



**WORCESTER**

**Bosch Thermotechnik**

# 280 RSF

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WALL MOUNTED COMBINATION BOILER FOR CENTRAL HEATING  
AND MAINS FED DOMESTIC HOT WATER

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## INSTALLATION AND SERVICING INSTRUCTIONS

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GC No. 47 311 11

### BOILER OUTPUT

Automatic Modulating Control

To Domestic Hot Water

Minimum 10.5 kW (35,900 Btu/h)

Maximum 28.0 kW (95,500 Btu/h)

To Central Heating

Minimum 10.5 kW (35,900 Btu/h)

Maximum 24.0 kW (82,000 Btu/h)

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**IMPORTANT: THIS APPLIANCE IS FOR USE WITH NATURAL GAS ONLY**

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THESE INSTRUCTIONS APPLY IN THE UK ONLY

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THESE INSTRUCTIONS ARE TO BE LEFT WITH THE USER OR AT THE GAS METER

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## 1. Installation Regulations

**1.1 Gas Safety (Installation and Use) Regulations 1984:** All gas appliances must be installed by a competent person in accordance with the above regulations. Failure to install appliances correctly could lead to prosecution.

**1.2** The manufacturers notes must not be taken, in any way, as overriding statutory obligations.

**1.3** The compliance with a British Standard does not, of itself, confer immunity from legal obligations. In particular the installation of this appliance must be in accordance with the relevant requirements of the Gas Safety (Installation and Use) Regulations 1984 (as amended), current IEE Wiring Regulations, local Building Regulations, Building Standards (Scotland) (Consolidation), by-laws of the local Water Company and Health and Safety Document No. 635 (Electricity at Work Regulations 1989). It should be in accordance with the relevant recommendations of the following British Standards.

BS 6798:1987 Specification for installation of gas fired hot water boilers of rated input not exceeding 60kW

BS 5449:1990 Central Heating for Domestic Premises

BS 5546:1990 Installation of gas hot water supplies for domestic purposes

BS 5440:1:1990 Flues and ventilation for gas appliances of rated input not exceeding 60kW: Flues

BS 5440:2:1989 Flues and ventilation for gas appliances of rated input not exceeding 60kW: Air Supply

BS 6891:1988 Installation of low pressure gas pipework installations up to 28 mm (R1)

**1.4** To ensure that the installation will perform to the highest standards, the system and components should conform to any other relevant British Standards in addition to those mentioned in the instructions.

## 2. General Information

**2.1** This appliance is not suitable for external installation.

**2.2** The appliance controls are set to provide a maximum output of 28 kW for the domestic hot water and a central heating load of up to 24 kW.

**2.3** The control circuit provides automatic ignition. A permanent pilot is not used.

### 2.4 PRINCIPLE APPLIANCE COMPONENTS

A low thermal capacity Gas to Water heat exchanger.

A Water to Water heat exchanger to provide domestic hot water.

Fully modulating controls in the central heating and domestic hot water modes of operation.

An expansion vessel, pressure gauge and pressure relief valve.

A by-pass for the central heating system.

Temperature safety cut-out controls.

A water flow regulator.

A standard flue assembly including a 90° flue bend.

A flue kit for the internal fitting of the flue assembly.

Optional extra flue kits to provide for flue lengths up to a maximum of 3000 mm.

Optional extra 90° flue bends.

**Note:** The maximum flue length reduces when a flue bend (or bends) is fitted to the flue assembly.

An optional extra vertical balanced flue system.

An optional extra fascia mounted programmer.

### 2.5 ELECTRICAL SUPPLY.

Mains supply: 240V ~, 50Hz, 270 watts.

External fuse: 3A. Internal fuse: 3A Fast blow.

### 2.6 GAS SUPPLY.

The boiler requires 3.35 m<sup>3</sup>/h (115 ft<sup>3</sup>/hr) of natural gas with a calorific value of 38.7 MJ/m<sup>3</sup> (1038 Btu/h). The gas meter and supply pipes must be capable of supplying this quantity of gas in addition to the demand from any other appliances being served.

The following table gives an indication of limiting gas pipe lengths and the allowance to be made for fittings. Refer to BS6891 for further information.

TOTAL LENGTH OF GAS SUPPLY PIPE (metres)			Pipe Diameter (mm)
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

The gas meter governor should deliver a dynamic pressure of 20mbar (8in wg.) at the appliance, equivalent to a pressure of about 18.5–19 mbar at the gas valve.

The complete installation including the gas meter must be tested for soundness and purged. See BS 6891.

### 2.7 PACKING.

The appliance and flue components are packed in separate cartons.

### 2.8 GENERAL INSTALLATION.

The appliance is supplied for connection to a sealed system but is suitable for use with an open system.

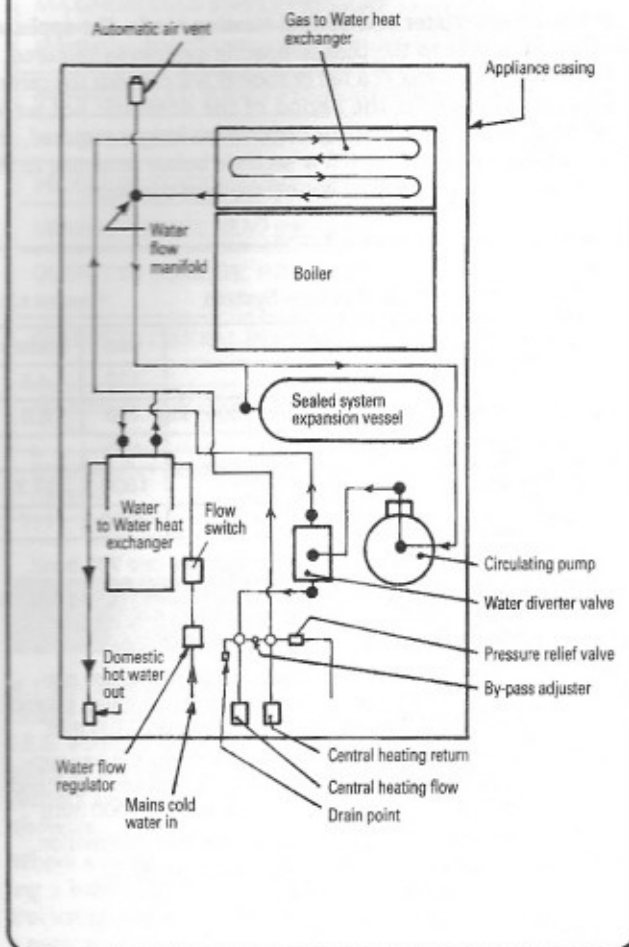
The specified ventilation openings made into a wall or compartment door must not be obstructed.

If the appliance is to be fitted into a compartment, then the compartment must conform to the requirements of BS 6798: 1987 Section 6.

Do not place anything on top of the appliance.

The clearances specified for servicing must be maintained.

Fig. 1. Appliance water flow diagram.



## 2.9 FLUE.

The appliance has a multi-directional balanced fanned flue system - right, left or rear.

A terminal guard, Type K2, GC 393 553, is available from Tower Flue Components, Vale Rise, Tonbridge, TN9 1TB.

The standard flue assembly length is from 100 mm to 1000 mm measured from the flue side of the appliance casing.

Extended flue lengths from 1000 mm to 3000 mm are available in 1000 mm lengths as optional extras.

A maximum of two 90° flue bends can be fitted in addition to the one supplied and are available as optional extras.

**Note:** When using an additional 90° flue bend (or bends) the maximum flue length is reduced. See Section 5b.

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

An optional extra internal flue fixing kit is available. When ordering the kit the following part number must be quoted: ZEGAS206. For fitting instructions refer to Section 11.6.

A vertical balanced flue is available with a flue height from 100 mm to 3500 mm.

## 2.10 CONTROLS.

The electronic control system (via the gas valve) modulates the heat input in response to the central heating and domestic hot water temperature settings between minimum and maximum.

The Operating Switch provides for the selection of domestic hot water only (WATER) or central heating and domestic hot water (HEATING & WATER) or OFF.

A fascia mounted programmer is available as an optional extra. A remote mounted programmer may be connected to the appliance.

The indicator lights on the fascia panel show the status of the appliance.

The electronic controls prevent rapid cycling of the appliance in the central heating mode.

There is provision for the connection of a mains voltage room thermostat and/or a frost thermostat

## Frost Protection.

The appliance has a built-in device for frost protection. When the water in the boiler section drops to a temperature of about 8°C the appliance will operate. Under most operating conditions this will protect the appliance and system.

When parts of the heating system are likely to be exposed to exceptionally low temperatures, it is advised to fit a frost thermostat to protect the system.

## 2.11 SYSTEM NOTES.

Check that no dirt is left in either the gas or water pipework as this could cause damage to the appliance. The primary system should be flushed and treated in accordance with the recommendations of BS 7593: 1992. Purge the gas supply before finally connecting the appliance.

The water pipe connections throughout a sealed system must be capable of sustaining a pressure of up to 3 bar.

Radiator valves must conform to the requirements of BS2767 (10): 1972.

The pressure relief valve drain outlet must be directed away from any electrical components or where it would cause a hazard to the user.

A drain cock to BS 2879 must be fitted to the lowest point of the system.

For circuit design purposes it is important that due note is taken of the information given in Table 3 relating to the available pump head.

## 2.12 SHOWERS, BIDETS, TAPS AND MIXING VALVES.

Hot and cold taps and mixing valves used in the system must be suitable for operating at mains pressure.

Thermostatically controlled or pressure equalising shower valves will guard against the flow of water at too high a temperature.

Hot and cold mains fed water can be supplied direct to an over-rim flushing bidet subject to local Water Company requirements.

With all mains fed systems, the flow of water from the individual taps will vary with the number of outlets operated simultaneously and the cold water mains supply pressure to the property. Flow balancing using 'Ball-o-Fix' type valves is recommended to avoid an excessive reduction in flow to individual outlets. For further information contact Worcester Heat Systems Ltd.

## 2.13 SAFETY CONSIDERATIONS.

The appliance must not be operated in a waterless condition.

The appliance must not be operated with the boiler inner casing panel removed.

Work must not be carried out on the appliance without the gas and electricity supplies being turned off.

Checks must be made to ensure that the ventilation openings made into walls and partitions are of the correct size and are not obstructed.

## 2.14 OPERATION.

See Fig.1.

**Domestic Hot Water Mode:** With a demand for hot water the burner will light at its maximum setting and then automatically adjust its output to maintain the temperature rise of the delivered water. When domestic hot water is no longer required the burner goes out. After a delay of a few seconds the pump will continue to run for a short period to dissipate the residual heat from the appliance around the central heating circuit.

**Note:** If it is required to use the appliance for domestic hot water before the central heating is connected, a 22 mm copper by-pass pipe must be connected between the central heating flow and return. The minimum length of the by-pass pipe should be 2 meters. Fill the appliance via a sealed system filling loop or a header tank. See Figs. 7 or 8.

**Central Heating Mode:** With a demand for heating the burner will light at its minimum setting and gradually increase to the output required for the system. The output of the appliance is then automatically adjusted to maintain the temperature of the system as set by the Temperature Control Knob on the fascia. The output can reduce down to a minimum of 10.5 kW.

If the system no longer requires even the minimum output to

maintain the desired room temperature, the burner will extinguish. The pump will continue to run for a short period to dissipate the residual heat from the appliance. The appliance will remain off for a fixed period of about 2 minutes before re-lighting and running through the normal central heating mode of operation.

**Domestic Hot Water and Central Heating Mode:** The appliance will supply heat to the central heating system as required. A demand for hot water at a tap or shower will override the central heating function for the period of the domestic hot water demand. When domestic hot water is no longer required, the burner will extinguish for a few seconds before returning to the central heating state and its normal mode of operation.

### 3. Technical Data

See Figs. 2 and 3.

The data plate is fixed to the top of the control box casing.

TABLE 1

NOMINAL BOILER RATINGS							
Output		Input		Burner Setting Pressure		Gas Rate	
kW	Btu/h	kW	Btu/h	m bar.	in. wg.	m <sup>3</sup> /h	ft <sup>3</sup> /h
10.5 Min.CH	35,900 Min.CH	14.8	50,500	2.0	0.8	1.38	48.6
24.0 Max.CH	82,000 Max.CH	30.8	105,000	10.5	4.2	2.87	101.0
28.0 Max.DHW	95,500 Max.DHW	35.0	119,400	14.0	5.6	3.25	115.0

TABLE 3

AVAILABLE PUMP HEAD						
Boiler Output		Head		Min. Flow Rate		Temp. rise across heating flow and return
kW	Btu/h	metres	feet	litres/min	gal/min	
10.5	35,900	4.0	13.2	14.3	3.2	11°C (20°F)
15.0	50,000	2.3	7.5	21.0	4.63	
17.5	60,000	2.5	8.25	18.5	4.1	16°C (24°F)
24.0	82,000	2.0	6.6	19.5	4.3	21°C (38°F)

TABLE 4

SPECIFICATIONS	
CENTRAL HEATING FLOW FITTING	22 mm Compression
CENTRAL HEATING RETURN FITTING	22 mm Compression
COLD WATER MAINS INLET FITTING	15 mm Compression
DOMESTIC HOT WATER OUTLET FITTING	15 mm Compression
GAS INLET FITTING	Rc <sup>3</sup> / <sub>4</sub>
PRESSURE RELIEF VALVE DISCHARGE FITTING	15 mm Compression
OVERALL HEIGHT (including flue bend)	1075 mm (42.3 in.)
CASING HEIGHT	900 mm (35.4 in.)
CASING WIDTH	500 mm (19.7 in.)
CASING DEPTH	320 mm (12.6 in.)
DRY WEIGHT	59.6 kg (131 lb.)
MAXIMUM INSTALLATION WEIGHT	58.5 kg (129 lb.)
PACKAGED WEIGHT	61.0 kg (135 lb.)

TABLE 2 – Multi-directional Flue System

\* Optional Extra

Horizontal Flue (Side or Rear)	mm	inches
Wall Hole Diameter	120	4.5
Wall Hole Diameter (* using internal fitting kit)	150	6.0
Standard Flue – Minimum Length	100	4
Standard Flue – Maximum Length	1000	39.3
Extended Flue – Maximum Length	3000	117

**Note 1** The standard flue assembly includes one 90° bend.

**Note 2** Optional extra flue bends are available. The maximum flue length is reduced when an extra flue bend (or bends) is used. Refer to notes 3 and 4.

**Note 3** When using two flue bends (including the one supplied with the standard flue kit) the maximum extended straight flue length must not exceed 2300 mm.

**Note 4** When using three flue bends (including the one supplied with the standard flue kit) the maximum extended straight flue length must not exceed 1000 mm.

**Note 5** See Section 5b–Flue Options for further information.

**Note 6** No more than three bends may be used.

TABLE 2a

Vertical Balanced Flue	mm	inches
Ceiling Hole Diameter	130	5.25
Minimum Air Duct Height	100	4.0
Maximum Air Duct Height	3500	138

**Note:** The maximum overall height of the vertical balanced flue measured from the top of the flue spigot on the appliance casing to the underside of the air inlet flange on the flue terminal is 4600 mm.

TABLE 5

SPECIFICATIONS	
PRIMARY WATER CAPACITY	3 litres (0.66 galls.)
MAXIMUM COLD SUPPLY PRESSURE	10 Bar (150 psi)
MINIMUM COLD SUPPLY PRESSURE (WORKING) FOR MAXIMUM HOT WATER FLOW	1.0 Bar (15.0 psi)
MINIMUM COLD SUPPLY PRESSURE (WORKING) TO OPERATE THE APPLIANCE	0.5 Bar (7.5 psi)
MAXIMUM CENTRAL HEATING FLOW TEMPERATURE	Nominally 82°C (180°F)
MAXIMUM STATIC HEAD (PRIMARY)	30 metres (97 ft)
MINIMUM STATIC HEAD (PRIMARY)	0.3 metres (1 ft)
OUTPUT TO DOMESTIC HOT WATER	Modulating 10.5–28.0 kW (35,900–95,000 Btu/h)
OUTPUT TO CENTRAL HEATING	Modulating 10.5–24.0 kW (35,900–82,000 Btu/h)
MAXIMUM DOMESTIC HOT WATER FLOW RATE FROM THE APPLIANCE	Nominally 10.0 litres/min (± 15%) (2.2 gallons/min)
EQUIVALENT DOMESTIC HOT WATER FLOW RATE TO GIVE A TEMPERATURE RISE OF 35°C	Nominally 11.4 litres/min (± 15%) (2.5 gallons/min)

## 4. Siting the Appliance

4.1 The appliance may be installed in any room although particular attention is drawn to the requirements of the current I.E.E. wiring regulations and, in Scotland, the electrical provisions of the building regulations applicable in Scotland, with respect to the installation of appliances containing baths or showers.

Where a room sealed appliance is installed in a room containing a bath or shower, any electrical switch or appliance control using mains electricity must not be able to be touched by a person using the bath or shower.

4.2 The appliance is not suitable for external installation.

4.3 The appliance does not require any special wall protection.

4.4 The wall must be capable of supporting the weight of the appliance. See Table 4.

4.5 If the appliance is to be fitted in a timber framed building refer to the British Gas publication "Guide for Gas Installations in Timber Framed Housing".

4.6 The following clearances must be available for installation and for servicing. See Fig 2.

	Installation	Servicing
Above the flue bend	25 mm	25 mm
In front	600 mm	600 mm
Below	200 mm	200 mm
Right hand side	5 mm	5 mm
Left hand side	5 mm	5 mm

4.7 The appliance can be installed in a cupboard to be used for airing clothes provided that the requirements of BS 6798 and BS 5440:2 are strictly followed.

4.8 The airing space must be separated from the boiler space by a perforated non-combustible partition. Expanded metal or rigid wire mesh are acceptable provided that the major dimension is less than 13 mm. See BS 6798:1987.

4.9 No combustible surface must be within 75 mm of the appliance casing. See BS476:4.

4.10 The distance between the inner face of a cupboard door and the cabinet front should not be less than 75 mm.

4.11 Always consider the possible need to disconnect the pipes from the appliance after installation.

4.12 The appliance has a vertical flue option. See Section 5c.

## 5a. Siting the Flue Terminal

See Fig. 4.

5a.1 The flue must be installed as specified by BS 5440:Part 1.

5a.2 The terminal must not cause an obstruction nor the discharge a nuisance.

5a.3 If the terminal is fitted within 850 mm of a plastic or painted gutter or within 450 mm of painted eaves then an aluminium shield at least 750 mm long should be fitted to the underside of the gutter or painted surface.

5a.4 If a terminal is fitted less than 2 meters above a surface to which people have access, then a guard must be fitted. See Section 2.9.

5a.5 The terminal guard must be evenly spaced about the flue terminal and fixed to the wall using plated screws

5a.6 In certain weather conditions a terminal may steam and siting where this could cause a nuisance should be avoided.

5a.7 Take care to ensure that combustion products do not enter ventilated roof voids.

## 5b. Flue Options

### 5b.1 STANDARD HORIZONTAL FLUE. (Flue Option 1)

See Fig. 5. Frame 1.

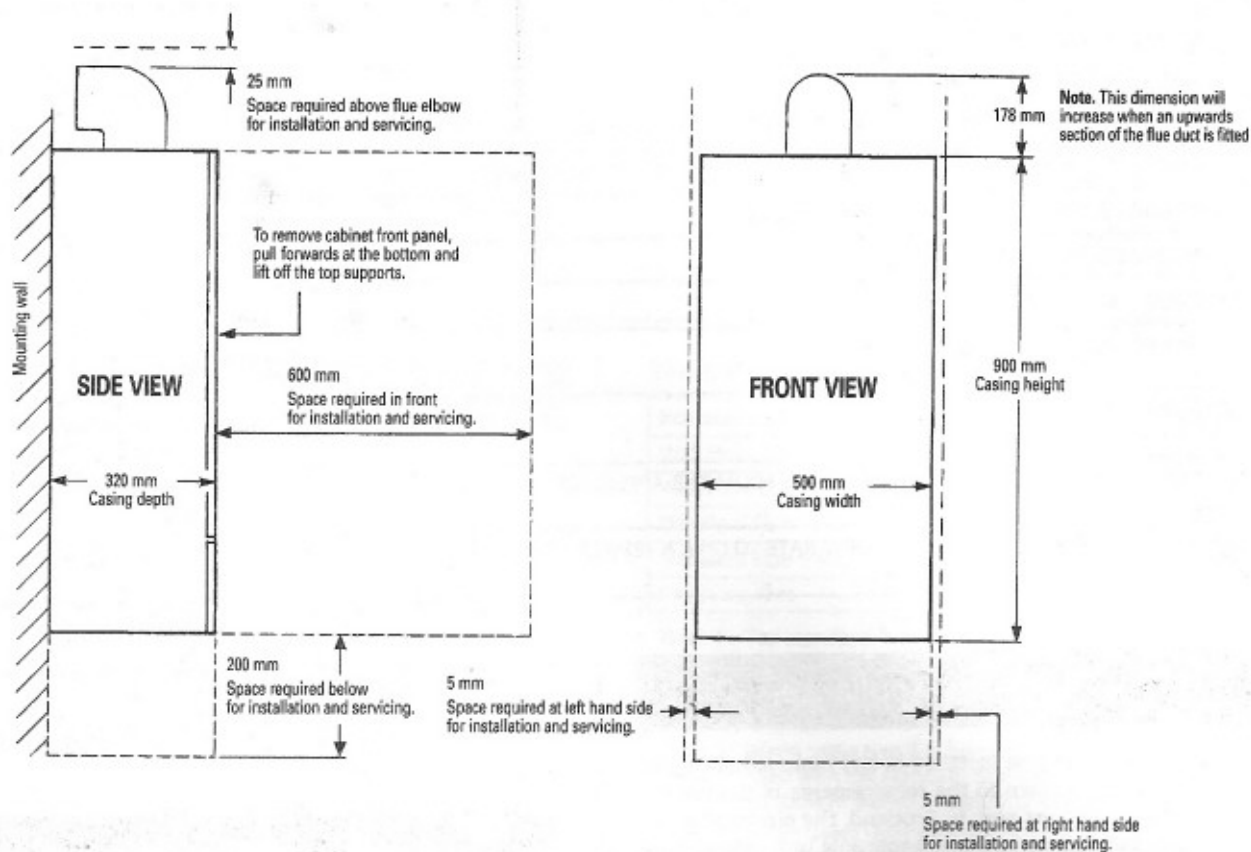
The appliance is supplied with a standard horizontal flue assembly including one 90° flue bend. The standard flue length measured from the side of the appliance casing is from 100 mm to 1000 mm.

The flue may be positioned in any horizontal direction to suit the installation.

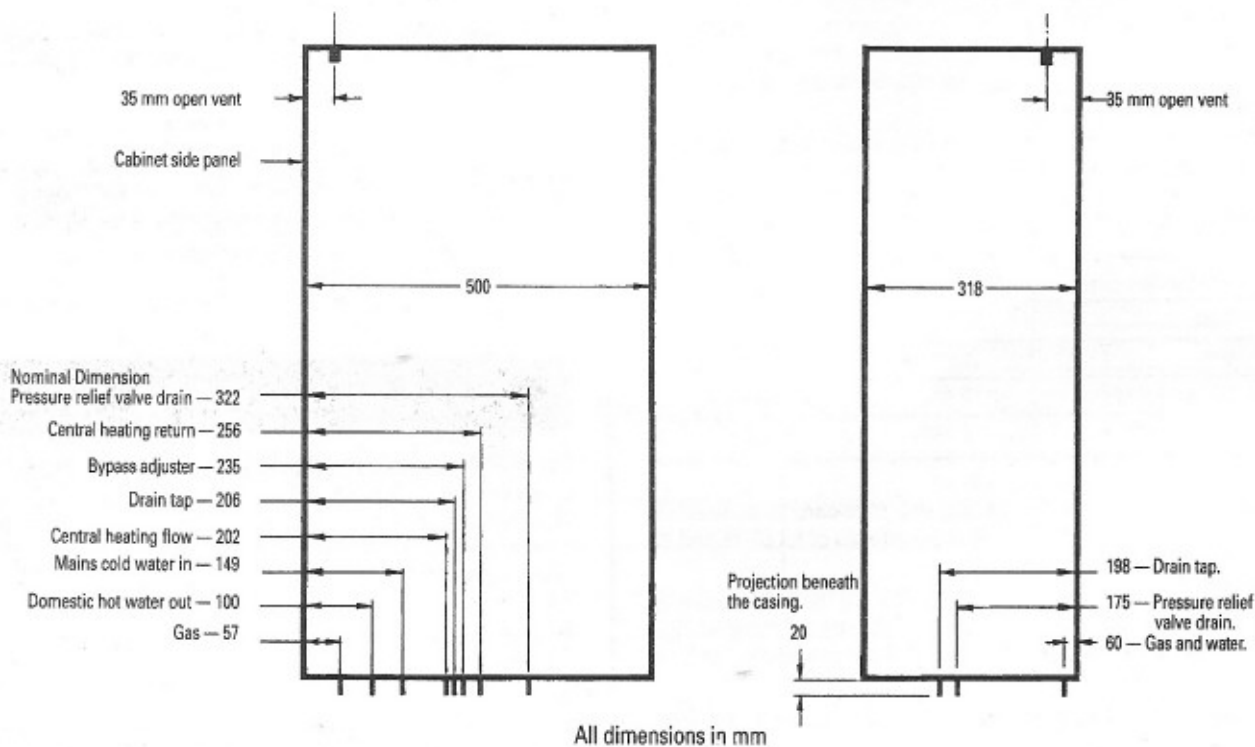
#### Notes:

(a) The following items referred to in this section are supplied as optional extras. The site must be surveyed and the items made available before the installation is commenced. When ordering extras the relevant part numbers must be quoted.

**Fig. 2. Appliance casing dimensions and required clearances.**

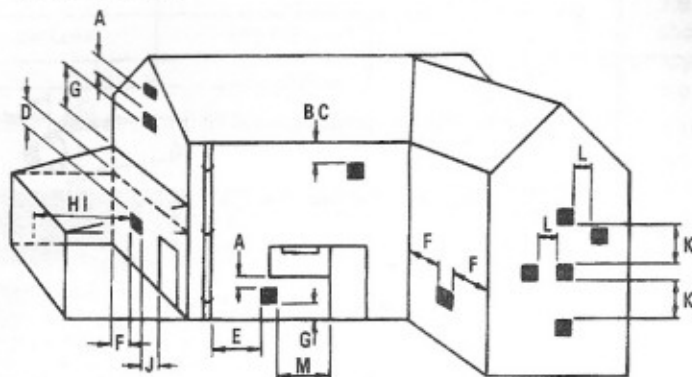


**Fig. 3. Appliance pipework connections.**



**Fig. 4. Siting of the flue terminal.**

MINIMUM SITING DIMENSIONS FOR POSITIONING THE BALANCED FLUE TERMINAL



TERMINAL POSITION	MIN. DISTANCE
A- directly below an openable window or other opening e.g. air brick.	300 mm (12 in.)
B- Below gutters, soil pipes or drain pipes.	75 mm (3 in.)
C- Below eaves.	25 mm (1 in.)
D- Below balconies or car port roof.	25 mm (1 in.)
E- From vertical drain pipes and soil pipes.	25 mm (1 in.)
F- From internal or external corners.	25 mm (1 in.)
G- Above ground, roof or balcony level.	300 mm (12 in.)
H- From a surface facing a terminal.	600 mm (24 in.)
I- From a terminal facing a terminal.	1200 mm (47 in.)
J- From an opening in a car port (e.g. door window) into dwelling.	1200 mm (47 in.)
K- Vertically from a terminal on the same wall.	150 mm (6 in.)
L- Horizontally from a terminal on the same wall.	300 mm (12 in.)
M- From door, window or air vent (achieve where possible).	150 mm (6 in.)

Optional Extra	Part No.
Extension Flue Kit-1000 mm long	ZAGAS177
Flue Adaptor	ZAGAS179
90° Flue Bend	ZAGAS178
Flue Spacer	ZAGAS174
Air Duct Support Bracket	ZAGAS180
Flue Kit for Internal Fitting	ZEGAS206

(b) When determining the flue length required, always measure to the outside of the wall where the flue terminal will be fixed. See Fig.5.

(c) When measuring between the centre lines of flue ducts, allow 83 mm for each flue bend. See Fig.5.

**5b.2 EXTENSION FLUE HORIZONTAL. (Flue Option 2)**

See Fig.5. Frame 2.

Extension flue lengths may be added horizontally. The flue must be assembled from the standard flue supplied and the extension flue kits. The flue may be any length providing it does not exceed 3000 mm measured from the side of the appliance casing.

The flue assembly may be positioned in any horizontal direction to suit the installation.

**5b.3 EXTENSION FLUE UPWARDS AND HORIZONTAL. (Flue Option 3). See Fig.5. Frame 3.**

Extension flue lengths may be added upwards and horizontally. The flue must be assembled from the standard flue supplied, the extension flue kits and a flue adaptor. The flue may be any length providing the total straight length does not exceed 3000 mm.

The horizontal section of flue may be positioned in any horizontal direction to suit the installation.

**5b.4 EXTENSION FLUE HORIZONTAL USING A SECOND 90° FLUE BEND. (Flue Option 4). See Fig.5. Frame 4.**

Extension flue lengths may be added horizontally and include a second 90° flue bend. The flue must be assembled from the standard flue supplied, extension flue kits and a second 90° flue bend. The flue may be any length providing the total straight length does not exceed 2300 mm.

The flue assembly including the second 90° flue bend may be positioned in any horizontal direction to suit the installation.

**5b.5 EXTENSION FLUE UPWARDS AND HORIZONTAL USING A SECOND 90° FLUE BEND. (Flue Option 5). See Fig.5. Frame 5.**

Extension flue lengths may be added upwards and horizontally and include a second 90° flue bend. The flue must be assembled from the standard flue supplied, extension flue kits and a flue adaptor. The flue may be any length providing the total straight length does not exceed 2300 mm.

The horizontal section of flue and second 90° flue bend may be positioned in any horizontal direction to suit the installation.

**5b.6 EXTENSION FLUE HORIZONTAL USING A THIRD 90° FLUE BEND. (Flue Option 6). See Fig.5. Frame 6.**

Extension flue lengths may be added horizontally and include a third 90° flue bend. The flue must be assembled from the standard flue supplied, extension flue kits and second and third 90° flue bends. The flue may be any length providing the total straight length does not exceed 1000 mm.

The flue assembly including the second and third 90° flue bends may be positioned in any horizontal direction to suit the installation.

**5b.7 EXTENSION FLUE UPWARDS AND HORIZONTAL USING A THIRD 90° FLUE BEND. (Flue Option 7). See Fig.5. Frame 7.**

Extension flue lengths may be added upwards and horizontally and include a second and third 90° flue bend. The flue must be assembled from the standard flue supplied, extension flue kits, second and third 90° flue bends and a flue adaptor. The flue may be any length providing the total straight length does not exceed 1000 mm.

The horizontal section of flue including the second and third 90° flue bends may be positioned in any horizontal direction to suit the installation.

**5c. Vertical Flue System**

A optional vertical balanced flue kit with a height of between 100 mm and 3500 mm can be fitted to the appliance. Refer to Section 2.4 and Section 3 - Table 2a. Instructions describing the fitting of the vertical balanced flue system are sent with the flue kit.

**6. Air Supply**

**6.1** The appliance does not require a separate vent for combustion air.

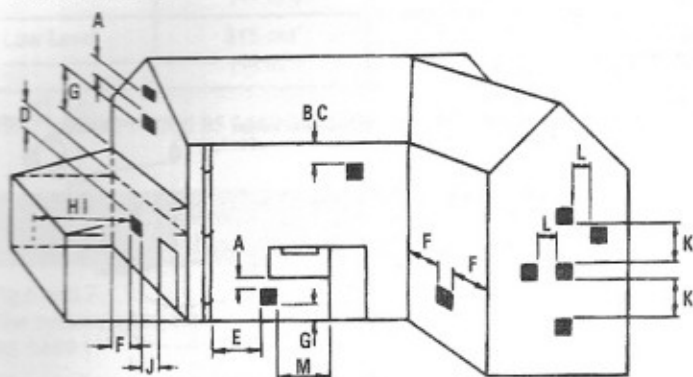
**6.2** Installations in cupboards or compartments require permanent vents for cooling purposes - one at high level and one at low level, either direct to outside air or to a room. Both vents must pass to the same room or be on the same wall to the outside air.

**6.3** There must be sufficient clearance around the appliance to allow proper circulation of ventilation air. See Section 4.6.

**6.4** The minimum free areas required are given as follows.

**Fig. 4. Siting of the flue terminal.**

MINIMUM SITING DIMENSIONS FOR POSITIONING THE BALANCED FLUE TERMINAL



TERMINAL POSITION	MIN. DISTANCE
A- directly below an openable window or other opening e.g. air brick.	300 mm (12 in.)
B- Below gutters, soil pipes or drain pipes.	75 mm (3 in.)
C- Below eaves	25 mm (1 in.)
D- Below balconies or car port roof.	25 mm (1 in.)
E- From vertical drain pipes and soil pipes.	25 mm (1 in.)
F- From internal or external corners.	25 mm (1 in.)
G- Above ground, roof or balcony level.	300 mm (12 in.)
H- From a surface facing a terminal.	600 mm (24 in.)
I- From a terminal facing a terminal	1200 mm (47 in.)
J- From an opening in a car port (e.g. door window) into dwelling.	1200 mm (47 in.)
K- Vertically from a terminal on the same wall.	150 mm (6 in.)
L- Horizontally from a terminal on the same wall.	300 mm (12 in.)
M- From door, window or air vent (achieve where possible).	150 mm (6 in.)

Optional Extra	Part No.
Extension Flue Kit-1000 mm long	ZAGAS177
Flue Adaptor	ZAGAS179
90° Flue Bend	ZAGAS178
Flue Spacer	ZAGAS174
Air Duct Support Bracket	ZAGAS180
Flue Kit for Internal Fitting	ZEGAS206

(b) When determining the flue length required, always measure to the outside of the wall where the flue terminal will be fixed. See Fig.5.

(c) When measuring between the centre lines of flue ducts, allow 83 mm for each flue bend. See Fig.5.

**5b.2 EXTENSION FLUE HORIZONTAL.** (Flue Option 2)  
See Fig.5. Frame 2.

Extension flue lengths may be added horizontally. The flue must be assembled from the standard flue supplied and the extension flue kits. The flue may be any length providing it does not exceed 3000 mm measured from the side of the appliance casing.

The flue assembly may be positioned in any horizontal direction to suit the installation.

**5b.3 EXTENSION FLUE UPWARDS AND HORIZONTAL.**  
(Flue Option 3). See Fig.5. Frame 3.

Extension flue lengths may be added upwards and horizontally. The flue must be assembled from the standard flue supplied, the extension flue kits and a flue adaptor. The flue may be any length providing the total straight length does not exceed 3000 mm.

The horizontal section of flue may be positioned in any horizontal direction to suit the installation.

**5b.4 EXTENSION FLUE HORIZONTAL USING A SECOND 90° FLUE BEND.** (Flue Option 4). See Fig.5. Frame 4.

Extension flue lengths may be added horizontally and include a second 90° flue bend. The flue must be assembled from the standard flue supplied, extension flue kits and a second 90° flue bend. The flue may be any length providing the total straight length does not exceed 2300 mm.

The flue assembly including the second 90° flue bend may be positioned in any horizontal direction to suit the installation.

**5b.5 EXTENSION FLUE UPWARDS AND HORIZONTAL USING A SECOND 90° FLUE BEND.** (Flue Option 5).  
See Fig.5. Frame 5.

Extension flue lengths may be added upwards and horizontally and include a second 90° flue bend. The flue must be assembled from the standard flue supplied, extension flue kits and a flue adaptor. The flue may be any length providing the total straight length does not exceed 2300 mm.

The horizontal section of flue and second 90° flue bend may be positioned in any horizontal direction to suit the installation.

**5b.6 EXTENSION FLUE HORIZONTAL USING A THIRD 90° FLUE BEND.** (Flue Option 6). See Fig.5. Frame 6.

Extension flue lengths may be added horizontally and include a third 90° flue bend. The flue must be assembled from the standard flue supplied, extension flue kits and second and third 90° flue bends. The flue may be any length providing the total straight length does not exceed 1000 mm.

The flue assembly including the second and third 90° flue bends may be positioned in any horizontal direction to suit the installation.

**5b.7 EXTENSION FLUE UPWARDS AND HORIZONTAL USING A THIRD 90° FLUE BEND.** (Flue Option 7).

See Fig.5. Frame 7.

Extension flue lengths may be added upwards and horizontally and include a second and third 90° flue bend. The flue must be assembled from the standard flue supplied, extension flue kits, second and third 90° flue bends and a flue adaptor. The flue may be any length providing the total straight length does not exceed 1000 mm.

The horizontal section of flue including the second and third 90° flue bends may be positioned in any horizontal direction to suit the installation.

**5c. Vertical Flue System**

An optional vertical balanced flue kit with a height of between 100 mm and 3500 mm can be fitted to the appliance. Refer to Section 2.4 and Section 3 - Table 2a. Instructions describing the fitting of the vertical balanced flue system are sent with the flue kit.

**6. Air Supply**

**6.1** The appliance does not require a separate vent for combustion air.

**6.2** Installations in cupboards or compartments require permanent vents for cooling purposes - one at high level and one at low level, either direct to outside air or to a room. Both vents must pass to the same room or be on the same wall to the outside air.

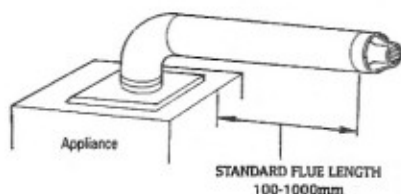
**6.3** There must be sufficient clearance around the appliance to allow proper circulation of ventilation air. See Section 4.6.

**6.4** The minimum free areas required are given as follows.

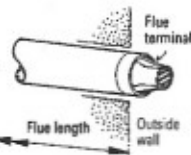


Fig. 5. Flue options.

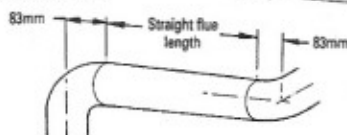
FRAME 1  
FLUE OPTION 1. Standard horizontal flue.



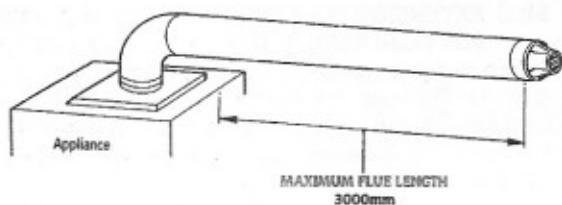
When deciding the flue length required, always measure to the outside of the wall where the flue terminal will be fixed.



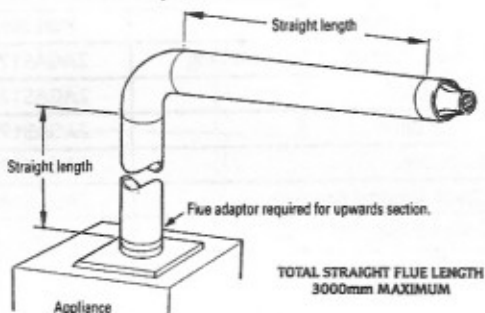
When measuring between the centre lines of the flue ducts, allow 83 mm for each flue bend.



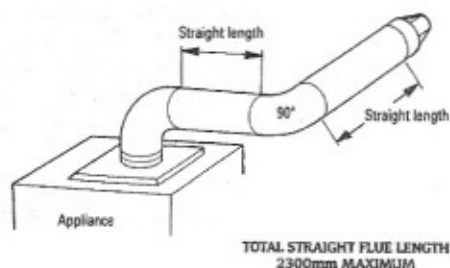
FRAME 2  
FLUE OPTION 2. Extension flue horizontal



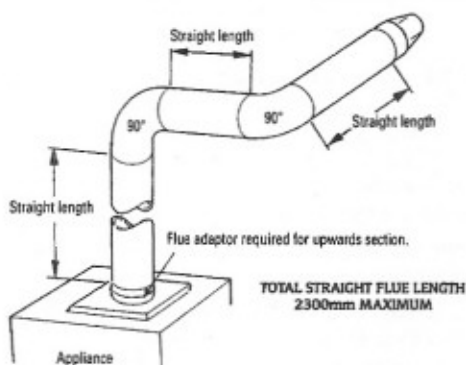
FRAME 3  
FLUE OPTION 3. Extension flue upwards and horizontal.



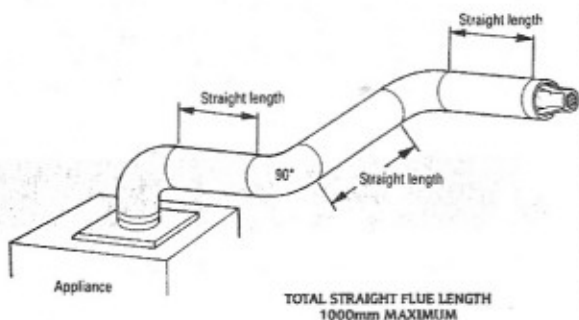
FRAME 4  
FLUE OPTION 4. Extension flue horizontal using a second 90° flue bend.



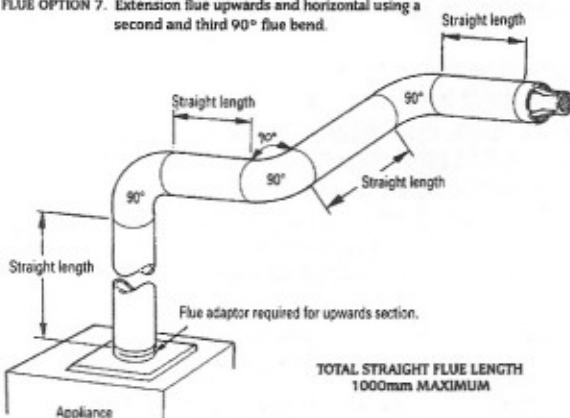
FRAME 5  
FLUE OPTION 5. Extension flue upwards and horizontal using a second 90° flue bend.



FRAME 6  
FLUE OPTION 6. Extension flue horizontal using a second and third 90° flue bend.



FRAME 7  
FLUE OPTION 7. Extension flue upwards and horizontal using a second and third 90° flue bend.



Position of air vents	Air from the room	Air direct from outside
High Level	315 cm <sup>2</sup> . (49 in <sup>2</sup> .)	158 cm <sup>2</sup> . (24 in <sup>2</sup> )
Low Level	315 cm <sup>2</sup> . (49 in <sup>2</sup> .)	158 cm <sup>2</sup> . (24 in <sup>2</sup> .)

6.5 Refer to BS 6798 and BS 5440:2 for additional information.

## 7. Sealed System

See Fig 6 and 7.

7.1 The system must comply with the requirements of BS 6798 and BS 5449:1.

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

7.3 The pressure relief valve operates at 3bar (45lb/in<sup>2</sup>). The discharge must be directed away from electrical items or where it might be a hazard to the user.

7.4 The pressure gauge indicates the system pressure which must be maintained.

7.5 The 10 litre expansion vessel is charged to 0.5 bar and is suitable for a static head of 5m (17.5ft). The pressure can be increased if the static head is greater than 5m (17.5ft).

7.6 With an initial system pressure of 0.5 bar, a system capacity of about 104 litres can be accommodated. Refer to BS 7074 Pt 1 for more information.

7.7 The filling point must be at low level. See Fig 6.

7.8 Any water lost must be replaced. See Fig 7. The connection should be made in the central heating return as close to the appliance as possible.

7.9 The make-up vessel must be fitted with a non-return valve.

7.10 Repeated venting loses water from the system. It is essential that this water is replaced and the system pressure maintained.

7.11 Connections to the mains cold water must not be made without the authority of the local Water Company.

7.12 The pump is set at maximum and must not be adjusted.

7.13 Connections in the system must resist a pressure of up to 3 bar.

7.14 Radiator valves must conform to BS 2767(10):1972.

7.15 Other valves used should conform to the requirements of BS 1010.

7.16 To make use of the extra heat available from the appliance at the end of any demand, it is recommended that a single small radiator be left permanently open.

7.17 If it is required to use the appliance for domestic hot water before the central heating circuit is connected, a 22 mm copper by-pass must be connected between the central heating flow and return. Refer to Section 11.

Fig. 6. Sealed primary water system.

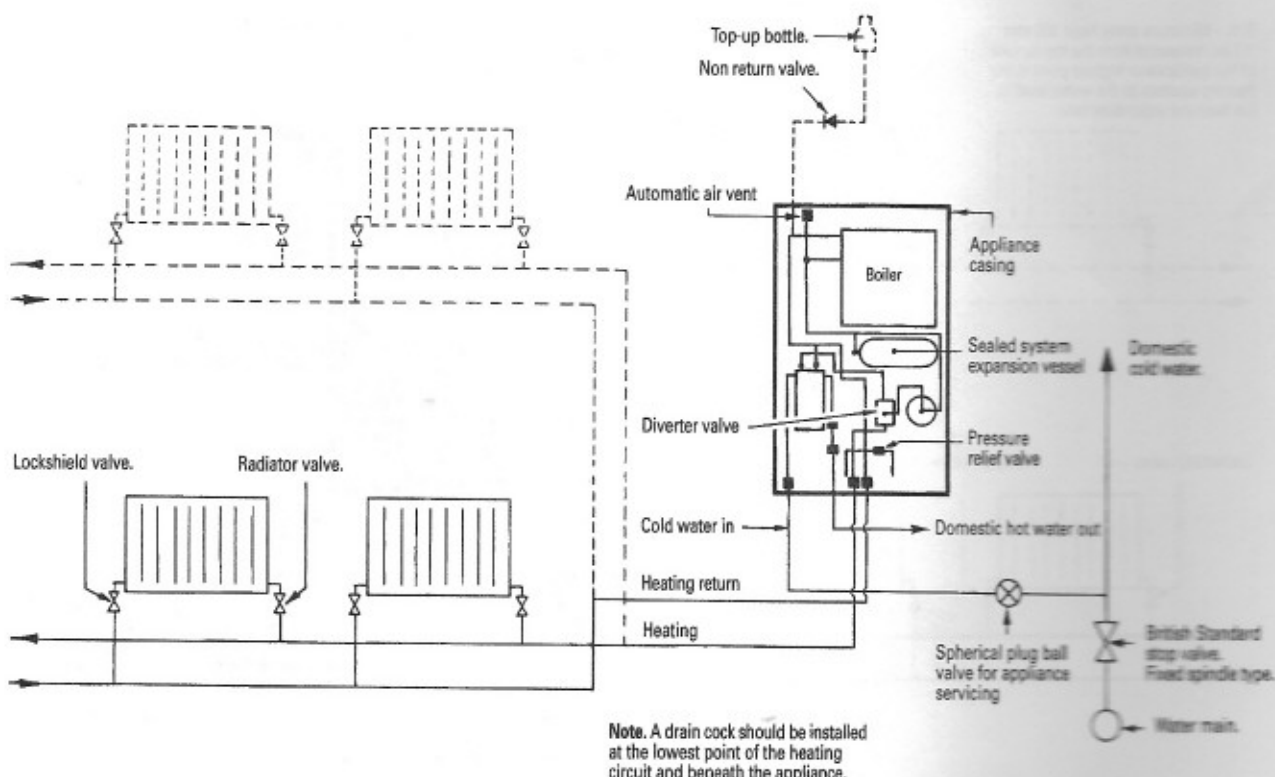
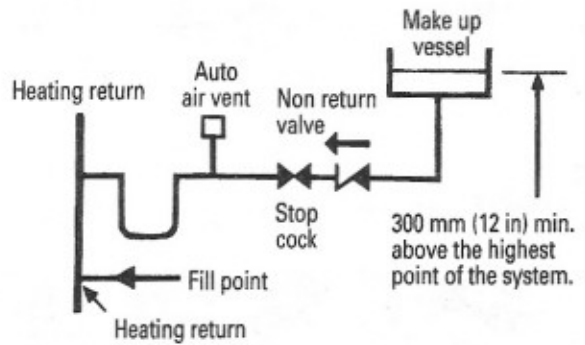
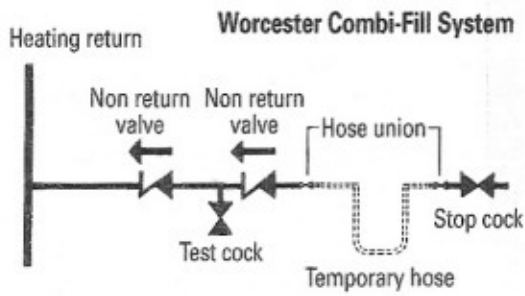


Fig. 7. System filling and make-up.



## 8. Open Vent Primary Systems

See Fig. 8

8.1 The size of the flow and return pipework is given in Section 3 - Table 4. The components required to connect the appliance to an open vent system are available as an optional extra kit.

8.2 The feed and expansion cistern should be arranged so that there is a minimum static head of 0.3 meters (12in.) above the top of the appliance or above the highest point in the heating circuit, whichever is the higher. See Fig. 8.

8.3 The feed and vent pipe should be 22 mm diameter and rise continuously from the appliance to the feed and expansion cistern.

8.4 A pressure relief valve is not required on an open vented sys-

tem. If the pressure relief valve is left in position then a discharge pipe must be fitted which terminates in a position such that any water or steam discharge does not cause a hazard to the occupants or damage electrical components.

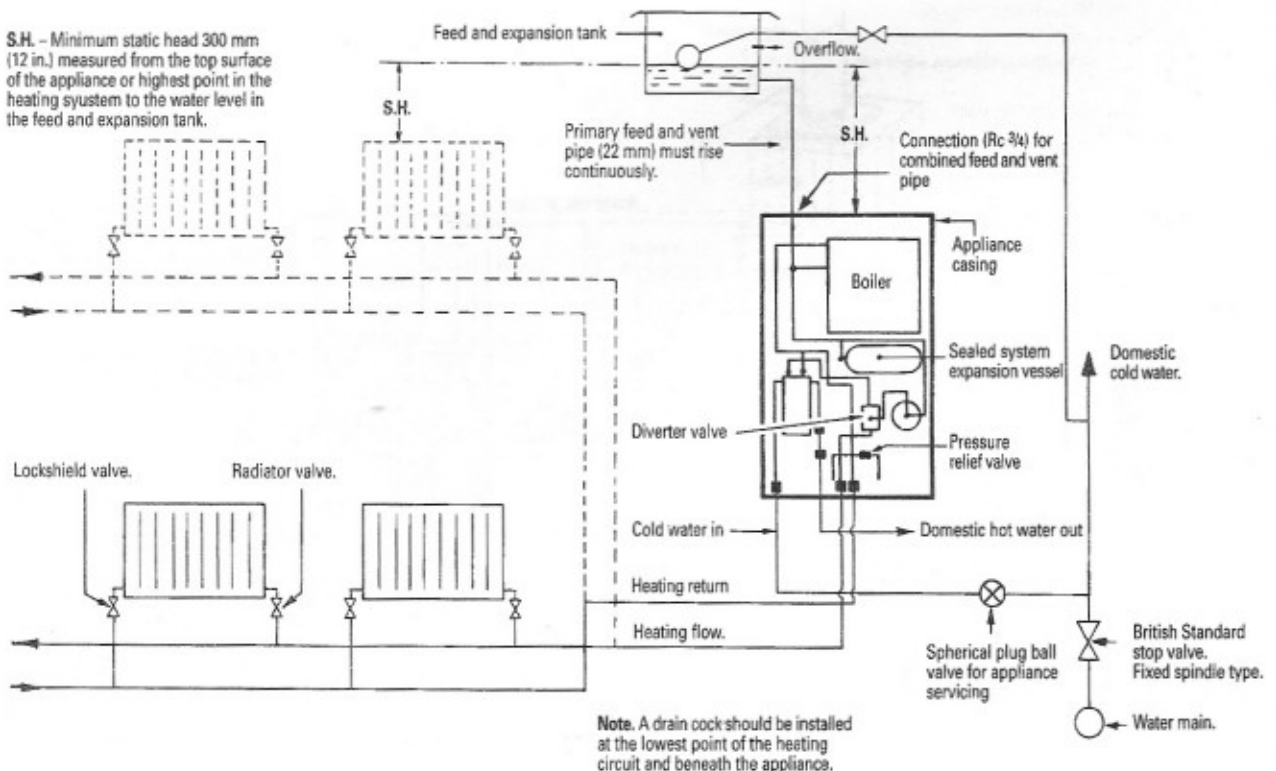
8.5 Air within the appliance will be expelled via the feed and vent connection or dissipated into the rest of the system which must be fitted with manual air vents at any high point.

8.6 The pump is set to maximum and must not be reset.

8.7 To make use of the extra heating available from the appliance at the end of any demand, it is recommended that a single small radiator be left permanently open.

8.8 If it is required to use the appliance for domestic hot water before the central heating circuit is connected, a 22 mm copper by-pass must be connected between the central heating flow and return. Refer to Section 11.

Fig. 8. Open vent water system.



## 9. Domestic Hot Water

### MAINS COLD WATER INLET

Devices capable of preventing the flow of expansion water must not be fitted unless separate arrangements have been made. An expansion vessel connection point (Rc $\frac{1}{2}$ ) is provided adjacent to the flow switch within the appliance.

A Zilmet Z160 expansion vessel is the preferred type. A thread sealant compatible with potable water must be used.

9.1 The final 600 mm of the mains cold water connection to the appliance should be made in copper tube only.

9.2 The appliance is suitable for a mains pressure of up to 10 bar (150 lb/in<sup>2</sup>)

9.3 The appliance is fitted with a mains supply isolating valve.

9.4 The maximum hot water flow rate is 10 litres/min. ( $\pm 15\%$ ) (2.2 gallons/min.)

9.5 In winter (when the mains inlet water temperature is lower) a reduced flow rate at the tap will increase the required delivery temperature.

9.6 It is suggested that long pipe runs to the taps or shower should be insulated to prevent the rapid cooling of hot water after the taps or shower have been turned off.

9.7 Hot and cold taps and mixing valves used with this appliance must be suitable for operating at a pressure of up to 10 bar (150 lb/in<sup>2</sup>).

9.8 Anti-syphonage arrangements are normally not necessary. See paragraph 9.10. following.

9.9 Thermostatically controlled or pressure equalising shower valves will guard against the flow of water at too high a temperature.

9.10 The head of a loose head shower must not fall closer than

25 mm (1in) above the top edge of the bath to prevent its immersion in bath water. Alternatively the shower must be fitted with an anti-syphonage device at the point of the flexible hose connections.

9.11 The supply of hot and cold mains water direct to a bidet is permitted (subject to local Water Company requirements) provided that the bidet is of the over-rim flushing type. The outlet(s) should be shrouded and unable to have any temporary hand held spray attached. No anti-syphonage arrangements are necessary.

9.12 As the maximum temperature of the Water to Water heat exchanger is limited by the control circuit, there is normally no need for water treatment to prevent scale accumulation. In exceptional circumstances a device to prevent scale formation can be fitted. Installation of a scale inhibitor assembly should be in accordance with the requirements of the local Water Company. An isolating valve to allow servicing should be fitted. The water hardness can be determined using a standard test paper or by reference to the local Water Company.

9.13 A miniature expansion vessel (Zilmet R1/2, 160ml, 15bar) can be fitted into the domestic water supply circuit if there is evidence of water hammer.

#### To fit the Expansion Vessel:

- (i) Remove the appliance front panel. Refer to Section 14.2(a) and Fig.2.
- (ii) Lower the control box. Refer to Section 15.1(b).
- (iii) Unscrew the hexagon headed screw located below the flow switch. See Fig. 36.
- (iv) Screw the expansion vessel into the connection using thread sealant compatible with potable water.

9.14 **Note.** If it is required to use the appliance for domestic hot water before the central heating circuit is connected, a 22 mm copper by-pass must be connected between the central heating flow and return. Refer to Section 11.

## 10. Electrical

See Figs. 9, 10 and 11.

**10.1 MAINS SUPPLY:** 240V ~, 50Hz, 270 watts.

External fuse: 3A. Internal fuse: 3A Fast blow.

**10.2** It must be possible to completely isolate the appliance.

**10.3** Connection to the mains supply should be via a double pole isolator with a contact separation of 3 mm in all poles and supplying the appliance and controls only.

**10.4** The appliance must be earthed.

**10.5** Mains Cable: PVC insulated 0.75 mm<sup>2</sup> (24x0.20 mm) to BS 6500 Table 16.

If a new cable is needed it must be connected into the terminals marked L (Brown or Red lead), N (Blue or Black lead) and (Green/Yellow or Green) and be held securely in the cable clamp.

Ensure that the earth conductor is longer than the current carrying conductors, so that if the cable slips in its anchorage the current carrying conductors become taut before the earth conductor. For access refer to Section 15.

**10.6** The wiring between the appliance and the electrical supply shall comply with current IEE Wiring Regulations, and any local regulations which apply.

**10.7** If a room and/or frost thermostat is to be fitted refer to Figs. 12 and 13. The thermostats must be suitable for use on mains voltage.

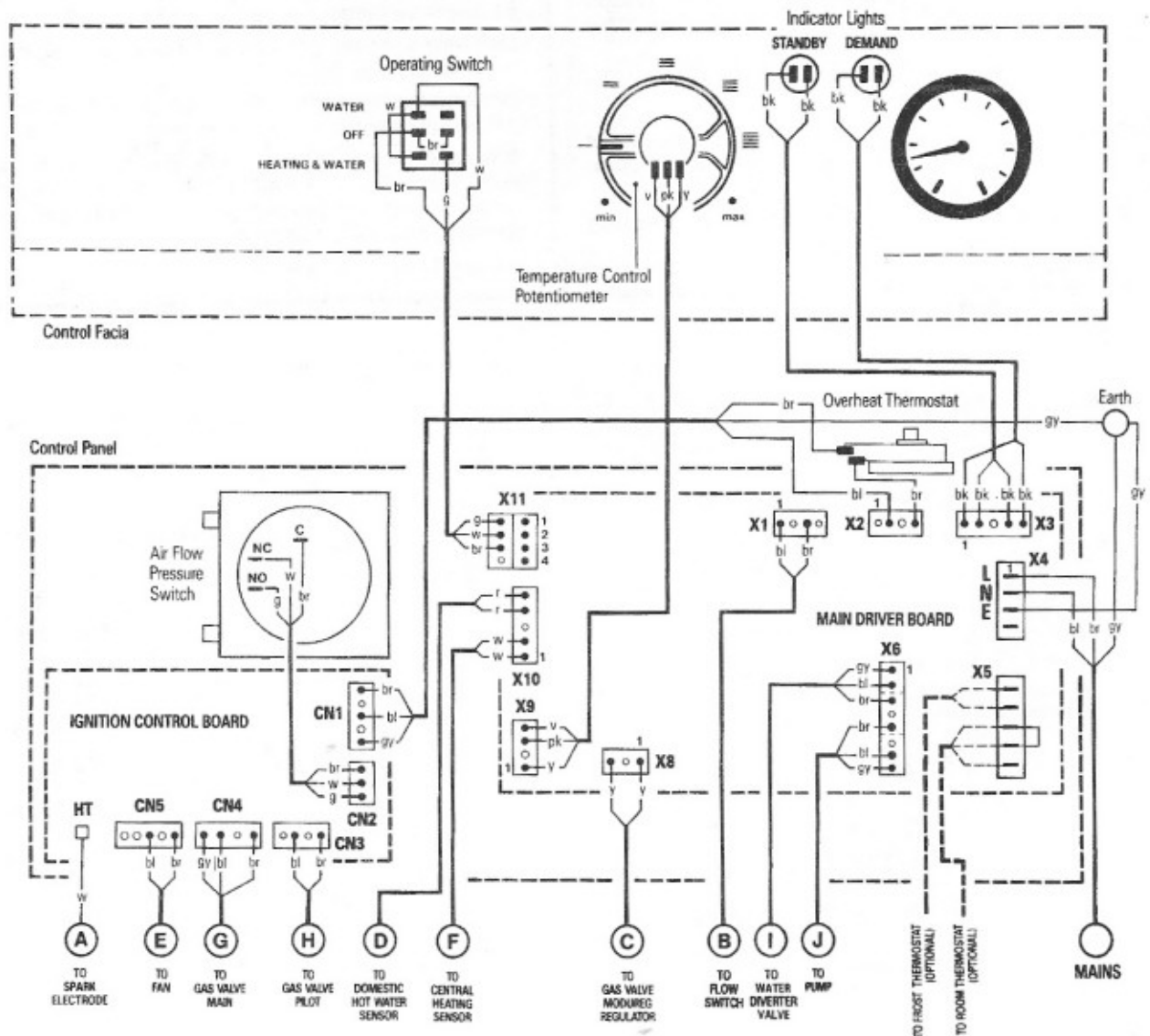
**10.8** A fascia mounted programmer is available as an optional extra. Instructions are supplied with the programmer kit.

**10.9** An external timeswitch or programmer can be fitted to the appliance.

### 10.10 SAFETY CHECK

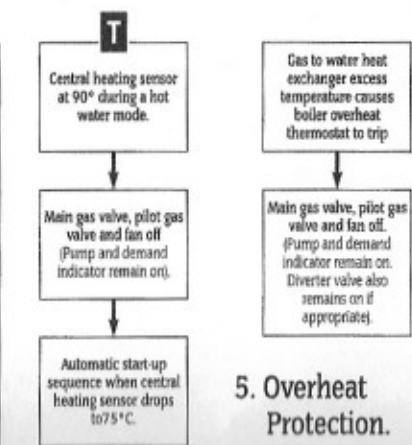
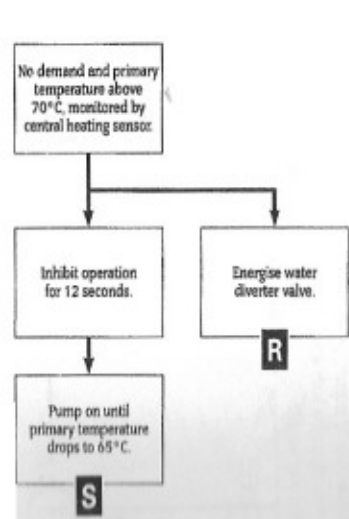
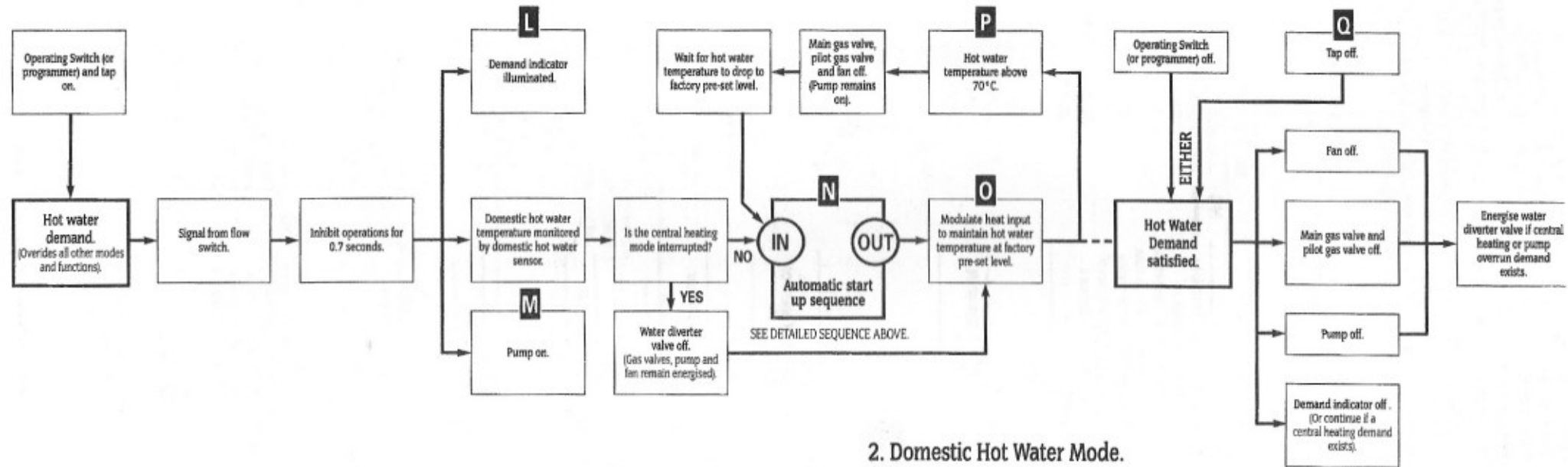
After installation (or in the event of an electrical fault) the electrical system shall be checked for short circuits, fuse failure, incorrect polarity of connections, earth continuity and resistance to earth.

**Fig. 9. Wiring diagram – Control panel and fascia.** (All components shown viewed from front of appliance)

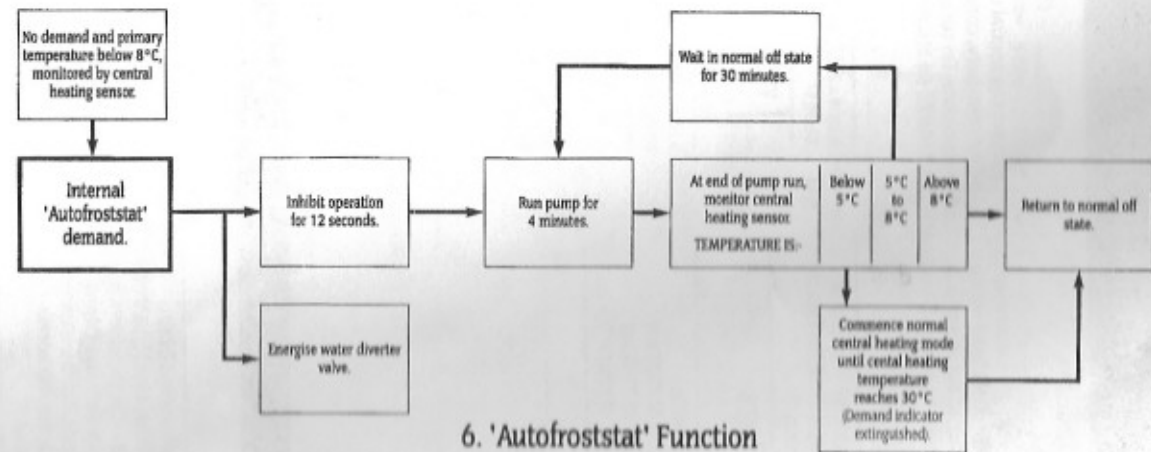


### COLOUR CODE

br - brown bl - blue gy - green and yellow bk - black or - orange  
r - red w - white y - yellow g - grey v - violet pk - pink



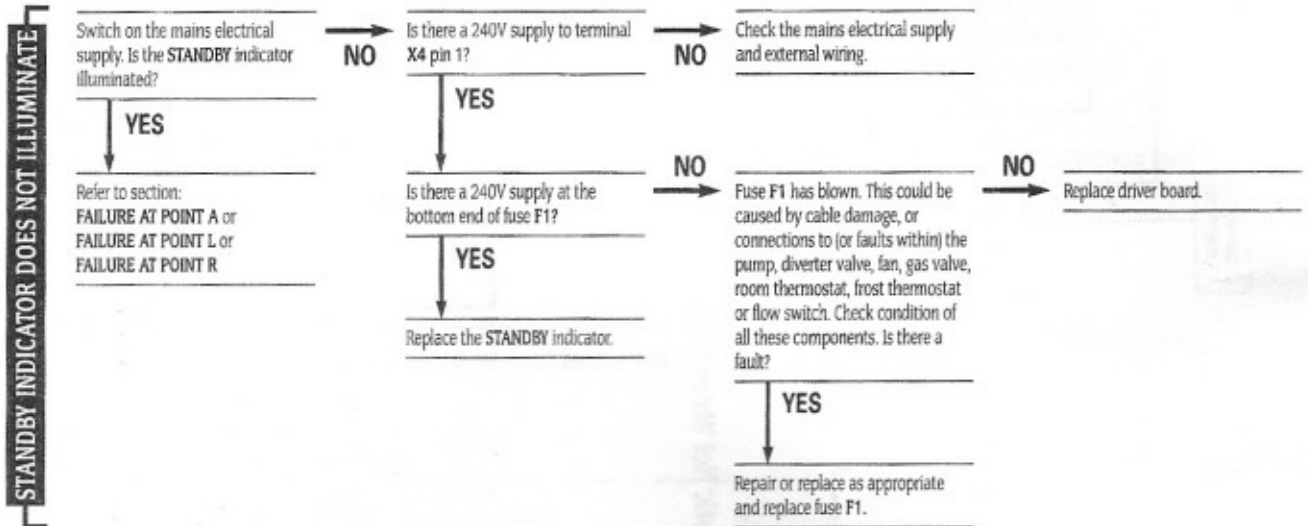
**5. Overheat Protection.**



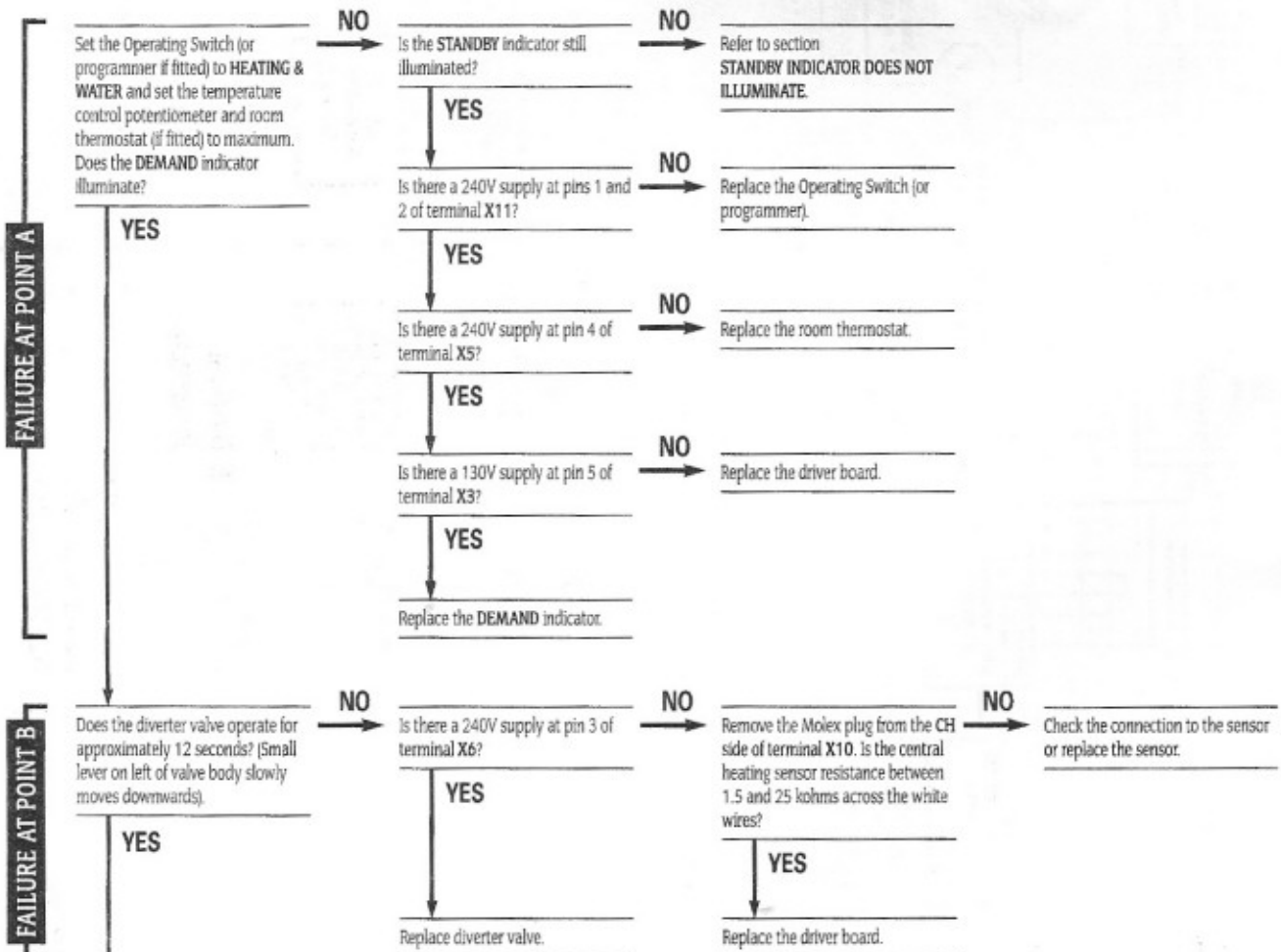
## 17. Fault Finding

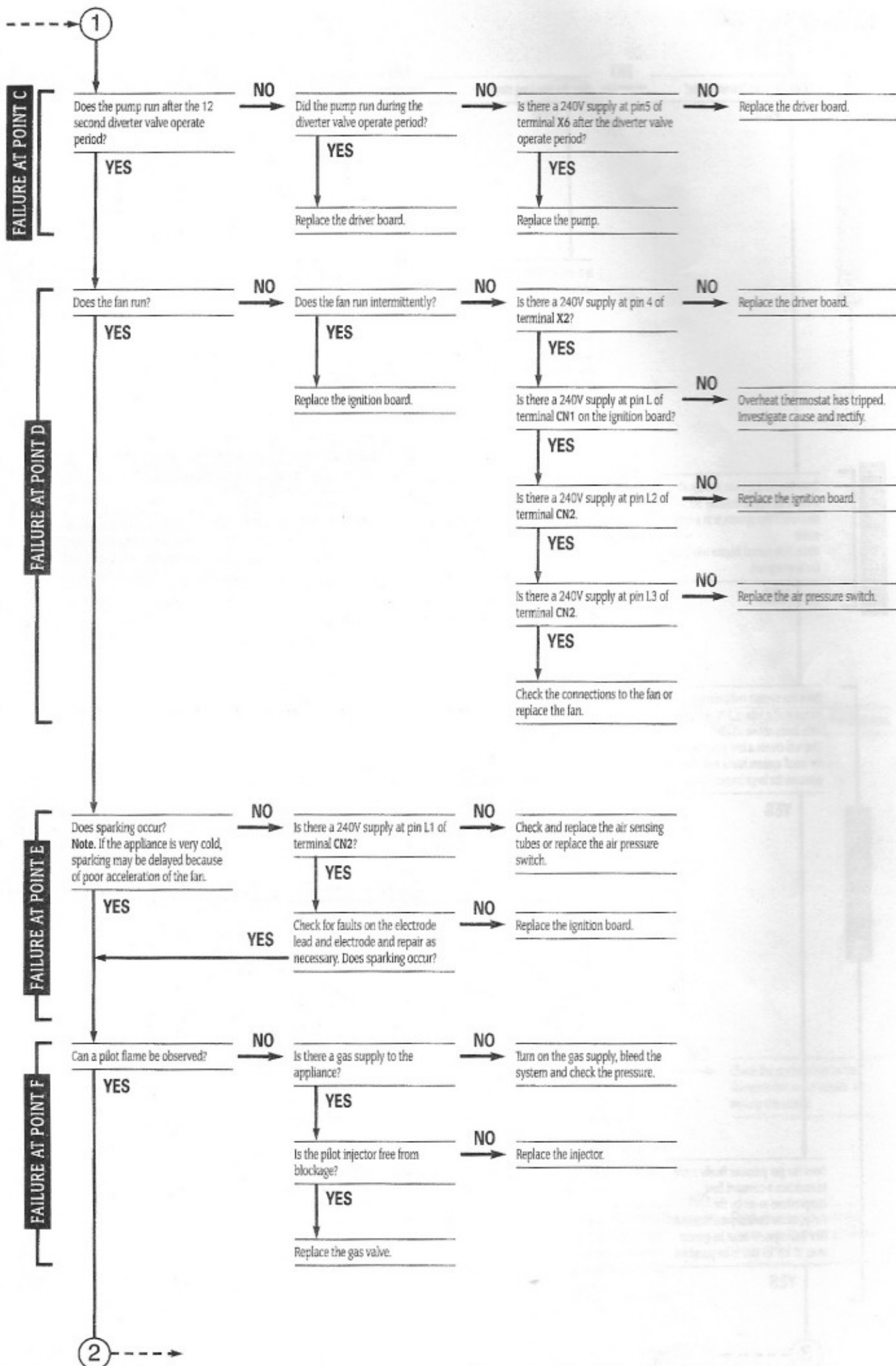
This Fault Finding Chart is to be used in conjunction with the Operational Flow Diagrams in Section 16. To find the fault, locate the point on the flow diagram at which the appliance has failed, e.g. letter B. Then read the corresponding section in the fault finding chart, e.g. **Failure at point B**. **Note:** Each section assumes that the appliance operates correctly up to that point.

**Notes:** 1. All voltage measurements are with respect to neutral unless otherwise stated. 2. Before changing any component indicated in the chart, it is essential that the associated wiring is checked for continuity, condition and correct routing. 3. Preliminary electrical system checks are the first electrical checks to be carried out during a fault finding procedure. On completion of the Service/Fault Finding task which has required the breaking and remaking of electrical connections, check—(a) EARTH CONTINUITY, (b) SHORT CIRCUIT CHECK, (c) POLARITY and (d) RESISTANCE TO EARTH.

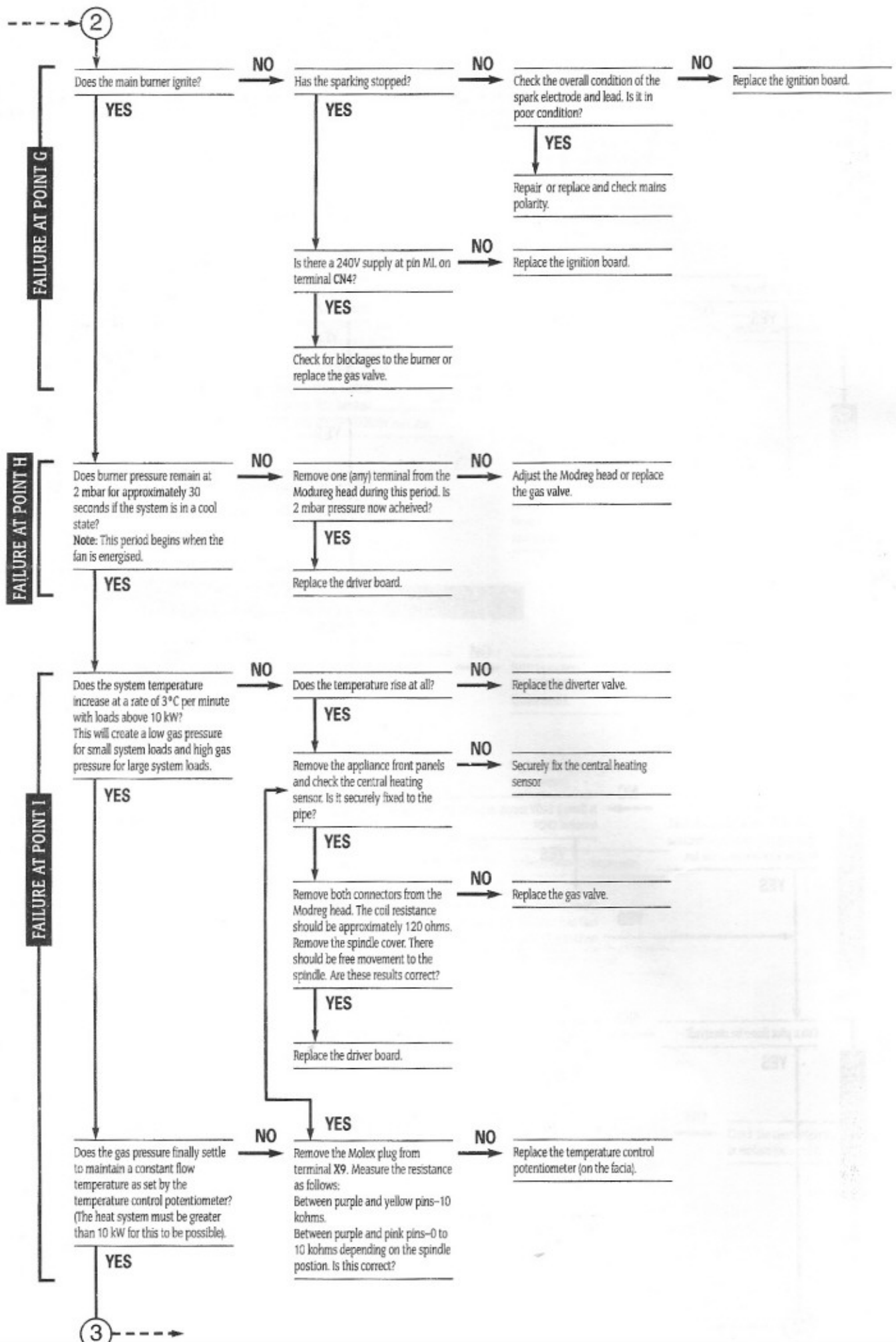


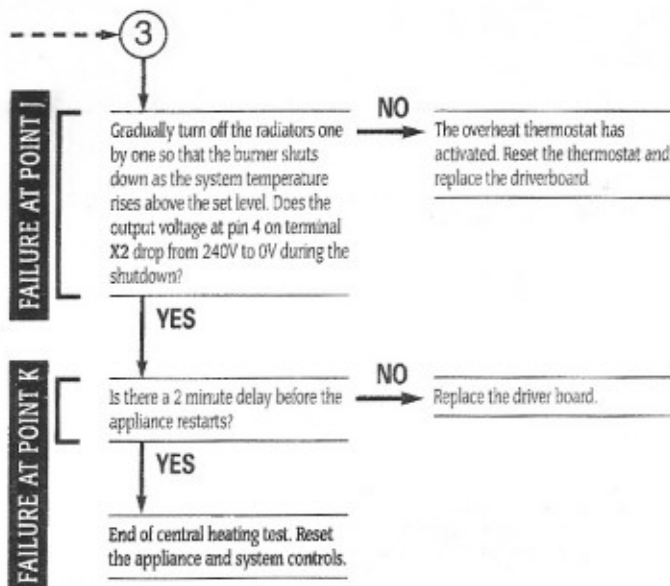
### START OF CENTRAL HEATING TEST



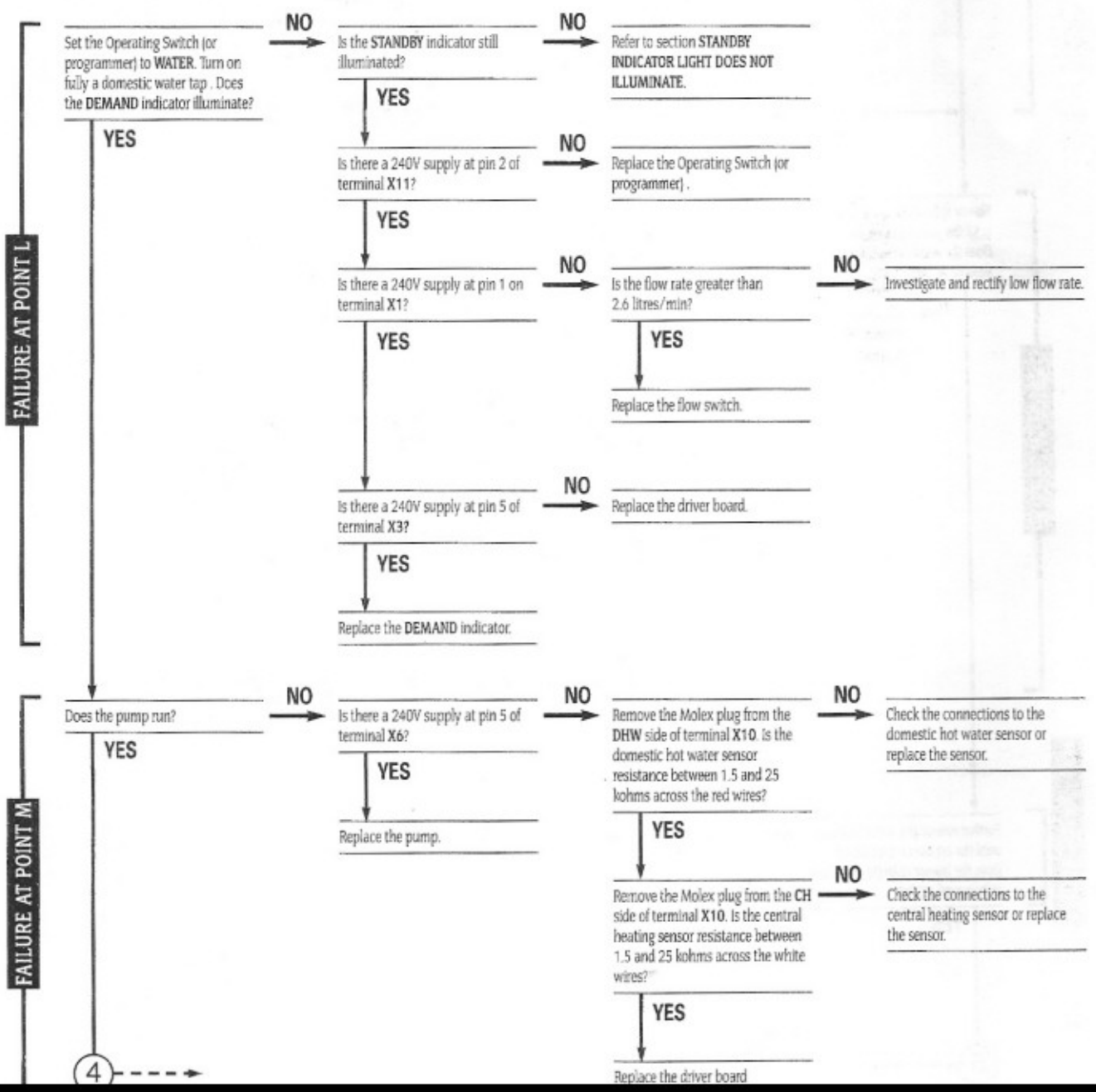


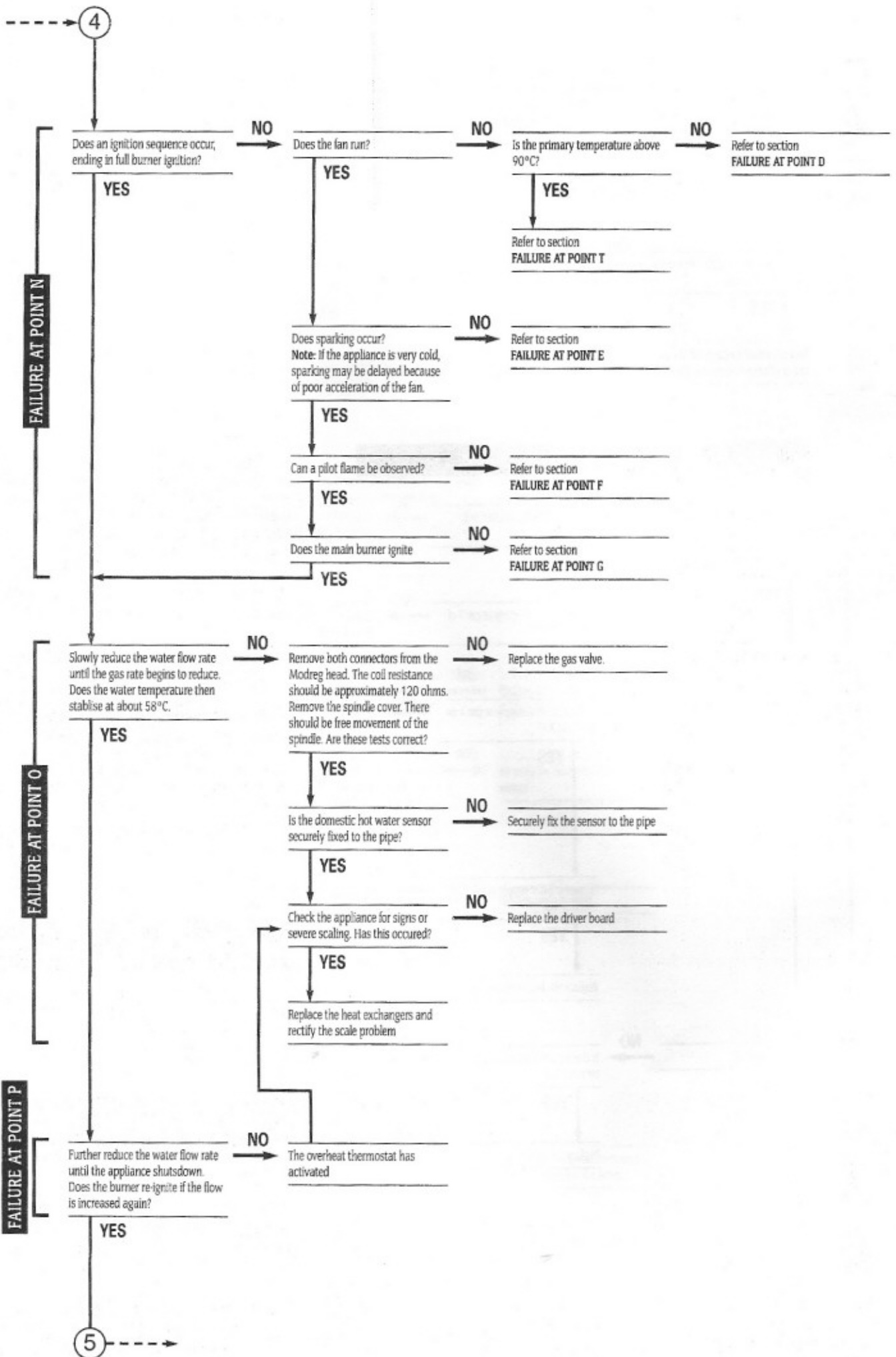






**START OF DOMESTIC HOT WATER TEST**





5

FAILURE AT POINT Q

Turn off the tap. Does the burner shut down immediately?

**YES**

End of domestic hot water test, Reset the appliance controls.

NO

Does the DEMAND indicator extinguish immediately?

**YES**

Replace the driver board.

NO

Replace the flow switch.

### START OF PUMP OVERRUN TEST

FAILURE AT POINT R

With no demand and with primary water temperature above 70°C, does the diverter valve operate for 12 seconds? (Small lever on left of valve body slowly move downwards)

**YES**

NO

Is the STANDBY indicator still illuminated?

**YES**

NO

Refer to section STANDBY INDICATOR DOES NOT ILLUMINATE.

Remove the appliance front panels. Is the central heating sensor securely fixed to the pipe?

**YES**

NO

Securely fix the sensor to the pipe.

Refer to section FAILURE AT POINT B

FAILURE AT POINT S

Does the pump run after the 12 second diverter valve operate period?

**YES**

NO

Refer to section FAILURE AT POINT C

Does the pump stop when the primary temperature drops below 65°C?

**YES**

NO

Replace the driver board.

End of pump overrun test.

### PRIMARY PROTECTION DURING DOMESTIC HOT WATER DEMAND

FAILURE AT POINT T

Does the burner shut down if the primary temperature exceeds 90°C during a domestic hot water demand?

**YES**

NO

Remove the appliance front panels. Is the central heating sensor securely fixed to the pipe?

**YES**

NO

Securely fix the sensor to the pipe.

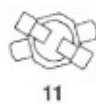
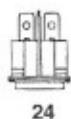
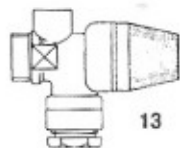
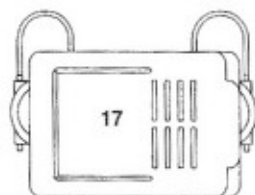
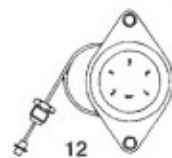
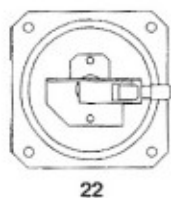
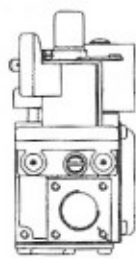
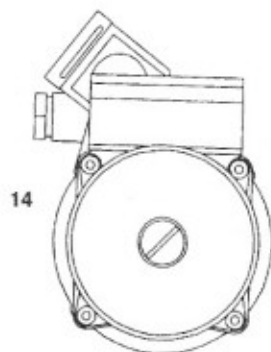
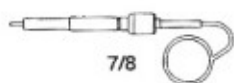
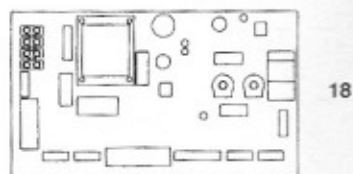
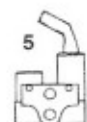
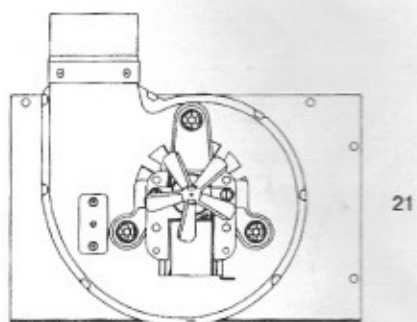
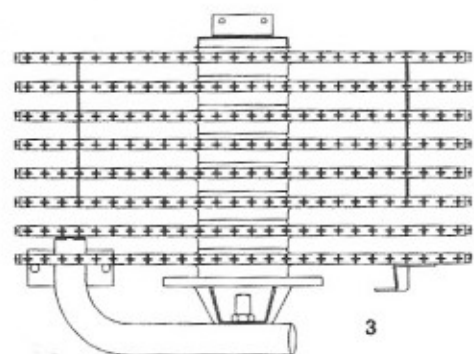
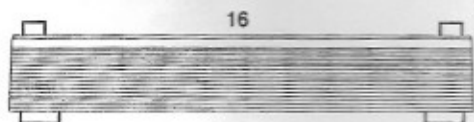
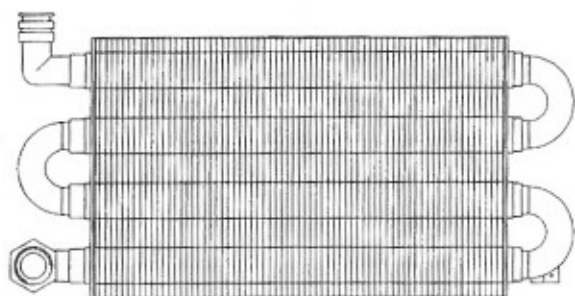
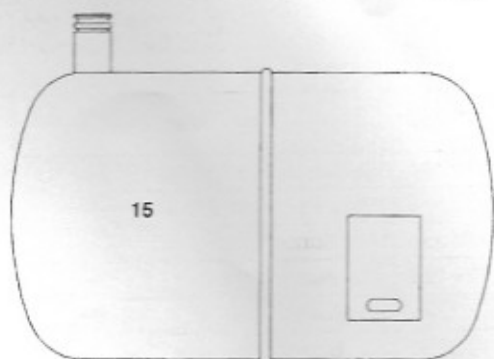
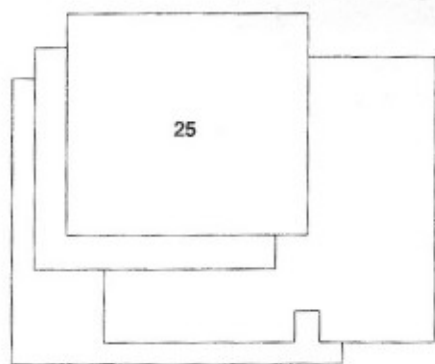
This a fault condition. Check that the domestic hot water sensor is securely fixed to the pipe. Check for scaling and check the gas pressure.

NO

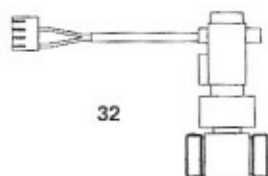
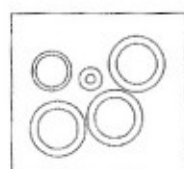
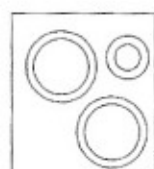
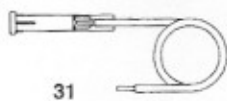
Replace the driver board.

## 18. Short Parts List

Key No.	GC No.	Part	Manufacturer's Reference	No.	WHS Part No.
1	378 744	Gas Valve	Honeywell VR4601NA2006	1	ZAGAS134
2	379 413	Modureg Pressure Reducing Valve	Honeywell V7335A2224	1	ZAGAS215
3	379 050	Main Burner Assembly	Aeromatic or Furigas	1	ZAGAS170
4	379 052	Main Burner Injector	4.9mm diameter Type 045-072	1	ZAGAS078
5	379 672	Pilot Burner	Honeywell Q385A 2002	1	ZBGAS091
6	382 850	Pilot Burner Injector	Honeywell 45004108-001B	1	ZBGAS016
7	379 561	Spark Electrode c/w lead	Honeywell 45900413-010	1	ZBGAS078
9	299 105	Gas to Water Heat Exchanger		1	ZAGAS149
10	379 419	Automatic Air Vent	Intermes 02, 50, 010	1	ZMMIS055
11	299 199	Thermistor (with paste)	Elmwood 6655-9428-4	1	SPK0039
12	299 202	Pressure Gauge (with washer)	Cewal	1	SPK0040
13	386 789	Pressure Relief Valve	Caleffi 3141, 3bar	1	ZCVLV018
14	386 224	Pump with O-rings	Grundfos 15-60 Special	1	SPK0006
15	371 521	Expansion Vessel (10 litres) with O-ring		1	SPK0005
16	E00/146	Water to Water Heat Exchanger		1	8716142902
17	299 108	Water Diverter Valve (Special)		1	ZAMAJ118
18	378 589	Main Driver Board	Honeywell W7075A1005B	1	ZAGAS127
19	397 569	Ignition Control Board	Pactrol 415000	1	ZAGAS096
20	378 029	Overheat Thermostat	Ranco LM7 P5050	1	ZAMAJ133
21	299 109	Fan Assembly		1	SSA6619/1
22	379 360	Air Pressure Switch	Honeywell (Yamataki) C6065A 1002	1	ZAGAS188
23	386 227	CH Temperature Control Potentiometer	Omeg OW 20BU 10KA	1	SSAHAR002
24	386 778	Operating Switch	Arrow 200400E839 AA		ZDELE237
25	299 110	Combustion Chamber Insulation (Complete)		1	SPK0027
26	371 539	Programmer Kit (Optional)	WHS-Single Channel Grey 490 488	1	ZAMAJ164
27	371 536	Gasket Pack - Gas		1	SPK0020
28	371 535	Gasket Pack - Water		1	SPK0019
29	394 291	Flow Regulator	Type E Blue 10 litres/min ( $\pm$ 15%)	1	ZBUNC140
30	371 524	Indicator Light - DEMAND	Neon (Green) - complete with plug IMO Ref. NI9RL 240G/S300-Green	1	SSAHAR081
31	371 525	Indicator Light - STANDBY	Neon (Amber) - complete with plug IMO Ref. NI9RL 240A/S300-Amber	1	SSAHAR082
32	379 615	Flow Switch	Sika VK315M	1	ZDELE586
33	324 822	Gauze Filter		1	ZBUNC230



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Parts key numbers



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This booklet is accurate at the date of printing but will be superseded and should be disregarded if specifications and/or appearances are changed in the interests of continued improvement.

All goods sold are subject to our official Conditions of Sale, a copy of which may be obtained on application.

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