Purewell Variheat mk2 c Boilers

Cast Iron, Pre-mix, Condensing, Modular Boilers with Automatic Ignition for Heating and Domestic Hot Water Installations

Installation, Commissioning and Servicing Instructions

MODELS - 70c, 95c, 110c, 140c & 180c

NATURAL GAS I_{2H}

IMPORTANT NOTE

THESE INSTRUCTIONS MUST BE READ AND UNDERSTOOD BEFORE INSTALLING, COMMISSIONING, OPERATING OR SERVICING EQUIPMENT

Hamworthy

Customer After Sales Services

Telephone: **01202 662555** Email: **service@hamworthy-heating.com** Fax: **01202 662522**

Technical Enquiries

To supplement the detailed technical brochures, technical advice on the application and use in the Hamworthy Heating range is available from our technical team in Poole and our accredited agents.

Site Assembly

Hamworthy offer a service if site assembly for many of our products where plant room access is restricted. Using our trained staff we offer a high quality of build and assurance of a boiler built and tested by the manufacturer.

Commissioning

Commissioning of equipment by our own engineers, accredited agents or specialist sub-contractors will ensure the equipment is operating safely and efficiently.

Service Contracts

Regular routine servicing of equipment by Hamworthy service engineers inspects the safety and integrity of the plant, reducing the risk of failure and improving performance and efficiency. Service contracts enable you to plan and budget more efficiently.

Breakdown service, repair, replacement

Hamworthy provide a rapid response breakdown, repair or replacement service through head office at Poole and accredited agents throughout the UK.

Spare Parts

We offer a comprehensive range if spare parts, providing replacement parts for both current and discontinued products. Delivery options are available to suit you. Please refer to our website fir more details.

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THE PUREWELL BOILER IS INTENDED FOR USE AS A COMMERCIAL APPLIANCE AND IS NOT CERTIFIED FOR USE IN DOMESTIC APPLICATIONS.

THIS BOILER IS FOR USE ON GROUP H NATURAL GAS (2^{ND} FAMILY) I_{2H} PLEASE ENSURE RELEVANT INFORMATION REQUIRED WITHIN DOCUMENT IS FOUND BEFORE FIRING BOILER.

COUNTRY OF DESTINATION : UNITED KINGDOM & REPUBLIC OF IRELAND

THIS BOILER COMPLIES WITH ALL RELEVANT EUROPEAN DIRECTIVES.
PRODUCT IDENTIFICATION No. 86CN70

PUBLICATION NO. 218612
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1.0 INTRODUCTION

1.1 A competent person holding 'GAS SAFE' registration or equivalent must install this boiler. All installations **MUST** conform to the relevant Gas Safety and Building Regulations. Health & Safety requirements must also be taken into account when installing any equipment. Failure to comply with the above may lead to prosecution.

This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instructions concerning cleaning, maintenance and use of the appliance by a person responsible for their safety. Children should be supervised to ensure that they do not play with the appliance.

1.2 These instructions are for Group H Natural Gas (2nd Family) only. The information relating to Natural Gas firing is to be found in Appendix 'A'. Boilers **MUST NOT** use gas other than that for which they were designed and made.

1.3 The Purewell Variheat mk2 is a fully modulating, pre-mix condensing, gas fired boiler manufactured from horizontal cast iron heat exchanger sections, connected to an economiser located in the base of the boiler. The boiler is floor mounted and is intended for the heating of Commercial and Industrial premises. It may also be used to supply hot water for these premises via an indirect cylinder.

1.3.1 Operation is initiated and controlled by a Navistem boiler management system with a user interface LCD display for accessing and changing boiler parameters.

1.3.2 The Purewell Variheat mk2 boiler is delivered to site fully assembled fitted with it's casing and controls. Care should be taken when manoeuvring the boiler into position to avoid damage.

1.3.3 Each of the boiler models is designed for direct connection to a flue system. The flue system must be suitable for pressurised wet operation. The flue outlets from more than one unit may be connected to a single chimney. No draught diverter is fitted to the boiler nor is a fixed diverter required in the flue system. However a draught stabiliser is recommended for some installations —see Appendix 'C' (Page 41).

1.3.4 The Purewell Variheat mk2 has a low water content and minimum flow rates **MUST** be maintained above the recommended levels shown in Appendix 'E' (Page 45).

1.4 If the boiler is to be connected to an un-vented (pressurised) heating system, care must be taken to ensure all extra safety requirements are met and that the relevant interlocks will shut down the boiler(s) should a high or low pressure fault occur.

The pressurisation unit must also incorporate a low level water switch, which protects the water pumps, and will directly or indirectly shut down the boiler plant should a low water condition occur.

Consideration should also be given to the maximum working pressure of the boiler as per Appendix 'E'. Consult Hamworthy Heating Technical Department for help or assistance if in doubt.

1.5 The Purewell Variheat mk2 boiler is not suitable for direct connection to domestic hot water supplies or gravity fed heating systems.

1.6 The Purewell Variheat mk2 boiler can be installed with either reverse return water flow layout or with single pipe header layout (non HHL supply). See Appendix E for typical schematic layout.

1.7 It is good practice in all heating installations to use some form of water treatment to reduce formation of lime scale and black iron oxide sludge. The high efficiencies produced by the Purewell Variheat mk2 Boiler can easily be reduced by lime scale formation. If a pressurisation unit is used, it is prudent to include an hours run meter to give an indication of pump running time and hence raw water make-up. Any leaks should be attended to as soon as possible to avoid scale build up within the boiler's waterways.

1.8 Each Purewell Variheat mk2 module is supplied with volt free contact outputs for Normal Run, Boiler lock-out from a General Fault, 0~10v analogue control input. Also provided are connections for BMS, Shunt Pump & Remote On/Off control as well as connections to a boiler lock circuit (causing the boiler to go to standby).

1.9 Options

1.9.1 Optional reverse return header kits are available in 2, 3 & 4 boiler configuration covering models 70c, 95c, 110c, 140c & 180c. These kits incorporate all necessary valves and interconnecting pipework. Refer to individual kit instructions for details.

1.9.2 Controls peripherals
The Navistem boiler management system has the potential to accept the following control options:

1.9.3 OCI345 LPB Clipin – Kit part number: 563605667 BSB to LPB interface to allow communication between boilers for Cascade of 16 boilers by LMS or communication to external RVS system components (e.g. Merley sequence controller).

1.9.4 For additional kit information please refer to Appendix F (page 50).

2.0 SUPPLY AND DELIVERY

Your boiler is despatched to site as a pre-assembled and tested unit. It is the installers responsibility to convey the boiler to the plantroom.

Ensure the boiler is kept secure when handling to avoid it toppling, as this will result in damage.

The flue connection & condensate trap to the boiler are packaged separately to avoid damage. The flue components consist of an adaptor elbow, gasket and straight length of 150mm diameter flue pipe. The condensate trap is supplied loose within the boiler's inner packaging.

TRANSPORTING & POSITIONING OF THE BOILER

CAUTION: Risk of injury through carrying heavy loads.

- Only trained personnel may undertake the handling. A risk assessment must be undertaken, taking into account each installations variabilities.
- Observe safety instructions relating to the lifting of heavy loads.
- Protect the boiler against slippage by means of a transport strap.

NOTICE: Boiler damage through impact.

The standard delivery of the boiler includes components that are susceptible to impact damage.

- Protect all components against impact influences when transporting the boiler.
- Observe the transport instructions on the packaging.

Where possible, transport the boiler to the installation location in its shipping packaging to protect it from contamination and damage.

1. Take the boiler to the plant room..

(*If using pallet truck refer to diagram below.)

2. To remove the appliance from the pallet, packaging and panels MUST be removed and stored safely.
3. Remove the four screws securing the boiler to the pallet (see diagram.)
4. Take the unit off the pallet.
5. Once off the pallet the boiler can be moved, ensuring it is lifted on the sump ribs.
6. Position the boiler for installation and using a sprit level check the appliance is level to ensure no air pockets can collect in the boiler and the condensate can fully drain.

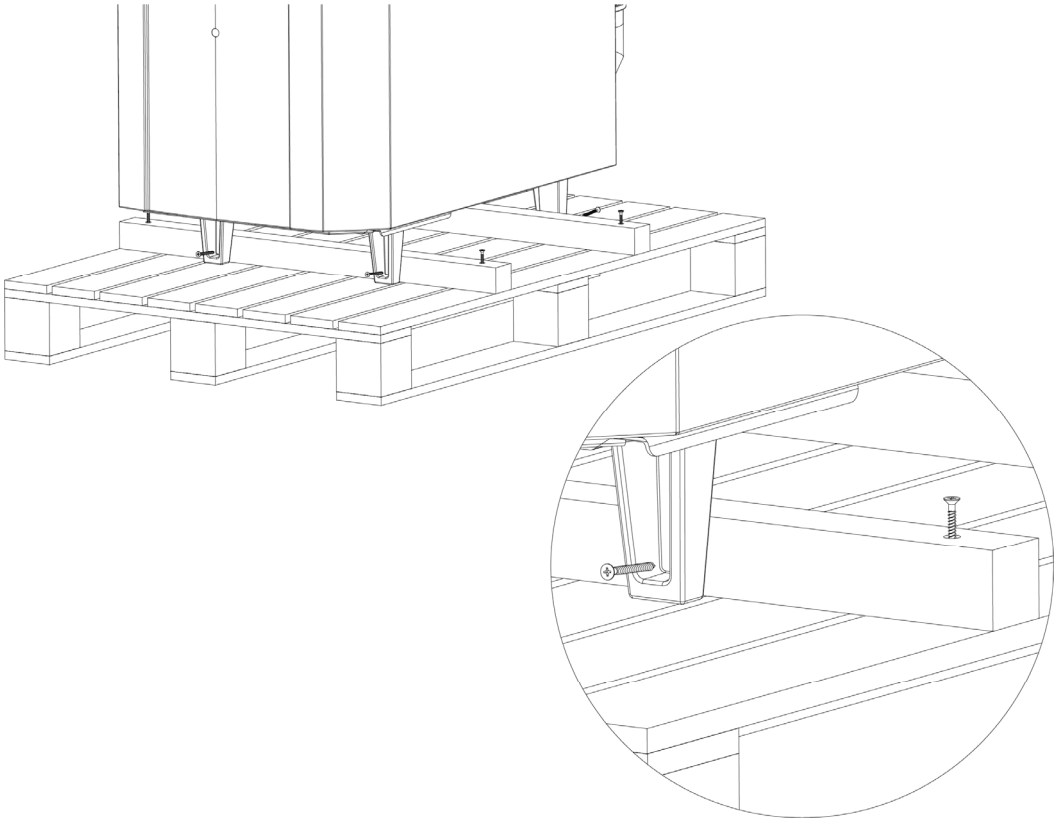


Figure 2.1 - Boiler Packaged Dimensions

Model	Depth	Width	Height	Weight
Purewell Variheat mk2 70c	1200mm	800mm	1320mm	195kg
Purewell Variheat mk2 95c				195kg
Purewell Variheat mk2 110c				195kg
Purewell Variheat mk2 140c				250kg
Purewell Variheat mk2 180c				250kg

Note: The above values include the pallet the boiler is supplied upon.

Delivery Verification

When taking delivery please ensure that you have received the correct number of boilers and ancillary packages to fulfil your order. If any item is missing please contact our after sales service team. Please provide details of your order such as order number and contract number as well as a detailed description of the missing item.

Reverse Return Header Sets

Where reverse return header sets are used these are packaged separately from the boilers.

Ancillary items such as isolation valves and flexible boiler connectors are packaged in a cardboard box on the same pallet. The whole is shrink wrapped for security and basic protection.

Model	Configuration	Length mm	Weight kg
70c -140c	2 boilers	1168	57
70c -140c	3 boilers	1730	95
70c -140c	4 boilers	2336	133
180c	2 boilers	1250	112
180c	3 boilers	1784	178
180c	4 boilers	2318	300

Figure 2.2 - Header Kit Packaged Dimensions

3.0 SIZE AND SPACE REQUIREMENTS

3.1 The Purewell Variheat mk2 boiler range has been designed to utilise minimum floor space, therefore it is important the plantroom has sufficient ceiling height to allow for installation and connection to the flue system.
A minimum distance of 50mm must be maintained from easily flammable materials
Also important is allowance for sufficient access at front, sides and rear of boiler for flue and pipework connections.
Ensure a minimum height of 150mm above the boiler for removal of the covers.
Do not run cabling through the top or display covers.
See Figure 3.1 below.

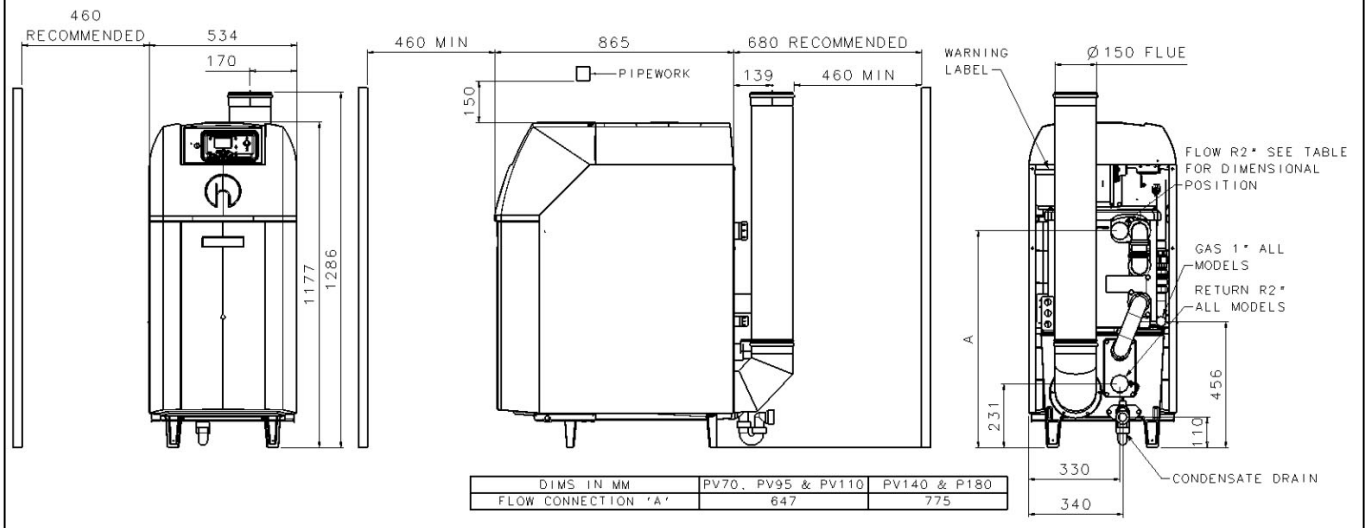
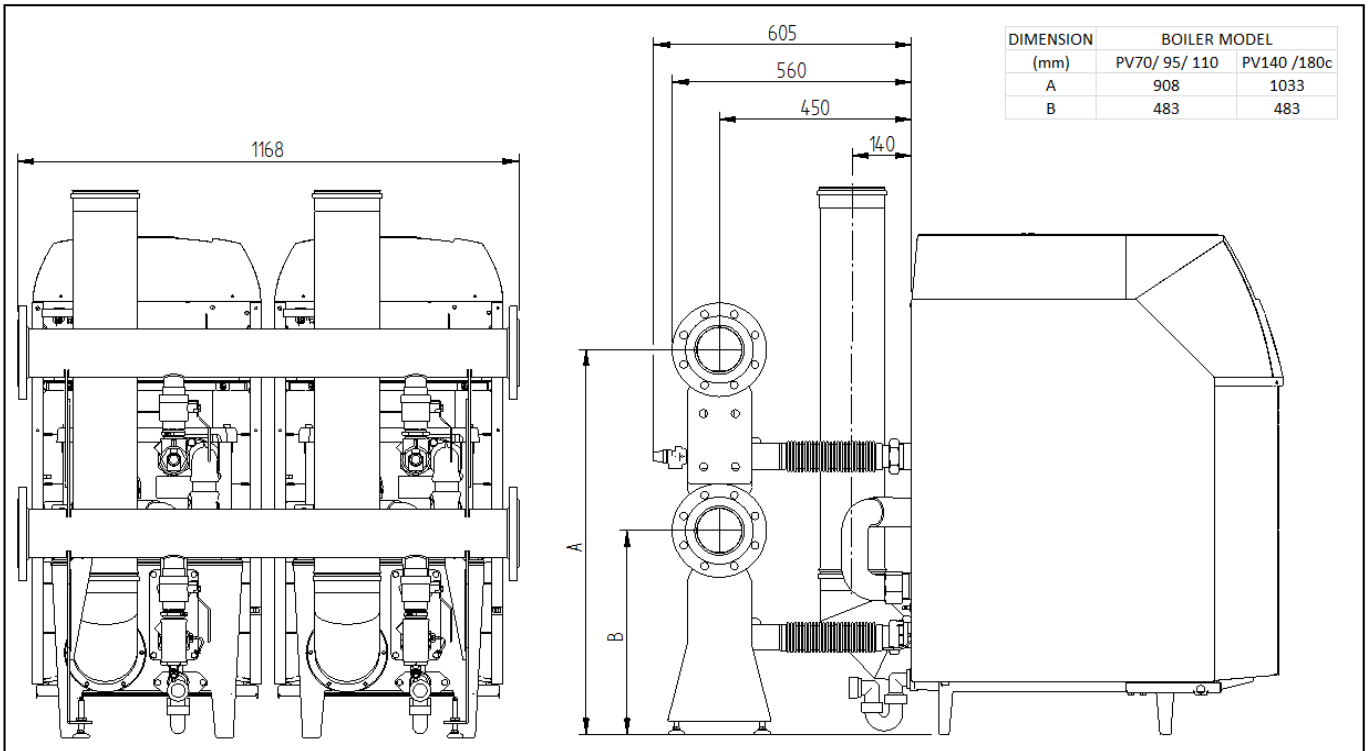


Figure 3.1 - Dimensions and Clearances

3.2 The Hamworthy Heating Ltd water manifold kit is designed to provide a compact solution for connecting the boilers to the gas supply and flow and return water connections. (Refer to the Manifold Kit Installer's Guide for specific details.)



DIMENSION	BOILER MODEL	
(mm)	PV70/ 95/ 110	PV140 /180c
A	908	1033
B	483	483

Figure 3.2.1 – Manifold Dimensions for a 2 Purewell Variheat mk2 boiler installation

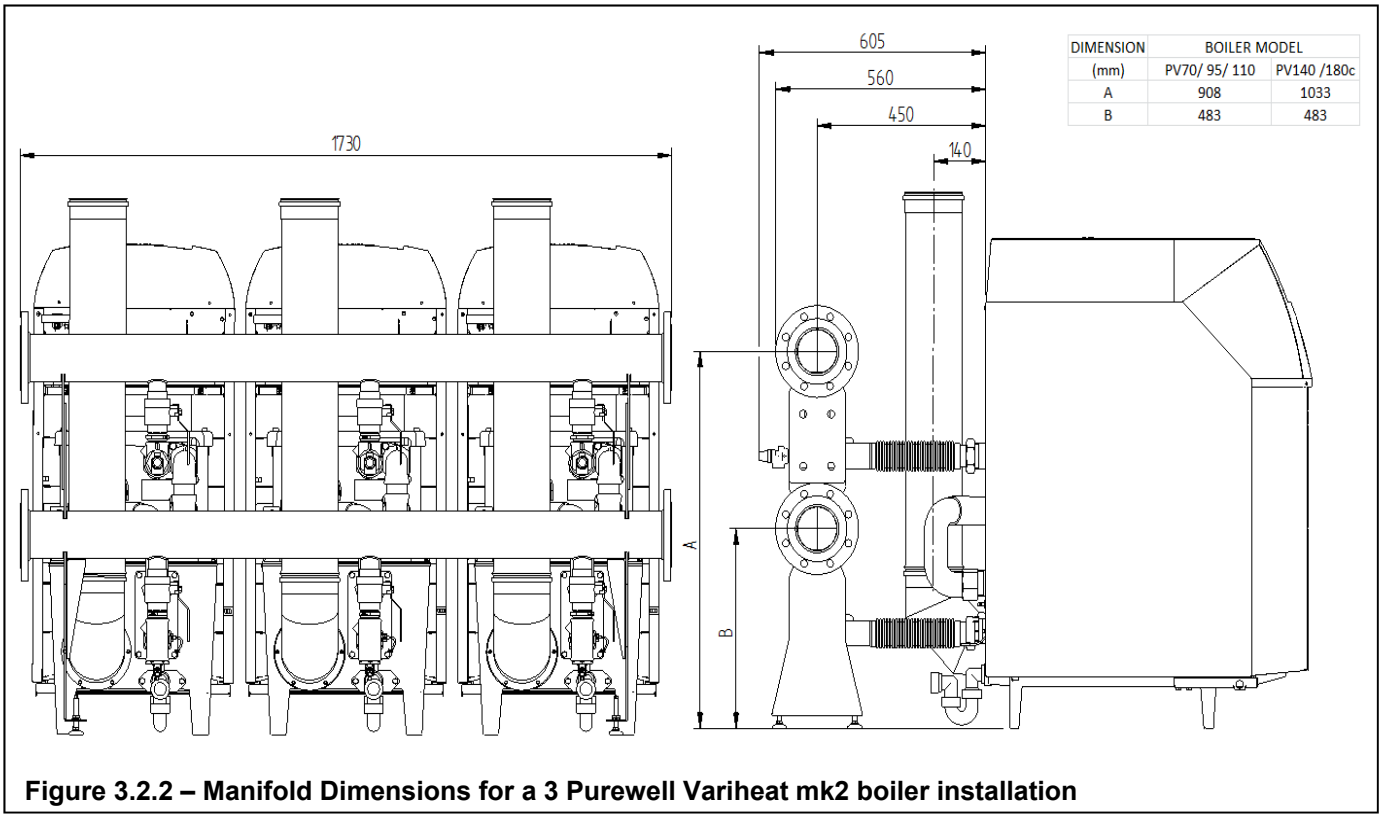


Figure 3.2.2 – Manifold Dimensions for a 3 Purewell Variheat mk2 boiler installation

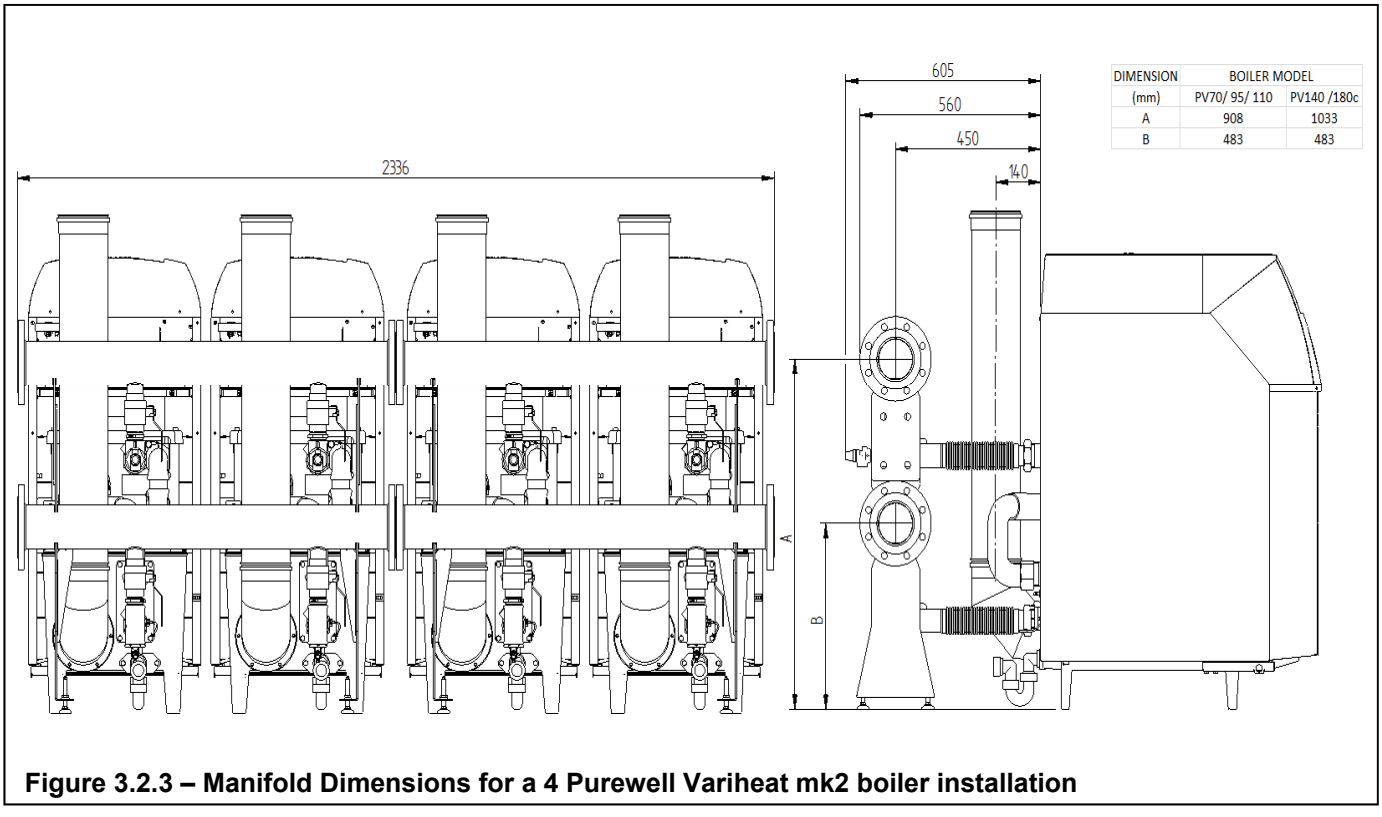


Figure 3.2.3 – Manifold Dimensions for a 4 Purewell Variheat mk2 boiler installation

Safety Valve: As each kit is provided with a 3 port isolating valve for use on the flow pipe, individual safety valves are not required on each module and a common valve can be fitted in the combined flow pipe. However, each boiler has a Rp1" connection (plugged) in the rear of the boiler heat exchanger assembly for use on applications where module isolating valves are not of the 3 port type..

4.0 SITE LOCATION AND PREPARATION

4.1 Site Location.

- The floor or plinth for the boilers and water manifold kit must be both flat and level to ensure correct alignment of fittings and connections.
- The floor or plinth must be sufficiently strong to support the weight of both the boilers and manifold kit where used.
- The floor or plinth must be fireproof in accordance with BS 6644.
- The plantroom must have sufficient space for installation of boilers, manifold kits, pipework, pumps controls, flues ventilation, access and servicing and other items of plant.

4.2 Gas Supply.

- Gas supply pipes must be in accordance with BS 6891 or IGE/UP/2
- Gas supply connection to the boiler must not be smaller than the connection on the boiler - R1”
- Gas installation must be soundness tested to BS 6891 or IGE/UP/1 & IGE/UP/1A.
- Gas installation must be purged to BS 6891 or IGE/UP/1 & IGE/UP/1A.
- Inlet gas pressure to boiler should be nominal 20mbar (minimum 17.5mbar) dynamic at the connection to the boiler.
- Boiler house gas isolation valve must be clearly identified and installed close to the entrance / exit.

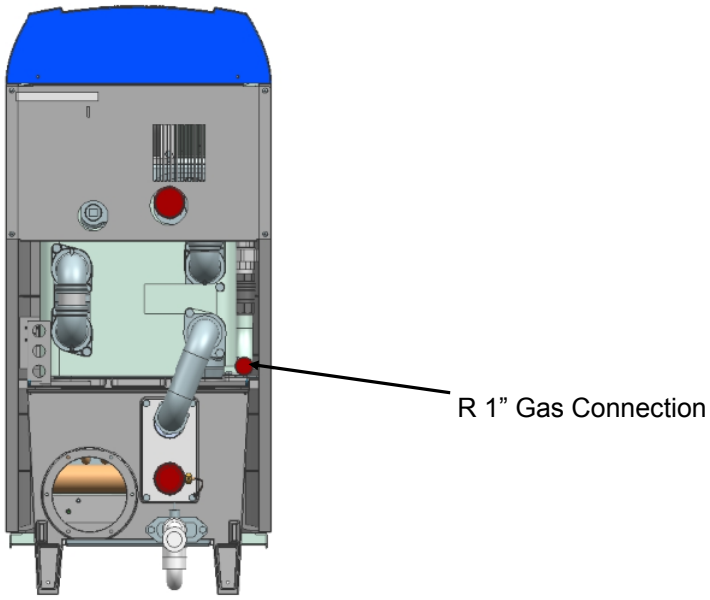


Figure 4.2 – Gas Connection Point

4.3 Flues

- Flue termination, routing and construction must comply with the requirements of the Clean Air Act 1993—Chimney Memorandum, BS 6644 BS 5440 and IGE/UP/10.

- Any flue must be self supporting and separable from the boiler for servicing requirements.

- The maximum number of modules firing into a common chimney is 9. For larger installations refer to HHL Technical.

- Due to the low flue gas temperature, 50°C (condensing) - 75°C (non-condensing), condensation will occur in the flue, flue materials must be non-corrosive and utilise fully sealing joints.

- Flue construction is recommended of a twin wall, insulated type to maintain buoyancy within the flue.

- Adequate facilities must be provided for draining the flue condensation.

- Horizontal flue runs must be kept as short as possible and be inclined at minimum 2° towards the termination.

- The flue system must be designed acknowledging that there may be a positive pressure generated by the boiler combustion fan. Refer to Appendix C.

- The flue system must be designed to limit the max. suction (cold) to 30Pa negative, measured at the connection to the boiler. If the suction is greater than 30Pa, refer to HHL Technical.
- This condition must then be checked hot and with all boilers firing, the max. pressure at the connection to the boiler should be 100Pa positive.
  In the event that the flue system when hot does generate a suction, the max. suction is 100Pa.

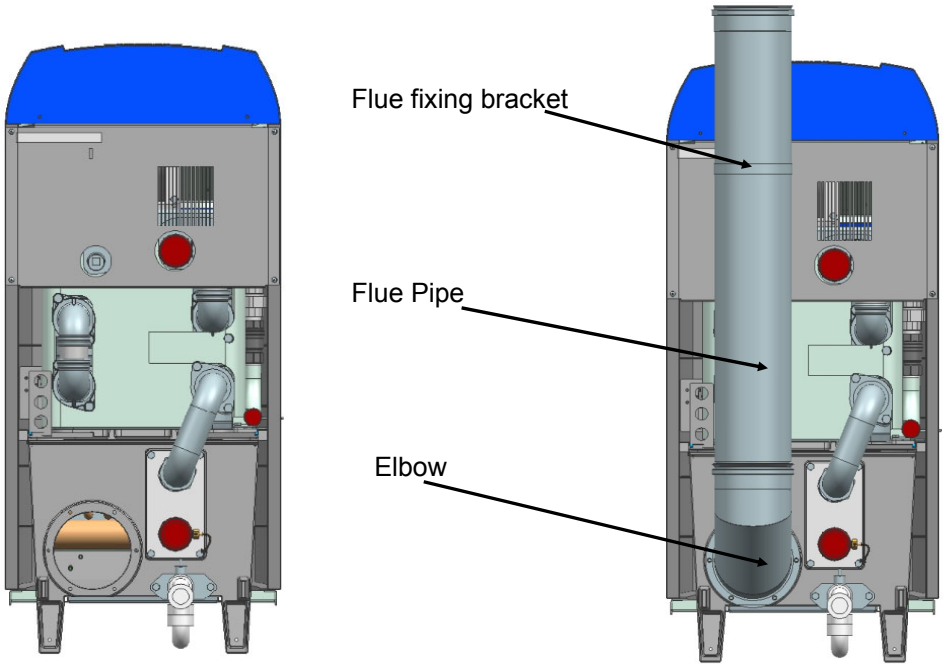
- Any stabiliser fitted must be in or close to the vertical chimney.

- Fan dilution - the design must provide for the use of balancing and trim dampers, and their location and operation must be such that the constraints detailed above can be met. Care must be taken to ensure that the fan performance is matched to deliver the appropriate dilution, whilst ensuring that the excessive suction is not applied to the boilers. If in doubt, refer to HHL Technical.

- Fan assist - the use of fan assist must only be a last resort, as the boilers have sufficient fan performance to drive the system. If in doubt, refer to HHL Technical.

- Connecting flue systems may be smaller in internal diameter than the boiler connection and must be designed to deliver the necessary condition at the connection to the boiler. Refer to Hamworthy Heating Technical dept. for assistance.

Figure 4.3 – Flue Connection Point



Flue Connection as delivered

Flue Connection fitted

4.4 Water Supply

- Feed and Expansion tanks to comply with static height requirements of BS6880 & BS6644.
- Cold feed and open vent pipes to comply with requirements of BS 6644.
- Pressurised system to comply with BS 7074.
- It is recommended that the system pipework is flushed twice before water treatment.
- In hard water areas (>180mg $CaCO_3$/litre) precautions such as water treatment are strongly recommended to prevent the build up of sludge and scale and also to control the system water pH to between 7.0 & 8.0.
- Leaks in the system pipe work should be fixed to prevent dilution of water treatment.
- Maximum working water pressure is 6 bar.
- For minimum water pressure see Appendix ‘E’ - Water Data (Page 45)

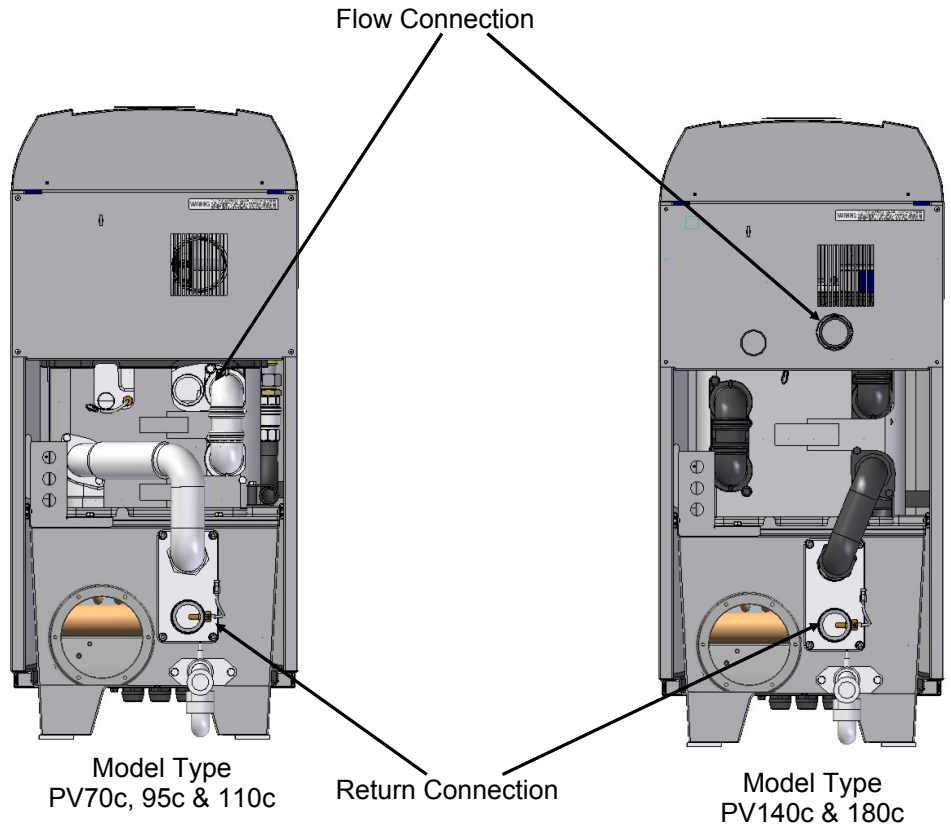


Figure 4.4 – Water Connection Points

4.5 Condensate Connections

- Provision must be made for removal of condensate from the boiler and flue system.
- Condense is mildly acidic, typically pH 3 - pH 5.
- Condense pipework must be non-corrosive and not copper. Hamworthy recommend 32mm dia. Plastic waste pipe.
- Condense may be discharged to a standard drain subject to National or Local regulations.

- Location of condense pipework should prevent freezing within tundishes, traps and pipework.
- Do not allow blockage or damage to the condensate trap.
- The connection to the boiler condense drain accepts a straight push-fit coupling for 32mm i.d. plastic waste pipe.

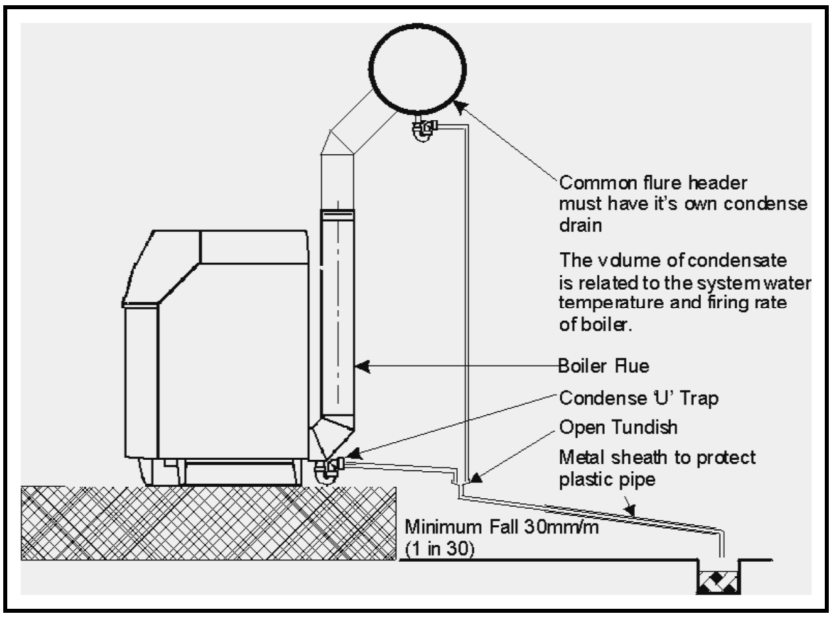


Figure 4.5.1 - Boiler Condensate Pipework Connection

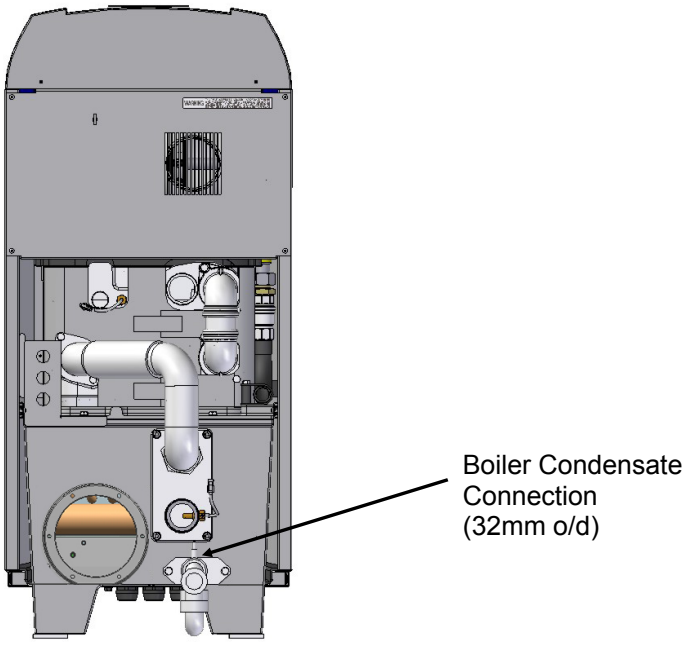


Figure 4.5.2 – Boiler Condensate Connection

4.6 ELECTRICAL SUPPLY

WARNING! THIS APPLIANCE MUST BE EARTHED IN ACCORDANCE WITH IEE REGULATIONS

- Boiler electrical supplies must not be switched by a time clock.
- Boilers are suitable for 230Volt, 50Hz supply.
- External fuses should be rated for 10 amps
- Wiring must be completed in heat resistant cable size 1.0mm² csa.
- Each module should have individual means of isolation.
- Electrical isolators must facilitate complete electrical isolation.
- Electrical isolators must have contact separation of minimum 3mm in all poles.
- Electrical isolators must be installed in readily accessible locations.
- Electrical supplies to boiler modules should only serve the boiler.
- Where volt free contacts are used, these too must be individually isolatable.
- Time clock control should be via the boiler modules Remote On/Off circuit (5V DC). Any circuit connected to the Remote On/Off MUST be volt free and compatible.

ADDITIONAL INFORMATION REGARDING ELECTRICAL SUPPLIES IS GIVEN IN BS EN60335, Part 1.

NOTE: The appliance MUST be isolated from the electrical supply if electric arc welding is carried out on connecting pipework.

FOR DETAILED WIRING INSTRUCTIONS SEE SECTIONS 5.3, 9.0 & APPENDIX B

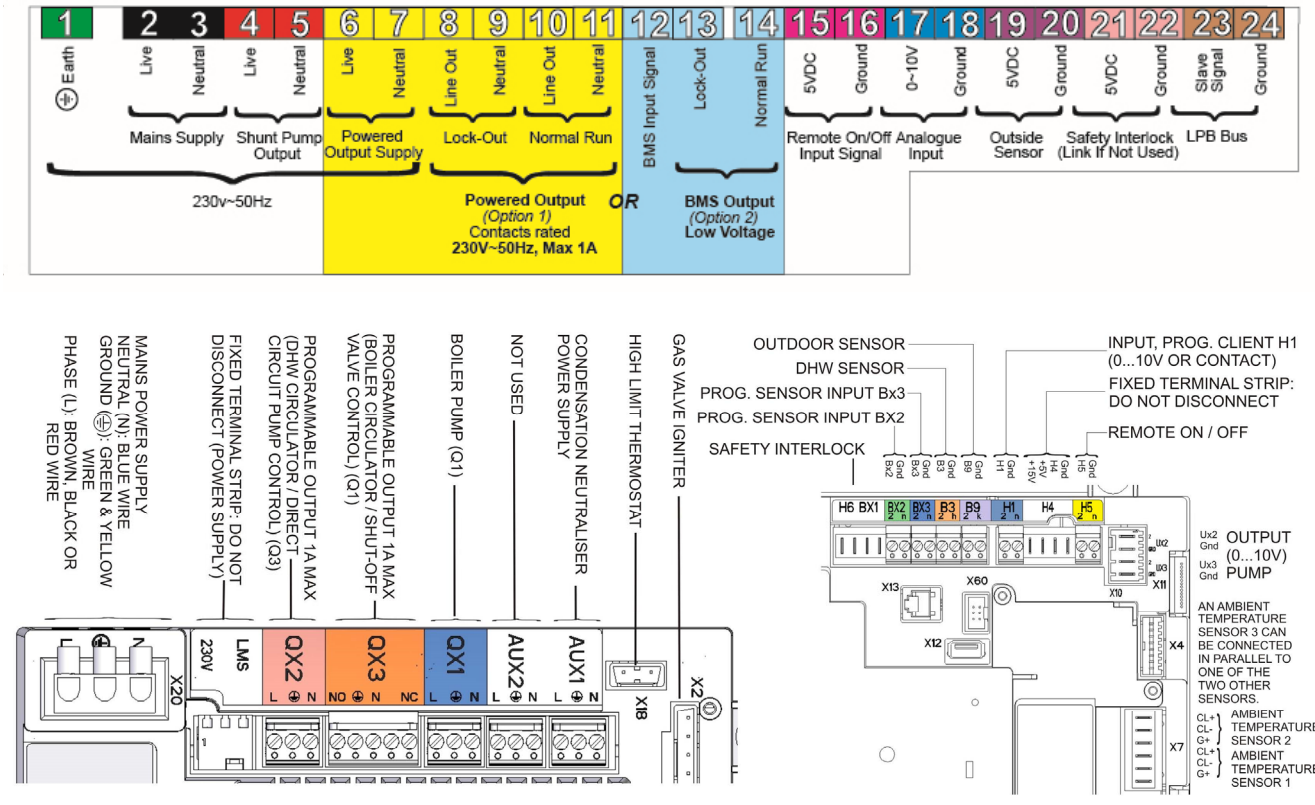


Figure 4.6 - Electrical Connections

5.0 BOILER ASSEMBLY

General

Boilers are despatched to site as fully assembled units. The flue pipe, chimney, condensate drain connection and pipework manifold set (where applicable) are the only items that will need assembling on site.
During assembly it is important to take care to prevent damage to the boiler casing. DO NOT STAND ON THE CASING PANELS.
Boiler positioning must allow the minimum clearances detailed in Section 3.0 to facilitate access for flue and pipework connections as well as maintenance. Boilers can be positioned side by side, no clearance is necessary.

5.1 Flue Pipe

So as to avoid damage, the flue connecting pipe is supplied separately. Fit the elbow to the base of the boiler and secure using the gasket and 6 - M8 bolts and washers. Moisten the lip seal and engage the flue pipe into the elbow. Secure the flue pipe to the boiler casing using the bracket supplied.

5.2 Water Connections:

Connecting pipework must be self-supporting to avoid stress on the boiler connections. Local unions are recommended in the pipework to facilitate future servicing requirements. **The following connections are provided on each boiler module;**

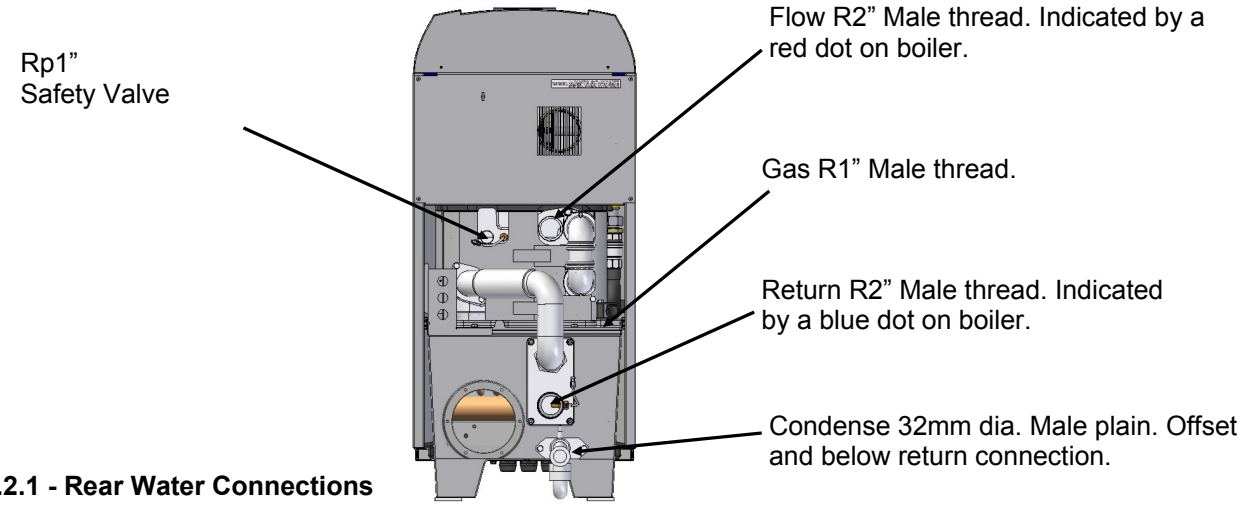


Figure 5.2.1 - Rear Water Connections

Open Vented Systems

Boilers must not be capable of isolation from the vent pipe. Valves between boiler and vent pipe to be three way type such that when boiler is isolated from vent pipe it is open to atmosphere. Safety valves should either be mounted on the boiler by using the connection provided, or it should not be possible to isolate a safety valve common to more than one boiler from each boiler. BS6644 provides details.

Sealed Systems

A boiler must not be capable of isolation from the individual or common safety valve. Valves between boiler and common safety valve to be three way type such that when boiler is isolated from safety valve it is open to atmosphere. The boiler is provided with a connection on the boiler for the safety valve .
Where using Hamworthy Heating Ltd pipework kits, assembly of these is detailed in the Instruction manual supplied with kit.

5.3 Electrical Connections:

The following electrical connections are provided on each module on a rail at the base of the front of the boiler.

- Supply: Live, Neutral and Earth. See Section 4.6 for details.
- Live and Neutral connections for Shunt pump or Primary Pump
- Boiler Overheat Fault Alarm Signal Output
- Common Fault Alarm Signal Output
- Boiler Normal Run Signal Output
- Remote On/Off
- 0-10v Analogue Control Signal Input
- Outside Temperature sensor
- LPB Bus Connection (Option)

Additional connections are provided directly on the Navistem B3000 boiler control module:

- Programmable sensor inputs. BX1, BX2 and BX3
- DHW sensor B3
- Programmable relay outputs. QX2—(DHW circulator / direct circuit pump control) QX3—(Boiler circulator/ Shut off valve control)
- Room temperature sensors X7 (QAA55 or QAA74)
- Programmable pump speed control outputs. UX2, UX3 (0-10V, Boiler pump speed control)

FOR ELCTRICAL CONNECTIONS PLEASE REFER TO FIGURE 4.6

6.0 PRE-COMMISSIONING

The following checks must be carried out before the boiler is commissioned.

6.1 Gas Supply.

Ensure that gas installation pipework and meter have been soundness tested and purged to IGE/UP/1 or IGE/ UP/1A as appropriate. Test and purge certificates should be available for viewing.

6.2 Ventilation

Ensure that ventilation and air supply to plantroom is correct - refer to Appendix D (page 44). Air supply around the rear of appliance is unobstructed.

6.3 Pipework, Valves and Pump

Ensure that;

- Pipework and valve arrangement is installed to Hamworthy Heating recommendations.
- Circulating system is full of water, vented and pressurised appropriately.
- Circulation pump is fitted, working and interlocked where required.
- Pipework connections to boiler are fitted correctly.
- All necessary isolation valves are open.
- Safety valve is correctly sized and located.
- Condense connections on boiler and flue are connected and piped to drain.
- Heat load is available.

6.4 Flue

Ensure that;

- Flue system is correctly designed and installed to suit boilers.
- Flue passages to chimney are clear.
- Fill traps with water.

6.5 Electrical

Ensure that;

- Electrical connections are correct and isolatable.
- External controls are operational.

WARNING: IF THE FRONT COVER IS REMOVED WHILST THE BOILER IS OPERATIONAL, CARE MUST BE TAKEN WITH ELECTRICAL COMPONENTS AND ACCESS TO PRIMARY INSULATION.

7.0 CHECKS PRIOR TO LIGHTING

IMPORTANT: BEFORE PROCEEDING TO LIGHT THE BOILER, ENSURE THAT THE PRE-COMMISSIONING CHECKS HAVE BEEN CARRIED OUT AND THE RESULTS SATISFACTORY.

7.1 Boiler Gas System Leak Check

Ensure that the appliance manual gas service valve is in the OFF position. Although the boiler receives a gas leak check and gas train component integrity check prior to leaving the factory, transport and installation may have caused disturbance to unions.

A procedure guide is given below. Care must be taken not to allow leak detection fluid on or near any electrical parts or connections.

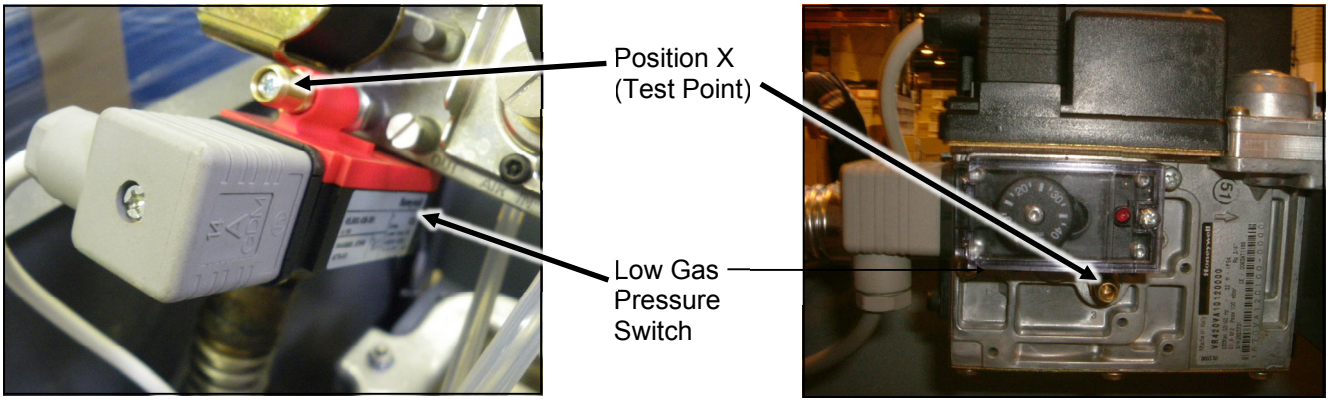


Figure 7.1.1 - Test Point Locations On Gas Valves

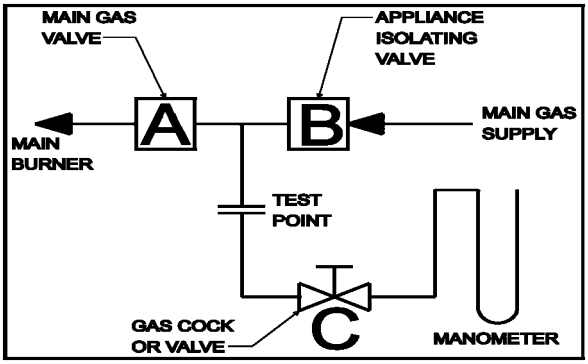


Figure 7.1.2 - Gas System Leak Check Diagram

Note: - Main gas supply pressure - G20 - 20mbar

To Check Valve B
1) Turn off the electrical power and gas to the appliance.
2) By unscrewing screw at Position X of Figure 7.1.1 remove the red gas pressure switch (L.H.S picture) or loosen the test point valve plug (R.H.S picture).
3) Connect the manometer to gas valve test point.
4) With A, B closed open C and monitor manometer over a 2 minute period, a rise indicates a leak on valve B.
5) Reinstall red gas pressure switch or shut valve plug in test point.

To Check Valve A
1) Repeat steps 1, 2, 3 & 5 above.
2) Open C.
3) Open B to produce the main gas supply pressure between A and B.
4) Close B
5) System may be considered sound if over a period of 2 minutes any drop in pressure is less than 0.5 mbar (0.2" wg.).

NOTE: Allow a manometer stabilisation period of approximately 1-minute before each 2 minute check period. Following soundness tests close valve B and remove manometer connections and tighten test points.

7.2 Checks Prior to lighting the boiler

NOTE: Refer to Appendix A for Natural Gas maximum gas inlet pressure for normal operation. The following checks must be made prior to lighting the boiler.

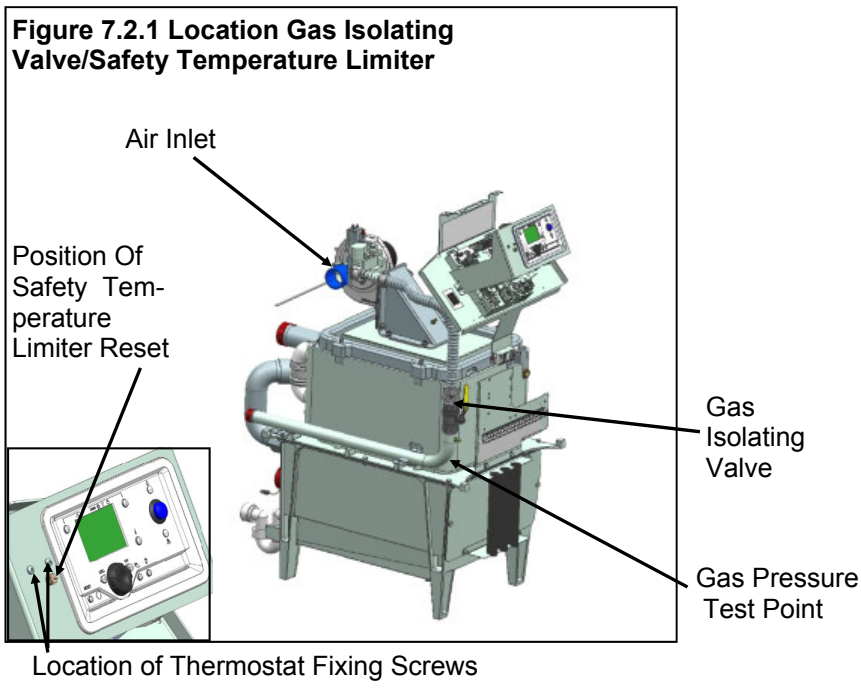
1) Ensure that the gas supply is connected but turned to the "off" position. Any unions or fittings are correctly tightened, test points are closed, and that the ignition and probe leads are connected correctly.
2) Ensure the electrical mains supply is correctly connected but the boiler isolator(s) are switched off. Remove the plastic covers by unscrewing the fixing screws. Check all wiring loom connections such as fan and gas valve, are correct and secure. Test the operation of the safety temperature limiter by removing the clip & bulb from the pocket in the front of the heat exchanger, and carefully apply a heat source to the bulb. The limit stat reset button should lift & protrude through the hole in the controls fascia. To reset, firmly press the button through the access hole in the controls fascia using a terminal screwdriver.
If satisfactory, refit the bulb in the pocket and secure with the clip. Ensure that all limiter bulbs /sensors are fully inserted into the pockets. The flow and return temperature sensors are located at the rear of the boiler in the flow and return pipes.

3) Check setting of the safety temperature limiter. The safety temperature limiter is set at 95°C. The Safety Temperature limiter, is to be found on the rear of the display fascia bracket. (See figure 7.2.1) To remove the safety temperature limiter the plastic display cover of the boiler must be removed. Then unscrew the screws securing the thermostat on the metal control bracket.

4) Before ignition of the boiler it must be ensured that all parts of the appliance are clean and free from debris. Special attention should be paid to ensure that the air inlet to the fan/venturi is clean and unobstructed.

5) Ensure the heating system circulation / shunt pump is operational and that the pipework is free of air.

Figure 7.2.1 Location Gas Isolating Valve/Safety Temperature Limiter



7.3 INITIAL LIGHTING

Only competent persons registered for working on non-domestic gas appliances should attempt the following operations. Before attempting to commission any boiler, ensure that personnel involved are aware of what action is about to be taken.

Record all readings for future reference on relevant commissioning sheet.
Allow system to warm up sufficiently to check operation of control thermostat.
A combustion check must be taken when first commissioning the boiler. A sampling point is provided in the boiler - refer to **section 8.5 - Combustion Checks**

7.3.1 Operational Checks

NOTE! Care should be exercised when the boiler is firing, as the heat exchanger components can achieve temperatures which could cause injury if touched.

1. Ensure that all external controls are in demand and that the gas supply to the module is isolated. Check and adjust if necessary the low gas inlet pressure switch located on the side of the boiler gas valve (ALL BOILERS ARE PRESET TO 12.5 mbar).

2. Switch the on/off switch located on the front panel of the boiler to the on position, and initiate the start up sequence. Refer to separate Navistem manual, HHL part no. 500001310).

3. As the gas valve is closed, the low gas pressure switch will prevent the boiler from firing and the error code 'E132' will be displayed on the screen. Refer to separate Navistem manual, HHL part no. 500001310.

4. If the above procedure occurs correctly, open the gas isolating valve and the fault indication will extinguish. The boiler will commence its ignition sequence as previously described. This time, when the gas valve is energised the burner will ignite.

5. With the burner firing, the flame signal displayed, should be approximately 3-11µA. Refer to separate Navistem manual, HHL part no. 500001310.

- At the end of the ignition proving period, 5 seconds, the spark ignition system will be switched off and the flame indicator on the control fascia is lit.
- After a period of 10 seconds the fan will alter speed and the burner modulation will be set according to the heat load.
- If after the 5 second flame proving period the flame signal is below the minimum detection current, the boiler will shut down and attempt one restart.

NOTE: THE BOILER IS EQUIPPED WITH A RESTART FACILITY AND WILL ATTEMPT A SECOND IGNITION, DURING WHICH THE ABOVE PROCEDURES WILL BE REPEATED. AT THE END OF THE RESTART PROCEDURE, IF NO FLAME IS DETECTED AFTER THE FLAME PROVING PERIOD, THE BOILER WILL LOCKOUT. THE BOILER WILL NOT OPERATE UNTIL THE LOCKOUT HAS BEEN MANUALLY RESET.

Ignition Controller Check

1. With the burner firing, the flame signal should be at least 3µA. Refer to **separate Navistem manual,,** HHL part no. 500001310. To check for correct operation of the ignition controller, close the gas valve. The boiler should shutdown after approximately one second and attempt a re-ignition. Check that the flame has been extinguished

2. Alternatively, the flame probe lead can be removed from the end of the flame probe, with the same result.

7.3.1 Safety Checks

7.3.1.1 To check for correct operation of the controller, with the boiler running, carefully disconnect the flame probe lead from the flame probe.

The boiler will shutdown, attempt to relight once & then lock out causing **Error code E133** to appear on the display. Carefully reconnect the probe lead then press the 'Reset' button to recommence the light-up sequence.

7.3.1.2 With the boiler firing, turn off the gas isolating valve and the boiler will shut down in 'Blocked' ' mode showing **'E132'** on the display. Wait at least 30 Seconds before opening the gas Isolating valve when the block will clear and the boiler will recommence the light-up sequence.

7.3.2 - Adjusting the settings of the boiler
The desired Flow temperature setpoint can be set as follows:

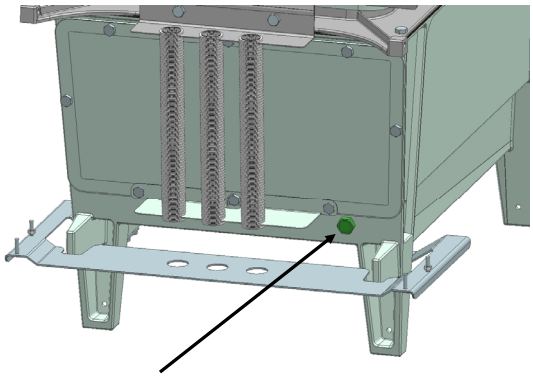
i) Press OK
ii) Hold i for 4 seconds
iii) Scroll using wheel to "Engineer"
iv) Press OK
v) Scroll to Heat Circuit 1
vi) Press OK
vii) Scroll to Heating Circuit 1 (Prog No 741)
viii) Press OK and adjust using wheel
ix) Press OK to confirm
x) Press ESC twice to return to Menu

7.4 Combustion Checks

The boiler is factory preset, however, where checks need be undertaken during servicing to confirm correct performance within the installation.

1) Put boiler into service mode (**for more information see Navistem Manual provided—p.g. 114**) to enable the High & Low CO_2 figures to be measured.

2) Remove the sample point plug from the front of the base of the boiler.



Flue Gas Sampling Point

Figure 7.4.1 - Removal of Sample Point Plug

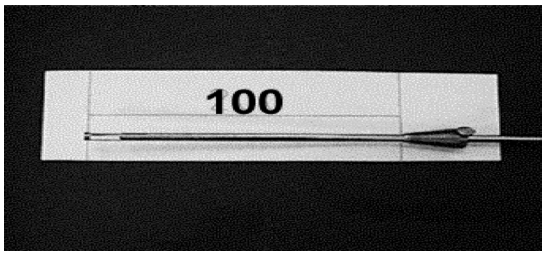


Figure 7.4.2 - Combustion Analyser Probe Setting

3) Ensure that an insertion distance of 100mm is set on the combustion analyser probe.
NOTE: THIS DISTANCE MUST BE SET TO ENSURE ACCURATE ANALYSIS OF THE FLUE GASES.

4) Insert the probe into the base up to the set stop position .

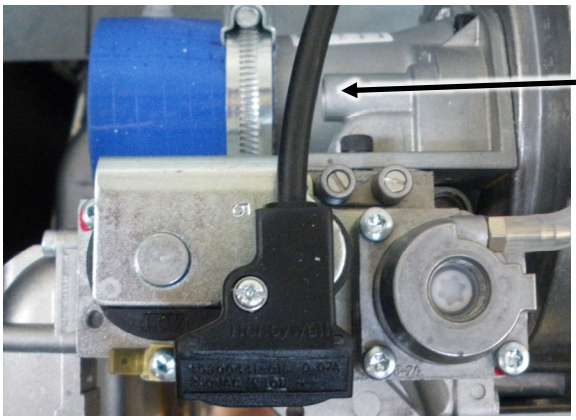
5) For Low Fire & High Fire Target CO_2 figures see information below.

6) CO = 0-50ppm: however figure should not exceed 200ppm under normal operating conditions.

7) If the combustion readings fall within the required range, the boiler is set and operating correctly.

8) Remove the combustion analyser probe & replace the sample point plug in the front of the base of the boiler.

9) If the combustion is outside of the ranges defined below, the factory sealed valves may be adjusted using the following procedure :



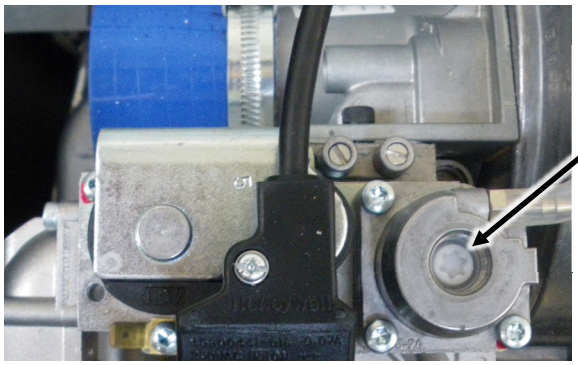
70c

High Fire Target **Nat Gas - 9.5% ±0.25% CO_2**

If combustion level is outside of this range adjust the Throttle Screw on the venturi using either a 4mm allen key or slotted screwdriver.

THIS SETTING MUST BE CORRECT BEFORE CONTINUING
To increase the CO_2 level, turn the adjustment anti-clockwise.

Figure 7.4.3.1a - Adjusting gas valve throttle



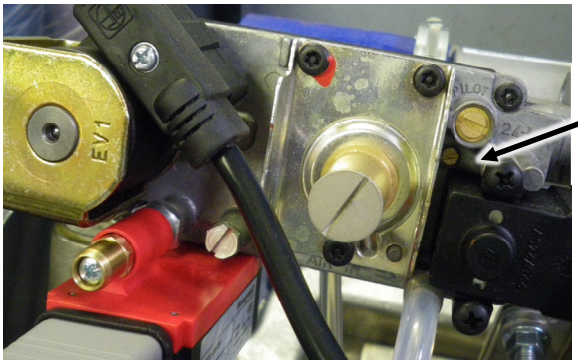
70c

Low Fire Target **Nat Gas 9.5% ±0.25% CO_2**

If combustion readings are outside target range use Torx Bit to make adjustments

To increase the CO_2 level, turn the adjustment clockwise.

Figure 7.4.3.1b —Adjusting gas valve offset



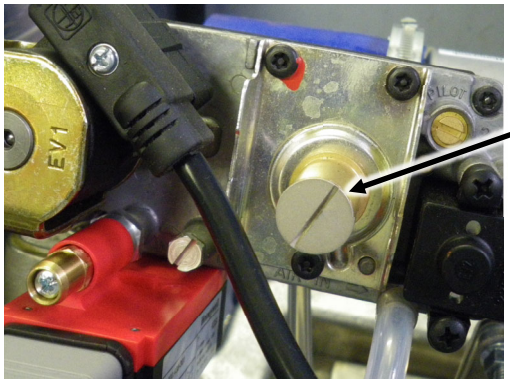
95c/110c/140c

High Fire Target **Nat Gas - 9.5% ±0.25% CO_2**

If combustion level is outside of this range use a slotted screwdriver to adjust the mixture.

THIS SETTING MUST BE CORRECT BEFORE CONTINUING
To increase the CO_2 level, turn the adjustment anti-clockwise.

Figure 7.4.4.1a - Adjusting gas valve throttle



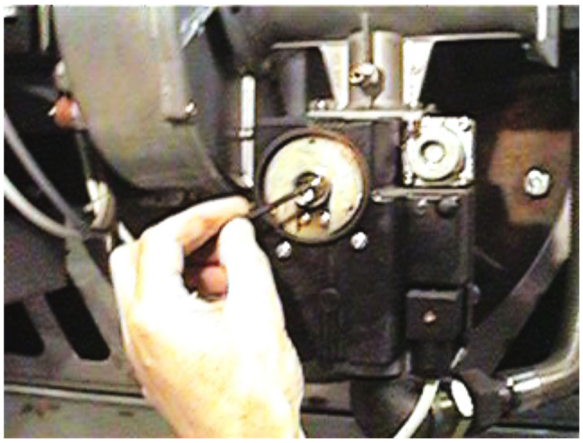
95c/110c/140c

Low Fire Target 95c & 110c - **Nat Gas 9.5% ±0.25% CO_2**
140c - **Nat Gas 8.5% ±0.25% CO_2**

If combustion readings are outside target range use a cross-slot screwdriver to make adjustments.

To increase the CO_2 level, turn the adjustment clock-wise.

Figure 7.4.4.1b —Adjusting gas valve offset



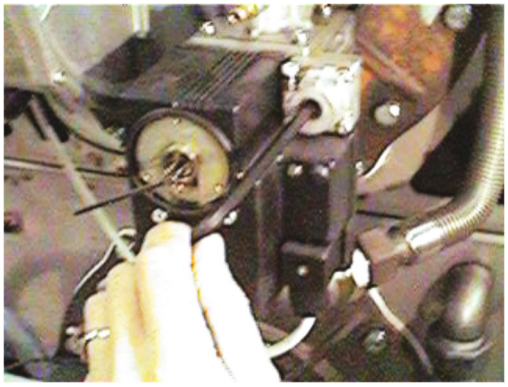
180c

High Fire Target **Nat Gas 9.5% ±0.25% CO_2**

If combustion level is outside of this range use an allen key to adjust the mixture.

THIS SETTING MUST BE CORRECT BEFORE CONTINUING
To increase the CO_2 level, turn the adjustment anti-clockwise.

Figure 7.4.5.1a - Adjusting gas valve throttle



180c

Low Fire Target **Nat Gas 8.5% ±0.25% CO_2**

If combustion readings are outside target range use Torx Bit to make adjustments

To increase the CO_2 level, turn the adjustment clockwise.

Figure 7.4.5.1b —Adjusting gas valve offset

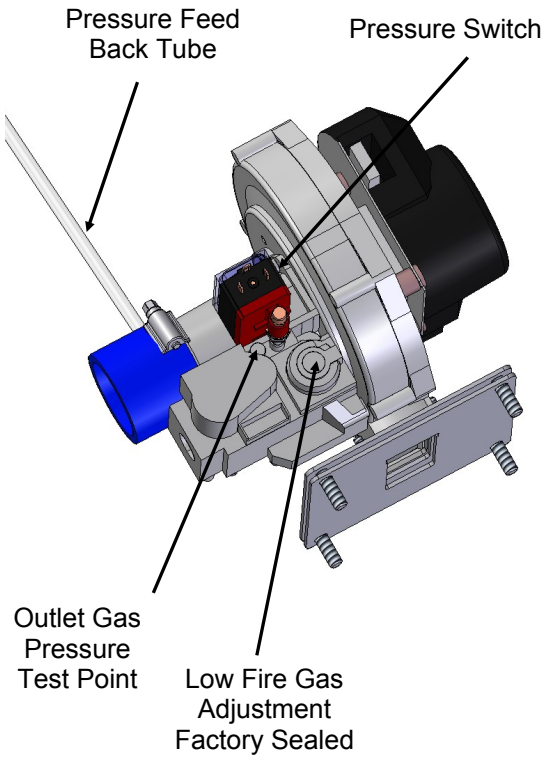


Figure 7.4.6 - Example Fan Assembly PV70c

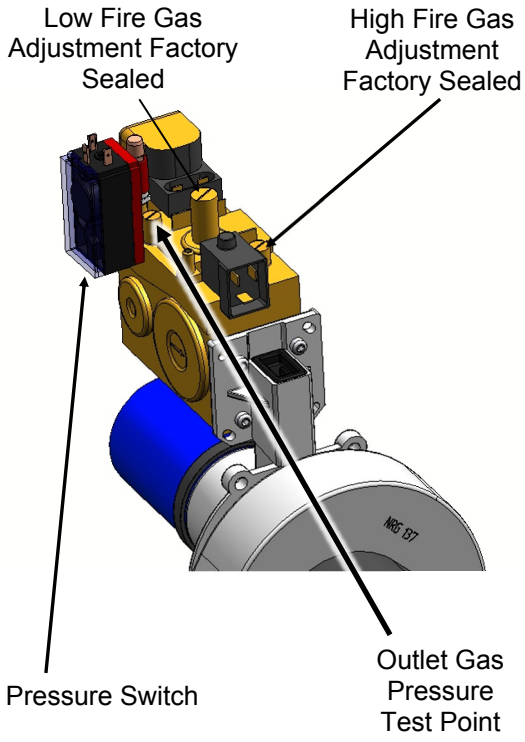


Figure 7.4.7 - Example Fan Assembly PV95c/110c/140c

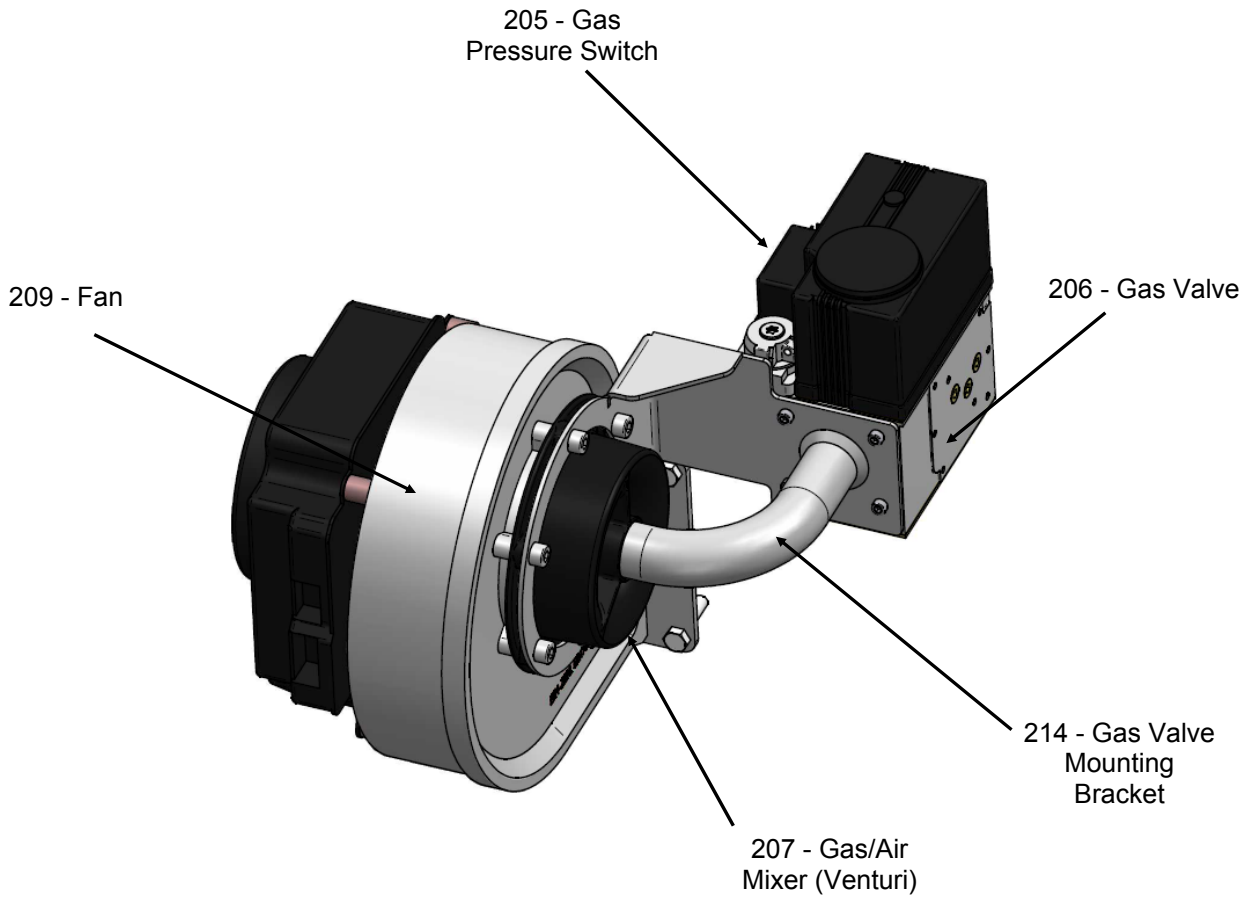


Figure 7.4.8 - Example Fan Assembly PV180c

7.5 Refer to **section 8.0 - Controls Operation**, to set the relevant boiler parameters and timings specific to the installation.

7.6 User's Instructions

The boiler owner or their representative should be made aware of the lighting and operating instructions.
A practical demonstration should be given describing each functional step. This Installer's Guide and User's Instructions should then be handed over & kept in a safe place for easy reference.

7.7 Burner Resistance Check

The burner pressure should be measured via a test point located on the gas inlet manifold as shown in figure 7.7.1.

This pressure should be noted on the commissioning checklist at both high & low fire. This can then be compared on each yearly service to assess burner resistance.

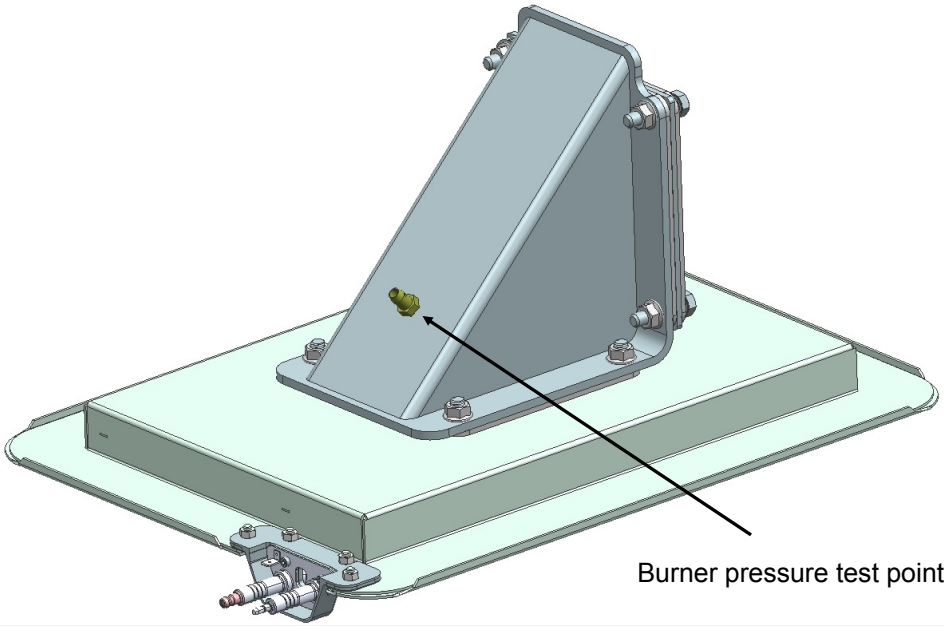


Figure 7.7.1 - Burner pressure test point

8.0 BOILER CONTROLS

8.1 CONTROLS OVERVIEW

Each Variheat mk2 boiler is controlled by a Navistem boiler controller.
The controller functions, settings and configurations are accessed via the rotary dial on the individual fascia panels.

Comprehensive details and instructions on setting and using the boiler controller can be found in the separate **Navistem** instruction manual, HHL part no. 500001310, which is supplied with each boiler.

A concise user instructions guide (HHL part no. 500001309) is supplied with each boiler. This guide gives instruction on initial set up as well as a list of possible error codes.

The Navistem controller is located on the main control panel assembly which can be accessed after removal of the boiler front cover.

Note: Should remedial work be carried out on a module, then the non-firing module must be electrically isolated so as to prevent accidental operation in the event that the installation is required for ongoing heating requirements.

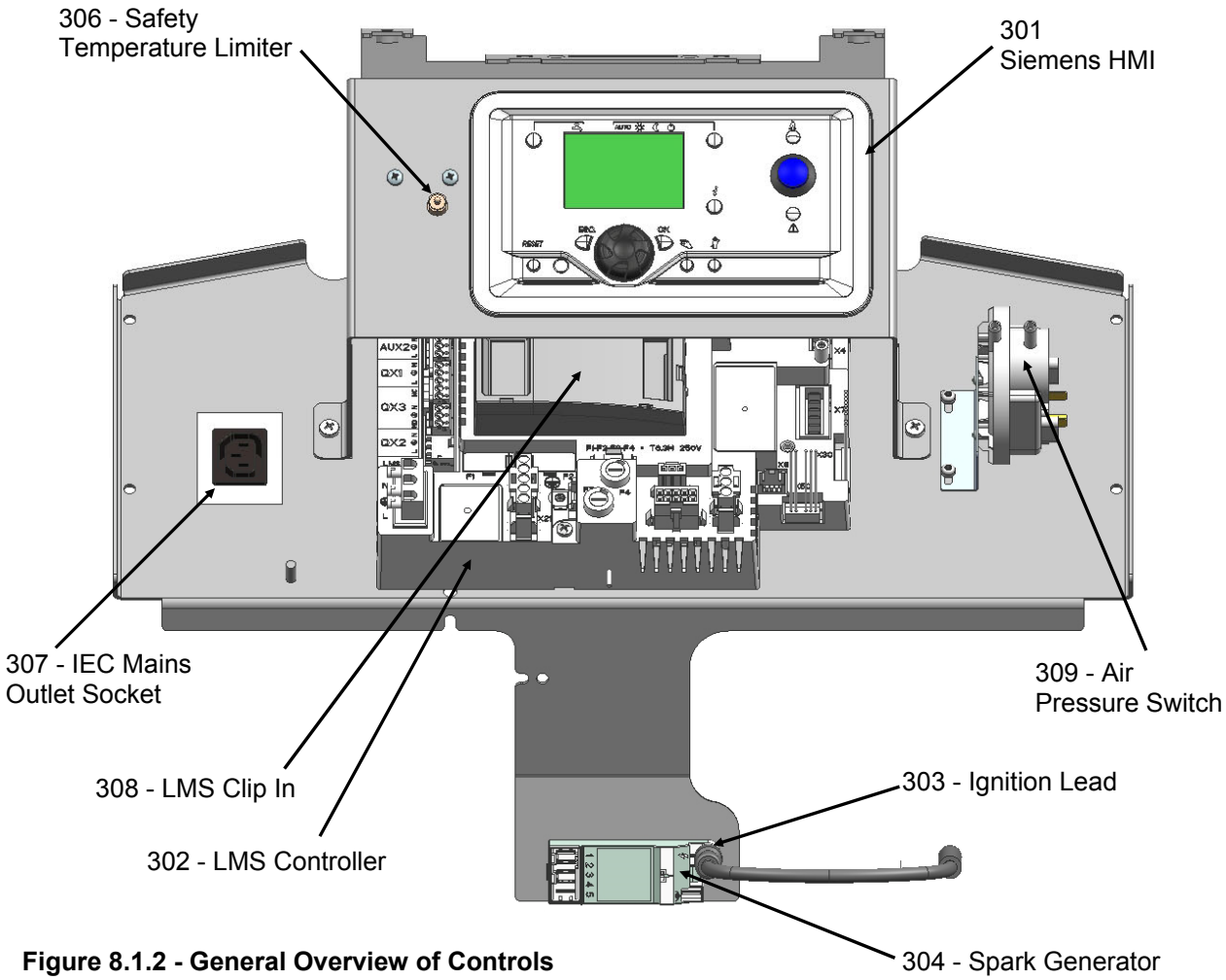


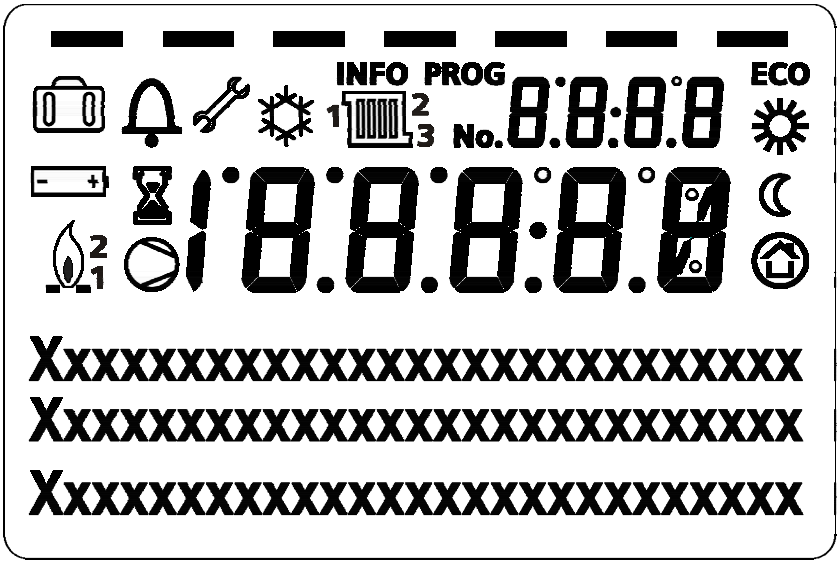
Figure 8.1.2 - General Overview of Controls

8.2 DISPLAY

The screen summarises the state of the boiler: operating mode, time, time schedule, boiler temperature, flame present, possible fault.

Pictograms:

	Heating to the Comfort setpoint		Holiday function active
	Heating to the Reduced set point		Reference to heating circuit.
	Heating to the frost protection setpoint		Service / special functions
	Cooling to cooling setpoint.		Error messages
	Process running – please wait	INFO	Info level activated
	Change battery	PROG	Programming activated
	Burner operating (only oil/gas boiler); active burner stage.	ECO	Heating temporarily switched off ECO function active
	Compressor operating (HP only).		



8.2.2 Operating Phases

Comprehensive details on the boilers operating phases can be found in the separate **Navistem** instruction manual, HHL part no. 500001310, which is supplied with each boiler.

8.3 - Functions

8.3.1 Frost Protection

Note: - to access this function, the circulating pump must be wired to the Navistem boiler control through a suitable contactor.
There are two levels of frost protection available dependent on the sensor options used.
1st stage - When the boiler water temperature is below 5°C, the burner and the heating pump are switched on. When the temperature increases and exceeds 15°C, the burner stops and the pump continues for the duration of the pump overrun.
2nd stage - This additional function uses the outside air temperature (if a sensor has not been fitted, the function is blocked) and provides three levels of activation.

- If the outside temperature is less than or equal to –5°C, the pump operates continuously
- If the outside temperature is between –4 & 1.5°C, the pump operates for 10 minutes every 6 hours.
- If the outside temperature is greater than 1.5°C, the pump is switched off.

Note:- any demand for dhw is given priority.
Should protection be required for the building fabric, then a QAA74 programmable room sensor must be used to maintain the internal building temperature.

8.3.2 Pump overrun

When the heating mode ends, the heating circuit pump remains on for a period (depending on the settings used - QAA74: 544).
In dhw systems, when the dhw heating period ends, the heating pump remains on until the return temperature drops below 70°C. During this period, the dhw selector valve (if fitted) is in the open position.

8.3.3 Boiler overheat protection

The boiler flow sensor in combination with the return sensor, provide overheat protection as follows:

- If the first level temperature is exceeded, a fault code is displayed.
- If the second level temperature is exceeded, an alarm code is displayed and the boiler will switch off. The boiler must be reset to restart.

To restart the boiler, the temperature must fall, accordingly the fan and pump will continue to operate until the boiler heat exchanger temperature drops.
Additionally, should the ΔT across the boiler heat exchanger exceed 25°C, the burner will reduce output to minimum rate. Should the ΔT exceed 30°C, the burner will shutdown.

8.3.4 Volts Free Contacts

Comprehensive details on the boilers Volts Free contacts can be found in the separate **Navistem** instruction manual, HHL part no. 500001310, which is supplied with each boiler.

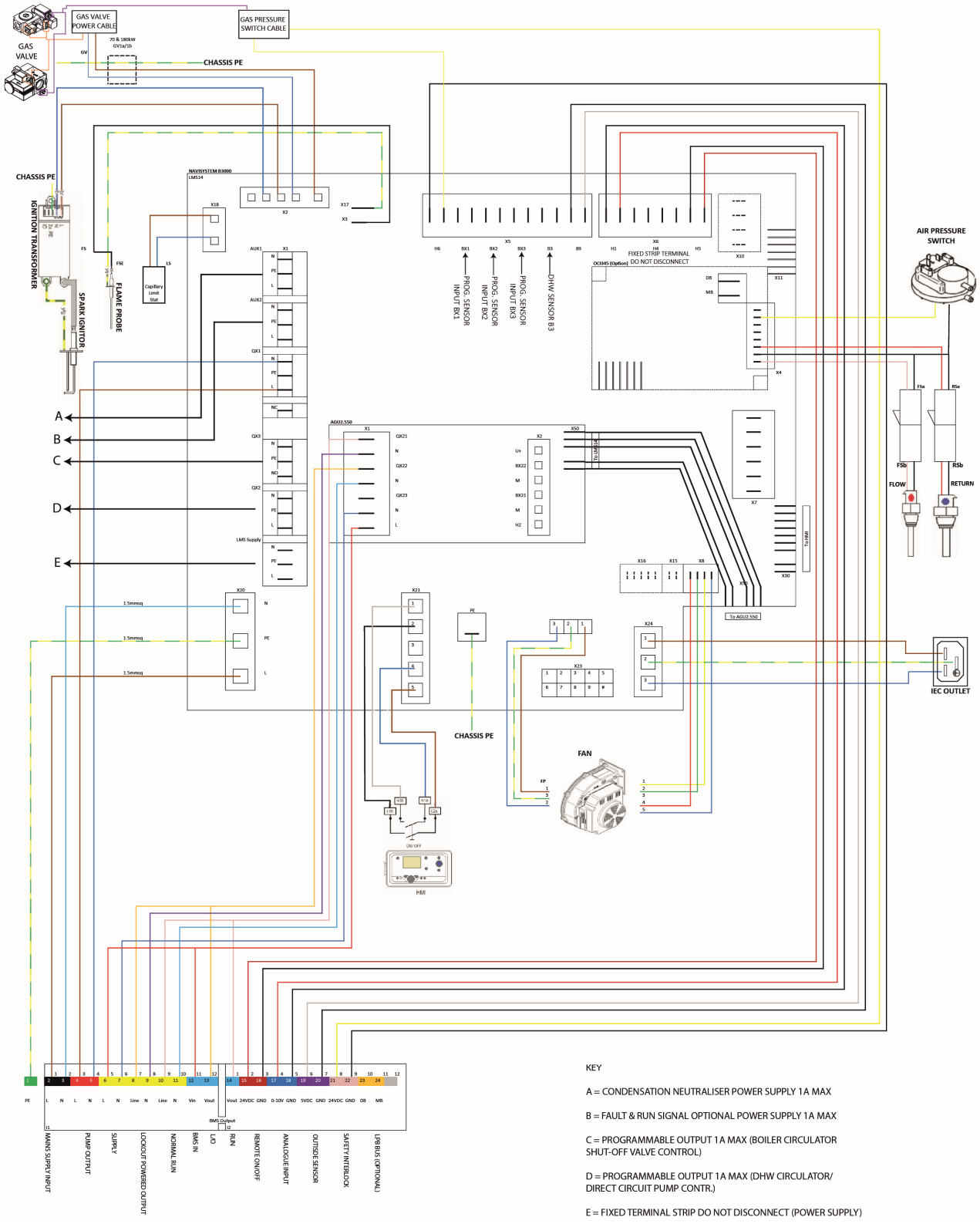
8.3.5 0-10V Control

This boiler has the ability for 0-10V Control, for more information please refer to page 60.

8.3.6 Cascade Operation

This boiler has the ability for Cascade Operation, for more information please refer to page 59.

Figure 9.0 Boiler Wiring Schematic



KEY

A = CONDENSATION NEUTRALISER POWER SUPPLY 1A MAX

B = FAULT & RUN SIGNAL OPTIONAL POWER SUPPLY 1A MAX

C = PROGRAMMABLE OUTPUT 1A MAX (BOILER CIRCULATOR SHUT-OFF VALVE CONTROL)

D = PROGRAMMABLE OUTPUT 1A MAX (DHW CIRCULATOR/ DIRECT CIRCUIT PUMP CONTR.)

E = FIXED TERMINAL STRIP DO NOT DISCONNECT (POWER SUPPLY)

9.0 FAULT FINDING

The Variheat mk2 boiler is equipped with full self-diagnostic fault indication, with faults being allocated a code. A lockout will be denoted by a flashing LED on the fascia panel which will also be constantly illuminated by a block error - refer to **the separate Navistem manual.**

The common fault codes are detailed in **the separate user instructions guide.** Fault codes not detailed in this manual should only be investigated by an Engineer.

Should a fault code appear which cannot be reset, or a fault code repeatedly occurs, contact Hamworthy Heating for assistance. Do not continue to operate or use the boiler.

9.1 Safety Temperature Limiter (Limit Thermostat)

1. The electronic control thermostat has several safety levels built in such that a controlled shutdown should occur before the safety temperature limiter is activated. Should these safety levels be overridden (say external pump overrun failure after shutdown) the safety temperature limiter will trip initiating a boiler shutdown, preventing the boiler from firing. A code on the controls display will flash indicating that the safety temperature limiter has tripped.

2. The limit thermostat (mounted on the front of the heat exchanger assembly - visible after removing the front cover) will require manual reset after the boiler returns to a normal operating temperature.

3. Always carry out an investigation to ascertain the reason for overheating. The most common cause of overheating is lack of water flow rate through the boiler - possibly due to external pump problem.

9.2 Ignition Controller

1. The flame is under constant supervision by the burner ignition controller. The controller monitors the flame's ability to rectify an AC current. If the flame diminishes for whatever reason and the rectified current drops below the controller's minimum detection current, the controller will de-energise the gas control valve within 1 second and commence a restart. Failure to establish and detect a flame during the light-up sequence will result in burner shutdown and lockout within 5 seconds, requiring a manual reset to restart the ignition sequence.

2. If the boiler continues to lockout, then an investigation must be made to ascertain the cause.

3. A false flame signal at the start and during pre-purge will cause the boiler module to restart its ignition sequence at the end of the pre-purge period. If this occurs 3 times in succession the controls will disable operation of the boiler module, requiring reset of the module.

10.0 SERVICING

A Gas Safe Engineer registered for working on non domestic gas appliances should check and ensure that the flue, its support and terminal, the ventilation to the boiler house, safety valve, drain, water filter if fitted, pressure gauge, etc.; are in a serviceable and working condition and still comply with the relevant standards and codes of practice - see **Section 4.**

10.1 Regular servicing is recommended, preferably by a Hamworthy appointed person, and at least annually, to ensure trouble free operation.

For Variheat mk2 boilers, Hamworthy would recommend an additional 6 monthly examination following commissioning, acknowledging site conditions and running hours.

Although cleaning of flueways may not be necessary on a yearly basis, it is important that all controls and safety features are checked for correct operation.

Note:- Measuring flue gas CO_2 and gas temperatures will give an indication of the state of the boiler flueways and waterways. Results should be compared with previously measured values to establish possible loss of efficiency.

WARNING: Isolate the electrical supply and turn off the gas isolating valve to the boiler being serviced.

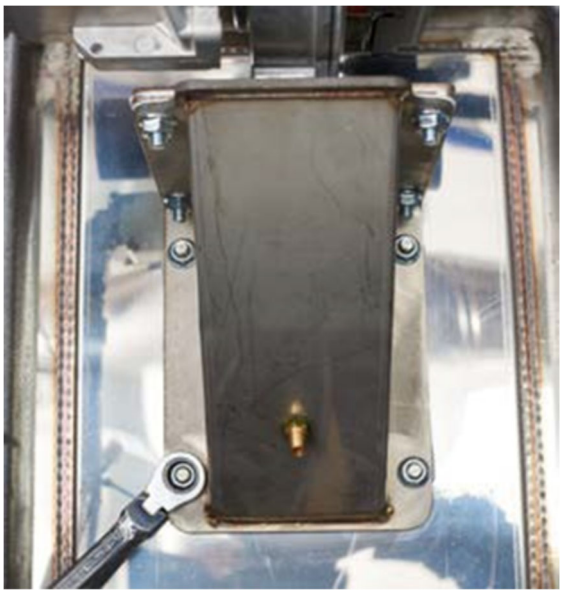
- Loosen captive fittings and remove top and front covers.
- Turn off gas service valve.
- Disconnect the gas assembly plug and the low gas pressure switch plug.

- Loosen the gas valve union.

- Disconnect the ignitor and flame probe leads.

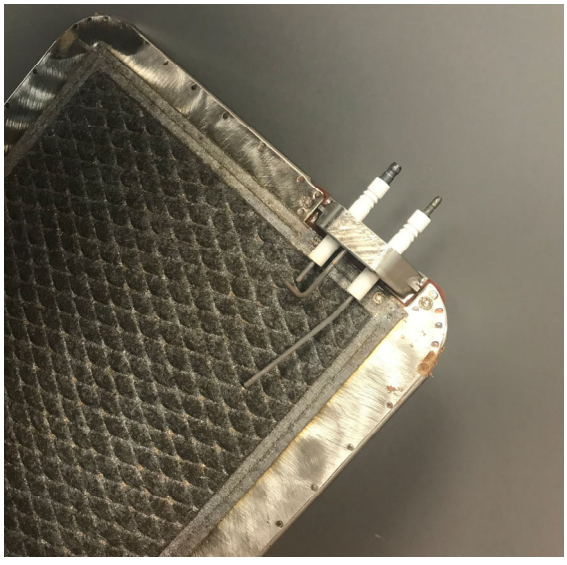
- Carefully remove the power and control cable from the fan.

- Remove the fan / gas valve assembly by loosening the 4 x M8 nuts securing the transition duct to the burner.



- Loosen the 4 x M8 nuts securing the burner clamping flange / ring, remove the flange. The burner can now be carefully lifted off the boiler.

- Check the condition of the ignitor and probe (replace as required).



- Clean the burner with clean water or compressed air, damaged burners should be replaced.
- Check the condition of the non-return valve. Inspection of the fan impellor can normally be checked at this point.

- Heat exchangers do not normally require cleaning, but if deposits have accumulated compressed air or water can be used to wash them through (the secondary heat exchanger may need removing if this is done as deposits may get trapped here.

- Remove the condensate trap and clean out any deposits which may be present. One re-fitting, fill the trap with water to ensure flue gases do not escape.

- Re-assemble the boiler in reverse order. Hamworthy recommends replacement of ALL gaskets and seals disturbed and are available in a service kit from Hamworthy, part number 563605569.
- Ensure when re-fitting the burner clamping ring the correct orientation of the cut outs to avoid damage to the flame probe and ignitor.

- Once the boiler is fully re-assembled, check all gas connections are tight and check for leakage.
- Switch on electrical supply and re-light the boiler.
- Take combusting readings to required levels (see Combustion Checks section of this manual for levels).
- Check flame probe signal is within required limits (see flame signal assessment section of this manual for limits.
- Re-fit the casing panels.

11.0 REPLACEMENT OF FAILED COMPONENTS

There are a number of components listed below which can be replaced simply and quickly by following the given procedure. In each case carry out the appropriate part of the commissioning procedure & check the operation of each component replaced. See **Section 7.3:Commissioning and Testing**

NOTE: Isolate electrical supply to the boiler and turn off the gas supply after removing controls cover and before commencing any servicing or component exchange procedure.

11.1 Igniter and Flame Probe Assembly

Both the Spark Igniter and flame probe are secured on the same Bracket. To remove assembly disconnect the plug/socket on the supply lead and remove the screw securing the igniter to the burner front panel. Generally remove any loose sooty deposits and clean as required.

11.2 Safety Temperature Limiter (Limit Stat)

With the boiler front cover removed, the Limit Stat is situated on the rear of the control panel fascia bracket to the left hand side of the main PCB. Remove the 'push on' spade connections from the temperature limiter body noting position of coloured cables. Unscrew holding bolts to detach temperature limiter from housing **(see figure 7.2.1)**. Gently feed the capillary back through the controls bulkhead. Re-set temperature limiter to 95°C. Check the operation of the device by carefully applying a heat source to the bulb. Re-assemble temperature limiter into controls housing ensuring correct cable notation. Refer to Figure 9.0.

11.3 Main Gas Valve.

NOTE! Hamworthy Heating strongly recommend that a new gas valve assembly is fitted to ensure safe, reliable operation of the boiler.

1) Disconnect the gas valve electrical plug.
Remove the four socket head screws securing the gas valve inlet flange. Take the weight of the gas valve and remove the four socket head screws securing the gas valve to the venturi lid (PV70c/90c/110c/140c), welded bracket with pipe (PV180c) . Withdraw the gas valve.
2) Before replacing the valve make the require adjustments shown in Figure 11.3.1 to the throttle venturi, this should enable the boiler to ignite. Once the boiler is lit repeat the process detailed in **Section 7.4 Combustion Checks** to ensure the boiler is operating correctly.
3) Always fit new 'O' rings to both inlet and outlet when replacing the gas valve.
Always test for gas soundness after replacement parts have been fitted.
Refer to **Section 7.1,** if necessary for valve integrity check procedure.
4) Re-light the boiler using instructions on the inside of the door. Check for correct operation. If necessary, refer to **Section 7.4 Commissioning the Boiler**, for correct procedures.

Figure 11.3.1—Course Adjustment of Gas Valve throttle for replacement of parts / spares

Boiler Size	Number of turns on the throttle / venturi	Turn Direction
70c	CO2 adjustment on venturi not gas valve	
95c	0	-
110c	0	-
140c	0	-
180c	3.5	Clockwise

11.4 Combustion Fan

NOTE! To remove the fan, it is necessary to remove the gas valve and venturi (PV70c/90c/110c/140c), or remove the metal bracket fixing the venturi to the fan (PV180c).

1) Disconnect the gas valve plug assembly from the gas valve and gas pressure switch. Disconnect the 3 & 5 way electrical plugs from the fan body.
2) Disconnect the gas pipe at the union after the isolation valve.
3) Disconnect the fan/gas valve assembly from the burner body by removing the four M8 nuts securing the transition duct to the burner. The assembly can then be removed if required.
4) Disconnect the silicone tube attached to the gas valve (PV70c/95c/110c/140c).
5) Note correct orientation of the venturi (PV70c/95c/110c/140c) and metal bracket (PV180c) & remove the screws securing it to the fan. Carefully store all of the venturi and gas valve assembly components.
6) Remove the screws securing the fan outlet to the burner transition duct. Beware there is a non return valve fitted between these components.
7) Re-assemble in reverse order using new gaskets where appropriate. After assembly and prior to re-fitting the assembly to the burner, check for correct and free operation of the non return valve in the burner transition duct.

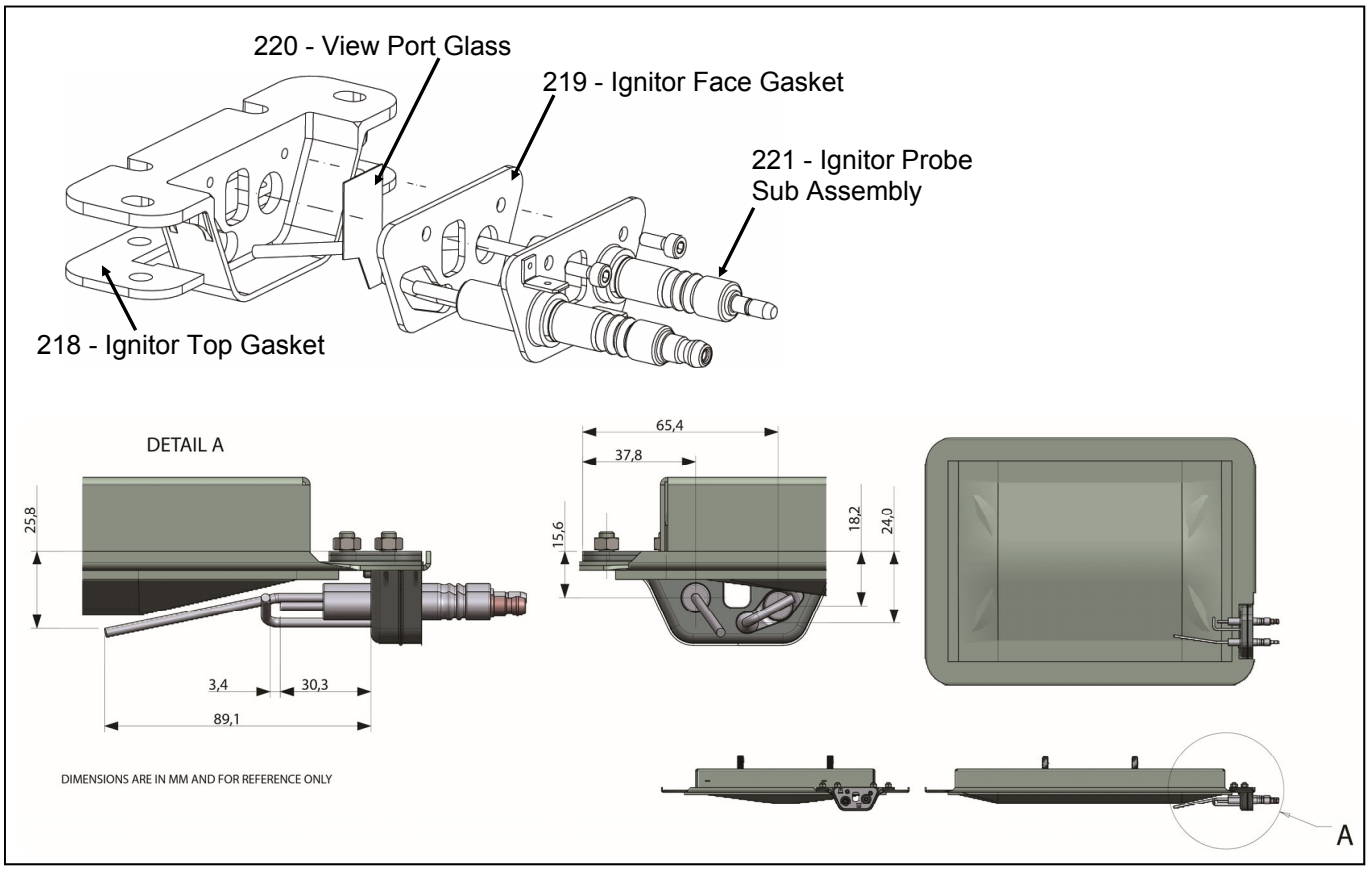


Figure 11.1—Ignition Electrode and Flame Sensing Probe Positions

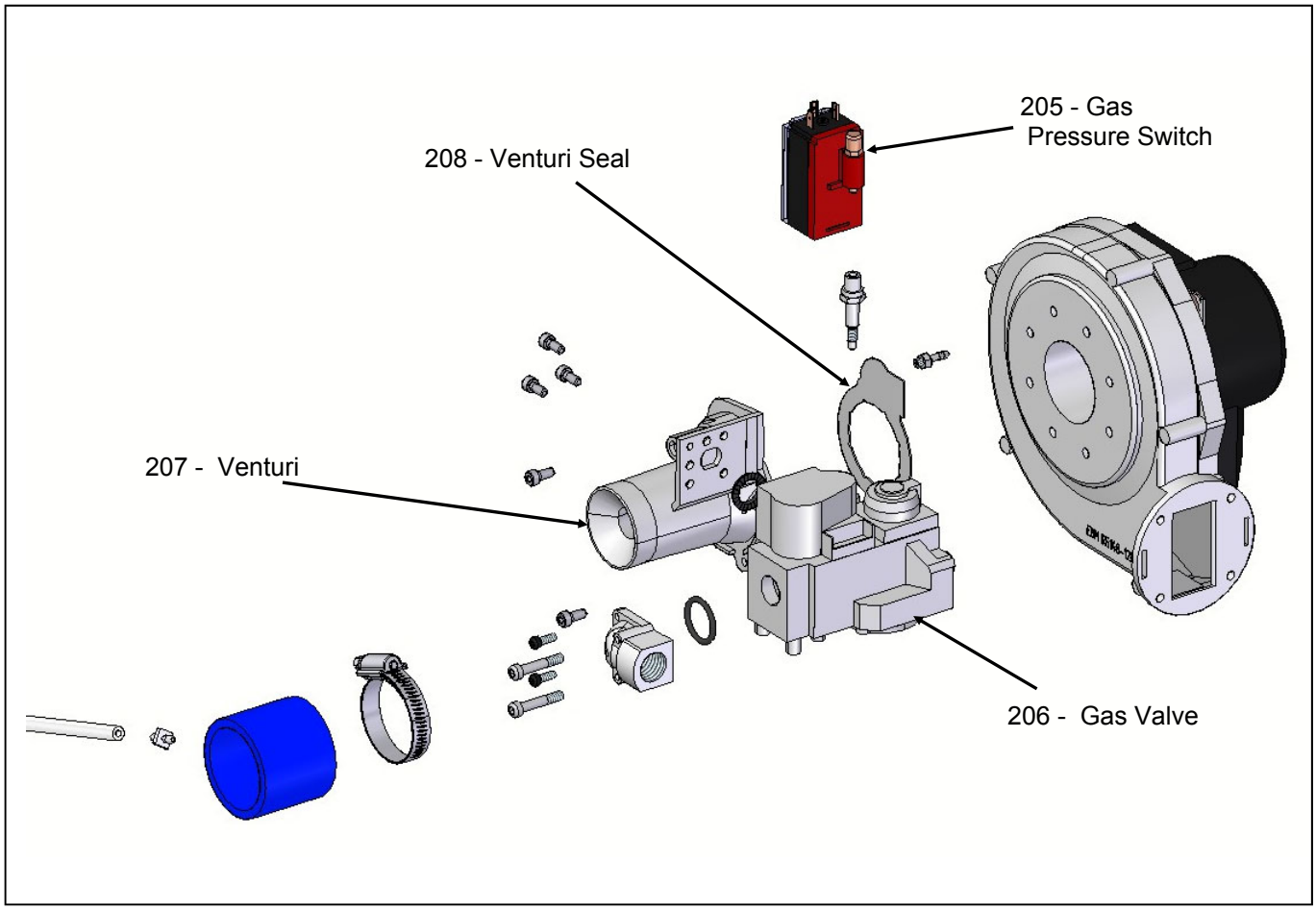


Figure 11.2.1 - Gas Valve Assembly Models PV70c

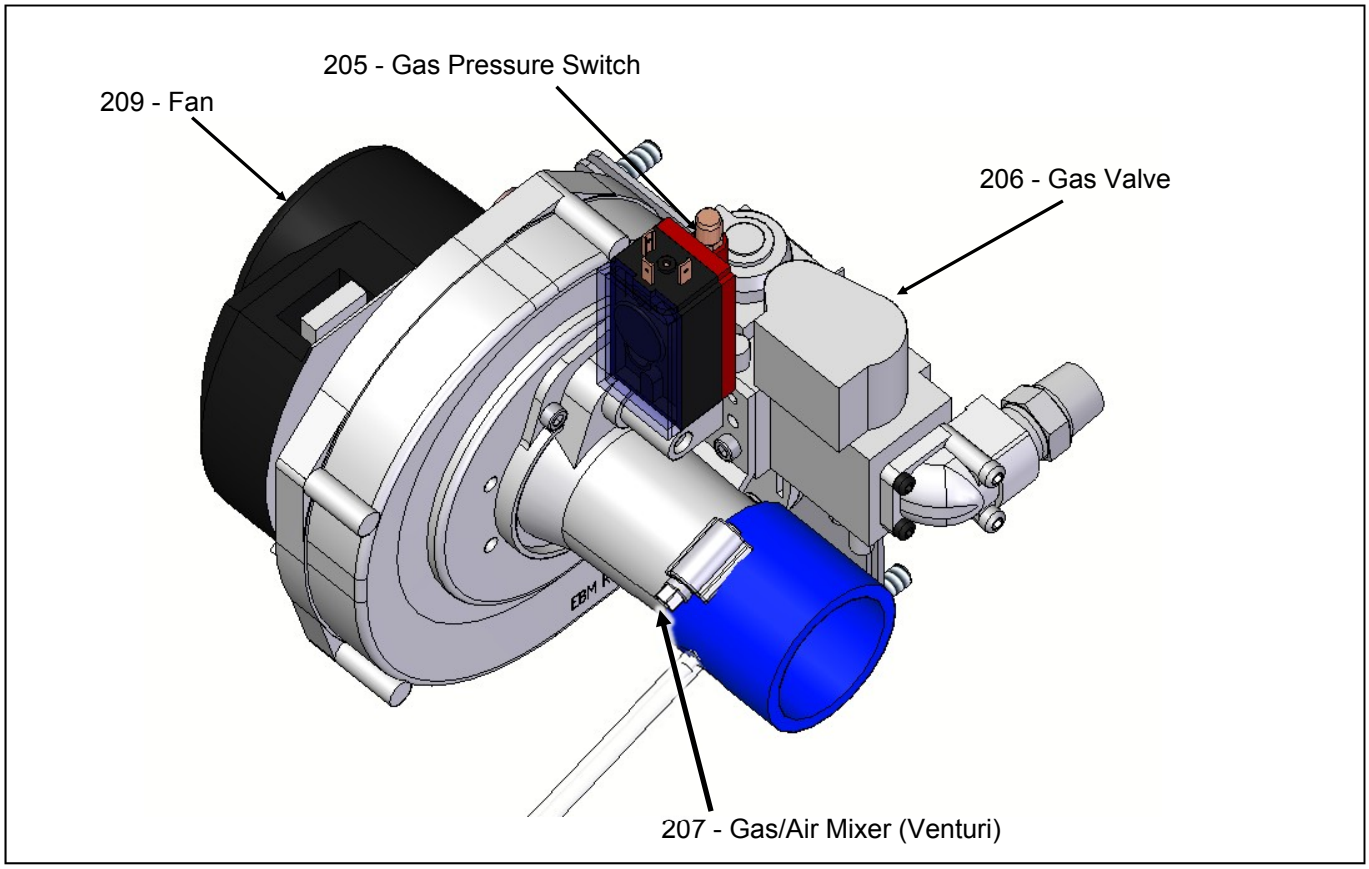


Figure 11.2.2 - Combustion System Assembly Model PV70c

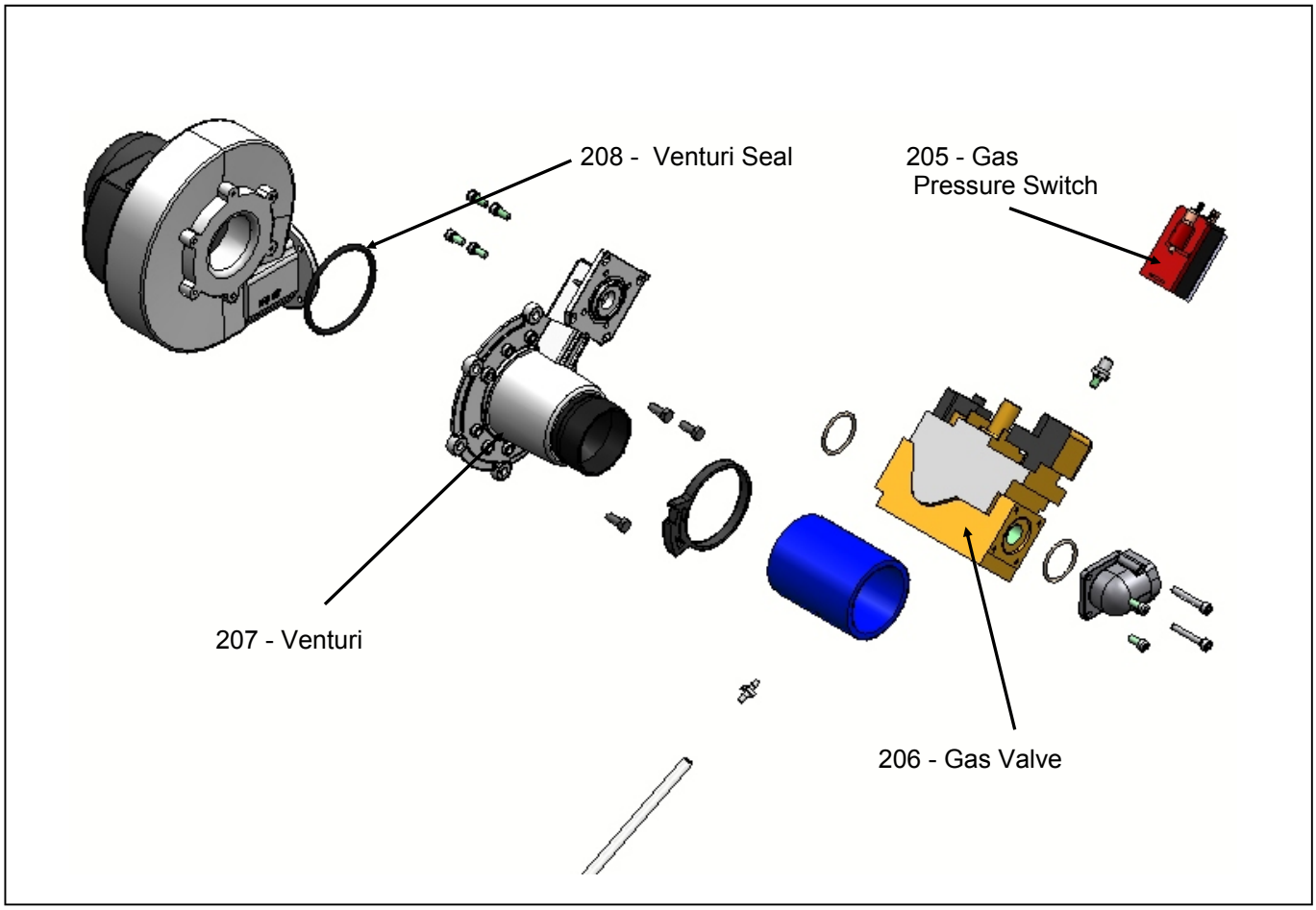


Figure 11.3.1 - Gas Valve Assembly Models PV95c/110c/140c

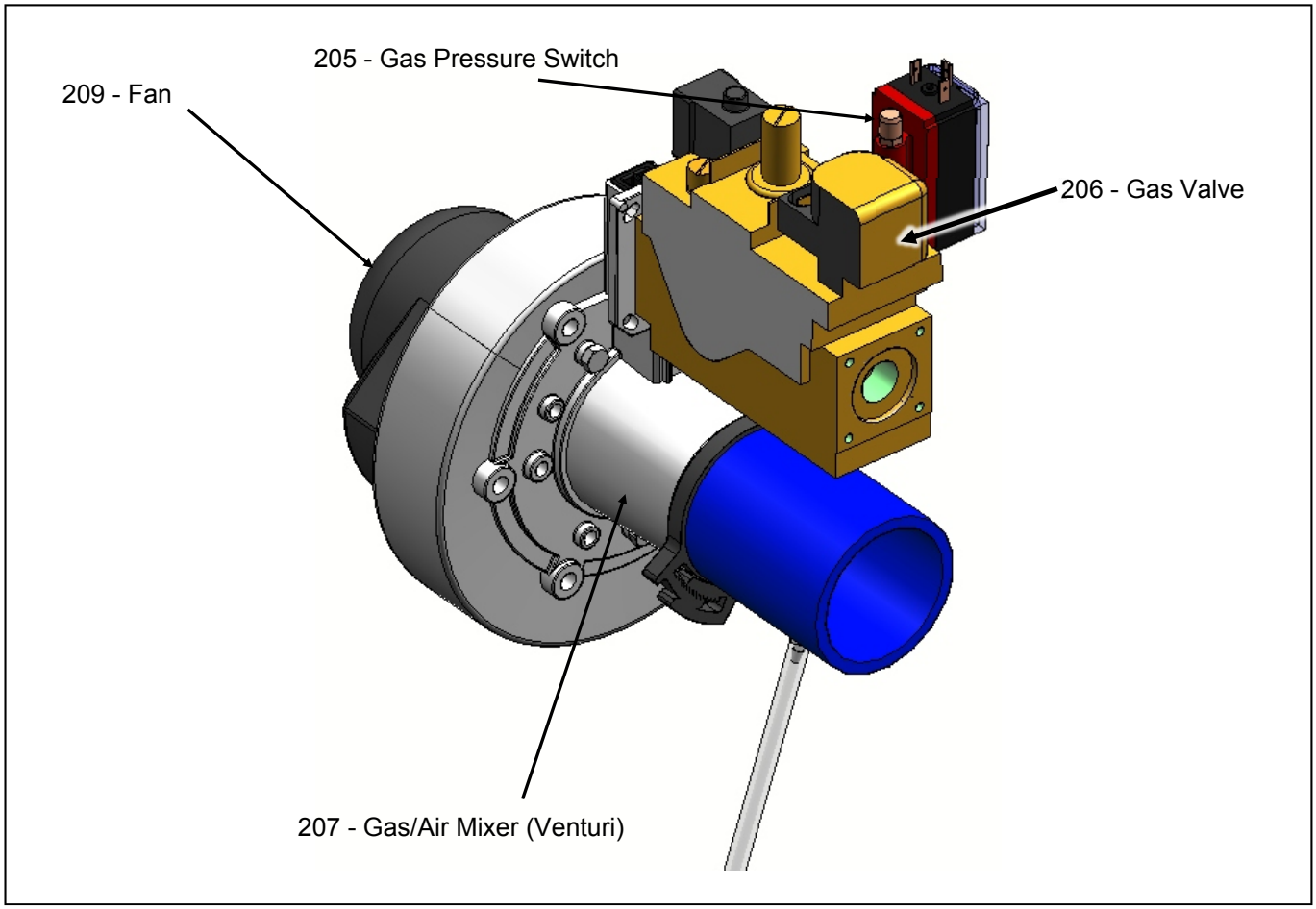


Figure 11.3.2 - Combustion System Assembly Model PV95c/110c/140c

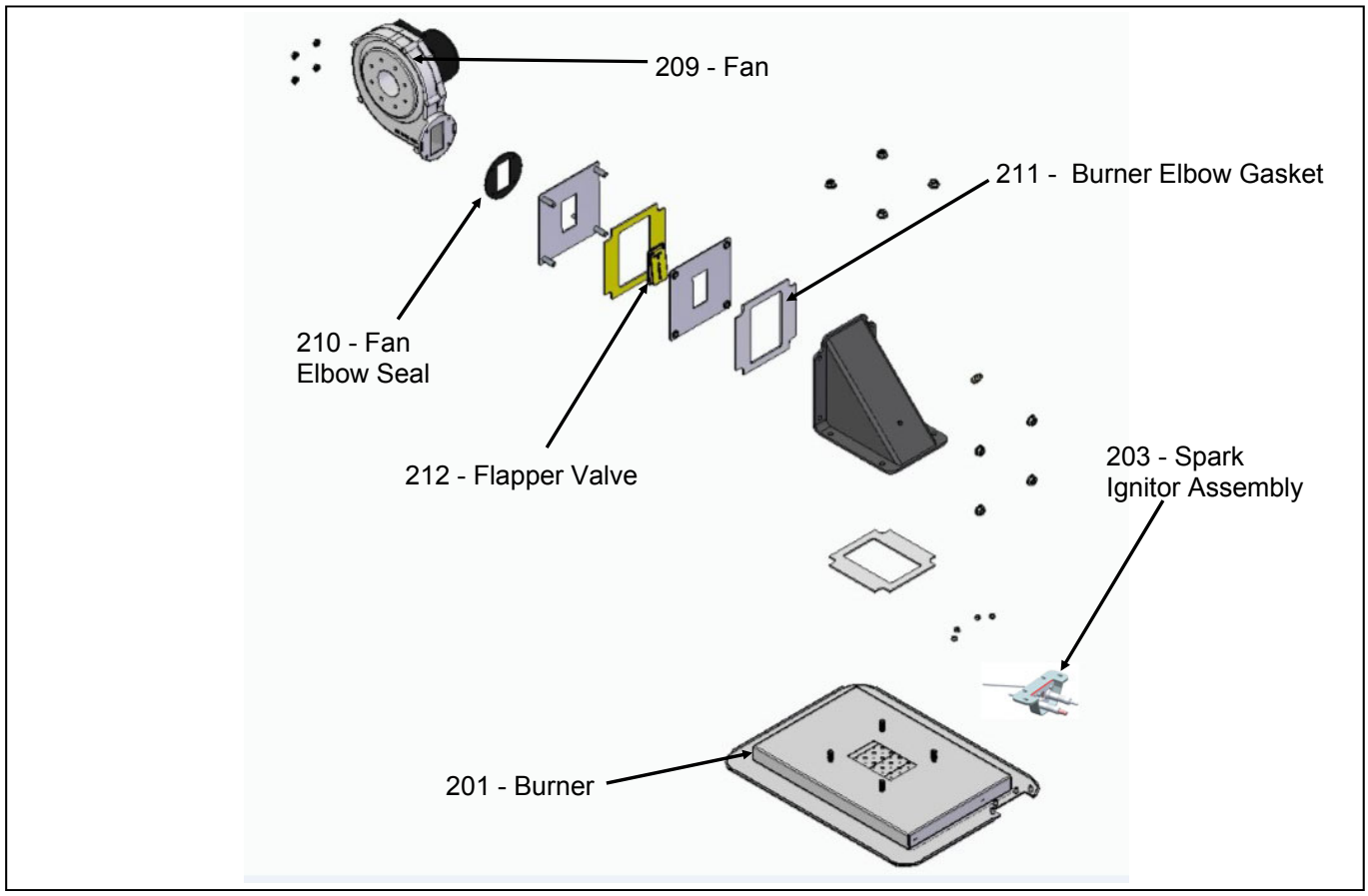


Figure 11.3.3 - Combustion System Assembly PV70c/95c/110c/140c

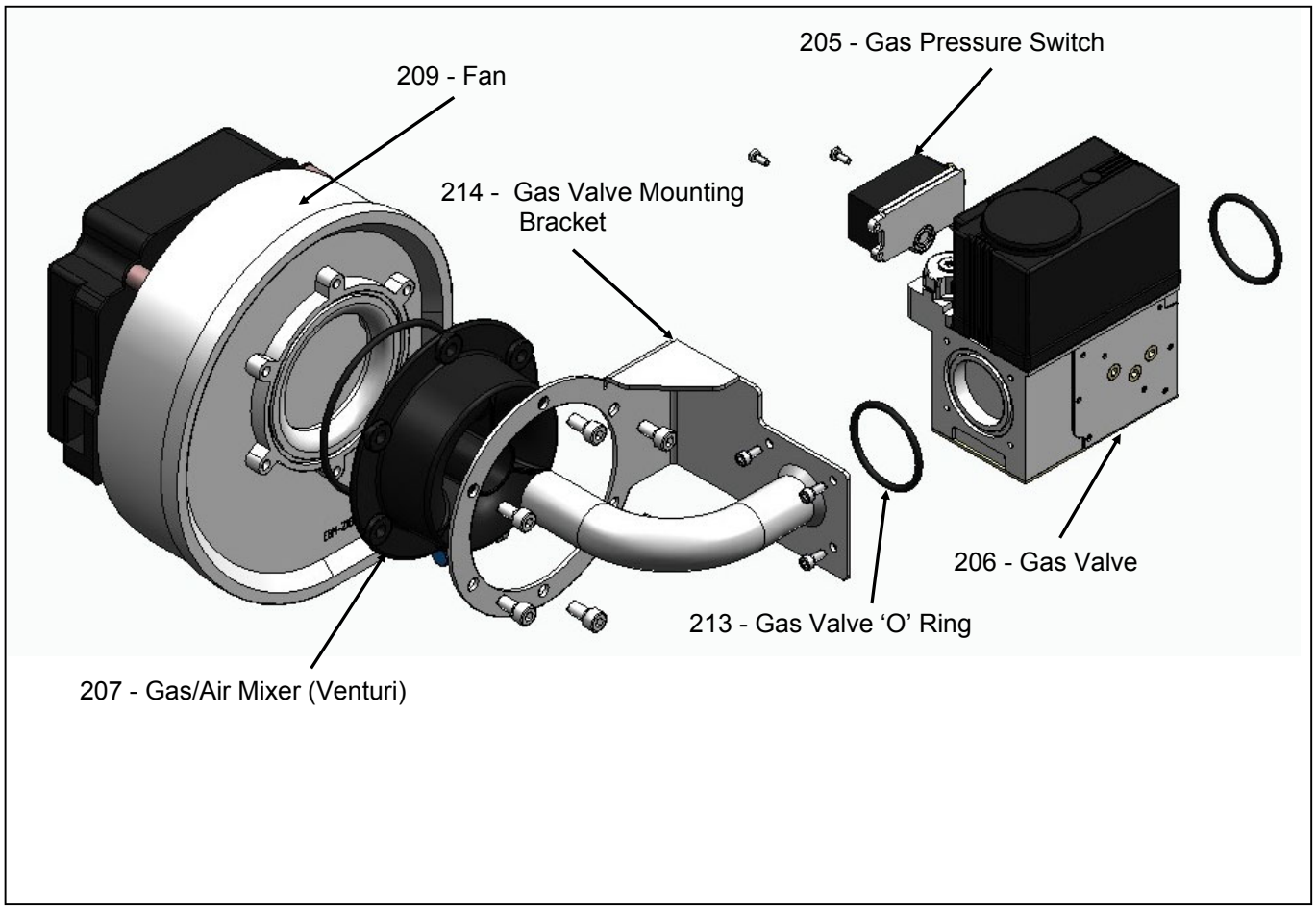


Figure 11.4 .1 – Gas Valve Assembly PV180c

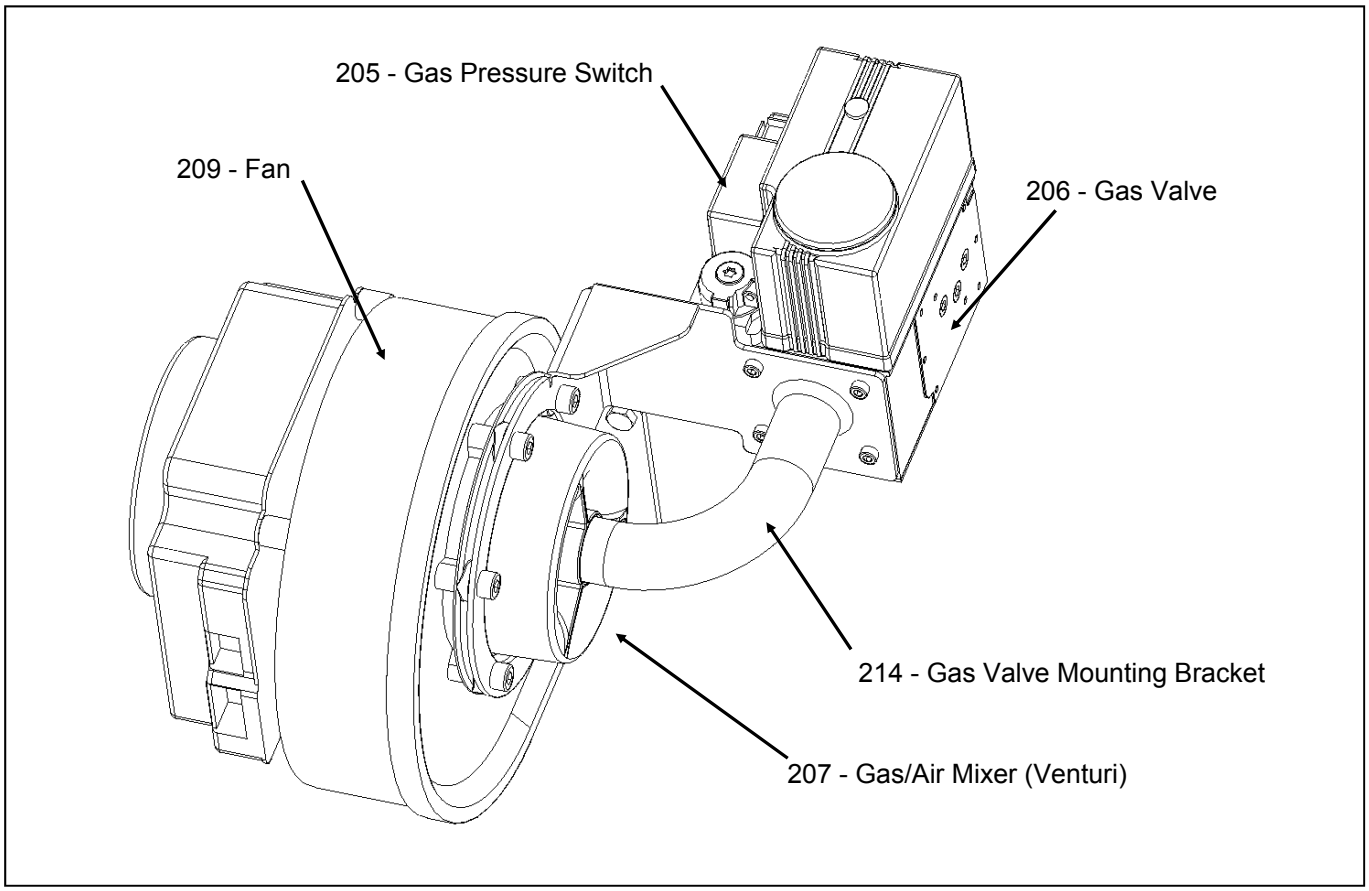


Figure 11.4.2 - Combustion System Assembly Model PV180c

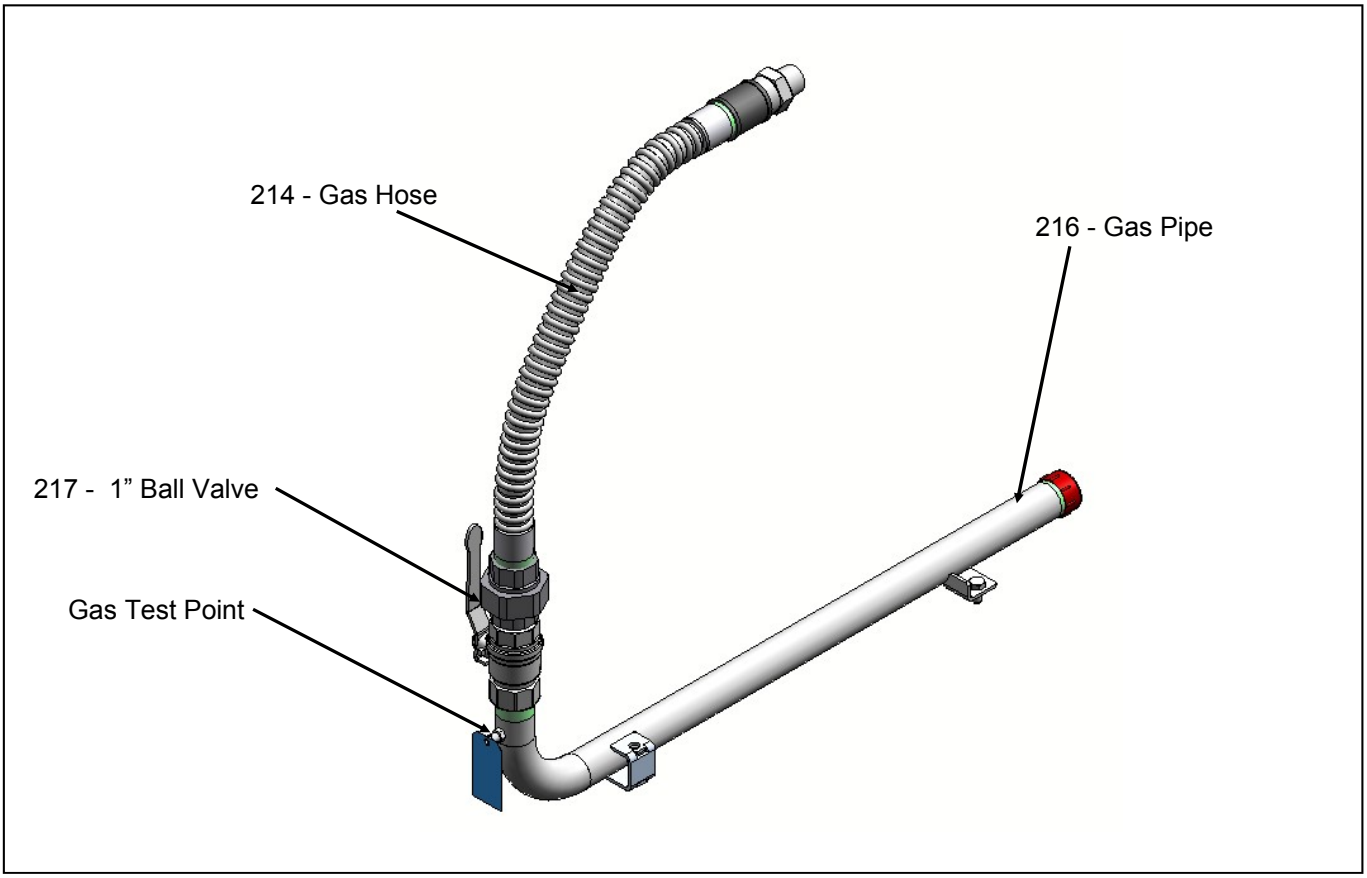


Figure 11.5 - Gas Train Assembly

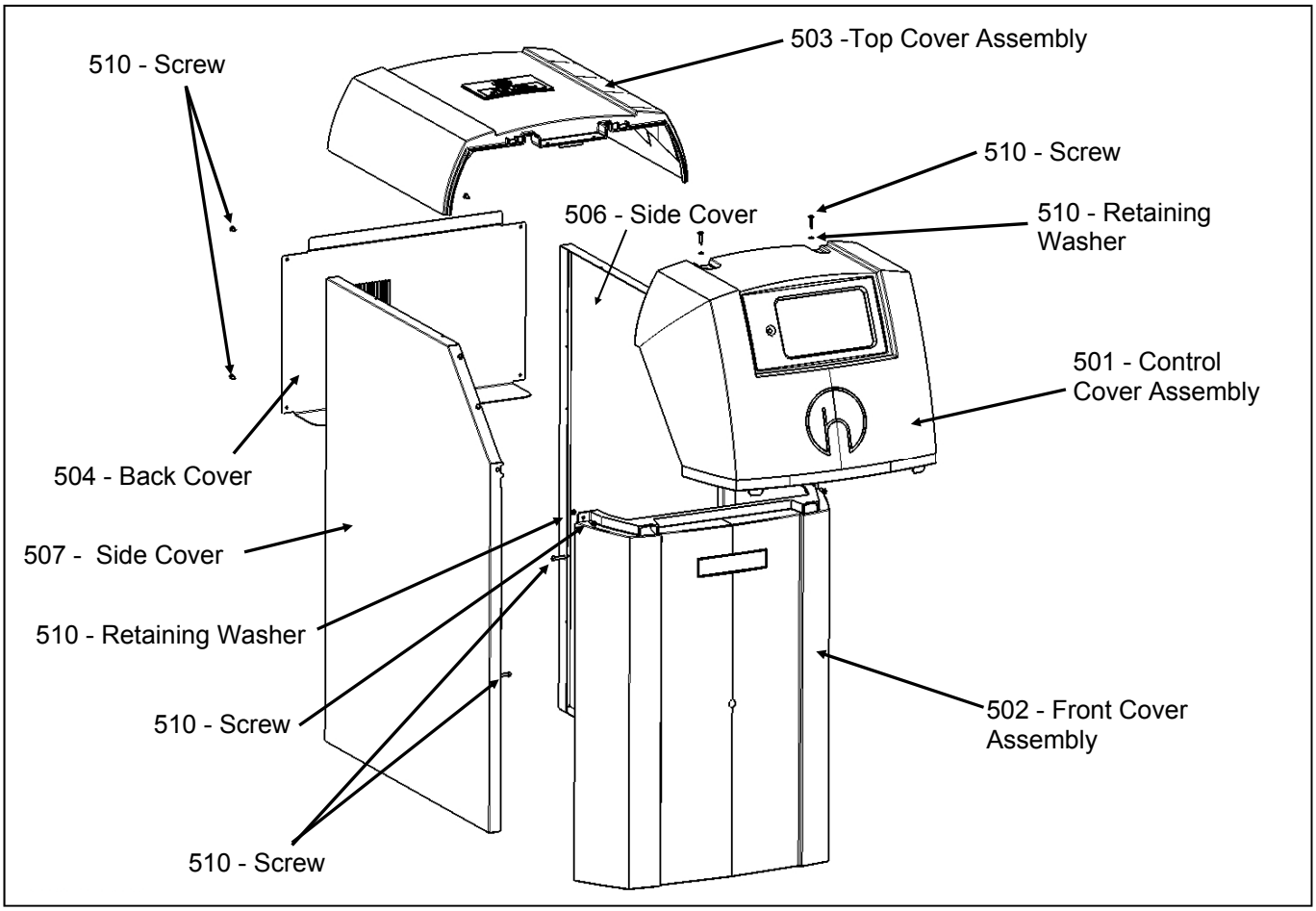


Figure 11.6—Casing Assembly

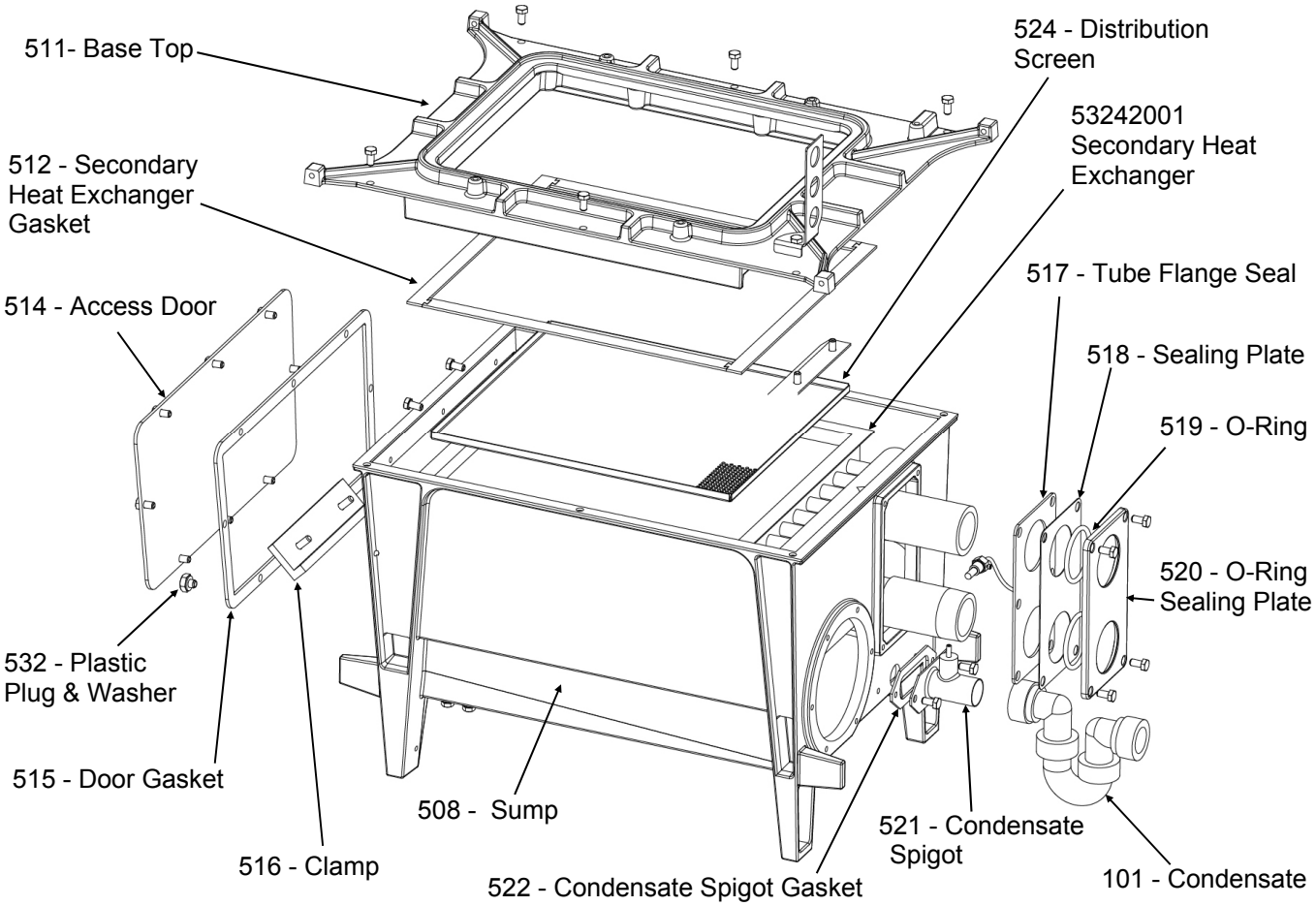


Figure 11.7- Secondary Heat Exchanger Assembly

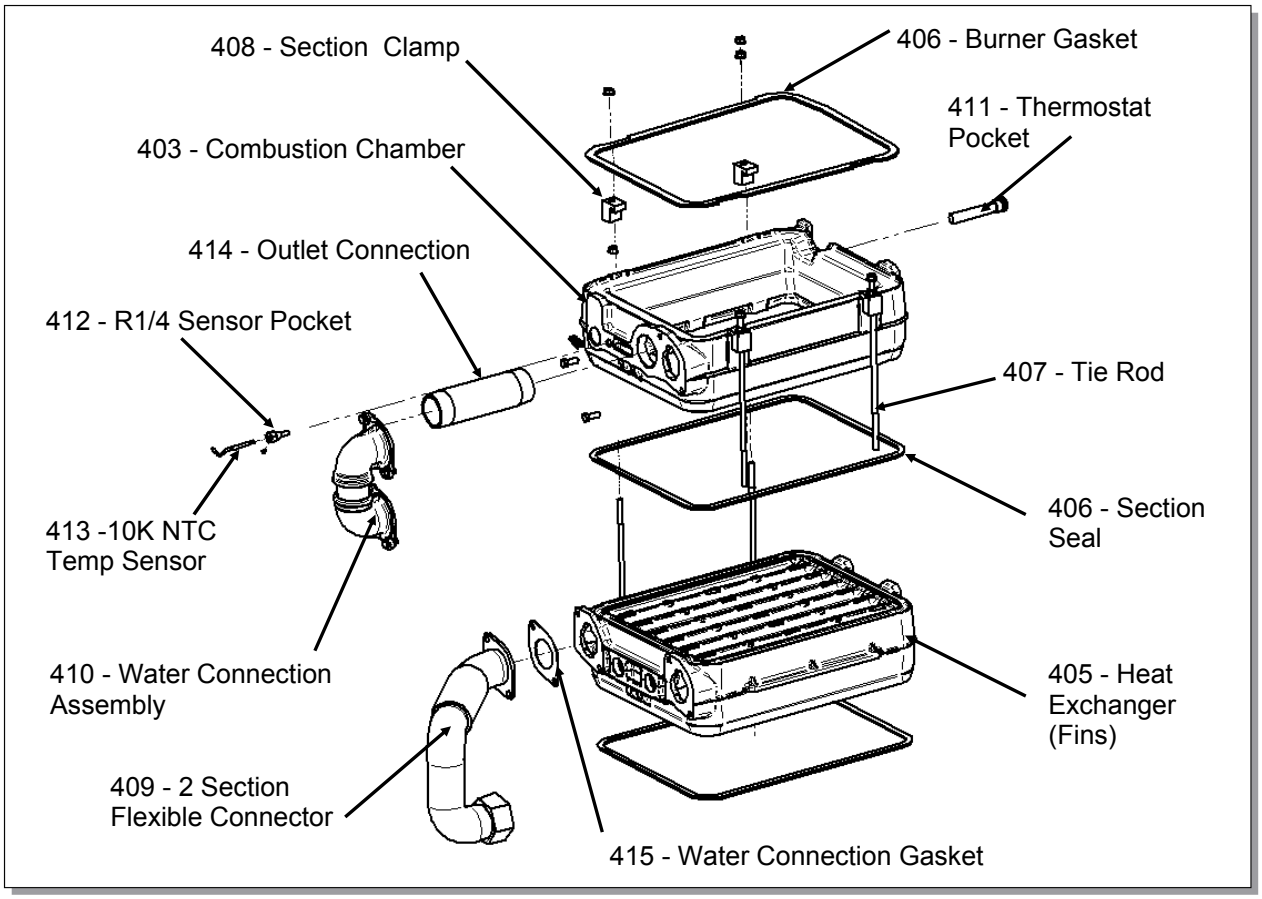


Figure 11.8- Heat Exchanger Assembly (model 70c—110c shown for illustration)

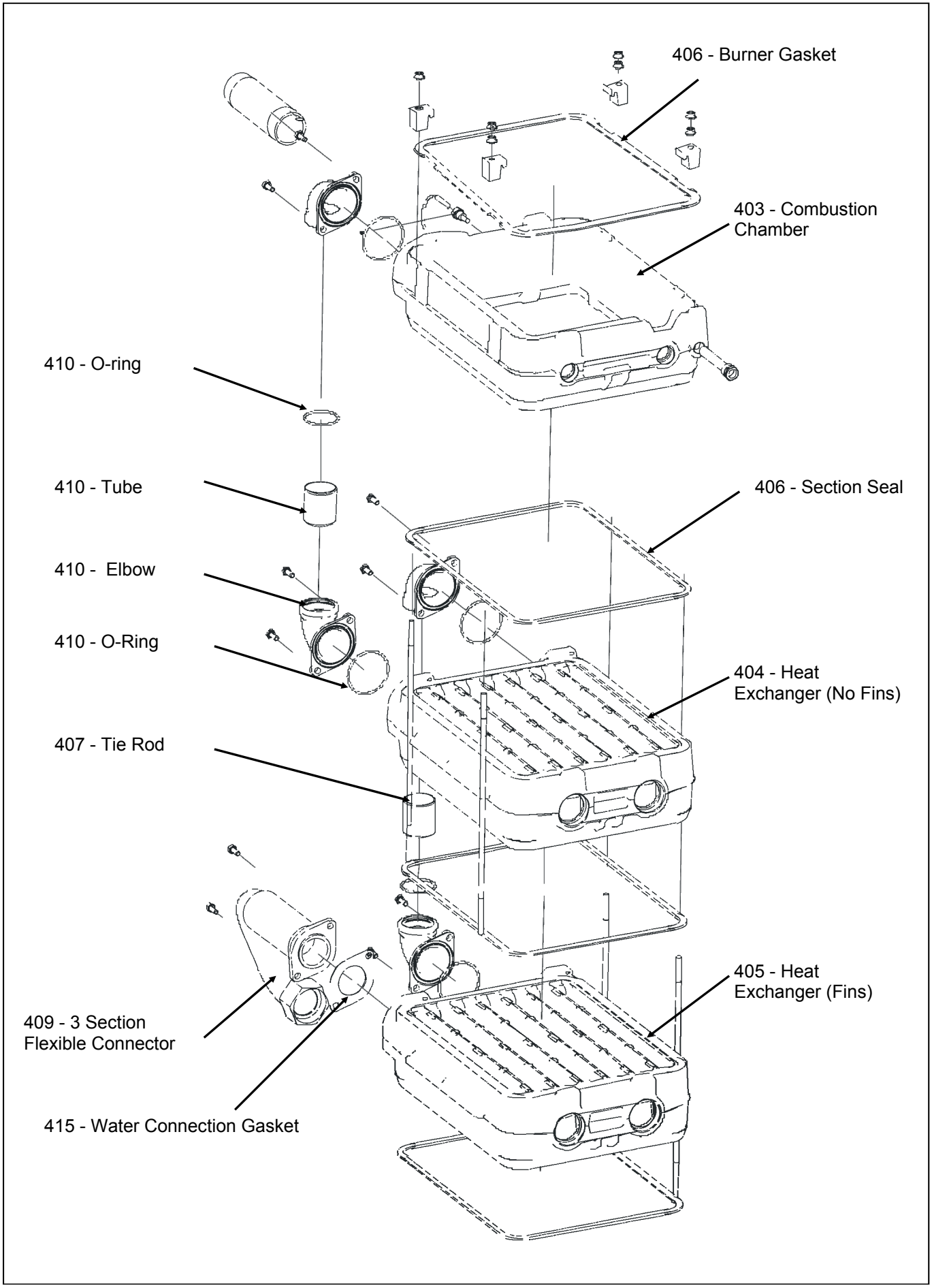
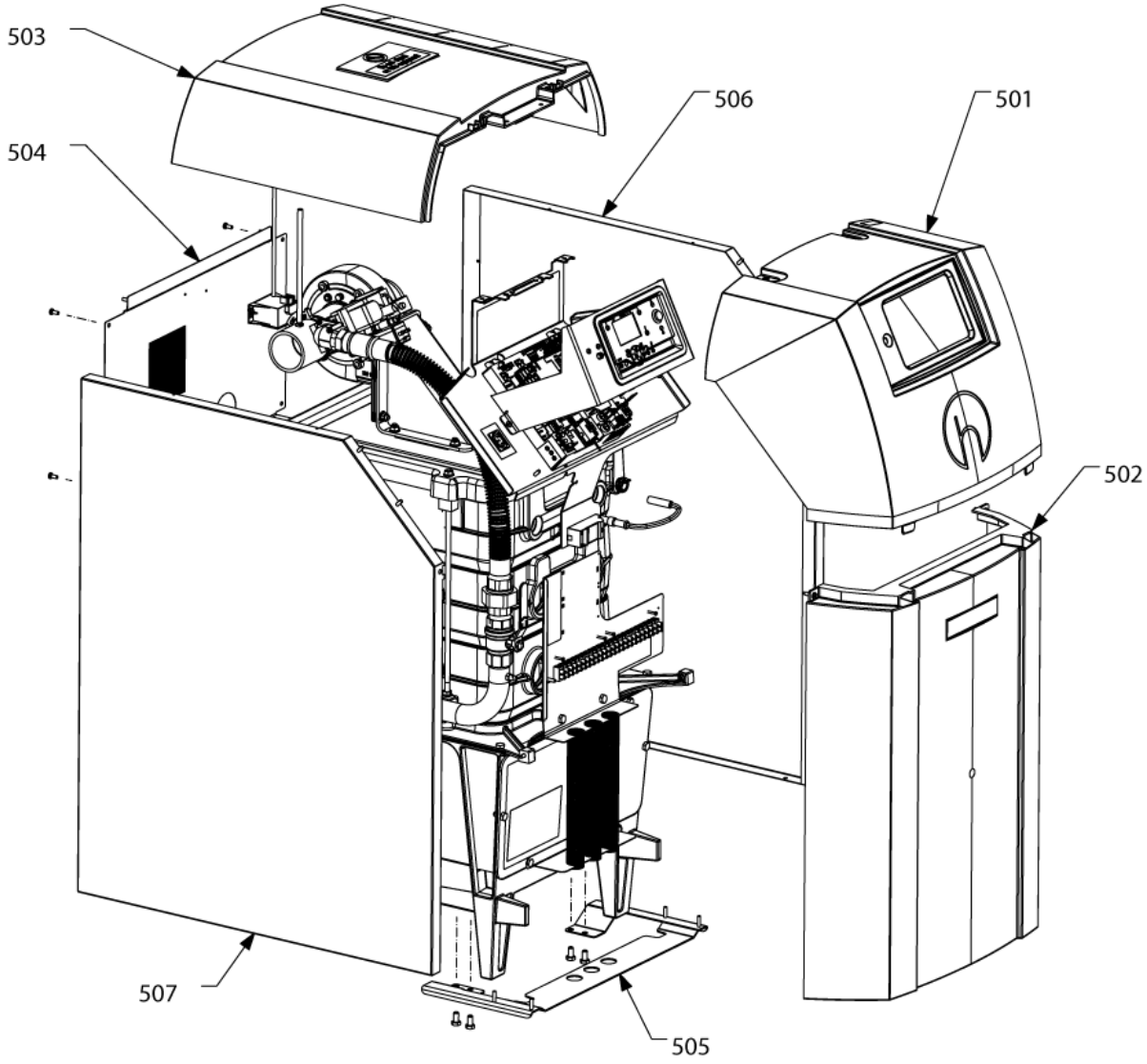


Figure 11.9 - Heat Exchanger Assembly (model 140c - 180c shown for illustration)

12.0 RECOMMENDED SPARES

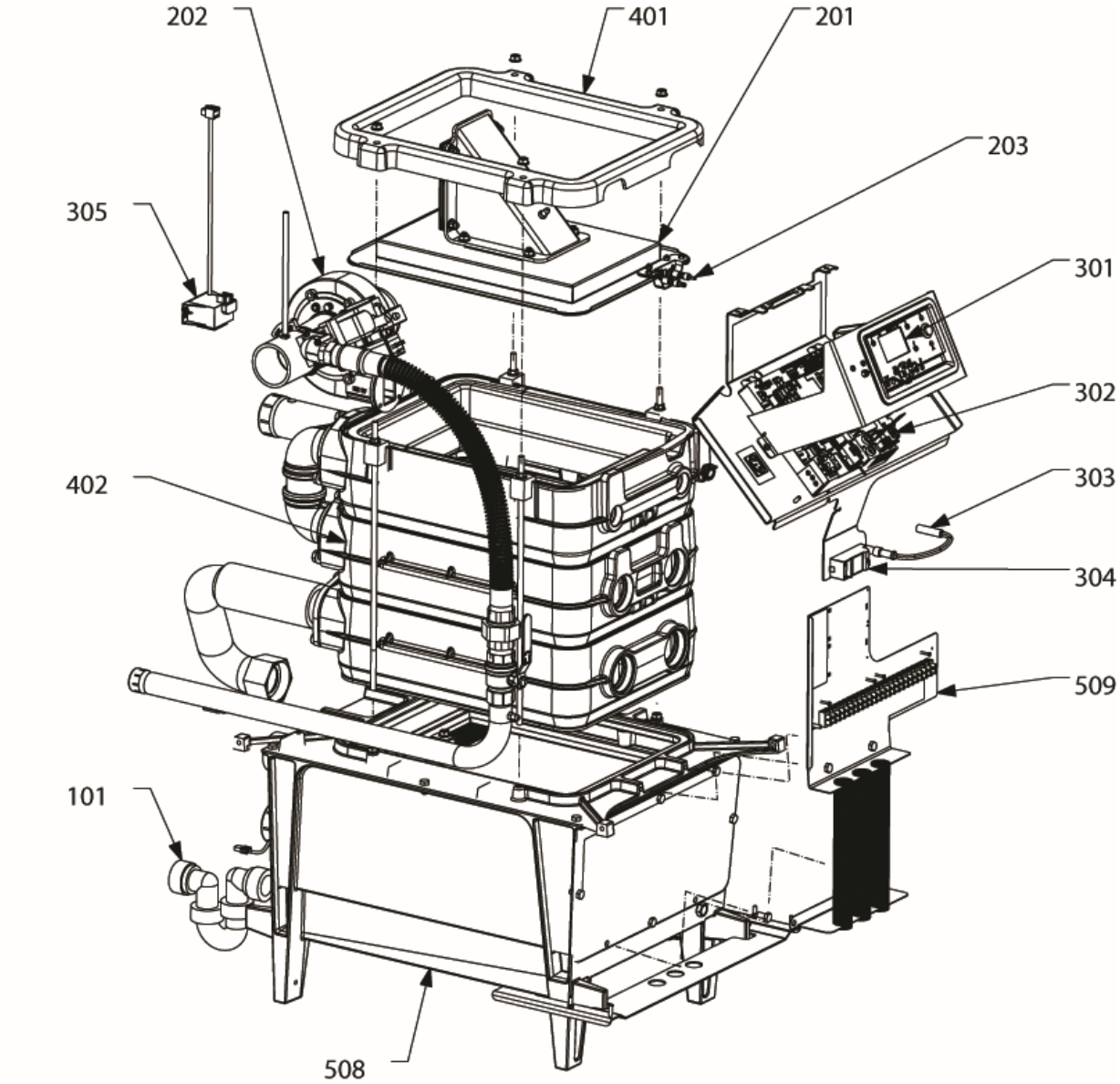
Please refer to ***www.hamworthy-heating.com*** for spare parts using the key numbers shown in this manual.

Please Note:- To ensure the correct spare parts are despatched by our spares department, it is imperative that the complete Boiler/Module/Control Panel Serial Numbers are given. The Boiler and Module Serial Numbers are located on the Data Plates affixed to the front of the heat exchanger base casting. These numbers **MUST** be quoted when ordering spare parts.



KEY:

501 CONTROL COVER ASSEMBLY
502 FRONT COVER ASSEMBLY
503 TOP COVER ASSEMBLY
504 REAR COVER
505 FRONT BRACE BRACKET
506 SIDE PANEL
507 SIDE PANEL



KEY:

101 CONDENSATE TRAP
201 BURNER ASSEMBLY
202 GAS TRAIN
203 IGNITOR ASSEMBLY
301 HMI ASSEMBLY
302 LMS CONTROLLER ASSEMBLY
303 IGNITION LEAD
304 SPARK GENERATOR
305 EMC FILTER
401 BURNER CLAMP
402 HEAT ENGINE ASSEMBLY
508 SUMP
509 TERMINAL BRACKET ASSEMBLY

SPARES ITEM **SPARES KEY No.**

ELECTRICAL ITEMS

Siemens LMS Controller……..302
Siemens LMS HMI……301
Flow / Return Sensor……413
Temperature Limiter……306
Air Pressure Switch……..309
Spark Ignitor Probe Kit……204
Spark Generator……304
Ignition Lead……..303
Fuses F1 & F2……...310
Fuses F4 & F4……...311

MECHANICAL ITEMS

Burner……..201
Burner Elbow Gasket……211
Ignitor Top Gasket……218
Ignitor Face Gasket……...219
Gas Valve……..206
Gas Valve 'O' Ring……213
Gas Hose……...215
Combustion Fan……209
Combustion Fan Seal……...210
Low Gas Pressure Switch……205

Set of Gaskets (Routine Service - combustion system) ……601
Set of Gaskets (Major Service - combustion system plus heat exchanger)....602

For service or spares please contact :-

Hamworthy Heating Limited
Wessex House
New Fields Business Park
Stinsford Road
Poole
Dorset BH17 0NF

Phone Number 01202 662500
Fax Number 01202 662522
Service 01202 662555
Spares 01202 662525
Technical 01202 662505

APPENDIX A - GAS DATA

Natural Gas

GENERAL DATA Purewell Variheat mk2 - non condensing		BOILER MODEL				
Model		70c	95c	110c	140c	180c
Boiler Input (maximum)	- kW (Gross)	72.2	98.4	115.0	151.3	194.6
Boiler Input (maximum)	- kW (Nett)	65.0	88.6	103.5	136.3	175.2
Boiler Output (maximum) 80/60°C	- kW	63.5	86.3	99.8	134.4	172.8
Boiler Output (minimum) 80/60°C	- kW	21.2	28.8	33.3	44.8	57.6
Building Regulations - Seasonal Efficiency	(%) gross	95.3	95.6	95.8	95.7	94.6

GENERAL DATA Purewell Variheat mk2 - condensing		BOILER MODEL				
Model		70c	95c	110c	140c	180c
Boiler Output (maximum) 50/30°C	- kW	70	95	110	140	180
Boiler Output (minimum) 50/30°C	- kW	20.3	27.6	31.9	40.6	52.2

GAS DATA						
Gas Inlet Connection Pipe Thread Size		R1”				
Nominal Gas Inlet Pressure	- mbar	20				
Maximum Gas Inlet Pressure	- mbar	25				
Gas Flow Rate (maximum)	- m^3/h	6.9	9.4	10.9	14.4	18.5
Dry NOx Emissions European Class 6	- mg/kWh	21.3	31.1	39.1	32	37.8
Noise Emission	- Max dB (A)	53	53	53	65	65
Target CO_2 % at High / Low fire ±0.25		9.5 / 9.5			9.5 / 8.5	

Figure A1 - Gas Data

APPENDIX B - ELECTRICAL CONNECTIONS AND CONTROLS

ELECTRICAL DATA							
Model			70c	95c	110c	140c	180c
Normal Supply Voltage			230V ~ 50Hz				
Power Consumption (maximum)*	-	W	554			667	
Start and Run Current (per boiler)	-	A	0.54			0.6	

Figure B1.1 - Electrical Supply

***Where The max allowable power output from the IEC Outlet is 460 W (fitted with A T6.3H fuse).**

IMPORTANT: Individual boiler modules must be earthed.

The boiler must be isolated from the mains electricity supply in the event of electric arc welding being carried out on any connecting pipework.

1.1 Wiring external to the boiler must be installed in accordance with the IET Regulations and any local regulations which apply. Wiring must be completed in heat resistant 3-core cable of 1.0mm² cross sectional area. Boilers are normally supplied for connection to a 230 volts, 50Hz mains supply. The Navistem B3000 control is supplied with a replaceable fuse (T6.3H). External fuses should be 10A for all boiler modules.

1.2 3-Phase Electrical Supplies. Banks of Variheat mk2 boilers and boilers installed in close proximity to each other **MUST NOT** be supplied from different phases of a 3 phase supply. The method of connection to the mains electricity supply must facilitate complete electrical isolation of the single boiler with a separation of at least 3mm in all poles.

1.3 A mains isolator must be provided adjacent to each boiler in a readily accessible position. The supply should only serve the boiler.

1.4 Volt free contact electrical supplies must be isolatable where fitted.

1.5 Further details regarding connection to the electricity supply are given in BS EN 60335, Part 1.

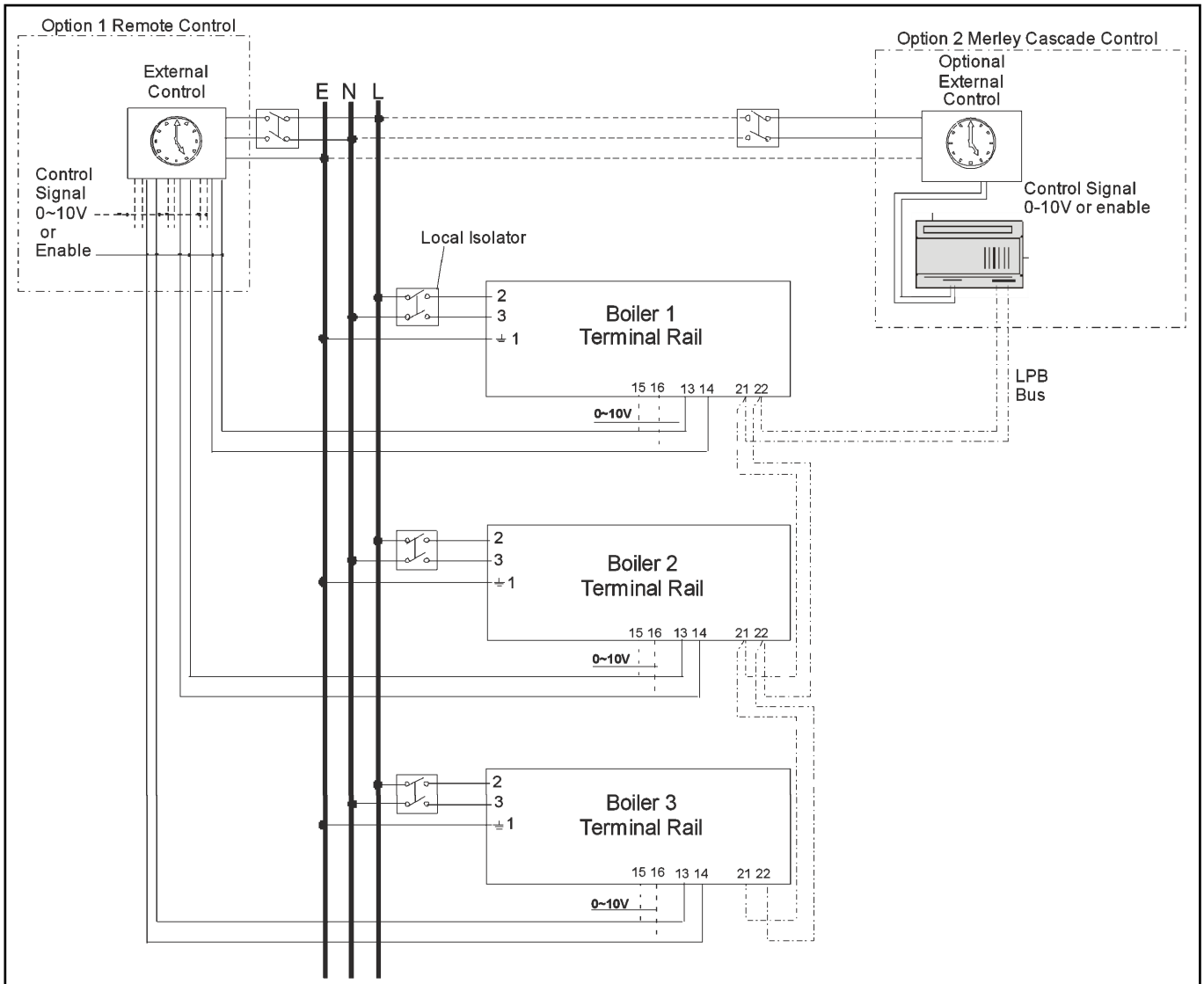
WARNING: THE MAINS POWER SUPPLY MUST NOT BE SWITCHED BY A TIME-CLOCK CONTROL

CAUTION: DO NOT FEED MAINS VOLTAGE ONTO THE TIMER TERMINALS

1.6 The mains power supply must be maintained at all times. Each Purewell Variheat mk2 boiler incorporates a remote stop/start loop, which can be used to operate the boiler(s) under a timed regime. The boiler controls provide a 5V DC signal that can be fed through a volt free contact for operation. Refer to BS 6644 for further information on installing the electrical supply.

NOTE:
FOR ELECTRICAL CONNECTIONS TO BOILER SEE FIGURE 4.6
FOR BOILER WIRING SCHEMATIC SEE FIGURE 9.0
FOR MULTIPLE BOILER WIRING SEE FIGURE B1.2 & B1.3
FOR CONTROL WIRING SEE FIGURE E1.3.1 TO E1.3.4

Figure B1.2 - External Control Wiring for Multiple Module Installation



Note:- each module requires independent isolation of electrical supply and control signals.
Signal cables must not be run in the same conduit as mains voltage cables

Option 1 - reference should be made to Building Regulations and CIBSE Guide 'Energy Efficiency in Buildings' for controls requirements.
All modules must be sequenced.
Enable - will give On/Off control of the modules
0~10V - will give modulation control of each module
Option 2 provides modulation control of up to **15** modules.

APPENDIX C - FLUE DATA

Natural Gas

FLUE DATA						
Model		**70c**	**95c**	**110c**	**140c**	**180c**
Nominal Flue Diameter	mm	150				
Pressure (Max) at the boiler flue outlet	Pa/mbar	100 / 1.0				
Approx. Flue Gas Temperature 80/60°C	°C (Gross)	60	60	65	70	75
Approx. Flue Gas Temperature 50/30°C	°C (Gross)	40	40	45	50	50
Approx. Flue Gas Volume @ 9.5% CO_2	m^3/h*	86	117	137	180	232

Figure C1—Flue Data
* **Note:-** Flue gas volumes are corrected to a flue gas temperature of 15°C and barometric pressure of 1013.25mbar.

C1.0 FLUE SYSTEM

1. Detailed recommendations for flue systems are given in BS 6644, and IGE/UP/10. All flue discharges for plant exceeding 135kW net input must comply with the third edition of the 1956 Clean Air Act Chimney Memorandum.

WARNING: THE FLUE DISCHARGE FROM A VARIHEAT MK2 BOILER WILL GENERATE A PLUME AT THE TERMINAL EXIT. THIS MUST BE CONSIDERED WITH REGARD TO TERMINAL LOCATION AND ADJACENT BUILDING FABRIC.

C1.1 General Requirements

For single boiler installations only the Purewell Variheat mk2 c series of boilers are designed to be used with a forced draught flue system. Flue systems should be designed in accordance with regulations and with reference to BS 6644 and IGE/UP/10.

Open (Natural draught) Flue.
Type B23: Intake from ventilated plant room and discharge via vertical flue. – Fig C1.2

The connection to the boiler is suitable for 150mm flue duct, for connection to an open flue (chimney) system . The resistance and maximum length of the flue system components is detailed in Figure C1.1

The following points should be noted:

a. Due to the high thermal efficiency of the boiler condensation in the flue will occur. It is strongly recommended that twin wall or insulated flue pipe is used on all external flue installations.

b. Care should be taken to ensure that the flue is installed such that any condensation is continuously drained. All flues should have a maximum slope of 2° upwards in the direction of the exhaust gas flow (no horizontal sections). All joints should be such that any condensation is directed back down the slope to an open drain connection in the flue. The drain pipe must be manufactured from a corrosion resistant material and be at least 15mm diameter. It must also have a fall of at least 2-3° (approx. 30-50mm per meter) and connect to a drain via a waste trap.

c. Boiler flue outlet sizes - A flue system designed with the same diameter as the boiler flue outlet may not provide satisfactory performance in all applications. Consideration must be given to the correct calculation of the required flue size. If in any doubt consult Hamworthy Heating Ltd who can supply a full flue design and installation service.

C1.2 Waste Gas Volume and Temperature.

It is recommended that the volume and temperature of the waste gases used for design of the flue system are as given in Table C1 above.

C1.3 Materials.

Materials used for the flue system must be mechanically robust, resistant to internal and external corrosion, non-combustible and durable under the conditions to which they are likely to be subjected. Consideration must be given to avoid possible freezing of condense water traps and pipework

C1.4 Suction

The flue system must be designed acknowledging that there is a positive pressure of generated by the boiler combustion fan available to the flue system. It is recommended that a draught stabiliser is fitted to the flue system where the draught is likely to become –ve at the boiler connection.

C1.5 Disconnection

Provisions should be made for disconnection of the flue pipe for servicing. It is advisable that bends are fitted with removable covers for inspection and cleaning as appropriate.

WARNING: THE FLUE SYSTEM MUST BE SELF SUPPORTING AND NOT PRESENT A RISK TO PEOPLE IN OR AROUND THE BUILDING.

C1.6 Flue Discharge

The flue system must ensure safe and efficient operation of the boiler to which it is attached, protect the combustion process from wind effects and disperse the products of combustion to the external air. The flue must terminate in a freely exposed position and be so situated as to prevent the products of combustion entering any opening in a building. Where the flue diameter is less than 204mm (8”) diameter a terminal must be fitted. Where the flue is of a larger size, consideration should be given to the fitting of a flue discharge terminal or grille to stop ingress of birds etc.

C1.7 Surface Temperatures

Combustible materials in the vicinity of the boiler and flue shall not exceed 65°C during boiler operation. The flue shall not be closer than 50mm to any combustible material, except where it passes through such material with a non-combustible sleeve when the air gap may not be less than 25mm.

C1.8 Location

The flue system must not be placed or fitted where there is undue risk of accidental damage to the flue pipe or undue danger to persons in the vicinity. Check that the flue and chimney are clear from any obstruction. Purewell Variheat mk2 boilers are suitable for installation in a balanced compartment in accordance with the requirements of BS 6644. Consult Hamworthy Heating Technical Department for help or assistance if in doubt.

C1.9. Condensate Discharge

Due to the high thermal efficiency of the boiler, condensation will occur within the boiler casing during firing from cold conditions. A drain with an integral trap is fitted to the rear of each module suitable for connection to a 32mm plastic waste pipe (not Hamworthy Heating Ltd supply), which must be connected to a tundish (not Hamworthy Heating Ltd supply). Discharge piping from a tundish should be of synthetic material due to the mild acidity of the condensate (pH 3-5), with all discharge piping having a minimum fall of 30mm/m away from the boiler. Consideration should be given to possible freezing of condense water traps and pipework. This must be avoided at all times by routing pipework within the building, where possible. It is strongly recommended that on modular installations, the common header and chimney system must have separate drains for condensate disposal - **refer to section 4.5.**

Model					
Component	70c	95c	110c	140c	180c
Straight tube ø150mm maximum length (m)	131	114	114	79	57
45° bend ø150mm Equivalent tube length (m)	1.6	1.7	1.7	1.8	1.8
90° bend ø150mm Equivalent tube length (m)	2.1	2.2	2.2	2.3	2.3

Figure C1.1 - Flue Resistance

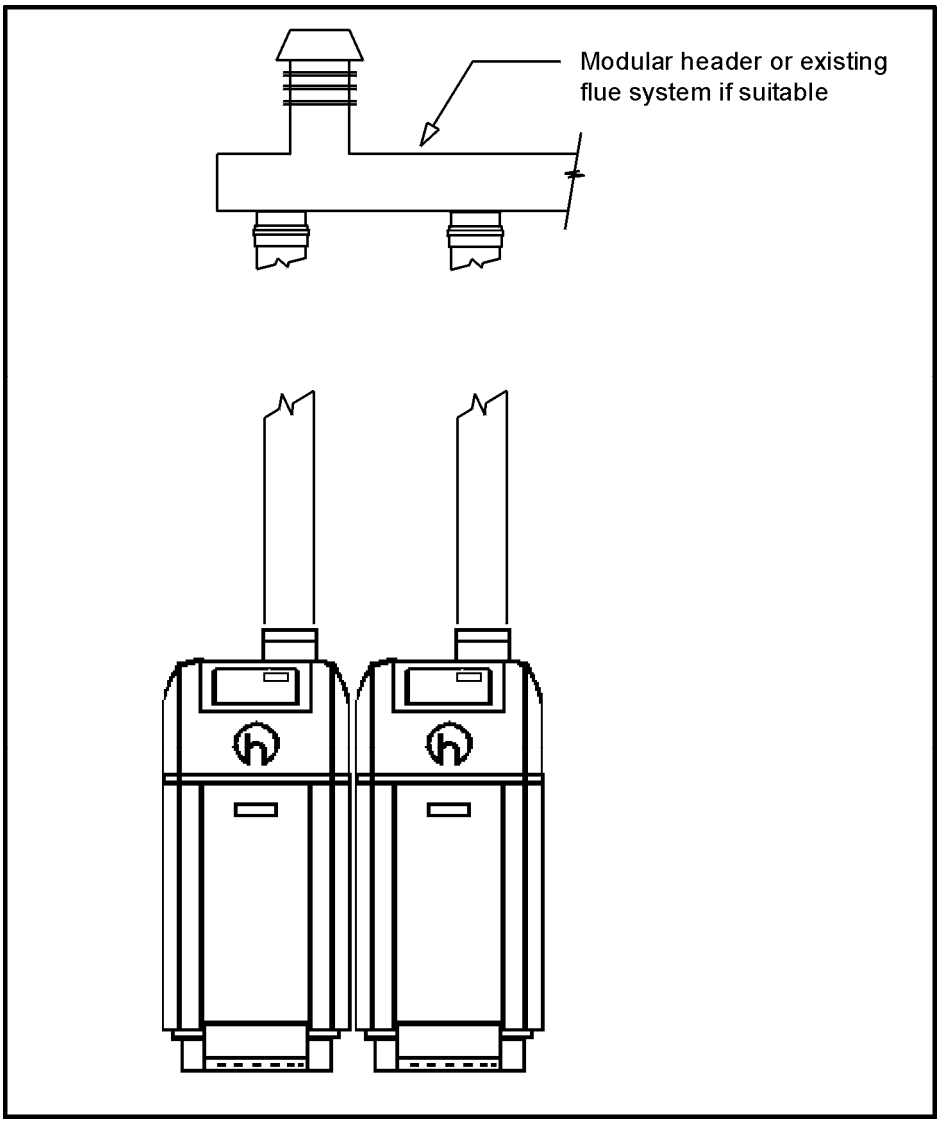


Figure C1.2 - Open (Natural Draught) B23 Flue System

APPENDIX D - VENTILATION

D1.1 Air Supply

Detailed recommendations for air supply are given in BS 6644. The following notes are intended to give general guidance. In all cases there must be provision for an adequate supply of air for both combustion and general ventilation, in addition to that required for any other appliance.

Combustion air for the boiler is drawn through the rear of the boiler casing. The area **must** be kept open and free from blockage at all times.

D1.2 Air Supply by Natural Ventilation

The boiler room must have, or be provided with, permanent air vents directly to the outside air, at high level and at low level. For an exposed boiler house, air vents should be fitted, preferably on all four sides, but at the least on two sides. Air vents should have negligible resistance and must not be sited in any position where they are likely to be easily blocked or flooded or in any position adjacent to an extraction system which is carrying flammable vapour. Grilles or louvres must be so designed that high velocity air streams do not occur within the space housing the boiler.

The air supplied for boiler house ventilation shall be such that the maximum temperatures within the boiler house shall be as follows;

1) At floor level (or 100mm above floor level) = 25°C
2) At mid-level (1.5m above floor level) = 32°C
3) At ceiling level (or 100mm below ceiling level) = 40°C.

Where both low and high level openings are used, the grilles shall have a total minimum free area of:

Low level (inlet) - 4.0 cm² per kilowatt of total rated net heat input.
High level (output) - 2.0 cm² per kilowatt of total rated net heat input.

If the boilers are to operate during the summer months for 75% of the time a further 1 cm² or for 100% of the time a further 2 cm² should be added per kW to both high & low openings.

D1.3 Air Supply by Mechanical Ventilation

Air supplied to the boiler room by Mechanical means should be as follows:

1) Mechanical ventilation must be interlocked with the boilers to prevent operation in the event of ventilation fan failure
2) Mechanical inlet and mechanical extract can be utilised providing the design extraction rate does not exceed one third of the design inlet rate.
3) Mechanical extract ventilation with natural inlet ventilation **MUST NOT** be used.

Figure D1 Mechanical Ventilation Flow Rates

Boilers Without Draught Diverters	Flow rate per kW total rated heat input (net)			
	Inlet air (Combustion ventilation)		Difference between inlet and extract air (Inlet minus extract ventilation)	
	m³/h	l/h	m³/h	l/h
Volume	2.6	2600	1.35 +/- 0.18	1350 +/- 180

APPENDIX E - WATER DATA

WATER DATA							
Model			**70c**	**95c**	**110c**	**140c**	**180c**
Water Connections (Flow & Return)			R2" male				
Maximum Water Pressure	-	bar g	6				
Water Content (not including headers)	-	litres	8	8	8	11	11
System Design Flow Rate @ 11°C ΔT Rise	-	litre/s	1.5	2.1	2.4	3.0	3.9
Minimum Flow Rate @ 20°C ΔT Rise	-	litre/s	0.8	1.1	1.3	1.7	2.1
Waterside Pressure Loss @ 11°C ΔT Rise	-	mbar	96	176	244	442	731
Waterside Pressure Loss @ 20°C ΔT Rise	-	mbar	32	52	72	134	221

Figure E1 - Water Data

E1.1 Water Circulation System

The Purewell Variheat mk2 boiler has a low water content and the requirements of minimum water flow are given in the above table. Recommendations for the water circulation system are given in BS 6644.

The following details are of particular importance for the correct installation of the water circulation system:

1) In a combined central heating and hot water system the hot water storage vessel must be of the indirect cylinder or calorifier type. The hot water storage vessel should be insulated, preferably with not less than 75mm (3") thick mineral fibre, or its thermal equivalent.
2) Circulating pipework not forming part of the useful heating surface should be insulated to help prevent heat loss and possible freezing, particularly where pipes are run through roof spaces and ventilated cavities. Cisterns situated in areas which may be exposed to freezing conditions should also be insulated. Furthermore, insulation exposed to the weather should be rendered waterproof.
3) Drain valves must be located in accessible positions which permit the draining of the whole system, including the boiler and hot water storage vessel.
4) Each boiler module has R2" male flow (indicated with a red spot) and return (indicated with a blue spot) connections. Boilers should be connected by flow and return headers. Headers should be connected to the system in a 'reverse / return' arrangement (the water flow in each header is in the same direction) to ensure equal flow in each module, or with a 'single pipe header system'. Figure E1.2 on the following page show typical layouts.
5) Ideally, individual valves should be fitted to each module to enable isolation from the system, however, the arrangement must comply with the requirements of BS 6644.

E1.2 Minimum System Water Pressure

To comply with guidance note **PM5 (Health and Safety Executive)**, the minimum pressure requirements at the boiler are given below as examples:-

1) Single installed boiler running at 82°C flow temperature. Minimum head required is not less than 2.0 metres or 0.2 bar.

2) Modular boiler installation running at 82°C flow temperature and 11°C rise across system. Minimum head required = 4.4 metres or 0.43 bar.

3) Modular boiler installation running at 82°C flow temperature and 15°C rise across system. Minimum head required = 6.5 metres or 0.64 bar.

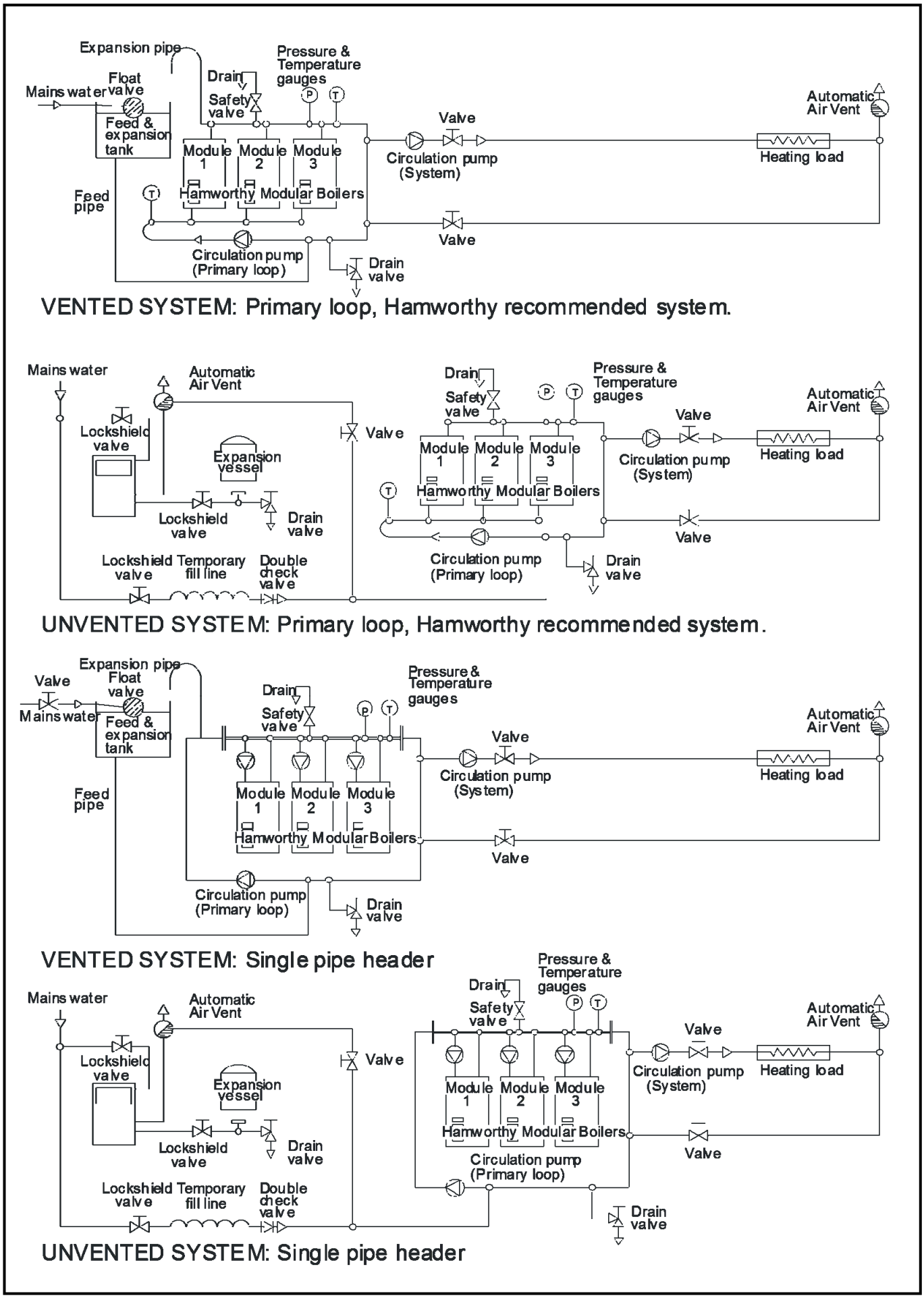
E1.3 Pressure Relief Valve (Safety Valve)

The most important single safety device fitted to a boiler is its safety valve. Each boiler module is provided with a capped R1" stub pipe for the fitting of a safety valve (not supplied). BS 6644 provides comprehensive information for the selection and location of safety valves and attention is drawn to the higher capacity requirements of safety valves for pressurised hot water systems.

Boiler Output	Feed mm	Vent mm
60 - 150kW	25	32
150 - 300 kW	32	38
300 - 600 kW	38	50

Figure E1.1 Cold Feed and Vent Pipe Sizes

Figure E1.2 - Typical Piping Layouts



E1.4 Open Vent and Cold Feed Pipe.

Every boiler or group of boilers should have an open vent pipe and cold feed pipe installed between the boiler and the first water isolating valve. The minimum bore (mm) of these pipes per installation is shown in the table. The vent pipe must rise continually, any valve fitted between a boiler and the open vent pipe for maintenance purposes shall be of the 3 way type such that when closed to the vent pipe the boiler will be open to atmosphere. The vent pipe shall be protected against freezing where this might occur. See BS 6644 for detailed information on Open Vent and Cold Feed Pipes.

E1.5 Altitude Gauge (Water Pressure Gauge)

Every boiler or group of boilers should be provided with an altitude gauge complete with isolating valve. See Figure E1.2 for typical position.

E1.6 Thermometer

A thermometer complete with pocket should be fitted in the pipework to indicate water flow temperature. See Figure E1.2 for typical position.

E1.7 Drain Valves

Each boiler is fitted with a 15mm NB drain valve in the boiler return to drain the boiler only. The heating system in total should have drain valves as recommended by BS 6644. See Figure E1.2 for typical position.

E1.8 Circulating Pump

One or more circulating pumps will be required to circulate water around the boilers and heating system. The pump should be sited to facilitate servicing. It is important that when Purewell Variheat mk2 boilers are used to replace boilers on an existing system, the pumps should be checked for performance against the new boiler waterside pressure loss to ensure that the minimum flow rate can be obtained. It is also important that the existing system be flushed through twice to remove any loose matter which may have accumulated. If in any doubt regarding the cleanliness of the system, a coarse filter should be fitted in the return pipework to the boilers.

If boiler / system pump(s) are not controlled by the boiler, a pump overrun (not Hamworthy Heating Ltd supply) should be fitted which must run for a minimum of 5 minutes on shutdown of the last boiler.

E1.9 Minimum Water Flow Rates

Minimum water flow rates are shown in table at beginning of Appendix E. These flow rates should be maintained through the boiler at all times whilst the boiler is firing. If the water flow rate is allowed to fall below the minimum the boiler heat exchanger could fail due to the resultant scale formation. Particular attention should be paid to the restriction of external flow circuits during periods of low heat demand.

E1.10 Waterside Pressure Drop

The waterside hydraulic resistance (Pressure drop) is given in table E1 at beginning of Appendix E.

E1.11 Water Flow Controls

Any external mixing valve / shunt pump or similar controls MUST always ensure that the minimum water flow rate as given in table at beginning of Appendix E is maintained. If there is any doubt relating to site flow conditions it is suggested that a flow switch is fitted. The flow switch should be connected such that the boiler will shut down if insufficient flow occurs.

E1.12 Frost Protection

Consideration should be given to fitting a frost thermostat set at approximately 4°C

E1.13 Unvented Systems

Refer to Figure E1.2 for typical layout of an unvented (Pressurised) Hot Water System. For system design refer to BS 7074 Part 2. In order to correctly size a pressurisation unit for any heating system the following parameters are required.

1) Static height of highest component in system (metres)
2) System volume. If this is not known, a general rule of thumb of 10litres/kW of installed boiler power can be used.
3) Maximum flow temperature (°C)
4) Maximum system hot working pressure, generally given in bar gauge.

From the parameters given, Hamworthy Heating can size the pressurisation unit and also the expansion vessel required.

Care must be taken in sizing expansion vessels to ensure maximum acceptance factors are not exceeded. Normally manufacturers of vessels impose a limit of 0.5. This value must not be exceeded at any time during the operation of the boiler, this includes the over pressure condition should a safety valve lift.

Consideration should also be given to sizing of the safety valve(s) in the system. Refer to BS 6644: Part 1 for further information and to BS 6880: Part 1 for design considerations.

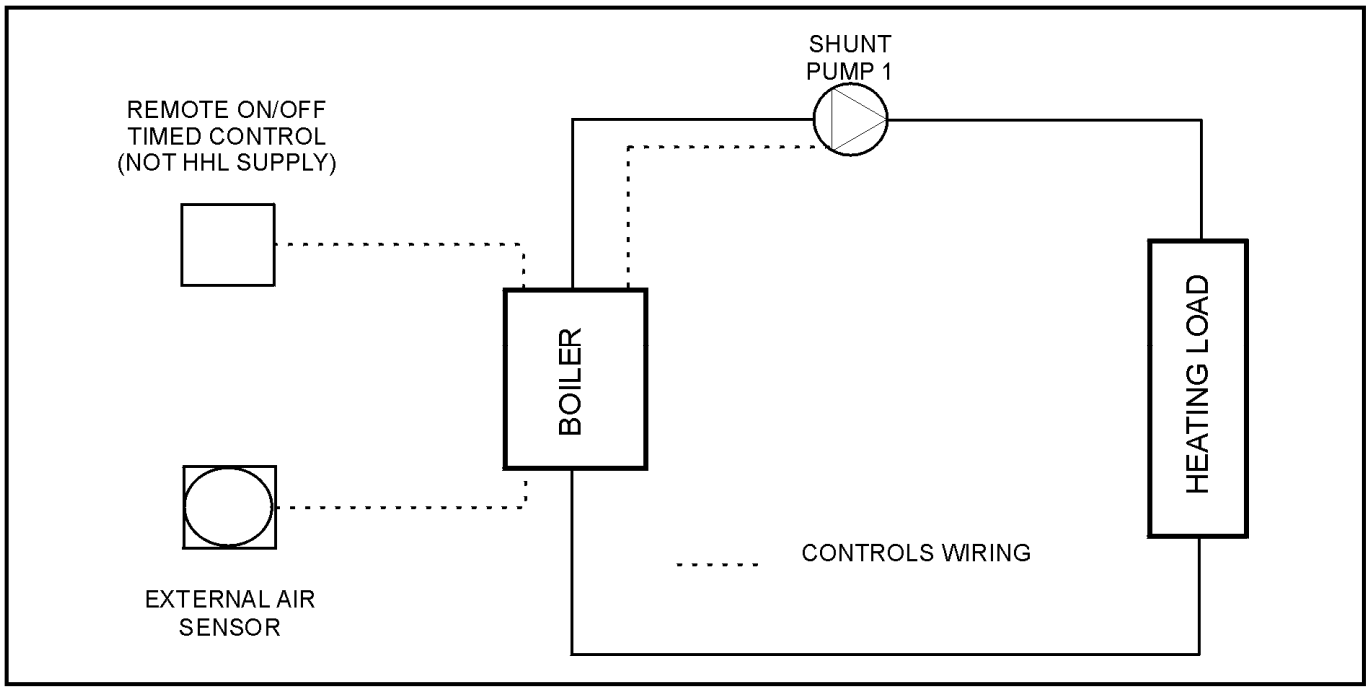


Figure E 1.3.1 - Schematic for Single Boiler System

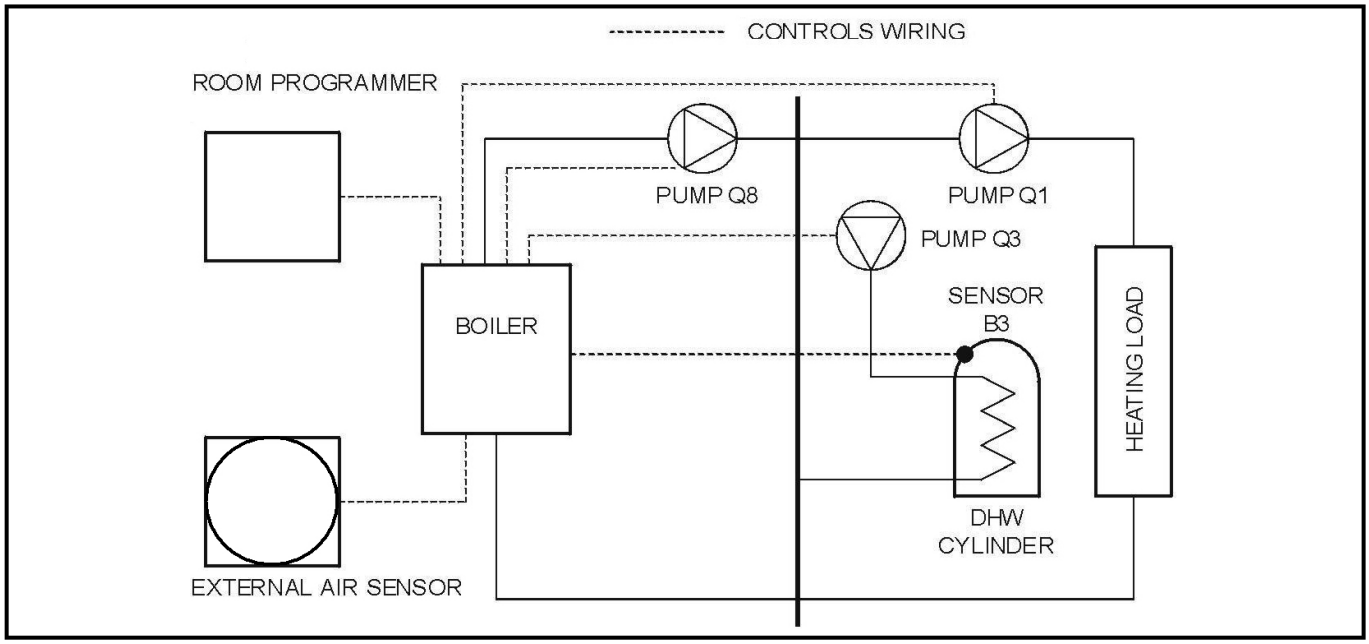


Figure E 1.3.2 - Schematic for Single Boiler, Primary Circuit System

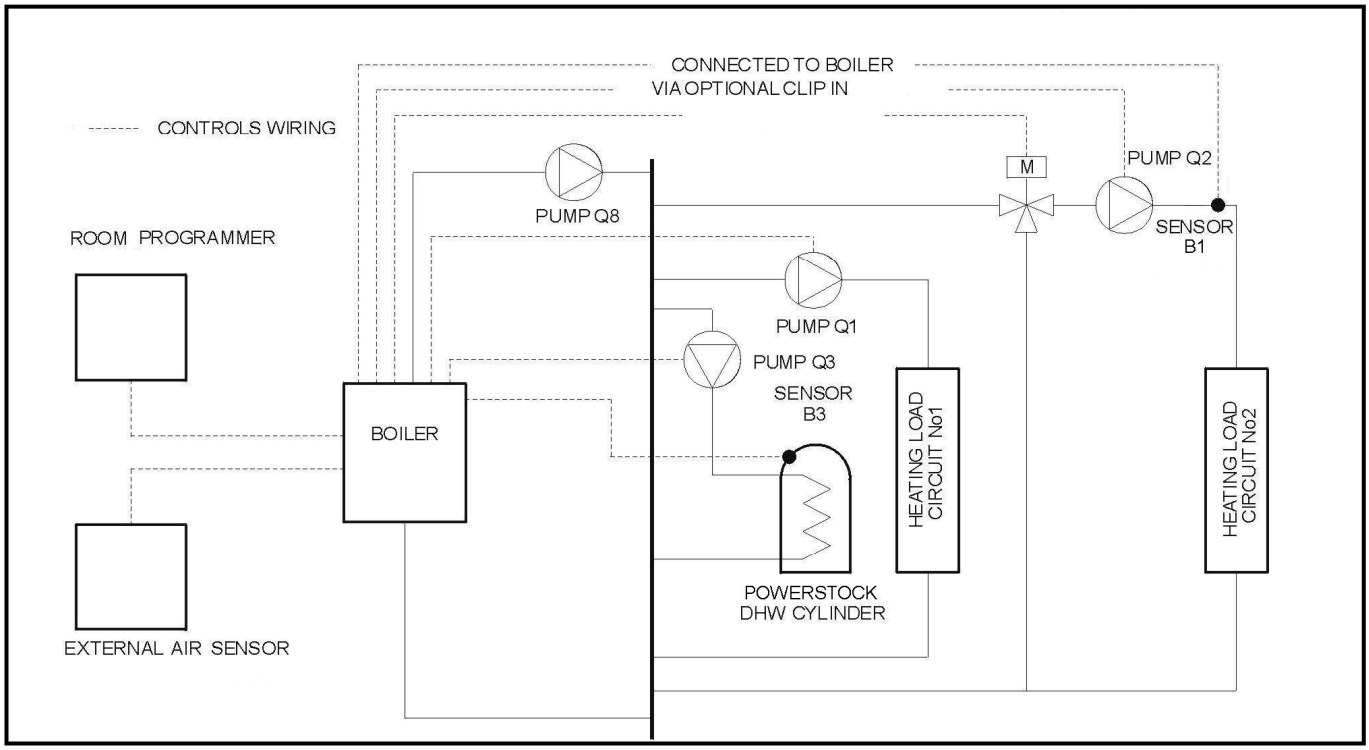


Figure E 1.3.3 - Schematic for Single Boiler (External 0~10V), Multi Circuit System

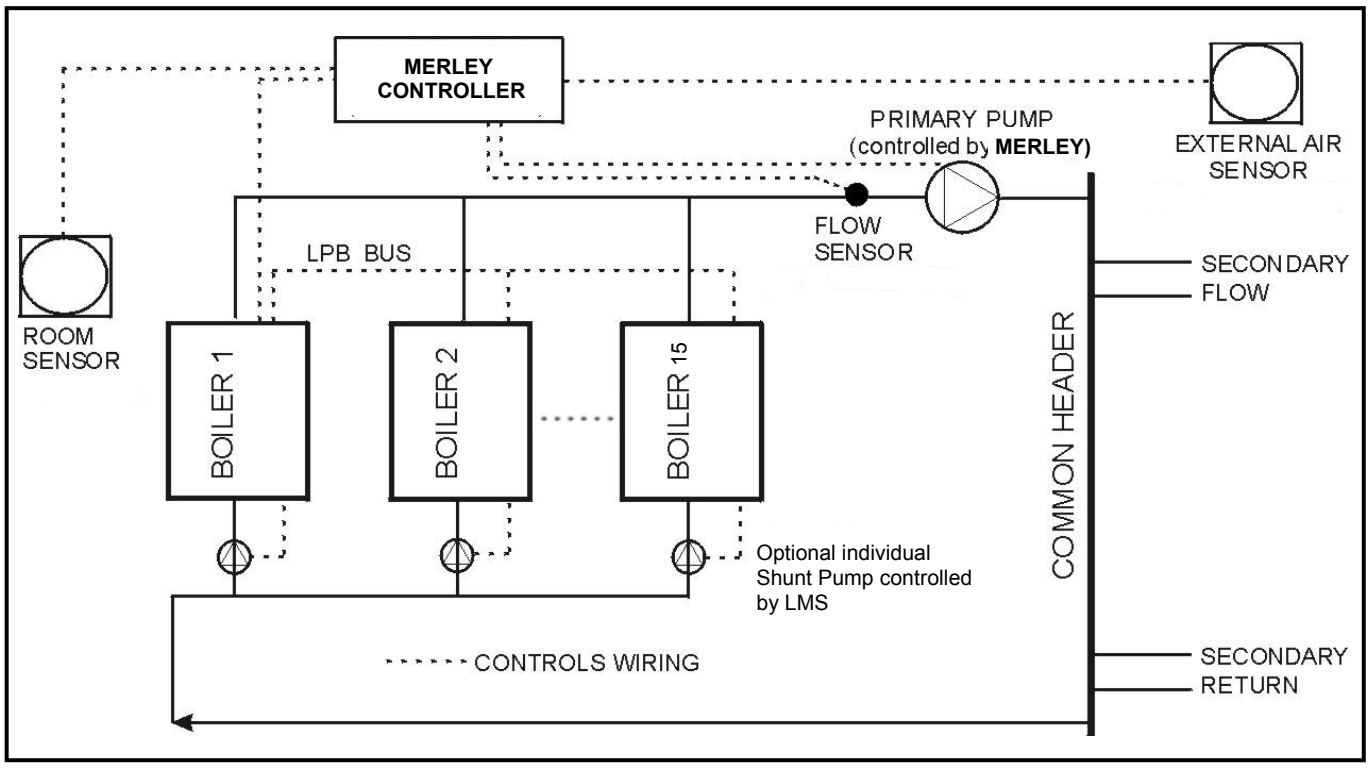


Figure E 1.3.4 - Schematic for Multiple Boiler (Cascade), Primary Circuit System

APPENDIX F - ADDITIONAL KITS

Additional kits available from Hamworthy Heating :

- Additional zone heating circuit kit AGU2.550A109 - 219357
- Additional 2 zone heating circuit kit AGU2.550A109 - 219358
- Outside air temperature sensor QAC34 - 533901457
- DHW Cylinder sensor kit QAZ36 - 563605674
- Heating circuit sensor kit QAZ36 - 563605673
- Strap On Water temperature sensor kit QAD36 - 533901594
- Offset Room sensor QAA55 - 563605696
- Programmable Room sensor - 563605695

Wireless:

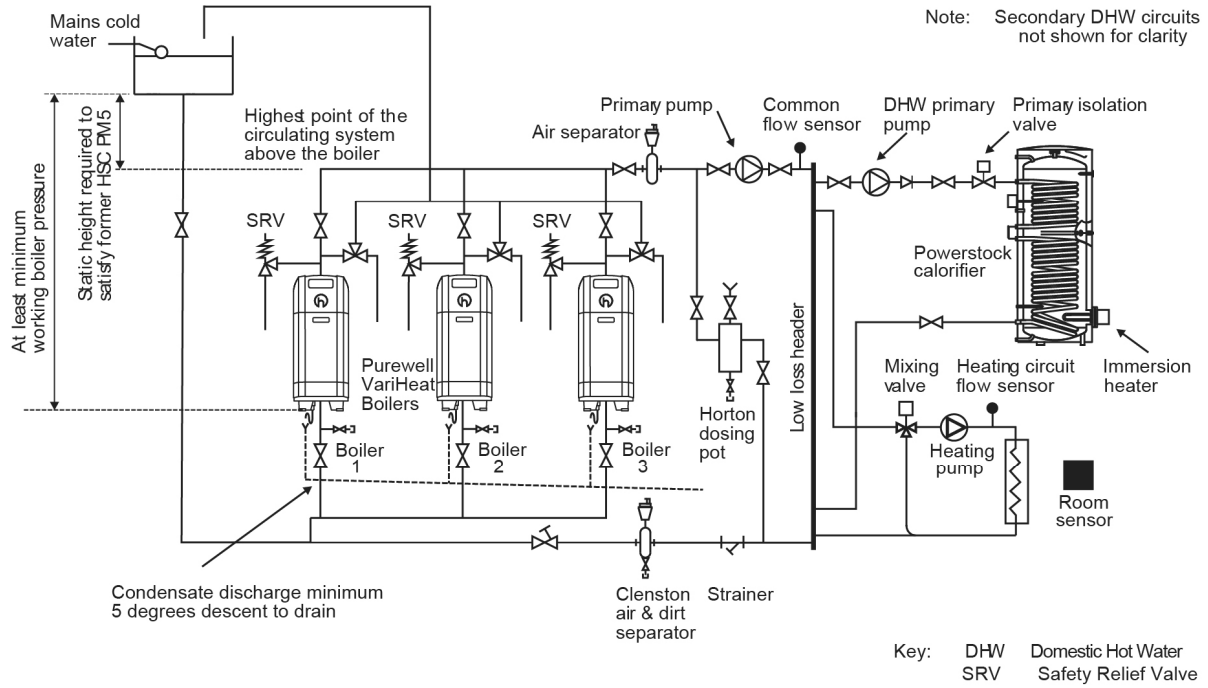
- Programmable Room sensor QAA78 - 533901588
- Outside air temperature sensor AVS13 - 533901592
- Radio module (required for all wireless sensors) AVS71 - 533901590

Merley sequence controller:

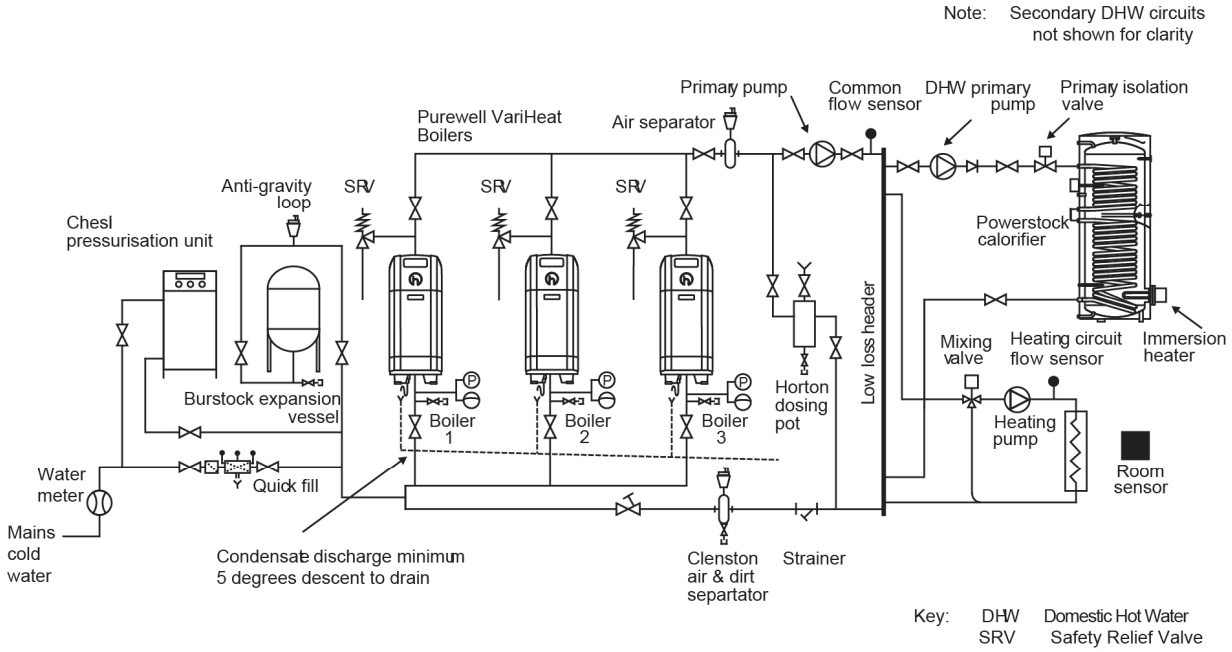
Loose kit 563605671 or fully assembled - 563605672 (allows cascade of up to 15 boilers and interface to a BMS system).

Hydraulic Schemes 1 & 2

Scheme 1: Open Vented System with Low Loss Header



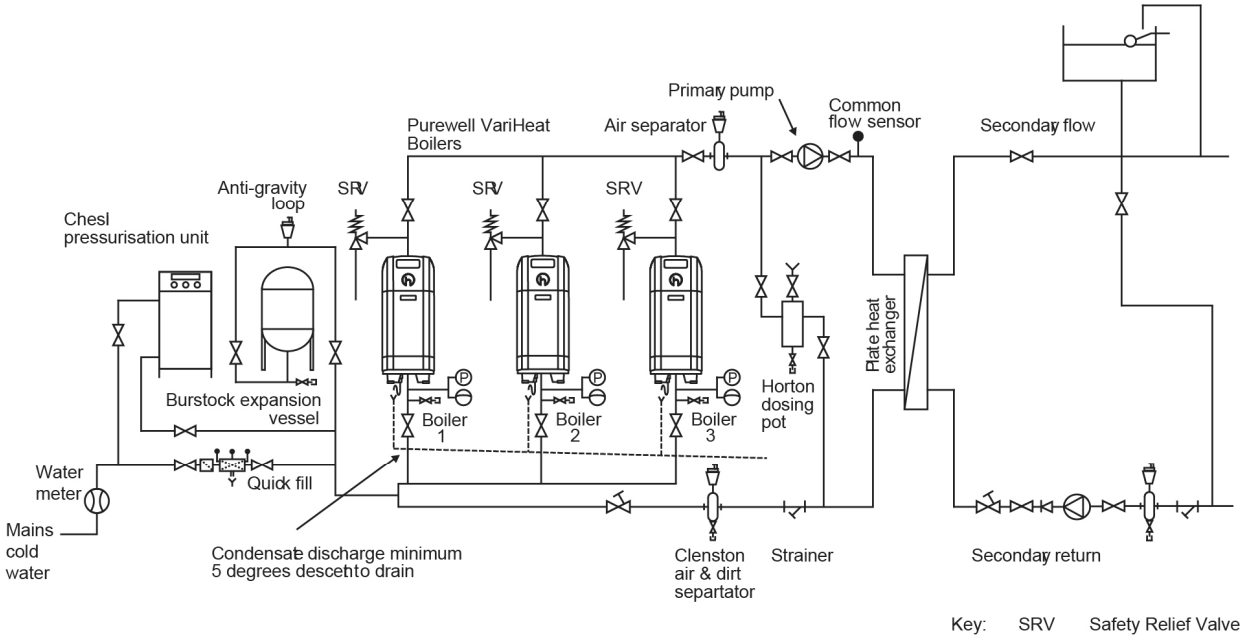
Scheme 2: Sealed System with System Pump and Low Loss Header



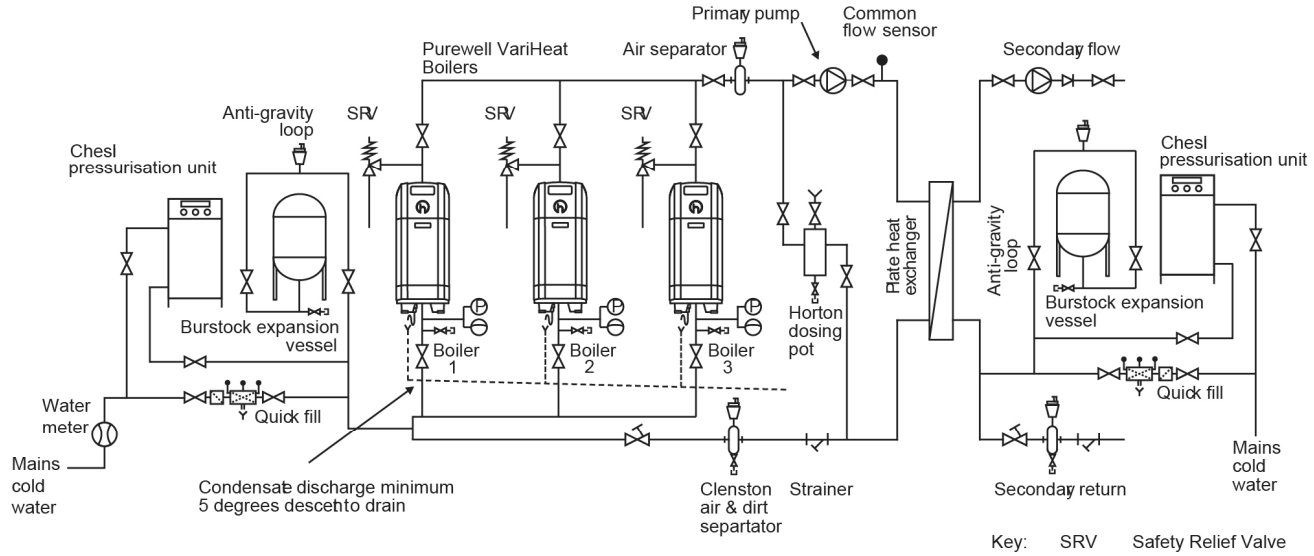
These schematics are available to download at **www.hamworthy-heating.com**

Hydraulic Schemes 3 & 4

Scheme 3: Sealed Primary and Open Vented Secondary System with Plate Heat Exchanger Separation



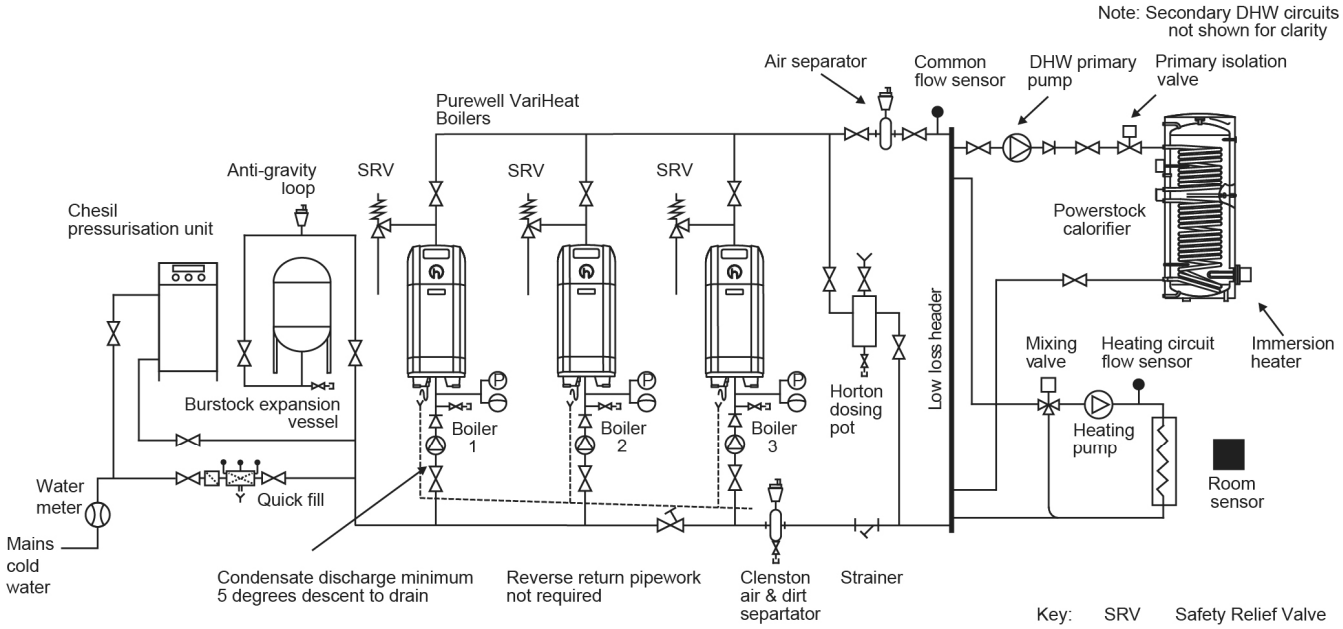
Scheme 4: Sealed System with Plate Heat Exchanger Separation



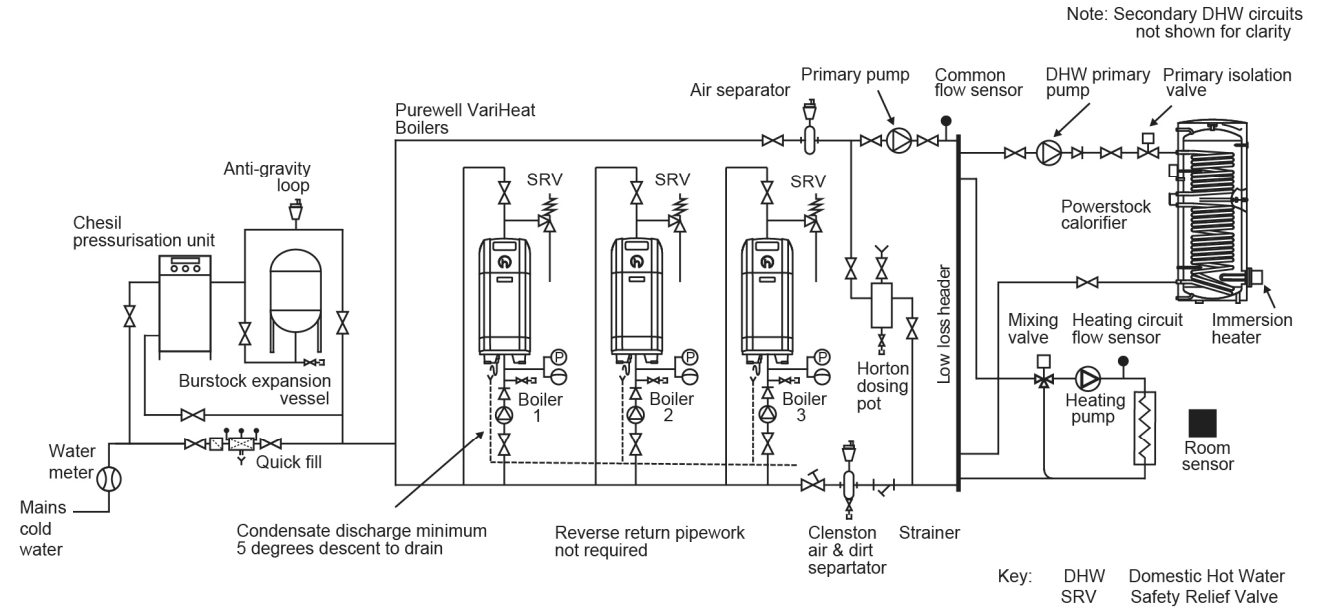
These schematics are available to download at **www.hamworthy-heating.com**

Hydraulic Schemes 5 & 6

Scheme 5: Sealed System with Pump per Boiler and Low Loss Header



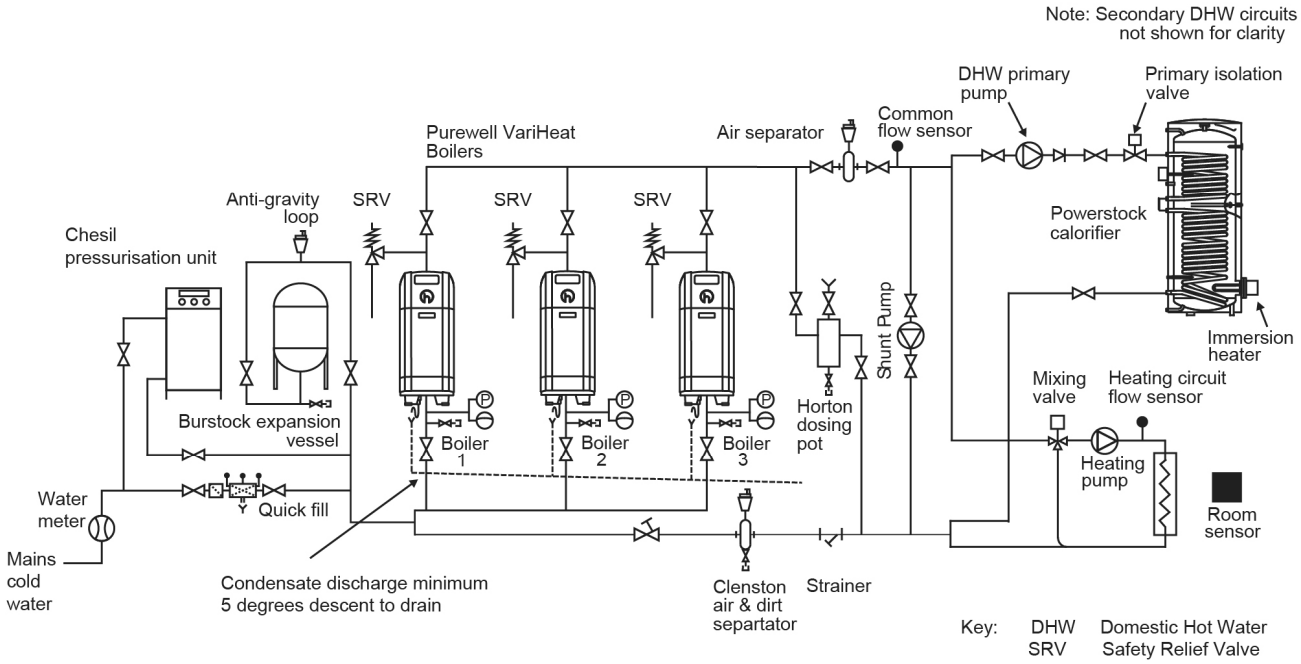
Scheme 6: Sealed System Single Pipe Header, Individual Boiler Pumps, System Pump and Low Loss Header



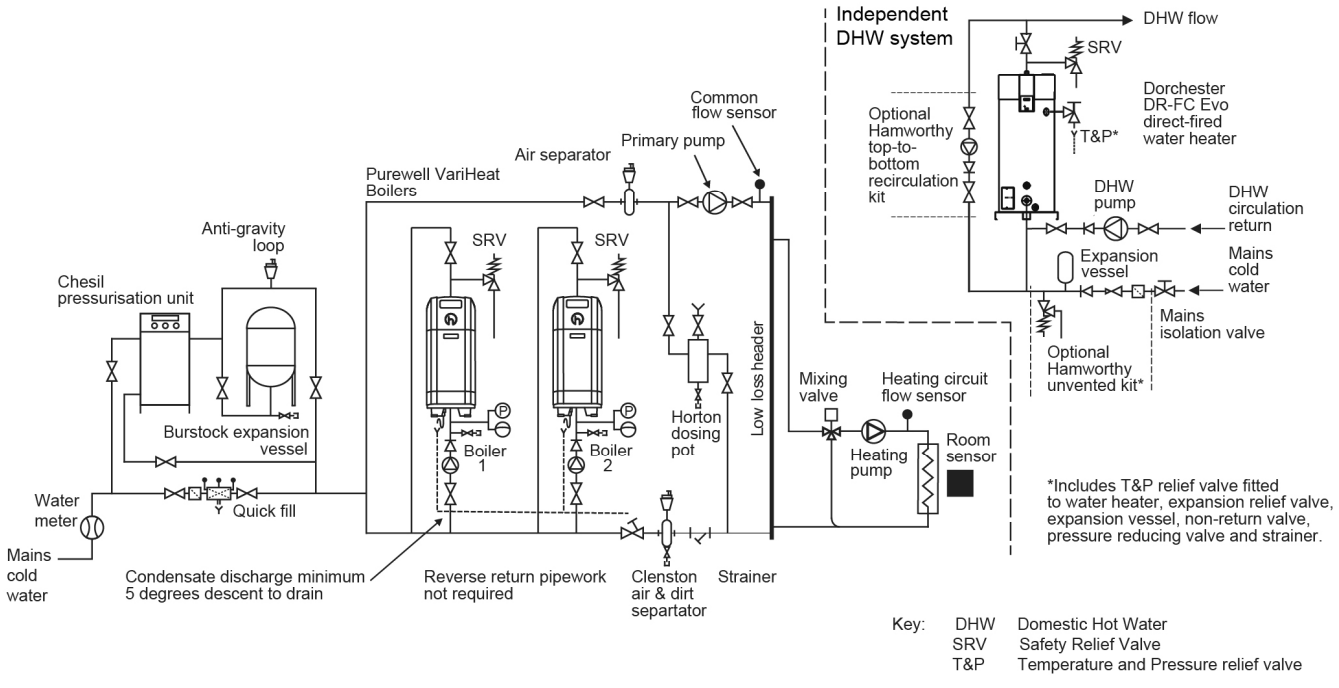
These schematics are available to download at **www.hamworthy-heating.com**

Hydraulic Schemes 7 & 8

Scheme 7: Sealed System without a Low Loss Header



Scheme 8: Sealed Single Pipe System with Independent Direct-Fired Dorchester DHW System



These schematics are available to download at **www.hamworthy-heating.com**

Boiler Parameter Settings: Single Boiler

Internal time clock with two heating circuits, DHW & boiler shunt pump

Legend E = End user I = Commissioning F = Heating engineer

Menu	Operating Line	User Level	Function	Setting
Configuration	5890	F	Relay output QX1	Boiler pump Q1
	5931	F	Sensor input BX2	Common flow Sensor B10
	5977	F	Function input H5	None
	5710	F	Heating Circuit 1	On
	5715	F	Heating Circuit 2	On
	6021	F	Function extension Module 2	Heating Circuit 1
	6022	F	Function extension Module 3	Heating Circuit 2
	6054	F	Function input H2 Module 2	Room Stat HC1
	6062	F	Function input H2 Module 3	Room Stat HC2
Domestic Hot Water	1610	F	Nominal Set Point	60°C

Domestic Hot Water - additional parameters may need to change

Extension module AGU 2.550A109 are require for each addition heating circuit to be controlled. Maximum of two additional extension modules can be accommodated per boiler.

Heating mode Auto symbol
Hot water mode On

Note:
For this application, the Function extension modules 2 & 3, with respect to their parameter setting as heating circuits 1 & 2, have pre-defined outputs for each extension module as shown in the table below.

	Wiring connections on heating circuit extension module AGU 2.550A109					
	QX21	**QX22**	**QX23**	**BX21**	**BX22**	**H2**
Multifunctional	*	*	*	*	*	*
Heating circuit 1	Y1	Y2	Q2	B1	*	*
Heating circuit 2	Y5	Y6	Q6	B12	*	*

Note:
To check operation of pumps, mixing valves & thermostats select: engineer – diagnostic consumers – parameters 8730 to 8779

Optional extras required for this configuration:

2x Heating circuit extension modules AGU2.550A109		Part number 563605669
Heating sensor kit	– QAZ36	Part number 563605673
2x Room sensor choice	– QAA55—Offset adjustable room sensor	Part number 533901589
	– QAA74—Programmable room sensor	Part number 533901587
DHW sensor kit	– QAZ36	Part number 563605674

Connections on heating circuit extension module AGU2.550A109:
QX21—Switched live—Mixing valve opening
QX22—Switched live—Mixing valve closing
QX23—Switched live—Heating circuit pump (Contactor required for pump)
BX21—Flow temperature sensor—Heating circuit
H2—Heating circuit room thermostat—Basic type no/nc switch vfc (Only use if optional room sensor QAA55 or QAA74 are not specified)

Boiler Parameter Settings: Single Boiler

Enable with external time clock for constant temperature

Legend E = End user I = Commissioning F = Heating engineer

Menu	Operating Line	User Level	Function	Setting
LPB System	6600	F	Device address	1
	6630	F	Cascade Master	Automatically
Configuration	5710	F	Heating circuit 1	Off
	5977	F	Function of input H5	Consumer circuit request VK1
Consumer Circuit 1	1859	F	Flow temperature setpoint	80°c or as required

Note:
Use H5 wiring connection to enable boiler requires volt free enable from time clock.

Optional extras required for this configuration:
None

External time clock with weather compensation

Legend E = End user I = Commissioning F = Heating engineer

Menu	Operating Line	User Level	Function	Setting
LPB System	6600	F	Device address	1
	6630	F	Cascade Master	Automatically
Heating Circuit 1	900	F	Operating mode Changeover	Automatic
Configuration	5710	F	Heating circuit 1	On
	5977	F	Function of input H5	HCS
	5978	F	Contact type H5	NC
Heating Circuit 1	740	F	Flow temp min set point	50
	741	F	Flow temp max set point	80
	720	F	Heating curve slope	3
	726	F	Heating curve slope adaption	On
Operation section	26	F	Operation lock	On
Hot water mode	No display			

Note:
Use H5 wiring connection to enable boiler requires volt free enable from time clock.

Optional extras required for this configuration:

External air sensor	– QAC34	Part number 533901457
Room sensor choice	– QAA55—Offset adjustable room sensor	Part number 533901589
	– QAA74—Programmable room sensor	Part number 533901587

Boiler Parameter Settings: Multiple Boilers

Sequence control using integral Master and Slave configuration

Single primary pump set for fixed flow rate operation (pump will have to be low energy type)

The table below shows all available settings up to the heating engineer level. However, certain operating lines may be hidden, for security purpose

Legend E = End user I = Commissioning F = Heating engineer

Menu	Operating Line	User Level	Function	Setting
LPB System	6600 F		Device address	Boiler 1 set to 1 (master) Boiler 2 set to 2 Additional boilers set to 3, 4 ect.
	6601 F		Segment address	Boilers all set to 0
	6640 F		Clock mode	Boilers 1 set to Master Boilers additional set to Slave with remote setting
	6630 F		Cascade	Boiler 1 set to always Boilers additional set to Autonomously
Configuration	5710 F		Heating Circuit 1	Boiler 1 set to on Boilers additional set to off
	5890 F		Relay output QX1	Boiler 1 set to Cascade pump Q25
	5931 F		Sensor input BX2	Boiler 1 Master Common flow sensor B10 Boilers additional set to none
	6117 F		Central compensation set up	Boilers all set to 5
	6200 F		Save sensors	Boilers all set to yes

Internal time clock settings
Settings must be programmed to master boiler

Menu	Operating Line	User Level	Function	Setting
Time program	500	E	Mon-sun: Mon-Fri:	As req
Heating	501	E	1st period on	
Circuit 1	502	E	1st period off	
	503	E	2nd period on	
	504	E	2nd period off	
	505	E	3rd period on	
	506	E	3rd period off	
Configuration	5710	F	Heating circuit 1	On

External enable—e.g. Remote time clock
Settings must be programmed to master boiler

Menu	Operating Line	User Level	Function	Setting
Configuration	5710	F	Heating circuit 1 1—on/off	On
	5950	F	Function of remote Input H1	Operating mode changeover HC1
	5951	F	Define time clock Switch—no/nc contacts	As required
Heating mode	Auto symbol			
Hot water mode	Off			

Optional extras required for this configuration:

Heating sensor kit – QAZ36	Part number 563605674
LPB bus communication module OCI345—one per boiler module	Part number 563605667

Boiler Parameter Settings: Multiple Boilers

Individual boilers enabled from B.M.S. using 0-10V analogue input

Legend E = End user I = Commissioning F = Heating engineer

Navistem settings

BMS 0-10v Power Control

Menu	Operating Line	User Level	Function	Setting
LPB System	6600	F	Device address	1
Configuration	5710	F	Heating circuit 1	Off
	5950	F	Function input H1	Output req VK1 10v
	5951	F	Contact type H1	NO
	5953	F	Voltage value H1	0.1v
	5954	F	Function value 1 H1	200 (200 = 20% modulation)
	5955	F	Voltage value 2 H1	10.0v
	5956	F	Function valve 2 H1	1000 (1000 = 100% modulation)
	5890	F	Relay output QX1	Boiler pump Q1

BMS 0-10v Temperature

Menu	Operating Line	User Level	Function	Setting
LPB System	6600	F	Device address	1
Configuration	5710	F	Heating circuit 1	Off
	5950	F	Function input H1	Consumer req VK1 10v
	5951	F	Contact type H1	NO
	5953	F	Voltage value H1	0.5v
	5954	F	Function value 1 H1	0 (0 = 0°C)
	5955	F	Voltage value 2 H1	10.0v
	5956	F	Function valve 2 H1	800 (800 = 80°C)
	5890	F	Relay output QX1	Boiler pump Q1

Note:
Use H1 wiring connection for 0-10V analog input from B.M.S.

Optional extras required for this configuration:
None

Boiler Parameter Settings: Individual Boiler Shunt Pumps

Legend E = End user I = Commissioning F = Heating engineer

Menu	Operating Line	User Level	Function	Setting
Configuration	5890	F	Relay output QX1	Boiler pump Q1

Optional extras required for this configuration:
None

Boiler Parameter Settings: Individual Boiler Flow Isolation Using Motorised Valve

Legend E = End user I = Commissioning F = Heating engineer

Menu	Operating Line	User Level	Function	Setting
Configuration	5892	F	Relay output QX3	Boiler pump Q1

Note:
The QX3 terminals have live outputs on NO & NC connection together with neutral & earth this will facilitate powering the valve open and closed.

Optional extras required for this configuration:
None

Boiler Parameter Settings: Multiple Boilers With External Merley Boiler Sequence Controller

The maximum number of boiler modules that can be controlled from Merley boiler sequence controller is 16.

The table below shows all available settings up to the heating engineer level. However, certain operating lines may be hidden, for security purposes

Legend E = End user I = Commissioning F = Heating engineer

Menu	Operating Line	User Level	Function	Setting
LPB System	6600	F	Device address	Boiler 1 set to 2 Boiler 2 set to 3 Additional boilers set to 4, 5 ect.
	6601	F	Segment address	Boilers all set to 0
	6640	F	Clock mode	Boilers all set to Slave with remote setting
Configuration	5710	F	Heating Circuit 1	Boilers all set to off
	6200	F	Save sensors	Boilers all yes
	6117	F	Central compensation set up	Boilers all set to 5

Note:
Merley to be set up independently using the Merley O&M (500001210)

Optional extras required for this configuration:

Merley wall mounted boiler sequence controller	Part number 563605672
Merley loose boiler sequence controller for panel mounting	Part number 563605671
LPB bus communication module OCI345—one per boiler module	Part number 563605667

Note:
2x LPB bus communications modules are supplied with each Merley boiler sequence controller, therefore additional modules are only required for boiler module 3 upwards.

USEFUL USER INFORMATION

INSTALLER	SITE ADDRESS

BOILER TYPE	BOILER SIZE(S)	UNIT NO(S).	SERIAL NO(S).	FLUE

NOTES

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NOTES:

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