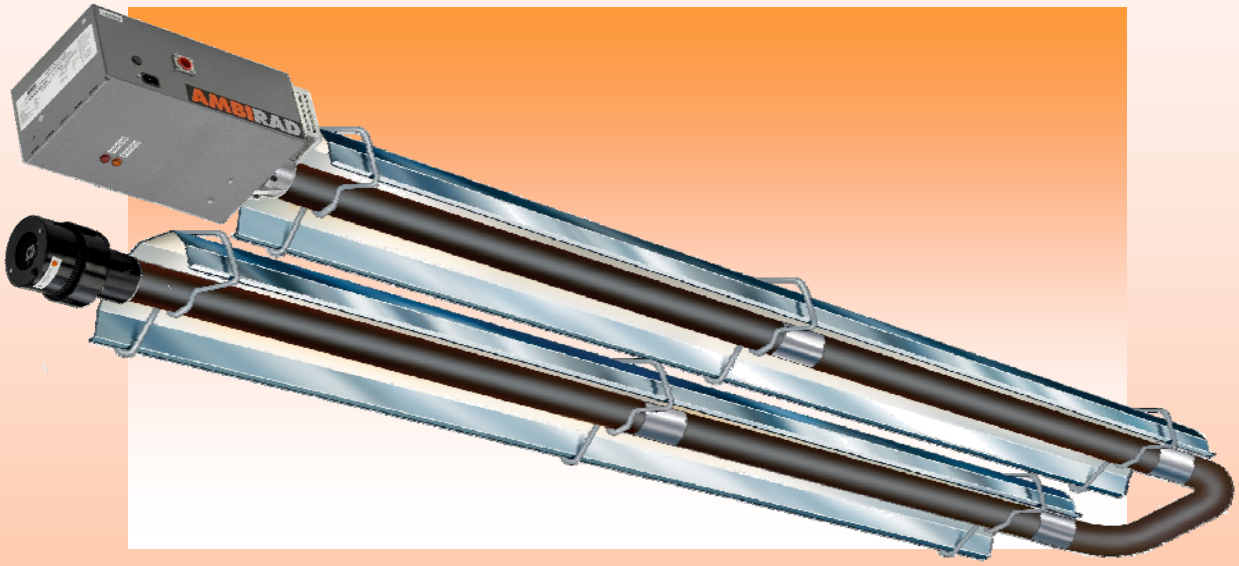
AMBIRAD

AMBIRAD AR(E)55 & 60

RADIANT TUBE HEATERS

INSTALLATION AND OPERATING MANUAL



INDEX **Section**

WARNINGS

Nortek Global HVAC (UK) Ltd 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. Due account should also be taken of any obligations arising from 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), BS 6896 (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.

CE

Part No. 700031

Nortek Global HVAC (UK) Limited, Fens Pool Avenue, Brierley Hill, West Midlands, DY5 1QA

Introduction.

Welcome to the range of AmbiRad AR/ARE radiant tube heaters. Local regulations may vary in the country of use and it is the installers responsibility to ensure that such regulations are satisfied

All installation, assembly, commissioning and service procedures must be carried out by suitable qualified competent persons to the statutory regulations in the country of use.

When assembling, installing, commissioning and servicing is undertaken on radiant tube heaters specified in these instructions, due care and attention is required to ensure that working at height regulations are adhered to at the mounting heights specified.

***PLEASE READ** this document prior to installation to familiarise yourself with the components and tools you require at the various stages of assembly.*

All Dimensions shown are in mm unless otherwise stated.

The manufacturer reserves the right to alter specifications without prior notice.

Document Index.

1. Installation Requirements.

Isolate any electrical supply to the heater and controller before proceeding.

1.1 Health and Safety

AmbiRad heaters must be installed in accordance with the relevant provisions of the Gas Safety (Installations and Use) Regulations 1998. Due account should also be taken of any obligations arising from 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), BS 6896:2005 (Industrial & Commercial) and any other relevant British Standards and Codes of Practice by a qualified installer. Isolate all electrical supplies to the heater & controller before proceeding.

For your own safety we recommend the use of safety boots and leather faced gloves when handling sharp or heavy items. The use of protective eye wear is also recommended.

1.2 Model Definitions

AR55/60 UT = AmbiRad U Tube heater with aluminised reflector & end caps.
AR55/60 SL = AmbiRad linear heaters with aluminised reflector & end caps.
AR55/60 HB = AmbiRad linear heaters in Herringbone manifold configurations with aluminised reflector & end caps.
All above in ARE configuration without End Caps

1.3 Heater Suspension

Attachment to the heater support lugs should be made by a 'speed link', D shackle or in the case of drop rods, a closed formed hook. The hanging attachments to overhead steelwork etc. must be purpose made to good sound engineering practice or of a proprietary type fixing. They must be adequately fixed and designed to carry the whole weight of the heater. In the event of suitable roof steelwork being unavailable, additional steelwork should be fitted to enable vertical hangers to be used for suspending the heaters.

These methods are illustrated in Figure 1. If there are any doubts as to the strength or suitability of roof steelwork to which heaters are to be suspended, please refer to a Consultant, Architect or owner of the building.

It is recommended that the heater is raised to its final position once the assembly of the tube/ bracket/reflector has been completed. Longer tube assemblies may be raised in more than one sub-assembly with final tube connection made in the air.

The suggested mounting heights for AmbiRad heaters are given in table 1 below.

Model	Recommended Mounting Height (m)	
	Horizontal	Inclined / wall mounted
55	4.0 - 5.0m	3.5 - 4.5m
60	4.5 - 7.0m	3.5 - 5.0m

1.4 Wall Mounting

These radiant tube heaters can be wall mounted using the appropriate bracket.

When using the wall mounting brackets the heater must be inclined at an angle between 35° and 55°.

1.5 Clearance to Combustibles.

Minimum clearance to combustibles are shown in Figure 2. Refer to table 2 over.

Figure 1. Recommended Methods of Heater Suspension.

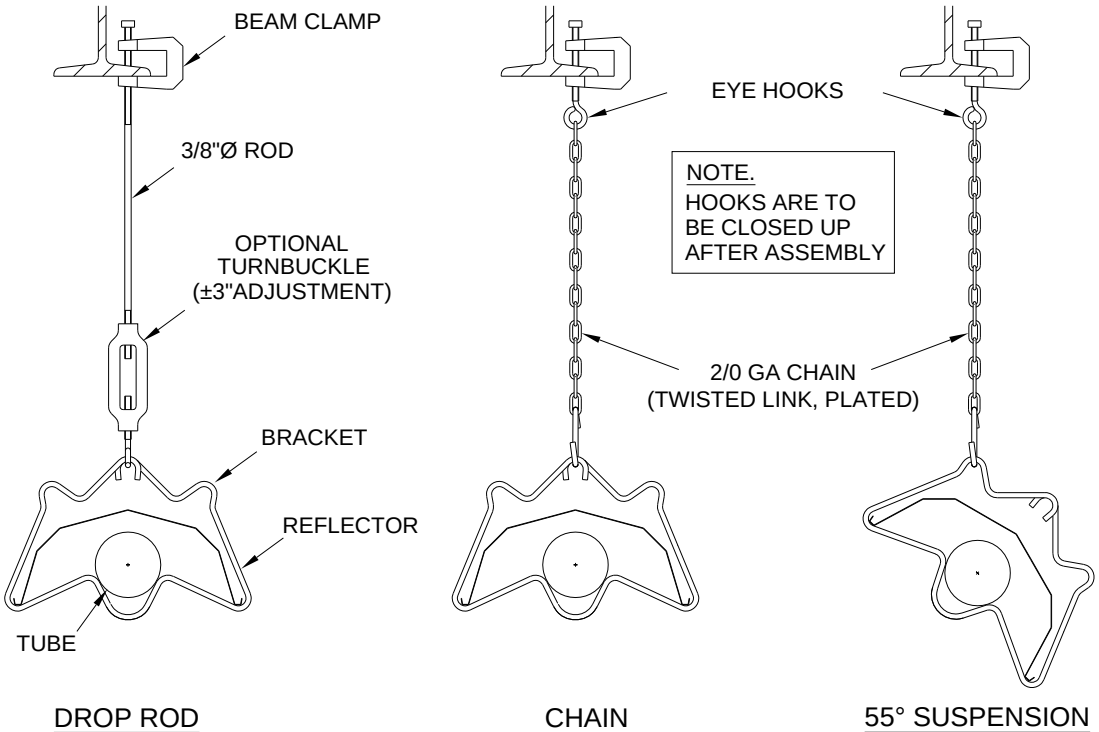
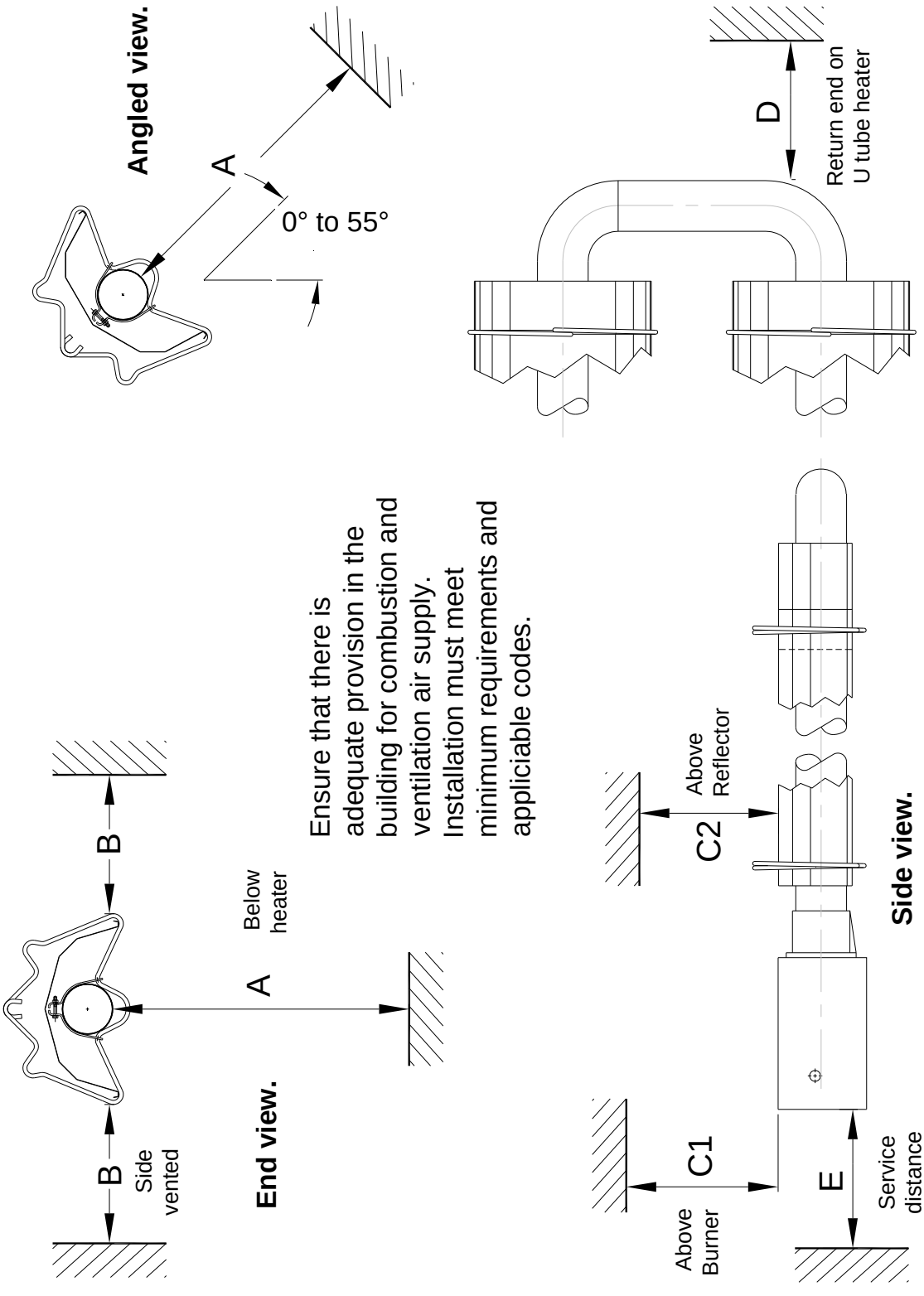


Figure 2 Clearance to Combustibles.

The minimum clearances to combustible materials are given in the tables below. These minimum distances MUST be adhered to at all times.

Table 2	Clearance to Combustibles (mm)					
Model	**A**	**B**	**C1**	**C2**	**D**	**E**
55	2085	1195	250	205	510	300
60	2085	1195	250	205	510	300



1.6 Herringbone systems (HB).

The manifold system should be arranged to fall slightly in the direction of the vacuum fan. This ensures that any condensation formed in the manifold on cold start and cool down is not trapped or allowed to drain back into the heater unit. This allows condensate to flow towards the condensate trap located at the vacuum fan end of the manifold system. (See figure 3a below for condensate trap arrangement).

The manifold should be supported by chain, stainless steel flexible wire, or other flexible means from the roof structure to allow movement caused by thermal expansion. For 100mm diameter manifold the maximum distance between supports is 2.4m and 3.0m for 150mm diameter.

Flexible couplers (supplied by AmbiRad) must be inserted within the manifold system to allow linear expansion to take place and prevent stress and strain on the system.

> The manifold must be supported either side of the flexible coupler.

The exhaust flue should be adequately supported from the building structure and installed in accordance with the British Standard Code of Practice BS 5440: Part 1:2000 – Installation and maintenance of flues and ventilation for gas appliances of rated input not exceeding 70kW net (1st, 2nd and 3rd family gases)

A condensate trap assembly must be provided at the end of the manifold system before the hot gas vacuum fan.

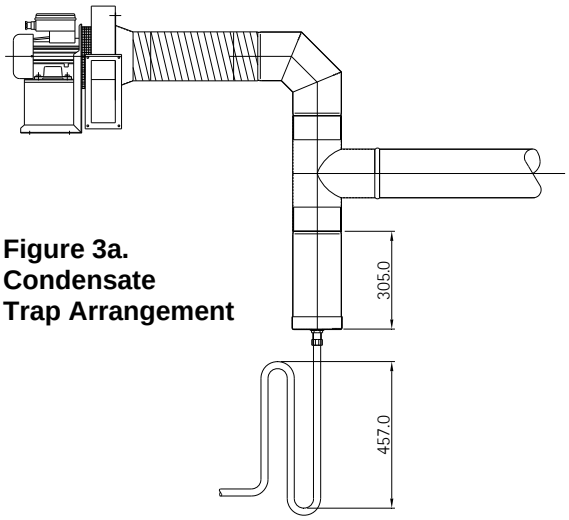


Figure 3a. Condensate Trap Arrangement

The minimum depth of the condensate collecting chamber shall be 305mm and the minimum depth of the condensate drain pipe 'U' trap shall be 457mm deep. The end cap of the collecting chamber to be fitted with a flush flanged tank connector. Any protrusion to be removed leaving the inside flush with end cap.

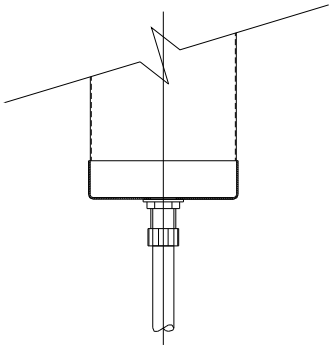


Figure 3b. Collecting Chamber Arrangement

The end cap should be sealed with silicon jointing compound and pop riveted in position. All condensate drains from the flue collecting chamber to the disposal point shall be corrosion-resistant material of not less than 22mm internal diameter. Copper or copper based alloy shall not be used for condensation drains. See reference BS 6896:2005. Condensate drain pipes must be protected against the effects of freezing.

The Type '0' and Type '2' vacuum fans have bottom horizontal discharge with rectangular connections (flanged on the type 0) and must be mounted in that position by means of the fan support stool onto a suitable platform or brackets fixed to the building structure.

For details of the fan outlet fixing holes see below.

Figure 3c. Type 'O' Fan Outlet Dimensions

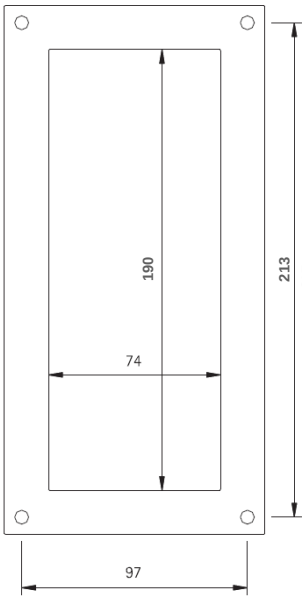
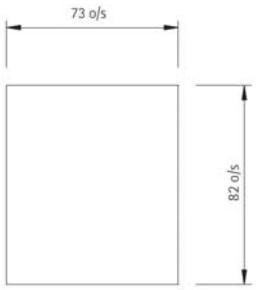


Figure 3d. Type 2 Fan Outlet Dimensions



For details of fan mounting bracket and fixing down holes see figure 4.

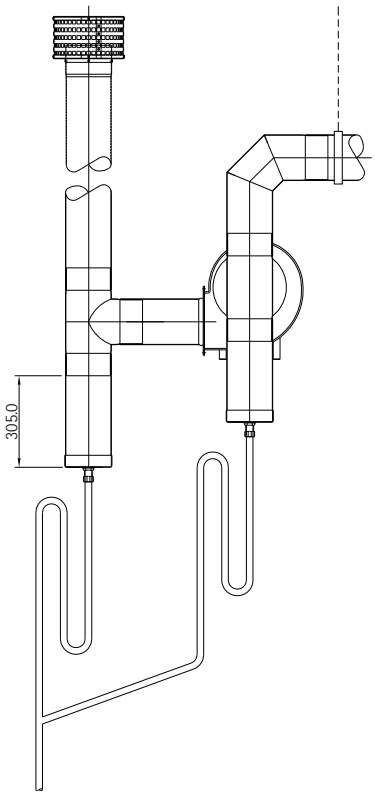


Figure 3e. Conventional Flue Arrangement Roof Exit.

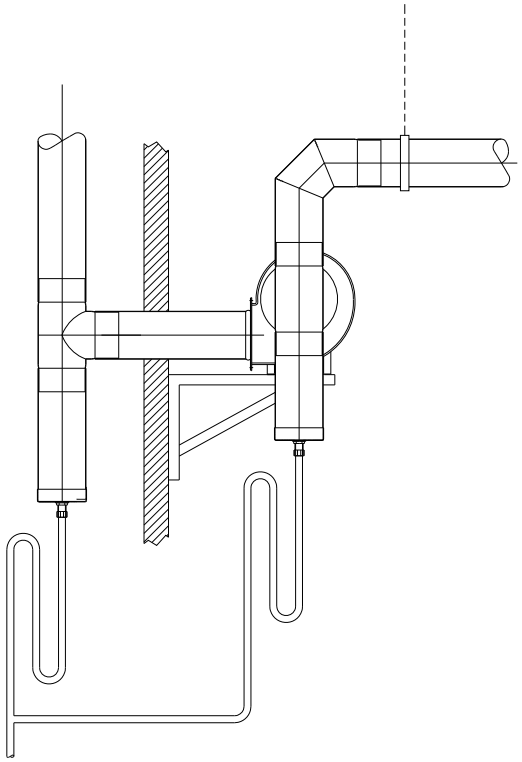


Figure 3f. Conventional Flue Arrangement Wall Exit.

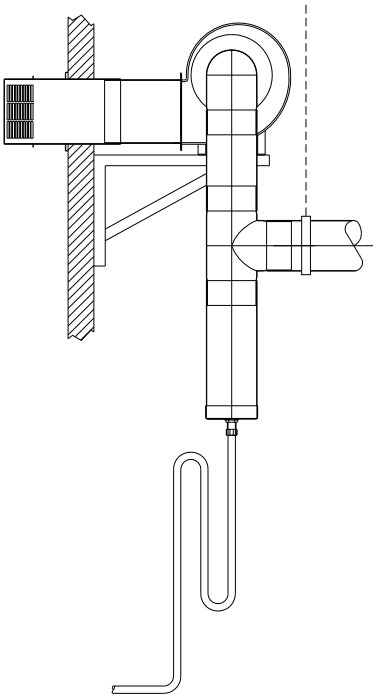


Figure 3g. Stainless Steel Telescopic Through The Wall Arrangement (available for Type 'O' and Type '2' fans)

Where a conventional flue is to be installed, AmbiRad supply an aluminium transformation piece to which a 150mm (6ins) diameter flue must be attached.

The length of flue which may be connected to the fan outlet must be adequately supported from the building structure.

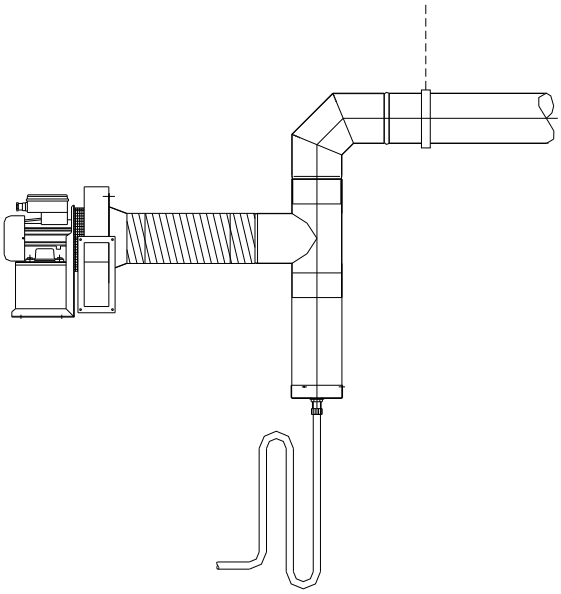
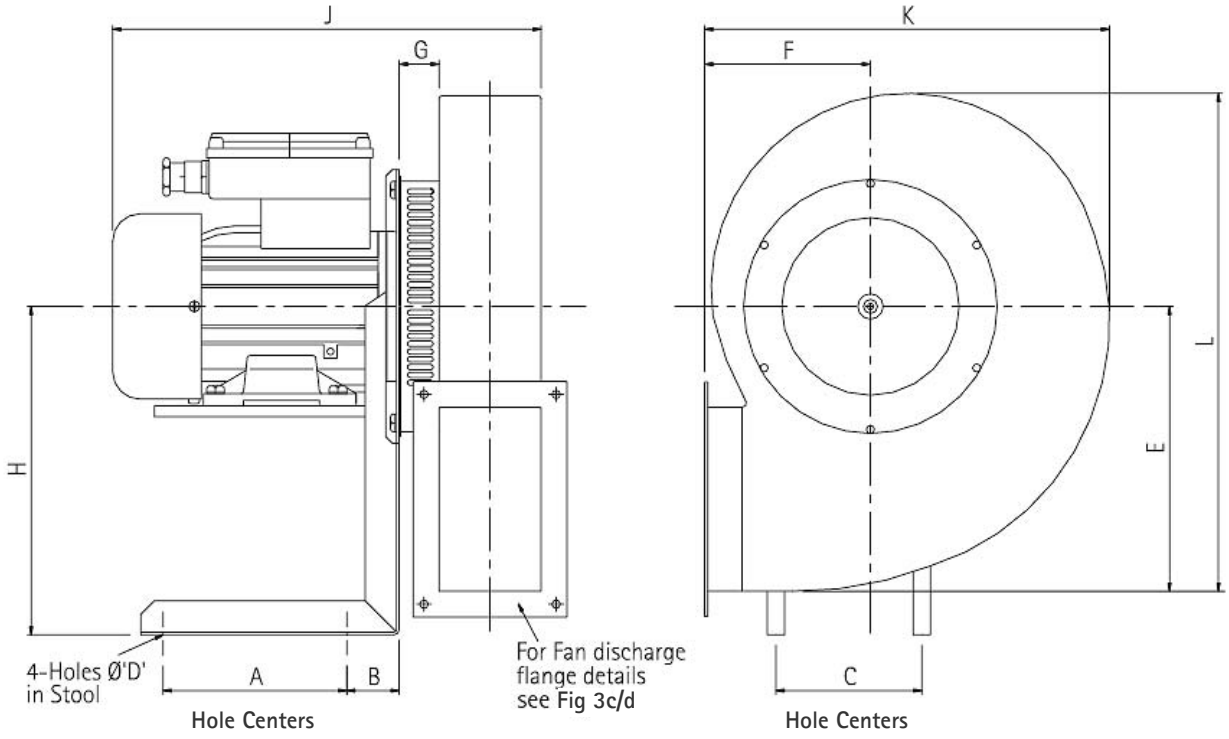


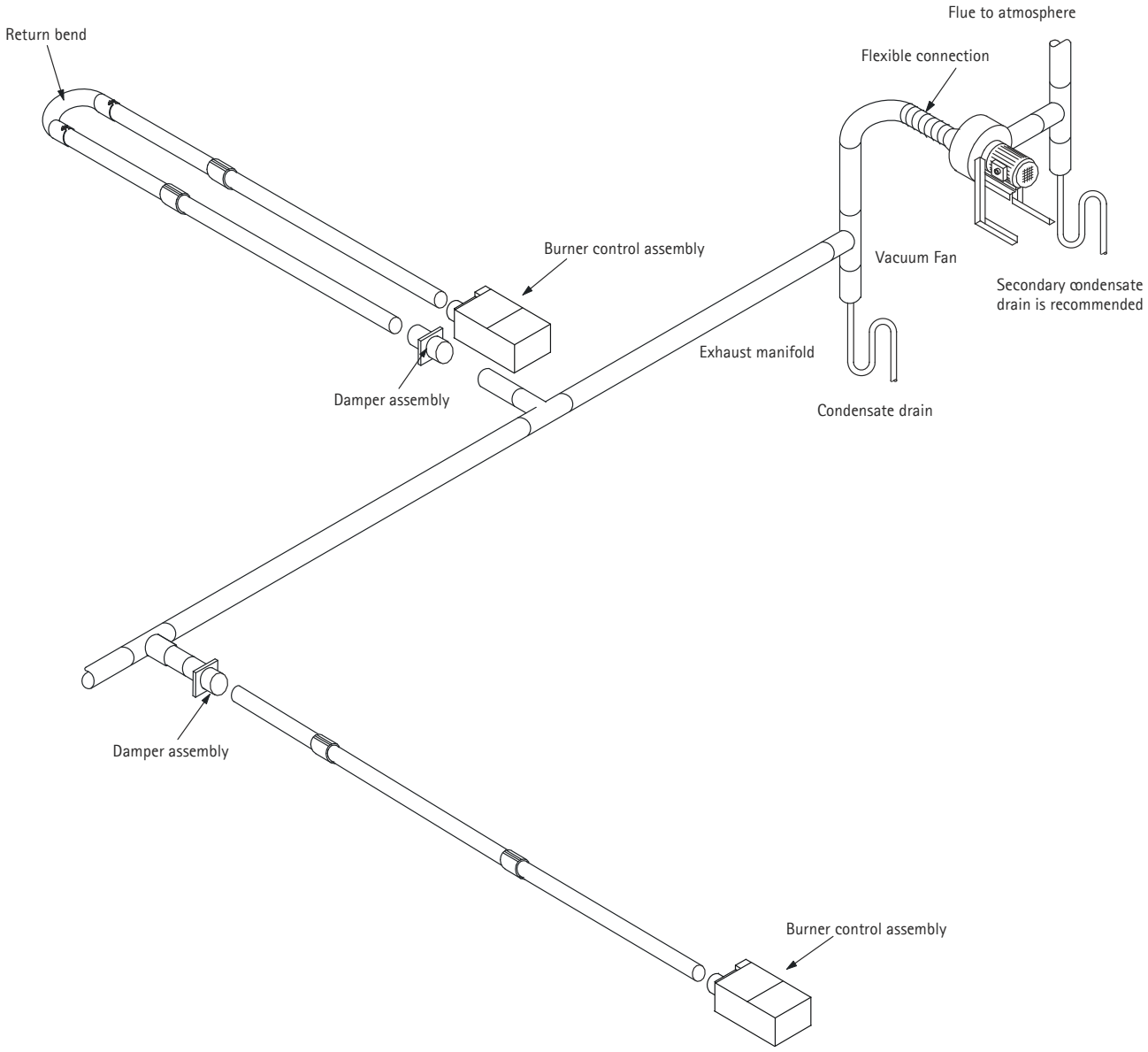
Figure 3h. Typical Low Fan Arrangement

Figure 4. Vacuum fan mounting details (Type 'O' fan illustrated)



Fan	Type O	Type 2
A	124	80
B	38	35
C	175	174
D	7.1	7
E	209	125
F	153	100
G	42	25
H	239	120
J	340	210
K	332	205
L	363	215
Power (watts)	550	120
Running Current (amps)	2.6	0.8
Voltage	230V 1ph	230V 1ph

Figure 5. Typical Herringbone system



Dos and don'ts of herringbone system

Dos	Don'ts
Check design pressure drop.	Run drains in copper or mild steel pipework.
Check for corrosive industrial process in proposed building - e.g. cleaning, electroplating, printers using sugar powder etc.	Install system with extra 90° bends without asking AmbiRad if the system will operate correctly.
Drain all flue ducts and seal all joints.	Install flue with vertical rise without firstly fitting a drain point at it's lowest level.
Secure joints with pop rivets as well as sealing compound (refer to assembly instructions).	Fit fan with outlet vertical or with top horizontal discharge.
Fit drain traps before and after fans (see figs 4).	Fit damper upside down or on it's side.
Fit expansion joints before fan and at intermediate points on the herringbone system.	Fit damper wrong way round. (see section 2.2.9.)
Run drains in galvanised steel or plastic pipes.	
Follow guide to combined flue heating system.	

1.7 Gas Connection and Supply

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

A competent or qualified engineer is required to either install a new gas meter to the service pipe or to check that the existing meter is adequate to deal with the rate of gas supply required. Installation pipes should be fitted in accordance with BS 6896:2005, so that the supply pressure, as stated in Table 4 will be achieved. It is the responsibility of the competent engineer to ensure that other relevant Standards and Codes of Practice are complied with in the country of installation. Pipes of smaller size than the heater inlet gas connection must not be used. The complete installation must be tested for soundness as described in the country of installation.

The gas union service cock MUST be fitted in the gas supply close to the heater, but not onto the burner itself.

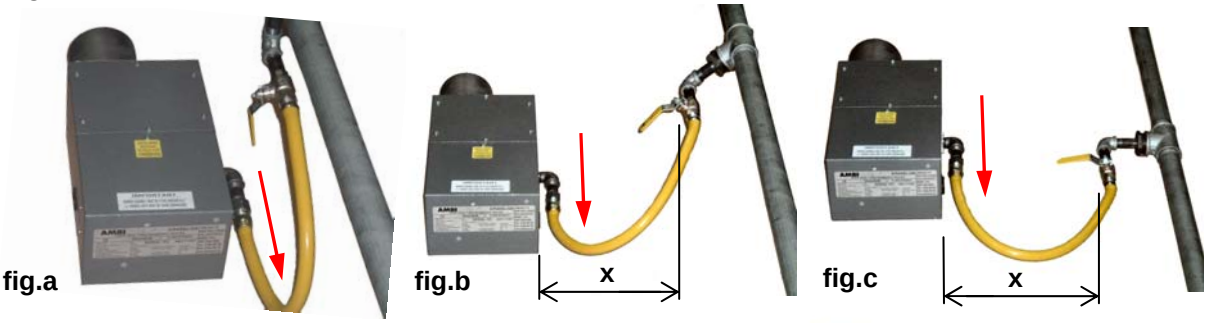
Take care when making a gas connection to the heater not to apply excessive turning force to the internal controls.

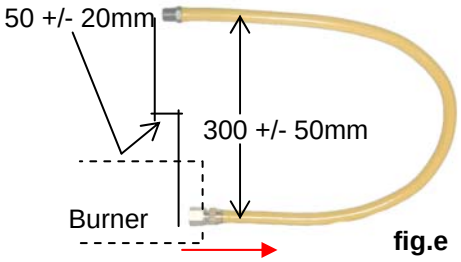
A flexible hose is installed to allow safe linear expansion of the heater without creating undue stress on the gas supply pipe work. It is therefore important that a tested and certified hose assembly made to ISO 10380 2003, supplied with ½" BSP female cone seat adapters, is installed as per these instructions.

It is also important to ensure that expansion is taken up in the body of the flexible hose, and not on its attachment to the pipe work. The cone seat adapter supplied on one end of the flexible gas hose provides a `swivel` action, and must be fitted on the burner using a ½" BSP barrel nipple to provide ease of disconnection for future servicing. This assumes that the heater and fixed gas supply to the isolating valve have been installed.

The installation layout described below is the only method recommended by the institute of gas engineers, the hose manufacturer, and AmbiRad and must only be carried out by a qualified/competent gas engineer.

Figure 6. Correct Installation of Flexible Gas Connection





Depending on the specific installation, the flexible gas hose may be routed to the gas cock at any of the following angles in relation to the burner:

Vertical (fig.a)
45° angle (fig.b)
90° angle (fig.c)

Any other position in between these angles is acceptable.

A clearance distance 'x' of min 200mm must be observed to allow side door access .

Care must be taken to observe the minimum pipe bend diameter (minimum 250mm, maximum 350mm) & pipe expansion distance (minimum 30mm, maximum 70mm) as shown in fig.e.

Maximum bend diameter for the 1000mm hose is 450mm.

The correct installation as shown will allow for approx 100mm of movement due to expansion.

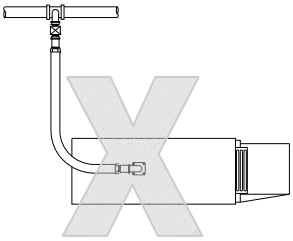


fig.f

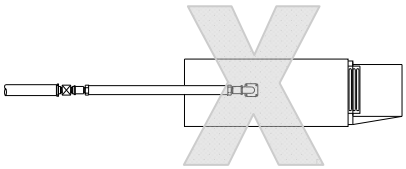


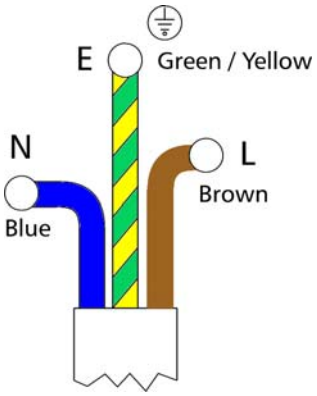
fig.g

The methods shown in fig.f and fig.g are unacceptable, due to undue stress on the hose & fittings.

Table 4 Gas Supply Pressures

Gas Category	I2H	I3P
Gas Type	Natural Gas (G20)	Propane (G31)
Max Supply Pressure (mbar)	25	45
Min Supply Pressure (mbar)	17	25
Nominal Pressure (mbar)	20	37
Gas Supply	Connection R½ ½in BSP Internal Thread	

1.8 Electrical Connections



This appliance must be earthed.
Supply 230V 50Hz single phase.
Standard heater 116W. Herringbone 16W.
Current rating 0.55 amp max (inductive).
Fuse: external 3 amp.

All electrical work should be carried out to IEE standards by a competent electrician. The electrical connection to the heater is made by means of a three pin plug-in power connector. Live, neutral and earth connections should be made via a flexible supply cable to the power connector and routed clear of the heater or tubes.

The flexible supply cables should be of 0.5mm² and comply with BS 6500:2000. The wires in the mains lead are coloured in accordance with the following code: Green & Yellow Earth; Blue Neutral; Brown Live

It is recommended the heater or group of heaters are controlled by thermostats, a time switch and if required manual control switches and a frost thermostat.

We recommend use of AmbiRad approved controls. Please refer to control manual for siting and installation details.

Where alternative manufactures controls are used, please refer to their instructions for their siting and installation details.

Figure 7.a Typical ARUT/AREUT Wiring Connections

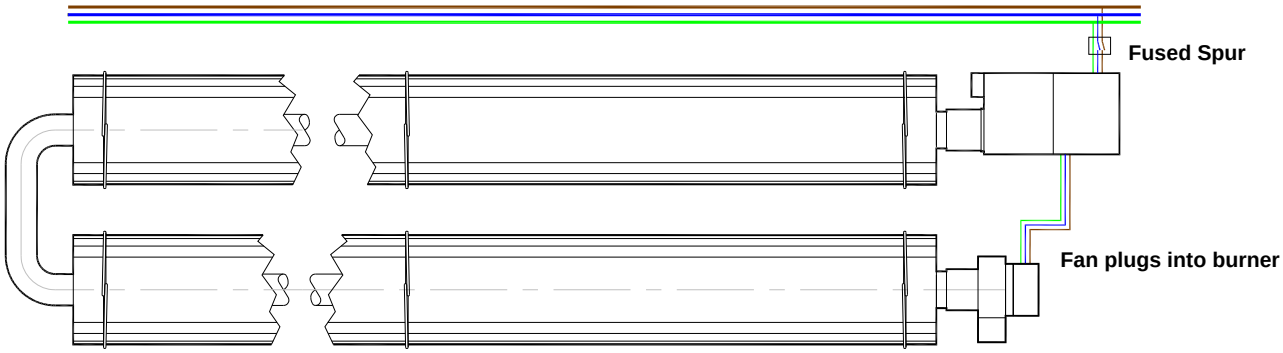


Figure 7.b Typical ARSL/ARESL Wiring Connections

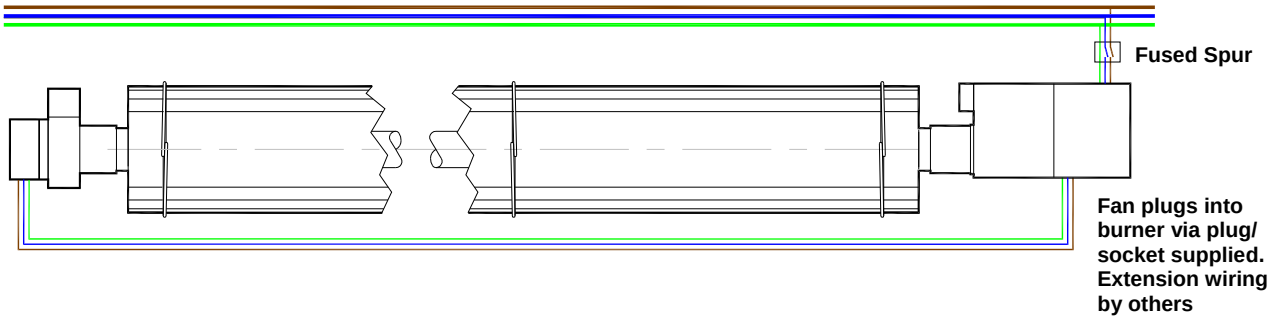


Figure 8. Internal Burner Wiring Diagram.

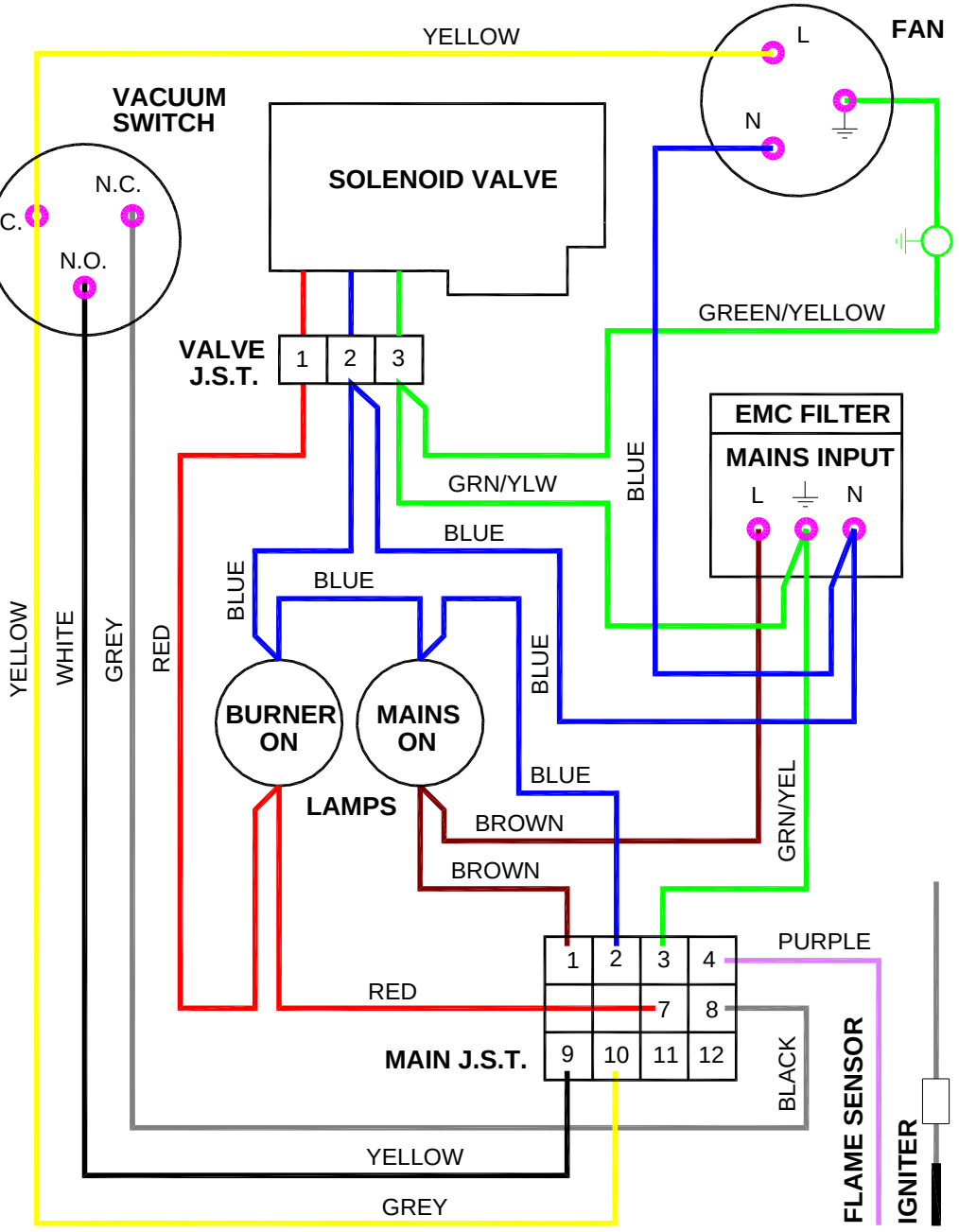
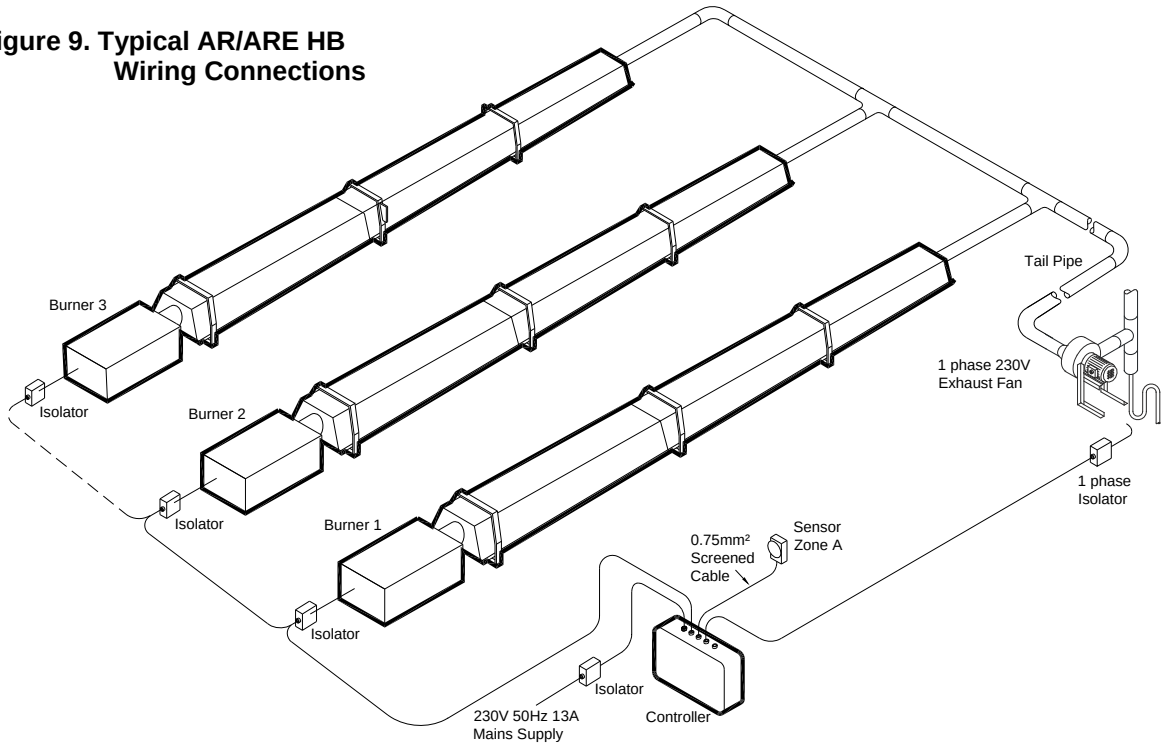


Figure 9. Typical AR/ARE HB Wiring Connections



1.9 Ventilation Requirements

AmbiRad tube heaters can be operated as flued or unflued appliances in accordance with the relevant national requirements in the country of installation.

1.9.1 Unflued Radiant Heater

Radiant tube heaters can be operated as unflued appliances so that the concentration of Carbon Dioxide (CO_2) at positions where the air will be inhaled does not exceed 0.28%.
BS EN 13410:2001 is a guide to achieving this requirement.

If the building air change rate exceeds 1.5 per hour or if the heat input is less than 5W/m³, no additional ventilation is required.

In addition to the ventilation requirements, consideration needs to be given to the possibility of condensation forming on cold surfaces.

It should be noted that the clearance distance around the burner increases when the unit is operated unflued (see section 1.6). It should be ensured that the combustion gases do not impinge on any combustible materials.

Mechanical Ventilation
Mechanical ventilation must be installed to meet a minimum of 1.5 air changes per hour using appropriately sized fans and interlocked with the heaters.

Natural Ventilation

BS EN 13410:2001 should be used to size air vents to provide adequate ventilation, an example of this calculation is given below:

Site Details:
20°c Internal Operating Temperature
0°c Outside Air Temperature
5m between high and low level vents

Following the sizing procedure in BS EN 13410:2001 gives an air exit velocity of 1.6m/s. This equates to a free area vent at both high level and low level of 17.36cm²/kW free area.

1.9.2 Flued Radiant Heater

In buildings having an air change rate of less than 0.5 per hour, additional mechanical or natural ventilation is required. For detailed information, please see BS6896:2005 section 5.2.2.2.1

Mechanical Ventilation
Mechanical ventilation must be installed to meet a minimum of 0.5 air changes per hour using appropriately sized fans and interlocked with the heaters.

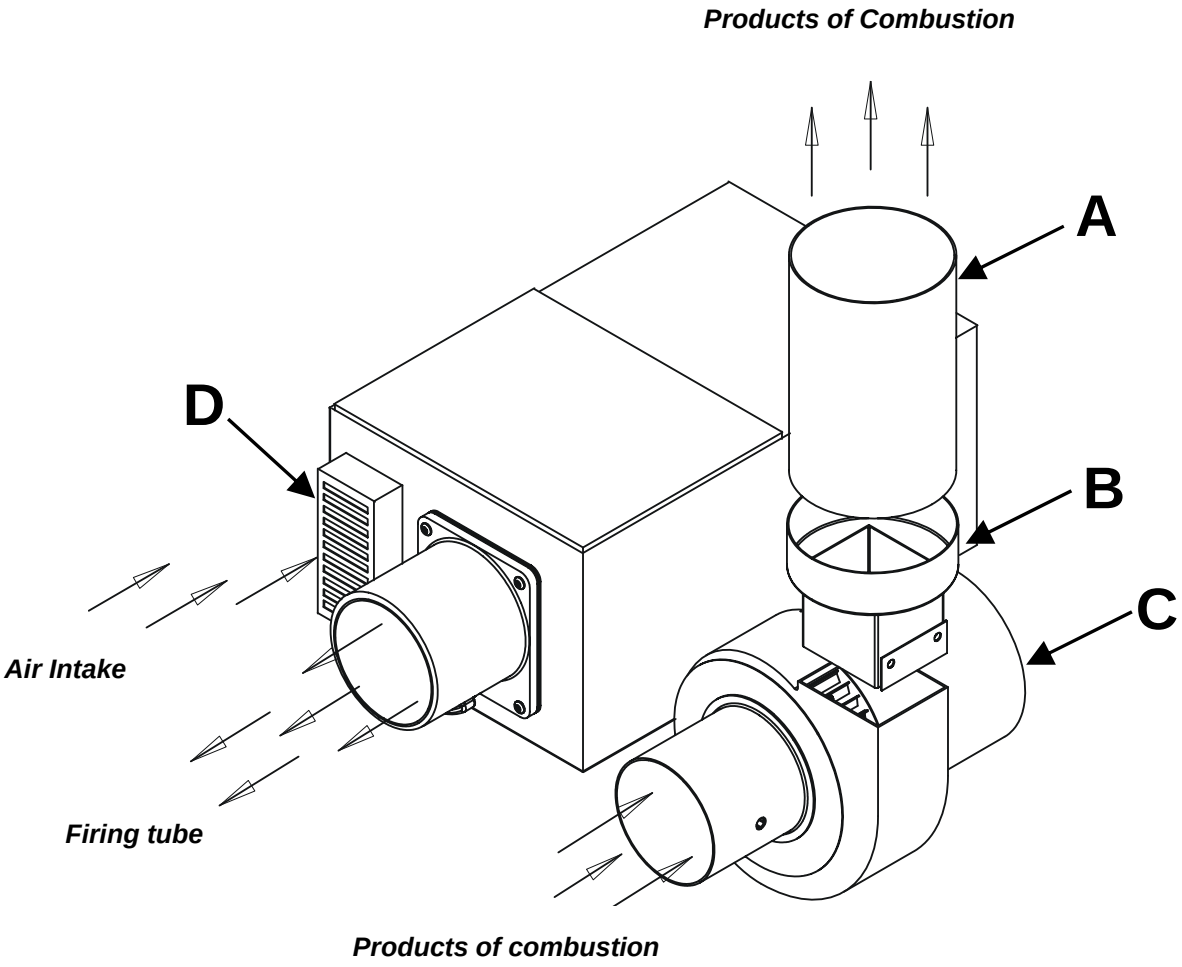
Natural Ventilation
Low level ventilation openings with a free area of at least 2cm²/kW shall be provided. See section 5.2.2.2.2.1.

1.10 Flue and Combustion Air Inlet - Options

Please refer to Figure 11 for options.

Figure 10. Flue Attachment Induced Burners

For non-flued installations, delete items A and B and rotate fan outlet to the HORIZONTAL position away from the burner.



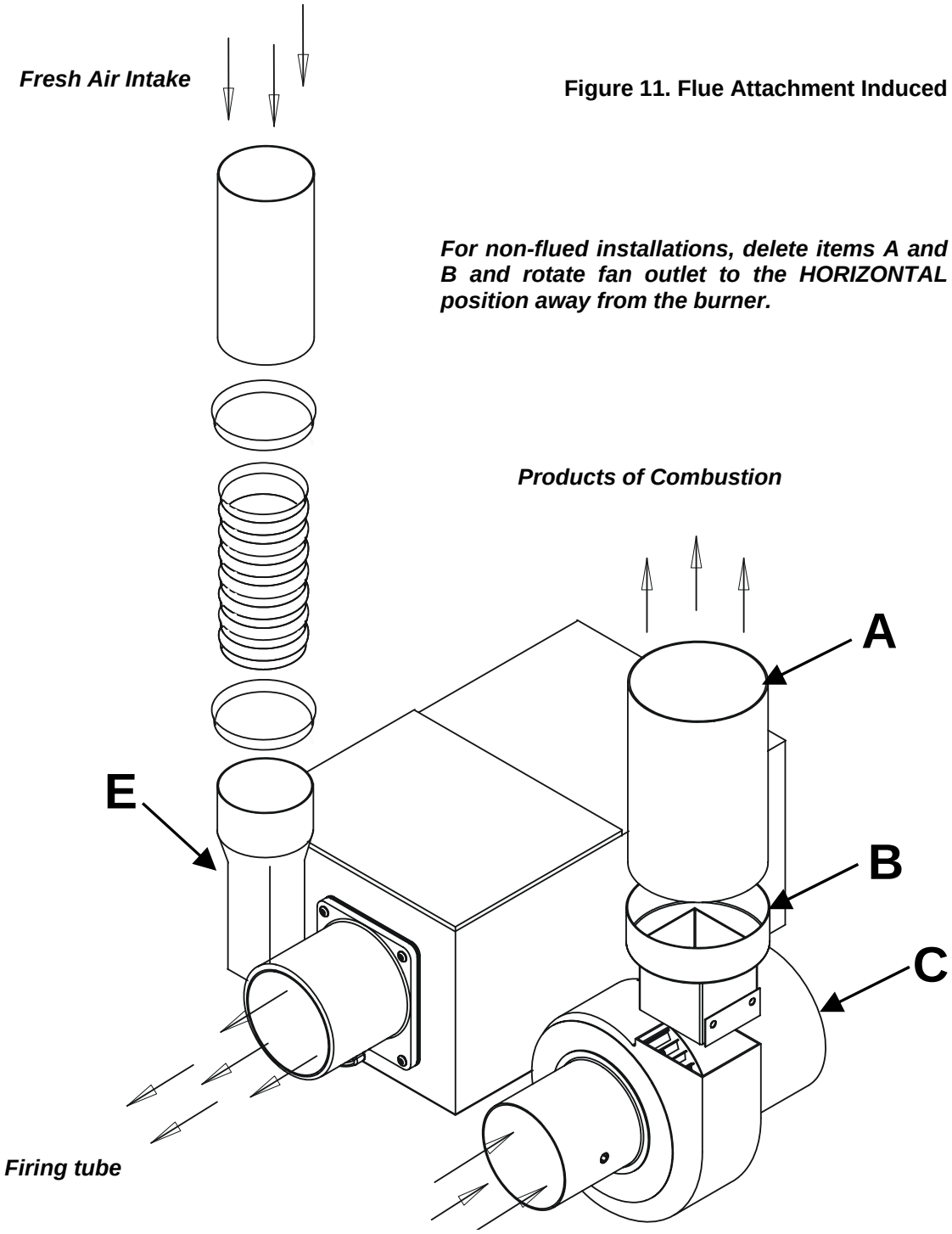
A	**127mm (5ins) Twin Wall Flue System**
B	**Fan Adaptor *7177-SUB***
C	**Fan *2560***
D	**Standard Air Intake (supplied as standard)**

Ventilation requirements are as detailed in section 1.9

Maximum flue length = 9.0m @ Ø125mm
Maximum no of bends = 2
All flues may terminate either vertically or horizontally. For further information on flue runs, please refer to BS 5440 pt.1 2000

Figure 11. Flue Attachment Induced

For non-flued installations, delete items A and B and rotate fan outlet to the HORIZONTAL position away from the burner.



Ventilation requirements are as detailed in section 1.9

Ducted air must be used in locations where there is airborne dust or where there is a polluted atmosphere e.g. Chlorinated Vapours.

Maximum length = 9m
Minimum diameter = 100mm
Maximum no of bends = 2

A	**127mm (5ins) Twin Wall Flue System**
B	**Fan Adaptor *7177-SUB***
C	**Fan *2560***
E	**Fresh Air Intake**

Maximum flue length = 9.0m @ Ø125mm
Maximum no of bends = 2
All flues may terminate either vertically or horizontally. For further information on flue runs, please refer to BS 5440 pt.1 2000

1.11 Technical Details.

No of Injectors	1
Gas Connection	½ in BSP Internal thread
Flue Nominal Bore mm (in)	125 (5)
Unitary Fan Motor Details	230 volt 1 phase 50Hz

Tables 5. Technical Details - Natural Gas (G20)

Heater Model	Heat Input kW		Gas Flowrate (m^3/hr)	Injector Pressure (mbar)	Injector Size (mm)	Size (h x l x w)	Weight (Kg)	Fan Rating (A)	Fan Type
	Gross	Nett							
AR(E)55UT	55.0	49.5	5.4	6.5	7.0	250x9950x1040		0.5	2560
AR(E)60UT	60.0	54.0	5.7	7.5	7.0	250x9950x1040		0.5	2560
AR(E)55SL	55.0	49.5	5.4	6.5	7.0	250x18910x380		0.5	2560
AR(E)60SL	60.0	54.0	5.7	7.5	7.0	250x18910x380		0.5	2560
AR(E)55HB	55.0	49.5	5.4	6.5	7.0	250x18900x380		n/a	
AR(E)60HB	60.0	54.0	5.7	7.5	7.0	250x18900x380		n/a	

Tables 6. Technical Details - Propane Gas (G31)

Heater Model	Heat Input kW		Gas Flowrate (l/hr)	Injector Pressure (mbar)	Injector Size (mm)	Size (h x l x w)	Weight (Kg)	Fan Rating (A)	Fan Type
	Gross	Nett							
AR(E)55UT	55.0	49.5	7.93	25.0	4.1	250x9950x1040		0.5	2560
AR(E)60UT	60.0	54.0	8.6	23.2	4.3	250x9950x1040		0.5	2560
AR(E)55SL	55.0	49.5	7.93	25.0	4.1	250x18910x380		0.5	2560
AR(E)60SL	60.0	54.0	8.6	23.2	4.3	250x18910x380		0.5	2560
AR(E)55HB	55.0	49.5	7.93	25.0	4.1	250x18900x380		n/a	
AR(E)60HB	60.0	54.0	8.6	23.2	4.3	250x18900x380		n/a	

Table 7. Herringbone Vacuum Fan characteristics

Fan type		**Type 'O'**	**Type '2'**
Power	(W)	550	120
Running current (overload setting)	(A)	2.6	0.8
Phase		Single	Single
Voltage	(V)	230	230

Table 8. Herringbone Settings- Natural Gas (G20)

Model	Cold HB Pressure		Hot HB Pressure	
	mm H_2O	mbar	mm H_2O	mbar
AR(E)55HB	34.7	3.4	23.5	2.3
AR(E)60HB	37.7	3.7	25.5	2.5

Table 9. Herringbone Settings- Propane Gas (G31)

Model	Cold HB Pressure		Hot HB Pressure	
	mm H_2O	mbar	mm H_2O	mbar
AR(E)55HB	38.7	3.8	26.5	2.6
AR(E)60HB	36.7	3.6	24.5	2.4

Table 10. Flue details - Natural Gas

Heater Model	Mass Flow Rate of Flue Gasses (kg/s)	Flue Pressure (Pa) Maximum Flue Resistance	Flue Gas Temp (°C)
AR(E)55UT/SL	0.0350	66.9	205
AR(E)60UT/SL	0.0335	81.6	214

Table 11. Flue details - Propane

Heater Model	Mass Flow Rate of Flue Gasses (kg/s)	Flue Pressure (Pa) Maximum Flue Resistance	Flue Gas Temp (°C)
AR(E)55UT/SL	0.0338	109	219
AR(E)60UT/SL	0.0329	93	231

2. Assembly Instructions.

PLEASE READ *this section prior to assembly to familiarise yourself with the components and tools you require at the various stages of assembly. Carefully open the packaging and check the contents against the parts and check list.*

The manufacturer reserves the right to alter specifications without prior notice.

Please ensure that all packaging is disposed of in a safe environmentally friendly way.

For your own safety we recommend the use of safety boots and leather faced gloves when handling sharp or heavy items. The use of protective eye wear is also recommended.

2.1 Tools Required.

Suitable alternative tools may be used.

The following tools and equipment are advisable to complete the tasks laid out in this manual.

Trestles

Leather Faced Gloves

Pozidrive Screwdriver

10mm, 12mm & 13mm Spanners

Cordless Drill

13mm Socket

4 & 5mm Allen Keys

Tape Measure

Saw

Pop Riveter & 3/16" Rivets

Silicone Sealant & Gun

Herringbone Systems Only

2.2 Assembly Notes.

Please read these assembly notes in conjunction with the correct assembly drawings (figs 12 & 13).

2.2.1 Tubes

Each heating unit has two types of emitter tube.

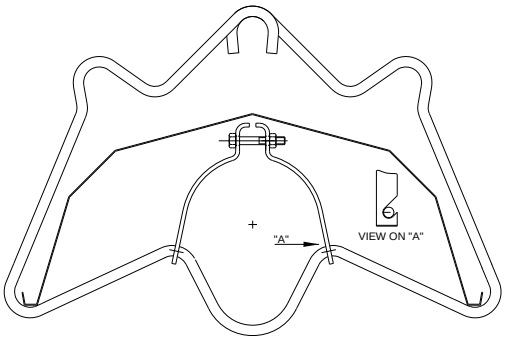
Identify and position tubes on trestles. For aesthetics it is advisable to position **all tube seam facing down.** Position coupling fastener so that these cannot be seen from beneath the heater.

Mark out the position of the bracket centres from the dimensions shown on the assemblers' drawings.

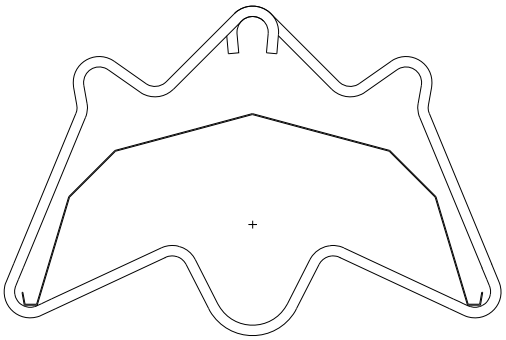
2.2.2 Brackets

There can be four types of brackets supplied with these heaters:

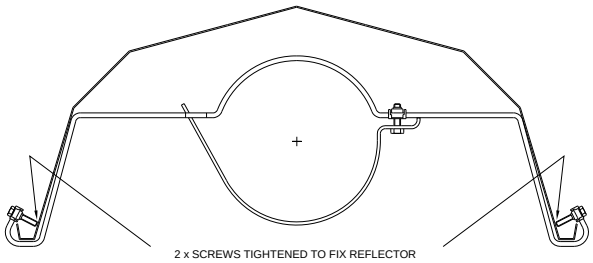
- *Type 'H' are suspension brackets with tube straps.*



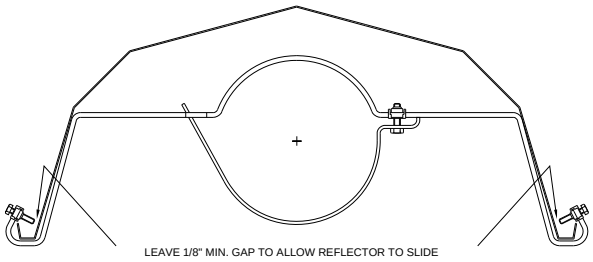
- *Type 'G' are suspension brackets with no tube straps.*



- *Type 'F' are fixed reflector brackets.*



- *Type 'S' are sliding reflector brackets.*



Slip the suspension brackets onto the tube assembly. The fixed suspension point 'H' shown on the drawings are adjacent to the burner and secures the first suspension bracket to the tube with a tube strap. All other suspension brackets 'G' shown on the drawings, have floating suspension points.

Reflectors are fixed at point 'F' with a reflector support bracket and reflectors are held in position with fixing screws. Fixed and sliding joints alternate along the heater at the spacings indicated on the individual heater assembly sheets.

2.2.3 Couplers

There are couplers for the joining of radiant tubes and U bends.

Slide the coupler over the tube ensuring that the rivet stop has butted up to the tube ends. Using the Allen wrench, tighten the pins.

DO NOT OVERTIGHTEN.

Moving between the two set pins, tighten both ensuring that equal pressure is applied to each set pin in turn. Complete assembly by drilling and screwing self tapping retention zip screws.

> *At this point raise the tube assembly into position and suspend from previously fixed chains (2/0 min. gauge), or attach to wall mounting brackets. Wall mounting brackets must support heater at an angle of inclination of 45° ± 10°. Longer tube assemblies may be raised in more than one sub-assembly with final tube connection made in the air. It is recommended that the heater be suspended to slope slightly down-ward from the burner approximately 25mm in 6m, but not more than 50mm total overall.*

2.2.4 Reflectors.

After removing the protective plastic coating, slip the reflectors through the hanger brackets until they overlap each other.

> All reflectors must be positioned/ attached to the brackets exactly as detailed in the assembly drawings.

The first and second reflector are fixed at the point F by a type F reflector support bracket and are held in place by tightening the fixing screws.

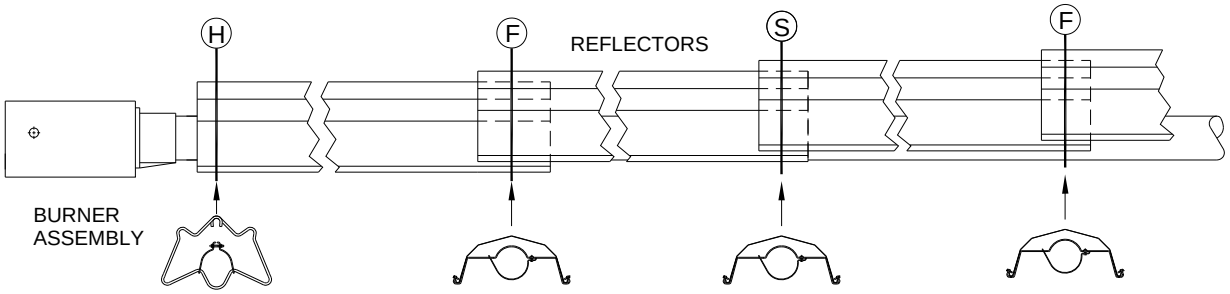
> Each subsequent reflector must **OVERLAP** the previous one as shown below and to a distance as indicated by their individual assembly sheets.

Alternate fixings of further reflectors by type S and type F reflector brackets and space as indicated by individual assembly sheets.

> Reflector support bracket assemblies are fitted at each reflector joint, with the clamp screws adjusted so that reflectors are fixed together.

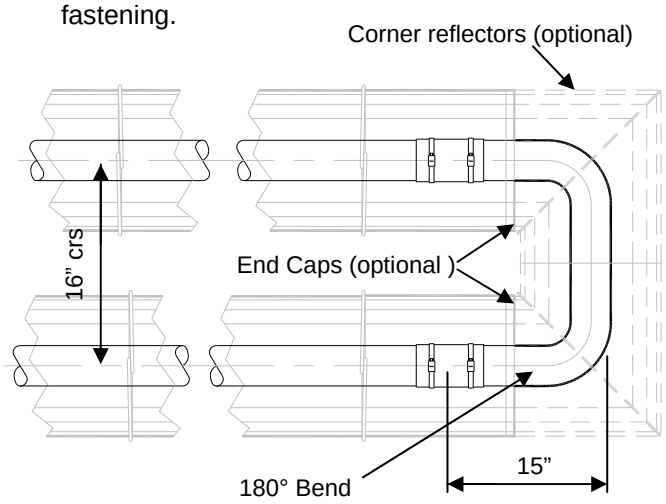
2.2.5 End Caps.

On AR heaters ONLY: position ONE end cap beneath the reflector profile at the open/fan/ damper end with the end cap flanges facing inwards. Fasten to reflector using 'Z' clips. Position the other end cap beneath the reflector profile at the burner end with the end cap flanges facing inwards. Fasten to reflector using 'Z' clips.



2.2.6 U Bend (where fitted)

Slide the bend into the open end of the coupler ensuring that the rivet stop has butted up to the tube ends. Refer to 2.2.3 for fastening.



2.2.7 Burner Assembly.

On U tube heaters only, slide the burner assembly onto the **RIGHT HAND TUBE** when viewed from above**,** ensuring it is fully engaged. Secure with grub screws.

On linear heaters only, slide the burner assembly onto the **inlet end of the tube** ensuring it is fully engaged. Secure with grub screws.

2.2.8 Fan Assembly.

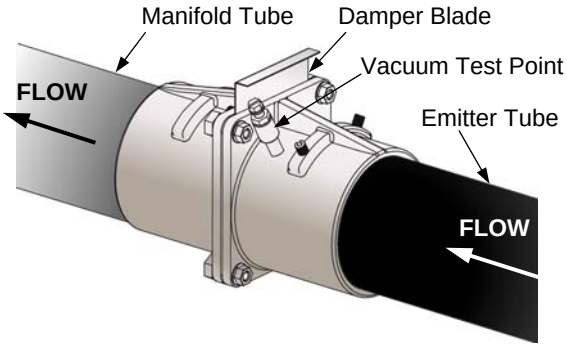
On U Tube heaters only, slide fan onto the left hand tube ensuring it is fully engaged. The fan discharge should face vertically for individually flued or horizontally away from the burner if unflued.

On linear heaters only, **s**lide fan onto the opposite end of the tube ensuring it is fully engaged. The fan discharge should face vertically for individually flued or horizontally away from the burner if unflued.

2.2.9 Herringbone Manifold Assembly.

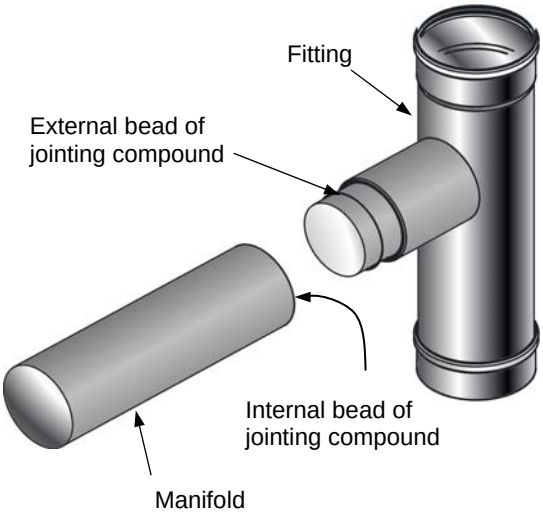
HB Models ONLY. After fixing the heaters in the desired position, the manifold system requires fitting.

After allowing for a minimum of 75mm (3in) of penetration of the fitting into the tube, cut the tubes to the lengths required and remove all burrs and wipe off any grease or oil with a clean rag.



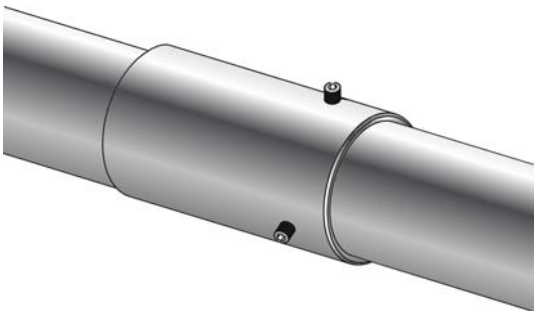
Method of jointing aluminium tube

Using the applicator gun exude 4mm diameter bead of high temperature silicon jointing compound externally round the end of the fitting and internally round the end of the tube.



Enter the fitting into the tube using a slight rotating movement to spread the jointing compound uniformly until a penetration of 75mm (3in) is achieved.

Note The silicon jointing compound remains workable after application for only 5 minutes.

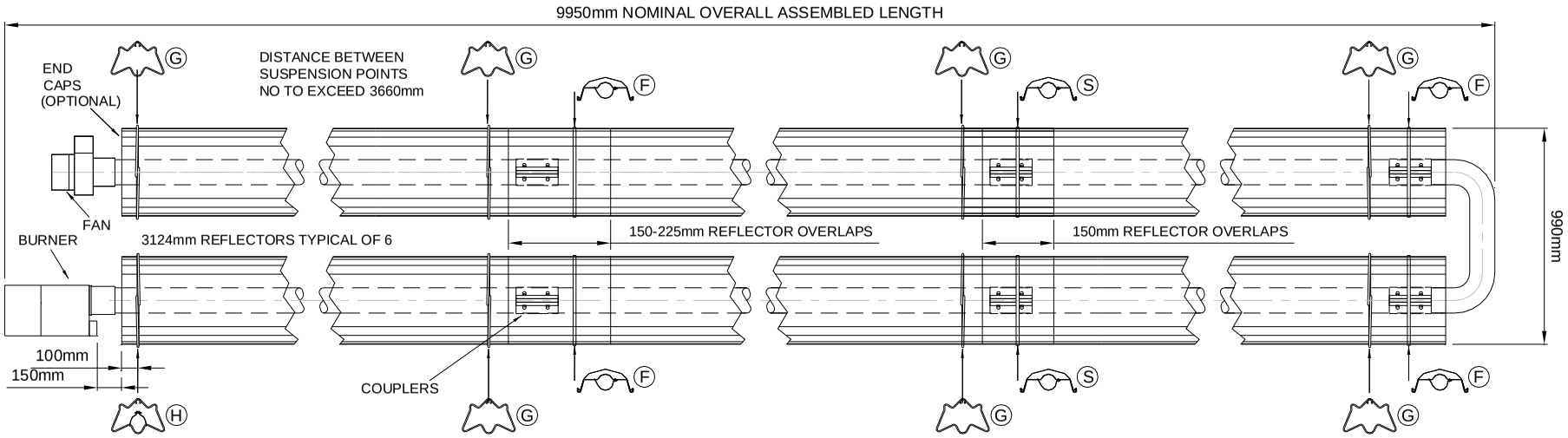


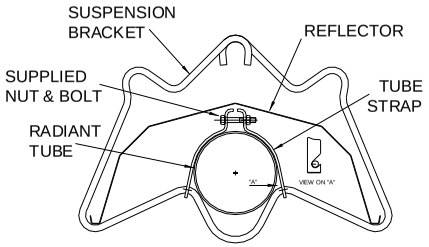
Secure the joint by drilling through the tube and fitting and fix with three pop rivets at 12 o'clock, 4 o'clock and 8 o'clock positions. 4.8mm (3/16in) diameter pop rivets are recommended.

2.2.10 Detailed Assembly Drawings

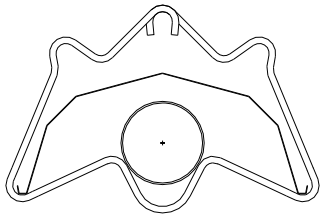
The following pages show the technical dimensional details of the AR/ARE55 and 60 heaters.

Please note the heater type, length and reference number from the delivery/advice note before identifying the correct model drawing.

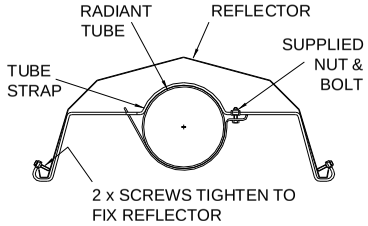




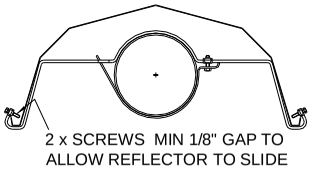
FIRST SUSPENSION POINT TUBE STRAP
DETAIL (H)



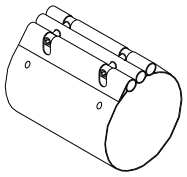
TUBE & REFLECTOR SUSPENSION BRACKET
DETAIL (G)



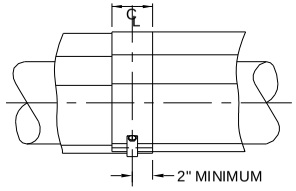
FIXED REFLECTOR BRACKET
DETAIL (F)



SLIDING REFLECTOR BRACKET
DETAIL (S)



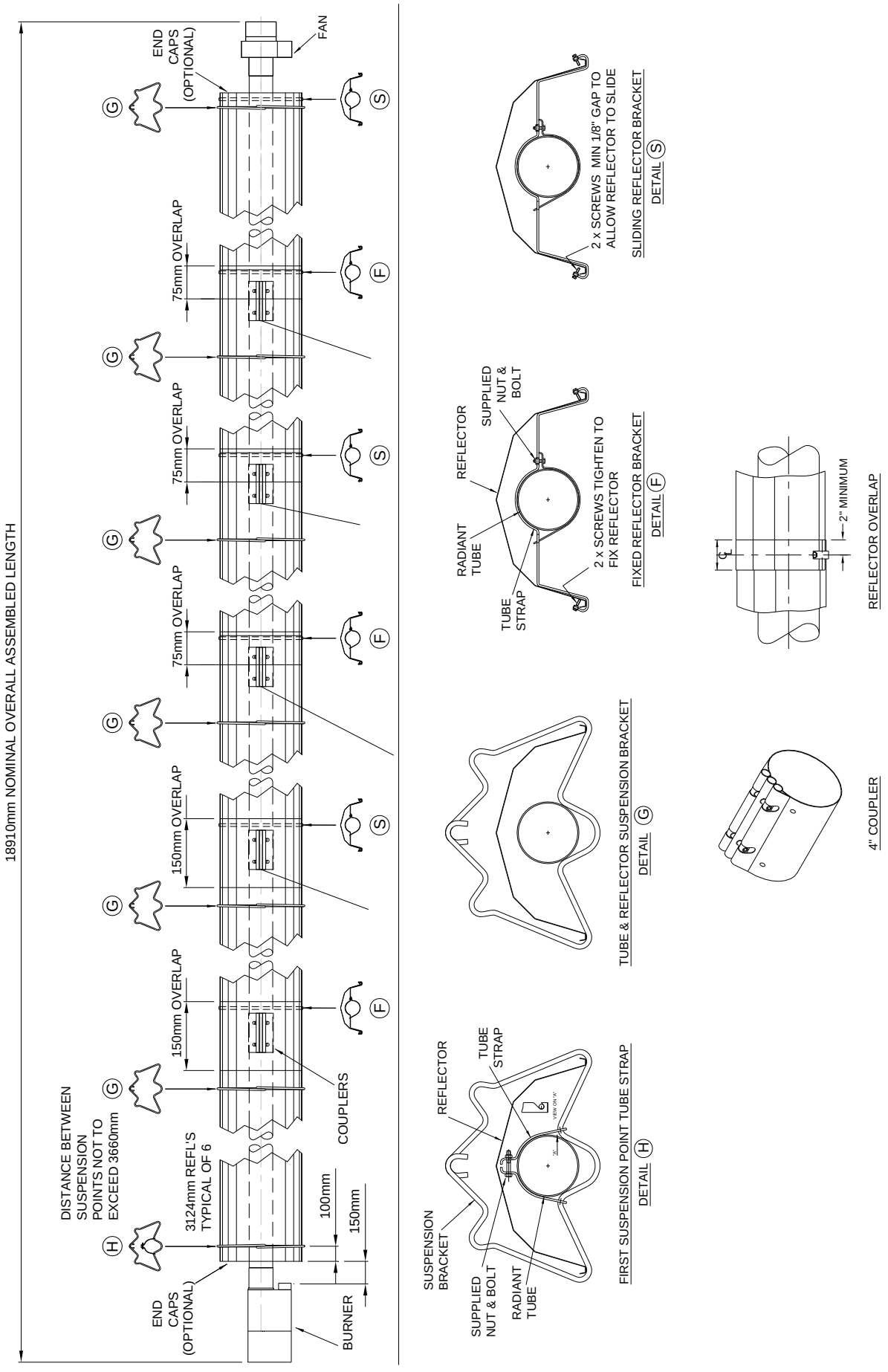
4" COUPLER



REFLECTOR OVERLAP

Figure 12. AR U tube Heater Assembly: AR55/60

Figure 13. AR SL tube Heater Assembly: AR55/60



3. Commissioning Instructions.

These appliances should be commissioned by a qualified engineer.

3.1 Tools Required.

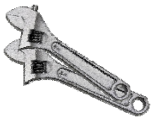
The following tools and equipment are advisable to complete the tasks laid out in this manual.

Suitable alternative tools may be used.


Leather Faced Gloves


Pozidrive Screwdriver


Small Flat Head Screwdriver


Large Adjustable Spanners or 22, 26 & 27mm Spanners for fitting Of Gas Flex.


12mm Spanner


4mm Allen Key


Manometer


Wrench with Extension


13mm Socket

3.2 Commissioning for individually flued and unflued heaters.

Inspect installation and ensure that it has been carried out in accordance with these instructions. Ensure that electrical and gas supplies are isolated. The gas supply should be purged and tested for soundness in accordance with the BS 6891:1988, BGIM/16, IGE Report 1M/2 and any other British Standard and Codes of Practice. Open isolating valve.

Remove the combustion chamber cover plate or ducted air inlet connection by unscrewing 6 fixing screws. Take care not to damage the sealing gasket. Inspect the burner and electrode assemblies, ensuring these are securely fixed and all electrical connections securely made. Replace the cover plate or ducted air inlet connection, ensuring that the sealing gasket is correctly positioned and the six screws are fully tightened. The heater will not operate until this plate is refitted.

Open the control housing cover door by unscrewing the securing screw. Ensure all internal components are securely fixed and all connections securely made.

Switch on the electrical supply to the heater and observe the correct start up sequence as follows:

The mains lamp (red) will illuminate. The ID fan will start to run and the vacuum switch checking relay (inside flame electronic sequence control box) will pull in. Safe-start checks are carried out automatically and a purge period of approximately 9 seconds will commence.

At the end of the purge period the ignition sequence will commence. The spark ignition will be energised producing a spark at the ignition electrode. The gas shut off valve will at the same time be energised. If ignition is successful the flame is detected by the flame sensing probe and the ignition spark will be switched off. The 'burner on' (amber) lamp indicates that the gas safety control valves are energised.

If the ignition is unsuccessful the gas safety control valve is closed and the spark ignition de -energised after approximately 5 to 7 seconds. After an unsuccessful ignition attempt the electronic sequence controller will 'lock-out'. The 'power lamp' (red) only will remain illuminated and the fan will continue to run. To reset this 'lock-out' condition, switch the power supply to the heater, wait 15 seconds then restore it. If repeated lock-out occurs investigate cause.

In the event of an electrical fault after installation of the appliance preliminary electrical systems checks should be carried out (re-earth continuity polarity and resistance to earth).

To shut down the heater, switch off the power supply to the heater. Automatic control of the heater or a series of heaters may be achieved by incorporating thermostats, time switches, frost thermostats, manual over-ride switches etc., in the electrical supply to the heater(s). It is essential to allow a delay of 15 seconds after switching off a heater before attempting to restart.

If at any time after completion of the start up sequences, loss of flame should occur, the electronic sequence controller will attempt to re

-ignite. If this is unsuccessful lock-out will occur.

Set burner gas pressure as follows. Isolate gas supply. Unplug mains input connector to heater. Unscrew the fixing screw in the hinged safety control housing lid and swing away.
Remove pressure test point screw nearest the burner head and connect a 'U' tube manometer to the pressure test nipple located on the body of the gas valves. Remove the slotted cover from the pressure test regulator revealing the adjustable screw.
Replace mains input connector and start the heater. Using a suitable screwdriver adjust the pressure regulator. Switch off the heater by pulling out the mains input connector.
Disconnect 'U' tube manometer and refit screw in pressure test nipple. Replace cover on pressure regulator. If heater is flued check that there is adequate updraught at the down -draught diverter eg. by means of a smoking taper when heater is running.

Check the operation of the flame safe guard equipment as follows. With the heater running normally, switch off the gas supply at the appliance isolating valve. Observe that the 'burner on' lamp extinguishes within one second. After a purge period of approximately 9 seconds the heater should attempt to re-light and if the gas isolating valve has been left off, lock -out should occur indicated by power light only being illuminated and fan running.

Check the operation of the vacuum proving switch as follows. With the heater running normally pull out the three pin fan connection plug, thus causing the fan to slow down and stop. Within 3 seconds the burner should shut off. Observe for at least 20 seconds that there is no attempt to re-ignite, then replace the three pin plug and observe that the heater proceeds to ignite in the normal way.

Close the safety control housing lid which is secured with the fixing screw.

Hand the 'User Instructions' to the user and explain how to operate the heater. Leave the 'Installation and Servicing Instructions' at the user's meter or preferably with the service/ maintenance engineer/manager for use on future service calls.

Note It will be noted that heaters have a tendency to bow when hot, this is normal and quite acceptable.

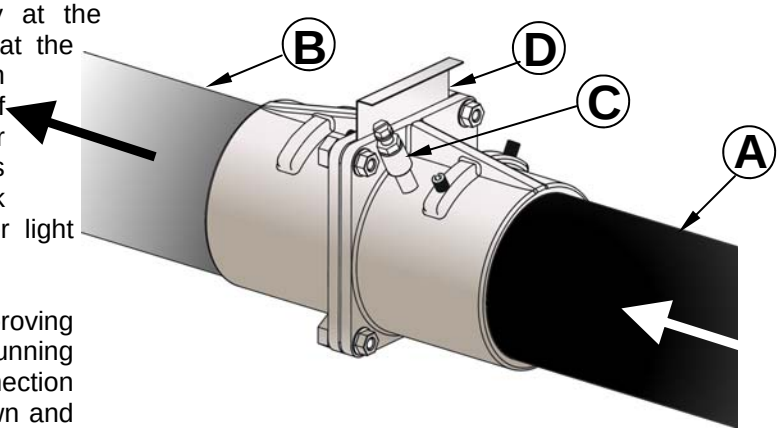
3.3 Balancing The Herringbone System

Important When all the heaters have been installed the vacuum settings must be finally balanced in the hot condition.

Before attempting to start up the heating system it is essential to perform the preliminary balancing of the vacuum level at each burner unit. Isolate each heater unit by unplugging the electrical connector and closing the gas isolating valve.

Start all burners up and allow them to run for at least 20 minutes. Adjust the damper at exit of each heater using a 4mm Allen key in the damper blade securing screw. Observing the vacuum reading using a 'U' tube manometer connected to the vacuum test point (see fig14) each damper should be readjusted and set at a hot condition reading as shown in table 8 (NG) and table 9 (LPG) for the appropriate size of heater and model.

Figure 14. HB Damper Assembly



3.4 Commissioning chart for AR series unitary heaters

Check installation has been carried out to these instructions.

Ensure gas and electricity supplies are isolated.

Disconnect gas hose from burner

Remove burner from tube and inspect burner head. (See servicing instructions)

Replace burner on tube and secure.

Reconnect gas hose. Open isolating valve. Check soundness.

Open control housing and check that all components are securely fastened.

Check thermostat is set to maximum and is calling for heat.

Switch on electrical supply. The red neon should now be illuminated. If restarting heater a delay of 15s should be allowed.

Turn off power and check that all components are securely fastened.

The heater should now run through its start up sequence and ignite.

NO

A successful ignition is indicated by the amber light illuminating and remaining illuminated.

Has the burner lit?

YES

Check gas pressure.

Check operation on flame failure. Check gas pressure.

Check operation of air pressure switch.

Close control housing

Leave the instructions with a responsible person.

Gas Valve adjustment

Gas inlet test point

Injector pressure test point.

Adjustment screw under cap to set injector pressure

4. Servicing Instructions.

These appliances should be serviced annually by a competent person to ensure safe and efficient operation. In exceptional dusty or polluted conditions more frequent servicing may be required. The manufacturer offers a maintenance service. Details available on request

4.1 Tools Required.

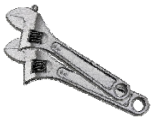
Suitable alternative tools may be used.

The following tools and equipment are advisable to complete the tasks laid out in this manual.

Leather Faced Gloves

Pozidrive Screwdriver

Small Flat Head Screwdriver



Large Adjustable Spanners or 22, 26 & 27mm Spanners for Fitting of Gas Flex.

12mm Spanner

4mm Allen Key

Manometer

Wrench with 13mm Socket

Soft Brush

4.2 ID fan

Remove ID fan by unplugging the electrical connection from the burner/control assembly and loosening the fan securing pinch screw. If a flue is fitted, this must be disconnected. The fan will now slip off the emitter tube. Inspect the main fan impeller and remove any dust by brushing with a soft brush. Similarly remove any dust from the finger guard covering the secondary (cooling) impeller and the mesh aperture in the motor cover. Ensure that the impeller turns freely and that there is not excessive play in the bearings. Do not replace fan until emitter tube inspection has been completed.

4.3 Emitter tube inspection

Brush away any dust on the exterior of the emitter tubes.

Inspect the emitter tubes internally. If there is any appreciable build up of dust or deposits the tubes should be cleaned internally. Remove the burner/control assembly as directed below.

Detach return bend and remove the turbulators where fitted. The two tubes can then be cleaned by passing rods and a suitable scraper through them or by use of an industrial vacuum cleaner with a long extension tube.

4.4 Reflector

Although not considered part of an annual routine service, the condition of the reflector should be noted and the user's attention drawn to any cleaning necessary. The reflectors can be simply withdrawn for cleaning by removing the M6 nuts and bolts securing them and sliding them out of the suspension brackets once the reflector end caps have been removed. The reflectors can be cleaned with a soft cloth and detergent in water. A mild non abrasive metal polish may be used in cases of extreme discolouration. Dirty reflectors will increase the heat radiation upwards into the roof space by 3-4%.

4.5 Removal of burner/control assembly

Remove the burner/control assembly by disconnecting the gas and electrical supply, fresh air inlet (if fitted) and the fan electrical connection. Slacken the burner fixing pinch screws and draw the assembly off the emitter tube.

4.6 Burner/electrode assembly

Inspect the burner electrode assembly by removing six dome head screws securing the combustion chamber's cover plate on top of the burner box, taking care not to damage the sealing gasket. Remove the burner head by unscrewing it from the injector, taking care not to drop it onto the leads of the ignition electrodes.

Pepper pot burner heads should be examined every 6 months for signs of debris and cleaned by blowing compressed air in reverse direction to flow. Renew the electrode assembly if it is not in good condition.

The assembly is then lifted out of the combustion chamber and the two connection cables disconnected.

If the electrode assembly is in good order check the spark electrode gap. This should be 3.5mm ± 0.5mm. Adjust the gap if necessary by bending the earth rod. Refit the electrode assembly in the reverse order of removal,

ensuring that the electrical connections to the assembly are the correct way round and secure.

Inspect the injector and clean as necessary. Do not broach out. To remove the injector with the burner head removed, unscrew the injector from its carrier using a spanner on the hexagon portion of its body. When replacing the injector ensure that it is fully tightened in its carrier.

Replace the burner head. Replace the combustion chamber plate cover, renewing the sealing gasket if this is not in good condition.

5. Spare Parts.

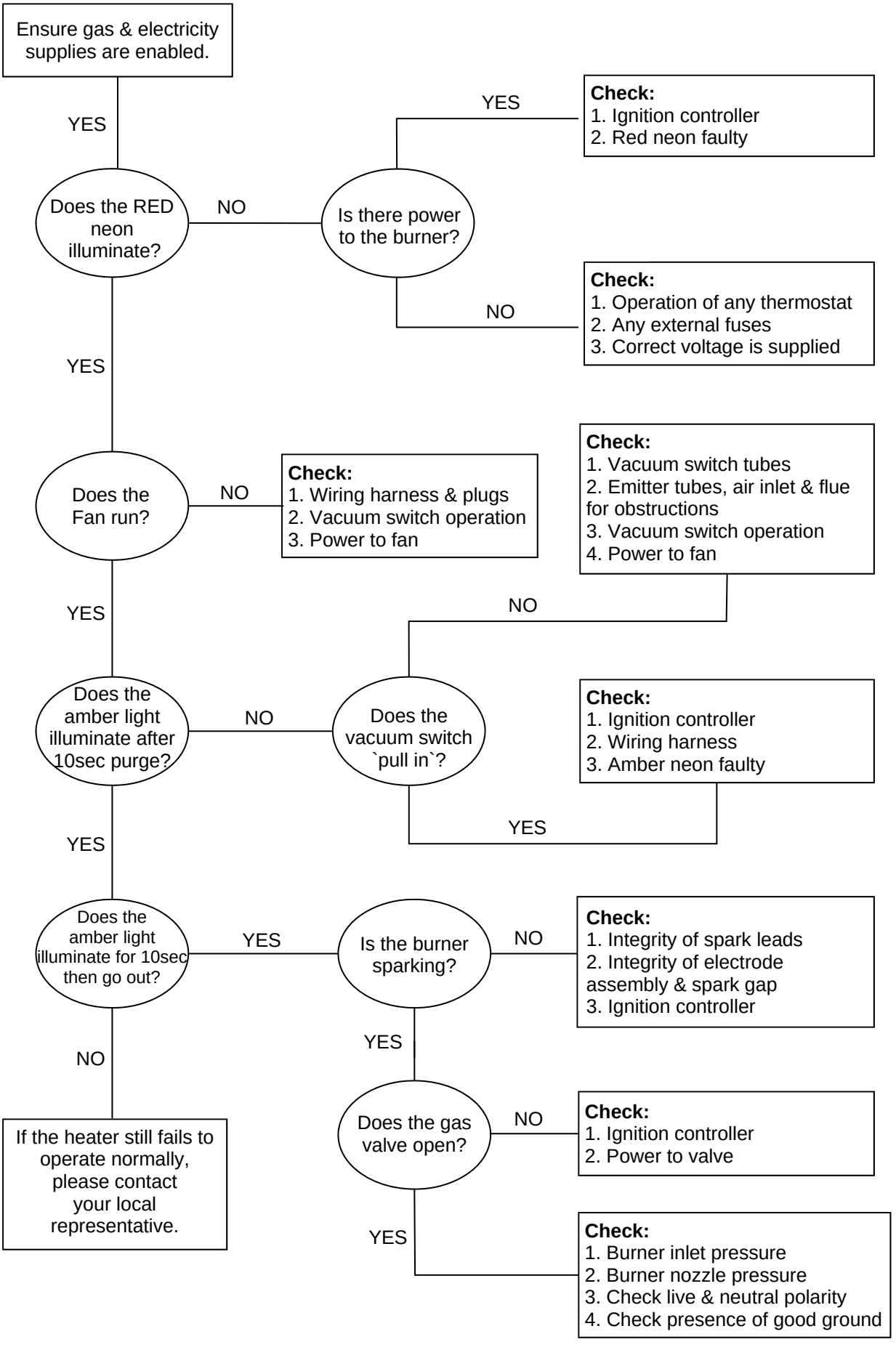
4.3. Required Spares

In order to aid troubleshooting and servicing we recommend that the components shown in this section should be stocked.

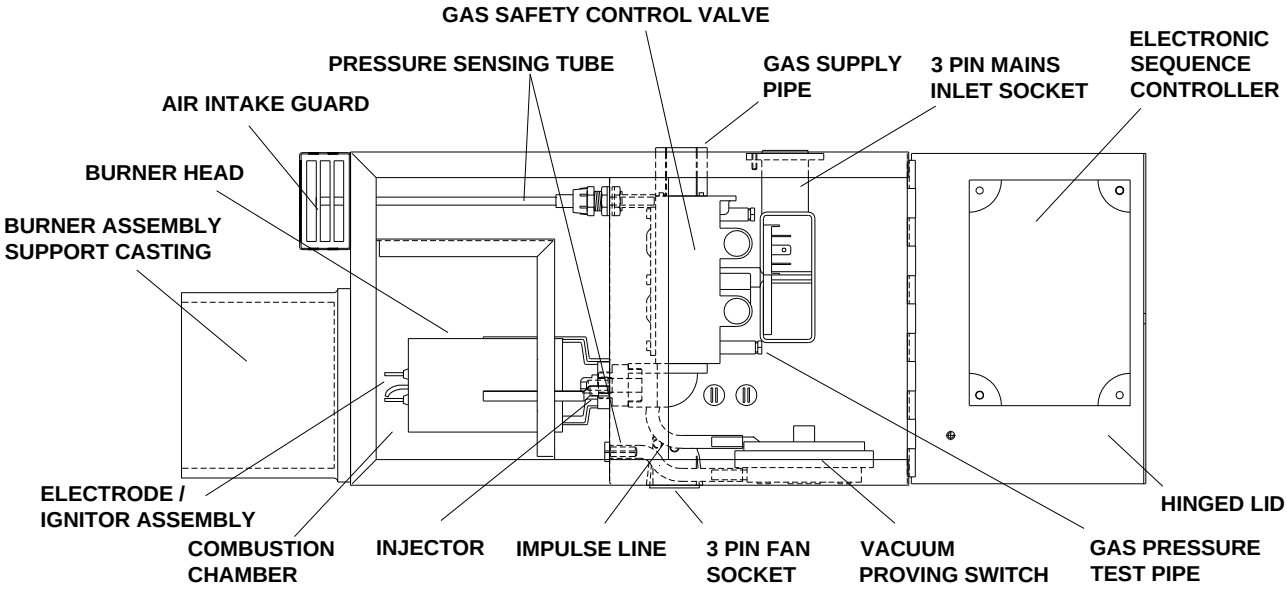
Note Any spare part components that are not approved by AmbiRad could invalidate the approval of the appliance and validity of the warranty.

Item	Description	Part No.	Item	Description	Part No.
	Ignition Controller	2015		Pressure Switch	2192-2-PTU
	Twin sol reg 220/240	201857		Amber Neon (Burner On)	2180
	Ignitor Assembly	202346		Red Neon (Mains On)	2175
	Filter	201292		Combustion Fan	2560
	Injector	See section 1.11		Fan Socket	3123-5
	Cables: Spark Electrode *(black)* Rectification lead *(purple)*	 2243-1 2243-2		Burner Gasket	3190
				Burner Support Gasket	M101391

6. Fault Finding Guide.



7. Replacing Parts.



> Turn off gas and any electrical supplies to the heater before starting repair work.

7.1 To replace ID fan

Remove ID fan connecting plug from the burner control assembly. Disconnect flue if fitted. Slacken pinch screw securing fan to emitter tube. Draw fan off tube. Remove three M5 screws securing fan support to fan casting.

Refit support flange to new fan with the pinch bolt facing in the same direction as the flue outlet.

Refit the fan to the heater, ensuring that the fan discharge faces upwards for flued heaters or horizontally away from the burner for unflued heaters.

7.2 To replace any components in the burner/ control assembly

This assembly should be removed from the heater by first disconnecting the gas and electrical supplies and the fan electrical connection. Slacken the securing pinch screws and draw the burner/ control assembly off the emitter tube.

When refitting the burner assembly to the heater ensure the box is horizontal ie. with indicator lamps downwards.

7.3 To replace electrode assembly

Remove top cover of combustion chamber by removing the six dome headed fixing screws, taking care not to damage the gasket. Remove the M4 screws securing the electrode assembly and pull off the two electrode cable connectors.

Reconnect the cable connectors to the new electrode assembly (the two connectors are non interchangeable) and refit the electrode assembly.

Refit the combustion chamber cover plate and sealing gasket. Replace the sealing gasket if this is damaged.

7.4 To replace burner head

Remove combustion chamber as above. Unscrew burner head from the injector, taking care not to drop it onto the ignition leads.

Refit new burner head and replace combustion chamber cover plate, replacing the gasket if this is damaged.

7.5 To replace the injector

Remove burner head as on previous. Unscrew injector from its carrier using a spanner on the hexagonal portion of its body. When replacing

ensure the injector is fully tightened in its carrier. For correct injector size see data badge on heater.

7.6 To replace gas safety control valve

Remove combustion chamber cover as previous. Remove control housing cover by removing the two dome headed fixing screws. Remove burner head and the 2 screws holding inlet gas connection supply support plate. Disconnect the gas valve electrical connection, marking each connection.

The gas valve and injector can now be removed as an assembly. Using an approved pipe joining compound on pipe threads, refit the pipe fittings onto the replacement control valve.

Replace the control valve into the control housing (refit burner onto injector holder before tightening inlet support plate screws).

Carry out commissioning, setting the burner pressure to that indicated on the data badge.

7.7 To replace the Pactrol electronic sequence controller

Swing open the safety control housing cover by unscrewing two screws. Disconnect the electrical connector on the side of the electronic sequence controller. Unplug the single grey high tension lead from the electronic sequence controller. Remove the two bolts securing the sequence controller to the control housing door and replace the sequence controller using the high tension lead (grey) from the old controller unless its insulation is damaged.

When refitting the pactrol sequence controller, take care that the rear flanges of the sequence controller are correctly located underneath the retaining lip in the door of the control housing (pactrol P16DIA only). Refit the two bolts and electrical connector into the sequence controller and high tension leads into its connector.

7.8 To replace the vacuum proving switch

Disconnect the two silicon rubber tube connections at the vacuum switch. Disconnect the three push on connectors from the vacuum switch. Remove the two screws securing the vacuum switch and slip the vacuum switch out of the control housing.

Refitting is a reversal of the above, taking care to correctly reconnect the three cables.

Notes.

8. User & Operating Instructions.

8.1 To Start the Heater

1. Ensure gas supply is turned on.

2. Electrical supply to the controls is on.

3. Ensure that the controls are correctly set i.e.;

   - Clock is correctly set.
   - Heater program is correctly set.
   - Required room temp is correctly set

4. Once the heating controller 'calls for heat' power will be supplied to the heater(s). The red neon will then illuminate.

5. After a pre-purge period of 10 seconds the burner will ignite and the amber neon will then illuminate.

6. If lockout occurs press the lockout reset button (if available), or switch off electrical supply and restart after 15 seconds.

7. If lockout occurs three times consecutively switch off and isolate the gas and electricity supplies.

   Contact the AmbiRad Service department.

8.2. To Switch Off Heater

1. Switch off electrical supply to the heater. The burner will stop and the fan will shut off.

2. If the heater is to be switched off for periods in excess of one week it is highly recommended that both the gas and the electrical supplies are turned off.

8.3. Routine Maintenance between Service Intervals

After ensuring that the heater is cold and mains electric isolated, cleaning of the reflectors with a soft cloth and a mild detergent (non solvent based cleaners only) in water can be undertaken.

Additional removal of dust from the radiant tubes, burner and heat exchanger can be undertaken.

8.4 Frequency of Servicing

The manufacturer recommends that to ensure continued efficient and safe operation of the appliance, the heater is serviced annually by a competent person e.g. every year in normal working conditions but in exceptional dusty or polluted conditions more frequent servicing may be required.

The manufacturer offers a maintenance service.

Details are available on request.

For Service requirements, please contact AmbiRad.

For further technical and service support visit our Support Information Database at www.s-i-d.co.uk

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