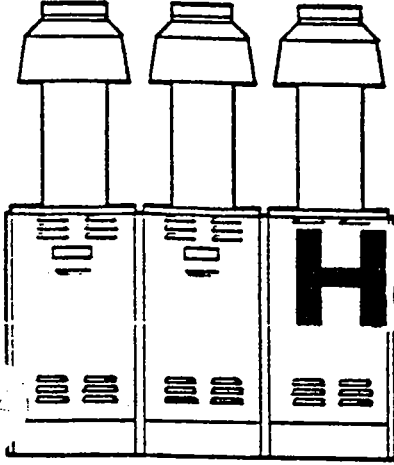


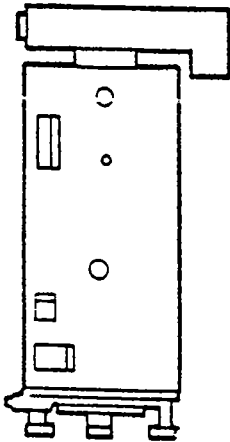
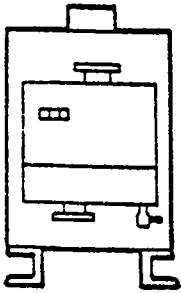
**HAMWORTHY**  
heating products



# Hamworthy Heating Products

**U R Series Gas Fired  
Modular Boiler Systems  
Installation, Commissioning  
and Maintenance Manual**

For Boilers Commencing  
Serial No. F6 2000 H  
(SEPT. 1986)



BS 5750 Part 1  
Certificate No. FM 10082

3-4 Pilot

5-7 Main Frame

UR 180

UR 250

UR 300

UR 365

UR 430

UR 470

**MODULAR HOT WATER BOILERS  
FOR HEATING AND DOMESTIC HOT WATER  
INSTALLATION AND COMMISSIONING INSTRUCTIONS  
FOR USE WITH NATURAL GAS**

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## DELIVERY

All the boilers are factory assembled, tested and delivered individually packed. One draught diverter and one casing (either single or multi) are delivered with the boiler in separate cardboard cartons. A further small carton, normally within the boiler crate, contains the thermostat assembly.

To check the size of the boiler, the rating label is attached to the square gas manifold in front of the burners.

## DESCRIPTION

The Hamworthy UR series of boilers are manufactured from horizontal cast iron sections nipples at alternate ends to give the unique series water flow through each boiler. The sections are positioned on an insulated basket which contains the atmospheric multi gas, stainless steel, bar burners. The front plate of the basket also acts as the assembly point for the bar burners and burner system and this can be removed as one item. An insulated floor reflector is located between the basket side beneath the bar burners.

A flue gas baffle is located on the top waterway section to retard the gases and a collector hood is clamped to it to provide the spigot on which to fit the draught diverter. The appropriate draught diverter is supplied with each boiler and this must be fitted to the top of the boiler without modification. Flue outlets from more than one diverter may be commoned together for entry into one chimney but no other draught diverter or stabilizer is required in the flue system.

An insulated flush steel casing is supplied for assembly around the boiler. This can be carried out after the boiler has been connected but the gas supply pipework and electrical conduit must be positioned correctly as shown in Fig. 1.

A twin thermostat assembly is also supplied consisting of a thermal re-set boiler thermostat, a manual reset overheat cut-off device (high limit thermostat) with gold plated contacts and a junction box.

The boilers, manufactured in six sizes, UR 180, UR 250, UR 300, UR 365, UR 430 and UR 470 are floor mounted and intended for the heating of commercial and industrial premises. They may also be used to supply hot water for the premises via an indirect cylinder. They can be installed as single units but are also designed on a modular concept whereby any number of boiler modules can be banked together to match the requirements of the building. In this manner, the boiler modules provide great flexibility in layout and greater efficiency in operation since only the modules required to meet the load would need to fire. The boilers have a low water content and should therefore only be used on pumped circuits and the minimum recommended water flow shown in Table 2 should be maintained at all times. They are suitable for both open and closed water systems although the latter is not covered by British Gas approval.

**CASINGS:** UR 250, UR 300, UR 365, UR 430 and Multiples

The steel casings can also be supplied in modular form, either as a single casing or a multi casing which has no side panels but contains a set of five connector pieces to join it to the next casing. The multi casing can only be used on a bank of two or more boiler modules if the modules are positioned on 533 mm (21 in) centres. If the distance

between centres is greater than 533 mm (21 in) individual single casings must be used. It is recommended that a maximum of 6 boiler modules are positioned on 533 mm (21 in) centres and fitted with multi casings. A larger number of modules should be split into two or more banks with an additional 150 mm (6 in) gap left between each bank. See Fig. 2.

NOTE: The suffix M in the following designations indicates modular assemblies of "UR" series boilers.

Example:-

UR	250 (1 X UR 250)	ON 533 mm (21 in) centres	1 Single Casing.
MUR	500 (2 x UR 250)	on 533 mm (21 in) centres	1 Single Casing+ 1 Multi Casing.
MUR	1000 (4 x UR 250)	a) on 533 mm (21 in) centres	1 Single Casing+ 3 Multi Casings.
		b) 2 banks of 2 modules - each bank on 533 mm (21 in) centres	2 Single Casings+ 2 Multi Casings.
MUR	2400 (8 x UR 300)	a) 2 banks of 4 modules - each bank on 533 mm (21 in) centres	2 Single Casings+ 6 Multi Casings.
		b) 1 bank of 6 & 1 bank of 2 modules on 533 mm (21 in) centres	2 Single Casings+ 6 Multi Casings.
		c) 2 banks of 3 & 1 bank of 2 modules on 533 mm (21 in) centres	3 Single Casings+ 5 Multi Casings.

CASINGS: UR 180

The casing for the UR 180 is supplied in a single form only and although these boilers are less than 533 mm (21 in) in width it is recommended that the 533 mm (21 in) spacing between boiler centres is adhered to on multi-module installations. This ensures a small gap between casing side panels which allows air circulation to take place around the modules and the protruding casing panel louvres. See Fig. 1a.

CASINGS: UR 365/430

These casings are deeper than the UR 250/300 casing and cannot be assembled with any other combination of casing.

CASINGS: UR 470

The casing for the UR 470 is supplied in single form only and it is recommended that boiler centres 600 mm (24 in) be maintained to allow adequate air circulation around modules. With this exception, boiler dimensions are as shown in Fig. 1e for UR 430.

TECHNICAL DATA

MODEL	UR 180	UR 250	UR 300	UR 365	UR 430	UR 470
Input	53.0 kW 180,700 Btu/hr	73.5 kW 250,650 Btu/hr	88.8 kW 302,900 Btu/hr	101.4 kW 346,000 Btu/hr	124.75 kW 425,650 Btu/hr	134.4 kW 458,600 Btu/hr
Output (To Water)	39.1 kW 133,350 Btu/hr	53.8 kW 183,500 Btu/hr	68.05 kW 232,200 Btu/hr	79.2 kW 270,250 Btu/hr	95.81kW 326,900 Btu/hr	105.0 kW 358,300 Btu/hr
Weight (Dry) (Less Casing)	175 kg 386 lb	230 kg 507 lb	275 kg 606lb	300 kg 661 lb	340 kg 750 lb	340 kg 750 lb
Max. Water Pressure	6.8 bar 100 psi	6.8 bar 100 psi	6.8 bar 100 psi	6.8 bar 100 psi	6.8 bar 100 psi	6.8 bar 100 psi
Min. Water Press. Modular Applications 82°C Flow With 11°C Δ t	0.42 bar 6.1 psi	0.42 bar 6.1 psi	0.42 bar 6.1 psi	0.42 bar 6.1 psi	0.42 bar 6.1 psi	0.42 bar 6.1 psi
Water Press. Drop at 11°C Δ t	0.057 m 2.23 in	0.145 m 5.71 in	0.320 m 12.60 in	0.343 m 13.50 in	0.660m 25.98 in	0.8m 31.5 in
Nominal Gas Inlet Press.	17.5 mbar 7 in	17.5 mbar 7 in	17.5 mbar 7 in	17.5 mbar 7 in	17.5 mbar 7 in	17.5 mbar 7 in
Max. Gas Inlet Press.	49 mbar 19.7 in	49 mbar 19.7 in	49 mbar 19.7 in	49 mbar 19.7 in	49 mbar 19.7 in	49 mbar 19.7 in
Gas Burner Setting Press.	14.2 mbar 5.7 in	13.7 mbar 5.5 in	13.3 mbar 5.3 in	9.6 mbar 3.85 in	9.6 mbar 3.85 in	13.0 mbar 5.22 in
Injector Dia.	2.8 mm 0.1100 in	2.95 mm 0.1161 in	3.2 mm 0.1260 in	3.85 mm 0.1516 in	4.2 mm 0.1654 in	4.0 mm 0.1575 in
Injector Marking	280	295	320	385	420	400
No. of Burner Bars	4	5	5	5	5	5

Table 1 - Technical Data

## CONNECTIONS

- Water: Water Flow Rc2 (2 in BSP internal thread taper)  
Water Return Rc2 (2 in BSP internal thread taper)
- Gas: Gas Rc 3/4 (3/4 in BSP Internal Thread taper)  
on gas cock
- Electrical: Electrical supply 240V - 50 Hz single phase fused at 5  
amps.
- Flue: Nominal Flue size UR 180 - 150 mm (6 in)  
UR 250, UR 300 & UR 365 - 200 mm (8 in)  
UR 430 & 470 - 250 mm (10 in)
- Dimensions: Detailed dimensions of all boilers are shown in Figs. 1a,  
b, c, d & e.

## GENERAL REQUIREMENTS

### Gas Safety Regulations 1972

"It is the 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 the 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 Standard Codes of Practice:-

- CP 331: Installation of Pipes and Meters for Towns Gas.  
Part 3: Low Pressure Installation Pipes.
- CP 332: Selection and Installation of Towns Gas Space Heating.  
Part 3: Boilers of More Than 150,000 Btu/h (44 kW) and Up To  
2,000,000 Btu/h (586 kW) Output.
- CP 341, 300 - 307: Central Heating by Low Pressure Hot Water.
- CP 342: Centralised Hot Water Supply.  
Part 1: Individual Dwellings.  
Part 2: Buildings Other Than Individual Dwellings.

### British Gas Publications:-

"Flues for Commercial and Industrial Gas Fired Boilers and Air Heaters" (MAY 1979) and "Combustion and Ventilation Air - Guidance Notes for Boiler Installations in Excess of 2,000,000 Btu/h (586 kW) Output."

### Health and Safety Executive:-

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



C.I.B.S. Publications:-

"C.I.B.S. (I.H.V.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.

#### 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 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 a 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 when hot 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.

#### ADEQUATE WATER FLOW

Hamworthy modular boilers are designed as quick response, low water content units, to run continuously with a minimum or no operating 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 system controls.

Table 2 gives normal and minimum recommended water flow. The control system and valves, where fitted, should be regulated to avoid lower flows occurring. The flow corresponding to 22°C temperature rise across the boiler is the minimum recommended flow at any time. For module pressure drop see Fig 3.

#### 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 to 5 minute circulating pump over-run after the last boiler has ceased firing.

#### 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 by adding 17°C to the required boiler flow temperature but never less than 2 m (6.5 ft).

e.g. 1. Required Flow Temperature = 95°C  
 Safety Margin = 17°C  
 Equivalent Saturated Steam Temperature =  $\overline{112^\circ\text{C}}$

From Steam Tables - corresponding Gauge Pressure = 0.5 bar (7.3 psi)  
 = 5 m (16.8 ft) W.C.

If the boilers are to be installed in a modular formation (see Fig. 2) 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.

e.g. 2. Required mixed flow temperature = 82°C  
 Temperature rise across boilers (see Table 2) = 11°C  
 Safety margin = 17°C  
 Equivalent Saturated Steam Temperature =  $\overline{110^\circ\text{C}}$

From Steam Tables - corresponding Gauge Pressure = 0.42 bar (6.1 psi)  
 = 4.3 m (14 ft) W.C.

e.g. 3. Required mixed flow temperature = 82°C  
 Temperature rise across boilers (see Table 2) = 22°C  
 Safety margin = 17°C  
 Equivalent Saturated Steam Temperature =  $\overline{121^\circ\text{C}}$

From Steam Tables - corresponding Gauge Pressure = 1.03 bar (15 psi)  
 10.5 m (34.6ft)W.C.

Boiler Model No.	Normal Flow and for 11°C Temp. Rise	Minimum Flow for 22°C Temp. Rise
UR 180	50.5 l/min 11.1 UK gal/min	25.25 l/min 5.55 UK gal/min
UR 250	69.5 l/min 15.3 UK gal/min	34.75 l/min 7.65 UK gal/min
UR 300	88.9 l/min 19.5 UK gal/min	44.40 l/min 9.8 UK gal/min
UR 365	102.4 l/min 22.5 UK gal/min	51.2 l/min 11.25 UK gal/min
UR 430	123.9 l/min 27.2 UK gal/min	61.95 l/min 13.6 UK gal/min
UR 470	136.0 l/min 30.1 UK gal/min	68.5 l/min 15.1 UK gal/min
For multiples of these boilers in parallel arrangement the minimum flow is multiplied by the number of boiler modules.		

Table 2 Minimum Water Flow Rates

## AIR FOR COMBUSTION & VENTILATION

Adequate air for combustion and ventilation must be provided by means of openings at high and low level within the boilerhouse. The air supply requirements are specified in CP 332:3 and the British Gas publication referred to before and the free areas required are as follows:-

Total Input Rating of Boiler(s)	Position of Openings	Free Area of Openings (Air Directed from Outside)
Installations up to 730 kW (2,500,000 Btu/h)	High Level	4.5 cm <sup>2</sup> per kW (1 in <sup>2</sup> per 5,000 Btu/h)
	Low Level	9.0 cm <sup>2</sup> per kW (2 in <sup>2</sup> per 5,000 Btu/h)
Installations between 730 kW and 1320 kW (2,500,000 Btu/h - 4,500,000 Btu/h)	High Level	3.3 cm <sup>2</sup> per kW (1 in <sup>2</sup> per 7,000 Btu/h)
	Low Level	6.6 cm <sup>2</sup> per kW (2 in <sup>2</sup> per 7,000 Btu/h)
Installations in excess of 1320 kW (4,500,000 Btu/h)	High Level	2.5 cm <sup>2</sup> per kW (1 in <sup>2</sup> per 9,000 Btu/h)
	Low Level	5.0 cm <sup>2</sup> per kW (2 in <sup>2</sup> per 9,000 Btu/h)

Table 3 - Air Requirements

### FLUE SYSTEM

The Hamworthy UR Series modular boilers are designed to be used with natural draught flues. Flue systems should be designed in accordance with current regulations and with reference to the British Gas publication "Flues for Commercial and Industrial Gas Fired Boilers and Air Heaters". The following points should be noted:-

- a) Each boiler must have its correct draught diverter fitted in an unmodified condition before connection to the flue system.
- b) The bottom of the flue header should be at least 500 mm (20 in) above the draught diverter skirt bottom.
- c) The flue system must be self supporting in the correct position to avoid compression of the draught diverters and to enable their removal for boiler cleaning.
- d) The boilers should be located as near the chimney as possible the nearest being not more than 2 m (6 ft) away.
- e) The flue system should be designed to achieve a suction of 0.125 mbar (0.05 in wg) at all times at the draught diverter outlet on all modules in the bank. In some instances, mechanical assistance may be necessary. The boilers are suitable for connection to a fan diluted flue system, refer to British Gas publication "Flues for Commercial and Industrial Gas Fired Boilers and Air Heaters".

It is recommended that the volume and temperature of the exhaust gases usual for design of the flue system is as shown below:-

Boiler Model	Exhaust Volume at N <sub>3</sub> T.P.		Nett Exhaust Gas Temp.	
	m <sup>3</sup> /h	ft <sup>3</sup> /h	°C	°F
UR 180	70	2500	260	500
UR 250	94	3300	276	529
UR 300	104	3700	234	453
UR 365	142	5000	236	457
UR 430	167	5900	214	417
UR 470	180	6350	220	428

Table 4 - Waste Gas Data

## INSTALLATION INSTRUCTIONS

### Location

The boilers should be positioned on a level, fire resistant floor or plinth, the packing removed and the wooden pallet knocked from underneath. Check that the floor reflector is located correctly, the insulation is in place on all four sides of the basket and that the bottom waterway section is sitting squarely and evenly on the burner basket casting. In positioning the boilers, do not lay them on their sides as the basket and burners will come away from the waterway sections. If multi-casings are to be used, the boilers should be positioned on 533 mm (21 in) centres and should be level, steady and square with each other. Allow an additional 150 mm (6 in) between each bank of modules. Allow adequate space (this should not normally be less than 18 in) to permit access around the boilers with space at the rear for flow and return connections, and at least 610 mm (24 in) in front for servicing.

NOTE: For roof-top applications it may be necessary to ensure that plinth/floor is of a hollow structure, capable of being ventilated to stop any progressive build-up of temperature (via radiation/conduction through basket feet).

### Connections

#### a) Water

Each module has one flow and one return tapping. (Note: UR 250/365 and multiples have flow connection at front). The modules should be connected by flow and return headers but sufficient length of connecting pipe should be allowed to clear the casing before connecting into the headers. The headers should be connected to the system in a "reverse return" arrangement (the water flow in each header is in the same direction) to ensure equal flow in each module. See Fig. 2.

Note: Header connections forced to "mate" can cause nipple leakage. Each isolatable module or bank of modules should be fitted with a drain cock to BS.2879 at the lowest point, a pressure relief valve and an open vent.

An altitude gauge and a temperature gauge should be fitted to the flow header beyond entry of the last module but before any take-offs to different circuits. A Rc 3/4 (3/4 in BSP) plugged tapping is provided on the top section of the module with a corresponding hole in the casing top. This can be utilised for a relief valve and/or gauges.

On filling, the system should be flushed out until satisfactory conditions are attained. This is especially true on an old system when only the boilers are being changed. If any doubt exists regarding the amount of matter in the system, a filter should be fitted on the return header. When full, remove air from the system and check for leaks and repair.

b) Gas

Connect the incoming gas supply to the gas cock on each module. The gas supply pipework should be run across the front of the boilers above the gas cock approximately level with the top of the boiler castings and connecting pipes dropped down to each cock. The union of the gas cock should always be on the burner side of the cock and the connection to the supply should not be forced. The gas supply pipework position is dictated by the knock-out in the side of the casing and this position should be checked as shown in Fig. 1. The gas supply pipework should be purged to ensure it is free from swarf and foreign matter before final connection and pressure testing.

Flues

Remove collector hood and flue gas baffle and check the boiler flueways are clear.

Reposition the flue gas baffle ensuring that it is laying flat on the top section and refit the hood. Locate the draught diverter onto the spigot on the hood. (Sealing is required on UR 365 UR 430 and UR 470 boilers).

If more than one module is being coupled together, the flue header can be positioned with the connector legs fitted into the spigot of the draught diverter.

NOTE: The flue system must be self supporting. Check that the flue and chimney are clear from any obstruction.

Casing

The casing should be assembled in accordance with the instructions provided inside each casing carton. This should be delayed until the installation is complete to avoid damage but it should be noted that the inside front panel needs to be in position before the thermostat and hence before the electrical installation can be completed. The pipe lagging should be terminated 50 - 75 mm (2 - 3 in) short of the casing to enable the panels to be removed if necessary.

## Electrical

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

The installation must be made in accordance with I.E.E. Regulations. Minimum specification for wiring heat resistant PVC insulated cable 0.75 mm CSA.

- a) Remove the thermostat and junction box from its carton. Remove the cover plate of the junction box. Attach the junction box to the inside front panel of the boiler casing with the two screws provided, ensuring that the pre-wired cable outlets are facing downwards.
- b) Insert the thermostat bulbs into the pocket fitted to the boiler and retain by tightening the screw (at the side of the pocket) onto the bracket.
- c) Connect the three core cable from the junction box to the control valve. "Push-on connectors to the solenoid coil" and "ring connector to earth".

**NOTE:** Remove the grey cover from the valve and thread the cable through the hole before connecting to the valve and fitting the strain relief bush.

The two core cable for the control stat (from junction box) and the two cables attached to the energy cut-off (E.C.O.) device which go to the over heat cut-off device (limit stat) can now be attached as follows:-

- d) Remove the front cover of the thermostats (control and limit) after first pulling off the circular dial.
- e) Unclip and remove the lower light grey sections of the thermostats revealing the spade terminals.
- f) Fit compression gland over two core cable, and feed cable end through gland hole in the bottom of one of the light grey sections. Place locknut over cable end, and attach cable to control thermostat (LH), terminals C and I.
- g) Feed twin ECO leads through gland hole in other section, and attach push on connectors over spade terminals on limit thermostat (RH), after first removing the steel clamps which are screwed onto the spade terminals C and I.
- h) Clip the light grey sections back onto the base of the thermostats. Assemble and tighten compression gland and locknut (LH). Locate and fit rubber grommet (RH).
- i) Remove dark grey cover on limit stat and adjust by rotating arrowed indicator to 105<sup>0</sup>C. Replace cover.
- j) Replace the thermostat front covers and circular dial.

The mains connection to each module is made via a compression gland located on the top left hand side of the junction box to the terminal block inside. A wiring diagram is shown in figure 4 and is also repeated on the inside of the junction box cover.

A 5 amp fused isolator having a minimum contact separation of 3 mm on each pole must be utilized and consideration given to an additional thermostat for each module situated in the common flow header, unless a step-controller is fitted when instructions pertaining to the particular controller should be followed.

All electrical conduit and cable-trays etc., should be run at high level if possible and connection to each module following the same path as the gas pipework. This leaves the floor in front of the modules clear, and allows for removal and replacement of a module.

Replace junction box cover.

The thermostat supplied is a combined thermal reset boiler thermostat and manual reset overheat cut-off device (high limit thermostat) with gold plated contacts having a range of:-

Boiler Thermostat: 70<sup>o</sup>C - 140<sup>o</sup>C (158<sup>o</sup> - 284<sup>o</sup>F) Honeywell L4191B-2018

Overheat Cut-Off Device (Limit Stat) 70<sup>o</sup>C - 140<sup>o</sup>C (158<sup>o</sup> - 284<sup>o</sup>F)

The boiler thermostat knob is fitted with an adjustable stop to prevent the thermostat being inadvertently set higher than the overheat cut-off device. The stop is factory set at 95<sup>o</sup>C (203<sup>o</sup>F).

#### MODE OF OPERATION

Once the wiring connections are completed and the boiler is ready to fire, the electrical controls are so arranged to give 3 distinct and separate circuits.

These are:-

- 1) The piezo circuit, which consists of a piezo unit mounted horizontally across the top flange of the control valve, a straight spark electrode fixed rigidly adjacent to the pilot burner and a single cable connecting the two. One push of the piezo unit button will produce a click at which time a spark is produced between the electrode and the pilot burner which is solely used to light the pilot flame.
- 2) The overheat cut-off device (high limit)/E.C.O. circuit which consists of the right hand overheat cut-off device of the dual thermostat, the energy cut-off connector situated at the control valve end of the thermocouple, the power unit in the valve and the twin cables connecting the overheat cut-off device to the E.C.O. The E.C.O. unit is made up of two items detailed in Fig. 6 with the connections arranged to ensure good contact since the power generation of the thermocouple is very small. At the overheat cut-off device (limit thermostat), gold plated contacts are utilised and the lead length is minimised to reduce power loss. In the event of the overheat cut-off device (high limit thermostat) operating, the power unit in the control valve will de-energise shutting off both the pilot and main flame (if firing). No gas will pass the valve until the button on the overheat cut-off device is reset and the pilot flame is manually re-ignited.

NOTE: An alarm signal to indicate overheat cut-off (high limit lock-out) cannot be fitted to this circuit.

- 3) The boiler thermostat/main valve circuit which consists of the left hand control side of the dual thermostat, the main solenoid operator of the control valve, the junction box and the inter-connecting cable all operating on the mains electrical supply. This circuit allows the boilers to operate on and off under normal conditions and with circuit 2 provides double valving of the gas supply.

NOTE: On no account should the circuits be interconnected and the dual thermostat should be regarded as two completely separate units with no interconnecting link.

### COMMISSIONING

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

- a) Flueway passages to chimney are clear.
- b) Flueway passages in the boiler are clear and clean.
- c) Adequate ventilation, as per Table 3, exists in the boilerhouse.
- d) 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.
- e) The pipework and valve arrangement is installed to Hamworthy recommendations in such a way that adequate water flow rates will be present in the boilers in accordance with Table 2.
- f) The gas supply pipework is clear of any loose matter, tested for soundness and purged to CP:331/3.

### Module Checks

On each module, before attempting to light check:-

- a) Gas supply is connected but turned off, cock is closed, unions are tightened, test points are tight, burners are correctly positioned, injectors are tight and the pilot is connected from the control valve.
- b) Electricity is connected but ensure supply is switched off, the cable from the junction box is connected to the valve, the thermostat bulbs are inserted into the pocket and the thermocouple is connected and undamaged between the valve and the pilot burner.
- c) Energy cut-off connector is located correctly between thermocouple and valve, the leads are undamaged and connected securely at E.C.O. and the overheat cut-off device (high limit thermostat). Ensure button on overheat cut-off device is reset by pushing in once.
- d) Piezo unit is fitted securely on its bracket to the control valve, the lead is undamaged and pushed home on the spade connection, the spark electrode is fitted correctly and undamaged.



## PROCEDURE FOR INITIAL LIGHTING AND ADJUSTMENT

**WARNING: IF THE PILOT LIGHT IS EXTINGUISHED EITHER INTENTIONALLY OR UNINTENTIONALLY, NO ATTEMPT SHOULD BE MADE TO RE-LIGHT THE GAS UNTIL AT LEAST 3 MINUTES HAVE ELAPSED.**

Switch the mains electrical supply to the boiler OFF.

Turn all thermostats to minimum setting.

Ensure that the main gas cock has been turned off for at least 5 minutes before attempting to light boiler - then open cock.

Light pilot burner by repeatedly pressing the button on the piezo unit while holding the WHITE start button on the control valve (See Fig. 5) fully pushed in. Hold white button in for 20 seconds after the pilot is lit before releasing. The pilot burner should remain alight but if it is extinguished, push in the RED stop button, wait 3 minutes and then repeat.

If pilot does not light after several seconds repeatedly operating the piezo unit, re-vent the gas line to the outside of the building and check whether both spark and gas are present at the pilot. (The white button must be depressed fully.)

The pilot can also be ignited by applying a lighted taper to the pilot burner utilising the small hole in the front of the plate. (See Fig. 7.)

Having established the pilot, release the start button and remove the pilot adjustment cover screw on the control valve. (See Fig. 5.) Adjust the screw beneath anti-clockwise to obtain maximum flame, then screw clockwise until the flame begins to decrease and finally add 1/2 turn anti-clockwise to ensure pilot flame just obtains maximum.

After pilot adjustment, check time clock circuits (if fitted) are closed and switch on the power supply to the appliance. Adjust thermostats to required settings when the gas valve will open and the main burner ignite.

After the boiler has operated for approximately 10 minutes, switch off power, remove the gas pressure test point screw on the burner manifold and fit a manometer. Switch the module on and measure the gas setting pressure. Check reading against pressure required in Table 1. Adjust control valve regulator as necessary by removing plastic cap and using a screwdriver, turning the nylon adjusting screw beneath, clockwise to increase, anti-clockwise to decrease the pressure. See Fig. 5.

Remove manometer remembering to refit and tighten pressure test point screw. Check that no waste gas spillage occurs from any draught diverter. Allow system to warm up sufficiently and check operation of all thermostats and other controls. If a sequence control panel is fitted, the separate commissioning instructions supplied with it should be followed.

Before leaving, adjust all thermostats to their correct settings for the system. The boiler overheat cut-off device (high limit thermostat) is set as follows:-

Turn power off to boiler thermostat.

Pull off boiler thermostat knob.

Remove two screws and remove cover plate.

Pull off grey cover at top front right of thermostat unit. This exposes the cut-off adjustment. Turn pointer to align with datum line pertaining to the required temperature setting.

Replace cover.

Before replacing the boiler thermostat knob, adjust the metal spring stop on the underside to coincide with the maximum required setting. Push on knob and check operation of stop. Always ensure the overheat cut-off device (limit thermostat) is set higher than the boiler thermostat.

NOTE: It is advisable to make a combustion check at initial commissioning. A flue gas sampling point is not provided but it is suggested that a hole of sufficient size to take the probe to be used is drilled in the primary flue approximately 225 mm to 300 mm (9 to 12 in) above the collector hood.

To check combustion take a flue gas sample from the primary flue of each module in turn.

For natural gas:-

Normal CO<sup>2</sup> = 8 - 9% by volume.

Normal CO level should not exceed 200 p.p.m. or 0.02% (by volume).

All for dry gas sample.

Upon satisfactory completion of the initial lighting and adjustment, all subsequent operations involving light-up and shut down should follow the procedure set out on the lighting-up instructions located on the inner front casing panel of the boiler and on the user's card which should be left with user or purchaser. Explain to the user or purchaser, the method of economic and efficient operation of the system and ensure that they are fully conversant with the lighting, shut down and general operational procedure.

#### Installation of Energy Cut-off Connectors

- 1) Fit preformed plastic terminal A into the slot provided in the control valve (see Fig. 5) and insert the thermocouple tip into the threaded connection hole. Tighten the attachment nut with a wrench only 1/4 to 1/2 turn beyond finger tight ensuring that the thermocouple tip engages with the exposed cable in the plastic terminal of the E.C.O. lead.
- 2) Insert the tip of terminal B into the power unit connection on the control valve (see Fig. 5). Tighten the attachment nut with a wrench only 1/4 to 1/2 turn beyond finger tight.
- 3) Connect spade terminals C and D to the terminals of the overheat cut-off device (high limit thermostat). (See Fig. 4.)

## FAULT FINDING

### Symptoms

#### BOILER GOES ON AND OFF AT FREQUENT INTERVALS

- 1) Wrong type of thermostat.
- 2) Break in control wiring.
- 3) No circulation caused by air pockets or faulty pump.

#### SYSTEM CALLS FOR HEAT, BOILER DOES NOT GO ON

- 1) Time clock not set correctly.
- 2) Boiler has previously overheated and the overheat cut-off device (high limit thermostat) has operated, shutting off the pilot.
- 3) Supply fuse blown or supply isolated.
- 4) Faulty thermostat.
- 5) Pilot out, either blown out or faulty thermocouple, power unit, energy cut-off connector, overheat cut-off device (high limit thermostat) or interconnecting wiring.
- 6) Control valve faulty or sticking.

#### THERMOSTAT IS SATISFIED, BOILER BURNS CONTINUOUSLY

- 1) Faulty thermostat.
- 2) Wiring fault.
- 3) Control valve faulty or sticking.

#### BOILER OVERHEATS AND SYSTEM REMAINS COLD

- 1) Insufficient circulation.
- 2) Air pockets restricting circulation.
- 3) Pump failure.
- 4) Faulty main controller or wiring.

#### RUMBLING SOUND IN BOILER

- 1) Insufficient circulation.
- 2) Thermostat set too high.
- 3) Faulty thermostat.
- 4) Control valve faulty or sticking.

#### BOILER AND SYSTEM OVERHEAT

- 1) System controls faulty or set too high.
- 2) Faulty thermostat.

## SERVICING

Regular annual servicing is recommended. Although cleaning of flueways may not be necessary every year it is important that all controls and safety features are checked for correct operation.

To carry out these actions observe the following points:-

**WARNING: ISOLATE THE ELECTRICAL SUPPLY AND TURN OFF THE GAS SERVICE COCK TO THE MODULE BEING SERVICED.**

Lift off white casing door to expose burner system.

With service cock off disconnect union below it.

With power supply off disconnect electrical cable at valve. Disconnect the energy cut-off unit by removing the thermocouple at the valve end, and pulling out the cable complete with the preformed plastic terminal (see Fig. 6). Disconnect the second E.C.O. cable at the valve by unscrewing the connection into the power unit.

Slacken and remove the screws/nuts holding the burner front plate (one either side and two beneath). Release "U" clamp holding gas supply pipe. The complete burner system can now be pulled forward and removed. Check and clean burners with a brush if necessary and check pilot, spark electrode, thermocouple and injectors for cleanliness.

Remove the two halves of the casing top which encircle the primary flue. Check that the flue above the draught diverter is self-supporting before removing the four nuts and bolts which attach the draught diverter hood to the primary flue. Push the primary flue up into the flue hood until it clears the collector hood, then pull sideways and remove. Remove the top nuts on the front and rear boiler tie bar brackets clamping the hood in place and lift off the hood and flue gas baffle.

The boiler flueways are now exposed and can be brushed through diagonally in both directions using the brush provided to remove the deposits from the finned surfaces.

Re-assemble the flue components in reverse order.

**NOTE:** A new gasket should be fitted between the top boiler section and the collector hood in order to ensure a gas tight seal.

Lift and remove the floor reflector from beneath the boiler and clean off the fallen deposits. Replace and reassemble the burner system ensuring that the insulation on the burner front plate and the burner basket is in good condition.

Relight module in accordance with lighting up instructions.

Dimensions in millimetres (inches)  
 Dimensions marked \* are subject to slight variation

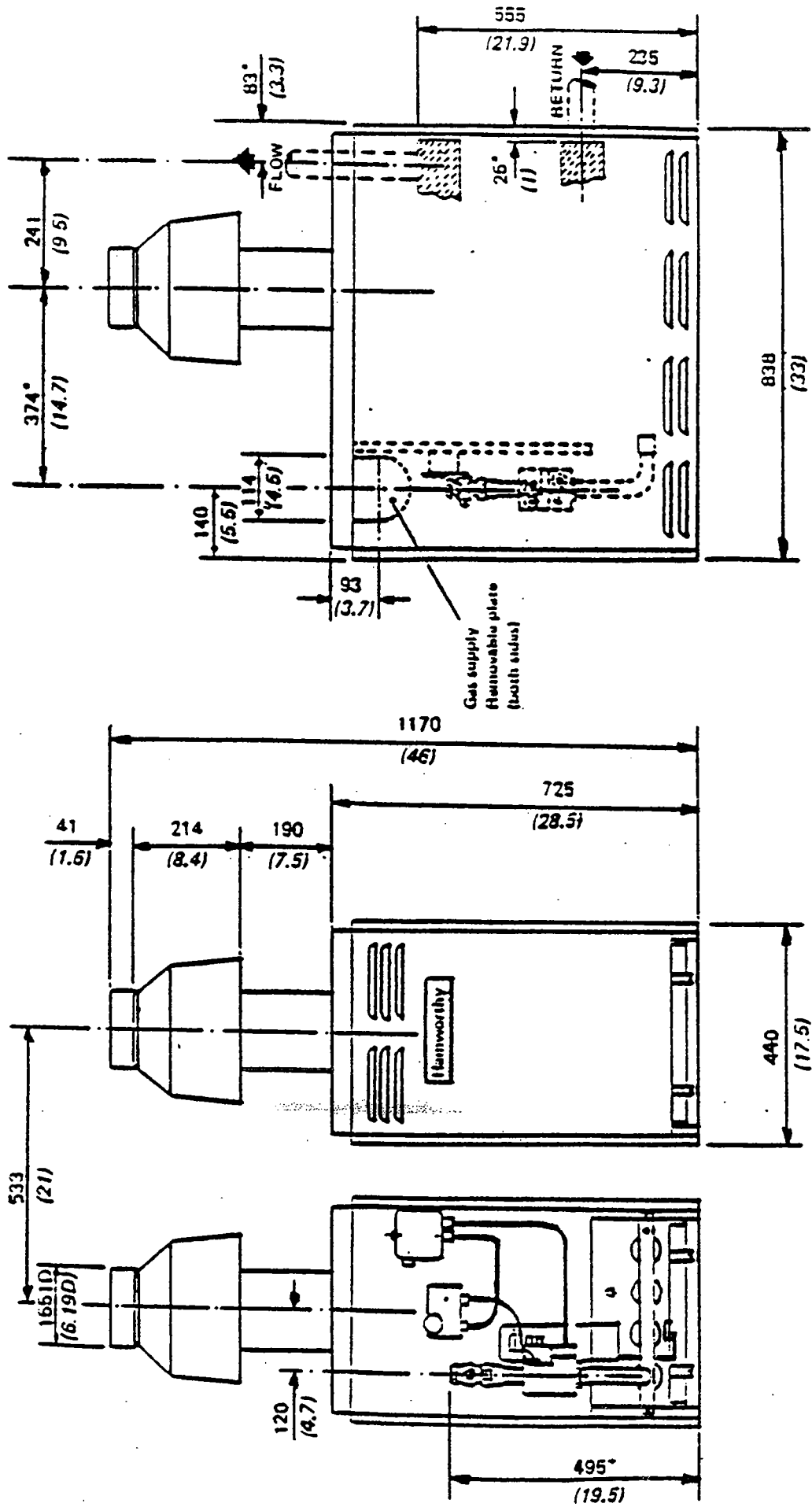


Fig. 1a UR 180 DIMENSIONED VIEWS (shown as a MUR 360 - 2 x UR 180)  
 NOTE: Single casings only

Dimensions in millimetres (inches)  
 Dimensions marked \* are subject to slight variation

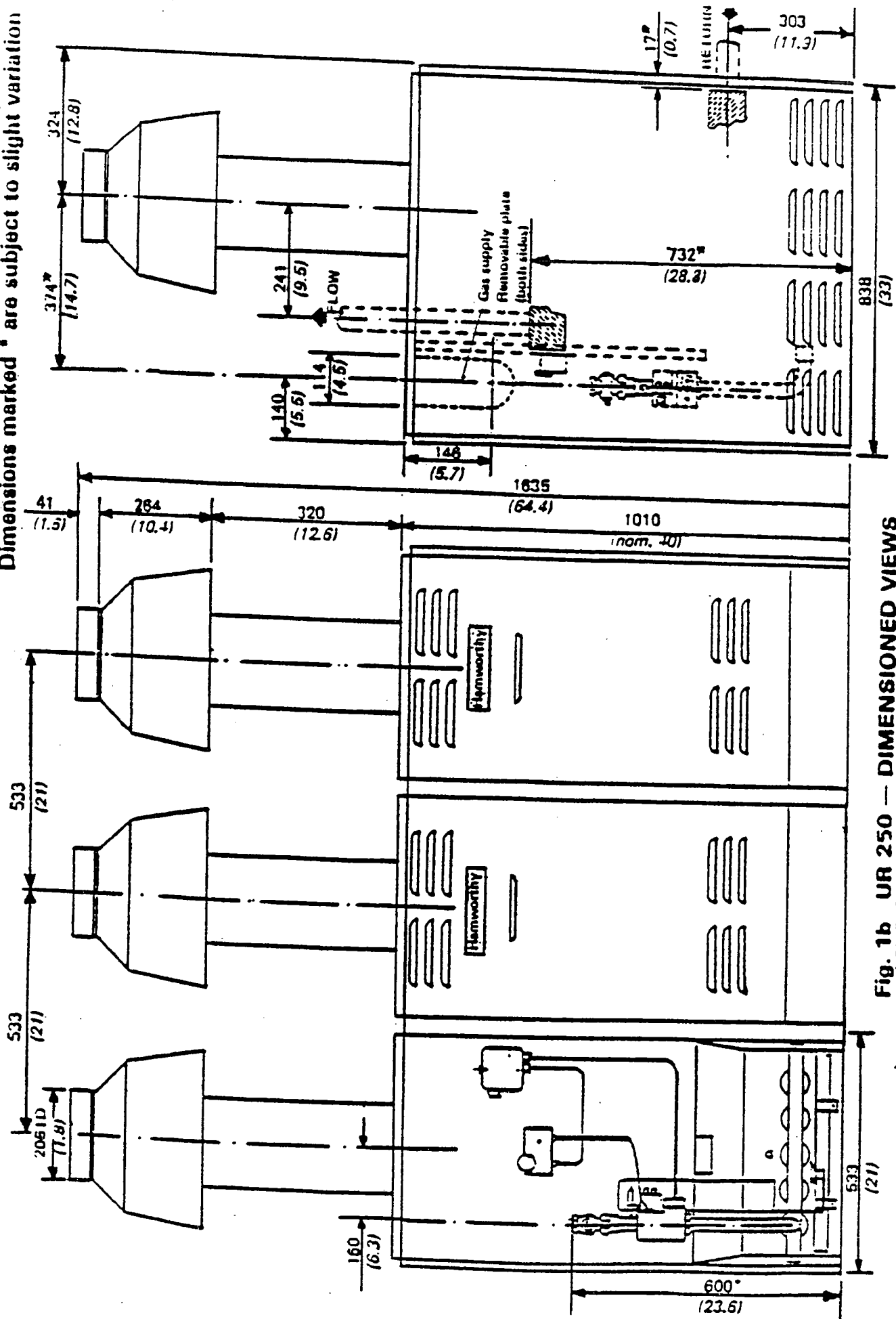


Fig. 1b UR 250 — DIMENSIONED VIEWS  
 shown as MUR 750 — 3 x UR 250 in 'B' battery formation

Dimensions in millimetres (inches)  
 Dimensiones marked \* are subject to slight variation

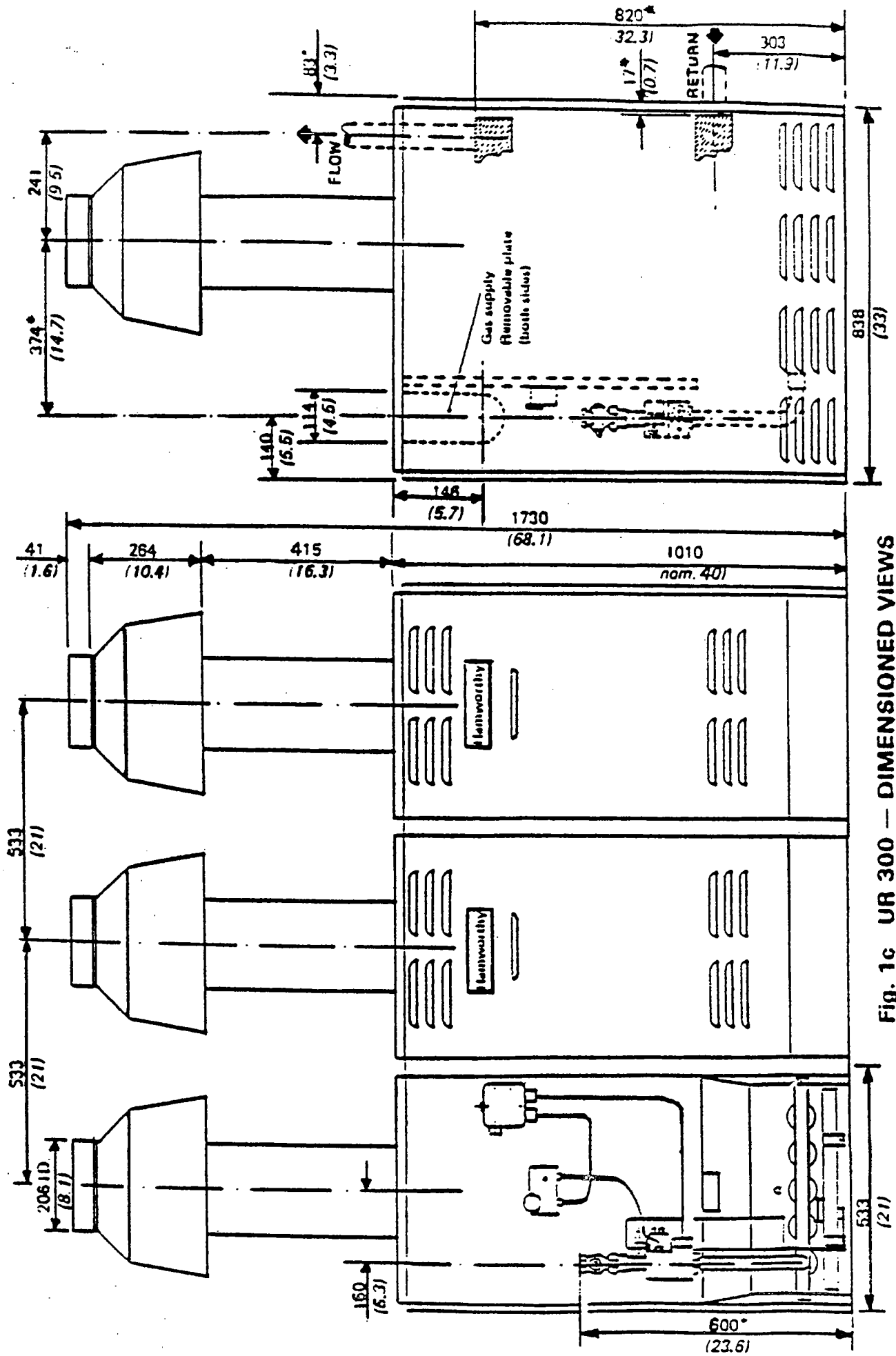


Fig. 1c UR 300 — DIMENSIONED VIEWS  
 shown as a MUR 900 — 3 x UR 300 in 'B' battery formation

Dimensions in millimetres (inches)  
 Dimensions marked \* are subject to slight variation

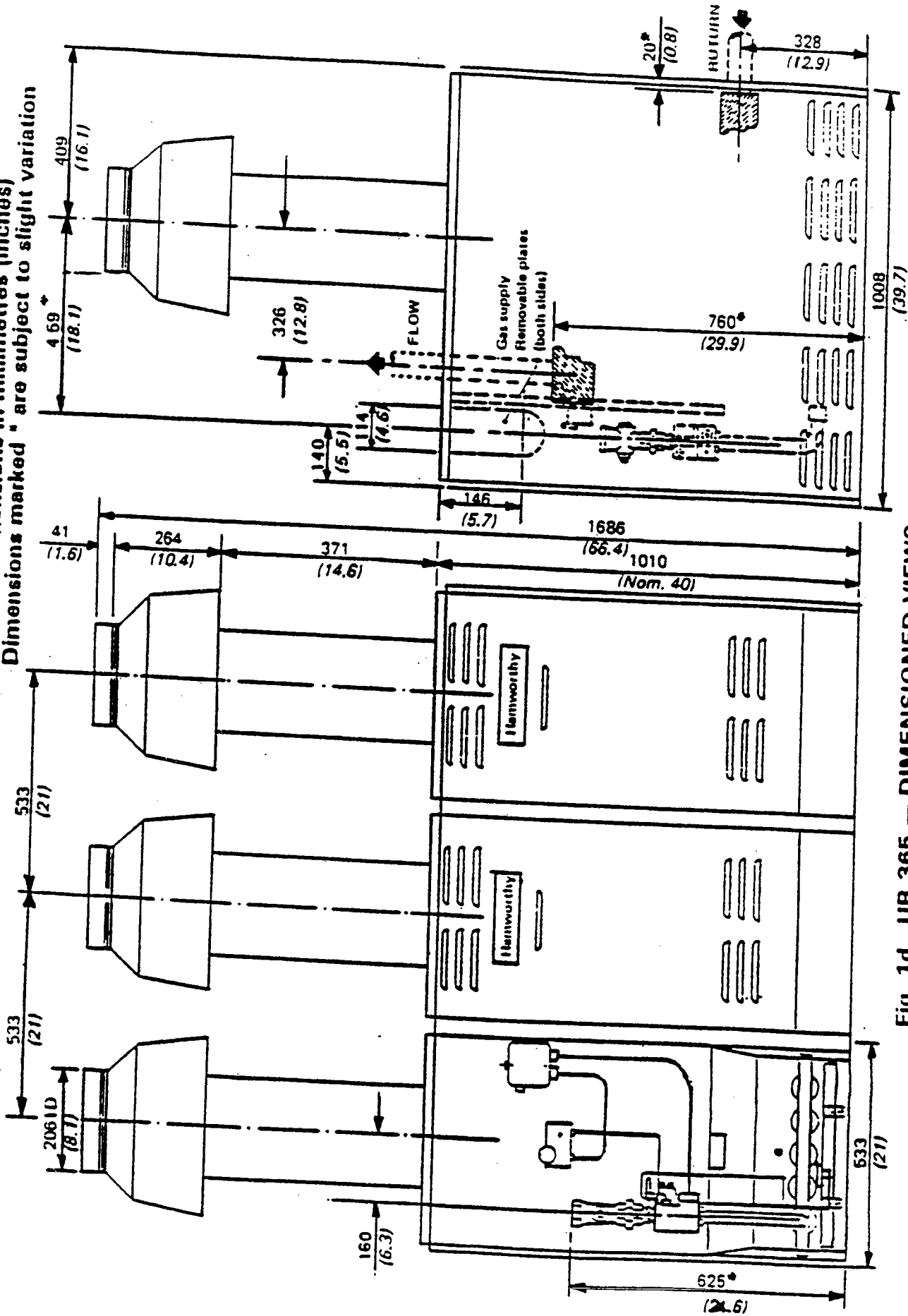


Fig. 1d UR 365 — DIMENSIONED VIEWS  
 shown as a MUR 1095 — 3 x UR 366 in 'B' battery formation



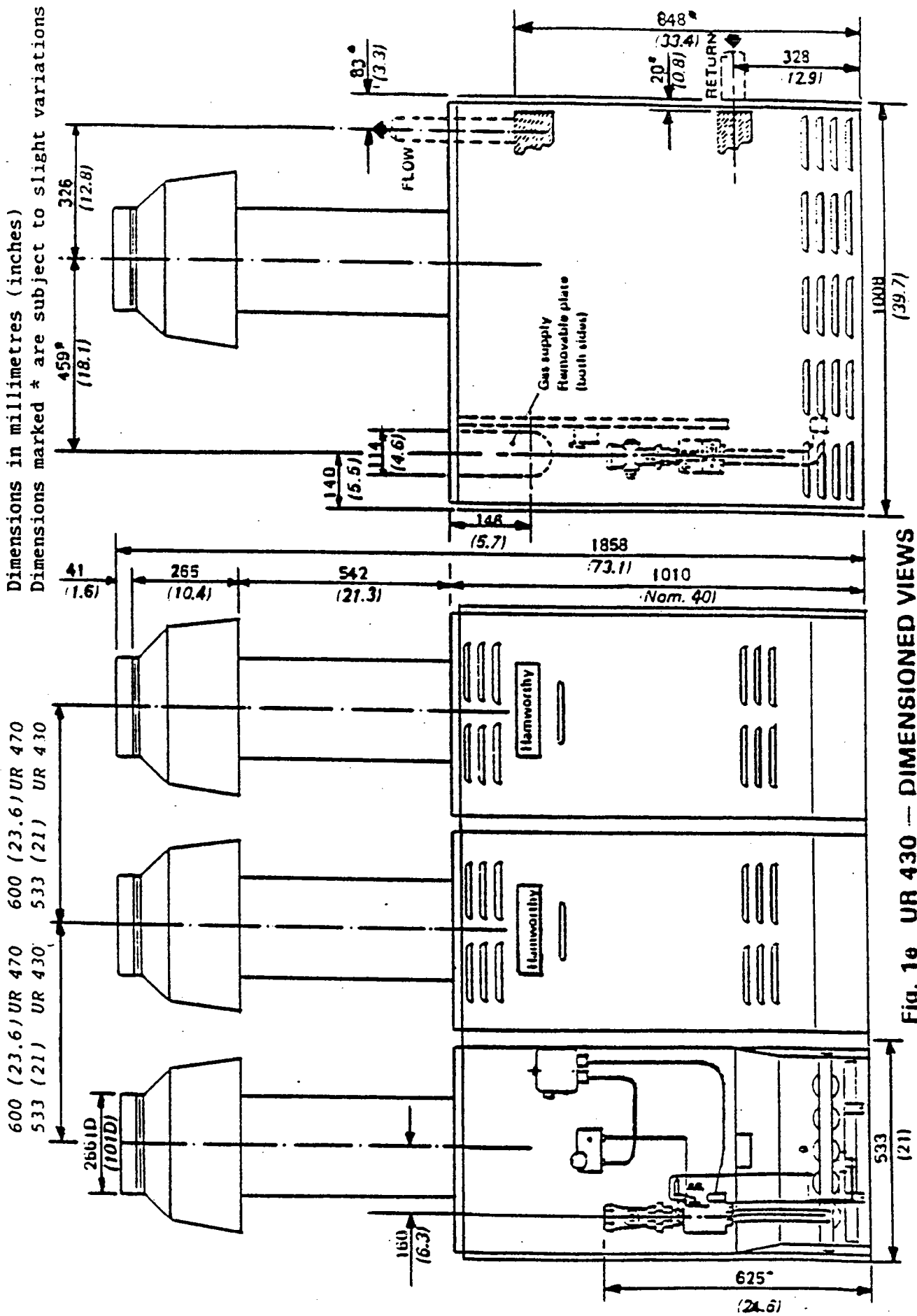


Fig. 1e UR 430 — DIMENSIONED VIEWS  
 shown as a MUR 1290 — 3 x 430 in 'B' battery formation

NOTE: UR 470 simple customer only

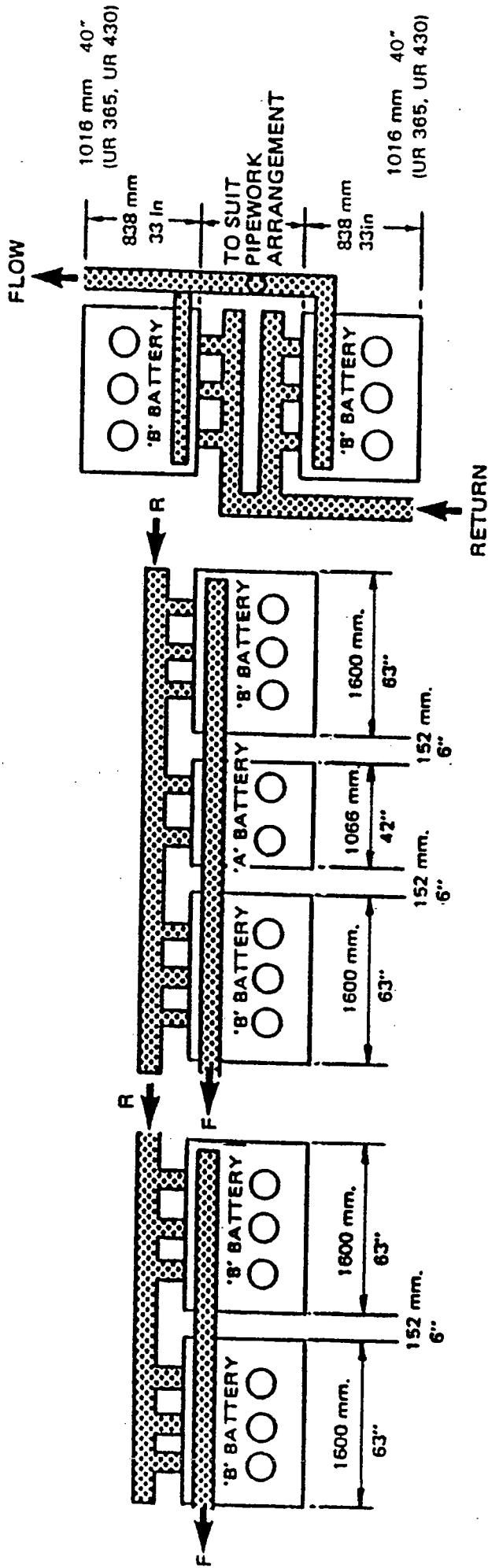
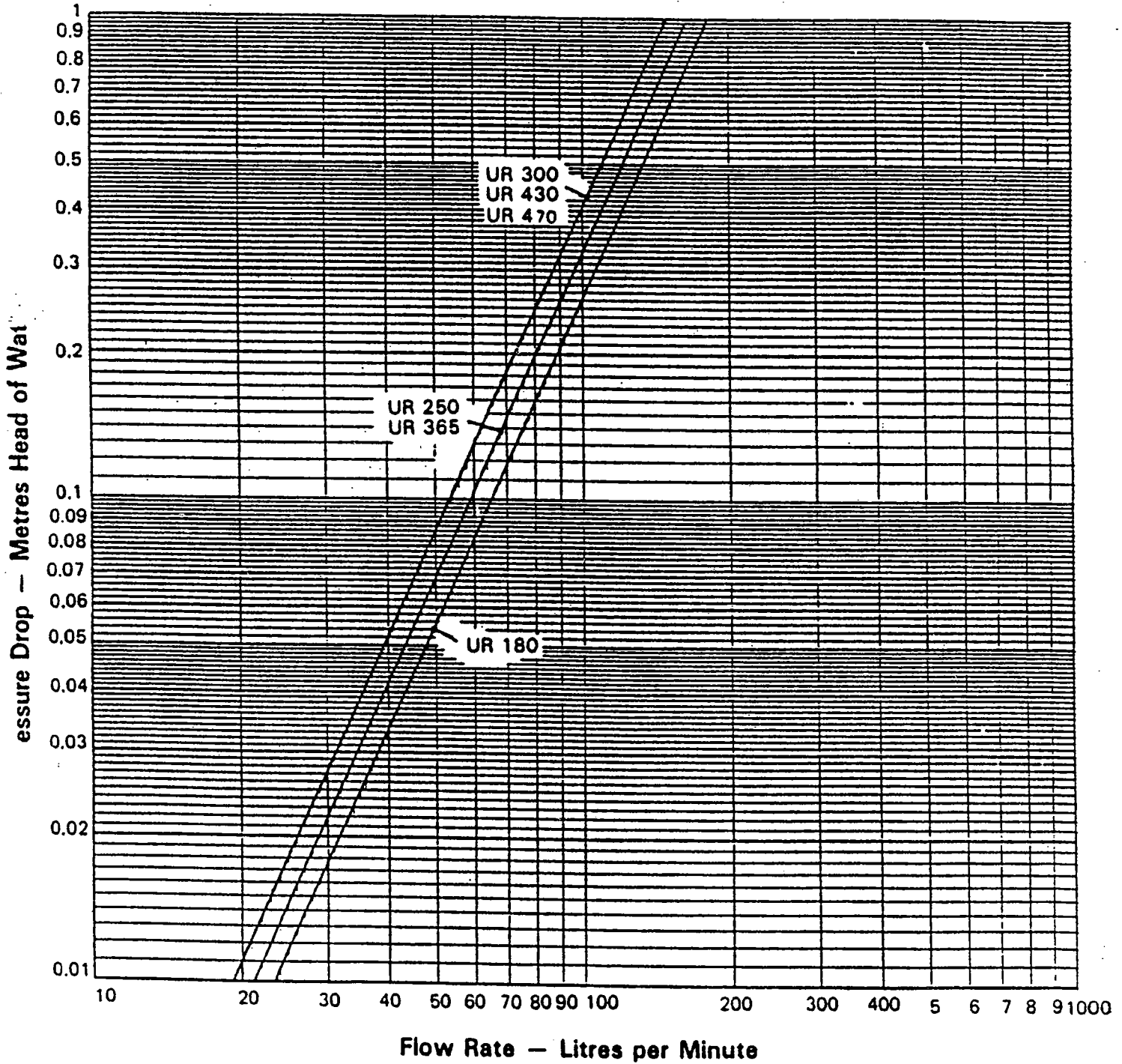


Illustration showing recommended reverse return water flow and typical battery layouts

Fig. 2

NOTE: Banks containing two boiler modules are designated 'A' Batteries.  
 Banks containing three boiler modules are designated 'B' Batteries.



1 Litre = 0.22 Gallon  
1 Gallon = 4.55 Litres

Fig. 3 WATER PRESSURE DROP

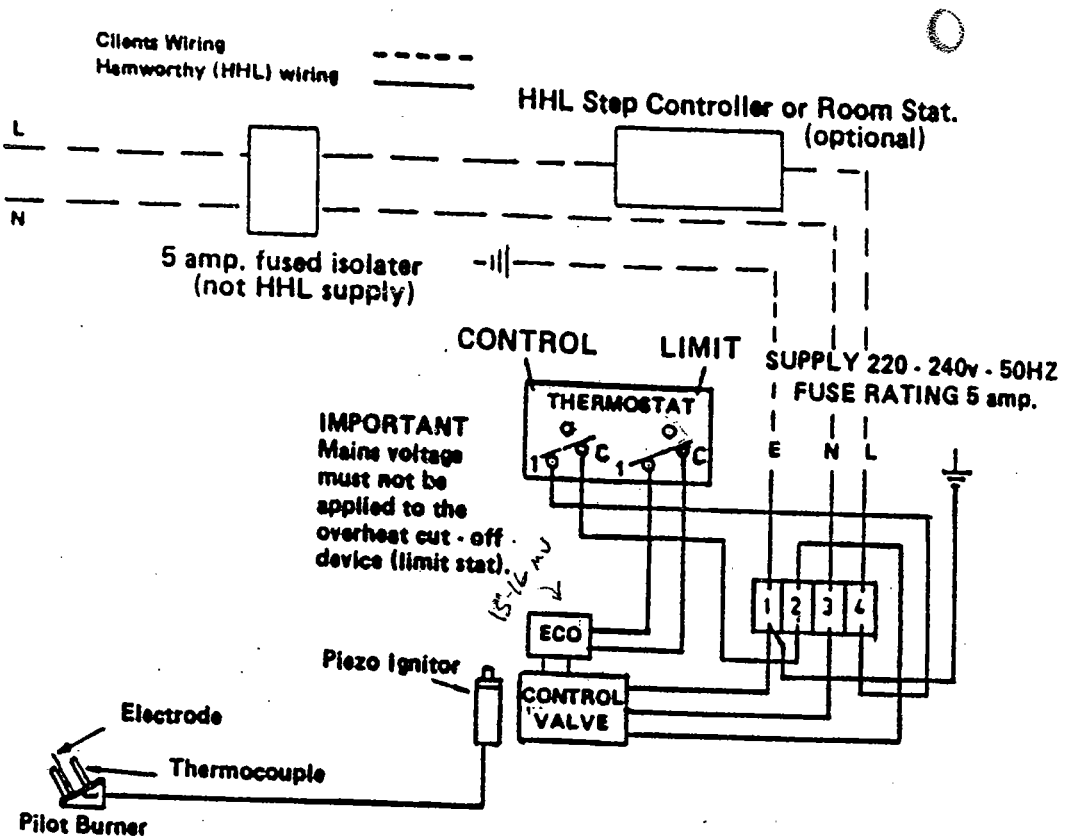


Fig. 4 BASIC WIRING DIAGRAM per module  
 UR SERIES BOILER.

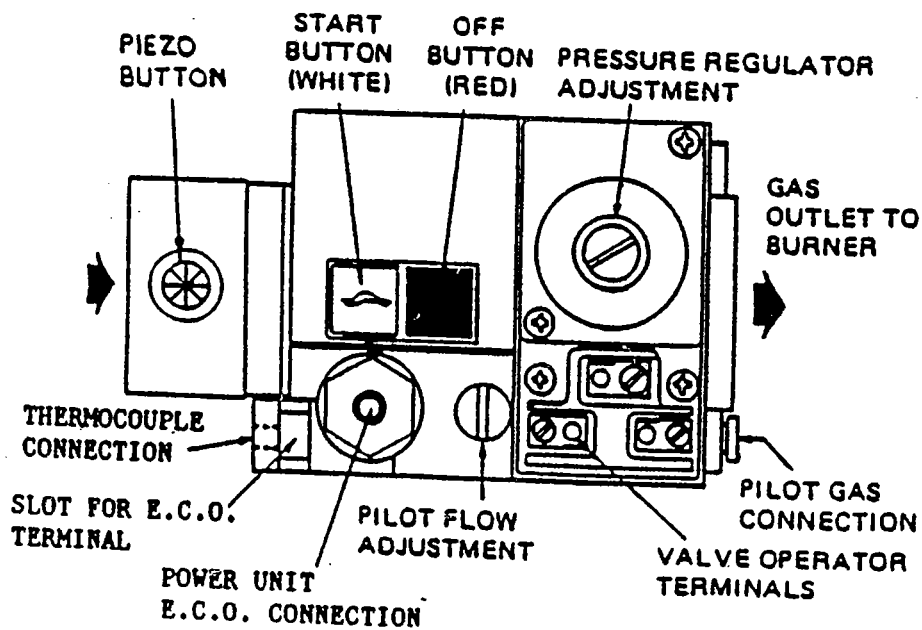


Fig. 5 - Honeywell V4400 C Softlite 3/4 in Control Valve

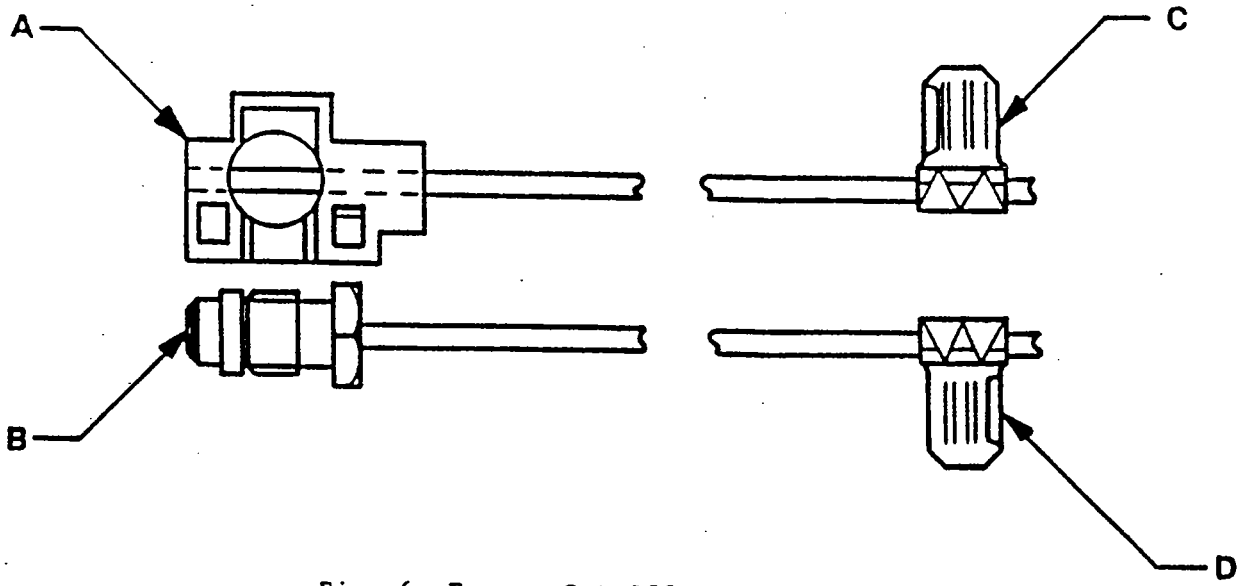


Fig. 6 Energy Cut-Off Connectors

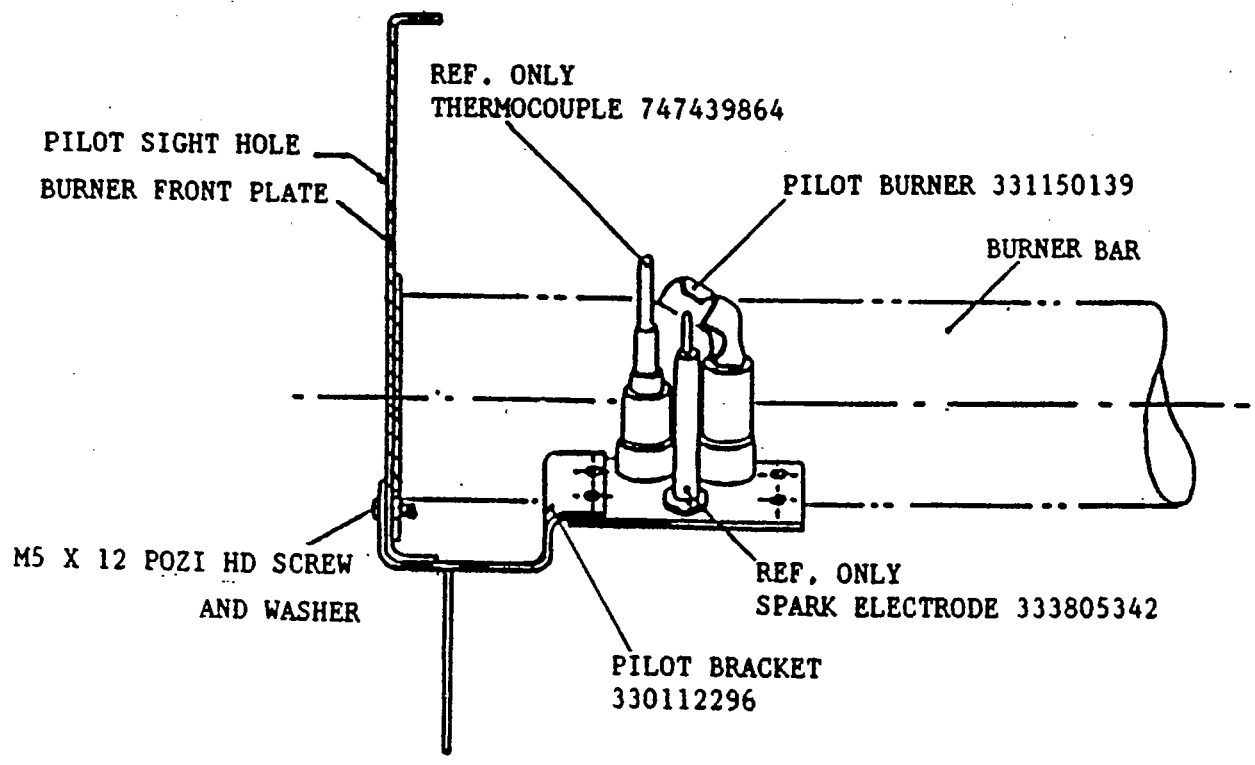


Fig. 7 Pilot Burner Assembly

1986 - 1994

RECOMMENDED SPARES

H.H.L. Part Number	Description
747809942	Multifunctional control valve (3/4 in)
747433859	Twin Thermostat 70°C - 140°C
747701727	Piezo Unit
747439864	Thermocouple
363913180	Energy cut-off Connector c/w leads
339007778	Main Burner. UR 180, 250 and 300
333811100	Main Burner - UR 365, 430 and 470
363801609	Pilot Burner
330512347	280 Injector - UR 180
330512354	295 Injector - UR 250
330512362	320 Injector - UR 300
330513196	385 Injector - UR 365
330512511	420 Injector - UR 430
532902011	400 Injector - UR 470
331101843	Pilot Injector
333805342	Spark Electrode c/w lead
331299233	Hood Joint
333806225	Insulation Slab - Front - UR 180
333806233	Insulation Slab - Rear - UR 180
333806407	Insulation Slab - Front - UR 250, 300, 365, 430 & 470
333806217	Insulation Slab - Rear - UR 250, 300, 365, 430 & 470
333806241	Insulation Slab - Side - UR 180, 250 & 300
333806266	Insulation Slab - Side - UR 365, 430 & 470
333806175	Floor Insulated Reflector - UR 180
333806183	Floor Insulated Reflector - UR 250 & 300
333806258	Floor Insulated Reflector - UR 365, 430 & 470
339007612	Insulation Hanger - Pin and Clip
742111245	Control Valve "O" Ring
339008347	Washer - Main Injector (copper/fibre)

## CONVERSION OF UR TYPE BOILERS FROM LPG TO NAT GAS

### Instructions:

1. Isolate boilers from gas and electrical supplies.
2. Remove burner assembly from below boiler.
3. Remove gas control valves from gas train.
4. Unscrew the five main jets from gas manifold and discard the copper sealing washers.
5. Remove pilot jet from pilot burner.
6. Remove existing rating label.
7. Fit five new main jets to gas manifold with the five new copper sealing washers.
8. Fit new pilot jet to pilot burner.
9. Fit new gas control valve making sure ECO lead and thermocouple are correctly fitted.
10. Fit new rating labels.
11. Replace burner assembly under boiler.
12. Re-connect gas and electricity supplies.
13. Check for gas leaks and eliminate.
14. The boiler should now be ready for commissioning.





UR STANDARD SERIES MODULAR HOT WATER BOILERS FOR USE ON PROPANE AND BUTANE

To be used in conjunction with main installer's guide - publication number 500001009.

DESCRIPTION

The Hamworthy UR range of modular cast iron boilers can be supplied as standard to fire commercial propane or butane gases. The boilers are very similar to the natural gas models, the difference being:-

- 1) The Honeywell 3/4 in control valve is type V4400D which is a Softlite L.P.G. valve with a blanking plate in place of the pressure regulator. (See Fig. 1).
- 2) The injectors, both main and pilot are sized for propane/butane instead of natural gas. The bar burners remain the same for both natural gas and L.P.G.

NOTE: On units supplied prior to the end of 1984, natural gas brass union plug cocks were replaced by Sabal ball valves for L.P.G. firing. In order to facilitate removal of the gas control valve and the burner assembly for servicing, an additional flange was mounted on the inlet to the gas control valve which allowed the gas train to be broken at that point.

On units supplied towards the end of 1984 and after, the natural gas and L.P.G. gas cocks are identical Gascon ball valves with a union beneath to facilitate servicing.

The operation of the units is exactly similar to those operating on natural gas but there is a very important difference with regard to the incoming gas pressure.

In line with British Standards, these boilers do not have appliance regulators and hence the gas pressure to the burners is entirely dependant upon the incoming gas supply pressure. It is therefore VERY IMPORTANT that the incoming gas supply pressure measured before the manual gas cock is accurately set up to the following table (see Table 1) by means of adjustment to the main lock-up regulator at the gas supply point.

GAS TYPE	INLET PRESSURE	
	mbar.	in w.g.
Propane	37	14.85
Butane	28	11.25

Table 1 - Gas Inlet Pressures

TECHNICAL DATA:

MODEL	UR 180	UR 250	UR 300	UR 365	UR 430
Input	53.0 kW 180,700 Btu/hr	73.5 kW 250,650 Btu/hr	88.8 kW 302,900 Btu/hr	101.4 kW 346,000 Btu/hr	124.75 kW 425,650 Btu/hr
Gas Rate Propane	2.0 m <sup>3</sup> /h 71.7 ft <sup>3</sup> /h	2.8 m <sup>3</sup> /h 99.5 ft <sup>3</sup> /h	3.4 m <sup>3</sup> /h 120.2 ft <sup>3</sup> /h	3.9 m <sup>3</sup> /h 137.3 ft <sup>3</sup> /h	4.8 m <sup>3</sup> /h 168.9 ft <sup>3</sup> /h
Gas Rate Butane	1.6 m <sup>3</sup> /h 56.5 ft <sup>3</sup> /h	2.2 m <sup>3</sup> /h 78.3 ft <sup>3</sup> /h	2.7 m <sup>3</sup> /h 94.7 ft <sup>3</sup> /h	3.1 m <sup>3</sup> /h 108.1 ft <sup>3</sup> /h	3.8 m <sup>3</sup> /h 133.0 ft <sup>3</sup> /h
Output (To Water)	39.1 kW 133,350 Btu/hr	53.8 kW 183,500 Btu/hr	64.4 kW 219,850 Btu/hr	79.2 kW 270,250 Btu/hr	95.81 kW 326,900 Btu/hr
Gas Inlet Pressure Propane	37 mbar 14.85 in	37 mbar 14.85 in	37 mbar 14.85 in	37 mbar 14.85 in	37 mbar 14.85 in
Gas Inlet Pressure Butane	28 mbar 11.25 in	28 mbar 11.25 in	28 mbar 11.25 in	28 mbar 11.25 in	28 mbar 11.25 in
Injector Diameter Propane/ Butane	1.80 mm 0.0709 in	1.90 mm 0.0748 in	2.10 mm 0.0827 in	2.30 mm 0.0906 in	2.50 mm 0.0984 in
Injector Marking	180	190	210	230	250
No of Burner Bars	4	5	5	5	5

Gas rates shown above are based on calorific values as follows:-

Propane 95.75 MJ/m<sup>3</sup> (2,520 Btu/ft<sup>3</sup>)  
 Butane 121.5 MJ/m<sup>3</sup> (3,200 Btu/ft<sup>3</sup>)

All other data is as shown for natural gas models in the main installer's guide.

TECHNICAL DATA:

MODEL	UR 180	UR 250	UR 300	UR 365	UR 430
Input	53.0 kW 180,700 Btu/hr	73.5 kW 250,650 Btu/hr	88.8 kW 302,900 Btu/hr	101.4 kW 346,000 Btu/hr	124.75 kW 425,650 Btu/hr
Gas Rate Propane	2.0 m <sup>3</sup> /h 71.7 ft <sup>3</sup> /h	2.8 m <sup>3</sup> /h 99.5 ft <sup>3</sup> /h	3.4 m <sup>3</sup> /h 120.2 ft <sup>3</sup> /h	3.9 m <sup>3</sup> /h 137.3 ft <sup>3</sup> /h	4.8 m <sup>3</sup> /h 168.9 ft <sup>3</sup> /h
Gas Rate Butane	1.6 m <sup>3</sup> /h 56.5 ft <sup>3</sup> /h	2.2 m <sup>3</sup> /h 78.3 ft <sup>3</sup> /h	2.7 m <sup>3</sup> /h 94.7 ft <sup>3</sup> /h	3.1 m <sup>3</sup> /h 108.1 ft <sup>3</sup> /h	3.8 m <sup>3</sup> /h 133.0 ft <sup>3</sup> /h
Output (To Water)	39.1 kW 133,350 Btu/hr	53.8 kW 183,500 Btu/hr	64.4 kW 219,850 Btu/hr	79.2 kW 270,250 Btu/hr	95.81 kW 326,900 Btu/hr
Gas Inlet Pressure Propane	37 mbar 14.85 in	37 mbar 14.85 in	37 mbar 14.85 in	37 mbar 14.85 in	37 mbar 14.85 in
Gas Inlet Pressure Butane	28 mbar 11.25 in	28 mbar 11.25 in	28 mbar 11.25 in	28 mbar 11.25 in	28 mbar 11.25 in
Injector Diameter Propane/ Butane	1.80 mm 0.0709 in	1.90 mm 0.0748 in	2.10 mm 0.0827 in	2.30 mm 0.0906 in	2.50 mm 0.0984 in
Injector Marking	180	190	210	230	250
No of Burner Bars	4	5	5	5	5

Gas rates shown above are based on calorific values as follows:-

Propane 95.75 MJ/m<sup>3</sup> (2,520 Btu/ft<sup>3</sup>)  
 Butane 121.5 MJ/m<sup>3</sup> (3,200 Btu/ft<sup>3</sup>)

All other data is as shown for natural gas models in the main installer's guide.



## GENERAL REQUIREMENTS

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 the guide together with the following additional documents:-

British Standard Codes of Practice:-

- CP 338 - Domestic Propane Gas Burning Installations in Permanent Dwellings.
- CP 339 - Domestic Butane Gas Burning Installations.
- BS 5258 - Part 1 - Safety of Domestic Gas Appliances.

## INSTALLATION

The boilers should be installed in the same manner as described in the main installer's guide.

## COMMISSIONING

The modules should be commissioned in exactly the same way as described in the main installer's guide but the following additional points should be closely observed:-

- 1) Before attempting to light the boiler, double check on the type of gas to be fired, and ensure that the orifice sizes agree with those in the literature and stamped on the boiler rating plate. The size of the orifice can be found stamped on the brass orifice itself.
- 2) Ensure that adequate ventilation is provided, particularly at low level. LPG is heavier than air so any spillage or leakage will result in a build-up of gas on the floor.
- 3) Ensure that the line pressure of the fuel before the gas cock is regulated to the correct figure, i.e. 37 mbar (14.85 in) for propane, 28 mbar (11.25 in) for butane.
- 4) Check all joints on the gas pipework including the boiler gas train and pilot line for leaks.
- 5) Ensure that the LPG reaches the boiler in a fully gaseous state. This is particularly important where the boiler is used in conjunction with a vapourizer when heat from the boiler is used to generate the gaseous fuel. During the start-up periods some other method must be used to vapourize the LPG since liquid gas is detrimental to the control valve and results in poor combustion.
- 6) It is not necessary to fit a manometer to the burner manifold test point to check gas pressure since the correct inlet pressure should already have been set (see Item 3). At this inlet pressure, the burner input will be correct.

## SERVICING

Follow the same procedure indicated in the main installer's guide.

For units supplied prior to the end of 1984 fitted with Sabal type manual gas cocks follow the same procedures indicated in the main installer's guide except for the disconnection of the union below the service cock. To disconnect the gas train ensure that the service cock is off and remove the four screws (M5 X 12) and lock washers which secure the flange on the inlet (top) of the gas control valve. This joint is sealed by means of a rubber "O" ring which seats in a recess in the flange. Ensure that this "O" ring is in good condition and in place before remaking joint.

## ADDITIONAL RECOMMENDED SPARES

H.H.L. Part Number	Description
747814074	Honeywell 3/4 in gas control valve type V4400D
330512446	180 Injector - UR 180
330512453	190 Injector - UR 250
330512461	210 Injector - UR 300
330513204	230 Injector - UR 365
330513212	250 Injector - UR 430
331101850	Pilot Injector - L.P.G.

## L.P.G. FUELS

IT IS STRONGLY RECOMMENDED THAT ON L.P.G. INSTALLATIONS GAS DETECTION EQUIPMENT IS FITTED.

THIS EQUIPMENT SHOULD BE POSITIONED NEAR THE BOILER AND AT LOW LEVEL.

IT IS ALSO IMPERATIVE THAT THE BOILERHOUSE IS VENTILATED AT HIGH AND LOW LEVEL AND TO THIS END OUR RECOMMENDATIONS MUST BE ADHERED TO.

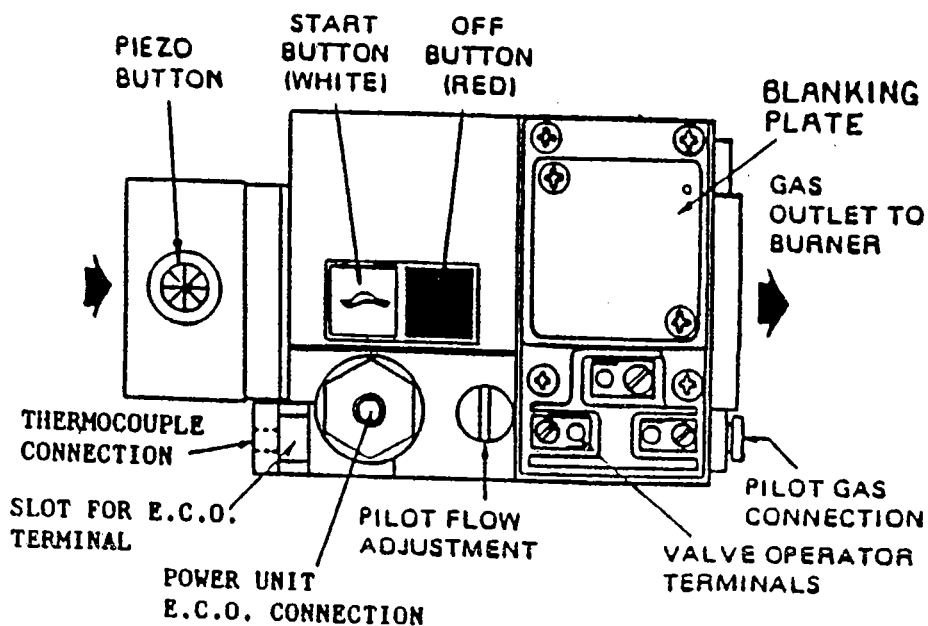


Fig.1 - Honeywell V4400 B

3/4 in Control Valve

UR SERIES MODULAR HOT WATER BOILERS FITTED WITH FULLY AUTOMATIC  
CONTROLS FIRING NATURAL GAS

To be used in conjunction with the main installer's guide publication no. 500001009.

## DESCRIPTION

The Hamworthy UR Series of modular cast iron boilers can also be supplied with fully automatic controls complying with the general requirements of BS5978. The fully automatic control provides a safe light-up and shut down programme for the burner, flame detection being based on the well known rectification principle.

When the controlling thermostat calls for heat a high energy spark is produced at the spark electrodes and the pilot gas valves, (see Fig. 1), are energised to establish a start gas flame on the centre burner bar (20% of the total boiler input rating). Following the start gas ignition period of approximately 5 seconds, the spark is removed and providing the start gas flame is established and detected by the flame probe, the main flame valve opens after a start gas establishment period of approximately 20 seconds, to admit gas to the remaining 4 burner bars and full energy input to the boiler.

Failure to establish and detect flame during a start-up attempt results in lock-out after the expiry of the 5 seconds ignition safety time. Flame failure during a "run" results in immediate fuel shut-off followed by a full re-start attempt to safely relight the burner. Flame simulation at the start position and during the 15 seconds waiting time prior to the introduction of the spark prevents spark ignition or the opening of any gas valve and the control box goes to lock-out.

The boilers are very similar to the basic range of permanent pilot models and for general information concerning water flows, flue designs, installation recommendations, etc. attention is drawn to the preceding installation and commissioning instructions in this composite manual. The basic difference between the permanent pilot, natural gas models and the fully automatic versions are as follows:-

- 1) The Honeywell V4400C Softlite gas control valve is replaced by a Honeywell VR4900C main gas control valve and a Honeywell VR4705A pilot gas valve supplying the centre burner bar only.
- 2) The thermocouple is replaced by a flame rectification probe.
- 3) The Piezo unit and electrode are replaced by a spark generator and spark electrode (see Fig. 5).
- 4) The pre-wired junction box is replaced with a pre-wired Satronic Controller type TFI-812.1B-Mod 5.

- 5) The Honeywell twin thermostat with gold plated contacts on the overheat cut-off (high limit) is replaced by a standard Honeywell twin thermostat of similar range type L6191B-2021.

NOTE: The main burner injectors and operating pressures may vary from the basic boiler range due to the differences in pressure drop across the various types of gas control valve.

- 6) The height of the manual gas cock above the floor level is greater than on the basic boiler range particularly on the UR 365 and UR 430 modules (see Fig 1).

#### DELIVERY

The boilers are delivered packed in a similar manner to the permanent pilot range but the small carton normally located within the boiler crate contains the wiring loom for the automatic controls including the thermostat, Satronic controller and spark generator. The spark electrodes and flame probe are incorporated on the burner front plate and the two gas safety shut-off valves and the manual gas cock come pre-assembled to the boiler/burner sub-assembly.

#### TECHNICAL DATA

MODEL	UR 250	UR 300	UR 365	UR 430
Input	73.5 kW 250,650 Btu/h	88.8 kW 302,900 Btu/h	101.4 kW 346,000 Btu/h	124.75 kW 425,650 Btu/h
Output (To Water)	53.8 kW 183,500 Btu/h	68.05 kW 232,200 Btu/h	79.2 kW 270,250 Btu/h	95.81 kW 326,900 Btu/h
Nominal Gas Inlet Press.	17.5 mbar 7 in w.g.	17.5 mbar 7 in w.g.	17.5 mbar 7 in w.g.	17.5 mbar 7 in w.g.
Maximum Gas Inlet Press.	60 mbar 24 in w.g.	60 mbar 24 in w.g.	69 mbar 28 in w.g.	69 mbar 28 in w.g.
Gas Burner Setting Press.	10.0 mbar 4.0 in w.g.	10.2 mbar 4.1 in w.g.	9.6 mbar 3.85 in w.g.	8.35 mbar 3.35 in w.g.
Injector Dia.	3.20 mm 0.1260 in	3.50 mm 0.1378 in	3.85 mm 0.1516 in	4.40 mm 0.1732 in
Injector Marking	320	350	385	440

*Pilot 3  
Main  
Burner*



## GENERAL INSTALLATION REQUIREMENTS

The boiler should be installed to the general requirements detailed in the preceding sections of this manual but attention is drawn to the following deviations from standard resulting from fully automatic amendments.

## ELECTRICAL INSTALLATION

**WARNING: THIS APPLIANCE MUST BE "EARTHED".**

The installation must be made in accordance with I.E.E. Regulations. Minimum specification for wiring - heat resistant PVC insulated cable 0.75 mm<sup>2</sup> CSA.

**NOTE:** The inside front panel of the boiler casing (normally packed inside the boiler front crate) must be in position before the thermostat is mounted and before the electrical installation can be completed, since it is used to mount the controller and the spark generator via hank bushes provided.

- a) Remove the automatic control/thermostat assembly from its carton together with the packet of screws and release the plastic cable tie from the wiring loom. Loosen the single screw holding the Satronic controller to its base and pull off from the base.

Locate the correct position for the controller base on the inside front panel of the casing (see Fig. 1) and mount the base, cable entries downwards using the two M4 screws provided.

- b) Insert the thermostat bulbs into the pocket fitted to the boiler and retain by tightening the screw (at the side of the pocket) onto the bracket.
- c) Locate the correct position for the spark generator on the inside front panel of the casing (see Fig. 1) and mount the unit with the two M4 screws provided.
- d) Remove grey cover from valve. Connect the 3 core cable identified with the blue sleeve from the controller base to the VR4705A gas control valve positioned over the centre burner bar. The cable must first be passed through the gland plate of the valve cover and the blue crimps attached to the upper coil spade connectors. The other (red) crimps are then connected to the lower coil spade connectors and the ring connection to the earth screw.

Replace grey cover ensuring that gland plate is correctly located. Tighten centre screw and insert cable restraint bush into gland plate.

- e) Remove the grey covers from both side operators of the VR4900C gas control valve. Connect the 3 core cables fitted with 'forked' crimp connectors as follows:-

Long lead to LH side operator.  
Short lead to RH side operator.

Pass these leads, in turn, through the grey covers before making connections to the operators. The 'ring' crimp must be secured to the earth screw and then others can be connected to either terminal. Secure covers to operator coils with screws provided and insert cable restraint bush into cover aperture.

- f) Connect the HT cable from the spark generator to the spark electrode - located on the RH side of the pilot assembly.
- g) Connect the RED wire to the rectification probe - located on the LH side of the pilot assembly.

NOTE: The connectors of f) and g) have been polarised to prevent incorrect fitting.

The main electrical supply connection to each module is made via the compression gland located on the bottom right hand side of the controller base to the terminals inside in the following manner:-

Live	to	Terminal 2
Neutral	to	Terminal 8
Earth	to	Terminal E

Replace the control box onto its base and tighten retaining screw.

A wiring diagram is shown in Fig. 2 and on the rear of the control box.

A 5 amp fused isolator having a minimum contact separation of 3 mm on each pole must be utilised and consideration given to fitting an additional thermostat for each module, situated in the common flow header, unless a sequence controller is fitted, when instructions pertaining to the particular controller should be followed.

All electrical conduit and cable-trays, etc. should be run at high level if possible, the connection to each module following the same path as the gas pipework.

### COMMISSIONING

The pre-commissioning checks should be carried out as detailed in the main installer's guide.

Module checks:-

On each module, before attempting to light, check:-

- a) Gas supply is connected but turned off, cock is closed, unions are tightened, test points are tight, burners are correctly positioned and injectors are tight.

- b) Electricity is connected but ensure supply is switched off, the cables from the controller are connected to the valves and the thermostat bulbs are inserted into the pocket. Ensure button on overheat cut-off device (limit thermostat) is reset by pushing in once.
- c) The spark generator is mounted securely to the inside front panel of the casing, the spark electrode is fitted correctly and undamaged, the H.T. cable is undamaged and fitted securely and correctly to the electrode and the spark generator.
- d) The flame probe is fitted correctly and undamaged and the cable is fitted securely and correctly to the probe and the controller base.

#### PROCEDURE FOR INITIAL LIGHTING AND ADJUSTMENT

**WARNING:** If a "lockout" condition occurs in the control box either intentionally or unintentionally and the reset button on the control box is illuminated, no attempt should be made to re-light the gas until at least 3 minutes have elapsed. The control box can then be reset by pushing the button which extinguishes the "lockout" light.

Switch the mains electrical supply to the boiler OFF.

Adjust thermostats to suitable settings and check time clock circuits (if fitted) are closed.

Ensure that the main gas cock has been turned off for at least 5 minutes before attempting to light boilers - then open cock.

Press reset button on control box and switch mains electrical supply to the appliance ON.

The control box will then initiate the start-up sequence which commences with a 10-12 seconds pre-purge period.

On completion of this time, the valves positioned above the centre burner will open, and the ignition circuit will be energised producing a spark at the pilot burner.

When the pilot flame is established, the spark will stop and after a delay of approximately 15 seconds, the left hand main valves will open and the main flame will ignite.

If the pilot burner does not light, the spark will continue for 5 seconds after which time the control box will "lockout" in a safe condition with the lockout button illuminated. If this occurs, wait 3 minutes, press the lockout button to reset and repeat the sequence.

After the boiler has operated for approximately 10 minutes, switch off the mains electrical supply, slacken the gas pressure test point screw on the outlet side of the centre burner pilot valve assembly and connect to a manometer (see Fig. 4).

Remove the gas pressure test point screw on the burner manifold and connect to another manometer. Switch the module on and measure the gas setting pressure.

Check reading against pressure required shown in table of technical data or on appliance data badge (positioned on burner manifold) and adjust pressure if necessary as follows:-

UR 250 - UR 430

- a) Remove the regulator screw cap from the valve positioned over the centre burner bar (through aperture in grey cover) and using a screwdriver turn the screw beneath clockwise to increase or anti-clockwise to decrease the pressure (see Fig. 4). Replace cap screw.
- b) Remove the small screw on the main control valve regulator and using a screwdriver turn the screw beneath clockwise to increase or anti-clockwise to decrease the pressure (see Fig. 4). Replace screw.

Switch mains supply to module 'off'.

Remove manometers, remembering to refit and tighten pressure test point screws.

Switch mains supply to module 'on'.

Allow system to warm up sufficiently and check operation of all thermostats and other controls. Check that no waste gas spillage occurs from any draught diverter.

Before leaving adjust all thermostats to their correct settings for the system.

Adjust the boiler overheat cut-off device (high limit thermostat), the boiler thermostat setting stops and check combustion in a similar manner to that described in the main installer's guide.

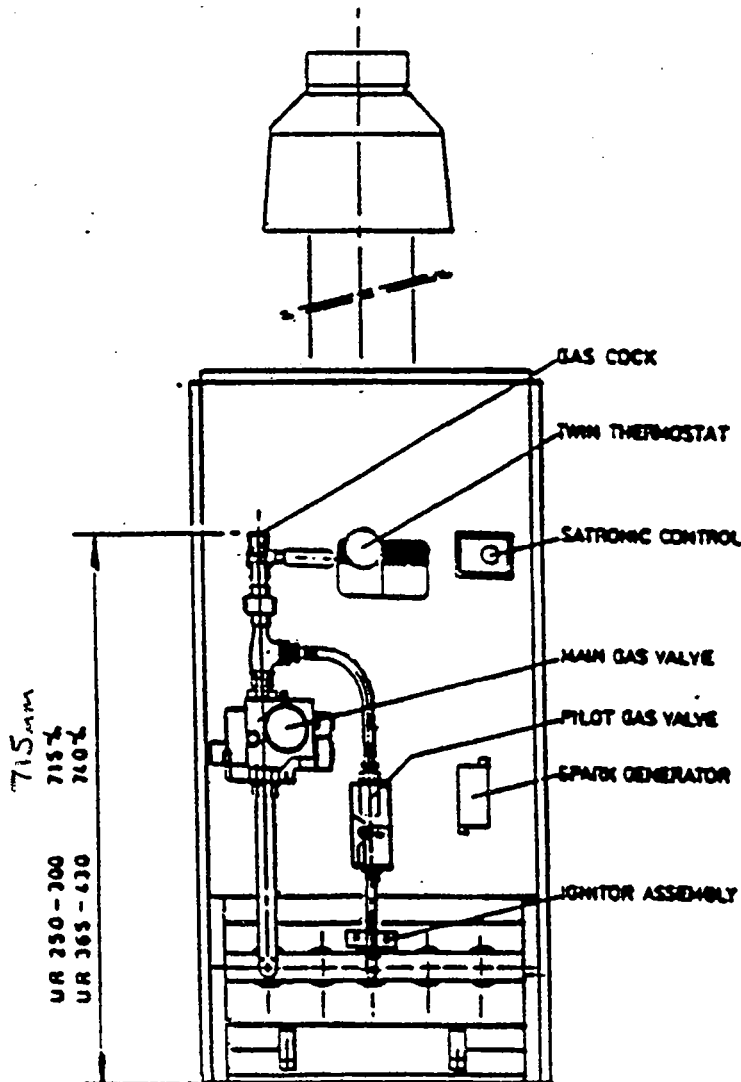
#### SERVICING

The same procedure as indicated in the main installer's guide should be followed when servicing the units with the following additional steps after disconnection of the union below the gas service cock:-

With electrical supply OFF disconnect both pilot and main valve electrical cables at the valves. At the igniter assembly disconnect the red cable to the flame probe by pulling off crimp connectors and pulling off the H.T. from the R.H. electrodes. (See Fig. 5).

ADDITIONAL RECOMMENDED SPARES

H.H.L. PART NUMBER	DESCRIPTION
747814025	Control Valve - VR4900C (UR 250/300/365/430)
531907001	Pilot Valve - VR4705A
747433842	Twin Thermostat 70° - 140°C
533901006	Satronc Controller
533901007	Ignition Spark Generator
530805004	Igniter Grounding Assy.
533805001	Spark Electrode
533805002	Probe Electrode
330512362	320 Injector - UR 250F/A
330512495	350 Injector - UR 300F/A
330513196	385 Injector - UR 365F/A
532902001	430 Injector - UR 430F/A
533901006	Pilot Valve 'O' Ring (VR 4705A)



GENERAL ARRANGEMENT OF BURNER CONTROLS FIG 1

# GR' SERIES BOILERS

CLIENTS WIRING

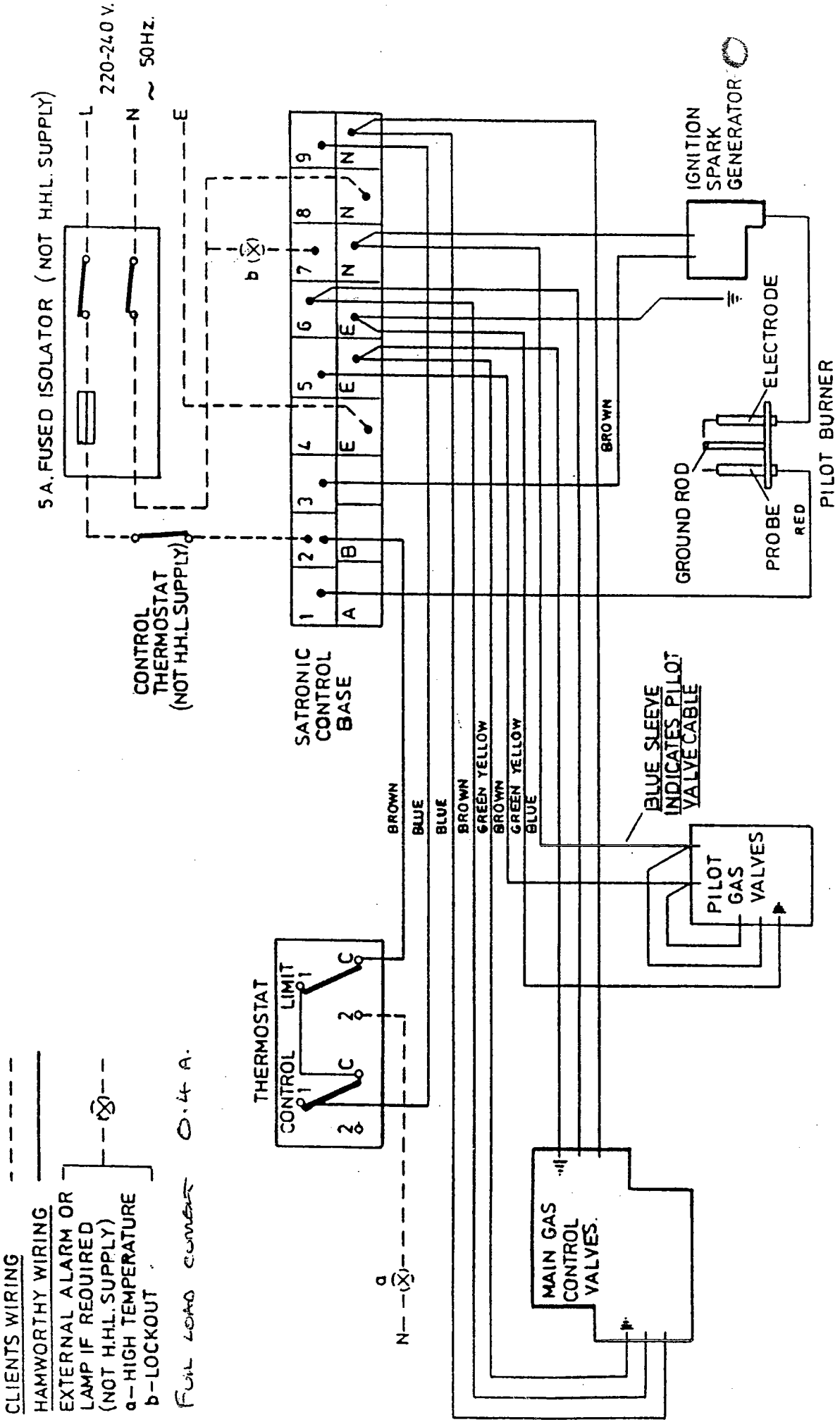
HAMWORTHY WIRING

EXTERNAL ALARM OR LAMP IF REQUIRED (NOT H.H.L. SUPPLY)

a - HIGH TEMPERATURE

b - LOCKOUT

FULL LOAD CURRENT 0.4 A.



01-8

FULLY AUTOM TIC WIRING DIAGRAM

FIG.2

**UR SERIES MODULAR HOT WATER BOILERS FITTED WITH FULLY AUTOMATIC CONTROLS FIRING PROPANE OR BUTANE**

To be used in conjunction with the main installer's guide publication no. 500001009 together with the following supplements:-

Appendix A : UR standard series modular hot water boilers for use on propane and butane.

Appendix B : UR series modular hot water boilers fitted with fully automatic controls firing natural gas.

**DESCRIPTION**

The Hamworthy UR range of modular cast iron boilers are also supplied as standard fitted with fully automatic controls and suitable for firing commercial propane and butane gases. The boilers are similar to the fully automatic natural gas fired models (detailed in Appendix B1), the main differences being:-

- 1) The Honeywell VR4900C gas control valve pressure regulator is replaced by a higher pressure version (See Fig. 1).
- 2) The injectors, both main and pilot, are sized for propane/butane instead of natural gas. They are similar sizes to those fitted to the basic LPG models (as detailed in the Technical Data Table : Appendix A) except for the UR430 injectors which are sized at 2.55 mm (0.1004 in) in diameter and the UR 300 which are sized at 2.15 mm (0.0846 in) diameter.

NOTE: The centre (pilot) jets are of a larger size - see table.

**VERY IMPORTANT**

The incoming gas supply pressure, measured before the manual gas cock, should be accurately set to 37 mbar (14.85 in w.g.) for PROPANE or 28 mbar (11.25 in w.g.) for BUTANE by means of adjustment to the main lock-up pressure regulator at the gas supply point.

The appliance pressure regulators are for fine-trimming of the jet pressures and once set, should be sealed using a drop of lacquer or wax on top of the adjusting screw to prevent any further adjustment or tampering.

TECHNICAL DATA - as detailed in Appendix A except for:-

MODEL	UR 250	UR 300	UR 365	UR 430
MAIN JET	1.90 mm 0.0748 in	2.15 mm 0.0846 in	2.30 mm 0.0906 in	2.55 mm 0.1004 in
SETTING PRESSURE PROPANE	32.7 mbar 13.13 in w.g.	32.1 mbar 12.89 in w.g.	30.2 mbar 12.12 in w.g.	26.9 mbar 10.80 in w.g.
SETTING PRESSURE BUTANE	25.2 mbar 10.12 in w.g.	24.8 mbar 9.96 in w.g.	23.3 mbar 9.35 in w.g.	20.8 mbar 8.35 in w.g.
PILOT/CENTRE JET SIZE	2.10 mm 0.0827 in	2.35 mm 0.0925 in	2.50 mm 0.0984 in	2.80 mm 0.1102 in
SETTING PRESSURE PROPANE	21.9 mbar 8.79 in w.g.	22.5 mbar 9.03 in w.g.	21.6 mbar 8.67 in w.g.	18.5 mbar 7.43 in w.g.
SETTING PRESSURE BUTANE	16.8 mbar 6.74 in w.g.	17.3 mbar 6.95 in w.g.	16.6 mbar 6.66 in w.g.	14.2 mbar 5.70 in w.g.

#### GENERAL REQUIREMENTS

The boilers should be installed to the general requirements outlined in the main installer's guide and in Appendix A.

#### INSTALLATION INSTRUCTIONS

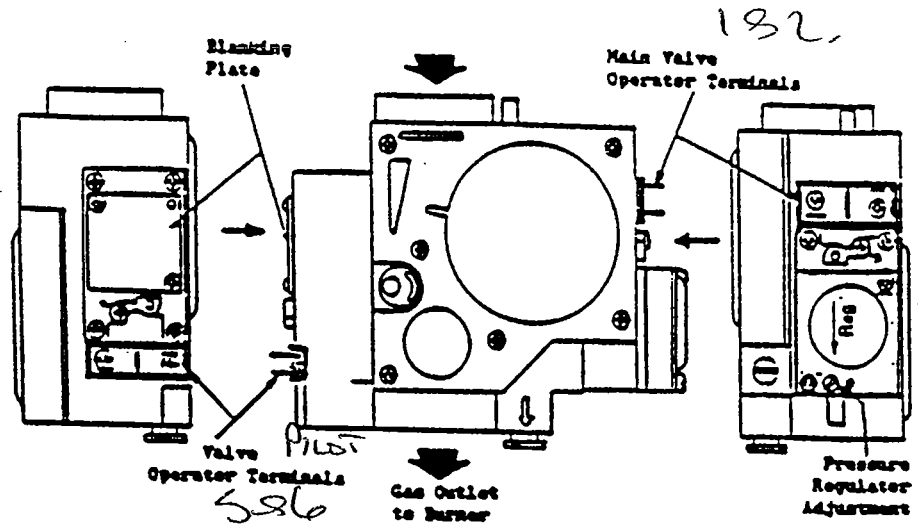
The installation instructions as detailed in the main installer's guide should be followed except for the electrical installation which is detailed in Appendix B1.

#### COMMISSIONING

The pre-commissioning checks should be carried out as detailed in the main installer's guide.

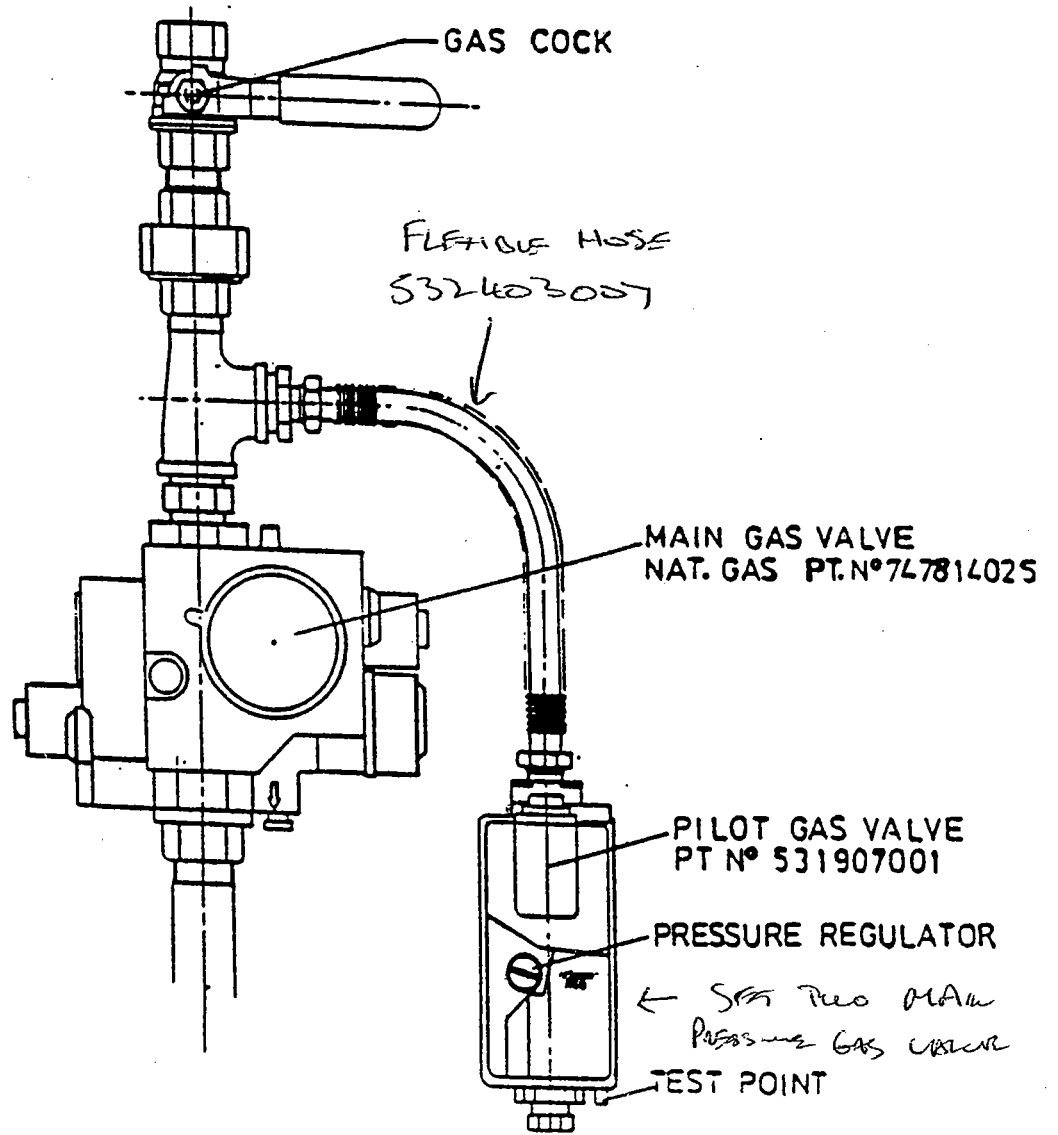
"Module Checks" and "Procedure for Initial Lighting and Adjustment" should be carried out as detailed in Appendix B1 but with special reference to the additional points detailed in Appendix A.





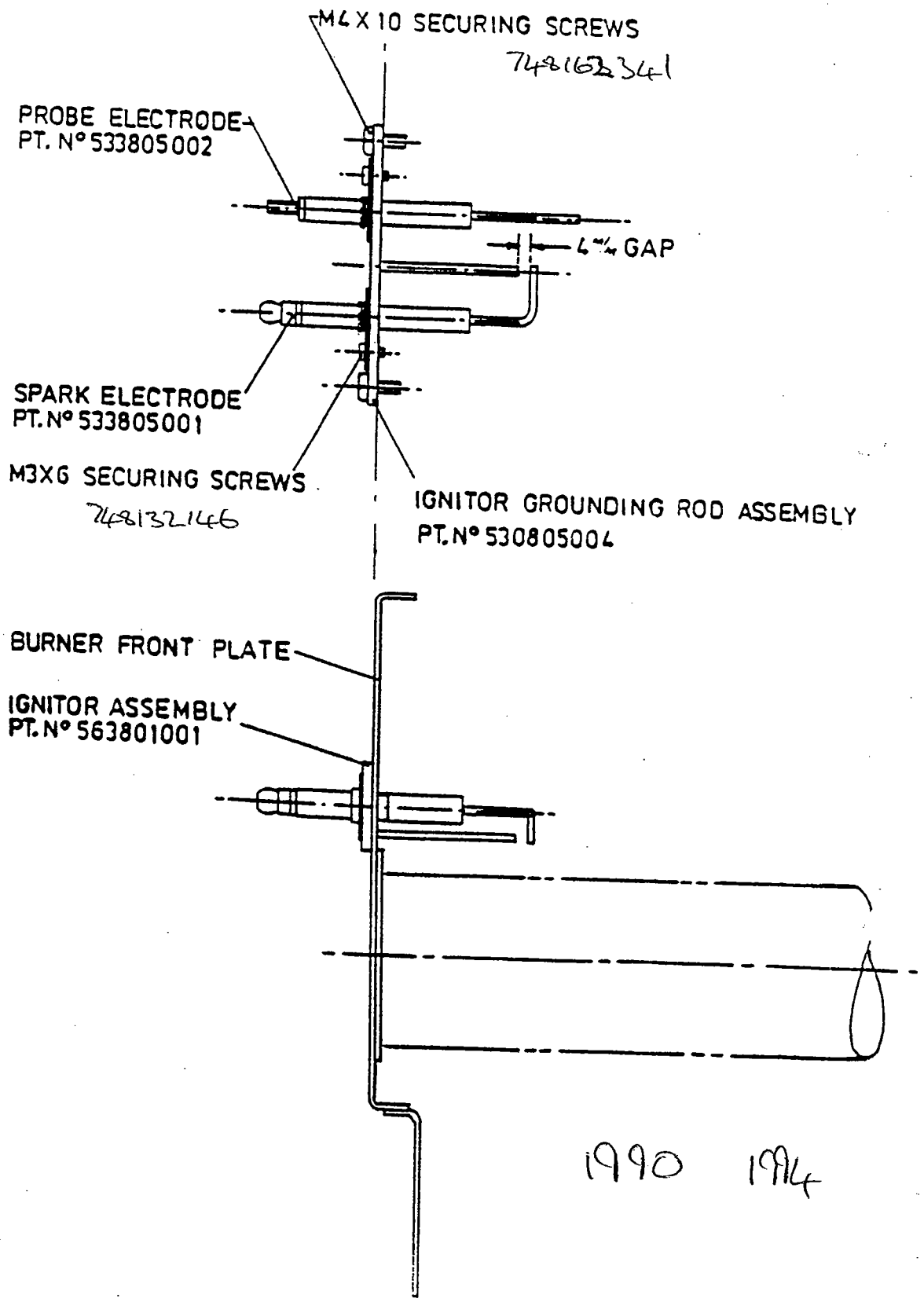
HONEYWELL VR4900C 3/4" GAS CONTROL VALVE

FIG 3



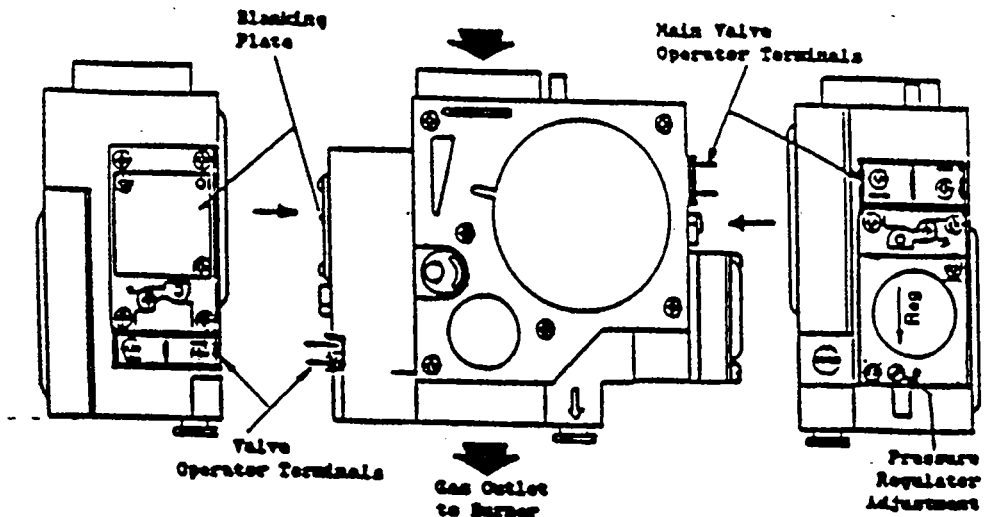
NATURAL GAS AUTOMATIC GAS TRAIN UR BOILERS

FIG 4

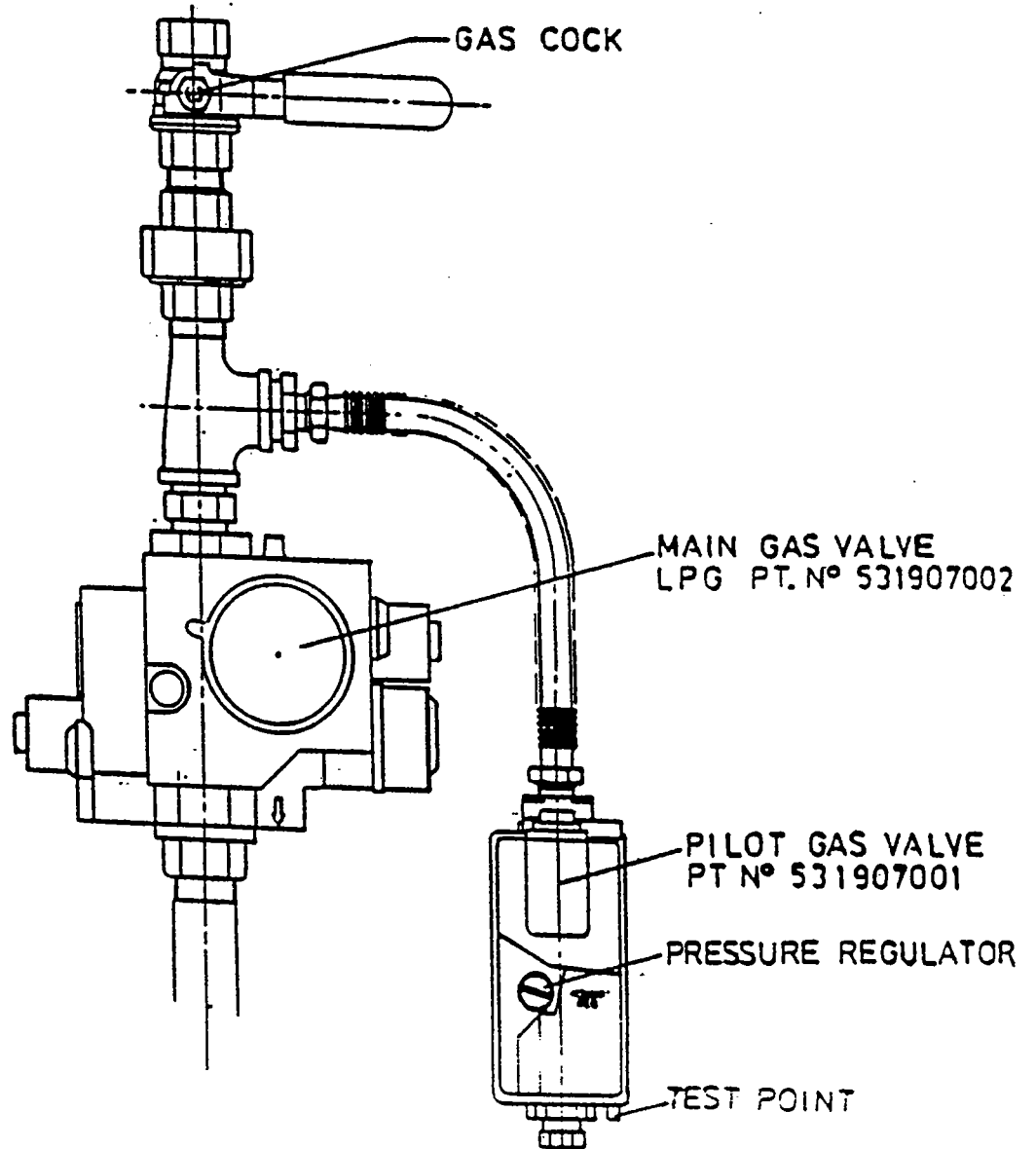


FULLY AUTOMATIC BURNER IGNITOR ARRANGEMENT

FIG 5



HONEYWELL VR4900C  $\frac{3}{4}$ " GAS CONTROL VALVE MODIFIED FOR USE ON LPG



LPG AUTOMATIC GAS TRAIN UR BOILERS

FIG 1

## SERVICING

The same procedures as indicated in the main installer's guide should be followed when servicing the boilers together with the additional steps detailed in Appendix B1.

## ADDITIONAL RECOMMENDED SPARES

See Appendix B1 together with:-

H.H.L. PART NUMBER	DESCRIPTION
531907002	Main Control Valve VR4900C - Modified for LPG
330512453	190 Injector - UR 250 LPG (Main)
330513048	215 Injector - UR 300 LPG (Main)
330513204	230 Injector - UR 365 LPG (Main)
330513220	255 Injector - UR 430 F/A LPG (Main)
330512461	210 Injector - UR 250 LPG (Pilot/Centre)
532902002	235 Injector - UR 300 LPG (Pilot Centre)
330513212	250 Injector - UR 365 LPG (Pilot/Centre)
330512347	280 Injector - UR 430 LPG (Pilot/Centre)

## L.P.G. FUELS

IT IS STRONGLY RECOMMENDED THAT, ON L.P.G. INSTALLATIONS, GAS DETECTION EQUIPMENT IS FITTED. THIS EQUIPMENT SHOULD BE POSITIONED NEAR THE BOILER AND AT LOW LEVEL.

IT IS ALSO IMPERATIVE THAT THE BOILERHOUSE IS VENTILATED AT HIGH AND LOW LEVEL AND TO THIS END OUR RECOMMENDATIONS MUST BE ADHERED TO.

UR STANDARD SERIES MODULAR HOT WATER BOILERS  
PILOT FLAME FAILURE INDICATION

To be used in conjunction with the main installer's guide publication no. 500001009 and Appendix A - "UR Standard series modular hot water boilers for use on propane and butane". This supplement does not apply to fully automatic boilers.

The Hamworthy UR range of modular cast iron boilers utilising a permanent pilot can be supplied as standard with a pressure switch fitted to the pilot burner supply pipe. This arrangement allows an electrical circuit to be switched on on failure of the pilot flame, providing a means of activating a remote alarm device.

Inclusion of this feature ensures compliance with the P.S.A. specification (M & E) No. 3. Kits are available for site fitting to existing boilers, if required.

## DESCRIPTION

As detailed in the main installer's guide under "Mode of Operation 2)" the overheat cut-off device (high limit)/E.C.O. circuit cannot be used to give alarm signals on pilot failure or high limit operation since it is a low power circuit energised solely by the thermocouple. Under normal conditions, the pilot burner is alight continuously, the circuit energised and the pilot supply pipe pressurised to approximately the inlet gas pressure. Any interruption of the circuit causes the power unit in the Honeywell V4400 valve to drop out and shut off the gas supply to both main and pilot burners. (A break in the circuit causes immediate drop out but a loss of pilot flame may delay drop out by up to 45 seconds while the thermocouple cools down.) The pressure in the pilot burner supply pipe then decays to atmospheric pressure. A pressure switch tapped into the pilot gas supply pipe and set to operate at approximately 10 mbar (4 in w.g.) detects closure of the pilot gas supply almost immediately bringing up the alarm.

## INSTALLATION

Pressure switch (see Fig. 1).

## MECHANICAL (SITE FITTING)

Isolate gas and electrical supply to boiler module.

Identify pilot gas supply pipe (bundy tube) and disconnect at gas control valve by unscrewing compression fitting.

Disconnect thermocouple at control valve by unscrewing fitting.

Disconnect piezo unit cable by pulling off spade connection at the unit.

Identify pilot burner bracket (see Fig. 7 - main installer's guide) at bottom edge of burner front plate; remove pilot burner complete.

Disconnect pilot supply pipe from pilot burner and discard.

NOTE: Ensure pilot injector remains in position within the pilot burner.

From the kit supplied, screw the central branch of the tee adaptor into the rear connection of the pressure switch, using the sealing washer and backnut provided, to form a gas tight joint.

Identify the two new pieces of pilot supply pipe and the compression fittings complete with olives, for the tee adaptor, valve and pilot burner.

Assemble the lower pilot supply pipe to the tee adaptor and to the pilot burner, ensuring that the pilot injector is in position.

Refit the pilot burner in position and connect the upper pilot supply pipe to the control valve and tee adaptor.

Reconnect the piezo unit cable and the thermocouple ensuring that the E.C.O. unit is in its correct position.

Ensure all compression joints are tight.

On pre-October 1984 models, the pilot burner (positioned above the bar burners) does not require removal since the pilot supply pipe connection is readily accessible. The thermocouple and piezo cable may also not require disconnection.

With electrical supply OFF relight pilot flame as detailed in the main installer's guide and check new pilot supply pipe joints for leaks using soapy water or equivalent.

N.B. Never check for leaks with a naked flame.

Extinguish pilot flame by depressing red button on control valve. (Wait 3 minutes before attempting any re-ignition of the pilot.)

## ELECTRICAL

**WARNING: THIS APPLIANCE MUST BE "EARTHED".**

The installation must be made in accordance with I.E.E. Regulations. Minimum specification for wiring: heat resistant PVC insulated cable 0.75 mm CSA. Remove plastic cover on the pressure switch to expose the four terminals within:- common, normally open, normally closed and earth. The electrical circuit and terminals used depends on the type

of alarm system to be connected. The simplest system is shown in Fig. 2 where a live feed is connected between terminal 4 at the module junction box and terminal C (common) at the pressure switch and from terminal NC (normally closed) at the pressure switch through a remote mounted lamp (not H.H.L. supply) to neutral. It should be noted that, if the module is controlled by equipment other than the boiler thermostat i.e. time clock, step controller, an alarm condition only shows when the module is being called to fire.

Alternatively, an independent circuit can be used to provide continuous monitoring of pilot flame failure.

All wiring to the pressure switch must pass through the cable gland supplied.

### COMMISSIONING

Ensure electrical supply to module and pressure switch is OFF.

Remove pressure test point screw located on pressure switch and fit a manometer.

Re-light pilot flame (after waiting 3 minutes from previous shutdown).

Using the pilot adjustment screw located beneath a cover screw on the gas control valve (see Fig. 5 - main installer's guide), check initial reading on manometer then reduce the pressure in the gas supply pipe to approximately 10 mbar (4 in w.g.).

Adjust pressure setting nut ON on the pressure switch (anti-clockwise to decrease clockwise to increase) until the switch operates (determined either by an audible click or use of a test meter).

Re-adjust pilot gas supply pressure to initial setting.

Replace pilot adjustment cover screw.

Extinguish pilot flame by depressing red button on control valve.

Remove manometer, replace and tighten pressure point screw.

Replace pressure switch cover.

Wait 3 minutes from extinguishing pilot before relighting.

If the module is to be commissioned follow the "procedure for initial firing and adjustment" detailed in the main installer's guide.

If the module has already been commissioned, relight in accordance with the lighting-up instructions.

Activate alarm circuit.

## FAULT FINDING

Should the alarm operate check for possible faults as follows:-

SYMPTOM	REMEDY
Alarm on but pilot remains alight.	Recommission pressure switch as detailed above. If switch does not operate - replace.
Alarm on - pilot out. Possible causes:-	
a) Pilot blown out or red button on control depressed inadvertently.	Wait 3 minutes then attempt to relight as normal.
b) Overheat cut-off device (high limit) has operated.	Depress red button on high limit thermostat. If the button resets with an audible click check:- <ol style="list-style-type: none"><li>1) Temperature setting of thermostat detailed in main installer's guide. Adjust as necessary.</li><li>2) Sufficient water flow is present through the module.</li><li>3) Pump overrun is provided on shut down of boiler plant.</li></ol> If thermostat cannot be reset or is out of calibration - replace.  Note: Before relighting pilot ensure reason for high limit operation has been ascertained.
c) E.C.O. circuit is broken.	Check all connections for tightness and continuity particularly the thermocouple connection to the E.C.O.
d) Thermocouple is faulty.	Replace.
e) Power unit is faulty.	Replace.
In addition:-	
Alarm off but pilot out.	<ol style="list-style-type: none"><li>1) If within 45 secs. from loss of pilot flame - thermocouple cooling down.</li><li>2) If over 45 secs. from loss of pilot flame - either pilot supply pipe from switch or pilot burner injector blocked or faulty/incorrectly set pressure switch.</li></ol>



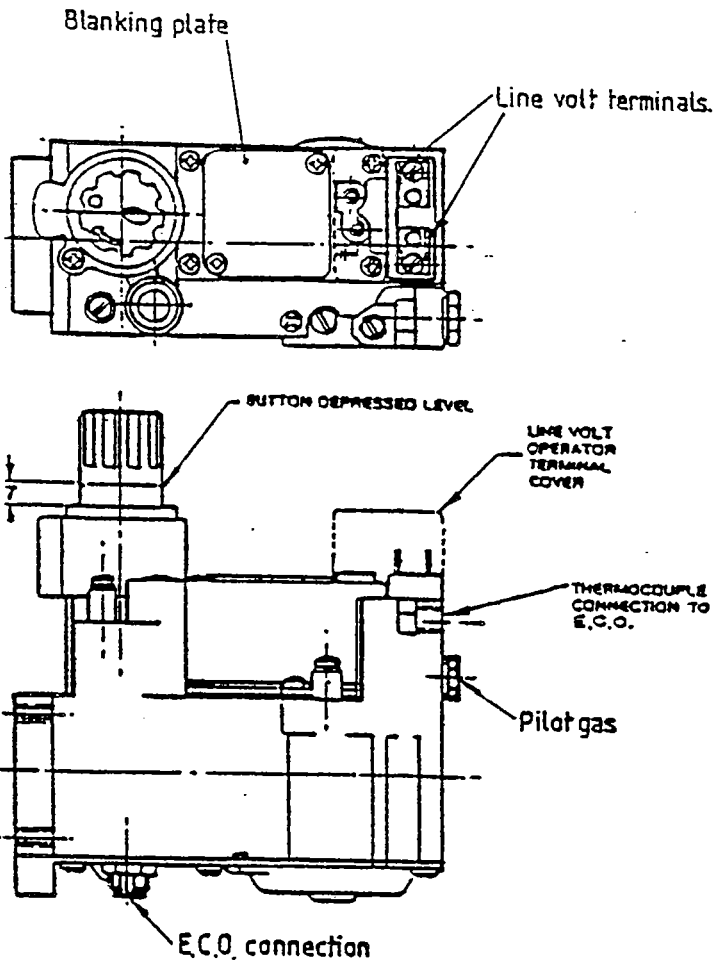
UR SERIES MODULAR HOT WATER BOILERS FITTED WITH DUAL FUEL BURNER CONTROLS TO FIRE NATURAL GAS AND L.P.G.

To be used in conjunction with the main installer's guide publication no. HPM 2003 and Appendix A : UR standard series modular hot water boilers for use on propane and butane.

DESCRIPTION

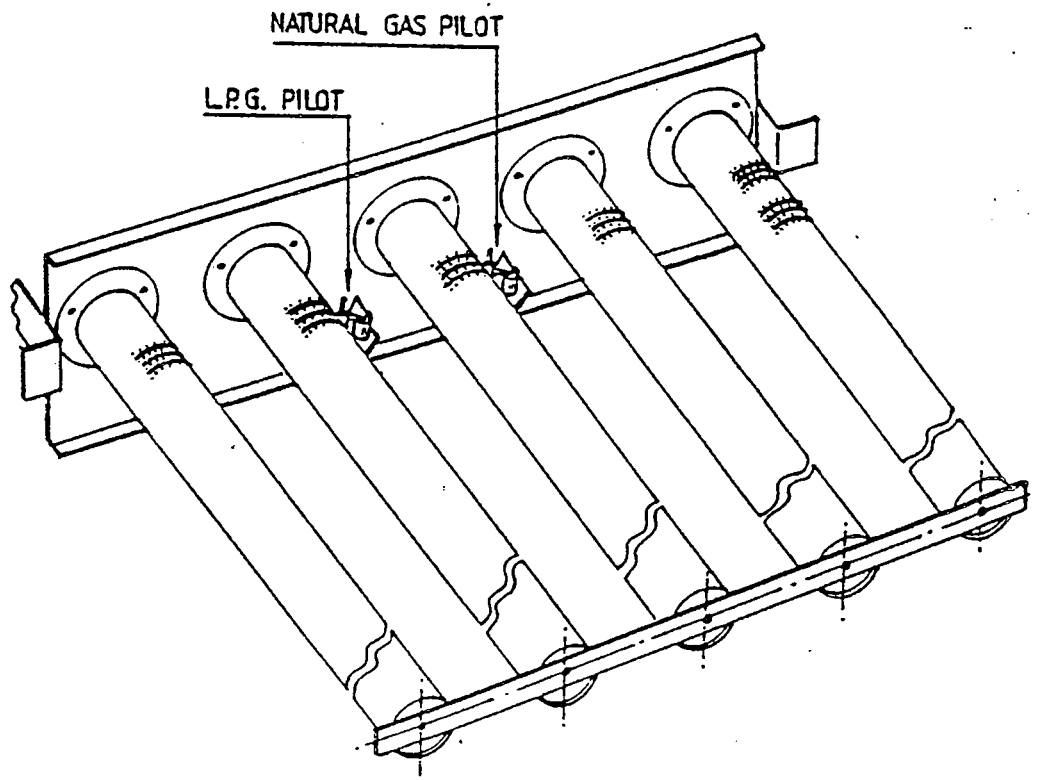
The Hamworthy UR series of modular cast iron boilers can now be supplied with dual burner assemblies to enable rapid changeover from natural gas to L.P.G. firing or vice versa without the necessity to change parts and by utilising permanently connected supplies of each gas. The boilers are very similar to the basic range of permanent pilot/energy cut-off models, the important differences being:-

- 1) The standard burner manifold is replaced by a special double manifold arrangement complete with two sets of angled brazed injectors. The lower larger manifold is used for natural gas and the upper for L.P.G. Each pair of injectors passes gas (either N.G. or L.P.G.) into the same bar burner.
- 2) The natural gas to the lower manifold utilises the same control system and Honeywell Softlite valves as that used on the basic British Gas approved natural gas boiler range (on left of the front plate). The L.P.G. is controlled by an entirely separate system utilising a Honeywell 1/2" V4600D valve ("compact" Softlite with blanking plate) see Fig. 1, (positioned on the right of the front plate). See Fig. 4. This system is controlled by the addition of a second pilot burner assembly for L.P.G. only, positioned to the right of the central bar burner (see Fig. 2).
- 3) The L.P.G. gas pipework terminates at a manual ball cock located adjacent to the natural gas manual cock on the left of the module front. The two manual cocks are held rigidly positioned by a clamp plate and each cock is fitted with a disc type handle containing slots and stops which interlock together. This interlocking of the handles allows both gas streams to be shut-off (for servicing etc) but permits only one to be opened. The L.P.G. manual cock is off-set behind the natural gas cock in order to allow the L.P.G. pipework header to fit behind the natural gas header as they pass through the casing panel cut-outs at the top of each module. (See Fig. 3.).
- 4) An additional overheat cut-off device (high limit thermostat) is fitted to the standard twin thermostat and wired to the thermocouple circuit of the L.P.G. control system. The module control thermostat operates either the natural gas or the L.P.G. control valve, the electrical supply being diverted to the valve in use by means of a 3 position fuel changeover switch located in the electrical junction box. The central switch position is an "off" condition which removes the electrical supply to both valves. (See Fig. 4.).

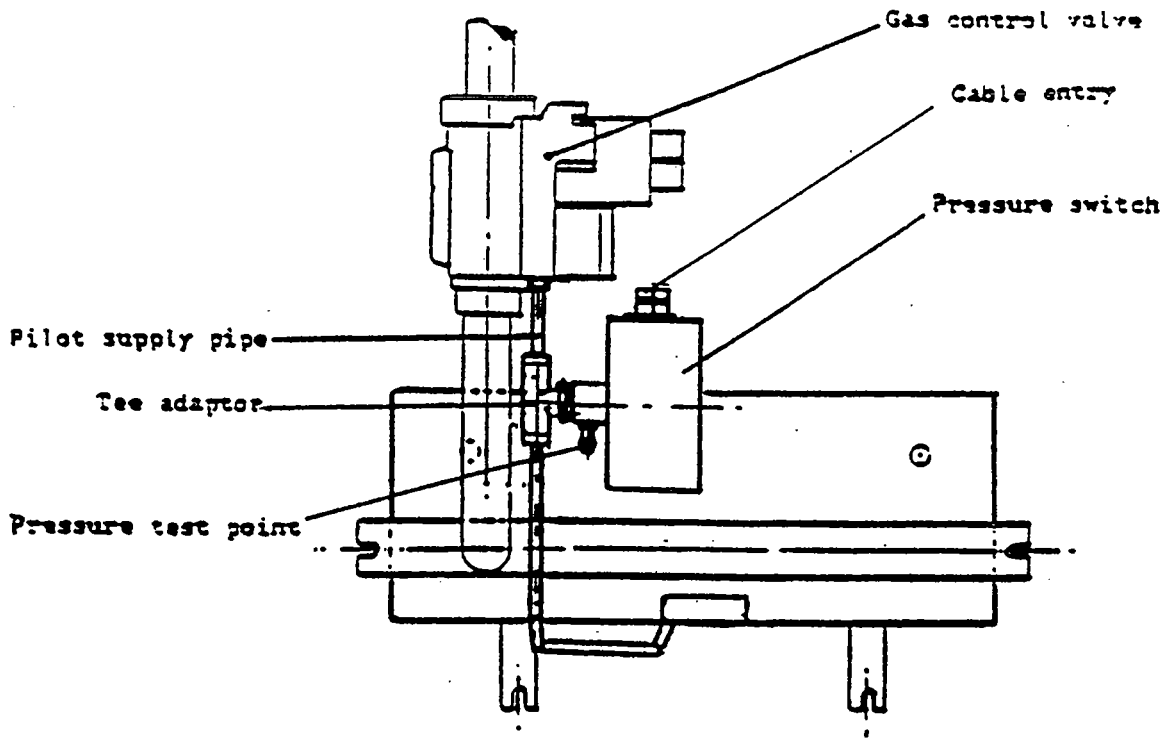


U.R. DUAL FUEL L.P.G. VALVE Honeywell  $\frac{1}{2}$  V4600D-1019

FIG. 1.

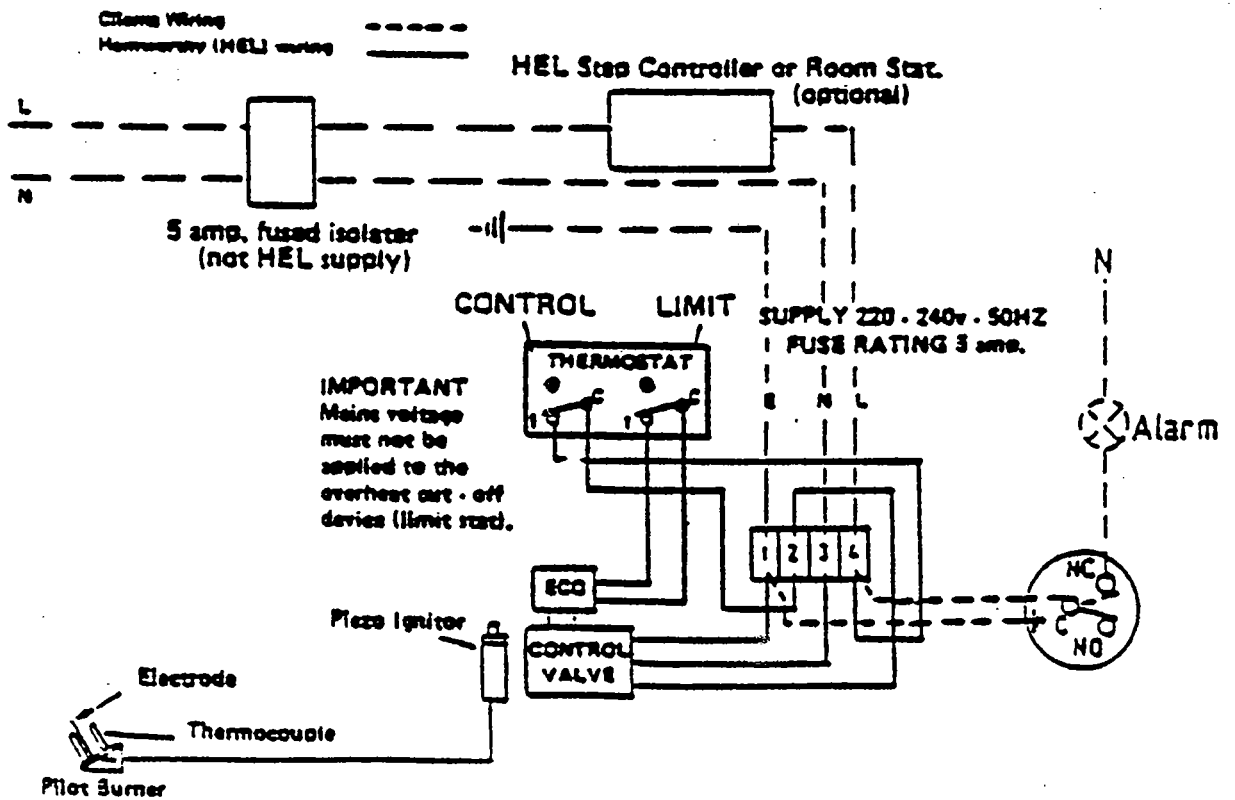


BURNER BAR ASSEMBLY FIG. 2



GENERAL ARRANGEMENT  
PILOT FLAME FAILURE PRESSURE SWITCH

FIG. 1



BASIC WIRING DIAGRAM PER MODULE WITH PRESSURE SWITCH

FIG. 2

ADDITIONAL SPARES

H.H.L. PART NUMBER	DESCRIPTION
339009477	Pressure switch

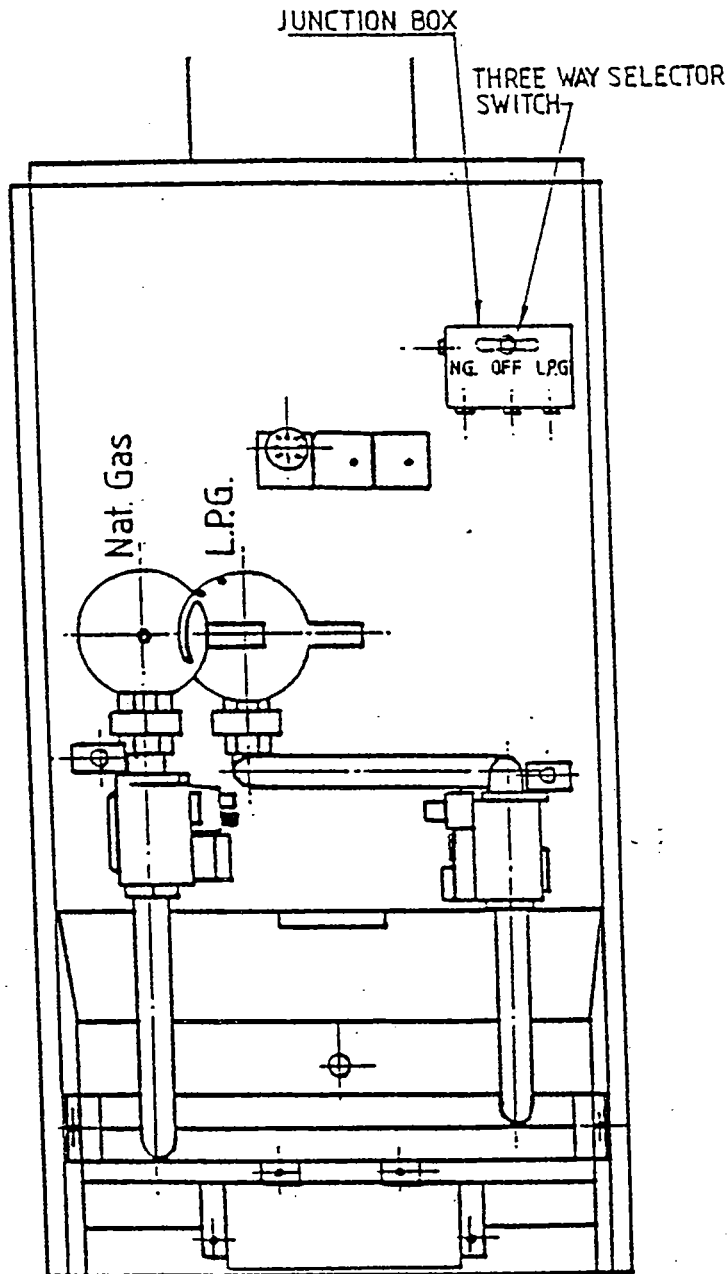
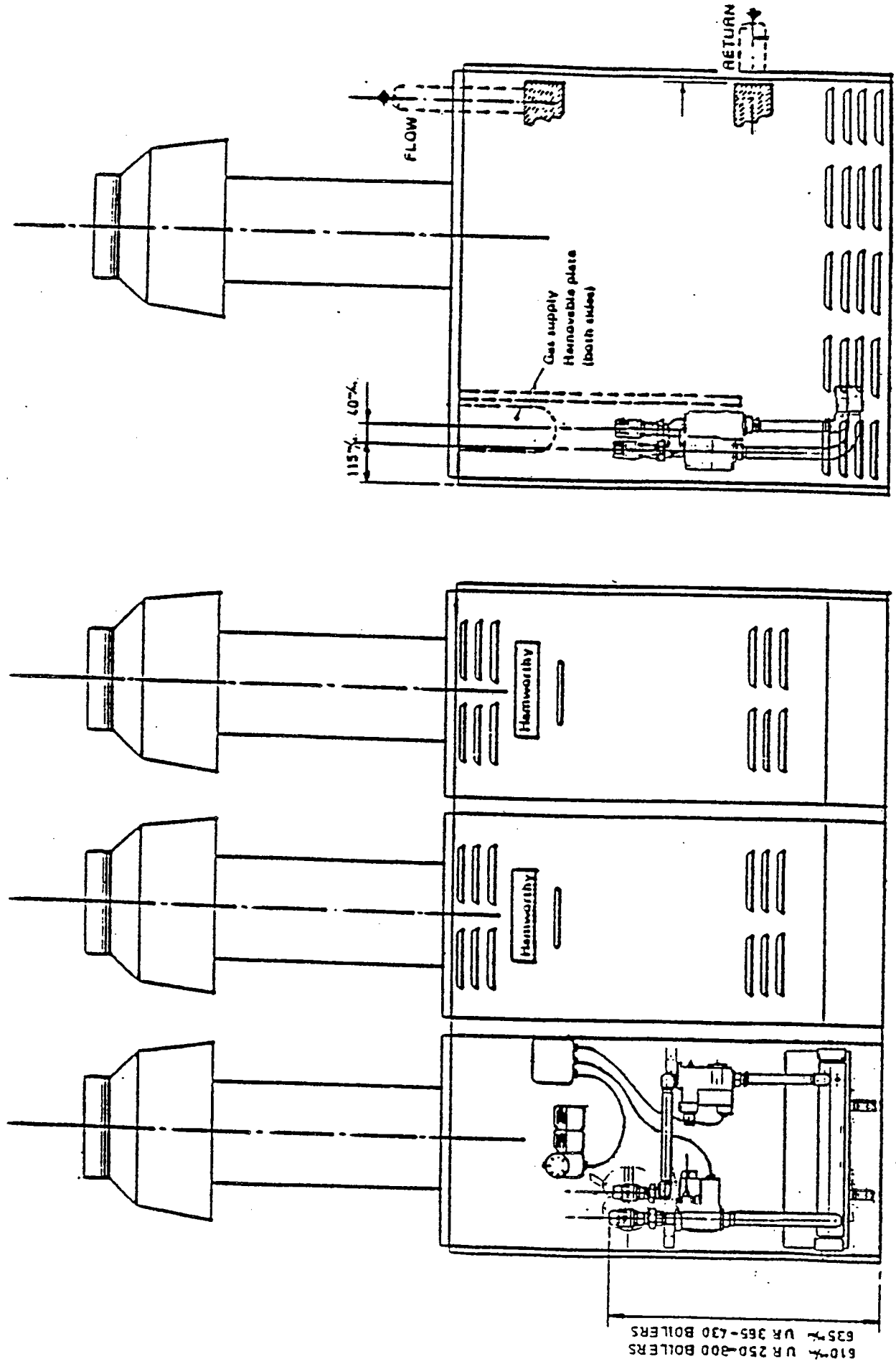


FIG. 4

- 5) The position of the manual gas cocks relative to the module is different to the basic boiler range - all other dimensions are as shown in Fig. 1b-1e of the main installer's guide. (See Fig. 3.).
- 6) The boiler casings are supplied in a similar form to that outlined in the main installer's guide (i.e. singles and multi) but it is recommended that the modules are grouped together in a maximum of three as shown in Fig. 2 of the main installer's guide. Each bank of three should then be coupled to the natural gas and L.P.G. via two gas supply pipes: Larger banks of boilers would require larger gas supply pipework and would become difficult to fit within the confines of the casings.



UR 250 / 430 DUAL FUEL BOLLERS ( GAS TRAIN DIMENSIONS )

FIG. 3

NOTE: The dual fuel burner assembly is only supplied fitted to the UR 250, UR 300, UR 365 and UR 430 models. The UR 180 is not suitable for this arrangement.

## DELIVERY

The boilers are delivered packed in a similar manner to the basic range, the small carton normally located within the boiler crate containing the triple thermostat and junction box/changeover switch assembly.

## TECHNICAL DATA

Natural gas - See Table 1 - Technical Data - main installer's guide

L.P.G. - See Table 2 - Technical Data - Appendix A

## GENERAL REQUIREMENTS

The boiler should be installed to the general requirements outlined in the main installer's guide and Appendix A.

## INSTALLATION INSTRUCTIONS

### Location

Refer to main installer's guide.

### Connections

#### a) Water

Refer to main installer's guide.

#### b) Gas

Connect the incoming gas supplies to the gas cocks on each module. The supply pipework should be run across the front of no more than 3 modules together (see 6 above) above the gas cocks, approximately level with the top of the module castings and connecting pipes dropped down to each cock. The L.P.G. gas supply pipe should be slightly lower and to the rear of the natural gas line to align with the gas cock positions (See Fig. 3). It is recommended that, as the gas cocks are rigidly coupled together, additional unions are fitted in each connecting leg of the gas supply pipework to facilitate the fitting of the pipework without disturbing the interlocked gas cocks. The connections to the gas supply pipes should not be forced.

The final position of the gas supply pipework is dictated by the gas cock positions and the removable plate in the side of the casing. These positions should be checked as shown in Fig. 3 of this supplement and Fig. 1 of the main installer's guide.

Before commissioning the complete gas installation must be purged, inspected and pressure tested for soundness to CP 331 Part 3.

### Flues

Refer to main installer's guide.

### Casing

Refer to main installer's guide.

### Electrical

**WARNING: THIS APPLIANCE MUST BE "EARTHED".**

The installation must be made in accordance with I.E.E. Regulations. Minimum specification for wiring: heat resistant PVC insulated cable 0.75mm CSA.

- a) Remove the thermostat assembly from its carton and release the four screws retaining the cover plate of the junction box. The fuel changeover switch is mounted in the lid which should be lifted with care to avoid straining the switch connecting cables. Attach the junction box to the inside front panel of the casing with the two screws provided, ensuring that the pre-wired cable outlets are facing downwards.
- b) Insert the 3 thermostat bulbs carefully into the pocket provided on the module and retain by tightening the screw at the side of the pocket onto the bracket.
- c) Connect the cable, identified with a blue sleeve, from the junction box to the left hand natural gas control valve. Push on connectors to the solenoid coil and ring connector to earth.

NOTE: Remove the grey cover from the valve and thread the cable through the hole before connecting to valve and fitting the gland.

- d) Connect the second cable (no blue sleeve) from the junction box to the right hand L.P.G. control valve in a similar manner to c) above.

The two pairs of cables attached to the energy cut-off units on each valve should be connected to the appropriate overheat cut-off device (high limit thermostats) as follows:-

- e) Remove the front covers of the thermostats (this may necessitate pulling the temperature control knob off first).
- f) Unclip and remove the lower light grey section of the two manual reset thermostats (right hand and centre), revealing the spade terminals.



- 2) The 2 overheat cut-off (high limit) E.C.O. circuits which consists of the centre (natural gas) and right hand (L.P.G.) overheat cut-off devices (high limit thermostats) the energy cut-off situated at the control valve ends of the thermocouple, the power units in the valves and the pair of twin cables connecting the overheat cut-off devices to the E.C.O.'s.

The E.C.O. units are made up of two items detailed in Fig. 6 of the main installer's guide with the connections arranged to ensure good contacts, since the power generation of the thermocouples is very small. At the overheat cut-off devices (high limit thermostats), gold plated contacts are utilised and the lead length is minimised to reduce power loss. In the event of the overheat cut-off devices (high limit thermostats) operating, the power units in the respective control valve will de-energise shutting off both the pilot and main flame (if firing) of the gas being fired. No gas will pass the valve until the button on the respective overheat cut-off device is reset and the pilot flame is manually re-ignited.

NOTE 1: An alarm signal to indicate overheat cut-off (high limit lock-out) cannot be fitted to this circuit.

NOTE 2: Irrespective of which gas is being fired, both overheat cut-off devices are sensing the same temperature and should be set at the same operating temperature. Therefore, if an overheat lock-out occurs it is probable that the overheat cut-off device on the non-firing gas circuit will also operate and this can be reset by pushing in the red reset button on the overheat cut-off device at the same time. An overheat lockout indicates a fault condition and the reasons should be ascertained before the module is reset and returned to service.

- 3) The boiler thermostat/main valves circuit which consists of the left hand, control side of the triple thermostat, the main solenoid operators control valves, the junction box, the fuel changeover switch and the interconnecting cable, all operating on the mains electrical supply. This circuit allows the module to operate on and off on either gas under normal conditions and with the circuits described in 2) above, provides double valving of each gas supply.

NOTE: On no account should the above circuits be interconnected and the triple thermostat should be regarded as three completely separate units with no interconnecting link.

### COMMISSIONING AND LIGHTING INSTRUCTIONS

It is important to understand that the DUAL GAS UR Atmospheric Boilers are essentially identical to the standard nat Gas Boilers and it's L.P.G. variant and commissioning, with a number of minor exceptions, already mentioned, and will follow the procedure detailed in the Installer's Guide for the UR Series Hot Water Boilers, Pages 16 to 24 natural gas and Appendix A propane and butane.

Before commencing to light boiler, ensure that the water system is fully operational.

### LIGHTING THE BOILER

WARNING: If the pilot light is extinguished either intentionally or unintentionally no attempt should be made to re-light the gas until at least 3 minutes have elapsed.

### FIRING NATURAL GAS

- 1N) Switch the mains electrical supply to the boiler OFF.
- 2N) Set fuel changeover switch (S) to mid "OFF" position.
- 3N) Ensure that both manual gas cocks (CN & CL) have been turned OFF for at least 3 minutes before attempting to light boiler - then open natural gas cock (CN).
- 4N) Press in and release reset button (RN) on the left hand natural gas overheat cut-off device (high limit thermostat).
- 5N) Light pilot burner (BN) by repeatedly pressing button (PN) on the piezo ignitor while holding the WHITE start button (W) on the control valve fully pushed in. Hold button (W) in for 20 seconds after the pilot is lit before releasing. The pilot flame should remain alight, but if it is extinguished, push in the RED stop button (R), wait 3 minutes and then repeat step 5N).
- 6N) Having established the pilot flame, switch mains electrical supply ON, set fuel changeover switch (S) to the left "MAT.GAS" position and adjust control thermostat (CT) and any additional thermostats or timeclocks (if fitted) to their required settings.
- 7N) Burners will light when heat is required.

### FIRING L.P.G.

- 1L) Switch the mains electrical supply to the boiler OFF.
- 2L) Set fuel changeover switch (S) to mid "OFF" position.
- 3L) Ensure that both manual gas cocks (CN & CL) have been turned OFF for at least 3 minutes before attempting to light boiler - then open L.P.G. cock (CL).
- 4L) Press in and release reset button (RL) on the right hand L.P.G. overheat cut-off device (high limit thermostat).
- 5L) Light pilot burner (BL) by repeatedly pressing button (PL) on the piezo igniter while holding the grey knob (G) on the control valve fully pushed in. Hold knob in for 20 seconds after the pilot is lit before releasing. The pilot flame should remain alight, but if it is extinguished, turn the grey knob (G) a 1/12th turn clockwise and release, wait 3 minutes and then repeat step 5L).

# BASIC WIRING DIAGRAM DUAL FUEL BOILERS

CLIENTS WIRING. - - - - -  
HAMWORTHY WIRING. ————

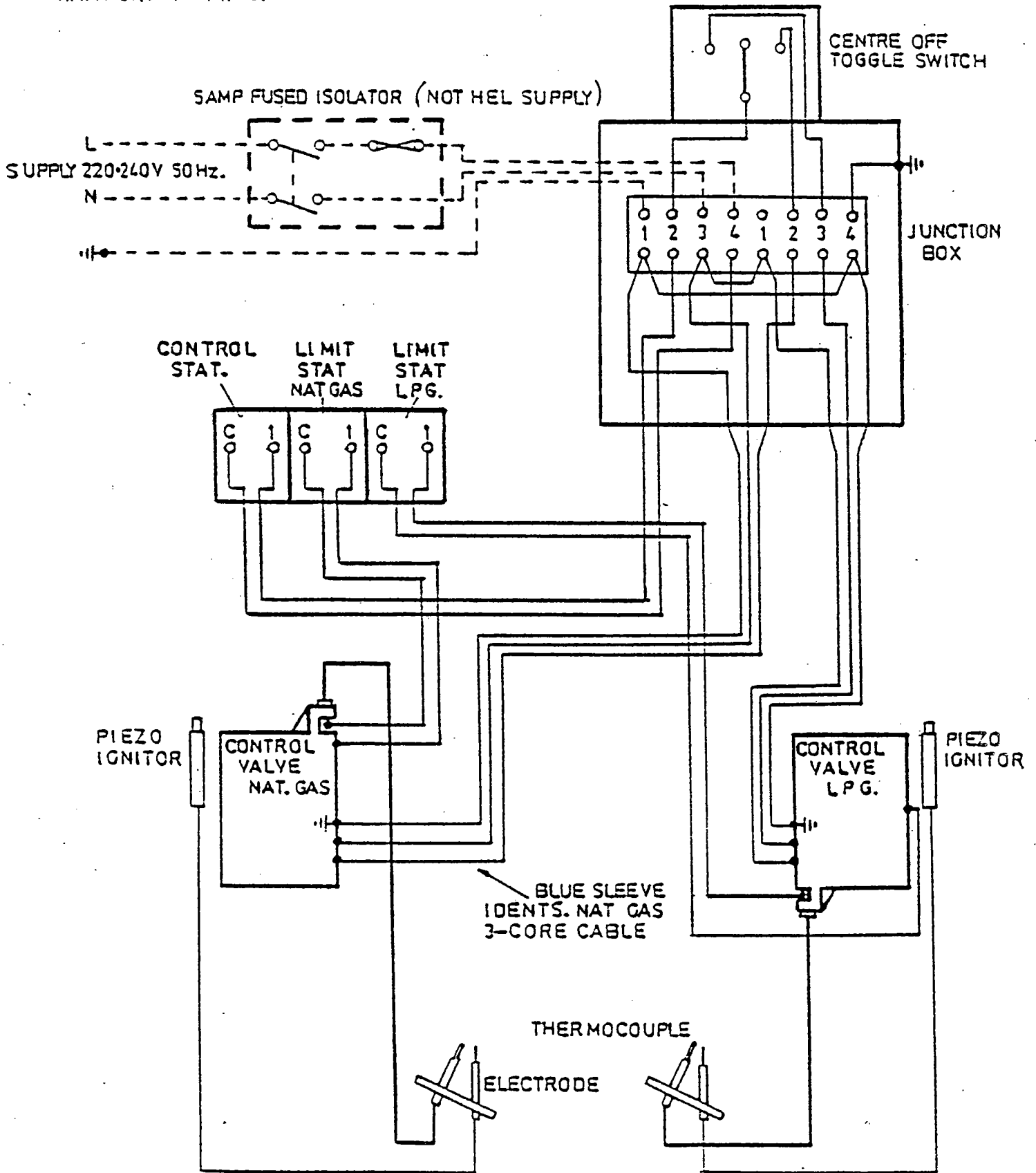


FIG. 5

D1-7

- g) Feed the pair of cables from the natural gas control valve through the gland hold of the grey cover and push the connectors over the spade terminals on the centre thermostat, marked 1 and C. It may be necessary to remove and discard the wire clamps which are screwed onto the spade terminals. Replace the lower grey terminal cover and push the rubber cable gland into position.
- h) Repeat g) for the L.P.G. cables and the right hand thermostat.
- i) Replace the front covers of the thermostats.

The mains connection to each module is made via the compression gland located on the left hand side of the junction box to the terminal block inside. A wiring diagram is shown in Fig 5 and is also repeated on the back of the junction box cover. A 5 amp fused isolator having a minimum contact separation of 3 mm on each pole must be utilised and consideration given to fitting an additional thermostat for each module in the common flow header unless a step controller is fitted when instructions pertaining to the particular controller should be followed.

All electrical conduit and cable trays etc, should be run at high level, if possible the connections to each module following the same path as the gas pipework. This leaves the floor in front of the module clear, and allows for removal and replacement of a module.

Replace the junction box cover.

The thermostat supplied is a combined thermal reset boiler thermostat and double manual reset overheat cut-off devices (high limit thermostats) with gold plated contacts having a range of:-

Boiler Thermostat	70 <sup>0</sup> - 140 <sup>0</sup> C (158 <sup>0</sup> - 284 <sup>0</sup> F)
Overheat Cut-Off Devices (Limit Stats)	70 <sup>0</sup> - 140 <sup>0</sup> C (158 <sup>0</sup> - 284 <sup>0</sup> F)

The boiler thermostat knob is fitted with an adjustable stop to prevent the thermostat being inadvertently set higher than the overheat cut-off devices. The stop is factory set at 95<sup>0</sup>C (203<sup>0</sup>F).

### MODE OF OPERATION

Once the wiring connections are completed and the module is ready to fire, the electrical controls are so arranged to give 5 distinct and separate circuits of 3 different types.

These are:-

- 1) The 2 piezo circuits, one for natural gas and one for L.P.G. which consist of a piezo unit mounted horizontally across the top flange of each control valve, a straight spark electrode fixed rigidly adjacent to each pilot burner and a single cable connecting each pair. One push of the piezo limit button will produce a click at which time a spark is produced between the electrode and the pilot burner which is solely used to light the pilot flame.

- 6I) Having established the pilot flame, switch mains electrical supply ON, set fuel changeover switch (S) to the right "L.P.G." position and adjust control thermostat (CT) and any additional thermostats or timeclocks (if fitted) to their required setting.
- 7L) Burners will light when heat is required.

### CHANGEOVER OF FUELS

NOTE: The manual gas cocks are mechanically interlocked - both can be turned OFF but only one at a time can be turned ON.

- 1) Switch the mains electrical supply to the boiler OFF.
- 2) Set fuel changeover switch (S) to mid "OFF" position.
- 3) If natural gas pilot is lit - push in red stop button (R) and turn gas cock (CN) OFF. If L.P.G. pilot is lit - turn grey knob (G) 1/12th turn clockwise and turn gas cock (CL) OFF.
- 4) WAIT 3 MINUTES then light boiler on alternative fuel using appropriate instructions above from step 3N) or 3L).

### TO SHUT OFF

- 1) For short periods - set fuel changeover switch (S) to mid "OFF" position.
- 2) For long periods - set fuel changeover switch (S) to mid "OFF" position; if using natural gas - press red stop button (R), turn gas cock (CN) OFF; if using L.P.G. - turn grey knob (G) a 1/12th turn clockwise, turn gas cock (CL) OFF. Switch mains electrical supply OFF.

THE ELECTRICAL SUPPLY TO THE BOILER MUST BE SWITCHED OFF BEFORE STARTING MAINTENANCE. DO NOT USE THE FUEL CHANGEOVER SWITCH FOR THIS PURPOSE.

### RECOMMENDED SPARES (IN ADDITION TO LIST FOR THE STANDARD BOILER AND PROPANE BOILER)

H.H.L. PART NUMBER	DESCRIPTION
361911467	Interlocked Shut-off Valve Assembly
747814165	Control Valve Honeywell V4600D-1019 (For L.P.G.)
332414625	Pilot Gas Tube L.P.G.
363406110	Dual Gas Manifold Assembly UR 250
363406102	Dual Gas Manifold Assembly UR 300
363406094	Dual Gas Manifold Assembly UR 365
363406086	Dual Gas Manifold Assembly UR 430
363406037	Front Plate/Burner Assembly UR 250/300
363406029	Front Plate/Burner Assembly UR 365/430
330897607	Front Plate

## 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 through the regional sales offices 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 regional offices 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 regional offices 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 X 6518.

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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