

# Installation, Commissioning and Servicing Instructions supplement

## Dorchester DR35L-CE to DR90L-CE Hot Water Storage Heaters

### Permanent Pilot Ignition

**IMPORTANT NOTE**

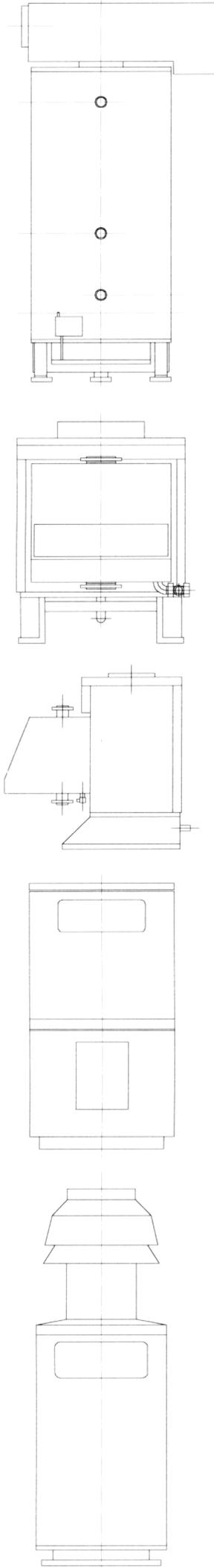
THESE INSTRUCTIONS MUST BE READ AND UNDERSTOOD BEFORE  
INSTALLING, COMMISSIONING, OPERATING OR SERVICING EQUIPMENT.



BS EN ISO 9001:1994  
Certificate No. FM 10082



**HAMWORTHY**  
heating products



# Customer Services

## ■ TECHNICAL ENQUIRIES

☎ 01202 662527 / 662528

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

## ■ SITE ASSEMBLY

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Specialist teams are available for on site assembly of the full range of Hamworthy boilers (excluding Lulworth). Boiler sections for site assembly must be positioned within the boiler house prior to the arrival of the assembly team and provide sufficient space for safe working. Handling sections into boiler houses other than at ground level may be subject to additional charges.

The normal assembly price does not include for the fitting of boiler casings or the burner, however this can be carried out at the time of build at additional cost.

Providing the facilities are available on site, a hydraulic test will be carried out within the terms of BS779. Upon completion a certificate of assembly and test will be issued.

## ■ COMMISSIONING

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Commissioning of equipment by Hamworthy Heating's own engineers, accredited agents or specialist sub-contractors will ensure that the equipment is operating safely and efficiently. Hamworthy commissioning reports provide a detailed record of the original status of the plant, which is essential for future routine maintenance and trouble free operation.

Standard warranty terms provide for the free of charge replacement of defective parts, but does not include labour. When the equipment is commissioned and routinely maintained by Hamworthy Heating under a Service Maintenance Agreement then the warranty terms will cover both parts and labour.

## ■ MAINTENANCE AGREEMENTS

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Regular routine servicing by Hamworthy Heating's engineers ensures trouble free operation and optimum efficiency. The frequency of visits required is variable, dependent upon the equipment type and usage. Annual service agreements are available on all Hamworthy products to meet individual requirements.

Planned maintenance of equipment by routine servicing reduces operational costs considerably below that associated with repair or breakdown approach.

## ■ BREAKDOWN SERVICE, REPAIR, REPLACEMENT

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

## ■ SPARE PARTS

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A comprehensive spare parts service is operated from our factory in Poole, providing replacement parts for both current and discontinued products. In some instances spares may be available from accredited agents.

Delivery of parts and components is normally from stock within 7 days. However, a 24 hour delivery service is available for breakdowns and emergencies for the additional cost of the courier. Please contact our spares team, providing details of product type, serial number, model or any other identifying marks or codes to determine part requirements wherever possible.

# INSTALLATION, COMMISSIONING AND MAINTENANCE MANUAL

DR 35L - CE P/P DR 50L - CE P/P

DR 70L - CE P/P & DR 90L - CE P/P

## DORCHESTER RANGE OF HOT WATER STORAGE HEATERS FOR DOMESTIC HOT WATER (PERMANENT PILOT IGNITION)

**NOTE! THESE INSTRUCTIONS SHOULD BE READ AND UNDERSTOOD BEFORE ATTEMPTING TO INSTALL, COMMISSION OR OPERATE THIS UNIT**

**THIS HEATER IS FOR USE ON 2ND FAMILY GASES ONLY. PLEASE ENSURE RELEVANT INFORMATION REQUIRED WITHIN DOCUMENT IS FOUND RELATING TO SPECIFIC GAS TO BE FIRED BEFORE FIRING HEATER.**

**THIS HEATER HAS BEEN TESTED TO COMPLY WITH THE GAS APPLIANCES DIRECTIVE (90/396/EEC).  
CERTIFICATION NO. 0085AP0195-6-8-9**

### APPENDICES AVAILABLE:

**APPENDIX 1 CORREX IMPRESSED CURRENT CORROSION PROTECTION SYSTEM  
PUBLICATION NUMBER. 500001002**

**APPENDIX 2 LPG MODELS  
PUBLICATION NUMBER. 500001003**

**APPENDIX 3 UNVENTED SYSTEM DESIGN FOR DRL WATER HEATERS  
PUBLICATION NUMBER. 500001004**

**APPENDIX 4 FULLY AUTOMATIC CONTROLS ON NATURAL GAS  
PUBLICATION NUMBER. 500001029**

**PUBLICATION NUMBER. 500001001  
ISSUE " F "**

## CONTENTS

	<b>PAGE</b>
1.0 INTRODUCTION AND DELIVERY	1
2.0 DESCRIPTION	1
3.0 GENERAL REQUIREMENTS	
3.1 RELATED DOCUMENTS	1
3.2 BRITISH STANDARDS	2
3.3 BRITISH GAS PUBLICATIONS	2
4.0 LOCATION	2
5.0 GAS SUPPLY	3
5.1 SERVICE PIPES	3
5.2 METERS	3
5.3 GAS SUPPLY PIPES	3
5.4 BOOSTED SUPPLIES	3
6.0 FLUE SYSTEM	3
6.1 FLUE CONSTRUCTION	3
6.2 WASTE GAS VOLUME	3
7.0 AIR FOR COMBUSTION AND VENTILATION	3
7.1 COMBUSTION	3
7.2 VENTILATION	4
8.0 WATER PIPEWORK INSTALLATION	4
8.1 INSTALLATION LAYOUT	4
8.2 WATER CONNECTION	4
8.3 SAFETY	4
8.4 WATER DRAW OFF	4
8.5 SYSTEM CHECKS	4
9.0 GAS PIPEWORK INSTALLATION	4
10.0 ELECTRICAL CONNECTION - HEATER	4
11.0 CONTROL SYSTEM	5
11.1 CONTROL THERMOSTAT	5
11.2 LIMIT THERMOSTAT	5
12.0 COMMISSIONING	5
12.1 CHECKS	5
12.2 PROCEDURE FOR LIGHTING	5
12.3 COMBUSTION CHECKS	6
13.0 SERVICING	6
13.1 REMOVAL OF GAS TRAIN	6
13.2 BURNER ASSEMBLY	6
13.3 SERVICING THE PILOT BURNER	7
13.4 PILOT BURNER CHECKS	7
13.5 CLEANING FLUE GAS PASSAGEWAYS	7
13.6 INSPECTING INSIDE OF HEATER	7
13.6.1 DRAINING THE HEATER	7
13.6.2 REMOVAL OF INSPECTION DOOR	7
13.7 INSPECTION OF MAGNESIUM ANODES	8
13.8 ASSEMBLY FOLLOWING SERVICE	8

14.0	RECOMMENDED SPARES	8
15.0	STORAGE TANKS	8
15.1	LOCATION	9
15.2	INSTALLATION	9
15.3	ASSEMBLY OF THERMOSTATS	9
15.4	CONNECTION OF PUMP MINIMUM THERMOSTAT	9
15.5	PIPEWORK SCHEMES	9
15.6	WATER CONNECTIONS	9
15.7	ELECTRICAL CONNECTIONS - STORAGE TANK	10
15.8	STORAGE TANK THERMOSTAT	10
15.9	LOADING PUMP	10
15.10	OPERATION	10
15.11	SERVICING	10

## FIGURES

1.	SECTIONAL VIEW DR35L - 90L WATER HEATER	11
2.	DIMENSIONED VIEWS	12
3.	INSTALLATION - SINGLE DRL HEATER	13
3A.	INSTALLATION - MULTIPLE DRL HEATERS	13
4.	ELECTRICAL SCHEMATIC DIAGRAM	14
5.	HONEYWELL SOFTLITE CONTROL VALVE	15
6.	PILOT BURNER	15
7.	INSTALLATION OF DRL HEATER WITH STORAGE TANK	16

## TABLES

1	TECHNICAL DATA	2
2	WASTE GAS DATA	3
3	AIR REQUIREMENTS	4

## **1.0 INTRODUCTION AND DELIVERY**

**1.1** This heater must be installed by a competent person holding 'CORGI' registration or equivalent.

All installations must conform to the relevant Gas Safety and Building Regulations. H.S.E. requirements must also be taken into account when installing any equipment.

Failure to comply with the above may lead to Prosecution.

**1.2** This heater is intended for use on Natural Gases (Family 2) only. For LPG (3rd Family gases), a different model is required. Please consult the heater data plate to ascertain which gas group the heater has been manufactured to use. Heaters **MUST NOT** use gas other than for which it was designed and made for.

**1.3** All heaters are factory assembled and delivered individually packed and shrouded in polythene on a wooden pallet with a separate draught diverter.

The exterior casing of the heater is coated with a protective plastic coating which should be peeled off following installation.

To check the size of the heater, refer to the rating label which is attached to the heater casing and mounted directly above the junction box assembly.

## **2.0 DESCRIPTION**

The Hamworthy DRL series is a range of fully automatic hot water storage heaters with Permanent Pilot ignition, designed exclusively for the preparation of hot water and fired by a number of atmospheric multi-gas stainless steel burner bars. The gas control valve and burner bars can be removed from the heater as a complete gas train assembly, being mounted above a tray and positioned beneath the combustion chamber at the base of the heater. The L range has been specifically designed to meet the exacting requirements of the DHSS Code of Practice for the prevention of Legionellae.

Flue gases from the combustion chamber enter the draught diverter via a number of vertical fire tubes which are individually retarded to ensure maximum heat transfer to water. The draught diverter must be fitted to the heater in an unmodified condition and provides a horizontal flue outlet connection which is adjustable through 360° in the horizontal plane. The

diverter locates on a spigot on the heater flue connector dome and is secured with a stainless steel fixing clamp.

The interior vessel of the heater consists of a fully welded, convex bottomed, pressure tested, storage vessel which is thermoglazed with a high quality glass lining on all waterside surfaces. This, together with two removable sacrificial anodes, provides the best possible protection against corrosion. The vessel is fully insulated and is covered by sheet steel casing. A parasitic current anode system (non-sacrificial) is available for those regions of the United Kingdom where water conductivity is less than 200 micro-siemens per centimetre - see Appendix 1. The connections provided are cold water inlet, hot water outlet, re circulation, drain cock and inspection/cleaning out door. A 2" BSP socket is available for combined temperature/pressure relief valves required on unvented systems - see Appendix 3.

All screw threads used in the Water Heater conform to the following:-

**ISO 7/1** or **ISO 228/1** for pipe threads where applicable.

**ISO 262** for all general screw threads.

Automatic water outlet temperature regulation is by means of a control thermostat which, for normal operation, should be set to a value not exceeding 60°C. Overheat protection is provided by a limit thermostat, with thermal reset.

The heaters, manufactured in four sizes, **DR 35L, DR 50L, DR 70L and DR 90L**, are floor mounted and are designed for providing hot water for commercial and industrial premises (refer to Table 1 for technical data). They can be installed in single or multiple units.

## **3.0 GENERAL REQUIREMENTS**

### **3.1 Related Documents.**

#### **Gas Safety Installations and Use Regulations 1994.**

It is Law that all gas appliances are installed by competent persons in accordance with the above regulations. Failure to install appliances correctly could lead to prosecution. It is in your own interest, and that of safety, to ensure that this law is complied with.

MODEL	DR35L	DR50L	DR70L	DR90L
Input (Gross)	43 kW	62 kW	87 kW	111 kW
Output	34 kW	49 kW	69 kW	88 kW
Weight (filled)	534 kg	539 kg	549 kg	570 kg
Maximum working head	53 m	53 m	53 m	53 m
Nominal inlet gas pressure to the Appliance	20 mbar	20 mbar	20 mbar	20 mbar
Maximum gas inlet pressure	25 mbar	25 mbar	25 mbar	25 mbar
Gas burner operating pressure	12.3 mbar	12.7 mbar	12.3 mbar	13.2 mbar
Injector diameter	3.6 mm	3.5 mm	3.6 mm	3.6 mm
Injector marking	360	350	360	360
Number of burner bars	2	3	4	5
Nominal flue size (dia)	130 mm	150 mm	175 mm	225 mm
Capacity	325 litres	315 litres	300 litres	280 litres
Recovery rate raised Through 44°C (80°F)	658 l/h	950 l/h	1336 l/h	1713 l/h

**Table 1. Technical Data**

The installation of the heater **MUST** be in accordance with the relevant requirements of the Gas Safety Regulations, Building Regulations, IEE 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:-

### 3.2 British Standard Codes of Practice

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

**BS 6644** - Installation of gas fired hot water boilers - 60 kW to 2 MW.

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

**BS 6880** - Part 1,2 and 3 Code of Practice for low temperature hot water heating systems of output greater than 45 kW.

**CP 342** - Centralised hot water supply, Part 2 - buildings other than individual dwellings.

**BS 3456** - The testing and approval of domestic electrical appliances Part 1 Clause 27.3.

### 3.3 British Gas Publications

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

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

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

**IM/16** - Guidance notes on the installation of gas pipework, excluding domestic installations of 25 mm and below.

### 4.0 LOCATION

The heater location should be such that a satisfactory flue system can be connected. An adequate air supply must be provided for combustion and ventilation and sufficient space for servicing provided.

The heater must be installed on a level concrete floor or plinth which is sufficient to support its weight when filled with water (reference Table 1).

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

## 5.0 GAS SUPPLY

### 5.1 **Service Pipes**

The local gas region must be consulted at the installation planning stage in order to establish the availability of an adequate supply of gas.

An existing service pipe must not be used without prior consultation with the local gas region.

### 5.2 **Meters**

If necessary a new gas meter will be connected to the service pipe by the local gas region, or a local gas region contractor.

### 5.3 **Gas Supply Pipes**

Supply pipes must be fitted in accordance with BS 6891. Pipework from the meter to the heater must be of adequate size and not smaller than the heater gas connection ( $\frac{3}{4}$ " BSP).

### 5.4 **Boosted Supplies**

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

## 6.0 FLUE SYSTEM

6.1 The **Hamworthy DRL Series Hot Water Heaters** are designed to be used with natural draught flues. Flue systems must be designed in accordance with the 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:-

**6.1.1** The heater must have its correct draught diverter fitted in an unmodified condition before connection into the flue system.

**6.1.2** The flue system must be self-supporting - refer to Fig 1.

**6.1.3** The heaters must be located as near the flue or flue header (on multi-bank installations) as possible. The distance between the heaters and the chimney must not exceed 2 m (6 ft).

**6.1.4** The flue system must be designed to achieve a minimum suction of 0.05 mbar (0.02" wg) at the draught diverter outlet. 0.05 mbar (0.02" wg) is equivalent to 1.5 metres of vertical flue. The flue connection on the heater is intended for sheet metal flues. In some instances mechanical assistance may be necessary, refer to British Gas publication '*Flues for Commercial and Industrial Gas fired Boilers and Air Heaters*'.

**6.1.5** The materials for the flue system must be non combustible, mechanically robust and resistant to internal and external corrosion.

### 6.2 Waste Gas Volume and Temperatures

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

**TABLE 2  
WASTE GAS DATA**

Heater Model	Exhaust Gas Volume at N.P.T.		Nett Exhaust Gas Temp.	
	m <sup>3</sup> /h	ft <sup>3</sup> /h	°C	°F
DR35L	67	2350	190	374
DR50L	90	3187	245	473
DR70L	120	4260	214	418
DR90L	161	5696	200	302

## 7.0 AIR FOR COMBUSTION AND 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 specified in BS 6644 are summarized as follows:-

**NOTE:** Aerosols in hairdressing salons give off vapours as do some industrial processes which can cause rapid corrosion of heater components. It is therefore essential that in these instances combustion air must be ducted from a space where vapours are not present.

**TABLE 3  
AIR REQUIREMENTS**

<b>Low Level (Inlet)</b>	<b>540 cm<sup>2</sup> plus 4.5 cm<sup>2</sup> per kW in excess of 60 kW total rated input</b>
<b>High Level (Output)</b>	<b>270 cm<sup>2</sup> plus 2.5 cm<sup>2</sup> per kW in excess of 60 kW total rated output</b>

**NOTE:** High level is considered to be as close to the roof as possible. Low level is considered to be 6" above floor level.

## **8.0 WATER PIPEWORK INSTALLATION**

**8.1** For details of a typical installation scheme of a DRL water heater refer to Fig 3. For details of a typical installation scheme of multi-DRL water heater refer to Fig. 3A.

### **8.2 Water Connections**

Cold water feed - 1 1/2" BSP female socket.  
Hot water outlet - 1 1/2" BSP female socket.  
Secondary connection - 3/4" BSP female socket.

**8.3** The hot water flow pipe for each heater must be fitted with a relief valve 3/4" in diameter (20 mm) and an open vent 1 1/4" in diameter (324 mm). The vent should rise to discharge over the feed cistern. No isolating valves should be fitted between the water heater and the draw-off point for relief valve and vent. For unvented systems see Appendix 3. The maximum working head of the heater is 53 m (174 cu ft).

**8.4** Dead legs to water draw-off points should be as short as possible and in no case should they exceed the lengths laid down in the Water Byelaws. The Water Byelaws state that the maximum lengths of pipe supplying a hot water draw-off tap measured along the axis of the pipe from the heater, cylinder or tank or from a secondary circuit are as listed below:-

Pipes not greater than 19 mm ID - max dead leg length 12 m.

Pipes in the range 10-24 mm ID - max dead leg length 7.6 m.

Pipes greater than 25 mm ID max dead leg length 3 m.

**8.5** After installation of the water system has been completed, open the main water supply valve, flush the system and fill the heater. Open the hot water taps and allow air to escape from the system. When the system is free of air close the hot water taps and check for leaks on all the water heater connections including the drain cock and control and limit thermostat pockets.

## **9.0 GAS PIPEWORK INSTALLATION**

Fit the 3/4" gas cock and nipple provided to the internal 3/4" BSP union connection at the inlet of the gas control valve.

**NOTE:** The union has parallel machined faces with an integral seal. Before connecting the main gas supply, unscrew the two separate halves of the union and check that the seal is in position before re-assembly.

**DO NOT CONNECT THE MAIN GAS SUPPLY WITHOUT ENSURING THE SEAL IS IN POSITION.**

Connect the incoming gas supply to the gas cock on each heater, observing the notes detailed in paragraph 'Gas Supply' and conforming to the requirements of BS 6891. Before commissioning the complete gas installation must be purged, inspected and pressure tested for soundness.

**NOTE:** Do not run the gas pipework across the front of the heater since this will prevent removal of the gas train assembly for cleaning.

## **10.0 ELECTRICAL CONNECTION - HEATER**

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

Electrical supply required is 230 volts, 50 Hz, single phase fused at 5 amps.

The method of connection to mains electrical supply should facilitate complete isolation for the heaters and should be provided in a readily accessible position.

The wiring must be completed in heat resistant three core cable sized 1 sq mm CSA.

The method of connection is as follows:-

Remove control thermostat knob and then front cover to expose PC board and terminal rail. Pass supply cable through one of the glands provided and connect live, neutral and earth wires to the appropriate terminals marked LI, N and earth.

The earth wire should be so cut that it is longer than the live and neutral wires to comply with the requirements of BS 3456 Part 101 Clause 27.3.

**NOTE:** If a **DRL heater** is to be used in conjunction with a **Storage Tank**, further wiring will be required to complete the circuitry for the storage tank thermostat and loading pumps. Therefore refer to paragraph 'Electrical Connections - Storage Tank'.

## **11. CONTROL SYSTEM**

### **11.1 Control Thermostat.**

The hot water outlet temperature is regulated by a single control thermostat (B1N) which senses, via a pocket, the heater water temperature and is located at the top front of the heater as detailed in Fig 1. The thermostat contacts normally closed are connected in series with the main live supply to the Honeywell gas valve and earthed back to earthing terminals within the heater junction box - see Fig. 4.

The control thermostat is graduated for a 35°C to 90°C operation but to comply with Hamworthy recommendations the outlet water temperature should be regulated up to a maximum of 60°C. The thermostat is fitted with an internal stop, restricting the settings between 35°C and 60°C.

### **11.2 Limit Thermostat**

A fixed 85°C thermostat (B1F) is pre-wired in series with the pilot flame thermocouple via a thermocouple interrupter - reference Figs 4 and 5. In the event of the thermocouple interrupter limit thermostat being activated, the flame signal from the pilot thermocouple to the Honeywell valve is broken, both the pilot and the main flame are then extinguished and the heater shuts down under a lockout condition. The limit thermostat is the thermal resetting type, but the heater will not re-fire until the pilot flame is re established as detailed in the commissioning instructions under the paragraph 'Commissioning'.

**NOTE:** In the event of the overheat limit thermostats being activated, the complete heater installation should be inspected to trace and isolate the cause of the problem before any further firing takes place.

## **12. COMMISSIONING**

### **12.1 Checks**

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

- a) Flueway passages to the chimney are clear;
- b) Adequate ventilation exists in the boilerhouse -

reference Table 3.

- c) The system is vented fully charged with water and ready to receive heat.
- d) The gas supply pipework is clear of any loose matter, tested for soundness and purged.
- e) Gas supply is connected but turned off, gas cock is closed, unions are tightened (with any seals in position), test points are tight, burners are correctly positioned, injectors are tight and the pilot is connected from the control valve;
- f) Electricity is connected, but ensure that the supply is switched off.

### **12.2 Procedure for Lighting (Permanent Pilot Ignition)**

Turn control thermostat to the minimum setting (35°C) and ensure electrical supply is off.

Open heater gas cock.

Depress fully start button (white) on gas valve (allowing gas to pass to the pilot burner) and ignite burner by repeatedly pressing the Piezo electric ignitor.

When the pilot is alight, maintain the start button depressed for a further twenty seconds, allowing adequate current to be generated by the thermocouple to hold the pilot valve open.

If the pilot does not light, re-vent the gas line to outside the building and check whether gas is present at the pilot. The start button must be fully depressed.

Having established the pilot, release the start button, remove the pilot adjustment cover screw on the valve - see Fig. 5 - and adjust the screw beneath to give a pilot flame envelope of 12 mm (0.5") long around the thermocouple.

After pilot adjustment, check that any electrical circuits are closed and switch on the power supply to the appliance. Adjust the control thermostat to the recommended required setting (to a value not exceeding 60°C) after which the gas valve will open and the main burner will light.

After the heater has operated for approximately five minutes, switch off power, slacken the gas pressure test point, screw on the Honeywell valve - see Fig. 5 - and fit a manometer. Switch the heater on and measure the operating gas pressure. Check readings against pressure required in Table 1. Adjust control valve regulator as necessary by removing cap and using a screwdriver, turning the nylon adjusting screw beneath clockwise to increase, anti-clockwise to decrease the pressure. Switch off burner by isolating power supply.

Remove manometer, remembering to re-tighten pressure test point. Relight the burner and check that no waste gas spillage occurs from any draught diverter. Check operation of control thermostat by adjusting temperature setting, thus lighting and extinguishing the main flame.

### 12.3 Combustion Check

A flue gas sampling point is not provided. However, access to the primary flue is available via the draught break in the draught diverter hood. Therefore to obtain a full gas analysis it will be necessary to utilise a U shaped sampling tube, passing through the draught diverter into the main gas stream.

For natural gas only:-

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

Normal CO level should not exceed 200 ppm by volume.

All for a dry gas sample.

Upon satisfactory completion and testing explain to the user the method of economic and efficient operation of the system. Ensure that the user is fully conversant with the lighting, shutting down and general operating procedure.

### 13.0 SERVICING

**IMPORTANT.** Due to the variable chemical nature of distributed water supplies, it is recommended that in addition to the annual inspection cleaning, this appliance is inspected for calcium deposition anode loss within a maximum of three months following initial commissioning and the frequency of subsequent inspections adjusted accordingly.

Failure to install in accordance with the relevant **Hamworthy Heating Installers Guides** and to carry out the above recommendations may compromise appliance warranties.

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

**WARNING:** Before proceeding with any maintenance, isolate the electrical supply and turn off the gas service cock to the heaters being serviced.

#### 13.1 Removal of Gas Train

Unscrew and disconnect the two halves of the

$\frac{3}{4}$ " gas pipework union at the inlet to the gas valve and remove and retain the union rubber sealing ring.

Pull off the sleeved spaded thermocouple interrupter leads linking the limit thermostat to the thermocouple interrupter assembly on the gas valve. The interrupter leads are identifiable as blue and black wires.

Remove the three core power supply lead to the gas valve as follows:-

Slacken the screw retaining the plastic cover over the gas valve operator terminals - reference Fig. 5. Remove the cover, pull off the live and neutral spaded connectors and then disconnect the earthing cable from the posidrive clamping screw.

The gas train assembly is secured to the heater by two nuts on front feet and screw behind the piezo ignitor. Removal of these enables the assembly to be withdrawn (care should be taken on removal of this assembly to avoid damage to the piezo ignition unit).

#### 13.2 Burner Assembly

The individual burner bars are attached to the gas manifold by three No. 8 x  $\frac{3}{8}$ " long self tap screws and U type captive nuts. Each burner can be removed and checked for cleanliness to ensure that the burner venturis, main injectors and flame ports are free from the accumulation of dust and debris. If necessary, clean and brush. If main injectors are removed for cleaning, ensure they are fitted to the burner manifold with the new copper sealing washers - refer to the spares list.

#### 13.3 Servicing Pilot Burner

**Thermocouple** - check thermocouple for any signs of flame erosion and change as necessary.

**Electrode** - check electrode for cracks in ceramic or flame erosion at ignition tip and change as necessary.

**Cleaning** - release the nut securing the gas connection to the pilot burner and withdraw the pilot injector. Check to ensure that the pilot injector burner flame ports and the air injectors are free from the accumulation of dust by blowing through as necessary.

Replace in reverse order.

#### 13.4 Pilot Burner

Inspect the two port pilot burner and thermocouple assembly. If the pilot is heavily contaminated with dust, clean the flame ports and if necessary remove the pilot orifice from the pilot burner as detailed in Fig. 6. If the thermocouple shows any signs of wear from flame or erosion, replace it immediately.

Check the operation of the Piezo electric ignition system. Repeated pressing of the Piezo ignitor should generate a spark between the electrode and the pilot burner flame port. If no spark is visible check for damage to the Piezo electric generator, the Piezo cable (possible fracture) and the spark electrode (possible crack in ceramic) and replace as necessary.

**NOTE:** If the gas passages are to be cleaned, proceed to the following paragraph before replacing the gas train assembly.

### 13.5 Cleaning Flue Gas Passageways

Access to the heater flueways will require removal of the draught diverter, the top cover ring of the heater casing and the flue collector dome.

Before removing the draught diverter ensure that the main flue system is self-supporting. Slacken and remove the two set screws retaining the draught diverter fixing clamp, remove the clamp and lift the draught diverter horizontally away and clear of the main flue.

Remove the four screws retaining the top cover ring of the exterior heater casing, lift the ring clear of the heater and remove the top insulation sections to expose the flue collector dome and the magnesium anodes.

Remove the four screws retaining the flue collector dome and lift the dome clear of the heater.

Withdraw each of the suspended flue gas retarders vertically upwards and clear of the firetubes.

**NOTE:** For heaters installed in buildings with minimum clearance for maintenance - reference Fig. 2, it may be necessary to flex the retarders as they are withdrawn.

Inspect each of the vertical firetubes and if there is any scale or extraneous deposits, clean each tube through with a stiff brush and collect any debris in the condensate tray and replace flue gas dome in reverse procedure. Check rope seal and replace as necessary.

**NOTE:** If anodes are to be inspected proceed to the next paragraph before replacing insulation, top casing ring, draught diverter and gas dome.

### 13.6 Inspection of the Heater Waterside Surfaces and Magnesium Anodes

#### 13.6.1 Draining the Heater

Isolate the cold feed, hot flow and circulation connections and three way vent if more than one heater. Connect a  $\frac{3}{4}$ " nominal bore hose to the drain cock connection at the bottom right hand side of the

heater, run the hose to a convenient drainage point, open the heater drain cock and drain the heater.

#### 13.6.2 Removal of Inspection Door

After checking to ensure that the heater has been fully drained, remove the four screws retaining the exterior (blue) casing panel of the inspection door. Remove the panel and the insulation disc to expose the inspection door flange and fixing bolts. Slacken and remove the M10 bolts and take off the inspection door.

Inspect the interior surfaces of the heater for any signs of calcium deposit.

Providing that exit water flow temperature has been restricted to a maximum of 60°C. deposits should not normally be present. If any deposits do exist within the heater, these can be removed with the aid of a stiff brush and a water jet (directed through the inspection port) and flushed through the drain connection of the heater.

**NOTE:** On no account should a metal scraper be used to remove deposits since this may result in damage to the glass lining.

After cleaning, replace the inspection door and gasket.

### 13.7 Inspection of Magnesium Anodes

**NOTE:** On no account remove the magnesium anodes without checking to ensure that the heater is isolated on flow, feed and circulation waterside connections.

Each heater includes sacrificial magnesium anodes which hang vertically within the heater water jacket and are located in  $\frac{3}{4}$ " BSP sockets at the top of the heater casing - reference Fig. 1.

Release the nuts securing the magnesium anodes (this will require a 30 mm socket spanner complete with extension bar) and withdraw the anodes vertically through the  $\frac{3}{4}$ " BSP sockets and clear of the heater. Remove the copper anode sealing washer and inspect each anode for erosion. If the extent of erosion is sufficient to have reduced the cross-sectional area of the anode by fifty percent i.e. the diameter of the anode is less than 15 mm, it should be replaced complete with a new sealing washer.

### 13.8 Assembly - Following Complete Servicing of the Heater.

Close the heater drain cock and remove the hose connection.

Open the heater cold feed, hot flow and circulation isolation valves and three way vent valve if fitted. Allow the system to fill with water.

Check to ensure that there are no leaks from the inspection door sealing gasket, the magnesium anode sealing washers and the drain cock.

Replace the insulation disc over the inspection door flange and refit the exterior casing panel with the four screws.

Replace the gas dome (renew rope seal if necessary), the insulation ring at the top of the heater and re-attach the top cover ring, draught diverter and diverter fixing clamp in reverse procedure to that detailed in the

paragraph headed 'Cleaning Flue Passageways'.

Slide the serviced gas train assembly beneath the heater. Reconnect the electrical connections to the gas valve, the gas manifold fixing screws and the

$\frac{3}{4}$ " gas pipework union (complete with the rubber seal) in the reverse procedure to that detailed in the paragraph headed 'Removal of Gas Train'.

## 14.0 RECOMMENDED SPARES

### 14.1 Description

### Part No.

Multi-functional control valve $\frac{3}{4}$ V4410.....	531907007
Control thermostat .....	747440052
Limit thermostat.....	533901190
Thermocouple.....	339008149
Thermocouple interrupter assembly.....	339008198
Main injector - DR 35L - 70L - 90L.....	532902004
Main injector - DR 50L.....	330512495
Washer - main injector (copper).....	339008347
Pilot injector (natural gas) - DR 35L - 90L.....	331101694
Pilot burner assembly (natural gas) complete.....	330514038
Piezo electric ignitor complete with ignitor cable.....	339008073
Main burner bar - DR 35L - 90L .....	333811134
Inspection door sealing gasket.....	339008966
Washer - magnesium anode (copper).....	331604911
Magnesium anode .....	539001014

## 15.0 STORAGE TANKS

The Dorchester range of DRL Water Heaters can be coupled to one or more storage tanks on installations which require the use of large volumes of water over short periods.

The following sections detail a typical method of coupling the heater and tank together using a thermostatically controlled loading pump (not Hamworthy Heating supply) to transfer hot water from the heater to the storage tank, and additional thermostats (see Figs 4 and 7).

**NOTE:** The installation of the storage tank must be made in accordance with the relevant British Standard Codes of Practice detailed in the paragraph on 'Related Documents', and be suitable for the system pressure.

### 15.1 Location

The storage tank must be installed on a level floor or plinth which is sufficient to support the weight when filled with water.

### 15.2 Installation

**NOTE:** When a DRL water heater is used in conjunction with a storage tank the modifications detailed in the following two paragraphs must be completed before connecting the mains electrical supply to the heater or charging the system with water.

### 15.3 Assembly of Thermostats B2N and B3N (reference Fig. 4).

When a storage tank is coupled to the heater pump minimum thermostat B2N must be fitted in the control housing and its capillary led to a thermostat pocket which replaces plugged tapping 24 Fig.1.

Pocket  $\frac{3}{4}$ " BSP - Part No. 531050005.  
B2N thermostat - Part No. 747440086

#### 15.4 Connection of Pump minimum Thermostat (reference B2N)

The base plate housing the control and limit thermostats must be carefully removed to enable fitment of the additional thermostat.

- a) Disconnect wiring to thermostat B1N and B1F and flying earth lead to base plate.
- b) Remove screws securing base plate to main control housing.
- c) Carefully ease thermostat capillaries through control housing bush whilst removing base plate sufficiently far enough to gain access to the rear.
- d) Assemble pump minimum thermostat to the base plate, using the screws provided, ensuring that it takes up its position to the left of the control stat with spade connections facing uppermost.
- e) Ease capillary and bulb through control housing bush and insert into lower pocket. Surplus capillary length can be carefully enclosed in the electrical trunking alongside.
- f) Secure base plate to control housing and ensure that earth lead connection is made.
- g) Reconnect wiring to thermostats B1N and B1F.
- h) Remove link connecting the two flying leads to the left hand side of the PCB.
- i) Connect these leads to the new thermostat B2N ensuring that they contact the left and centre spade connections (Common and Normally Open)
- j) Remove clear plastic cover and set thermostat to desired setting - normally 55°C.
- k) Replace control housing cover and thermostat knob.

In addition a loading pump thermostat B3N and

1/2" BSP pocket is fitted into the storage tank and wired back to the heater control housing as described under 'Electrical Connection' below.

B3N thermostat including pocket - Part No. 747433776.

#### 15.5 Pipework Schemes

For details of typical installation schemes of a **DRL heater** used in conjunction with one storage Tank refer to Fig. 7.

#### 15.6 Water Connections

The hot water flow pipe for each tank must be fitted with a relief valve 3/4" in diameter (20 mm) and an open vent 1 1/4" in diameter (32 mm). The vent should rise to discharge over the feed cistern. No isolating valves should be fitted between the water heater and the draw off point for the relief valve and vent.

After the installation of the water system has been completed, open the hot water taps and allow air to escape from the system. When the system is free of air, close the hot water taps and check for leaks on all storage tank connections including the thermometer and control thermostat pockets.

For unvented systems see Appendix 3.

#### 15.7 Electrical Connections - Storage Tank

The lower thermostat, designated Minimum B2N Pump Thermostat, must be wired so that the Normally Open contact is in series with the loading pump - reference terminals 14 and 9, Fig. 4.

The wiring should also include an earth connection back to the heater terminal rail.

#### 15.8 Storage Tank Thermostat

The thermostat in the Storage Tank - reference Fig. 4. - designated the Loading Pump Thermostat B3N, must be wired so that the Normally Closed contact is in series with the loading pump - reference terminals 9 and 10, Fig. 4. The wiring should also include an earth connection back to the heater terminal rail.

#### 15.9 Loading Pump

Connect a live, neutral and earth supply to the loading pump via a 3 core 1 mm CSA cable run from terminal rail.

**NOTE:** When wiring both thermostats and the loading pump, access to the heater terminal rail is via the heater trunking cover and the spare compression gland fittings in the heater junction box assembly.

#### 15.10 Operation

Assuming the required exit water flow temperature delivered from the storage tank is 60°C, the settings of the heater control thermostat, the pump minimum thermostat and the loading pump thermostat would be typically 60°C, 55°C and 60°C respectively.

During initial light-up (with both the heater and storage tank filled with cold water) the burner ignites and raises the water within the heater to the required control temperature. As the water in the heater reaches 55°C the pump is energised and transfers hot water from the heater to the storage tank. This will result, initially, in a mixed water temperature which will be less than 55°C and therefore the pump will stop, and heater continues to fire up to 60°C. The process will continue until both the heater and storage tank are filled with hot water at 60°C.

During draw-off, the hot water delivered from the storage tank is displaced by hot water from the heater,

which is similarly replaced by cold water from the feed cistern. The addition of cold water into the heater is sensed and provides immediate re-heating at full rated output. Therefore, the combination of the heater and storage tank thermostats ensures that the storage tank is maintained charged full with hot water at all times.

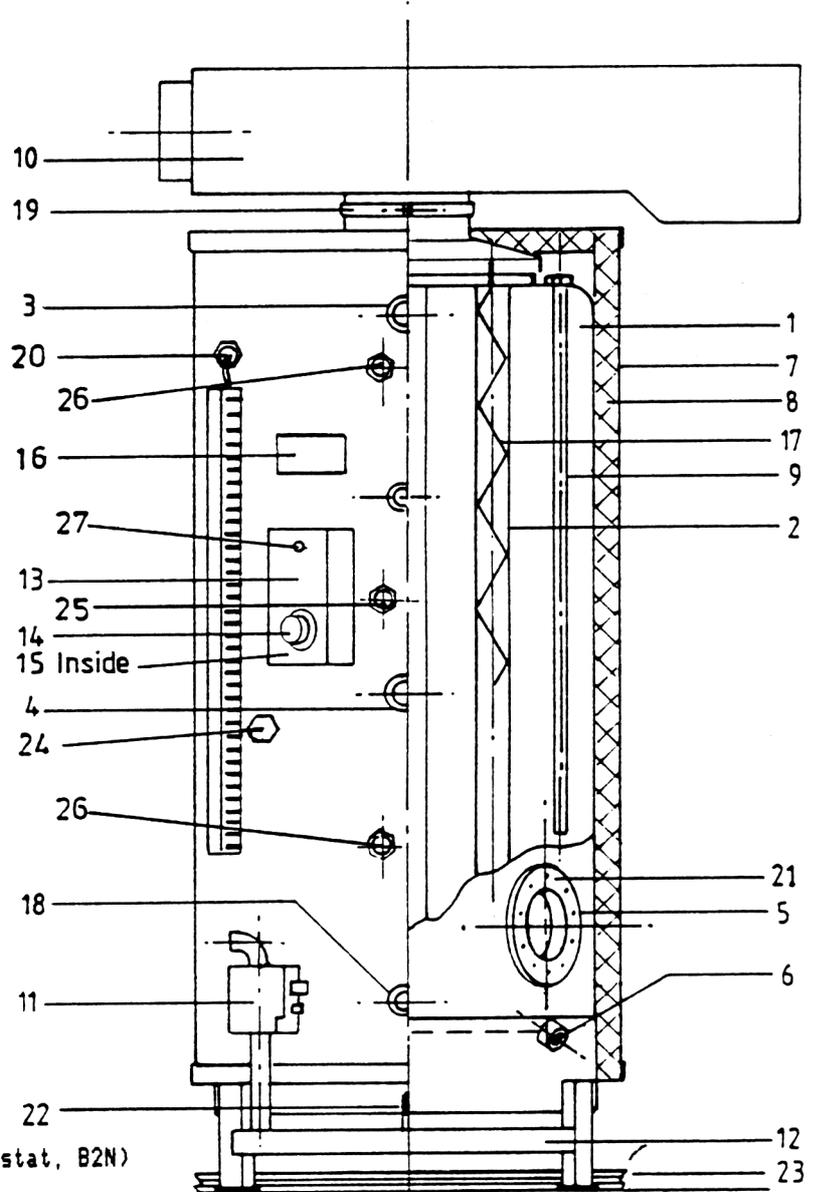
### **15.11 Servicing**

The storage tank should be serviced to the instructions supplied by the Manufacturer.

SECTIONED VIEW - DR 35L-90L WATER HEATER

FIGURE 1

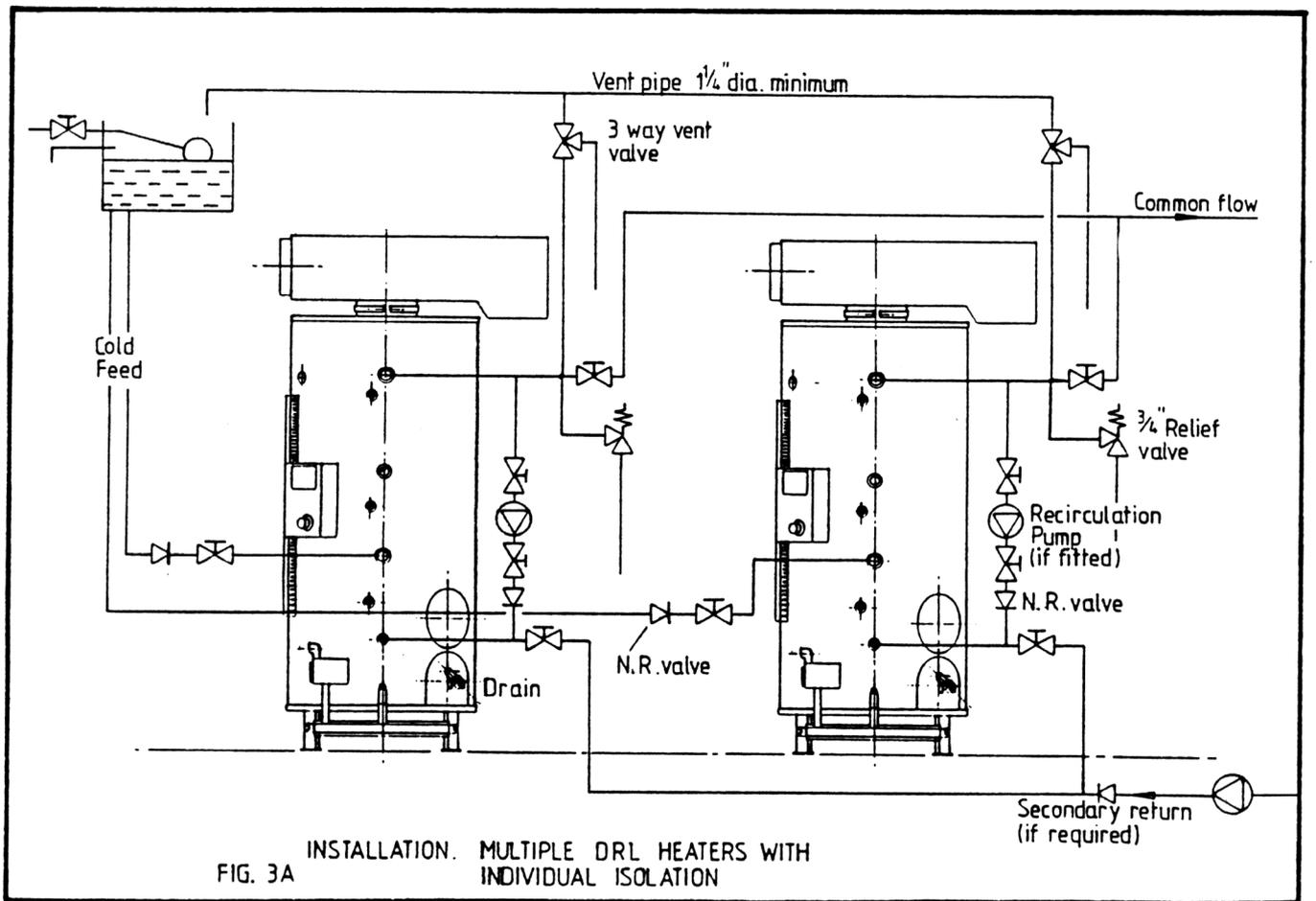
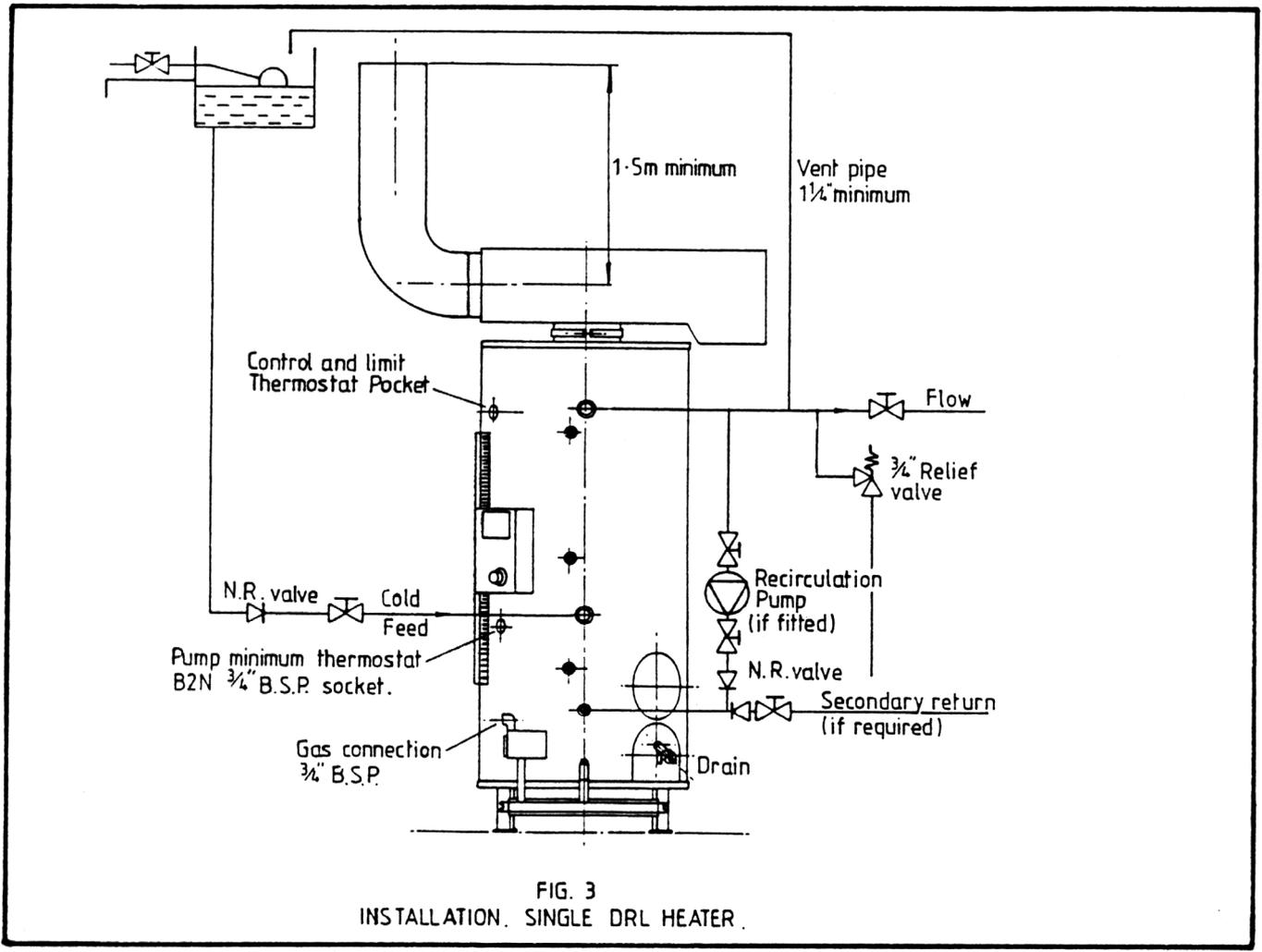
- 1) Inner Vessel
- 2) Fire Tube
- 3) Hot water connection
- 4) Cold water connection
- 5) Cleaning door flange
- 6) Drain cock
- 7) Sheet steel casing
- 8) Insulation
- 9) Sacrificial anode
- 10) Draught diverter
- 11) Gas control valve
- 12) Gas burner manifold and burner bars
- 13) Junction box
- 14) Control thermostat
- 15) Limit and Lock-out thermostat
- 16) Rating Label
- 17) Suspended gas flow retarder
- 18) Recirculation connection
- 19) Draught diverter securing clamp
- 20) Control/Limit thermostat pocket
- 21) Inspection door sealing gasket
- 22) Piezo electric spark igniter
- 23) Tray
- 24) 3/4" Blank (position for pump minimum stat, B2N)



(CORREX SYSTEMS ONLY - SEE APPENDIX)

- 25) DR 35L - 50L - 70L Correx UP, electrode
- 26) DR 90L Correx UP, electrodes
- 27) Correx UP, Lamp





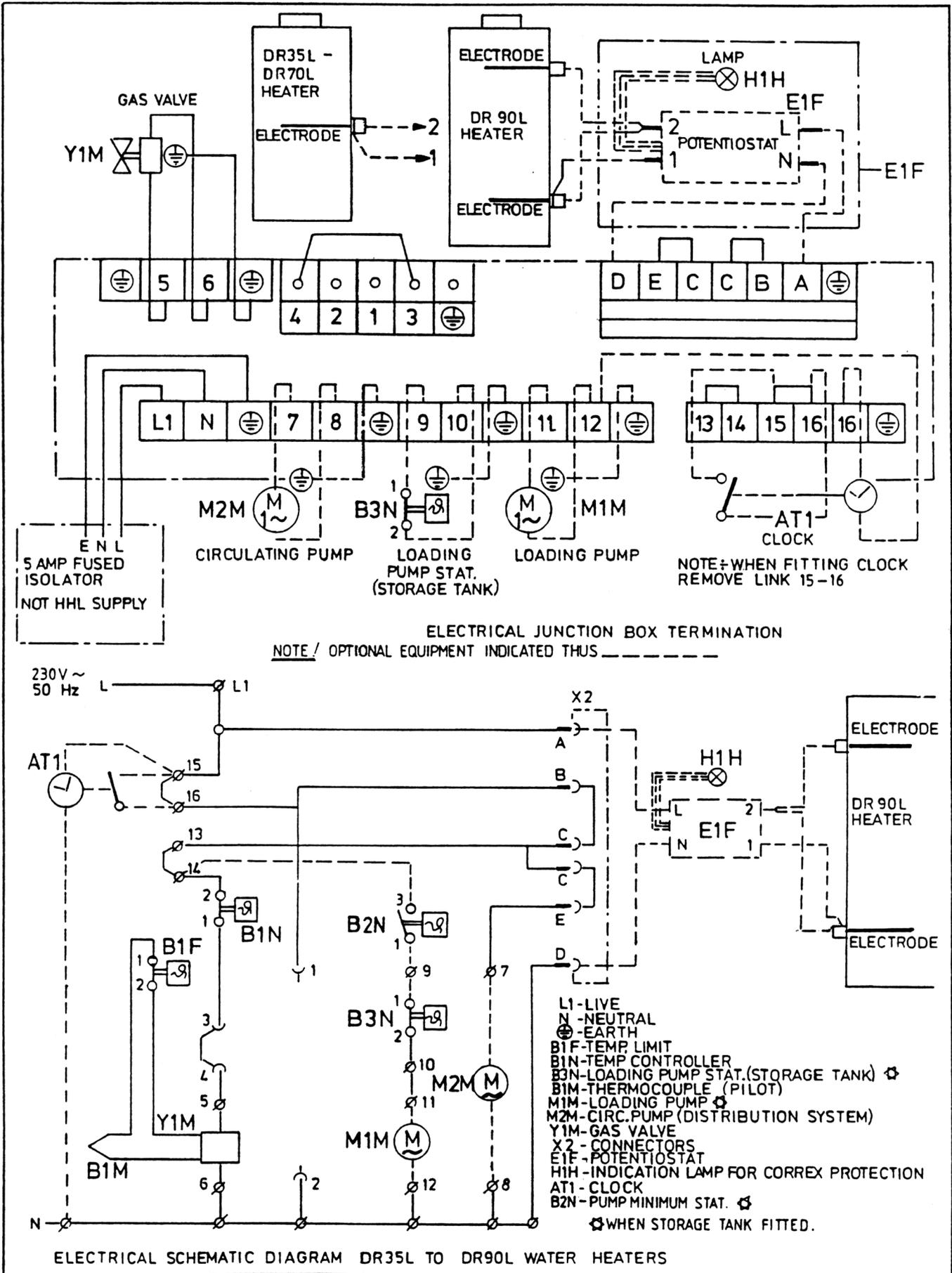


FIG. 4

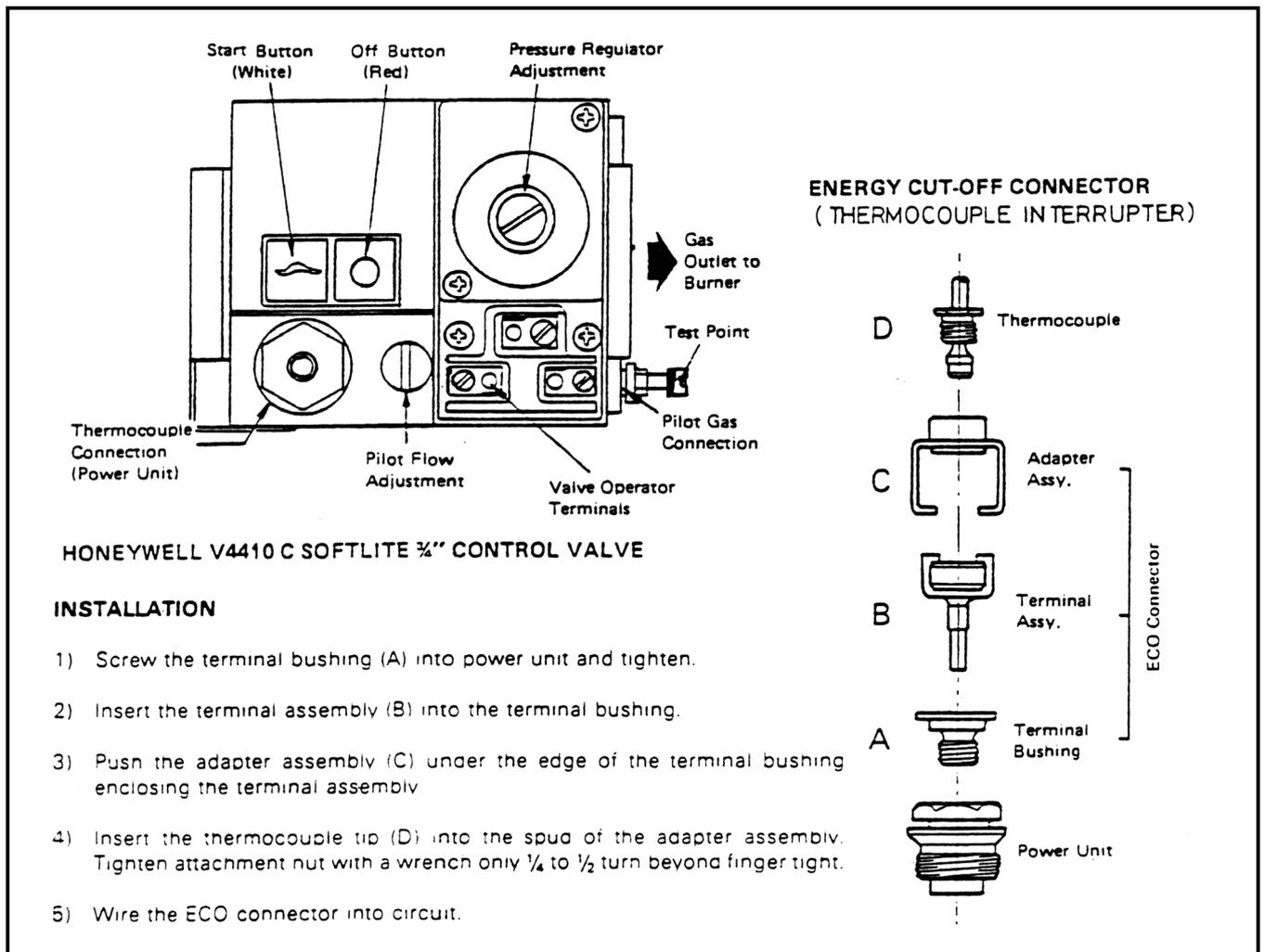
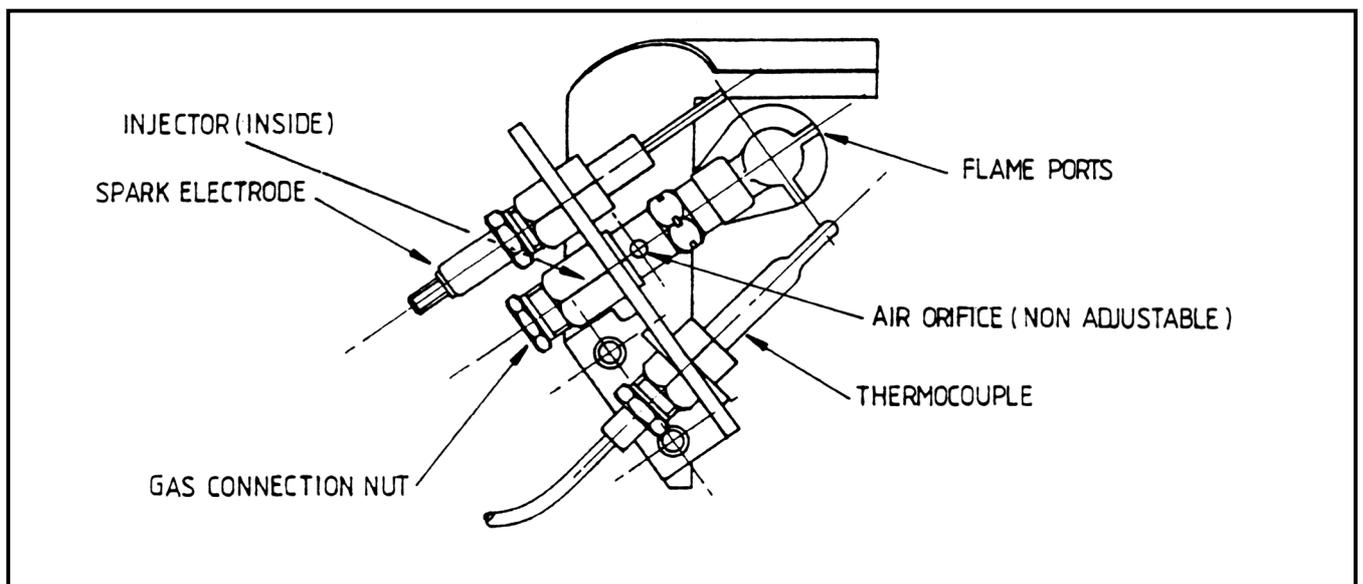


FIG. 5

FIG. 6 DR 35L-CE P/P TO DR90L-CE P/P PILOT BURNER



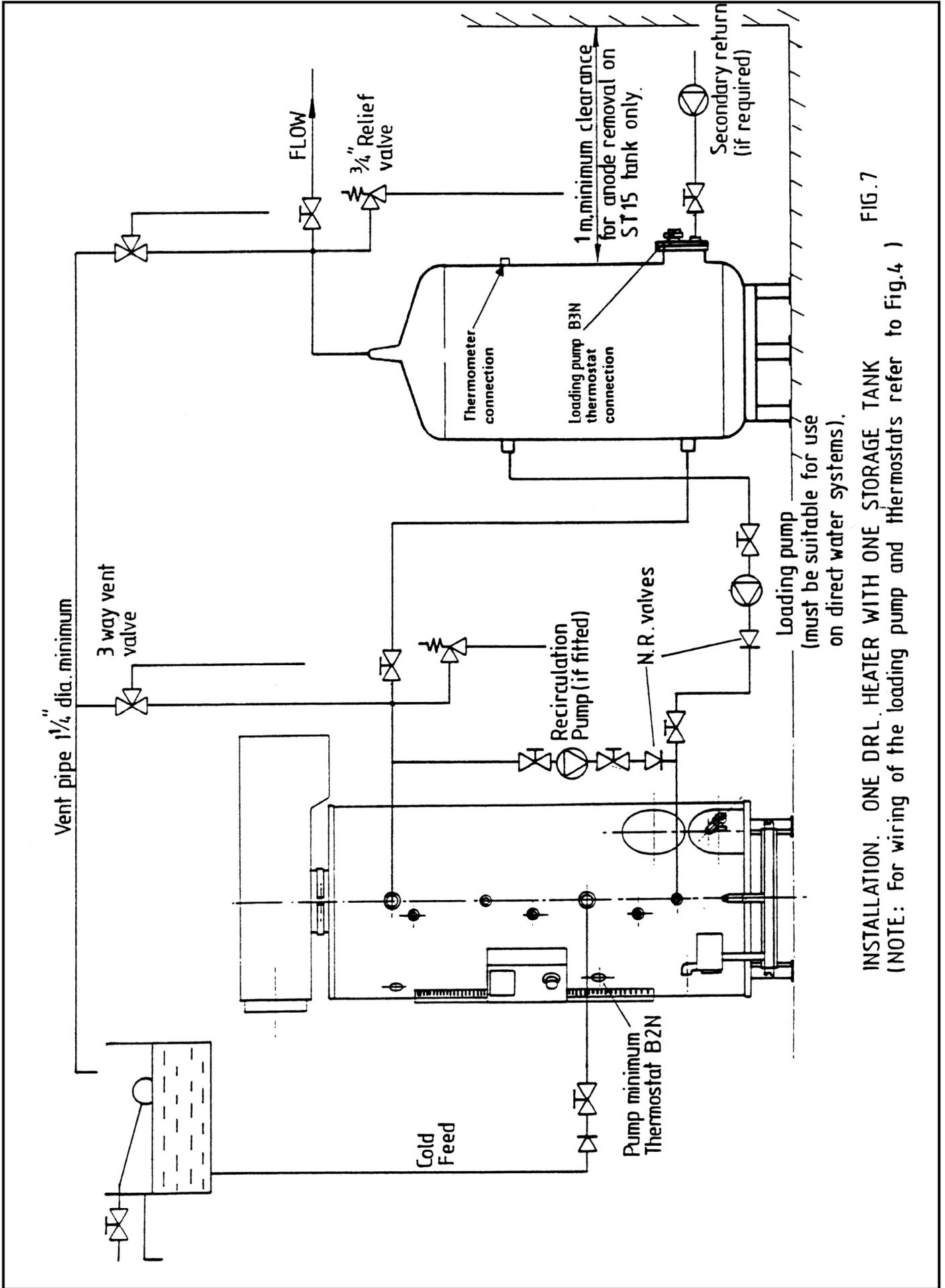


FIG. 7

INSTALLATION. ONE DRL HEATER WITH ONE STORAGE TANK  
 (NOTE: For wiring of the loading pump and thermostats refer to Fig. 4)

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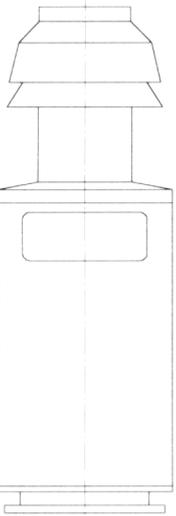
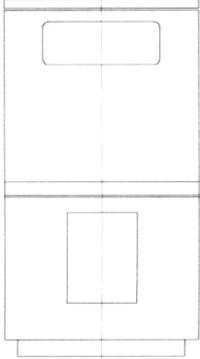
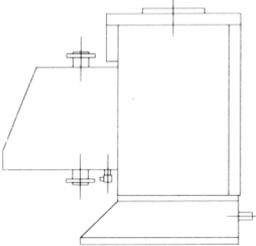
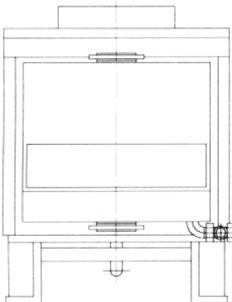
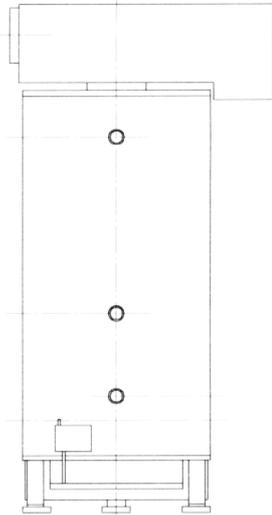
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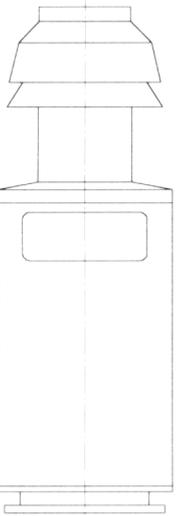
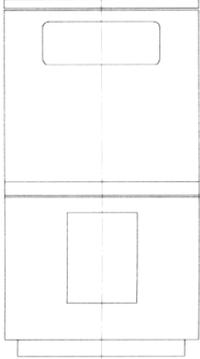
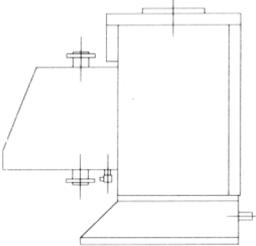
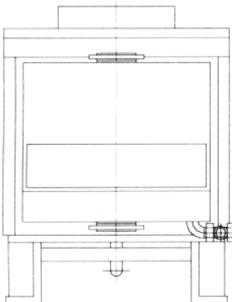
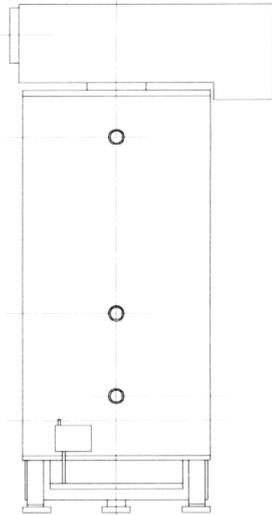
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