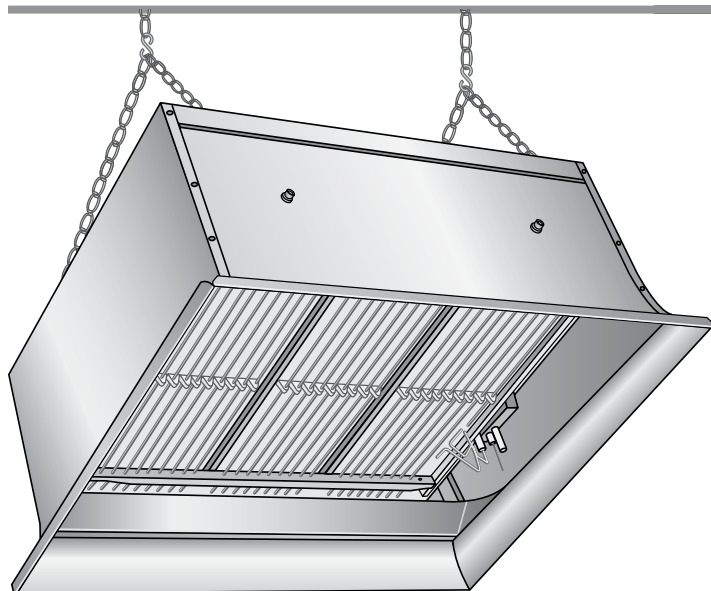


Detroit Radiant Products Co.

DR Series Manual



Gas Fired Radiant Plaque Heater Installation, Operation, Maintenance and Parts

⚠ WARNING



Read these instructions carefully before attempting to install, operate or service the heater.

This heater **must** be installed and serviced by a Gas Safe Gas Engineer only! Conversion of the heater for use with other gases must be carried out by a Gas Safe Gas Engineer.



All persons involved with the installation, operation and maintenance of the heater system must read and understand the information in this manual. Failure to comply with these warnings and instructions, or those on the heater, could result in personal injury, death, fire, asphyxiation and/or property damage.

Not for domestic use!

This unflued, gas fired, overhead radiant heater is designed for use in industrial and commercial building such as warehouses, manufacturing plants, aircraft hangars, service garages, etc.

This heater is **not** approved in any domestic application. This includes (but is not limited to) the home, living quarters, attached garages, etc. Installation in domestic indoor spaces may result in property damage, asphyxiation, serious injury or death.

The manufacturer cannot anticipate every use that may be made with their heaters. Check with your local fire safety authority if you have questions about local regulations.

This appliance is pre-set for use in the country whose code appears on the appliance's rating label only. If the code on the appliance does not match your application, refer to the technical instructions for adapting the appliance to the conditions for use in that country.

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Keep these instructions for future reference.

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1.0 Safety

Codes and Regulations

Notwithstanding their limited scope, this appliance should be installed in accordance with relevant provisions of the following regulations:

UNITED KINGDOM:

Gas safety (Installation and Use) Regulations 1984 and BS 6896:2005. Due account should be taken of any obligations arising from the Health and Safety at Work etc. Act 1974, the current Building Regulations, the current I.E.E. Regulations and other relevant codes of practice.

IRELAND:

I.S. 3212:1987, ICP 4, I.S. 327. Due account should be taken of any obligations arising from the current Building Regulations, the current I.E.E. Regulations and other relevant codes of practice.

General Specifications

Table 1.1 • DR Series General Specifications

Model No.	Nominal Input (kW)	Injector Size (mm)				Burner Pressure (mbar)		Gas Connection Size	Burner Qty.	Width (mm)	Height (mm)	Depth (mm)	Weight (kg)
		D.M.S.	Nat (I _{2H})	D.M.S.	LP (I _{3P})	Nat (I _{2H})	LP (I _{3P})						
DR 30	8.8	43	2.25	52	1.60	15	25	1/2" BSP	1	314	575	289	8.2
DR 50	14.6	45	2.10	53	1.50	15	25	1/2" BSP	2	479	575	289	12.2
DR 60	17.6	43	2.25	52	1.60	15	25	1/2" BSP	2	479	575	289	12.2
DR 80	23.5	45	2.10	53	1.50	15	25	1/2" BSP	3	645	575	289	16.3
DR 90	26.4	43	2.25	52	1.60	15	25	1/2" BSP	3	645	575	289	16.3
DR 100	29.3	42	2.35	51	1.65	15	25	1/2" BSP	3	645	575	289	16.3
DR 120	35.2	43	2.25	52	1.60	15	25	1/2" BSP	4	810	575	289	20.4
DR 130	38.1	42	2.35	51	1.65	15	25	1/2" BSP	4	810	575	289	20.4
DR 150	44.0	43	2.25	52	1.60	15	25	1/2" BSP	5	975	575	289	24.5
DR 160	46.9	42	2.35	51	1.65	15	25	1/2" BSP	5	975	575	289	24.5

⚠ WARNING

Improper installation, adjustment, alteration, service or maintenance can cause property damage, serious injury or death. Read and understand, the installation, operating and maintenance instructions thoroughly before installing or servicing this equipment. Only trained, qualified gas installation and service personnel may install or service this equipment.

Safety Symbols

Safety is the most important consideration during installation, operation and maintenance of the infrared heater. You will see the following symbols and signal words when there is a hazard related to safety or property damage.

⚠ WARNING

Warning indicates a potentially hazardous situation which, if not avoided, could result in death or injury.

⚠ CAUTION

Caution indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

Notice indicates a potentially hazardous situation which, if not avoided, could result in property damage.

Applications

This is not an explosion proof heater. Consult your local fire service, insurance carrier and other authorities for approval of the proposed installation.

Commercial / Industrial

Infrared heaters are designed and certified for use in industrial and commercial buildings such as warehouses, manufacturing plants, aircraft hangars and vehicle maintenance shops. For maximum safety, the building must be evaluated for potential hazards before installing the heater system. A critical safety factor to consider before installation is the clearance to combustibles.

Residential

This heater is **NOT** approved for use in any domestic application. This includes, but not limited to, attached garages, living quarters, solariums, etc. Consult the local fire service and/or insurance provider if unsure of your application.

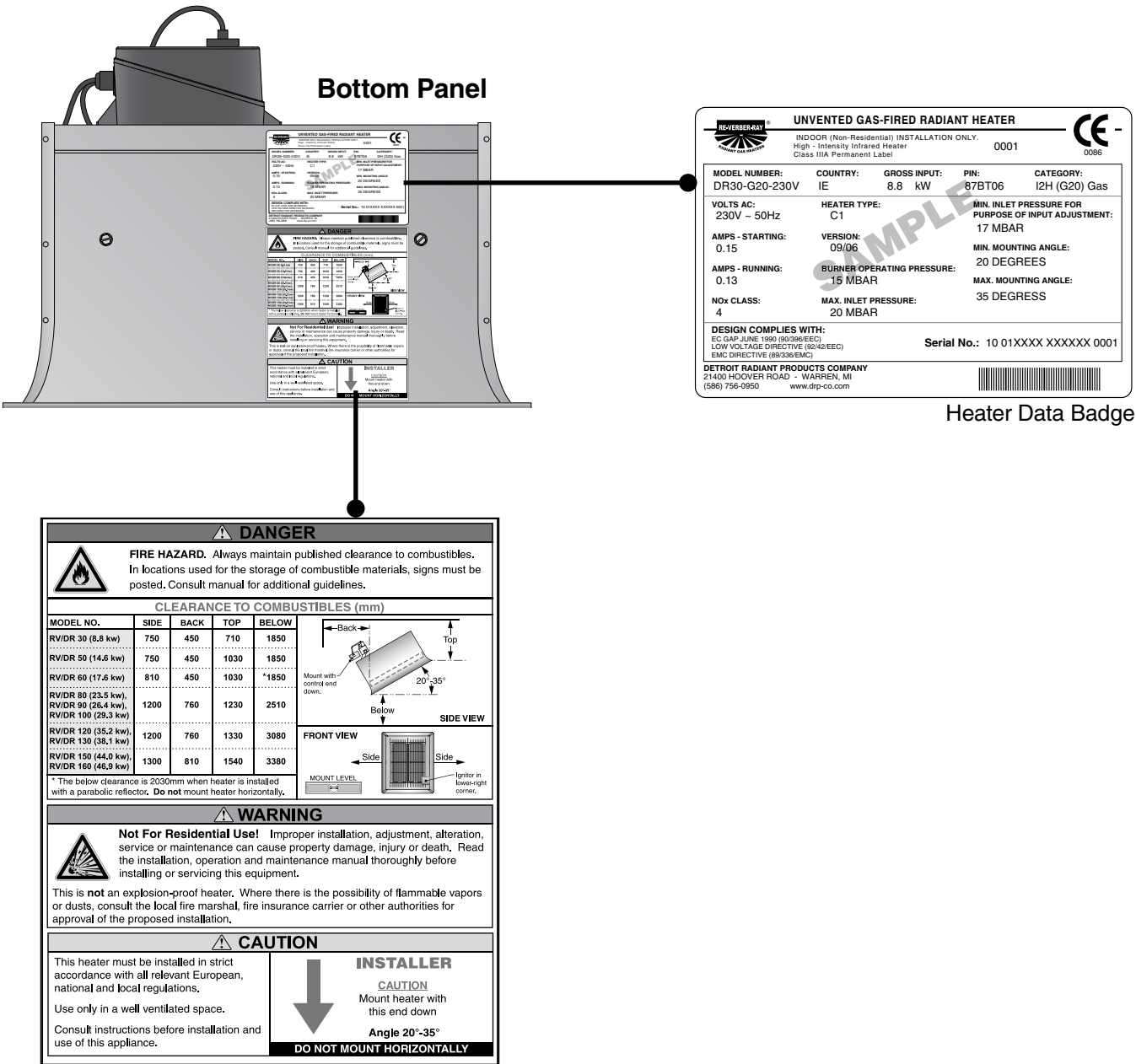
⚠ WARNING**Not For Residential Use.**

Installation of an infrared heater system in residential indoor spaces, RV's, mobile homes, etc. may result in property damage, asphyxiation, fire, serious injury or death.

Safety Labels

Safety warning labels must be maintained on the infrared heater. Illustrations of the safety labels, and their locations, are pictured below.

Figure 1.1 • Safety Label Locations



F/N: LLDCL003
Clearance to Combustibles Label

Clearance to Combustibles

⚠ WARNING



Improperly connected gas lines may result in serious injury or death, explosion, poisonous fumes, toxic gases, asphyxiation. Connect gas lines in accordance to national, state, provincial and local codes.

Placement of explosive objects, flammable objects, liquids and vapors close to the heater may result in explosion, fire, property damage, serious injury or death. **DO NOT STORE OR USE PETROL OR OTHER INFLAMMABLE VAPORS AND LIQUIDS IN THE VICINITY OF THIS OR ANY OTHER APPLIANCES.**

Failure to comply with the published clearances to combustibles could result in personal injury, death and/or property damage.

⚠ CAUTION



Signs shall be posted specifying the maximum permissible stacking height in order to maintain clearances to combustibles.

A critical safety factor to consider before installation is the clearances to combustibles. Clearance to combustibles is defined as the minimum distance you must have between the infrared surface, or reflector, and the combustible item. Considerations must also be made for moving objects around the infrared heater.

IMPORTANT: Fire sprinkler heads must be located at an appropriate distance from the heater. This distance may exceed the published clearance to combustibles. Certain applications will require the use of high temperature sprinkler heads or relocation of the heaters.

Potentially flammable substances, such as propylene glycol or other antifreeze solution, are not to be used in conjunction with this heater without careful consideration for and avoidance of all potential hazards.

When installing the infrared heater system, the minimum clearances to combustibles must be maintained. These distances are shown in Table 1.2 and on the heater. If you are unsure of the potential hazards, consult your local inspector, fire insurance carrier or other qualified authorities on the installation of gas fired infrared heaters for approval of the proposed installation.

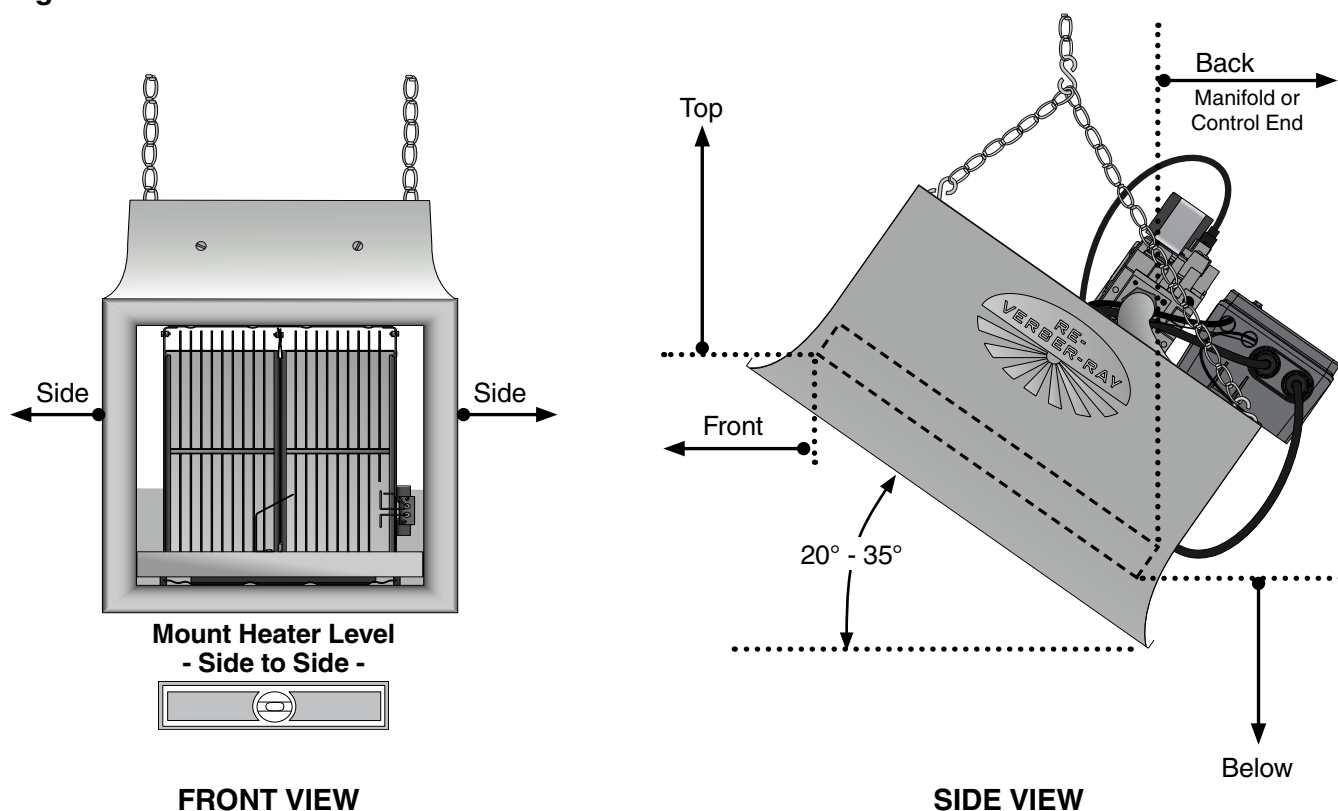
Table 1.2 • Clearance to Combustibles in Millimeters (see Figure 1.2)

Model No.	Sides	Back	Top	Below/Front
DR 30	750	450	710	1850
DR 50	750	450	1030	1850
DR 60	810	450	1030	1850*
DR 80	1200	760	1230	2510
DR 90	1200	760	1230	2510
DR 100	1200	760	1230	2510
DR 120	1200	760	1330	3080
DR 130	1200	760	1330	3080
DR 150	1300	810	1540	3380
DR 160	1300	810	1540	3380

* This clearance is 2030 mm when the heater is fitted with a parabolic reflector.

NOTE: If the heater is mounted beneath a non-combustible surface, a 610 mm minimum top clearance must be maintained from the top of the heater to prevent overheating the controls.

In locations used for the storage of combustible materials, signs must be posted to specify the maximum permissible stacking height to maintain the required clearances from the heater to the combustibles. Signs must either be posted adjacent to the heater thermostats or in the absence of such thermostats, in a conspicuous location.

Figure 1.2 • Clearance to Combustibles

2.0 Installation

⚠ WARNING



Read and understand the installation, operating and maintenance instructions thoroughly before installing or servicing this equipment.

Only trained, qualified gas installation and service personnel may install or service this equipment.

⚠ CAUTION

Before installation, check that the local distribution condition, the nature of gas and pressure and adjustment of the appliance are compatible.

⚠ WARNING



Improper suspension of the infrared heater may result in collapse and being crushed. Always suspend from a permanent part of the building structure that can support the total force and weight of the heater.



Failure to maintain minimum clearance to combustibles may result in fire and/or explosion, property damage, serious injury or death. Always maintain minimum clearances and post signs or provided tags where needed. Signs should state the hazards for the particular application and be legible to the building occupants. Consult the factory or a factory representative for additional information on signage compliance.

Design

To ensure a safe, properly designed heating system, a layout should be developed for the correct placement of the infrared heater(s). Aside from safety factors such as clearance to combustibles (see Table 1.2 on page 7), you should take into consideration the environment (e.g., cold/drafty, average, protected), heat coverage (m^3) needed, heater centers, the distance behind a person or work station(s), and exhaust path. Also, the effective infrared surface temperature of a person or object may be diminished with winds above 8 km/h. Wind barrier(s) may be required. Most importantly, clearance to combustibles **must** always be maintained!

This installation manual, along with applicable relevant codes, address these issues. It is critical that you read, understand and follow all guidelines and instructions. Always inspect and evaluate the mounting conditions, space for exhaust, gas supply and wiring.

Heater Mounting

Whenever possible, fit the heater at the recommended mounting height above floor level (see Table 2.1 below). When considering heater position, ensure that the required minimum clearances between the various heater surfaces and combustible materials are preserved (refer to Table 1.2 on page 7).

Extended parabolic reflectors are available for all heater models. When these are fitted, the higher mounting heights given in Table 2.1 should be maintained.

Table 2.1 • Recommended Mounting Heights and Distances

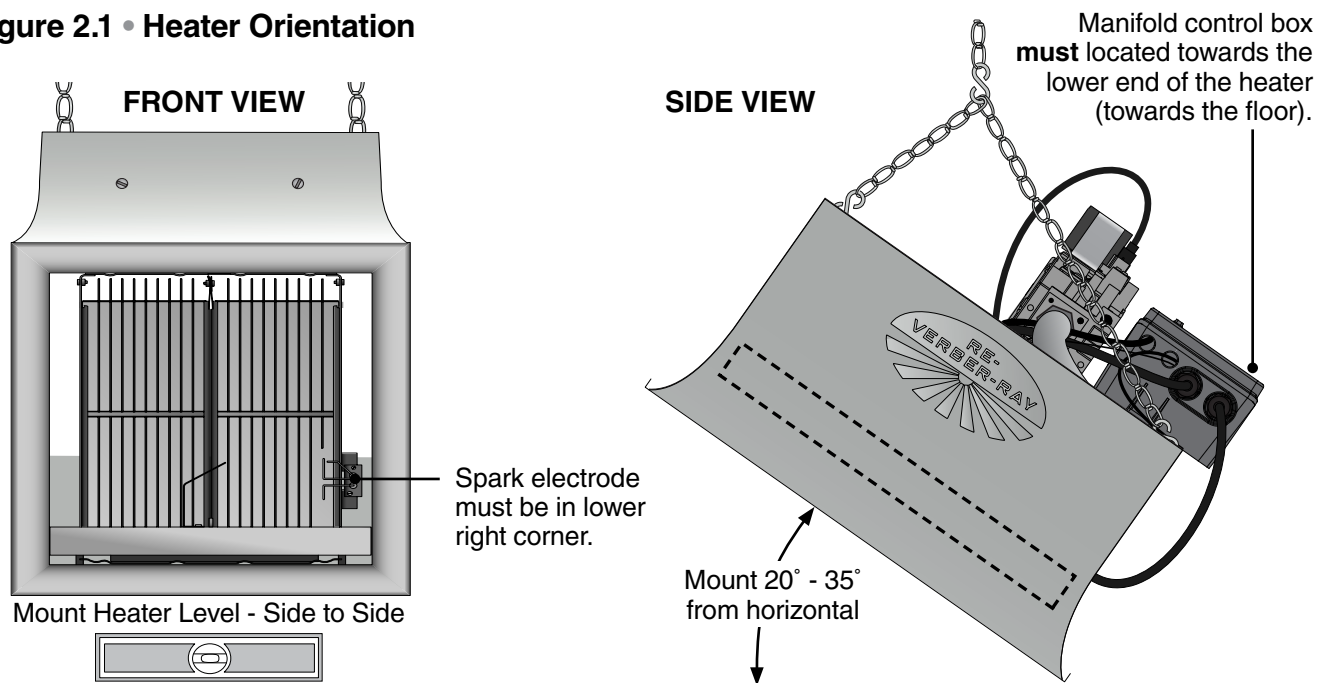
Model No.	30° Angle Standard Reflector (mm)	30° Angle Parabolic Reflector (mm)
DR 30	3800	4300
DR 50	4200	5500
DR 60	4500	6100*
DR 80	5000	6400
DR 90	5500	7000
DR 100	6000	7600
DR 120	7000	8200
DR 130	7500	8500
DR 150	8000	9200
DR 160	8500	10000

* Clearance to combustibles is increased when using this accessory on this model (see Table 1.2 on page 7).

NOTE: Fixing heights are measured from the centre of the heater face.

Factory recommended mounting heights are listed as a guideline. If infrared heaters are mounted too low or too high, they may result in discomfort or lack of heat. It is recommended that mounting heights are observed in order to optimize comfort conditions. However, certain applications such as spot heating, freeze protection or very high ceilings may result in the heaters being mounted outside of the recommended mounting heights.

Figure 2.1 • Heater Orientation



Preferred Mounting Methods

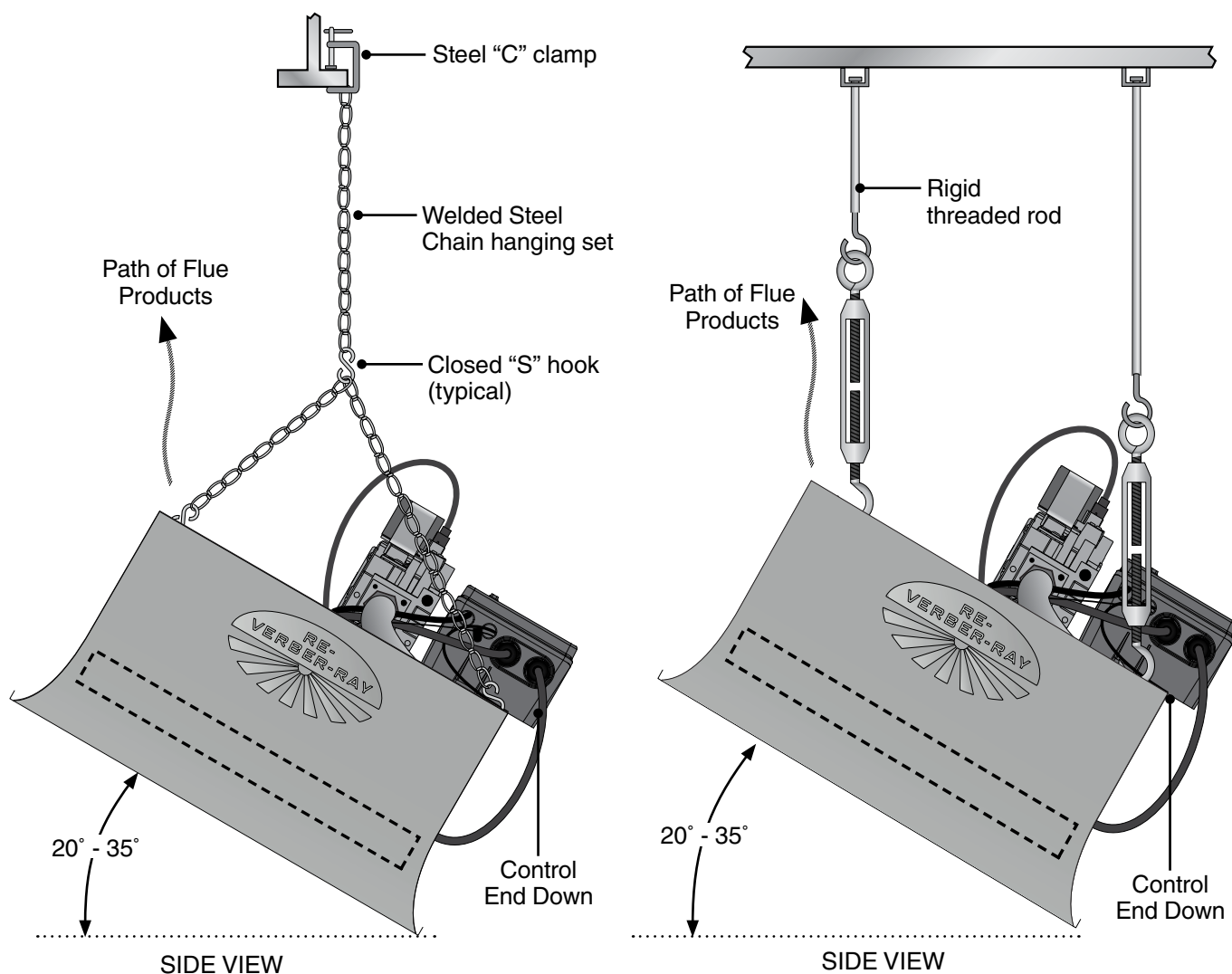
Heaters may be suspended from roof structures by various methods. Figure 2.2 below shows common methods to mount the heater. Some local regulations or application conditions, such as draughts that could cause the unit to swing, stipulate that if flexible gas connectors are used then the heater must be rigidly mounted.

The heater must be level from side to side and between 20° and 35° from horizontal. The igniter, manifold and controls must be located on the lower end.

THE HEATER FACE MUST NOT MAKE AN ANGLE OF LESS THAN 20° WITH HORIZONTAL.

The flue outlet area of the heater must remain free of obstructions at all times. Gas pipework or electrical cables must never be used to lend mechanical support to the heater.

Figure 2.2 • Common Mounting Methods

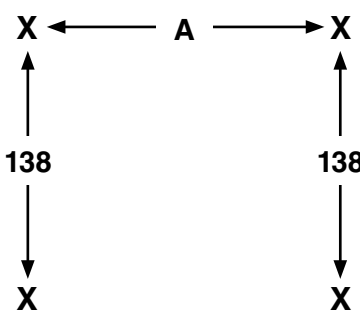


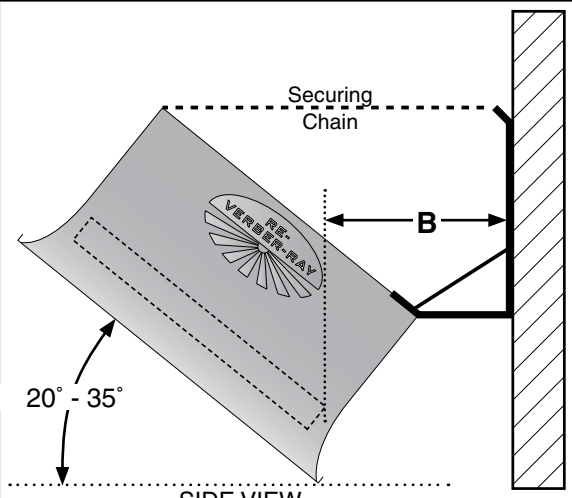
Mounting the Heater Using Optional Wall Bracket Set

Wall brackets allow mounting angles between 20° and 35° to the horizontal, and heaters must not be installed on walls, or at angles outside of this range.

- ❶ Place brackets in proposed heater position on the wall. Check that they are properly aligned and mark in hole positions for fixing screws (see Table 2.2 below). Drill holes, fit plugs and use screws to fix brackets in position.
- ❷ Fix each bottom side of the heater to the bottom side of its respective wall bracket using the nuts and bolts provided. Connect top sides of the heater to bracket using S-hooks and chain.

Table 2.2 • Wall Bracket Mounting Dimensions (not included with heater)

	Model No.	Dim. A (mm)	Dim. B (mm)
	DR 30	125	200
	DR 50	287	200
	DR 60	287	200
	DR 80	453	200
	DR 90	453	200
	DR 100	453	400
	DR 120	615	400
	DR 130	615	400
	DR 150	695	400
	DR 160	695	400



Dim. A: Distance between mounting brackets.

Dim. B: Rear clearance to combustibles.

Ventilation

⚠ WARNING

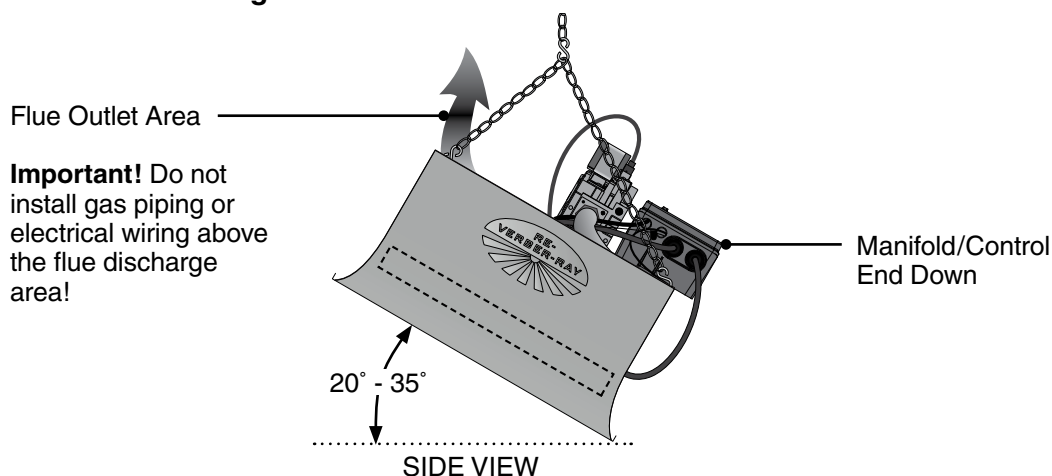


Insufficient ventilation may result in health problems, carbon monoxide poisoning or death. Vent enclosed spaces and buildings according to local regulations.

Improper venting may result in asphyxiation, fire, explosion, injury or death.

The space to be heated must be ventilated to remove the products of combustion and to provide an adequate supply of fresh air. The minimum air volume requirement must comply with local codes and to the guidelines set forth in this manual. The flue outlet area of the heater must remain free of obstructions at all times. Gas pipework or electrical cables must never be used to lend mechanical support to the heater (see Figure 2.3).

Figure 2.3 • Hot Flue Discharge



Ventilation requirements in accordance to BS EN 13410:2001 must be adhered to. A minimum air displacement of **3.7 m³/h per kW** of total rated heat input is required.

Example: One DR 30 is rated at 8.79 kW.
 Ventilation Requirement = $8.79 \times 37.5 \text{ m}^3/\text{h}$
 = $329.62 \text{ m}^3/\text{h}$

Air displacement may be accomplished by either gravity or mechanical means. Mechanical exhausters are preferred and typically mounted at high points on the roof where stagnant air accumulates inside the building. For a flat roof, considerations of prevailing winds, high and low pressure areas, and distribution of air movement must be taken into consideration when locating exhausters.

A balanced system is essential to avoid negative building pressure which causes excessive infiltration, unfavorable drafts and affects combustion efficiency.

NOTE: When heated, materials high in hydrocarbons (solvents, paint thinner, mineral spirits, formaldehydes, etc.) can evaporate. This may result in odors or fumes being emitted into the environment. To correct this problem, clean the area and/or introduce additional ventilation. Heaters installed and serviced in accordance with the installation manual do not emit foul odors into the environment.

Gas Supply

⚠ WARNING



Improperly connected gas lines may result in fire, explosion, poisonous fumes, toxic gases, asphyxiation or death. Connect gas lines in accordance with the regulations listed on page 3.

This heater must be installed and serviced by trained gas installation and service technician only. All pipework must be supported and installed in accordance with the regulations listed on page 3 and provide the operating gas pressure for the appliance.

- The gas outlet must be in the same room as the appliance and accessible. It may not be concealed within or run through any wall, floor or partition.
- The gas supply to the heater must terminate with an isolation cock and a flexible connector. This will allow the heater to be disconnected for maintenance or repair.
- Check that the main gas supply line is of proper diameter to supply the required fuel pressures. Pipes of a smaller size than the heater inlet gas connection must **not** be used.
- If utilizing used pipe, verify that its condition is clean and comparable to a new pipe. Test all gas supply lines in accordance with local codes.
- Test and confirm that inlet pressures are correct. Refer to the heater data plate and packaging to verify fuel type.
- Install a sediment trap/drip leg for condensation which may occur at any point of the gas supply line. This will decrease the possibility of loose scale or dirt in the supply line entering the heater's control system and causing a malfunction.
- The final connection is made to the heater's gas valve. The has an Rp 1/2 inch ISO 7 thread (1/2 inch B.S.P. Internal thread). A flexible metallic hose conforming to BS 6501-1:1991 must be used for this purpose. This must be kept clear of the flue product opening at the top of the heater.
- Take care when making the final connection to the gas valve not to apply excessive force to the valve. The valve inlet may be held using a 40 mm spanner (wrench).

The following information is valid for heaters supplied in the UK and Ireland using either natural gas or propane fuel. Information on converting heaters for use in other European countries is given on page 21.

Table 2.3 • Burner Pressure

Type of Gas	Required Burner Pressure	Minimum Inlet Pressure	Maximum Inlet Pressure
Natural (I_{2H})	15 mbar	17 mbar	50 mbar
Liquefied Petroleum (I_{3P})	25 mbar	27 mbar	50 mbar

NOTE: The gas pressure governor has been factory preset.

Electrical

⚠ WARNING

**Electric Shock**

Field wiring to the heater must be earthed and comply with I.E.E. and local authority recommendations.

A 230 Volt, 50Hz, single-phase supply is required

Important! Proper earthing and polarity are essential for heaters with spark ignition controls. If the system is not properly earthed, it cannot determine the presence of a flame and will lockout and shut off.

All wiring must comply with I.E.E. and local authority recommendations. The wires in the mains lead used on this appliance are colored in accordance with the following code:

Green and Yellow:	Earth
Blue:	Neutral
Grey:	Neutral
Brown:	Live
Black:	Live

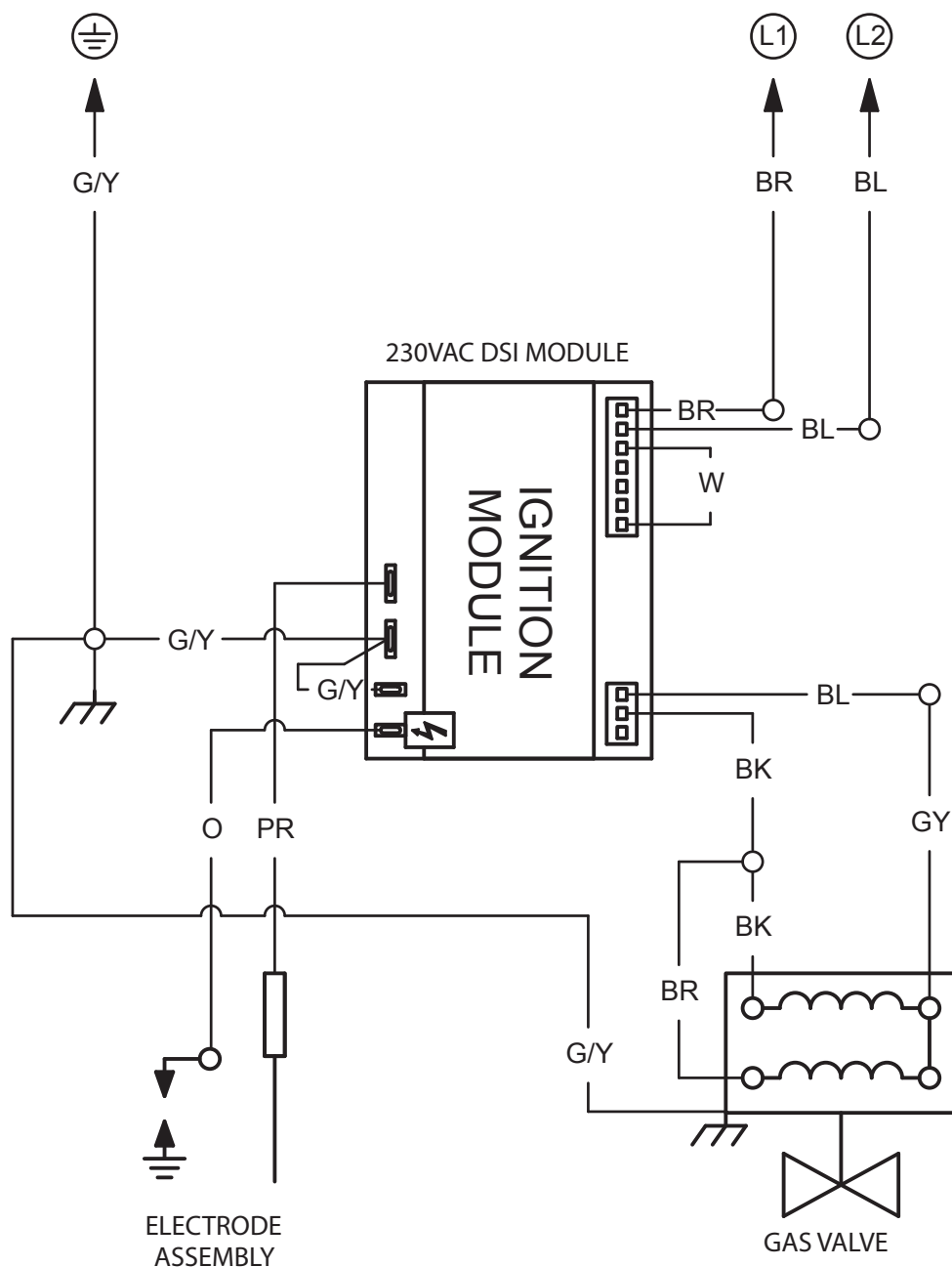
The method of connection to the electrical supply must facilitate complete isolation and should preferably be made via a fused double pole isolator having a contact separation of at least 3 mm in all poles and supplying the appliance only. An alternative connection may be made via a fused three-pin plug and an unswitched, shuttered socket both complying with the requirements of BS 1363.

Ensure that live, neutral and earth are connected correctly as the flame detection circuit will not operate correctly if the polarity of the supply is reversed.

Before field wiring this appliance - Check existing wiring; replace if necessary.

NOTE: If any of the original wire supplied with the appliance must be replaced, it must be replaced with wiring material having a temperature rating of at least 105° C.

Figure 2.4 • 230V Circuit Board Internal Wiring Diagram



3.0 Operation

Annual Maintenance

⚠ WARNING



Electric Shock - Disconnect power to heater before servicing!

Do not touch the ignition or flame detection electrodes or any part of the ignition/flame detection circuit while power is connected to the heater. The parts carry high voltages at all times and will give an electric shock if touched.



Do not operate unit if repairs are necessary. Do not operate unit showing any signs of burner malfunction. Call a professional for assistance.

⚠ CAUTION



Avoid Equipment Failure.

Do not blow out heating elements with high pressure air.

Annual maintenance is normally sufficient unless abnormal site conditions necessitate that such work be carried out at more frequent intervals (e.g. dusty environment, etc.).

The procedure outlined below should be followed:

- ❶ Turn **OFF** electrical isolating switch and gas cock.
- ❷ Remove dirt and other deposits from all heater surfaces. Low pressure compressed air may be used to clean ceramic plaques and venturies.

IMPORTANT: Air hose pressure **must not exceed 200 kPa or 30 psi**. Gently pass the air hose over the entire exposed area of the ceramic. A distance of 610 mm to 1220 mm from the unit is recommended. Blowing out the gasket material will permanently damage the rayhead.
- ❸ If necessary, remove and clean injectors.
- ❹ Check that:
 - All ceramic plaques are free from cracks or other damage.
 - The heater fixing arrangements are satisfactory.
 - The flue products outlet is free from obstructions.
 - The minimum clearances between various heater surfaces and combustible materials are preserved.
- ❺ Re-commission heater as outlined on page 17.
- ❻ Switch **OFF** the heater and close gas service cock if heaters are not to be used for an extended period. Periodically inspect the gas supply for signs of corrosion or failure. Replace if necessary.

Pre-Commissioning Check

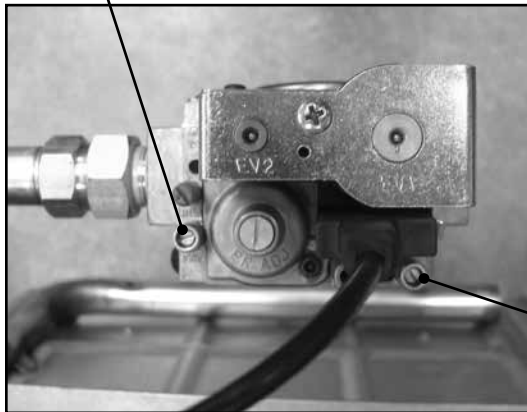
Inspect ceramic plaques to ensure that none have been damaged. If any cracks are detected, the heater must not be commissioned until the affected burner unit has been replaced (See Section 4.0 Maintenance).

Commissioning

- ❶ Ensure that the service cock to heater is turned OFF.
- ❷ Purge air from gas supply and test for gas soundness in accordance with the relevant Standards (see page 3).
- ❸ Check that all electrical connections are made to the heater and that the unit has a sound earth connection.
- ❹ Remove operating pressure test point screw (located on outlet of the gas valve) and connect pressure gauge.
- ❺ Remove inlet pressure test point screw (located on inlet of the gas valve) and connect pressure gauge.

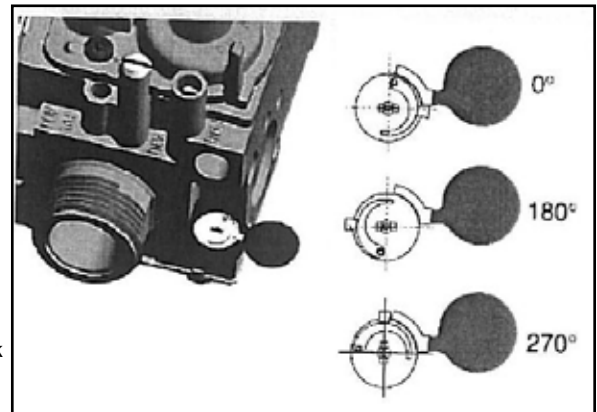
Figure 3.1 • Pressure Gauge Connections

Connect pressure gauge here to check heater operating pressure.



Connect pressure gauge here to check inlet gas pressure.

Figure 3.2 • Regulating Screw Set Point



- ❻ Verify that the regulating screw set point is set to the 270° position as shown in Figure 3.2.
- ❼ Open the gas service cock.
- ❽ Switch on the power to the heater via remote electrical switch. After a purge period lasting a few seconds, the solenoid valves will open and the heater will come into operation having been lit by the electrical spark.
- ❾ Check heater operating gas pressure. This should be in accordance to the pressures listed on page 13 (Table 2.3).
The pressure governor on the gas valve has been factory pre-set to the correct operating pressure. If the correct operating pressure is not measured, then it may be necessary to re-adjust this. Please see page 23 for details on how this is done.
When the correct pressure is measured, switch off the heater. Remove pressure gauges. Replace and ensure test screws are tight and leak tested.
- ❿ Test supply between service cock and heater for gas soundness.
- ⓫ If applicable, fit or post advisory/caution plate. The heater is now ready for use.

4.0 Maintenance

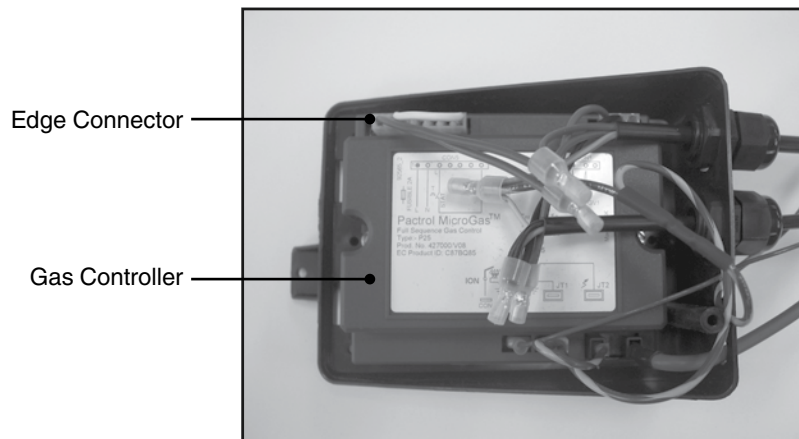
Troubleshooting

Table 4.1 • General Troubleshooting

Symptom	Remedy
Power is connected to the heater but nothing happens.	Check electrical supply and all electrical connections. If this reveals nothing, it is likely that the ignition control has failed. Replace control.
The electrode sparks but the heater fails to ignite.	Check the heater inlet gas pressure (test point on gas valve). This should be at least 17 mbar for natural gas or 27 mbar for propane. Check electrode spacing (recommended gap=3 mm). Check operation of gas valve. Replace if necessary. Replace ignition control if the valve is not defective.
The heater ignites satisfactorily, but switches off after a short period.	Check electrode spacing (recommended gap = 3 mm and a 3 mm clearance should be maintained to the surface of the ceramic plaques). If this doesn't resolve the problem, replace ignition control.
A burner does not reach its normal operating temperature (orange color) and a loud roaring noise is audible.	This indicates that the burner has flashed back. This condition is caused by damage to the ceramic plaques. Replace the affected burner assembly.

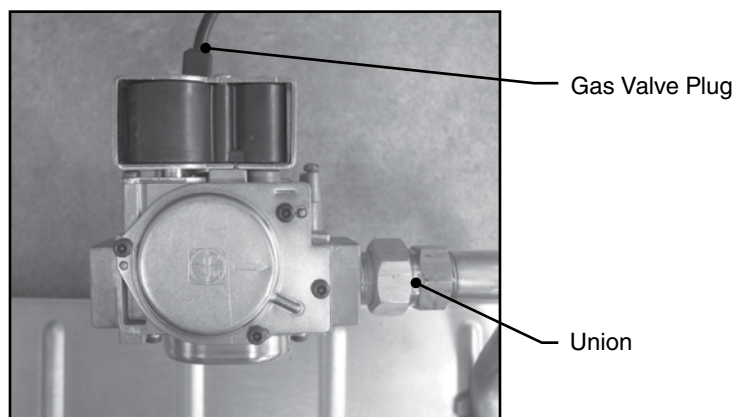
Replacement Procedures

Figure 4.1 • Replacement of Gas Controller



- ❶ Switch **OFF** electrical supply.
- ❷ Unscrew the screw which retains the cover of the control enclosure. Remove cover.
- ❸ Disconnect the spark electrode lead from the control box terminal.
- ❹ Unscrew the two machine screws which retain the gas controller in place. Disconnect the edge connector from the controller. Lift controller clear.
- ❺ Replace controller and re-assemble.
- ❻ Re-commission heater.

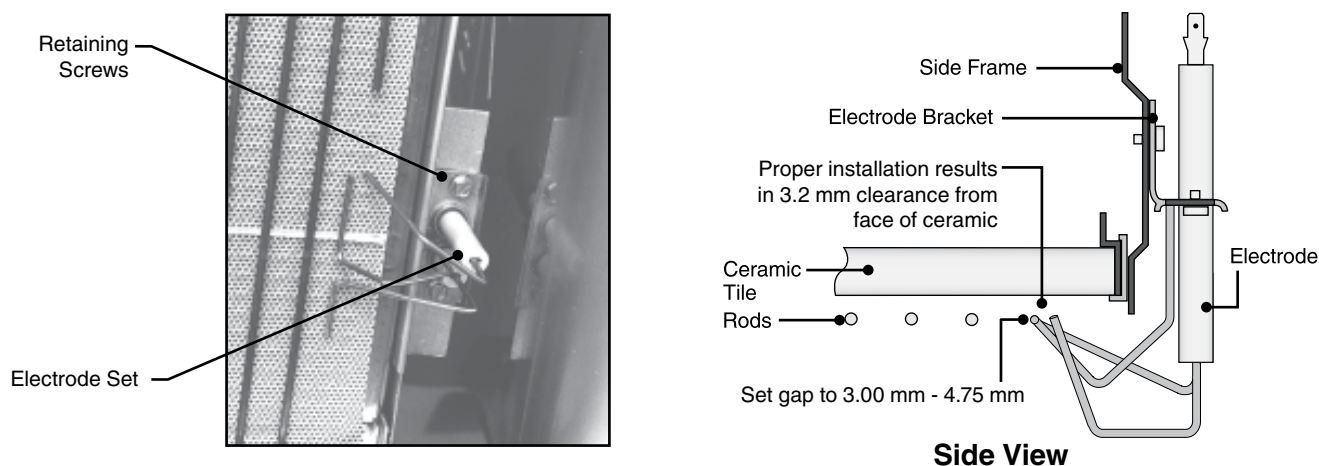
Figure 4.2 • Replacement of Gas Valve



- ❶ Switch **OFF** electrical and gas supplies.
- ❷ Disconnect gas valve plug from gas valve.
- ❸ Disconnect flexible connector from gas valve.
- ❹ Open the “union” which connects gas train to heater manifold.
- ❺ Replace gas valve and re-commission heater.

Figure 4.3 • Replacement of Electrode Set

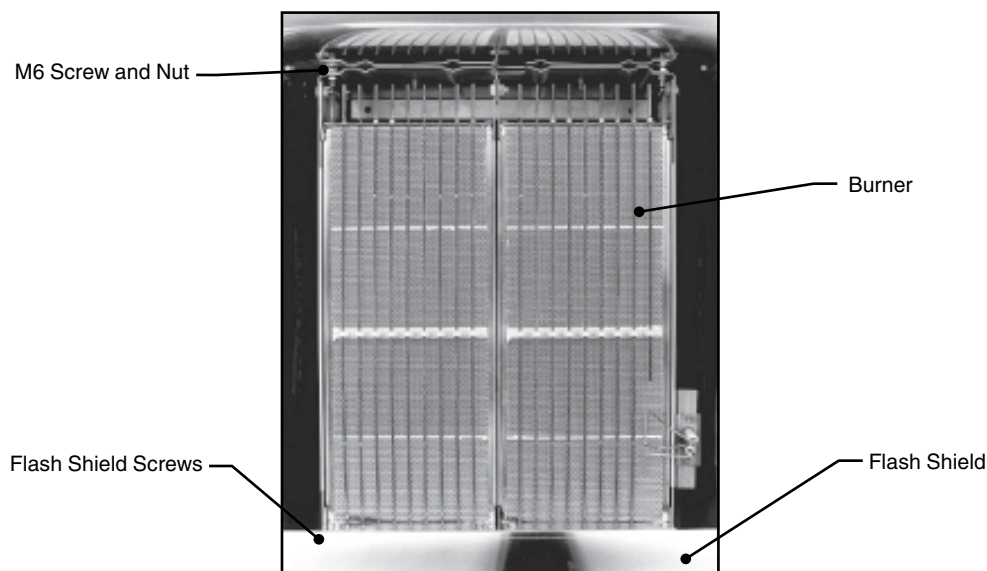
If electrodes are damaged, they must be replaced complete with holder.



- ❶ Switch OFF electrical supply and gas service cock.
- ❷ Disconnect leads from electrodes.
- ❸ Remove electrode set from mounting bracket by unfastening the retaining screws.
- ❹ Replace with new electrode set.
- ❺ Re-assemble and re-commission the heater.

Figure 4.4 • Replacement of Burner Assembly

If the ceramic plaques are damaged, it is necessary to replace the entire burner assembly.



- ❶ Remove screws which retain the flash shield to the burner(s).
- ❷ Remove the flash shield.
- ❸ Remove the four 6 mm nuts and bolts which retain the burner unit to the heater frame.
- ❹ Remove burner and replace.
- ❺ Replace the flash shield.
- ❻ Re-commission the heater.

Converting Heaters from one Gas to Another

Table 4.2 • Suitable Conversions

Marking	Gas Type	Gas Supply Pressure	Country of Use	Notes
I2H	Natural	Varies	United Kingdom, Ireland, Austria, Denmark, Finland, Italy, Portugal, Spain, Sweden, Switzerland	Suitable for use without modification.
I3P	LPG (Propane)	37 mbar	United Kingdom, Ireland, France, Denmark, Portugal, Spain	Suitable for use without modification.
	LPG (Propane)	50 mbar	Austria, Germany, Netherlands, Spain	Check operating pressure and reset to 25 mbar during heater commissioning. See page 17.
	LPG (Propane)	30 mbar	Denmark, Finland, Netherlands, Sweden	Check operating pressure and reset to 25 mbar during heater commissioning. See page 17.
Convert to I2E+	Natural	Varies	France, Belgium	Convert heaters by changing gas valve with a valve which includes a flow restrictor instead of a governor.
Convert to I2ELL	Natural	20 mbar	Germany	These are physically identical to the I2H heaters, except that a change of injectors is required when the appliances are to be used on group LL gases (G25 @ 20 mbar). The operating gas pressure of the burner must be reset to 15 mbar after the injectors have been changed. NOTE: DR-50 and the DR-80 models are not suitable for use with LL gases.
Convert to I2L	Natural	25 mbar	Netherlands	Injectors must be changed to the sizes given in Table 3.3. Adjust operating pressure to 15 mbar after changing injectors. This must be done while the heater is supplied with Natural Gas at an inlet pressure of 25 mbar.

Table 4.3 • Injector Sizes

Model No.	Number of Injectors	Injector Size I2H, I2E+ and I2ELL Heaters (Nat Gas - G20)		Injector Size I2L, and I2ELL Heaters Using group L and LL gases (Nat Gas - G25)		Injector Size I3P Heaters (LPG - Propane - G31)	
		(mm)	Marking	(mm)	Marking	(mm)	Marking
DR 30	1	2.25	43	2.50	40	1.65	52
DR 50	2	2.15	44	2.35	42	1.55	53
DR 60	2	2.25	43	2.50	40	1.65	52
DR 80	3	2.15	44	2.35	42	1.55	53
DR 90	3	2.25	43	2.50	40	1.65	52
DR 100	3	2.35	42	2.60	38	1.65	52
DR 120	4	2.25	43	2.50	40	1.65	53
DR 130	4	2.35	42	2.60	38	1.65	52
DR 150	5	2.35	42	2.45	41	1.65	52
DR 160	5	2.35	42	2.60	38	1.65	52

Converting a Heater from Natural Gas (I2H) to LPG (I3P)

- ❶ If the heater is already installed, switch **OFF** the gas and electricity then remove the heater to the ground level.
- ❷ Remove the gas injectors.
- ❸ Replace the injectors with the correctly sized injectors for propane (see Table 4.3).
- ❹ Re-install heater and connect electrical and gas supply.
- ❺ Connect gas pressure gauge to operating pressure test point on the outlet of the gas valve (see commissioning on page 17).
- ❻ Switch **ON** the heater.
- ❼ Read the operating pressure from the pressure gauge. This must be adjusted to **25 mbar**.
- ❽ Remove the sealing ring on the governor adjusting screw. Turn the screw clockwise to increase the gas pressure to **25 mbar** (see pressure adjustment on page 23).
- ❾ When operating pressure has stabilized at **25 mbar**, switch **OFF** the heater.
- ❿ Remove pressure gauge and replace pressure test point screw.
- ⓫ Re-seal the governor adjusting screw using the sealing ring.
- ⓬ Replace or amend the heater data badge to show that the heater has been adjusted for LPG.

Converting a Heater from LPG (I3P) to Natural Gas (I2H)

- ❶ If the heater is already installed, switch **OFF** the gas and electricity then remove the heater to the ground level.
- ❷ Remove the gas injectors.
- ❸ Replace the injectors with the correctly sized injectors for natural gas (see Table 4.3).
- ❹ Re-install heater and connect electrical and gas supply.
- ❺ Connect gas pressure gauge to operating pressure test point on the outlet of the gas valve (see commissioning on page 17).
- ❻ Switch **ON** the heater.
- ❼ Read the operating pressure from the pressure gauge. This must be adjusted to **15 mbar**.
- ❽ Remove the sealing ring on the governor adjusting screw. Turn the screw counter-clockwise to reduce the gas pressure to **15 mbar**.
- ❾ When operating pressure has stabilized at **15 mbar**, switch **OFF** the heater.
- ❿ Remove pressure gauge and replace pressure test point screw.
- ⓫ Re-seal the governor adjusting screw using the sealing ring.
- ⓬ Replace or amend the heater data badge to show that the heater has been adjusted for natural gas.

Converting a Heater for Operation on Nat. Gas (I2E+) in France or Belgium

Follow the procedure outlined above for conversion of a heater for operation on natural gas.

The gas valve on the heater (SIT valve model 0.840.061) must be replaced with a different valve (SIT valve model 0.830.010). This valve incorporates a gas flow adjuster instead of a governor. Follow the procedure outlined in Figure 4.2 - Replacement of Gas Valve; page 19.

The operating pressure **must** be adjusted to **15 mbar** as described above.

Seal the flow rate adjuster screw using the sealing ring.

Replace or amend the heater data badge to show that the heater has been adjusted.

WARNING: The inlet gas pressure must not exceed 20 mbar for G20 or 25 mbar for heaters equipped with a flow adjuster.

Converting a Heater for Operation on Group LL Nat. Gas (I2ELL) in Germany

Follow the procedure outlined on page 22 for conversion of a heater for operation on natural gas.

Replace the injectors with the correctly sized injectors for Group LL Natural Gas (see Table 4.3 on page 21).

Adjust the operating pressure to **15 mbar** using the procedure given on the previous page.

Seal the flow rate adjuster screw using the sealing ring.

Replace or amend the heater data badge to show that the heater has been adjusted.

Converting a Heater for Operation on Natural Gas (I2L) in the Netherlands

Follow the procedure outlined on page 22 for conversion of a heater for operation on natural gas.

Replace the injectors with the correctly sized injectors for Group L Natural Gas (see Table 4.3 on page 21).

With an inlet gas pressure of **25 mbar**, adjust the operating pressure to **15 mbar** using the procedure given on the previous page.

Seal the flow rate adjuster screw using the sealing ring.

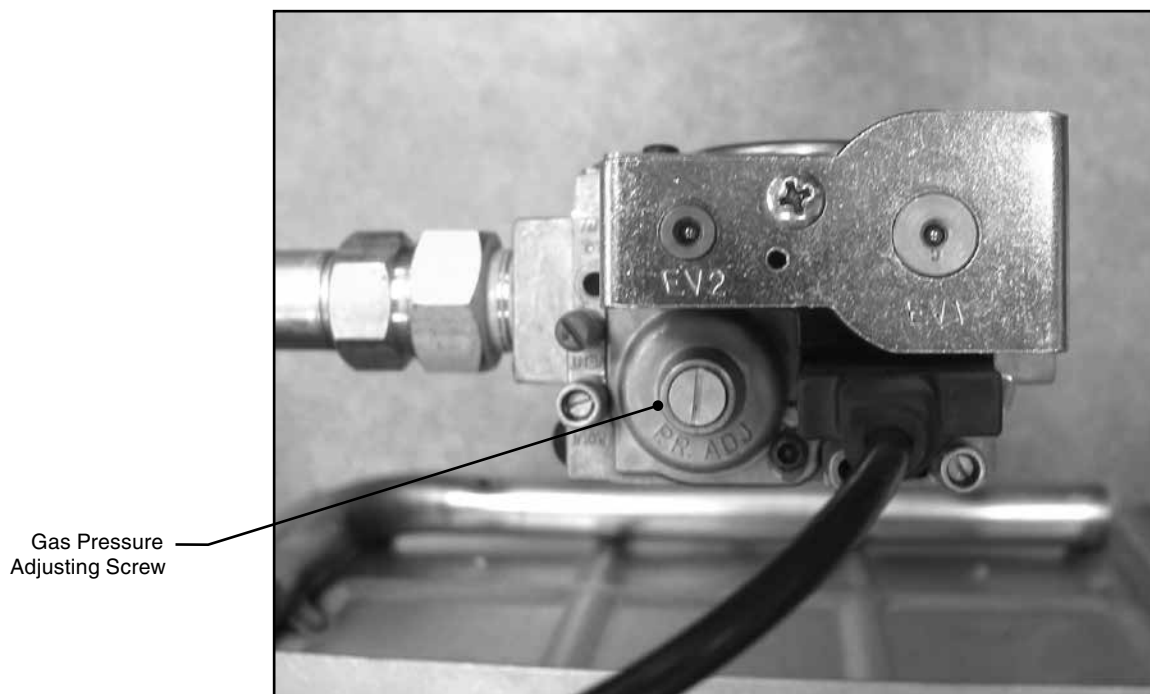
Replace or amend the heater data badge to show that the heater has been adjusted.

Adjusting the Gas Pressure

The gas pressure is adjusted using the pressure adjusting screw on the SIT valve. On valve type 0.840.061 with governor, the screw is rotated clockwise to increase the pressure.

The pressure adjusting screw is covered by a sealing ring. This must be removed prior to making any adjustments and replaced afterwards.

Figure 4.5 • Gas Valve Pressure Adjusting Screw



5.0 Parts

Table 5.1 • Heater Components Parts List

Part Description	Stock No.	Part Description	Stock No.
Electrical Parts Reference List			
Electrode Set (3-prong)	32-508	EN-298 CE Circuit Board	DR-CB230A
DR-230V Gas Valve - SIT 0.840.061	TP-740B	Wire Harness for DR-230VCBA	DR-WH230A
DR-230V Valve Cord	DR-VC230	Red Rubber Spark Boot	DR-RSB
230V 3-Core Wire (560 mm)	DR-3CW	230V Junction Box Bottom	DR-PJBB
High Voltage Ignition Wire	HVW-18	230V Junction Box Cover	DR-PJBT
Low Voltage Ignition Wire	LVW-18		
Burner Related Parts Reference List			
Rayhead with Center Support	DR-RH	Injector 2.15 mm	ORF#44
Rayhead no Center Support (DR 30 LP)	DR-RHP	Injector 2.25 mm	ORF#43
Long Rayhead Rod	DR-LROD	Injector 2.35 mm	ORF#42
Igniter Rayhead Rod	DR-SROD	Injector 2.45 mm	ORF#41
Injector 1.55 mm	ORF#53	Injector 2.60 mm	ORF#38
Injector 1.65 mm	ORF#52		
Nuts & Bolts Reference List			
1/4-10 Short Electrode Mounting Screw	DR10-EMS	1/4-20 Hex Nut (mates to DR-20STB)	DR-20HN
#8 x 1/2" Sheet Metal Self-tap Screw	DR-8STS	1/4-20 x 1/2" Self-tap Bolt	DR-20STB
#8 x 1/2" Common Sheet Metal Screw	DR-8SMS	Union Fitting, 3-piece	DR-MU
1/4 - 20 x 1/2" Machine Screw	DR-20MB		
Core Components Reference List			
Manifold (*specify 1-5)	DR-MAN^	Side Frame	DR-SF
Upper Frame (*specify 1-5)	DR-UF^	Electrode Mounting Bracket	DR-EMB
Heat Shield (*specify 1-5)	DR-HS^	Side Frame Insert	DR-SFI
Flash Shield (*specify 1-5)	DR-FLSH^	Embossed Reflector Sides	DR-ERS
Reflector End (*specify 1-5)	DR-RFE^	Cross-over Bracket	DR-CO
Full Reflector Assembly (*specify 1-5)	DR-^REF		

* (1=DR 30; 2=DR 50-60; 3=DR 80-100; 4=DR 120-130; 5=DR 150-160). ^ Specify model number.

NOTE: Replacement burners are called "rayheads". Ceramic plaques are not sold separately, order DR-RH.

Figure 5.1 • Heater Assembly Components
