

Quantum DB



Installation and Servicing Manual



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(Issue A)

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1.0 General information

1.1 Product description

The Quantum DB is a fully automatic, fan assisted modulating gas condensing boiler with a high-grade stainless steel heat exchanger designed for wall-mounted applications. It incorporates a microprocessor based control system with direct burner ignition and is suitable for firing on natural gas (G20) or LPG (G31).

The boiler has an attractive two-tone white and grey outer casing with the user controls hidden behind the Quantum logo, which are accessed via a drop down cover.

Heat output is controlled by demand and by outside temperature conditions according to the built in weather compensation feature that is simple to adjust.

The appliance is supplied as a standard boiler, suitable for fully pumped open vented systems, or as a system boiler that incorporates an expansion vessel, pump, pressure gauge, safety valve and automatic air vent suitable for sealed systems. It is ideally suited for connection to underfloor heating systems.

Depending on order, the boiler is supplied for either (a) low voltage system wiring in conjunction with a 'W' plan installation (a 24V. 3 port divert valve and suitable time clock are available as an option to integrate with this arrangement) (see Fig 3D). Or (b) the boiler is supplied for operation with 230V system wiring i.e. 'Y' or 'S' plan installations.

The microprocessor control system incorporates a fault diagnosis display that facilitates quick

identification of a fault condition. On the system boiler version it also includes a pump exercise program that will energise the pump once every 24 hours in the "no demand" situations i.e. summer holidays etc and a two stage frost protection feature designed to protect the boiler during very cold weather.

If the boiler is to be installed in a system that will have thermostatic radiator valves fitted, we recommend that one radiator is fitted with a lock shield valve (usually in the bathroom) to avoid the possibility of the pump pumping against a closed head.

The boiler is supplied with standard, separate air intake and flue outlet pipes suitable for "through the wall" rear exit installation for walls up to 370 mm (14.1/2 in) thick. (See section 4.8)

For boilers requiring "top exit" flues a kit is available as an option, this will permit the installation of a flue and air intake up to 6 metres long either vertically or horizontally.

1.2 Certification information

The boiler is certified to comply with the requirements of EN 483 for use in GB and IE (Great Britain and Ireland) using gas category I2H (G20 with a governed gas supply at 20 mbar (8 in.wg) inlet pressure, or gas category I3p (G30 with a governed gas supply at 37 mbar (14.1/2 in)

The boiler classification is either C 13 or C 33 depending upon whether it has a horizontal or vertical flue.

2.0 Technical Specification

2.1 Product details

Thermal performance - Natural gas

		FLOW / RETURN	
TEMPERATURE		80/60°C	50/30°C
MAX. HEAT INPUT	Q=	24 kW	
MAX. HEAT OUTPUT	P=	21 kW	23 kW
MIN. HEAT INPUT	Q=	11 kW	
MIN. HEAT OUTPUT	P=	10.5 kW	

Thermal performance - LPG

		FLOW / RETURN	
TEMPERATURE		80/60°C	50/30°C
MAX. HEAT INPUT	Q=	24 kW	
MAX. HEAT OUTPUT	P=	22 kW	23.5 kW
MIN. HEAT INPUT	Q=	13.5 kW	
MIN. HEAT OUTPUT	P=	13 kW	

2.2 General specifications

	<u>System boiler</u>	<u>Standard boiler</u>
Total water capacity (litres)	2	2
Weight empty (kg)	43	35
Weight full (kg)	45	37
Lifting weight (no front panel) (kg)	35	27
Minimum system pressure cold	0.5bar (8 psi)	---
Maximum system pressure hot	2.5bar (36psi)	---
Minimum head open vented system	---	2.5m(8 ft)
Maximum head open vented system	---	30m(100 ft)
Electrical supply	230V 50Hz	230V 50Hz
Maximum power consumption	120 W	70 W
External fuse rating	5 A	5 A
Maximum flow temperature (degrees centigrade)	85	85
Expansion vessel capacity (litres)	10	—
Expansion vessel pre-charge pressure	1.0bar (15psi)	---

2.3 Overall dimensions

Connection sizes	System boiler	Standard boiler
Gas	1/2 in BSP (F)	1/2 in BSP (F)
Flow outlet	22 mm compression	22 mm compression
Return inlet	22 mm compression	22 mm compression
Pressure relief valve outlet	1/2 in BSP (F)	N/a
Flue/air intake duct	50 mm (2 in) MU PVC	50 mm (2 in) MU PVC
Condensate discharge pipe	3/4 in plastic overflow	3/4 in plastic overflow

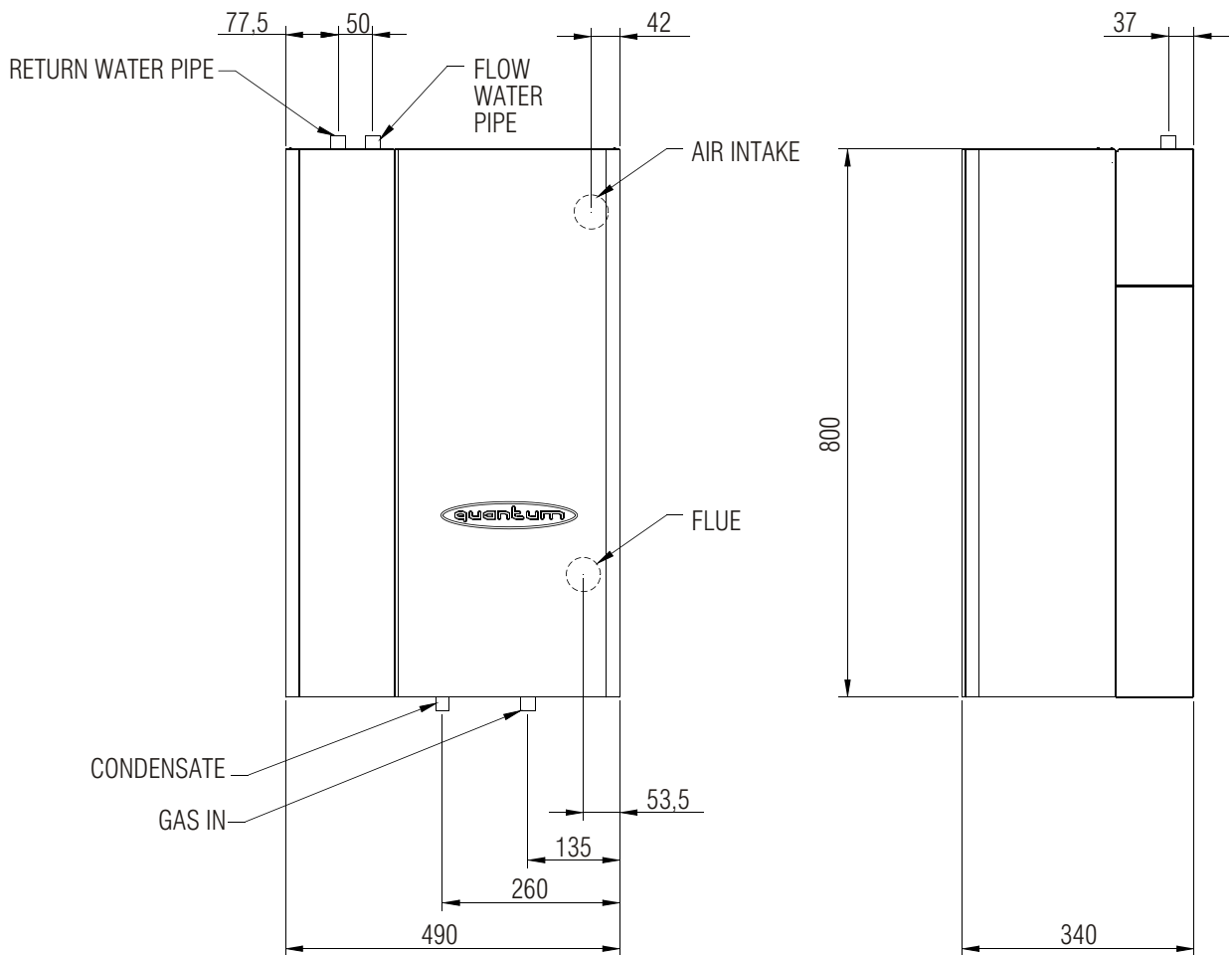


Figure 2A

2.4 Minimum clearances

The following minimum clearances must be maintained for installation and to facilitate servicing.

	<u>System boiler</u>	<u>Standard boiler</u>
Right hand side	5 mm (1/4 in)	5 mm (1/4 in)
Left hand side	5 mm (1/4 in)	5 mm (1/4 in)
Top (above the casing)	150 mm (6 in)	150 mm (6 in)
Bottom (below the casing)	400 mm (16 in)	200 mm (8 in)
In front of the boiler	500 mm (20 in)	500 mm (20 in)

2.5 Flue options

Figure 2B give examples of the flue outlet/air intake ducts suitable for use with the Quantum DB.

IMPORTANT: As condensate will continue to form inside the flue duct, it is essential that the flue has a minimum slope back towards the boiler of 3 degrees under all conditions.

Lengths of pipe and elbows if required are available as an option from Quantum Heating Ltd, Helmn Way, Whitewalls Industrial Estate, Nelson, Lancashire. BB9 8SY

Rear horizontal arrangement

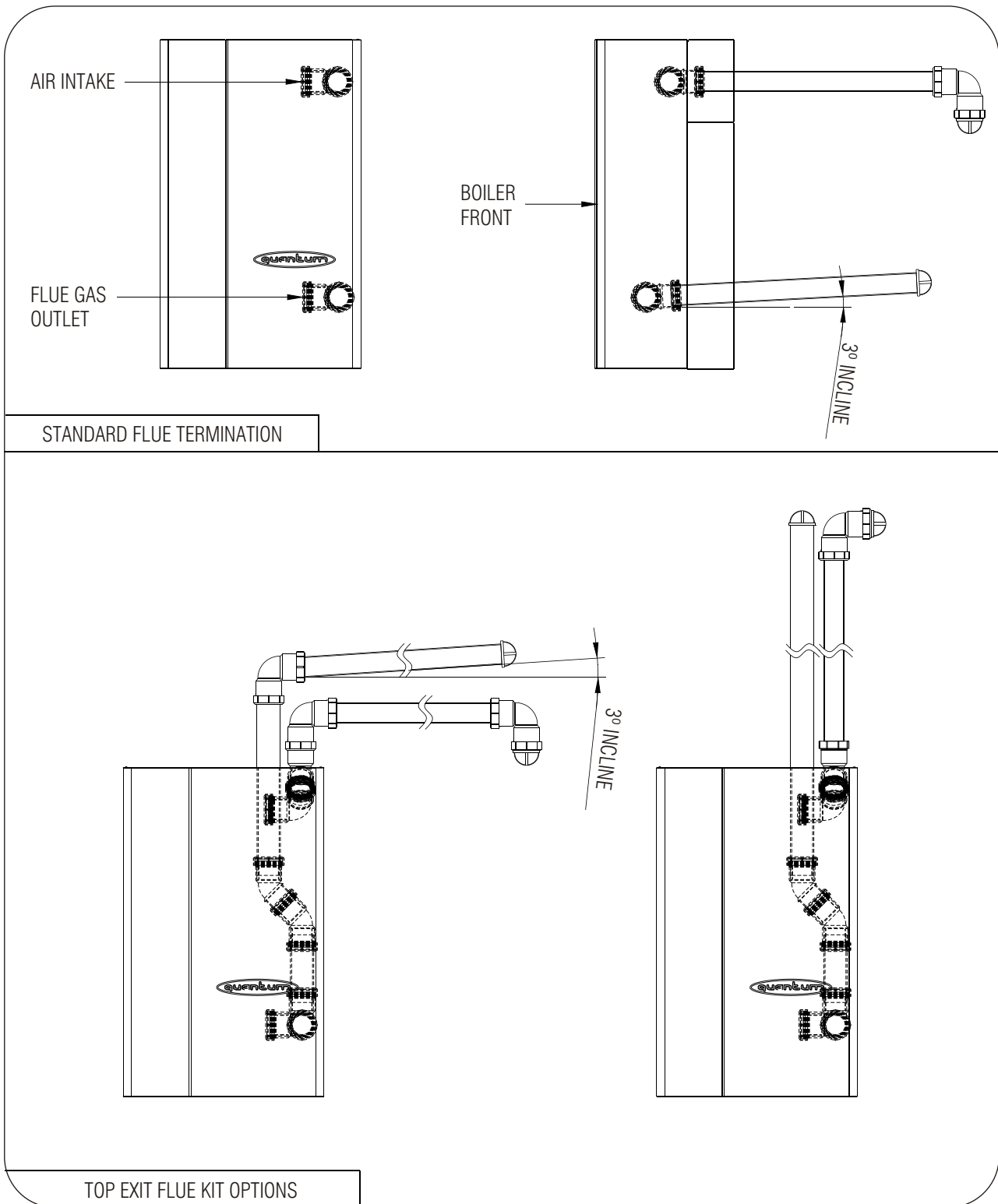
Two x 600 mm (24 in) lengths of 50 mm (2 in) diameter MU PVC pipe are supplied as standard with the boiler. This is sufficient for wall thicknesses up to 370 mm (14.1/2 in).

All other horizontal arrangements

A top exit flue kit is available as an option. When fitted this will enable left or right horizontal flue arrangements up to 6 metres (20 ft). If additional elbows are to be used, each elbow fitted reduces the overall flue length by 1000mm (40in).

Vertical flue arrangement

A top exit flue kit (available as an option) is necessary to facilitate a vertical flue. When fitted this will enable a vertical flue to be fitted up to 6 metres tall. If additional elbows are to be used, each elbow fitted reduces the overall flue height by 1000mm (40 in). Each 45-degree bend fitted will reduce the overall height by 500 mm (20 in).



STANDARD FLUE TERMINATION

TOP EXIT FLUE KIT OPTIONS

Figure 2B

2.6 Hydraulic circuit (boiler internal)

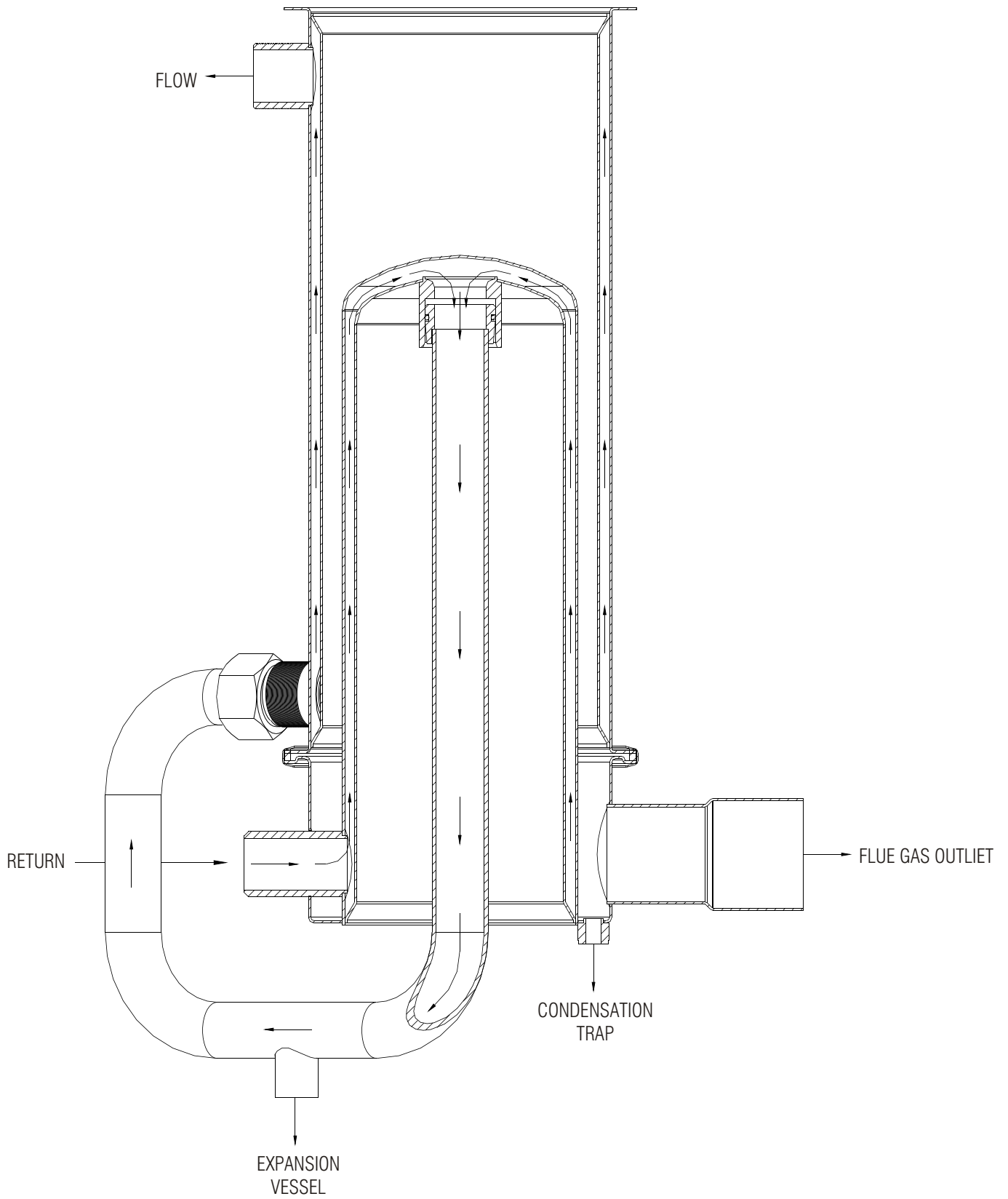


Figure 2C

2.7 General arrangement

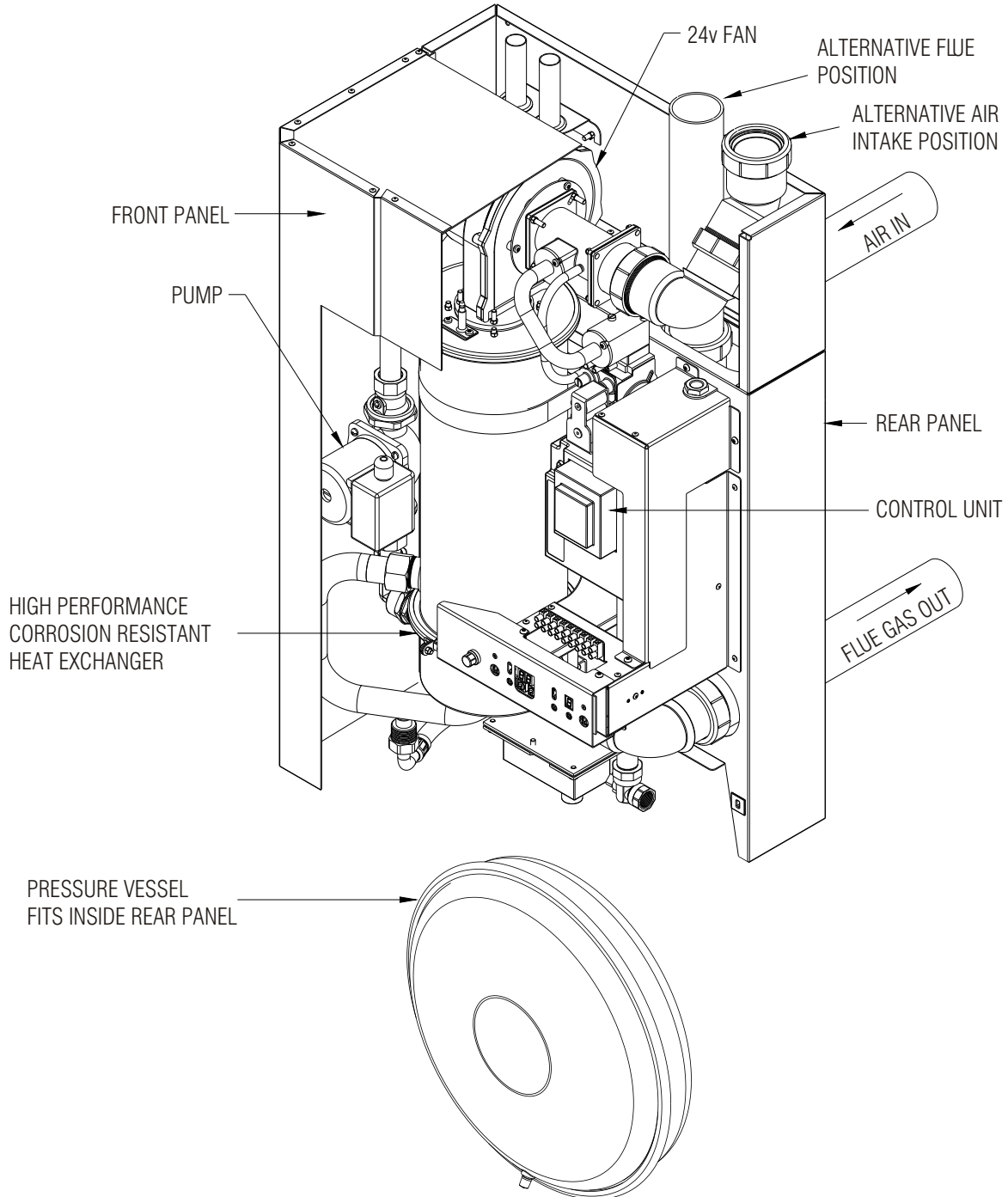


Figure 2D

3.0 Installation requirements

3.1 Statutory requirements

GAS SAFETY (INSTALLATION AND USE) REGULATIONS (CURRENT ISSUE)

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

In addition to the above regulations, this appliance must be installed in accordance with current IEE Wiring Regulations for electrical installation, (BS 7671), any local building regulations that prevail in Great Britain and Ireland, the Building Standards (Scotland) (Consolidation) Regulations, bye laws of the local water undertaking and Health and Safety Document number 635 'The Electricity at Work Regulations 11989.

It should also be installed in accordance with the relevant recommendations in the current editions of the following British Standards and Codes of Practice: BS 5449, BS 5546, BS 5440:1, BS 5440:2, BS 6798 & IGE/UP/7 and any relevant Codes of Practice in Ireland.

Important Note: Manufacturer's instructions must NOT be taken in any way as overriding statutory obligations.

3.2 Boiler location

The following limitations **MUST** be observed when determining the boiler location:

- i) The boiler is not suitable for installing externally. It must be positioned inside a building or enclosure that is dry, frost-free and provides sufficient space around the boiler to install and service it (see section 2.4).
- ii) The wall chosen must be able to support the weight of the boiler and associated equipment and provide for one of the specified flue/air intake duct arrangements (see section 2.5).
- iii) If the boiler is fitted in a timber framed building, it must be fitted in accordance with the British Gas publication 'Guide for Gas Installations in Timber Frame Housing', Reference DM2. If in doubt, advice may be sought from the local gas region.
- iv) If the boiler is to be installed in a room containing a bath, shower or hand washbasin, any electrical switch or control utilizing mains electricity must be positioned such that it cannot be touched by any person using the washing facility. Attention is drawn to the requirements of BS 7671 (the current IEE Wiring Regulations) and in Scotland the electrical provisions of the Building Regulations applicable in Scotland.
- v) If the boiler is to be located in a compartment, then the compartment must be designed and constructed specifically for the purpose. An existing cupboard or compartment may be used provided it is modified in accordance with BS 5376:2
- vi) Where the boiler will be installed in an unusual location, special procedures may be necessary; guidelines are given in BS 6798.

3.3 Ventilation requirements

Detailed requirements for air supply are given in BS 5440:2. The following information is given as general guidance:

- i) There is no requirement to have a purpose provided air vent in the room or compartment in which this boiler is installed.
- ii) It is important that the minimum clearances detailed in section 2.4 are maintained at all times.

3.4 Flue terminal positioning

The flue installation requirements given in BS 5440:1 must be observed. The following information is given as general guidance.

- i) The boiler MUST be installed so that the flue outlet/ air intake duct terminations are exposed to outside air on the same face of the building.
- ii) The position of the flue outlet/ air intake duct terminations MUST allow a free passage of air across them at all times.

- iii) It MUST be ensured that products of combustion discharged from the flue outlet cannot re-enter the building or adjacent buildings through windows, doors, ventilators or any other source of air infiltration i.e. air conditioning etc.
- iv) The minimum permitted dimensions for the flue outlet duct termination to any ventilation opening are stated in Figure 3A. To prevent flue gases from re-entering the air intake duct, a minimum distance of 500mm (20") must be maintained between flue outlet and air intake terminals.
- v) When in operation, all condensing boilers discharge a plume of steam from the flue; therefore if the flue outlet duct is to discharge into a pathway or across your boundary, check that it will not cause a nuisance.
- vi) If the flue outlet termination is less than 450 mm (18 in) from painted eaves or guttering, an aluminum shield should be fitted to the underside of the painted surface.

Position	Minimum spacing
A. Directly below an openable window air vent or other ventilation opening	300 mm (12 in)
B. Below gutter, drain or soil pipe	75 mm (3 in)
C. Below eaves	200 mm(8 in)
D. Below a balcony	200 mm(8 in)
E. From vertical drain or soil pipes	75 mm(3 in)
F. From internal or external corners	300 mm(12 in)
G. Above adjacent ground or balcony level	300 mm(12 in)
H. From a surface facing a terminal	2000 mm (7 ft)
I. Facing terminals	2000 mm (7 ft)
J. From opening (door or window) in carport into dwelling	1200 mm (4 ft)
K. Vertically from a terminal on the same wall	75 mm(3 in)
L. Horizontally from a terminal on the same wall	300 mm(12 in)
M. Adjacent to opening	300 mm (12 in)
N. Below a carport	600 mm(24 in)
O. From adjacent wall	300 mm(12 in)
P. From adjacent opening window	1000 mm (40 in)
Q. From another terminal	600 mm (24 in)
R. Minimum height	300 mm(12 in)

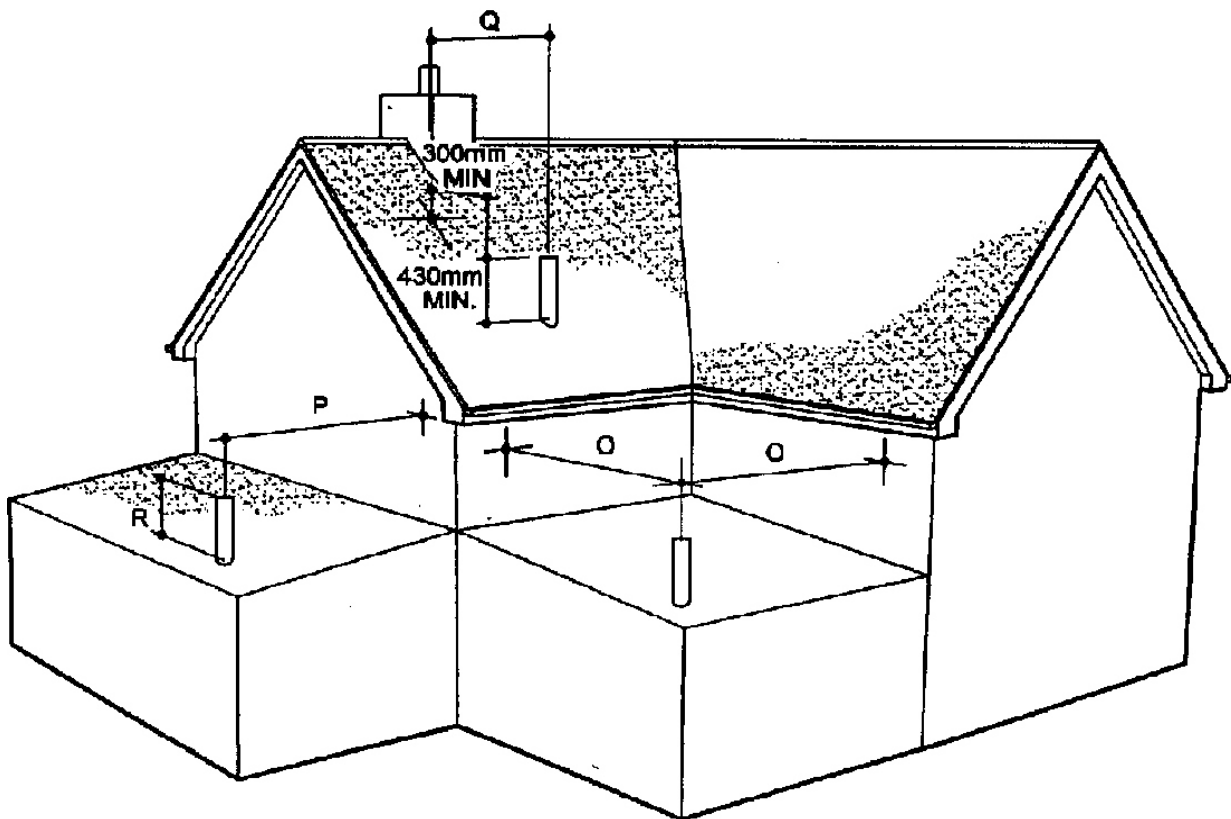
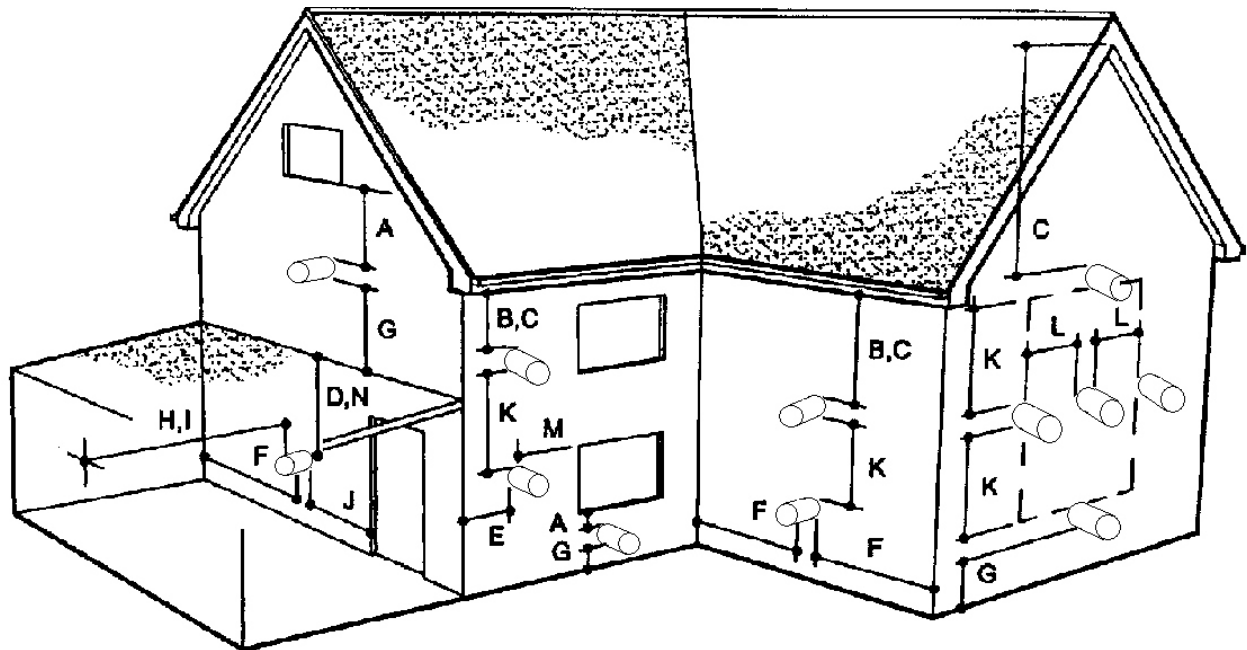


Figure 3A

3.5 Central heating system

The standard boiler is designed for installation into a fully pumped open vented system. The minimum and maximum static head requirements stated in section 2.2 must be observed. A suitable pump should be fitted to the system to ensure that the boiler's minimum flow rate of 0.2 l/s is met under all conditions.

The system boiler includes its own pump, 10 litre expansion vessel, pressure gauge, safety valve and automatic air vent. The available pump head given in Figure 3B is that in excess of the boiler's hydraulic resistance i.e. that available for the system. A sealed system must only be filled by a competent person and a fill point must be included in the system design.

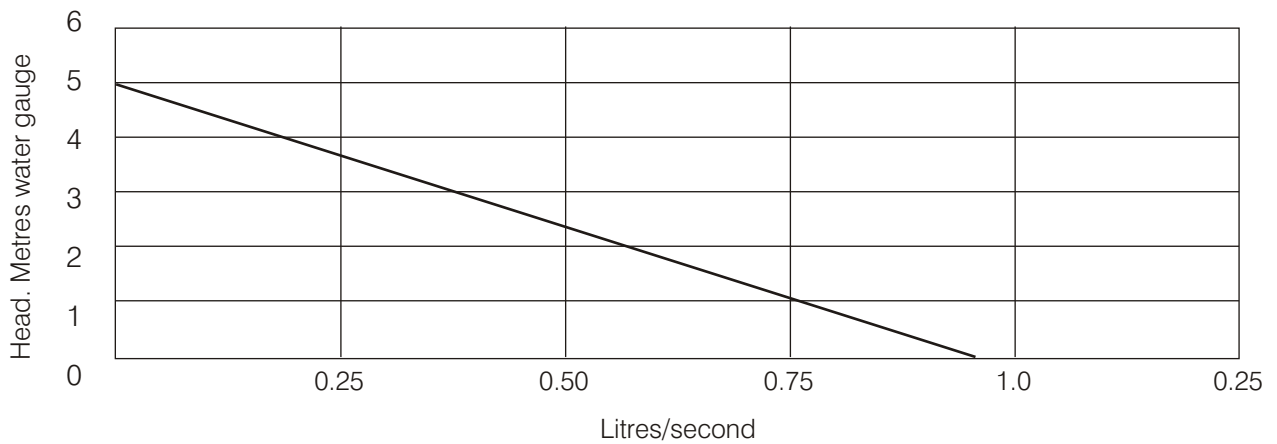


Figure 3B

Expansion Vessel

Figure 3 C gives the maximum system volume the integral expansion vessel can handle with different charge pressures. If the total system volume is greater than that shown, a second expansion vessel must be fitted into the system return pipe as near to the boiler as possible. Should it be necessary to fit a second vessel, ensure that the total capacity of the two vessels is sufficient to meet the needs of the system. For further information refer to the current issues of BS 5449 and BS 679.

IMPORTANT: If the pressure gauge reads 2.5 bar or greater with the boiler at maximum temperature with all radiators open, then an additional expansion vessel is needed.

Vessel charge & system first fill pressure	bar	0.5	1.0	1.5
	psi	7.3	14.6	21.9
Maximum system water content using the 10-litre integral expansion vessel	litres	121	92	63
	gallons	26	20	14
Systems with larger capacities multiply the total system volume in litres via this factor to determine the min vessel size required.		0.083	0.11	0.16

Figure 3C

Pressure gauge/safety valve and automatic air vent (System boiler only)

A pressure gauge, safety valve and an automatic air vent are mounted on the safety manifold positioned above the boiler and fitted to the boiler flow connection (see fig. 4B). The pressure relief valve is factory set at 3 bar (43 psi).

System design

Depending on order, the boiler is supplied for either (a) low voltage system wiring in conjunction with a 'W' plan installation (a 24V 3 port divert valve and suitable time clock are available as an option to integrate with this arrangement (see fig. 3D). Or (b) the boiler is supplied for operation with 230V system wiring i.e. 'Y' or 'S' plan installations.

Low voltage system wiring

Figure 3 D provides detailed information on both hydraulic circuit and the electrical schematic arrangement. The hydraulic circuit is principally a Honeywell 'W' plan system which, via the 3 port divert valve devotes all the boiler energy at maximum temperature to priority hot water before switching over to weather compensated (via an outside sensor) central heating duty.

230V System wiring

If the boiler is to be connected to mains voltage system wiring (which would have been specified when ordering) the switched live from the system **MUST** be connected into the 230/24V relay connector box provided (see fig. 3E)

Existing systems

IMPORTANT: Before fitting a new **Quantum DB** boiler to an existing system it is essential that the system be flushed thoroughly first to remove all sludge and debris.

3.6 Gas supply

- i) The gas supplier should be consulted at the installation planning stage in order to establish that an adequate supply of gas is available.
- ii) An existing gas service pipe **MUST NOT** be used without first consulting the gas supplier.
- iii) The gas supplier or their contractor only can connect the gas meter.
- iv) An existing meter and/or Pipework should be of sufficient size to carry the maximum boiler input plus the demand of any other installed appliance. (BS 6891:1988). A minimum of 22 mm diameter Pipework is required to within 1 metre of the boiler gas cock.
- v) The governor at the meter must give a constant outlet pressure of 20 mbar (8 in wg) when the boiler is operating.
- vi) The gas supply line must be purged. **WARNING:** Before purging, open all doors and windows; also extinguish any cigarettes, pipes and any other naked lights.
- vii) The complete installation must be tested for gas soundness.

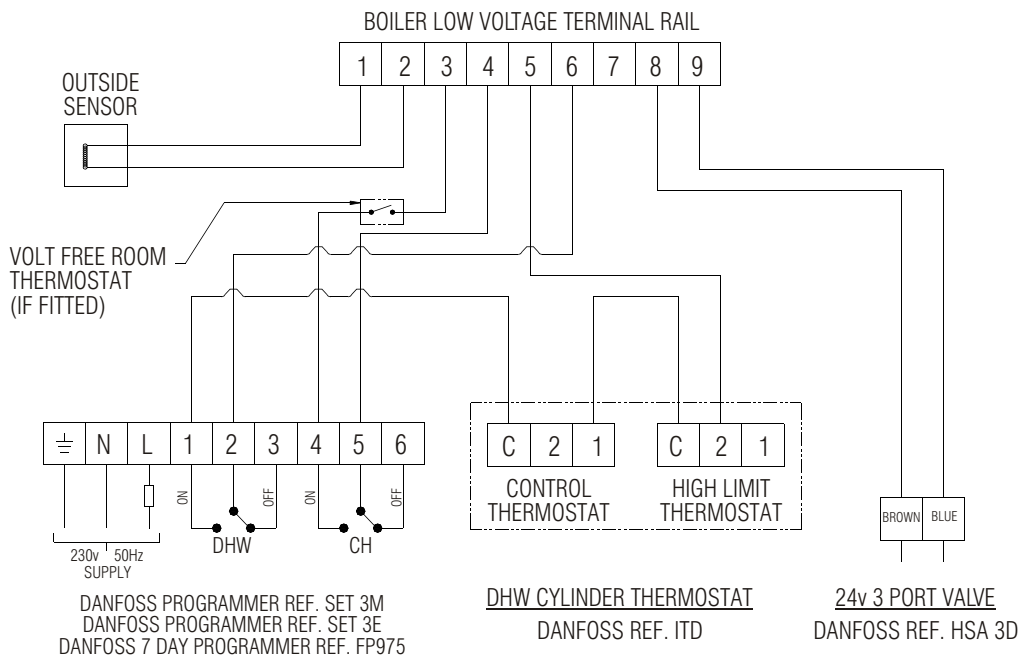
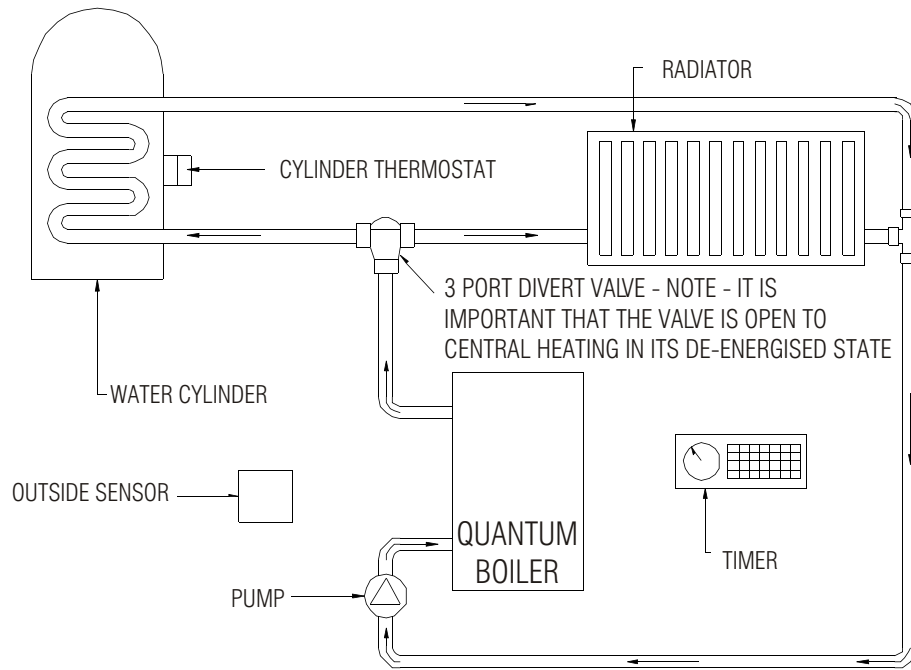
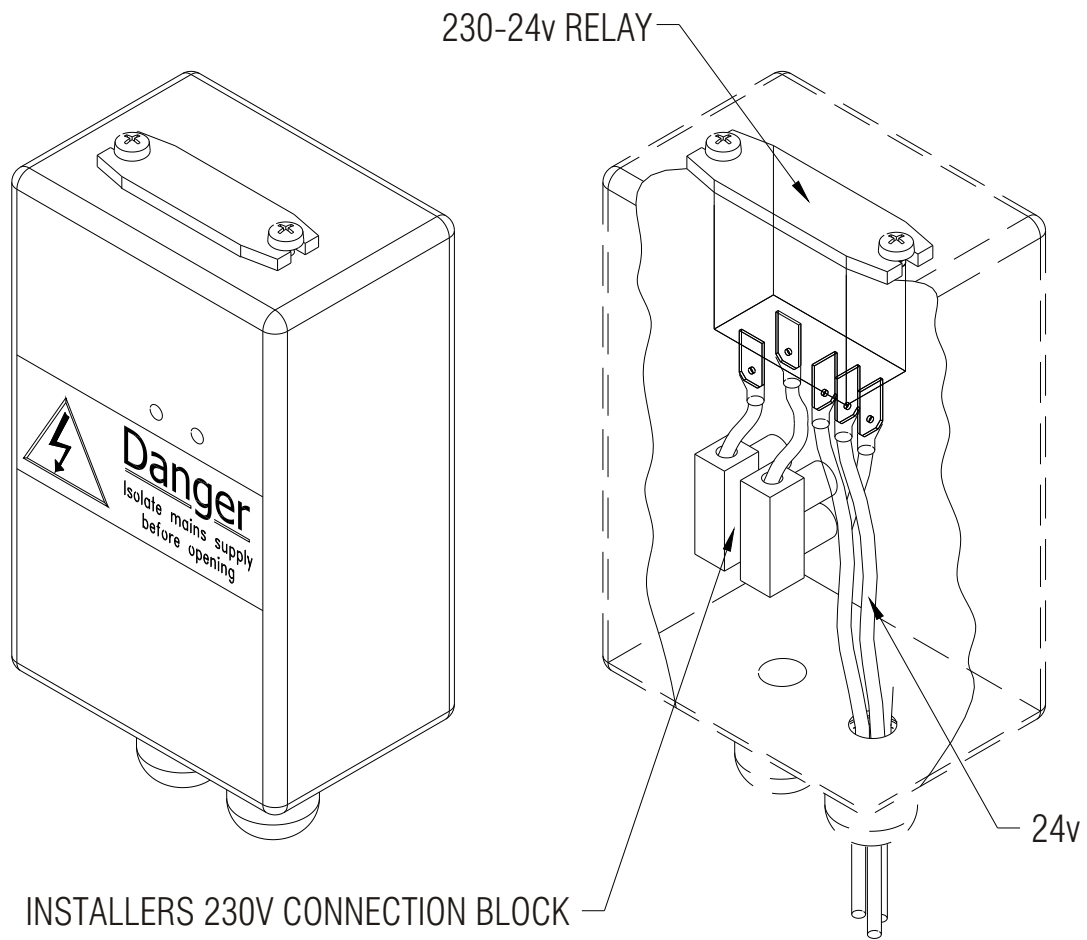


Figure 3D



THE RELAY BOX IS LOCATED IN THE LOWER LEFT HAND SECTION OF THE BOILER CASE.

Figure 3E

3.7 Electrical supply

- i) **WARNING:** THIS APPLIANCE MUST BE EARTHED. Failure to provide a satisfactory earth connection would make it a safety hazard and could also cause it to malfunction.
- ii) The mains supply cable must be of a least 0.75 mm² (24/0.2 mm) PVC insulated to BS 6500 table 16.
- iii) The method of connection to the mains supply must facilitate complete electrical isolation of the appliance. Either a 5A fused 3 pin plug and unswitched shuttered socket outlet, both complying with BS 1363, or a 5A fused double pole switch having a 3 mm contact separation in both poles and serving only the boiler and its external controls may be used.

IMPORTANT: The mains plug/socket must remain accessible to the user at all times.

- iv) All electrical wiring external to the boiler must be in accordance with BS 7671 (the current IEE Wiring Regulations) and any local regulations that apply.

3.8 External controls

Depending on order, the boiler will have been supplied for connection to low or mains voltage controls. The outside sensor supplied, is common to both systems and **MUST** be fitted.

Low voltage controls (see Fig. 3D)

The boiler will require a 24V 3 port divert valve and a 2 channel time clock suitable for volt free switching (both are available as an option) and a cylinder thermostat suitable for volt free switching. The only other system controls recommended for use in conjunction with the weather compensation control are thermostatic radiator valves, fitted to all but one of the radiators.

Main voltage controls

When the boiler is supplied with the 230/24V relay fitted, it can be connected into any of the popular fully pumped system designs i.e. 'Y' plan (3 port mid position valve) or 'S' plan (2 x 2 port zone valves).

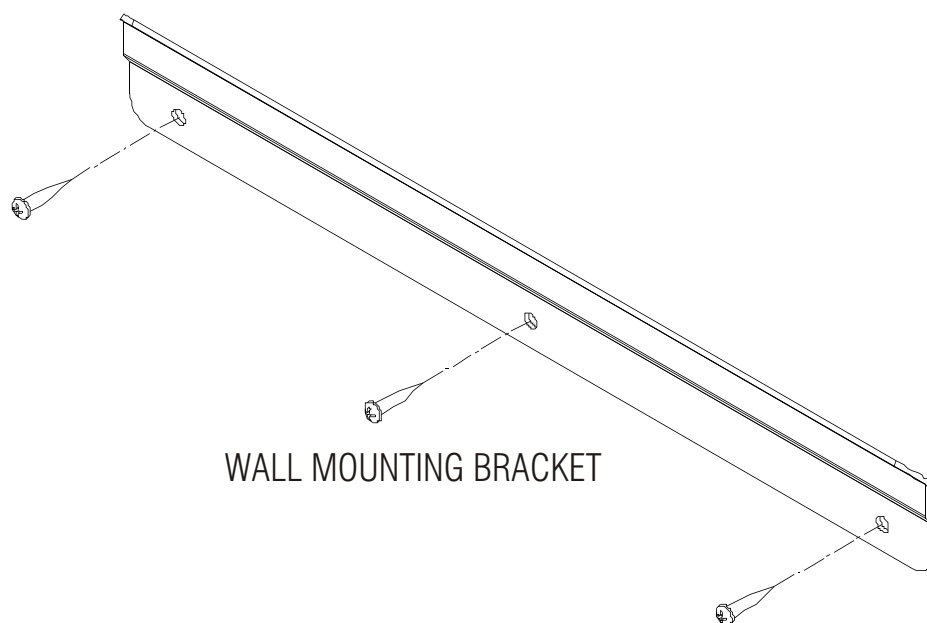


Figure 4A

4.0 Installation

4.1 Unpack the boiler

The boiler is supplied in a single carton. Check the contents and their condition and familiarize yourself with the individual components before commencing with the installation.

The carton contains:	Description	Quantity
	Boiler assembly	1
	Wall template	1
	Wall mounting bracket	1
	No10 x 2 in (50 mm) woodscrew	7
	Wall plug	7
	50mm (2 in) x 600 mm (24 in) MU PVC pipe	2
	50 mm (2 in) pipe end cage	2
	50mm elbow (air inlet)	2
	Installation and servicing manual	1
	Users guidance manual	1
	Warranty card	1
	Outside sensor	1
	Angled gas cock	1
Depending on order:	24v three port valve	1
	2-channel digital time clock (volt free contacts)	1
	Safety manifold assembly (system boiler only)	1
	Top exit flue kit	1

NOTE: Any Additional elbows or pipe are packed separately.

4.2 Wall preparation

Before installing the boiler, check that the selected position is suitable (see section 3.2) that sufficient clearance can be maintained around the boiler (see section 2.4) and that the flue termination requirements are satisfactory (see section 3.4)

- i) Unpack the cardboard wall template and fix it in the selected position on the wall. Make sure that the boiler centre line is vertical and that minimum boiler clearances are assured.
- ii) Mark the position of the 3 holes to fix the wall mounting bracket and the 4, boiler corner fixing holes.
- iii) If you have chosen to have rear entry flue and air intake ducts, mark their positions also on the wall and remove the template.
- iv) Drill the 3 holes to fix the wall mounting bracket and the 4 holes to secure the boiler corners using a 7 mm diameter masonry drill, and fit all 7 wall plugs.
- v) For rear entry flue/air intake, drill the 2 holes through the wall using a 75 mm (3 in) diameter (recommended) core drill. When drilling the flue duct hole, a 3 degree inclined angle through the wall **MUST** be observed (see Figure 2B) to facilitate the drainage of condensate that forms in the flue, back into the boiler to be discharged with the rest of the condensate. **IMPORTANT:** accurately measure the wall thickness and note this dimension for later when fitting the flue.
- vi) Fit the wall mounting bracket to the wall using 3 x No 10 x 2 in (50 mm) woodscrews (see Figure 4A)

4.3 Mounting the boiler

- i) Unpack the boiler, remove the front panel and stand to one side. The front cover is held by 2 fixing screws under the bottom of the boiler and 2 hooks at the top of the boiler (see figure 5B).
- ii) NOTE: If the boiler is to be converted to top exit flue /air intake duct arrangement, see separate instructions detailing this in the 'Top exit flue kit' pack.
- iii) Lift the boiler and engage the rear flange of the back panel on to the wall-mounting bracket.
- iv) Check the alignment of holes for flue and air intake ducts and using the remaining 4 x No10 x 2 in (50 mm) woodscrews, fix the boiler at its 4 corners.

4.4 Flow and return water connections

(System boiler only). With reference to Figure 4B, fit the safety manifold assembly to the flow connection on the boiler using the 22 mm 'Tee' connection provided. The safety valve, automatic air vent and pressure gauge connections into the manifold need to be made sound using a suitable thread sealing compound or similar. Check that the automatic air vent is sitting vertically.

(Both boiler variations). With reference to fig 4B, connect the flow and return connections on the boiler to the system using 22 mm compression fittings.

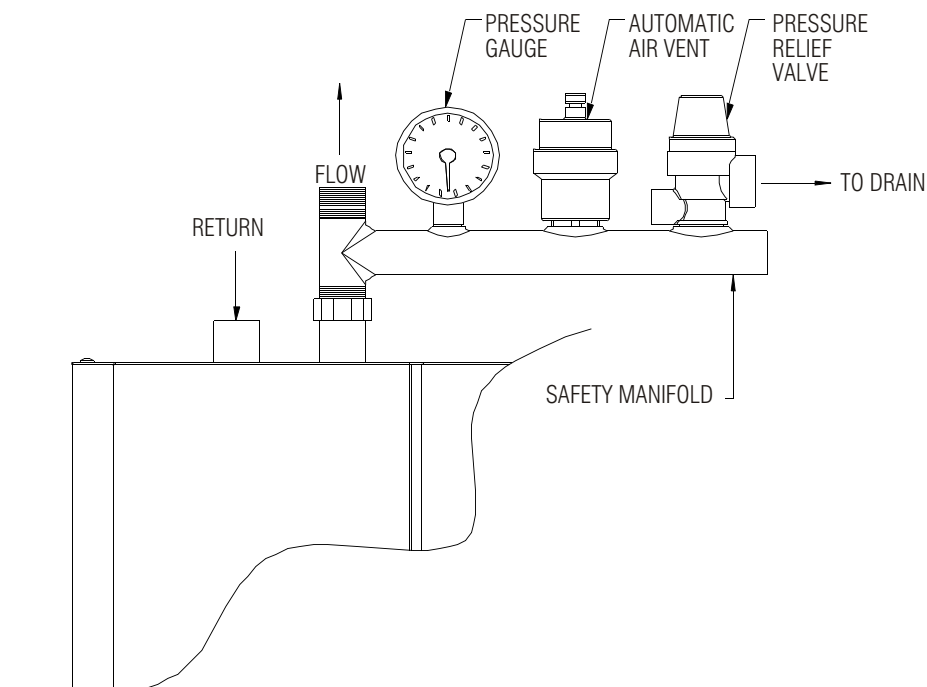


Figure 4B

4.5 Safety discharge arrangement (system boilers only)

Connect a 15 mm copper pipe to the compression fitting on the discharge side of the safety valve. **IMPORTANT:** As any water exiting the safety valve could cause scalding, the discharge pipe must be routed to discharge to a safe point, visible to the user but not able to cause a hazard.

4.6 Condensate discharge arrangement

From every cubic metre of natural gas that is combusted, the combustion products contain around 1.6 litres of water in the form of steam. Depending on the mode of operation the Quantum DB condensing boiler will convert a little or most of this steam back into water, which needs to be disposed of.

Wherever possible the condensate should be disposed of internal to the building. i.e. sink or bath waste.

If this is not practicable external runs must be kept as short as possible and lagged to help prevent freezing. To assist this the boiler is fitted with a siphonic discharge trap, which is designed to discharge a quantity of condensate intermittently.

The connection is made to the underside of the trap coming off with a standard $\frac{3}{4}$ in plastic waste elbow. Continue in $\frac{3}{4}$ in plastic waste pipe to the discharge point. (With system boiler only) The pipe should be route such that it will not interfere with the removal of the rear expansion vessel should it be deemed necessary.

IMPORTANT: The discharge pipe **MUST** have a continuous fall from the boiler of at least three degrees.

4.7 Gas supply connection

Refer to Figure 4C. Fit the gas cock and connect the gas supply to the inlet connection. Upon completion, tighten the union connection and isolate from the supply.

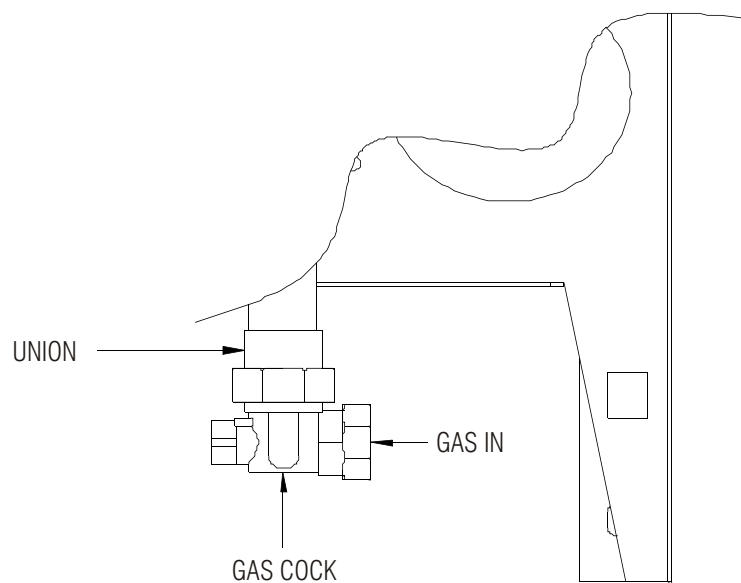


Figure 4C

4.8 Fitting the flue and air intake ducts

- i) Calculate the length to cut the flue duct. This is calculated as the wall thickness (as previously measured) plus 230 mm (9 in).
- ii) Carefully cut one of the lengths of pipe to the dimension calculated and remove all burrs and sharp edges from both the inside and outside of the pipe.
- iii) Remove the elbow from the flue outlet on the heat exchanger and fit it to one end of the pipe.
- iv) Taking due account of the rise through the wall, gently push the assembly through the wall and remake the elbow connection on to the heat exchanger. Make sure that the seal in the elbow is correctly located and that the connection is made tight.
- v) Calculate the length to cut the air intake duct. This is calculated as the wall thickness (as previously measured) plus 150 mm (6 in)
- vi) Carefully cut the other length of pipe to the dimension calculated and remove all burrs and sharp edges from both the inside and outside of the pipe.
- vii) Fit one of the 90° plastic elbows to one end of the pipe
- viii) Carefully push the assembly through the wall and connect the elbow to the fan air intake. Make sure that the seal in the elbow is correctly located and that the connection is made tight.
- ix) Make good the brickwork around the flue and air intake ducts on the outside of the building. Seal to the brickwork around the ducts using silicon sealant.
- x) Fit the remaining plastic elbow to the end of the pipe with the open end facing down.
- xi) Fit an end cage to each of the ducts.

4.9 Electrical wiring

WARNING: THIS APPLIANCE MUST BE EARTHED

All electrical wiring external to the boiler must be in accordance with BS 7671 (the current IEE Wiring Regulations) and any local regulations that apply.

- i) Route external controls cable to the underside of the controller and through the grommet provided. (See Fig 4D)
- ii) Remove the 3 screws retaining the cover that shields the mains terminal block and place to one side.
- iii) Run a mains cable (3 core 0.75 mm² (24/0.2) to BS 6500 table 16) up behind the rear panel and connect it into the mains terminal block, making certain that the strain relief clamp is correctly tightened.
- iv) Refit the mains terminal block cover making sure that the screws are tightened.

Fitting the outside sensor

The outside sensor should ideally be fixed to a north facing wall (where it will not be influenced by sunlight) at least 2.5 metres from the ground. This should be wired back to terminals '1' and '2' on the 9 way terminal block on the boiler using 2-core cable of at least 1.5 M². This should be routed via the grommet provided and through the nearest strain relief clamp. The orientation of the 2 wires is not important.

Connecting the 2 channel time clock (low voltage system only)

- i) Select a convenient place for the time clock i.e. the kitchen, close to a suitable 230v mains supply.
- ii) Following the time clock manufacturers instructions fit the clock to the wall and connect a suitable 230v mains supply to it in accordance with BS 7671 (the current IEE Wiring Regulations).

IMPORTANT: The switching contacts for both central heating and hot water in the time clock **MUST BE 'volt free'** therefore **NO LINK WIRES** should be fitted.

- iii) Connect the switch connections in the time clock (using 2 core 0.5 mm² PVC double insulated cable) via the grommet and strain relief clamps to the 9 way terminal block in the boiler in accordance with Figure 4D.

Connecting the three port valve (low voltage system only)

Connect the 3 port valve (using 2 core 0.5 mm² PVC double insulated cable) via the grommets and strain relief clamps to the 9 way terminal block in the boiler in accordance with Figure 4D.

Connecting the 24/230 V relay (for interfacing with new or existing 230V system wiring)

If the boiler is to be connected to a new or existing 230V wiring system the switched live from the system wiring centre must be wired back to the 230V side of the relay provided in the boiler.

The switched live for example on a Honeywell 'Y' plan system should be run from the terminal 8 of the 10 way block in the wiring centre and for a Honeywell 'S' plan system, it should be run from terminal 10.

- i) Refer to Fig. 3E. For ease of assembly, undo the clamping band holding the relay in position and carefully lift it clear of its location. Take care not to put any strain on the cable retaining it.
- ii) Undo the 4 fixing screws and remove the relay housing lid.
- iii) Route the switched live cable through the cable entry grommet and through the spare strain relief bush in the relay housing and connect into the terminal block provided.
- iv) Tighten the strain relief bush and re-fit the relay housing lid.
- v) Return the relay housing to its original position, re-fit the clamping band and tidy cables.

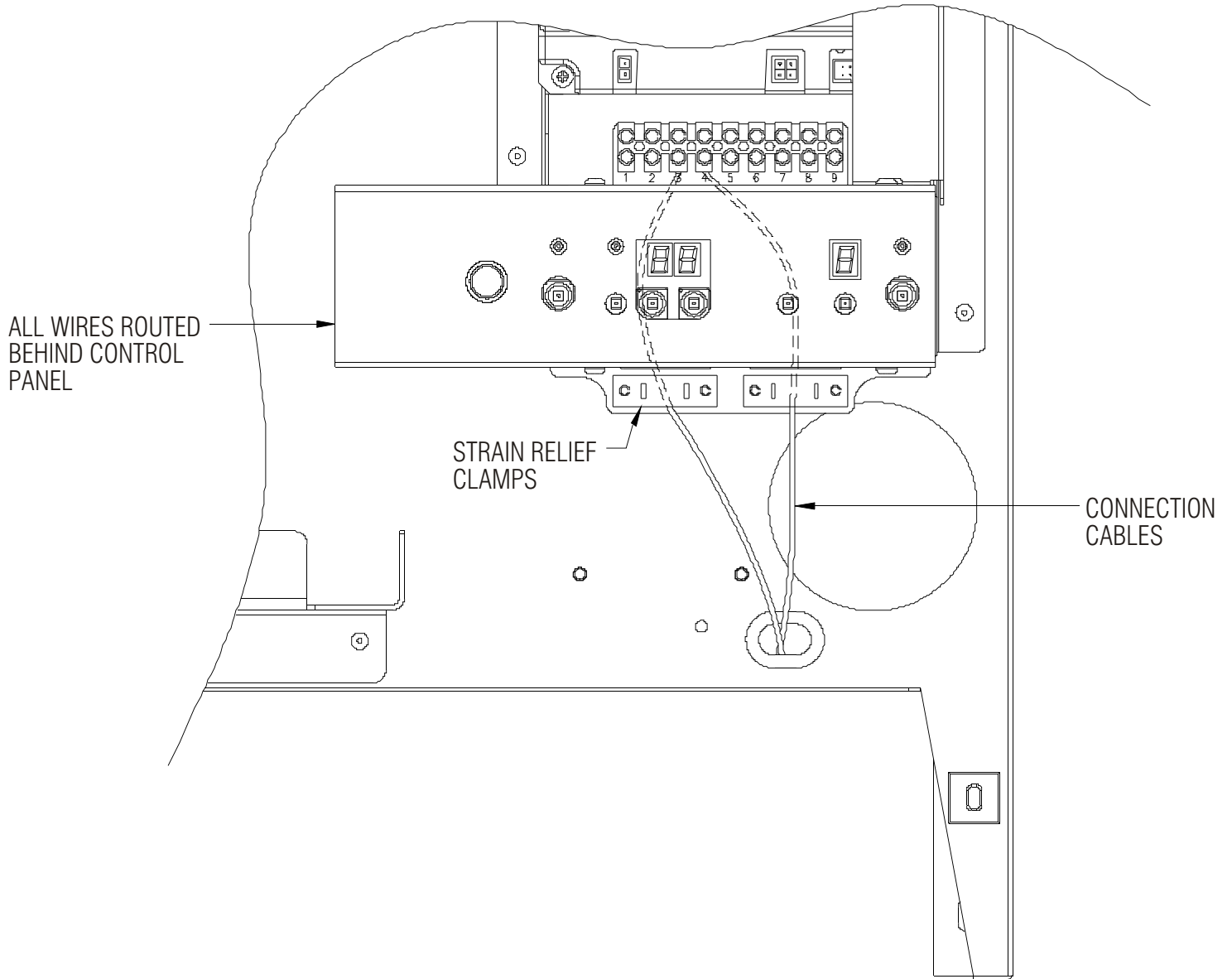


Figure 4D

5.0 Commissioning and testing

Before the boiler is commissioned, the whole of the gas installation including the meter **MUST** be purged and tested for gas soundness in accordance with BS 6891:1988.

IMPORTANT: Open all doors and windows, extinguish naked lights and **do not smoke** whilst purging the gas line.

Before starting the commissioning procedure, make sure that the gas service cock is turned on, that the electricity supply is isolated, and that the whole central heating system pipework is complete.

The following instructions assume that the front panel has not yet been fitted. If it has been fitted, unscrew the 2 fixing screws located in the bottom face of the boiler, take hold of the front panel at the bottom and gently pull towards you. This will disengage 2 location tongues (one either side). The front panel can now be lifted to disengage the hooks at the top, the panel may then be moved clear and placed to one side (see fig.5B).

5.1 Filling the system

- i) If the boiler has been fitted with isolating valves on the flow and return, check that they are open.
- ii) Turn the mains water supply on.
- iii) (On sealed systems) Open the filling loop valves. Check the system pressure on the gauge. Close the filling loop before the pressure reaches 2.5 bar.
- iv) Vent all radiators and air vents in the normal way.
- v) Unscrew the pump spindle cover (in the centre of the pump) and spin the pump shaft using a flat bladed screwdriver, ensure it rotates freely and replace the cover.

- vi) Check for the correct operation of the pressure relief valve by rotating the plastic cap on the valve anti-clockwise a quarter of a turn. Check that water is discharged and that it seals without leaks afterwards. Should the valve leak or it is stuck closed, replace it.
- vii) Check the complete system for soundness, then drain the whole system to flush out any debris, and refill the system by repeating the above procedure.
- viii) (On sealed systems) Refill the system to 0.2 bar above the system design pressure and disconnect the filling loop.

NOTE: The system design pressure should be between 1.0 and 1.5 bar.

5.2 Commissioning the boiler

The **Quantum DB** is a fully modulating gas condensing boiler. It utilizes a multifunctional 1:1 gas/air control arrangement that is set at the factory. No further adjustment is required, it is only necessary to check the gas inlet supply pressure as follows:-

- i) Refer to Figure 5 A. Loosen the inlet test point screw on the gas valve and fit a pressure gauge.
- ii) Ensure that the time clock, cylinder thermostat etc are calling for heat. Turn on the gas supply and light the boiler and any other gas appliance being served by the gas supply pipe turning them to maximum output.
- iii) Check that the dynamic inlet pressure is between 17.5 and 22.5 mbar (7 to 9 in.wg) for natural gas or 35 to 40 mbar (14 to 16 in.wg) for LPG. If the pressure is outside this range turn all the appliances off and consult the gas supplier

- iv) Remove the pressure gauge and re-tighten the inlet pressure test point screw.

Measure the CO and CO₂ concentrations in the flue. The expected values for natural gas (depending on degree of modulation) are between 8.9% and 9.7% CO₂, and between 10 p.p.m and 50 p.p.m. CO and NO_x below 20 p.p.m.

The expected measurements for LPG should (depending on degree of modulation) be between 9.9% and 10.7% CO₂, and between 40 and 80 p.p.m. CO and NO_x below 20 p.p.m.

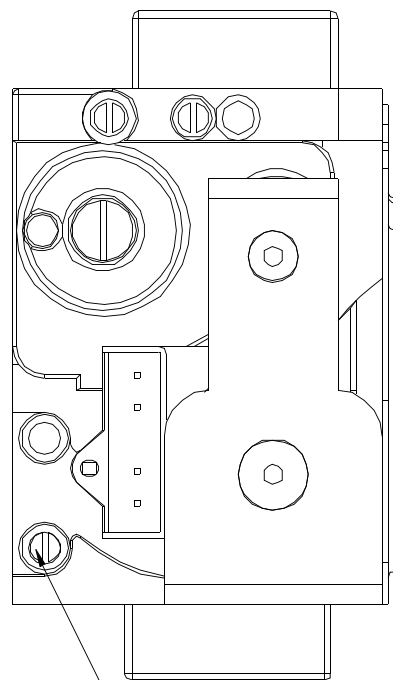


Figure 5A INLET PRESSURE TEST POINT

5.3 Final checks

- i) To fit the boiler front casing, lift it over the boiler and locate the two top brackets into the slots in the upper rear panel (see Figure 5B)
- ii) Locate the two lugs at the bottom by pushing backwards towards the wall and replace the 2 fixing screws (see fig 5B) making sure that they are tight.
- iii) Open the hinged controls cover (behind the 'Quantum' name) and set the rotary 'weather compensation control knob to the midway between the blue and red arrows.
- iv) The maximum flow temperature is set to 80 degrees centigrade.
- v) Close the controls cover.
- vi) Explain the function of the boiler safety controls to the user and how to reset them. Emphasise that if a cutout condition persists, the boiler should be turned off and the installer or service engineer consulted.
- vii) Stress to the user the importance of an annual service by a C.O.R.G.I. registered heating engineer.

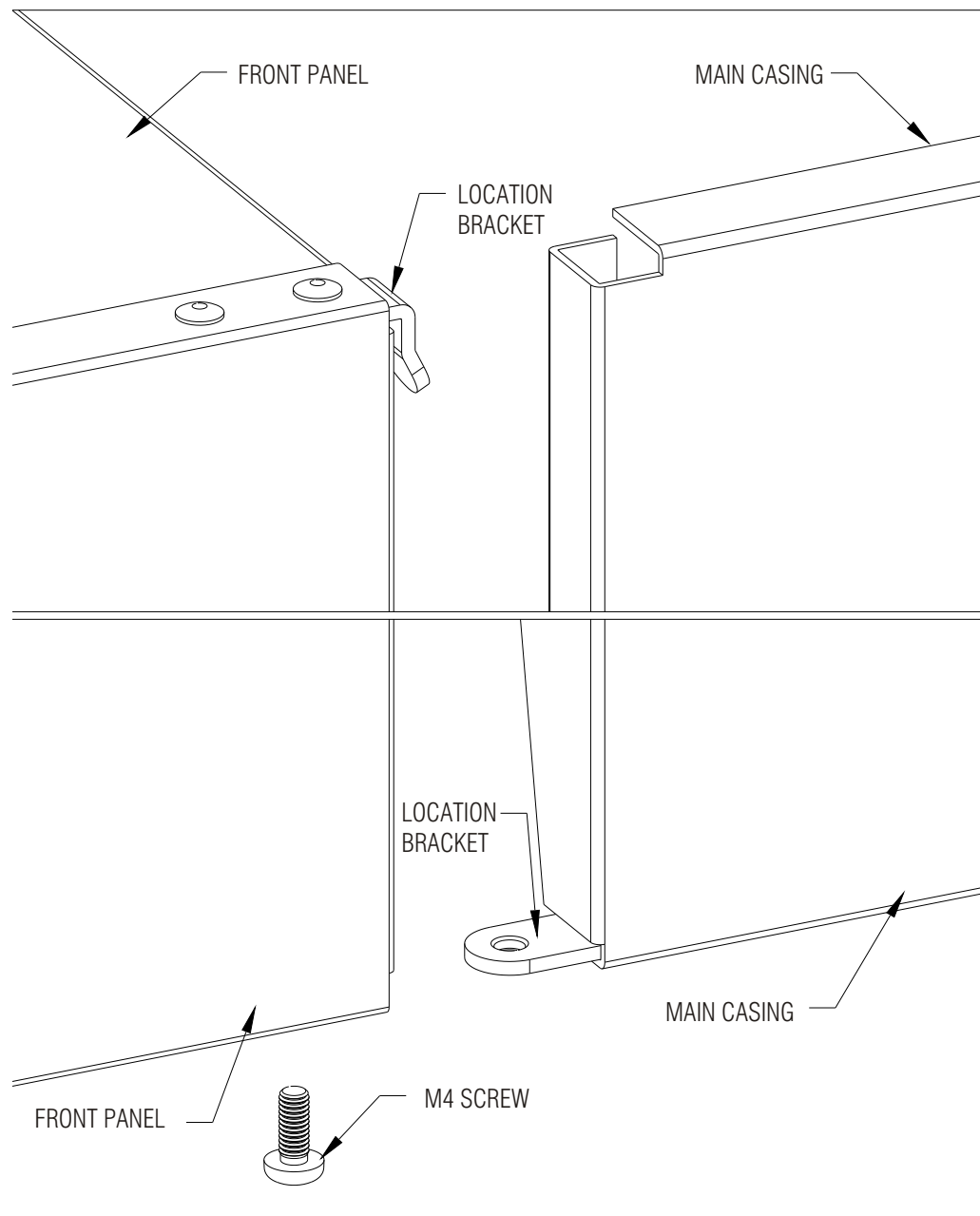


Figure 5B

5.4 Users guidance

Upon completion of the commissioning and testing, hand the boiler over to the user and make reference to the following points:-

- i) Give the '**Users Guidance**' booklet to the householder and emphasise their responsibilities under the 'Gas Safety (Installation and Use) Regulations 1996, (as amended).
- ii) Explain and demonstrate the lighting and shutdown procedures.
- iii) Advise the householder on the efficient use of the system including the use and adjustment of the system controls for both central heating and hot water.
- iv) Advise the user of the precautions necessary to prevent damage to the system and the building in the event of the system remaining inoperative during frost conditions.

6.0 Servicing requirements

6.0 Servicing requirements

To ensure the continued efficient and safe operation of the boiler, it is recommended that it is serviced and checked over at regular intervals. The frequency of servicing depends on the particular installation conditions and its usage, generally once a year is sufficient.

IMPORTANT: It is law that any service work **MUST** be carried out by a competent person such as British Gas or other **CORGI** registered person.

The boiler incorporates a flue sampling point in the flue elbow as it leaves the heat exchanger. If the service engineer has flue gas analysis equipment, the plug may be removed to enable a sample tube to be inserted. A flue gas sample will allow the engineer to determine if a major service is required.

Note: Under normal conditions the expected measurements in the flue duct for natural gas should (depending on degree of modulation) be between 8.9% and 9.7% CO₂, and between 10 p.p.m and 50 p.p.m. CO and NO_x below 20 p.p.m.

The expected measurements for LPG should (depending on degree of modulation) be between 9.9% and 10.7% CO₂, and between 40 p.p.m and 80 p.p.m CO and NO_x below 20 p.p.m.

Before starting any service work, **ISOLATE** the mains electricity supply and **TURN OFF** the gas supply at the main service cock.

To service the boiler proceed as follows: -

6.1 Burner

- i) Remove the front panel as follows:- Unscrew the 2 fixing screws located in the bottom face of the boiler. Take hold of the front panel at the bottom and gently pull towards you. This will disengage the 2 location tongues (one at each side) the front panel must be lifted to disengage the hooks at the top. The panel may now be moved clear and placed to one side.
- ii) Carefully disconnect the fan wiring, this will just pull off.
- iii) Disconnect the ignition electrode lead where it plugs onto the electrode.
- iv) Disconnect the air intake elbow at the joint nearest the fan.
- v) Remove the two fixing screws securing the gas supply pipe to the mixing chamber. Take care not to lose the 'O' ring seal.
- vi) Slacken and disengage the retaining band at the top of the heat exchanger.
- vii) Carefully lift the fan/burner assembly clear of the heat exchanger.
- viii) Inspect and if necessary clean the burner ports using a soft brush or vacuum cleaner. Do not use a wire brush or any abrasive material.
- ix) Check the heat shield and sealing gasket behind the burner for any damage or decay, replace as necessary.

6.2 Ignition electrode)Inspect the spark plug in situ. It may be cleaned with a soft brush if necessary. If either the electrode or the ceramic insulation shows signs of damage o

- ii) Refer to Figure 6B and check the alignment of the electrode. If necessary, it can be adjusted by carefully bending the tip of the electrode rod whilst supporting the base of the electrode. Do not apply any pressure to the ceramic insulation.

6.3 Fan

- i) Undo the four fixing screws holding the fan to the top cover plate and remove the fan. Gently place the burner/top plate assembly to one side.
- ii) Undo the three fixing screws holding the mixing chamber to the fan assembly.
- iii) Inspect the fan assembly particularly the impeller for dirt, damage or signs of wear. If necessary clean the impeller using a soft brush and vacuum cleaner. Spin the impeller and check that it rotates freely without any noise or any imbalance. If there is signs of damage, the fan should be replaced.
- iv) The mixing chamber should also be cleaned with a soft brush and vacuum cleaner to remove any deposits that may be lodged.

6.4 Heat exchanger

Inspect the heat exchanger for combustion deposits, if necessary the heat exchanger may be chemically cleaned using a chemical cleaning product approved for this application. The heat exchanger should always be rinsed through afterwards with warm water to remove all traces of the cleaning agent.

WARNING: Take care not to spill water on to any of the electronic equipment, as damage caused by water is not covered by the manufacturers warranty.

6.5 Condensate siphonic trap

- i) Disconnect the condensate discharge pipe from the trap.
- ii) Undo the six screws that hold the condensate trap body in place and remove it carefully.
- iii) Remove the siphon arrangement (this just pulls off) and wash both the siphon and the condensate trap body under a hot tap to remove all deposits.
- iv) Remove the old gasket and replace it with a new one when re-assembling.

6.6 General

- i) Check all gaskets and seals for damage, replace as necessary.
- ii) Use a soft brush or vacuum cleaner to remove any dust or deposits from within the boiler casing,

6.7 Re-assembly

Re-assemble all components in reverse order but do not fit the front cover. Check that all joints and seals are correctly located and fitted.

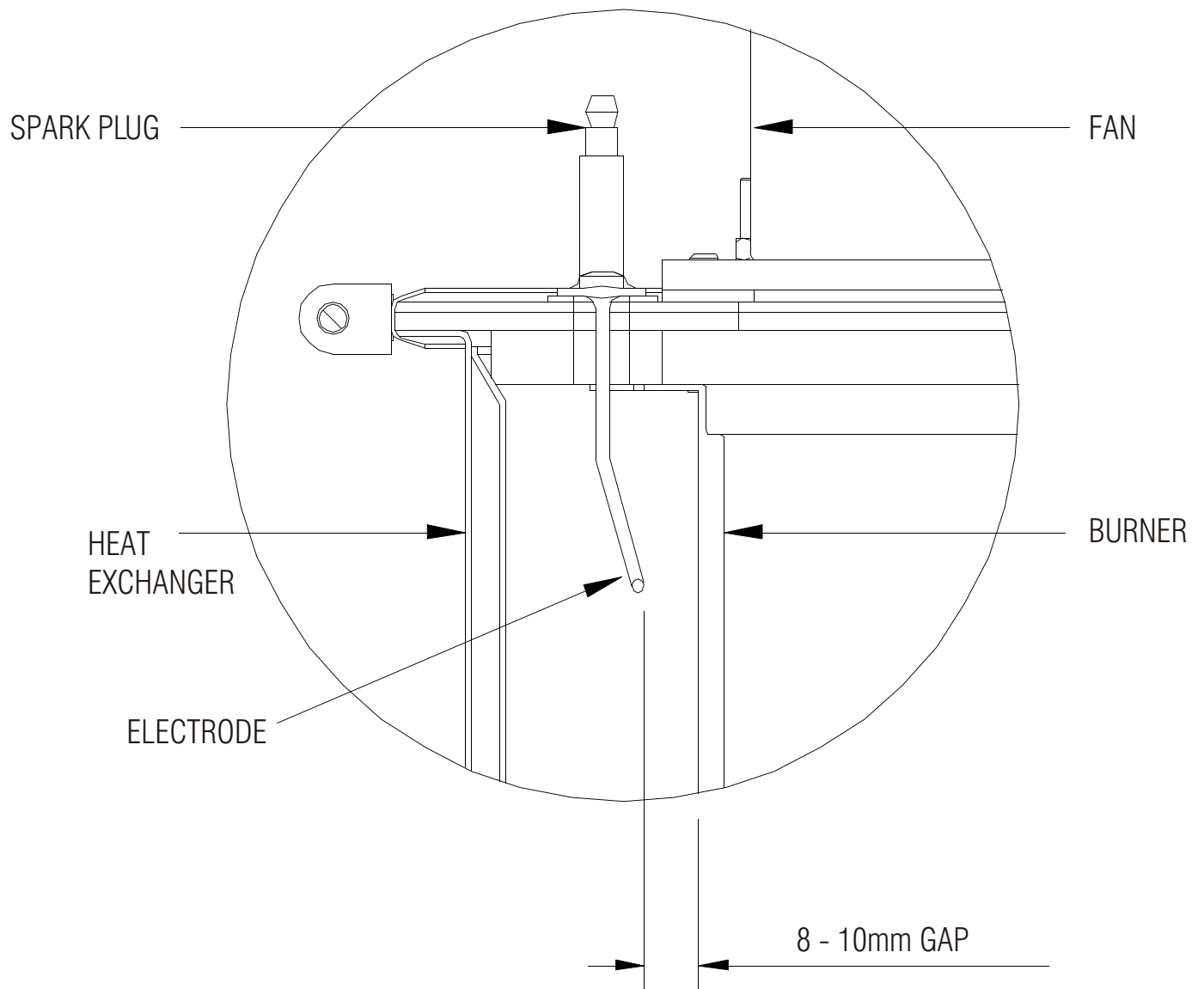


Figure 6B (electrode alignment)

6.8 Re-commission

The **Quantum DB** utilizes a multifunctional 1:1 gas/air control arrangement that is set at the factory. No adjustment is necessary.

- i) Test the whole installation for gas soundness.
- ii) Refer to Figure 5 A. Loosen the inlet test point screw on the gas valve and fit a pressure gauge.
- iii) Ensure that the time clock, cylinder thermostat etc are calling for heat. Turn on the gas supply and light the boiler and any other gas appliance being served by the gas supply pipe turning them to maximum output.
- iv) Check that the dynamic inlet pressure is between 17.5 and 22.5 mbar (7 to 9 in.wg) for natural gas or 35 to 40 mbar (14 to 16 in.wg) for LPG. If the pressure is outside this range turn all the appliances off and consult the gas supplier
- v) Remove the pressure gauge and re-tighten the inlet pressure test point screw.
- vi) Check the flue gas emissions, under normal conditions the expected measurements in the flue duct for natural gas should (depending on degree of modulation) be between 8.9% and 9.7% CO₂, and between 10 p.p.m and 50 p.p.m. CO and NO_x below 20 p.p.m.

- vii) The expected measurements for LPG should (depending on degree of modulation) be between 9.9% and 10.7% CO₂, and between 40 p.p.m and 80 p.p.m. CO and NO_x below 20 p.p.m.

6.9 Sealed water system checks

- i) Check the satisfactory operation of the safety relief valve as detailed in section 5.1.
- ii) Check the correct operation of the pressure gauge by noting the reading when the boiler is cold and check that it increases with temperature. Replace the gauge if the readings are not reliable.
- iii) Check that the system is at its original (cold) design pressure. Re pressurise the system as described in section 5.1 and check for any system leaks that may have caused the pressure loss.

6.10 Final checks

- i) Refit the front panel as detailed in section 5.3 and return all controls to their required settings.
- ii) Check that the minimum boiler clearances are still maintained.
- iii) Check that the air intake and flue outlet terminals are clear and free from any obstructions.

7.0 Internal wiring

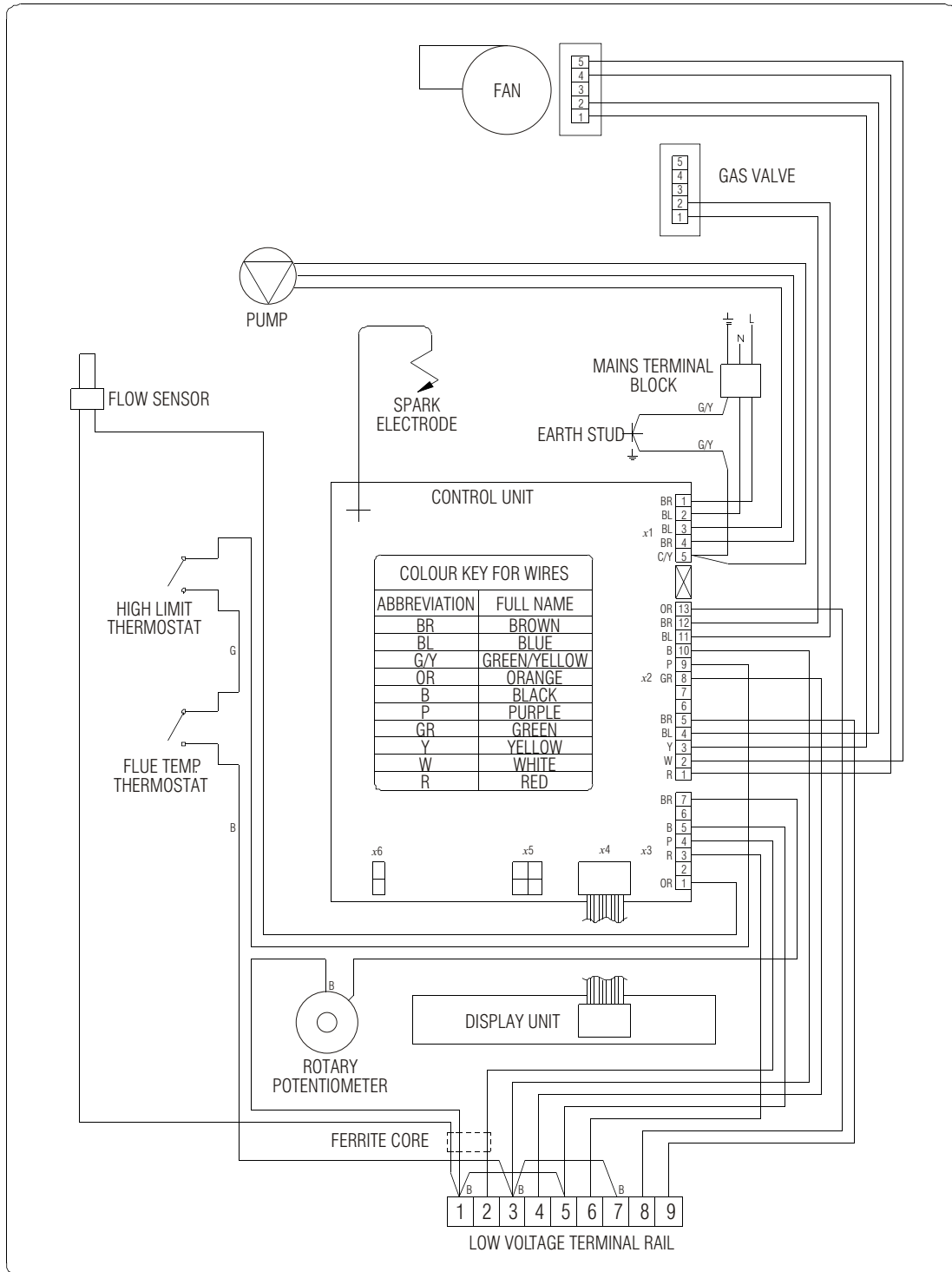


Figure 7A (Internal wiring diagram)

8.0 Fault finding

It is law that any service work must be carried out by a competent person such as British Gas or other CORGI registered personnel.

8.1 General

Before looking for a fault condition, first check the following:-

- i) That the mains electricity supply is turned on.
- ii) That the time clock and room thermostat (if fitted) are calling for heat.
- iii) That the weather compensation control knob is at its usual setting.
- iv) That the gas service cock is in the open position.









Before attempting to carry out any electrical faultfinding, always conduct the preliminary electrical system checks as described in the instructions for the British Gas multimeter or other similar instrument.

On completion of any service or faultfinding operation involving making or breaking electrical connections, always check for EARTH CONTINUITY, POLARITY, and RESISTANCE TO EARTH.

Detailed procedures for replacing faulty components are given in section 9 (Component replacement)

8.2 Diagnostic features

Status codes normal operation (single digit):

	STAND BY
	TEMPERATURE BLOCKING
	FLAME SIMULATION OR FAN SPEED BLOCKING
	PER-PURGE
	IGNITION
	CENTRAL HEATING DEMAND
	DOMESTIC HOT WATER DEMAND
	BOILER IS SWITCHED OFF

8.3 Troubleshoot sequence

Diagnosis

- Determine the error message and establish the behaviour pattern of the boiler.
- Look for the corresponding causes of the fault in the table below.

Rectification

- Determine the action required from the table on page 34.
- Correct the fault

Error codes: (single digit is blinking)

DOUBLE DIGIT	SINGLE DIGIT	FAILURE	POSSIBLE CAUSE
		SAFETY LIMIT THERMOSTAT OPENED	1,2,3,4,5,6,7,29
		FUSE F3 BROKEN	8,29
		FLOW SENSOR SHORT CIRCUIT	9,10,29
		FLOW SENSOR INTERRUPTION	11,12,13,29
		FLOW SENSOR TOO HOT	1,2,5,29
		STORAGE TANK PROBE TOO HOT	4,13,29
		NO FLAME AFTER IGNITION ATTEMPTS	14,15,16,17,18,19,26,29
		FLAME OFF WHILE RUNNING	15,16,18,19,20,21,22,26,29
		FLAME SIGNAL IN STAND BY	29
		PARAMETERS PROGRAMMED	23,29
		FAN FAILURE	24,25,26,29
		INTERNAL BURNER CONTROL FAILURE	29
		GAS VALVE FAILURE	27,28,29
		INTERNAL BURNER CONTROL FAILURE	29
		INTERNAL BURNER CONTROL FAILURE	29
		INTERNAL BURNER CONTROL FAILURE	29
		INTERNAL BURNER CONTROL FAILURE	29

Rectification table

1	Boiler pump failure	Check the wiring to the pump, make sure the pump is running when power is supplied to it, if not replace the pump.
2	Water pressure too low	Re-fill the boiler, check for leaks in the system, do not forget to check the correct operation of the expansion vessel if on a sealed system.
3	Air in the boiler	De-air the system.
4	Three-way valve failure	Check the wiring to the three-way valve; check the correct functioning of the three-way valve (in case of dhw demand the water flow should go into the direction of the storage tank).
5	Heat exchanger dirty	Clean the heat exchanger
6	Safety limit thermostat failure	Replace the safety limit thermostat.
7	Pump speed selector on wrong setting	Select a higher pump speed.
8	Fuse broken	Replace the fuse.
9	Internal sensor short circuit	Check the sensor by removing it from the boiler and measuring the resistance. (approx 10 Kohm at 25 °C) if the sensor does not test ok, replace the sensor.
10	Sensor wiring short circuit	Check the wiring to the sensor.
11	Sensor not connected	Place the connector on the sensor
12	Sensor failure	Check the sensor by removing it from the boiler and measuring the resistance. (approx 10 Kohm at 25 °C) if the sensor does not test ok, replace the sensor.
13	Sensor wiring damaged	Check the wiring to the sensor
14	Gas valve not opened	Check the gas flow during ignition
15	Gas pressure too low	Check the gas line pressure
16	Gas valve settings not correct	Adjust the gas valve
17	Ignition lead not connected to control	Make sure the ignition lead is properly connected to the electronic control and ignition probe. Also check if the lead is properly connected in the ignition cap
18	Syphon blocked	Clear the syphon, and unblock it
19	Flue pipe blocked	Clear the flue pipe
20	Gas pipe diameter too small	Change the gas pipe to the boiler
21	Recirculation of flue gas	Check the flow of flue gas and ambient air
22	Wrong gas inlet orifice	Replace the orifice for the correct one
23	Burner control programmed	Press the reset button on the user interface
24	Failure in wiring to the fan	Check the wiring
25	Fan failure (electrical)	Replace the fan
26	Fan failure (mechanical)	Replace the fan
27	Gas valve failure	Replace the gas valve
28	Gas valve wiring failure	Check the wiring to the gas valve
29	Burner control failure	Reset the burner control, if the failure is still present, replace the electronic control.

9.0 Component replacement

Before attempting any service operation, ISOLATE the mains electricity supply and TURN OFF the gas supply at the main service cock.

It is law that any service work must be carried out by a competent person such as British Gas or other CORGI registered personnel.

9.1 Heat exchanger

- i) Remove the front panel as described in 6.1.i)
- ii) Isolate the flow and return connections (if isolating valves have been fitted) and drain the boiler. Alternatively drain the system.
- iii) Disconnect the flow and return connections onto the heat exchanger. Take care not to splash any water on the electronic controls, as faults caused by the ingress of water are not covered by the manufacturers warranty.
- iv) Carefully disconnect the fan wiring connector, this will just pull off.
- v) Disconnect the ignition electrode lead where it plugs onto the electrode.
- vi) Disconnect the air intake elbow at the joint nearest the fan.
- vii) Remove the two fixing screws securing the gas supply pipe to the mixing chamber. Take care not to lose the 'O' ring seal.
- viii) Slacken and disengage the retaining band at the top of the heat exchanger.
- ix) Carefully lift the fan/burner assembly clear of the heat exchanger.
- x) Disconnect the condensate discharge pipe.
- xi) Disconnect the flue outlet elbow at the joint nearest the heat exchanger.
- xii) Disconnect the flue gas high limit capillary from the heat exchange flue gas outlet pipe.
- xiii) Support the heat exchanger and undo the two screws securing the heat exchanger clamping band. The heat exchanger may now be lifted gently from its bottom location bracket.
- xiv) Replace the heat exchanger and assemble in reverse order making sure that all joints and seals are correctly made.
- xv) Connect the filling loop hose (in the system) open the flow and return isolating valves (if fitted) and re-pressurise the system to the design pressure using the filling loop valves and venting as necessary. Check all connections for soundness, refit the front panel and finally, disconnect the filling loop.

9.2 Fan assembly

- i) Remove the front panel as described in 6.1.i)
- ii) Carefully disconnect the fan wiring connector, this will just pull off.
- iii) Remove the three screws that hold the mixing chamber to the fan housing (see Figure 9A).
- iv) Remove the four nuts that fix the fan assembly to the top cover plate (see Figure 9A) and remove the fan.
- v) Fit a new gasket on the top cover plate, replace the fan assembly and re-assemble in reverse order.

9.3 Ignition Electrode

- i) Remove the front panel as described in 6.1.i)
- ii) Carefully disconnect the fan wiring connector, this will just pull off.
- iii) Disconnect the ignition electrode lead where it plugs onto the electrode.
- iv) Disconnect the air intake elbow at the joint nearest the fan.
- v) Remove the two fixing screws securing the gas supply pipe to the mixing chamber. Take care not to lose the 'O' ring seal.
- vi) Slacken and disengage the retaining band at the top of the heat exchanger.
- vii) Carefully lift the fan/burner assembly clear of the heat exchanger.
- viii) Undo the two screws securing the electrode and remove it.
- ix) Replace the electrode and gasket, set the electrode gaps (see Fig 6B) and re-assemble in reverse order.

9.4 Burner

- i) Repeat steps i) to vii) of 9.3.
- ii) Undo the four nuts that secure the burner (see Fig 9A) and remove it.
- iii) Replace the burner, heat shield insulation and the top cover plate gasket. Pay particular attention to the refitting of the spacers correctly (see Fig 9A).
- iv) Check and if necessary reset the ignition electrode gaps.
- v) Re-assemble in reverse order.

9.5 Gas control valve

- i) Remove the front panel as described in 6.1.i)
- ii) Disconnect the gas supply at the coned union fitting on the gas service cock.
- iii) Disconnect the gas valve wiring connector plug. This will just pull off.
- iv) Undo the three screws and remove the high voltage terminal cover.
- v) Undo the two screws at each end of the gas supply to mixing chamber pipe and remove the pipe. (See Figure 9B). Take care not to lose the 'O' ring seals.
- vi) Slacken the two nuts that secure the gas supply pipe to the rear panel and lift the gas valve/supply pipe assembly upwards. Note it may be necessary to turn the assembly through 90 degrees to allow it to pass the air intake. Lift the assembly sufficient to gain access to the two fixing screws that secure the gas valve to the supply pipe and remove them. Take care not to lose the 'O' ring seal.

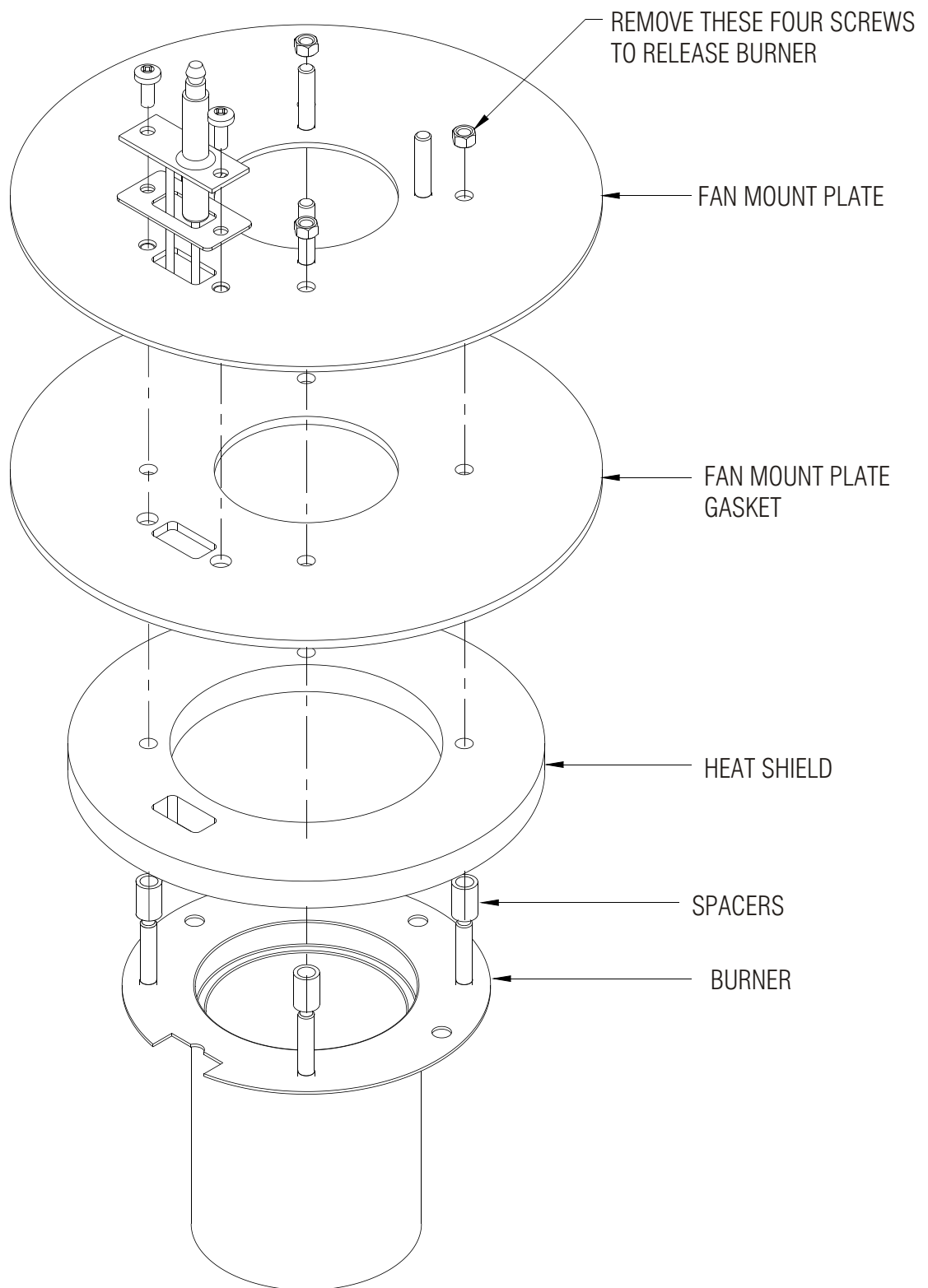


Figure 9A Burner replacement

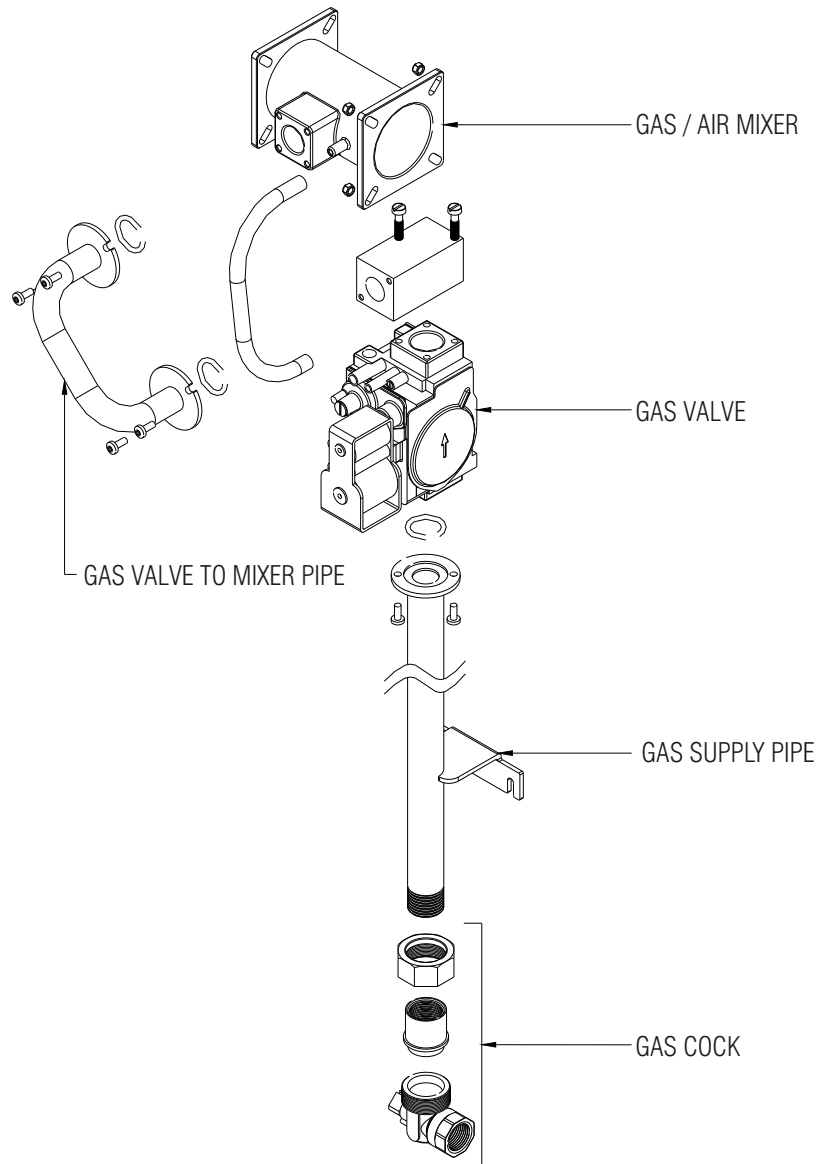


Figure 9B (Gas train arrangement)

- vii) Undo the two screws that fix the gas outlet elbow and remove it. Take care not to lose the 'O' ring seal.
- viii) Replace the gas valve and re-assemble in reverse order renewing any 'O' ring seals that show any signs of deterioration.
- ix) Test for gas soundness.
- x) When a new gas valve has been fitted, it must be adjusted by a competent person in accordance with the following instructions.

All adjustments must be carried out in the following order.

CO₂ and offset adjustment

- i) Check supply pressure as described in 5.2 and test for gas soundness
- ii) Slacken test point screws and connect a micro manometer in accordance with Fig. 9C.
- iii) With the boiler firing, set boiler to minimum fan speed by pressing service button and minus (-) button simultaneously for a few seconds, a letter 'L' will appear in the 'STATUS' window.
- iv) Refer to Fig. 9C, remove plug 'A' to reveal screw 'B'. Using the micro manometer, adjust the offset via screw 'B' to read +20pa (+0.2 mbar)
- v) Set the boiler to full fan speed by pressing service button and plus (+) button simultaneously for a few seconds.
- vi) Remove the sampling plug from the exhaust elbow and insert flue gas analyser test probe.
- vii) Once analyser has stabilised, set CO₂ to read 9.7% for Natural Gas or 10.7% for LPG by adjusting screw 'E' (See Fig. 9C)
- viii) Remove micro manometer and flue gas analyser, tighten all test point screws and replace all plugs.

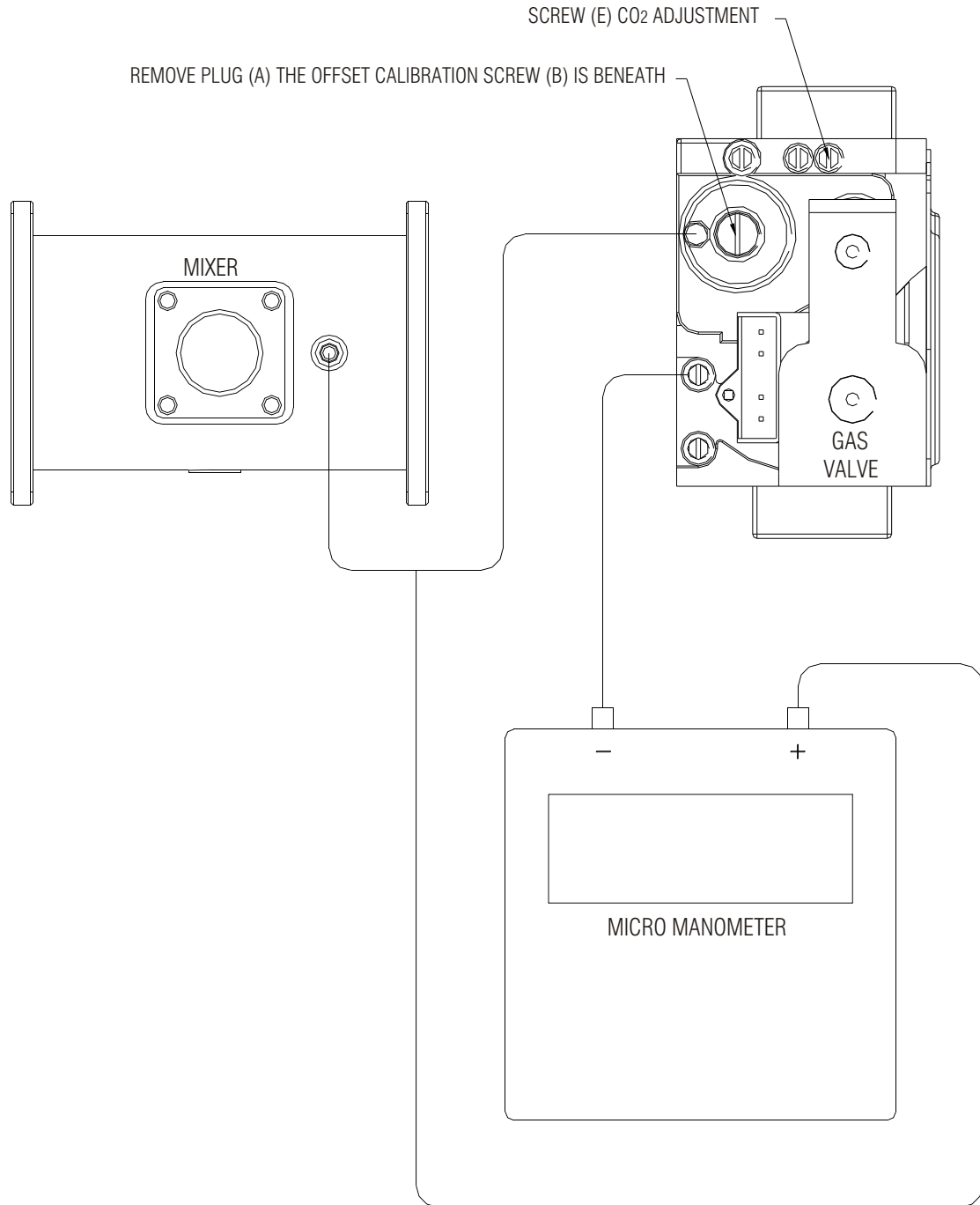


Figure 9C (Gas valve adjustment)

9.6 Control unit

- i) Remove the front panel as described in 6.1.i)
- ii) Undo the three screws and remove the high voltage terminal cover. (See Figure 9B)
- iii) Disconnect the spark ignition electrode lead.
- iv) Disconnect the three multi wire connectors to the right of the control unit and the ribbon wire connector to the bottom of the control.
- v) Whilst supporting the control unit, undo the four screws (one at each corner) and remove it from the boiler.
- vi) Replace the control unit and reassemble in reverse order.

9.7 Display board

- i) Remove the front panel as described in 6.1.i)
- ii) Pull off the rotary knob.
- iii) Undo two screws above and two screws below the fascia support bracket and remove it.
- iv) Disconnect the ribbon cable connector at the control unit end.
- v) Using a pair of pointed nosed pliers, gently squeeze the four stand off pillar fixings to release the display board.
- vi) Replace the display board and reassemble in reverse order.

9.8 Water high limit thermostat

- i) Remove the front panel as described in 6.1.i)
- ii) Disconnect the two push on terminals on the water high limit thermostat.
- iii) Undo the two screws that fix it in position and remove.
- iv) Replace the water high limit thermostat and reassemble in reverse order.

9.9 Flue high limit thermostat

- i) Remove the front panel as described in 6.1.i)
- ii) Disconnect the two push on terminals on the flue high limit thermostat.
- iii) Undo the threaded insert and remove the thermostat cappillary.
- iv) Undo the two screws that fix the thermostat body and remove it.
- v) Replace the flue high limit thermostat and reassemble in reverse order.

9.10 Flow sensor

- i) Remove the front panel as described in 6.1.i)
- ii) Disconnect the two pin connector to the flow sensor.
- iii) Unclip the flow sensor from the flow pipe.
- iv) Clean the flow pipe with wire wool, fit a new sensor and reassemble in reverse order.

9.11 Pump (system boiler only)

- i) Remove the front panel as described in 6.1.i)
- ii) Close the isolating valves above and below the pump.
- iii) Remove the pump cover and disconnect the pump wiring.
- iv) Support the pump and undo the flange connection above and below the pump.
WARNING: Be careful not to let any water get onto any of the electronic controls, as damage caused by this is not covered by the manufacturer warranty.
- v) Clean the pipe flanges, fit a new pump and gaskets and reassemble in reverse order.

9.12 Expansion vessel (system boiler only)

- i) Remove the front panel as described in 6.1.i)
- ii) Isolate the flow and return connections (if isolating valves have been fitted) and drain the boiler. Alternatively drain the system.
WARNING: Be careful not to let any water get onto any of the electronic controls, as damage caused by this is not covered by the manufacturer warranty.
- iii) Disconnect the braided hose connection onto the bottom of expansion vessel.
- iv) Disconnect the condensate discharge pipe
- v) Support the expansion vessel and undo the four screws fixing the expansion vessel support bracket and withdraw the vessel from below the boiler. (See Figure 9D)
- vi) Replace the expansion vessel and reassemble in reverse order.
- vii) Connect the filling loop hose (in the system) open the flow and return isolating valves (if fitted) and re-pressurise the system to the design pressure using the filling loop valves and venting as necessary. Check all connections for soundness, refit the front panel and finally, disconnect the filling loop.

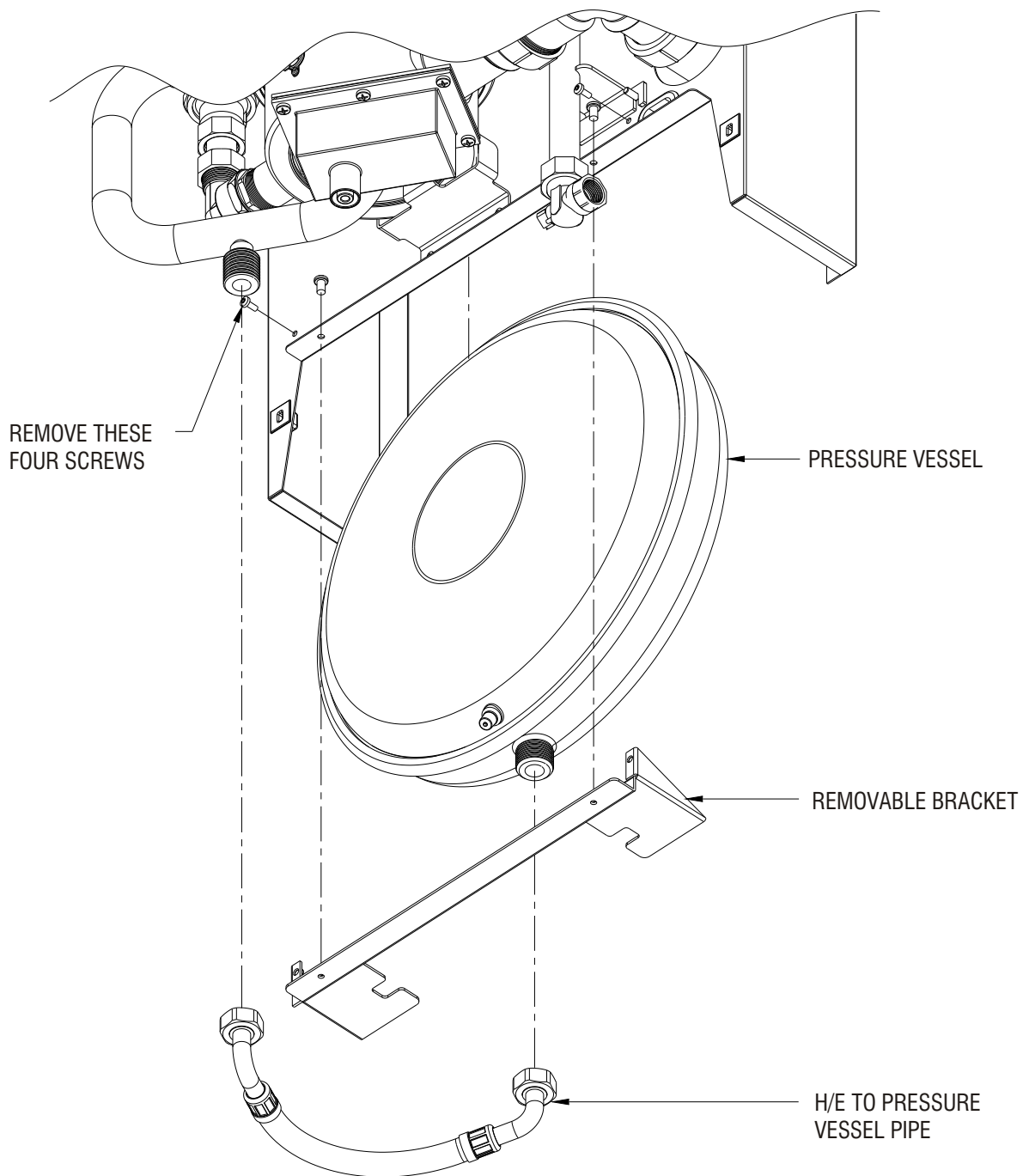


Figure 9D (Expansion vessel support bracket removal)

9.13 Pressure gauge (system boiler only)

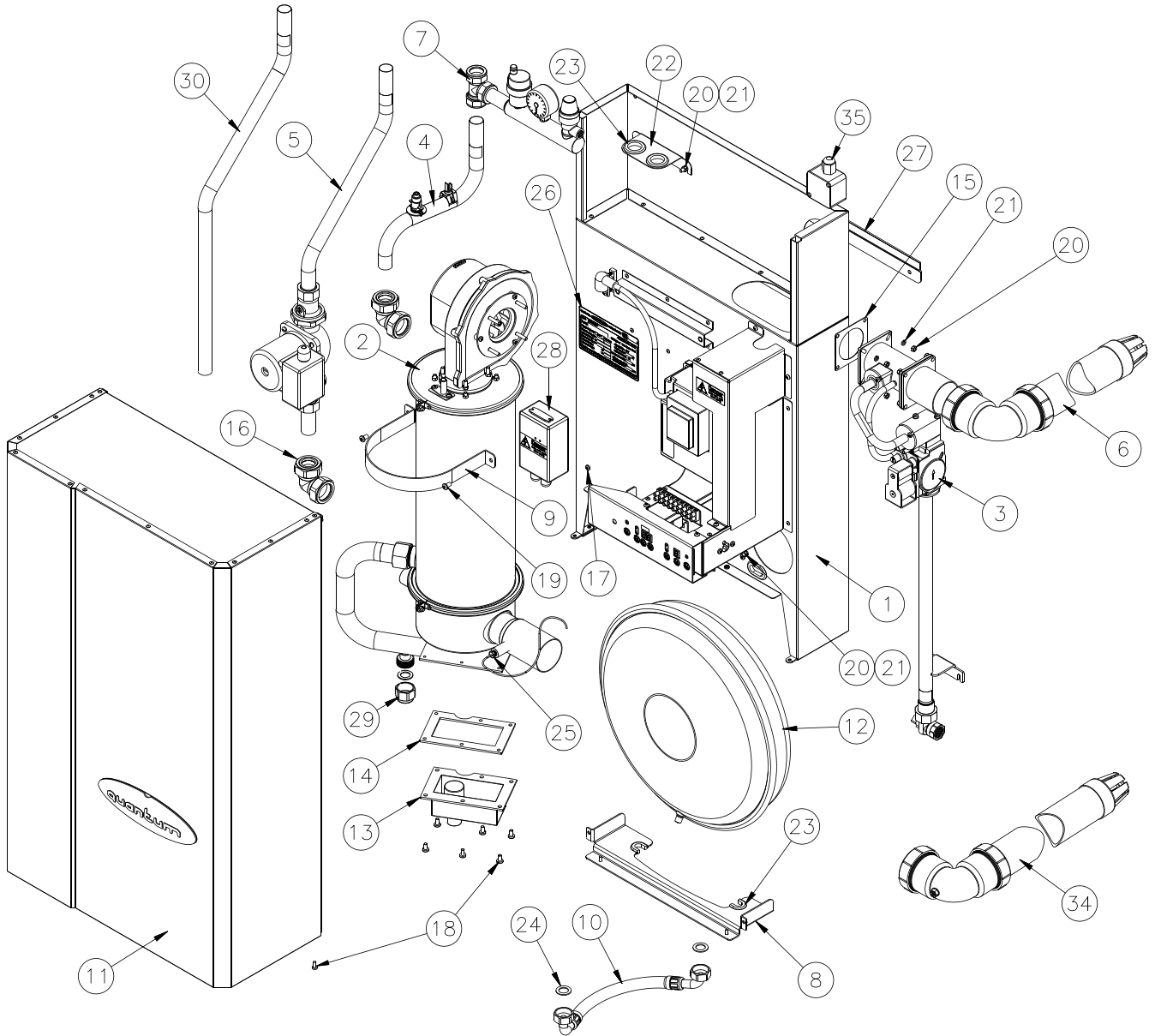
- i) Remove the front panel as described in 6.1.i)
- ii) Isolate the flow and return connections (if isolating valves have been fitted) and drain the boiler. Alternatively drain the system.
WARNING: Be careful not to let any water get onto any of the electronic controls, as damage caused by this is not covered by the manufacturer warranty.
- iii) Undo the pressure gauge and replace it.
- iv) Reassemble in reverse order
- v) Connect the filling loop hose (in the system) open the flow and return isolating valves (if fitted) and re-pressurise the system to the design pressure using the filling loop valves and venting as necessary. Check all connections for soundness, refit the front panel and finally, disconnect the filling loop.

9.14 Safety valve (system boiler only)

- i) Remove the front panel as described in 6.1.i)
- ii) Isolate the flow and return connections (if isolating valves have been fitted) and drain the boiler. Alternatively drain the system.
WARNING: Be careful not to let any water get onto any of the electronic controls, as damage caused by this is not covered by the manufacturer warranty.
- iii) Undo the safety valve and replace it.
- iv) Reassemble in reverse order
- v) Connect the filling loop hose (in the system) open the flow and return isolating valves (if fitted) and re-pressurise the system to the design pressure using the filling loop valves and venting as necessary. Check all connections for soundness, refit the front panel and finally, disconnect the filling loop.

9.15 Automatic air vent

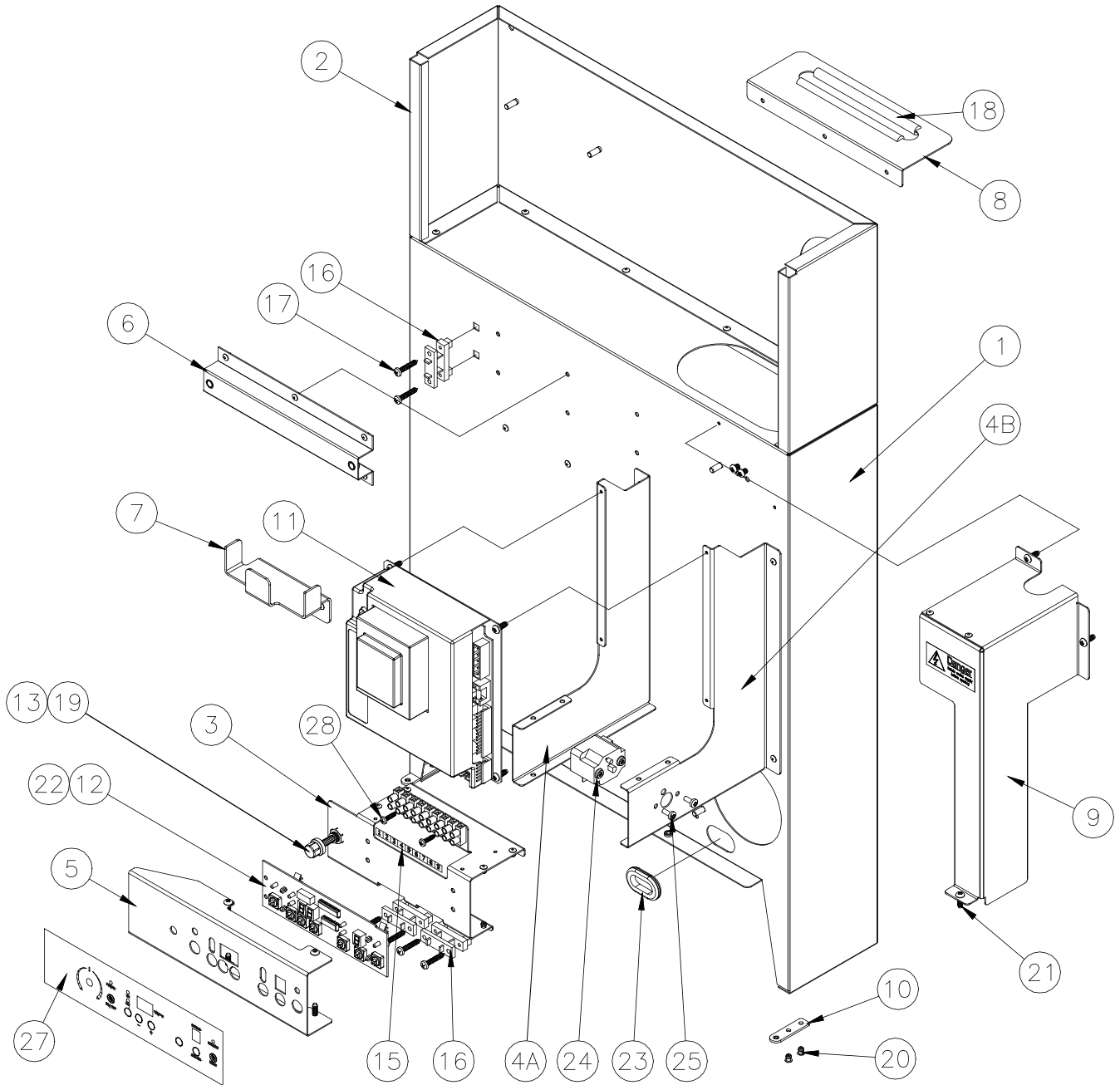
- i) Remove the front panel as described in 6.1.i)
- ii) Isolate the flow and return connections (if isolating valves have been fitted) and drain the boiler. Alternatively drain the system.
WARNING: Be careful not to let any water get onto any of the electronic controls, as damage caused by this is not covered by the manufacturer warranty.
- iii) Undo the automatic air vent and replace it.
- iv) Reassemble in reverse order.
- v) Connect the filling loop hose (in the system) open the flow and return isolating valves (if fitted) and re-pressurise the system to the design pressure using the filling loop valves and venting as necessary. Check all connections for soundness, refit the front panel and finally, disconnect the filling loop.



ITEM	DESCRIPTION	QTY.	MATERIAL	PART No.	ITEM	DESCRIPTION	QTY.	MATERIAL	PART No.
1	INNER CASING ASSEMBLY	1	ZINTEC	D76/1943	19	M6x10 PAN HEAD SCREW	4	BZP	N/A
2	HEAT EXCHANGER ASSEMBLY	1	-	D76/1941	20	M5 NUT	8	BZP	N/A
3	GAS IN ASSEMBLY	1	-	D76/1942	21	M5 SHAKE PROOF WASHERS	8	BZP	N/A
4	FLOW WATER PIPE ASSEMBLY	1	-	D76/1946	22	WATER PIPE ANCHOR BRACKET	1	S/S	D76/1820
5	RETURN WATER PIPE ASSEMBLY	1	-	D76/1945	23	OPEN GROMMET (HEYCO)	3	P.V.C.	410 1033
6	AIR INLET ASSEMBLY	1	U.P.V.C.	D76/2059	24	WASHER $\phi 23 \times \phi 12 \times 2$	2	FIBRE	N/A
7	SAFETY MANIFOLD ASSEMBLY	1	-	D76/1950	25	COMPRESSION GLAND (COTHERM)	1	-	THCOMGL
8	REMOVABLE VESSEL HOLDER	1	ZINTEC	D76/1873	26	SERIAL No. LABEL (SEE NOTE 6)	1	FOIL	D76/2033
9	H/E CLAMP BAND	1	ZINTEC	D76/1868	27	WALL BRACKET	1	ZINTEC	D76/1870
10	H/E TO EXP. VESSEL PIPE	1	S/S	D76/1856	28	RELAY ASSEMBLY	1	-	D76/2042
11	FRONT PANEL	1	ZINTEC	D76/1944	29	3/4" BLANKING NUT	1	BRASS	-
12	10 Ltr EXPANSION VESSEL	1	M/S	ZI-305010	30	WATER RETURN PIPE	1	COPPER	D76/2073
13	CONDENSATE TRAP BODY	1	PLASTIC	D76/1927	31	INSTALLATION & SERVICE MANUAL	1	-	-
14	CONDENSATE GASKET	1	FOAM	D76/1930	32	USERS GUIDANCE MANUAL	1	-	-
15	MIXER GASKET	1	C.F.M.	D76/1936	33	PACKING BOX & WALL TEMPLATE	1	Cardboard	D76/2034
16	$\phi 28 - \phi 22 \times 90^\circ$ ELBOW	2	BRASS	N/A	34	EXHAUST FLUE ASSEMBLY	1	U.P.V.C.	D76/2060
17	M4x6 PAN HEAD SCREW	4	BZP	N/A	35	OUTSIDE TEMPERATURE PROBE	1	-	100.980.001
18	M5x10 PAN HEAD SCREW	8	BZP	N/A					

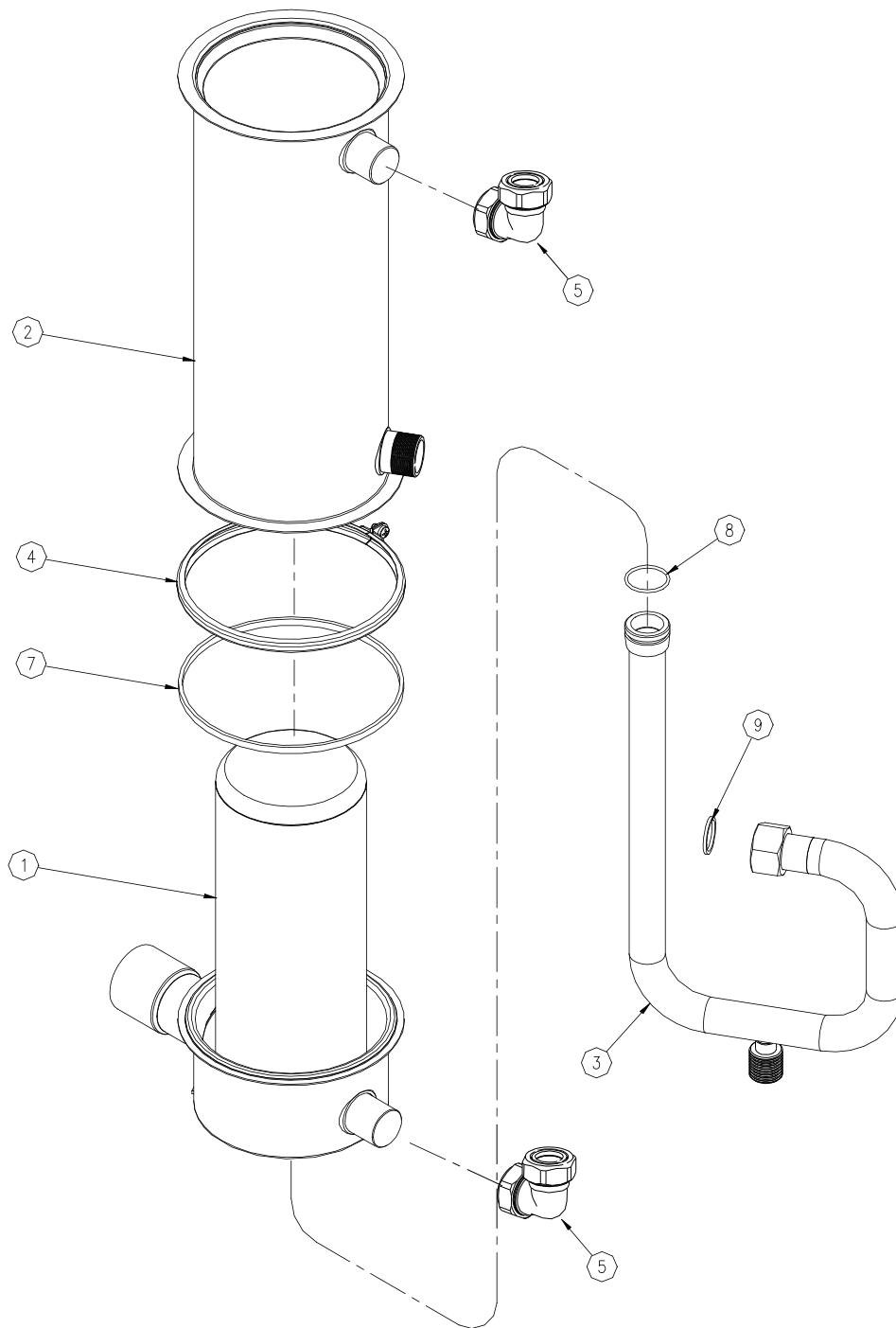
Item 29 and 30 = System boiler only

Boiler Main Assembly



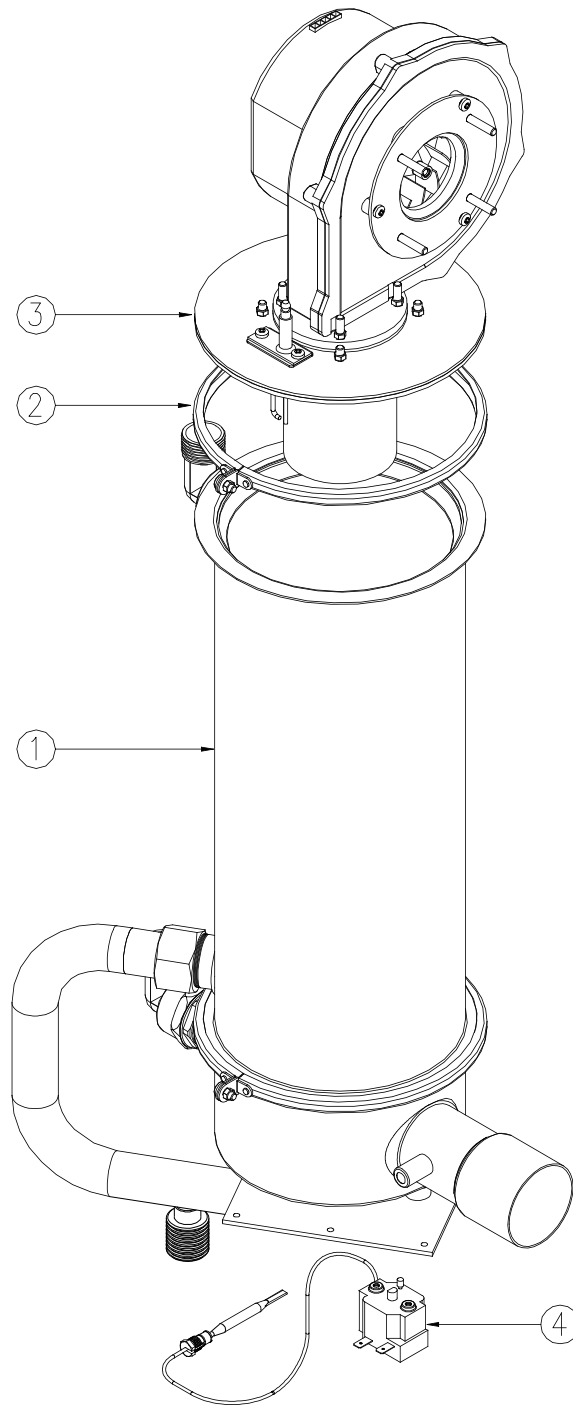
ITEM	DESCRIPTION	QTY.	MATERIAL	PART No.	ITEM	DESCRIPTION	QTY.	MATERIAL	PART No.
1	MAIN CASING	1	1.2 ZINTEC	D76/1862	15	TERMINAL BLOCK 1-9 LABEL	1	N/A	D76/2033
2	TOP CASING	1	1.2 ZINTEC	D76/1863	16	CABLE CLAMP (HMCC 1-01)	3	N/A	RICHO
3	PCB SWITCH MOUNT PLATE	1	1.2 ZINTEC	D76/1864	17	No 8x25 SELF TAPPING SCREW	6	BZP	N/A
4	L&R CONTROL BOX BRACKET	1+1	1.2 ZINTEC	D76/1865	18	RUBBER EXTRUSION 130 LONG	2	NITRILE	BAINES (873)
5	P.C.B. SWITCH COVER	1	1.2 ZINTEC	D76/1866	19	KNOB FOR ROTARY SWITCH	1	N/A	D76/2069
6	HEAT/EX. MOUNT PLATE	1	1.2 ZINTEC	D76/1867	20	ø4 x 6 POP RIVETS	36	N/A	N/A
7	HEAT/EX. SADDLE BRACKET	1	2.0 ZINTEC	D76/1869	21	ø4 x 6 TRILOBULAR SCREWS	15	BZP	N/A
8	FIXED VESSEL MOUNTING PLATE	1	1.2 ZINTEC	D76/1872	22	P.C.B. SUPPORTS	4	PLASTIC	PCB 013
9	CONTROL BOX INSULATION COVER	1	1.2 ZINTEC	D76/1988	23	MAINS CABLE GROMMIT	1	NITRILE	N/A
10	OUTER CASING FIXING BRACKET	2	S/S	D76/1918	24	HEAT SENSOR (COTHERN)	1	N/A	GTLHR047
11	CONTROL BOX (Furimat)	1	N/A	850/60	25	M4 x 6 PAN HEAD SCREW	2	BZP	N/A
12	P.C.B. SWITCH	1	N/A	BV DU-812	26	WIRING HARNESS (NOT SHOWN)	1	-	D76/2069
13	WEATHER COMPENSATION SWITCH	1	N/A	D76/2069	27	OVERLAY	1	POLYESTER	D76/1933
14					28	No 6x16 SELF TAPPING SCREW	2	BZP	N/A

Casing Assembly



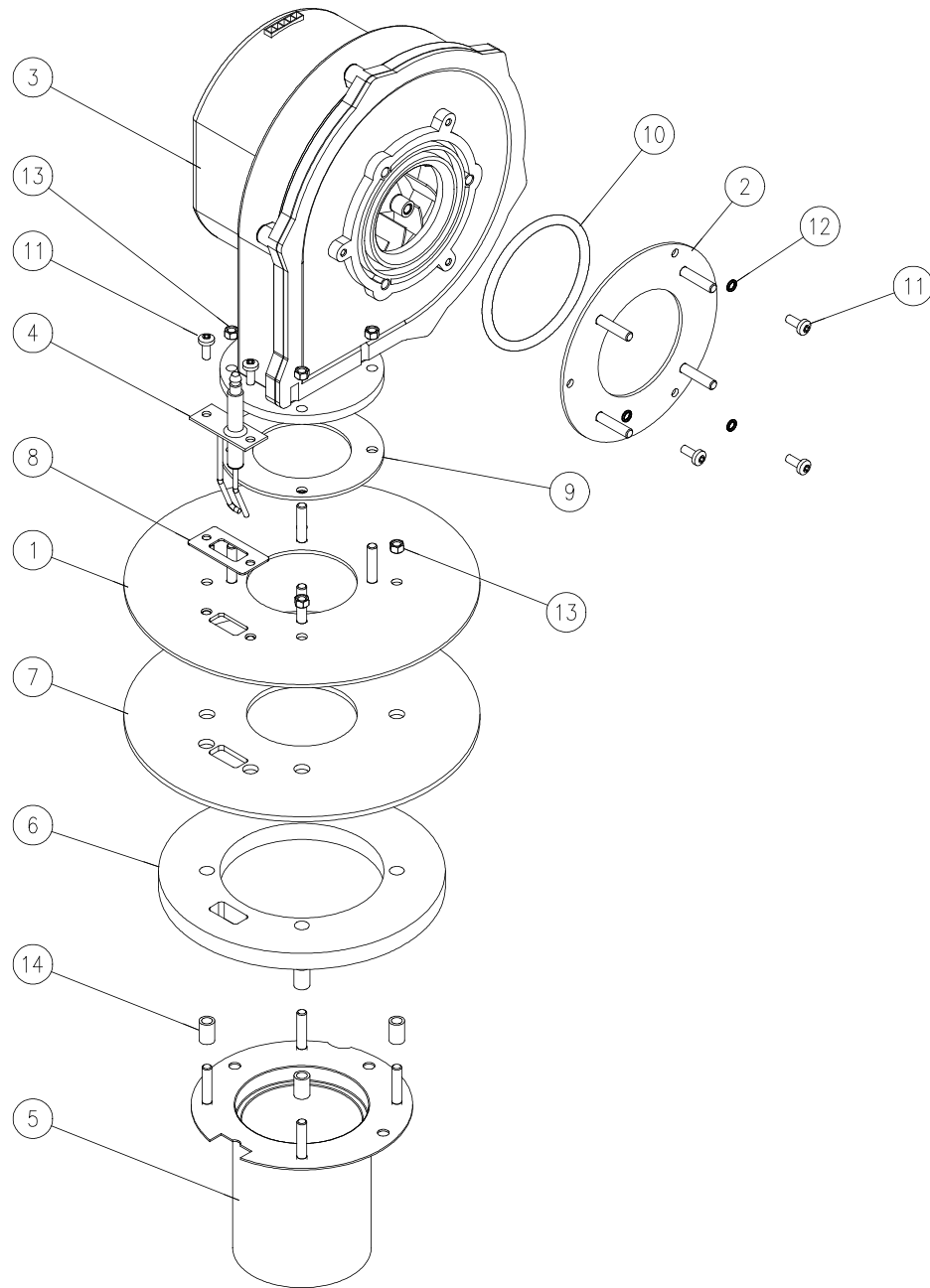
ITEM	DESCRIPTION	QTY.	MATERIAL	PART No.	ITEM	DESCRIPTION	QTY.	MATERIAL	PART No.
1	INNER HEAT EXCHANGER ASSEM	1	S/S	1905	6				
2	OUTER HEAT EXCHANGER ASSEM	1	S/S	1906	8	PLENUM SEAL O-RING	1	N/A	
3	WATER PIPE	1	S/S	1926	9	WATER RETURN O-RING	1	N/A	
4	CLAMP BAND	1	S/S		10	FIBRE WASHER	1	N/A	
5	28 TO 22 COMP. ELBOW	2	BRASS						

Heat Exchanger Assembly



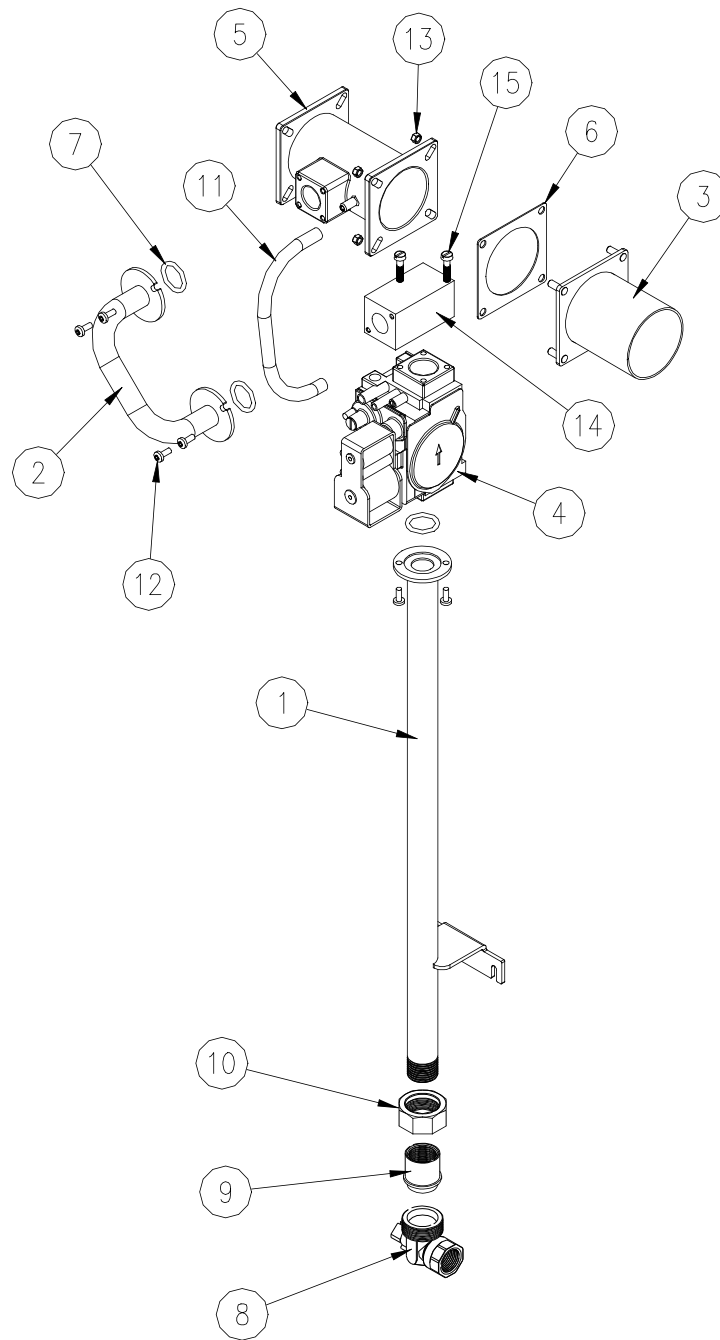
ITEM	DESCRIPTION	QTY.	MATERIAL	PART No.
1	HEAT EXCHANGER ASSEMBLY	1	VARIABLES	1938
2	CLAMP BAND	2	S/S	
3	BURNER ASSEMBLY	1	VARIABLES	1939
4	FLUE STAT	1	N/A	

Burner + Heat Exchanger Assembly



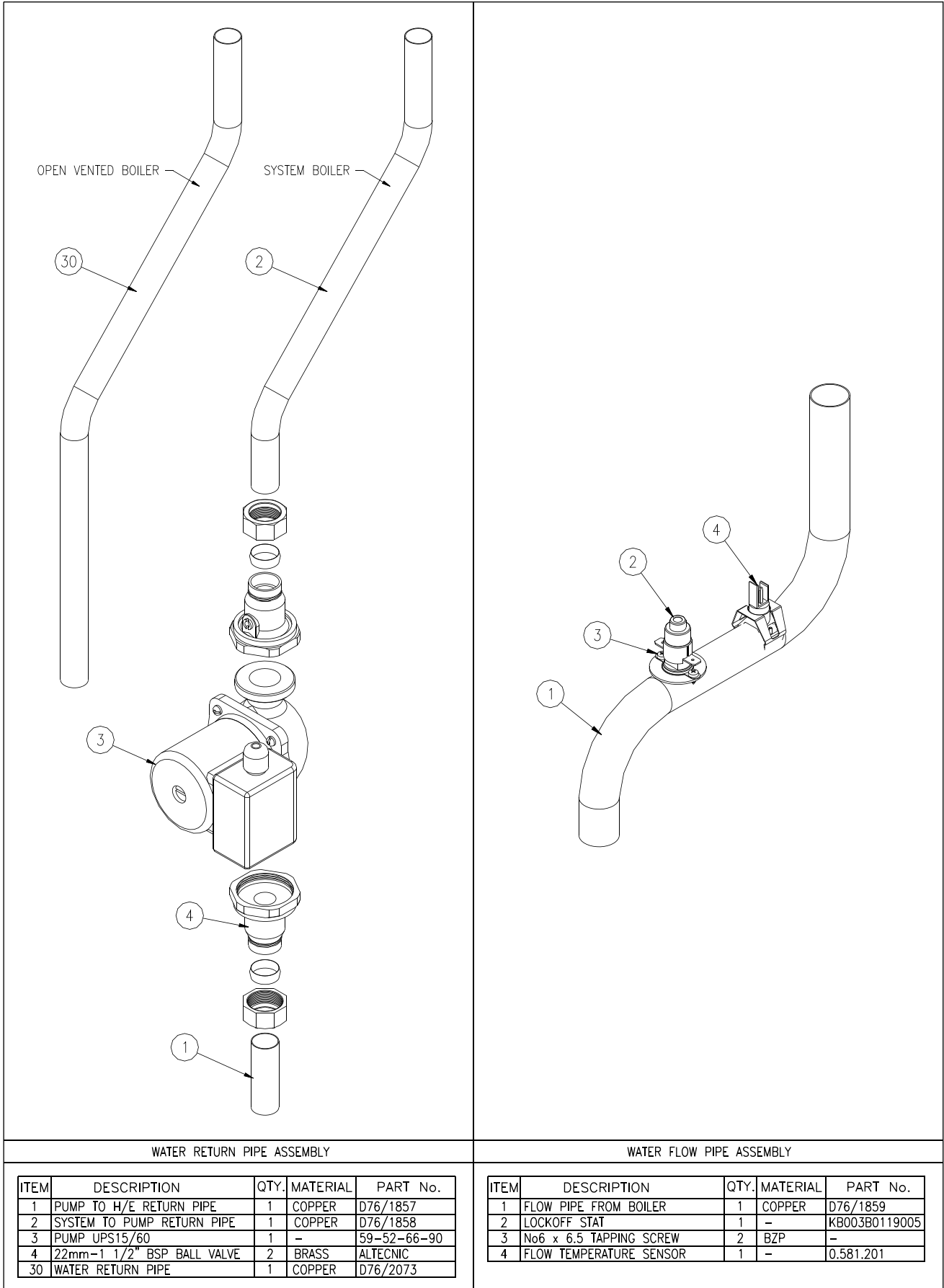
ITEM	DESCRIPTION	QTY.	MATERIAL	PART No.	ITEM	DESCRIPTION	QTY.	MATERIAL	PART No.
1	FAN MOUNTING PLATE	1	S/S	1892	8	SPARK PLUG GASKET	1	C.F.M.	1934
2	FAN TO MIXER ADAPTER PLATE	1	S/S	1851	9	BLOWER GASKET	1	C.F.M.	1928
3	24v DC FAN	1	N/A	RG128	10	62 1/D x ø3 CHORD O-RING	1	N/A	
4	SPARK SPLUG	1	N/A		11	M4x6 PAN HEAD SCREWS	5	BZP	N/A
5	BURNER	1	S/S	1916	12	M4 SHAKE PROOF WASHERS	3	BZP	N/A
6	HEAT SHIELD	1	C.F.M.	1931	13	M5 NUTS	8	BZP	N/A
7	TOP PLATE GASKET	1	C.F.M.	1929	14	SPACER	4	S.S	D76_2056

Burner Assembly

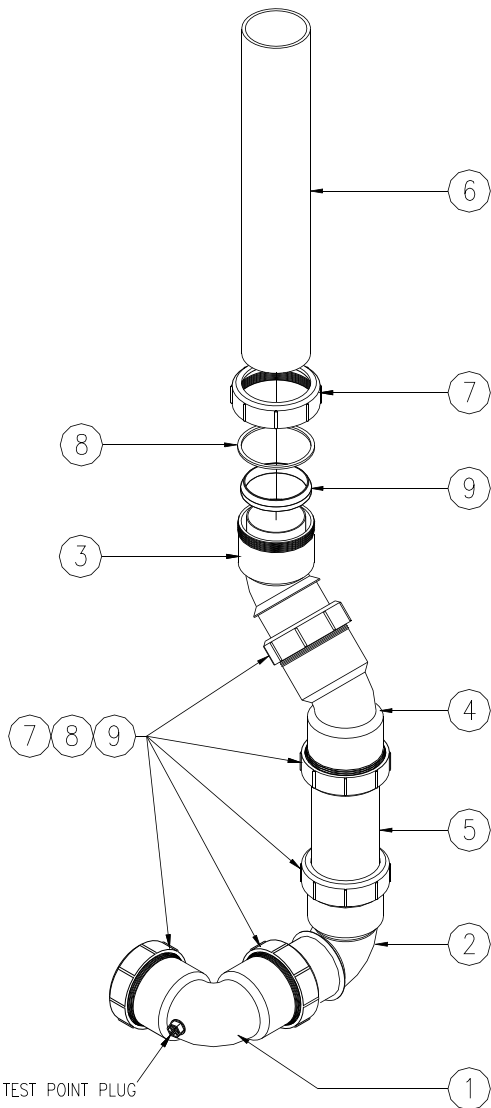


ITEM	DESCRIPTION	QTY.	MATERIAL	PART No.	ITEM	DESCRIPTION	QTY.	MATERIAL	PART No.
1	GAS INLET PIPE	1	M/S	1861	9	1/2" BSP THREADED BOSS	1	BRASS	
2	VALVE TO MIXER PIPE (N.G)	1	M/S	1860 A	10	FLANGED 3/4" BSP NUT	1	BRASS	
2A	VALVE TO MIXER PIPE (L.P.G)	1	M/S	1860 B	11	Ø6x1 CAPPILARY TUBE (200L)	1	RUBBER	
3	FLUE IN ADAPTOR PLATE	1	S/S	1871	12	M4x6 PAN HEAD SCREWS	6	BZP	N/A
4	GAS VALVE	1	N/A		13	M5 NUTS	4	BZP	N/A
5	GAS/AIR MIXER	1	N/A		14	MACHINED ELBOW	1	ALLUM	1989
6	MIXER GASKET	1	C.F.M.	1936	15	M4 x 40 PAN HEAD SCREWS	2	BZP	N/A
7	Ø27 x 2.5 O-RING	3	NITRILE				1		
8	GAS COCK	1	BRASS				1		

Gas Train Assembly

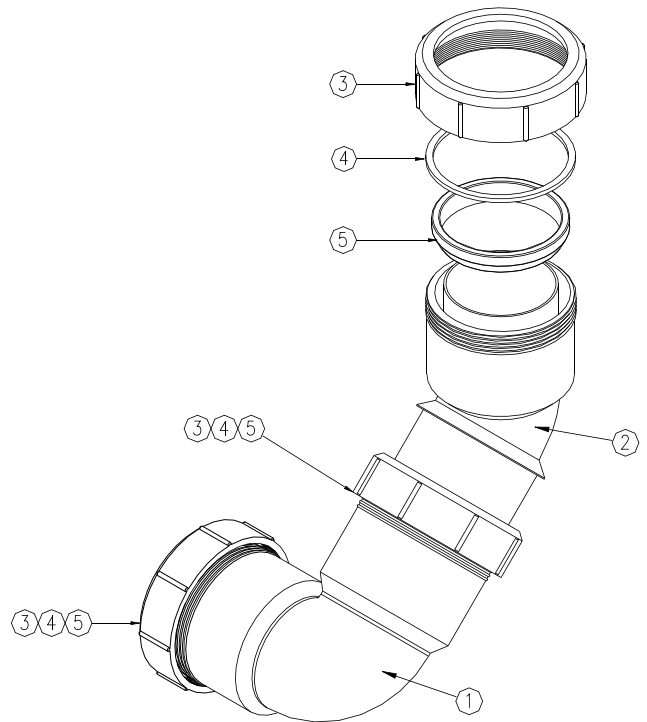


Water Pipe Assembly



AIR OUT FLUE ASSEMBLY

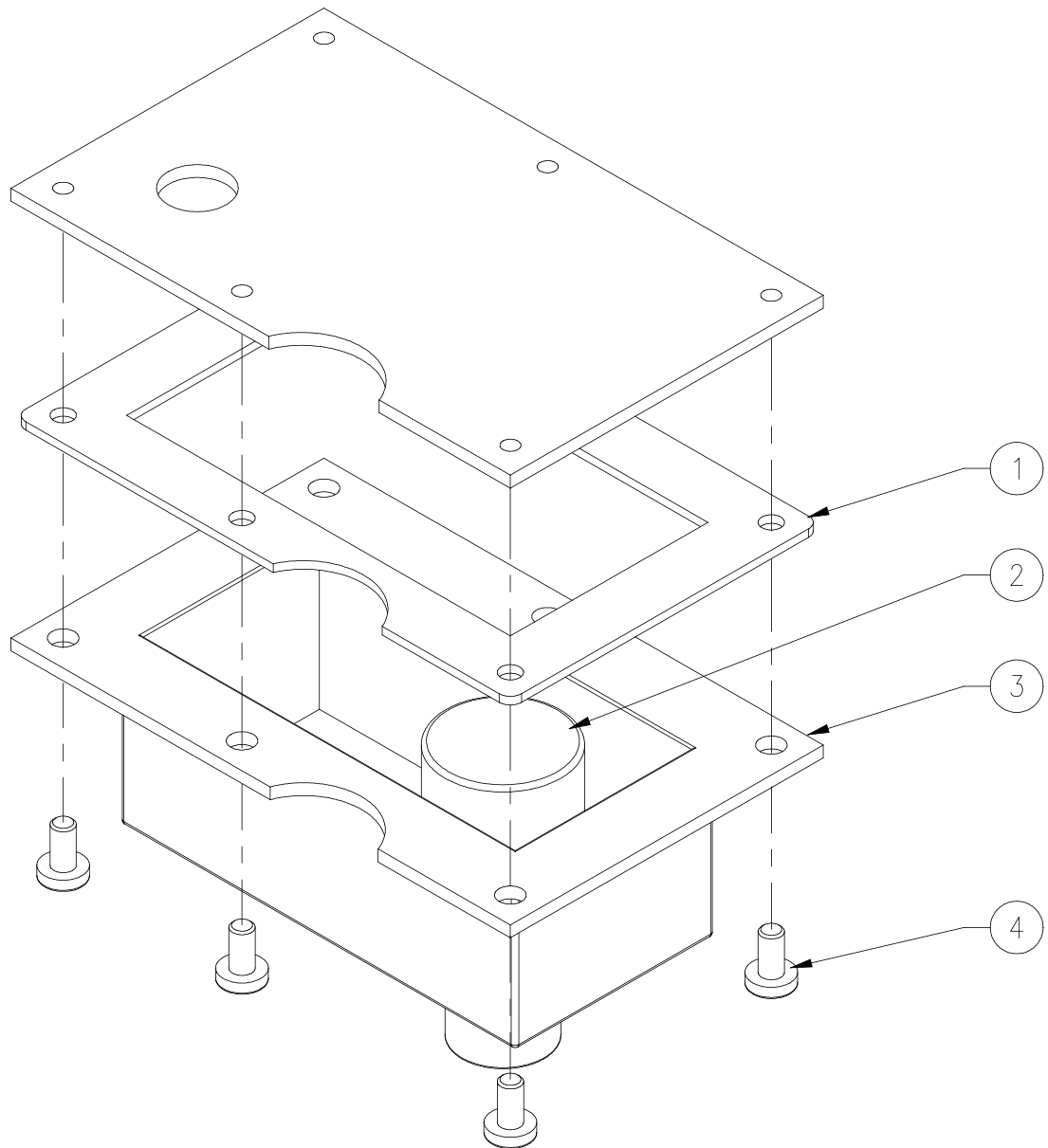
ITEM	DESCRIPTION	QTY.	MATERIAL	PART No.
1	FEMALE TO FEMALE 90° ELBOW	1	U.P.V.C.	N/A
2	FEMALE TO MALE 90° ELBOW	1	U.P.V.C.	N/A
3	FEMALE TO MALE 45° ELBOW	1	U.P.V.C.	N/A
4	FEMALE TO FEMALE 45° ELBOW	1	U.P.V.C.	N/A
5	165mm LONG 2,1/4" FLUE PIPE	1	U.P.V.C.	N/A
6	330mm LONG 2,1/4" FLUE PIPE	1	U.P.V.C.	N/A
7	PLASTIC NUT	6	U.P.V.C.	N/A
8	PLASTIC WASHER	6	U.P.V.C.	N/A
9	RUBBER OLIVE	6	RUBBER	N/A



AIR IN FLUE ASSEMBLY

ITEM	DESCRIPTION	QTY.	MATERIAL	PART No.
1	FEMALE TO FEMALE 90° ELBOW	1	U.P.V.C.	N/A
2	FEMALE TO MALE 45° ELBOW	1	U.P.V.C.	N/A
3	NUT FOR 1,1/4" FLUE PIPE	3	U.P.V.C.	N/A
4	WASHER	3	U.P.V.C.	N/A
5	RUBBER OLIVE	3	U.P.V.C.	N/A

Top Exit Flue Arrangement



ITEM	DESCRIPTION	QTY.	MATERIAL	PART No.
1	CONDENSATE TRAP GASKET	1	NITRILE	1930
2	SYPHON CAP	1	PLASTIC	1927
3	CONDENSATE TRAP BODY	1	PLASTIC	1927
4	M5x10 SCREWS	6	BZP	N/A

Condensate Assembly

10.0 Spare parts lists (Parts not illustrated)

Description	Quantity	Part Number
Wiring harness	1	Order by description.
24v 3 port divert valve	1	
24 hour time clock	1	
7 day time clock	1	
Safety manifold assembly	1	
Safety valve	1	
Automatic air vent	1	
Pressure gauge	1	
Safety valve	1	
		↓



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