Appliance controls

- 1 Service button
- 2 "Chimney sweep" button
- 3 Temperature control for central heating
- 4 Temperature control for hot water
- 5 Display

#### Selecting service function:

**i** 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, 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 temperature control to select the required function.

Service function	Code no.	See page
Pump control mode	<b>2.2</b>	28
Anti-cycle time	<b>2.4</b>	28
Max. CH flow temperature	<b>2.5</b>	28
Switching difference	<b>2.6</b>	29
Max. heating output	<b>5.0</b>	29

Table 14

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

### Entering a setting

- ▶ To enter the setting for a function, turn the temperature 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 to their original positions.

### 6.2.2 Selecting the pump control mode for central heating mode (Service Function 2.2)

**i** If an room temperature controller unit is connected, pump control mode 3 is automatically activated.

The choice of settings is as follows:

- **Control Mode 1**  
**For heating equipment without a control unit.**  
The pump is controlled by the central heating flow temperature control.
- **Control Mode 2 (factory setting)**  
For heating systems with room thermostat.  
The central heating flow temperature control controls only the gas, the pump is not affected. The room thermostat controls both the gas and the pump.  
The pump and fan have an overrun time of between 15 s and 3 min.
- **Control Mode 3**  
The pump is controlled by the room temperature controller unit. In summer mode, the pump operates only for hot water mode.

### 6.2.3 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).

### 6.2.4 Setting the maximum CH flow temperature (Service Function 2.5)

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

### 6.2.5 Setting the switching difference (Service Function 2.6)





- i** 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 CH 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). The minimum CH flow temperature is 30°C.

### 6.2.6 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 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.

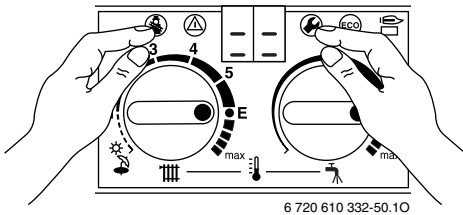



Fig. 40

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

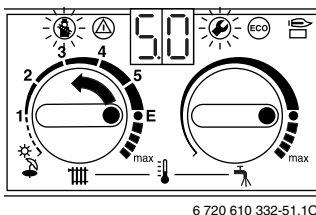







Fig. 41

- ▶ 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 43).
- ▶ Turn the temperature 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.

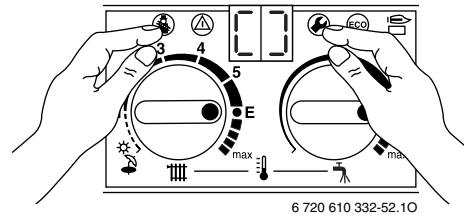




Fig. 42

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

### 6.3 Setting the gas/air ratio

The appliance is set at the factory and adjustment to the CO<sub>2</sub> 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<sup>3</sup> and 20 mbar supply pressure and sealed.

### Conversion kits

Model	For conversion from ...	Order no.
R 28 HE	N.G to L.P.G	7 710 149 049

Table 15

- 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<sub>2</sub> 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 15, 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. 43.
- ▶ Insert testing probe about 135 mm into the flue gas testing point and seal testing point.

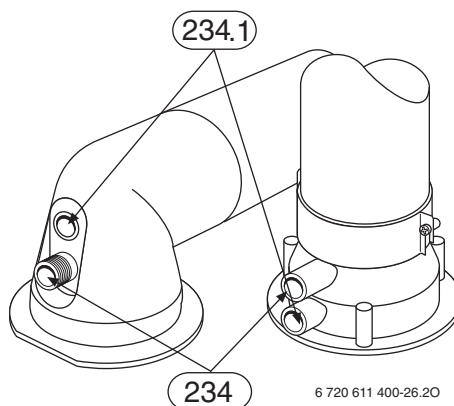


Fig. 43

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

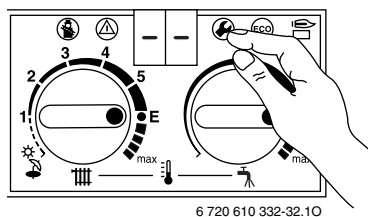


Fig. 44

- ▶ 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).

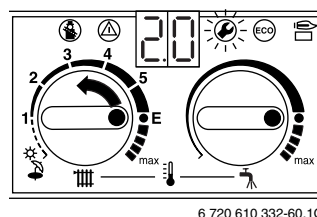


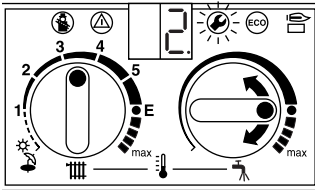


Fig. 45

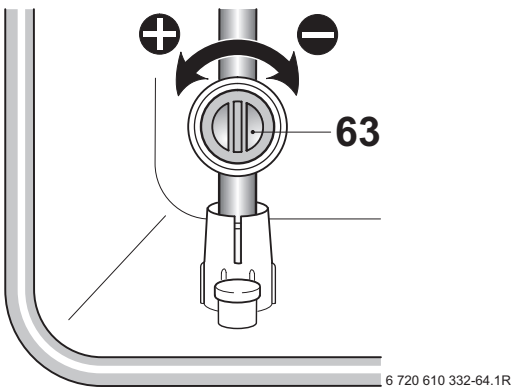
- ▶ Turn the temperature control  until the display shows **2**. (= max. rated heat output). The display and the  button will flash.



6 720 610 332-61.10

Fig. 46

- ▶ Measure the CO<sub>2</sub> level.
- ▶ Prise off the seal on the gas flow restrictor.
- ▶ Adjust the gas flow restrictor (63) to obtain the CO<sub>2</sub> level given in Table 16. Refer to fig. 47.





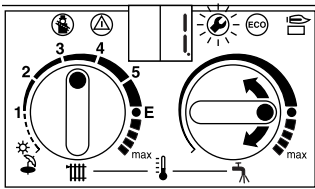
6 720 610 332-64.1R

Fig. 47

Gas Type	CO <sub>2</sub> reading at max. rated heat output	CO <sub>2</sub> reading at min. rated heat output
Natural gas type G20	9.2 %	8.8 %
LPG G31 (propane)	10.8 %	10.5 %

Table 16

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

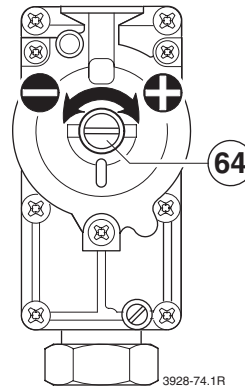


6 720 610 332-63.10

Fig. 48






- ▶ Measure the CO<sub>2</sub> level.

- ▶ Remove the seal from the gas valve adjusting screw (64) and adjust the CO<sub>2</sub> level to the figure given in Table 16 for min. rated heat output.



3928-74.1R

Fig. 49



- ▶ Recheck 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  to their original positions. The display will revert to the CH 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<sub>2</sub> or CO<sub>2</sub> level in the combustion air



By testing the O<sub>2</sub> or CO<sub>2</sub> level in the combustion air the gas tightness of a type C<sub>13</sub> or C<sub>33</sub> **flue system** can be checked. The O<sub>2</sub> level must not be less than 20,6 %. The CO<sub>2</sub> 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. 50).
- ▶ Insert testing probe about 80 mm into the testing point and seal testing point.

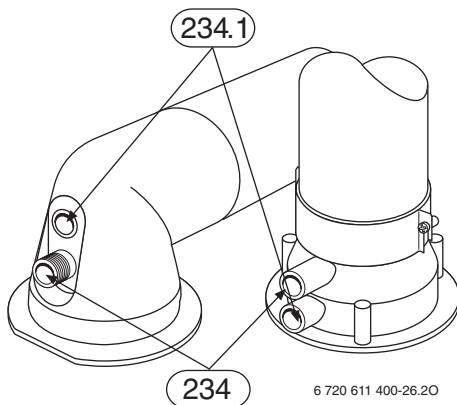






Fig. 50



- ▶ Measure O<sub>2</sub> and CO<sub>2</sub> levels.
- ▶ Refit sealing plug.
- ▶ Press and hold  button until the display shows --. The  button will stop flashing and the display shows the CH flow temperature.

### 7.2.2 Testing CO and CO<sub>2</sub>

- ▶ 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. 50).
- ▶ Insert testing probe about 135 mm into the testing point and seal testing point.
- ▶ CO- and CO<sub>2</sub> levels.
- ▶ Refit sealing plug.
- ▶ Press and hold  button until the display shows --. The  button will stop flashing and the display shows the CH 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.



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

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

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- ▶ 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 pressure relief valve.
- ▶ To drain the appliance shut the system valves and open the pressure relief 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 35).								
2	Check ionisation current, Service Function 3.3, (see page 35).								
3	Perform visual check of air/flue duct. Visual check of diaphragm for soiling and splits (see page 37).								
4	Check gas supply pressure (see page 30). mbar								
5	Test combustion air/flue gas (see page 32).								
6	Check CO <sub>2</sub> setting for min./max. (gas/air ratio) (see page 30). min. % max. %								
7	Check gas and water systems for leaks (see page 16).								
8	Check heat exchanger (see page 35). mbar								
9	Check burner (see page 36).								
10	Clean condensation trap (see page 36).								
11	Check charge pressure of expansion vessel matches static head of heating system. mbar								
12	Check central heating system pressure. mbar								
13	Check electrical wiring for damage.								
14	Check heating programmer settings.								
15	Check appliances that are part of the heating system.								

Table 17

## 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 28 "Selecting service function").

There is a list of the fault codes in the Appendix (see page 42).

To delete "Last fault stored":

- ▶ Turn temperature 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 28 "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.

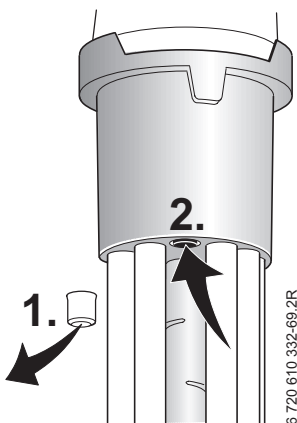


Fig. 51



The heat exchanger should only be cleaned if the control pressure is **4.2 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. 52.

- ▶ Remove the fan and the burner as described in the text headed "Burner" (see page 36).

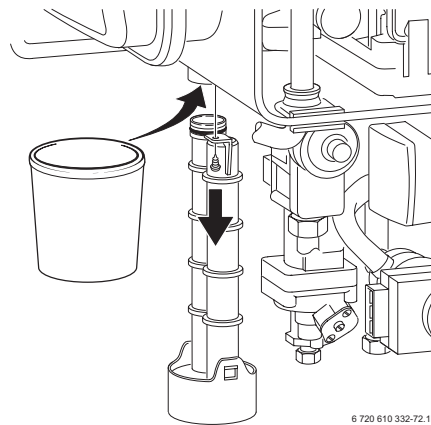


Fig. 52

- ▶ Loosen any deposits in the heat exchanger from top to bottom using the cleaning blade. Refer to fig. 53.

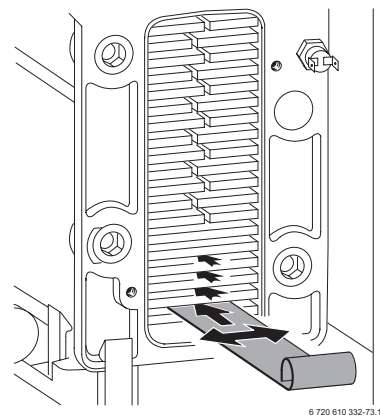


Fig. 53

- ▶ Clean the heat exchanger from top to bottom using the brush. Refer to fig. 54.

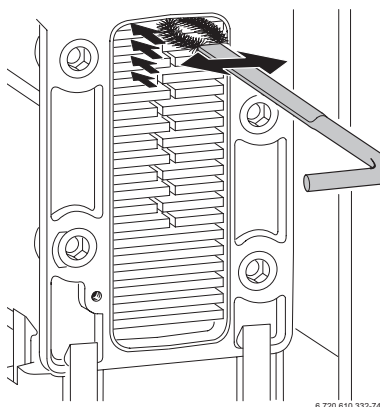


Fig. 54

- ▶ Flush the heat exchanger from the top. Refer to fig. 55.

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

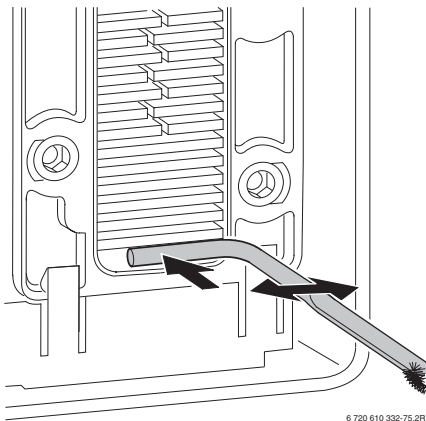


Fig. 55

- ▶ 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. 56.
- ▶ Unscrew and remove the two hexagon screws securing the fan (3.).
- ▶ Slacken fully the rear securing bolt (4.).
- ▶ Remove the burner coverplate.

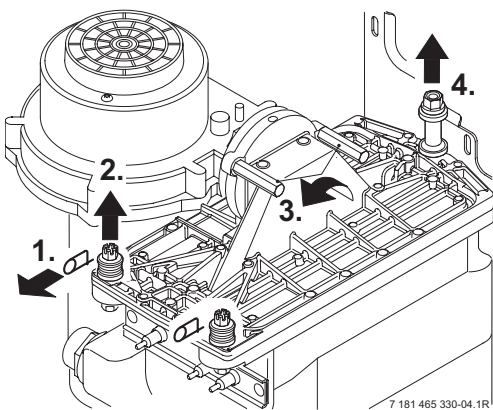


Fig. 56

- ▶ Remove the burner skin and clean components. Do not use a wire brush. Refer to fig. 57.

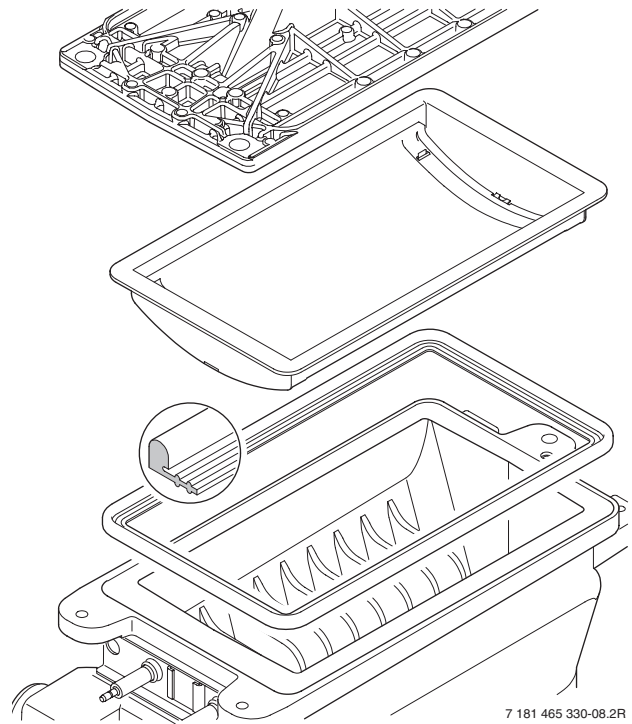


Fig. 57

- ▶ 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 35, fig. 52).

- ▶ 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. 51.
- ▶ Clean the electrodes with a non-metallic brush. (The spark gap should be 4 mm ± 1 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.

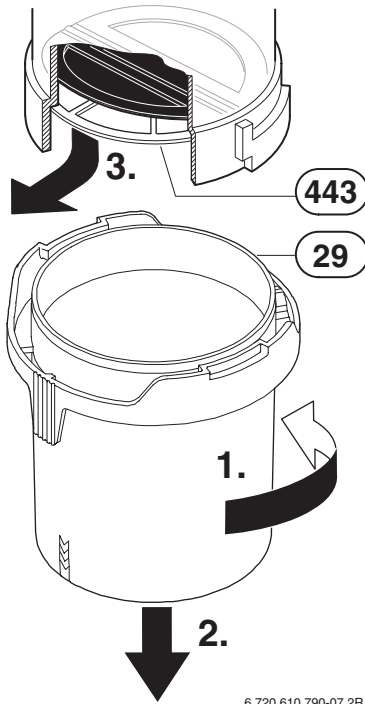


Fig. 58

- ▶ 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.

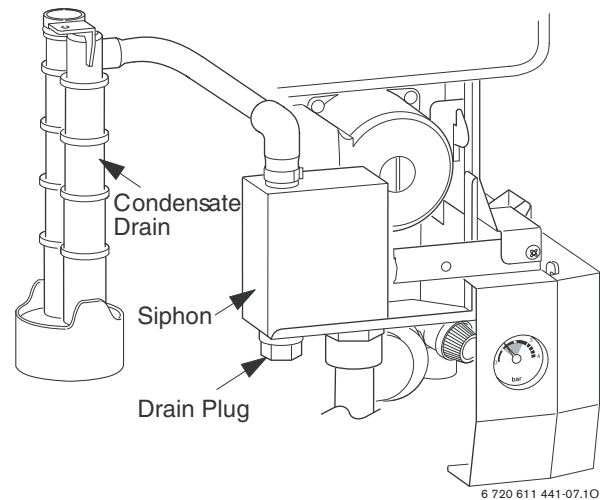


Fig. 59

### Expansion vessel

The expansion vessel should be checked once a year.

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

### Heating system pressure



Fill the system using the WRAS approved filling loop.

- ▶ The pointer on the pressure gauge should be 1 bar.
- ▶ If the pointer is below 1 bar (when the system is cold), water should be added until the pointer is 1 bar again.
- ▶ **Max. pressure** of 2.5 bar when the heating system water is at maximum temperature must not be exceeded. If this pressure is exceeded then an extra expansion vessel must be fitted in the system return as close to the appliance as possible.
- ▶ If the system does not retain the pressure, the expansion vessel and the heating system should be checked for leaks.

### 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. 63.

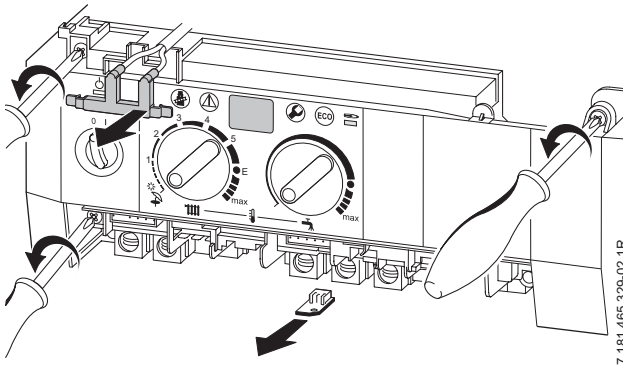


Fig. 60

- ▶ Lower the control box.
- ▶ Unscrew earth lead.
- ▶ Unscrew four fixing screws from cover plate. Refer to fig. 64.
- ▶ Prise off cover plate.
- ▶ Pull off transformer.
- ▶ Remove pcb holder.

- ▶ Remove the pcb control board.

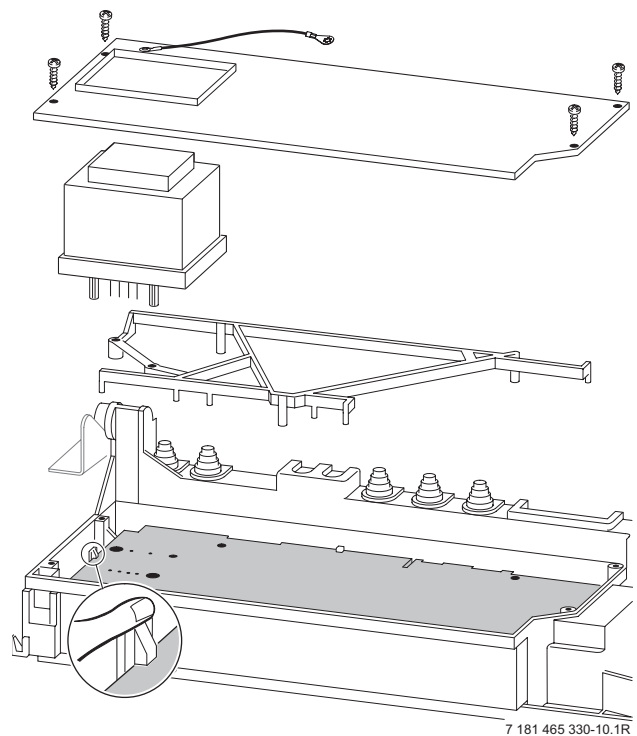


Fig. 61

#### 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.

### 8.3.2 Fan Assembly

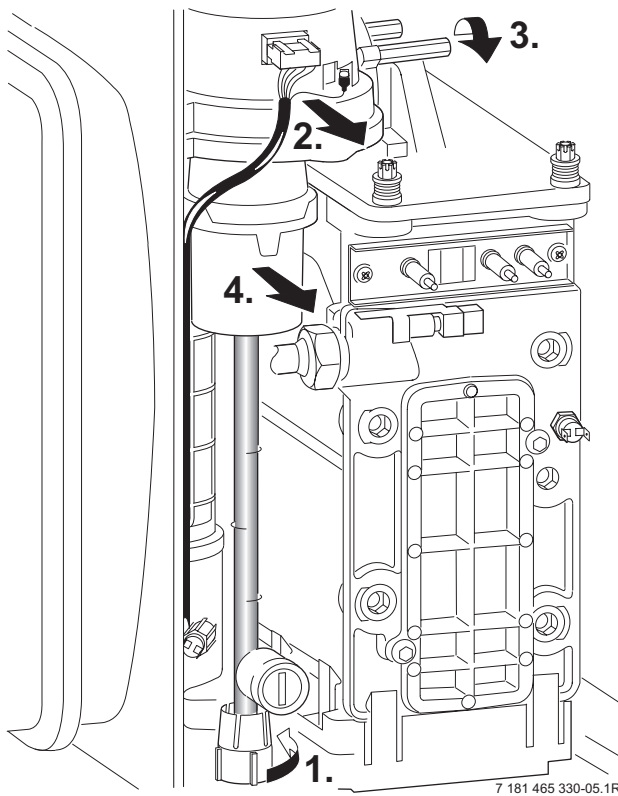


Fig. 62

- ▶ Switch off the appliance.
- ▶ Disconnect the appliance from the power supply.
- ▶ Undo lower pipe union on gas pipe (1.). Refer to fig. 62.
- ▶ 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 Pump

- ▶ Switch off the appliance.
- ▶ Disconnect appliance from the power supply.
- ▶ Remove two switchbox fixing screws (1.). Refer to fig. 63.
- ▶ Lower switchbox (2.).
- ▶ Unscrew and remove the siphon by releasing the jubilee clip. Refer to fig. 59.
- ▶ Unscrew the pump union nuts (3.). Refer to fig. 63.
- ▶ Carefully remove the pump and disconnect the leads.

#### Alternatively

- ▶ After removing the siphon release the four Allen screws and remove and replace the pump head.

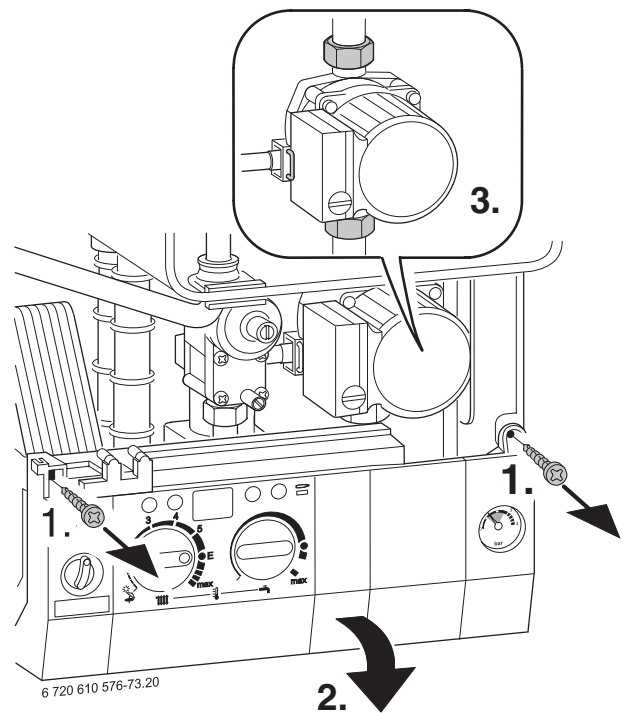
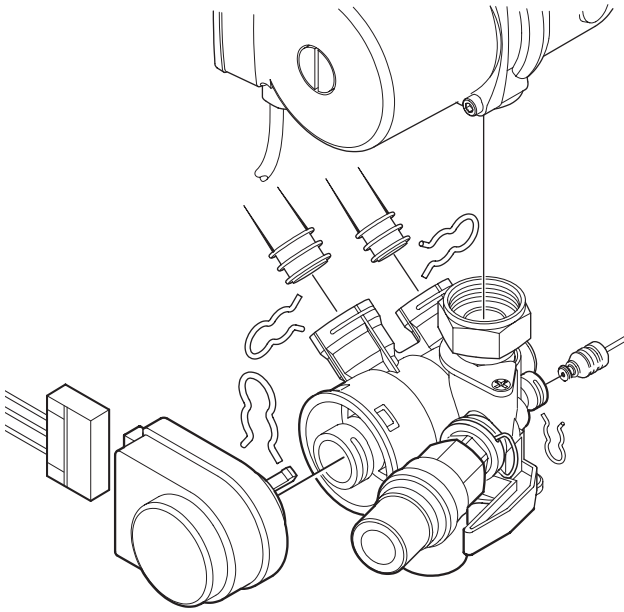


Fig. 63

### 8.3.4 Optional 3-way diverter valve

- ▶ Switch off the appliance.
- ▶ Disconnect appliance from the power supply.
- ▶ Turn off service cocks.
- ▶ Unplug connector from 3-way valve motor. Refer to fig. 64.
- ▶ Pull out retaining clip.
- ▶ Remove motor.
- ▶ Disconnect the relief valve drain.
- ▶ Disconnect the pressure gauge by withdrawing the clip and pulling out the capillary head.
- ▶ Undo pipe unions by withdrawing the clips.

- ▶ Remove 3-way valve.



7 181 465 330-12.1R

Fig. 64

After refitting:

- ▶ Fill system, bleed and re-pressurise (see Installation Instructions).

### 8.3.5 3-way diverter valve motor

- ▶ Switch off the appliance.
- ▶ Turn off the service cocks.
- ▶ Unplug connector from 3-way valve motor. Refer to fig. 64.
- ▶ Pull out retaining clip.
- ▶ Remove motor.

### 8.3.6 Sensors

- ▶ Check that the appliance is electrically isolated.

#### Central Heating Flow Temperature Sensor – Item 36, fig. 2, 63

- ▶ 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, 63

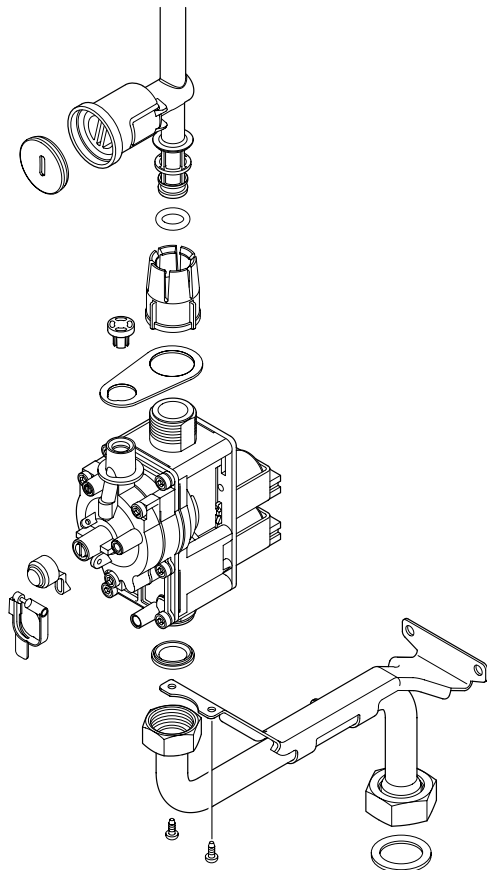
- ▶ Pull-off the connectors.
- ▶ Unscrew the sensor.

#### Flue Temperature Limiter – Item 9, fig. 2, 63

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

### 8.3.7 Gas Valve

- ▶ Check that the gas cock is turned off.
- ▶ Lower the control panel. Refer to fig. 63.
- ▶ 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. 62.
- ▶ 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 - 04.10

Fig. 65

### 8.3.8 Electrode assembly

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

### 8.3.9 Pressure gauge

- ▶ Drain the appliance.
- ▶ Lower the facia. Refer to fig. 63.
- ▶ Twist the pressure gauge head anti-clockwise to release it from the casing. Refer to fig. 2.
- ▶ Disconnect the capillary head from the rear by withdrawing the clip and pulling out the head. Refer to fig. 57.

### 8.3.10 Expansion vessel

- ▶ Drain the appliance.
- ▶ Undo the union connection at the base of the vessel. Refer to fig. 2.
- ▶ Unscrew the top and bottom fixing screws and remove the vessel.
- ▶ Set the pressure of the new vessel to that required by the system.

### 8.3.11 Pressure Relief Valve

- ▶ Drain the appliance.
- ▶ Disconnect the drain pipe from the valve. Refer to fig. 33.
- ▶ Pull-out the clip securing the valve.
- ▶ Pull-out the valve.
- ▶ Ensure that the replacement valve is fully entered before fitting the clip.

### 8.3.12 Burner

- ▶ Refer to section 8.2.

### 8.3.13 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 8.3.6.
- ▶ Undo the central heating flow union.
- ▶ Undo the top connection of the pump. Refer to fig. 57.
- ▶ Undo the grey plastic cap, next to the top pump connection 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.

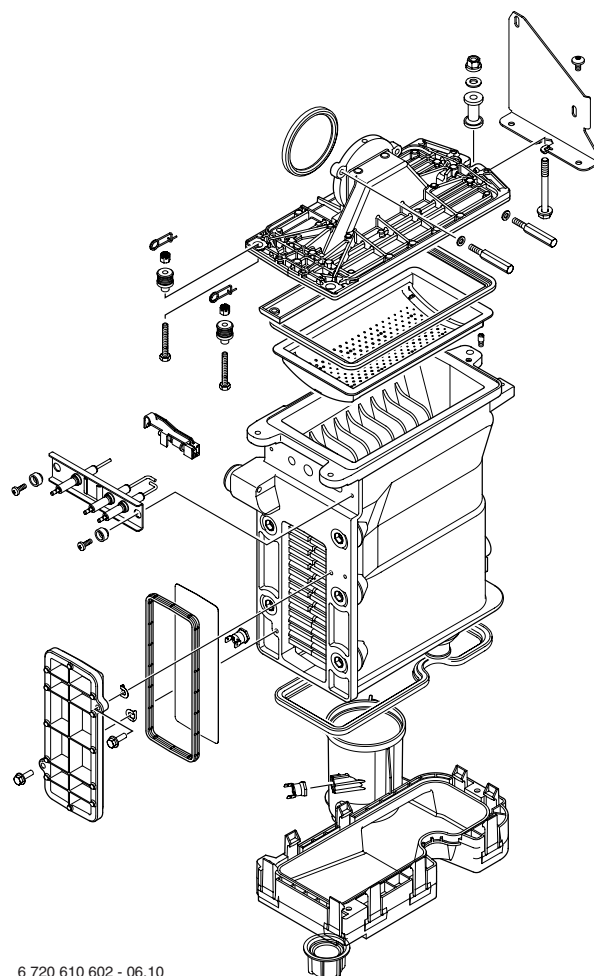


Fig. 66

## 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
<b>A8</b>	Break in communication	Check connecting lead to programmer
<b>AC</b>	Module not detected.	Check connecting lead between TA211E/TR212E and Heatronic
<b>b1</b>	Code plug not detected.	Insert code plug correctly, test and replace if necessary.
<b>C1</b>	Fan speed too low.	Check fan lead and connector, and fan; replace as necessary.
<b>d3</b>	Jumper 8-9 not detected.	Connector not connected, link missing, underfloor heating limiter tripped.
<b>E2</b>	CH flow NTC sensor defective	Check CH flow NTC sensor and connecting lead.
<b>E9</b>	Safety temp. limiter in CH flow has tripped.	Check system pressure, check safety temp. limiters, check pump operation, check fuse on pcb, bleed appliance.
<b>EA</b>	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 <sub>2</sub> level.
<b>F0</b>	Internal error.	Check electrical connector contacts, programmer interface module ignition leads are not loose; replace pcb if necessary.
<b>F7</b>	Flame detected even though appliance switched off.	Check electrode assembly, dry pcb. Flue clear?
<b>FA</b>	Flame detected after gas shut off.	Check gas valve and wiring to gas valve. Clean condensation trap and check electrode assembly. Flue clear?
<b>Fd</b>	Reset button pressed by mistake.	Press reset button again
<b>P1, P2, P3, P1...</b>	Please wait, initialisation in progress.	24 V fuse blown. Replace fuse.

Table 18

## 9.2 Short parts list

Key	Description	Qty GC	Spare part number
1	Sensor - Flue gas temp.	1	8 722 963 858 0
2	Sensor - CH flow temp.	1	8 714 500 087 0
3	Control board	1	8 748 300 395 0
4	Gas valve	1	8 747 003 508 0
5	Fan assembly	1	8 717 204 373 0
6	Fan washer	1	8 729 000 183 0
7	Expansion vessel	1	8 715 407 236 0
8	Relief valve	1	8 717 401 012 0
9	Electrode assembly	1	8 718 107 077 0
10	Electrode lead	1	8 714 401 999 0
11	Pump	1	8 717 204 384 0
12	Pressure gauge	1	8 717 208 079 0
13	Burner skin seal	1	8 711 004 168 0
14	Transformer - facia	1	8 747 201 358 0
15	Heat exchanger washer	1	8 710 103 153 0
16	Washer set Condensation Trap	1	8 710 103 154 0
17	Fuse set	1	8 744 503 010 0
18	Primary heat exchanger	1	8 715 406 615 0

Table 19

## 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 $t_V/t_R = 80/60^\circ\text{C}$ )
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 20

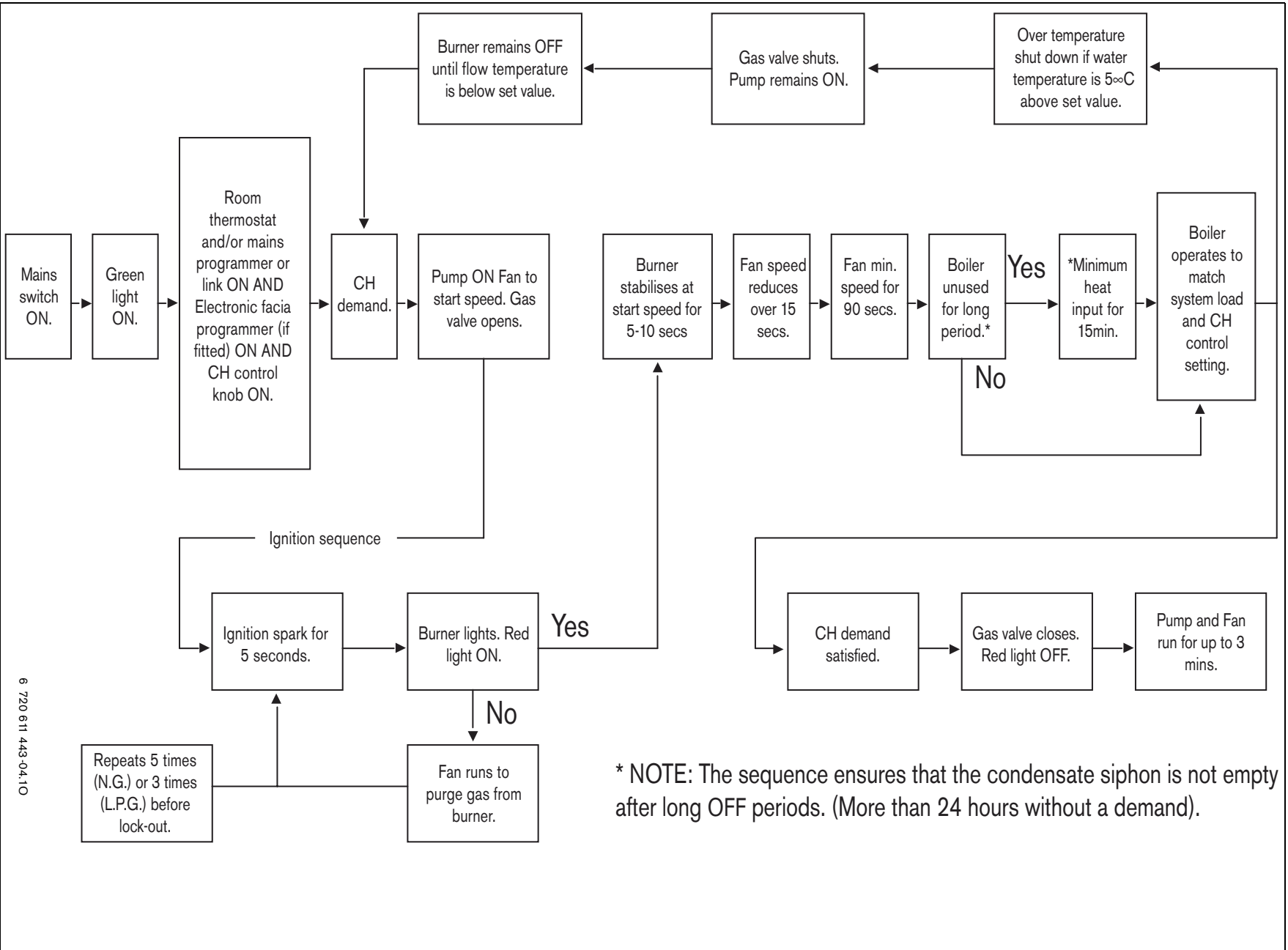
## 9.4 Heating/hot water output settings (L.P.G)

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 21

9.5 Operational Flow diagrams

9.5.1 Central heating function



\* NOTE: The sequence ensures that the condensate siphon is not empty after long OFF periods. (More than 24 hours without a demand).

Fig. 67

6 720 611 443-04.10







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