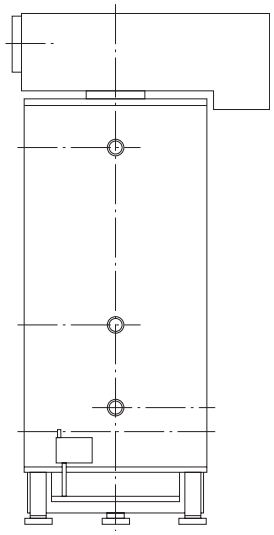

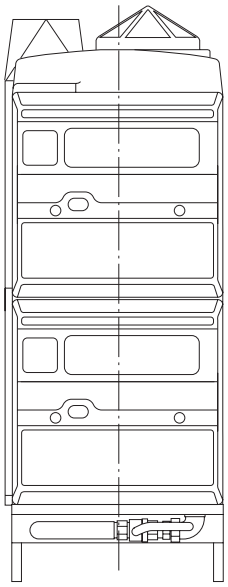

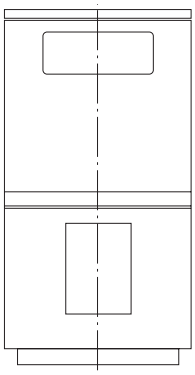

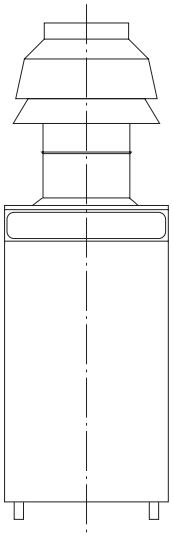

# Wessex 220 M Series Boilers

High Efficiency, Fully Modulating, Pre-Mix, Gas Fired, Modular Boilers for Heating and Domestic Hot Water Installations

## Installation, Commissioning and Servicing Instructions

Wessex 220 M220, M440 & M660 Models

*NATURAL GAS* $I_{2H}$
*LPG-PROPANE* $I_{3P}$

**IMPORTANT NOTE**

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

Hamworthy
HEATING & HOT WATER PRODUCTS

# Customer Services

**Technical Enquiries** **01202 662527/662528**

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** **01202 662555**

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** **01202 662555**

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

**Maintenance Agreements** **01202 662555**

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** **01202 662555**

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

**Spare Parts** **01202 662525**

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.

# Wessex 220 M Series Boilers

**High Efficiency, Fully Modulating, Pre-Mix, Gas Fired, Modular Boilers for Heating and Domestic Hot Water Installations**

## Installation, Commissioning and Servicing Instructions

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*NATURAL GAS* $I_{2H}$
*LPG-PROPANE* $I_{3P}$

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

**THE WESSEX 220 M BOILER IS INTENDED FOR USE AS A COMMERCIAL APPLIANCE.**

**THIS BOILER IS FOR USE ON GROUP H NATURAL GAS (2ND FAMILY) $I_{2H}$ OR LPG-PROPANE (3RD FAMILY) $I_{3P}$. 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-87/02/28, (BED) BE-87/02/06.
PRODUCT IDENTIFICATION No. 87BN28.

**PUBLICATION NO. 500001110**
**ISSUE 'E'**
**MAY 2006**

**CONTENTS**

## 1.0 INTRODUCTION

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

**1.2** This boiler is intended for use on Group H Natural Gas (2nd Family) and LPG-Propane (3rd Family). The information relating to propane firing is to be found in Appendix 'A'. Boilers **MUST NOT** use gas other than that for which they are designed and adjusted.

**1.3** The Wessex 220 M is a gas fired, fully modulating, fan assisted, open flued central heating / hot water boiler. Using the latest gas / air ratio control technology it is able to provide clean efficient operation across a large output range. The boiler can be supplied in a modular format, a maximum of three vertically stacked modules being arranged into a single unit sharing a common flue

**1.3.1** Each boiler module utilises a metal fibre, fan assisted, pre-mix burner. Operation is initiated by a full sequence ignition control that incorporates a Hot Surface Ignition system and rectification supervision of the flame.

**1.3.2** Each of the boiler models is designed for direct connection to a flue system. The Technical Data for the various arrangements is given in **Section 2.** The flue outlets from more than one unit may be connected to a single chimney. No draught diverter is fitted to the boiler nor is a fixed diverter required in the flue system. However a draught stabiliser is recommended for some installations.

**1.3.3** The Wessex 220 M is floor mounted and is intended for the heating of Commercial and Industrial premises. It may also be used to supply hot water for these premises via an indirect cylinder.

**1.3.4** The Wessex 220 M has a low water content and water flow rates **MUST** be maintained at or above the recommended levels shown in **Section 8** and Figure 2.2.

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

The pressurisation unit must also incorporate a low level water switch which protects the water pumps and will directly or indirectly shut down the boiler plant should a low water condition occur. Consideration should also be given to the maximum working pressure of the boiler as given in **Section 2: TECHNICAL DATA**. Consult Hamworthy Heating Technical Department for help or assistance if in doubt.

**1.5** The Wessex 220 M boiler is not suitable for direct connection to domestic hot water supplies.

**1.6** The Wessex 220 M boiler can be installed with either reverse return water flow, (optional kits available) or with single pipe headers, (non HHL supply). See Figure 1.1. for typical schematic layout.

**BOILER VARIATIONS**
**Wessex 220 M220** - Single 220 kW unit.
**Wessex 220 M440** - Single 440 kW unit created by stacking 2 – 220 kW modules vertically.
**Wessex 220 M660** - Single 660 kW unit created by stacking 3 – 220 kW modules vertically.

**1.7** The fully assembled unit is supplied covered with a protective sleeve. The flue assemblies for the M440 and M660 models are supplied in a separate pack.

**1.8 Options**

**1.8.1** Optional reverse return header kits are available for models M440 and M660. These kits are free-standing allowing installation to the system prior to installing the boiler and can incorporate all necessary valves, inter connecting pipework, and flexible flow and return connections. Refer to individual kit instructions for details.

**1.8.2** Milton boiler sequence control system for timed remote control of single and multiple modulating boilers, with outside temperature compensation and optimised start. Refer to Milton kit instructions for details.

**1.8.3** Sequencing Interface Module – Hamworthy Heating can supply an interface module fitted within the boiler module control panel to enable the remote fully modulating control of the boiler module via a 0-10V analogue control signal from a non-HHL control system. An interface module will be required for each boiler module, and a 0-10V control signal will be required for each boiler module. Refer to sections 8.12 and 9.3 for further details.

**Figure 1.1 Boiler Installation (Typical)**

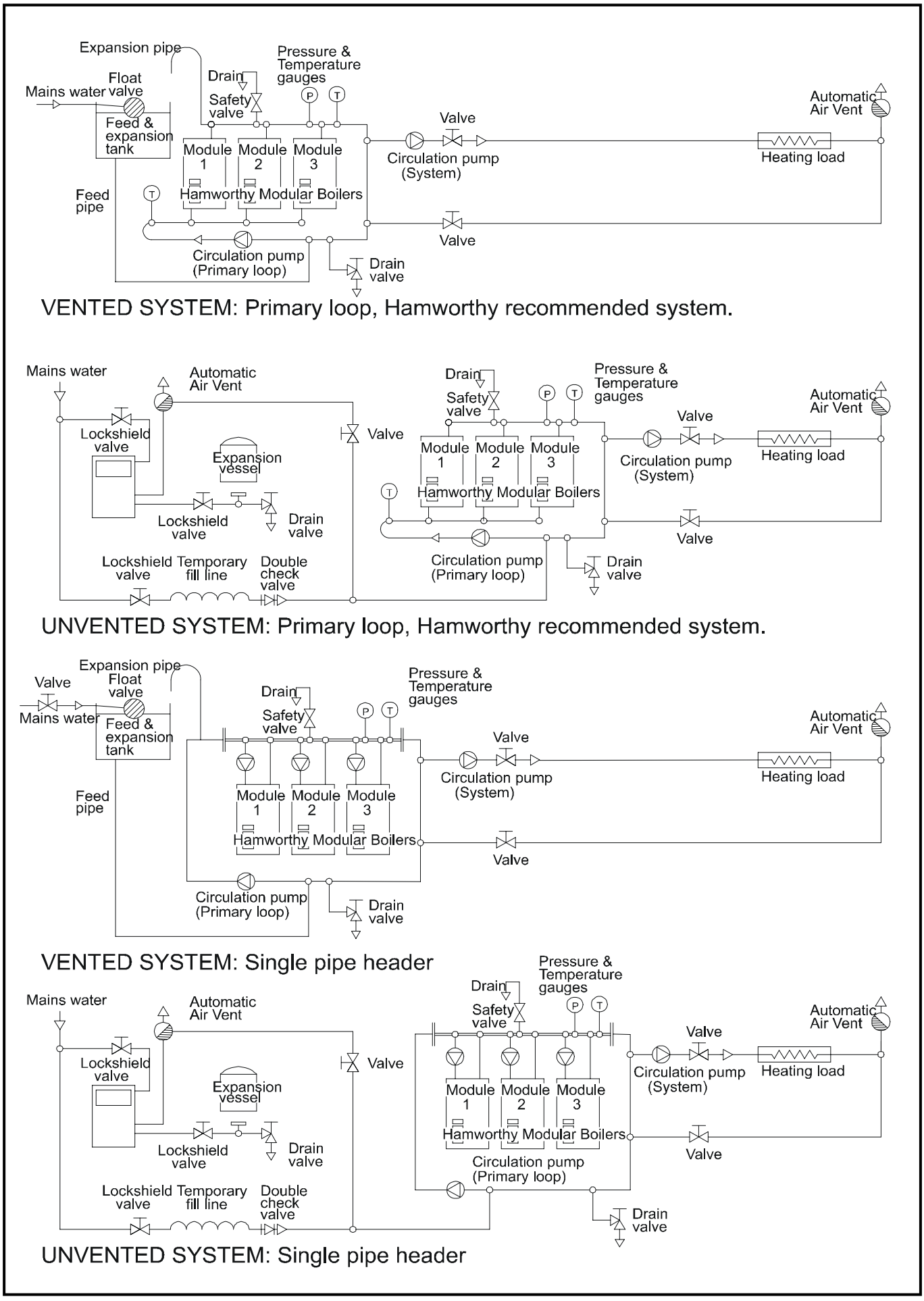
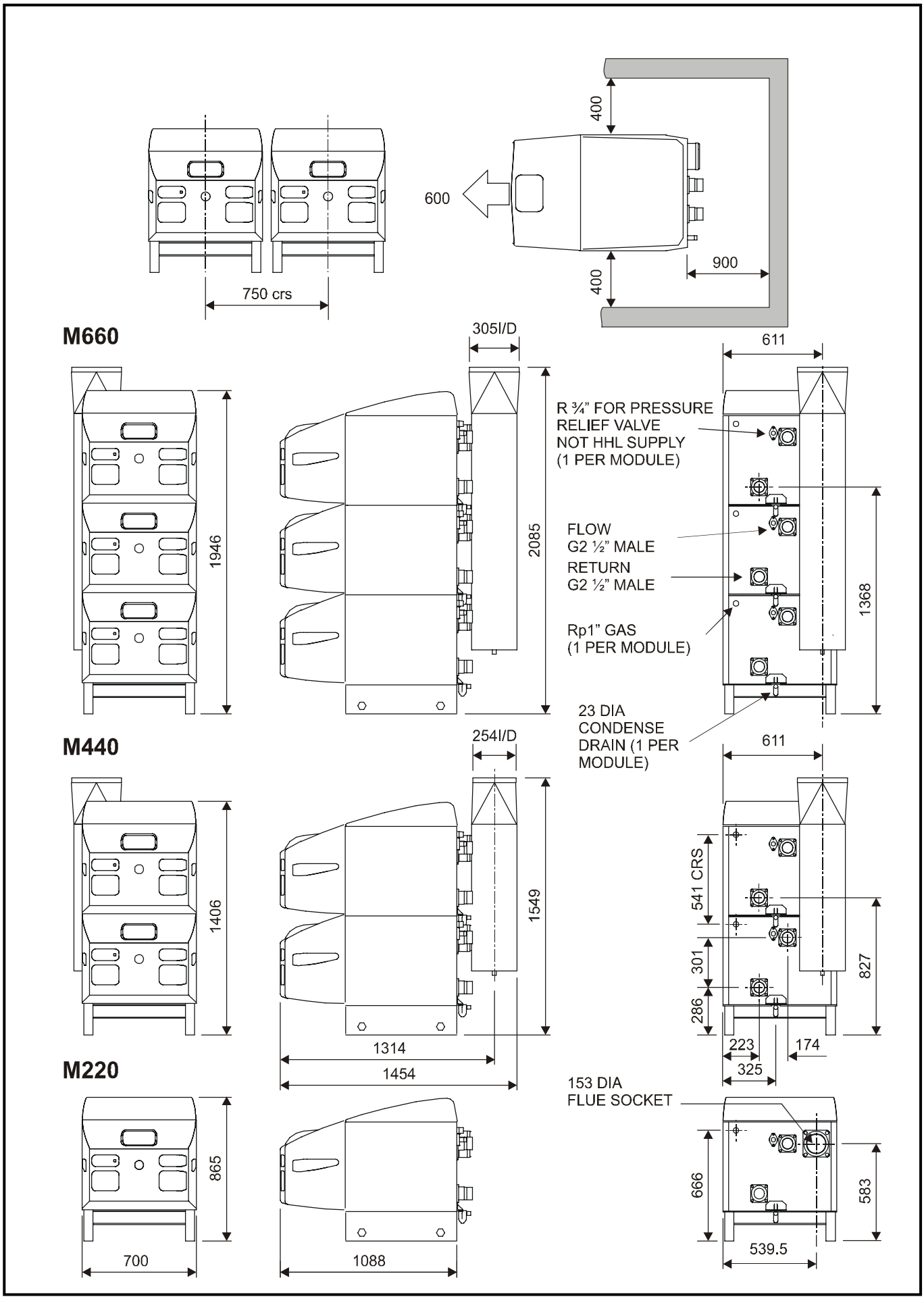


**Figure 2.1 Boiler Dimensions/Clearances**



## 2.0 TECHNICAL DATA

**2.1** The Wessex 220 M boilers can be installed as single units or in modular form. Each module has an independent door for access to the controls and other working components.

Overall dimensions are shown in Figure 2.1. For both single and multiple boiler arrangements.

It is recommended that a maximum of 2 boilers can be positioned on 750mm centres if required, Larger numbers should be split into banks with adequate access to the rear of each boiler.

**2.2** General Information and Technical Data relating to Natural Gas is shown in Figure 2.2.

Technical data relating to propane firing can be found in Appendix 'A'.

**2.3 Screw threads**: All screw threads used in the Wessex 220 M boiler conform to the following:-

**ISO 7/1** or **ISO 228/1** for pipe threads where applicable.
**ISO 262** for all general screw threads.

**Figure 2.2 Performance and General Data Information – Natural Gas**

| **GENERAL DATA**<br>**Wessex 220 M series** | | | **BOILER MODEL** | | |
|---|---|---|---|---|---|
| | | | **M220** | **M440** | **M660** |
| Boiler Input (maximum) | - | kW (Gross) | 262.22 | 524.44 | 786.66 |
| Boiler Input (maximum) | - | kW (Nett) | 236.13 | 472.26 | 708.39 |
| Boiler Output kW (maximum) | - | kW | 220 | 440 | 660 |
| Boiler Module Output (minimum) | - | kW | 44 | | |
| **FLUE DATA** | | | | | |
| Nominal Flue Diameter | - | mm | 153 (6") | 254 (10") | 305 (12") |
| Approx. Flue Gas Temperature | - | °C (Gross) | 135 | | |
| Approx. Flue Gas Volume @ 8.7 – 9.3% $CO_2$ | - | $m^3/h$* | 329 | 659 | 988 |
| **GAS DATA** | | | | | |
| Gas Inlet Connection Pipe Thread Size | | | R1 | | |
| Nominal Gas Inlet Pressure | - | mbar | 20 | | |
| Maximum Gas Inlet Pressure | - | mbar | 25 | | |
| Gas Supply Pressure Switch Setting | - | mbar | 12.5 | | |
| Gas Flow Rate (maximum) | - | $m^3/h$ | 24.99 | 49.97 | 74.96 |
| Gas Valve Offset Pressure Setting | - | mbar | 0.00 | | |
| **WATER DATA** | | | | | |
| Water Connections (Flow & Return) | | | G2½ male | | |
| Maximum Water Pressure | - | bar g | 10 | | |
| Water Content (not including headers) | - | litres | 17 | 34 | 51 |
| System Design Flow Rate @ 11°C ΔT Rise | - | litre/s | 4.78 | 9.56 | 14.33 |
| Minimum Flow Rate @ 15°C ΔT Rise | - | litre/s | 3.50 | 7.01 | 10.51 |
| Waterside Pressure Loss @ 11°C ΔT Rise | - | mbar | 64.0 | | |
| Waterside Pressure Loss @ 15°C ΔT Rise | - | mbar | 34.5 | | |
| **PHYSICAL DATA** | | | | | |
| Shipping Weight (excluding flue headers) | - | kg | 220 | 430 | 635 |
| **ELECTRICAL DATA** | | | | | |
| Normal Supply Voltage | | | 230V ~ 50Hz | | |
| Power Consumption (maximum) | - | W | 250 | 500 | 750 |
| Start and Run Current (per module) | - | A | 1.07 | | |

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

## 3.0 GENERAL REQUIREMENTS

### 3.1 Related Documents.

**Gas Safety Installations and Use Regulations 1998- (As amended).** It is law that all gas appliances are installed by competent persons, in accordance with the above regulations. Failure to install appliances correctly could lead to prosecution. It is in your own interest, and that of safety, to ensure that this law is complied with.

The installation of the boiler **MUST** be in accordance with the relevant requirements of the Gas Safety Regulations, Building Regulations, IEE Regulations and the bylaws of the local water undertaking.

The installation should also be in accordance with any relevant requirements of the local gas region and local authority and the relevant recommendations of the following documents :-

**British Standards**

**BS 7074:** Application, selection and installation of expansion vessels and ancillary equipment for sealed water systems.

**Part 2:** Code of practice for low and medium temperature hot water systems.

**BS 6644:** Installation of Gas Fired Hot Water Boilers - 60 kW to 2MW.

**BS 6700:** Design, installation, testing and maintenance of services supplying water for domestic use.

**BS 6880: Part 1, 2 & 3:** Code of practice for low temperature hot water heating systems of output greater than 45 kW.

**BS EN 60335, Part 1.** Safety of Household & similar electrical appliances. **BS 3456, Part 201:** Electrical Standards.

**CP 342:** Centralised hot water supply. Part 2: Buildings other than individual dwellings.

**I. Gas E. Publications**

**IGE/UP/1** Soundness testing and purging of industrial and commercial gas installations.

**IGE/UP/1A** Soundness testing and direct purging of small low pressure industrial and commercial natural gas installations.

**IGE/UP/2** Gas installation pipework, boosters and compressors in industrial and commercial premises.

**IGE/UP/10** Installation of gas appliances in industrial and commercial premises **Part 1** flued appliances.

**Health and Safety Executive: -**

**Guidance Note PM5** - Automatically controlled steam and hot water boilers.

**CIBSE Publications:- "CIBSE Guide"**

It is impractical in this document to specify all relevant information, but the following extracts from the above references are emphasised since failure to comply with these requirements will almost certainly result in an unsatisfactory installation.

### 3.2 Feed Water Quality

If the boiler feed water has a high degree of hardness, it is recommended that the water be treated to prevent precipitation of scale or sludge in the boiler water passageways. Details of additives can be obtained from any reliable manufacturer of water treatment products or the local water authority.

It should be noted however, that even if the boiler water is of average hardness, not requiring treatment, subsequent draining of the system for repair or constant make-up water due to an undetected leak will cause additional deposits and gradual build-up of scale. It is essential therefore, that leaks are attended to promptly and draining is kept to an absolute minimum.

It is recommended that the system be flushed out at least twice before any water treatment is added. If any doubt exists regarding the internal cleanliness of an old system, consideration should be given to the fitting of a coarse filter in the return pipework to the boilers.

### 3.3 Adequate Water Flow

The Hamworthy Wessex boiler is designed as a quick response, low water content unit, to run continuously with maximum reliability. Care should be taken in the initial design and layout having due regard for adequate water flow through the boilers and the influence of the system controls.

The Wessex boiler is a high efficiency appliance tested with flow/return temperatures of 80°C/65°C. It is recommended that the system design should ensure a minimum return temperature of 50°C.

If the temperature / flow rates of the application cannot meet those given in Figure 2.2. it may be necessary to incorporate mixing valves and shunt pumps to ensure that the boiler will operate satisfactorily.

Figure 2.2. shows recommended and minimum water flows required with the associated pressure losses. The control system and valves, where fitted, should be regulated to avoid lower flows occurring. The flow corresponding to 15°C temperature rise across the boiler is the minimum recommended at any time.

### 3.4 Time Clock Control

In order to avoid local overheating and progressive calcium deposition at zero flow conditions where boilers are operated from time clocks, provision should be made for a 5 minute circulating pump over-run after the last boiler has ceased firing.

**NOTE!** Time clocks should not interrupt live, neutral or earth connections, see **Section 9.0: ELECTRICAL SUPPLY** for details. See Figures 8.12 and 9.1 for wiring details.

### 3.5 Minimum System Water Pressure

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

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

**2)** Single installed boiler running at 90°C flow temperature. Minimum head required = 3.0 metres or 0.30 bar. **See Section 8.10.1.**

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

**4)** Modular boiler installation running at 82°C flow temperature and 15°C rise across system. Minimum head required = 6.5 metres or 0.64 bar. See **Section 8.11** for Pressurised Water Systems.

## 4.0 LOCATION

**4.1** (See Figures 2.1. & 2.2. for dimensions /clearances and weights.) The location chosen for the boiler **MUST** permit the provision of a satisfactory flue system and an adequate air supply. The location must also provide adequate space for servicing and air circulation around each unit. This includes any electrical trunking laid along the floor and to the appliance.

Allow adequate space, this must not be less than 900mm at the rear, for flue and flow / return connections. Allow 650mm (minimum) in front of the boiler for servicing.

The boiler must be installed on a level non-combustible surface that is capable of adequately supporting its weight (when filled with water) and any ancillary equipment.

The boiler can be manoeuvred into position utilising bars through the 4 holes in the sides of the base.

Any combustible material adjacent to the boiler and the flue system must be so placed or shielded to ensure that its temperature does not exceed 65°C.

Further details regarding boiler location are given in **BS 6644**.

## 5.0 GAS SUPPLY

### 5.1 Service Pipes

The local gas region must be consulted at the installation planning stage in order to establish the availability of an adequate supply of gas. An existing service pipe must not be used without prior consultation with the local gas region.

### 5.2 Meters

A new gas meter will be connected to the service pipe by the local gas region, or a local gas region contractor. An existing meter should be checked, preferably by the gas region, to ensure that it is adequate to deal with the rate of gas supply required.

### 5.3 Gas Supply Pipes

Supply pipes must be fitted in accordance with **BS 6891 or IGE/UP/2**. Pipework from the meter to the boiler must be of adequate size. Do not use pipes of a smaller size than the boiler gas connection. The complete installation must be purged and tested for soundness as described in **BS 6891 or IGE/UP/1 & IGE/UP/1A** as appropriate.

Each Wessex 220 M module is supplied with an individual gas pipe which exits rearwards on the right hand side, see Figure 2.1. for position. The incoming mains gas supply must be capable of supplying gas to the boiler at the required pressure and volume, under all firing conditions. An approved isolating valve and union should be installed for each boiler in a convenient and safe position and be clearly marked.

### 5.4 Boosted Supplies

Where it is necessary to employ a gas pressure booster, the controls must include a low pressure cut-off switch at the booster inlet. The local gas region must be consulted before a gas pressure booster is fitted.

### 5.5 Boiler House Control Valve

A manual valve for boiler house isolation shall be fitted in the gas supply line. It shall be clearly identified and readily accessible for operation, preferably by an exit.

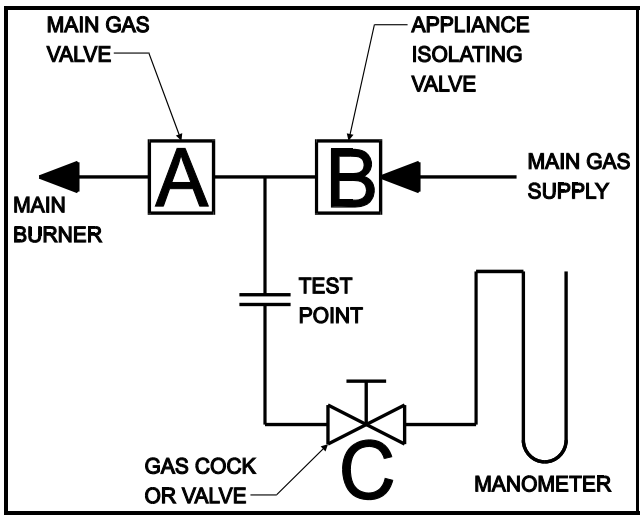
### 5.6 Boiler Gas System Leak Check

Ensure that the appliance manual gas service valve is in the OFF position.

Although the boiler receives a gas leak check and gas train component integrity check prior to leaving the factory, transport and installation may cause disturbance to unions, fittings and gas valve assemblies etc. During commissioning a further test for soundness should be carried out on the boiler gas pipework and components. A procedure guide is given below, refer to Figure 5.1. Care must be taken not to allow leak detection fluid (if used) on or near any electrical parts or connections. **Note:** In the case of M440 & M660

appliances, the test detailed should be carried out on each module.

**Figure 5.1 Gas valve/pipework leak test procedure.**




**Note:-**
Main Gas Supply Pressures
Natural Gas - 20mbar
LPG Propane - 37mbar

**TO CHECK B**

**1)** Turn off the electrical power and gas to the appliance.
**2)** Connect the manometer assembly to test point (Fitted on the inlet to the gas valve).
**3)** With A and B closed open C and monitor manometer over a 2 minute period, a rise indicates a leak on valve B.

**TO CHECK A**

**1)** Open C.
**2)** Open B to produce the mains gas supply pressure between A and B.
**3)** Close B.
**4)** System may be considered sound if over a period of 2 minutes any drop in pressure is less than 0.5 mbar (0.2" wg.).

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

## 6.0 FLUE SYSTEM

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

The following notes are intended to give general guidance only.

### 6.1 Flue System General Requirements

The Hamworthy Wessex 220 M series of boilers are designed to be used with natural draught flues. Flue systems should be designed in accordance with current regulations and with reference to the **BS6644 & IGE/ UP/10**. The following points should be noted:-

Due to the high thermal efficiency of the boiler, the flue gas temperature is approximately 135°C. Condensation in the flue is thus more likely to occur than with lower efficiency boilers. 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 minimum slope of 2° upwards in the direction of the exhaust gas flow (no horizontal sections). All joints should be such that any condensation is directed back down the slope to an open drain connection in the flue. The drain pipe must be manufactured from a corrosion resistant material and be at least 15mm dia. It must also have a fall of at least 2-3° (approx. 3-5cm per metre) and connect to a drain via a waste trap.

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 Limited.

**Hamworthy Heating Limited Birmingham Office can provide a full flue design and installation service.** Refer to the rear cover of this manual for contact details.

### 6.2 Design Waste Gas Volume and Temperature

It is recommended that the volume and temperature of the waste gases used for design of the flue system are as shown in Figure 2.2.

### 6.3 Materials

Materials used for the flue system must be mechanically robust, resistant to internal and external corrosion, non-combustible and durable under the conditions to which they are likely to be subjected.

Consideration should be given to possible freezing of condense water traps and pipework. This must be avoided at all times.

### 6.4 Suction

The flue system should be designed to maintain atmospheric pressure or a slight suction at the boiler flue connection at all times (0.08 - 0.1mbar).

It is recommended that a draught stabiliser is fitted to the flue system where the suction is likely to exceed 0.1mbar or the height of the flue exceeds 4 metres.

### 6.5 Disconnection

Provisions should be made for disconnection of the flue pipe for servicing. It is advisable that bends are fitted with removable covers for inspection and cleaning as appropriate. **NOTE!** The flue system must be self supporting and not present a risk to people in or around the building.

See **Section 13: SERVICING** for further information**.**

### 6.6 Flue Discharge

The flue system must ensure safe and efficient operation of the boiler to which it is attached, protect the combustion process from wind effects and disperse the products of combustion to the external air.

The flue must terminate in a freely exposed position and be so situated as to prevent the products of combustion entering any opening in a building.

Where the flue diameter is less than 204mm (8") dia. a terminal must be fitted. Where the flue is of a larger size consideration should be given to the fitting of a flue discharge terminal or grille to stop ingress of birds etc.

### 6.7 Surface Temperatures

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

### 6.8 Flue System Location

The flue system must not be placed or fitted where there is undue risk of accidental damage to the flue pipe or undue danger to persons in the vicinity. Check that the flue and chimney are clear from any obstruction.

Wessex 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.

### 6.9 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 22mm plastic waste pipe (not supplied), which must be connected to a tundish (not supplied).

Discharge piping from a tundish should be of a synthetic material due to the mild acidity of the condensate (pH 3-5), with all discharge piping having a minimum fall of 30mm/m away from the boiler. Consideration should be given to possible freezing of condense water traps and pipework. This must be avoided at all times by routing pipework within the building, where possible.

In addition to the above the M440 and M660 flue boxes are provided with a 22 dia drain stub pipe which should be connected in a similar manner via a suitable trap.

## 7.0 AIR SUPPLY

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

**Note:-** Combustion air for the appliance is drawn through the slots in the rear edge of the side panels. It **must** be ensured that these air inlets are kept open and free from blockage at all times.

### 7.1 Air Supply By Natural Ventilation

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

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

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

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

Low Level (inlet) -
540cm$^2$ plus 4.5cm$^2$ per kilowatt in excess of 60kW total rated input (Gross).

High Level (outlet) -
270cm$^2$ plus 2.25cm$^2$ per kilowatt in excess of 60kW total rated input (Gross).

### 7.2 Air Supply By Mechanical Ventilation

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

**1)** Mechanical inlet and mechanical extract can be utilised providing the design extraction rate does not exceed one third of the design inlet rate.

**2)** Mechanical extract ventilation with natural inlet ventilation **MUST NOT** be used.

**NOTE:** 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.

**Figure 7.1 Mechanical Ventilation Flow Rates**

| | Flow rate per 1000kW total rated heat input (Gross) | |
|---|---|---|
| Atmospheric Boilers | Inlet air (Combustion ventilation) | Extract air (ventilation) |
| | $m^3/s$. | $m^3/s$. |
| Volume | 1.10 | 0.45 |

## 8.0 WATER CIRCULATION SYSTEM

### 8.1 General

The Wessex Boiler has a low water content and the requirements of minimum water flow are given in **Section 8.8: Minimum Water Flow Rates** and Figure 2.2. Recommendations for the water circulation system are given in **BS 6644** and **CP 342**. The following notes are of particular importance:-

**1)** In a combined central heating and hot water system, the hot water storage vessel must be of the indirect cylinder or calorifier type. The hot water storage vessel should be insulated preferably with not less than 75mm (3 in) thick mineral fibre, or its thermal equivalent.

**2)** Circulating pipework not forming part of the useful heating surface should be insulated to help prevent heat loss and possible freezing, particularly where pipes are run through roof spaces and ventilated cavities. Cisterns situated in areas, which may be exposed to freezing conditions, should also be insulated. Insulation exposed to the weather should be rendered waterproof.

**3)** Drain valves must be located in accessible positions which permit the draining of the whole system, including the boiler and hot water storage vessel.

**4)** Each boiler module has G2½ male flow (indicated with a red spot) and return (indicated with a blue spot) connections. Boilers should be connected by flow and return headers. Headers should be connected to the system in a "reverse / return" arrangement (the water flow in each header is in the same direction) to ensure equal flow in each module, or with a “single pipe header system”. Figure 1.1. shows typical layouts.

**5)** Ideally, individual valves should be fitted to each module to enable isolation from the system, however, the arrangement must comply with the requirements of **BS 6644.** See **Section 10.3 Water Connections.**

### 8.2 Pressure Relief Valve (Safety Valve)

The most important single safety device fitted to a boiler is its safety valve. Each boiler module is provided with a capped R¾” stub pipe for the fitting of a safety valve (non HHL supply).

**BS 6644** provides comprehensive information for the selection and location of safety valves and attention is drawn to the higher capacity requirements of safety valves for pressurised hot water systems.

### 8.3 Open Vent and Cold Feed Pipe

(See **BS 6644** for further information.)

Every boiler or group of boilers should have an open vent pipe and cold feed pipe installed between the boiler and the first water isolating valve. The minimum bore (mm) of these pipes per installation is shown in Figure 8.3.

The vent pipe must rise continually, any valve fitted between a boiler and the open vent pipe for maintenance purposes shall be of the 3 way type such that when closed to the vent pipe the boiler will be open to atmosphere.

The vent pipe shall be protected against freezing where this might occur.

**Figure 8.3. Cold Feed and Vent Pipe Sizes**

| Boiler Output | Feed | Vent |
|---|---|---|
| 220 kW | 32 | 38 |
| 440 kW | 38 | 50 |
| 660 kW | 50 | 55 |

### 8.4 Altitude Gauge (Water Pressure Gauge)

Every boiler or group of boilers should be provided with a gauge complete with isolating valve. See Figure 1.1. for typical position.

### 8.5 Thermometer

See Figure 1.1. for typical position.

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

### 8.6 Drain Valves

Each boiler should have a 15mm NB drain valve (not HHL 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**. See Figure 1.1. for recommended positions.

### 8.7 Circulating Pump

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

**Note:-** If boilers are run off time clock control, a pump overrun (not H.H.L. supply) should be fitted which must run for a minimum of 5 minutes on shut-down of the last boiler.

### 8.8 Minimum Water Flow Rates

Minimum water flow rates are shown in Figure 2.2. 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.

### 8.9 Waterside Pressure Drop

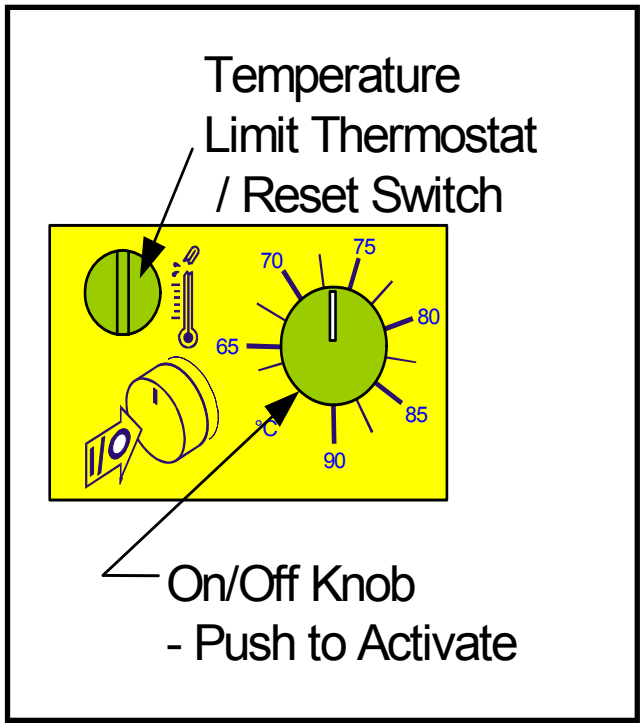
The waterside hydraulic resistance (Pressure drop) is shown in Figure 2.2.

### 8.10 Control Schemes

#### 8.10.1 Temperature Controls

An electronic control thermostat using a PT1000 temperature sensor is incorporated within the boiler controls. A fascia mounted potentiometer is used to adjust the control thermostat set point between the range 65 to 90°C. The potentiometer also acts as the boiler on/off switch via a push and release action. A standard electro-mechanical temperature limiter, (hand reset limit thermostat) is also fitted to the boiler and must be set at 95°C. The thermostat controls are accessible by removing the thermostat cover plate from the boiler front cover. A quarter turn latch is used to retain the thermostat cover plate in place.

**Figure 8.10.1 Temperature Controls and Boiler On/Off Switch**




#### 8.10.2 Water Flow Controls

Any external mixing valve / shunt pump or similar controls **MUST** always ensure that the minimum water flow rate as shown in Figure 2.2. 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.

#### 8.10.3 Frost Protection

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

### 8.11 Unvented Systems

See Figure 1.1. for typical layout of an Unvented (Pressurised) Hot Water System. For system design refer to **BS 7074 Part 2.**

In order to correctly size a pressurisation unit for any heating system certain parameters are required. These are:-

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

From the above information Hamworthy Heating can size the pressurisation unit and also the expansion vessel required.

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

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

### 8.12 Modular Boiler Control Schemes

For modular installations of the Wessex 220 M range of boilers, Hamworthy Heating can supply an optional Milton fully modulating boiler sequence control system.

This system comprises a wall mounted control which communicates with the boilers, water temperature sensor, room sensor (optional) and outside temperature sensor (optional). The Milton incorporates diagnostic and data logging capabilities. For further information, contact Hamworthy Heating for details.

In order to enable remote fully modulating boiler control by a non-HHL control system Hamworthy Heating can also supply an optional Sequencing Interface Module fitted within each boiler module's control panel. This interface module will control the boiler firing rate based on the level of a 0-10V analogue signal from the external control system. A 0-10V output from the external control system will be required for each boiler module.

Alternatively, the Wessex 220 M boilers can be set to a high/low mode of operation for sequence control, via the remote stop/start control loop and a high/low control loop, by a non HHL control system. – see Figure 8.12.

## 9.0 ELECTRICAL SUPPLY

**WARNING:- THIS APPLIANCE MUST BE EARTHED**

Wiring external to the boiler must be installed in accordance with the IEE Regulations and any local regulations which apply. Wiring must be completed in heat resistant 3-core cable. (Size 1.0mm$^2$ csa). Boilers are normally supplied suitable for 230 volts, 50 Hz. PCB fuse rating is T1A for 'F1' and F2A for 'F2'. External fuses should be 6A for all boiler models.

**3 Phase Electrical Supplies** - Individual modules of M440 and M660 boilers and boilers installed in close proximity to each other **MUST NOT** be supplied from different phases of the 3 phase supply.

The method of connection to the mains electricity supply must facilitate complete electrical isolation of the single boiler/battery with a contact separation of at least 3-mm in all poles.

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

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

Models M440 and M660 - It is highly recommended that each boiler module is connected via its own mains isolator to facilitate servicing and maintenance of individual boiler modules whilst leaving the remaining modules in operation.

**NOTE!** Volt free contact electrical supplies must also be isolatable where fitted. Further details regarding connection to the electricity supply are given in **BS EN 60335, Part 1 or BS 3456, Part 201**.

**The mains power supply MUST NOT be switched by a time-clock control.** The mains power supply must be maintained at all times. Each Wessex 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 Figures 8.12 and 9.1 for typical site wiring connections. See **BS 6644** for further information. **DO NOT feed mains voltage onto these terminals.**

### 9.1 Site Wiring

Access to the controls is achieved by turning the ¼ turn latch and removing the front cover. Note the latch arm passes through a horizontal keyhole slot that requires the latch arm to be correctly aligned prior to removal of the cover.

Note that the front cover is retained in position by spring clips in the front edges of the side panels. Site installed electrical cabling should enter the boiler control panel via the 25mm dia. conduit connection located on the lower left hand side.

The main boiler control PCB incorporates screw terminals for the site wiring connections. Care must be taken to ensure correct connections are made to the relevant terminals before applying power. DO NOT overtighten the screw terminals.

Refer to Figures 8.12 and 9.1 for typical wiring diagrams.

### 9.2 Indication Signals and Volt Free Contacts

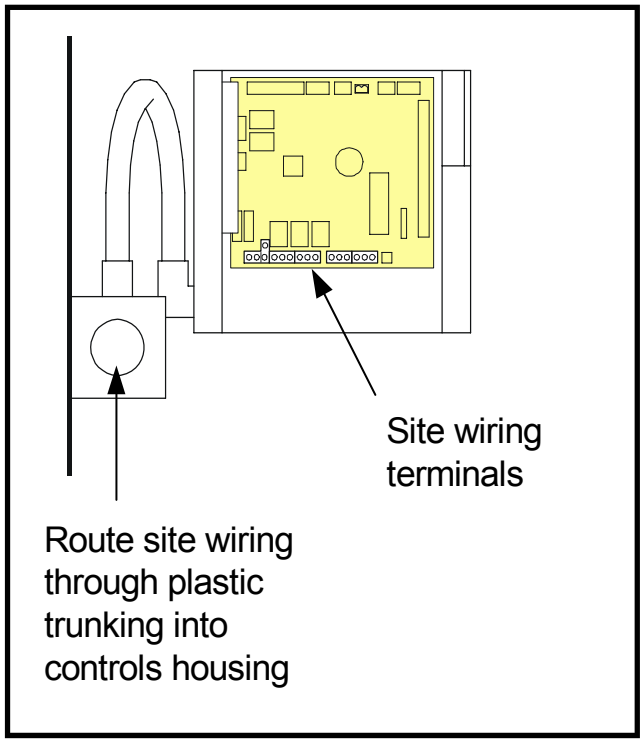
Volt free contacts are provided to enable external indicator lights or alarms to derive signals for normal run, overheat and lockout.

**Note:-** These external circuits **MUST** be isolated before obtaining access to the controls for any service or maintenance procedures to be carried out.

### 9.3 Sequencing Interface Module (Optional)

The interface module is supplied fitted to the boiler control panel and with the control connections to the boiler main control PCB made. The interface module requires a 230V ~ 50Hz L & N supply. The interface module PCB fuse rating is T250mA. It is recommended that the interface module is supplied from the same mains isolator as the boiler module it is fitted to.

**Figure 9.1.1 Site Wiring Connections - Control Panel Layout**

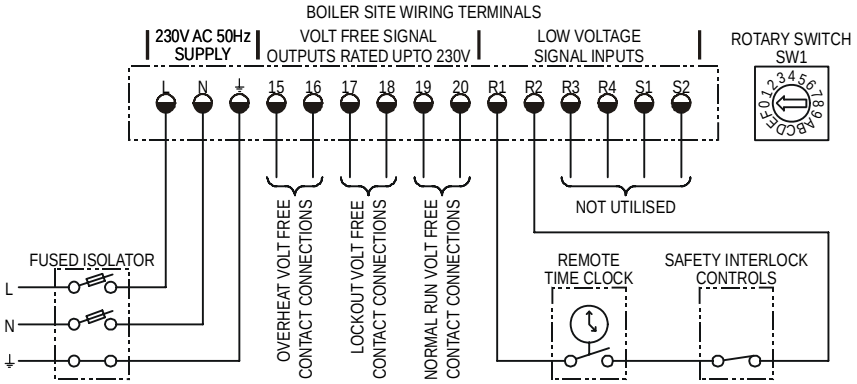



A 0-10V analogue control signal from the external sequence control system is required, ground and signal connections. The interface module is configured to give a linear response to the 0-10V signal between 2.0V (20% rate) and 10.0V (100% rate). Below the 2.0V the boiler will operate at 20% rate until the input signal falls below 0.3V at which point the boiler is shut down. There is ±0.1V switching hysteresis.

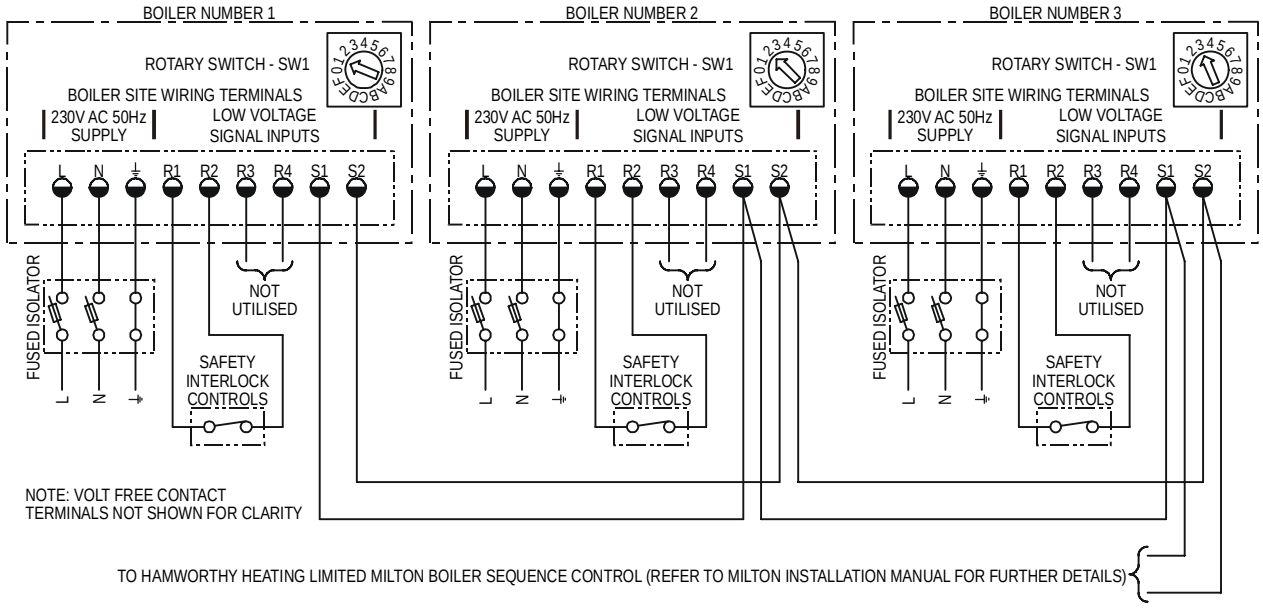
The sequencing interface module incorporates a 10way plug/socket screw terminal block to make the site wiring connections. Refer to Figure 8.12 for wiring connection details.

**Figure 8.12 Site Wiring Diagram (Page 1 of 2)**

1) SINGLE BOILER INSTALLATION, FULLY MODULATING OPERATION VIA REMOTE TIME CLOCK CONTROL.
NOTE: ROTARY SWITCH 'SW1' ON BOILER CONTROL PANEL MAIN PCB - POSITION '0' SETS BOILER TO FULLY MODULATING OPERATION.




2) MULTIPLE BOILER INSTALLATION, FULLY MODULATING SEQUENCED OPERATION VIA HAMWORTHY HEATING LIMITED MILTON BOILER SEQUENCE CONTROL.
NOTE: ROTARY SWITCH 'SW1' ON BOILER CONTROL PANEL MAIN PCB - POSITIONS '1' THROUGH '9' SETS BOILER TO MILTON SEQUENCED OPERATION, AND SETS THE BOILER FIRING ORDER.




3) MULTIPLE BOILER INSTALLATION, HIGH/LOW SEQUENCED OPERATION VIA NON HAMWORTHY HEATING LIMITED BOILER SEQUENCE CONTROL.
NOTE: ROTARY SWITCH 'SW1' ON BOILER CONTROL PANEL MAIN PCB - POSITION 'A' SETS BOILER TO TO HIGH/LOW SEQUENCED OPERATION.

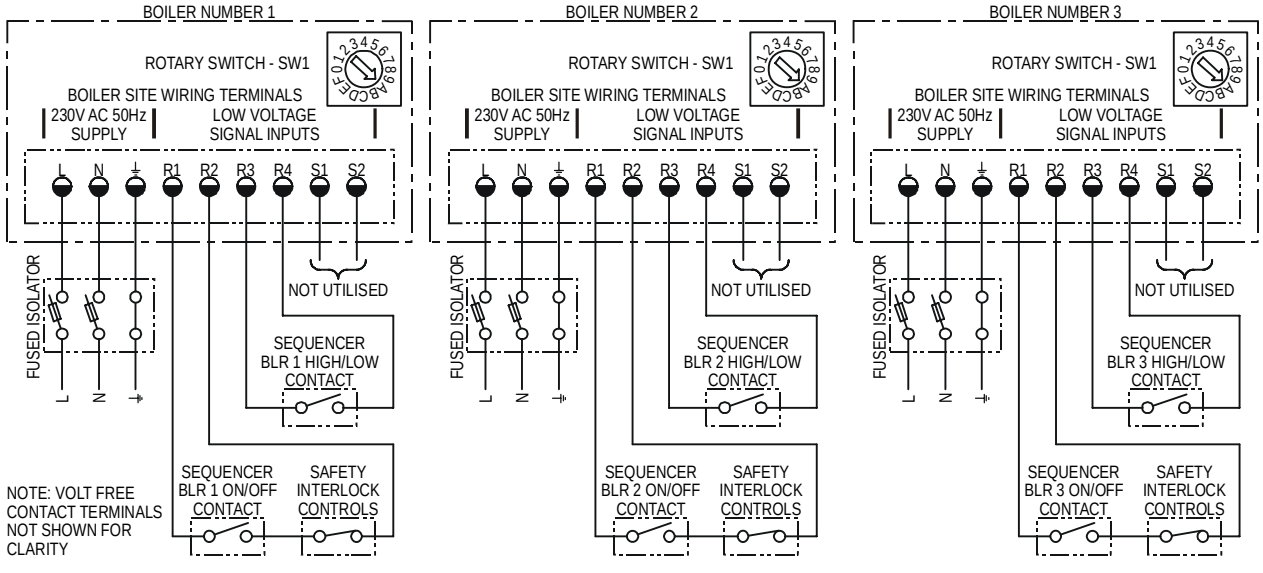


**Figure 8.12 Site Wiring Diagram (Page 2 of 2)**

4) MULTIPLE BOILER INSTALLATION, FULLY MODULATING SEQUENCED OPERATION VIA 0-10V ANALOGUE CONTROL SIGNALS FROM A NON HAMWORTHY HEATING LIMITED BOILER SEQUENCE CONTROL SYSTEM, UTILISING OPTIONAL HAMWORTHY HEATING LIMITED SEQUENCING INTERFACE MODULES.
NOTE: ROTARY SWITCH 'SW1' ON BOILER CONTROL PANEL MAIN PCB - POSITION '1' SETS BOILER TO REMOTE FULLY MODULATING SEQUENCED OPERATION. ROTARY SWITCH 'SW1' ON SEQUENCING INTERFACE MODULE PCB - POSITION '0' FOR 0-10V ANALOGUE CONTROL SIGNAL OPERATION.

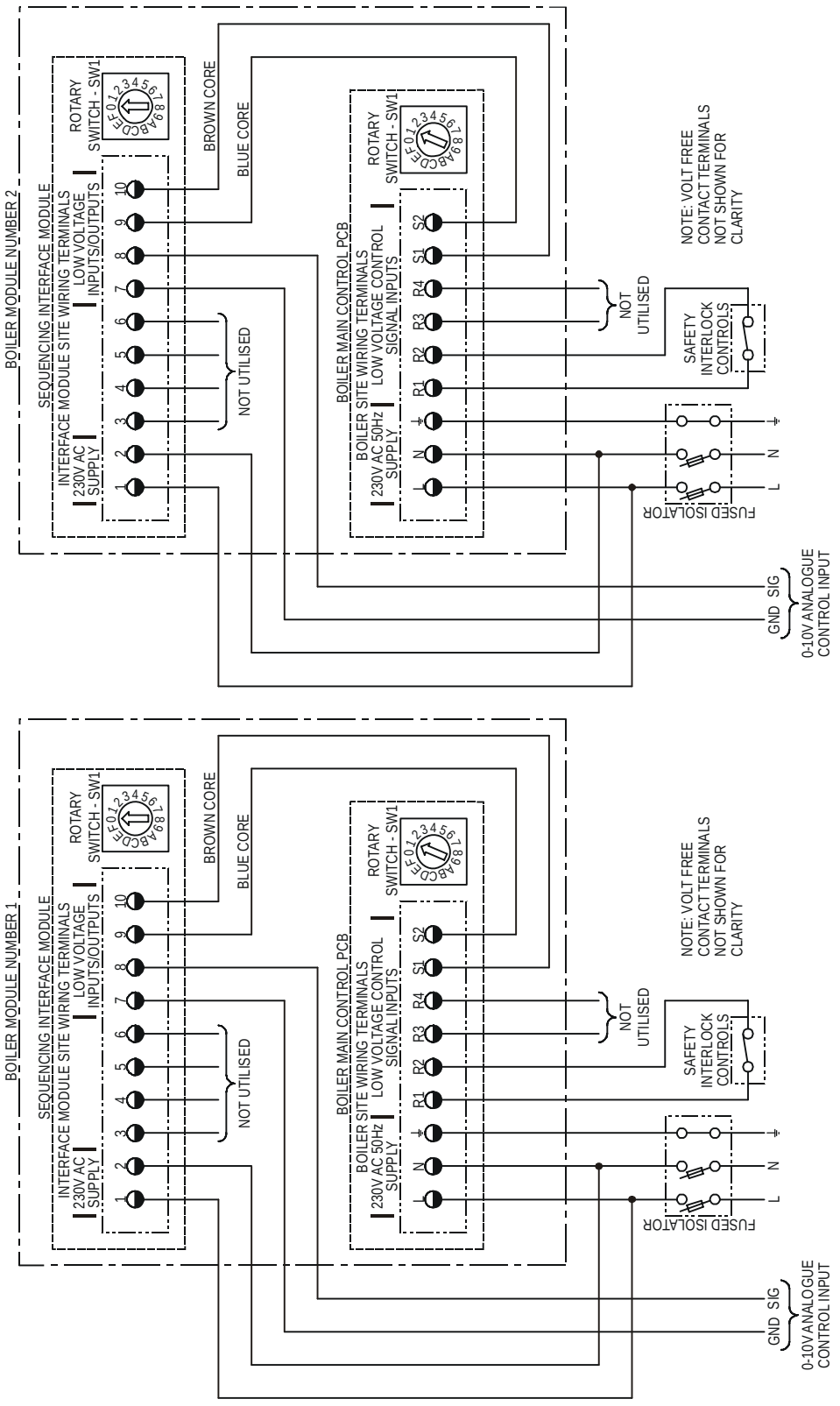
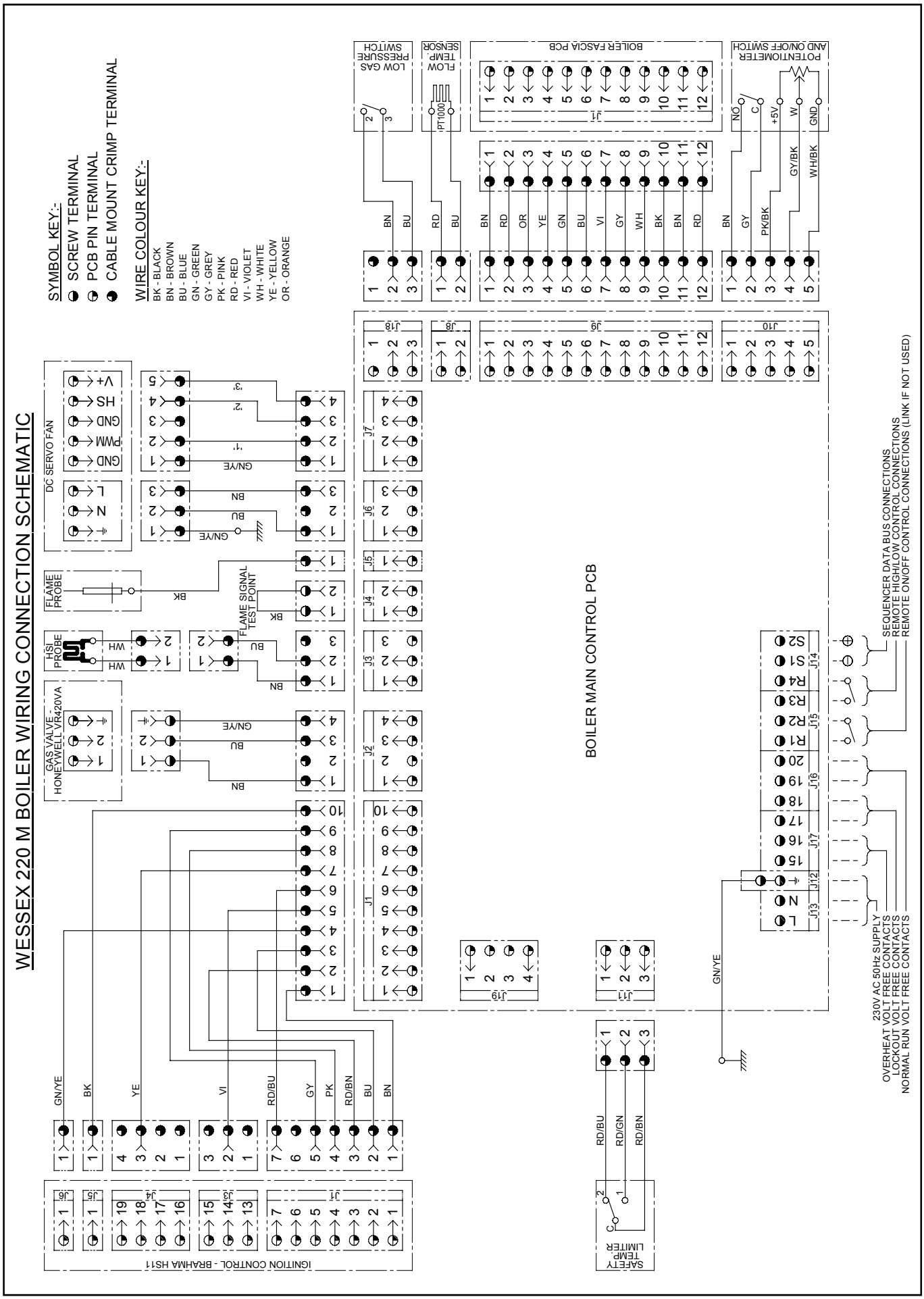


**Figure 9.1 Wiring Schematic**



## 10.0 BOILER ASSEMBLY AND INSTALLATION

### 10.1 General

Each boiler is normally despatched to site as a pre-assembled unit for floor mounting and should be stored in a weatherproof place prior to installation. In the case of the M440 and M660 boilers, there will also be a pack containing the flue box system for each boiler.

The boiler should be positioned to allow at least the minimum clearances detailed in Figure 2.1 allowing rear access for pipework and flue connections.

During installation, care must be taken to prevent damage to the boiler casing panels prior to the contract completion.

### 10.2 Connection of Boilers to the Flue System

Notes on the recommendation for design of the flue system are given in **Section 6:FLUE SYSTEM**.

No fixed draught diverter is fitted to the boiler, nor is one required in the flue system. Flues must be constructed with suitable materials to resist corrosion against the acidic nature of the flue gases. Materials used in the joints must also resist attack.

For the M220 model, the flue connection is a spigot with an ID of 153mm, terminating horizontally at the rear of the boiler, see Figure 2.1. It is recommended that connection to a flue system is via an elbow off the boiler and a minimum vertical height of 1m.

For the M440 and M660 models, the flue connection is a spigot with ID's of 254mm and 305mm respectively, terminating vertically at the rear of the boiler on top of the flue header, see Figure 2.1. A minimum vertical height of 1m is recommended for the flue. The flue spigot provided is suitable for accepting twin-wall flue pipe. Sealing of the flue to the spigot should be made using a suitable caulking string and cold caulking compound.

It is important, for service requirements, that the flue system is fully self supporting. Check the flue and chimney are clear from obstruction.

#### 10.2.1 Flue Kit Fitting.

**Applicable for M440 and M660 boilers only.**

1) Loosen the nuts securing the flue spigot castings to the boiler casing.
2) Loosen the worm drive clamps on the flue spigot sockets. It will be noted that the flue socket is provided with an internal shoulder. Apply a suitable sealing compound around this shoulder.
3) Lift flue box into position ensuring that the flue spigots locate squarely against the shoulder. Tighten the worm drive clamps until the socket lightly contacts the spigot.
4) Tighten the nuts securing the flue spigot castings to the boiler casing, ensuring that the flue header is positioned squarely.

### 10.3 Water Connections

See Figure 2.1. for position of water connections (flow and return). Care must be taken when installing water system pipework that undue stress is avoided on the boiler flow and return connections (identified by red and blue dots). It is recommended that unions are fitted local to the boiler to permit future servicing requirements.

If the boiler is installed into an open-vented system, fully closing valves **must not** be connected to both flow and return pipes. Any valve fitted between the boiler module and the vent pipe shall be of the three way type such that when closed to the vent the boiler module will be open to atmosphere.

If the boiler is installed into a pressurised (unvented) system, fully closing valves may only be fitted to both flow and return pipes if each boiler module is fitted with an individual, correctly sized pressure relief valve.

Optional reverse return water manifold kits are available for models M440 and M660. Refer to section 1.8.

## 11.0 COMMISSIONING AND TESTING

For general layout of boiler, refer to Figures 2.1. & 11.1.

### 11.1 Electrical Installation

Wiring **MUST** be checked by a suitably competent person. Power supply required is 230 volts 50 Hz single phase. Isolator(s) correctly fused at 6A should be sited adjacent to the boiler.

Access to the controls is achieved by turning the ¼ turn latch and removing the front cover. Note the latch arm passes through a horizontal keyhole slot that requires the latch arm to be correctly aligned prior to removal of the cover.

Site installed electrical cabling should pass through the 25mm dia. conduit connection located on the lower left hand side. The boiler is supplied with a remote stop/ start circuit for time-clock operation. **Any other interlocks, i.e. Pressurisation unit, BEM System should be wired in series with the remote stop/start loop.**

The site wiring terminal rail is marked with Live, Neutral and Earth connections. See Figures 8.12 and 9.1 for details.

A schematic of the control circuit is shown in Figure 9.1.

### 11.2 Gas Installation

For design see **Section 5: GAS SUPPLY.**

The whole of the gas installation including the meter must be inspected and tested for soundness and purged in accordance with the recommendations of **IGE/UP/1** or **IGE/UP/1A** as appropriate.

### 11.3 Water Circulation System

For design see **Section 8: WATER SYSTEM.**

The system should be thoroughly flushed out with cold water without the pump in position. Ensure all the valves are open.

With the pump fitted the system should be filled and air locks cleared. Vent the radiators and check for leaks.

If the system is unvented the pressurisation unit should not be utilised for the initial filling. This should be carried out using a WRAS approved double check valve and temporary filling loop. In order to comply with local Water Authority Regulations, this loop must be disconnected when filling is complete. Water treatment should not be fed through the pressurisation unit unless permitted by the manufacturer. Check the expansion vessel cushion pressure as detailed by the manufacturer's Installer's Guide.

### 11.4 Commissioning The Boiler

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

**1)** Flueway passages to chimney are clear.

**2)** Adequate ventilation as per **Section 7: AIR SUPPLY** exists in the boiler house. The air inlet slots on the appliance side panels are clear and open.

**3)** The system is fully charged with water, ready to receive heat. All necessary valves are open and the pump is circulating water.

**4)** The pipework and valve arrangement is installed to Hamworthy Heating recommendations in such a way that water flow rates will be in accordance with Figure 2.2.

**5)** The gas supply pipework is clear of any loose matter, tested for soundness and purged to **IGE/UP/1** or **IGE/ UP/1A** as appropriate.

**6)** The condensate discharge is connected to a drain.

#### 11.4.1 Boiler Checks Prior To Lighting

**Note:-** Refer to Figure 2.2. for Natural Gas maximum inlet pressure for normal operation.

Information relating to propane firing can be found in Appendix 'A'.

**1)** Ensure the gas supply is connected, but the boiler module gas service valve(s) are closed. Any unions or fittings are correctly tightened and test points are closed.

**2)** 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 and secure. Reset and test the operation of the temperature limiter by firmly pressing the reset button (on controls fascia), removing the clip and bulb from the pocket and carefully applying a heat source to the bulb. The reset button should operate. If satisfactory, refit the bulb in the pocket and secure with the clip. Ensure the thermostat bulbs are fully inserted into the pocket.

**3)** Check setting of both temperature limiter and control thermostat. The temperature limiter must be set at 95°C maximum. This can be achieved by unscrewing the plastic cover (if fitted) , unscrewing the shaft securing nut and withdrawing the limiter rearwards from controls housing. Adjust if required and refit in reverse order to that above. Set control thermostat to required temperature using scale plate as a guide.

**4)** To assess flame signal when in operation locate test link 'J4' in the top right-hand region of the main control PCB. Insert a multimeter across the two screw terminals of J4 set to read dc µA.

**5)** To ensure correct ignition of the boiler it is recommended to 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 and measuring the resistance across the pins of the 2 way connector. The reading should be between 70 and 110 ohms.

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

**Caution: When the front cover is removed and the boiler is in operation, it is possible for loose articles of clothing or long hair to be drawn into the venturi / fan.**

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

#### 11.4.2 Procedure For Initial Lighting

Before switching on the electrical supply to boiler module ensure that the 16 position rotary switch, marked 'SW1' on the boiler control panel main PCB is set to the '0' position.

Ensure the boiler module gas service valve is closed. Switch on the boiler module electrical mains supply isolator and ensure that the boiler on/off switch / thermostat control (on the fascia) is in the on position (amber 'boiler on' indicator on fascia illuminated). Press the red lockout reset button on the fascia to reset the controls, (wait at least 15 seconds before pressing again if the red lockout indicator is not extinguished). The combustion fan will start and run at full speed for a pre-purge period (approximately 20 seconds). During this time the 'fan running' indicator will illuminate. After the pre-purge the fan speed will reduce to the ignition speed and the HSI system will operate causing the igniter to glow (visible through the viewing port). After a delay of approximately 10 seconds the gas control valve will be energised, the 'boiler running' indicator on the fascia and the amber neon indicator on the gas control valve will illuminate. As the gas service valve is closed, the controls will go to lockout (red lockout indicator on the fascia illuminated) at the end of the ignition safety time of 5 seconds. If the above occurs correctly, OPEN the gas service valve and press the red lockout reset button on fascia.

The boiler module will commence its ignition sequence, this time when the gas control valve is energised the burner will light. At the end of the ignition safety time the HSI system will be switched off, and after a delay of 15 seconds the fan will speed up to full rate (dependent on the water temperature).

With the burner firing the flame signal measured with the multimeter should be at least 2µA.

To check for correct operation of the ignition controller, remove multimeter test link (terminal J4 on the PCB). The boiler should lockout after approximately one second. Check that the flame has been extinguished. Replace link then wait at least 15 seconds before pressing the lockout reset button on the fascia to reset the ignition controller. After a waiting period the boiler will light and run normally.

When all 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 inlet to the gas valve, with a maximum inlet pressure of 25mbar.

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

**Note:-** Each boiler module is fitted with a low gas supply pressure switch, which disables operation of the boiler module in the event of low gas supply pressure. Refer to figure 2.2 for correct switch setting.

Switch off the boiler module(s) by pressing the push button on/off switch / thermostat control on the boiler module fascia(s).

**11.4.3** The boiler modules are pre-set at the factory, however site checks **must** be undertaken to confirm correct performance.
Refer to figure 11.1 for general layout and relevant components.

**1)** Isolate the module electrical supply and ensure that the rotary selector switch 'SW1' on the main control PCB is set to position 'A'.

**2)** Fit a wire link across terminals R1 and R2 on the main control PCB and a wire link across terminals R3 and R4.

**3)** Remove the plug from the flue gas sampling point located on the top left hand region of the front of the module casing and insert the combustion analyser probe. **Note:-** The probe **must** be inserted a measured distance of **200mm**.
**4)** Energise electrical supply and start the boiler module, it will ignite the burner and run continuously at full rate.

**5)** Monitor the combustion readings indicated on the combustion analyser.

**Target:-**

$CO_2$ = 9.0% ±0.3%
CO = 0-100ppm*

(Note above readings taken with front cover removed and 200mm probe insertion).

* Figure must not exceed 200ppm under normal operating conditions.

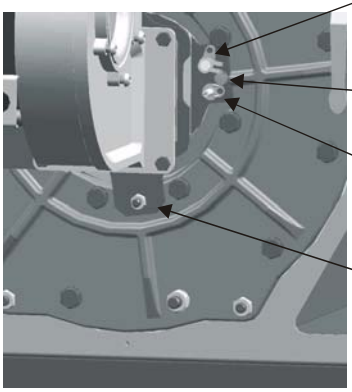
If combustion readings fall within the required range the boiler module is set and operating correctly.

If the combustion readings fall outside the required range the burner settings will require adjustment. These adjustments involve a specific setting procedure requiring specialist equipment. Therefore it is recommended that Hamworthy service personnel, who carry the necessary equipment, should be utilised to make these adjustments and commission the appliance. Contact Hamworthy Heating technical department for further details.

**6)** Shut down the boiler and isolate from the electrical supply, Remove all instrumentation and replace any test points and plugs.

**7)** Turn rotary switch 'SW1' back to normal operating position, '0' for stand alone modulation, 'A' for high/low sequenced operation, '1' – '9' for Milton sequenced operation, or '1' for fully modulating sequenced operation using an optional Sequencing Interface

Figure 11.1 General Layout (Front View)



HOT SURFACE IGNITER

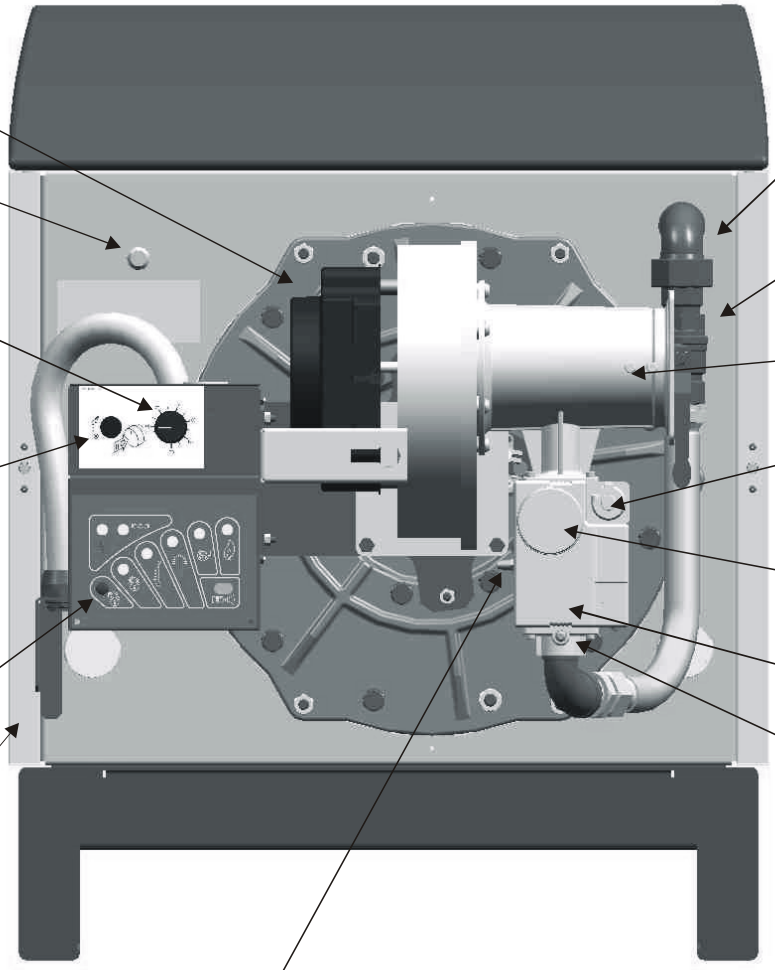
VIEW PORT

FLAME PROBE

FAN/BURNER SECURING NUT

AIR INLET VENTURI

LOCATION OF LPG ORIFICE IF FITTED



FAN MOTOR

FLUE GAS SAMPLING POINT

ON/OFF SWITCH CONTROL THERMOSTAT

LIMIT THERMOSTAT RESET

LOCKOUT RESET BUTTON

ELECTRICAL GLAND PLATE

OFFSET ADJUSTMENT +Ve GAS TAPPING

GAS PIPE

GAS SERVICE VALVE

AIR INLET VENTURI

GAS/AIR OFFSET ADJUSTMENT (FACTORY SET)

THROTTLE SCREW CO2 ADJUSTMENT (FACTORY SET)

GAS VALVE

INLET GAS PRESSURE

module. Also ensure that the rotary switch 'SW1' on the Sequencing Interface Module PCB (if fitted) is set to position '0'.

### 11.4.4 External Controls

The external controls used in typical boiler installations, for both vented and unvented systems, are shown in Figure 1.1. If different systems or controls are to be used and there are any doubts as to the suitability, contact Hamworthy Heating Technical Department for advice.

### 11.4.5 Installation Noise

In order to avoid the possibility of noise from the installation, care should be taken to follow the manufacturer's instructions. Particular attention should be paid to minimum water flow rates. If acoustic insulation is added to the boiler, care must be taken not to impede combustion or ventilation air flow. If in doubt contact the manufacturer.

### 11.4.6 User Instructions

When the above is complete, the boiler owner or their representative should be made aware of the lighting and operating instructions. A practical demonstration should be given describing each functional step. This installer's guide and the user's instructions should then be handed over and be kept in a safe place for easy reference.

## 12.0 FAULT FINDING

### 12.1 Fault Finding

### 12.1.1 Safety Features Summary

Should the control thermostat fail, the temperature limiter will trip thus creating an immediate shutdown regardless of firing mode. An overheat indicator on the controls fascia will indicate this condition has occurred. If, after pushing the reset button, the indicator on the fascia does not extinguish and the boiler does not fire up, it could be that the boiler is still too hot, i.e. the limit thermostat has not reset. Allow the boiler to cool down. An investigation should be carried out to ascertain the reason for the overheating. Another obvious reason would be too low a water flow rate through the boiler.

The flame is under constant supervision by the burner ignition controller. This is accomplished by measuring the flame's ability to rectify an AC current. If the flame diminishes for whatever reason and the rectified current drops below the controller's minimum detection current (1.2 µA DC), the controller will de-energise the gas control valve within 1 second, and commence a restart. Failure to establish and detect a flame during the light up sequence will result in burner shutdown and lockout within 5 seconds, requiring a manual reset (situated on controls fascia) to restart the ignition sequence. If the boiler continues to lockout, then an investigation must be made to ascertain the cause. See Figures 12.1 and 12.2 for possible corrective scenarios.
A false flame signal at the start and during pre-purge will cause the boiler module to restart its ignition sequence at the end of the pre-purge period. If this occurs 3 times in succession the controls will disable operation of the boiler module, requiring reset of the module on/off switch (on the controls fascia). This fault condition is indicated by a flashing sequence of the 'fan running' indicator of 5 flashes.

### 12.1.2 Fault Finding Procedures

General fault finding is shown in Figures 12.1, 12.2 and 12.3. If the boiler still cannot be operated satisfactorily after following the chart, consult the local office of Hamworthy Heating for assistance.

### 12.1.3 Possible Causes Of Boiler Lockout

1) Ignition failure due to no power at the Hot Surface Igniter.
2) Ignition failure due to faulty gas valve.
3) Ignition failure due to broken igniter or flame probe lead.
4) No or low gas supply pressure.
5) No ignition due to faulty ignition controller.

**Figure 12.1. Fault Finding Procedures.**

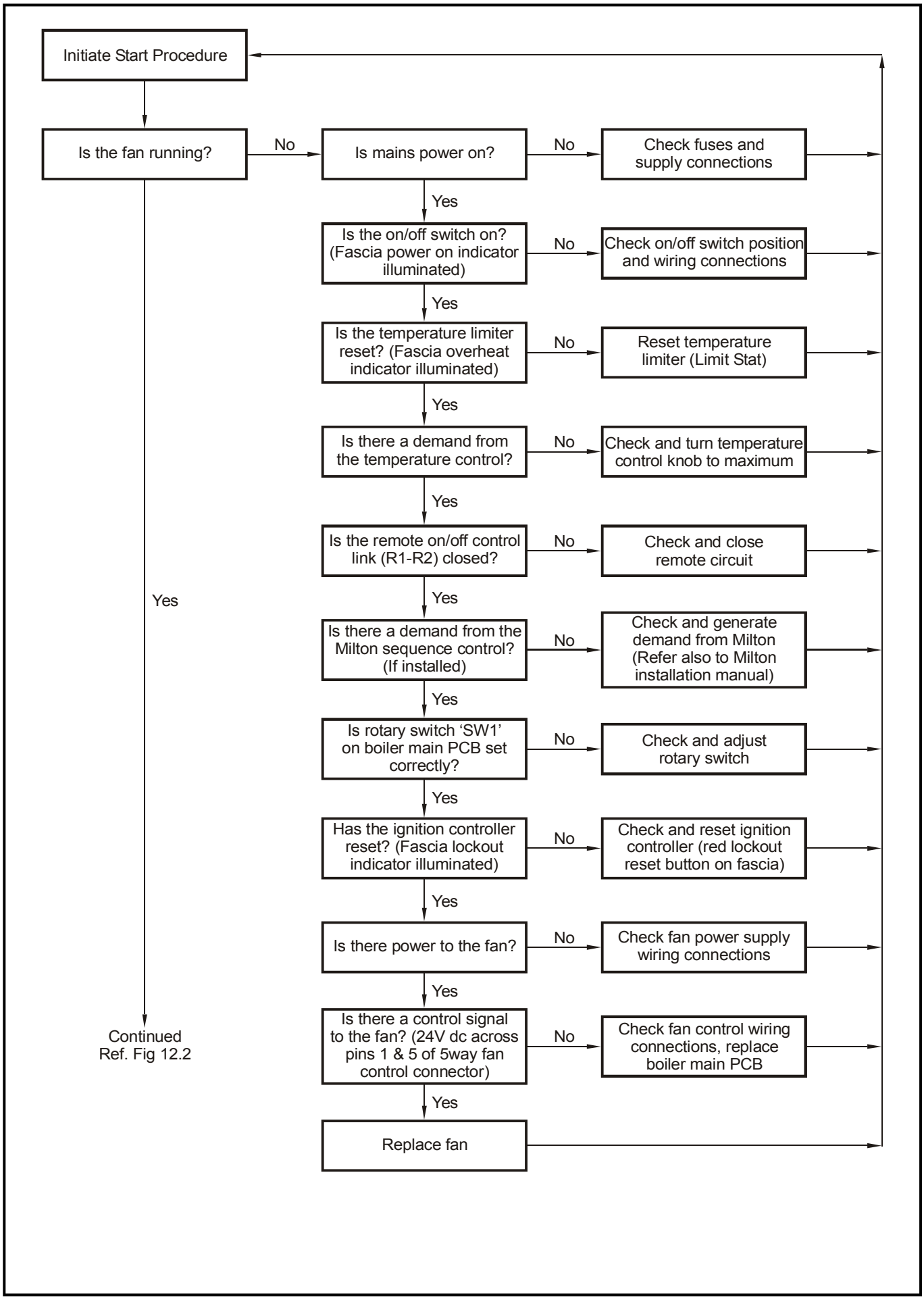


**Figure 12.2 Fault Finding Procedures.**

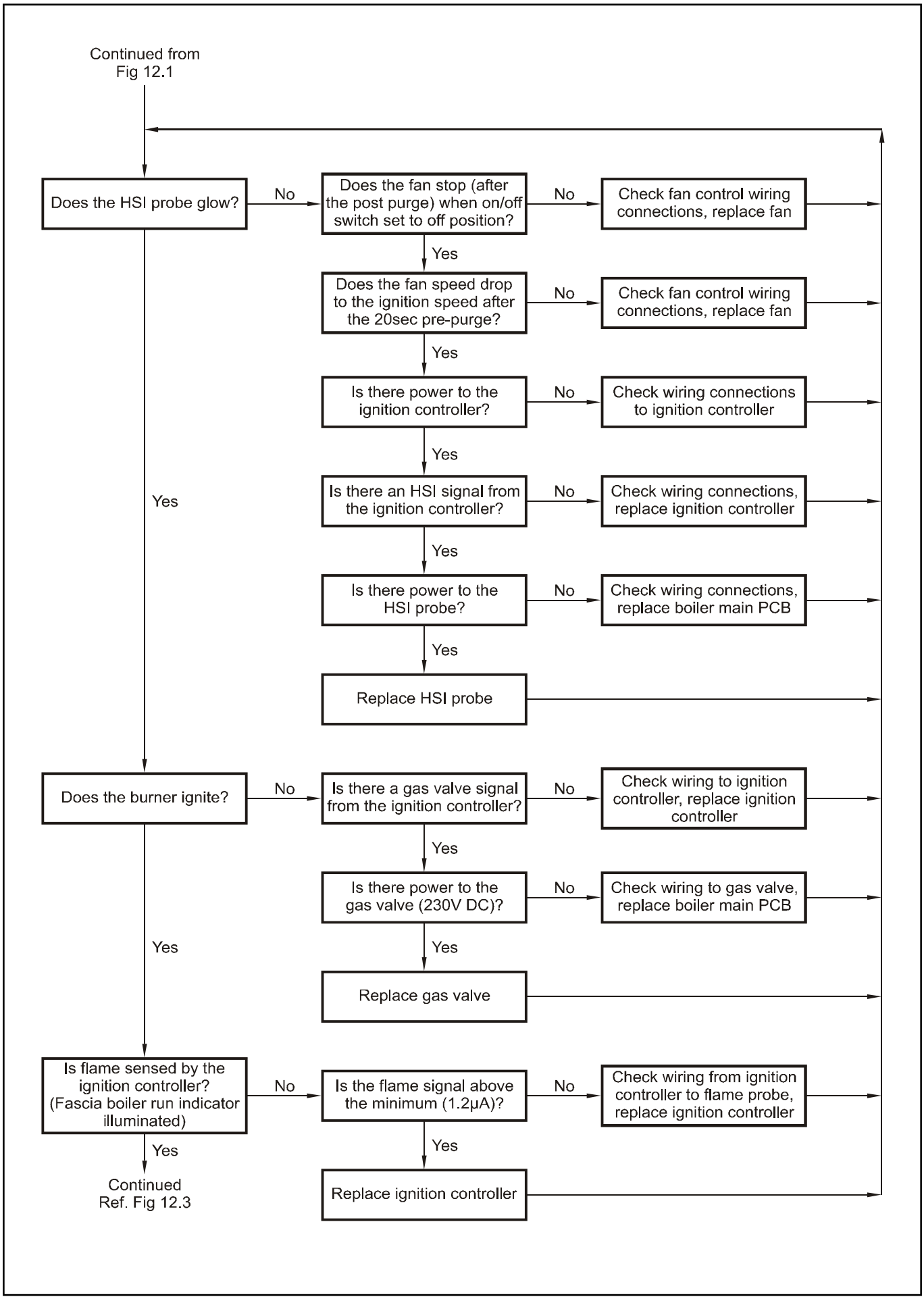
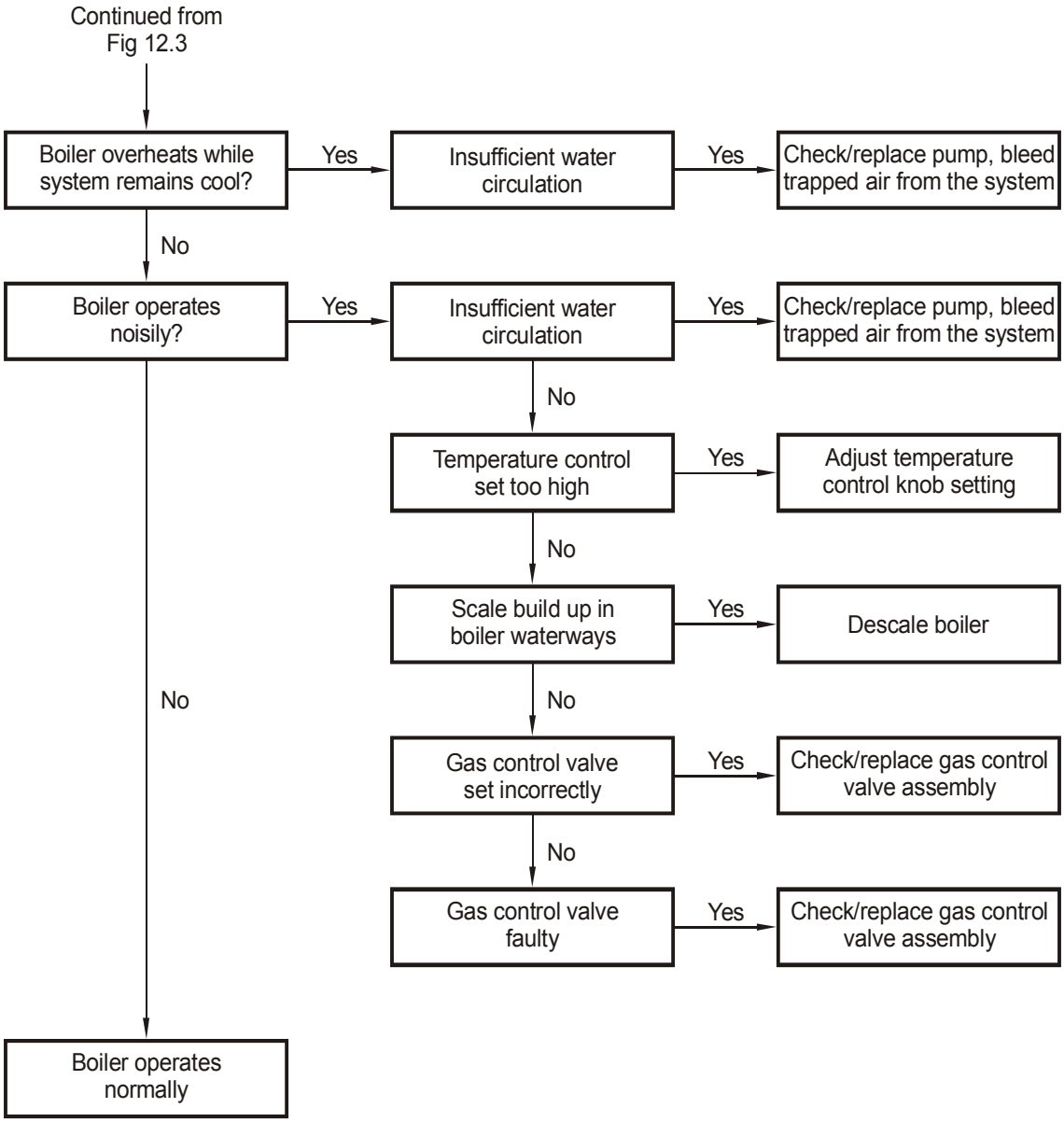


**Figure 12.3. Fault Finding Procedures.**




| **Boiler Fault Indication**<br>Certain boiler fault conditions are indicated by a sequence of flashes of the fascia fan running indicator | |
|---|---|
| Number of Flashes | Fault Condition |
| 1 Flash | Ignition Lockout |
| 2 Flashes | Fan Fault (Running at wrong speed or running when should be stopped) |
| 3 Flashes | Low gas supply pressure |
| 4 Flashes | Overheat (high limit thermostat tripped) |
| 5 Flashes | Premature flame detection (Flame sensing circuit fault)<br>or Ignition control fault |

## 13.0 SERVICING

A competent person registered for working on non domestic gas appliances should check and ensure that the flue, its support and terminal, the ventilation to the boiler house, safety valve, drain, water filter if fitted, pressure gauge, etc.; are in a serviceable and working condition and still comply with the relevant standards and codes of practice - see **Section 3.**

**13.1 Regular annual servicing is recommended**, preferably by a Hamworthy appointed person, to ensure trouble free operation. Although cleaning of flueways may not be necessary on a yearly basis, it is important that all controls and safety features are checked for correct operation. **Note:-** Measuring flue gas $CO_2$ and gas temperatures will give an indication of the state of the boiler flueways and waterways. Results should be compared with previously measured values to establish possible loss of efficiency.

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

### 13.2 Annual Service

The procedure detailed relates to a single module and **MUST** be carried out on ALL individual modules which constitute a unit. Before servicing the boiler, the following procedure must be carried out :-

**WARNING: Isolate all electrical supplies and turn off the gas service valve.**

**1)** Remove the front casing door by unscrewing the centre latch. Note the latch arm passes through a horizontal keyhole slot that requires the arm to be correctly aligned prior to removal of the cover.

**2)** Remove limit and main control thermostat sensors from the heat exchanger pocket.

**3)** Disconnect the H.S.I. and flame probe connectors.

**4)** Disconnect the fan power supply and control leads.

**5)** Unscrew retaining screws and remove the gas valve plugs.

**6)** Loosen the 4 M6 nuts that retain the control panel, now lift the panel upwards and outwards to separate from the bracket. Sit the panel on the pin attached to the conduit entry bracket, passing the pin into the hole in the rear left corner of the control panel.

**7)** Check that the 1" gas service valve is closed, then undo the lower connection on the flexible hose (at gas control valve inlet elbow).

**8)** Remove the 2 M8 burner retaining nuts and carefully withdraw the complete burner assembly from the heat exchanger. Separate the burner fabrication from the fan, venturi and gas control valve .

**9)** Remove and inspect H.S.I. and flame probe, ensure they are free from debris or deposits. Test resistance value of H.S.I. if above 110 ohms (cold), replace with a lower resistance unit. Check respective positions – See Figure 13.2.

**Note:-** The H.S.I. element is very fragile.

**10)** Check the burner and 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 any residual debris from inside the burner tube. A damaged or cracked burner should be replaced.

**11)** Separate the venturi and gas control valve from the fan by undoing the 6 M8 socket dome head screws. Ensure venturi mouth and internal tube is clean and free of obstruction.

**12)** Inspect the fan scroll and impellor, clean and check for damage.

**13)** Separate the inlet flange and elbow fitting from the gas control valve by removing the 4 M5 socket cap head screws. Check that the mesh inlet filter in the gas valve is clear of debris, remove any foreign objects caught in the filter.

Re-assemble in reverse order taking care to inspect and if necessary, replace any o-rings, gaskets or seals.

Refer to **Section 11, Commissioning and Testing**, and test all gas joints broken or disturbed for soundness before firing.

Carry out a combustion check by testing the flue gas $CO_2$ and CO levels as detailed in **Section 11.4.3.**

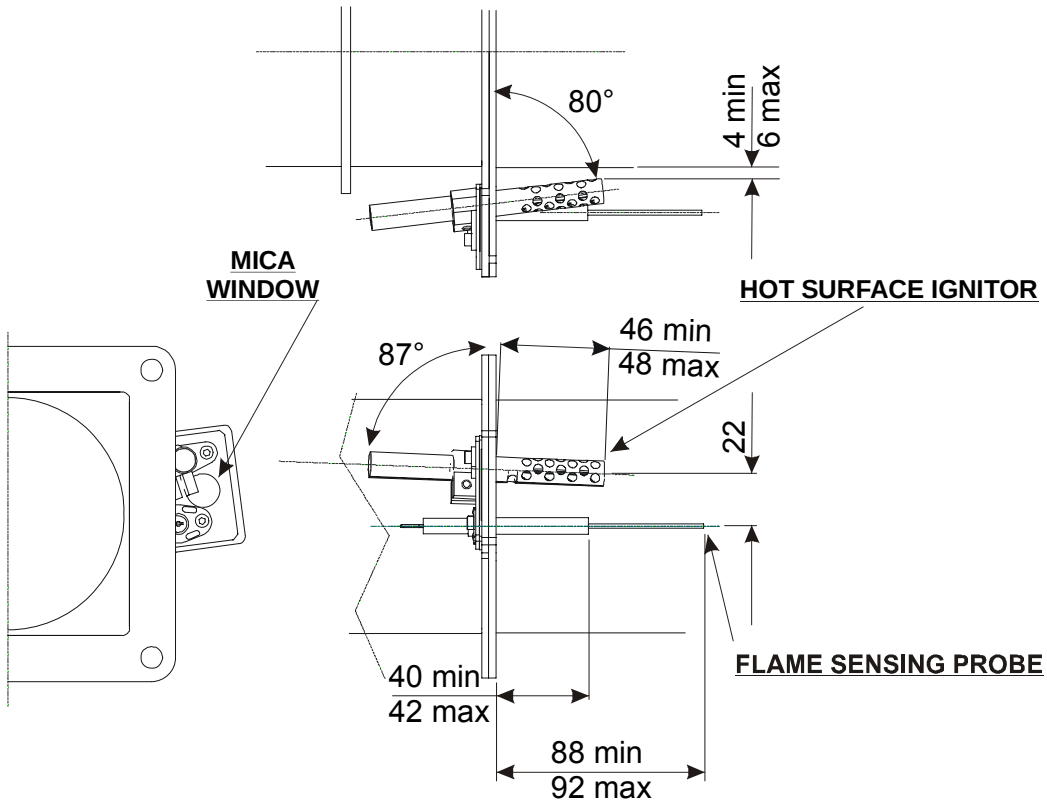
### 13.3 Two Year Service

Repeat the annual service as previously described but do not refit any components to the heat exchanger.

**13.3.1** To clean the heat exchanger, the use of a high pressure water hose (40-80 psi) is recommended. However provision must be made for the drainage of water used in this process. At the rear of the boiler module remove the condensate drain trap assembly from the casing by unfastening the 2 M6 nuts, to expose the opening in the casing. The cleaning water and any debris will exit the casing through this opening. On completion ensure that the opening is clear of debris and refit the condensate drain trap assembly, renewing the gasket if required.

**13.3.2** Should a high pressure hose not be available, the heat exchanger will have to be removed from the

**Figure 13.2 Diagram of Hot Surface Igniter and Flame Sensing Probe**




**NOTE:** the Mica window is held in place by the screws holding the igniter and flame sensing probes in position. To prevent the window from accidently being misplaced ensure that only one probe screw at a time is removed.

module casing. Isolate the heat exchanger from the flow and return water pipework and drain down. Remove all fittings from the G2½ inlet nipples and remove the safety valve (if fitted) or ¾" cap. Unfasten the 10 M8 nuts securing the water connection sealing plates and the safety valve pipe sealing plate, and remove all sealing plates and o-rings.

Each heat exchanger holds approximately 17 litres of water and weighs 122kg. It is recommended that a suitable lifting apparatus is used to support the weight of the heat exchanger, an M12 lifting eye nut can be fitted to the M12 stud at the top of the heat exchanger front plate for this purpose. Before connecting the lifting equipment to the lifting eye, hang a new heat exchanger to casing sealing gasket over the lifting eye, with the adhesive side facing the boiler. This will enable the new gasket to be fitted on re-assembly without cutting it!

Remove the 6 M10 nuts that retain the heat exchanger into the boiler module casing, and with the front end supported slowly withdraw the heat exchanger until the rear of the stainless steel baffles are visible. With the rear of the heat exchanger resting in the body of the boiler and the front supported by the lifting apparatus, access is gained for removal of the stainless steel baffles. Unhook the stainless steel springs and remove the baffle plates to expose the finned tube bank. Wire brush both sides of the baffles to remove any deposits. Thoroughly wire brush the finned tubes and ensure that all debris is removed from the centre of the heat exchanger.

Re-assemble the baffle plates by fitting one of the stainless steel springs and inserting the baffles beneath it, then fitting the second spring. Remove the existing heat exchanger to casing sealing gasket and fit the new gasket previously hung on the lifting eye. Refit heat exchanger ensuring correct rotational orientation, so that the water connection nipples and safety valve pipe pass through the holes in the rear of the casing, fastening in place with the 6 M10 nuts. Refit the water connection and safety valve pipe sealing plates, renewing all gaskets and o-rings. Reconnect the system pipework and check for soundness.

Re-fit the burner assembly. **Test all gas joints broken or disturbed for soundness before firing**.
Refer to **Section 11.4 Commissioning The Boiler**, for correct procedures.

### 13.4 Four Year Service

Repeat the 2 year service as previously described. Before re-assembly, if not already done, remove the heat exchanger from the boiler casing as described in

section **13.3.2**. Supporting both front and rear of the heat exchanger assembly using suitable lifting equipment, completely remove the heat exchanger from the boiler module casing.

Remove the 18 M12 bolts and 2 M12 nuts securing the heat exchanger front cover plate. Remove the 20 M12 bolts securing the heat exchanger rear cover plate, the water connection nipples will come free. Clean and de-scale all surfaces of the heat exchanger tube header castings and cover plates, and internal surfaces of the finned tubes and water connection nipples. Chemical de-scaling is preferred for the tube bank assembly. Recommended solutions include "Gamlen XD" blended with "Gamlen C.U.O." inhibitor.

**Note:-** Always follow the chemical manufacturer's instructions to ensure correct application and safety.

Clean mating surfaces of the heat exchanger tube header castings and cover plates. Re-assemble the heat exchanger assembly using new gaskets (a light coating of grease applied to gasket faces will assist seal). Ensure that the cover plates are re-fitted in the correct orientation and refit the water connection nipples to the rear cover plate, renewing the o-ring seals. Evenly torque the bolts and nuts to 5.5kg m.

Refit the heat exchanger as detailed in section 13.3.2, renewing all o-rings and sealing gaskets. Reconnect the system pipework and check for soundness.

Re-fit the fan/venturi/burner assembly. **Test all gas joints broken or disturbed for soundness before firing**.

Refer to **Section 11.4 Commissioning The Boiler**, for correct procedures.

## 14.0 REPLACEMENT OF FAILED COMPONENTS

There are a number of components listed below which can be replaced simply and quickly by following the given procedure. In each case the operation of each replaced component must be checked by carrying out the appropriate part of the commissioning procedure. See **Section 11.0: COMMISSIONING & TESTING.**

**Note:- Isolate all electrical supplies to the boiler module and turn off the gas supply before removing the front cover and commencing any servicing or component exchange procedure.**

### 14.1 Hot Surface Igniter and Flame Probe Assembly Part Nos. 563801013 & 533805019

**Note:- The igniter and flame probe ceramics are very fragile.**

Unplug the igniter from the harness, remove the single socket cap head screw securing the igniter to the burner flange and withdraw the igniter. When fitting the replacement carefully feed the igniter through the mounting hole and secure with the socket cap head screw.

Disconnect the flame probe lead, remove the single socket cap head screw securing the probe to the burner flange and withdraw the probe. When fitting the replacement carefully feed the probe through the mounting hole taking care not to damage the ceramic.

**Note:-** Do not remove both securing screws at the same time as the separate flange and Mica sight glass will become detached.

Ensure the positions of the igniter and probe are as recommended in Figure 13.2.

### 14.2 Control Thermostat Potentiometer Assembly Part No. 563901312

Remove the black plastic cover from the centre of the temperature control knob. Slacken the collet nut sufficiently to allow removal of control knob. Remove the potentiometer retaining nut from the main shaft and draw the potentiometer rearwards out of the fascia panel. Now disconnect the potentiometer plug and lead from the main PCB.

Fit the replacement in reverse order. When refitting the control knob to the potentiometer shaft, tighten the collet nut until the knob can just be spun on the shaft. Turn the knob counter-clockwise until the stop is reached, then turn the knob further clockwise until one of the slots in the outer edge of the knob aligns with short mark just below the 9 o'clock position on the thermostat scale label. Carefully turn the knob clockwise and tighten the collet nut fully, do not overtighten as this may impede the push-button operation of the potentiometer. Turn the knob fully counter-clockwise again and fit the knob cover, aligning the marker line with the short mark just below the 9 o'clock position on thermostat scale label.

Run the boiler and turn the thermostat up and down to check for correct operation. Set the thermostat to the previously noted setting.

Hamworthy Heating Ltd engineers are equipped with software interrogation tools, that allow checks to be made of actual boiler set points against indicated set point on the fascia scale plate.

### 14.3 Temperature Limiter (Limit Stat) Part No. 533901179

Check the setting of the replacement temperature limiter, the temperature must be set at 95°C maximum.

To replace the limiter, remove the plastic cover, undo the shaft securing nut and withdraw the limiter rearwards from controls fascia. Remove the electrical connections from the temperature limiter body noting the position of the coloured cables.

Check the operation of the replacement device by carefully applying a heat source to the bulb. Fit the replacement in reverse order. Ensure that the electrical connections are replaced in the correct positions. Refer to Figure 9.1 - Wiring Schematic for details.

**14.4 Gas Control Valve**
**Part No. 563903005**

**Note:-** Some gas valve components can be replaced without completely removing the whole assembly from the boiler. However, Hamworthy Heating strongly recommend that a complete new gas valve is fitted to ensure safe, reliable operation of the boiler. Please refer to Hamworthy Heating Technical Department before attempting to remove components from the gas valve.

Ensure that the boiler module electrical power and gas supplies are isolated. Unfasten the gas valve plug securing screws and disconnect the plugs by pulling firmly away from the valve.

Remove the 4 M5 cap head screws securing the gas valve to the gas inlet flange, allow the flange to hang free on the flexible gas pipe. Remove the 4 M5 cap head screws securing the gas valve to the venturi body, taking care to support the weight of the valve. Note that the cap head screws are different lengths at the inlet and outlet of the valve, be sure to replace at the correct positions.

**Note:-** LPG-Propane models, check the condition of the LPG orifice, and ensure that it is correctly located in the recess in the venturi gas inlet flange before fitting the gas valve to the venturi, refer to figure 11.1.

Replace the gas valve ensuring correct orientation - gas flow is in the same direction as the arrow marked on the valve. Replace the gas valve leads, ensuring correct plug positions and orientation, and secure firmly with the retained screws.

Check the setting of the gas supply pressure switch, and adjust if necessary. Unfasten the single pozi pan head screw to remove the cover if adjustment is required. Replace the cover after setting the switch. For correct pressure switch settings refer to figure 2.2 (and Appendix A for LPG-Propane models).

Switch on the boiler module gas supply and check for integrity of all joints using a proprietary leak detector. Refer to Figure 5.1 if necessary for valve integrity check procedure. Switch on the boiler module electrical power supply and ensure gas valve operation is correct and safe before continuing.

Re-light the boiler module. For correct settings and procedures refer to **Section 11.4 Commissioning The Boiler**.

**14.5 Combustion Fan**
**Part No. 533704003**

Ensure that the boiler module electrical power supply is isolated before removing the front cover and gaining access to the controls.

Disconnect the fan power supply and control leads from the fan. Separate the venturi and gas control valve from the fan by unfastening the 6 M8 socket dome head screws. Make provision to support the weight of the venturi and gas control valve whilst not connected to the fan.

Remove the 4 M8 hex head screws, nuts and washers fastening the fan to the burner and remove the fan.

Fit the replacement in reverse order, and if required replace any seals or gaskets.

**Note:-** After re-making any gas or combustion circuit joint/connection, an integrity check is recommended to ensure safety.

**14.6 Venturi**
**Part No. 532418001**

Ensure that the boiler module electrical power supply is isolated before removing the front cover and gaining access to the controls.

Isolate the boiler module gas supply by closing the gas service valve. Remove the 4 M5 socket cap-head screws from the venturi gas inlet flange and separate the gas control valve from the venturi. Make provision to support the weight of the valve assembly whilst not connected to the venturi. Separate the venturi from the fan by unfastening the 6 M8 socket dome-head screws.

**Note:-** LPG-Propane models, check the condition of the LPG orifice, and ensure that it is correctly located in the recess in the venturi gas inlet flange before fitting the gas valve to the venturi, refer to figure 11.1.

Fit the replacement in reverse order, and if required replace any seals or gaskets.

**14.7 Ignition Sequence Controller**
**Part No. 533901379**

Ensure that the boiler module electrical power supply is isolated before removing the front cover and gaining access to the controls.

Unplug the electrical connections to the controller noting the orientation and relative positions. Remove the two pozi pan head screws securing the controller to the control panel and withdraw. Fit the replacement unit in reverse order. Re-light the boiler and check for correct operation.

**14.8 Main Control PCB**
**Part No. 533901166 - Nat Gas**
**Part No. 533901403 - LPG-Propane**

Ensure that the boiler module electrical power supply is isolated before removing the front cover and gaining access to the controls. Also ensure that all other supplies, particularly to the volt free contact outputs, are also isolated.

If a Sequencing Interface Module is fitted, this must first be removed. Carefully disconnect the 10way screw terminal block from the module. Unfasten the 2 M4 pozi pan head screws, securing the module mounting bracket to the control panel metalwork and remove the module complete with the bracket.

Unplug the electrical connections to the PCB noting the orientation and relative positions. An EMC filter module is connected to the PCB which is fastened in place with a self-adhesive pad - carefully prise the filter module free. Unfasten the 4 socket cap head screws securing the controller to the control panel and withdraw.

Before fitting the replacement PCB, check that a wire jumper link is **NOT** fitted at position 'J9' (top right hand corner of PCB). If a link is present ensure that it is removed.

Fit the replacement PCB in reverse order as described above. Observe that rotary switch 'SW1' (located to the right of the site wiring terminals) is set correctly. Re-light the boiler and check for correct operation.

**14.9 Slave Interface Module**
**Part No. 533901421**

Ensure that the boiler module electrical power supply is isolated before removing the front cover and gaining access to the controls.

Carefully disconnect the 10way screw terminal block from the module. Unfasten the 4 pozi screws securing the module to its mounting bracket, taking care to retain the 4 plastic PCB spacers.

The module PCB is supplied mounted to a plastic housing which is not required for use on the Wessex 220 M boiler. Remove the PCB from the housing by unfastening the 4 mounting screws, and discard the housing and screws.

Fit the replacement module in reverse order as described above. Observe that rotary switch 'SW1' located to the right of the 10way terminal block is set to position '0'. Restart the boiler and check for correct operation.

## 15.0 RECOMMENDED SPARES

**Please Note:-** To ensure the correct spare parts are despatched by our spares department, it is imperative that the complete Boiler/Module/Control Panel Serial Numbers are given. The Boiler and Module Serial Numbers are located on the Data Plates affixed to the combustion chamber front panel. The Electrical Serial Number is located inside the Control panel on the maximum power rating label. These numbers **MUST** be quoted when ordering spare parts.

| **SPARES ITEM** | **PART No.** |
|---|---|
| **ELECTRICAL ITEMS** | |
| Fuse - T1A Slow Blow 5dia x 20mm - Boiler main PCB control fuse 'F1' (RH) | 533922006 |
| Fuse - F2A Fast Blow 5dia x 20mm - Boiler main PCB fan supply fuse 'F2' (LH) | 533922002 |
| Fuse - T250mA Slow Blow 5dia x 20mm - Sequencing Interface Module | 533922008 |
| Main PCB (Nat Gas) | 533901166 |
| Main PCB (LPG-Propane) | 533901403 |
| Fascia PCB | 533901382 |
| Ignition Sequence Controller | 533901379 |
| Control Thermostat Sensor | 533901378 |
| Control Thermostat Potentiometer and Cable Assembly | 563901312 |
| Temperature Limiter | 533901179 |
| Hot Surface Igniter | 563801013 |
| Flame Sensing Probe | 533805019 |
| Sequencing Interface Module* | 533901421 |
| **MECHANICAL ITEMS** | |
| Burner Fabrication | 533301010 |
| Gas Control Valve | 563903005 |
| Combustion Fan | 533704003 |
| Venturi | 532418001 |
| Gas Orifice Plate (LPG boilers only) | 531101011 |
| Small Service Kit (1 & 2 year service) | 563605265 |
| Set of Gaskets (4 year service) | 563605237 |
| Gasket - Burner to heat exchanger | 531201078 |
| Gasket—Fan to burner | 531201071 |
| Gasket—View port | 531201068 |
| View Port Sight Glass | 539907001 |

*The Sequencing Interface Module PCB is supplied mounted to a plastic housing which is not required for use on the Wessex 220 M boiler. Remove the PCB from the housing by unfastening the 4 mounting screws, and discard the housing and screws.

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 Wessex 220 M Series**

**INFORMATION RELATING TO PROPANE FIRING**

**NOTE:-**
**LPG FUELS - IT IS STRONGLY RECOMMENDED THAT, ON LPG INSTALLATIONS, GAS DETECTION EQUIPMENT IS FITTED. THIS EQUIPMENT SHOULD BE POSITIONED NEAR THE BOILER AND AT LOW LEVEL. IT IS ALSO IMPORTANT THAT THE SPACE HOUSING THE BOILER IS ADEQUATELY VENTILATED AT HIGH AND LOW LEVEL. REFER TO MAIN INSTALLER'S GUIDES.**

## 1.0 INTRODUCTION

The operation of the Wessex 220 M range of boilers on LPG-Propane (3rd family) $I_{3P}$ is similar to that on Natural Gas (2nd family) $I_{2H}$ and the design and installation details described in the main body of the installer's guide should be followed. There are however, differences in the construction and setting of the propane fired boiler which are as follows: -

a) An LPG gas orifice is fitted to each boiler module, located between the gas control valve outlet and venturi gas inlet, fitted into a recess in the venturi gas inlet flange.
b) The nominal gas inlet pressure for propane should be 37mbar.
c) Relevant labels are replaced to indicate the appropriate gas for which the boiler is set up to fire.

The following tables and paragraphs, using the same numbering system as the main installer's guide, highlight the different values and procedures to be used when firing propane, and should be used in conjunction with the Main Installer's Guide.

### 2.2 Performance and General Data Information

| GENERAL DATA | | | BOILER MODEL | | |
|---|---|---|---|---|---|
| | | | M220 | M440 | M660 |
| Boiler Input (maximum) | - | kW (Gross) | 262.22 | 524.44 | 786.66 |
| Boiler Input (maximum) | - | kW (Nett) | 241.25 | 482.50 | 723.74 |
| Boiler Output kW (maximum) | - | kW | 221.6 | 443.2 | 664.7 |
| Boiler Module Output (minimum) | - | kW | 44.3 | | |
| **FLUE DATA** | | | | | |
| Approx. Flue Gas Temperature | - | °C (Gross) | 135 | | |
| Approx. Flue Gas Volume @ 9.7 – 10.3% $CO_2$ | - | $m^3/h$* | 326 | 653 | 979 |
| **GAS DATA** | | | | | |
| Nominal Gas Inlet Pressure | - | mbar | 37 | | |
| Maximum Gas Inlet Pressure | - | mbar | 45 | | |
| Gas Supply Pressure Switch Setting | - | mbar | 22.5 | | |
| Gas Flow Rate (maximum) | - | $m^3/h$ | 9.87 | 19.74 | 29.61 |
| Gas Valve Offset Pressure Setting | - | mbar | 0.00 | | |

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

## 11.0 COMMISSIONING AND TESTING

### 11.4.3 Combustion Checks

Refer to section 11.4.3 embodied in the natural gas section of these instructions.

Combustion figures for LPG Propane should be as follows:-

$CO_2$ = 10.0% ±0.3%
CO = 0-100ppm*

(Note above readings taken with front cover removed and 200mm probe insertion).

* Figure must not exceed 200ppm under normal operating conditions.

## USEFUL USER INFORMATION

| INSTALLER | SITE ADDRESS |
|---|---|
| | |

**DATE OF COMMISSIONING:**

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

**NOTES:**

**NOTES:**

# Notes

# Connect direct

## Direct Dial Telephone and Fax Numbers

Hamworthy
HEATING & HOT WATER PRODUCTS

- boilers
- controllers
- water heaters
- pressurisation sets

### Poole Office

Hamworthy Heating Limited
Fleets Corner, Poole, Dorset BH17 0HH England
Main switchboard tel: **01202 662500**

| | | |
|---|---|---|
| Technical enquiries | **01202 662527/662528** | **01202 665111** |
| Spare parts | **01202 662525** | **01202 665111** |
| Service department | **01202 662555** | **01202 662522** |

Hamworthy
FLUE & CHIMNEY SYSTEMS

- flue components
- packaged fan dilution systems
- bespoke flue components
- bespoke flue systems
- design and installation

### Birmingham Office

Hamworthy Heating Limited
Shady Lane, Great Barr, Birmingham B44 9ER
Main switchboard tel: **0121 360 7000** fax: **0121 325 2309**

General enquiries **0121 360 7000**

## Direct Email Addresses

**Customer Services** spares@hamworthy-heating.com
service@hamworthy-heating.com
technical@hamworthy-heating.com
sales.flues@hamworthy-heating.com

## Hamworthy Heating Accredited Agents

**North West England**
Gillies Modular Services
210-218 New Chester Road, Birkenhead, Merseyside L41 9BG
tel: **0151 666 1030** fax: **0151 647 8101**

**Scotland**
McDowall Modular Services
14-46 Lomond Street, Glasgow, Scotland G22 6JD
tel: **0141 336 8795** fax: **0141 336 8954**

**Southern Ireland**
HEVAC Limited
Naas Road, Dublin 12, Ireland
tel: **00 3531 141 91919** fax: **00 3531 145 84806**

**North East England**
Allison Heating Products
17 Beech Road, South Shields, Tyne & Wear NE33 2QH
tel: **0191 455 7898** fax: **0191 455 7899**

**Northern Ireland**
HVAC Supplies Limited
Unit 2, Antrim Line Business Park, Sentry Lane, Newtownabbey BT36 8XX
tel: **02890 849826** fax: **02890 847443**

## Website

# www.hamworthy-heating.com

Associate Companies, Offices and Agents throughout the World.