

SPACE-RAY

Herringbone Linked Flue System

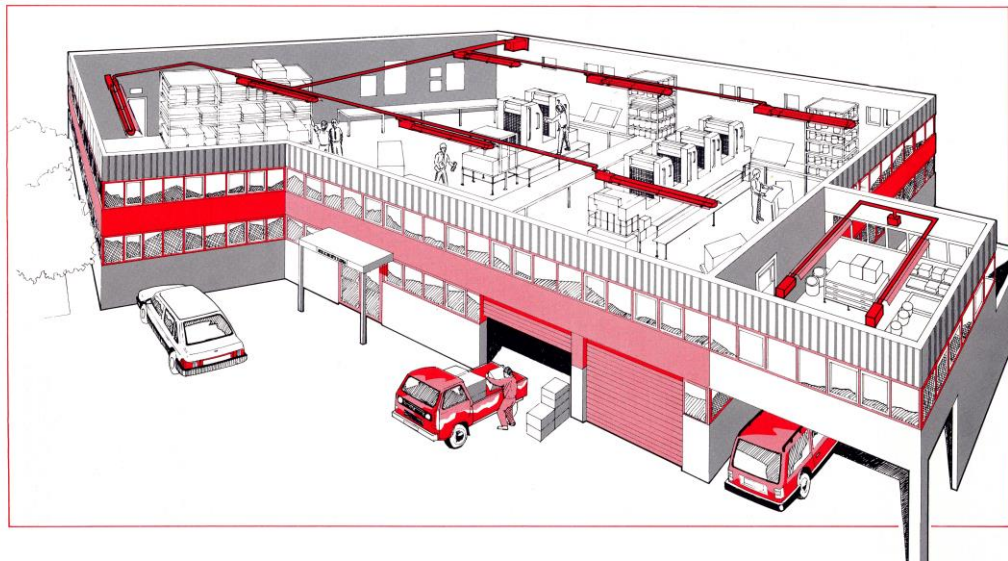
THESE ARE SUPPLEMENTAL INSTRUCTIONS FOR HEATER MODELS LISTED BELOW.

ALL GENERAL SPECIFICATIONS, ASSEMBLY, OPERATION AND SERVICE INSTRUCTIONS ARE INCLUDED IN THE SEPARATE MANUALS SUPPLIED WITH EACH HEATER.

Models

LRU25-HB, LRU30/35/40/45-HB
LRL25-HB, LRL30/35/40/45-HB

ADU25-HB, ADU30/35/40/45-HB
ADL25-HB, ADL30/35/40/45-HB



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1.0) SAFETY

This heater is a self-contained infrared radiant tube heater. Safety information required during installation and operation of this heater is provided in this manual and the labels on the product. The installation, service and maintenance of this heater must be performed by a contractor qualified in the installation and service of gas fired heating equipment.

All personnel in contact with the heater must read and understand all safety information, instructions and labels before operation. The following symbols will be used in this manual to indicate important safety information.

WARNING

Warning instructions must be followed to prevent or avoid hazards which may cause serious injury, property damage or death.

CAUTION

Caution instructions must be followed to prevent incorrect operation or installation of the heater which may cause minor injury or property damage.

2.0) INSTALLER RESPONSIBILITY

The installer is responsible for the following:

- The heater and venting, as well as electrical and gas supplies must be installed in accordance with these installation instructions and any applicable codes and regulations.
- Every heater shall be located with respect to building construction and other equipment so as to permit access to the heater.
- Each installer must follow the clearances to combustible materials for the heaters.
- Install the heater so that the supports and hangers are correctly spaced in accordance with these instructions. The heater must be supported by materials having a working load limit of at least 52kg.
- Supply the owner with a copy of these Installation and Operation Instructions.
- Never use the heater as a support for a ladder or other access equipment. Do not hang anything from the heater.
- Supply all installation materials necessary that are not included with the heater.
- Check the nameplate to make sure that the burner is correct for the gas type in the building.

3.0) GENERAL INFORMATION

This heater is a self-contained infrared radiant tube heater designed for use where flammable gases or vapors are not generally present.

Installation of this heater must be in accordance with all applicable codes shown in the instructions and/or the local codes and authorities having jurisdiction. In the UK all equipment must be installed and maintained in accordance with the relevant provisions of the Gas Safety (Installations and Use) Regulations 1998 for gas fired products. Installation practices must take into account the Health and Safety at Works Act 1974 or relevant codes of practice. In addition the installation must be carried out in accordance with the current IEE wiring regulations (BS 7671:current revision), BS 6896:current revision (Industrial & Commercial) and any other relevant British Standards and Codes of Practice by a qualified installer. All external wiring MUST comply with the current IEE wiring regulations.

Clearances to combustibles as outlined in the manual should always be observed. In areas used for storage of combustible materials where they may be stacked below the heater, the installer must post signs that will “specify the maximum permissible stacking height to maintain the required clearances from the heater to combustibles.”

Every heater shall be located with respect to building construction and other equipment so as to permit access to the control housing. Each installer shall use skillful and reliable installation practices when locating the heaters and must give consideration to service accessibility.

This heater is for **INDOOR INSTALLATION ONLY** and is used in **VENTED or UNVENTED** mode. The term **Unvented** actually means *Indirect Vented*. While the products of combustion are expelled into the building, national codes require ventilation in the building to dilute these products of combustion. This ventilation must be provided by gravity or mechanical means. Ventilation requirements are addressed further in these instructions.

Although these heaters may be used in many applications other than space heating (e.g., process heating), Space-Ray will not recognize the warranty for any use other than space heating.

This heater is not an explosion proof heater. Where the possibility of exposure to volatile and low flash point materials exists, it could result in property damage or death. This heater must not be installed in a spray booth where the heater can operate during the spraying process. Consult your local fire marshal or insurance company.

Linear Configuration Series Only: Since linear configuration tube heaters are always hotter at the control end than at the flue terminal end, always observe the minimum recommended mounting heights.

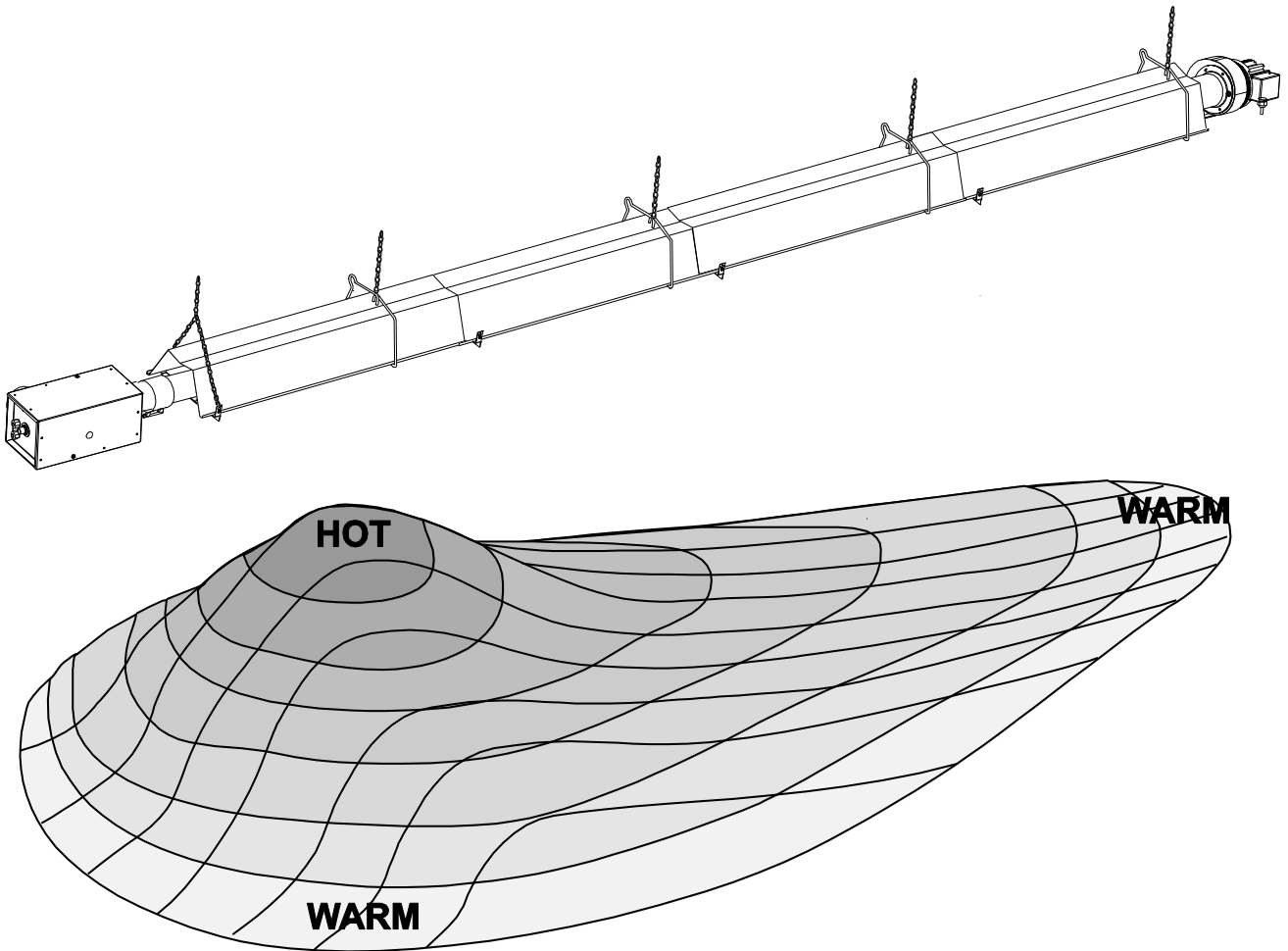
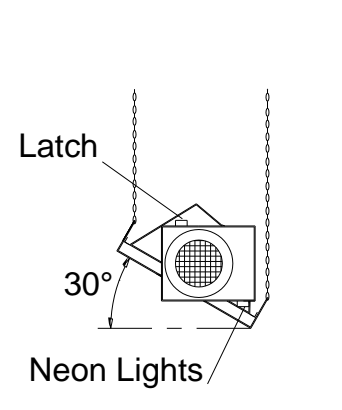
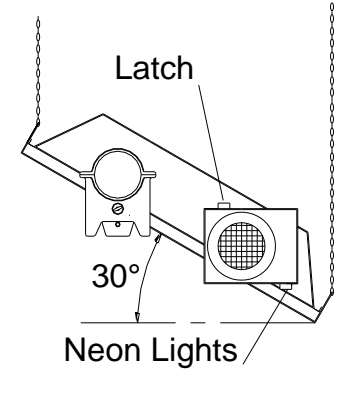
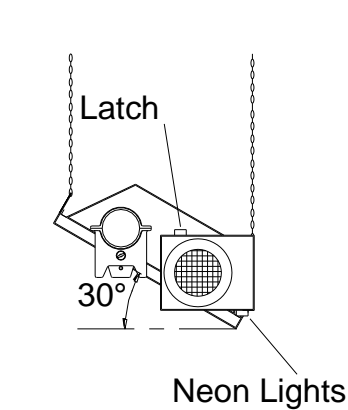
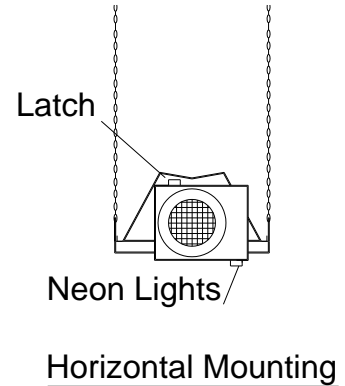
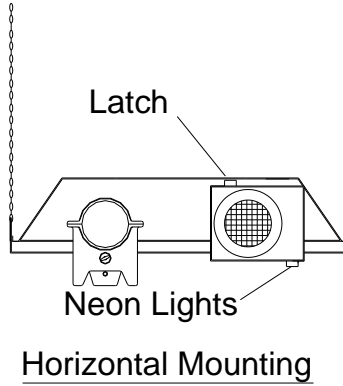
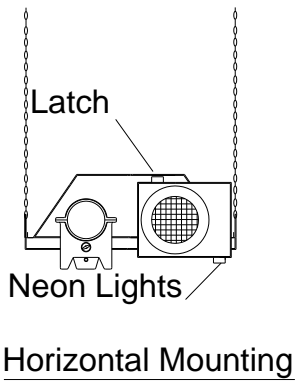


Fig. 1

4.0) SUSPENSION – SYSTEM EXHAUST MANIFOLD

The appliance may be mounted horizontally or at a recommended angle of 30° maximum to the horizontal as shown below.

IMPORTANT: when 'U' Tube Heaters are angle mounted (Fig. 2 & 3) the fan should be assembled to the higher of the two emitter tubes as shown.



Angle Mounting
(recommended to 30°)

Angle Mounting
(recommended to 30°)

Angle Mounting
(recommended to 30°)

LRU15-HB
LRU25-HB
ADU25-HB
Fig. 2

LRU30/35/40/45-HB
ADU30/35/40/45-HB
Fig. 3

LRL15/25-HB
LRL30/35/40/45-HB
ADL25/30/35/40/45-HB
Fig. 4

1. The system exhaust manifold should be installed to conform with the plan provided.
2. For suspending the manifold it is recommended that suitable protected welded chain, (Ø3mm x 65links/m), stainless steel flexible wire or similar and manifold tube hangers be used. The manifold should be supported at the following centres from the building structure with supports positioned adjacent to tube fittings and couplings.

Manifold Diameter
a. 76mm
b. 102mm
c. 152mm

Support Centres (max.)
2.25m
2.25m
3.00m

3. Arrange the manifold suspension to provide a slight fall in the direction of the exhaust fan in order that any condensate formed will be collected in the condensate trap, which should be fitted immediately before the inlet to the exhaust fan (Fig.5a). Suggested slope of 25mm per 6m length of manifold tube. The condensate trap (15mm PVC or galvanised (not copper)), should be 'U' shape with a minimum depth of 250mm and with the outlet connected to a drain.

Fan Type 1

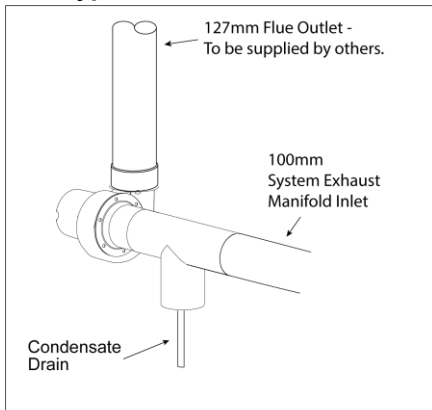


Fig. 5

4. For fan type 3 (Part No. 4262254) which are supported directly from the building structure, a flexible connector (supplied) must be fitted between the condensate trap and the fan. The fan connects directly to the manifold.
5. The fan exit may be positioned either horizontally (see A & B) for exhausting through the wall or vertically (see C & D) for exhausting through the roof.

Fan Type 3

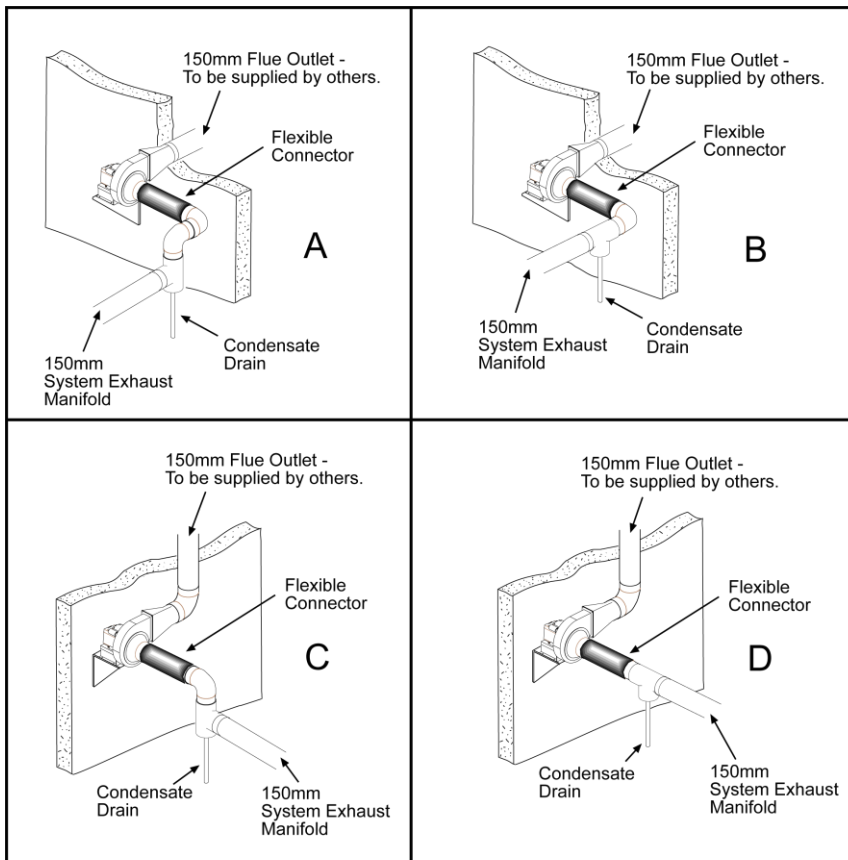


Fig. 5a

Condensate "T" Configurations

5.0) GAS SUPPLY

1. Natural Gas - G20 at 20mbar nominal supply pressure (appliance cat 2H)

Maximum supply pressure (Pmax)	25mbar
Minimum supply pressure (Pmin)	17mbar
Setting pressure	12.5mbar
Gas connection	R - ½

2. Installation pipes should be fitted in accordance with National and Local Regulations. Pipes of a smaller size than the heater connection (R - ½) should not be used and the pipework must be designed to achieve a gas supply pressure between the maximum and minimum values stated above, measured at the appliance inlet pressure test point.

A union service cock **MUST** be fitted as close as practicable upstream of the heater to enable the gas train to be removed for maintenance or repair.

It is essential to provide a flexible metallic hose, which must conform, to national or Local Regulations, to connect the appliance to the gas supply. Minimum size to be ½" (12.7mm) bore.

3. LPG - G30/G31 at 29/37mbar nominal supply pressure (appliance cat. 3+).

Maximum supply pressure (Pmax):	G30 - 35mbar G31 - 45mbar
Minimum supply pressure (Pmin):	G30 - 20mbar G31 - 25mbar

Note:- for appliance cat 3+ the governor is not operational
Gas connections: R - ½

4. The appliance should be connected to a permanent piped supply of LPG with pipes of adequate size to achieve a gas supply pressure between the maximum and minimum valves stated above, measured at the appliance inlet pressure test point.
5. The complete installation **MUST** be tested for soundness in accordance with National or Local Regulations.

6.0) ELECTRIC SUPPLY

WARNING: THIS APPLIANCE MUST BE EARTHED

1. The electrical wiring to this heater must be installed in accordance with the latest or current National Regulations and any Local Regulations, which apply.

Electrical supply	230V~50Hz 25W
Current rating	0.55
Fuse externally	3A

2. Twin core and earth PVC covered flexible supply cable (0.5mm²-to National or Local standard specification) must be used, with connection made as follows:-

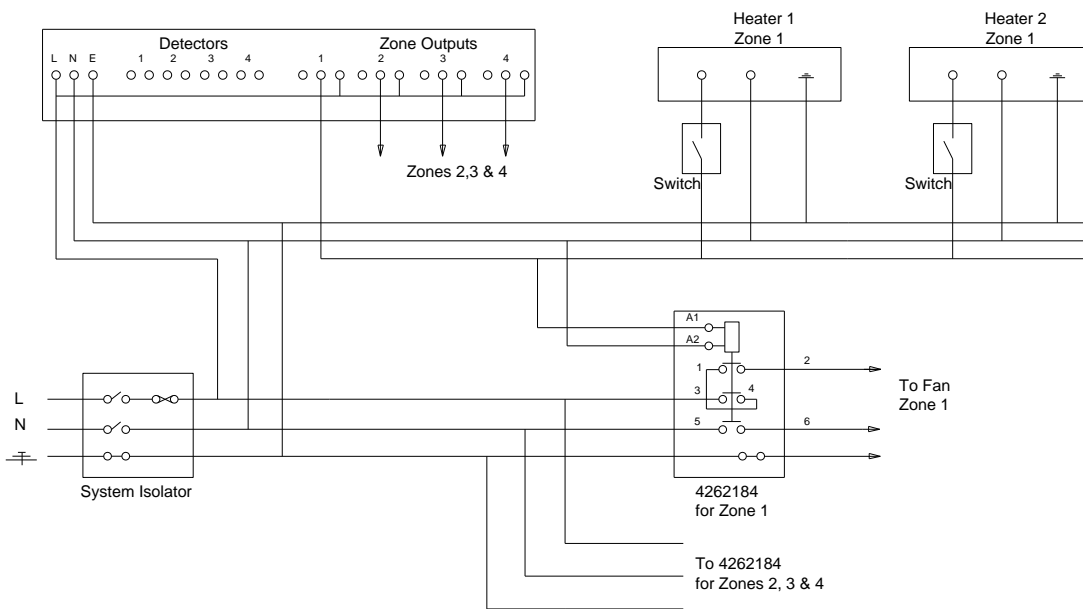


Fig. 6 Control by Zone Controller

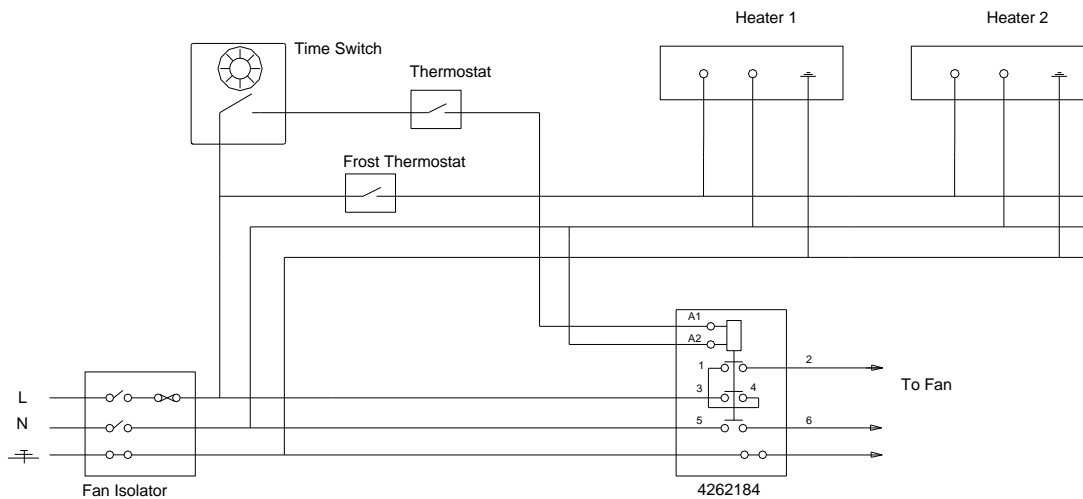


Fig. 7 Single Zone Control by Time Switch and Thermostat

Notes:

The method of connection to the electrical supply must facilitate complete isolation and should preferably be via a fused double pole isolator having a constant separation of at least 3mm in all poles and supplying the appliance ONLY.

Alternatively, connection may be made via a fused 3 pin plug and un-switched, shuttered socket, both complying with the requirements of National or Local Regulations. Neither thermostat nor switch are supplied as standard equipment.

N.B. In the event of an electrical fault after installation of the appliance, preliminary system checks are required to be carried out i.e. earth continuity, polarity and resistance to earth

Internal Wiring Diagram For Each Appliance

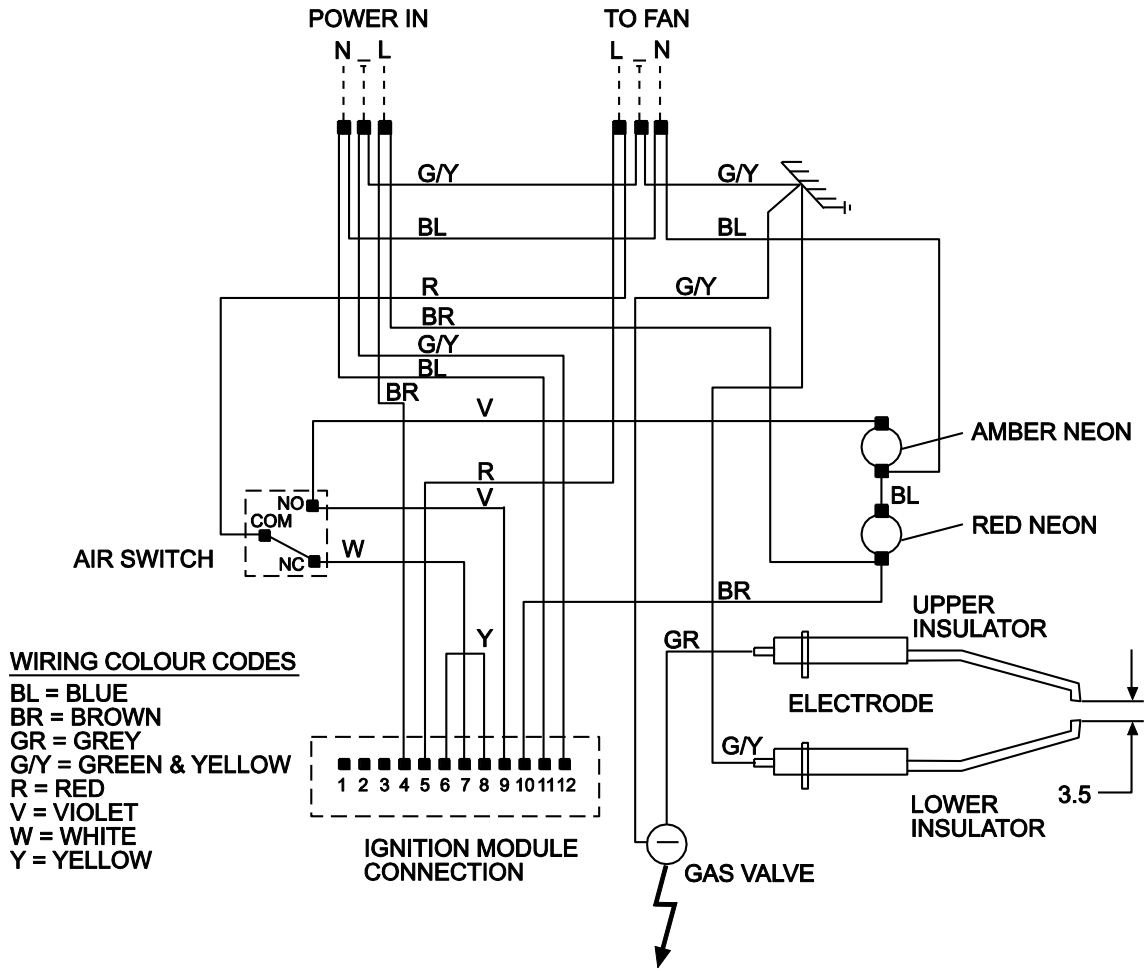


Fig. 8

7.0) SYSTEM VENTILATION

1. The ventilation requirements for flued appliances is set out in **BS 6896:1991** and must be applied. The following is guidance to the standard:

2. Natural Ventilation

Low level ventilation shall be provided in all cases below the level of the heater(s).

Up to and including 60kW - 4.5cm²/kW

Over 60kW - 270cm² + 2.25cm² /kW in excess of 60kW total rated heat input.

Where the air supply openings can be closed, it shall only be possible to operate the radiant heaters when they are open.

3. Mechanical Ventilation

Ventilation shall be provided in all cases at or below the level of the heaters.

Minimum proven air flow - 2.35m³/h/kW of total rated heat input.

It shall only be possible to operate the radiant heaters whilst the ventilation airflow is proven

7.1) FLUE SIZE

1. The Type 1 Fan has a Ø127 (5") flue adaptor fitted to which flue pipe complying with National and Local Regulations should be fitted. Maximum length of flue should be 13m with a maximum of two 90° bends.
2. The Type 3 Fans have a Ø152 (6") flue adaptor fitted to which flue pipe complying with National and Local Regulations should be fitted. Maximum length of flue should be 13m with a maximum of two 90° bends.
3. **Outside (ducted) combustion air supply.** When installed in a dusty or polluted atmosphere, the heater should be fitted with a ducted supply of clean fresh air. A length of 100mm flexible ducting should be installed between the Control Box Air Inlet and any rigid ducting and be secured to the Air Inlet with hose clips. The maximum length of ducting should be 15m with a maximum of two 90° bends.

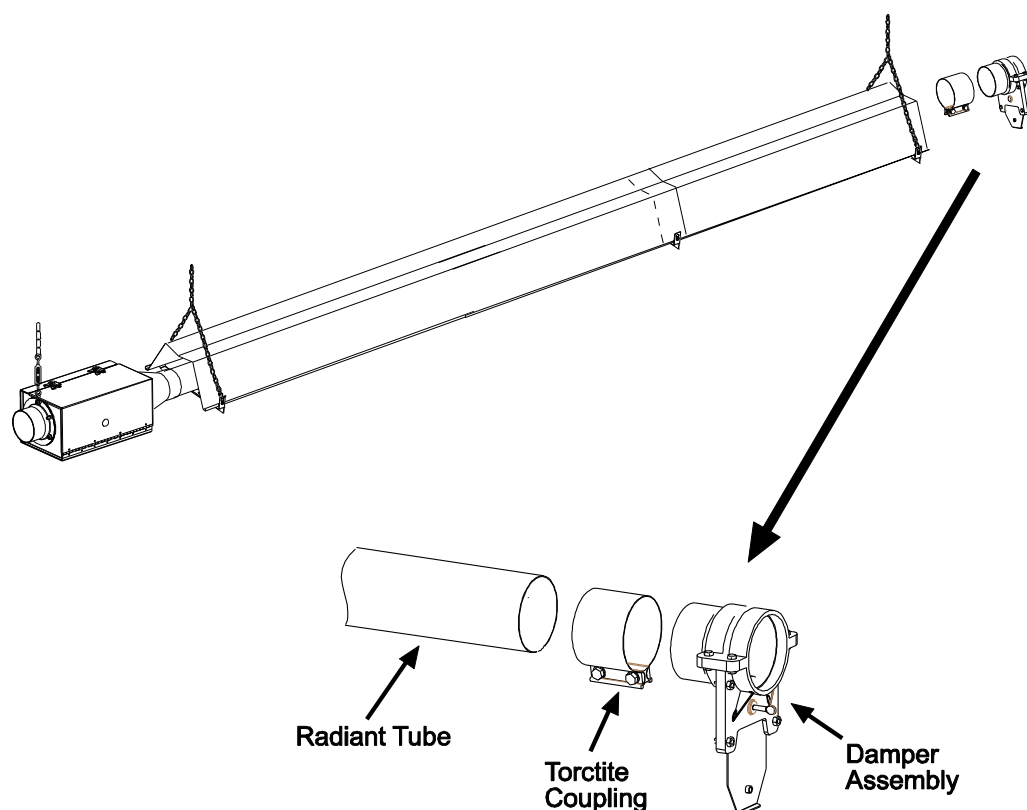
Where outside combustion air is ducted directly to the burner(s) the low level **natural** ventilation openings shall be not less than 50% of the areas given in 7.0) 2. above.

8.0) DAMPER ASSEMBLY ATTACHMENT (LINEAR MODELS)

1. Assemble the Damper Assembly to the Radiant Tube, ensuring that it engages fully into the Torctite Coupling (up to the stop) and is positioned with the adjustable slide flange at its lower edge. Tighten the nuts of the Torctite Coupling to secure the Damper Assembly to the Radiant Tube, taking care to support the Damper Assembly in line with the axis of the tube.

NOTE: Tighten the Torctite Coupling screws alternately whilst continually checking for slackness of the joint.

Fig. 9

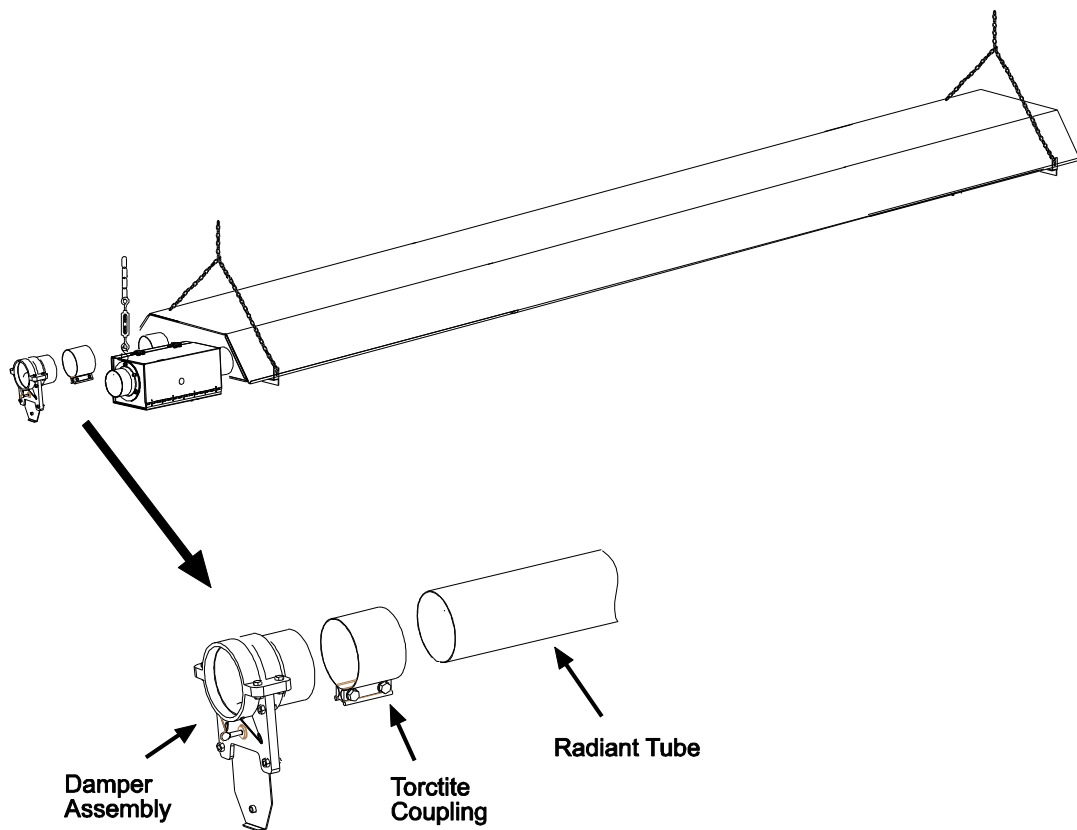


8.1) DAMPER ASSEMBLY ATTACHMENT (U-TUBE MODELS)

1. Assemble the Damper Assembly to the Radiant Tube, ensuring that it engages fully into the Torctite Coupling (up to the stop) and is positioned with the adjustable slide flange at its lower edge. Tighten the nuts of the Torctite Coupling to secure the Damper Assembly to the Radiant Tube, taking care to support the Damper Assembly in line with the axis of the tube.

NOTE: Tighten the Torctite Coupling screws alternately whilst continually checking for slackness of the joint.

Fig. 10



9.0) SYSTEM EXHAUST MANIFOLD

1. All exhaust manifold tube is manufactured to a standard diameter. All joint connections, on all sizes of fittings, push fit into the relative tube and should be sealed using high temperature silicone sealant. No locking bands are required.
2. Tube joints should be made as follows:-
Cut tube to length required, remove all burrs and wipe off any oil or grease with a clean rag. Apply a bead (3mm) of high temperature silicone sealant around both the outer end of the fitting and the inner end of the tube. Insert the fitting into the tube up to the raised bead around the fitting. (50mm) using a slight rotary action to spread the sealant (Fig. 11).

NOTE: The sealant remains workable for approximately 5 minutes after application.

3. Finally, secure the joint by drilling 3 equally spaced holes ($\text{\O}5.5\text{mm}$) through both the tube and fittings (one hole to be at 12 o'clock to prevent possible leakage of condensate) and rivet the tube to the fittings $\text{\O}5 \times 6$ pop rivets.

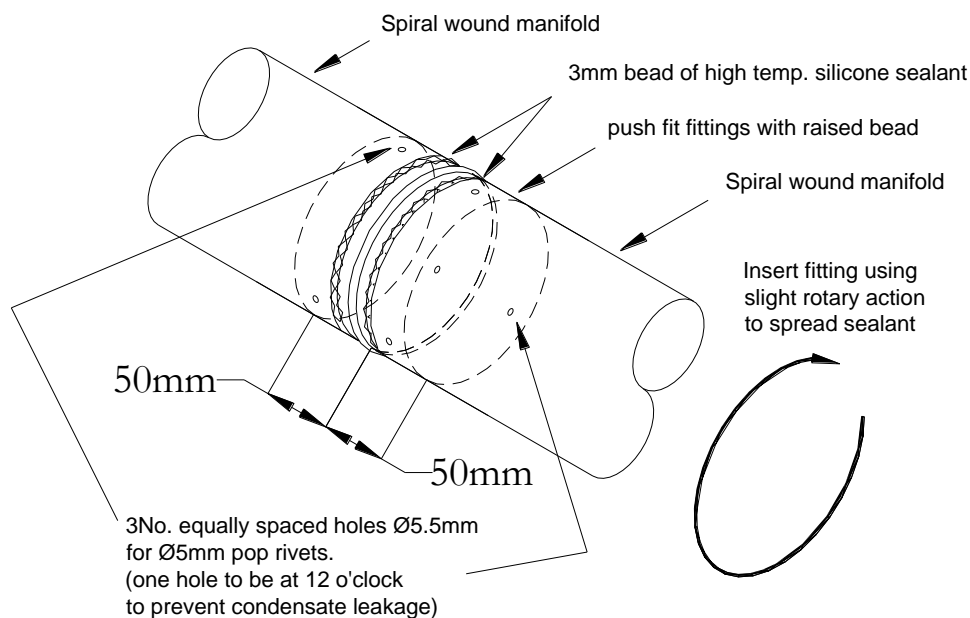


Fig. 11

10.0) COMMISSIONING

Inspect the installation and ensure that the appliance, exhaust manifold and any combustion air ducting has been assembled and installed in accordance with the relevant section of these Installation, Service and Operating Instructions.

It is essential that all new pipework installations are purged and tested for soundness with a suitable leak detection fluid prior to attempting to ignite any appliance. This work should be carried out in accordance with National or Local regulations.

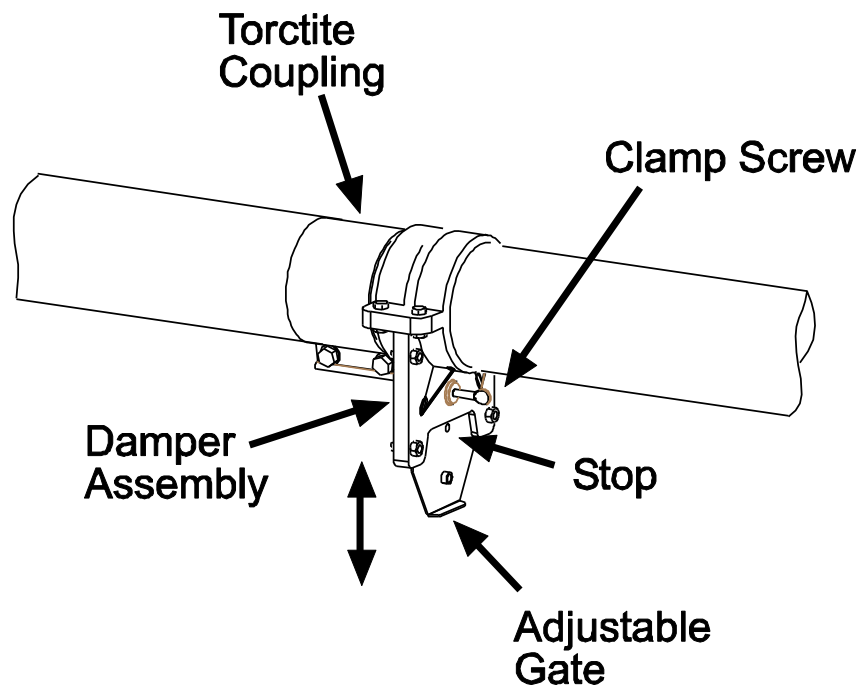
N.B. DO NOT TEST FOR SOUNDNESS BY USE OF NAKED FLAMES.

A. Combustion Air Adjustment (System Cold)

It is necessary to adjust the amount of combustion air to each burner in the system by carrying out the following procedures:

1. Switch off the electricity supply to each appliance in the system.
2. Turn off the gas supply to each appliance in the system, at their gas isolation valves.
3. Set the adjustable gate of each appliance damper (after unscrewing the clamp screw) such that the stop (rivet) is positioned against the damper housing ie. position of maximum resistance to air flow. Secure the adjustable gate in position with the clamp screw. See Fig. 12 below.

Fig 12



4. Activate the exhaust fan by switching on the electricity supply to the system control and setting the time switch and thermostat to demand heat. Carry out the procedures at 5 and 6 on each of the appliances in the system.
5. Connect a suitable manometer (0.01 mbar resolution) to the test nipple protruding from the rear panel of the control box (adjacent to the air inlet adaptor) as outlined in separate installation and operation instructions manual supplied with the heater.
6. Reposition the adjustable gate of the appliance damper (after unscrewing the clamp screw) to attain a negative pressure reading on the manometer of $1.5\text{mbar} \pm 0.05\text{mbar}$. Secure the adjustable gate in position with the clamp screw
7. Finally, check all the test points again to verify that the negative pressure at each of the burners in the system is $1.5\text{mbar} \pm 0.05\text{mbar}$.

Carry out the procedures of **B** below on each appliance in the system.

A. Combustion Air Adjustment (System Hot)

It is **IMPORTANT** to finally adjust the amount of combustion air to each burner in the system when the system is operating at thermal equilibrium.

1. Operate the system for 20 minutes to attain thermal equilibrium then adjust the amount of combustion air at each burner by carrying out the procedures at 2 to 4 on each appliance in turn.
2. Connect a suitable manometer (0.01mbar resolution) to the test nipple protruding from the rear panel of the Control Box (adjacent to the Air Inlet Adaptor) as outlined in the separate installation and operation instructions supplied with the heater.
3. Reposition the adjustable gate of the appliance damper (after unscrewing the clamp screw) to attain a negative pressure reading on the manometer of $0.65\text{mbar} \pm 0.05\text{mbar}$. Secure the adjustable gate in position with the clamp screw.
4. Finally check all the test points again to verify that the negative pressure at each of the burners is $0.65\text{mbar} \pm 0.05\text{mbar}$.

11.0) SERVICING

It is essential that at least once a year, preferably before the heating season, a qualified person service the appliance. In exceptionally dirty conditions, such as may occur in a foundry, more frequent servicing may be desirable.

IMPORTANT:

- A. Do not rest anything, especially ladders, against the appliance.
- B. Gas and Electricity supplies must be isolated before commencing servicing work or replacement of components.
- C. Unless instructed to the contrary, re-assemble components in reverse order.
- D. Check all joints for gas soundness after carrying out any servicing of the appliance.
- E. On completion of a service/fault finding task which has required the breaking and remaking of electrical corrections, the following checks, using a multi-meter must be made.
 - Earth continuity check
 - Polarity check
 - Resistance to earth check

1. Exhaust Fan

Inspect the main impellor and secondary cooling impellor and remove any dust by brushing with a soft brush. Remove any dust from the guard covering the secondary cooling impellor. Check that the impeller rotates freely and that there is no excessive play in the bearings. The bearings are pre-lubricated and require no attention.

2. Flue Pipes/Manifold

It is important that periodic sweeping of the flue is carried out according to the National or Local regulations in force.

3. Re-assemble and Commission

Re-assemble the appliance in reverse order and commission in accordance with the instructions contained in Section 10.0.

4. Auxiliary Controls

Room thermostats, time switches, frost thermostats etc should be checked to ensure correct functioning, and are set to the user requirements.

12.0) REPLACING COMPONENTS

IMPORTANT: Disconnect gas and electricity supplies to the appliance (and system) before carrying out any repair work. This work can be carried out at high level using a purposes designed access tower, but it is preferable that this work should be carried out at ground level.

1. Exhaust Fan

- A. Type 1 Fan.
- B. Remove the cover from the Exhaust Fan terminal housing and remove the electrical leads.
- C. Disconnect the flue from the fan outlet.
- D. Slacking the screws of the Torctite Coupling securing the Fan Connector to the Manifold Tube and draw the Fan Assembly off the Manifold Tube.
- E. Remove the Fan Connector (inlet) and Flue Adaptor (outlet) from the fan.
- F. Type 3 Fan.
- G. Remove the cover from the Exhaust Fan terminal housing and remove the electrical leads.
- H. Disconnect the flue from the fan outlet.
- I. Slacking the Hose Clips securing the Fan Connector to the Manifold Flexible Coupling.
- J. Remove the screws securing the Exhaust Fan to the Mounting Bracket and draw the Fan off the Manifold Tube.
- K. Remove the Fan Connector (inlet) and Flue Adaptor (outlet) from the fan.

Note: When re-assembling the Fan Connector and Flue Adaptor, new gaskets must be fitted between them and the Fan Case (inlet) and Fan Outlet Flange.

12.1) REPLACEMENT PARTS LIST

The following is a list of replacement parts which may be required during the life of the appliance.

Part	Part Number
Gasket (Type 1 Fan Inlet)	4260506
Gasket (Type 1 Fan Outlet)	4260507
Gasket (Type 3 Fan Inlet)	4260508
Gasket (Type 3 Fan Outlet)	4260509
Damper Assembly	4250789
Fan (Type 1)	4262255
Fan (Type 3)	4262254

13.0) OPERATING INSTRUCTIONS

1. Ensure that the Control Box door is closed and secured with the two toggle latches.
2. The heater will not operate with the door open.
3. Turn on the gas supply to the appliance.
4. Set any time switches or thermostats to demand heat.
5. Switch on the electricity supply to the appliance. The red neon indicator and amber neon indicator will be illuminated.
6. The burner should ignite within 20 seconds. Both red and amber neon indicators will remain illuminated.
7. Failure to ignite will result in the ignition controller going to "lockout" condition. The red neon indicator will remain illuminated. The amber neon indicator will be extinguished.
8. If lockout occurs, switch off the electricity supply to the zone or system fan, wait for 10 seconds before switching on the electricity supply to the zone or system fan to repeat the ignition sequence. It is not possible to re-ignite individual appliances. In systems with more than one zone, only the fan isolator for the particular zone should be switched off; not the system isolator.
9. If the appliance fails to ignite after a second sequence switch off the electrical supply to the appliance and call the service engineer.
10. If gas failure occurs after successful ignition the appliance will attempt one re-ignition before going to lockout condition.
11. To shut down the appliance for short periods of time, switch off the electricity supply to the appliance.
12. To shut down the appliance for longer periods of time, switch of the electricity supply to the appliance and turn off the gas supply at the gas isolation valve.

NOTES: