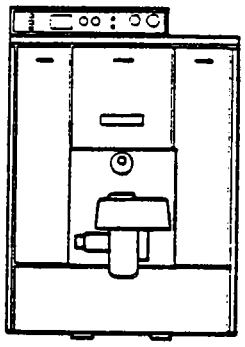

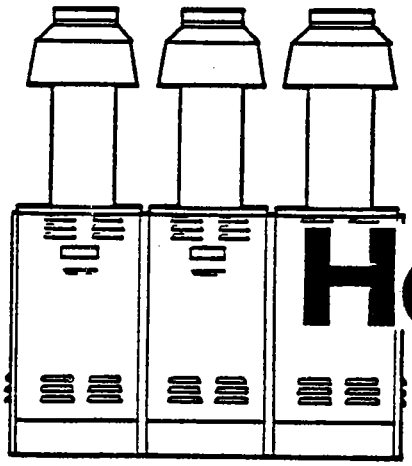

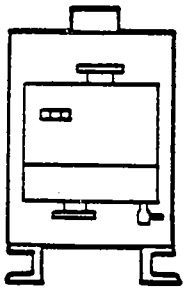

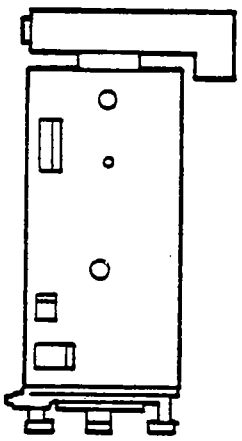

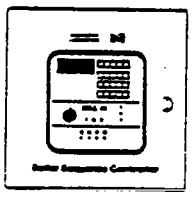

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Hamworthy Heating Products

WESSEX 200 kW. Mk IV
Hot Water Boiler
Installation, Commissioning and Maintenance Manual

BS 5750 Part 1
Certificate No. FM 10082

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INSTALLATION, COMMISSIONING AND MAINTENANCE MANUAL

WESSEX 200 Mk IV
WESSEX 400 COUNTY

HOT WATER BOILERS

FOR HEATING AND DOMESTIC HOT WATER

FOR USE WITH NATURAL GAS ONLY

NOTE: THE INSRUCTIONS SHOULD BE READ AND UNDERSTOOD BEFORE ATTEMPTING TO INSTALL, COMMISSION OR OPERATE THIS UNIT!

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

THIS BOILER IS FOR USE ON NATURAL GAS (2ND FAMILY) ONLY. PLEASE ENSURE RELEVANT INFORMATION REQUIRED WITHIN THE DOCUMENT IS FOUND RELATING TO SPECIFIC GAS TO BE FIRED BEFORE FIRING THE BOILER.

THIS BOILER HAS BEEN TESTED TO COMPLY WITH THE GAS APPLIANCE DIRECTIVE (90/396/EEC).

EC TYPE CERTIFICATE NO. BG/EC - 87/95/30
EC IDENTIFICATION NO. 87AQ30

THIS BOILER COMPLIES WITH THE MACHINARY DIRECTIVE

THIS BOILER HAS BEEN TESTED FOR EMC COMPATIBILITY AND COMPLIES WITH THE REQUIREMENTS OF EN50081-1:1992 EMISSIONS AND EN50082-1:1992 IMMUNITY

RENUMBERED 500001008 "D"

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FIGURES:

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1.0 INTRODUCTION

1.1 These instructions are for use with natural gas (family 2) only, boilers MUST NOT use gas other than for which they were designed and built.

The Wessex is a gas fired, fan assisted, open flued central heating/hot water boiler. The boiler comprises of a burner and tube bank assembly which is referred to as a module. The current Wessex 200 range comprises of a single 200 kW module and a vertically stacked multiple module (Wessex 400 County) mounted in a common casing.

The boiler is arranged for direct connection to the flue system. The flue outlets from more than one boiler may be connected to a single chimney, providing the relevant requirements of the current Building Regulations are adhered to. No draught diverter is fitted to the boiler nor is a fixed diverter required in the flue system. However a draught stabiliser is recommended for some installations (see Section 6.1) The Wessex boiler is floor mounted and is intended for the heating of commercial and industrial premises. It may also be used to supply hot water for those premises via an indirect cylinder.

The boiler has a low thermal capacity and water flow rates should be maintained above the minimum levels shown in Fig 2.

1.2 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. HSE requirements must also be taken into account when installing equipment.

Failure to comply with the above may lead to Prosecution.

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

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

Consideration should also be given to the maximum working pressure of the boiler as given in Section **2: TECHNICAL DATA.** Consult Hamworthy Heating Technical Department for help or assistance if in doubt.

2.0 TECHNICAL DATA

2.1 Overall Dimensions

For arrangement drawing of Wessex 200 refer to Fig 8.

For arrangement drawing of Wessex 400 County refer to Fig 10.

2.2 TECHNICAL DATA TABLE

BOILER	WESSEX 400 COUNTY	WESSEX 200
HEAT INPUT (gross)	476 kW	238 kW
	1,624,000 Btu/h	812,000 Btu/h
HEAT OUTPUT (gross)	400 kW	200 kW
	1,364,800 Btu/h	682,400 Btu/h
GAS RATE	44.4 m^3	22.2 m^3/h
	1752 ft^3/h	876 ft^3/h
NOMINAL GAS INLET PRESSURE	20 m bar (8.0 wg)	20 mbar (8.0 in w.g.)
GAS ORIFICE PRESSURE DROP	7.0 m bar (2.8 wg)	7.0 mbar (2.8 in w.g.)
GAS ORIFICE DIAMETER Valve Seats in Series	2 x 23.8 mm	2 x 23.8 mm.
MAX. WATER PRESSURE	6.0 bar (60 m)	6.0 bar (60 m.)
WEIGHT (dry)	515 kg	257 kg
ELECTRICAL SUPPLY 240V ~ 50 Hz	600 W	300 W

3.0 GENERAL REQUIREMENTS

3.1 Related Documents - as Safety (Installations and Use) Regulations 1984, and (Amendment) Regulations 1990

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, I.E.E. Regulations and the byelaws of the local water undertaking.

It 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 6891: Installation of low pressure gas pipework of up to 28 mm (R1) in domestic premises. (For larger installations see **IM/2, IM/5** and **IM/16** below).

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

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

BS 6880: Code of practice for low temperature hot water heating systems of output greater than 45 kW.

BS 3456: (CEE 10 Part 1, CEE 11 Part 1) Electrical Standards.

CP 342: Centralised hot water supply.
Part 1: Individual dwellings.
Part 2: Buildings other than individual dwellings.

British Gas Publications

IM/2: Purging procedures for non-domestic gas installations.

IM/5: Soundness testing procedures for industrial and commercial gas installations.

IM/11: Flues for commercial and industrial gas fired boilers and air heaters.

IM/16: Guidance notes on the installation of gas pipework. (Excluding domestic installations of 25 mm and below).

Health and Safety Executive

Guidance Note **PM5** - Automatically Controlled Steam and Hot Water Boilers

C.I.B.S.E. Publications

C.I.B.S.E. Guide

It is impractical in this document to specify all relevant information, but the following extracts from the above references are emphasized 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 with hot water 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

See also section 8.8.

The Hamworthy Wessex boiler is designed as a quick response, low water content unit, to run continuously with minimum or no operation problems. 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 control systems.

NOTE! The Standards Authority recommend a minimum return temperature of 50°C in all heating systems other than condensing boilers.

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 3 minute circulating pump over-run after the last boiler has ceased firing.

NOTE! Time clocks should not interrupt live, neutral or earth connections. External voltage MUST NOT be applied to remote, stop/start terminals 5 and 6.

4.0 LOCATION

(See Fig. 8 for dimensions/weights and section 10.1 for clearances.)

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.

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.

Any combustible material adjacent to the boiler and the flue system must be so placed or shielded as to ensure that its temperature does not exceed 65°C (150°F)

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 **IM/16** as appropriate. 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 **IM/2** and **IM/5** as appropriate.

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.

5.6 Boiler Gas System Leak Check

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. and during commissioning a further test for soundness should be carried out on the boiler gas pipework and components. A procedure guide is given in Fig. 1a.

TO CHECK B.C.D.

1) Turn off the electrical power to the appliance.
2) Connect the manometer assembly to TP1 and TP2 (see Fig 1a).
3) With A, B, C, E closed, open F and "Crack Open" D to produce 5 mbar (2" WG) on manometer.
4) Close D and monitor no rise on manometer over a 2 minute period* - a rise would indicate a leak on valve D.
5) Repeat at 20 mbar (8" WG) between B, C, D.
System B, C, D may be considered sound if over a period of 2 minutes any pressure drop is less than 0.5 mb (0.2" WG).

TO CHECK A.B.

6) Open E and F.
7) Crack D to produce 20 mbar (8" WG) between A, B.
8) Close D and F.
9) Drop pressure between B, C and D by removing connection to TP2.
10) System A, B may be considered sound if over a period of 2 minutes* any pressure drop 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, remove manometer connections and tighten test points TP1 and TP2.

NOTE: Care must be taken not to allow soapy water on or near any electrical parts or connections.

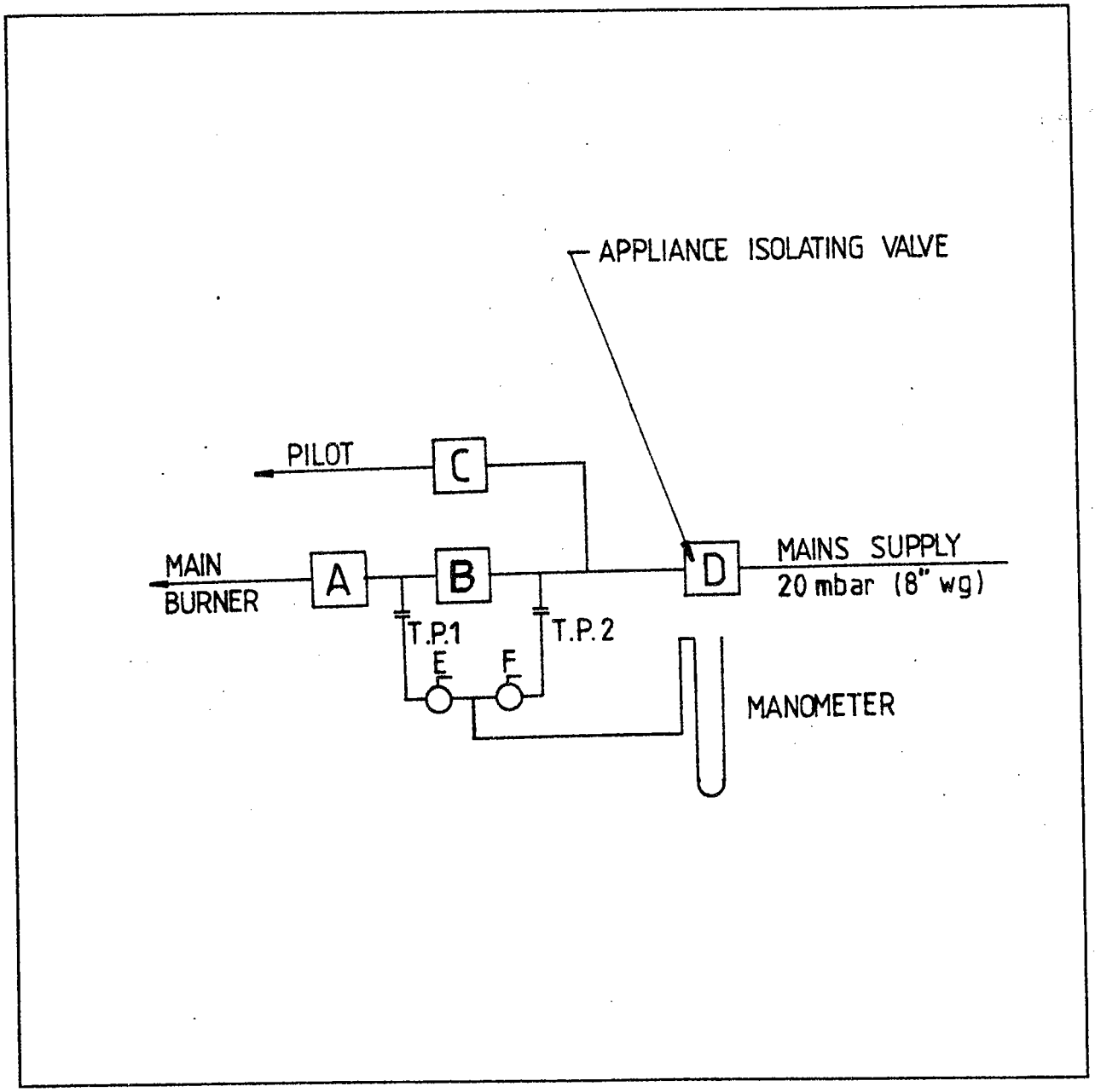


Fig. 1a. Wessex Boilers - 50 kW and 200 kW Models
Valve and Pipework Soundness Testing

BOILER	EXHAUST VOLUME AT N.T.P.(0°C-760 mm Hg) 9% CO_2		EXHAUST TEMP.		FLUE SIZE	
					Spigot	Nom. Flue
	m^3/h	ft^3/h	°C	°F	I.D.mm.	dia. in.
WESSEX 200	288	10,130	125	257	344	12
WESSEX 400 COUNTY	576	20,260	125	257	358	14

6.0 FLUE SYSTEM

Detailed recommendations for flue systems are given in **BS 6644**, British Gas Publication, **IM/11** "Flues for Commercial and Industrial gas fired boilers and air heaters".

The following notes are intended to give general guidance only.

6.1 Suction

Each boiler/battery is arranged for direct connection to the flue system. The flue outlets from more than one battery may be connected to a single chimney. No draught diverter is fitted to the singleboiler/battery nor is a fixed diverter required in the flue system. However, a draught stabiliser is recommended for some installations.

The flue system should be designed to maintain atmospheric pressure or a slight suction at the single boiler/battery flue connection at all times. It is recommended that a draught stabiliser is fitted to the flue system where the suction is likely to exceed 0.1 mbar (0.04 in w.g.) or the height of the flue exceeds 4 m (13 ft).

6.2 Design Waste Gas Volume and Temperature

It is recommended that the volume and temperature of the waste gases shown above are used for the design of the flue system.

6.3 Flue Condensation

With the high thermal efficiency of the boiler, the flue gas temperature is low (approx.125°C). Condensation in the flue is thus more likely than with lower efficiency units. 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 2½° upwards in the direction of exhaust gas flow (no horizontal sections). All joints should be such that any condensation is directed back down the slope. The drain fitted to the boiler casing is ¾" socket which will adequately cope with any condensation from 6 m (20 ft) of twin-wall flue, any longer lengths of flue should have separate open drain connections. The drain pipe must be 15.0 mm (½ in) dia. minimum, having a fall of at least 3° (approx. 5 cm per metre) and be of non-corrosive material and led to a gully via a waste trap.

6.4 Materials

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

6.5 Disconnection

Facilities must be made for disconnecting the flue pipe from each single boiler/battery for inspection and servicing purposes. Bends with removable covers should be fitted for inspection and cleaning purposes where considered appropriate. Flues must be adequately supported and protected from damage. They must not present a risk to people in or about the building.

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.

Consideration should be given to the fitting of a flue discharge terminal.

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 50 mm 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 25 mm.

NOTE! The flue MUST be self supporting. Check that the flue and chimney are clear from only any obstruction.

6.8 Flue Pipe Location

The flue 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.

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.

7.1 Air Supply by Natural Ventilation

The purpose provided space housing the boiler must have, or be provided with, permanent air vents communicating directly with the outside air, at high level and at low level. Where communication with the outside air is only possible by means of high level air vents, ducting down to floor level for the lower vents should be used. 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 grilles shall have a total minimum free area as follows -

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

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

The air supplied for boiler house ventilation shall not allow the boiler house temperature to exceed 25°C at floor level, 32°C at mid-level and 40°C at ceiling level during the heating season.

7.2 Air Supply by Mechanical Ventilation.

The supply of air to a space housing the boiler by mechanical means should be by mechanical inlet with natural or mechanical extraction. Mechanical extract ventilation with natural inlet must not be used. Where a mechanical inlet and a mechanical extract system is applied, the minimum flow rates should be in accordance with the table below.

The requirements for air supply by mechanical ventilation are given in **BS 6644.**

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.

Mechanical Ventilation
Flow Rates

Type of boiler	Flow rate per 1000 kW total rated heat input	
	Inlet air (combustion ventilation)	Extract air (ventilation)
	m^3/s	m^3/s
Natural draught boilers	1.10	0.45
Forced/induced draught boilers	0.90	0.60

8.0 WATER CIRCULATION SYSTEM

8.1 General

The boiler has a low water content and the requirements of minimum water flow are given in Section 8.8 and Fig. 2. Recommendations for the water circulation system are given in **BS 6644** and **CP 342.**

The following notes are of particular importance.

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 75 mm (3 in.) thick mineral fibre, or its thermal equivalent.

Circulating pipework not forming part of the useful heating surface should be insulated to help prevent heat loss 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.

Draining taps must be located in accessible positions which permit the draining of the whole system, including the boiler and hot water storage vessel.

8.2 Pressure Relief Valve (Safety Valve)

The most important single safety device fitted to a boiler is its safety valve and each boiler, or in the case of modular installations, each bank of boilers, must be fitted with a pressure relief valve to **BS 759** or **BS 6759** Part 1 **(ISO 4126)** and sized as in **BS 6644** (See note to 1.0 Introduction).

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 Pipe and Cold Feed Pipe

(See **BS 6644**)
Ref: Fig 1b for the open vent connection.

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 size of these pipes per installation is as follows:-

	Feed	Vent
< 60 kW	19	25
60 kW - 150 kW	25	32
150 kW - 300 kW	32	38
300 kW - 600 kW	38	50

The vent pipe must rise continually, must not be valved except by a design which when closed for maintenance the boiler is open to atmosphere. The pipe shall be protected against freezing where this might occur.

8.4 Altitude Gauge (Water Pressure Gauge)

See Fig. 1b for position of tapping.

Every boiler or group of boilers should be provided with a gauge complete with isolating cock.

8.5 Thermometer

See Fig. 1b for position of tapping.

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

8.6 Drain Taps

See Fig. 1b for position of tapping.

Each boiler must have a ½ in. n.b. drain tap fitted.

8.7 Circulating Pump

One or more circulating pumps will be required to circulate the boilers and heating system. Fig. 2 shows the hydraulic resistance of the boiler. 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 drop to ensure that the minimum flow rate can be obtained. It is also important that the existing system be flushed through 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.

8.8 Minimum Water Flow Rates

The minimum water flow rates are shown in Fig. 2. These flow rates should be maintained through each boiler at all times when the boiler is firing. If the water flow rate is allowed to fall below the minimum then the water ways of the boiler might be subject to premature failure due to 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 water side pressure drop is shown in Fig. 2.

NOTE: If boilers are run off time clock control, a pump overrun (not H.H.L. supply) should be fitted which must run for minimum of 3 minutes on shut-down of the boiler.

8.10 Control Schemes

8.10.1. Temperature Controls.

An adjustable control thermostat is supplied fitted to each module, being set to operate within the range 65-90°C for standard applications.

If a higher water temperature is required (and providing sufficient head on the water system is available) the thermostat may be adjusted to operate

in excess of 90°C.

For high temperature applications, a "special to contract" controls thermostat is available with a higher range and it should be noted that on boilers applied to systems having flow temperatures in excess of 100°C, additional insulation should be applied to the front heat exchanger tube plates (apply to Hamworthy Heating for this special insulation kit). See Note to 1.0 Introduction.

A temperature limiter (hand reset limit thermostat) is also fitted to the module and is normally set at 100°C.

NOTE! Standard temperature limiters setting = 105°C (Max). The minimum difference between control thermostat and temperature limiter must not be less than 10°C.

8.10.2 Water Flow Controls

Any external mixing valves or similar controls should always ensure that the minimum water flow rate shown in Fig. 2 is maintained. It is recommended that a water flow switch is fitted to the system. The switch should be connected such that the boiler cannot fire unless the water flow is proved.

When multiple boilers are installed it is recommended that the water pipework is connected using the reverse flow principle to ensure equal flow through all boilers

8.10.3 Frost Protection.

Consideration should be given to fitting a frost thermostat set at approximately 4°C (39°F).

8.11 Minimum Water System Pressure

To comply with Guidance Note PM5 from the Health and Safety Executive the minimum static water pressure at the highest point in the circulating system must be calculated as follows:-

If the boilers are to be installed as single units the minimum pressure must be equal to the gauge pressure equivalent to the saturated steam temperature obtained be adding 17°C to the required boiler flow temperature but never less than 2 m (6.5 ft).

eg. 1 Required Flow Temp. = 90°C
Safety Margin = 17°C

Equivalent Saturated Steam Temp = 107°C

From Steam Tables -
Corresponding Gauge Pressure
= 0.3 bar (4.1 psi)
= 2.87 m (9.4 ft) head of water.

If the boilers are to be installed in a modular formation the minimum pressure must be equal to the gauge pressure equivalent to the saturated steam temperature obtained by adding 17°C to the sum of the required mixed flow temperature and the temperature rise across the boilers.

eg. 2 Required mix flow Temp = 82°C
Temp rise across boilers = 11°C
Safety margin = 17°C

Equivalent Saturated Steam Temp = 110°C

From Steam Tables -
Corresponding Gauge Pressure
= 0.42 bar (6.1 psi)
= 4.3 m (14 ft) head of water

eg. 3 Required mixed flow Temp = 82°C
Temp rise across boilers at minimum flow = 13°C
Safety margin = 17°C

Equivalent Saturated Steam Temp = 112°C

From Steam Tables -
Corresponding Gauge Pressure
= 0.57 bar (8.3 psi)
= 5.8 m (19.1 ft) head of water

8.12 Unvented Pressurised Systems

See Fig 1b for typical layout of a pressurised (unvented) Hot Water System.

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.
2) System volume - if not known a general rule of thumb of 10 litres/kW installed boiler power can be used.

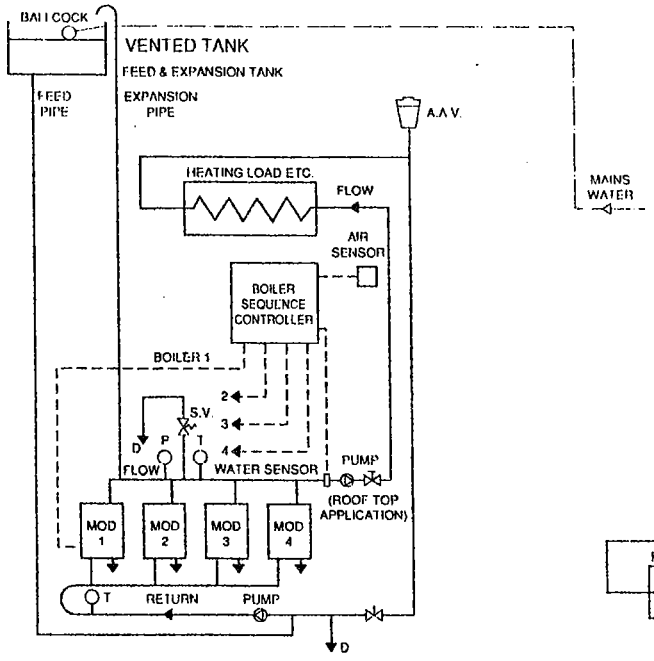
3) Maximum flow temperature, ie most systems run at 82°C.
4) Maximum system hot working pressure, generally given in bar gauge.

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

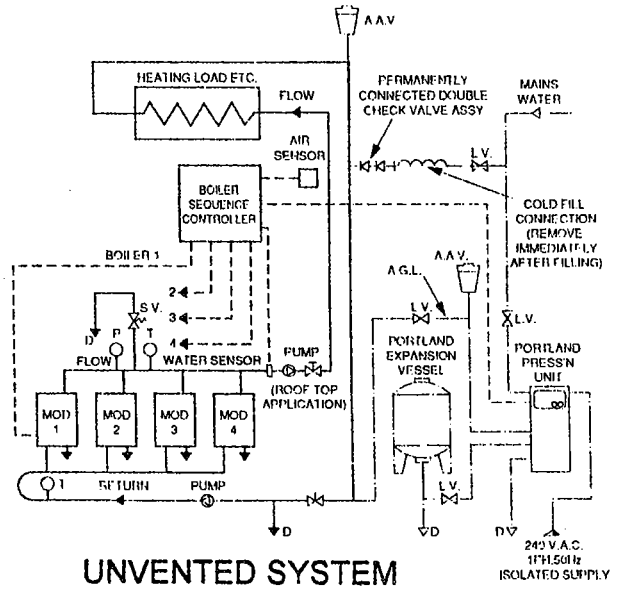
Care must be taken in sizing expansion vessels to ensure maximum acceptance factors are not exceeded. Normally manufacturers of vessel impose a limit of 0.5. This value must not be exceeded at any time during the operation of the boiler: this includes the over pressure condition should a safety valve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

Consideration should also be given to sizing of the safety valve(s) in the system. See **BS 6759: Part 1, (ISO 4126)** for information.

See also **BS 6880: Part 1** for design considerations.



VENTED SYSTEM



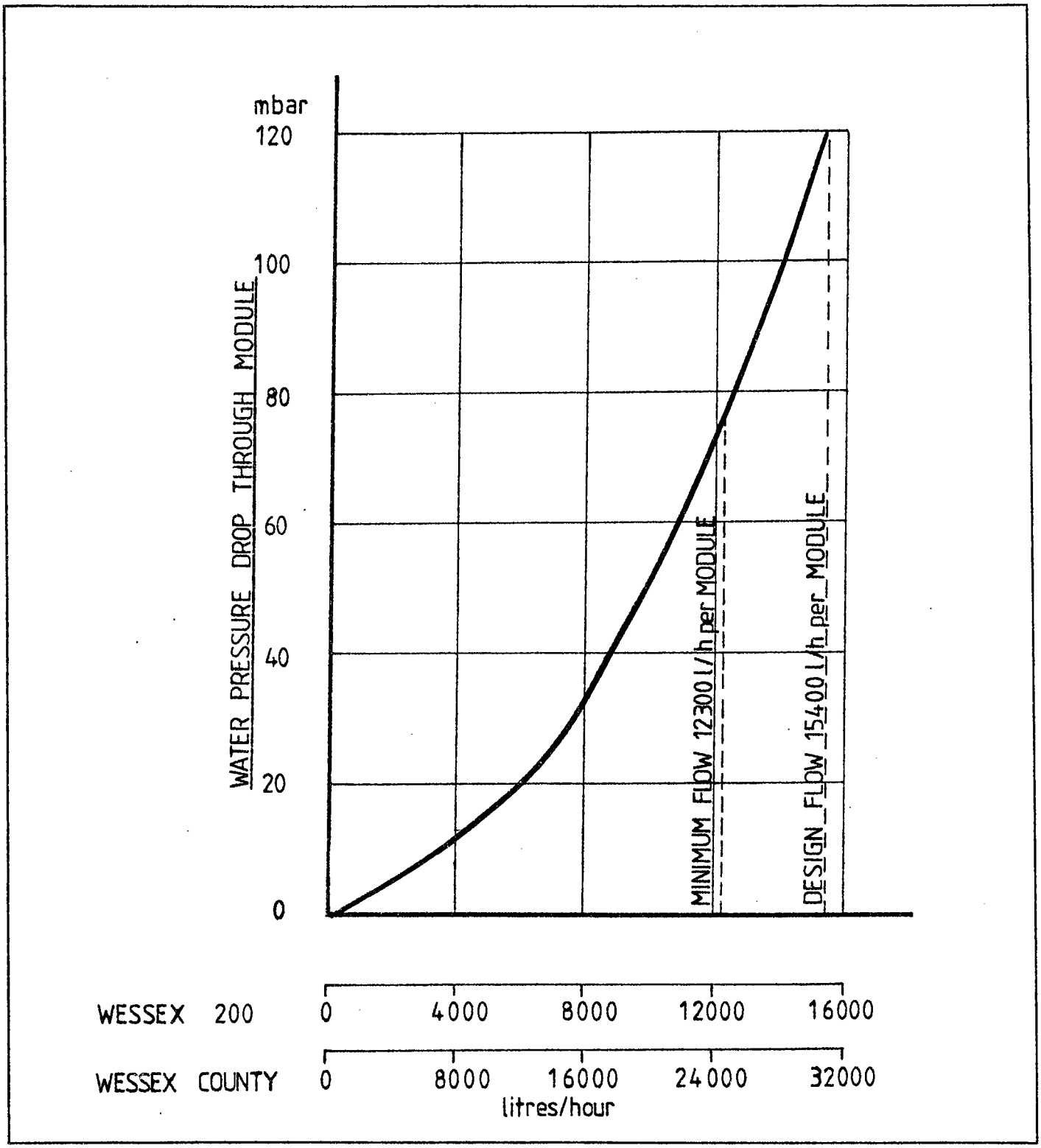
UNVENTED SYSTEM

Boiler Installation (Typical)
Vented and Un Vented Systems

T - Thermometer
P - Pressure Gauge
LV - Lockshield Valve
SV - Safety Valve
D - Drain Cock
AAV - Air Separator/Auto-Air Vent
AGL - Anti-Gravity Loop

Fig No. 1b Schematic Arrangement of Water and Gas Pipework

Fig. 2 Water Pressure Drop and Minimum Flow Rate



9.0 ELECTRICAL SUPPLY

See **BS 6644.**

WARNING: THIS APPLIANCE MUST BE EARTHED.

Wiring external to the boiler must be installed in accordance with the I.E.E. Regulations and any local regulations which apply. Wiring must be completed in heat resistant 3 core cable. (Size 1.0 square mm C.S.A.) Boilers are normally supplied for 240 volts. 50 Hz. Internal fuse rating of each module is 2A. External fuses should be 5A. for all single boiler/battery sizes.

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.

A mains isolator must be provided adjacent to the boiler in a readily accessible position. The supply should only serve the boiler. Further details regarding connection to the electricity supply are given in **BS 3456 (CEE 10 Part 1, CEE 11 Part 1).**

NOTE! Volt free contacts electrical supplies must also be isolated when fitted (see note on fascia).

9.1 Mains Cable Connection

The path of the mains cable is shown in Fig. 3. The length of the conductors between the cord anchorage and the terminals must be such that the current carrying conductors become taut before the earthing conductor, if the cable or cord slips out at the cord anchorage.

9.2 Boiler Wiring Diagram

The boiler wiring diagram is shown in Fig. 4. This wiring diagram is also fitted inside each boiler cover.

Fig. 3. Path of Mains Cable

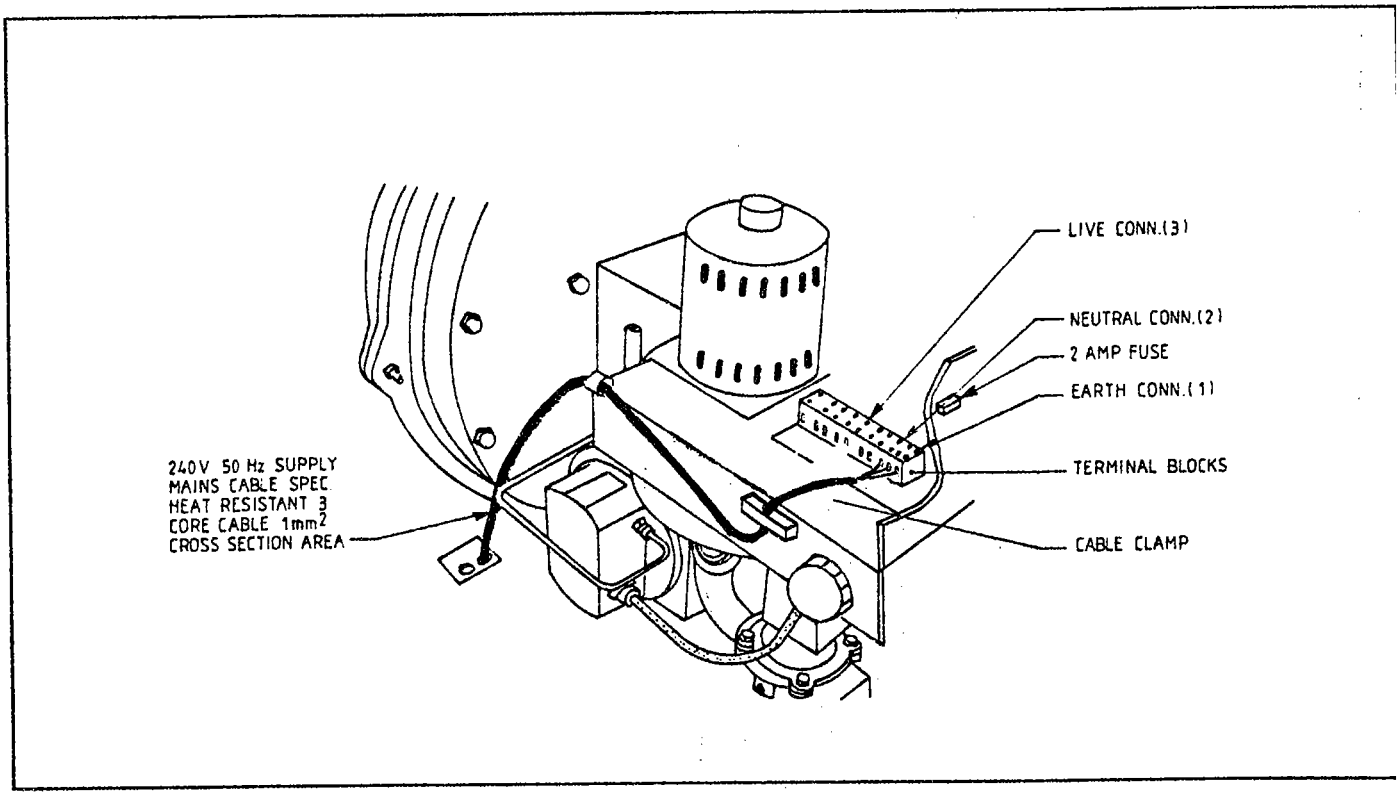
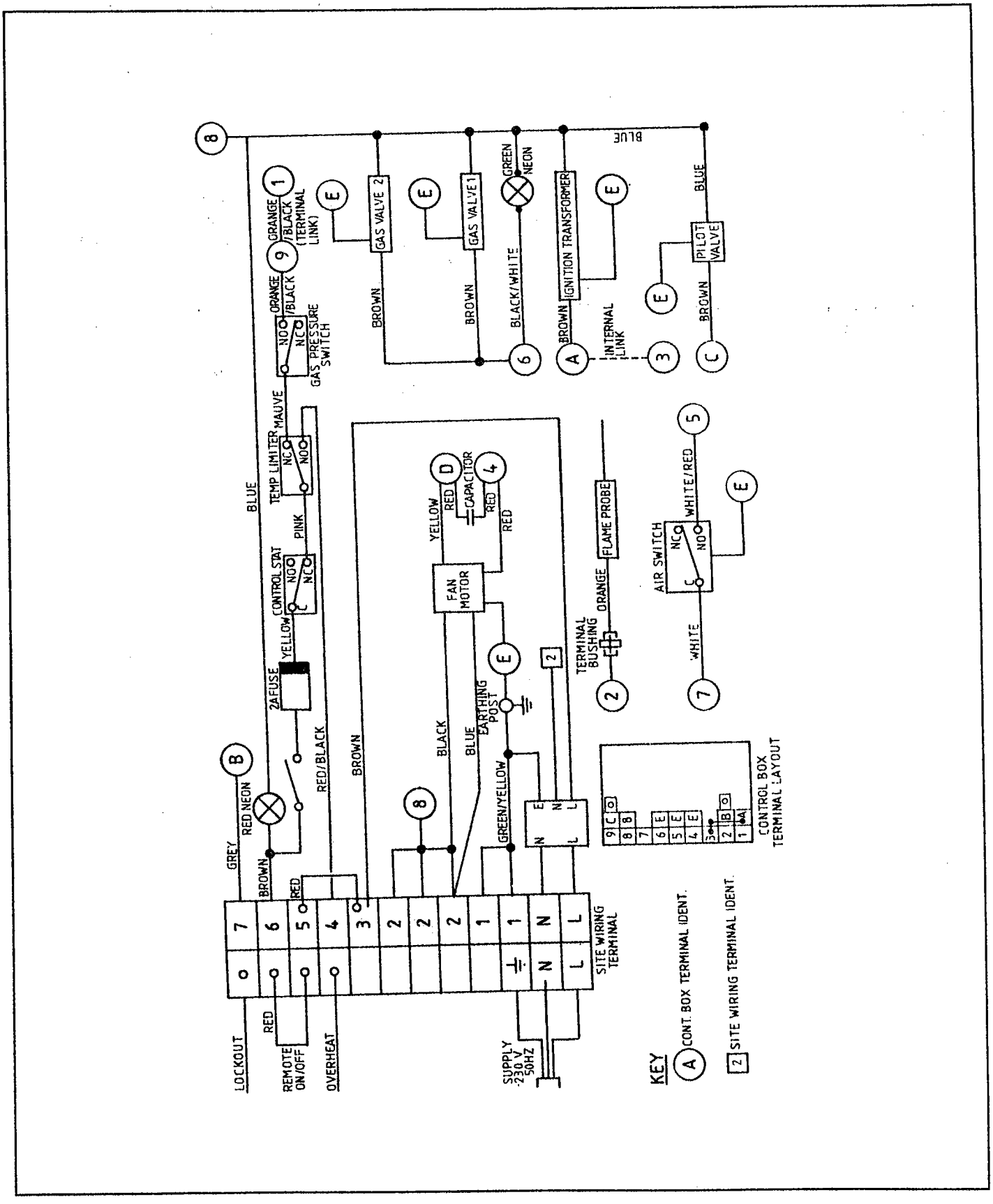


Fig. 4. Wiring Diagram - Wessex 200 kW Mk IV



10.0 INSTALLATION OF BOILERS

10.1 General

Each boiler is normally despatched to site as a pre-assembled unit for floor mounting. The boilers should be stored in a weatherproof place before installation.

The boilers should be positioned to allow minimum clearance of 150 mm (6 in) to the rear, 400 mm (16 in) to each side, and 800 mm (32 in) to the front from adjacent walls or equipment to facilitate occasional inspection. Other installation dimensions are given in Fig. 8.

10.2 Connection of Boilers to the Flue System

Notes on the recommendation for design of the flue system are given in Section 6.

No fixed draught diverter is fitted to the boiler nor is one required to be fitted to the system.

A flue socket is provided suitable for accepting standard twin wall flue pipe. Sealing of the flue to the socket should be made using a suitable caulking string and cold caulking compound.

Suitable means should be incorporated in the flue system adjacent to the boiler for removal of the boiler casing without dismantling the whole flue system.

NOTE: Fit top insulation panel before connecting the flue.

10.3 Gas Connections.

For design see Section 5.

Size and position of gas connections are shown in Fig. 8. A filter mesh is fitted inside each main gas solenoid valve.

11.0 COMMISSIONING AND TESTING

11.1 Electrical Installation

For design see Section 9.

Wiring must be checked by a suitably competent person.

Normal supply required is 240 V 50 Hz single phase. An isolator correctly fused at 5 amps should be sited close to the boiler.

Any other interlocks ie pressurisation unit, BEM system should be wired in series with the remote stop/start loop.

A schematic of the circuit is shown in Fig 4.

11.2 Gas Installation

For design see Section 5.

The whole of the gas installation including the meter, must be inspected and tested for soundness and purged in accordance with the recommendations of **BS 6891** or **IM/2** or **IM/5** as appropriate.

11.3 Water Circulation System

For design see Section 8.

NOTE: If a boiler is to be fitted onto an old or existing pipework system it is advisable to chemically clean and thoroughly flush the system through prior to installation.

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

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

11.4 Lighting the Boiler (Initial Commissioning)

Prior to delivery, all Wessex boilers are subject to a full sequence check and pressure switches are adjusted to design settings. (See following text for values). The intent therefore of the following initial commissioning procedure, is to check the correct functioning of the sequence system up to and including the establishment of the pilot flame, with the gas supply to the main burner isolated.

WARNING: Before attempting to light the boiler ensure that any personnel involved are aware of what action is about to be taken and begin by making the following checks:-

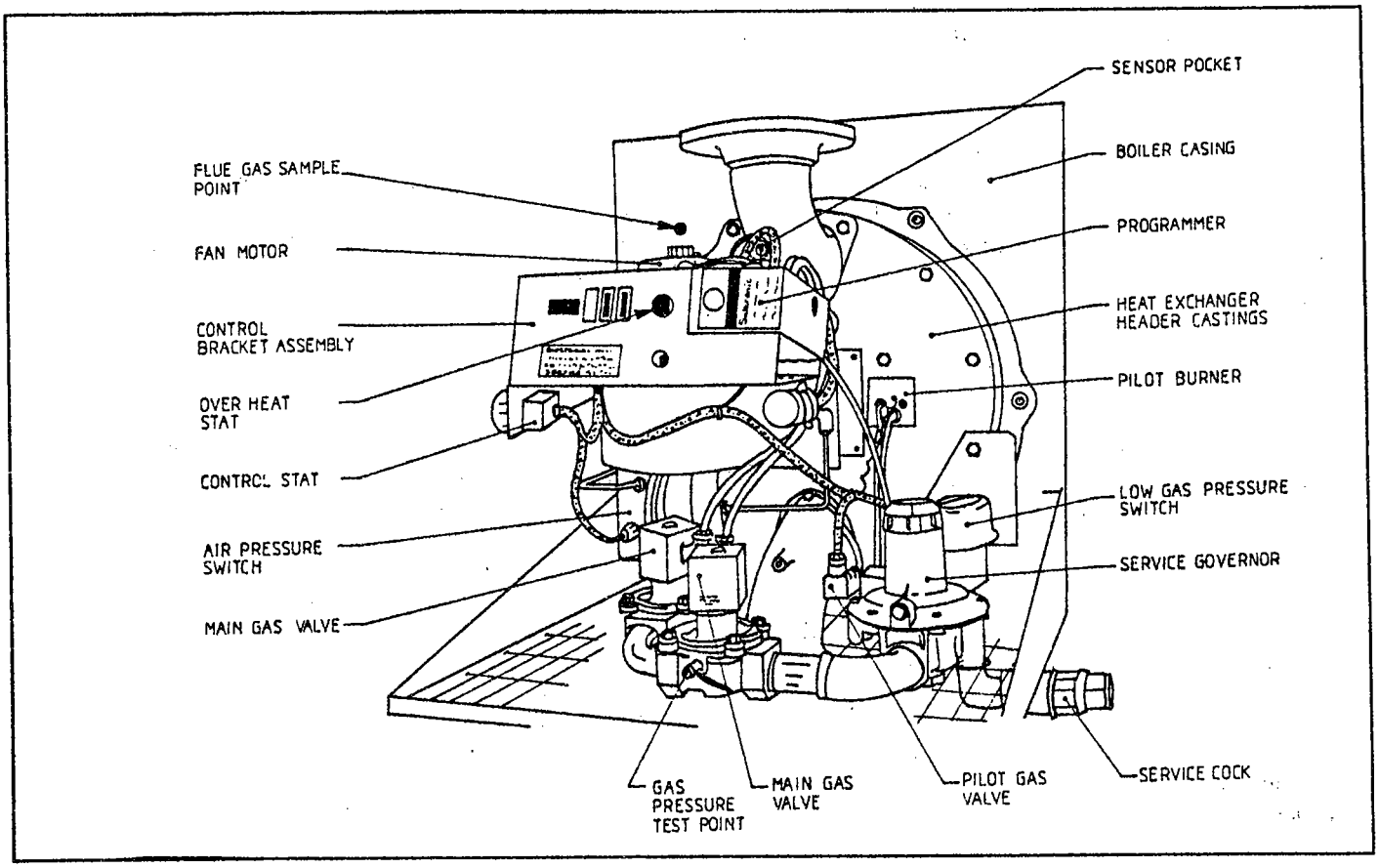
i) Flueway passages to chimney are clear.
ii) Adequate ventilation exists in the boiler house, reference Section 7.
iii) The system is fully charged with water, ready to receive heat, all necessary valves are open and the pump is running and circulating the water.
iv) The pipework and valve arrangement is installed to Hamworthy recommendation in such a way that adequate water flow rates will be present in accordance with Fig. 2.
v) The gas supply pipework is clear of any loose

matter, tested for soundness and purged in accordance with the recommendations of **BS 6891** or **IM/2** or **IM/5** as appropriate.

Turn off the electrical supply to the boiler at the mains external isolator.

a) Switch the boiler ON/OFF switch to ON after which the controller should commence an automatic sequence of events. If when the switch is turned to ON it is observed that the lock-out lamp on the sequence step controller is illuminated, the controller should be re-set by depressing the illuminated button.

Fig. 5. Wessex 200 Module



Remove the boiler front cover.

Remove the Din connector to each main gas valve, thus isolating the gas from the main burner.

Disconnect the orange lead from the flame probe to the control bracket and reconnect with a micro-ammeter - IN SERIES.

Ensure main gas supply is turned ON at the boiler service cock (Reference Fig. 5.).

Set the control thermostat to the minimum setting (65°C) and switch on electrical supply to boiler at external isolator, ensuring that all external controls are calling for heat (e.g. time clocks etc.).

b) With the controller re-set from lock-out, the cam timer will motor to its normal start position and the fan will commence a boiler pre-purge of approximately 40 seconds.

c) Following this pre-purge period, an ignition spark will be generated and the pilot gas solenoid valve will lift to supply gas to the pilot burner.

d) After a few seconds, the spark will be removed and a short pilot flame monitoring period will start. The pilot flame proving signal should be 2.5 - 5.0 μA.

e) On completion of the pilot proving period, the green normal firing lamp will be seen to illuminate but since the main gas solenoid valves are

disconnected, the boiler sequence will go to lock-out after approximately 4 seconds. The lock-out lamp on the controller will then illuminate and the green normal firing lamp will be extinguished.

f) When the commissioning engineer is satisfied that he has a stable reliable pilot flame, the module should be electrically isolated at the plant switch and the Din Connectors reconnected.

Main Burner Commissioning

Having established a satisfactory pilot flame and reconnected the supply to the main gas solenoid valves, the sequence described above will, after switching the boiler on, be repeated but instead of the boiler going to lock-out at the end of the pilot proving period, the main gas valves will open and after approximately 4 seconds of green lamp illumination, the pilot valve will be de-energised and the main flame should remain established under the control of the flame monitoring system. The main flame proving signal should be 25-35 μA.

Turn the boiler switch and electrical isolator to off, remove the micro ammeter, reconnect the flame probe connections.

Burner pre-mix system leakage check. (Using a Gasco-Seeker)

With the burner/controls casing on and all tests for soundness carried out, light the boiler and wait for five minutes. With a suitable gas detector, insert the probe into the circular viewing port on the right hand front of the casing and test at insertion depths of 50 mm (2 in.) and 150 mm (6 in.) within the casing. Also conduct tests at 100 mm (4 in.) intervals around the casing where it fits to the boiler and at any case openings. (N.B. The detector probe should be held approximately 13 mm (0.5 in) from the casing joint when testing outside the casing.)

If the gas reading in the casing does not exceed 25% LEL and there is no gas detected outside the casing, any leakage from the pre-mix system is acceptable. If the gas reading in the casing exceeds 25% LEL at either point or gas is detected outside the casing, the leakage must be located and sealed and the tests repeated.

11.5 Gas Pressure Adjustment and Combustion Checks

11.5.1 Gas Pressure Adjustment

After approximately 30 minutes of normal firing, the gas pressure differential across the gas valves (reference Figure 7) should be checked by connecting a differential manometer to test points A & B. The pressure drop for Natural Gas should be 7.0 mbar (2.8 in. w.g.) and minor adjustments to the appliance governor may be necessary to correct for site gas pressure conditions.

NOTE: The above is a first order check, Final Setting must be made using a gas meter.

For reference the gas pressure switch setting (factory adjusted) is 10 mbar (4 in. w.g.) to "make". And the air pressure switch (factory adjusted) is 2.0 mbar (0.8 in. w.g.) to "break".

11.5.2 Combustion Checks

A flue gas sampling point is provided in the front boiler casing (see Fig. 5). To check combustion take a flue gas sample from each module test point and for reference North Sea natural Gas CO_2 measurements should be between 9 and 10% or 4.0 to 5.5% when the basis of measurement is oxygen. Normal CO levels should not exceed 200 ppm or 0.02% (by volume)

NOTE: All the above measurements refer to dry gas samples.

11.6 TEMPERATURE LIMITER & CONTROL THERMOSTATS

11.6.1 Temperature Limiter

The temperature limiter is supplied factory set to 100°C which is normally satisfactory for low pressure hot water systems.

NOTE: For high temperature applications, it is essential that the water system static head or in the case of pressurised systems, the system pressure, is suitable for operation at elevated temperature and attention is drawn to the specific requirements of **BS 6644** and the Health and Safety Executive Guidance Note PM5 (Automatically Controlled Steam and Hot Water Boilers).

11.6.2 Control Thermostat Adjustment

Control thermostats are factory set to limit their adjustment to 90°C, however the thermostat may be adjusted to operate in excess of this temperature.

NOTE: Standard temperature limiter setting = **105°C (MAX)**

The minimum difference between control thermostat and temperature limiter must not be less than 10°C.

Fig. 6. Sequence Controller Coloured Programme Indicator Disc.

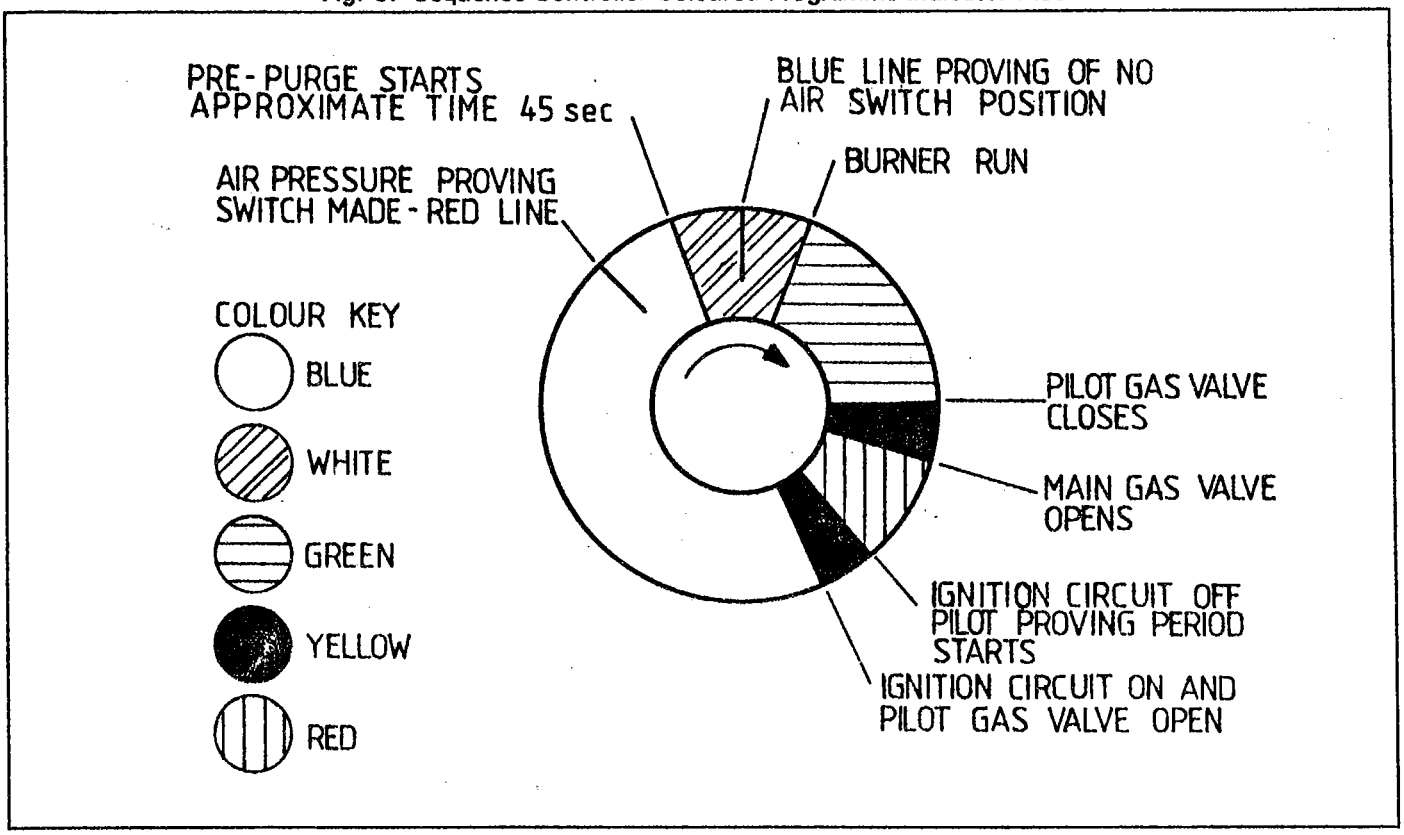
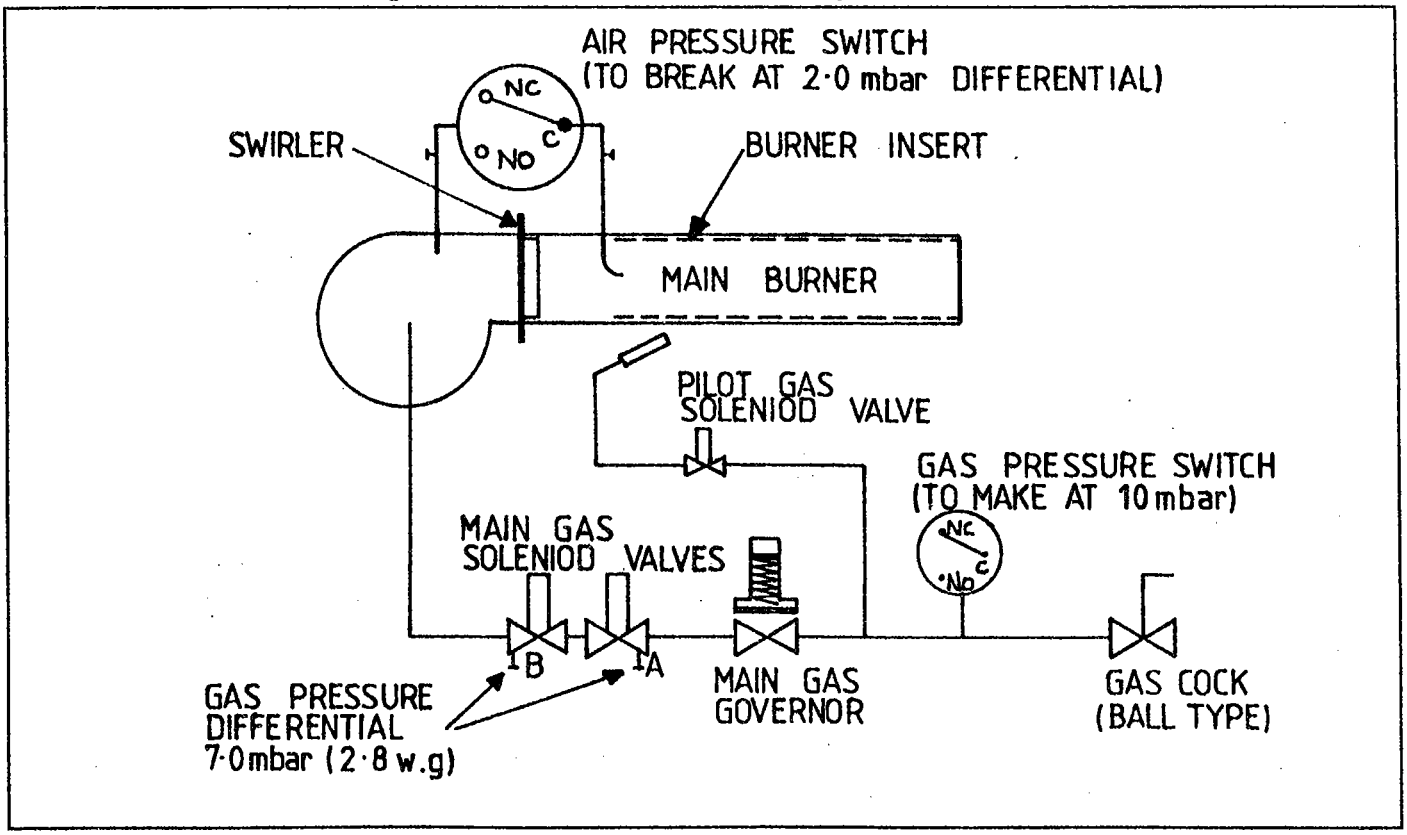


Fig. 7. Wessex 200 kW Mk IV Burner System Schematic



11.7 Users Instructions

Upon satisfactory completion of commissioning and testing, the commissioning engineer should hand the Users Instructions to the user or purchaser and explain the method of economic and efficient operation of the system. Ensure that the user or purchaser is fully conversant with lighting, shut-down and general operational procedures.

12.0 FAULT FINDING

The controller fitted to the Wessex 200 kW boiler incorporates a rotating coloured disc fixed to the cam timer which provides information with regard to the position that has been achieved at any point in the sequence. This disc with the relevant sequence information is shown in Fig. 6 and in general the fault can be located by observing the position at which the disc stopped rotating and the functions controlled to that point.

BOILER SEQUENCE CONTROLLER, OPERATION AND FAULT FINDING

12.1 Summary of Safety Features

1. Flame failure during a run, results in burner shut-down and lockout within 1 second.

2. Failure to establish and detect flame during the light-up sequence, results in burner shutdown and lockout within 2 - 5 seconds from the initial release of fuel.

3. Air supply failure at any time, results in burner shutdown and immediate lockout.

4. The air pressure proving switch, is checked in both the "no air" and "air supply proved" positions.

5. Restoration of the power supply after an interruption, results in a full light-up sequence to safely restart the burner. Power failure after a lockout, will not interfere with this condition when the supply has been restored.

6. False flame signals at the start point and during pre-purge result in burner shutdown and lockout.

7. The light-up sequence can only commence providing the cam switches and relay contacts within the control box are at their correct relative positions, and continuity of the lockout relay circuit is proved.

12.2 Fault Finding - See Fig. 6.

NOTE: The coloured programme indicator referred to in this Section can be observed through the top of the cover (46 mm dia. hole provided) by removing the white plastic plug and using a small light.

1. **Burner will not start.** Coloured programme indicator stopped on blue line in white sector.

a) Check that thermostat circuit is "calling for heat" and timeswitch circuit (if fitted) is made. A supply on terminal 9 will determine this.

b) Check that the start circuit loop across terminals 9 and 1 is made and the gas pressure switch contacts are closed.

2. **Burner will not start.** Synchronous motor runs, coloured programme indicator rotates but burner does not start.

Check air pressure proving switch is in correct state i.e. "no air" position.

3. **Burner starts but goes to lockout.** Programme indicator stopped on red line in blue sector.

a) Check air pressure proving switch.

b) Check that a load, e.g. start gas valve is connected to terminal C.

c) Check continuity of start gas coil winding.

d) Check for flame simulation or false flame signal.

4. **Burner starts but goes to lockout.** Coloured programme indicator stopped in blue sector.

a) Check for combustion air supply failure.

b) Check for flame simulation, if necessary, change control box.

c) Check for continuity of start gas valve coil circuit.

5. **Burner starts, flame established but control box goes to lockout.** Coloured programme indicator stopped at end of yellow sector/start of red sector.

a) Check that flame detection probe is in contact with flame.

b) Check that flame probe insulator is not cracked. A cracked insulator will be sufficient to give rise to an a.c. leakage current.

c) Check that flame probe is not in contact with other metallic parts of the burner.

6. Burner starts, flame established but control box goes to lockout. Coloured programme indicator stopped in red sector.

Check that when main gas valve has been switched on, the change in combustion or flame characteristics has not caused the flame to "lift-off" the combustion head and hence allow the flame probe to lose contact with the flame.

7. Burner starts, runs but subsequently goes to lockout. Coloured programme indicator stopped at end of green-start of white sector.

a) Check for interruption in gas supply.

b) Check for failure of combustion air supply.

c) Check flame probe position for proper contact with flame.

d) Check flame probe insulator for soundness.

e) If necessary, change control box.

NOTE: If the control box goes to lockout, it is generally performing the function it is designed for.

12.3 Causes of Lockout

1. No Ignition.
2. Ignition not in correct place, check electrode settings and ceramic insulator for cracks or damage.
3. No gas supply.
4. Gas valves not opening.
5. Failure of combustion air supply.
6. Incorrectly positioned flame probe, poor earth contact with flame, interference to flame signal from ignition spark.
7. Faulty control box.

13.0 SERVICING INSTRUCTIONS

13.1 General

Regular periodic servicing is recommended, preferably by a Hamworthy appointed person.

The following procedures are to be applied by those persons less familiar with the appliance.

NOTE:
WARNING: ISOLATE THE ELECTRICAL SUPPLY TO THE SINGLE BOILER/BATTERY BEFORE ANY SERVICING OR COMPONENT EXCHANGE PROCEDURE, AND TURN OFF THE GAS SERVICE COCK TO THE MODULE BEING SERVICED. VOLT FREE CONTACT ELECTRICAL SUPPLIES MUST ALSO BE ISOLATED WHEN FITTED.

13.2 Annual Service

13.2.1 Remove controls cover by unscrewing the central 'Pozidrive' retaining screw and releasing the top of the cover which hooks behind the closing plate that is around the top water connection (Wessex 200). This is done by pushing the closing plate down a little so that the fingers can be entered under the cover top and lifting to unhook. The cover is then drawn forward while it rests on the filter tray.

The Wessex County cover is removed in a similar manner having firstly removed the closing plates fitted around the water connections.

13.2.2 Remove fan/mixing chamber and controller assembly complete using the following steps:

a) Disconnect mains supply cable and any other system monitoring cables employed at the terminal block, loosen cable clamp and withdraw cables from assembly.

b) Disconnect leads to spark electrode and flame probe by pulling their connectors from the pilot assembly.

c) Loosen and remove copper gas pipe from between the pilot burner and pilot solenoid valve.

d) Remove pilot burner assembly by unscrewing the two M5 pan head screws.

e) Remove the low gas pressure switch cover and disconnect the mauve and orange/black leads, the single earth lead (green/yellow) and ease them through the grommet hole.

f) Remove the Air pressure switch cover and disconnect the white and white/red leads, the single earth lead (green/yellow) and slacken the cable gland and remove with the leads.

g) Unplug the Din Connectors to the main and pilot solenoid valves.

h) Loosen and remove the two Bundy Tubes that connect the Air pressure switch to the fan/fan extension.

i) Remove the clip and withdraw thermostat bulbs from pocket.

j) Unscrew the four M6 nuts securing the complete

assembly to the front tube plate cover casting and withdraw the assembly from the module.

k) Remove stainless steel orifice plate/insert and its cork gaskets.

l) The burner can now be withdrawn from inside the heat exchanger by first removing the M5 screw and washer, then tap lightly on the flange to loosen the burner. The centre cone can be gripped with pliers to facilitate withdrawal.

13.2.3 Clean the burner by gently brushing inner and outer surfaces, tap burner flange firmly downwards on a wooden block to eject particles of dust and debris. Check circular cork gasket for soundness and renew if necessary. Clean burner insert in a similar manner. Replace burner in module. (Closed end of burner must locate in recess in module rear tube plate, this will be indicated when the flanged end of the burner is flush and square with the front header casting.) Ensure the "Top" marking on the flange is correctly positioned.

13.2.4 The fan/mixing chamber and controller assembly may be removed to bench for cleaning:

a) Remove fan casing/extension piece from fan and motor mounting plate by removing four 'Pozidrive' screws, holding fan motor and controls bracket and work loose taking care not to damage rubber gasket, and without putting any strain on cable connections or wiring loom.

b) Gently brush fan blades if necessary to remove any dust accumulation.

c) Blow through the pressure switch bundy pipe to check clear.

13.2.5 Check pilot assembly. If either electrode shows signs of oxidation or is bent it should be renewed. Check spark gap is set at 2 - 3 mm (3/32 in.). If not, replace the assembly.

13.2.6 Check flame probe for signs of oxidation or bending. Renew if required. Length of metal rod should be 98 mm minimum.

13.2.7 Re-assemble fan/mixing chamber and controller assembly to boiler in reverse procedure to that given in paragraph 13.2.2. Check rectangular cork gaskets for soundness and renew if required. Use colour code given on wiring diagram (on boiler front cover and page 12) to facilitate reconnection of electrical leads.

13.2.8 With module service gas cock still turned off check the programmed sequence as described in paragraph 11.4/11.5 on initial commissioning in Commissioning and Testing section.

13.2.9 Check gas pressure and reset if necessary in accordance with the values given in paragraph 11.5 (Commissioning and Testing Section).

13.2.10 Remove the two filter pads from the burner tray and the front of the module controls cover. Remove contaminating dust by shaking or washing in soapy water, rinsing and drying. If the contaminants cannot be substantially removed - discard and fit new filters. Replace module controls cover and tighten retaining screw.

13.2.11 Carry out combustion check by testing the flue gas CO_2 and CO levels; typical values are given in paragraph 11.5.2.

13.3 Two Year Service

NOTE: It is advisable to have at hand a tube of silicone rubber sealant in addition to other usual gasket materials.

13.3.1 Repeat annual service as describe in paragraphs 13.2.1 to 13.2.6 inclusive, but do not reassemble any items to the boiler.

13.3.2

a) Remove and retain the 6 M5 'Pozidrive' screws retaining the boiler insulation panels, taking care to note the order of re-assembly. Lift the top insulation panel clear of the boiler and then remove each of the four individual side panels.

b) Undo all the M5 screws retaining both stainless casing side panels and remove by pulling out at the top and then lifting; if caution is exercised the silicone rubber seal will come away intact on each side panel and can be re-used.

c) Unhook both stainless coil spring baffle retainers and remove. Also remove the 16 stainless steel baffle plates. Wire brush both sides of the baffles to remove any deposits.

d) Thoroughly brush the exposed finned copper tubes until clean. (The tube bank may be gently hosed down with clean water to remove debris providing the burner is removed). Blow off dry.

e) De-sludge the floor of the casing and ensure the drain is clear.

13.3.3 If necessary repair the silicone rubber seal around edges of side panels with new liquid sealant. Allow 20 minutes for partial cure.

13.3.4 Replace one coil spring baffle retainer around tube bank and slip in baffles one at a time. When all the baffles are repositioned replace the second retainer and locate between tabs on baffles, ensure first retainer is similarly located. Now lightly smear grease over side sealing faces of casing.

13.3.5 Replace side panels carefully to avoid damaging repaired seal etc. and tighten screws. Clean off any excess liquid rubber that may squeeze out.

13.3.6 Continue with re-assembly in accordance with procedure for annual service viz: paragraphs 13.2.7 to 13.2.11.

13.4 Four Year Service

13.4.1 Either the heat exchanger module may be descaled in situ*:

Repeat two year services as described in paragraphs 13.3 to 13.3.5 inclusive then:

13.4.2 Isolate the boiler from the main system flow and return pipes and circulate a chemical descaling solution through the heat exchanger, preferably using a pumped recirculating system. This job is best carried out by experts. Recommended solutions include "Gamlen" XD blended with "Gamlen" CUO inhibitor. Follow the chemical manufacturers recommendations and instructions regarding method, solution strength and safety and handling precautions.

Reconnect boiler to pipework system after cleaning up flanges and renewing gaskets.

NOTE: Fit flange bolts so that nuts are uppermost on flow connection, and underneath on return connection. This is important to avoid controls cover fouling bolts.

Now proceed to paragraphs 13.4.12 and 13.4.13.

* Or alternatively the heat exchanger module may be removed for descaling:

13.4.3 Carry out annual service as previously described in paragraphs 13.2.1 to 13.2.6 inclusive, do not re-assemble any items to boiler.

13.4.4
a) Release 1 in. gas union connecting service cock to boiler pipework.

b) Undo the M8 nut and bolt clamping the vertical gas feed pipe. Undo both M8 set screws retaining gas controls assembly to 3 in. n.b. water return elbow. Remove gas control assembly.

13.4.5
a) Isolate the boiler from the main system flow and return pipes and drain boiler. (It contains approximately 20 litres (4.5 gallons) of water.)

b) Remove filter tray assembly by slackening the six (three each side) M5 pan head screws and lift off at the keyhole slots.

13.4.6 Either:

a) Remove the six M10 nuts holding the heat exchanger module to the casing, and carefully withdraw the module from its casing by sliding it out on its internal runners. The module is heavy (137 kg or 300 lb) and will require frontal support as soon as the front flange clears the studs. Otherwise tube bank damage will result. Also support the rear of the module as it emerges from the casing.

Alternative to a) above if space permits:

b) Disconnect boiler casing from flue duct and remove water flow and return pipework local to boiler front including elbows up to front header casting. Undo four of the six M10 nuts (front header to casing) leaving the two outer nuts in place (those on horizontal centre line of module). Tip casing forward onto front header casting using timber or similar to protect studs etc. and to shore up.

Undo the remaining two M10 nuts and gently lift casing from the module.

Return casing to normal position for cleaning.

13.4.7 Remove module baffles by unhooking the stainless steel retaining springs. Brush the baffles and tube bank assembly and continue service in accordance with paragraphs 13.3.2 (c), (d) and (e). (Two Year Service).

13.4.8
a) Remove the 12 M12 bolts securing the front header plate to the front tube plate and separate the plates.

b) Remove the 18 M12 bolts securing the rear cover plate to the rear tube plate and separate the plates.

c) Clean and descale the tubes through and also the waterways in the tube plates and covers. Chemical descaling is preferred for the tube bank assembly, recommended solutions include "Gamlen" XD blended with "Gamlen" CUO inhibitor.

Follow chemical manufacturers instructions for solution strength, method of application, safety and handling precautions.

13.4.9 Clean up mating surfaces and re-assemble covers to tube plates with new gaskets lightly greased before assembly. Torque M12 bolts down evenly to 60lb/ft.

13.4.10
a) Re-assemble baffles to module etc. in accordance with procedure in paragraph 13.3.4.

b) Renew ceramic rope seal and replace module in casing by reverse of either method (a) or (b) described in paragraph 13.4.6.

c) If necessary replace boiler "in line" with its associated pipework and reconnect flow and return connections and flue duct, clean up flanges and renew gaskets.

NOTE: Fit flange bolts to flow and return elbows so that nuts are uppermost on flow connection, and underneath on return connection. This is important to avoid controls cover fouling bolts.

13.4.11
a) Replace gas controls assembly, reverse instruction 13.4.4locating assembly to return elbow.

b) Reconnect 1 in. gas main union to service cock.

13.4.12 Continue with re-assembly in accordance with procedure for annual service viz: paragraphs 13.2.7 to 13.2.11.

13.4.13 When the module is firing the gas pressure must now be checked in accordance with paragraph 11.5 (commissioning and Test Section).

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 11.0.

NOTE: ISOLATE ELECTRICAL SUPPLY TO THE BOILER AND TURN OFF THE GAS SUPPLY BEFORE REMOVING CONTROLS COVER AND COMMENCING ANY SERVICING OR COMPONENT EXCHANGE PROCEDURE.

14.1 Pilot Burner Assembly - H.H.L. Part No. 563801004.

The pilot burner is situated on the horizontal centre line to the right of the fan extension duct, screwed to the front header casting.

Pull off the H.T. and flame probe caps, loosen nuts securing copper pipe and remove; remove the two M5 pan head screws and withdraw the assembly.

Renew insulated spark and probe electrodes as required -

H.H.L. Part Nos.	Spark Electrode	333801440
	Flame Probe	533805006

Generally clean up Pilot Assembly removing any loose sooty deposits or oxidisation and replacing any damaged parts, see Fig. 9 (Assembly Drawing).

Check pilot assembly. If either electrode shows signs of oxidation or is bent it should be renewed.

Check spark gap is set at 2 to 3 mm (3/32 in.). Adjust if necessary. Replace assembly in reverse order.

14.2 Fan Motor Renewal - H.H.L. Part No. 339011192

Remove sequence controller by first unscrewing the retaining screw located at centre of the controller. Pull controller firmly from base. Disconnect motor leads from base terminals, viz: YELLOW from terminal D in middle of base, also GREEN/YELLOW from earth terminal on the motor casing and RED from terminal 4. Loosen cable gland nut and pull disconnected leads with protective sleeve from base. BLACK and BLUE leads from "N" at incoming terminal block.

Remove the four M5 'Pozidrive' screws holding the controls bracket and fan motor plate to the fan casing. Place the controls bracket to one side taking care not to stretch or pull any cables or capillaries etc.

Withdraw the fan, gently taking care not to damage the rubber gasket. Slacken the impeller retaining grubscrew and remove the impeller from the motor shaft.

Undo the four 'Pozidrive' screws exposed by the impeller removal and take off the motor mounting plate noting the position of all spacers, rubber bushes and earth strap etc.

Replace these items (together with mounting plate and impeller) on the new motor, position the impeller to give a 6 mm (¼ in.) gap between motor plate and impeller back plate at the rim of the latter. Tighten

the retaining grubscrew onto the flat surface provided on the motor shaft.

Cut the flying leads of the new motor to lengths identical to the old.

Rebuild the assembly in reverse order to remainder of removal procedure, using the wiring diagram on the controls cover to assist with wiring connections.

14.3 Pilot Solenoid Valve Renewal (Coil Only) - H.H.L. Part No. 74744549

It is likely that the main cause of gas valve failure will be due to coil winding failure either open or short circuit. In such an event it is possible to replace the coil only.

Disconnect the Din Plug from the valve coil ('Pozidrive' screw at centre of plug).

Remove the spring clip on top of the valve and lift coil from valve stem. Replace with new coil and refit spring clip and Din Plug.

14.4 Main Solenoid Valves (Coil Only) - H.H.L. Part No. 747445556

It is likely that the main cause of gas valve failure will be due to coil winding failure either open or short circuit. In such an event it is possible to replace the coil only.

Disconnect the Din Plug from the valve coil ('Pozidrive' screw at centre of plug).

Remove the spring clip on top of the valve and lift coil from valve stem. Replace with new coil and refit spring clip and Din Plug.

14.5 Control Thermostat Renewal - H.H.L. Part No. 339009345

Alternative thermostat manufacturers may be used in the Wessex boiler controls assembly. However, the fitting and wire spade connections are physically identical. The terminal identification may well be different from that shown on the wiring diagram. Please refer to fixing instructions included with the thermostat to ensure correct connections are made and correct operation is obtained.

To replace the thermostat the following procedure must be followed. **NOTE!** Record existing temperature setting of thermostat for reference before removal.

Remove thermostat capillary retaining clip at pocket and withdraw the bulb from the pocket in the flow header. Remove the spaded YELLOW and PINK leads at the "push-on" terminals on the thermostat body. Pull off the control knob and remove the spring and bezel. The thermostat is retained to the support bracket by two M3 screws, one of which is a pillar type and forms the control knob stop. Take care to note the relative position of the two screws before removing them (i.e. the lower screw has a pillar head), together with the thermostat body.

Re-assemble the new thermostat in reverse procedure ensuring that the YELLOW and PINK leads connect the thermostat in the normally closed position. (Identified as contacts 1 and 2 on the thermostat body.) Run the boiler and turn the thermostat up and down to check for correct operation during the warm up period.

NOTE: For adjustment of thermostat operating range refer to Appendix 1. Control thermostat setting procedure. See Note to 1.0 Introduction.

14.6 Temperature Limiter (Thermostat) Renewel - H.H.L. Part No. 339011044

Remove thermostat capillary retaining clip at pocket and withdraw the bulb from the pocket in the flow header. Remove the spaded PINK, MAUVE and RED/BLACK leads at the "push-on" terminals on the device body. Undo the bulkhead nut and withdraw the device.

Fit the new temperature limiter (limit thermostat) in reverse procedure ensuring that the PINK and MAUVE leads connect the device in the normally closed position and RED/BLACK to normally open position. (Identified as contacts 1 and 2 on the device body.)

To check it's operation, link out the control thermostat and run the boiler whilst gradually reducing the water flow through the boiler until it shuts down. Check the boiler thermometer during this operation. Re-establish the waterflow. When the water temperature has cooled down the boiler should remain off until the green reset button on the thermostat is pressed. Turn off the electrical isolator and remove the link across the control thermostat.

NOTE: For adjustment of over-heat cut-off device (limit thermostat) operating range, refer to section 8.10.1. Also see Note to 1.0 Introduction.

14.7 Sequence Controller Renewal - H.H.L. Part No. 747246236

The sequence controller can be removed complete. Unscrew the cheese head screw retaining the controller to its terminal wiring base. Pull the

controller firmly from its base, there will be some resistance due to the "push-in" terminal connections. Locate new controller correctly to base and push firmly home, tighten retaining screw.

14.8 Neons and On/Off Switch Renewal

Item	H.H.L. Part No.
Green neon lamp	747436456
Red neon lamp	747436449
On/off rocker switch	339006648

Pull off the electrical leads to the appropriate item spade connectors. Release switch or lamp from mounting facia by pressing in the plastic retaining lugs at the top and bottom. Pull component out frontwards. Push in new component until lugs lock in position and reconnect leads. Consult wiring diagram on controls cover or Fig. 4 if in doubt regarding reconnection.

14.9 Ignition Spark Generator - H.H.L. Part No. 747217120

The ignition spark generator is located behind the sequence controller. Release the screw retaining the sequence controller and pull the top clear of the base-plate to expose the terminal rails. Pull off H.T. cap from ignition electrode and unscrew the clip inside the cap and pull out the lead (use 'Pozidrive' No. 2 point in the clip). Disconnect wiring from base-plate at terminals A, 8 and E. Release two screws securing base plate and transformer to controls bracket, remove transformer.

Re-assemble components in reverse order making sure that the transformer is earthed at the earthing terminal.

14.10 Air Differential Pressure Switch Renewal - H.H.L. Part No. 747146295

The air pressure switch is located on the left hand side of the fan casing and attached to the gas feed pipe fabrication.

Remove the cover by unscrewing the single captive 'Pozidrive' screw. Undo the earth screw in the pressure switch body and release the green/yellow lead.

Disconnect the white and white/red wires from switch at screw terminals, slacken conduit gland nut and withdraw protecting sleeve and all wires from pressure switch. Loosen and remove the bundy tube to the fan extension fabrication.

Loosen and unscrew the switch and Enots adaptor from the bulkhead fitting in the gas feed pipe fabrication.Transfer the Enots adaptor to the new switch.

Transfer the Enots adaptor for the Bundy tube (Choke Adaptor) to the new switch.

NOTE: The ⅛ in. BSP tapping point in the replacement switch will be sealed with a protective plug which must be removed with a screwdriver before assembling the choke fitting.

Transfer the cable strain relief bush to the new switch.

Reassemble the switch to the boiler in the reverse order (ensure the appropriate joints are gas tight) and rewire and fit cover.

14.11 Gas Pressure Switch Renewal - H.H.L. Part No. 339009477

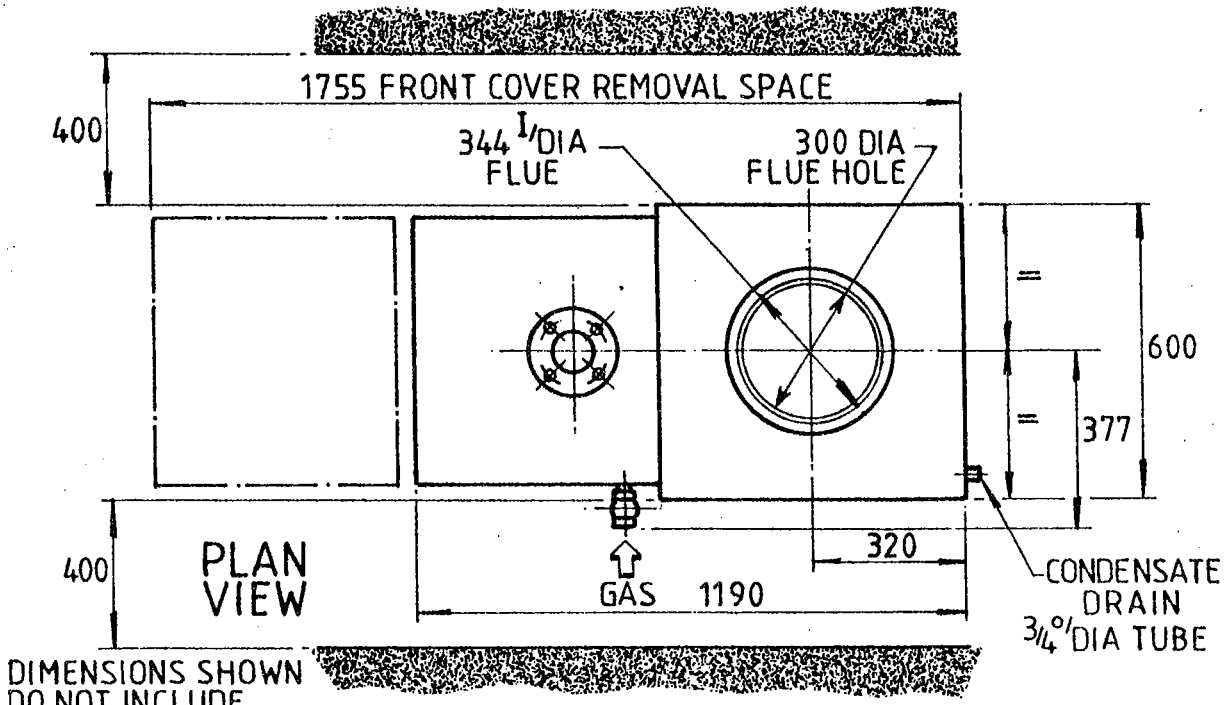
Remove cover-plate by releasing pozihead screw. Disconnect and remove wires from terminals. Using suitable spanners, unscrew switch from fitting at main gas pipe fabrication. When fitting new switch ensure that suitable jointing compound is applied to the male thread of the adaptor.

Turn on gas cock and test for gas soundness. Turn off gas cock and connect wiring as indicated:

a) Orange/Black wire to terminal marked "N.O."
b) Mauve wire to terminal marked "C"
c) Green/Yellow wire to earthing point on body.

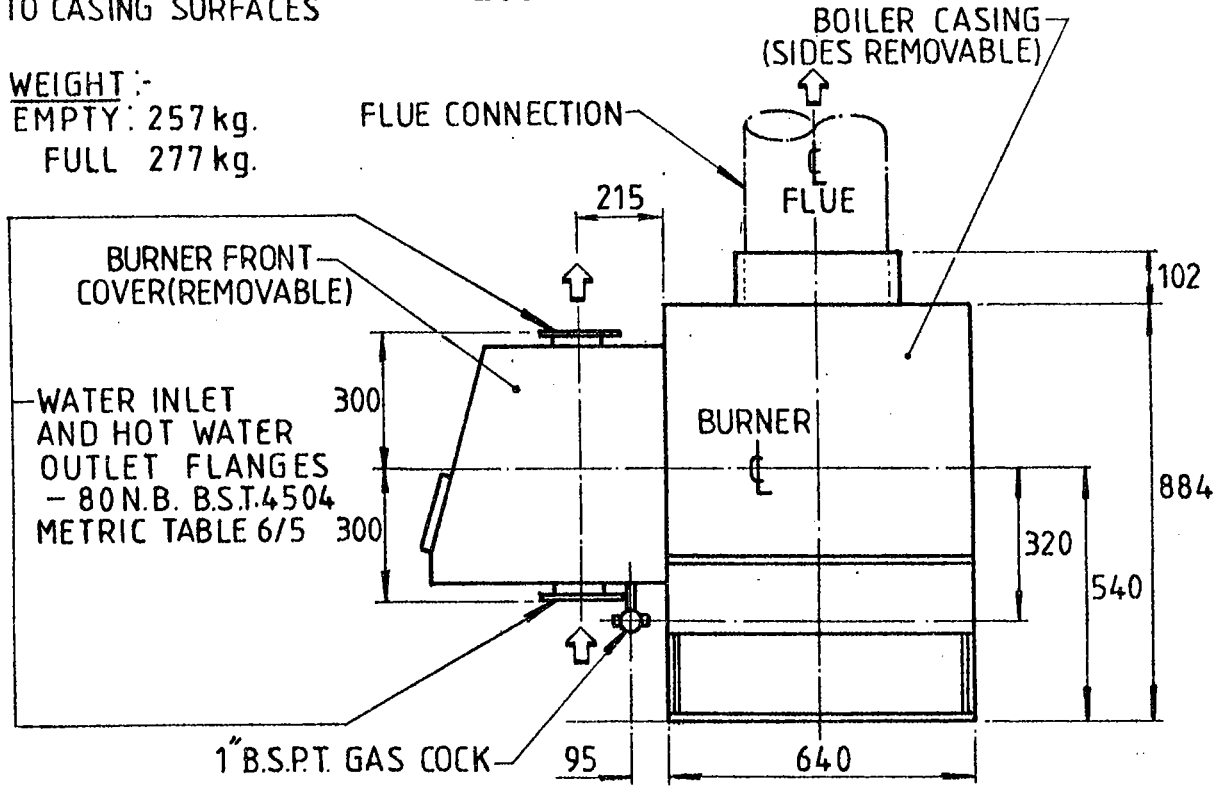
Replace cover plate. (This switch will have been FACTORY SET).

Fig 8. General Arrangement Drawing



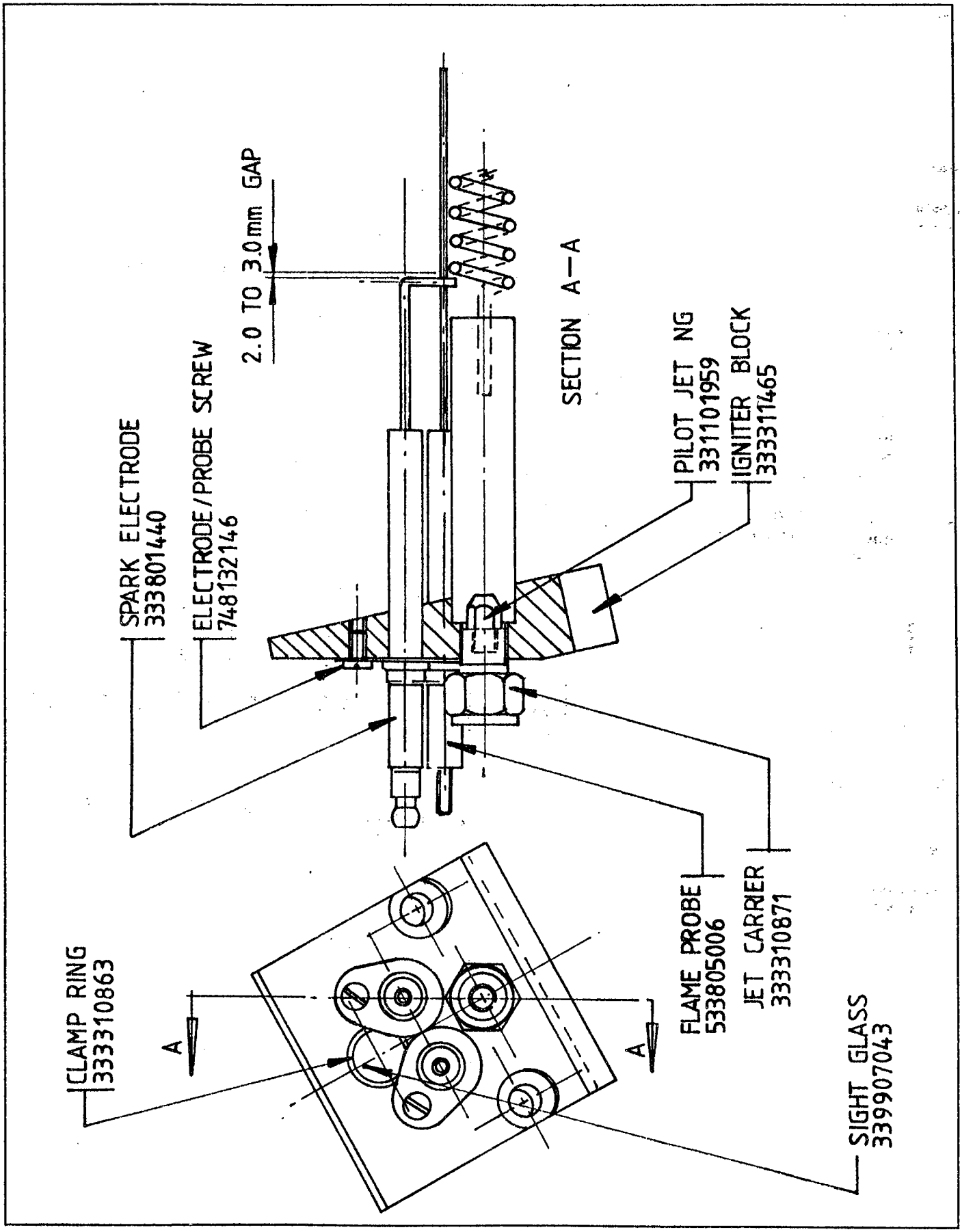
DIMENSIONS SHOWN DO NOT INCLUDE EXTERNAL INSULATION PANELS WHICH ADD 30mm. TO CASING SURFACES

OUTLINE DIMENSIONS of 200KW WESSEX HOT WATER BOILER



WEIGHT :-
EMPTY : 257 kg.
FULL 277 kg.

Fig. 9. Wessex 200 kW Mk IV Pilot Burner Assembly 563801004



Appendix 1. Control Thermostat Setting Procedure
See Note to 1.0 Introduction

LANDIS & GYR THERMOSTAT

Adjusting the limitation of angle of rotation only for thermostats with drum type setting knobs.

1. Pull the setting knob off the thermostat spindle.
2. Remove the spring clip and limit stop discs (1) and (2) from inside the setting knob.
3. Insert limit stop disc (1) into the setting knob so that its stop arm locks onto that rib having the guide number (5) which corresponds to the start value of the desired setting range.
4. Insert limit stop disc (2) in the same manner, but this time choosing the rib and guide number which corresponds to the end value of the desired setting range.
5. Replace spring clip, thus securing the limit stop discs.
6. Push the setting knob back on to the thermostat spindle so that the stop screw is located within the selected setting range.
7. Rotate the setting knob to the limit stops of both ends of the scale to check the adjusted range against the setting scale.

A. Desired start value of the new setting range in °C.
Corresponding guide number for limit stop disc (1).

B. Desired end value of the new setting range in °C.
Corresponding guide number for limit stop disc (2).

Setting Range °C	Limit Stop Disc Nr		1	3	5	7	9	11	13	15	17	19	21	23	25	27
50-110	1	A	50	55	60	65	70	75	80	85	90	95	100	105	110	-
	2	B	-	50	55	60	65	70	75	80	85	90	95	100	105	110

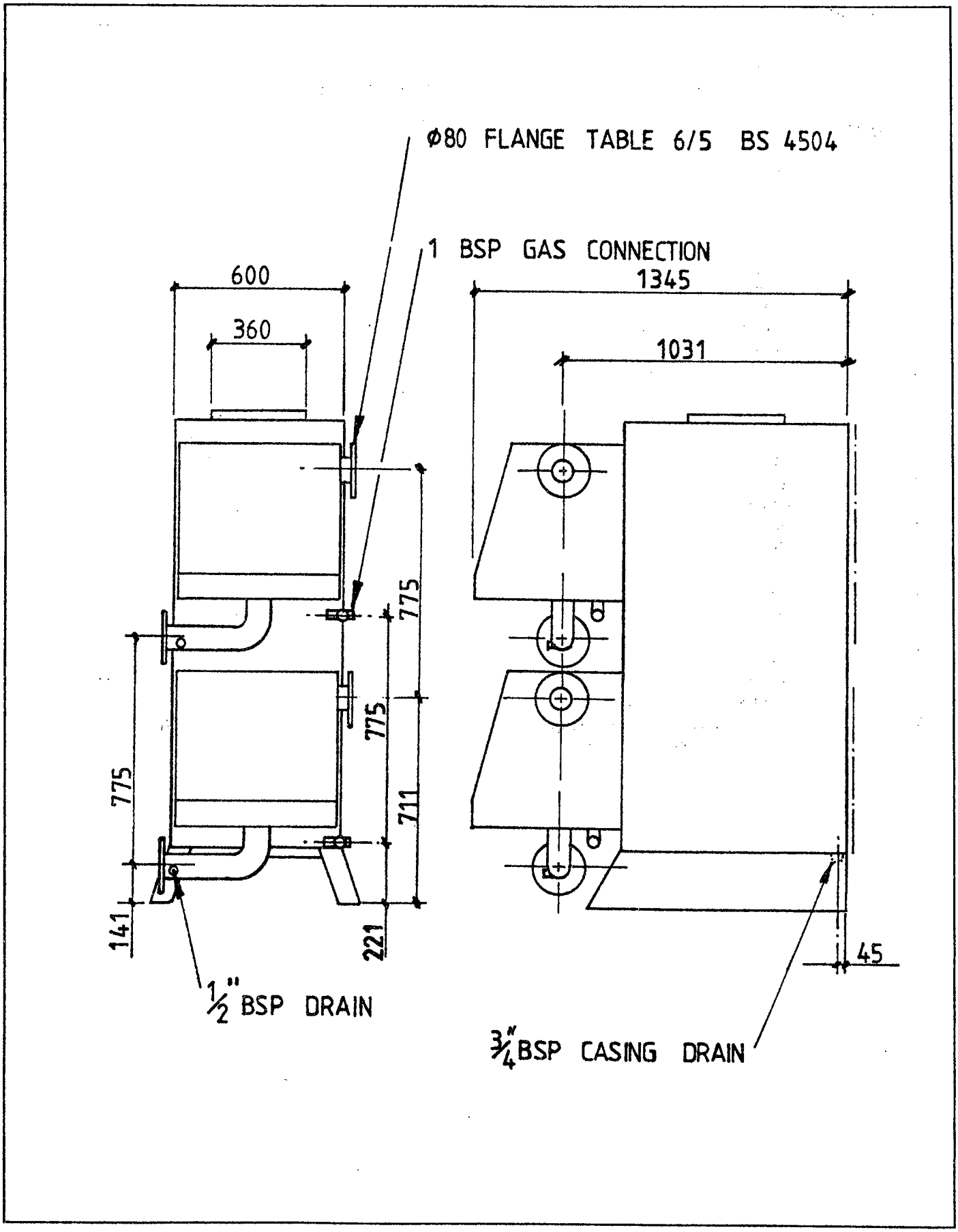
IMIT THERMOSTAT

1) Pull the setting knob off of the thermostat spindle.

2) Reposition the spring stop inside the control knob to new setting.

3) Push the control knob back on the spindle and rotate to ensure the settings provide the correct desired setting range.

Fig 10 Arrangement Drawing (Wessex 400 County)



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RECOMMENDED SPARES FOR WESSEX 200 KW MK IV

QUANTITY	DESCRIPTION	PART NO.
1	Spark Electrode	333801440
1	Flame Probe	533805006
1	Sight Glass	339907043
1	Fan Motor (only)	339011192
1	Fan Motor Assembly	339009667
1	Main Solenoid Valve	747442538
1	Main Solenoid Coil	747445556
1	Pilot Solenoid Valve	747442520
1	Pilot Solenoid Coil	747445549
1	Air Pressure Switch	747146295
1	Gas Pressure Switch	339009477
1	Control Thermostat	339009345
1	Overheat Cut Off (Limit Stat)	339011044
1	Sequence Controller	747246236
1	Ignition Transformer	747217120
1	Green Neon	747436456
1	Red Neon	747436449
1	On/Off Switch	339006648
1	Pilot Burner Assembly (Igniter)	563801004
1	Burner Assembly	363310924
1	Boiler Module Fuse	747225834
1	Fan Impeller	339012364
1	Burner Insert	533301004
1	Burner Gasket (Circular Cork)	331212673
2	Fan Extension Gasket (Square Cork)	331214018
1	Swirler Gasket (Square-Neoprene)	331212707
1	Fan Case Gasket (Circular-Neoprene)	331213366

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CUSTOMER SERVICES

APPLICATION

To supplement the detailed technical information booklets, technical advice on the application and use of the Hamworthy Heating product range is available from Poole and accredited agents.

COMMISSIONING

A commissioning service is offered for all the Hamworthy Heating products. Commissioning by the manufacturer ensures the most efficient performance and correct operation is achieved.

Hamworthy commissioning reports are detailed and definitive. Such information reports on the original status of the plant are essential for the future routine maintenance and fault finding situations.

ROUTINE SERVICE

Hamworthy offer routine service contracts for all products. Planned maintenance of equipment by routine servicing reduces operational costs considerably below that associated with repair or breakdown approach. Regular servicing by Hamworthy trained staff ensures that all equipment is operating to optimum efficiency.

The frequency of visits to maintain installations up to required level is variable depending upon the equipment type and usage.

BREAKDOWN SERVICE, REPAIR, REPLACEMENT

Even when the commissioning and routine servicing has been carried out to the highest standard there are always occasions when the unexpected breakdowns occur. Hamworthy provide a rapid response breakdown, repair or replacement service through head office at Poole and accredited agents located throughout the UK.

SPARE PARTS

A comprehensive spare parts service is operated from our head office at Poole providing delivery, even for out of date items in most cases. In some instances spares may be available from the regional office and accredited agents.

Delivery of parts and components is normally from stock within 7 days. However, a 24 hour service is available for breakdowns and emergencies for the additional cost of the courier.

For your spares enquiries and orders please contact Carol Miller on 0202 665566.

To help Carol and her staff help you, please give as much detail as possible of the product type, serial number or any other identifying marks or codes.

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