

RAVENHEAT®

Instructions for Use Installation and Servicing

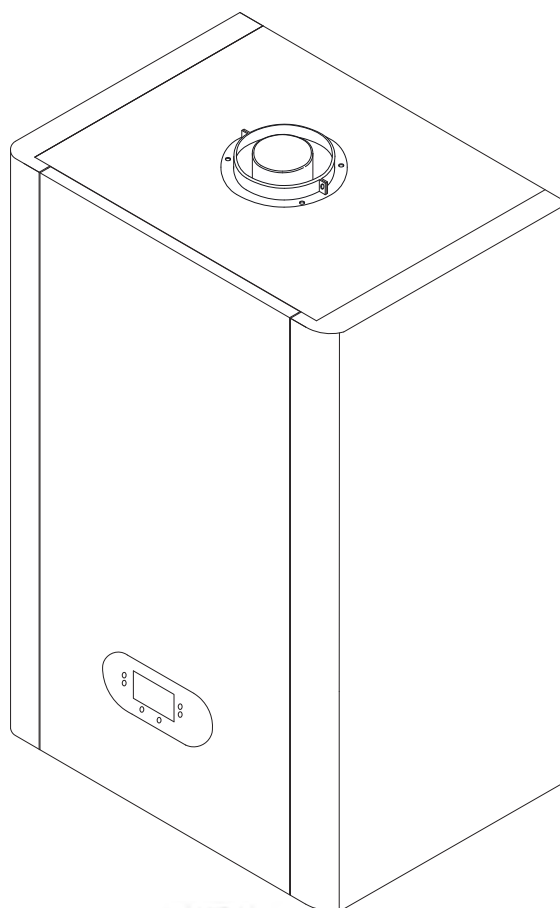
To be left with the user

COMBINATION BOILER

LS 24

COMBINATION BOILER

Natural Gas G20 I2H

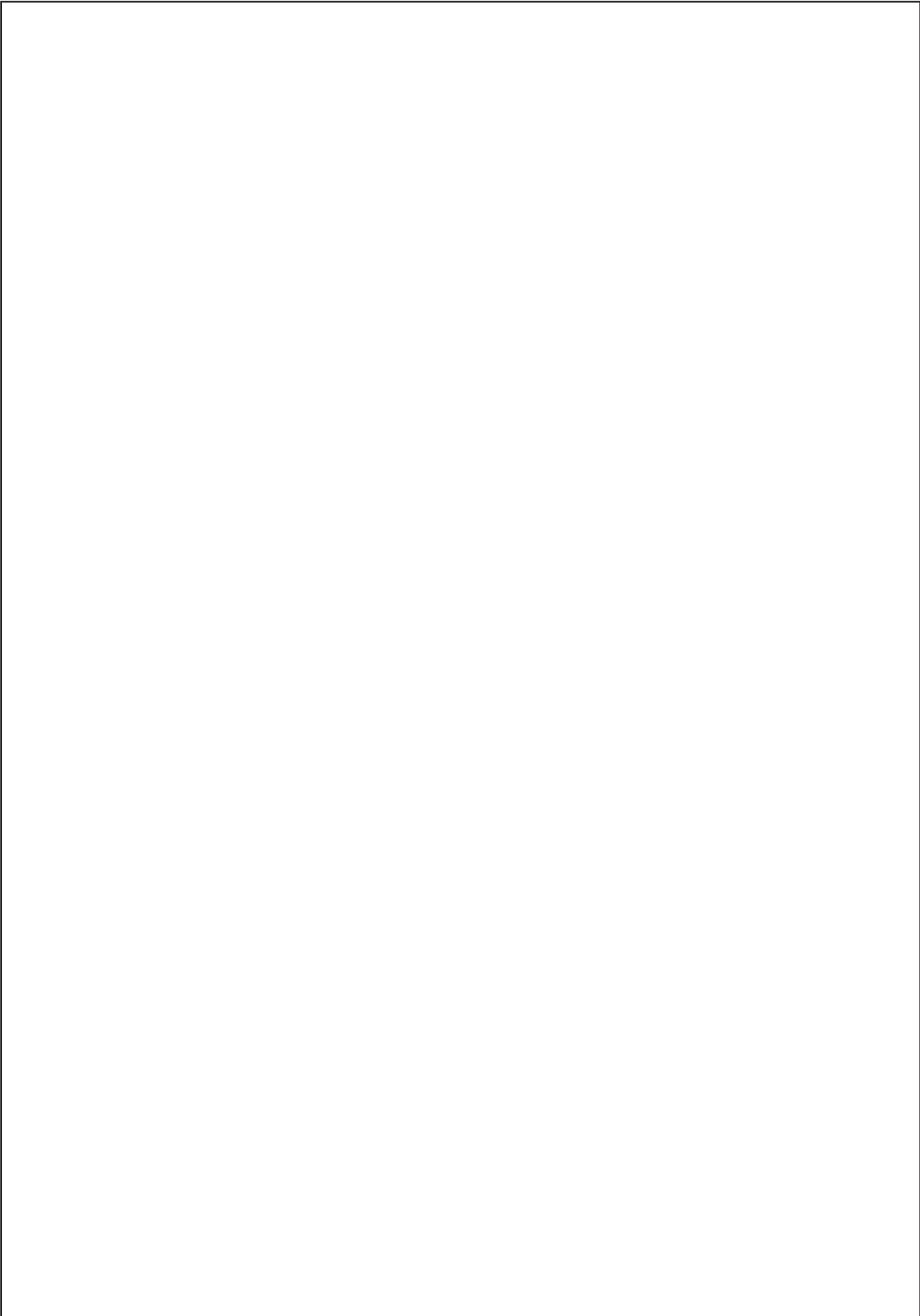


Certigaz 1312



Technical and illustrative data are not binding and can be modified without prior notice.
The descriptions and illustrations in the present booklet are for guidance purposes only.

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HIGH EFFICIENCY CONDENSING BOILER FOR CENTRAL HEATING AND DOMESTIC HOT WATER

This new highly efficient modulating boiler is designed to meet domestic hot water and central heating requirements at high efficiency.

POSITION

The appliance is extremely versatile as it can be fitted in almost any room. The appliance is room sealed so there is no contact between the combustion chamber and living accommodation. This guarantees maximum safety and efficiency. Each boiler has been designed and manufactured in our modern plant to exacting ISO 9001 discipline.

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This product is guaranteed by: Ravenheat International srl Via Dell' Agricoltura, 50 - 37059 Zevio (VR) Italy.

MAJOR COMPONENTS

Guarantee is a full 24 months from date of purchase providing the appliance has been fitted in accordance with these instructions and relevant codes of practice.

- Modulating gas valve.
- Modulating pump head suitable for any type of central heating system.
- Burner with flame stabiliser designed to operate under all thermal conditions.
- Stainless steel plate heat exchanger for super high heat transfer to domestic hot water supply.
- Built in frost protection.
- Printed circuit board designed to connect to room stat and/or timer.
- Aesthetically pleasing panels and controls.
- On/Off ball valves for shutting off gas, central heating and domestic hot water circuit.
- Safety relief valve (for safety discharge).

COSHH - CONTROL OF SUBSTANCES HAZARDOUS TO HEALTH IMPORTANT

It is the Users/Installers responsibility to ensure that the necessary personal protective clothing is worn when handling this appliance, and where applicable the pertinent parts that contain any materials that could be interpreted as being injurious to health and safety.

GENERAL INFORMATION:

GLUES AND SEALANTS - exercise caution - if these are still in liquid form.

RAVENHEAT use only high quality material for production of this product, in an effort to protect the environment wherever possible components should be recycled.

WARNING: when installing the appliance, care should be taken to avoid any possibility of injury when handling sheet metal parts.

Users instructions

Sections	Page	Sections	Page
1	6	5	20
1.1	6	5.1	20
1.2	6	5.2	20
1.3	6	5.3	20
		5.4	20
1.4	7	5.5	21
1.5	8	5.6	22
1.6	8	5.7	23
1.7	8		
		5.8	23
2	9		
2.1	10	5.9	26
2.2	11	5.10	26
2.3	11		
		5.11	26
2.4	11	5.12	27
2.5	11	5.13	29
2.6	11		
2.7	12	5.14	29
2.8	12	5.15	30
2.9	12		
3	13	5.16	30
4	14		
4.1	14	5.17	30
4.2	14	5.18	31
4.3	15		
4.4	15	5.19	32
4.5	15	5.20	32
4.6	15	5.21	32
4.7	16	5.22	32
4.8	16	5.23	32
4.9	16	5.24	32
4.10	17	5.25	33
4.11	17	5.26	33
4.12	17	5.27	33
4.13	18		
4.14	18	6	34
4.15	18	6.1	34
4.16	19	6.2	34
		6.3	34
4.17	19	6.4	34
4.18	20		
4.19	20		
4.20	20		

Sections	Page	Sections	Page
6.5 Filling the hot water system	34	9 Fault finding Central heating	44
6.6 Lighting the boiler	34	9.1 Fault finding Domestic Hot Water	45
6.7 Check the gas pressure	35	10 Electrical system diagram	46
6.8 Checking the flue system	35	11 Spare parts	47
6.9 Checking the heating thermostat	35		
6.10 Testing/regulating the D.H.W flow	35		
6.11 Range rating central heating or/and domestic hot water	36		
6.12 Test mode	36		
6.13 Instructing the user	36		
7 Servicing instructions	37		
7.1 Boiler frost protection	37		
7.2 To inspect and clean the appliance	38		
8 Replacements of parts	38		
8.1 General	38		
8.2 To remove front panel	38		
8.3 To remove left and right panels	39		
8.4 To remove/replace fan	39		
8.5 To remove/replace the electrode	39		
8.6 To remove/replace main heat exchanger	39		
8.7 To remove/replace expansion vessel	40		
8.8 To remove/replace gas valve	40		
8.9 To remove/replace plate heat exchanger	40		
8.10 To remove/replace the water pressure switch	40		
8.11 To remove/replace diverter valve motor	40		
8.12 To remove/replace C.H. diverter valve	41		
8.13 To remove/replace pump	41		
8.14 To remove/replace automatic air vent	41		
8.15 To remove/replace D.H.W. diverter valve mechanism	41		
8.16 To remove/replace safety relief valve	41		
8.17 To remove/replace D.H.W. sensor	42		
8.18 To remove/replace C.H. flow sensor	42		
8.19 To remove panel control box	42		
8.20 To remove/replace control board and digital display	42		
8.21 External control connection	42		
8.22 Remove replace burner	43		

1 USERS GUIDE

It is the law that all gas appliances are installed by a competent person, in accordance with the gas safety installation and to the current Gas Safety (Installation and Use) Regulations B.S.5440:2-(2009).

Do NOT search for gas leaks with a naked flame.

WARNING: This appliance must be earthed.

1.1 INTRODUCTION

Please carefully read the information given in this booklet to help you gain maximum control from your appliance with minimum trouble and cost.

Your LS 24 combination boiler has been designed to supply your Central Heating and Domestic Hot Water directly from one unit.

When Central Heating is operating, the circulation will be interrupted when Domestic Hot Water is being drawn off (domestic hot water has priority).

This will normally not affect the level of Heating.

IMPORTANT:

In the unlikely event of the exhaust flue gases exceeding the overheat temperature setting, the boiler operation will be stopped to prevent damage to the appliance.

1.2 CLEARANCES AROUND THE APPLIANCE

Side clearance:

The position of the appliance must provide a minimum clearance of only 5 mm as the side panels do not require removing for servicing. However, if the option is preferred to remove the panels then a minimum clearance of 55 mm is required.

Top clearance:

The top clearance should be a minimum of 125 mm.

Bottom clearance:

A minimum bottom clearance of 80 mm is required between the appliance and any surface, though 150 mm is preferred whenever possible.

Front clearance:

A minimum of 450 mm is required in front of the appliance for access during servicing, the front clearance can be reduced when installed in a cupboard to 25 mm from the access door.

USER CONTROLS

This appliance is designed to operate with the minimum of ease for the user. All the controls are found on the control panel on the front of the boiler.

1.3 OPERATING SAFETY CHECKS TO PROTECT YOUR APPLIANCE (CHECKING THE SYSTEM PRESSURE)

Before lighting the appliance check that the Central Heating system pressure is not less than 1 bar. If it is below this it will be necessary to re-pressurise the system, between 1 and 1.5 bar to allow the boiler to operate. To view the system pressure press the INFO button once, this will display the current pressure (**if the pressure is on nil or too low, then error code 04E is displayed**).

A filling device (filling loop) will have been fitted on the system.

This is usually on the pipework near to the boiler. If you are unsure of its position, or you cannot identify it, consult the installer who fitted the boiler.

The filling loop usually consists of two taps and a separate silver coloured braided flexible pipe with connection fittings. Only when re-pressurising should the braided flexible pipe be connected between the two taps, ensure that the nuts or the pipe ends are tightened onto the taps.

Fully open one of the taps first and then while monitoring the water pressure on the digital display, carefully open the second tap. When the water pressure is to a maximum of 1.5 bar turn both taps off.

Disconnect the flexible pipe from the taps (a small amount of water may be present).

Keep the pipe in a safe place for future use.

Press the ESC button once to return to the main screen.

In the event of an error, the appliance will show a sequence code displayed on the digital display of the control panel (fig. 1). By pressing the "RESET" button it is possible to relight the boiler (see sect. for 9 list of error codes).

1.4 APPLIANCE STATUS INDICATORS

Your boiler is equipped with a large LCD display that indicates the appliance operating status (fig. 1).

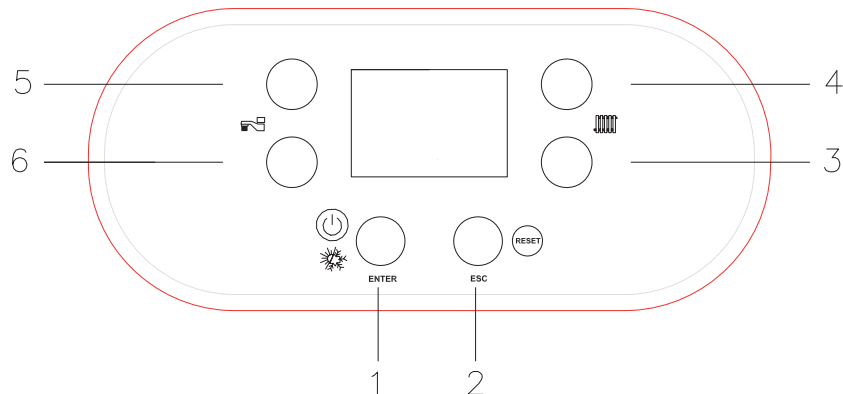


Fig. 1

KEY:

- 1 - ON/OFF button.
Press to turn the boiler ON, summer mode (hot water symbol only), winter mode (hot water and radiator symbol), and OFF.
Press the button also to confirm selections.
- 2 - Press to RESET the appliance if ever an error code is displayed or ESC to back-up from the boiler menus.
- 3/4 - Temperature and function mode selectors.
Press the arrow up or the arrow down to increase or decrease the central heating set-point temperature.
Press also to show the boiler values or to show the options program when the digital display is in INFO or in USER PARAMETERS.
- 5/6 - Temperature selectors.
Press the arrow up or the arrow down to increase or decrease the heating hot water outlet temperature.
- 2/6 - INFO: press together for show the boiler values and use the arrow up and arrow down buttons (3/4) to scroll.
- Flow temperature
 - Domestic hot water temperature
 - External temperature, if the external probe is present
 - % power of modulation.
- 1 - USER PARAMETERS (for service people): press the RESET and the arrow down buttons together (buttons 1 and 3).
- Press the arrow up and arrow down buttons to show the boiler parameters.
- 0: Gas type (0 = Natural gas 1 = LPG)
 - 1: Max C.H. power (100 %)
 - 2: min. C.H. power (0)
 - 3: Ignition power (40%)
 - 4: C.H. antycycle waiting time after over temperature OFF (36 = 180 sec range 0:90*5)
 - 5: C.H. power rampe time (1 min range 0:10 min)
 - 6: C.H. pump overrun time (26 = 180 sec range 0:90*5 sec)
 - 7: D.H.W. pump overrun time (18 = 90 sec range 0:90*5 sec)
 - 8: Anti water-hammer delay time (0 sec range 0:20 sec)
 - 9: C.H. start delay (0 sec range 0:199 sec)
 - 10: C.H. range 0 = standard C.H. flow 35/85°C
1 = reduced C.H. flow 25/45°C
 - 11: Post purge timing (12 sec range 3:200*3 sec)
 - 12: Hydraulic group configuration (0= bithermic - 1 = Monothermic - 2 = Only heating - 3 = storage tank)
 - 13: OTC coefficient (30 range 0:30)
 - 14: Fluxostat/fluxmeter D.H.W. selection (0 = fluxostat - 10:40 = fluxmeter switch on threshold Hz)
 - 15: TEST function enable:
"0" = disabled - "1" = enable.

Press ESC to esc INFO mode.

Press ESC to esc USER PARAMETERS mode.

1.5 DIGITAL DISPLAY

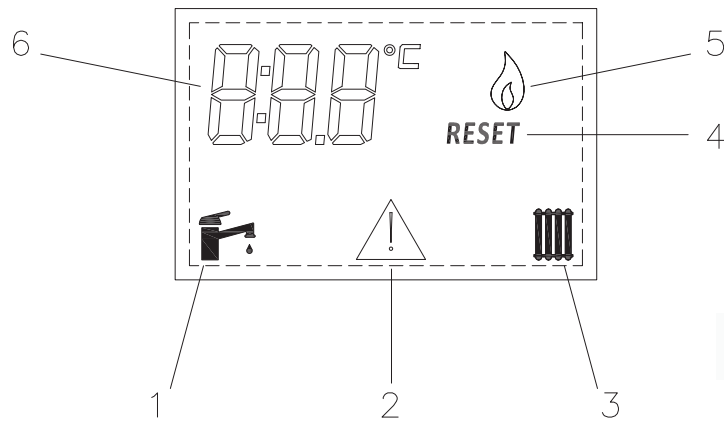


Fig. 2

KEY

- 1 - D.H.W. request present / D.H.W. setpoint setting (not used on only heating)
- 2 - Generic error indicator
- 3 - C.H. enabled / C.H. setpoint setting
- 4 - User unlockout reset request
- 5 - Flame presence
- 6 - Temperature

1.6 BOILER VALUE

It is possible to show the boiler value.
Press RESET button (item 2 fig. 1) and the arrow down setpoint D.H.W. button (item 6 fig. 1) together to show the boiler values.

Use the arrow up and the arrow down buttons C.H. setpoint, (item 3 and 4 fig. 1) to show the following info:

- Flow temperature
- Domestic hot water temperature
- External temperature, if the external probe is present
- % power of modulation.

1.7 DIAGNOSTIC

The display shows eventual error or faulty message.

Stop boiler: The boiler stops the operating cycle and waits for the disappearance of the cause of the error in order to go back to be operating mode.

Block boiler: the boiler requires a manual reset to become operational again.

2.0 GENERAL LAYOUT (Fig. 3)

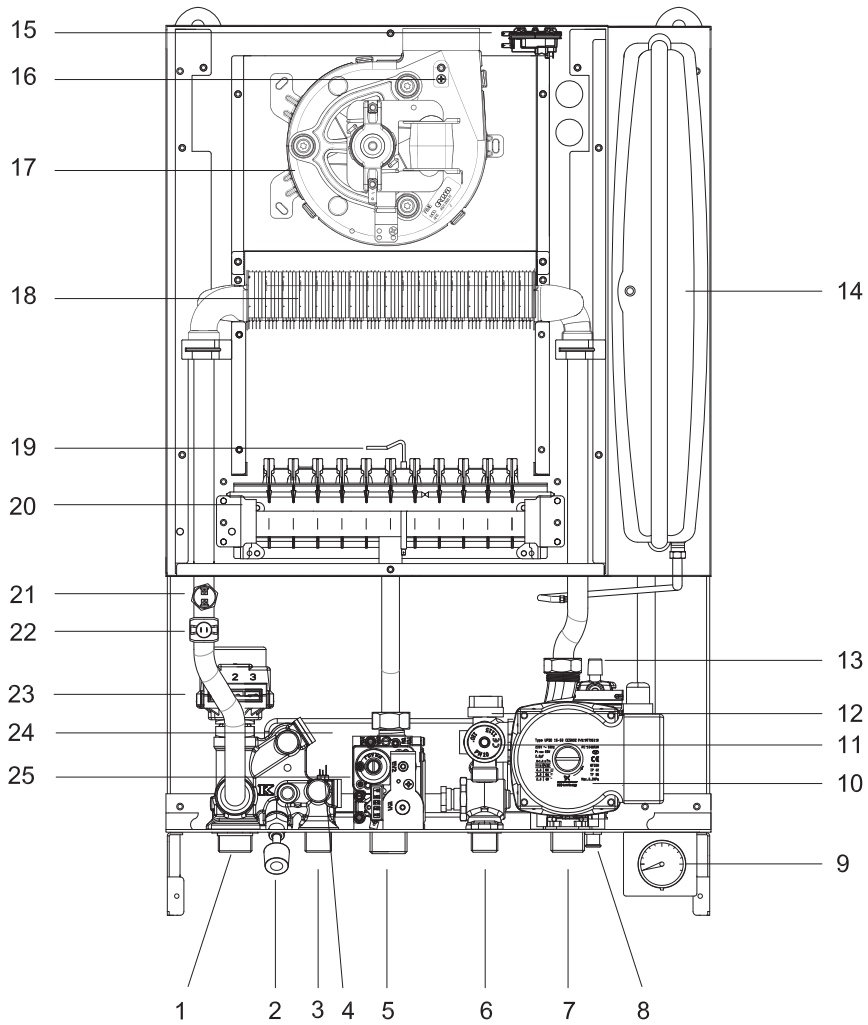


Fig. 3

KEY

- | | | |
|--------------------|---------------------------------|------------------------------|
| 1 - CH flow | 11- Safety relief valve | 22 - Flue temperature sensor |
| 2 - CH loading | 12 - Water pressure switch | 23 - Diverter valve motor |
| 3 - DHW flow | 13 - Automatic air vent | 24 - Plate heat exchanger |
| 4 - DHW sensor | 14 - Expansion vessel | 25 - Gas valve |
| 5 - Gas inlet | 15 - Air pressure switch | |
| 6 - DHW inlet | 16 - Venturi | |
| 7 - CH return | 17 - Fan | |
| 8 - Drain point | 18 - Main heat exchanger | |
| 9 - Pressure gauge | 19 - Spark/sensing electrode | |
| 10 - Pump | 20 - Burner | |
| | 21- Overheat cut off thermostat | |

2.1 OPERATING SCHEME (Fig. 4)

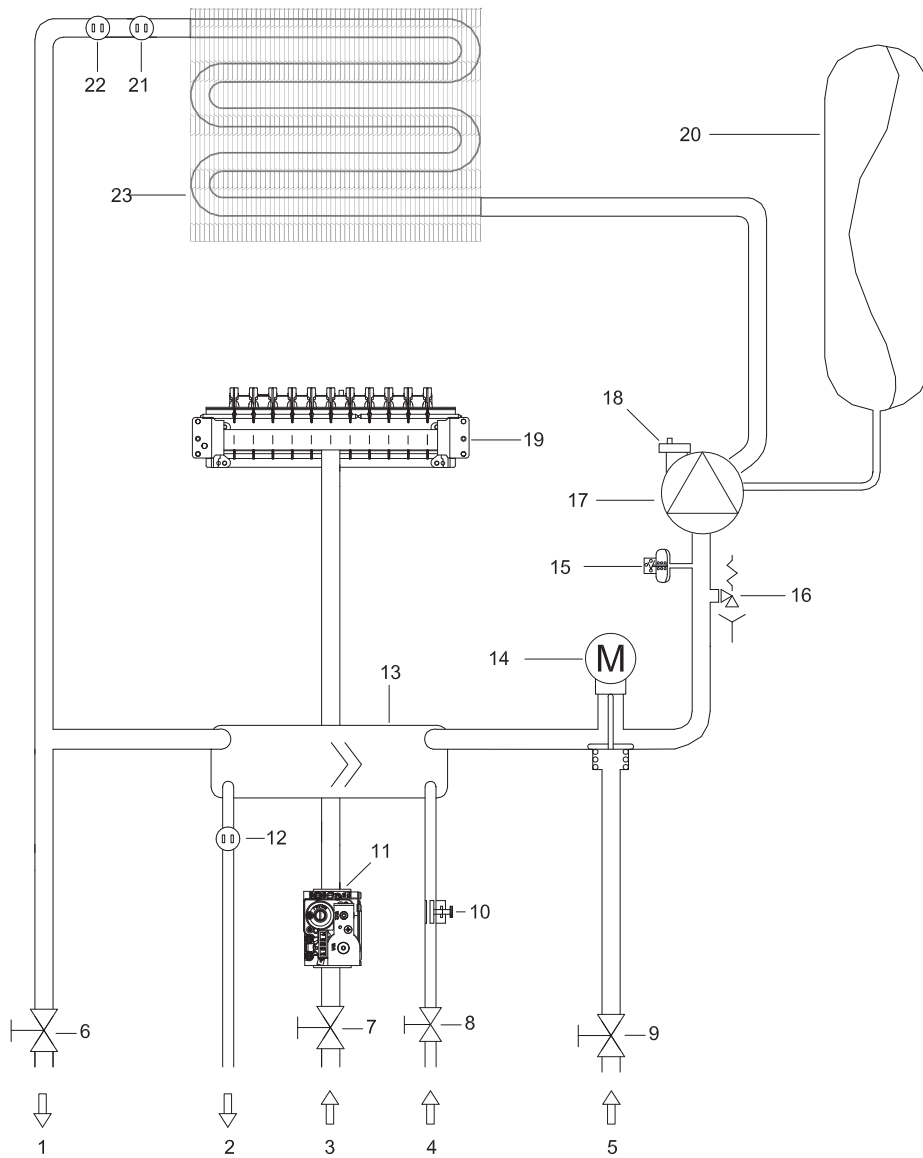


Fig. 4

KEY

- | | | |
|-----------------------------------|--------------------------------|----------------------------------|
| 1 - C.H. flow | 10 - D.H.W. flow sensor | 18 - Burner |
| 2 - D.H.W flow | 11 - Gas valve | 20 - Expansion vessel |
| 3 - Gas inlet | 12 - D.H.W. temperature sensor | 21 - Overheat cut off thermostat |
| 4 - Water inlet | 13 - Plate heat exchanger | 22 - C.H. flow sensor |
| 5 - C.H. return | 14 - Diverter valve motor | 23 - Main heat exchanger |
| 6 - C.H. compression ball valve | 15 - Water pressure switch | |
| 7 - Gas service cock | 16 - Safety pressure system | |
| 8 - D.H.W. compression ball valve | 17 - Pump | |
| 9 - C.H. compression ball valve | 18 - Automatic air vent | |

2.2 INTRODUCTION

This boiler is designed for the production of central heating and domestic hot water combined in one unit.
It is fitted with an automatic domestic hot water priority valve.
It is possible to select either a summer or winter function.
With the summer position only being for domestic hot water.
The winter position being for central heating with domestic hot water priority.

2.3 DESCRIPTION OF CONTROL SYSTEM AND SEQUENCE OF OPERATION

2.4 Domestic hot water mode

When the appliance is in rest mode, select the summer position by pressing the ON/OFF button (item 1 fig. 1) please ensure that the heating circuit is charged with water (above 1 bar).

If the domestic hot water tap is turned on, the boiler will function in the following sequence:

The pump starts. The fan starts and sends a signal back to the ignition board that the fan is running.

The spark ignition system is powered which in turn commences the spark igniter to operate and light the burner.

At this point the ignition board opens the gas valve to light the burner.

When the electrode sensor senses the signal that the burner is alight, the spark igniter stops.

The fan speed settings on the boiler increases to the maximum permissible power over a period of 5 seconds and will remain at its maximum required power until its maximum regulated temperature is achieved and then will modulate to maintain this.

When the domestic hot water tap is closed the diverter valve goes back into rest mode, the burner is shut down along with the fan which is also switched off.

2.5 Central heating mode

If the appliance is in winter mode with a demand for heat to supply radiators, etc. , with the heating circuit fully charged above 1 bar, so as to operate the low water sensor device the boiler will start in the same way as domestic hot water mode.

As the heating sensor reaches temperature the burner speed modulates to maintain the temperature set on the display panel.

2.6 GENERAL FUNCTION

The boiler is fitted with an anti-cycling device on the control board. This delays the boiler from re-firing within 10 minutes.
If the heating temperature goes 20 °C below the set point, the burner restarts immediately.
The domestic hot water will always take priority and is unaffected by the anti-cycling device.

The instrument panel permits regulation of the boiler to partial heating requirements, between maximum and minimum settings.

The fan also forces exhaust gas through the flue to the outside, this creates a lesser pressure in the sealed combustion chamber, thus sucking in combustion air, through the inlet duct.

The boiler water temperature is automatically controlled by a built in thermostat.

Interior space temperature is set by the room thermostat to be installed in the heating system. The boiler already carries connection terminals for this thermostat, as well as for an external timer if required. The burner continues to operate until it is stopped by the digital clock or one of the thermostats.

When the internal CH temperature sensor or the room thermostat intervenes the burner shuts down. The fan stops but the pump continues to operate for 3 minutes.

The boiler also incorporates an anti-block system which powers the pump every 24 hours, allowing it to operate for 2 minutes if the boiler has not been in use. This operation may in some cases be heard for a short period when the pump has been activated.

The heat exchanger in the DHW circuit is a stainless steel plate heat exchanger water to water, and domestic water is heated by converting the water in the central heating circuit. The transfer of heat is very high because the two fluids move in a counter direction.

Select the winter position by pressing the ON/OFF button (item 1 fig. 1).

When a hot water tap is turned on the diverter valve motor moves to exclude the central heating circuit, the boiler automatically modulates to maintain the domestic hot water at a constant temperature.

The water temperature can be regulated by the digital display.

When domestic hot water is being drawn off the burner and pump perform as they do during central heating except that the burner is commanded by the DHW thermostat.

When DHW is no longer called for (tap is turned off), the boiler will automatically return to the central heating mode.

Select the summer position by pressing the summer/winter button. The boiler functions like an automatic gas hot water heater.

When DHW is no longer required the burner and pump and fan will immediately turn off.

This also takes place when in winter mode, if there is no demand for heat to the central heating system or until the digital clock and room thermostat (if fitted) demands the central heating circuit.

2.8 SAFETY DEVICE

In both central heating and domestic hot water mode safe operation is ensured by a control board which shuts off the main burner, if the fan stops or the flue or combustion air intake duct is obstructed.

An overheat cut off thermostat acts to turn off the burner to resettable "lockout".

A safety valve is fitted on the central heating circuit set at 3 bar.

A low water pressure switch set at 0.4 bar is fitted on heating circuit, to prevent the boiler operating below this boiler system pressure.

2.7 OVERALL DIMENSION (Fig. 5)

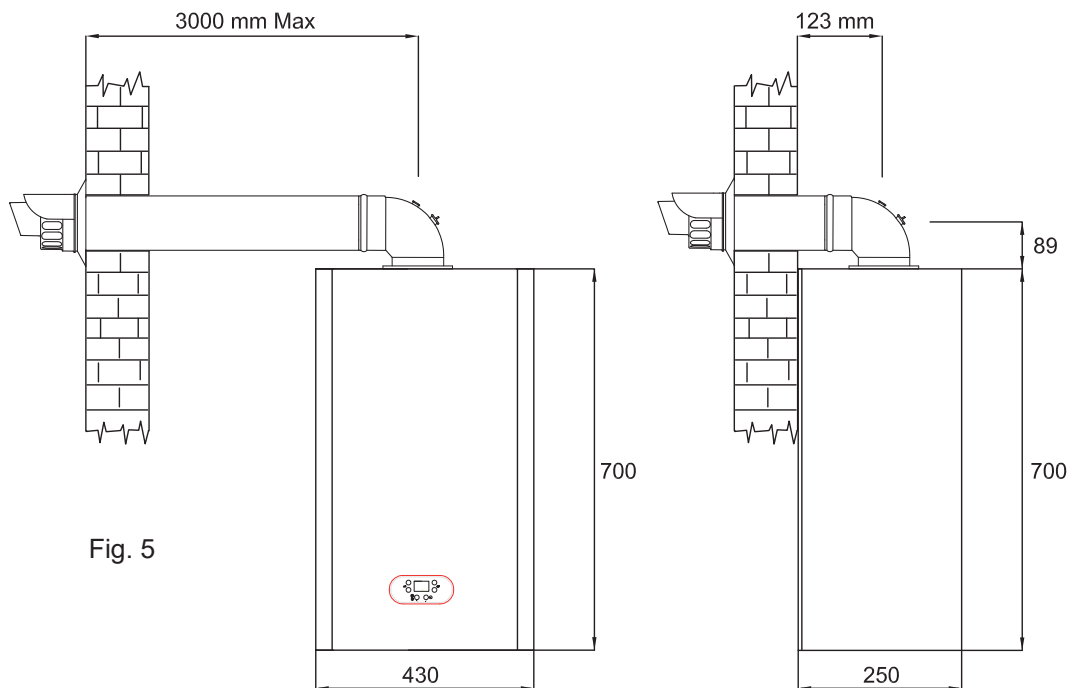


Fig. 5

2.9 AVAILABLE PUMP HEAD

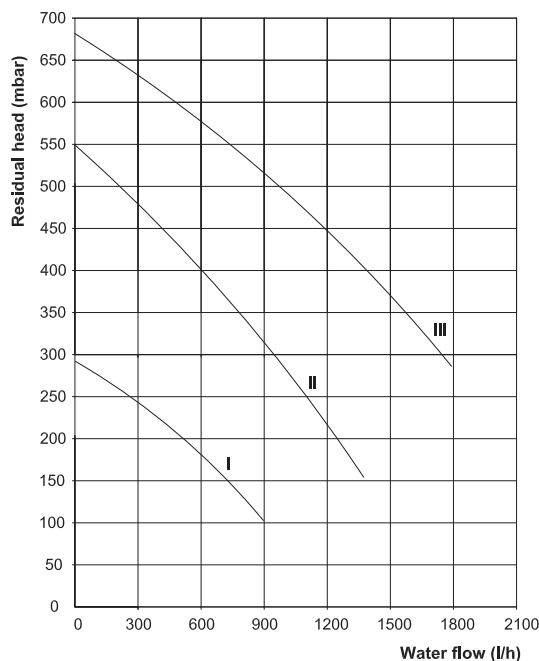


Fig. 6

3 TECHNICAL DATA**LS 24****TABLE 1/A****NATURAL GAS (G 20) I_{2H}**

Nominal heat Input net QMS	24.0 kW
Minimum heat Input net	10.5 kW
Nominal heat output	23.4 kW
Minimum heat output	9.8 kW
Inlet pressure 20 mbar	Gas rate after 10 minutes Max 2.1 m ³ /h - min. 0.4 m ³ /h
Burner pressure Max 10.0 mbar C.H. min 1.5 mbar	Burner injectors nr. 11 x1.35
Electrical supply: 230 V ~ 50 Hz External fuse rating: 3 A	Internal fuse F1: 3.15 A (20 mm To BS 4265)
Dry weight : 26 Kg	Water content C.H.: 0.8 Litre Water content D.H.W.: 0.2 Litre
Gas Supply Connection	15 mm compression isolating valve
Flow connection C.H.	22 mm compression isolating valve
Return connection C.H.	22 mm compression isolating valve
Inlet connection D.H.W.	15 mm compression isolating valve
Outlet connection D.H.W.	15 mm compression valve
Safety discharge C.H.	15 mm copper pipe
Condensation drain	3/4" (21.5 mm) push fit over flow
Max cold water capacity without additional expansion vessel	110 Litre
Sealed water system C.H.	
Max pressure PHS	2.5 bar
Minimum working pressure	0.5 bar
7 Litres expansion vessel pre-charge-pressure	0.5 bar
Central Heating operating temperature	Max 80 °C min 35 °C
Design flow rate	1066 l/h 20 °C rise
Minimum flow rate C.H.	350 l/h
D.H.W. flow rate 30 °C rise	11.5 l/min
D.H.W. flow rate 35 °C rise	9.9 l/min
D.H.W. flow rate 40 °C rise	8.6 l/min 10°C Inlet temperature
D.H.W. temperature	Max 60 °C min 35 °C
Burner pressure D.H.W.	Max 10.0mbar min 1.5 mbar
Qmw Input Net	Max 24.0 kW min 10.5 kW
D.H.W. Pressure Pmw	Max 6.5 bar
D.H.W. Pressure Pmw	min 0.5 bar
D.H.W. Minimum Flow Rate	2.5 l/min
Flue outlet nom. diameter 100 mm specially supplied with boilers (If required)	
Destination:	Category: I2H
Flue Type: C12 - C32 - C52	Electrical protection index: IP X4 D

4 GENERAL REQUIREMENTS

4.1 SAFETY

Gas Safety (Installation and Use). Regulations.

Failure to install appliances correctly could lead to prosecution. It is in your own interest, and that of your safety, to ensure the law is complied with. Check the boiler and flue is the correct type for installation undertaken.

The installation of the boiler MUST be in accordance with the latest IET (BS 7671) Wiring Regulations, local building regulations, bye-laws of the local water authority, the building regulations and any relevant requirements of the local authority.

4.2 GENERAL INFORMATION

Both the user and the manufacturer rely heavily on the installer, whose job it is to install the combination boiler and connect it to a correctly designed heating system. Acquaint yourself with the relevant British Standards concerning installation requirements. It is recommended that tools suitable for brass fittings are used, and have a capability to accommodate hexagon sizes up to 50 mm.

APPLICABLE CODES OF PRACTICE

Ref: Documents.

BS6891:2015: Low pressure installation pipes.

BS6798: Installation of gas fired hot water boilers of rated input not exceeding 70 kW.

BSEN12828: Design for water based heating systems.

BSEN12831: Heating systems in buildings, Method for calculation of the design heat load.

BSEN14336: Installation & commissioning of water based heating systems.

The followings standards give valuable additional information:

BS 7074: Expansion vessels and ancillary equipment for sealed water system.

BS 7593: Treatment of water in domestic hot water and central heating system.

Health & Safety Document No.635 The Electricity at Work Regulations, 1989.

IMPORTANT:

These appliances are certificated for safety and performance. It is therefore important that no external control devices e.g. flue dampers, economisers etc., are directly connected to this appliance unless covered by these Installation and Service Instructions or as otherwise recommended by Ravenheat in writing. If in doubt please enquire.

Any direct connection of a control device not approved by Ravenheat could invalidate the certification and the normal appliance warranty.

It could also infringe the Gas Safety regulations and the above regulations.

NOTE:

The LS 24 combi boiler has been tested and examined by CERTIGAZ, in according to:

EN 61000-3-2:2014

EN 61000-3-3:2013

EN55014-1:2006 + A1:2009 + A2:2011

EN 55014-2:2015.

Manufacturers instructions must NOT be taken in any way as overriding statutory obligations. If in doubt on any point please consult Ravenheat.

4.3 LOCATION OF BOILER

Siting of LS 24 combi boiler must be as follows. The position of installation should be within the building, unless otherwise protected by a suitable enclosure.

Adequate space for installation, servicing and air circulation around the boiler must be allowed for.

LS 24 combi boiler must be fitted on a flat and vertical wall capable of adequately supporting the weight of the boiler and any ancillary equipment. The appliance may be fitted on a combustible wall insulation between the wall and the boiler is not necessary, unless required by the local authority.

For electrical safety reasons there must be no access available from the back of the boiler.

The boiler must not be fitted outside.

4.4 CLEARANCES AROUND THE APPLIANCE

Side clearance:

The position of the appliance must provide minimum clearance of 5 mm as the side panels.

Top clearance:

The top clearance should be a minimum of 125 mm.

Bottom clearance:

A bottom clearance of 80 mm is required between the appliance and any surface. Though 150 mm is preferred whenever possible.

Front clearance:

A minimum of 450 mm is required in front of the appliance for access during servicing, the front clearance can be reduced when installed in a cupboard, to 25 mm from the access door.

4.5 IMPORTANT NOTICE

The boiler may be installed in any room or internal space, although particular attention is drawn to the requirements of the current IET (BS 7671) Wiring Regulations.

A compartment when used to enclose the combination boiler MUST be designed and constructed specifically for this purpose. An existing cupboard, or compartment, may be used provided it is modified accordingly. Samples of the LS 24 combi boiler have been examined by CERTIGAZ notification body, and are certified to comply with the essential requirements of the gas appliance.

4.6 GAS SUPPLY

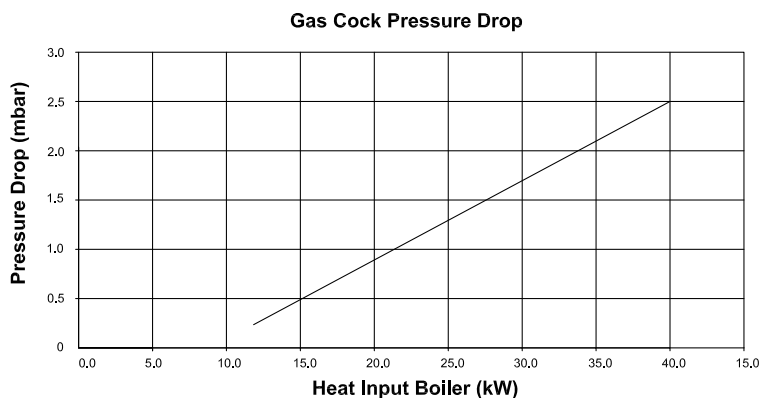
A gas meter is connected to the service pipe by the Local Gas Region or the Local Gas Region contractor. An existing meter should be checked preferably by the Gas Region to ensure that the meter is adequate to deal with the rate of gas supply required for all appliances it serves. Installation pipes should be fitted in accordance with BS 6891:2015. Pipework from the meter to the boiler must be of adequate size
A smaller size than the boiler inlet gas connection should not be used. The complete installation must be tested for soundness as described in the above code.

N.B. It is the responsibility of the Gas Installer to size the gas installation pipework in accordance with BS 6891:2015. Whilst the principle of the 1:1 gas valve ensures the Ravenheat range is able to deliver the full output at an inlet pressures as low as 14 mbar, other gas appliances in the property may not be as tolerant.

When operating pressures are found to be below the minimum meter outlet of 19 mbar these should be checked to ensure this is adequate for correct and safe operation.

Allowing for the acceptable pressure loss of 1 mbar across the installation pipework, it can be assumed that a minimum permitted operating pressure of 18 mbar (nat gas) will be delivered to the inlet of the appliance. (reference BS 6400-1 Clause 6.2 Pressure Absorption).

The external gas cock could further reduce the operating pressure when measured at its test point. The pressure drop is relative to the heat input to the boiler (kW), refer to graph below.



4.7 FLUE SYSTEM

The terminal should be located where dispersal of combustion products is not impeded and with due regard for the damage or discolouration that might occur to building products in the vicinity (section 4.10).

The terminal must not be located in a place where it is likely to cause a nuisance in cold and/or humid weather as water vapour may condense on leaving the flue terminal. The effect of such plumbing must be considered.

The terminal must not be closer than 25 mm (1 inch) to any combustible material for protection of combustibles, refer to BS 5440: Part1.

Where a flue terminal is installed less than 1000 mm from a plastic, or painted gutter; or 500 mm from painted eaves, an aluminium shield 1000 mm long, should be fitted to the underside of the gutter or painted surface.

Plumbing will occur at the terminal so, where possible, terminal positions which could cause a nuisance should be avoided.

The flue must be installed in accordance with the recommendations of BS 5440: Part 1.

IMPORTANT NOTES:

For greater flue lengths see alternative flue instructions. Flue must be positioned in a place not likely to cause a nuisance from plumbing.

IMPORTANT NOTICE: If the flue terminates below a balcony, above the ground, above a flat roof to which people have access, then a suitable **terminal guard** must be fitted if less than 2 metres high.

IMPORTANT:

The following notes are intended for general guidance.

The boiler **MUST** be installed so that the terminal is exposed to external air.

It is important that the position of the terminal allows the free passage of air across it at all times.

Minimum acceptable spacing from the terminal to obstructions and ventilation openings are specified in section 4.10.

Note positions: *Due to the terminal design, installation is possible with clearances less than those specified in BS 5440, Part 1*

NOTE:

The flue must be terminated in a place not likely to cause a nuisance.

A concentric vertical flue kit is available for longer flueing applications (see table 4 page 23).

For further details see vertical flue installation instructions.

4.8 AIR SUPPLY

The following notes are intended for general guidance.

The room sealed fan flued boiler does not require a permanent air vent for combustion air supply.

Where installed in a cupboard or compartment ventilation is not required.

4.9 WATER CIRCULATION (Central heating)

Detailed recommendations are given in BS 6798: 2014 - BSEN12828 - BSEN12831 - BSEN14336 (for smallbore and microbore central heating systems). The following notes are given for general guidance.

4.10 PIPEWORK

Copper tubing to BSEN 1057:1 2006, BSEN 1172, BSEN 1652 and BSEN 1653, is recommended for water pipes. Jointing should be either with capillary soldered or with compression fittings.

Where possible pipes should have a gradient to ensure air is carried naturally to air release points and water flows naturally to drain taps. It should be ensured as far as possible that the appliances heat exchanger is not a natural collecting point for air except where providing useful heat. Pipes should be insulated to prevent heat loss and to avoid freezing. Particular attention should be paid to pipes passing through ventilated spaces in roofs and under floors.

IMPORTANT:

A minimum length of 1 metre of copper pipe MUST be fitted to both flow and return connections from the boiler before connection to any plastic piping.

The water through the appliance heat exchanger circuit must exceed the min. 2.38 gals/min. (650 L/h) when the burner is firing. It is important to ensure that this rate is achieved when sections of the system are shut off either manually or by automatic controls.

If the volume of circulating water is too low, the boiler water temperature will rise too rapidly. This could cause noise in the system or even cause the safety thermostat to trip.

This appliance is designed to work on a two pipe system as shown in fig.6.

4.11 BOILER INTERLOCK CONTROL

Central heating system controls should be installed to ensure the boiler is switched off when there is no demand for heating, in compliance with Building Regulations.

The boiler has its own built in bypass.

If the system has thermostatic radiator valves on all radiators, or two port valves, then a bypass circuit must be fitted with an automatic bypass valve to ensure a flow of water should all valves be in the closed position (fig. 6).

It is important that the system is flushed thoroughly before the appliance is fitted or left to operate (as recommended in BS 7593) in order to maintain an efficiently operating heating system. For replacement installations, the system MUST be flushed with the old boiler insitu, in order to prevent system debris. Once the system has been flushed, an inhibitor (suitable for stainless steel and aluminium heat exchanger) should be added (see section 4.18).

4.12 DRAINING TAP

These must be located in accessible positions to permit the draining of the whole system. The taps must be at least 15 mm nominal size and manufactured in accordance with BS 2879.

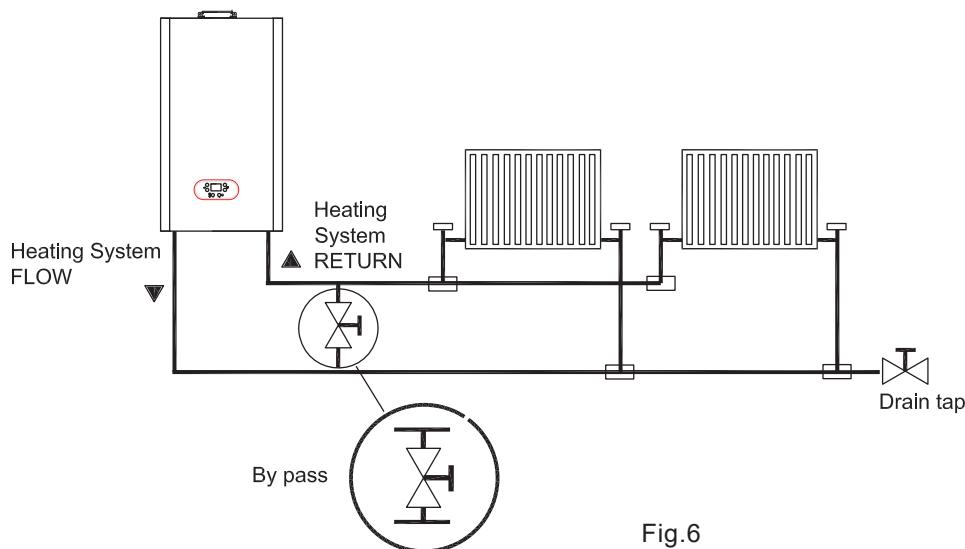


Fig.6

4.13 AIR RELEASE POINTS

These must be fitted at all high points where air will naturally collect, and must be sited to facilitate complete filling of the system.

The appliance has an integral sealed expansion vessel to accommodate the increase of water volume when the system is heated.

It can accept up to 7 L of expansion water. If the appliance is connected to a system with an unusually high water content, calculate the total expansion (see table 4) and add additional sealed expansion capacity as appropriate (Fig. 7). In general, modern systems below 7 L should not present any problem.

4.14 MAINS WATER FEED. CENTRAL HEATING

There must be no direct connection to the mains water supply, even through a non-return valve, without the approval of the Local Water Authority.

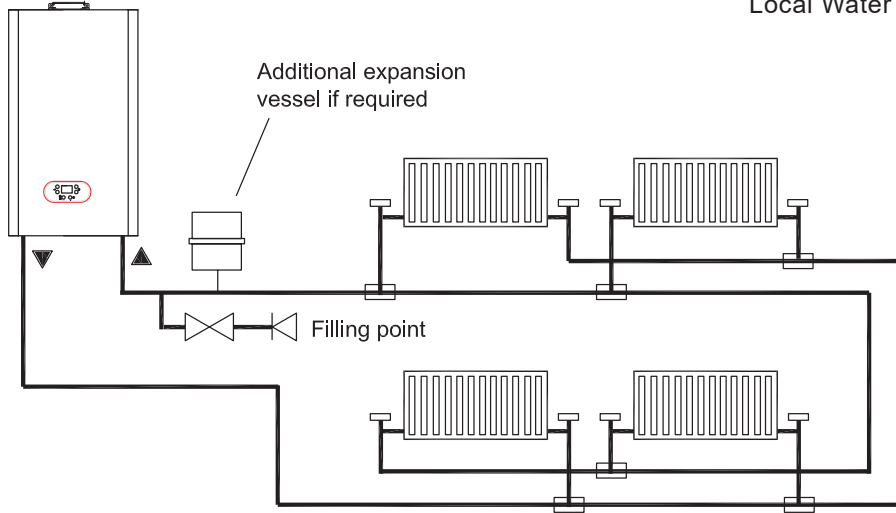


Fig.7

4.15 SIZING OF ADDITIONAL EXPANSION VESSEL TABLE 3

Deduct from the value given in the table the 7 litre vessel supplied.

Safety valve setting (bar)	3.0								
Vessel charge pressure (bar)	0.5			1.0			1.5		
Initial system pressure (bar)	0.5	1.0	1.5	2.0	1.0	1.5	2.0	1.5	2.0
Total water content of system	EXPANSION VESSEL VOLUME (LITRES)								
Litres									
25	2.1	3.5	6.5	13.7	2.7	4.7	10.3	3.9	8.3
50	4.2	7.0	12.9	27.5	5.4	9.5	20.6	7.8	16.5
75	6.3	10.5	19.4	41.3	8.2	14.2	30.9	11.7	24.8
100	8.3	14.0	25.9	55.1	10.9	19.0	41.2	15.6	33.1
125	10.4	17.5	32.4	68.9	13.6	23.7	51.5	19.5	41.3
150	12.5	21.0	38.8	82.6	16.3	28.5	61.8	23.4	49.6
175	14.6	24.5	45.3	96.4	19.1	33.2	72.1	27.3	57.9
200	16.7	28.0	51.8	110.2	21.8	38.0	82.4	31.2	66.2
225	18.7	31.5	58.3	124.0	24.5	42.7	92.7	35.1	74.5
250	20.8	35.0	64.7	137.7	27.2	47.5	103.0	39.0	82.7
275	22.9	38.5	71.2	151.5	30.0	52.2	113.3	42.9	91.0
300	25.0	42.0	77.7	165.3	32.7	57.0	123.6	46.8	99.3
325	27.0	45.5	84.1	179.1	35.7	61.7	133.9	50.7	107.6
350	29.1	49.0	90.6	192.8	38.1	66.5	144.2	54.6	115.8
375	31.2	52.5	97.1	206.6	40.9	71.2	154.5	58.5	124.1
400	33.3	56.0	103.6	220.4	43.6	76.0	164.8	62.4	132.4
425	35.4	59.5	110.1	239.2	46.3	80.7	175.1	66.3	140.7
450	37.5	63.0	116.5	247.9	49.0	85.5	185.4	70.2	148.9
475	39.6	66.5	123.0	261.7	51.8	90.2	195.7	74.1	157.2
500	41.6	70.0	125.9	275.5	54.5	95.0	206.0	78.0	165.5
For system volumes other than those given above, multiply the system volume by the factor across	0.0833	0.140	0.259	0.551	0.109	0.190	0.412	0.156	0.331

Note: This pressure can be increased up to 1.5 bar to suit high static head situations.

If the capacity of the central heating system should exceed 110 L, an additional vessel should be installed on the return to the combination boiler from the heating system (fig. 7). Guidance on vessel sizing is given (see table 3).

Reference should be made to British Gas Publications. Draining taps should be at least 1/2" in BSP nominal size and be in accordance with BS 2879.

4.16 INSTALLATION TO AN EXISTING CENTRAL HEATING SYSTEM

Clean the central heating system and also check pipework and renew any corroded pipework or fittings. Valve glands must be repacked or replaced wherever necessary and any defective controls exchanged.

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

It is recommended that you fit a primary water cleanser to the system. We recommend fitting a filter that will help remove both magnetite and non-magnetic debris.

4.17 WATER TREATMENT

This boiler has an aluminium and stainless steel heat exchanger, Ravenheat recommend the use of FERNOX or SENTINEL, or other treatment products recognised by Ravenheat which must be used in accordance with the manufacturer's instructions.

4.18 HARD WATER AREAS

If the area of installation is recognised as a hard water area, it is recommended that a suitable water treatment device is installed on the mains supply. The water hardness can be determined by using the standard test paper or by referring to local water authority.

4.19 DOMESTIC WATER

The domestic hot water must be in accordance with the relevant recommendations of BS 5546. Copper tubing to BS EN 1057 is recommended for water carrying pipework and MUST be used for pipework carrying potable water.

Important:

It is important that at installation allowance must be made for the expansion of DHW within the appliance. If the DHW inlet has a back flow prevention device fitted for example a non-return valve or water meter. Then additional measure should be taken in the form of a mini expansion vessel. Fitted in the cold inlet pipe between the back flow prevention device and the boiler.

4.20 ELECTRICAL SUPPLY

Warning: this appliance must be earthed

External wiring to the appliance must be carried out by a competent person and be in accordance with the current Regulations and local regulations which apply. Ravenheat boiler is supplied with a connection to a 230 V ~ 50 Hz single phase supply.
The supply must be fused at 3 A.

NOTE: The method of connection to the electricity supply MUST facilitate complete electrical isolation of the appliance, by the use of a fused, double pole isolator, having a contact separation of at least 3 mm in all poles. The point of connection to the electricity supply must be readily accessible and adjacent to the appliance except, where the appliance is installed in a bathroom.

5 INSTALLATION

5.1 WARNING

It is MOST IMPORTANT that this appliance is installed in a HORIZONTAL POSITION, with the flue air duct passing through the wall. **Make sure the flue is at a 1.5° incline, rising from the boiler with 50 mm. Flue terminal diagram states 1.5° - 25 mm, fall back on flue (fig. 9).**

5.2 DELIVERY

The appliance carton contains:

- a) Installation/ User' s instructions,
- b) Guarantee card

5.3 UNPACKING OF BOILER

IMPORTANT:

With regard to the Manual Handling Operations the following lift operation exceeds the recommended weight for a one man lift.

- Stand the boiler carton upright.
- Open the top of the carton.
- Rest the carton on the floor (keeping the flaps open).
- Turn the carton over with the boiler inside and then pull the carton up away from the boiler.
- Rest the boiler on its back on the floor to prepare it for installation.

5.4 POSITIONING OF THE BOILER

Unscrew the two lower screws that secure the front panel and pull forward and lift up (fig. 34).

Make sure the casing and screws are put to one side in a safe place.

5.5 FLUE TERMINAL POSITION

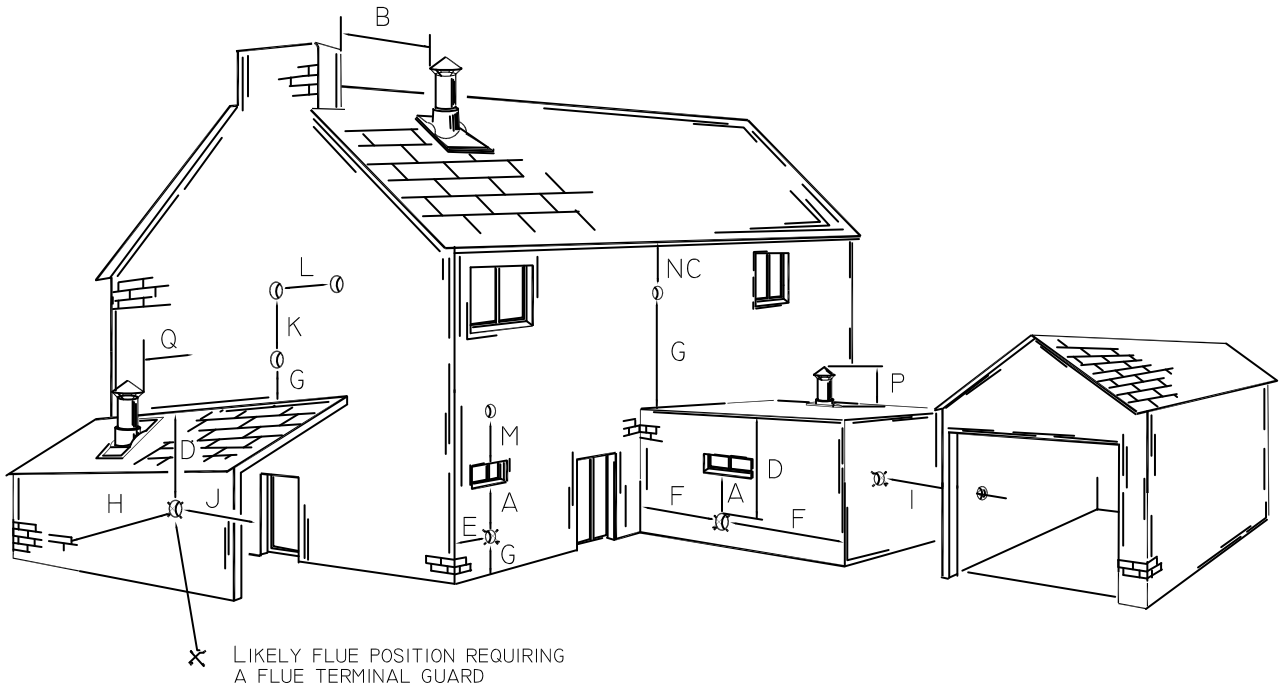


Fig.9

Terminal position for fan assisted boiler (minimum distance)

mm

A -	Directly below an open window or other opening (e.g. air brick)	300
B -	From a vertical structure on the roof	150
C -	Below eaves	200
D -	Below balconies or car port roof	200
E -	From a vertical drain pipes and soil pipes	150
F -	From an internal or external corner	100
G -	Above ground or below balcony level	300
H -	From a surface facing a terminal	600
I -	From a terminal facing the terminal	1200
J -	From an opening in the car port (e.g. door window) into dwelling	1200
K -	Vertically from a terminal on the same wall	1500
L -	Horizontally from a terminal on the same wall	300
M -	Above an opening, air brick, opening windows etc...	300
N -	Below gutters, soil pipes or drain pipes	75
P -	Above intersection with roof	300

5.6 OPTIONAL EXTRAS

HORIZONTAL FLUE KIT BOX CONTAINING (Fig 10):

- 52 - Self-cutting joint securing screw
- 57 - Elbow header
- 59 - Rubber seal Ø 60
- 56 - Rubber seal Ø 100
- 60 - Fumes sample point
- 61 - Flue exhaust duct
- 62 - Air intake duct
- 69 - Air sample point
- 127 - Terminal Rubber wall seal

IMPORTANT: Please lubricate the internal part of the seals before fitting.

Generally speaking, oils and greases are not suitable for the “peroxide -EPDM”, therefore we suggest a correct lubrication using silicon-substances, for instance “Silikon Spray“ (Arexons).

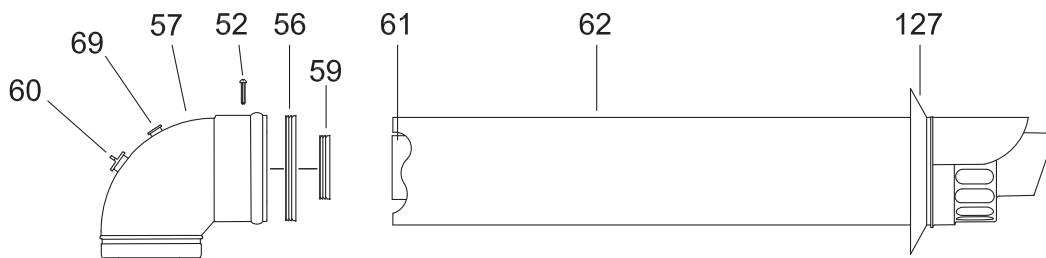


Fig 10

FLUE EXTENSION BOX CONTAINING (Fig. 11):

1000 mm flue extension duct as an extra cost only when requested for side and vertical flue applications.

WARNING: With horizontal concentric flue, the maximum flue length is 3 metres, duct extension can be used with the standard flue (see table 4).

- 59 - Rubber seal Ø 60
- 63 - Air intake duct extension
- 64 - Flue exhaust duct extension

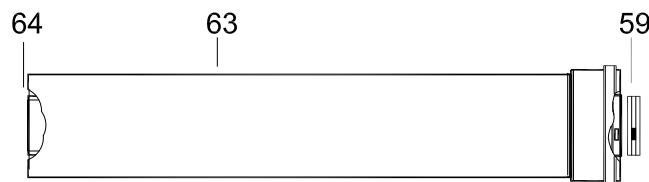


Fig 11

TYPE OF FLUE SYSTEM (All types) - minimum and maximum distance					TABLE 4
Flue type	C ₁₂		C ₃₂		C ₅₂ ¹
Flue Diameter	60/100 (concentric)	80/125 (concentric)	60/100 (concentric)	80/125 (concentric)	80 mm single pipe
Minimum length (m)	0.3 (horizontal length)	0.3 (horizontal length)	1.0 (vertical length)	1.0 (vertical length)	0.5
Maximum length (m)	3.0	23.0	3.0	5.5	10.0
Equivalent length of 45° bend (m)	0.5	1.25	0.5	1.25	1.25
Equivalent length of 90° bend (m)	1.0	2.5	1.0	2.5	2.5

5.7 INSTALLING THE APPLIANCE FOR REAR FLUE OUTLET (Fig. 14, 156, 10, 11). FOR APPLIANCE CLEARANCES SEE SECT. 4.4 AND SECT. 5.5)

Use adhesive tape to attach the template to the wall, making sure that the centre line is vertical and that the clearance distance is no less than that shown in fig. 14.

- Mark the two holes for the top fixing bolts to fix the boiler on the wall as well as the centre of the flue duct.
- Detach the template from the wall.
- Use a 10 mm dia drill to make the 2 holes. Insert the plastic expansion plugs.
- Cut or core drill a 105 mm dia hole for inserting the flue duct.

Screw the elbow header and seal on to the top of the boiler, positioning it towards the required direction (fig 14).

Important: Make sure that the inner 60 mm diameter of the elbow header is inserted fully into the flue manifold, and the flue manifold rubber seal is correctly fitted. (Fig 10 item 65)

If using the horizontal flue duct and it is too long it can be shortened. Should it be necessary to cut the flue always cut on right angles and ensure the cut is de-burred.

Note: Minimum overall flue length is 30 mm to allow for terminal rubber wall seal (fig.10 item 127).

Insert the flue assembly locating it onto the wall.

Lift the boiler on the wall, locating onto the top two fixing bolts. Tighten the two bolts using a spanner to secure to the wall.

Working above the boiler pull the flue exhaust duct towards the boiler in order to engage tube (fig. 11 item 61) into its header.

Position flue into elbow header and push so as to locate inner and outer flue correctly ensuring a good seal is made with O-rings and fix securing screws.

Fit the terminal rubber wall seal and if necessary terminal guard.

Extension kits are available to order for flue extension of up to a total overall length of 8 metres (fig.11).

Each extension length extends the pipe by approximately 1000 mm long up to a maximum of seven extensions.

Extensions must be installed with the widened end of the pipe and the tapered end of the flue pipe aimed towards the exhaust terminal.

5.8 INSTALLING THE APPLIANCE FOR SIDE FLUE OUTLET (Fig. 13, 14, 15, 10, 11)

- Attach the template to the wall with adhesive tape, making sure that the centre line is vertical and that the distance from the centre line to the nearest side wall is not less than measurement in fig.13.

- Mark the two fixing bolt securing holes on the wall and extend the axis of the flue duct hole to the side wall ensuring it is horizontal.

- **Make sure flue slopes 1.5° down towards the boiler and that there is a 25 mm fall per metre of the flue length.**

- Trace the centre of the flue duct hole and measure distance from the corner of the wall (fig.13), measure the distance 124 mm between the centre of flue duct hole to the corner.

Detach the template from the wall.

- Use a 10 mm. dia drill to make the 2 holes for the fixing bolts. Insert the plastic expansion plugs. Core drill a 105 mm dia. hole in the side wall for inserting the flue duct.

Screw the elbow header and seal on to the top of the boiler, positioning it towards the required direction.

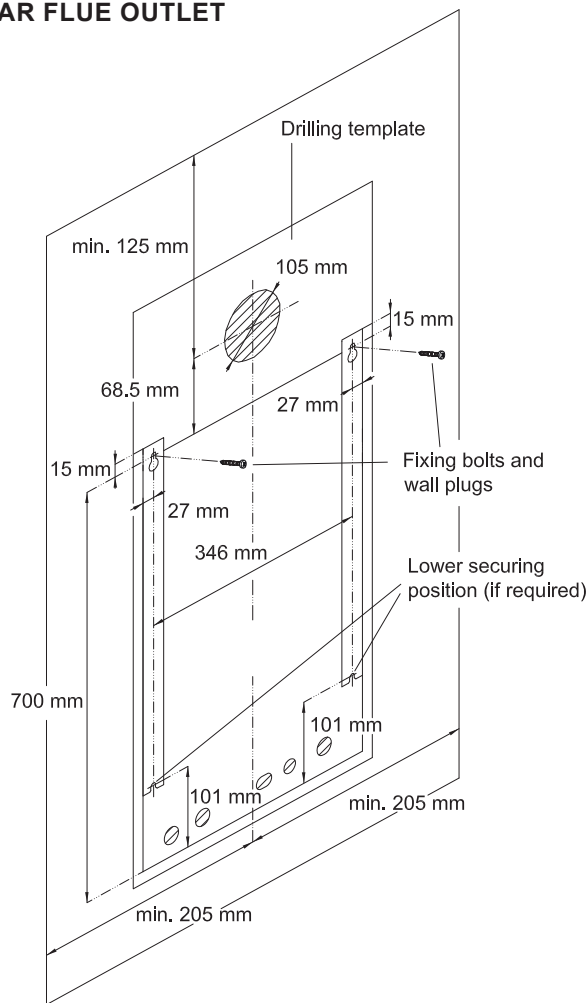
Important: Make sure that the inner 60mm diameter of the elbow header is inserted fully into the flue manifold, and the flue manifold rubber seal is correctly fitted. (Fig 17 item 65)

If using the horizontal flue duct and it is too long it can be shortened.

Should it be necessary to cut the flue always cut on right angles and ensure the cut is de-burred.

Note: Minimum overall flue length is 30 mm to allow for terminal rubber wall seal (fig.10 item 127).

REAR FLUE OUTLET



NOTE: The position of the appliance must provide minimum side clearances of 5mm as the side panels do not require removing for servicing. However, if the option is preferred to remove the panels then a minimum clearance of 55mm is required.

Fig 12

Insert the flue assembly into the wall, making sure it will not interfere when fixing the boiler on the wall.

Lift the boiler on the wall, locating onto the two fixing bolts. Tighten the two bolts using a spanner to secure to the wall.

Working above the boiler pull the flue duct towards the elbow in order to engage the tube into its header (fig.10). Position the flue elbow in line with the flue and push so as to locate inner and outer flue correctly. Ensuring a good seal is made with O-rings. Tighten the two screws on the flue flange to secure the elbow header in place.

IMPORTANT:

Terminal rubber wall seal must be fitted (127 fig.10 item 127).

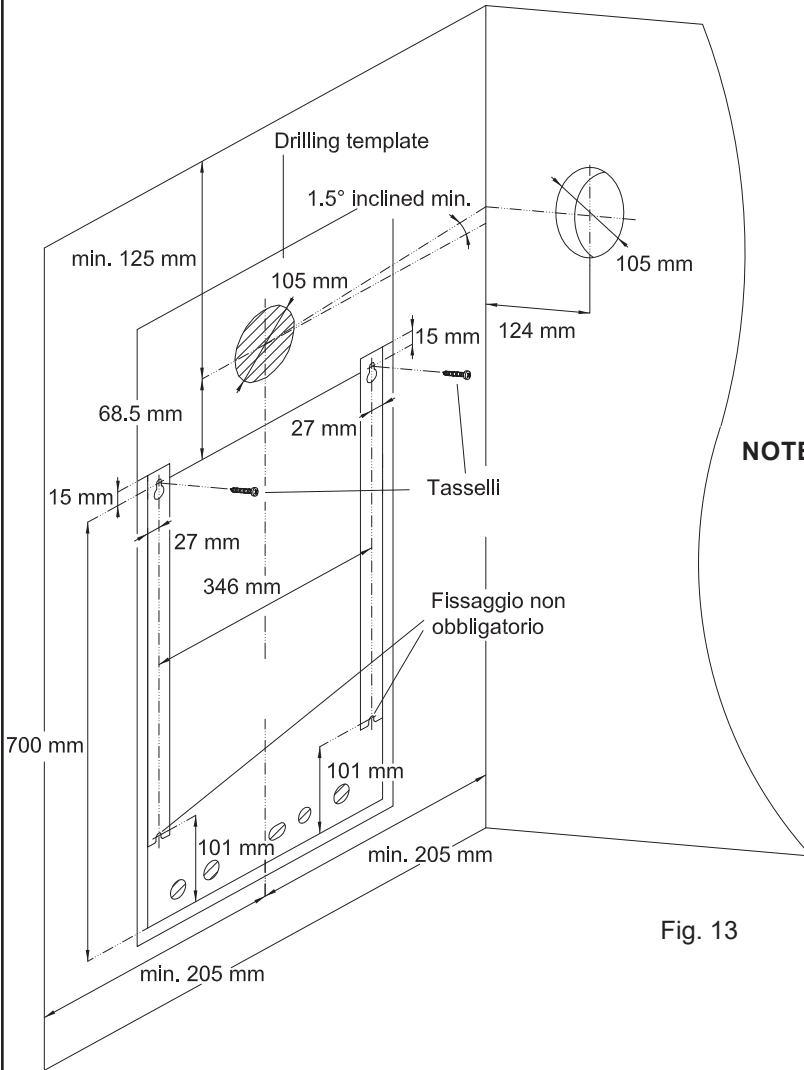
Each extension length extends the pipe by approximately 1000 mm long up to a maximum of seven extensions. Pipeline length can be established using the instructions in section 5.6. Extensions must be installed with the widened end of the air intake pipe and the tapered end of the flue pipe aimed towards the exhaust terminal.

Extensions must be joined together with the standard terminal pipe, and inserted in each other as far as they can go.

If an extension must be shortened, this must be done from the straight end, and not from the widened or tapered end. To measure the pipeline properly all components must be assembled and total length measured before cutting. The straight end of the extension connects to the boiler. The flue output and air intake pipes fits into the boiler header until it stops (fig.10 - 11).

When cutting both inner and outer ducts of the extension, always ensure that the reduced end (male) of the inner and outer duct are square and to the same length.

SIDE FLUE OUTLET



NOTE: The position of the appliance must provide minimum side clearances of 5mm as the side panels do not require removing for servicing. However, if the option is preferred to remove the panels then a minimum clearance of 55mm is required.

Fig. 13

All joints must be sealed with the rubber seals supplied.

It is important to put the centering spacer, supplied with the unit, inside between the two pipes, from the side opposite the extension's straight end.

NOTE: A suitable support bracket (flue bracket) is available from Ravenheat and should be used to support the flue length at least every one metre preferably at each joint this bracket should be secured to wall and flue duct.

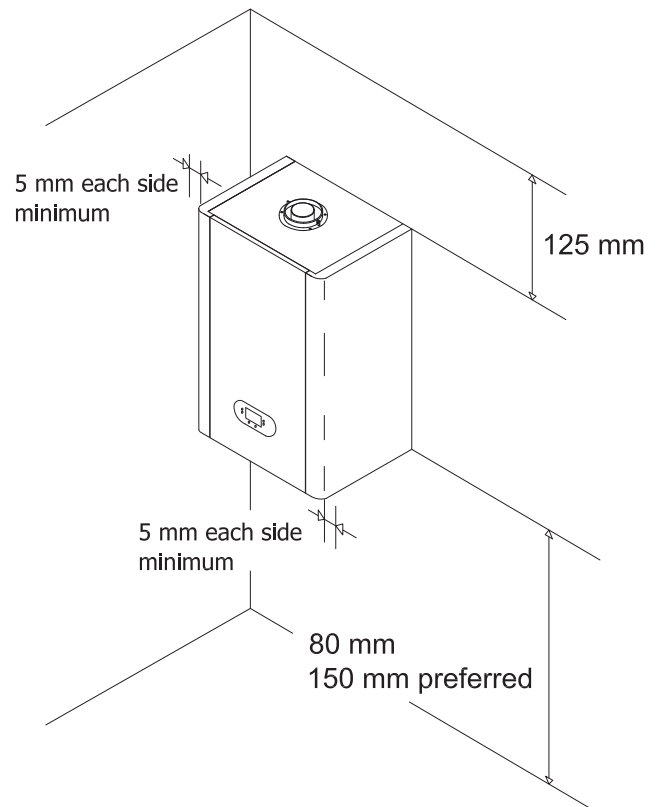


Fig. 14

5.9 COMPLETING HORIZONTAL FLUE INSTALLATION.

Ensure the flue system has been checked for soundness, is stable and secure. Where the horizontal flue terminal passes through the external wall, it is essential that the flue must be sealed on both in exterior and interior part of the wall, and securing screws fitted. The terminal rubber must also be fitted (fig. 15-165 item 127).

Must be sealed

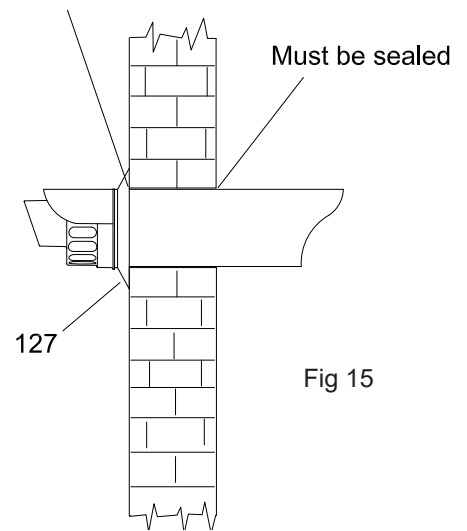


Fig 15

5.10 INTAKE AND EXHAUST TERMINAL COMPONENTS

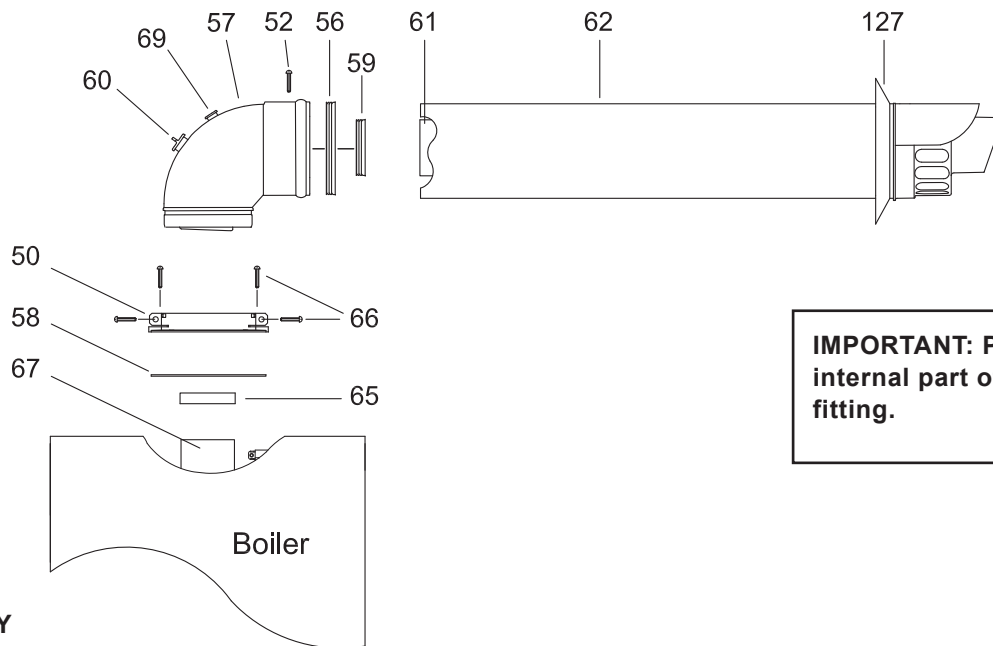


Fig.16

IMPORTANT: Please lubricate the internal part of the seals before fitting.

KEY

- | | | |
|--|--------------------------------|---------------------------------|
| 52 - Self-cutting joint securing screw | 60 - Fumes sample point | 67 - Flue temperature sensor |
| 56 - Rubber seal Ø 100 | 61 - STD flue exhaust duct | 69 - Air sample point |
| 57 - Elbow header | 62 - Terminal | 127 - Terminal Rubber wall seal |
| 58 - Header gasket | 65 - Flue manifold rubber seal | |
| 59 - Rubber seal Ø 60 | 66 - Securing screw | |

5.11 IN-LINE FLUE BEND AND FLUE EXTENSION

IN-LINE FLUE BEND

Measure the distance between the flue bends or the flue/terminal assembly. The measurements should be taken from the outer edge of the flue and bend (fig. 17).

- | |
|--|
| 49 - In-line Flue Bend |
| 52 - Self-cutting joint securing screw |
| 56 - Rubber seal Ø 100 |
| 59 - Rubber seal Ø 60 |
| 63 - Air intake duct extension |
| 64 - Flue exhaust duct extension |

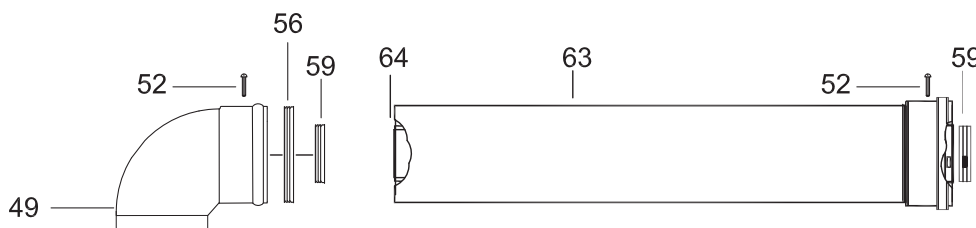


Fig.17

5.12 VERTICAL FLUE INSTRUCTION ONLY (Fig. 18-19-20)
SEE SECT. 4.10 FOR PERMISSIBLE FLUE POSITION

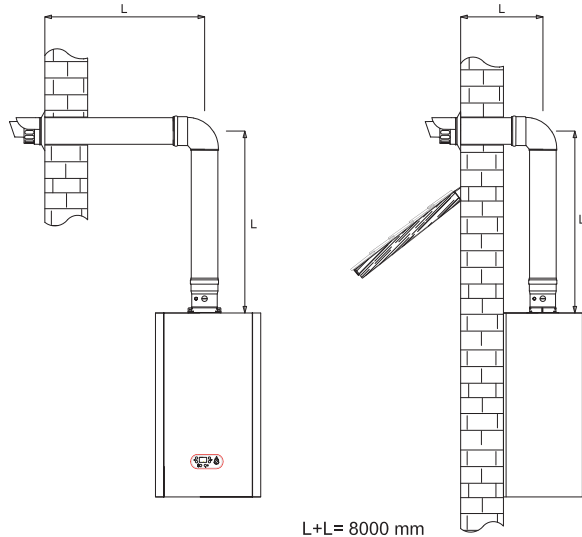
IN-LINE FLUE BEND - 1000 mm MUST BE DEDUCTED FROM OVERALL LENGTH FOR EACH 90° BEND
 OBTUSE FLUE BEND - 500 mm MUST BE DEDUCTED FROM OVERALL LENGTH FOR EACH 135° BEND.

The vertical flue kit is intended for use where a horizontal flue outlet is not possible or desired. The vertical flue can be used either with a flat roof or a pitched roof (maximum pitch 60°). Where a straight vertical flue is not possible or desired, an offset vertical flue can be used in conjunction with a side horizontal flue extension piece and in-line 135°/90° flue bend (fig. 18).

IMPORTANT NOTES : For greater flue length see twin flue or concentric 80/125 flue instructions

Proceed with installation as detailed in section 5 ignoring all references to horizontal flue installations. Use adhesive tape to attach the template to the wall, making sure that the centre line is vertical and that the flue centre line is virtually below the point at which the flue will exit the roof.

L + L = 3m Max



L+L= 8000 mm

Fig. 18

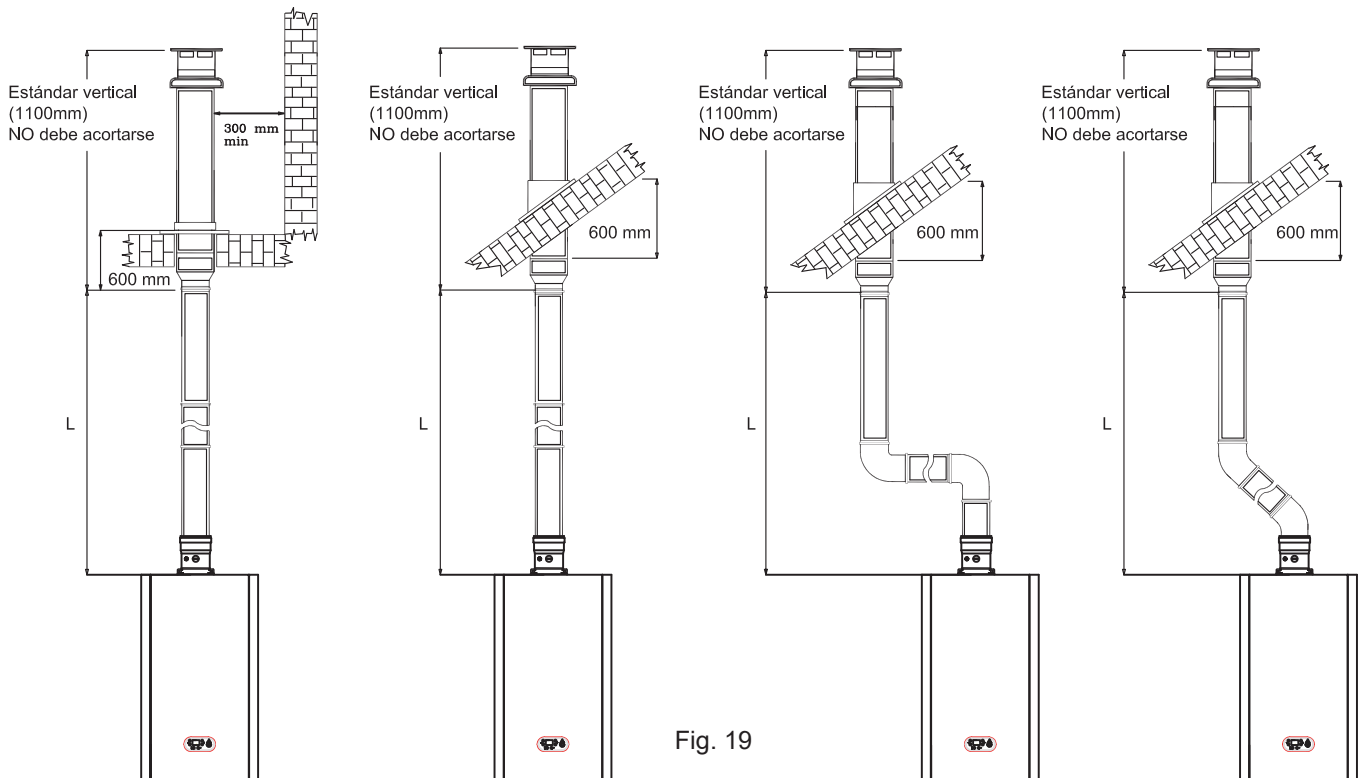


Fig. 19

Straight Flue
 L = 4 m Max
 plus Terminal

Straight Flue
 L = 4 m Max
 plus Terminal

Offset Flue
 L = 2.6 m Max
 plus 2 bend 90°
 and Terminal

Offset Flue
 L = 3.35 m Max
 plus 2 bend 45°
 and Terminal

- Ensure that the maximum permissible flue length is not exceeded (fig. 19 and see table 4).
- Mark the two wall fixing bolt holes
- Detach the template from the wall.
- Use a 10 mm dia. drill to make the 2 holes.
- Insert plastic expansion plug.
- Screw in the two coach bolts.
- Position the flue sample point starter (straight flue header which must be fitted) and fix the securing screw on the flue adaptor appliance

(fig. 20 item 66), and ensure that the gasket is correctly fitted.

Important: Make sure that the inner 60 mm diameter of the straight flue header is inserted fully into the flue manifold, and the flue manifold rubber seal is correctly fitted. (Fig 20 item 65)

Cut a 105 mm diameter hole through the ceiling and/or roof, at the point previously marked.

Fit a roof flashing slate to the roof, available from Ravenheat. Insert the Vertical Flue terminal assembly through the flashing slate from the outside.

Lift the boiler on the wall, locating onto the top two fixing bolts. Tighten the two bolts using a spanner to secure to the wall.

Measure the vertical distance between the top of the flue and the bottom of the flue terminal assembly (fig. 21). The measurements should be taken from the outer diameter of the flue.

NOTE: Where this length does not match any standard combination of the extensions, only the extension can be cut to the required length (fig. 22).

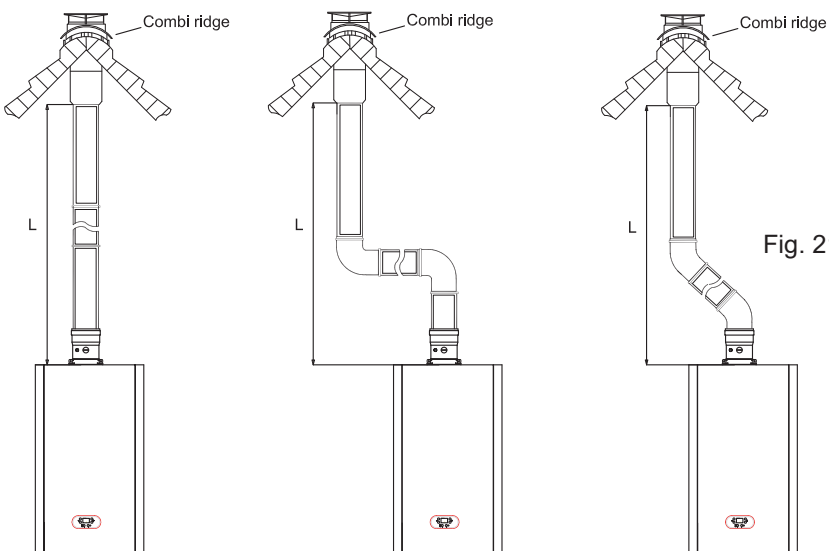
When cutting both inner and outer ducts of the extension, always cut on spigot side, and they must be de-burred.

Starting at the appliance end, assemble the extension duct sections, making each inner and outer (flue) joint by inserting the spigot end into the socket end of the next tube, making sure the seal rings are correctly located (fig. 20). Make sure that the entire flue is adequately supported. Use at least one bracket for each extension used.

Ensure that all inner flue connections have a good fit/seal, and that the space clips in each extension are correctly positioned.

**ACCESSORIES CONCENTRIC FLUE 60/100 EXTRAS:
TABLE 6**

Part. No.	Description
COL0180050	Straight flue header / sample point 60/100
PRFE	Flue Extension 60/100 L1000
PR45FBI	45° bend 60/100
PR90FBI	90° Elbow bend 60/100
PR5023016	Horizontal terminal 60/100
TER180200	Vertical flue Terminal

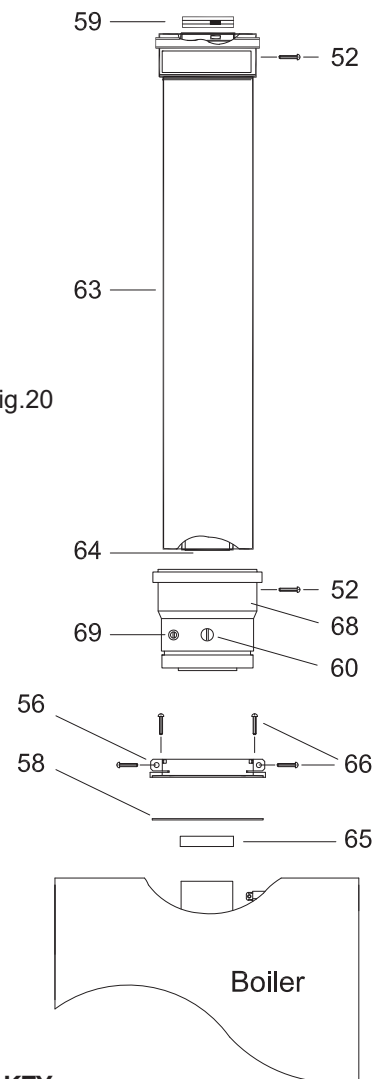


Straight Flue
L = 4 m Max
plus Combi ridge

Offset Flue
L = 4 m Max
plus 2 bend 90°
and Combi ridge

Offset Flue
L = 3 m Max
plus 2 bend 45°
and Combi ridge

Fig.20



KEY

- 52 - Self-cutting joint securing screw
- 56 - Flue adapter
- 58 - Header gasket
- 59 - Rubber seal Ø 60
- 60 - Fumes sample point
- 63 - Flue extension
- 64 - Flue exhaust duct extension
- 65 - Flue manifold rubber seal
- 66 - Securing screw
- 68 - Flue starter
- 69 - Air sample point

Fig.22



IMPORTANT: Please lubricate the internal part of the seals before fitting.

5.13 INSTALLATION INSTRUCTIONS FOR TWIN FLUE PIPE (ECCENTRIC FLUE DUCT SYSTEM)

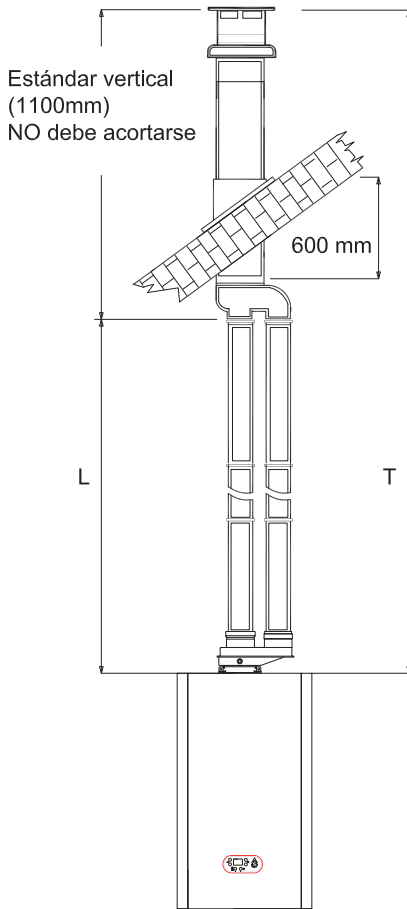


Fig. 23

IMPORTANT: Please, lubricate the internal part of the seals before fitting.

IMPORTANT:

These instructions must be read in conjunction with the main installation and servicing instructions. As with all flues the kits must be installed taking due account of the current issue of BS 5440 parts 1 & 2. Also note that the requirements will vary depending upon the kit being installed. Guidance is provided but unless otherwise stated, always comply with the recommendations of the relevant codes of practice.

TABLE 7

Part. No	Description
SDO180050	Twin flue header F80/F80
PRO180200	Straight pipe L.1000 80
CUR180150	90° elbow bend 80
CUR180200	45° bend 80
GRI180050	Air inlet terminal 80
GRI180100	Exhaust terminal 80
TER060110	Vertical eccentric flue Terminal

5.14 TWIN FLUE INSTRUCTIONS

This part of the installation manual covers the installation and fixing instructions of the twin flue eccentric flue duct systems only. When ordering twin flue it must be stated for LS 24 range. Typical installation procedures are illustrated by drawings. Remove the front panel of the case (sect.8.1). Unscrew the screw (item 66 fig. 17) on the flue adaptor.

Make sure that the flue manifold rubber seal is located into the flue manifold, and lubricate the internal part of the seal before assembly. Locate the header gasket on the twin flue header and push into the flue adaptor making sure that the inner plastic exhaust locates firmly in the outlet spigot of the flue manifold, and screw the securing screw that secure the twin flue header on the boiler. Locate the 2 x 80 mm O-rings in the twin flue header and lubricate the internal part of the seal before assembly to ensure easy snug fit. Figures show the versatility of this flueing system. Measurements and bends must be calculated correctly to ensure the maximum flue length is not exceeded. All located O-rings must be lubricated with a silicone grease to ensure a snug fit.

NOTE: Exhaust flue must slope 1.5° down towards the boiler 25 mm/m fall per metre of flue length.

Spacing Clips

Spacing Clips are available on request should they be required.

NOTE: for eccentric vertical flue a 125 mm (5 in) diameter flashing plate will be required.

IMPORTANT:

- See fig. 6 for terminal clearances.

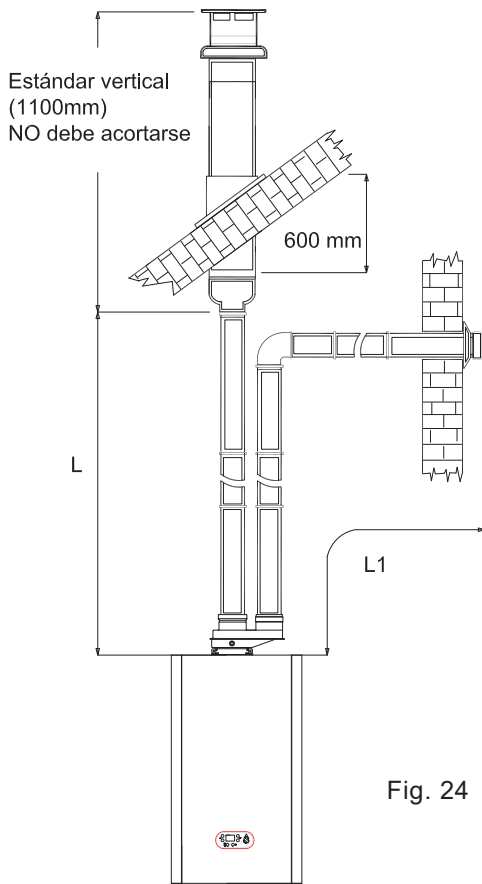


Fig. 24

IMPORTANT NOTICE:

- Inlet and exhaust terminals must never be installed on opposite walls of the building (PrEN 483).
- If the flue terminates less than 2 m above a balcony, above the ground, or above a flat roof to which people have access, then a suitable terminal guard must be fitted.
- Fit only recommended flue terminal guard by securing concentrically around terminal with screws.

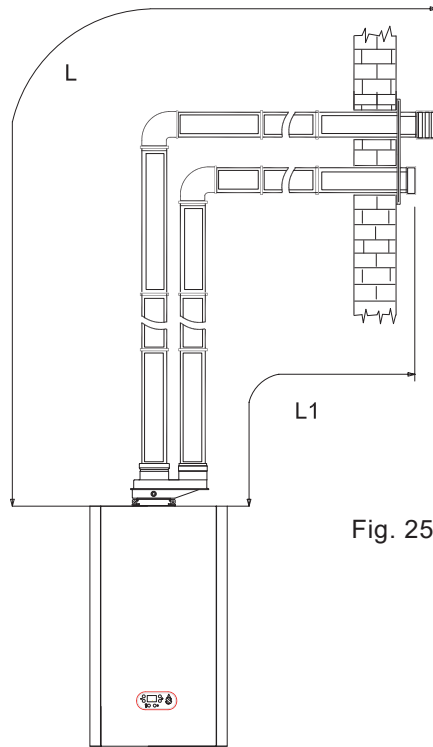


Fig. 25

5.15 Exhaust/suction system with concentric pipes for flat or sloping roofs. Extensions with two separate pipes (fig. 24).

Maximum distance: $T = L = 5 + 5 = 10$ metres + Terminal

Minimum distance: $L = 0.5 + 0.5 = 1$ metres + Terminal
Exhaust terminal must not be cut.

NOTE:

- If bends are used in the exhaust flue then horizontal sections must be avoided and there must be a 1.5° slope
- Towards the boiler 25 mm fall per metre.

When fitting the twin flue due attention, checking that the gaskets are in correctly positioned.

Insert the diaphragm into the fan outlet.
The diameter varies as follows:

- from 1 to 5 meters diam. 44
- from 6 to 10 meters diam. 46.

5.16 Exhaust/suction system with with two separate rated 80 dia. pipes exhaust on flat or sloping roof, suction from vertical wall (fig. 24).

Maximum distance $D = L + L1 = 10$ metres + Terminal
Minimum total length = 2 metres

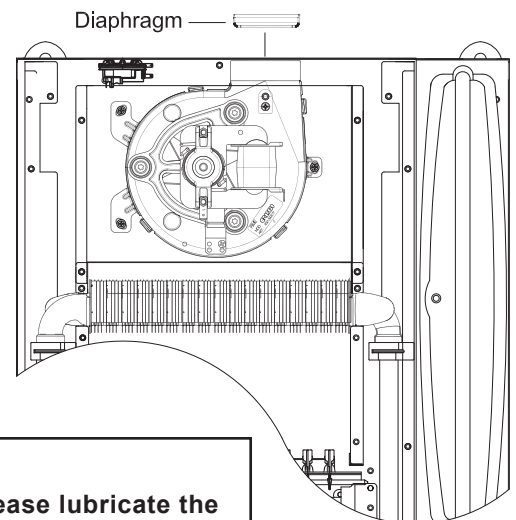
NOTE: Exhaust flue must slope 1.5° down towards the boiler 25 mm fall per metre.

5.17 Exhaust/suction system with two separate pipes through a single vertical wall (fig. 25).

Maximum distance: $D = L + L1 = 10$ metres

Minimum distance: $D = L + L1 = 1$ metres

Min distance between pipe 50 mm.



IMPORTANT: Please lubricate the internal part of the seals before fitting.

5.18 INSTALLATION INSTRUCTIONS FOR CONCENTRIC 80/125 FLUE SYSTEM

The vertical 80/125 flue kit is intended for use where a horizontal 60/100 flue outlet is not possible or desired.

The vertical flue can be installed on either a flat roof or a pitched roof (maximum pitch 60°).

Where a straight vertical flue is not possible or desired, an offset vertical flue can be used in conjunction with a side horizontal flue extension piece and an inline 135°/90° flue bend (fig. 26).

IMPORTANT:

See fig. 6 for terminal clearances.

IMPORTANT NOTICE:

When using our vertical flue kit the 125 mm x 100 reducer is supplied complete with the vertical terminal simply remove this and fix it into the straight flue header (which must be fitted) on the top of the boiler.

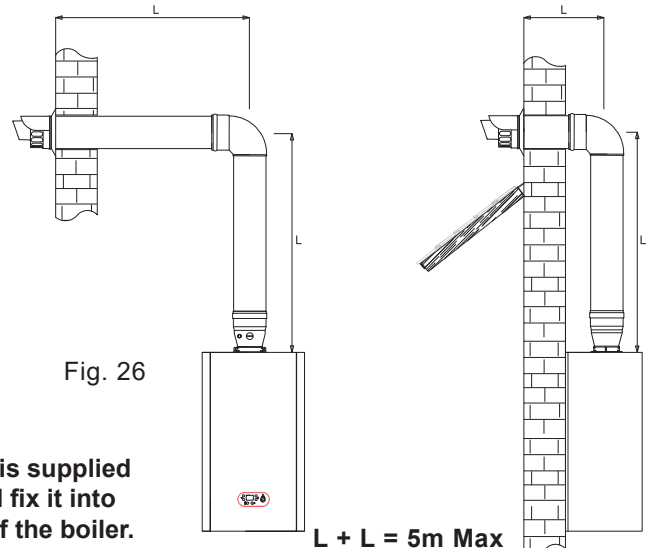


Fig. 26

L + L = 5m Max

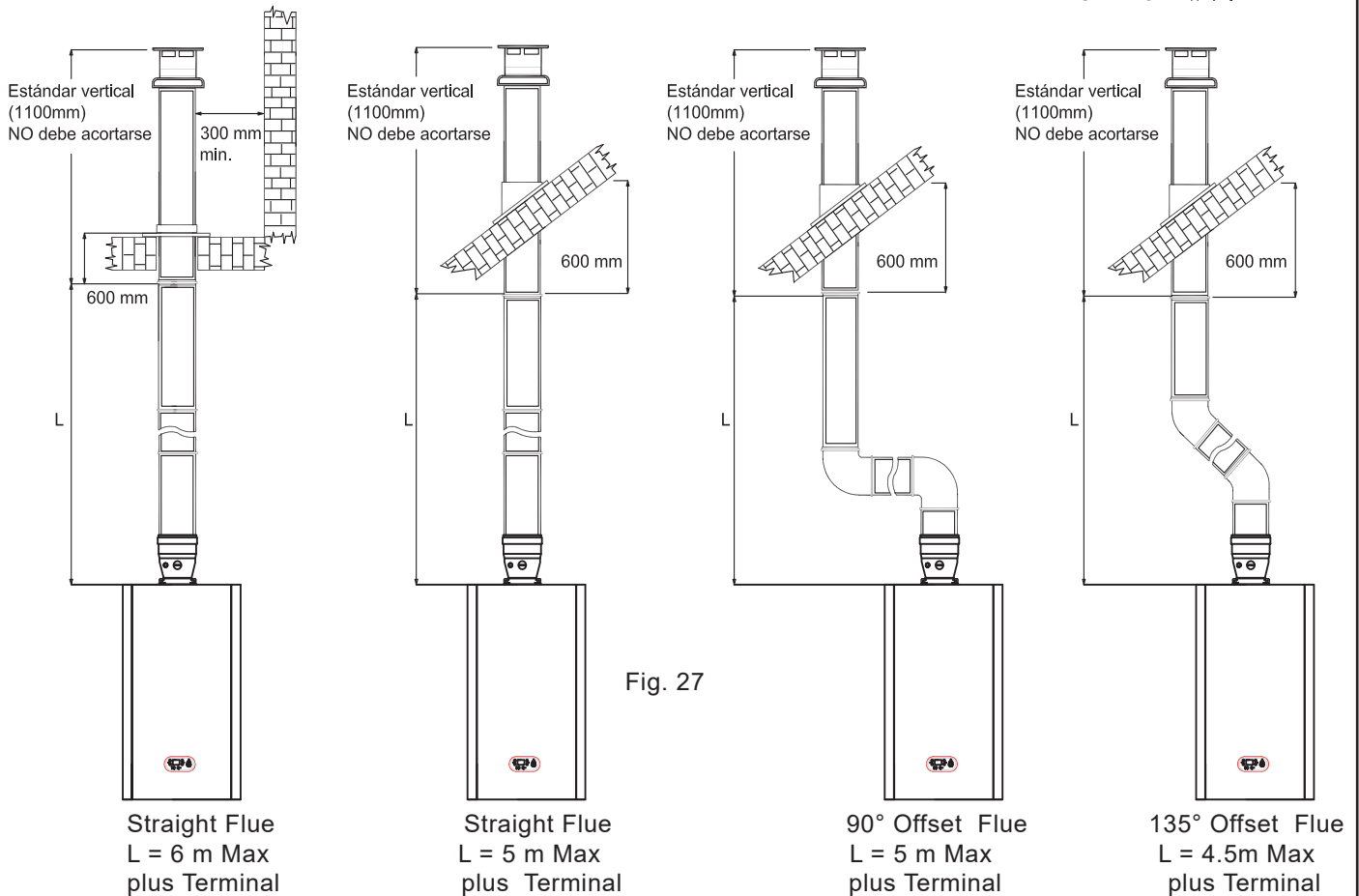


Fig. 27

Straight Flue
L = 6 m Max
plus Terminal

Straight Flue
L = 5 m Max
plus Terminal

90° Offset Flue
L = 5 m Max
plus Terminal

135° Offset Flue
L = 4.5 m Max
plus Terminal

NOTE : If using Flue arrangement in fig. 27 then the 125x100 Flue reducer must be purchased separately.

TABLE 8

Part No	Description
COL160050	Straight flue header / sample point 60/100
PRO110300	Flue Extension 80/125 L1000
RID110050	125/80 to 100/60 Flue reducer
CUR110250	45° flue bend 80/125
CUR110300	90° elbow flue bend 80/125
TER010050	Horizontal Flue Terminal 80/125
TER110200	Vertical Flue Terminal 80/125
TEG060051	Flashing sleeve/slate

IMPORTANT: Please lubricate the internal part of the seals before fitting.

5.19 ASSEMBLE BOILER

5.20 Fitting valve pack

Remove plastic caps from boiler connection and fit valves as per fig. 28 using the washers provided.

It is recommended fitting the valve pack before installing the boiler on the wall.

5.21 GAS CONNECTION (Fig. 28)

A minimum working gas pressure of 20 mbar (8 in w.g.) must be available at the boiler inlet at full flow rate. (Also see section 4.6)

Fit the gas service cock to the boiler via the union nut and connect gas pipe. Do not over tighten and use another spanner as a counter force to avoid straining internal connections. Important consult (sect 4.6).

5.22 CENTRAL HEATING CONNECTION (Fig. 29)

Before any central heating connections are made to the boiler all system valves should be opened and the system thoroughly flushed out with cold water.

- Connect the central heating return pipe to the isolating cock.
- Connect the central heating flow pipe to the isolating cock marked CHF.
- Pipe dimensions and positions are marked on template supplied (fig. 29).

5.23 DOMESTIC HOT WATER CONNECTION (Fig. 28)

The domestic hot water circuit does not need a safety valve but it is essential to ensure that the pressure of the cold water supply does not exceed 10 bar. If in doubt it is advisable to install a pressure reducing valve. The minimum pressure needed to operate the domestic hot water system is 0.5 bar with a flow of approx 3 L per min. Flush out all foreign matter from the supply pipe before and after connecting to the appliance.

- Connect the 15 mm. cold water pipe to the appliance inlet.
- Connect the 15 mm. hot water pipe to the appliance outlet.

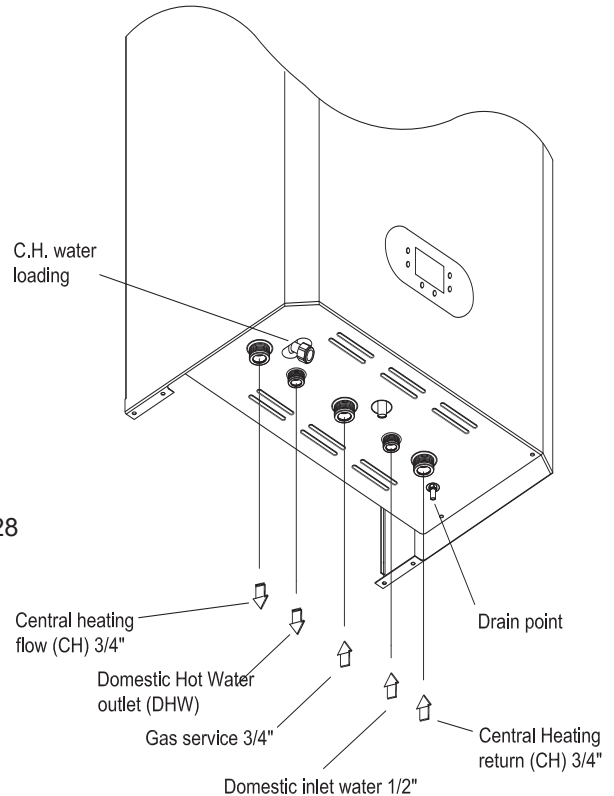


Fig.28

5.24 POSITION OF WATER/GAS CONNECTIONS

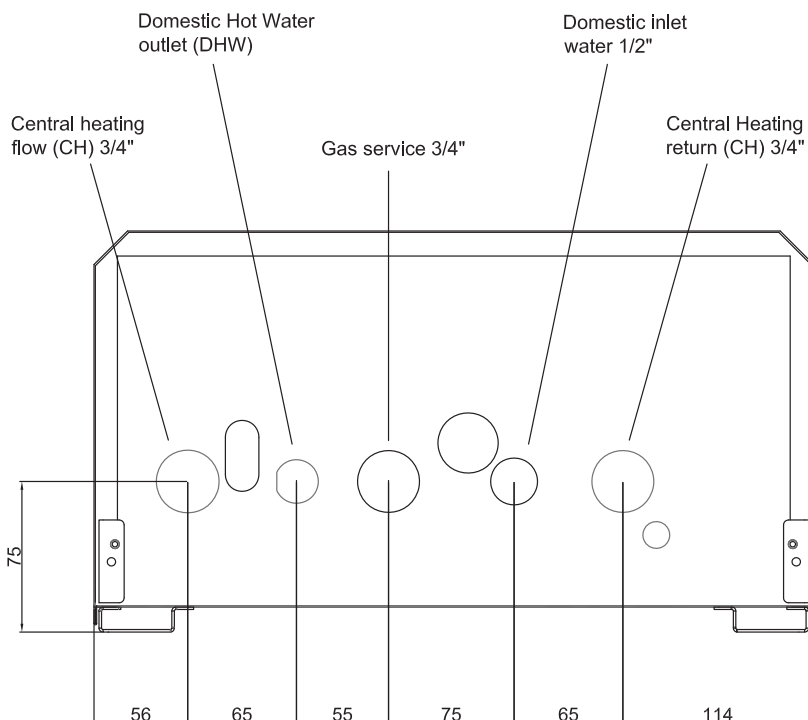


Fig. 29

5.25 SAFETY VALVE DISCHARGE

The safety valve is located to the rear (15 mm copper) to permit a discharge pipe to be connected. When connecting ensure the discharge pipe does not restrict access. The discharge should terminate facing downward exterior to the building in a position where discharging (possibly boiling water & steam) will not create danger or nuisance, an easily visible position, and not to cause damage to electrical components or wiring. The discharge must not be over an entrance or a window or any other type of access.

5.26 EXTERNAL CONTROLS

IMPORTANT:

Electricity supply must be as specified in clause (sect. 4.22).

- When controls external to the appliance are required, design of the external electrical circuits should be undertaken by a competent person. In accordance with the IEE wiring regulations.

It is essential that all external controls are VOLT FREE.

Factory fitted internal wiring must not be disturbed when wiring external controls.

- To gain access to the electrical box remove the front panel of the case as described in clauses sect. 8.2.
You can slide towards the top the instrument panel box and push the retaining latches and remove the instrument panel (sect. 8.24).
- Heat resistant flexible cable is fitted between the isolator and the terminal block which is a 3 core cable of 0.75 mm² (24x0,2 mm) to BS 6500.

Make sure all wires to the appliance are routed away from sharp edges and hot surfaces.

The cable must be fastened with its cord anchorage and connected so that it should make the cable slip from the anchorage until the current carrying conductors

become taut before the earthing conductor. Securely tighten all terminal screws and arrange the cable with slack between the cord anchorage and the terminal block.

WARNING:

If the supply cord is damaged, it must be replaced by a service engineer (supply cord available from Ravenheat).

5.27 OUTDOOR SENSOR

For use, consult Outdoor Sensor instructions.

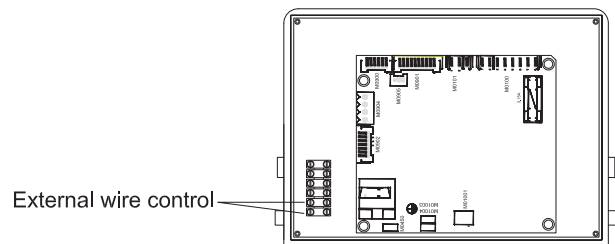


Fig. 30

6 COMMISSIONING

Each boiler has been through a rigorous operational testing procedure at our factory and should not require any further adjustment, if you are not the installer but just commissioning this boiler check that the boiler has been installed in accordance with these instructions, and the integrity of the flue system and the flue seals, as described in the flue installation section.

N.B.: The safety valve is set to lift at 3 bar (30 m/42.5 psi).

To lower the system pressure to the required value unscrew the drain point (fig. 32) or drain on the heating circuit.

6.1 GAS SUPPLY INSTALLATION

Inspect the entire installation including the gas meter, test for soundness and purge, all as described in BS 6891.

6.5 FILLING THE HOT WATER SYSTEM

Close all hot water draw-off taps.
Open the cold water inlet cock.
Slowly open each draw-off tap until clear water is discharged.

6.2 ELECTRICAL INSTALLATION

Preliminary electrical systems checks to ensure electrical safety shall be carried out by a competent person.

ALWAYS carry out the preliminary electrical system checks:

i.e. earth continuity, polarity, resistance to earth and short circuit, using a suitable test meter.

6.6 LIGHTING THE BOILER

Before lighting the boiler make sure that the heating circuit flow and return valves are open and also that the cold water input cock is open.

- If external controls are installed (E.g. time clock and thermostat) make sure that they are calling for heat.
- Select winter function, the winter icon in digital display will be flashing.
- To select the minimum heating temperature press the radiator button.

6.3 INITIAL FILLING OF THE SYSTEM

Open central heating flow and return valves Unscrew the cap on automatic air release valve positioned on the top of the pump housing one full turn (leave open permanently).

- Close all air release taps on the central heating system. Press the info button to display the current pressure (code E08 will display if the pressure is nil/too low).
- Gradually open stopcock at the filling point connection to the central heating system until water is heard to flow.
- Starting with the lowest radiator open each air release tap in turn. Close when the water is clear, free of bubbles and flows out. In the same way release air from any high points in the pipework.
- Continue filling the system until 1.5 bar register on digital display. Press the ESC button once again to return to the main screen.
Then turn off the filling points stopcock.
- Inspect the system for water soundness and remedy any leaks discovered.

IMPORTANT:

Before lighting the boiler select the minimum central heating temperature. This must be left at minimum for approx 5 mins to purge air safely from the boiler.

6.4 SETTING THE HEATING SYSTEM DESIGN PRESSURE

The design pressure must be a min. 1bar and max. 1.5 bar.

The actual reading should ideally be 1 bar + the height in metres to the highest point of the system above the base of the appliance (up to max of 1.5 bar).

- The ignition control will automatically make three attempts to start, if it doesn't start this may be due to air in the gas supply line. If the burner fails to light, the digital led display and fan will stop, and the display will show the lockout code (E01 depicts flame failure).
- If necessary push the boiler Reset button (item 2 fig.1) and the boiler will restart automatically.
- After the boiler has lit, allow to warm at minimum temperature setting to purge any air from the system.
- Once the system has been purged of air, set the heating temperature to the desired setting.
- To select the minimum heating temperature press the radiator button.
- Press arrow up and arrow down buttons to adjust.
- The digital display shows the current set temperature in central heating.
- After a few seconds the digital display shows the central heating temperature in demand (CH icon flashing, item 3 fig. 2).
- The fan starts and after a few seconds or so the digital led display will show that the ignition has commenced.

6.7 CHECK THE GAS PRESSURE

Check the gas mains pressure at the gas valve inlet pressure test point (fig.31) with the boiler operating at full rate.

Check with the Local Gas supplier if the pressure differs significantly from 20 mbar G20 (natural gas).

With leak detection fluid test for gas tightness of all gas components and joints.

- 1 - Inlet pressure
- 2 - Electrical connections
- 3 - Max min pressure regulator nuts
- 4 - Gas valve modulator
- 5 - Outlet pressure

Fig. 31

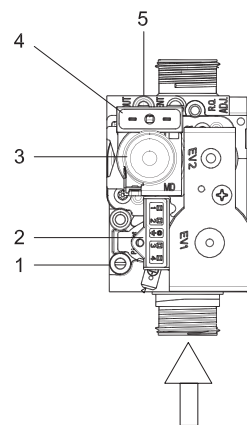
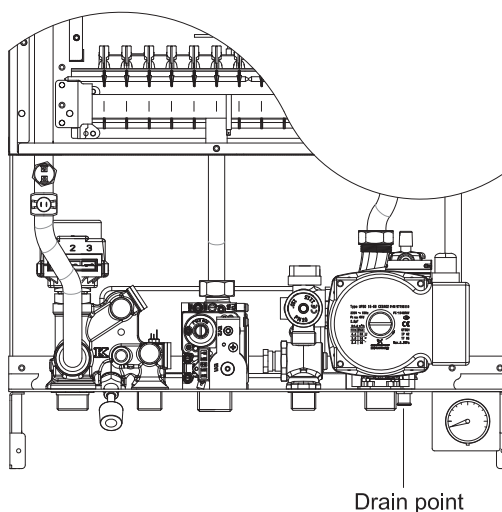


Fig. 32



6.8 CHECKING THE FLUE SYSTEM

The flue system should be visually checked for soundness. Check all connections and fixings are secure and tight.

6.9 CHECKING THE HEATING THERMOSTAT

Allow the system to warm up and then select the C.H thermostat to ensure the main burner modulates from "high" to "low" and "low" to "off" and vice versa (scale range covers approx. 35 °C - 85 °C, sec 1.5 key 5 to set heating temperatures).

6.10 TESTING AND REGULATING THE DOMESTIC HOT WATER SYSTEM FLOW AND CHECK THE OPERATIONAL (WORKING) INLET PRESSURE

Set up the boiler to operate at maximum rate by opening the hot tap to maximum flow. With the boiler operating at the maximum rate check the operational dynamic (working) gas pressure test complies with the requirements.

Ensure that this inlet pressure can be obtained with all other gas appliances in the property working.

Put the appliance in summer position (item 1 fig. 1).

- Open a domestic hot water tap (preferably the bath tap). Ensure the cold water inlet stopcock is open and the DHW is set at maximum, press the arrow up (item 3 fig. 1) the digital display shows the set temperature, if necessary adjust with arrow up and arrow down buttons.
- After a few seconds the digital display shows water temperature in demand (D.H.W. icon flashing, item 1 fig. 2).
- If the boiler does not light check that the water flow rate is above the min. required to operate the differential pressure 2.8 L/min. (0.61 gals/min).
- The temperature of the water will depend on the rate at which it flows. If, due to high water pressure, the flow rate is too high (and the temperature too low for practical use) the flow rate may be adjusted. It is better to set for the lowest acceptable temperature preferably at the bath tap since the user can gain higher temperatures at other restricted flow taps.
- If the cold supply is subject to large fluctuations or is above the permitted max. water pressure, a suitable pressure/flow regulator should be fitted on the cold water supply to the appliance.

- Slowly close the draw off tap to reduce the flow rate to the min (approx. 2.8 L/min).
- Select a different temperature for DHW. to ensure it operates at its various setting.
- Close the draw-off tap still further. The burner should stop when the rate falls below about 2.8 L/min (0.61 gals/min).

6.11 RANGE RATING CENTRAL HEATING OR/AND DOMESTIC HOT WATER

The boiler comes set, in Central heating, at the MID RANGE of its output.

The boiler has already been adjusted by the manufacturer during production. If the adjustments need to be made again at maximum and minimum power remove cap covering modulator to gas valve and use a screw driver to turn the nut (Fig. 31 item 3). Clockwise to increase pressure and anti-clockwise to decrease pressure. When adjust the minimum power detach the cables connected to the modulator.

The adjustment must be strictly in the sequence indicated, by qualified personnel only.

RATIO BETWEEN FAN SPEED AND HEAT INPUT

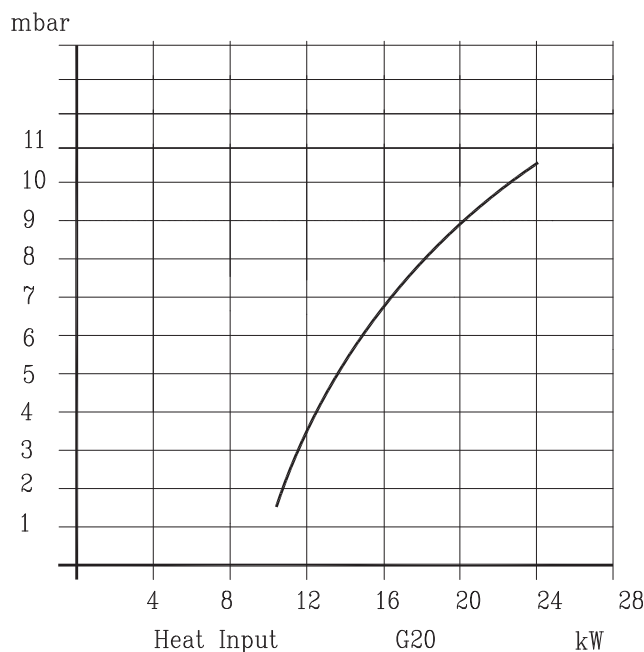


Fig. 33

6.12 TEST MODE

It is possible to activate the test mode by pressing the RESET and the ARROW UP buttons (item 2 and 4 fig. 1) together for 3 seconds.

Press the ARROW UP and the ARROW DOWN buttons (item 3 and 4 fig. 1) to set the maximum or minimum power.

The function is enabled for maximum 15 minutes.

Press RESET to esc test mode.

6.13 INSTRUCTING THE USER

After completion of the installation and commissioning of the system, the installer should hand over to the householder by taking the following actions:

- Explain and demonstrate the lighting and shutting down procedures.
- Show the user the location of the filling valve and how to top-up the system pressure correctly.
- Explain the operation of the boiler including the use and adjustment of ALL system controls which should be fully explained to the householder. This will ensure the optimum fuel economy for the household requirements of both heating and hot water consumption. Advise the User of the precautions necessary to prevent damage to the system, and to the building, in the event of the system remaining inoperative during frost conditions.
- Explain the function and the use of the boiler, the summer/winter button, the ON/OFF switch and the reset of the digital display.
- Explain and demonstrate the function of the temperature controls, radiator valves etc. for the economic use of the system.
- If an external time clock is fitted, then draw attention to ensure the boiler timer is left in the manual position.
- Stress the importance of regular servicing by a qualified Heating Engineer and that a comprehensive service should be carried out AT LEAST ONCE A YEAR.
- Explain to the user how to isolate the appliance from the gas, water and electricity supplies and the locations of all drain points.

7 SERVICING INSTRUCTIONS

During routine servicing, and after any maintenance or change of part of the combustion circuit, the following must be checked:

- The integrity of the flue system and the flue seals.
- The integrity of the boiler combustion circuit and the relevant seals.
- The operational dynamic (working) gas inlet pressure at maximum rate.
- The gas rate.
- Check all joints and connections in the appliance and remake any that show signs of leakage.

COMPETENCE TO CARRY OUT THE CHECK OF COMBUSTION PERFORMANCE.

Please note: BS6798:2009 Specification for installation and maintenance of gas-fired boilers of rated input not exceeding 70 kW net advises that:

- The person carrying out a combustion measurement should have been assessed as competent in the use of a flue gas analyser and the interpretation of the results.
- The flue gas analyser used should be one meeting the requirements of BS7927 or BS-EN 50379-3 and be calibrated in accordance with the analyser manufacturers requirements.
- Competence can be demonstrated by satisfactory completion of the CPA1 ACS assessment which covers the use of electronic portable combustion gas analysers in accordance with BS 7967, Parts 1 to 4.

7.1 BOILER FROST PROTECTION

The appliance has a built in frost protection device that protects the boiler from freezing. With the gas and electric supplies ON and irrespective of any room thermostat setting, the frost protection device will operate the pump when the temperature falls below 10 °C and will operate the burner when the temperature falls below 5°C.

The burner will switch off when the temperature reaches 27 °C. When the frost protection device operates "AF" is displayed on the digital display.

IMPORTANT NOTE:

The system should be protected by incorporating a system frost thermostat.

To ensure continued efficient operation of the appliance it is necessary to carry out servicing and cleaning at regular intervals. The frequency of servicing and cleaning will depend upon the particular installation conditions and usage but in general, once a year is advisable.

WARNING:

Before the start of any servicing or replacement of components always isolate the electricity supply to the appliance and always turn off the appliance gas supply at the gas service cock.

The data badge is positioned low on the inside left panel.

- The following notes apply to the appliance and its controls but it should be remembered that attention must also be paid to the heating and hot water circuits with special attention to radiator valves, thermostats, clocks, leaking hot water taps etc.
- Where it is necessary to replace a gasket that relies on adhesive for securing - this adhesive will be supplied with the gasket as a spare item.
- In all cases prior to servicing, remove the front panel of the case. Operate the appliance by turning the hot water services on to a high water flow. Measurement of the products of combustion can be achieved by connection of a probe to the combustion analyser test point.

- IMPORTANT:

After completing any servicing or replacement of gas carrying components it is essential that a test for gas soundness is always carried out along with functional checks in operation.

7.2 TO INSPECT AND CLEAN THE APPLIANCE

Before carrying out the cleaning operation, cover the electrical control panel with a piece of waterproof material to protect it from debris.

Inspect the heat exchanger for any blockage. Deposits of any material should be brushed away using a soft brush.

NOTE: Do not use brushes with metallic bristles.

Examine internal pipe-work connections and automatic air vent for any water leaks and rectify if necessary.

Examine and remove loose debris from the combustion chamber using a soft brush and vacuum cleaner. (Ensure the water is kept away from electrical components).

Examine the spark and sensing electrode for any mechanical damage. Clean away any debris and check the spark and sensing gap.

Examine flue duct and flue manifold and ensure that there is no obstruction. Examine the gasket at the entry into the flue manifold.

It is essential that a good seal is made at the outlet to the flue manifold, renew this gasket if there is any sign of damage or deterioration.

8 REPLACEMENT OF PARTS

8.1 GENERAL

Replacement of parts must be carried out by a competent person.

Before replacing any parts the boiler should be isolated from the mains electric supply and the gas should be turned off at the service cock on the boiler.

After replacing any parts always test for gas soundness and if necessary carry out functional test of the controls.

For replacement of parts, the front, and bottom panels of the boiler will need to be removed (it is not necessary to remove the side panels as all parts are accessible from the front or beneath the boiler).

8.2 TO REMOVE THE BOILER PANELS

To remove the front panel unscrew the two lower screws that secure the front panel to the boiler and lift off.

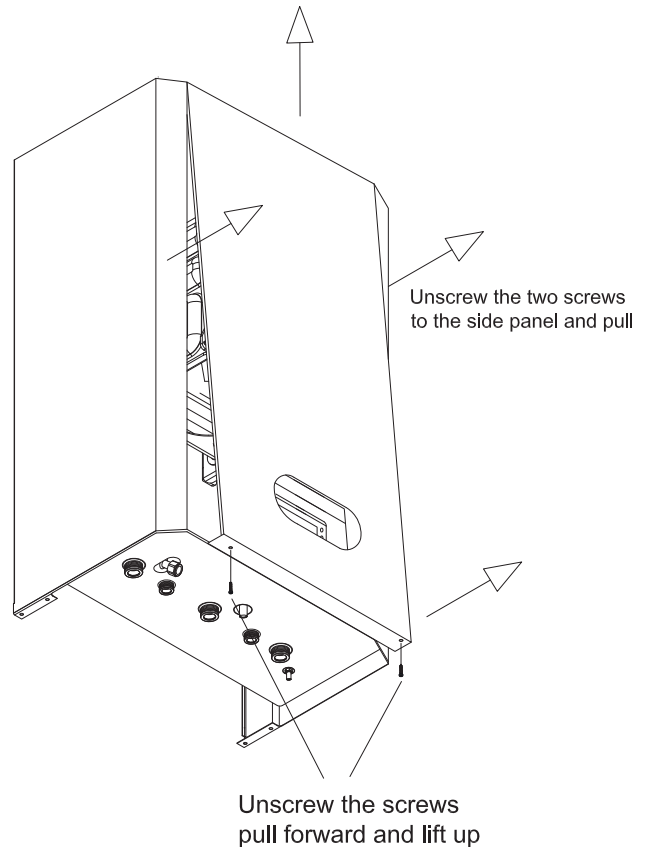


Fig. 34

8.3 TO REMOVE LEFT AND RIGHT PANELS (Fig. 35)

Remove the front panel (fig. 34).
 Unscrew the four screws to the bottom panel.
 Unscrew the two screws to the side panel and pull.

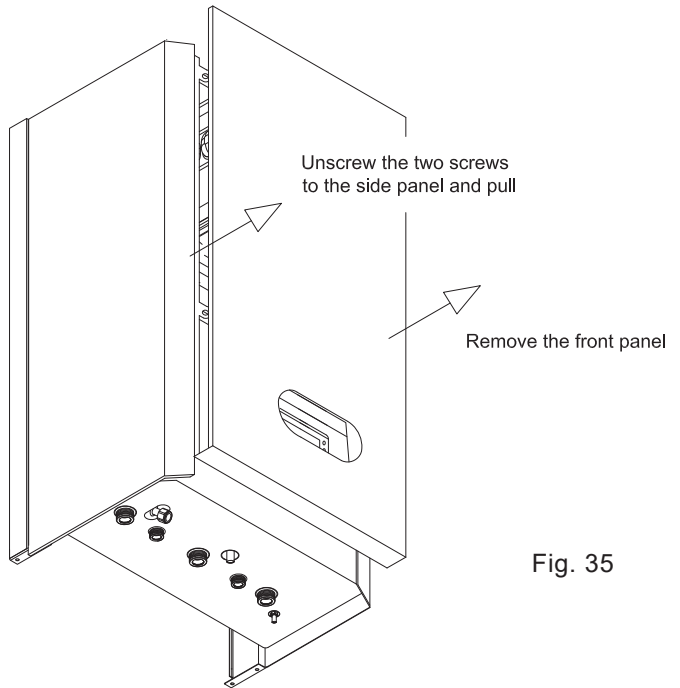


Fig. 35

8.4 TO REMOVE/REPLACE FAN (Fig. 361)

Remove the front panel (fig. 34).
 Unscrew the gas pipe nut and remove the retaining clip. Detach the connectors from the fan. and unscrew the screws that fix the fan. Pull forward.
 Replace in reverse order.

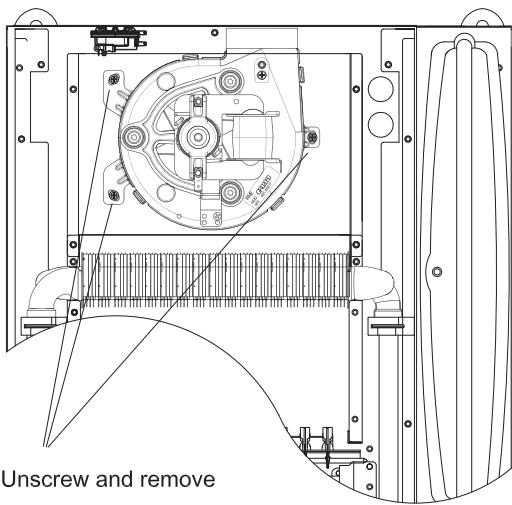
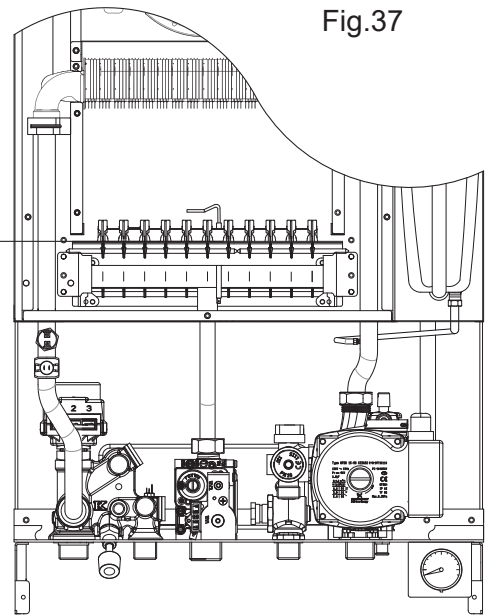


Fig.36

Fig.37

Unscrew the screw



8.5 TO REMOVE/REPLACE THE ELECTRODE (FIG.37)

Remove the front panel (fig. 34).
 Remove the depression chamber cover and the combustion chamber cover.
 Detach the connector from the electrode.
 Unscrew the screw that fix the electrode to the burner.
 Replace in reverse order.

8.6 TO REMOVE/REPLACE THE MAIN HEAT EXCHANGER

Remove the front panel (fig. 34).
 Drain the boiler CH circuit and drain the DHW circuit.
 Remove the depression chamber cover and the combustion chamber cover.
 Remove the flow and the return pipe then carefully ease the heat exchanger out.

CAUTION : There will be water in the heat exchanger.

Replace in reverse order, always use new O-ring seals.

8.7 TO REMOVE/REPLACE EXPANSION VESSEL (Fig. 38)

Remove the front and right panels (fig. 34/35).
Close the on/off valves for the heating circuit and drain the water at the drain point (fig.32). Unscrew the fixing nut on the top and the nut connecting the expansion vessel. Lift up the vessel and remove.
Replace in reverse order. Use a new gasket, taking care to ensure they are replaced correctly.

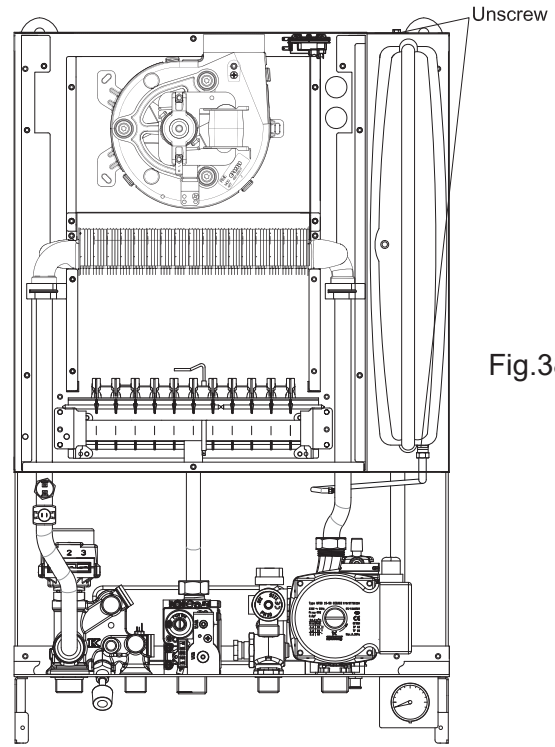


Fig.38

8.8 TO REMOVE/REPLACE GAS VALVE (Fig. 39)

Remove the front panel. (fig. 34).
Unscrew the nut at the top and the two screws on the bottom of the gas valve.
Replace in reverse order.

IMPORTANT:
when the gas valve is re-fitted, **check the pressure and adjust if necessary (see section 6.7).**

8.9 TO REMOVE/REPLACE PLATE HEAT EXCHANGER (Fig. 40)

Remove the front panel (fig. 34).
Remove the panel control box.
Close off the on/off valves for CH circuit and DHW circuit and drain the boiler and drain hot water from the lowest hot water tap.
Unscrew the two allen screws that connect the DHW heat exchanger and pull it out from the boiler.
Replace in reverse order.
NOTE: Always use new O-rings.

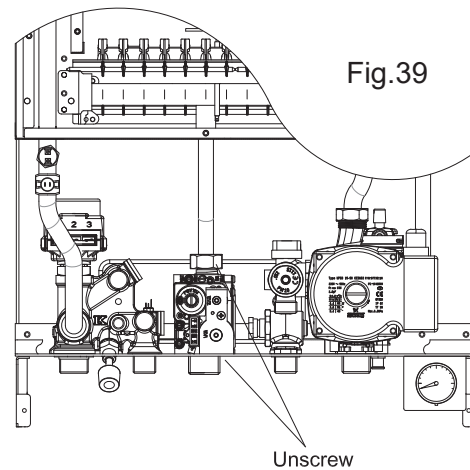


Fig.39

8.10 TO REMOVE/REPLACE THE WATER PRESSURE SWITCH (Fig. 41)

Remove the front panel (fig. 34).
Close the on/off valves for the heating circuit and drain the water at drain point (fig.32).
Detach the wire connector, remove the securing clip.
Replace in reverse order.

8.11 TO REMOVE/REPLACE DIVERTER VALVE MOTOR (Fig. 41)

Remove the front panel (fig. 34).
Detach the electrical plug and remove the retaining clip. Replace in reverse order.

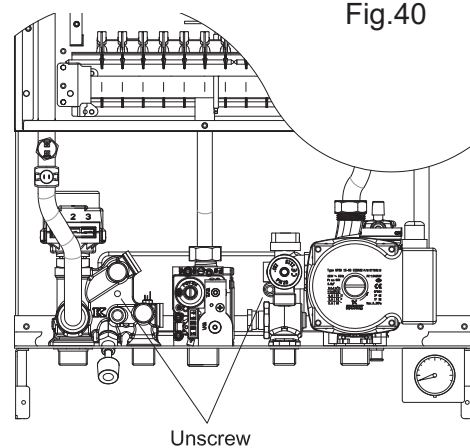


Fig.40

8.12 TO REMOVE/REPLACE C.H. DIVERTER VALVE (Fig. 46)

Remove the front panel (fig. 34).
 Remove the panel control box.
 Close the on/off valves for the heating circuit and drain the water at drain point (fig.46).
 Remove diverter valve motor switch, to allow access and unscrew the C.H.diverter valve (fig.41).
 Replace in reverse order.
 NOTE: Always use new O-ring.

8.13 TO REMOVE/REPLACE PUMP (Fig.47)

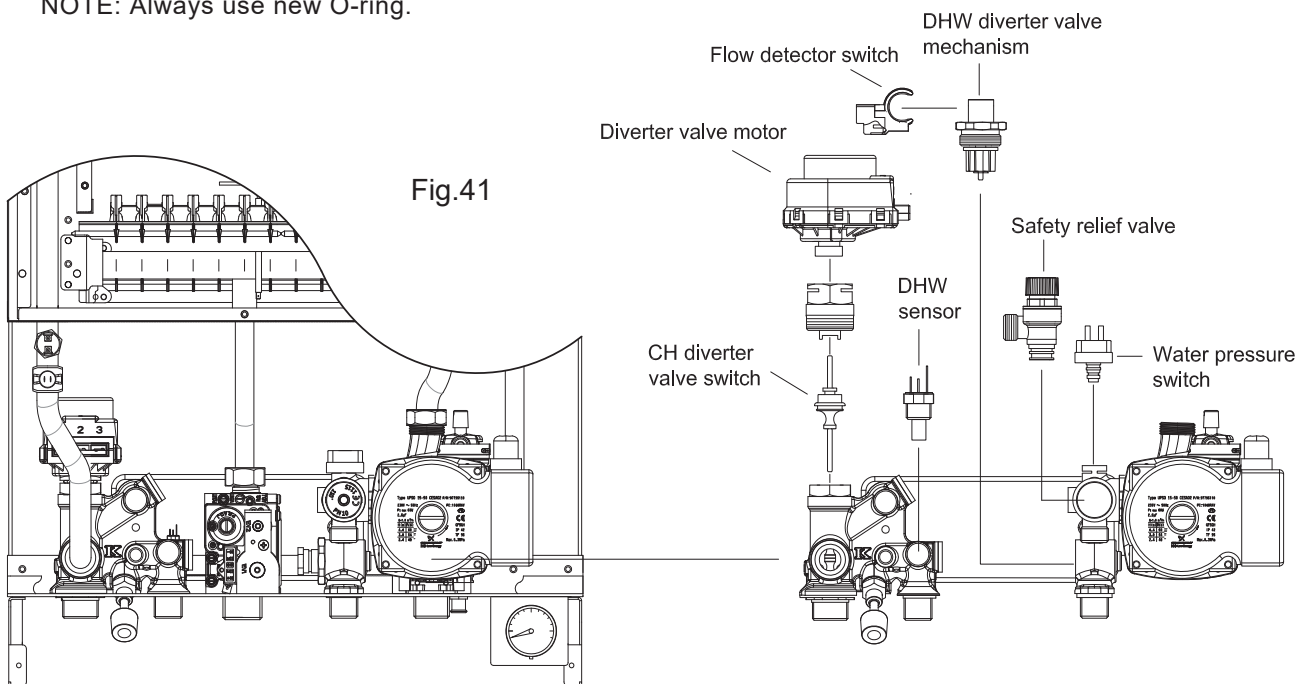
Remove the front and right panels (fig. 34/35).
 Close the on/off valves for the heating circuit and drain the water at drain point (fig.32).
 Detach the supply wire connector from the pump.
 Unscrew the nut that fastens the pump to the CH pipe and remove the pump and remove the securing clip at the pump manifold.
 Replace in reverse order.
 NOTE: Always use new O-ring.

8.15 TO REMOVE/REPLACE D.H.W. DIVERTER VALVE MECHANISM (Fig. 41)

Remove the front panel. (fig. 34/35).
 Remove the panel control box.
 Close the on/off valves for the heating circuit and drain the water at drain point (fig.32).
 Remove flow detector and unscrew DHW diverter valve.
 Replace in reverse order.
 NOTE: Always use new O-ring.

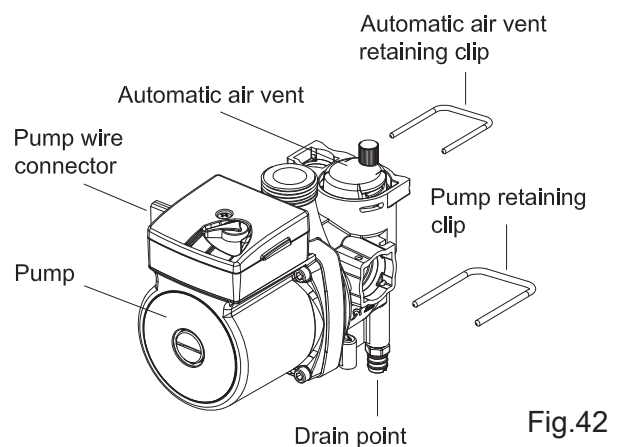
8.16 TO REMOVE/REPLACE SAFETY RELIEF VALVE (Fig. 41)

Remove the front panel (fig. 34).
 Close the on/off valves for C.H. circuit and drain the water from at drain point fig.32.
 Unscrew the safety relief valve screw and pull up.
 Replace in reverse order and using a new gasket.



8.14 TO REMOVE/REPLACE AUTOMATIC AIR VENT (Fig. 42)

Remove the front and left panels (fig. 34/35).
 Remove the panel control box.
 Close the on/off valves for C.H. circuit and drain the water from at drain point.
 Remove the clip and pull the automatic air vent from the pump.
 Replace in reverse order.
 NOTE: Always use new O-ring.



8.17 TO REMOVE/REPLACE D.H.W. SENSOR

(Fig. 41)

Remove the front panel (fig. 34).
 Close the on/off valve for the DHW circuit and drain the hot water from the lowest hot water tap.
 Detach the wire connector and unscrew the sensor.
 Replace in reverse order.

8.18 TO REMOVE/REPLACE C.H. FLOW
(Fig. 43)

Remove the front panel (fig. 34).
 Detach the wire connector and remove the retaining clip sensor from the pipe.
 NOTE: When reconnecting ensure the correct wires go to the t sensor (the polarity on each one is unimportant).

8.19 TO REMOVE PANEL CONTROL BOX
(Fig. 44,45).

Remove the front panel (fig. 34).
 Lift and rotate the control box until it is slightly out of the boiler.
 As doing so move the box forward until the control box becomes free or lift and rotate the box until the box became stop.

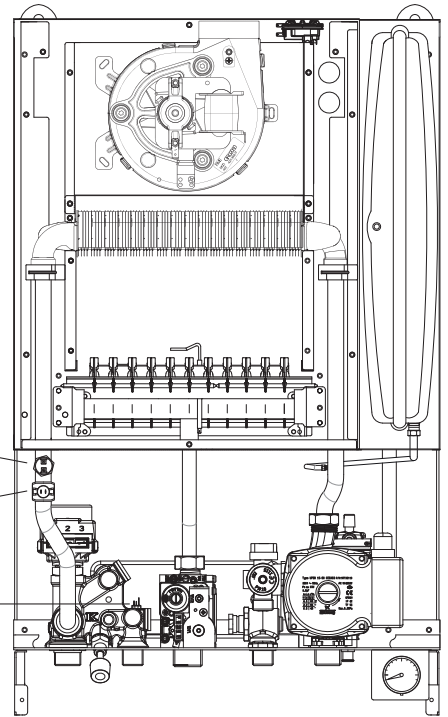


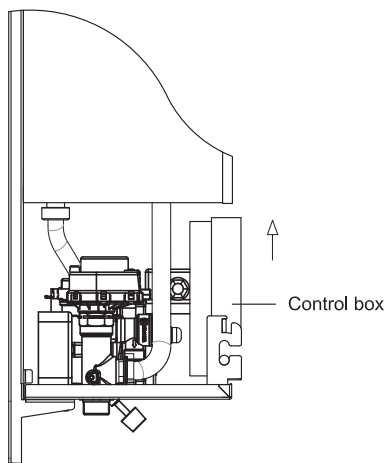
Fig.43

8.20 TO REMOVE/REPLACE CONTROL BOARD AND DIGITAL DISPLAY.

Remove the front panel (fig. 34).
 Lift and rotate the control box.
 Unscrew the four screws of control box cover and remove it.
 Detach all connectors from control board, unscrew the four screws and lift up.
 Replace in reverse order.

8.21 EXTERNAL CONTROL CONNECTION
(Fig. 30)

Remove the front panel (fig. 34).
 Remove the external wire link on the panel control box.
 Replace with external wire controls.
(These must be volt free).



Lift and rotate the control box

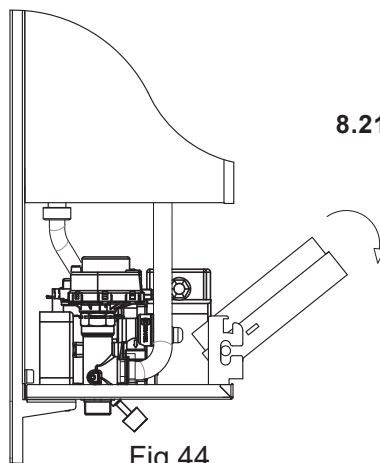
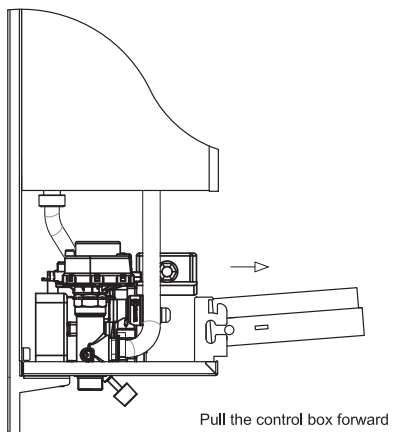


Fig.44



Pull the control box forward until the box becomes free or lift and rotate until the box becomes stop

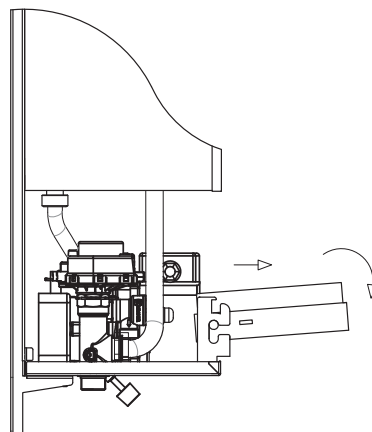


Fig.45

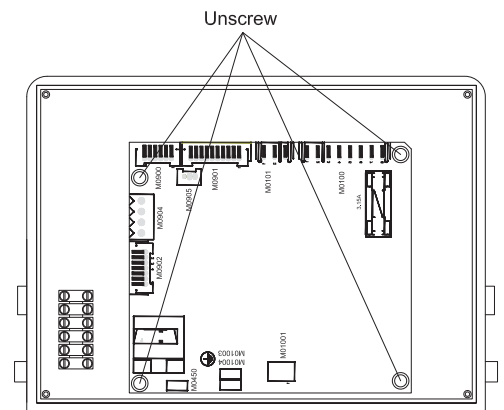


Fig.46

8.22 TO REMOVE/REPLACE THE BURNER (FIG. 47/48)

Remove the front panel (fig. 34).
Remove the depression chamber cover and the combustion chamber cover.
Detach the connector from the electrode and unscrew the four screws that fix the burner to the injectors collector and remove it.
Unscrew the gas pipe nut and unscrew the screws that fix the injectors collector to the boiler and remove it.
Replace in reverse order.

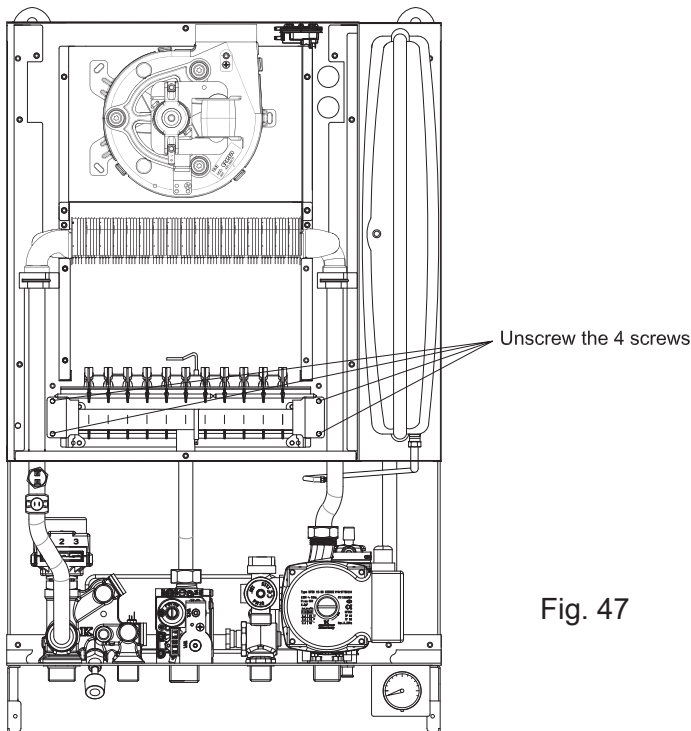


Fig. 47

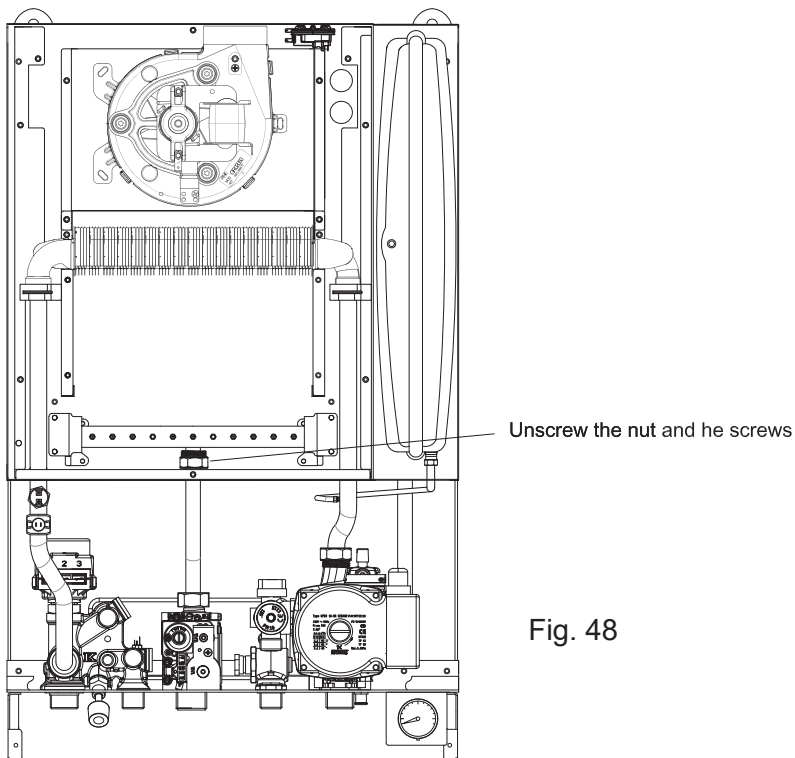
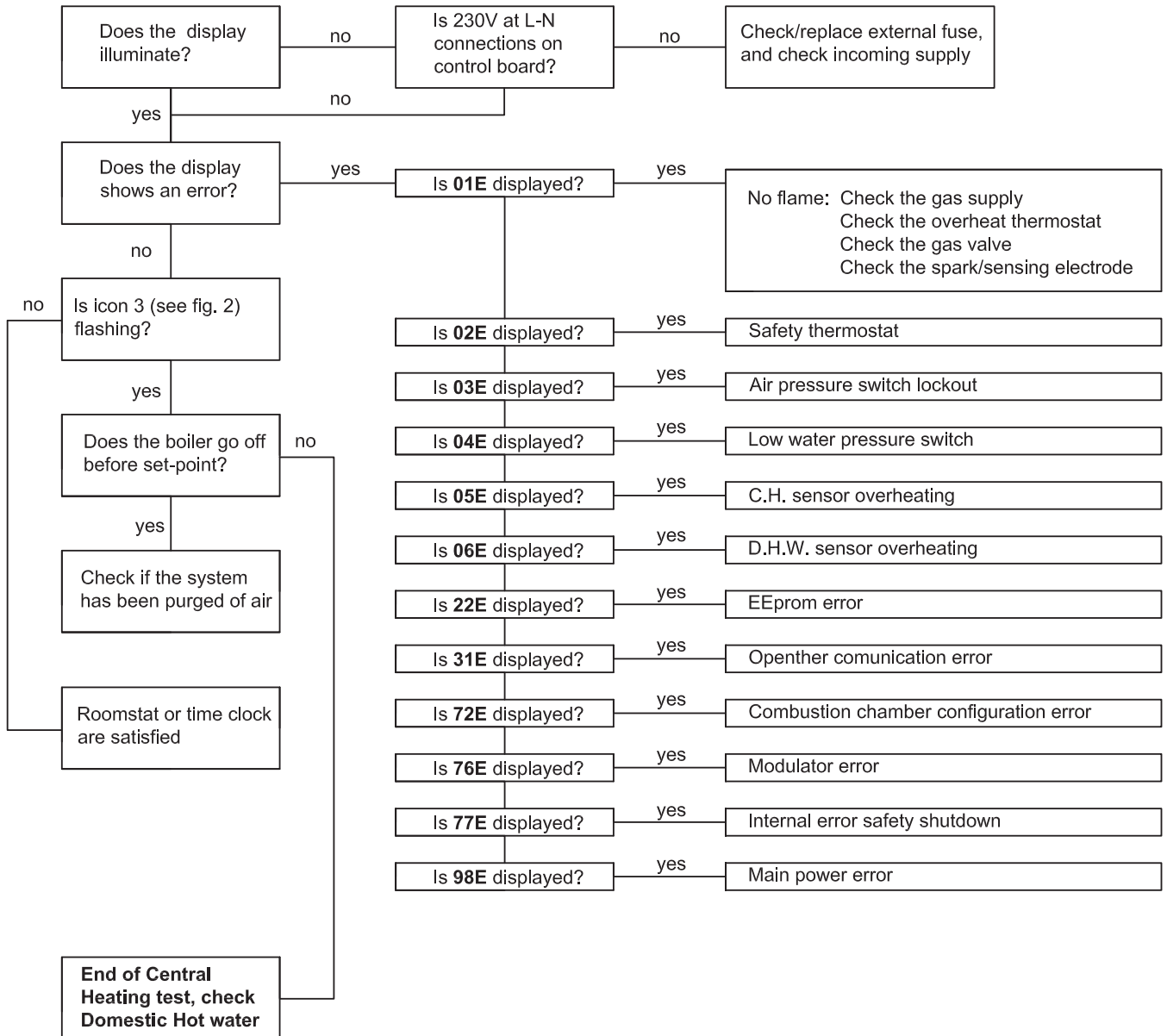


Fig. 48

9 FAULT FINDING CENTRAL HEATING

Before trying to operate the boiler make sure that: all gas supply cocks are open and the gas supply has been purged of air. The heating system pressure is at least 1 bar min to 1.5 bar max, select winter position on the digital display and set the central heating temperature to maximum. (sect. 1.4).

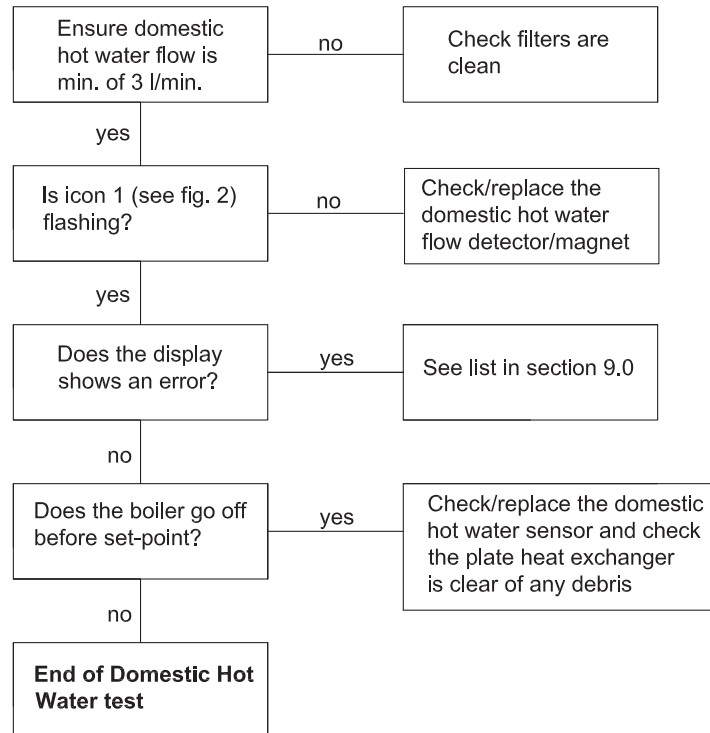
Ensure external controls are calling for heat (room thermostat/ digital clock) and check the following appliance operations:



9.1 FAULT FINDING DOMESTIC HOT WATER

Before continuing see section 9, and after selecting the summer position on the digital display and setting the domestic hot water temperature to maximum (sect.1.4).

Open the domestic hot tap and check the following appliance operations:



10 ELECTRICAL SYSTEM DIAGRAM

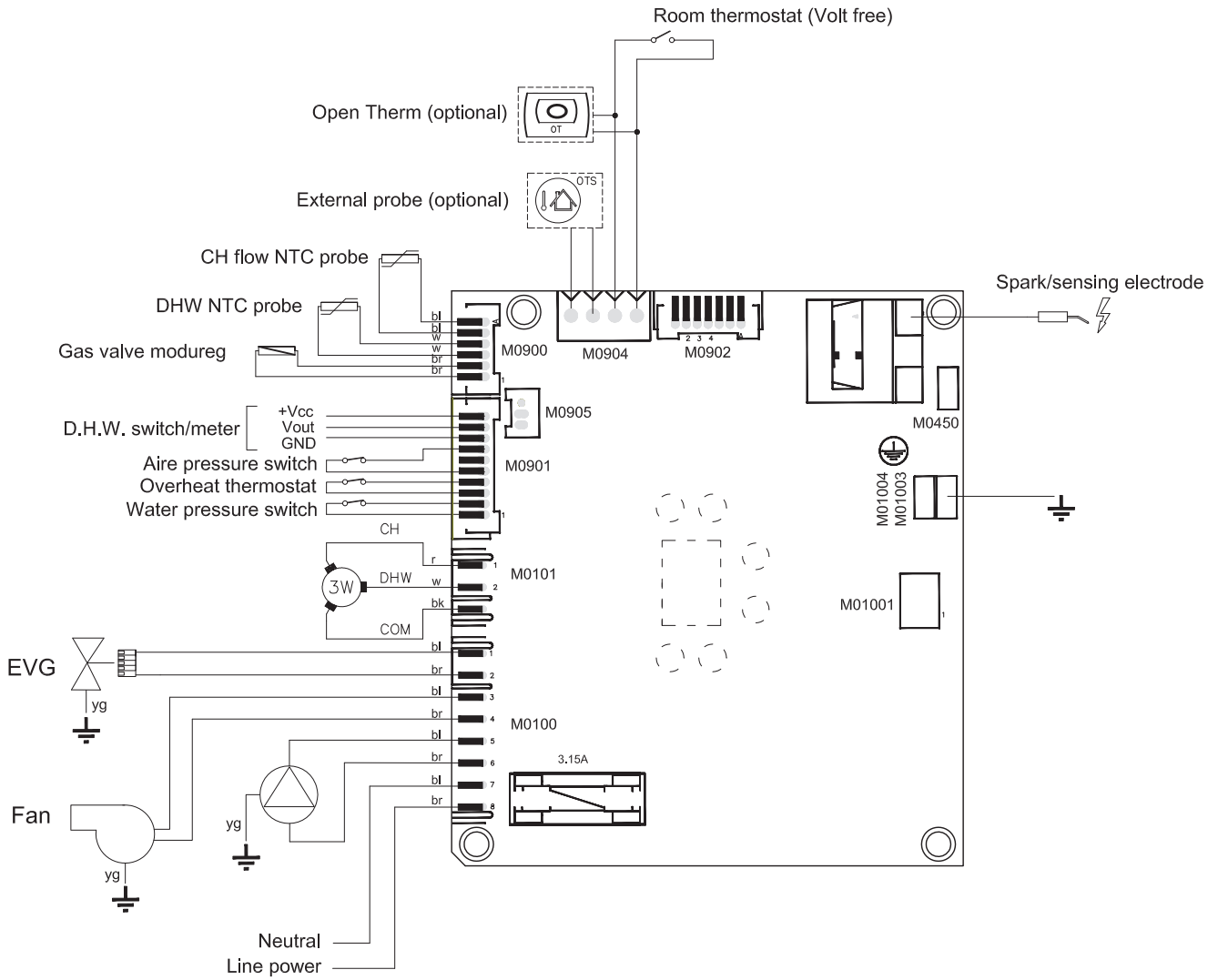


Fig. 49

11 SPARE PARTS

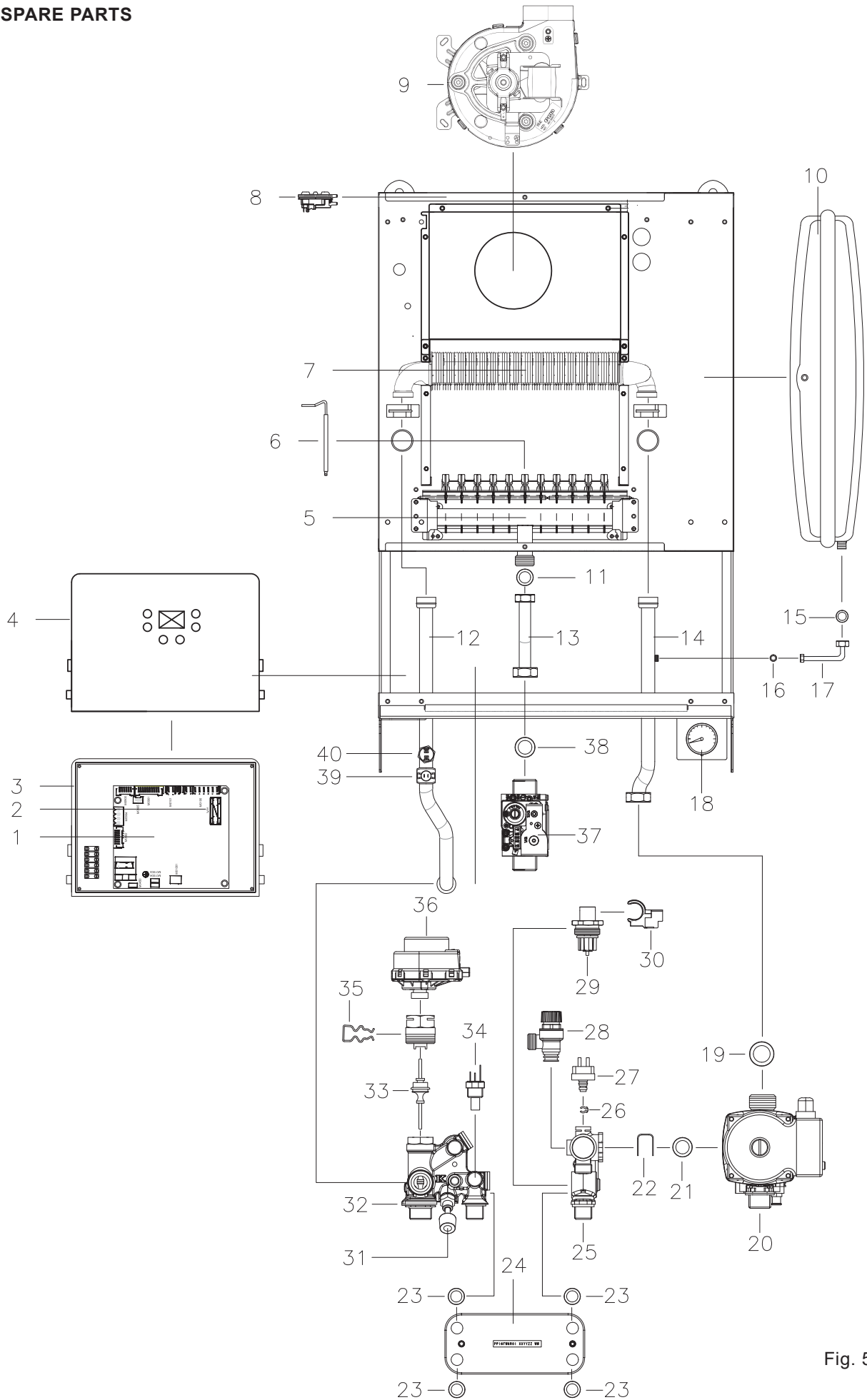


Fig. 56

LS 24
SHORT LIST OF SPARE PARTS AND FLUE ACCESSORIES

Pos.	Part. No.	G.C. Part. No.	Description
1	0012CIR18005/0		Control board
2	0012FUS01015/0		Internal fuse 3.15 A
3	0014SCA18005/0		Instrument panel box
4	0014PAN18005/0		Digital display cover
5	0003BRU18005/0		LS 24 Burner
6	0012CAN18005/0		Electrode
7	0002SCA18005/0		LS 24 main heat exchanger
8	0005PRE09005/0		Air pressure switch
9	0012VEN18005/0		Fan
10	0004VAS18005/0		Expansion vessel
11	0013GUA010200		1/2" gas valve gasket
12	0010TUB18005/0		Flow pipe
13	0010TUB18015/0		Gas pipe
14	0010TUB18010/0		Return pipe
15	0013GUA06011/1		3/8" gasket
16	0013GUA01005/0		1/4" gasket
17	0010TUB18020/0		Expansion vessel pipe
18	0006IDR09005/0		Pressure gauge
19	0013GUA01031/1		1" gasket
20	0009CIR18005/0		Pump
21	0013ORI15015/0		Pump Oring
22	0016FOR15020/0		Pump clip
23	0013ORI11045/0		Plate heat exchanger Oring
24	0002SCA15015/0		LS 24 plate heat exchanger
25	0011GRU18010/0		Return manifold
26	0016FOR15025/0		Water pressure switch clip
27	0012PRE16005/0		Water pressure switch
28	0008VAL18005/0		Safety relief valve
29	0011TUR15005/0		Turbine
30	0012RIV15005/0		Flow detector switch
31	0008VAL18010/0		C.H. valve load
32	0010TUB18005/0		Flow manifold
33	0011OTT15005/0		Diverter valve by-pass
34	0007SON15005/0		D.H.W. sensor
35	0016FOR15015/0		Diverter valve motor clip
36	0012MOT15005/0		Diverter valve motor
37	0008VAL18005/0		Gas valve
38	0013GUA01026/0		3/4" gas valve gasket
39	0007SON11010/0		C.H. flow sensor
40	0007TER13005/0		Overheat thermostat
/	0012IMP18005/0		Wiring harness

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