BUILDING REGULATIONS
up to
91%
Gross efficiency
(100% Nett)
PART L COMPLIANT

Hamworthy Wessex 220 M Series

High Efficiency, Fully Modulating, Pre-mix Gas Fired Modular Boilers

Outputs 220kW, 440kW and 660kW

BUILDING REGULATIONS NO PROBLEM
PART L compliant ENGLAND & WALES
PART J Scotland

CE

Hamworthy
HEATING & HOT WATER PRODUCTS

Wessex 220 M Series

High Efficiency, Fully Modulating, Pre-mix Gas Fired Modular Boilers Natural Gas or LPG

Since the early 1980's Hamworthy has led the way in development of high efficiency pre-mix modular boilers.

The latest in the line is the new Wessex 220 M Series which builds on the success of the innovative Wessex 100 M Series.

The output of each module has been increased from 200kW, on Wessex HE boilers, to 220kW on the Wessex 220 M Series and the burner is now fully modulating, packing in more power and increasing the control to match the load even closer.

Designed to meet the requirements of new build and refurbishment projects, the Wessex is a well proven, reliable British product, which has come of age with the latest amendments to the Building Regulations (2001). The Hamworthy Wessex range has been achieving efficiency performance beyond these latest regulations for over twenty years and through investment in product development and continuous improvement, the evolution in design has maintained its position at the forefront of boiler technology.

The Wessex 220 M Series uses building blocks of 220kW modules in a matrix configuration which enables boilers to be assembled in one, two or three high arrangements and positioned closely together side by side.

There are three models in the series, M220, M440 and M660 with outputs of 220kW, 440kW and 660kW respectively.

Options

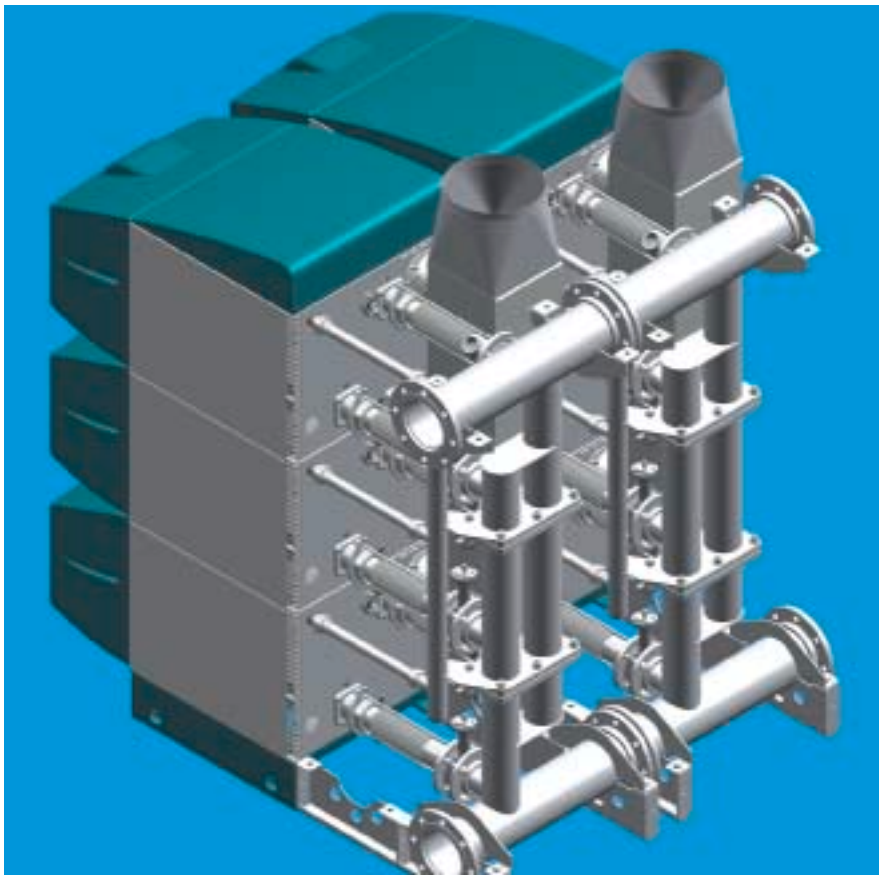
- **Modulating sequence controller**
- **LPG - propane**
- **Pipeworks kits**

BENEFITS

- **Fully Compliant with Building Regulations Part L**
- **Qualifies for Enhanced Capital Allowances***
- **Closely matches heat load to demand**
- **Rapid response and ultra low standing losses**
- **Extremely economical with space**
- **Ease of handling on site**
- **Reduced installation costs**
- **Pipework Kits for fast turnaround**

*on loads over 400kW

The Wessex M Series of high efficiency boilers exceed the requirements for the latest Building Regulations, (Amendment 2001), Part L (England & Wales) and Part J (Scotland)



2 Wessex 220 M660 boilers with manifold kits fitted

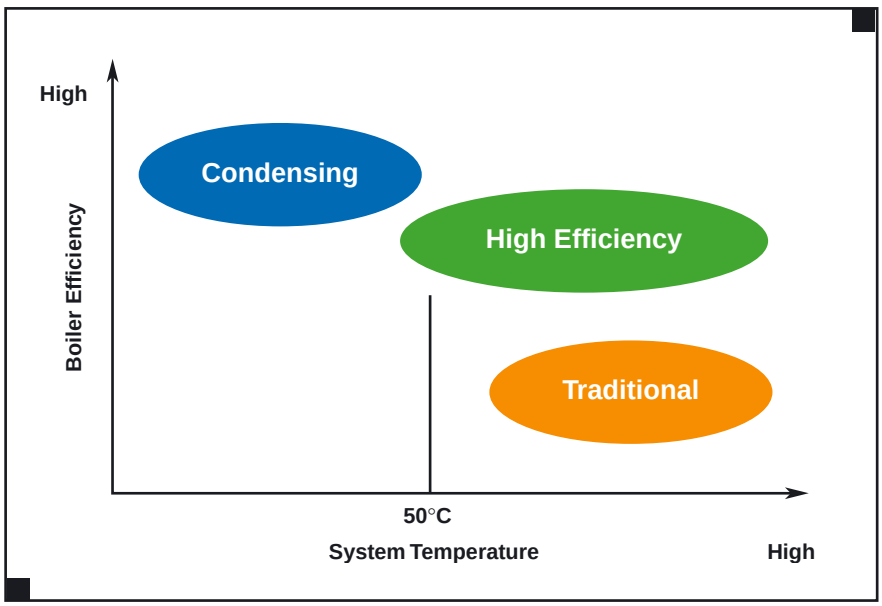
Your solution to meeting Part L (Part J in Scotland)

Using high efficiency boilers is a simple reliable solution to meeting Part L in refurbishment projects.

More often than not, the original heating system design was based on 80°C flow temperature from the boiler. This does not fall within the normal operating range of condensing boilers, therefore, unless the entire heating system is redesigned, then it is unlikely that the full benefits of a condensing boiler will be achieved.

The Wessex range of high efficiency boilers from Hamworthy produces exceptional performance, with full load efficiency up to 84% gross (93% nett) and part load efficiency up to 91% gross (100% nett).

This level of performance enables the designer to use the energy performance of the boiler to compensate for a lower level of performance in the building fabric, such as insulation or glazing, and yet easily comply with the requirements of the latest Building Regulations.



The Wessex 220 M Series boilers feature a fully modulating premix burner control system. An electronic thermostat monitors the boiler operating conditions and automatically adjusts the output to suit. The gas/air ratio control system ensures that clean and efficient combustion is maintained throughout the maximum modulation range, down to a minimum of 20%.

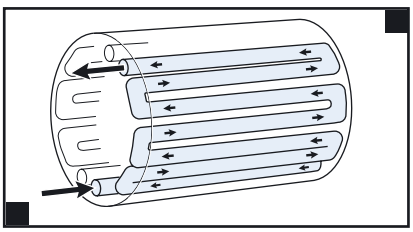
Fully automatic ignition is achieved utilising a hot surface ignition system. This highly effective and reliable form of ignition requires less maintenance than conventional spark ignition and eliminates the electrical interference sometimes associated with that type of system. Flame proving is achieved using a flame rectification probe.

The controls are housed within a fabricated steel enclosure, which features a visual display allowing the user to monitor the current operating status of the boiler.

All boilers are fitted as standard with volt free contacts, which allow for remote monitoring of the boiler status, indicating boiler run, lockout & high temperature conditions.

The compact design achieves up to 880kW output per square metre floorspace, which significantly reduces the plant room size when compared to traditional cast iron boilers.

Wessex 220 M Series boilers are supplied fully assembled from the factory therefore eliminating boiler builds on site. The assembled boiler can be easily manoeuvred using a pallet truck and will pass through a standard single doorway.



Water flow through multi-pass copper finned heat exchanger

High Efficiency System

The central component to the Hamworthy design is a heat exchanger that can generate a highly efficient gas to water heat transfer, through a cylindrical extended surface heat exchanger constructed from finned copper tubes. To ensure an equal flow through each tube, sectioned end plates are incorporated into the design.

Gas to Water Heat Transfer

The copper finned tubes of the Wessex heat exchanger provide the perfect ratio of eight times more surface area on the gas side compared to the water side. In addition to this, copper is an ideal heat exchanger material being 8.5 times more conductive than cast iron or steel. It is also compatible with system water and offers resistance to flue gas corrosion.

Rapid Response

The superior rate of heat transfer of the Wessex boilers means that the removal of that heat requires an increase in the flow rate of water. This results in a smaller boiler with reduced water content. The combination of this low volume and high water velocity not only keeps solids in suspension, but increases the speed at which the boiler responds.

Access via a single door

Specification

Heat Exchanger

All Wessex models have a highly efficient cylindrical primary heat exchanger constructed from copper finned tubing. The tubes are expanded at each end into cast iron tube plates. These tube plates are sectioned to provide even flow through each tube in a multi-pass arrangement.

The relatively large 22mm diameter tubes combined with the high water flow velocities considerably reduces the risk of blockage in comparison with alternative heat exchanger designs, which have smaller waterways.

Section of primary heat exchanger tube

Water System

The Wessex is designed to accommodate high rise applications and has a maximum working pressure of 10 bar.

Each module is supplied with a connection for fitting a pressure and temperature relief valve, (not Hamworthy supply).

Where 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.

The Gas Train

A zero governor gas valve is used to precisely control the mixture of gas and air entering the burner as the firing rate modulates. This is achieved by measuring the pressure drop across a venturi at the fan inlet and adjusting the gas pressure accordingly.

Burner

A cylindrical woven fibre burner is positioned centrally within the primary heat exchanger. This design of burner allows for good flame stability at low turndown rates. The woven fibre construction of the burner also results in lower flame temperatures being achieved and thus lowers NOx emissions.

Low NOx

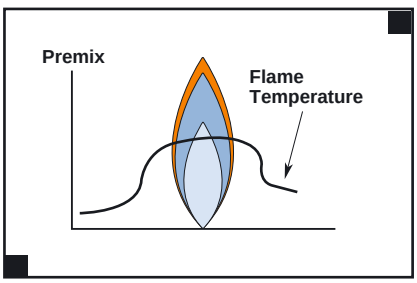
An area crucial to the success of reducing NOx emissions is the burner design and its ability to evenly distribute the excess air required during the combustion process.

In designing the burner, Hamworthy took consideration of the requirement for low NOx production, and any anticipated EC legislation.

Here the correct air/gas mixture is achieved before entering the burner bar, and can effectively provide flames through the 360° of it's surface.

By pre-mixing the air and gas prior to ignition, the excess air required is evenly distributed achieving a more even temperature. This process results in low NOx production and is further assisted by the superior heat transfer qualities of the copper fins which keep the combustion chamber cool.

Hamworthy Wessex boiler NOx emissions are low, achieving European class 5 performance.



Combustion Air Intake

Incoming combustion air is pre-heated by directing the flow through the innovative casing design, contributing to the efficiency performance. The flow of combustion air also serves to insulate the boiler casing panels and removes the need for insulation material in the casing.

Thermostats

All Wessex 220 M Series boilers are fitted with a manual reset limit thermostat, which has a range of 90-110°C. This will normally be factory set to 95°C.

An electronic temperature control thermostat regulates the boiler flow temperature up to a maximum of 90°C. The control thermostat also operates as a push button on/off switch.

To accommodate multiple boiler installations the limit thermostat is adjustable up to a maximum of 110°C where the boiler control thermostats are to be set higher than 83°C, adequate system pressure must be available either by gravity head or system pressurisation.

For further details of multiple boilers, system pressures and temperatures please refer to Hamworthy publication 500002194, Energy Efficient Multiple Boiler Systems.

Hot Surface Ignition

The Wessex M Series boilers have a fully automatic direct burner ignition system that employs a hot surface ignition element. Using hot surface ignition eliminates the electrical interference sometimes associated with traditional spark electrodes. In addition it also requires less maintenance than a spark electrode.

Hot surface ignitor and flame probe.

Low weight design

The boiler's lightweight design, compared with traditional cast iron sectional boilers, offers perfect solutions for roof top installations without the need for excessive structural reinforcement.

Around one-third of the weight of conventional boilers, the Wessex 220 M series weighs in at approximately 1kg per kW output.

Its compact dimensions and base design enable it to be easily manoeuvred, using a standard pallet truck, through a normal sized doorway

Pipework manifold kits

As with all Hamworthy products, the pipework kits are designed with the complete solution in mind. The Wessex 220 M series is available with optional pipework kits to make the boiler installation quicker and easier to enable the contractor to save time in the plant room during installation.

Contrary to popular practice, the pipework can be installed before the boilers are put in place. This reduces the possibility of damage to the boiler casings during pipework installation and gives the contractor more room to work in the plant room.

The M440 and M660 water and gas manifold pipework kits are free standing and incorporate all necessary valves, inter connecting pipework, and flexible flow and return connections.

The water manifold kits are for hot water heating installations up to 100°C maximum temperature and all components are pressure tested prior to despatch from our works.

The water manifold kits are intended for use in reverse return configuration. The Wessex 220 M Series boilers have a low water content and water flow rates must be maintained at or above the levels shown in the technical data table for the boilers. A suitable pressure relief valve (not Hamworthy supply) must be fitted to each boiler module before connecting the water manifold assembly.

The main pipework kit is designed for ease of handling and is delivered to site in a kit form which utilises a steel base arrangement similar to the boiler for ease of handling and to facilitate alignment with the boiler.

Our BS EN ISO 9001 accreditation ensures that our products are designed and manufactured to our consistently high standard.

All Hamworthy boilers have European Certification and bear the CE mark, the customers assurance of conformity with European standards.

Power Supply

An independent isolator and fused electrical supply is recommended for each module, to enable each module to be shut down without losing the entire boiler output.

230 volt, 50Hz single phase.

Remote Signalling

Volt free contacts are fitted as standard to all models to indicate boiler lockout, high limit lockout and normal run. The contacts are BMS compatible and allow the boiler to connect to a Building Management System to monitor boiler operation and status.

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 centre of each module to enable the disposal of the condensate.

The connection to the trap is Rp½". The drainpipe must be manufactured from a non corrosive material and be at least 22mm diameter. The pipework should be installed with at least a 3° fall (approximately 50mm per metre) and connect via a tundish to a drain.

In addition to the boiler condensate drain, the M440 and M660 models have a condensate drain connection fitted to the close-coupled flue header. This is a 22mm diameter drain stub which should be connected in a similar manner via a suitable trap.

Sequence Control

Using a number of smaller boilers (modules) in order to accurately match the required load is acknowledged as an excellent approach to heating system design. In order to get the full benefit from a multiple boiler installation it is essential to fit some form of sequence control to regulate the firing of each module.

The Milton sequence control panel has been specifically designed to control fully modulating boilers such as the Wessex 220 M Series.

Milton sequence controller for fully modulating boilers

The Milton can control the operating pattern of up to 9 modules firing in fully modulating mode. The unit is enclosed in a compact lightweight casing and is designed to be installed on a boilerhouse wall or any other location within the building.

In addition to providing sequence control the Milton is also capable of direct weather compensation and optimised boiler start. These features require optional external and room sensors to be fitted, and enable further energy savings to be achieved.

Delivery

Wessex 220 M Series boilers are supplied fully assembled from the factory. The assembled boiler can be easily manoeuvred using a pallet truck and will pass through a standard single doorway.

The M440 and M660 models are supplied with a separate close-coupled flue header, which has to be fitted to the boiler on site.

Electrical details

Supply 230V 50Hz, single phase.

Wiring external to the boiler must be installed in accordance with I.E.E. regulations and any local regulations which apply. Wiring must be completed in heat resistant 3 core cable, (size 1.0 mm^2 c.s.a.). Fascia fuse rating is 2 amp. An isolator correctly fused at 5 amps should be sited close to the boiler, for each module.

Time clock control

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

Flue System

Each of the boiler variations is designed for direct connection to a flue system. M440 and M660 models are supplied with a separate close-coupled flue header, and the outlets from more than one boiler may be connected to a single chimney.

A fixed draught diverter is not required in the flue system, however, a draught stabiliser is recommended for some installations.

Refer to page 15 for further details.

Enhanced Capital Allowances

As part of the Climate Change Programme the Government introduced Enhanced Capital Allowances (ECA) in April 2001, coinciding with the introduction of the Climate Change Levy.

Companies that are liable to pay business or corporation tax may benefit from Enhanced Capital Allowances through improved cash flow as a result of a reduced tax demand in the first year of investment in qualifying plant.

The normal method of a reducing balance capital allowance would spread the benefit over a longer period, where typically 95% of the cost would be relieved in a period of 8 years. The Enhanced Capital Allowance enables 100% of the allowance to be claimed in the first year.

This benefit should encourage designers to specify more energy efficient boilers for their client. All Hamworthy Wessex boilers are eligible for the allowance where specified on loads over 400kW output, and other costs directly associated with the provision of the boiler may be included in the ECA claim.

For further details on the Enhanced Capital Allowance scheme, please refer to Hamworthy publication AAG 001, or visit the Government ECA web site at www.eca.gov.uk

The Wessex 220 M Series complements the range of high efficiency boilers manufactured by Hamworthy, satisfying the high output end of the range.

Mid-range there is the Wessex 100 M Series, which utilises 100kW modules in the same compact design.

To satisfy the smaller outputs, Hamworthy has designed the Sherborne wall hung high efficiency fully modulating pre-mix boiler (65kW output), which can be open flued or fitted with a room sealed balanced flue.

For further details of Wessex 100 M Series boilers please refer to publication 500002184, and for Sherborne boilers refer to publication 500002216.

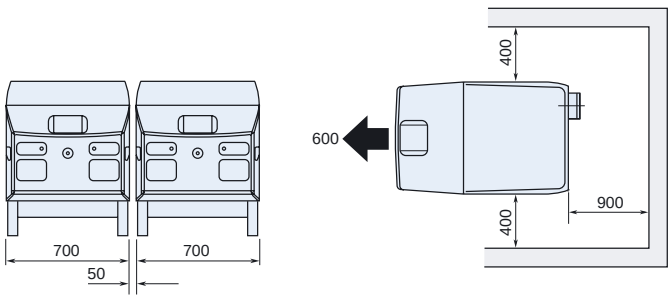
Technical data

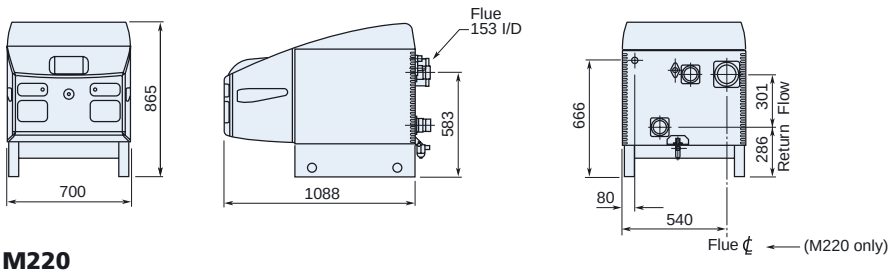
Wessex 220 M Series - Performance and General Data Information - Natural Gas

	Boiler Model		M220	M440	M660
	Number of Modules		1	2	3
Energy	Boiler output - maximum	kW Btu/h x 1000	220 750	440 1501	660 2252
Energy	Boiler input (gross) - maximum	kW Btu/h x 1000	262 894	524 1788	787 2685
Energy	Boiler input (nett) - maximum	kW Btu/h x 1000	236 805	472 1610	708 2416
Energy	Module output - minimum	kW Btu/h x 1000		44 150	
Water	Water content (not including headers)	litres	17	34	51
Water	System design flow rate across boiler @ 11°C ΔT rise	l/s	4.78	9.56	14.33
Water	Minimum flow rate @ 15°C ΔT rise	l/s	3.50	7.01	10.51
Water	Waterside pressure loss @ 11°C ΔT rise	mbar		64	
Water	Waterside pressure loss @ 15°C ΔT rise	mbar		34.5	
Water	Maximum water pressure	barg		10	
Gas	Gas flow rate natural gas (G20) - maximum	m^3/hr	24.99	49.97	74.96
Gas	Nominal gas inlet pressure natural gas (G20)	mbar		20	
Gas	Maximum gas inlet pressure natural gas (G20)	mbar		25	
Flue	Approx. flue gas volume @ 8.7-9.3% CO_2	m^3/hr	329	659	988
Flue	Approx. flue gas temperature	°C		135	
Flue	No_x Emission (DAF) European Class 5	mg/kWh ppm		<51 <29	
Connection	Water flow/return connections			G2½" male	
Connection	Gas inlet connection pipe thread size			R1"	
Connection	Nominal flue diameter (I/D)	mm inches	153 6	254 10	305 12
Electrics	Normal supply voltage			230V AC 50Hz 1Ph	
Electrics	Power consumption - maximum	W	250	500	750
Electrics	Module start and run current	Amp		1.07	
	Approx. shipping weight	kg	220	430	635

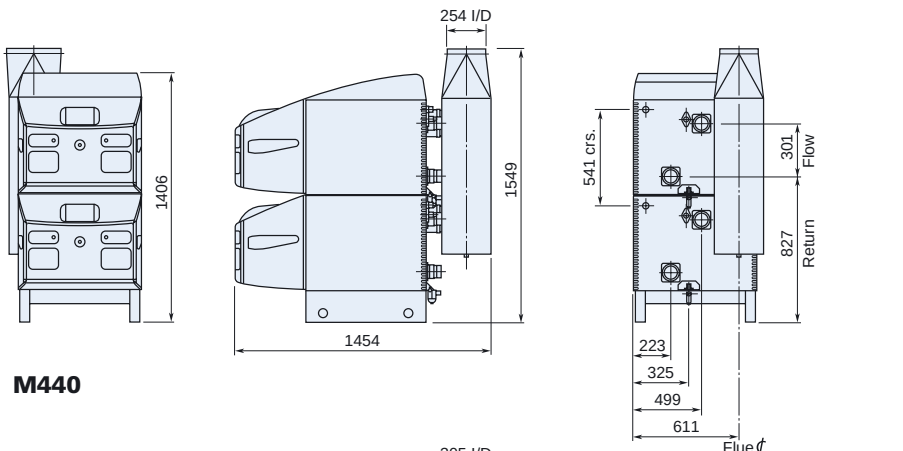
Dimensional Details

Wessex 220 M Series - Boiler Dimensions/Clearances

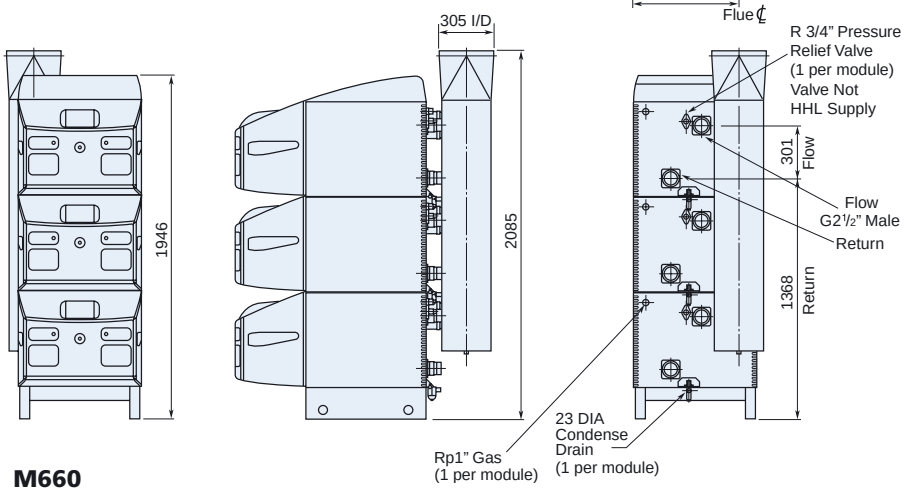




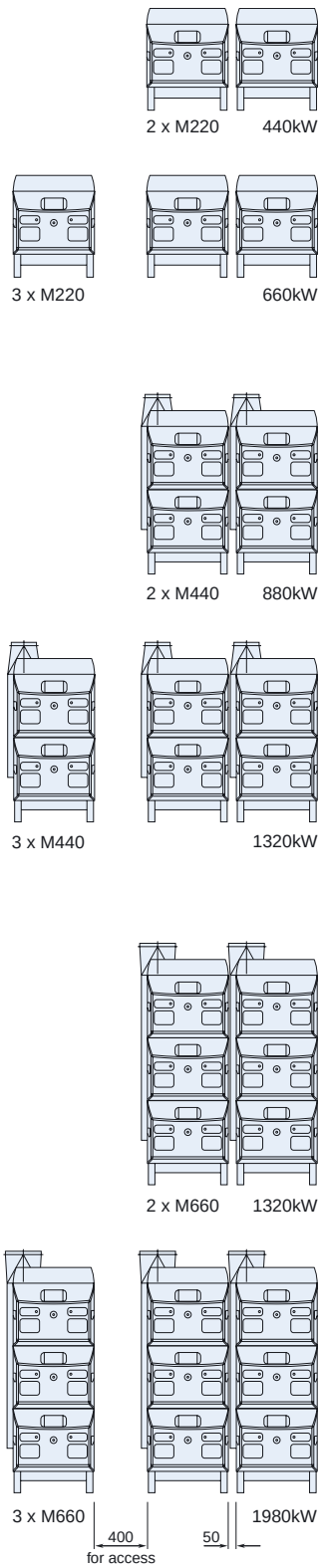
M220



M440

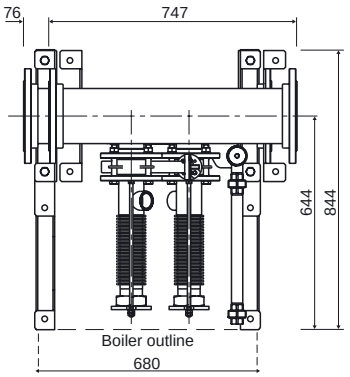


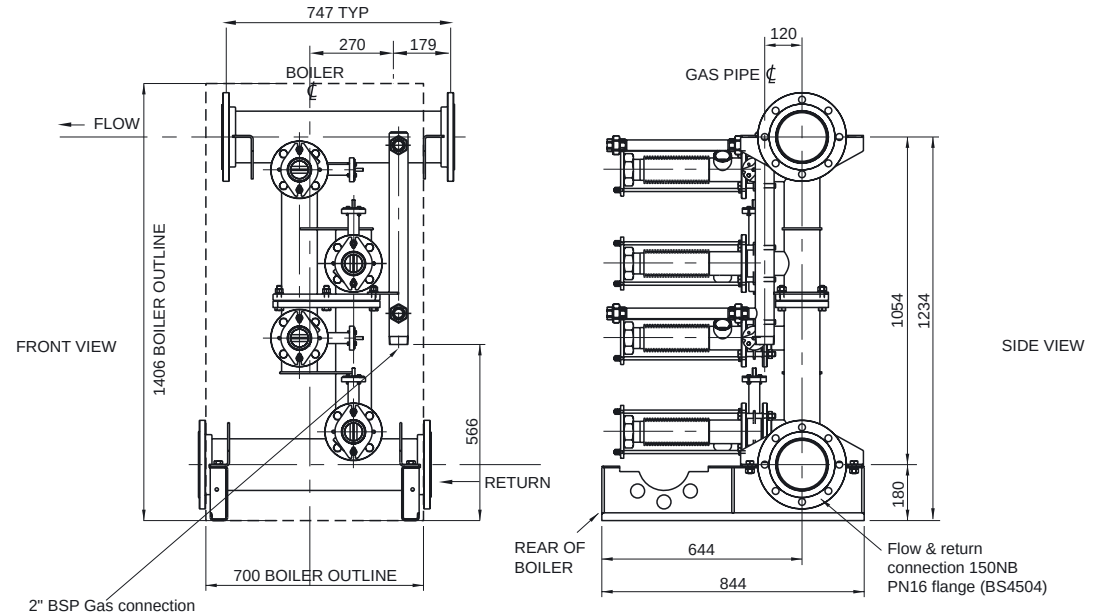
M660

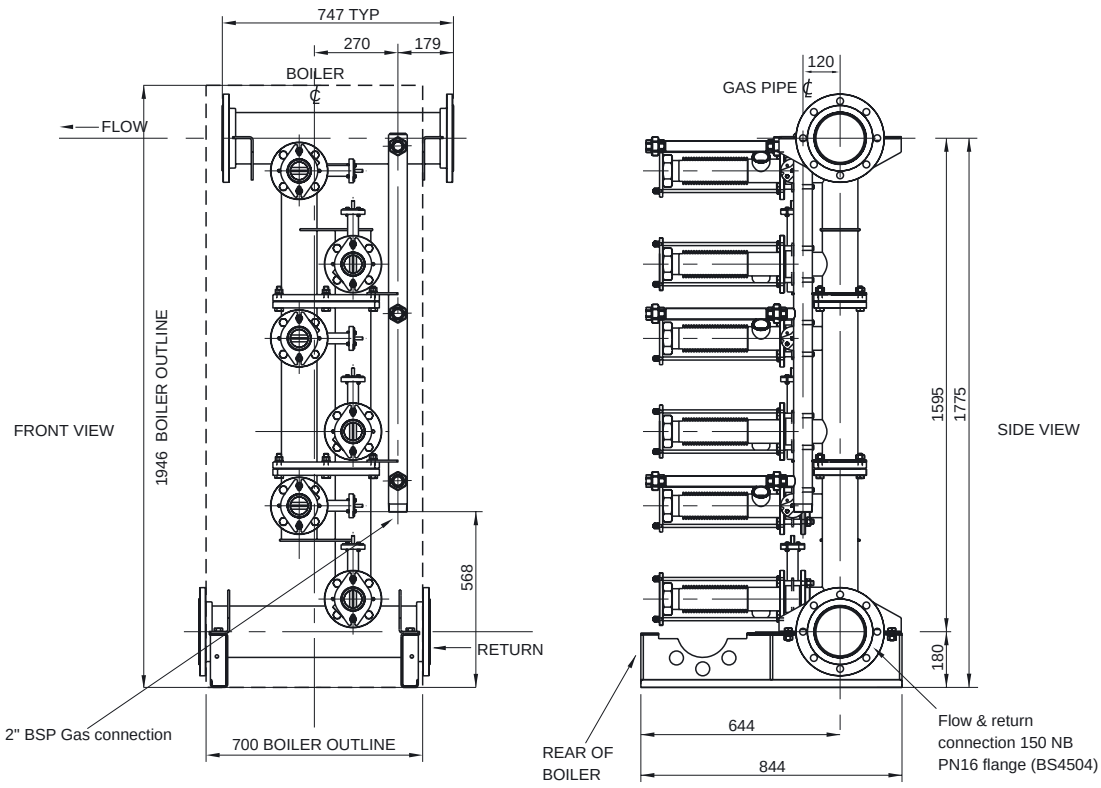


Dimensional Details

Wessex 220 M Series Water Manifold Kits







Application & System data

The installation of all boilers MUST be in accordance with the relevant requirements of the Gas Safety Regulations, Building Regulations, I.E.E. Regulations and the bye-laws of the local water undertaking. It should also be in accordance with any relevant requirements of the local gas region, local authority and relevant recommendations of the following documents:

British Standards

BS7074: 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.

BS6644: Installation of gas fired hot water boilers – 60kW to 2MW.

BS6700: Design, installation, testing and maintenance of services supplying water for domestic use.

BS6880: 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.

Boiler Accessories

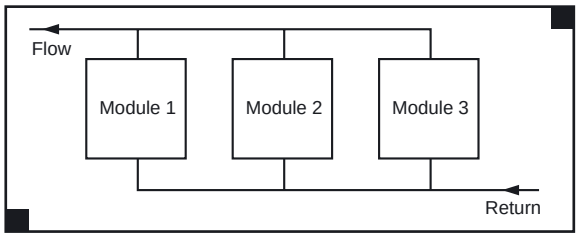
Wessex boiler modules are supplied with control and high limit thermostats. The following items (not supplied) should be fitted to the boiler pipework system to satisfy British Standards. Each isolatable module or arrangement of modules, should have a drain cock at the lowest point, a pressure relief valve and an open vent, (or high/low pressure switches on closed systems). An altitude gauge and temperature gauge should be fitted to the flow manifold beyond the entry of the last module but before any branches to different circuits. If a sequence control panel is fitted, the flow temperature sensor should be fitted in a similar position.

Boiler base

Wessex boilers should be positioned on a level non combustible surface that is capable of adequately supporting its weight (when filled with water) and any ancillary equipment. Adequate space for installation and servicing should be considered. Clearance details are provided on page 6.

Water systems - Modular installations

Wessex modular boilers are suitable for installation in both open vented and closed systems. Irrespective of the type of system, the water flow and return headers should be connected in a "reverse return" arrangement (i.e. the water flow in each header follows the same direction) thus providing equal flow through each boiler. This also ensures that pressure loss across any number of boilers will never be greater than the head loss across one boiler plus local pipework losses.



Wessex modular boilers in "reverse return arrangement"

Adequate water flow

Hamworthy Wessex modular boilers are designed as high efficiency, rapid response, low water content units. Care must be taken with initial system design and layout to ensure that there is adequate waterflow through each module, and that the influence of the system control does not adversely affect that flow at any time.

A minimum flow rate equal to 80% of the quoted design flow must be maintained at all times when the burner is firing.

System 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 passages. Details of additives can be obtained from any specialist water treatment manufacturer or local water authority.

When Wessex units replace boilers in an existing system, it is important that the existing system is thoroughly flushed through tfitted with isolating valves and inspected regularly after commissioning.

Open vent pipe and cold feed pipe		
Boiler	**Open vent size**	**Cold feed size**
<60kW	25mm (1in)	19mm (3/4 in)
60kW-150kW	32mm (1 1/4 in)	25mm (1in)
150kW-300kW	38mm (1 1/2 in)	32mm (1 1/4 in)
300kW-600kW	50mm (2in)	38 (1 1/2 in)
660kW	55mm	50mm

Pressure relief valve

Each boiler, or in the case of a modular installation, each bank of boilers must be fitted with a pressure relief valve to BS759 or BS6759 Pt.1 and sized as shown in BS6644.

BS6644 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.

System Head

Guidance Note PM5 Health and Safety Executive

This note states that "hot water boilers should have an automatic control apparatus to cut off fuel to the burners of gas fired plant when the water at or near the boiler flow outlet rises to a pre-determined temperature. This should provide a margin of at least 17°C below the temperature of saturated steam corresponding to the pressure at the highest point of the circulation system above the boiler." To comply with this recommendation, the minimum system pressure is dependant on system design flow temperatures and in the case of modular installations, the temperature rise across each module.

Single installations

The minimum pressure must be equal to the gauge pressure equivalent to the saturated steam temperature obtained by adding 17°C to the required boiler flow temperature. The highest point of the circulation system above the boiler should never be less than 2m (6.5ft).

Required flow temperature	90°C
Safety margin	17°C
Equivalent saturated steam temperature	112°C

From steam tables corresponding gauge pressure - 0.50 bar (7.3 psi) - 5.1m (16.7ft) head of water.

Modular installations

The minimum pressure should be equal to the gauge pressure equivalent to the saturated steam temperature. This is obtained by adding 17°C to the sum of the required mixed flow temperature plus the temperature rise across the modules.

Required mixed flow temperature	82°C
Temperature rise across modules at minimum flow rate	11°C
Safety margin	17°C
Equivalent saturated steam temperature	110°C

From steam tables corresponding gauge pressure 0.42 bar (6.1 psi) - 4.3m (14ft) head of water.

Commissioning

Hamworthy Heating strongly recommends that all boilers are commissioned by their service department. On completion, Hamworthy will issue a boiler log book which will provide details of the initial operating settings. The log book should be used to record any future maintenance and service work.

For more information on commissioning contact Hamworthy Heating Service Department: 01202 662555

Air supply and ventilation

An adequate supply of fresh air for combustion and ventilation must be provided in accordance with BS 6644.

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

The air supply should be achieved using:

- Natural ventilation supplying air with a low level opening and discharge through a smaller sized high level opening.
- A fan to supply air to a low level opening with natural discharge through a high level opening.
- A fan to supply air to a low level opening and discharged by means of a fan at a high level.

Note: Fans must be selected such that a negative pressure is not created in the boilerhouse relative to outside air pressure.

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

At floor level (or 100mm above the floor level)	25°C
At mid level (1.5m above floor level)	32°C
At ceiling level (or 100mm below ceiling level)	40°C

Where natural ventilation is used suitable permanent openings at low level and high level connected directly to the outside air should be provided. These openings must be fitted with grilles that cannot be blocked or flooded.

The free area of the grilles should be as follows:

Low Level (Inlet)

540cm² plus 4.5cm² per kW in excess of 60kW total rated input.

High Level (Outlet)

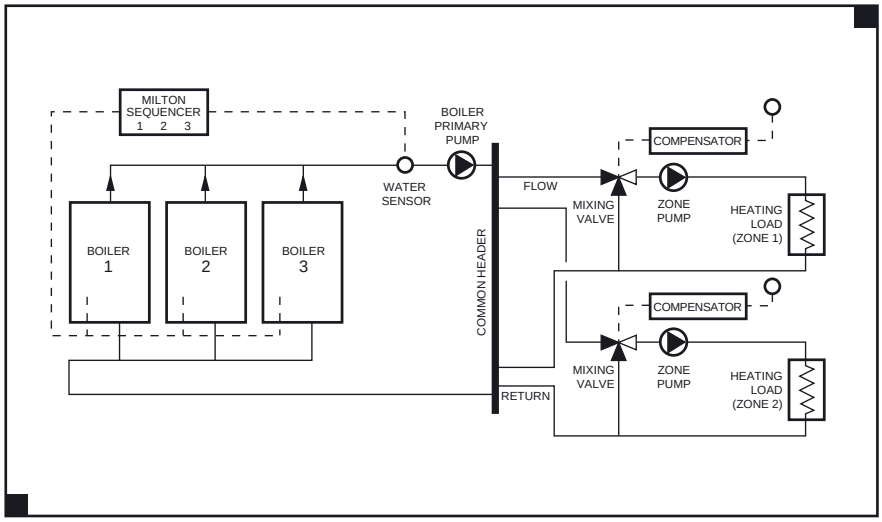
270cm² plus 2.25cm² per kW in excess of 60kW total rated input.

System Design

The installation of modular boilers in commercial and industrial heating and hot water systems offer a wide choice of design options and applications. The following systems shown are typical and should be considered for general guidance.

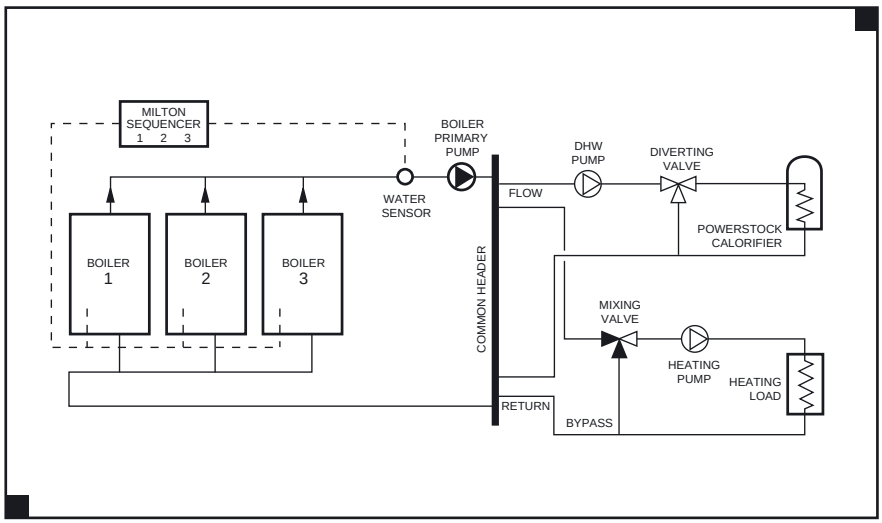
Example 1

Heating only; with separate temperature compensation on each zone.



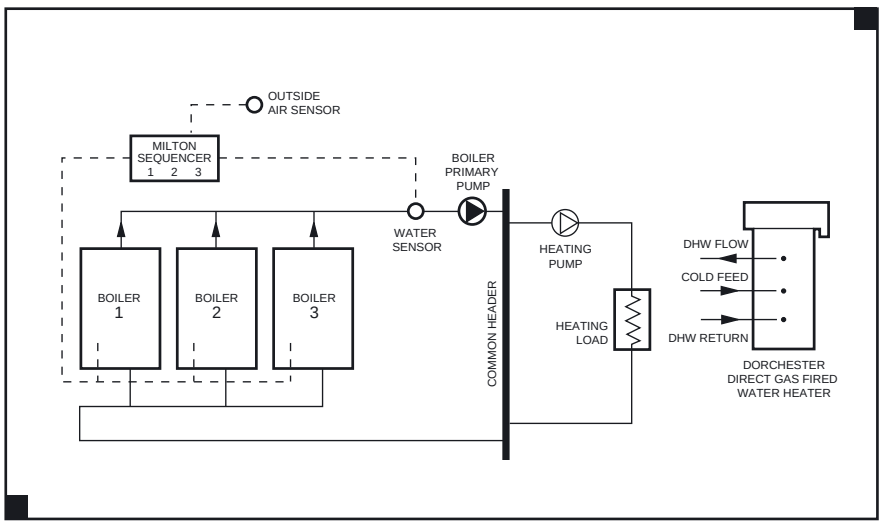
Example 2

Combined heating and domestic hot water with diverting valve on DHW and mixing valve on heating.



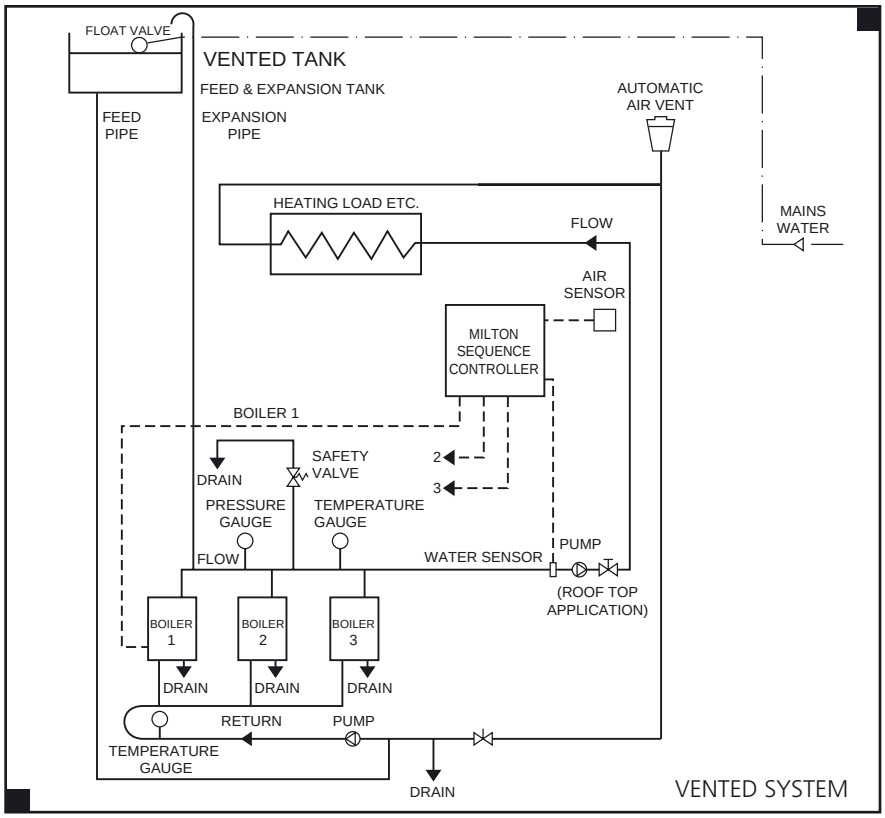
Example 3

Split system. Completely separate heating and DHW systems. Multiple boilers under direct temperature compensation and a decoupled heating circuit, which may have a variable flow. DHW generated by direct gas fired water heaters.



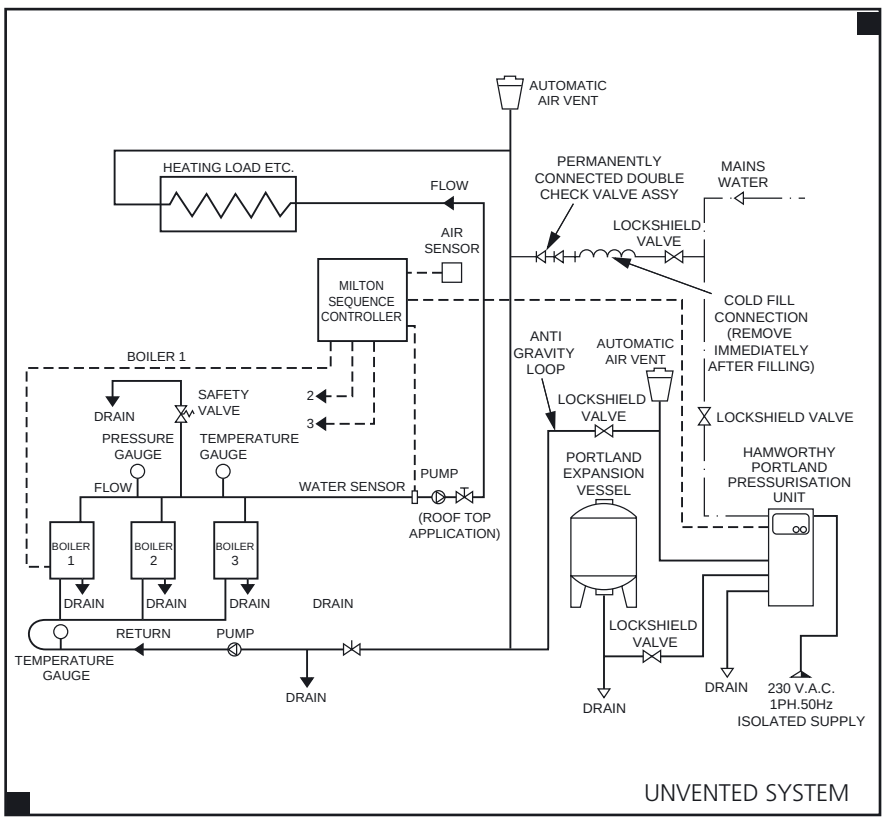
Example 4

Boiler installation (typical) vented system.



Example 5

Boiler installation (typical) unvented system.



General notes

In any single or modular system, it is important that the water flow rate through each firing boiler does not fall below the minimum required flow rate for that size of boiler (see table page 7).

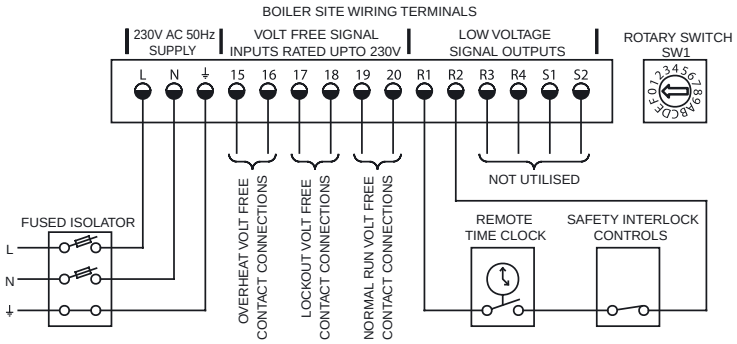
In applications where the minimum flow rate will not be met a shunt pump should be installed, sized to provide the minimum stated flow rate per boiler at the equivalent boiler pressure drop plus pipework resistance.

Both heating and shunt pumps should be controlled to provide an overrun period to dissipate residual heat.

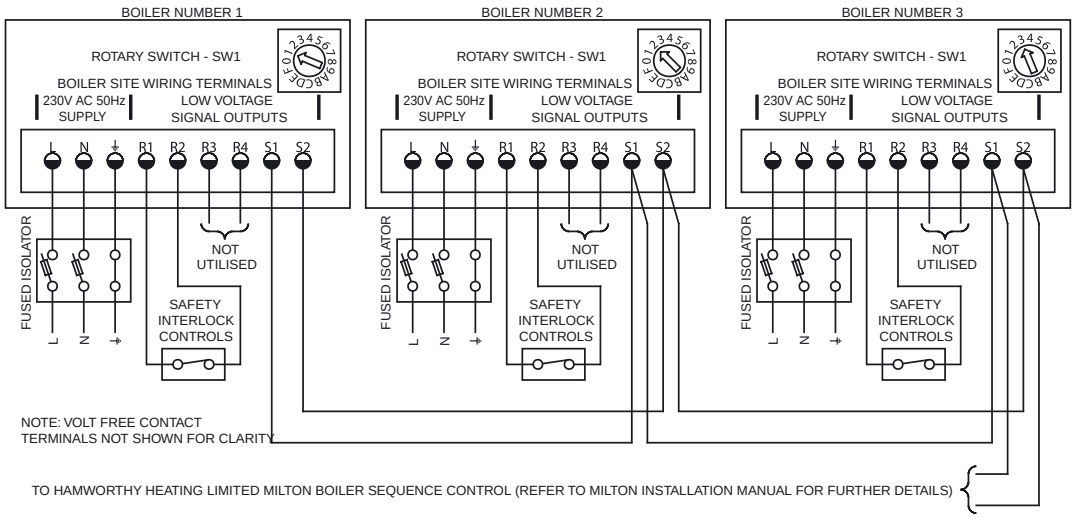
Wiring Diagrams

Wessex 220 M series

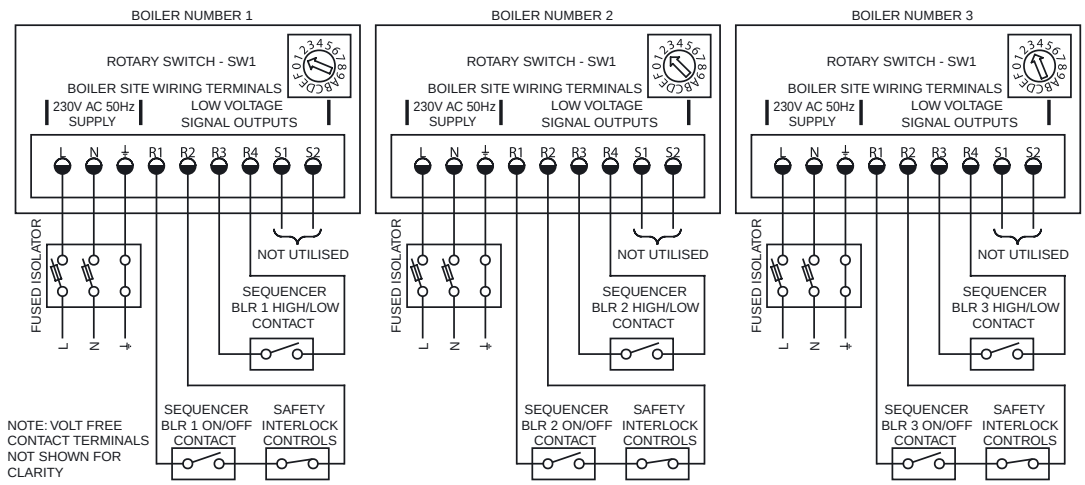
1) SINGLE BOILER INSTALLATION, FULLY MODULATING OPERATION VIA REMOTE TIME CLOCK CONTROL.
NOTE: ROTARY SWITCH 'SW1' ON BOILER CONTROL PANEL MAIN PCB - POSITION '0' SETS BOILER TO FULLY MODULATING OPERATION.



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.



Flue System

General Requirements

The Wessex is designed for direct connection to a flue system and flue outlets from more than one boiler which may be connected to a single chimney, providing the relevant requirements of the current Building Regulations are adhered to.

The Wessex has a low draught requirement and is therefore able to operate with a low chimney, improving the aesthetic appearance of the building exterior.

The flue system should be designed to maintain atmospheric pressure or a slight suction at the module flue connection at all times.

If at any time the suction is likely to exceed 0.1 mbar (0.04 in wg), it is recommended that a draught stabiliser be fitted to the flue system.

Because of their high operating efficiency Wessex modular boilers have a correspondingly low exhaust gas temperature (125°C - 135°C). The flue gas temperature provides the motive force in overcoming flue resistance, therefore this temperature must be maintained. It is recommended that twin walled or insulated flue ducts incorporating a stainless steel inner skin are used on all Wessex installations.

NOTE: Where twin walled insulated flues are used, minimum draught condition at the furthest module will be obtained with all modules firing under summer ambient (20°C) temperature. Maximum draught condition will be obtained with one module firing under winter ambient (0°C). Both conditions should be checked and a controller(s) fitted if the draught exceeds 0.1 mbar (0.04 in wg).

Wessex boilers are suitable for connection to a fan diluted flue system, refer to British Gas publication IM/11 'Flues for commercial and industrial gas fired boilers and air heaters.'

Flue Condensation

As a result of the high thermal efficiency of Wessex modules, the flue gas temperature is low (135°C) and condensation is likely to be produced within the flue system during start-up and low load conditions. Care should be taken to ensure that each flue is installed with a minimum slope of 3° in the direction of the condensate drain, and that all joints are shaped to direct condensation to a drain pipe. Longer lengths of flue should be provided with a separate drain connection.

Each boiler casing is fitted with a drain connection. The drain pipe must be 22mm ID minimum, having a fall of at least 3 degrees (approx. 50mm per metre), and consist of non-corrodible material led to a gully via a waste trap.

Hamworthy flue components

Boiler and flue packages

Hamworthy boiler flues are specifically designed to complement their extensive range of boilers and other industrial and commercial heating equipment.

Flue solutions can be engineered in natural draught, fan assisted or fan dilution applications, offering single skin, twin wall with an air gap or twin wall with an insulated gap construction.

Hamworthy offer a comprehensive range of flue equipment from stock for supply only contracts, or alternatively provide a full design and installation service incorporating sizing, site survey and drawings for approval, (where necessary) prior to manufacture.

Engineered flue solutions from Hamworthy may well result in a reduction in sizes providing an efficient system at lower cost.

Please refer to brochure 500002009 or contact Hamworthy Flue & Chimney Systems for further details.

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