

# Sherborne Series Boilers

**Room Sealed, Fully Modulating, Pre-Mix,  
Gas Fired Boilers for Heating & Domestic  
Hot Water Installations**

## **Installation, Commissioning and Servicing Instructions**

SE 71c - FULLY CONDENSING  
SE 64he - HIGH EFFICIENCY

*NATURAL GAS I<sub>2H</sub>*  
*LPG-PROPANE I<sub>3P</sub>*

### **IMPORTANT NOTE**

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



**Heating *at work.***

# Customer After Sales Services

Telephone: **0845 450 2866** E-mail: **aftersales@hamworthy-heating.com** Fax: **01202 662522**

## **Technical Enquiries**

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

## **Site Assembly**

Hamworthy offer a service of site assembly for many of our products in instances where plant room area is restricted. Using our trained staff we offer a higher 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.

## **Maintenance Agreements**

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. Maintenance agreements enable our customers 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**

A comprehensive spare parts service is operated from our factory in Poole, providing replacement parts for both current and discontinued products. Delivery of parts and components is normally from stock within seven days. However, a next day delivery service is available for breakdowns and emergencies.

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**NOTE: THESE INSTRUCTIONS MUST BE READ & UNDERSTOOD BEFORE INSTALLING, COMMISSIONING, OPERATING OR SERVICING EQUIPMENT.**

THE SHERBORNE BOILER IS INTENDED FOR USE AS A COMMERCIAL APPLIANCE & CAN BE OPERATED AS EITHER ROOM SEALED OR OPEN FLUE.

**THIS BOILER IS FOR USE ON GROUP H NATURAL GAS (2<sup>ND</sup> FAMILY) I<sub>2H</sub> OR LPG-PROPANE (3<sup>RD</sup> FAMILY) I<sub>3P</sub>. PLEASE ENSURE RELEVANT INFORMATION REQUIRED WITHIN DOCUMENT IS FOUND RELATING TO SPECIFIC GAS TO BE FIRED BEFORE FIRING BOILER.**

THIS BOILER COMPLIES WITH ALL RELEVANT EUROPEAN DIRECTIVES.  
EC TYPE CERTIFICATE Nos. (GAD) EC-87/01/20, (BED) BE-87/01/02.  
PRODUCT IDENTIFICATION No. 87BM20.

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## **1.0 INTRODUCTION**

The boiler must be installed by competent people holding 'GAS SAFE' registration or equivalent. All installations **MUST** conform to the relevant Gas Safety & 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.

Sherbornes are designed to use Group H Natural Gas (2nd Family) & LPG-Propane (3rd Family). Information on propane firing in in Appendix A. Boilers **MUST NOT** be used with other gases. The boiler **MUST** only be used on a governed supply.

The Sherborne range of boilers consists of two models:

A **high efficiency SE64he** with outputs of 13.6 - 64kW & a **Condensing SE71c** with outputs of 13.6 - 71.3kW

The boiler is fitted with a fan assisted pre-mix burner. Operation is initiated by a full sequence ignition control that incorporates a Hot Surface Ignition system & rectification supervision of the flame across the range of outputs.

The boiler is designed for direct connection to a room sealed or conventional flue system. Data for the various flue arrangements is given in Appendix C.

Sherborne boilers can be wall or frame mounted & are intended for the heating of Commercial/Industrial premises. They may also be used to supply hot water for premises via an indirect cylinder. The boilers are not suitable for direct connection to domestic hot water supplies or gravity systems.

Sherborne boilers have a low water content & water flow rates **MUST** be maintained at or above the recommended levels shown in Appendix E.

Sherbornes are suitable for connection to open vented fully pumped systems & un-vented (pressurised) heating systems. On un-vented systems have extra safety requirements which must be satisfied including interlocks which will shut the boiler(s) off should a high or low pressure fault occur.

Pressurisation units must also incorporate a low level water switch which protects the water pumps & will cause the boiler plant to shut down if a low water condition occur. HHL Department can provide assistance if in doubt.

In all heating installations should use some form of water treatment to reduce formation of lime scale & black iron oxide sludge. If a pressurisation unit is used, it is prudent to include an hours run meter to give an indication of pump running time & 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.

Sherborne boilers can be installed in banks of up-to three units with either reverse return water flow, (optional kits available) or with single pipe headers, (non HHL supply). See Appendix E for typical schematic layout.

HHL recommend a 'Primary Loop' circuit to prevent changes in system performance affecting flow through the boiler(s). For installations of more than three units in a single bank, consult HHL Technical Department for help or assistance.

Each Sherborne boiler is supplied with volt free contact outputs for Normal Run, & General Fault, & 0~10v analogue control input compatibility.

### **1.1 Options**

- Flue kits - (Appendix C)
- Mounting frames for single, double & triple bank configuration (Refer to kit instructions for details)
- Optional reverse return header kits for double & triple bank configuration (Refer to kit instructions for details)

### **1.2 Controls peripherals**

The controls system has the potential to accept the following control options:

- An external sensor which allows direct weather compensation on an individual boiler (Not for multiple systems)
- A clip-in module (LPB Bus) which allows communication with multiple boilers when used with a cascade control.
- The cascade control which allows management of up to 12 boilers, & interface with a BMS system.

## 2.0 SUPPLY & DELIVERY

Your boiler is despatched to site as a tested unit. The main boiler block is supplied in a crate, with the flue assembly & accessories in separate cartons. Each boiler is delivered by a tail lift vehicle & lowered to ground level. It is the installers responsibility to convey the boiler to the plantroom.



The boiler is supplied in three packages.

- boiler assembly
- accessory pack assembly
- flue assembly

The crate is designed to be transported on site by a standard pallet truck. The package dimensions are shown in the table below:

Model	Depth	Width	Height	Weight
Sherborne SE 64he	740mm	550mm	870mm	83kg
Sherborne SE 71c				87kg
Accessory pack	840mm	750mm	550mm	25kg
Standard Concentric Flue assy	1050mm	260mm	150mm	3kg

### Reverse Return Header Sets

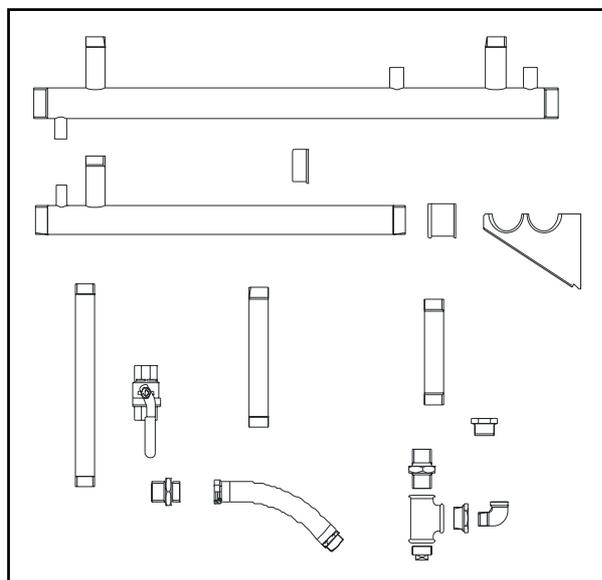
Where reverse return header sets are used these are packaged separately from the boilers. Ancillary items such as isolation valves & flexible boiler connectors are packaged in a cardboard box on the same pallet. The dimensions of these packages are shown below:

Model	Configuration	Length mm	Weight kg
SE 64he & 71c	2 boilers	1200	35
SE 64he & 71c	3 boilers	1200	50
SE 64he & 71c	Frame	1400	20

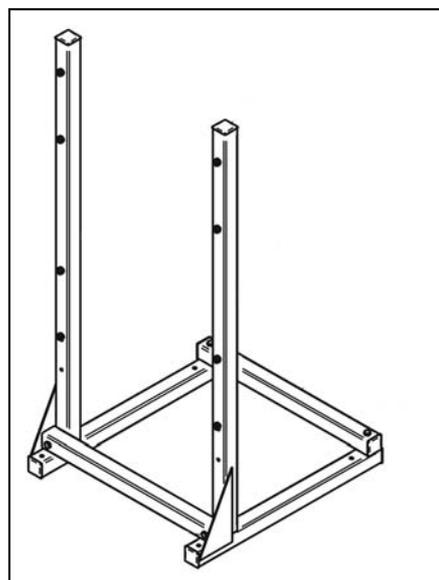
### Delivery Verification

When taking delivery please ensure that you have received the correct number of boilers & 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 & contract number as well as a detailed description of the missing item.

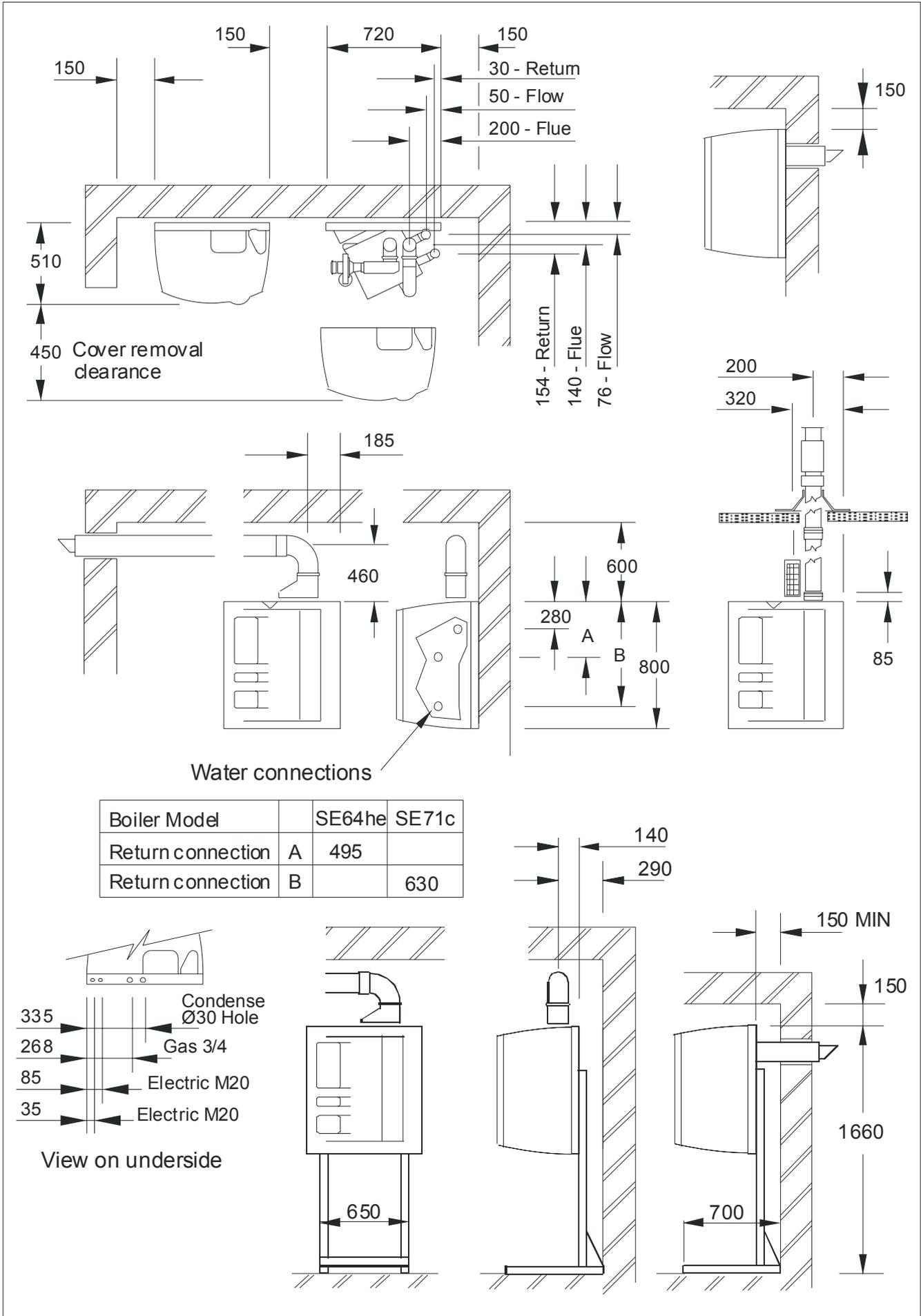
Header Kit



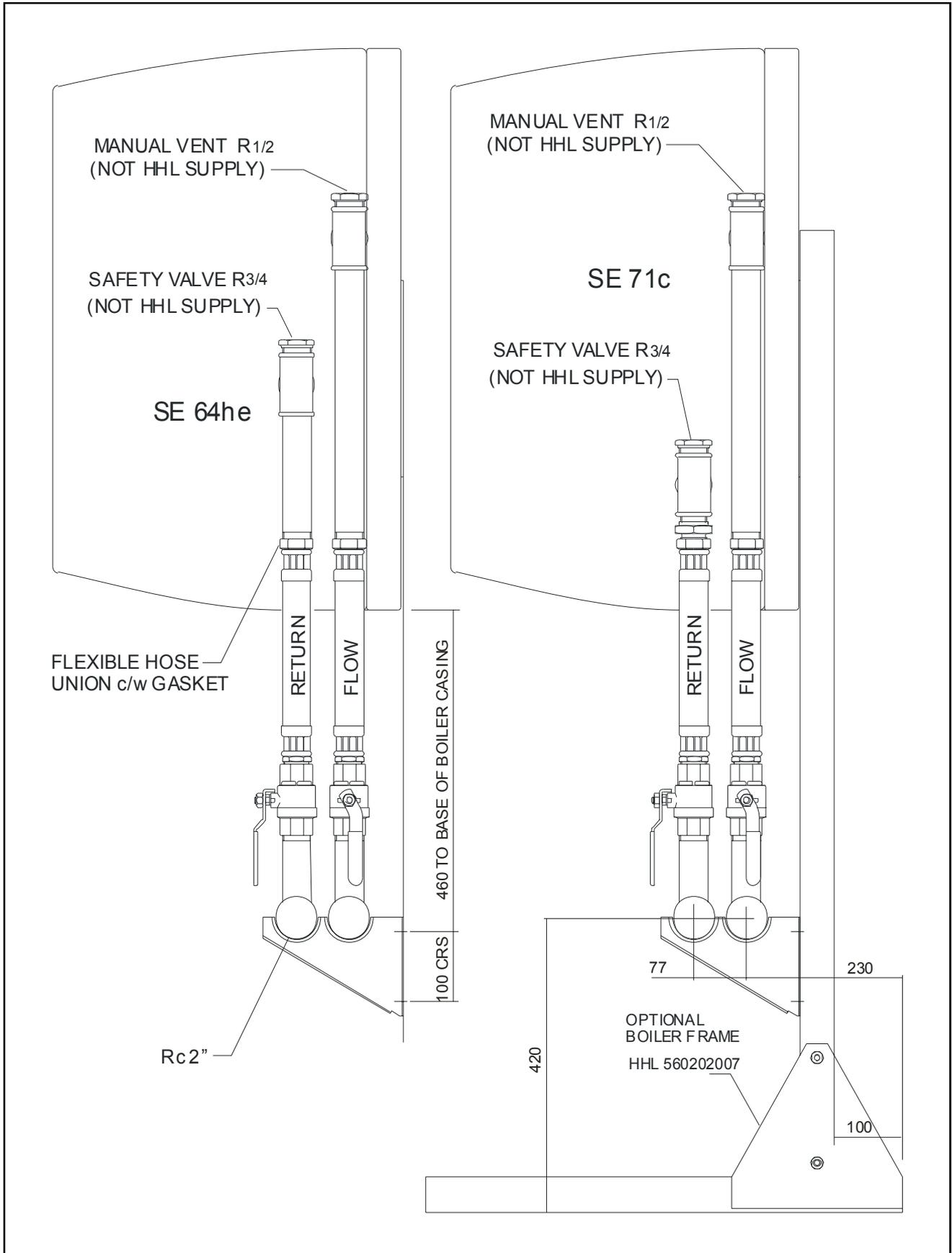
Frame Kit



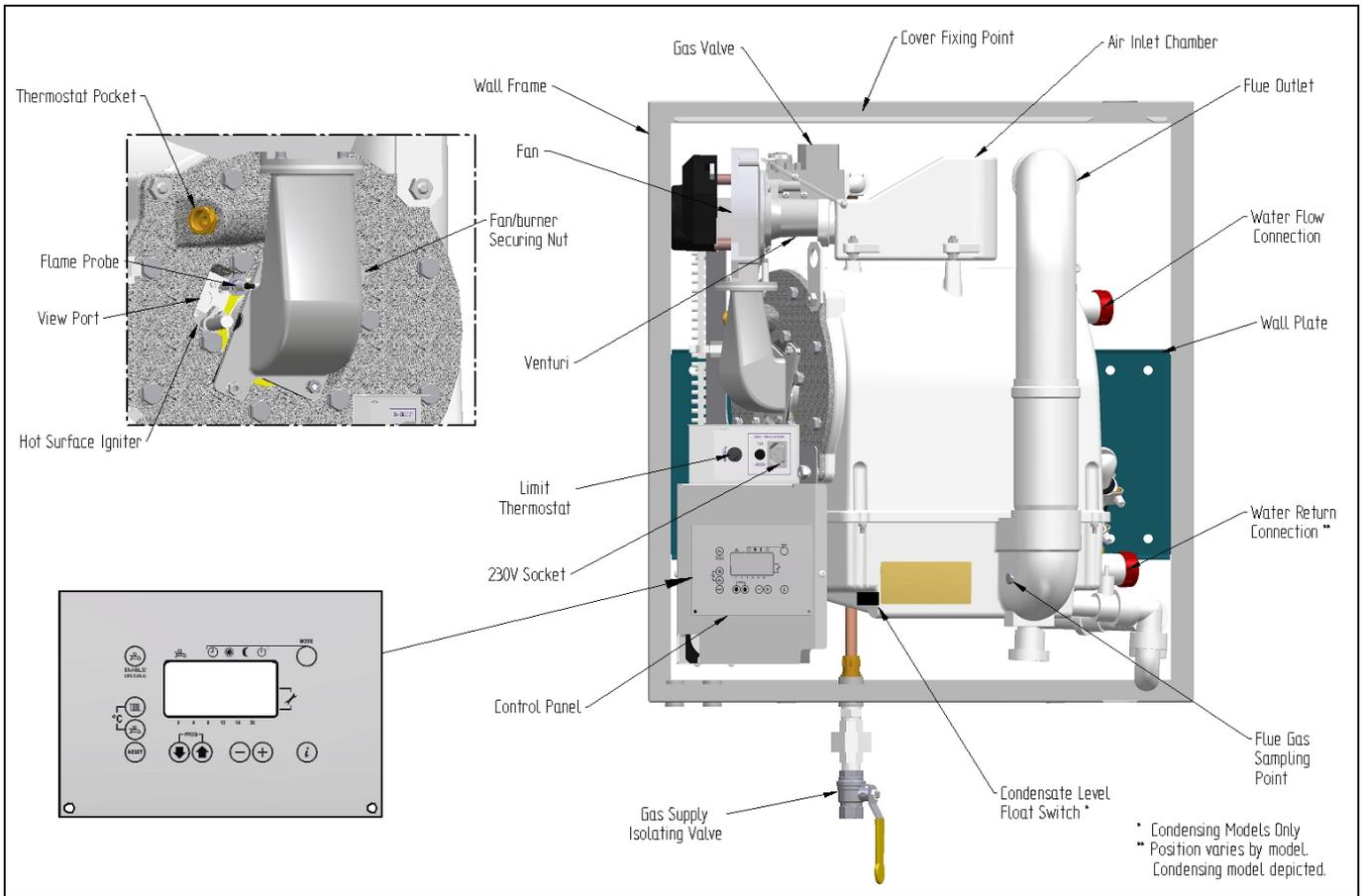
**3.0 SIZE & SPACE REQUIREMENTS**



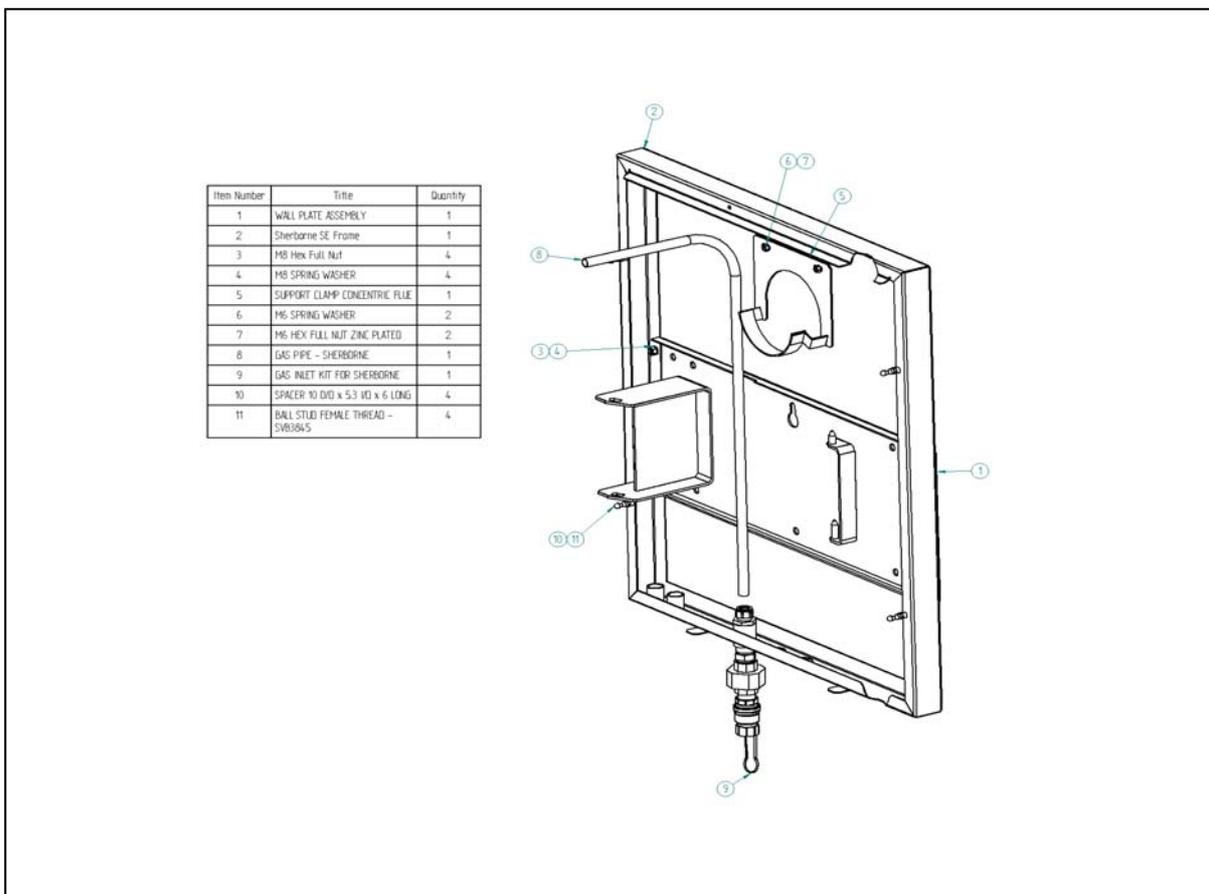
The Sherborne boiler range has been designed to utilise minimum wall space, therefore it is important the plantroom has sufficient ceiling height to allow for installation & connection to the flue system.  
 A minimum distance of 50mm around the flue pipe must be maintained from easily flammable materials  
 Also important is allowance for sufficient access at front, sides, top & bottom of boiler for flue & pipework connections.  
 A minimum space of 450mm in front of the boiler is required for removal of the cover.  
 Do not run cabling through the cover.



## 4. Boiler Layout & Description



### 4.1 Accessory Pack



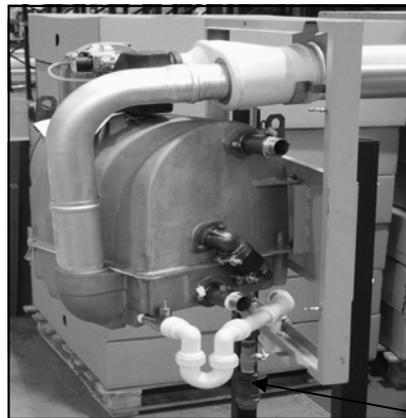
## **5.0 SITE LOCATION & PREPARATION**

### **5.1 Site Location.**

- The wall, floor or plinth for the boilers, frames & water manifold kit must be both flat & level to ensure correct alignment of fittings & connections.
- The wall or floor must be sufficiently strong to support the weight of both the boilers & manifold kit where used.
- The wall or floor 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 & servicing, & other items of plant.

### **5.2 Gas Supply.**

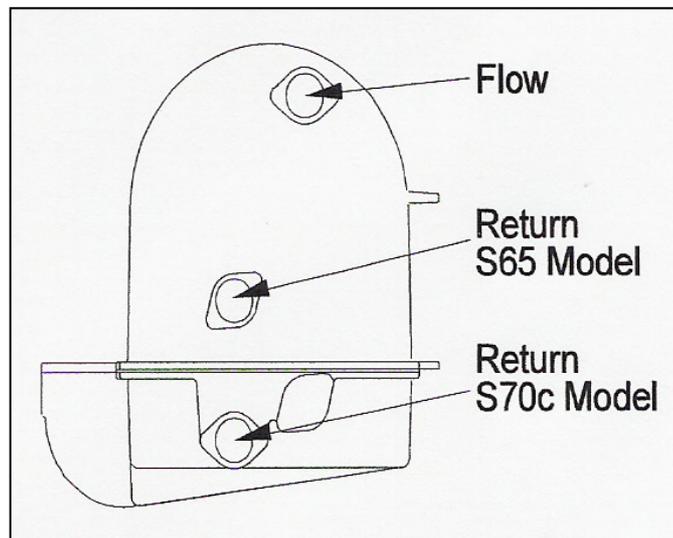
- Gas supply pipes must be in accordance with BS 6891 or IGE/UP/2
- Gas supply connection to the boiler must not be smaller than the connection on the boiler - Rp 3/4"
- Gas installation must be soundness tested to BS 6891 or IGE/UP/1 & IGE/UP/1A.
- Gas installation must be purged to BS 6891 or IGE/UP/1 & IGE/UP/1A.
- Inlet gas pressure to boiler for Natural Gas should be nominal 20mbar (minimum 17.5mbar) dynamic at the connection to the boiler. Refer to Appendix A for LPG.
- Boiler house gas isolation valve must be clearly identified & installed close to the entrance / exit.



Rp 3/4" Gas Connection

### **5.3 Water Supply & Return**

- Feed & Expansion tanks to comply with static height requirements of BS6880 & BS6644.
- Cold feed & 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<sub>3</sub>/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 pipework should be fixed to prevent dilution of water treatment.
- Maximum working water pressure is 7 bar.
- For minimum water pressure see Appendix E .



## 5.4 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, 60°C - 130°C, 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. The flue system MUST NOT drain through the boiler. See section 5.2.
- 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.
- Note: Due to high thermal efficiency of the Sherborne boiler & the resultant low flue gas temperatures there will be visible pluming of the flue gases at the flue termination. This is likely even when the boiler is not operating at condensing temperatures.

### 5.5 Condensate Connections

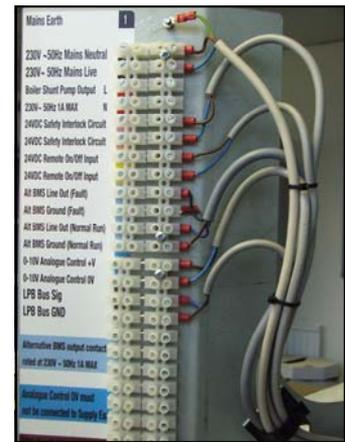
- Provision must be made for removal of condensate from the boiler & flue system.
- Condense is mildly acidic, typically pH3 - pH5.
- Pipework must be non-corrosive & not copper. Hamworthy recommend 32mm dia. Plastic waste pipe.
- Condense may be discharged to a standard drain subject to National or Local regulations.
- Location of condense pipework should prevent freezing within tundishes, traps & pipework.
- The connection to the boiler condense drain accepts a straight push-fit coupling for 32mm i.d. plastic waste pipe.



### 5.6 ELECTRICAL SUPPLY

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

- Electrical supplies must not be switched by time clocks
- Boilers are suitable for 230Volt, 50Hz supply.
- External fuses should be rated for 10 amps
- Wiring must be in heat resistant cable size 1.0mm<sup>2</sup> 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 (30V DC).



**Any circuit connected to the Remote On/Off MUST be volt free**

**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 LATER SECTIONS & APPENDIX B

### 5.7 Mounting the boiler to the wall

- Select a position on the wall or the position the free standing frame with the minimum clearances from section 4.
- Position the template on the wall in the selected location ensuring it is level both horizontally & vertically.
- Mark the position of 5 wall plate fixing holes, the centre (keyhole) must be used together with four others (2 on each side).
- Mark the position of the flue hole for rear exit if applicable.
- Drill the fixing holes & fit an M10 Rawlbolt (not included) to the centre fixing.
- Locate the wall plate on the centre fixing bolt & secure the wall plate using the remaining fixings, ensuring that it is level.

If the boiler is to be mounted onto a free standing frame, fasten the wall plate to the top 4 holes in the 2 frame uprights using 4 M10x65 bolts, nuts & washers supplied with the free standing frame kit.

If the rear flue exit is being used, core drill the hole for the flue pipe (150mm dia.). For all other flue installations refer to section 5.8

- Stand the boiler body assembly on the floor with the water connections to the right hand side.
- Disconnect the pressure feedback tube from the gas valve
- Remove the burner/fan assembly (is secured by 2xM6 nuts to the heat exchanger) & store it in a safe location.
- Fit the wall frame to the wall plate using the four M6 nuts provided.
- Screw the compression/BSP adapter for the gas inlet pipe into the socket of the wall frame using suitable sealant.
- Loosely fit the long vertical leg of the gas pipe to the wall frame connection.
- Hang the boiler on the wallplate using the lugs on the right hand side & the pins on the right hand side of the wallplate.

**Caution the assembly weighs approx. 60kg & should be lifted by two people. Alternatively, two lifting eyes are provided for use with suitable lifting equipment.**

- Fit the burner assembly back into the heat exchanger using its existing fastenings & reconnect the pressure feedback tube
- Swing the boiler back to wall engaging the horizontal leg of the gas pipe with the fitting on the inlet to the gas valve.
- Secure the boiler to the wallplate at the left bracket using the M10 nuts & bolts supplied.
- Tighten the compression fittings to provide a gas tight seal. A soundness check on these joints must be carried out.

### 5.8 Connection of Boiler(s) to the Flue System

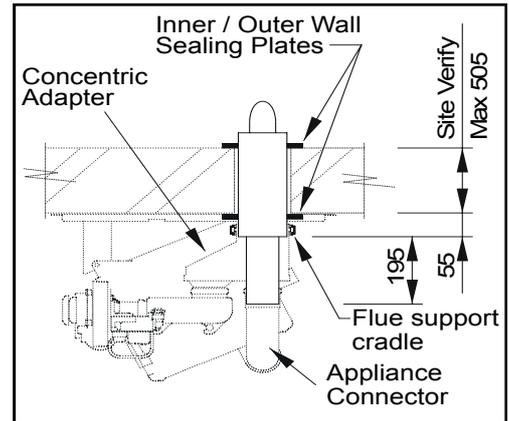
Dependent on installation a number of flue options are available (refer to Appendix C). In all instances, the flue must be obtained from HHL or in the case of connection to an open flue system, the ducts up to the chimney must be obtained from HHL.

The maximum allowable flue length must be determined in accordance with Appendix C It is also important, for service requirements, that the flue system is fully self-supporting & that prior to commissioning a check has been made to ensure that the pipe is clear & free from obstruction.

#### 5.8.1 Connection of Through Wall Horizontal Balanced Flue Terminal – 80/125mm.

The flue terminal should be cut to length. **Note:** Deburr both tube ends & ensure that the cuts are square to avoid damage to the flue seals when assembling the flue system.

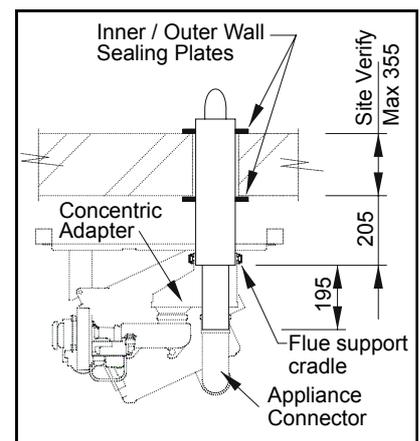
- From the outside of the building position the outer wall sealing plate over the cut hole so that there is a 2° slope from the terminal to the boiler connection to allow any condensate to run back to the boiler.
- Mark the four securing holes, drill & plug the holes & secure the wall plate.
- From the inside of the building place the inner wall sealing plate over the cut hole so that there is a 2° slope from the terminal to the boiler connection to allow any condensate to run back to the boiler.
- Check the position of the wall plate using the flue support cradle located on the 2 M6 studs on the wall frame.
- Mark the four securing holes, drill & plug the holes.
- Fit the flue terminal from the inside of the building ensuring the correct position of the terminal discharge
- Fit the inner wall sealing plate over the flue, securing it to the wall.
- Fit the flue support cradle over the end of the flue pipe.
- Fit the flue concentric adaptor to the rear of the flue protruding into the boiler.
- Ensure orientation of the terminal is correct at the terminal outlet & the concentric adaptor is fully engaged onto the flue.
- Secure flue support cradle to the wall frame with 2xM6 nuts ensuring the concentric adaptor is located in the cradle.
- Engage the air inlet box onto the left hand connection of the concentric adaptor
- Fit the appliance connector duct between the flue outlet in the aluminium boiler casing & the flue duct.



#### 5.8.2 Connection of Extended Lengths of Horizontal/Vertical Balanced Flue – 100/150mm.

**Note:** the flue support cradle is not required for this installation & should be discarded.

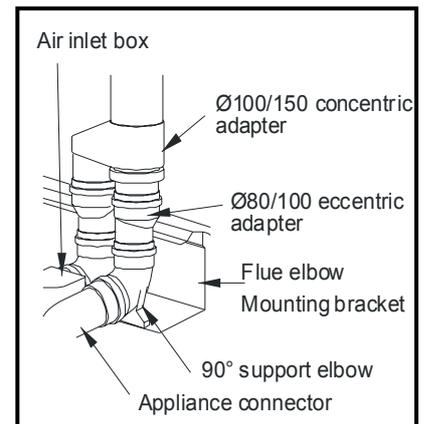
- Make a hole Ø170-180mm through the wall or roof for the flue termination point (refer to appendix C).
- Secure the elbow mounting bracket to the wall frame using 3xM6 nuts & washers.
- Locate the elbows in the mounting bracket lugs & fit appliance connector duct between flue outlet on the boiler & the discharge support elbow.
- Insert the inlet support elbow into the air inlet box.
- Insert the 80-100mm adaptors into the elbow outlets & engage twin pipe concentric adaptor into the left hand (air) 100mm tube orientating so the discharge socket is coaxial with flue discharge adaptor.
- Fit the flue make up piece through the socket into the discharge adaptor so either a concentric elbow or straight vertical section can be fitted.
- Fit remaining flue components on route to terminal discharge ensuring a minimum 2° slope & the flue system is self-supporting using wall brackets where necessary.
- When terminating the flue ensure the joint through the wall/roof is made good & weatherproofed. Whilst carrying out the above procedure ensure that all seals are correctly located & provide gas tight joints.
- The top of the plastic boiler cover has a D shaped recess for the vertical flue exit point. Using a suitable fine toothed hacksaw or jigsaw, cut around the inside of the recess to provide the flue outlet.



### 5.8.3 Connection of Twin Pipe Horizontal/Vertical Room Sealed –100mm

**Note:** the flue support cradle is not required for this installation & should be discarded.

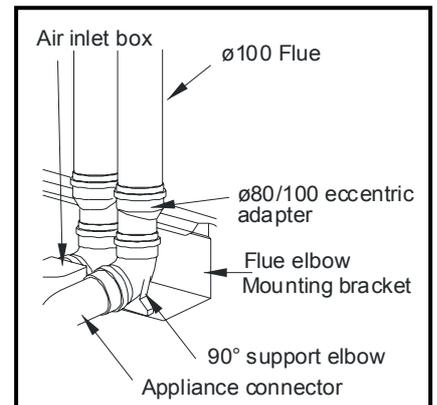
- Secure the flue elbow mounting bracket to the wall frame using 3xM6 nuts & washers.
- Locate the two elbows in the mounting bracket lugs & fit appliance connector duct between flue outlet on the boiler discharge support elbow.
- Insert the inlet support elbow into the air inlet box.
- Insert the 80-100mm adaptors into the elbow outlets.
- Fit remaining flue components on route to terminal discharge ensuring a minimum 2° slope & the flue system is self supporting using wall brackets where necessary.
- When terminating the system, ensure the joint through the wall / roof is made good & weatherproofed. Whilst carrying out the above procedure ensure that all seals are correctly located & provide gas tight joints.
- The top of the plastic boiler cover has a D shaped recess for the vertical flue exit point. Using a suitable fine toothed hacksaw or jigsaw, cut around the inside of the recess to provide the flue outlet.



### 5.8.4 Connection of Twin Pipe Horizontal/Vertical Room Sealed –100mm

**Note:** the flue support cradle is not required for this installation & should be discarded.

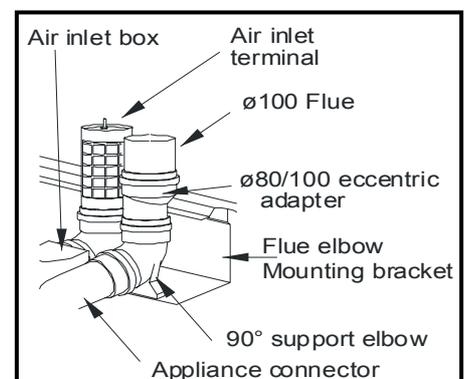
- Secure the flue elbow mounting bracket to the wall frame using 3xM6 nuts & washers.
- Locate the two elbows in the mounting bracket lugs & fit appliance connector duct between flue outlet on the boiler discharge support elbow.
- Insert the inlet support elbow into the air inlet box.
- Insert the 80-100mm adaptors into the outlets of the elbows.
- Fit the remaining components on route to the terminal discharge ensuring a minimum 2° slope & the flue system is self supporting using wall brackets where necessary.
- In terminating the flue ensure that the joint through the wall/roof is made good & weatherproofed. Whilst carrying out the above procedure ensure that all seals are correctly located & provide gas tight joints.
- The top of the plastic boiler cover has a D shaped recess for the vertical flue exit point. Using a suitable fine toothed hacksaw or jigsaw, cut around the inside of the recess to provide the flue outlet.



### 5.8.5 Connection of Single Pipe Horizontal/Vertical Room Sealed –100mm

**Note:** the flue support cradle is not required for this installation & should be discarded.

- Secure the flue elbow mounting bracket to the wall frame using 3xM6 nuts & washers.
- Locate the two elbows in the mounting bracket lugs & fit appliance connector duct between flue outlet on the boiler discharge support elbow.
- Insert the inlet support elbow into the air inlet box.
- Insert the 80-100mm adaptors into the outlets of the elbows.
- Fit the remaining components on route to the terminal discharge ensuring a minimum 2° slope & the flue system is self supporting using wall brackets where necessary.
- In terminating the flue ensure that the joint through the wall/roof is made good & weatherproofed. Whilst carrying out the above procedure ensure that all seals are correctly located & provide gas tight joints.
- The top of the plastic boiler cover has a D shaped recess for the vertical flue exit point. Using a suitable fine toothed hacksaw or jigsaw, cut around the inside of the recess to provide the flue outlet.



### 5.8.6 Open Vented Systems

Boilers must not be capable of isolation from the vent pipe. Valves between boiler & vent pipe must be three way type such that when boiler is isolated from vent pipe it is open to atmosphere. Safety valves should be mounted on the boiler as detailed in Figure 3.2.

### 5.8.7 Sealed Systems

Boilers must not be capable of isolation from the safety valve. Valves between boiler & safety valve to be three way type such that when boiler is isolated from safety valve it is open to atmosphere. Hamworthy Heating Ltd recommend the use of the connection for the safety valve as detailed in Figure 3.2.

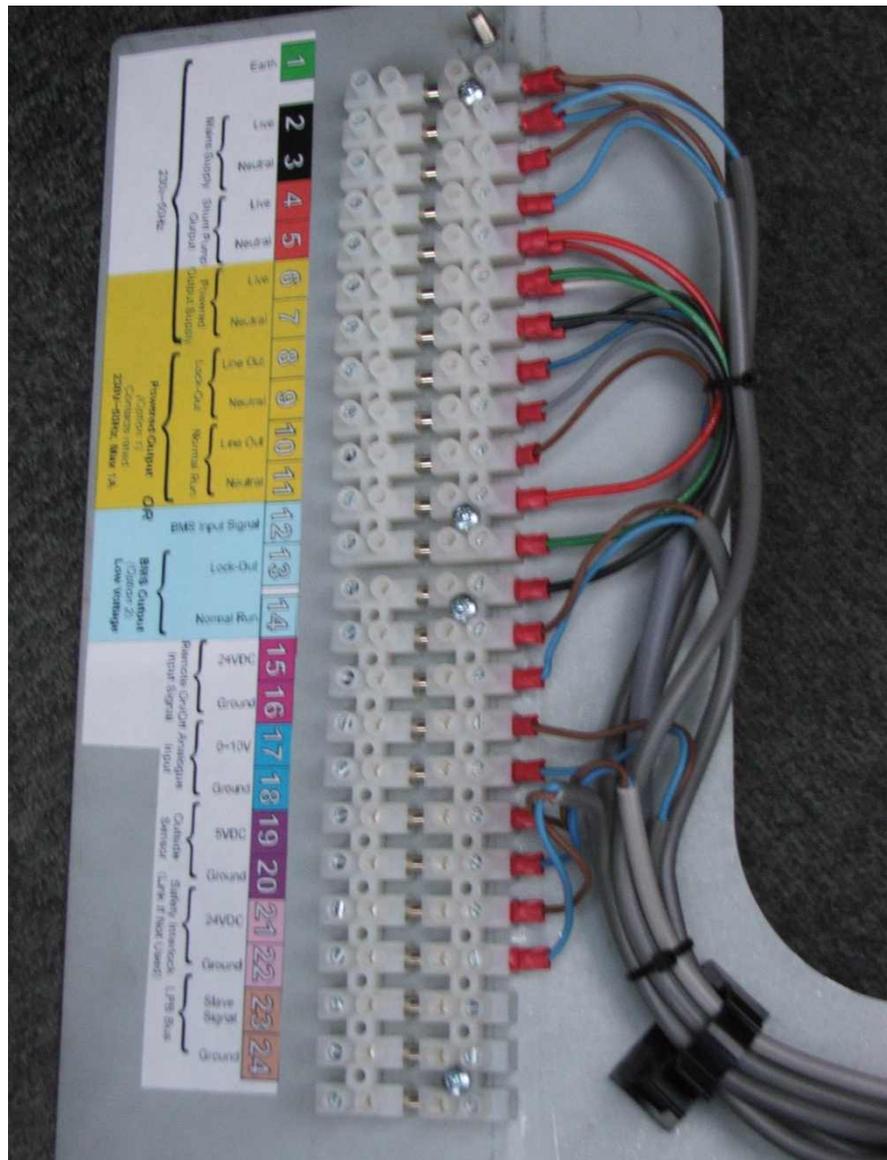
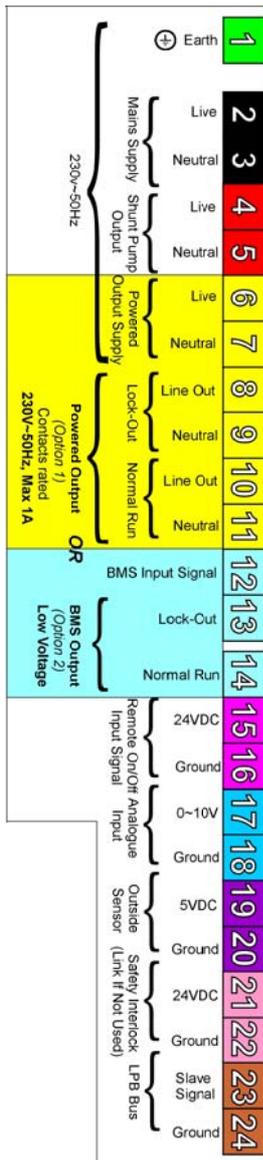
Where HHL pipework kits are used their assembly instruction manual is supplied with the kit.

### 5.9 Electrical Connections

The following electrical connections are provided on each module on a rail on the side of the boiler frame..

- Supply: Live, Neutral & Earth. See Section 5.6 for details.
- Supply Input for Boiler Fault & Normal Run Signals
- Boiler General Fault Alarm Signal Output
- Boiler Normal Run Signal Output
- 0-10v Analogue Control Signal Input
- Remote on/off Control Input
- Boiler Shunt Pump Output
- Safety Interlock Circuit Input
- Optional LPB Bus for use with cascade control

The remote on/off terminals 15 & 16 and the safety interlock terminals 21 & 22 must be linked (15to16 & 21to22) if these features are not used.



## **6.0 PRE-COMMISSIONING**

The following pre-commissioning check must be carried out before the boiler is commissioned.

### **6.1 Gas Supply.**

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

### **6.2 Ventilation**

Ensure that ventilation & air supply to plantroom is correct. Air supply slots in the boiler cover are clear & open.

### **6.3 Pipework, Valves & Pump**

Ensure that;

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

### **6.4 Flue**

Ensure that;

- Flue system is correctly designed & installed to suit boilers.
- Flue passages to chimney are clear.

### **6.5 Electrical**

Ensure that;

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

**WARNING: WHEN THE BOILER IS OPERATIONAL WITH THE FRONT COVER REMOVED, CARE MUST BE TAKEN WITH ELECTRICAL COMPONENTS & ACCESS TO PRIMARY INSULATION.**

## 7.0 BOILER CHECKS

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

### 7.1 Boiler Gas System Leak Check (Transport & installation may cause leaks)

Switch the appliance manual gas service valve to the OFF position & follow the procedure below. Care must be taken not to allow leak detection fluid on or near any electrical parts or connections.

#### To Check Appliance Isolating Valve (B)

- Turn off the electrical power & gas to the appliance.
- Connect the manometer to gas valve test point.
- With A, B closed open C & monitor manometer over a 2 minute period, a rise indicates a leak on valve B.

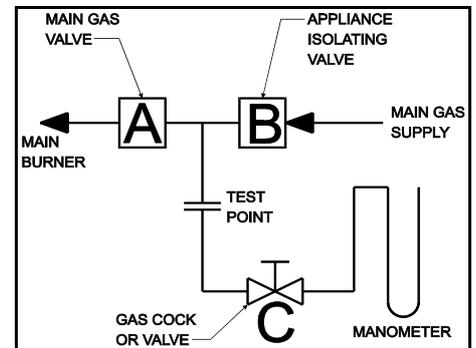
#### To Check Main Gas Valve (A)

- Open C.
- Open B to produce the main gas supply pressure between A & B.
- Close B
- System may be considered sound if over a period of 2 minutes any drop in pressure is less than 0.5 mbar.

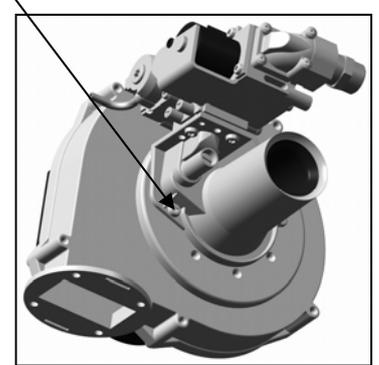
**Note:** - Main gas supply pressure - G20 - 20mbar  
- LPG - 37mbar

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

**Gas System Leak Check Diagram**



**Test Point Location On Gas Valve Test Point**



### 7.2 Checks Prior to lighting the boiler

**NOTE!** Refer to Appendix A for Natural Gas / LPG maximum gas inlet pressures for normal operation.

**The following checks must be made prior to lighting the boiler.**

- Check gas supply is connected but turned to "off" position.
- Check unions/fittings are correctly tightened & test points closed.
- Check the ignition & probe leads are connected correctly.
- Check flow & return sensors are correctly fitted (in the flow & return pipes)
- Ensure the electrical mains supply is correctly connected but the boiler module isolator(s) are switched off.
- Check all wiring loom connections such as fan or gas valve, are correct or secure.
- Test safety thermostat by removing clip & bulb from the pocket in the front of the heat exchanger & carefully applying heat source to the bulb. The thermostat reset button should operate. To reset, remove the black screw cover & depress the button, once the sensing bulb has cooled down. If satisfactory, refit the cover & the bulb in the pocket & secure with the clip.
- Check setting of temperature limit thermostat (Factory set at 95°C & must not be set above 100°C)
- Check setting of control thermostat (factory set to a flow temperature of 80°C & must be re-set to suit the application— see section 8 for controls operation)
- Check the resistance of the hot surface igniter. This should be checked cold, using a suitable ohmmeter, by disconnecting the igniter from the control panel cable & measuring the resistance across the pins of the 2 way connector. The reading should be between 70 & 110 ohms.

### 7.3 INITIAL LIGHTING

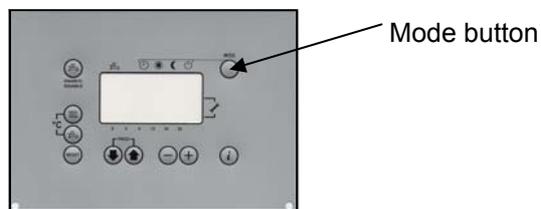
Only competent people registered for working on non-domestic gas appliances should attempt the following operations. Before commissioning a boiler ensure that all involved are aware of what action is about to be taken.

- 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.
- 

NOTE! Flue components can be hot enough to cause injury if touched when boiler is firing

#### 7.3.1 Lighting the boiler

1. Ensure the boiler gas isolating valve is closed.
2. Switch on the electrical supply
3. Press the mode button to continuous operation (see section 8)
4. The boiler will start-up & go through the ignition sequence. As the gas is isolated, the control will go to lockout as displayed on the display screen. Refer to section 8 of Controls Operation.
5. If the above procedure occurs correctly, open the gas isolating valve. Reset the lockout & the fault indication will extinguish.
6. The boiler will commence its ignition sequence as previously described. This time, when the gas valve is energised the burner will ignite.



#### 7.3.2 Safety Checks

To check for correct operation of the controller, with the boiler running, switch Off the gas supply at the isolating valve, the boiler should shutdown within one second & make a re-ignition attempt. As the gas is isolated, the control will go to lockout. Switch On the isolating valve. Wait at least 15 seconds before pressing re-set button on fascia to re-set controller. After a waiting period the boiler will light & run normally.

#### 7.3.3 Flame Signal Assessment

The flame ionisation signal generated whilst the boiler is firing, can be viewed directly from the display screen. The value should be approximately 15-20 $\mu$ A, but not less than 3 $\mu$ A.

#### 7.3.4 - Adjusting the settings of the boiler

The desired Flow temperature setpoint can be set as follows.

With the boiler in normal operation, press the boiler temperature button & the current set-point will be displayed (factory set to a maximum flow temperature of 80°C). Pressing the - or + buttons will increase or decrease the setpoint in 0.5°C increments within the limits set in the program.

After changing the setpoint to the desired value, the mode key must be pressed to store the value.

Note: the screen will revert back to the Default Screen after a few seconds.

#### 7.4 Ignition Controller Check.

With the burner firing, the flame signal should be at least 3 $\mu$ A. To check for correct operation of the ignition controller, close the gas valve. The boiler should shutdown after approximately one second & attempt a re-ignition. Check that the flame has been extinguished

#### 7.5 Gas Supply Pressure Check.

.When the boiler modules have been checked for correct operation the gas supply pressure should be checked. This should be done with all modules firing.

For Natural Gas the gas control valve zero governor control system is configured for a nominal gas inlet pressure of 20mbar measured at the rear of the boiler, with a maximum inlet pressure of 25mbar.

For LPG firing boilers, the nominal gas inlet pressure is 37mbar with a maximum inlet pressure of 45mbar.

## 7.6 Combustion Checks

The boiler modules are factory pre-set, however, site checks must be undertaken to confirm correct performance.

- 1 Use appropriate tool to remove sample point plug.
- 2 Insert combustion analyser probe horizontally into the sample hole provided in the sump casting.
- 3 Energise electrical supply & start the boiler. Refer to section 7.3.1.

**Note!** Care should be exercised if the boiler is firing as the flue can achieve temperatures which can cause injury if touched.

- 4 Monitor the combustion readings indicated on the combustion analyser at both Maximum & Minimum firing rates.

High Fire Target **8.7% CO<sub>2</sub> ±0.25%**

If combustion level is outside of this range use the Cross Head Throttle Screw to adjust the mixture.

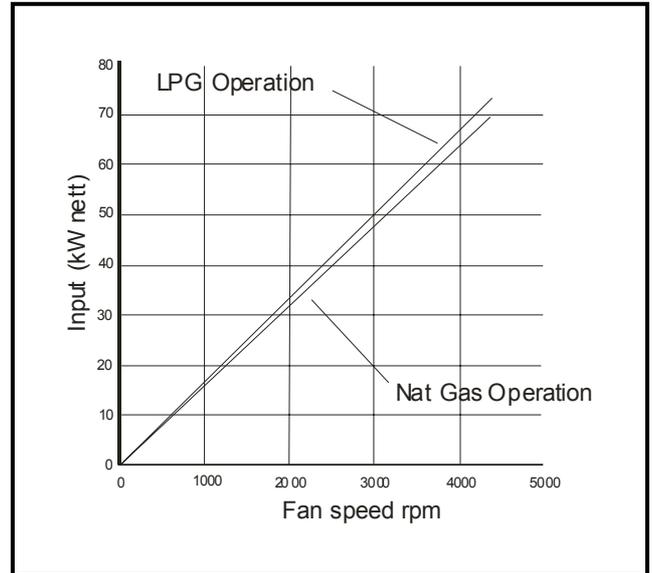
**THIS SETTING MUST BE CORRECT BEFORE CONTINUING**

**To increase the CO<sub>2</sub> level, turn the adjustment anti-clockwise.**

Low Fire Target **8.7% CO<sub>2</sub> ±0.25%**

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

**To increase the CO<sub>2</sub> level, turn the adjustment clockwise.**



CO = 0-50ppm. However the figure must not exceed 200ppm under normal operating conditions.

**If combustion readings fall within the required range the boiler module is set & operating correctly. If the combustion readings fall outside the required range the burner settings will require adjustment.**

**For LPG Propane firing—see appendix A**

**CONTACT HAMWORTHY HEATING TECHNICAL DEPARTMENT FOR FURTHER DETAILS**

5. Shut down the boiler & isolate from the electrical supply. Remove all instrumentation & replace any test points & plugs.
6. Refer to **section 8.0 - Controls Operation**, to set the relevant boiler parameters & timings specific to the installation

## 7.7 User Instructions.

When the boiler is fully commissioned, the owner or their representative should be made aware of the lighting-up & operating instructions. A practical demonstration should be given describing each functional step. This Installation & Commissioning guide, the servicing instructions manual & the user's instructions should then be handed over & be kept in a safe place for future reference.

### 8.0 CONTROLS OPERATION

The control system is a self contained package which controls & monitors all safety & functional aspects of the boiler performance & it's integration with external system controls.

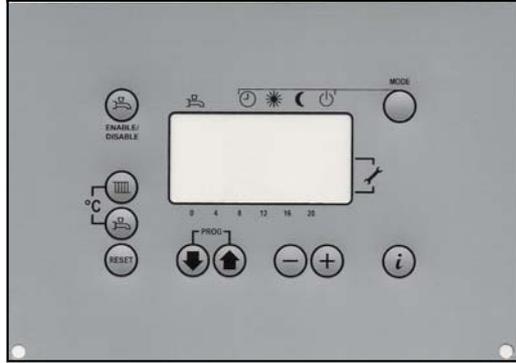
The system is compatible with BMS (or other) external controls via an enable 0~10V DC input signal. Operational outside & mixed flow sensors are supplied by HHL to ensure safe & reliable operation.

The system provides 2 volt free contacts for external fault indication—Normal run & lockout.

The control system allows the connection of multiple boilers on an RS485 bus connection (twisted pair) to enable cascade control of up to 12 multiple boilers by selection of Master/Slave configuration.

Note: To ensure safe & reliable operation, all wiring between sensors & master/slave boilers must be separated from mains voltage wiring.

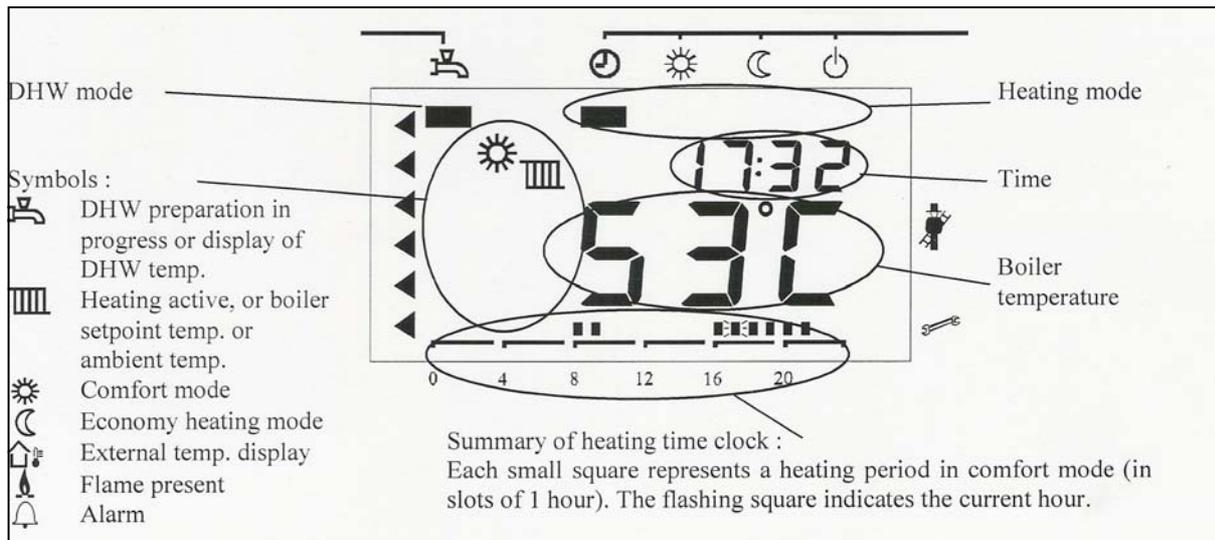
### 8.1 Fascia Details



Button	Operation	Function
	Lockout reset	Resetting the controls
	Enable dhw mode	Dhw on/off <b>-not used</b>
	Heating circuit mode	Selection of operating mode
	Heating circuit temperature setpoint	Adjustment of boiler or room temperature setpoint (not used)
	Line selection (up/down)	Selection of operating parameter
	Adjustment of settings	Adjustment of parameter settings
	Information	Select information display screens
	Enable Maintenance Mode	Switches to maintenance mode (press both buttons to select)

### 8.2 Display Details

In it's standard version the screen displays the boiler status (operating mode, time heating time program, boiler temperature, presence of flame & possible fault)



The arrowheads on the left hand side indicate water pressure between 0-4bar or 0-10bar depending on the pressure sensor used (if one is used)

### 8.3 Operating Modes



The boiler has 4 heating modes which can be selected by pressing the mode button

The currently selected mode is indicated by a block below the mode symbols on the fascia. Pressing the mode button will cycle through the 4 modes 1 at a time.

Automatic > Continuous 'Normal' > Continuous 'Reduced' > Standby ↵



#### Operating mode

#### Effect of selection

Automatic operation	Heating circuit (HC1) runs according to time switch program 1
Standby	Heating circuit 1 is switched off, Frost protection functions active
Continuous 'Normal'	Heating circuit 1 continuously on according to the adjusted nominal room temperature set point or heating circuit set point
Continuous 'Reduced'	Reduced room temperature set point or heating circuit frost protection set point

### 8.4 Information Button

Information about the boiler can be obtained at any time by pressing the info button. Repeated presses will cycle through the following information:

Dhw temperature > Water Pressure > Operating Phase > Outside Temperature > Error Code > Boiler Temperature ↵

Press the mode button to return to the default display

#### 8.4.1 Extended Information Modes

The information button can be used to obtain additional information about the operation of the boiler. To do this press both arrow buttons for 3 seconds. The time display will be replaced by an address formed by a letter (b,C or d) & a digit (0-7). Use the arrow buttons to change the letter and the + & - buttons to change the digit.

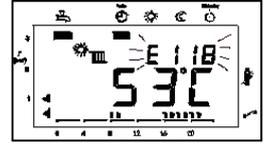
Press the information button to switch back to the information display or the mode button to return to the default display. After 8 minutes the display will automatically change back to the default display



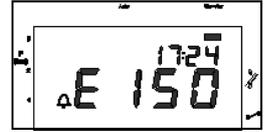
Display Code	Description
b0	Internal Software Diagnostic Code
b1	Boiler return temperature
b2	DHW temperature sensor 2
b3	-
b4	Outside temperature
b5	Composite outside temperature
b6	Attenuated outside temperature
b7	Flow temperature 3-way valve
C1	Ionization current
C2	Fan speed
C3	Current fan control PWM
C4	Relative output
C5	-
C6	Control differential
d1	Set point of 2-position or modulating controller (PID)
d2	Current boiler temperature setpoint
d3	Room Temperature setpoint
d4	DHW temperature setpoint
d5	Maximum degree of modulation in heating mode
d6	Maximum speed at maximum output in heating mode

## 8.5 Error Code Display

When a non-blocking fault occurs the time display alternates with the fault code display. This does not result in a lockout condition.



When a fault causes a lockout the fault code is displayed flashing in place of the boiler temperature & a small bell appears at the lower left of the display.



### 8.5.1 Internal Error Code Display

If the fault cannot be rectified then extra information can be obtained from the internal error code. To obtain this code press the into button then press and hold both arrow buttons for 3 seconds.



### 8.5.2 Error Code Table

The table below contains fault finding information for some of the codes. If the code displayed is not shown on this table or the actions do not fix the fault contact HHL for advice.

After the problem is fixed press and hold the reset button for 1 second to reset the controls

Error code	Internal Error Code	Potential cause	Actions
0		No entry in code	
10		Fault outside sensor	
20	142	Short Circuit Boiler Flow Sensor	Check temp sensor in water flow pipe & replace if necessary
	143	Open Circuit Boiler Flow Sensor	Check connections to temp sensor in water flow pipe Check temp sensor in water flow connection & replace if necessary
28		Fault flue gas sensor	
32		Fault flow temperature sensor 2	
40	144	Short Circuit Boiler Rtn Sensor	Check temp sensor in water rtn pipe & replace if necessary
		Open Circuit Boiler Rtn Sensor	Check connections to temp sensor in water rtn pipe Check temp sensor in water rtn connection & replace if necessary
50		Fault DHW temperature sensor 1	
52		Fault DHW temperature sensor 2	
61		Fault room unit 1	
62		Wrong room unit 1 or wrong radio clock connected	
77		Fault air pressure sensor	
78		Fault water pressure sensor	
81	518	LPB Short Circuit or no power supply	Check connections to clip in (switch off and isolate boiler before working on mains wiring)
82		Address collision on LPB...	
91		Data overflow in EEPROM	
92		Hardware fault in electronics	
95		Invalid time of day	
100		2 clock time masters	
105		Maintenance message	
110/111		Limit thermostat has cut out	Allow the boiler to cool and reset thermostat Investigate cause of overheating (see section 9.3)
113		Flue gas supervision equipment has cut out	
117		Water pressure too high	
118		Water pressure too low	
119		Water pressure switch has cut out	
128		Loss of flame during operation	Check connections to flame probe Investigate flame probe condition Check combustion when boiler is firing
130		Flue gas limit temperature exceeded	
132		Safety shutdown	Check gas pressure Check flue & condensate trap for blockages Check safety switches
133		No flame on completion of safety time	Check operation of gas valve
134		Loss of flame during operation	
140		Inadmissible LPB segment number/device N°	
148		Incompatibility LPB... interface / basic unit	
151	552	Relay clip in faulty	Check connections to clip in Check and replace clip in module (switch off and isolate boiler before working on mains wiring)
152		Fault in connection with LMU settings	
153		LMU has locked out	Press reset button (code appears if reset button is pressed when there are no faults)
154		Flow Problems	Check water flow through the boiler & Check the pumps
160		Fan speed threshold not reached	Check obstructions in fan, burner & flue. Check non-return valve operates Check heat exchanger for debris
161		Maximum fan speed exceeded	
162		Fault air pressure switch (does not close)	
164		Fault heating circuit flow switch / pressure switch	
166		Fault air pressure switch (does not open)	
180		Chimney sweep function active	
181		Controller stop function active	
183		LMU... in parameter setting mode	

## 8.6 User Settings & Functions

### 8.6.1 - Start-up / Initialisation

On startup after power-On, or after a lockout reset, the setpoints will be initialized. These will be to the factory settings until the first adjustment is made. After any adjustment the new settings will be permanently stored in the controls..

### 8.6.2 - Users Parameter Settings

The boiler is supplied with default settings. These can be modified by the user to suit their particular needs with the following procedure:

- Press one of the arrow keys to enter the end user programming mode
- Press either arrow key to switch to the relevant setting
- Adjust the setting using the + or - buttons

The new setting is stored as soon as the mode button is pressed to leave the programming mode or a arrow button is pressed to change the parameter to be set. To leave the programming mode without changing the current parameter press the information button.

If no button is pressed for 8 minutes the screen will return to the default display.

Overview of enduser adjustable parameters

<i>Line</i>	<i>Function</i>	<i>Range</i>	<i>Unit</i>	<i>Resolution</i>	<i>Default value</i>
<i>Time of day</i>					
1	Time of day	0...23:59	h / min	1 min	---
<i>Setpoints</i>					
5	Reduced room temperature setpoint «TrSollRed» or (reduced boiler temperature setpoint «TvSollRed») (When using an additional room unit, line 5 will be hidden)	TRF...TRN	°C	0.5	16.0
<i>Time program HK1 (heating circuit 1)</i>					
11	Time program HC1 switch-on time 1 <sup>st</sup> period	00:00...24:00	hh:mm	10 min	06:00
12	Time program HC1 switch-off time 1 <sup>st</sup> period	00:00...24:00	hh:mm	10 min	22:00
13	Time program HC1 switch-on time 2 <sup>nd</sup> period	00:00...24:00	hh:mm	10 min	24:00
14	Time program HC1 switch-off time 2 <sup>nd</sup> period	00:00...24:00	hh:mm	10 min	24:00
15	Time program HC1 switch-on time 3 <sup>rd</sup> period	00:00...24:00	hh:mm	10 min	24:00
16	Time program HC1 switch-off time 3 <sup>rd</sup> period	00:00...24:00	hh:mm	10 min	24:00

## 8.6.4 - FUNCTIONS

### 8.6.4.1 - Chimney Sweep mode



This mode is intended for use when making measurements on the boiler. When the chimney sweep mode is activated, the boiler will deliver maximum output until the limit thermostat cuts out.

This mode is enabled by pressing both buttons for between 3-6 seconds. On the display, the upper arrow of the maintenance symbol flashes & the currently selected temperature appears.

To leave this mode press the mode button.



### 8.6.4.2 - Controller Stop mode

The controller stop mode enables the boiler's heat output to be adjusted manually in heating mode by pressing both buttons simultaneously for more than 6 seconds.

On the display, the lower arrow of the maintenance symbol flashes & the currently selected temperature appears & the display shows the adjusted relative boiler output.

Minimum & maximum output can be directly selected by pressing the arrow buttons

To leave this mode press the mode button

### 8.6.4.3 - Time of day function

To ensure that this function operates, the time of day & time settings must be correctly set. Refer to section 8.3.2 for an explanation of how to set this.

Each time the + or - button is pressed during the time setting, the seconds are set to 0. The clock continues to run while making the setting.

To leave this mode press the mode button

## 8.7.10 - Display of operating phases

Display	Meaning	Internal Operating Phases of the LMU ....
00	Standby (no demand for heat)	PH_STANDBY
01	Prevention of startup	PH_STARTVER
02	Fan runup	PH_THL_1 & PH_THL1_2
03	Pre-purging	PH_TV
04	Waiting time	PH_TBRE, PH_TW1 & PH_TW2
05	Pre-ignition time	PH_TVZ
06	Safety time, constant	PH_TSA1 & PH_TSA2_1
07	Safety time, variable	PH_TSA1_2 & PH_TSA2_2
10	Heating operation	PH_TI, PH_MODULATION & Heating mode
11	DHW operation	PH_TI, PH_MODULATION & DHW mode
12	Parallel operation of space heating & DHW operation	PH_TI, PH MODULATION, Htg & DHW MODE
20	Post-purging with last control of operation	PH_THL2_1 & PH_TN_1
21	Post-purging with control of pre-purging	PH_THL2_2 & PH_TN_2
22	Home run	PH_TNB, PH_TLO & PH_TNN
99	Lockout position (display of the current error code)	PH_STOER

The operating phases according to the controls sequence diagram can be displayed. Assignment of the display code & the LMU... 's phase designation is as follows:

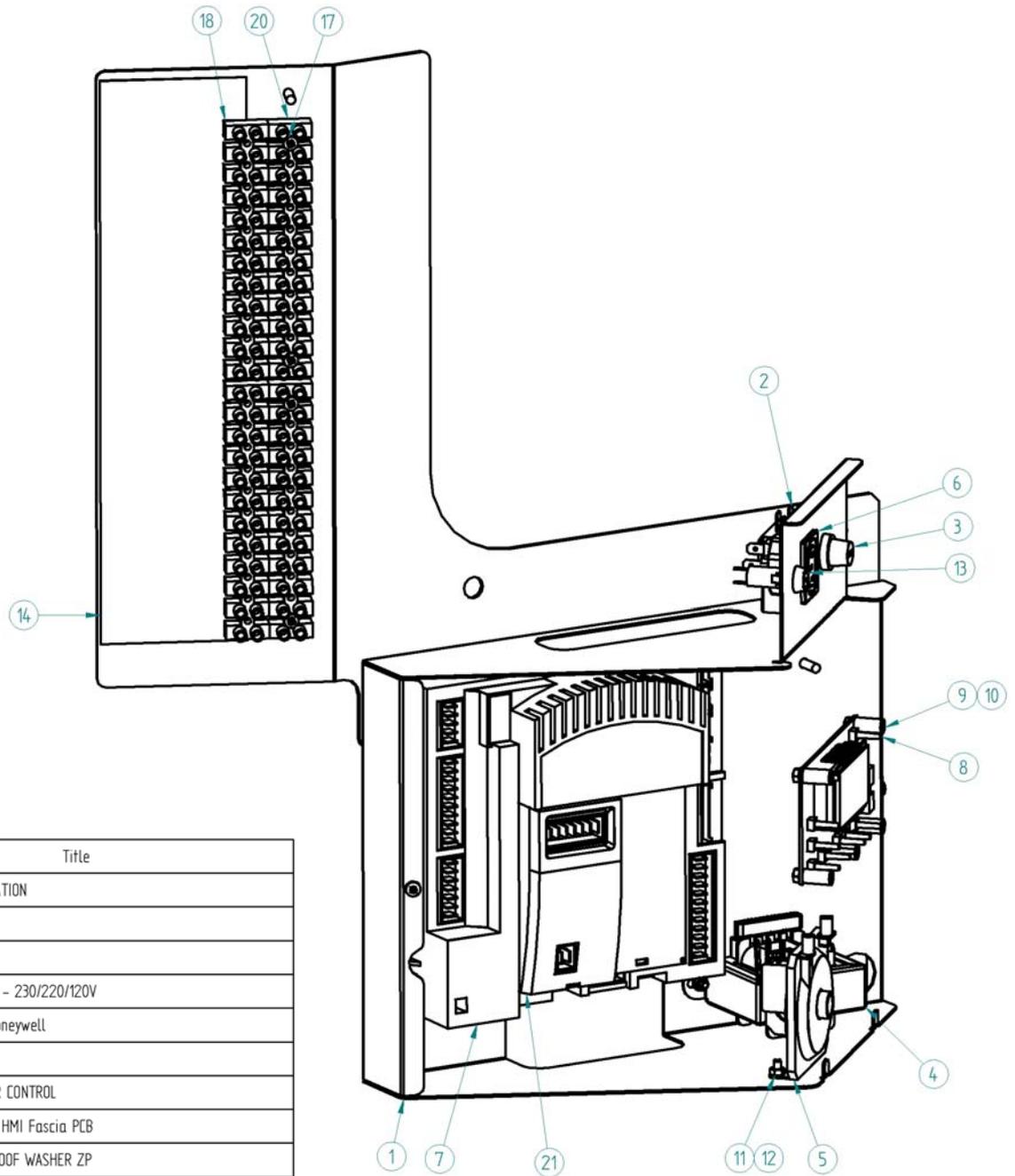
**Note:** -If operating phases are passed very quickly or skipped, the relevant display code will not appear.



## 8.8 Control Panel Assembly

The control system is contained within the control panel/pod on the side of the boiler. The front panel can be removed by removing the two screws at either side of the panel.

The following pictures show the basic layout of the panel



Item Number	Title
1	CONTROLS POD FABRICATION
2	Limit Stat IMIT LS-1
3	part of 533901179
4	IGNITER TRANSFORMER - 230/220/120V
5	Air pressure switch Honeywell
6	IEC MAINS OUTLET
7	SIEMENS LMU64 BOILER CONTROL
8	Siemens AGU2.310A109 HMI Fascia PCB
9	M4 INTERNAL SHAKEPROOF WASHER ZP
10	NYLON INSULATING SPACER M4 M/F Ø8 x 15mm
11	M4 HEX FULL NUT ZINC PLATED
12	M4 x 10 PDZ1 PAN HD SCREW
13	FUZE HOLDER SNAP-IN 5 x 20mm FUZE
14	TERMINAL IDENTIFICATION LABEL
15*	FASCIA LABEL FOR SIEMENS CONTROLS
16*	Sherborne SE Wiring Loom
17	8BA x 1-2inch Pan Head Self Tapping Screw Mild Steel Zinc Plated
18	Variheat Female Terminal Block
19*	Sherborne SE Wiring Loom
20	Variheat Female Terminal Block
21	SIEMENS AGU2.51A109 VFC + 0-10V CLIP-IN MODULE





## 9.0 FAULT FINDING

The Sherborne boiler is equipped with full self-diagnostic fault indication, with faults allocated a code, which is displayed on the screen - refer to section 8 Controls Operation.

The common fault codes are detailed in section 8 Fault codes not detailed in this manual should only be investigated by an Engineer.

### 9.1 Temperature Limit Thermostat

The electronic control thermostat has several safety levels built in such that a controlled shutdown should occur before the limit thermostat is activated. Should these safety levels be overridden (say external pump overrun failure after shutdown) the temperature limit thermostat will trip initiating a boiler shutdown, preventing the boiler from firing. The code (111) on the controls display will flash indicating that the temperature limit thermostat has tripped.

The temperature limit thermostat is located behind the yellow labelled cover above the controls fascia. To reset it remove the cover to access the thermostat control & reset button. Unscrew the black cover over the reset button and press the button.



Before attempting to reset the limit thermostat the boiler must be allowed to cool to normal operating temperature. If, after pushing the reset pushbutton & resetting the lockout the code on the display does not extinguish & the boiler does not fire up, it is possible that the limit thermostat will not reset because the boiler is still too hot.

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 problems.

If the boiler continues to lockout, then an investigation must be made to ascertain the cause - refer to section 9.3 below.

### 9.2 Fault Finding Procedures

General error messages are detailed in section 8 to assist with fault finding. If the boiler still cannot be operated satisfactorily after following the instructions, consult your Hamworthy Heating for assistance.

### 9.3 Possible Causes of Boiler Lockout

- 1) Ignition failure due to faulty igniter.
- 2) Ignition failure due to faulty gas valve.
- 3) Ignition failure due to No or low gas supply pressure.
- 4) No ignition due to faulty controller.
- 5) Ignition failure due to faulty flame probe or sensing circuit.
- 6) High temperature
- 7) Unnecessary pressing of reset when boiler is running

**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 as this may cause damage to the controls.**

## **10 SERVICING**

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

Regular servicing is recommended preferably by a Hamworthy appointed person & at least annually, to ensure trouble free operation. For Sherborne, HHL would recommend an additional 6 monthly examination following commissioning, acknowledging site conditions & running hours. Although cleaning of flueways may not be necessary on a yearly basis, it is important that all controls & safety features are checked for correct operation.

Note:- Measuring flue gas CO<sub>2</sub> & gas temperatures will give an indication of the state of the boiler flueways & waterways. Results should be compared with previously measured values to establish possible loss of efficiency.

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.

### **10.2 Annual Service**

#### **10.2.1 Preliminary Checks & Cleaning**

The procedure **MUST** be carried out on **ALL** individual modules which constitute an installation.

- **Isolate all electrical supplies**
- **Turn off the gas service valve**
- Remove the screw on the bottom of the cover & pull the cover up & off the hooks on the wall frame.
- Unplug the condensate trap and clear out any debris found
- Disconnect all the electrical from the control panel & the air pressure hose from the condensate trap
- Remove the 2xM10 nuts & washers securing the control panel to the heat exchanger & remove it.
- Disconnect the pressure feedback tube from the gas valve.
- Remove the 4 screws/nuts securing the fan/venturi/gas valve assembly to the transition duct.
- Withdraw the assembly from the air inlet duct.
- Remove the 2 screws securing the venturi/gas valve assembly to the fan. Cleaning impellor & venturi tube with a soft brush if necessary.
- Remove the 2 nuts securing the burner to the heat exchanger & carefully remove the burner assembly.
- Remove the single socket cap head screws securing the igniter & flame probe to the burner flange.
- Withdraw the igniter & probe.
- Remove the loose flange & Mica sight glass noting the position for re-assembly.
- Check condition of the igniter assembly & probe for damage, clean or replace as required.
- Remove the 2xM6 nuts securing the transition duct to burner & separate the components.
- Check the burner & clean using a soft brush if required (if possible use compressed air to blow out the dust inside the burner tube). Alternatively the burner tube can be washed using a soapy water solution.
- Tap the burner flange firmly downwards on a block of wood to dislodge residual debris from inside the burner tube. A damaged burner should be replaced.
  
- Re-assemble in reverse order checking the condition of gaskets & replace if necessary.
- Fit the igniter & probe to the burner flange to check the respective positions - See section 11.1.
- Refer to Section 7 & test all gas joints broken or disturbed for soundness before firing.
- Carry out a combustion check by testing the flue gas CO<sub>2</sub> & CO levels as detailed in Section 7.

#### **10.2.2 Heat Exchanger Cleaning**

The heat exchanger should be cleaned using the following procedure at least every 4 years. It may be necessary to carry out this procedure more regularly. Measuring flue gas CO<sub>2</sub> & gas temperatures will give an indication of the state of the boiler flueways & waterways. Results should be compared with previously measured values & values shown in the appendix c of this manual to establish the necessity for heat exchanger cleaning.

##### **10.2.2.1 SE64he**

If a high pressure hose is available then the following procedure can be used:

- Support the sump & remove the 4xM6 securing nuts. Lower the sump to expose heat exchanger & baffles.
- To clean the heat exchanger(s), the use of a high pressure water hose (40-80 psi) is recommended with the resultant discharge being collected in a suitable receptacle.
- Using the high pressure hose, insert the cleaning nozzle into the burner opening. Switch on the pump & traverse the full length & circumference of the heat exchanger to remove any deposits.

If a high pressure hose is not available then the SE71c procedure must be used.

### 10.2.2.2 SE71c

- Isolate the boiler from the system & drain it down.
- Disengage the appliance flue connector from the sump casting. Un-plug the condensate tube from the trap
- On the SE71c Model remove the return (lower) connection & heat exchanger connecting pipe from the rear of the boiler, secured by M8 nuts & washers. Note, there is an 'O' ring used on each fitting.
- Support the sump & remove the 4xM6 securing nuts. Lower the sump to expose the heat exchanger & baffles.
- To clean the heat exchanger(s), the use of a high pressure water hose (40-80 psi) is recommended with the resultant discharge being collected in a suitable receptacle.

**Primary Exchanger** - Insert cleaning nozzle into the burner opening. Switch on the pump & traverse the full length & circumference of the heat exchanger to remove any deposits

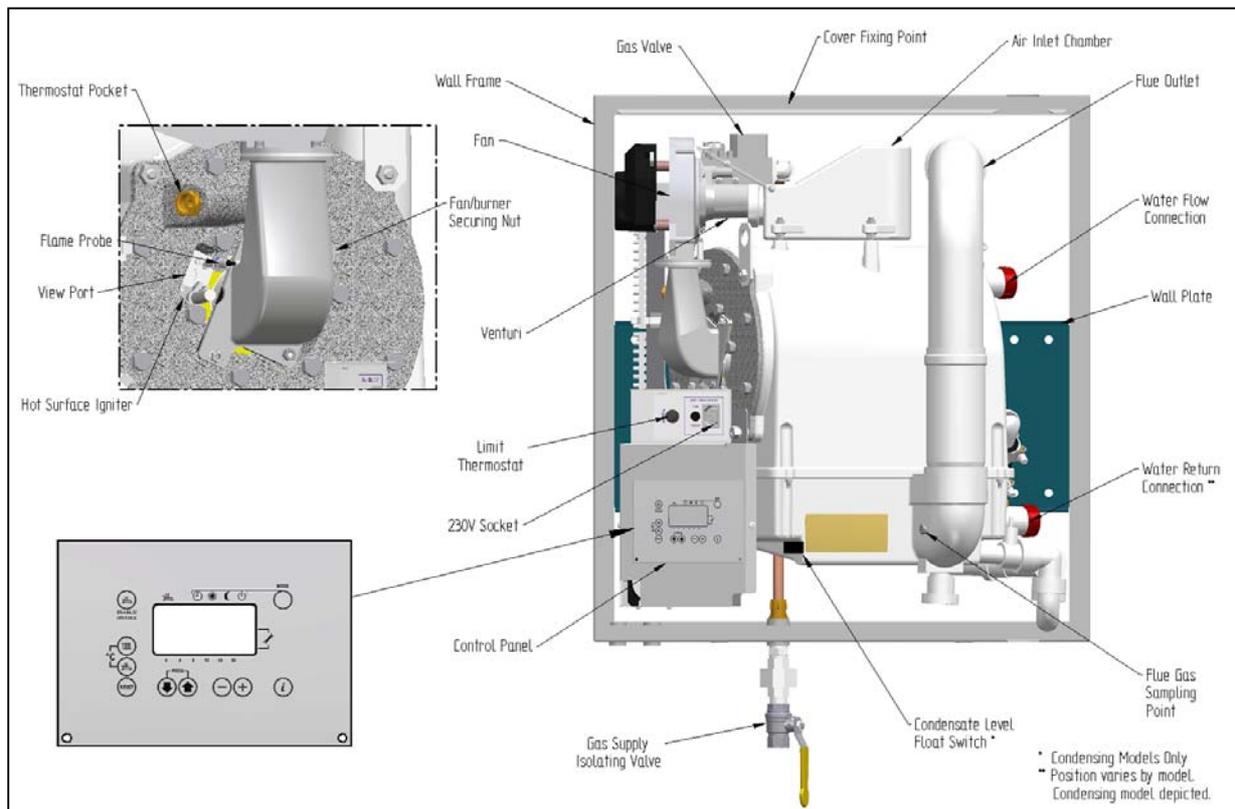
**Condensing Heat Exchanger** - Using the high pressure hose, traverse the exposed top & side of the heat exchanger angling the sump to drain.

Should a high pressure hose not be available, the respective heat exchangers will have to be removed from the casings. Each module holds approximately 4 - 5 litres of water & weighs 50 - 60kg (depending on model). It is **strongly recommended** that a minimum of two people are on hand to lift the module from the wall. Alternatively, two lifting eyes are provided for use with suitable lifting equipment.

- Place the module on two blocks of wood so the heat exchanger front casting is supported off the floor to protect from damage.
- Remove the 4xM10 nuts securing the front casting to the aluminium casing & carefully lift the casing vertically upwards away from the heat exchanger.
- Unhook the stainless steel springs & remove the 16 stainless steel baffle plates to expose the finned tubes.
- Wire brush both sides of the baffles to remove any deposits.
- Thoroughly wire brush the finned tubes.

### 10.2.3 Re-assembly

- Re-assemble in reverse order & refit heat exchanger to the casing using a new gasket. Replace the water connection gaskets on the rear of the boiler. Re-connect the water connections using new 'O' rings. Carefully lift the module back onto the wall plate & secure with the M10 nut & bolt on the left hand side mounting. Re-fit the system pipework & check for soundness.
- Re-assemble the fan/transition/burner assembly using new gaskets where necessary, & refit in reverse order. **Test all gas joints broken or disturbed for soundness before firing.** Re-light the boiler, check & adjust the combustion as described in Section 7.
- Check thermostat settings & adjust if required.
- Re-fit the boiler cover & tidy floor around boiler as necessary.



## 11.0 REPLACEMENT OF FAILED COMPONENTS

The components listed below can be replaced simply & quickly by the following procedures. Check the operation of new components by carrying out the appropriate part of the commissioning procedure. See Section 7

**NOTE: Isolate all electrical supplies to the boiler & turn off the gas supply before commencing any servicing or component exchange procedure.**

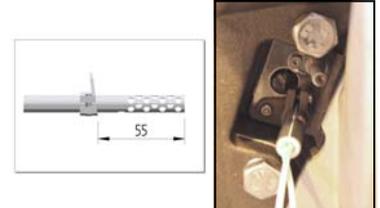
Remove the screw on the bottom of the cover & pull the cover up & off the hooks on the wall frame.

### 11.1 Hot Surface Igniter & Flame Probe Assembly. Part Nos. 563801011 & 533805019

Note:- igniter & probe ceramics are fragile. Do not remove both as flange & sight glass will become detached.

#### Igniter

- Unplug the igniter from the harness & remove the single socket cap head screw securing the igniter.
- Withdraw the igniter, renew or clean as required & generally remove any loose sooty deposits.
- Replace igniter & secure socket cap head screw holding the igniter to the burner flange.
- Check igniter is correctly positioned in the bracket before assembly



#### Flame Probe Assembly

- Disconnect the flame sensing probe connection.
- Remove the single socket cap head screw securing the probe to the burner flange & withdraw the probe.
- Renew or clean & generally remove any loose sooty deposits.

### 11.2 Flow / Return Sensor Part No. 533901431 (located in the flow & return pipes at the rear of the boiler)

- Disconnect sensor plug from wiring harness & loosen the screw securing the sensor in the pocket.
- Withdraw sensor from pocket & fit replacement, securing with the screw & re-connecting the plug.

### 11.3 Temperature Limiter (Limit Stat) Renewal. Part Nos. 533901179

Remove the 'push on' spade connections from the temperature limiter body noting position of coloured cables. Remove the two screws securing the thermostat to the display panel & withdraw the capillary & bulb from the sensing pocket in the front of the heat exchanger. Check the operation of the device by carefully applying a heat source to the bulb. Set temperature limiter to (maximum 100°C) & re-assemble temperature limiter ensuring correct cable notation. Refer to Figure 9.3.2 for terminal identification.

Temp °C	Resistance Ω	Temp °C	Resistance Ω
0	41505	50	3661
10	19691	60	2536
20	12474	70	1974
30	8080	80	1290
40	5372	90	942

### 11.4 Main Gas Valve / Venturi Part No. 533903033

The gas valve & venturi are supplied as a matched & factory set assembly & must not be tampered with or adjusted. To replace the gas valve/venturi it is preferable to remove the complete fan assembly.

- Unplug the 2 connectors from the fan & gas valve.
- Remove the screws securing the gas valve inlet elbow to the gas valve (take care not to loose the 'O' ring)
- Disconnect the pressure feedback tube from the gas valve.
- Remove the screws/nuts securing the fan/venturi/gas valve assembly to the transition duct.
- Withdraw the assembly from the air inlet duct.
- Remove the screws securing the venturi/gas valve assembly to the fan (note cork sealing gasket)
- Remove the copper feedback connecting tube from the valve & refit to the new valve using thread sealant.
- When replacing the gas valve it is advisable to renew the O-ring (See spares section for Part Nos).
- In LPG boilers check the orifice plate is undamaged & fitted in the recess in the gas valve. (Refer fig 11.4).
- Re-assemble using new gaskets where necessary & ensuring correct orientation of gas valve.
- Ensure electrical plugs are firmly & correctly located.
- Switch on gas & power supply & check for integrity of all joints using a proprietary leak detector.
- Ensure gas valve operation is correct & safe before continuing.
- Re-light the boiler
- Check & adjust the combustion as detailed in Section 7

### 11.5 Fan Assembly Part No. 563901376

To replace the fan it is preferable to remove the complete gas valve/venturi & fan assembly.

- Unplug the 2 connectors from the fan & gas valve.
- Disconnect the 15mm gas connection to the gas valve inlet.
- Remove the 4 screws/nuts securing the fan/venturi/gas valve assembly to the transition duct.
- Withdraw the assembly from the air inlet duct.
- Remove the 25 screws securing the venturi/gas valve assembly to the fan (note the cork sealing gasket).
- Re-assemble in reverse order using new gaskets where necessary.
- Ensure all screws are tightened & electrical plugs are firmly & correctly located.
- Re-light the boiler, check & adjust the combustion as detailed in Section 7.

### 11.6 Main control PCB

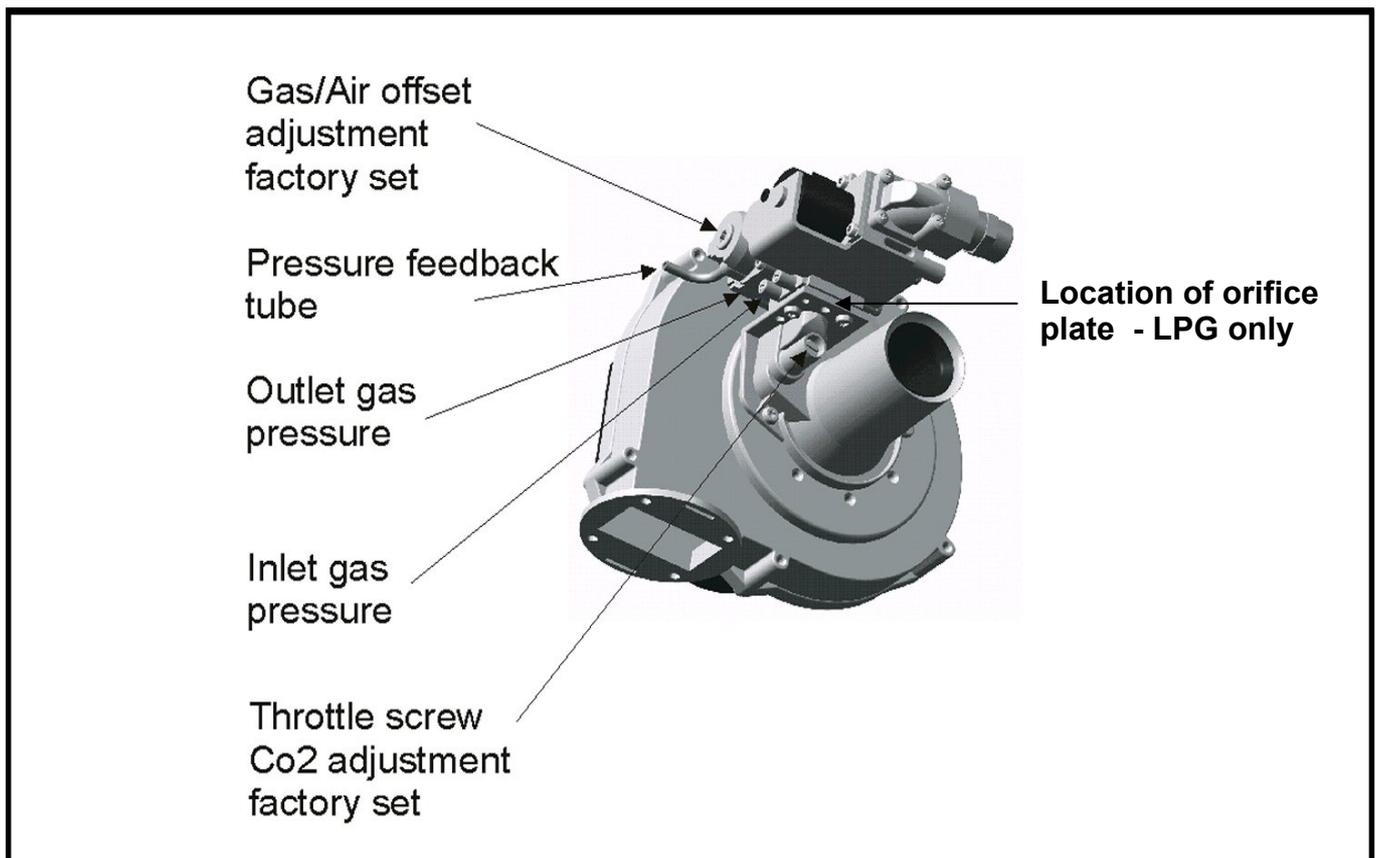
**Part No. 533901508 – (SE64he) Nat Gas**

**Part No. 533901xzy – (SE71c) Nat Gas**

**Part No. 533901yzz – (SE64he) LPG**

**Part No. 533901yxz – (SE71c) LPG**

- Remove the 2 screws which secure the fascia panel to the controls panel body.
- Carefully withdraw the fascia panel & hang it on the two hooks on the control panel body.
- Disconnect the plug connectors from the main PCB.
- These are polarised to ensure correct engagement.
- Carefully remove the screws securing the pcb to the panel & withdraw the control.
- Re-assemble in reverse order.
- Re-light the boiler & check for operation.



## **12.0 RECOMMENDED SPARES**

**Please Note!** To ensure the correct spare parts are despatched by our spares department, it is imperative that the complete Boiler Serial Number is given. The Boiler Serial Number is located on the Data Plate affixed to the aluminium casing.



### **SPARES ITEM**

### **PART NO.**

#### **ELECTRICAL ITEMS**

Fuse - T6.3A Slow Blow 5dia x 20mm - PCB control fuse 'F1' .....	533901461
Boiler main PCB (SE64he) Nat Gas .....	533901508
Boiler main PCB (SE71c) Nat Gas .....	533901509
Boiler main PCB (SE64he) LPG .....	533901510
Boiler main PCB (SE71c) LPG .....	533901511
Fascia PCB .....	533901437
Fan assembly .....	533901376
Flow / return Sensor .....	533901431
Flame sensing probe.....	533805019
Hot Surface Igniter.....	563801011
Temperature Limiter .....	533901179
Pressure Switch.....	533901496

#### **MECHANICAL ITEMS**

Burner Assembly .....	563301029
Spares Gasket Set .....	563605209
Small Service Kit.....	563605293
Gas Valve / Venturi.....	533903033
Gas Orifice Plate – LPG.....	531101010
Gasket - Burner to Heat Exchanger .....	531201007
Fan / Venturi Gasket .....	531201067
Viewing port (sight glass) .....	539907001
Flue Seal 50Ø .....	532511035
Flue Seal 80Ø .....	532511036
Flue Seal 100Ø.....	532511037

For service or spares please contact :-

**Hamworthy Heating Limited**  
**Fleets Corner**  
**Poole**  
**Dorset BH17 0HH**

**Phone Number..... 01202 662500**  
**Fax Number..... 01202 665111**  
**Service .....** **01202 662555**  
**Spares .....** **01202 662525**  
**Technical .....** **01202 662566**

## APPENDIX A - GAS DATA

### Natural Gas

GENERAL DATA		BOILER MODEL	
Model		Sherborne SE64he	Sherborne SE71c
Boiler Input (maximum)	- kW (Gross)	77.7	
Boiler Input (maximum)	- kW (Nett)	70.0	
Boiler Input (minimum)	- kW (Gross)	15.5	
Boiler Input (minimum)	- kW (Nett)	14.5	
Boiler Output kW (minimum)	- kW	13.6	
Boiler Output kW (maximum) condensing	- kW	-	71.3
Boiler Output (minimum) non-condensing	- kW	64.0	66.6

GAS DATA	
Gas Inlet Connection Pipe Thread Size	Rp 3/4"
Nominal Gas Inlet Pressure	- mbar 20
Maximum Gas Inlet Pressure	- mbar 25
Minimum Gas Inlet Pressure	- mbar 12.5
Gas Flow Rate (maximum)	- m <sup>3</sup> /h 7.4
Target CO <sub>2</sub> % at High / Low fire ±0.25%	8.7

### LPG Propane

**NOTE: - It is strongly recommended that on LPG installations, Gas Detection Equipment is fitted. This equipment should be positioned near the boiler & at low level. It is also important that the space housing the boiler is adequately ventilated at High & Low level; refer to Appendix D.**

There are minimal differences between the propane & natural gas fired boilers :-

- The addition of a control orifice located in the gas valve outlet - see figure 11.4
- Warning labels are attached to indicate the use of LPG.
- The nominal gas inlet pressure for LPG should be 37mbar.
- The target CO<sub>2</sub> value is detailed in the respective table.

GENERAL DATA		BOILER MODEL	
Model		Sherborne SE64he	Sherborne SE71c
Boiler Input (maximum)	- kW (Gross)	76.0	
Boiler Input (maximum)	- kW (Nett)	70.0	
Boiler Input (minimum)	- kW (Gross)	15.2	
Boiler Input (minimum)	- kW (Nett)	14.0	
Boiler Output kW (minimum)	- kW	13.6	
Boiler Output kW (maximum) condensing	- kW	-	71.4
Boiler Output (minimum) non-condensing	- kW	64.0	66.5

GAS DATA	
Nominal Gas Inlet Pressure	- mbar 37
Maximum Gas Inlet Pressure	- mbar 45
Minimum Gas Inlet Pressure	- mbar 25
Gas Flow Rate (maximum)	- m <sup>3</sup> /h (kg/h) 2.9 (5.5)
Target CO <sub>2</sub> % at High / Low fire ±0.25%	10.0

## APPENDIX B - ELECTRICAL CONNECTIONS & CONTROLS

<b>ELECTRICAL DATA</b>		
Model	Sherborne SE64he	Sherborne SE71c
Normal Supply Voltage	230V ~ 50Hz	
Power Consumption (maximum)	- W	175
Start & Run Current (per module)	- A	<1.0A

### B1.1 Electrical Supply

**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.**

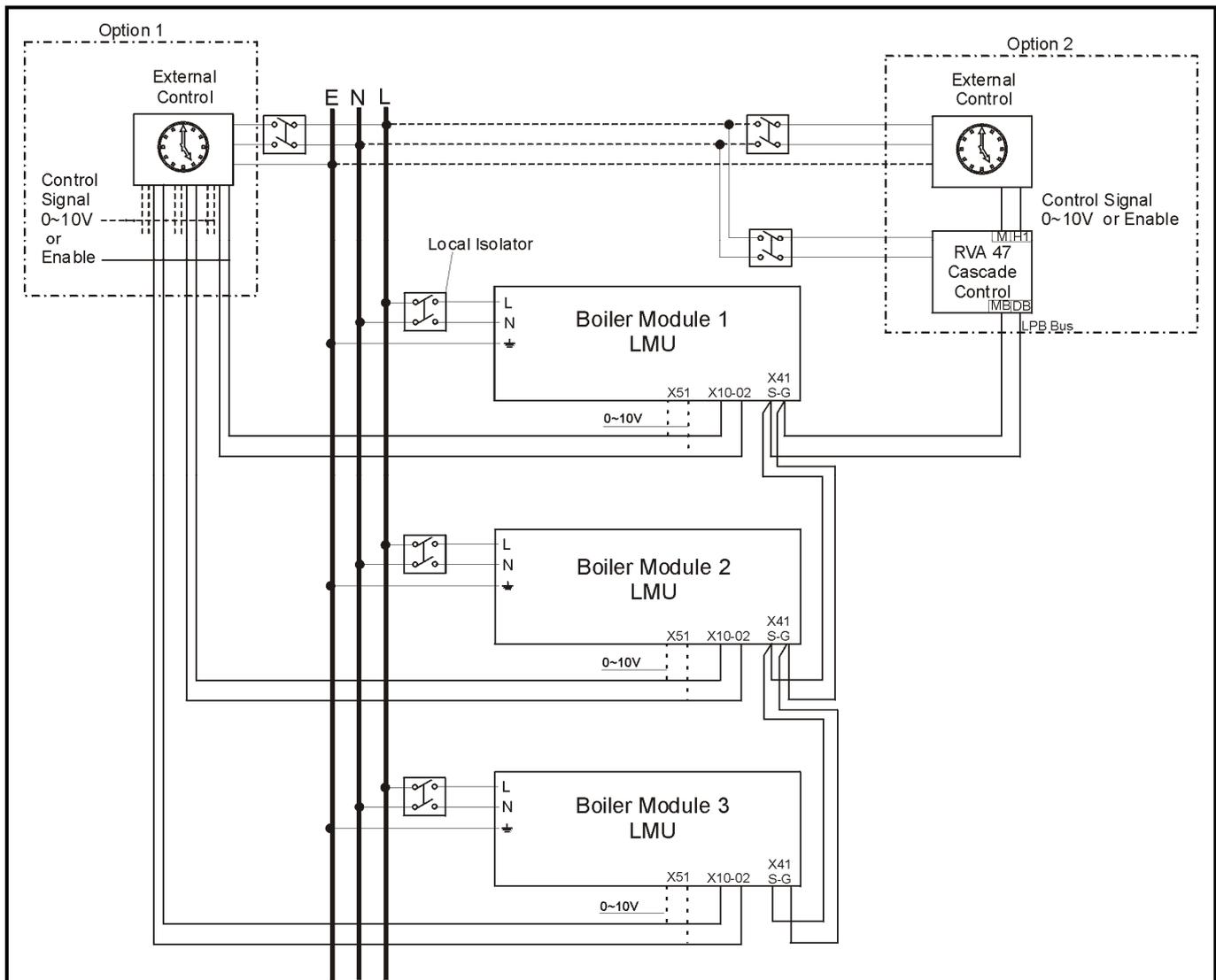
1. Wiring external to the boiler must be installed in accordance with the IEE Regulations & any local regulations which apply. Wiring must be completed in heat resistant 3-core cable of 1.0mm<sup>2</sup> cross sectional area. Boilers are normally supplied for connection to a 230 volts, 50Hz mains supply. The LMU control is supplied with a replaceable fuse (T6.3A). External fuses should be 10A for all boiler modules.
2. 3-Phase Electrical Supplies. Individual modules of Sherborne boilers & 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 / battery with a separation of at least 3mm in all poles.
3. A mains isolator must be provided adjacent to the boiler in a readily accessible position. The supply should only serve the boiler.
4. Volt free contact electrical supplies must be isolatable where fitted.
5. Further details regarding connection to the electricity supply are given in BS EN 60335, Part 1 or BS 3456, Part 201.
6. Refer to figure B1.2 for typical control wiring schematics for multiple boilers.

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

**CAUTION: DO NOT FEED MAINS VOLTAGE ONTO THE TIMER TERMINALS**

6. The mains power supply must be maintained at all times. Each Sherborne boiler module incorporates a remote stop/start loop, which can be used to operate the boiler(s) under a timed regime. The boiler controls provide a 24V 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 BASIC TERMINATION DIAGRAM SEE FIGURE 4.5**



**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 upto 12 modules. Refer to RVA 47 instructions for details.

**External Control Wiring for Multiple Module Installation**

## APPENDIX C - FLUE DATA

### Natural Gas

FLUE DATA			Sherborne SE64he	Sherborne SE71c
Model				
Nominal Flue Diameter	-	mm	Single pipe 100, concentric 80/125 or concentric 100/150	
Approx. Flue Gas Temperature (non condensing)-		°C	140	65
Approx. Flue Gas Temperature (condensing) -		°C	-	55
Pressure at the boiler flue outlet	-	Pa/mbar	100/1.0	
Approx. Flue Gas Volume @ 9% CO <sub>2</sub>	-	m <sup>3</sup> /h*	114	90
NOx corrected (daf mg/kWh [ppm])			44 [25]	

\* **Note:-** Flue gas volumes are corrected to a flue gas temperature of 15°C & barometric pressure of 1013.25mbar.

### C1.0 FLUE SYSTEM

Detailed recommendations for flue systems are given in BS 6644, & IGE/UP/10. All flue discharges for plant exceeding 150kW output must comply with the third edition of the 1956 Clean Air Act Memorandum.

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

### C1.1 General Requirements

The Hamworthy Sherborne series of boilers are designed to be used with natural draught flues or a room sealed system supplied by Hamworthy Heating. Flue systems should be designed in accordance with regulations & with reference to BS 6644 & IGE/UP/10.

**Room Sealed - type C13** (see figure C1): Horizontal balanced flue in 80/125mm concentric (for rear through the wall discharge) or in 100/150mm concentric for remote discharge.

**Room Sealed - type C33** (see figure C2): Vertical balanced flue.

**Room sealed - type C53** (see figure C3): Separate intake & discharge ducts terminating in different pressure zones.

**Note:** the intake & discharge terminals must be separated by a minimum distance of 700mm.

**Open flue - type B23** (see figure C4): Air intake from ventilated plant room & discharged via horizontal/vertical flue .

The following points should be noted:

- 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 installations.
- 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 & be at least 22mm diameter. It must also have a fall of at least 2-3° (approx. 30-50mm per meter) & connect to a drain via a waste trap.

**Important - In fitting the HHL supplied 100mm dia. ducts to a stainless steel flue system, the flue system must have it's own condense drain. The system must not be allowed to drain back through the HHL supplied components.**

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 & installation service.

### C1.2 Waste Gas Volume & Temperature.

Where the boiler(s) discharge into a chimney system, it is recommended that the volume & temperature of the waste gases used for design of the flue system are as detailed in the Flue Data table.

### C1.3 Suction

The flue system must be designed acknowledging that there is a positive pressure generated by the combustion fan. 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.

### C1.4 Maximum Length of Flue Duct

For single boiler installations, the maximum allowable linear equivalent length of straight ducts for both twin duct & concentric systems is 10m & 7m respectively. This dimension relates to the distance between the boiler & the discharge terminal. Figure C1.1 details the equivalent length of flue tube. Components can be combined in any order provided that the total equivalent length of flue does not exceed the maximum. **Note:** if the maximum stated length is exceeded, the boiler will not achieve maximum output.

#### Flue Resistance

Equivalent tube lengths.	
Component	Length m
Straight tube ø100mm per m	1
45° bend ø100mm	2.25
90° bend ø100mm	4.10
Concentric straight tube Ø80/125mm /m	1
Concentric straight tube Ø100/150mm /m	1
Concentric 45° bend Ø100/150mm	1.30
Concentric 90° bend Ø100/150mm	2.20

### C1.5 Disconnection

Each boiler is fitted with a telescopic appliance connector, enabling the boiler to be disconnected from the flue system.

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

### C1.6 Flue Discharge

The flue system must ensure safe & efficient operation of the boiler to which it is attached, protect the combustion process from wind effects & disperse the products of combustion to the external air. The flue must terminate in a freely exposed position situated to prevent the products of combustion entering any opening in a building. Where the application requires the flue discharge to terminate below 2m above ground level, the use of a terminal guard is required.

### C1.7 Surface Temperatures

Combustible materials in the vicinity of the boiler & 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 & chimney are clear from any obstruction. Sherborne 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 (pH3-5), with all discharge piping having a minimum fall of 30mm/m away from the boiler. Consideration should be given to possible freezing of condensate water traps & pipework. This must be avoided at all times by routing pipework within the building, where possible

Horizontal Balanced Flue

# Flue type C13

Ref 031 Horizontal terminal Assembly Ø100/150

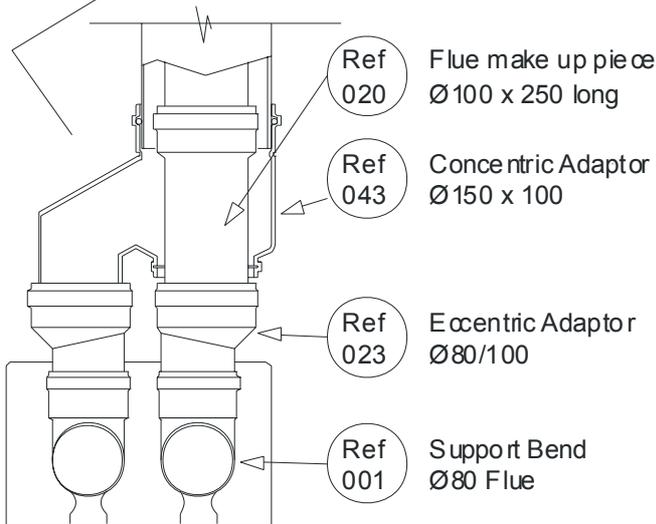
7m max

Ref 030 Concentric Flue Ø100/150 x 1m long

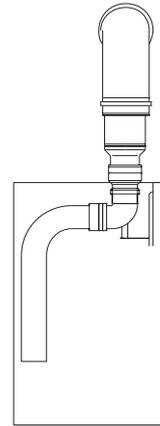
Ref 029 Concentric Flue Ø100/150 Adjustable

Ref 027 90° Concentric Bend Ø100/150

Ref 028 45° Concentric Bend Ø100/150

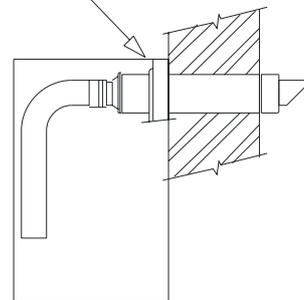


Enlarged detail showing cut section through concentric adaptor



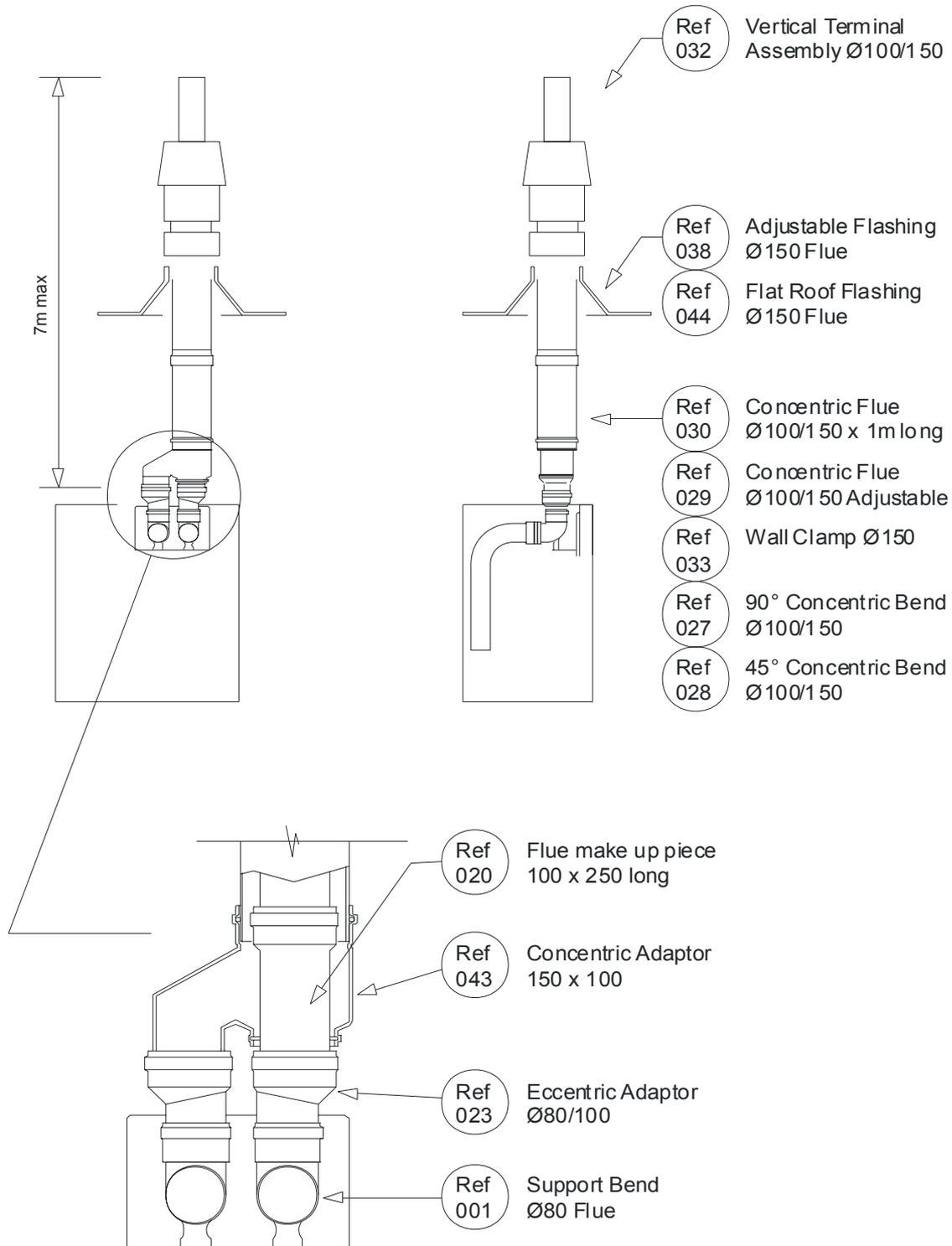
Ref 007 Horizontal terminal Assembly Ø80/125

Ref 014 Wall plate Ø125



Note: If the terminal is fitted vertically within 2m of areas accessible to people an appropriate guard should be fitted.

# Flue type C33

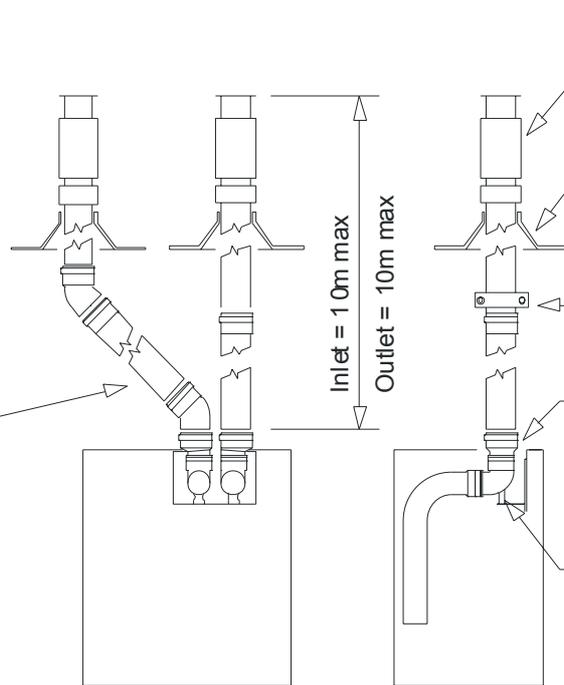


Enlarged detail showing cut section through concentric adaptor

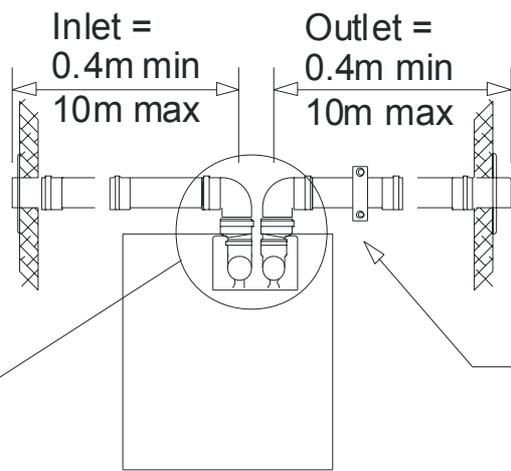
# Flue type C53

- Ref 020 Single Flue 250 long Ø100
- Ref 021 Single Flue 500 long Ø100
- Ref 022 Single Flue 1000 long Ø100
- Ref 018 90° Bend 1000 long Ø100
- Ref 019 45° Bend 1000 long Ø100

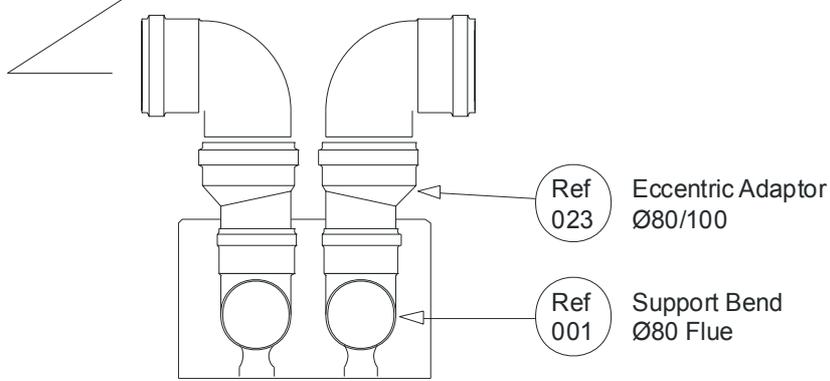
- Ref 024 Horizontal Inlet Terminal Ø100 Flue



- Ref 026 Vertical terminal Ø100 Flue
- Ref 039 Flat Roof Flashing Ø100 flue
- Ref 040 Adjustable Flashing Ø100 flue
- Ref 017 Wall Clamp ø100
- Ref 023 Eccentric Adaptor Ø80/100
- Ref 001 Support Bend Ø80 Flue



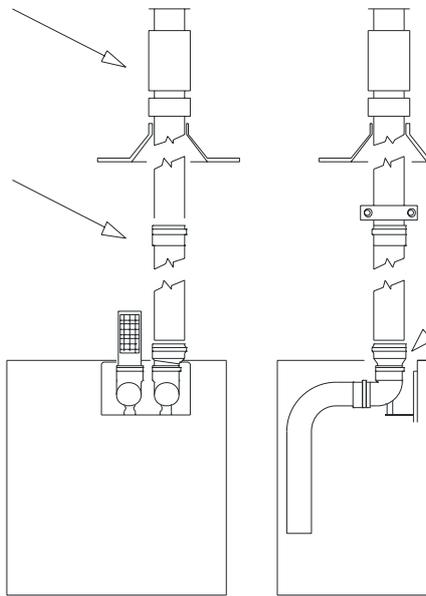
- Ref 025 Horizontal Flue Terminal Ø100 Flue
- Ref 017 Wall Clamp Ø100
- Ref 020 Single Flue 250 long Ø100
- Ref 021 Single Flue 500 long Ø100
- Ref 022 Single Flue 1000 long Ø100
- Ref 018 90° Bend 1000 long Ø100
- Ref 019 45° Bend 1000 long Ø100



Enlarged detail

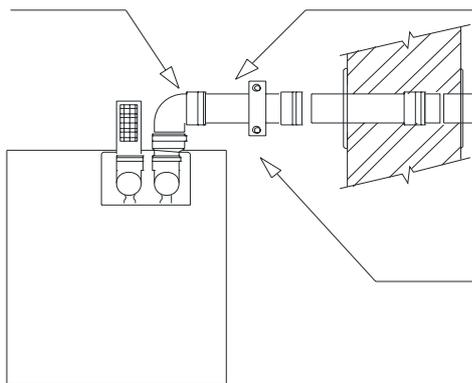
# Flue type B23

- Ref 026 Vertical terminal Ø100 Flue
- Ref 020 Single Flue 250 long Ø100
- Ref 021 Single Flue 500 long Ø100
- Ref 022 Single Flue 1000 long Ø100

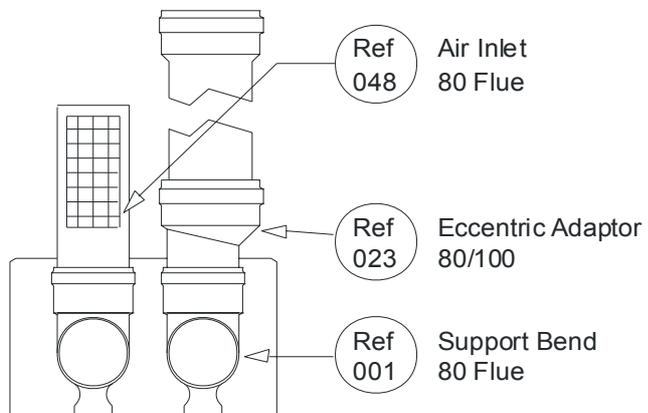
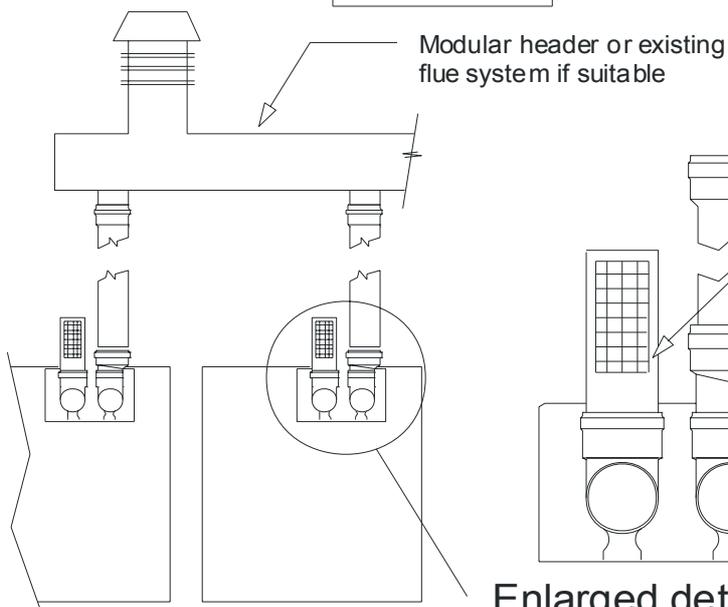


- Ref 039 Flat Roof Flashing Ø100 flue
- Ref 040 Adjustable Flashing Ø100 flue
- Ref 017 Wall Clamp Ø100
- Ref 023 Eccentric Adaptor Ø80/100

- Ref 018 90° Bend Ø100 1000 long
- Ref 019 45° Bend Ø100 1000 long



- Ref 020 Single Flue 250 long Ø100
- Ref 021 Single Flue 500 long Ø100
- Ref 022 Single Flue 1000 long Ø100
- Ref 017 Wall Clamp Ø100



- Ref 048 Air Inlet 80 Flue
- Ref 023 Eccentric Adaptor 80/100
- Ref 001 Support Bend 80 Flue

Enlarged detail (typical B23)

## **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 & general ventilation, in addition to that required for any other appliance.

Combustion air for the boiler is drawn through the slots in the rear edge of the side panels. The air inlets **must** be kept open & free from blockage at all times.

#### **D1.2.1 Air Supply by Natural Ventilation - Open Flue applications**

The boiler room must have, or be provided with, permanent air vents directly to the outside air, at high level & 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 & 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.

##### **Boiler house ventilation**

Low level (inlet) - 4cm<sup>2</sup> per kW of total rated input (Net)

High level (output) - 2cm<sup>2</sup> per kW of total rated input (Net)

##### **Compartment ventilation**

Where the boiler is to be installed in a cupboard or compartment, permanent high & low level ventilation is required which must communicate direct to outside, for cooling purposes.

Low level (inlet) - 10cm<sup>2</sup> per kW of total rated input (Net)

High level (output) - 5cm<sup>2</sup> per kW of total rated input (Net)

#### **D1.2.2 Air Supply by Natural Ventilation - Room Sealed Installations**

Where the boiler(s) are to be installed in a boiler room or internal space, the room or internal space must have permanent air vents directly to the outside air, at high level & at low level with the general requirements detailed above on location & construction.

##### **Boiler house ventilation**

Low level (inlet) - 2cm<sup>2</sup> per kW of total rated input (Net)

High level (output) - 2cm<sup>2</sup> per kW of total rated input (Net)

##### **Compartment ventilation**

Where the boiler is to be installed in a cupboard or compartment, permanent high & low level ventilation is required which may communicate to an adjoining room or outside, for cooling purposes.

Ventilation to a room or internal space - 10cm<sup>2</sup> per kW of total rated input (Net)

Ventilation direct to outside - 5cm<sup>2</sup> per kW of total rated input (Net)

### **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 & 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.

For Mechanical ventilation systems an automatic control should be provided to cut off the gas supply to the boiler, in the event of failure of air flow in either inlet or extract fans.

### **D 1.4. Boiler House Temperatures**

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

At floor level (or 100mm above floor level) = 25°C.

At mid-level (1.5m above floor level) = 32°C.

At ceiling level (or 100mm below ceiling level) = 40°C.

### **D 1.5. General Requirements**

The air supply should be free from contamination such as building dust & insulation fibres from lagging. To avoid unnecessary cleaning & servicing of the boiler modules, the boilers should not be fired whilst building work is

being undertaken.

High & low level ventilation grilles shall be positioned as high & as low as practicably possible. Low level grilles should be located within 1 metre of the floor for Natural Gas & within 250mm of the floor for LPG. High level grilles should be positioned within 15% of the boiler room height from the ceiling. High & low level grilles shall communicate with the same room or space where compartment ventilation is used. Where grilles communicate directly with outside air, they shall be positioned on the same wall.

#### Mechanical Ventilation Flow Rates

	Flow rate per kW total rated heat input (Net)	
	Inlet air (Combustion venti- lation)	Difference between Inlet & Extract air *
	m <sup>3</sup> /h.	m <sup>3</sup> /h.
Volume	2.6	1.35

Note \* : Where the associated air extraction is also by means of a fan, this shall be selected such as not to cause a negative pressure to develop in the boiler house & to maintain the difference between inlet & extract flow rates shown above.

The calculated extract flow rate is the actual inlet flow rate minus the appropriate figure in the table above.

## APPENDIX E - WATER DATA

WATER DATA			SE65he	SE71c
Model				
Water Connections (Flow & Return)			1 1/4" BSPT	
Maximum Water Pressure	-	bar g	7.0	
Water Content (not including headers)	-	litres	4.0	5.0
System Design Flow Rate @ 11°C ΔT Rise	-	litre/s	1.39	1.45
Minimum Flow Rate @ 15°C ΔT Rise	-	litre/s	1.02	1.05
Waterside Pressure Loss @ 11°C ΔT Rise	-	mbar	220	520
Waterside Pressure Loss @ 15°C ΔT Rise	-	mbar	120	280

### E1.1 Water Circulation System

The Sherborne boiler has a low water content & the requirements of minimum water flow are given in the above table. Recommendations for the water circulation system are given in BS 6644 & CP 342.

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

- In a combined central heating & 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.
- Circulating pipework not forming part of the useful heating surface should be insulated to help prevent heat loss & possible freezing, particularly where pipes are run through roof spaces & 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.
- Drain valves must be located in accessible positions which permit the draining of the whole system, including the boiler & hot water storage vessel.
- Each boiler module has 1 1/4" BSPT male flow (indicated with a red spot) & return (indicated with a blue spot) connections. Boilers should be connected by flow & 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 E1.1.1 on the following page show typical layouts.
- 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 & Safety Executive)**, the minimum pressure requirements at the boiler are given below as examples:-

- Single boiler running at 82°C flow temperature. Minimum head required is not less than 2.0 metres or 0.2 bar.
- Single boiler running at 90°C flow temperature. Minimum head required = 3.0 metres or 0.30 bar.
- Modular boiler running at 82°C flow temp & 11°C rise across system. Min head required = 4.4 metres or 0.43 bar.
- Modular boiler running at 82°C flow temp & 15°C rise across system. Min 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. BS 6644 provides comprehensive information for the selection & location of safety valves & attention is drawn to the higher capacity requirements of

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

#### Cold Feed & Vent Pipe Sizes

safety valves for pressurised hot water systems.

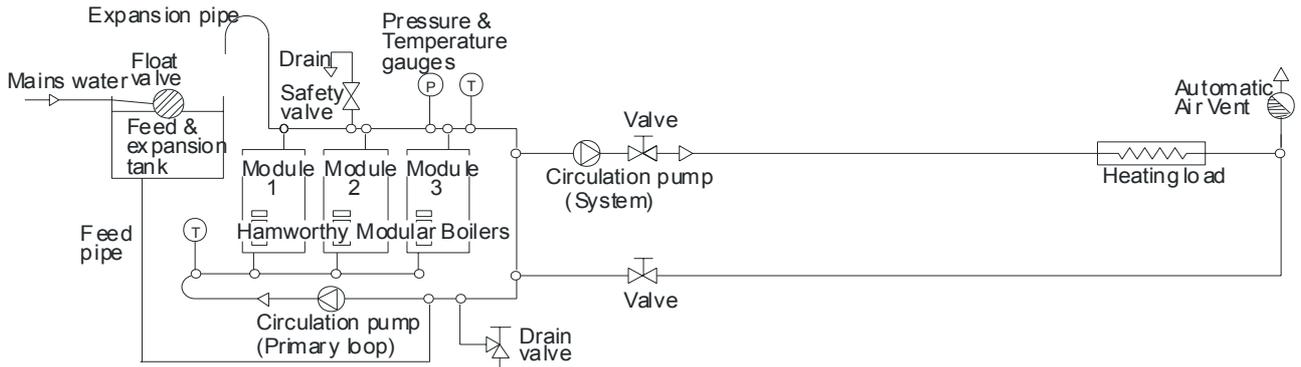
### E1.4 Open Vent & Cold Feed Pipe.

Every boiler or group of boilers should have an open vent pipe & cold feed pipe installed between the boiler & 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 & 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 & Cold Feed Pipes.

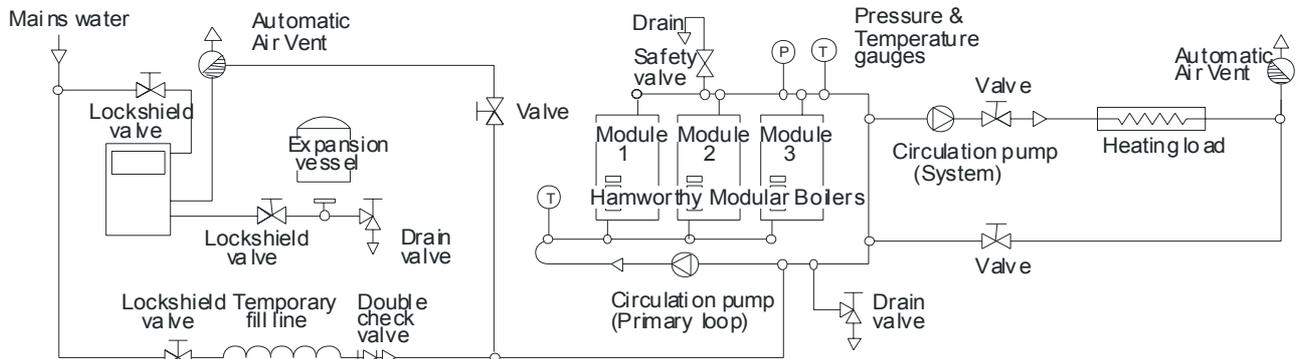
### E1.5 Altitude Gauge (Water Pressure Gauge)

Every boiler or group of boilers should be provided with an altitude gauge complete with isolating valve.

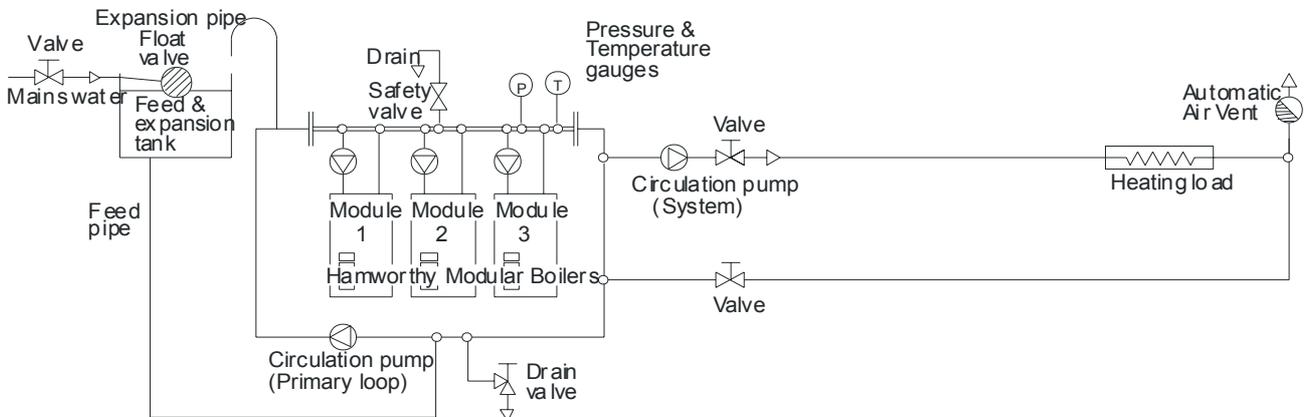
# Typical Piping Layouts



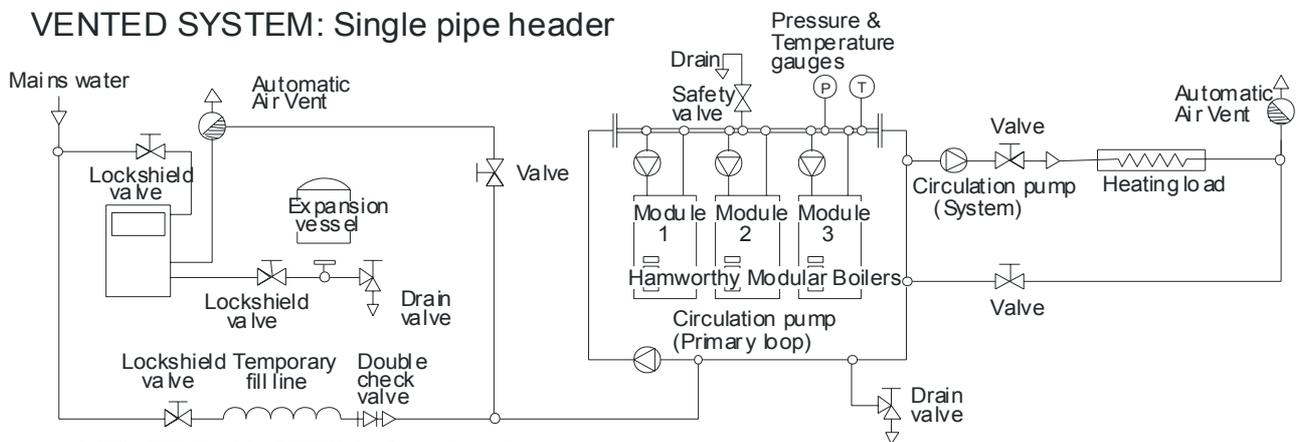
**VENTED SYSTEM: Primary loop, Hamworthy recommended system.**



**UNVENTED SYSTEM: Primary loop, Hamworthy recommended system.**



**VENTED SYSTEM: Single pipe header**



**UNVENTED SYSTEM: Single pipe header**

### **E1.6 Thermometer**

A thermometer complete with pocket should be fitted in the pipework to indicate water flow temperature.

### **E1.7 Drain Valves**

Each boiler should have a 15mm NB drain valve (not Hamworthy Heating Ltd supply) fitted in the boiler return to drain the boiler only. The heating system in total should have drain valves as recommended by BS 6644.

### **E1.8 Circulating Pump**

One or more circulating pumps will be required to circulate water around the boilers & heating system. The pump should be sited to facilitate servicing. It is important that when Sherborne 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 pumps 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 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**

The boiler is equipped with it's own two stage frost protection capability, assuming that the circulating pump is controlled by the boiler. If this is not the case, consideration should be given to fitting a frost thermostat set at approximately 4°C

### **E1.13 Unvented Systems**

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.

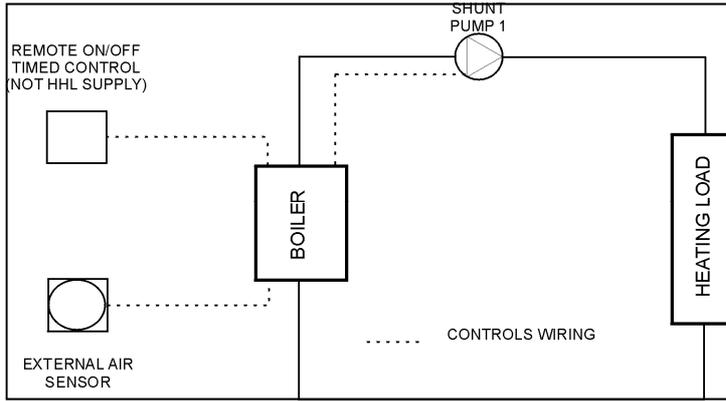
- Static height of highest component in system (metres)
- System volume. If this is not known, a general rule of thumb of 10litres/kW of installed boiler power can be used.
- Maximum flow temperature (°C)
- Maximum system hot working pressure, generally given in bar gauge.

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

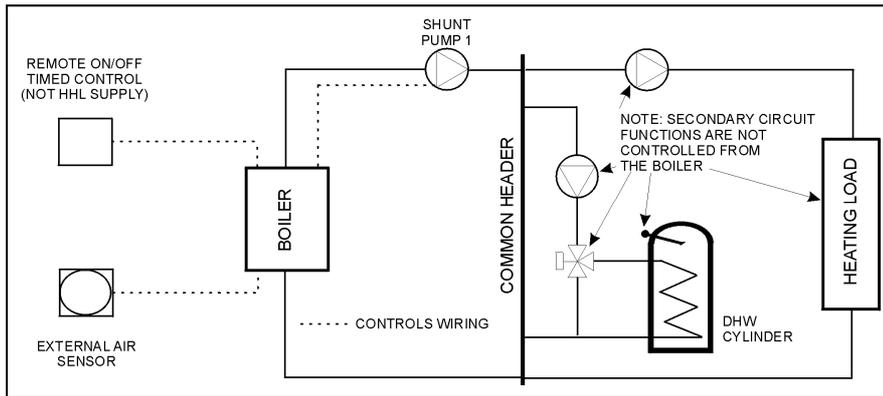
Care must be taken in sizing expansion vessels to ensure maximum acceptance factors are not exceeded. Normally manufacturers of vessels impose a limit of 0.5. This value must not be exceeded at any time during the operation of the boiler, this includes the over pressure condition should a safety valve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

Consideration should also be given to sizing of the safety valve(s) in the system. Refer to BS 6759: Part 1 for further information & to BS 6880: Part 1 for design considerations.

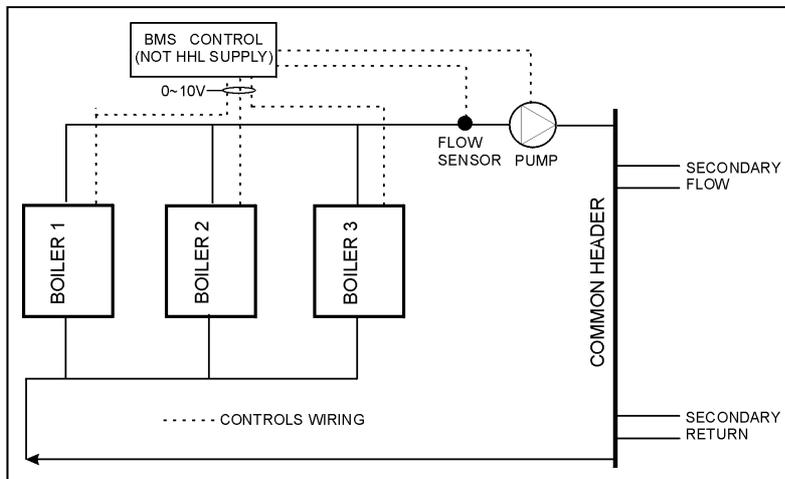
**Schematic for Single Boiler System**



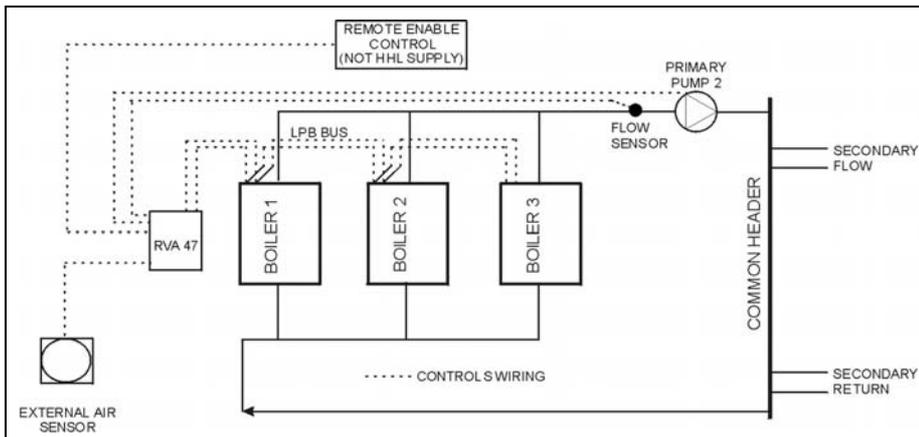
**Schematic for Single Boiler, Primary Circuit System**



**Schematic for Multiple Boiler (External 0~10V), Primary Circuit System**



**Schematic for Multiple Boiler (HHL Cascade), Primary Circuit System**



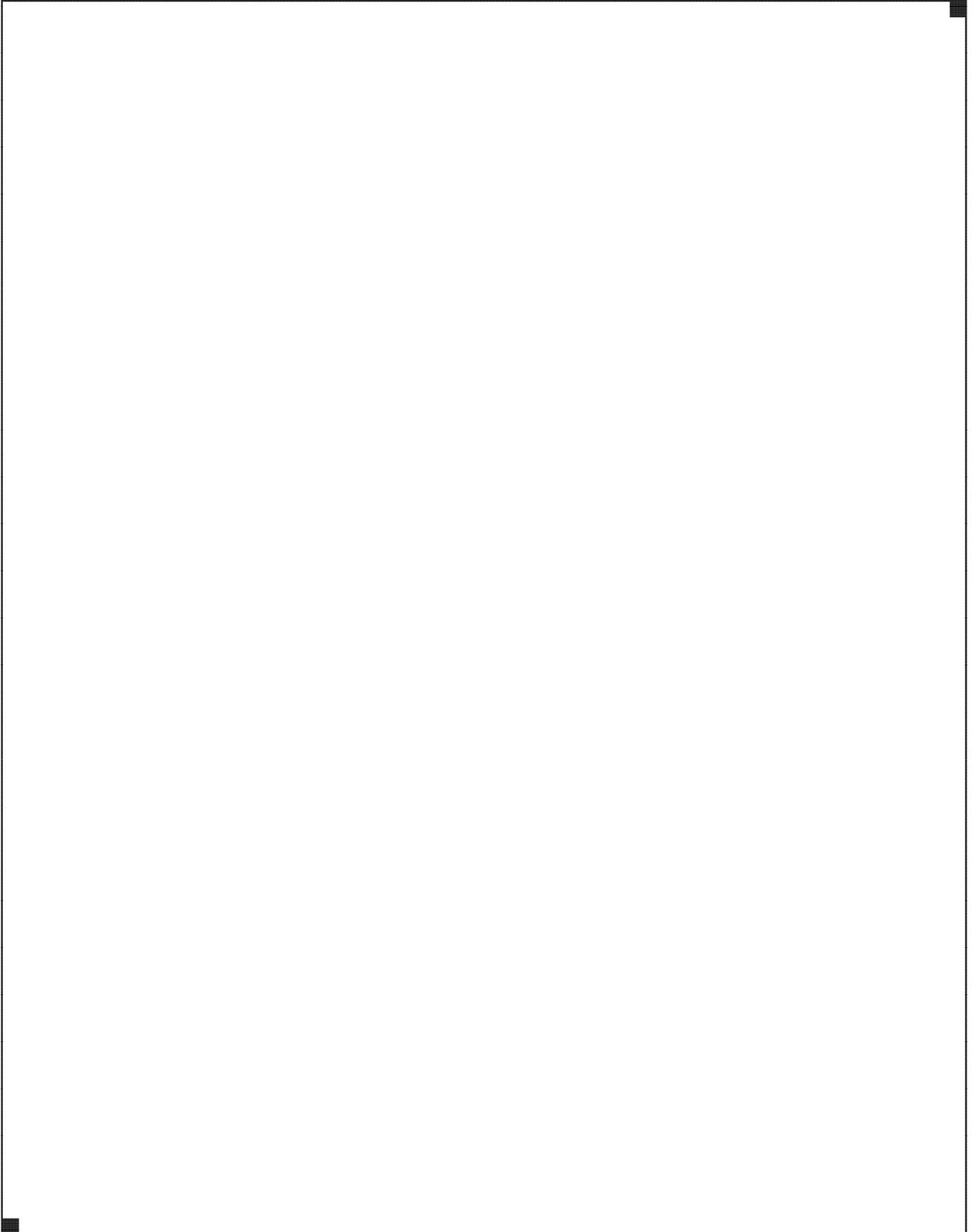
**USEFUL USER INFORMATION**

<b>INSTALLER</b>	<b>SITE ADDRESS</b>

<b>BOILER TYPE</b>	<b>BOILER SIZE(S)</b>	<b>UNIT NO(S).</b>	<b>SERIAL NO(S).</b>	<b>FLUE</b>

**NOTES**

# Notes



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