

INSTALLATION / OPERATION / MAINTENANCE


Applies to:

**Model VSXUS 120V 60Hz
Gas-Fired, Tubular, Radiant,
Low-Intensity Infrared Heater**



Vision Range

VSXUS OWNERS MANUAL

 **WARNING:** Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death. Read the installation, operating and maintenance instructions thoroughly before installing or servicing this equipment.



AMBIRAD

Part # 700115

HEATING AND VENTILATION SOLUTIONS


Introduction

Welcome to the new range of high efficiency powered infra-red heaters. Local regulations may vary and it is the installer's responsibility to ensure that such regulations are satisfied.

All installation, assembly, commissioning and service procedures must be carried out by suitable qualified competent persons and conform with local building codes, or in the absence of local codes, with the National Fuel Gas Code ANSI Z223.1/NFPA 54.

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.

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

All Dimensions shown are in inches unless otherwise stated.

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

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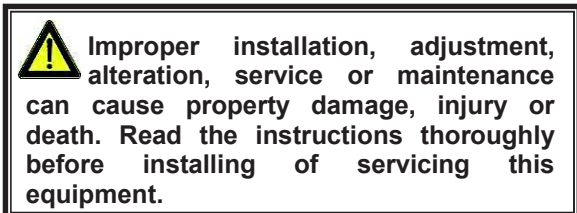
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1. Installation Requirements



1.1 Health and Safety

- A. Heater is intended for heating non-residential indoor spaces and should only be installed where flammable gases or vapors are not generally present.
- B. Heaters may be suspended either horizontal or at an angle, or may be wall mounted. See section A3 for clearance dimensions.
- C. The installation must conform with local building codes or, in the absence of local codes, with the *National Fuel Gas Code*,

ANSI Z223.1/NFPA 54

- D. The unit shall be electrically grounded in accordance with National Electric Code ANSI/NFPA 70.
- E. The heater may be installed in aircraft hangars installed in accordance with the Standard for *Aircraft Hangars, ANSI/NFPA 409* and in automotive garages when installed in accordance with the Standard for *Parking Structures, ANSI/NFPA 88A*, or the Standard for *Repair Garages, ANSI/NFPA 88B* and are so marked.
Ensure that minimum clearances will be maintained to vehicles parked below the heater.

1.2 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.

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

1.3 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°.

 Burner **MUST** be mounted on the lower tube.

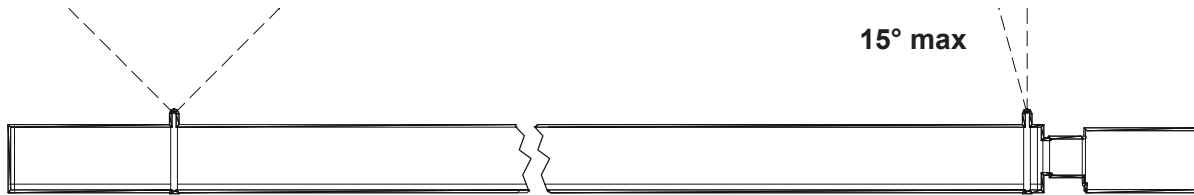
Model	Minimum Mounting Height, ft (m)	
	Standard minimum	Inclined minimum
90	14 (4.3)	12 (3.7)
115	14 (4.3)	12 (3.7)
140	16 (4.9)	14 (4.3)
165	16 (4.9)	14 (4.3)



WARNING:

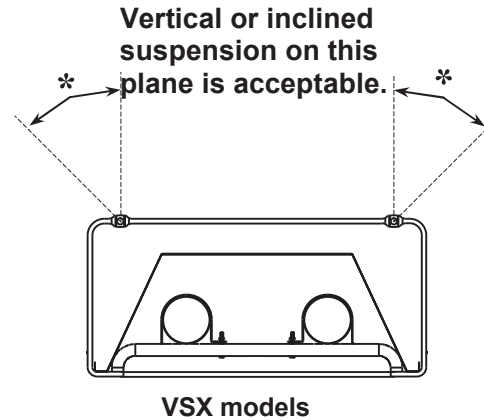
If not installed, operated and maintained in accordance with the manufacturer's instructions, this product could expose you to substances in fuel or from fuel combustion which are known to the state of California to cause cancer, birth defects or other reproductive harm.

Where chain supports have an angle of inclination greater than 15° an equal and opposite support is recommended.



15° max

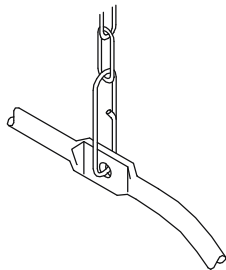
Ensure that there is adequate provision in the building for combustion and ventilation air supply. Installation must meet minimum requirements and applicable codes.



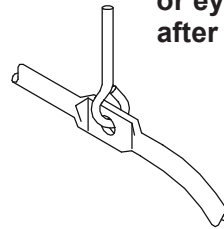
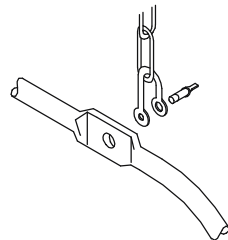
Vertical suspension chain ideal. Where supports are inclined max. recommended angle of inclination 15°

4

IMPORTANT: THE HEATER SHOULD SLOPE DOWNWARDS TOWARDS THE RETURN BEND BY APPROX. 10mm FOR BOTH HORIZONTAL AND WALL MOUNTED INSTALLATIONS.



Shackle method of attachment. Pin must be tightened by pliers



N.B. Drop rod with formed hook or eyebolt must be closed tight after installation.

Alternative method of suspending 'U' tube and linier type heaters.

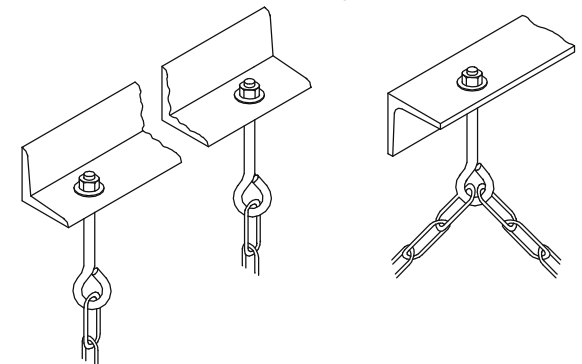


Figure 1. Recommended Methods of Heater Suspension.

1.4 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. Adequate clearance **MUST** be provided around air openings into the combustion chamber and there **MUST** be suitable clearance for accessibility and for combustion / ventilating air supplies.

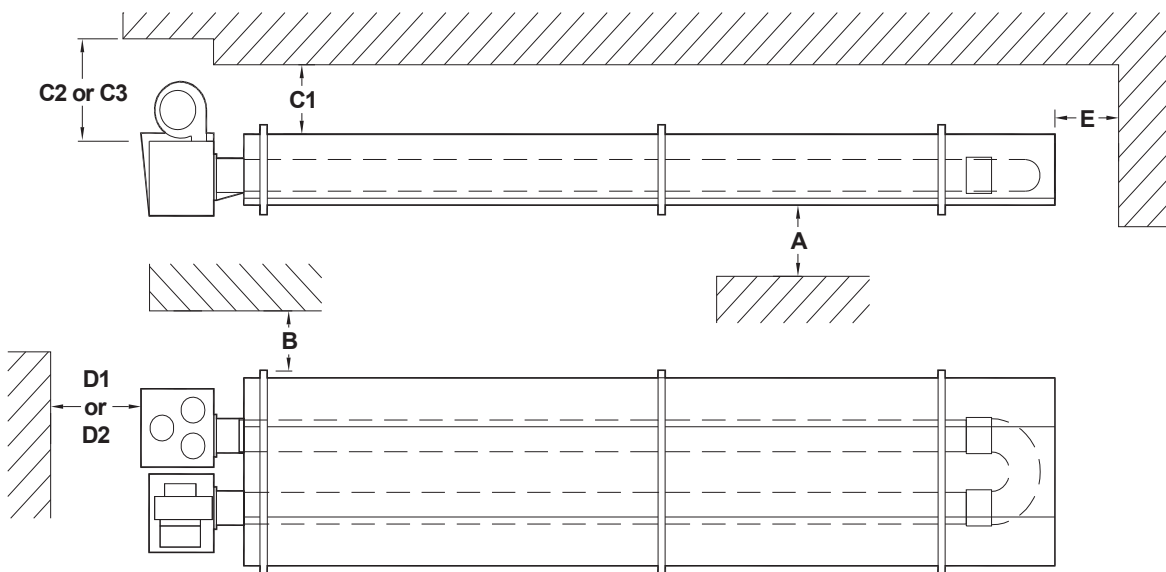
! IMPORTANT:

The stated clearance to combustibles represents a surface temperature of 90°F (50°C) above room temperature.

Building material with a low heat tolerance (such as plastics, vinyl siding, canvas, tri-ply, etc.) may be subject to degradation at lower temperatures.

It is the installer's responsibility to assure that adjacent material are not subject to degradation.

Figure 2 Clearance to Combustibles.



Model	Clearance to Combustibles, inches (cm)							
	A	B	C1	C2	C3	D1	D2	E
90	85 (216)	35 (89)	4 (11)	20 (51)	24 (61)	32 (82)	24 (61)	21 (54)
115	85 (216)	35 (89)	4 (11)	20 (51)	24 (61)	41 (105)	24 (61)	21 (54)
140	90 (229)	35 (89)	4 (11)	20 (51)	24 (61)	42 (107)	24 (61)	21 (54)
165	96 (244)	48 (122)	4 (11)	20 (51)	24 (61)	48 (122)	24 (61)	28 (72)

! WARNING:

Minimum clearance from the heater must be maintained from vehicles parked below heater. In all situations, clearances to combustibles must be maintained. Signs should be posted in storage areas to specify maximum stacking height to maintain required clearance to combustibles. Such signs must either be posted adjacent to the heater thermostats or in the absence of such thermostats in a conspicuous location. Refer to mounting clearance tables.

1.5 Gas Connection and Supply


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

The gas connection on the heater is ½”N.P.T internal thread.


Injector sizes and manifold pressure for the burners are shown in table 5. The gas supply piping and connections must be installed so that the minimum pressure stated is achieved.

A gas shut off valve and union should be fitted in the gas supply line close to the heater and a ⅛” N.P.T plugged tapping, accessible for test gauge connection, provided immediately upstream of the appliance gas inlet.

It is essential to provide some flexibility in the final gas connection by use of an approved flexible gas connector. (See Fig. 4)

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

Care must be taken to observe the minimum pipe bend diameter (minimum 10” - 250mm, maximum 14” - 350mm) & pipe expansion distance (minimum 1⅛” - 28mm, maximum 3¾” - 95mm).

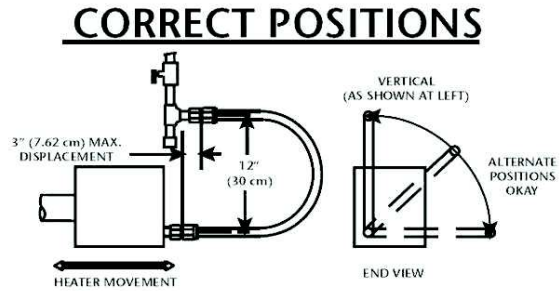
 The correct installation as shown will allow for approx 4” of movement due to expansion.

WARNING: FIRE OR EXPLOSION HAZARD - Expansion of the radiant pipe occurs with each firing cycle causing the burner to move with respect to the gas line. This can result in a gas leak producing an unsafe condition. It is therefore essential to provide some flexibility in the final gas line connection by use of an approved flexible connector as shown in the drawings.

Figure 3. Correct orientation of Ball Valve



Figure 4. Correct Installation of Flexible Gas Connection



INCORRECT POSITIONS

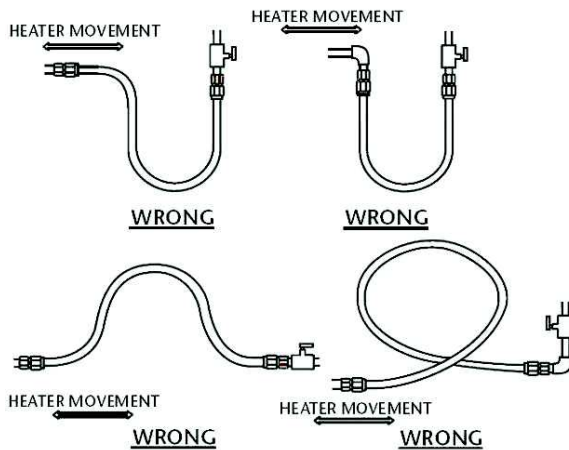


Table 3 Gas Supply Pressures

Gas Type	Natural Gas
Required Gas Pressure (in W.C) 90 to 140,000 Btu/h	5.0
Required Gas Pressure (in W.C) 165,000 Btu/h	7.0
Max Supply Pressure (in W.C)	14.0
Gas Supply	Connection ½" N.P.T internal thread

* Connector must be certified for use on a radiant tube type infrared heater and must comply with Standard for Connectors for Gas Appliances, ANSI Z21.24/CSA 6.10 or with the Standard for Elastomeric Composite Hose and Hose Couplings for Conducting Propane and Natural Gas, CAN/CGA 8.1.
 For heaters up to 150,000Btu/h, ½" ID x 24" long.
 For heaters above 150,000Btu/h, ¾" ID x 36" long.
 NOTE: For Canada all heaters MUST use a hose 36" long.
 See Table 3.

Table 3

HOSE SIZE	PART No.
¾"	A4129
½"	A4128

WARNING: Before making electrical connections, switch OFF the main electrical disconnect. There may be more than one disconnect switch. Lock out and tag switch with a suitable warning label. Electrical shock can cause personal injury or death.

The electrical supply to the heater is by three wires: live, neutral and ground connections. Install in accordance with all state & local codes.

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

1.6 Electrical Connections

This appliance must be electrically grounded

Supply 120V 60Hz single phase.
 Standard heater 0.16HP.
 Current rating 1.2 amp max (inductive).
 Fuse: external 3 amp.

Important: All electrical work should be done by a qualified electrician in strict accordance with the National Electrical Code ANSI/NFPA 70 or Canadian Codes CSA C22.1

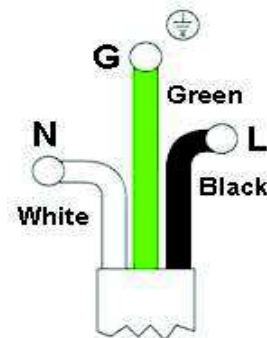


Figure 5. Typical Wiring Connections

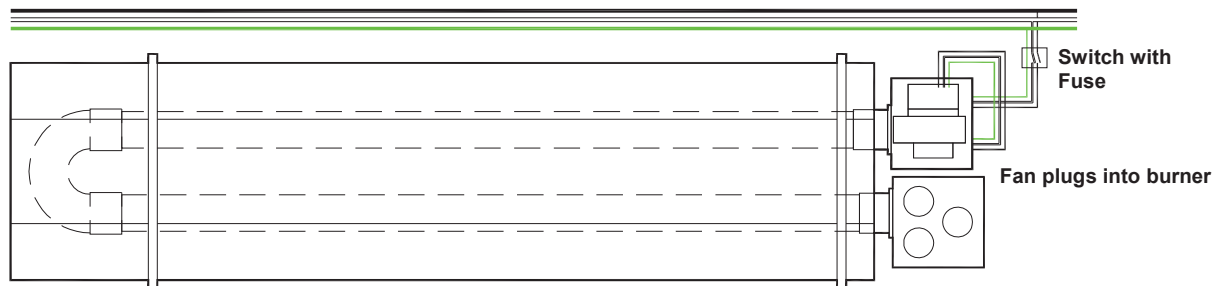


Figure 5a. Single and Multiple Heater Installations 120V Control

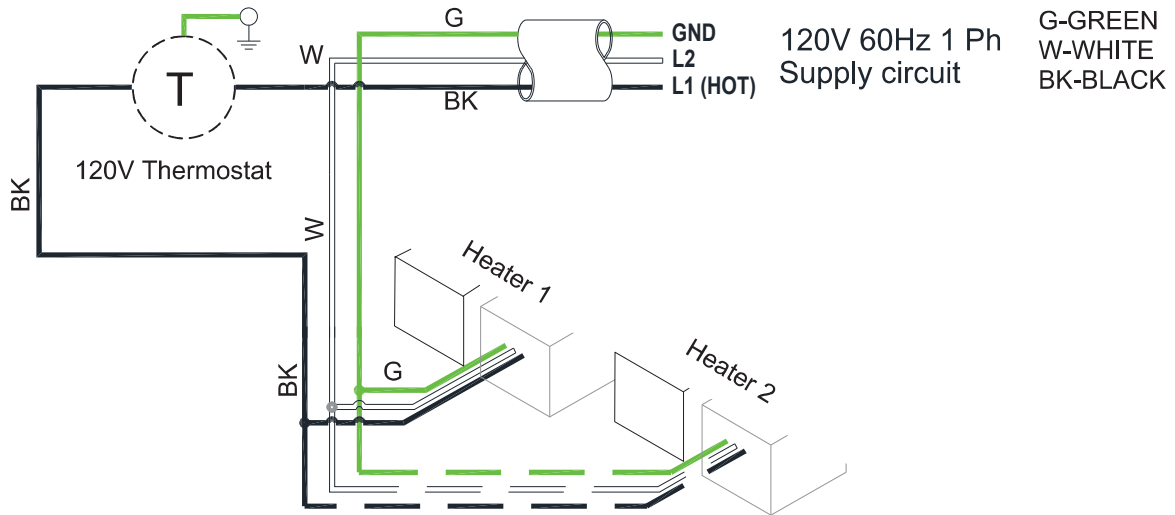


Figure 5b. Single Heater Installations 24V Control

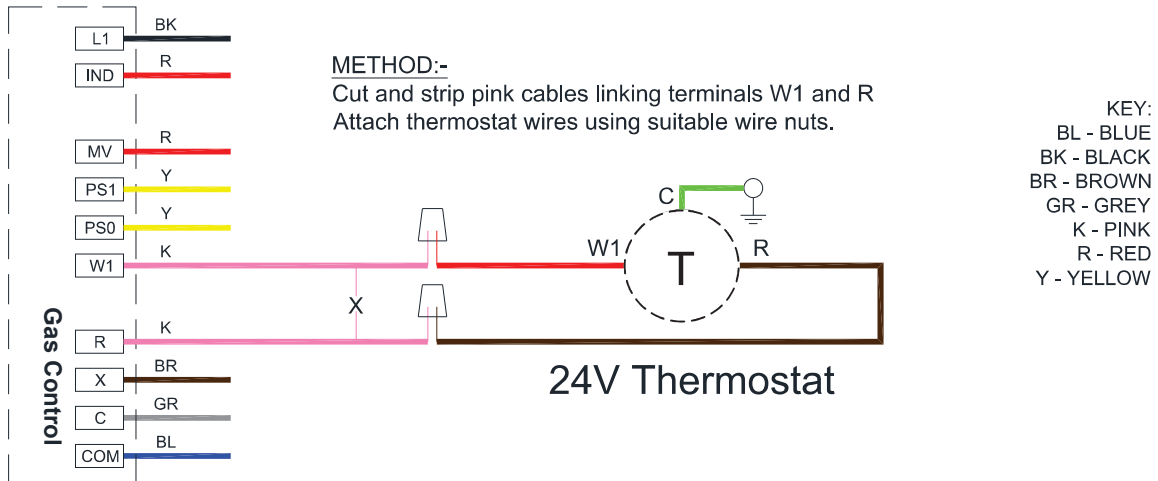


Figure 5c. Multiple Heater Installations 24V Control

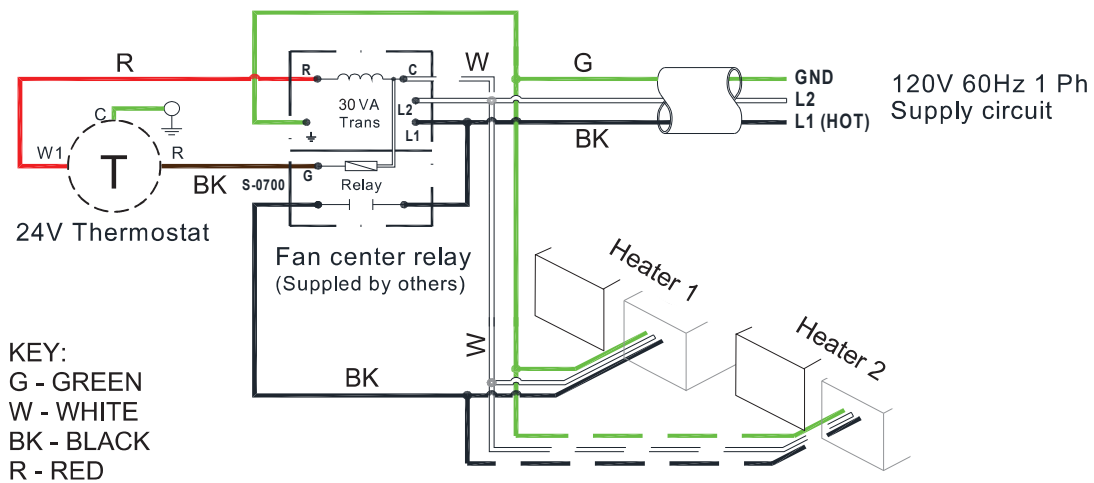
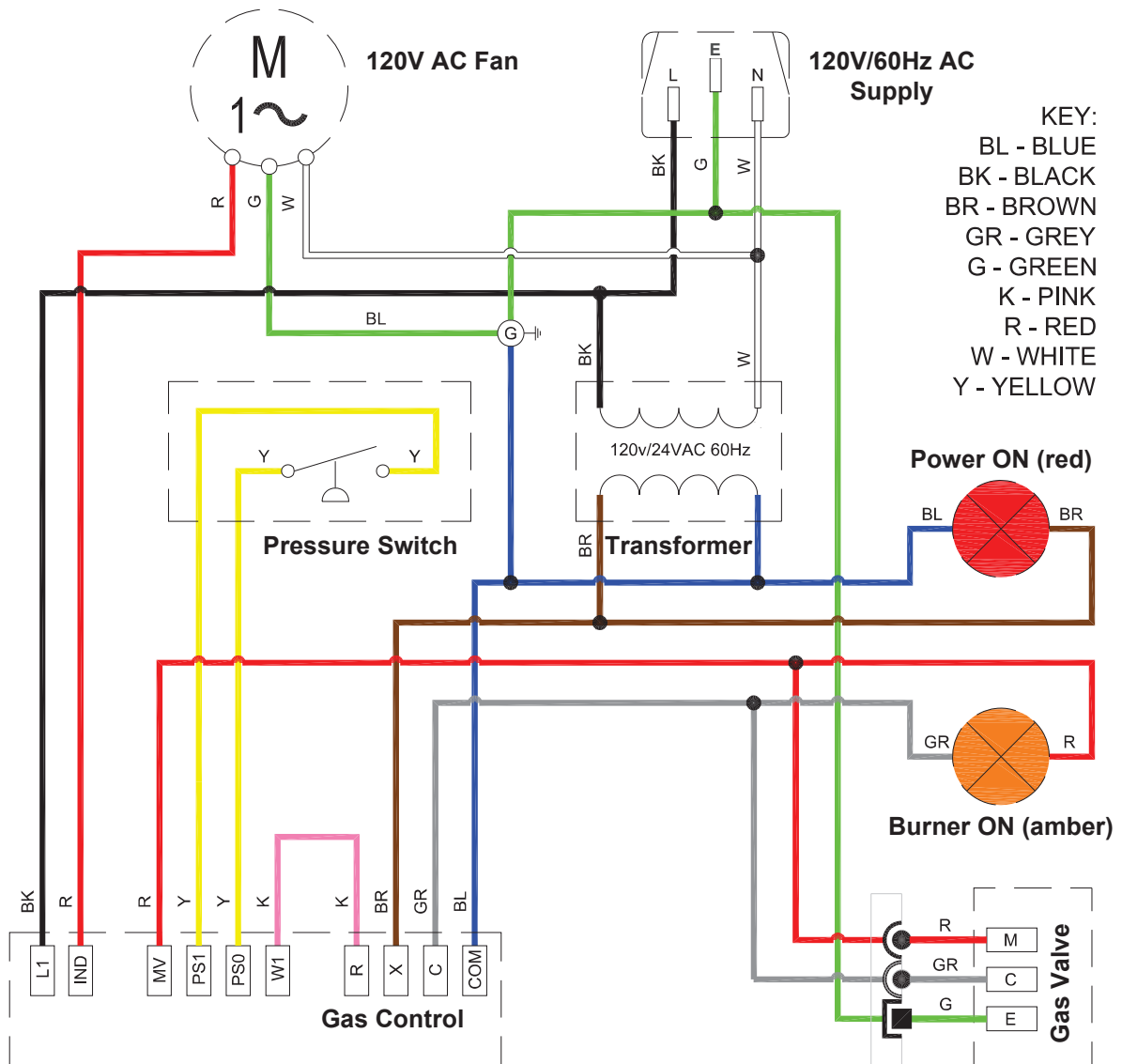


Figure 6. Internal Burner Wiring Diagram.




NOTES:-

Power On light is permanently illuminated when 120V / 60 Hz AC external supply is connected to burner.

Additional wiring is required to install an optional extra thermostat and / or time clock.

If no thermostat is required then a jumper is fitted between terminals R and W1. In this configuration the burner will continuously fire until the 120V power supply is disconnected.

Wire specification:- 18 AWG (1.0mm²), Tri-rated, 105°C

 If any of the original wire as supplied with the appliance must be replaced, it must be replaced with wiring material having a temperature rating of at least 220°F/105°C

1.7 Ventilation Requirements and Details

1.7.1 Unvented units

Heaters may be installed without a vent providing the governing building codes are met and consideration is properly given to possibilities of condensation on cold surfaces.

Installation shall meet the following requirements when unvented:

- Natural or mechanical means shall be provided to supply and exhaust at least 4 CFM per 1000 BTU per hour input of installed heaters.
- Combustion gasses shall not impinge on combustible materials with a temperature in excess of 150°F.

1.7.2 Vertical venting

The heater can be installed with a vertical vent.

All vent piping should be adequately supported from the building structure and terminated with an approved terminal. **The maximum recommended vent length is 25ft (7.6m) with a maximum of two elbows.** All connections should be properly sealed. Refer to fig 7a.

1.7.3 Horizontal venting

Individual units can be vented horizontally through side walls. Recommended terminals are AmbiRad V0700 for 4" and V0800 for 6".

Distances from adjacent public walkways, adjacent buildings, opening windows and building openings, consistent with the *National Fuel Gas Code, ANSI Z223.1/NFPA 54* or the *Natural Gas and Propane Installation Code, CSA B149.1*.

Maximum length of vent is 25ft (7.6m) with two - 90° elbows.

Runs of 12ft (3.6m) or shorter can use 4" (101mm) dia vent. Runs over 12ft (3.6m) should use 6" (152mm) vent pipe.

Any portion of vent that passes through a combustible wall must be insulated, or use an approved insulating thimble.

Standard vent terminals must extend at least 6" (152mm) from the wall and at least 24" (609mm) from any combustible overhang. This protects the building material from degradation by the vent gasses.

Vent joints should be sealed and secured using at least 3 sheet metal screws. Should condensation occur the vent should be shortened or insulated.

The terminal should be at least 3ft (0.91m) away from any air intake to the building.

If the heater is equipped with ducted combustion air, the vent terminal must be at least 3ft (0.91m) away from the air inlet and located higher than the inlet.

The vent terminal must be installed at a suitable height above the ground to prevent blockage by snow.

1.7.4 Fresh Air Intake

Whenever the heater is installed in locations where airborne dust or other pollutants are present, a fresh air supply should be ducted to the burner.

A fresh air duct of 4"(101mm) dia. should be installed from the fresh air to the air intake connection on the fan housing. A flexible jointing piece should be installed at the fan connection with hose clamps to facilitate expansion and contraction.

The maximum recommended length air duct is 25ft (7.6m) and the maximum number of elbows is two. The minimum length is 18" (456mm).

The location of the fresh air duct inlet must be where it will receive dust free clean air.

An inlet cap with bird screen must be fitted at the inlet of the duct.

If the duct inlet is located above the roof the underside of the inlet terminal must be at least 2ft (0.61m) above roof level and at least 10" (254mm) above any projection on the roof within 7ft (2.1m) of the inlet.

Intake pipe, fittings and sealant are not furnished by the manufacturer. Refer fig 7c & d.

Figure 7.a Vertical Venting.

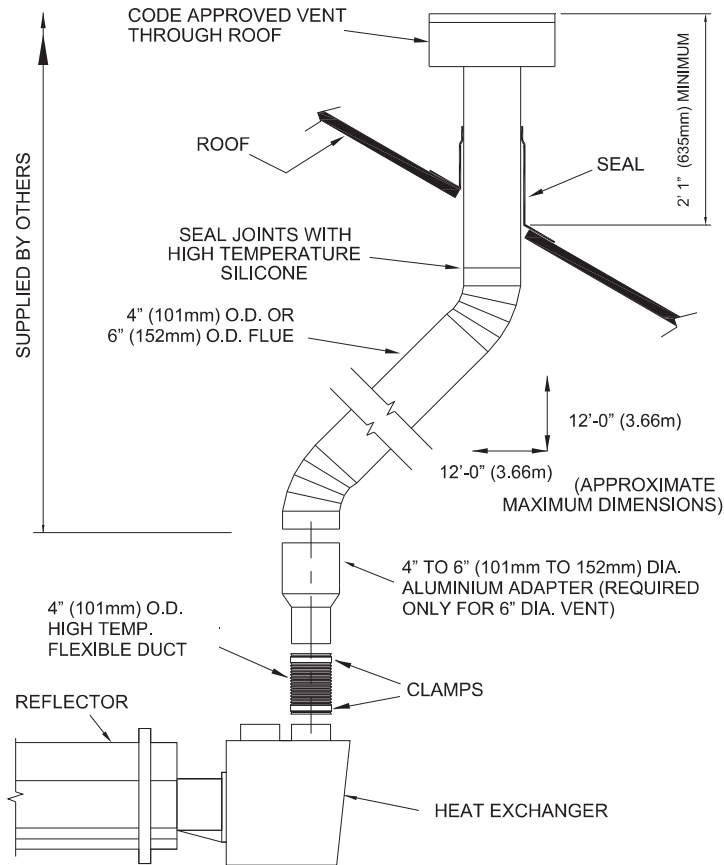
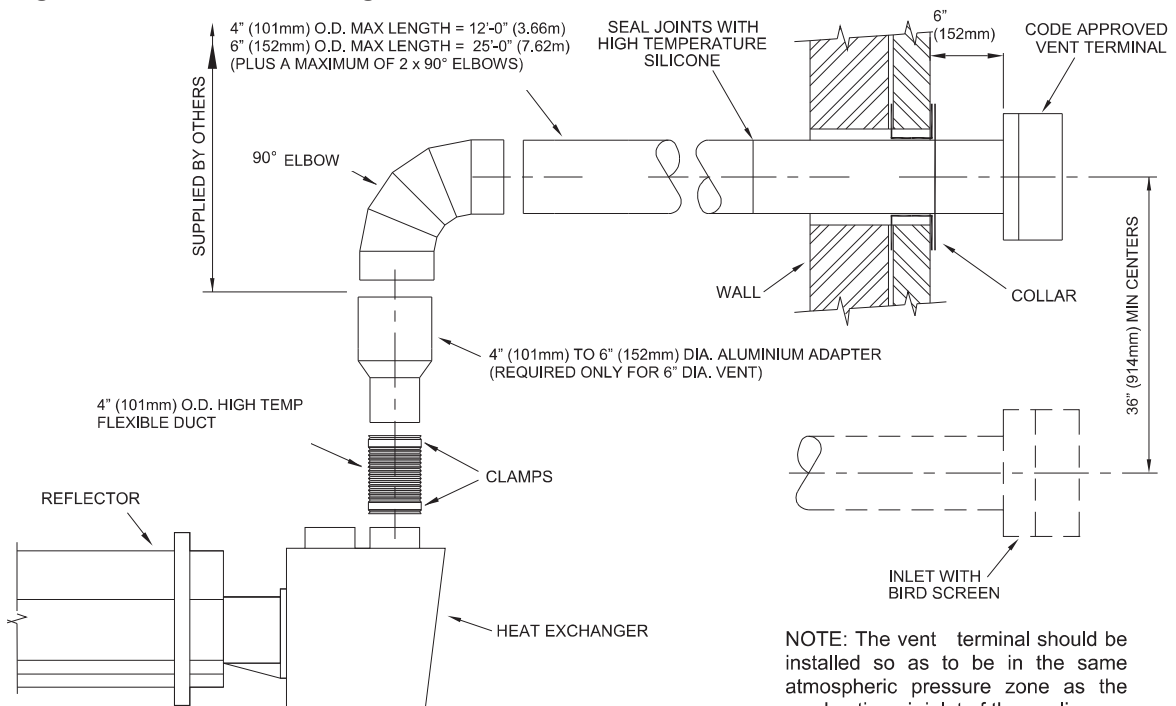


Figure 7.b. Horizontal Venting



NOTE: The vent terminal should be installed so as to be in the same atmospheric pressure zone as the combustion air inlet of the appliance.

NOTE: The vent terminal must NOT be installed below the fresh air intake.

Figure 7.c Fresh Air Ducted Intake.

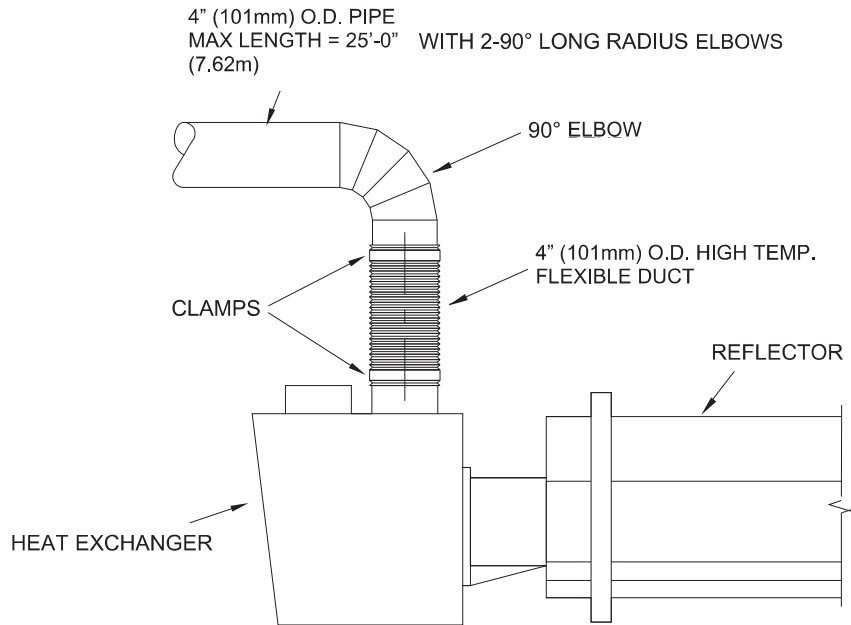
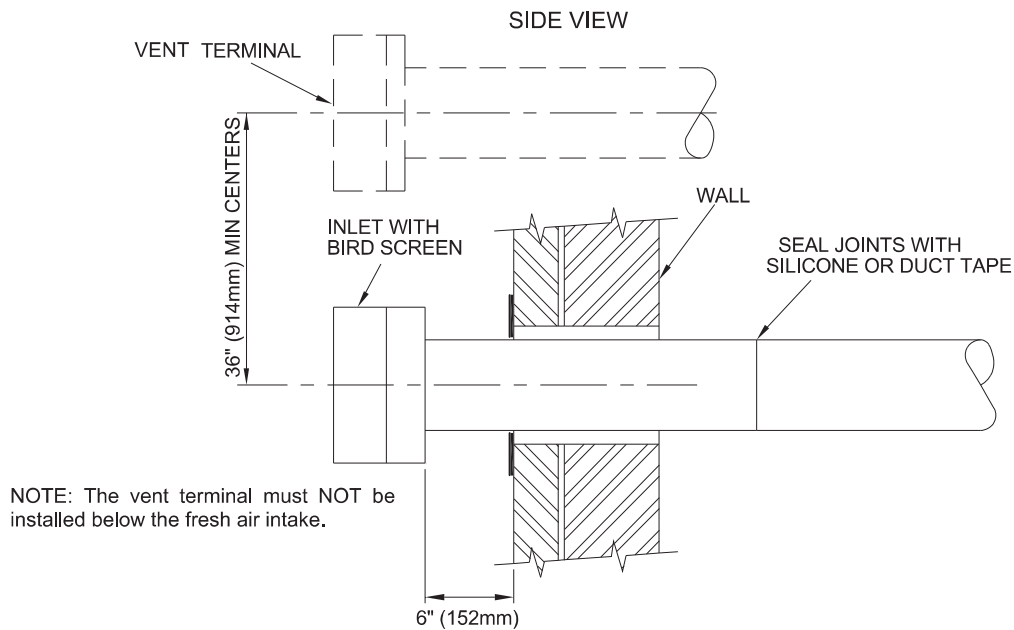


Figure 7.d Wall Terminal Intake Kit.



1.8 Vent and Combustion Air Inlet Options

Dependent on the type of burner fitted to your heater, it is possible to have configuration options of vent and combustion air inlet as shown:

• Option 1

For vented products of combustion and no ducted air please refer to Figure 7.e.

• Option 2

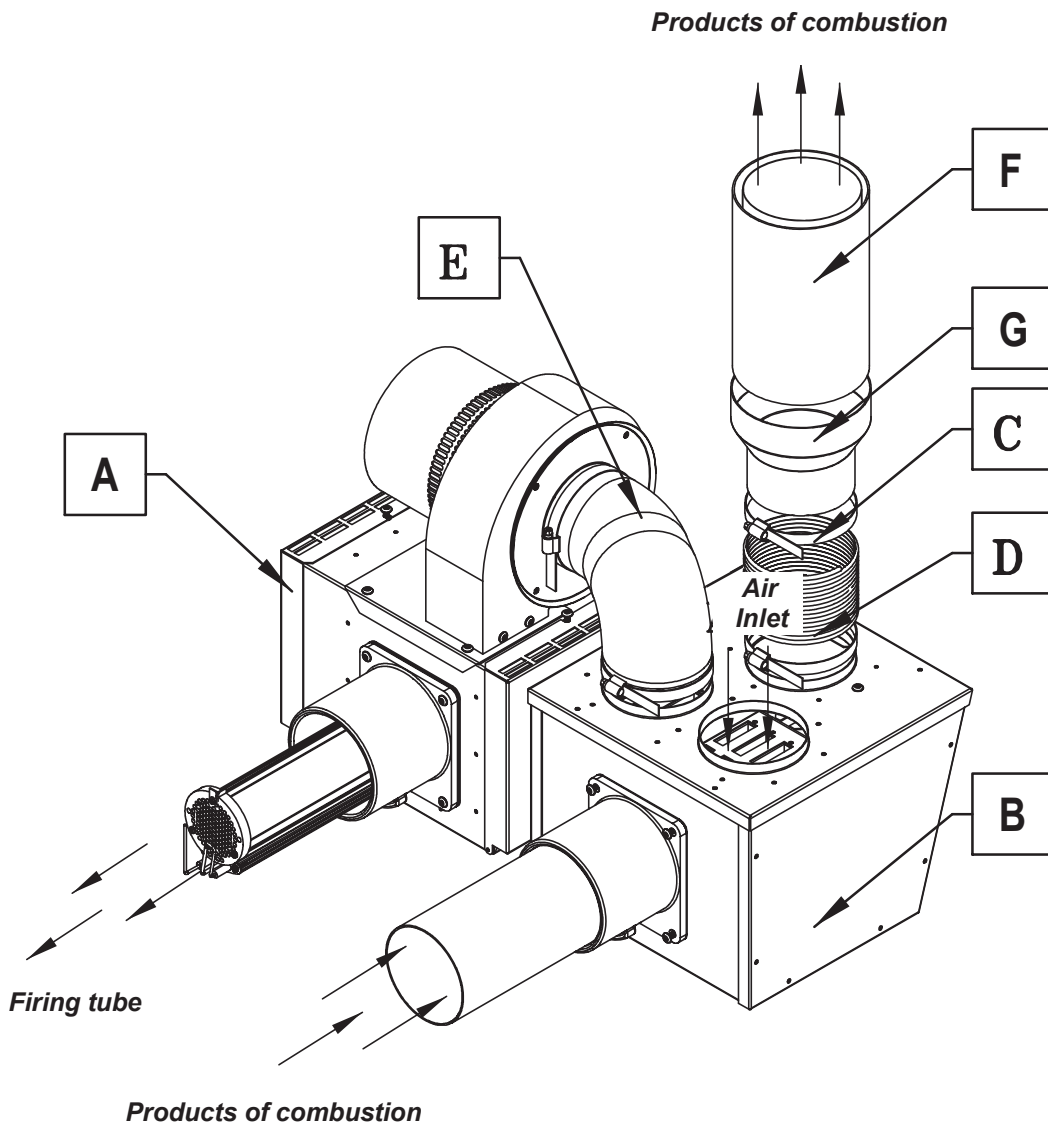
For ducted air and products of combustion to ventilated area please refer to Figure 7.f.


• Option 3


For vented products of combustion and ducted air via concentric pipe please refer to Figure 7.g.


Option 1 - Figure 7.e. Forced Burner with Heat Exchanger (Standard Vent)


For vented products of combustion and no ducted air



 If heaters are installed with no vent the ventilation instructions detailed in section 1.7.1 must be applied.

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

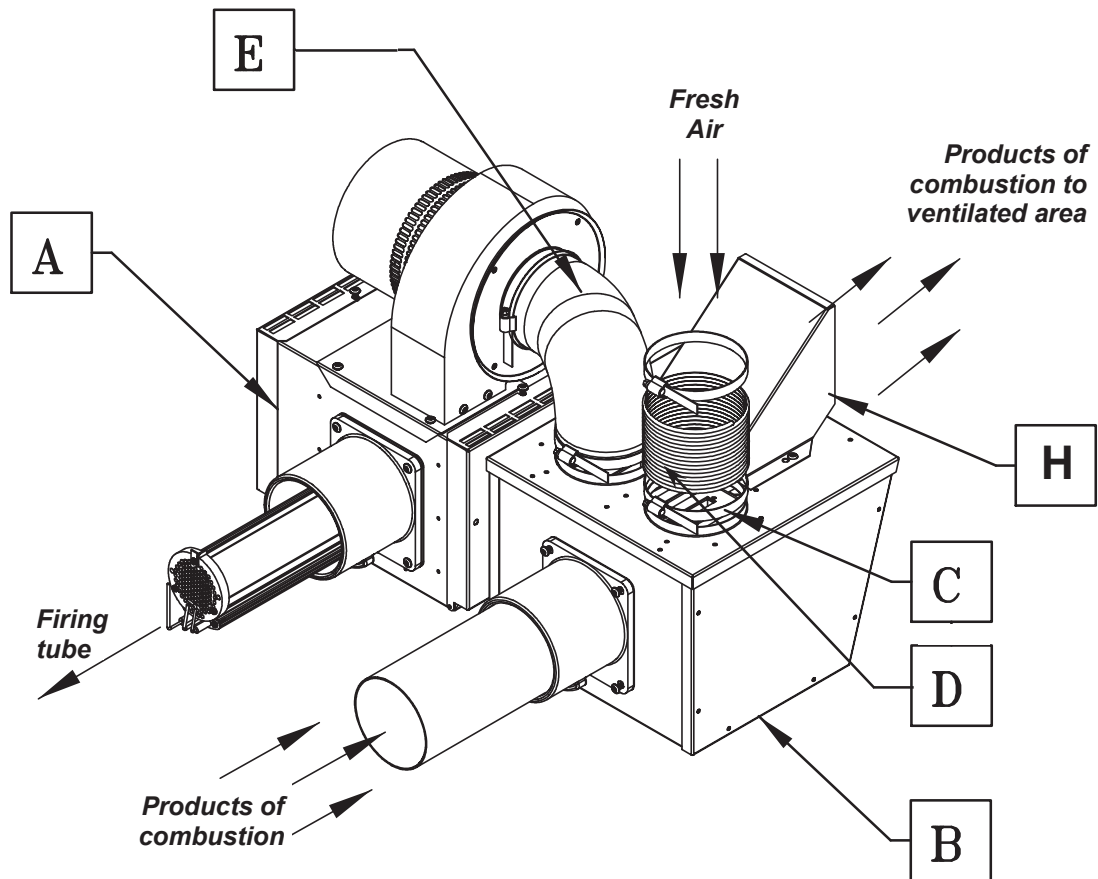
 Maximum length = 25ft (7.62m)
Minimum diameter = 4in (101mm)
Maximum no of bends = 2


 Refer to section 1.7.2 or 1.7.3 for maximum length of vent.


A	Forced Burner
B	Heat Exchanger
C	4ins (101mm) Clip
D	4ins (101mm) Flexible Vent
E	4ins (101mm) Flexible to Fan
F	6" (152mm) Vent Pipe
G	6" (152mm) to 4" (101mm) Reducer


Option 2 - Figure 7.f. Forced Burner with Heat Exchanger (No External Venting)

For ducted air and products of combustion to ventilated area



 if heaters are installed with no vent the ventilation instructions detailed in section 1.7.1 must be applied.

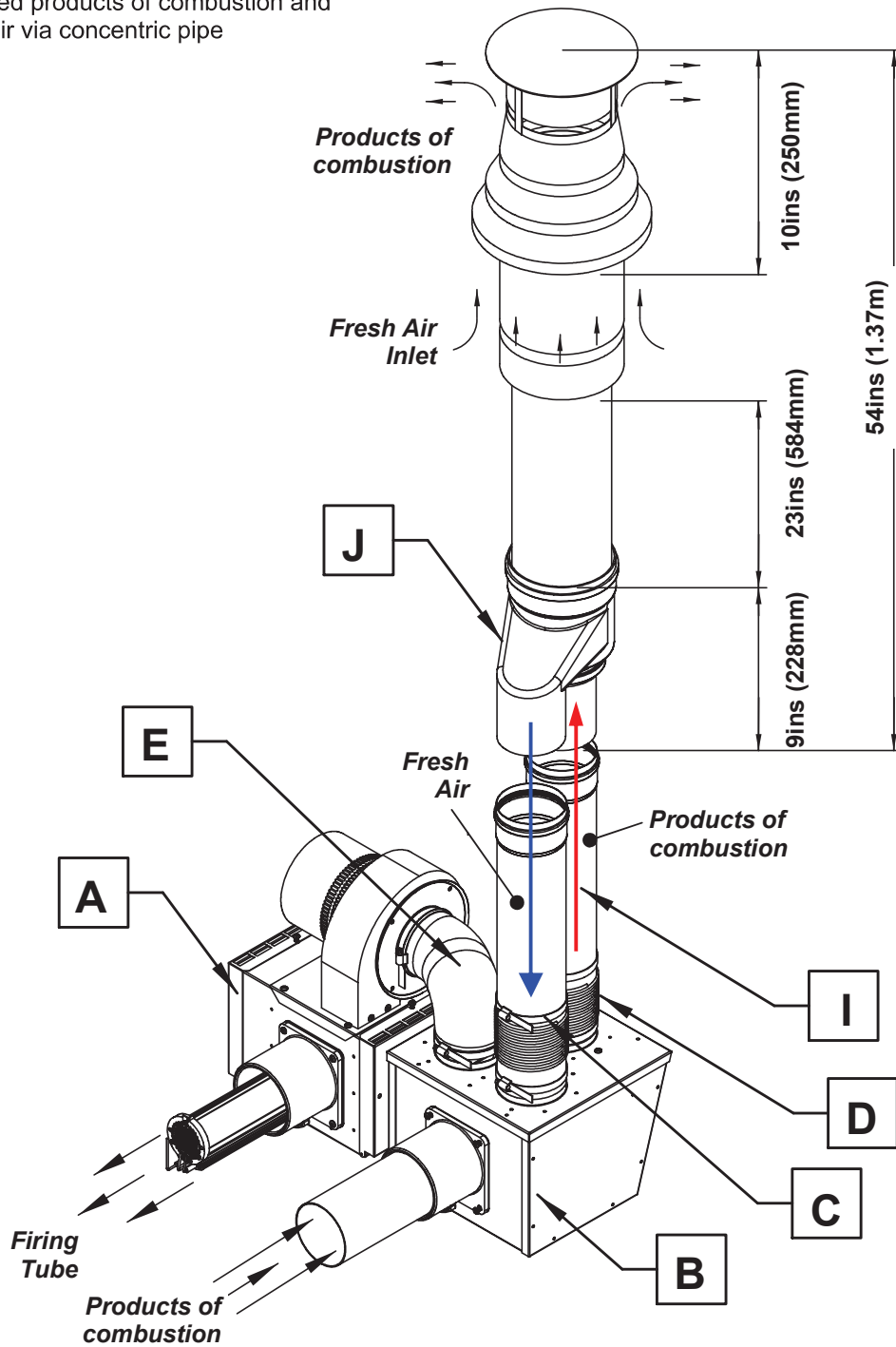
 Ducted air must be used in locations where there is airborne dust or where there is a polluted atmosphere e.g. Chlorinated Vapours.


 Maximum length = 25ft (7.62m)
 Minimum diameter = 4ins (101mm)
 Maximum no of bends = 2


A	Forced Burner
B	Heat Exchanger
C	4ins (101mm) Clips
D	4ins (101mm) Flexible Vent
E	4ins (101mm) Flexible to Fan
H	Shroud for unvented heater installation


Option 3 - Figure 7.g. Forced Burner with Heat Exchanger (with Concentric vent)

For vented products of combustion and ducted air via concentric pipe



 if heaters are installed with no vent the ventilation instructions detailed in section 1.7.1 must be applied.

 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 = 25ft (7.62m)
 Minimum diameter = 4ins (101mm)
 Maximum no of bends = 2

 Refer to section 1.7.2 or 1.7.3 for maximum length of vent.

A	Forced Burner
B	Heat Exchanger
C	4ins (101mm) clips
D	4ins (101mm) flexible x 2
E	4ins (100mm) flexible to fan
J	Concentric Vent Terminal
I	Vent

1.9 Technical Details

No of Injectors	1
Gas Connection	½" N.P.T.
Electrical Supply	120 volt 1 phase 60Hz
Vent size (in)	4" (101mm) or 6" (152mm)
Unitary Fan Motor Details	120 volt 1 phase 60Hz
Current Rating	1.2A MAX
Ignition	Electronic Program Start up with Spark Ignition

MODEL	Natural Gas	Min. Heater Length	Max. Heater Length
	BTU/Hr	U ft (m)	U ft (m)
90	90,000	24 (7.3)	34 (10.4)
115	115,000	34 (10.4)	34 (10.4)
140	140,000	34 (10.4)	44 (13.4)
165	165,000	44 (13.4)	44 (13.4)

Appliances can be installed up to 10,000 ft in the USA. Altitude conversion kits are available on request.

USA	Natural Gas 0- 2000 ft (0-610m)			
Size	90	115	140	165
"WC	3.4	3.6	4.5	4.0

USA	Natural Gas 2001- 4000ft (611-1220m)			
Size	90	115	140	165
"WC	3.2	3.4	4.3	3.8

CANADA	Natural Gas 0- 2000 ft (0-610m)			
Size	90	115	140	165
"WC	3.4	3.6	4.5	4.0

CANADA	Natural Gas 2001- 4500ft (611-1370m)			
Size	90	115	140	165
"WC	3.2	3.4	4.3	3.8

USA & CANADA	Natural Gas 0- 2000 ft (0-610m)			
Size	90	115	140	165
Burner Orifice Plate Part No.	201063-26	201063-25	201063-30	201063-73
Fan Type	2576T		2560-1	
Fan Orifice Part No.	3133DE	3201DE	M101622-55DE	M101622-70DE
Injector Part No.	201007-22	201007-24	201007-30	201631-28
Pressure Switch Part No.	201676			


MODEL	U Tube		
	U25	U35	U45
90	•	•	
115		•	
140		•	•
165			•

MODEL	Tube Type Material	
	AL.S	MS
90	TUBE 1	REMAINDER
115	TUBE 1	REMAINDER
140	TUBE 1	REMAINDER
165	TUBE 1 & 2	REMAINDER


Options


- 1 All standard units fitted with unvented vent, natural gas, stainless steel reflectors and ducted air attachments.
- 2 Tube length (U25-12ft, U35-17ft and U45 - 23ft).
- 3 Vented design (v suffix).
- 4 Stainless steel tubes (ST suffix).

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.

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

 Suitable alternative tools may be used.



Saw Horses



Leather Faced Gloves



Phillips Screwdriver



Wrench Set



Tape Measure



3/16"
5/32"
Allen wrenches

2.2 Assembly Notes.



Please read these assembly notes in conjunction with the correct assembly drawings (figs 9 to 12).

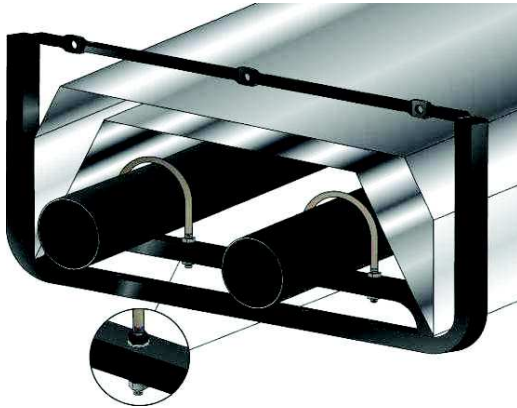
2.2.1 Turbulators



Ensure the correct length and quantity are inserted into their respective correctly identified tube(s) as detailed in the assembly drawings.

2.2.2 Brackets

! Tighten clamping 'U' bolt arrangement to tubes **ONLY WHERE STATED** on the assembly drawings.



2.2.6 Insulation Mats (optional)

Using the recommended safety equipment i.e. gloves, goggles and a face mask, cover the back of reflectors with the insulation mats. Tuck in the edge of the mat behind the lip of the reflector.

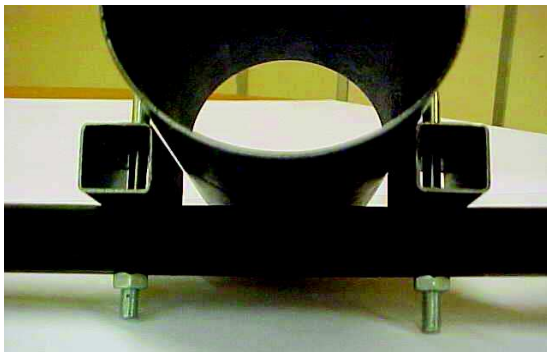
The insulation mats come in two sections for the U45 variants.



2.2.3 Tube alignment sections

! For U45 Angle Mounted Installations **ONLY**.

To allow for differential expansion of the tubes, a tube alignment assembly is fitted to the first bracket on the fan side radiant tube. Position U bolt tube alignment sections over the tube and through bracket prior to clamping.



2.2.7 Prior to assembly

- Ensure the area in which you are working is safe and clear of obstructions.
- Identify with the components in the check list and in which order they will be assembled.
- Arrange the trestles* in a straight line to allow for length of tubes.
- Remove all protective plastic from underside of Stainless Steel Reflectors / inside of End Caps.

! If saw horses cannot be located, ensure any alternative is sound and can carry the heater weight.

Methodology:

To cater for the expansion of the firing leg, all U bolts on the firing leg (except the one closest to U bend) are to be loose as described hereafter. All reflectors, tubes, brackets and canopies are bolted together.

2.2.4 Reflectors.












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












! Remove the protective plastic coating.

2.2.5 Couplers.

! Locate and position tube couplers at the end of the tubes. Ensure socket heads are facing outwards & the pre-fitted bolts in the couplers line up with the locating holes in the tubes. Ensure the bolts are not over tightened.

2.3 Identification check list

COLOUR CODE	U25	U35	U45
 Burner	1x	1x	1x
 Heat Exchanger	1x	1x	1x
 U Bend	1x	1x	1x
 Inner Reflectors	2x	3x	4x
 Outer Canopy	2x	3x	4x
 Brackets	3x	4x	5x
 M6 Mud washer	12x	16x	20x
 M6 Washer	4x	6x	8x
 M6 Full Nut	6x	10x	14x
 M6 x 35 Set pin	4x	6x	8x
 M4 x 10 Pozi Set pin	7x	8x	9x

COLOUR CODE	U25	U35	U45
 Inner End Caps	2x	2x	2x
 Outer Canopy End Caps	2x	2x	2x
 Tubes	2x	2x	4x
 Turbulators	Model 90 2x	Model 115 3x 140 2x	Model 165 3x 140 2x
 Couplers	2x	2x	4x
 M4 Full Nut	1x	2x	3x
 M4 Washer	7x	8x	9x
 No.5 Torque Screw	14x	16x	18x
 M6 x 15 Set pin	2x	4x	6x
 M8 Full Nut	16x	22x	28x
 M8 U Bolt	6x	8x	10x

2.4 Step by step.

2.4.1 TUBES & TURBULATORS.

1 Locate and position tubes on trestles. After deciding which end will have the burner, mark out the position of the first bracket as shown in the assembly drawings section. Slide brackets over tubes as shown.

2x 2x 2x

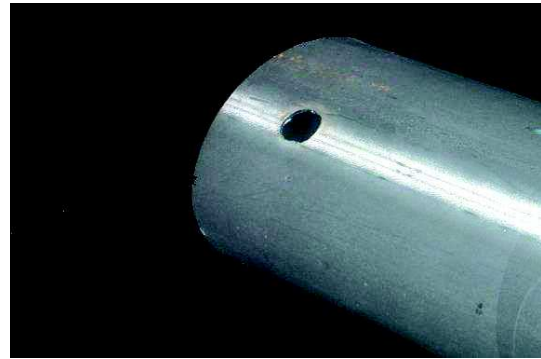


2 **U45 only:** Locate & position the two shorter tubes and affix to tubes using couplers. Keeping the tubes in line, tighten the couplers evenly until the tubes cannot be turned in the couplers.

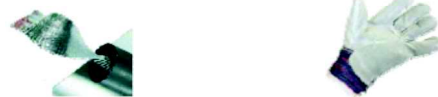
0x 0x 2x



0x 0x 2x



3 Locate and insert turbulator(s) into tube(s) ensuring the correct length and quantity are inserted into the correct tube. See assembly drawings section for quantity, location & length.



! CAUTION — SHARP EDGES!

2.4.2 BRACKETS, U BOLTS & U BEND.

4 Fit the M8 U bolts over the tubes and into the holes in the bracket & loosely secure with M8 nuts.

! DO NOT tighten any of the nuts at this stage.

Note: all the brackets on the RIGHT HAND FIRING TUBE (except the bracket adjacent to the U bend) should have nuts and washers on both sides of the bracket to allow bracket to be tightened while still allowing a 3mm gap for expansion between the tube & U bolt. See fig.a

3x 4x 5x

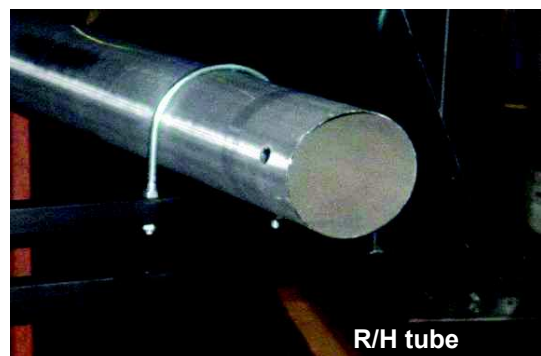
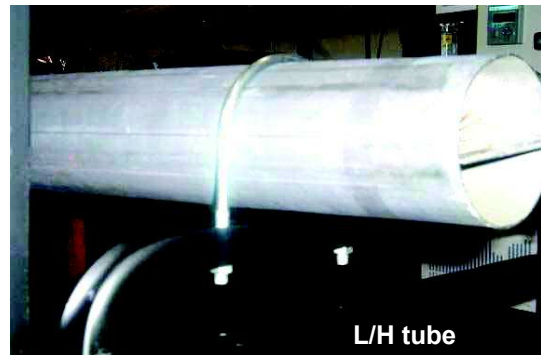
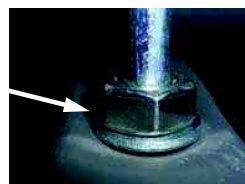


Fig.a

M8 nut and washer on the top side of the bracket



M8 nut and washer on the under side of the bracket



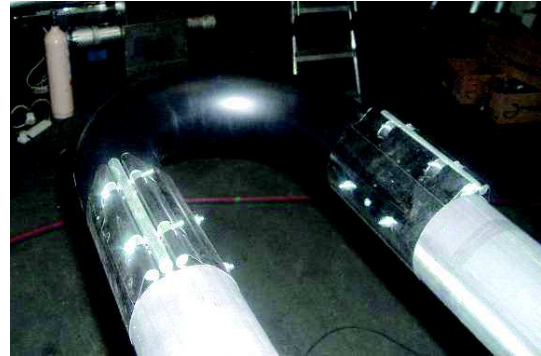
5 Working at the opposite ends of the tubes to the burner, locate & position two couplers so that the socket heads are facing outwards & the pre-fitted bolts in the couplers line up with the coating holes in the tubes. **Do not fully tighten at this stage.**

2x 2x 4x



6 Slide U bend into the open end of the couplers ensuring the pre-fitted bolts engage in the pre-cut holes in the U tube section. Tighten all four clamping bolts to provide a tight grip between tubes & U tube section.

1x 1x 1x



2.4.3 REFLECTORS

7 *Remove protective film before starting.*

The reflectors supplied all have the same hole positions, however, each end reflector should be positioned with the holes for the end caps (position arrowed) outermost.

Starting at the burner end, slide the reflectors through the brackets until they are all roughly in position along the heater, referring to the assembly diagram showing overlaps. Measure the distance between the end of the burner end tubes & the centre of the end bracket, **This should be 6" (150mm)**, slide bracket along tubes to adjust, then tighten U bolts on the end bracket.

2x 3x 4x



CAUTION — SHARP EDGES!

8 Slide end reflector so that the innermost slotted holes line up with 1st bracket fixing holes, then fix in place using M6 x 35mm pins, mud washers & nuts.

2x 2x 2x



9 Slide 2nd bracket to line up with innermost slotted hole in 1st reflector, & bolt together using M6 x 35mm pins, mud washers & nuts. Bolt 1st & 2nd reflectors together using end elongated holes in each. Refer to notes 'W', 'X', 'Y' and Z, see figs.9-12 for further details.

2x 4x 6x



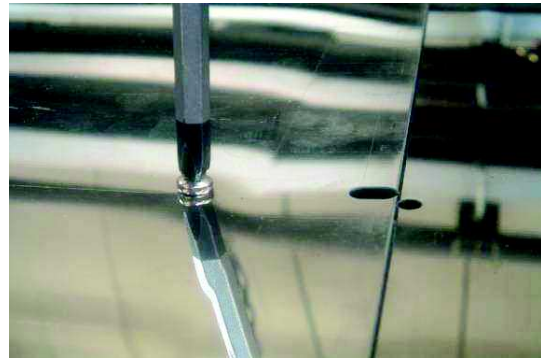
10 Repeat this procedure referring to the assembly diagram for quantities used on specific models, but noting that the final bracket is **not** bolted to the reflector. (See photo)



! At this stage all the U bolts should be fully tightened.

11 Locate M4 pins, washers & nuts into holes in overlapping reflectors as shown.

1x 2x 3x
1x 2x 3x
1x 2x 3x



! At this stage the Insulation should be inserted if necessary. As per section 2.2.5

2.4.4 END CAPS

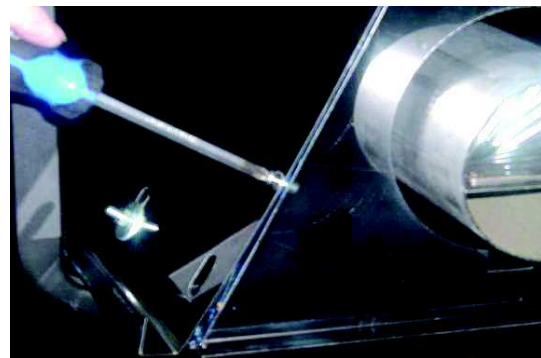
12 Using M4 set pins & washers fix the blank end cap beneath the reflector profile at the U bend end with the **flanges facing outwards**.

3x 3x 3x
3x 3x 3x



13 Using M4 set pins & washers fix the 'cut out' end cap beneath the reflector profile at the burner end with the **flanges facing outwards**.

3x 3x 3x
3x 3x 3x



! CAUTION — SHARP EDGES!

2.4.5 CANOPIES

14 Remove protective film before starting.

Slide the outer canopies over the reflectors from the U bend end ensuring correct location in reflector profile. Line up burner end canopy flush with burner end reflector. Overlap canopies as shown in the assembly diagram.

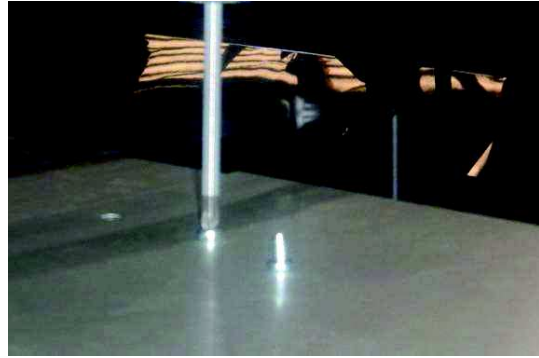
2x 3x 4x



CAUTION — SHARP EDGES!

15 Adjust canopies so that the holes on top align with each other as detailed in the assembly instructions. Locate and fix two No.5 torque screws on every canopy overlap.

2x 4x 6x



2.4.6 CANOPY END CAPS

16 Locate 6 off No.5 torque screws. Position the blank canopy end cap with the end cap flanges facing **inwards**, beneath the canopy profile at the U bend end & fix with screws. Repeat procedure for 'cut-out' canopy end cap, again ensuring the flange faces **inwards**.

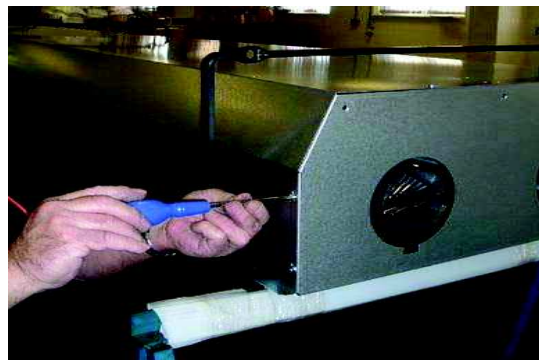
2x 2x 2x



12x 12x 12x



CAUTION — SHARP EDGES!



2.4.7 GENERAL

17 The heater assembly is now complete and can now be installed. *We would recommend that the burner and heat exchanger be assembled once the heater has been installed in the roof space.*

1x 1x 1x



1x 1x 1x



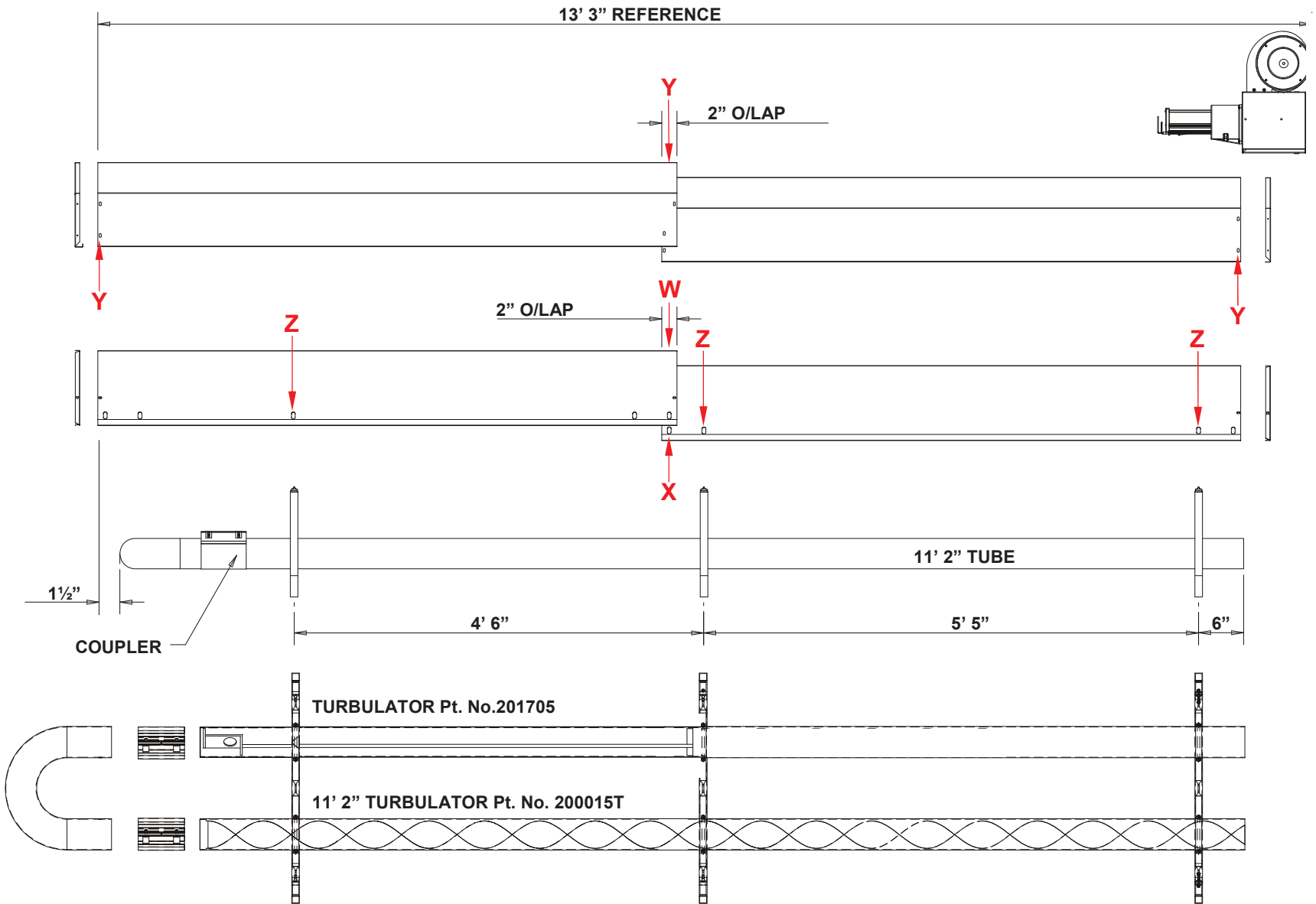
Slide the burner assembly onto the **RIGHT HAND TUBE** and the heat exchanger onto the **LEFT HAND TUBE** when viewed from above, ensuring it is fully engaged.

The hose connections should face vertically. Secure both assemblies with grub screws.

Attach the flexible hose between fan flange and the r/hand hose connection on the heat exchanger.

2.4.8 DETAILED ASSEMBLY DRAWINGS

Figure 9. Heater Assembly: 90U25



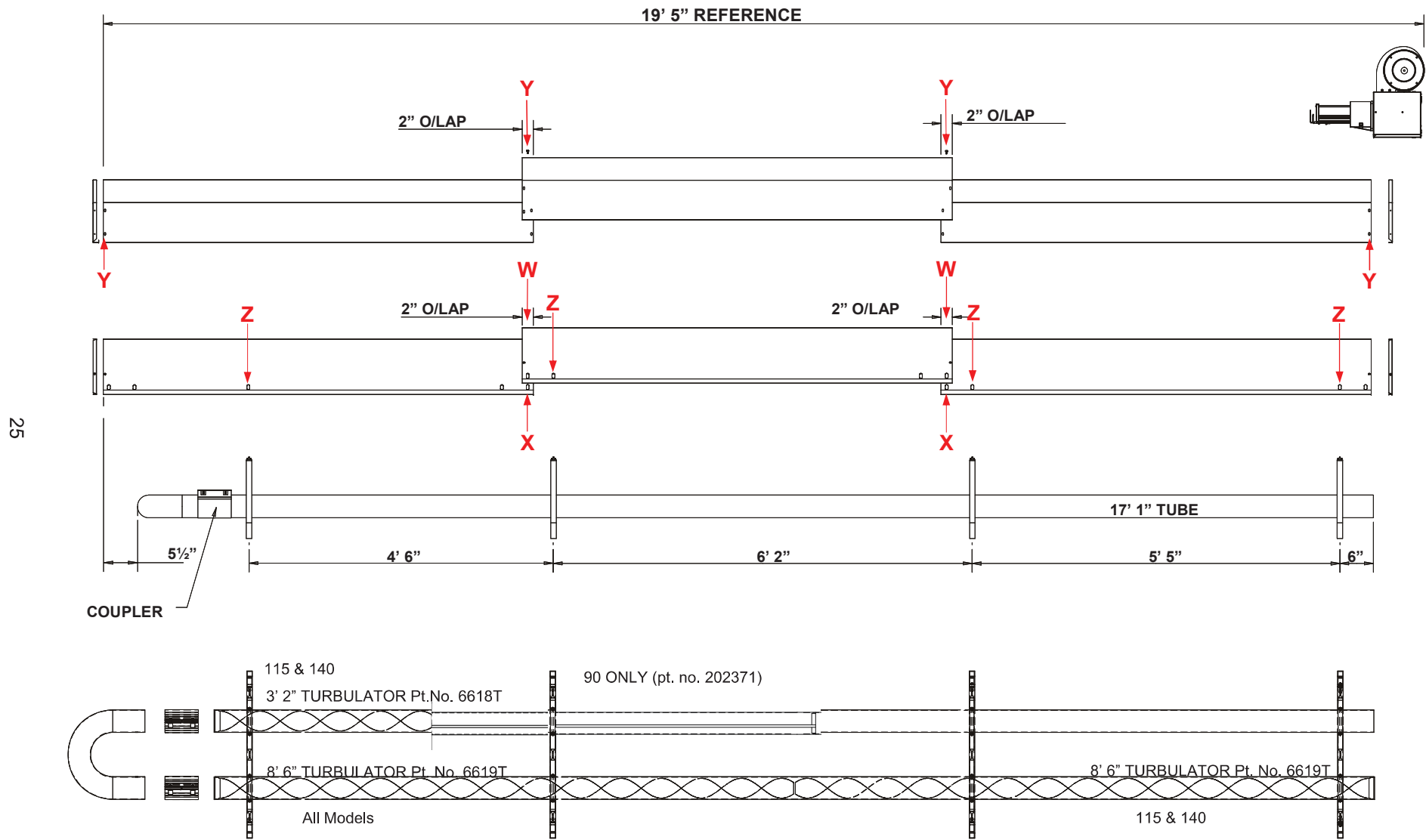


Figure 10. Heater Assembly: 90U35, 115U35 and 140U35,

Figure 11. Heater Assembly: 140U45 and 165U45,

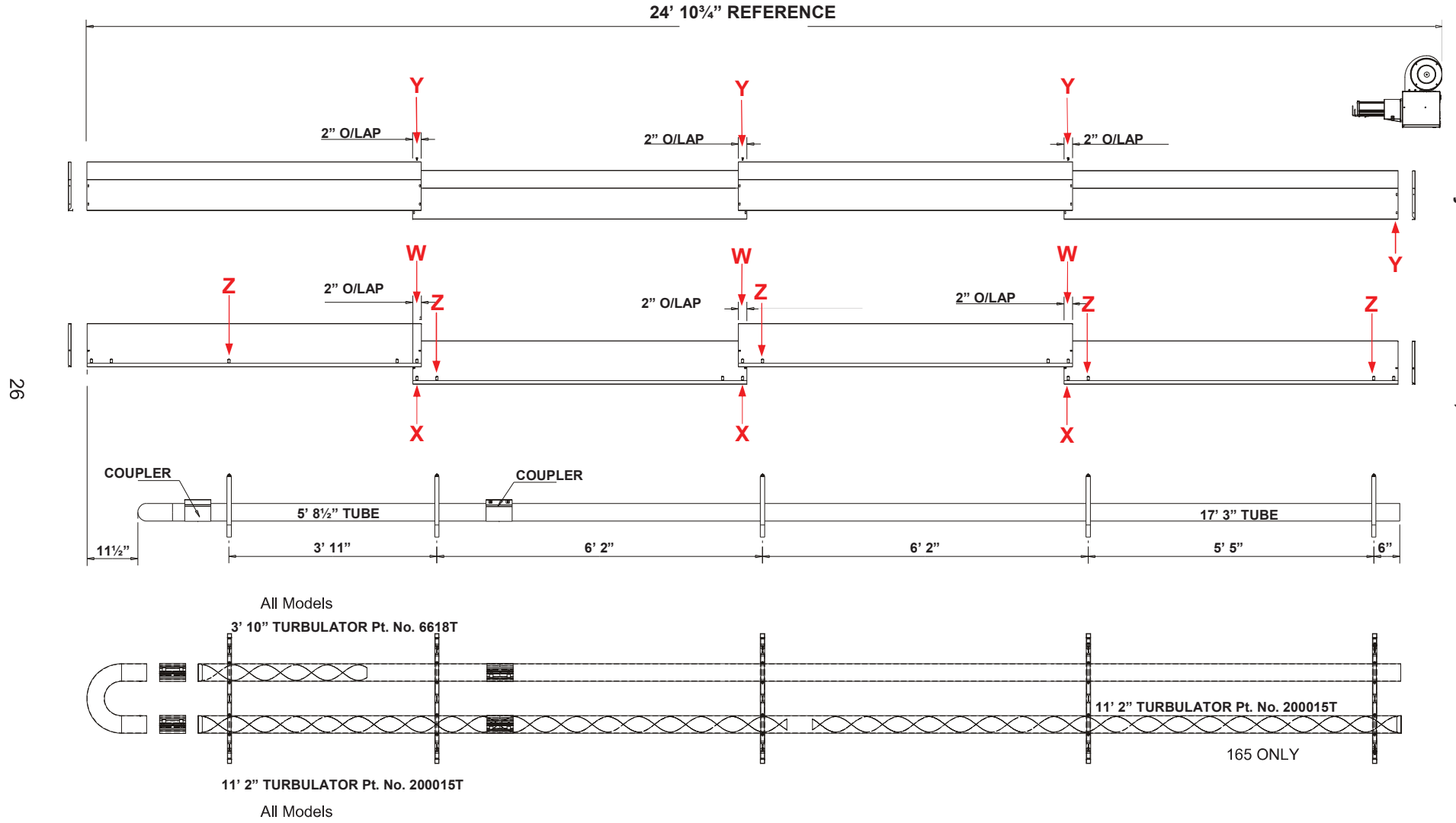
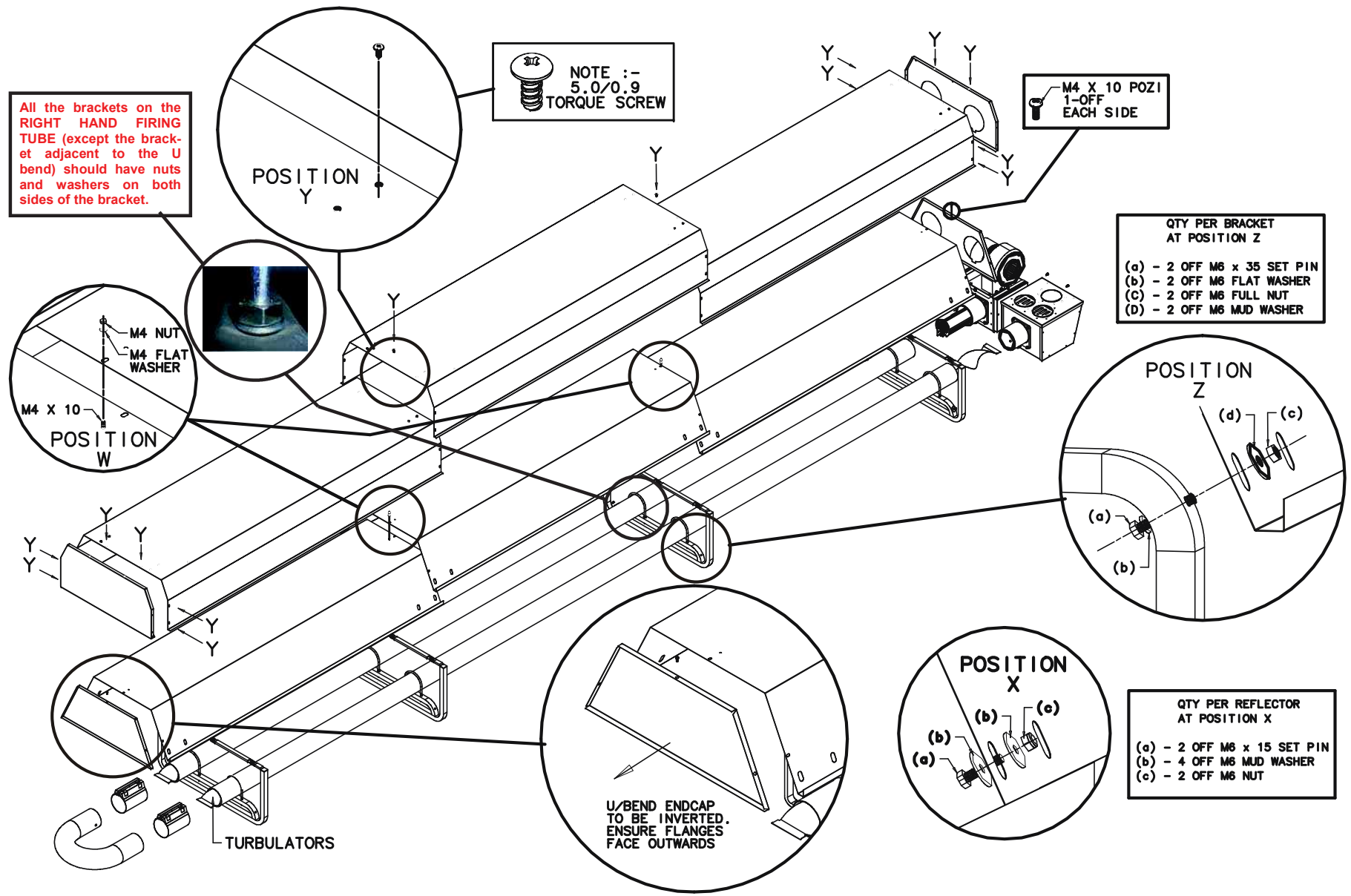


Figure 12. Heater Breakdown (U35 shown)



3. Start Up Instructions.



These appliances should be commissioned by a qualified mechanical contractor.

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



Phillips Screwdriver



Small Flat Head Screwdriver



Large Adjustable Wrenches for fitting Of Gas Flex.



1/2" Spanner



5/32" (4mm) Allen Wrench



Manometer



Multimeter

3.2 Start Up Procedure

Inspect installation and ensure that it has been carried out in accordance with these instructions. Remove burner and inspect the electrode assemblies ensuring these are securely fixed and all electrical connections securely made.

Re-fit the burner ensuring that it is correctly positioned and the screws are fully tightened. Ensure that electrical and gas supplies are isolated.

The gas supply should be purged and tested for soundness in accordance with local and National Safety codes.

Open isolating gas valve and test gas connections for soundness using soap solution.

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

Open the manual gas valve outside the control housing

Switch on the electrical supply to start the heater and observe the correct start up sequence. Ensure that the setting of any time switch and thermostat are such that the heating system will be required to operate.

The fan will start to run and the 'power on' lamp will illuminate. Safe-start checks are carried out automatically.

After the fan has run up to full speed and a satisfactory pressure condition has been

established, the ignition sequence will commence. The spark ignition will be energized producing a spark at the ignition electrode. The gas solenoid valve will at the same time be energised and the 'burner on' lamp will illuminate. If the ignition is successful the flame is detected by the flame sensing probe and the 'burner on' lamp will remain on.

If ignition is unsuccessful the gas valve will close and the spark ignition will de-energize after approximately 15 seconds. For approximately 30 seconds the fan will purge the system then re-ignition will be attempted. After 2 further attempts at ignition, the control unit will 'lock-out', the 'power on' lamp will remain illuminated and the fan will run for 120 seconds then stop.

To reset after 'lockout' switch off the power supply to the system and wait 2 minutes, then turn the power on. If repeated 'lockout' occurs investigate the cause.

Set burner gas pressure as follows:
Switch off the power supply to the heating system.

Connect a 'U' tube manometer to the pressure test point provided on the combination gas control valve.

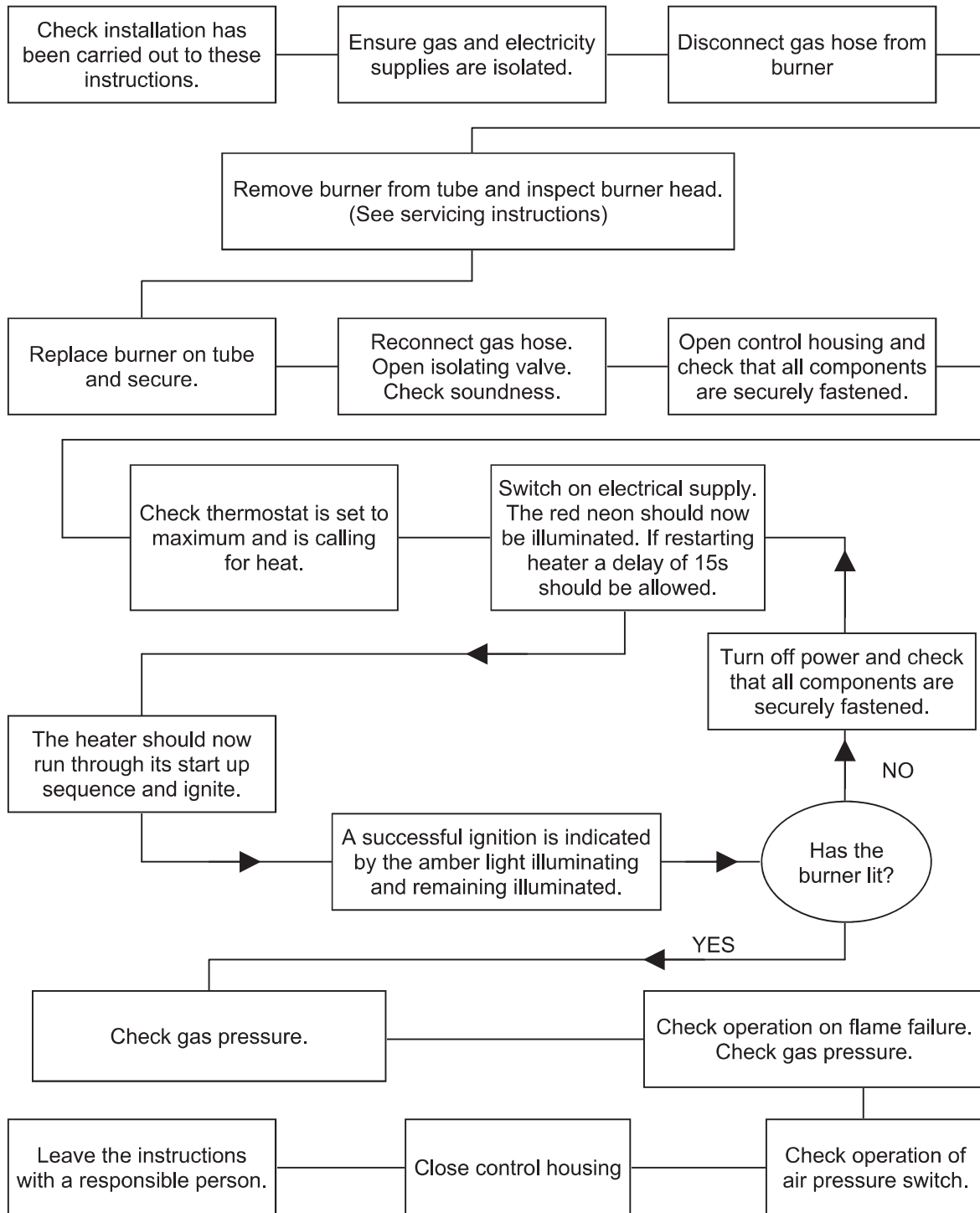
Remove the cover from the pressure regulator revealing the adjustable screw.

Start the heater and using a suitable screwdriver adjust the pressure regulator, turning the screw clockwise to increase the pressure or counter-clockwise to decrease the pressure. Set the pressure to appropriate inches w.c. from the table of gas pressures and orifice plate dimensions for correct heater description.

Switch off the power supply to the heating system. Disconnect 'U' tube manometer, then securely replace screw in pressure test nipple. Check the operation of the flame safeguard equipment as follows:
 With the heater running normally, switch off the gas supply at the shut off valve. The heater should attempt to relight and if the gas has been left off 'lock-out' should occur indicated by the 'power on' lamp being illuminated and fan running, but the 'burner on' lamp being off.

Check the operation of the pressure proving switch as follows:
 With the heater running normally, pull off both black rubber caps connected to the white plastic tees fitted in the pressure switch silicone tubing. Within 4 seconds the burner should shut off. Replace the tube securely and observe that the heater proceeds to ignite in the normal way. Close the controls door securing it with the screw.

Commissioning Chart



4. Servicing Instructions.

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



Phillips Screwdriver



Small Flat Head Screwdriver



Large Adjustable Wrenches for fitting of Gas Flex.



1/2" Spanner



4mm Allen Wrench



Manometer



Multimeter

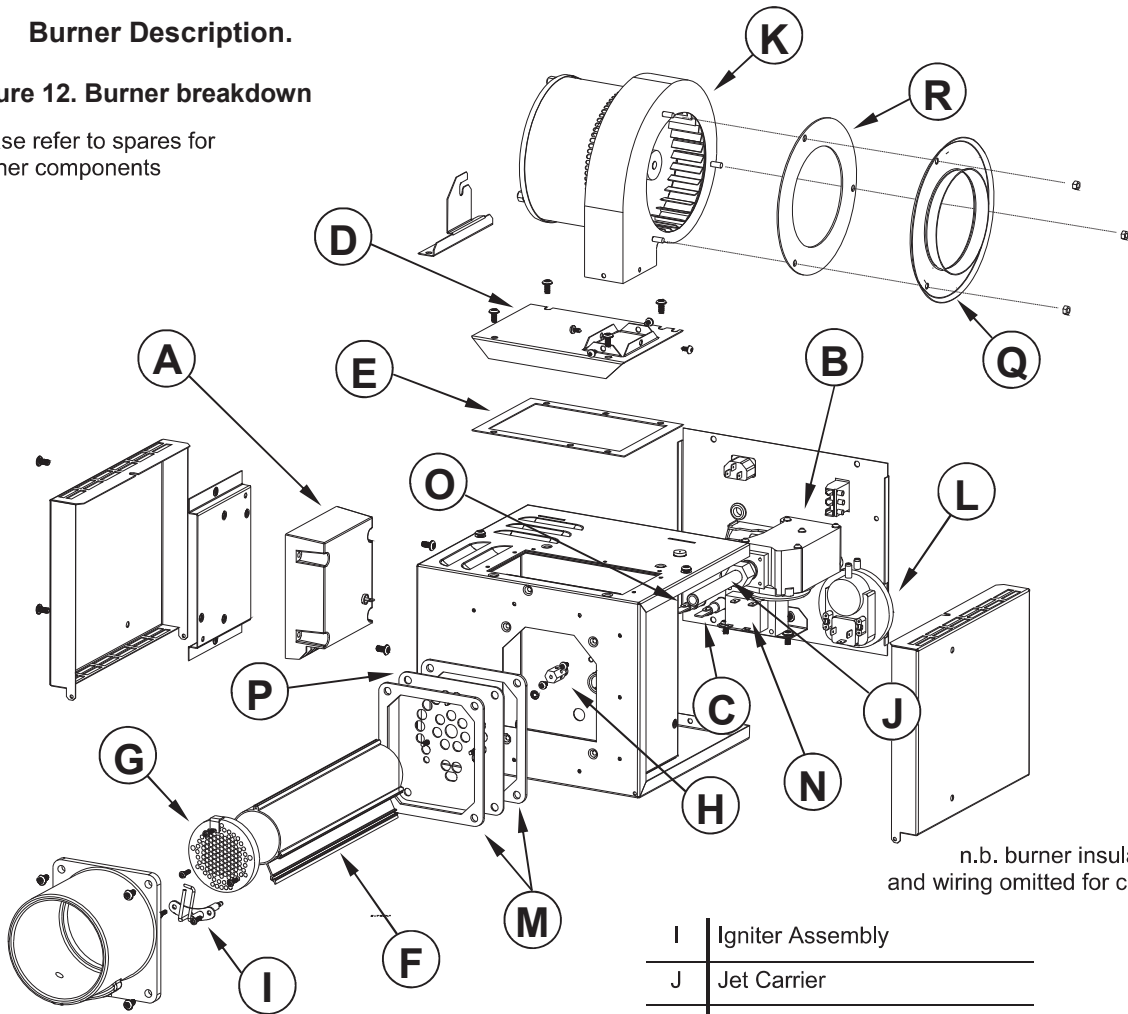


Soft Brush

4.2 Burner Description.

Figure 12. Burner breakdown

Please refer to spares for burner components




n.b. burner insulation and wiring omitted for clarity

A	Ignition Controller
B	Gas Valve
C	Power On Red Lamp
D	Fan Mount Plate
E	Fan Mount Plate Gasket
F	Burner Tube
G	Burner Head
H	Injector

I	Igniter Assembly
J	Jet Carrier
K	Combustion Fan
L	Pressure Switch
M	Gaskets
N	Transformer
O	Burner On Amber Lamp
P	Burner Orifice Plate
Q	Fan Inlet Spigot
R	Fan Orifice Plate

4.3 Burner Removal

 **Step 1:** Isolate power and gas supplies.

Step 2: Unplug the power connectors.



Step 3: Detach the gas supply as shown below, taking care to support the burner connection.




Step 4: Slacken the jubilee clip attaching the pre-heated air hose to the heat exchanger and remove the flexible hose from the burner.



Step 5: Remove the set screw on the burner support casting to enable the burner to be

removed from the radiant tube.



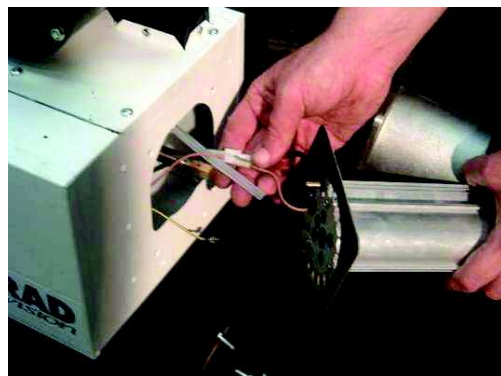
 **Step 6:** Remove the burner and position in a safe area to prevent the burner or attached components from falling to the ground.

4.4 Burner Gas Injector Servicing

Step 1.a: Remove the burner support casting and gasket.



Step 1.b: The burner head assembly can be disconnected by separating the connectors of the ignition lead assembly and removing the pressure switch silicon tube.



Step 2: The gas injector can be inspected and replaced if contaminated or blocked.



⚠ When replacing the gas injector ensure approved thread sealant is used.

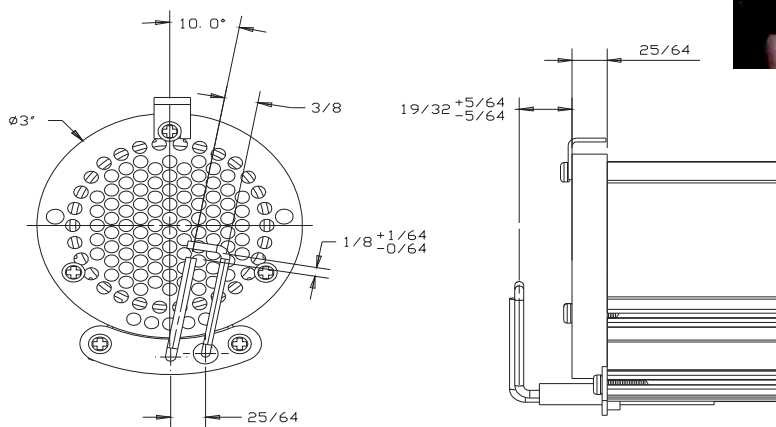
Step 3: Reconnect ignition leads and silicone tube to test nipple. Refit gasket and support casting.

4.5 Burner Head and Electrode Servicing



Step 1: Check the pepper pot burner head for contamination. If necessary this can be removed. See below. This can be cleaned together with the Inside of the burner head.

Step 2: The pepper pot burner head can be replaced ensuring the 5 holes on the outer ring are aligned alongside the probes.



Step 3: The condition of the igniter assembly can be checked for deterioration. However, we advise replacement at each service to ensure continued reliability. Detach the electrode assembly from the burner head by removing the two screws and separating the igniter lead connectors.



Step 4: Refit the electrode assembly and ensure the connections are secure to prevent arcing of the spark electrode.

Step 5: Check the positions and spark gap as shown below.

Step 6: The burner assembly is ready to refit after servicing the combustion fan and the radiant tube assembly.

4.6 Combustion Fan Assembly

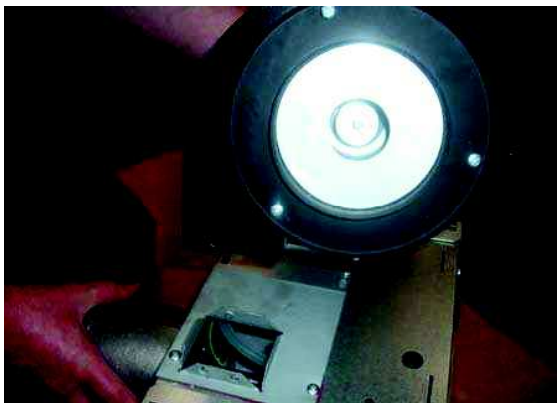
Step 1 Slacken hose clamp and remove the flexible hose from the fan.



Step 2: Remove fan screws and unplug from burner box.



Step 3: The combustion fan can now be detached.



Step 4: Remove the fan orifice plate spigot and spinning.

Step 5: Inspect the impeller and remove any dust with a soft brush.



Step 6: Remove any dust from fan scroll and from around the motor.

Step 7: Ensure the impeller rotates freely.

Step 8: Refit components.

4.7 Radiant Tube Servicing

Step 1: Brush any dust from the exterior of the tubes.

Step 2: Inspect the fan and burner tubes visually. If the tubes appear clean, skip to servicing the reflector.

Step 3: Remove the U bend.



Step 4: Withdraw the turbulators from the appliance, carefully noting their condition and position. Replace turbulators if necessary.



Step 5: The turbulators should be cleaned with a soft brush.



Step 6: If required the interior of the tubes can then be cleaned using an industrial vacuum cleaner or by using long poles and a scraper.

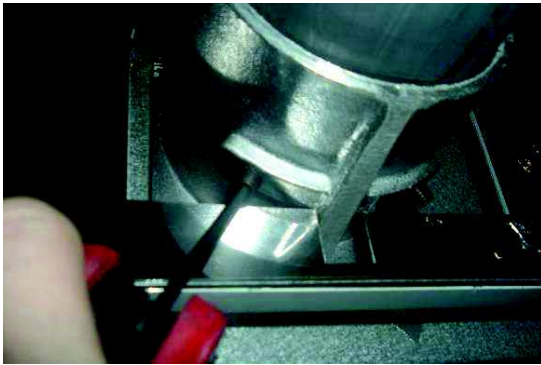
Step 7: Refit components.

4.8 Heat exchanger Servicing

Step 1: Remove the vent connections



Step 2: Slacken casing support screws and remove heat exchanger from the radiant tube.



Step 3: Remove any dust and dirt from the heat exchanger & refit.

4.9 Reflector Servicing

The condition of the reflectors should be noted. If necessary the reflectors can be cleaned with a mild detergent. This can significantly improve the efficiency of the appliance.

4.10 Sweeping of Vent

Inspect the fresh air inlet duct and vent to ensure they are free from any blockage or obstruction. The air inlet terminal and vent terminal should be inspected to ensure they are not liable to obstruction.

4.11 Re-commissioning After Service

After servicing of the heater has been undertaken, it will be necessary to re-commission the heater as detailed in Section 3 of these instructions.

5. Spare Parts

Required Spares

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

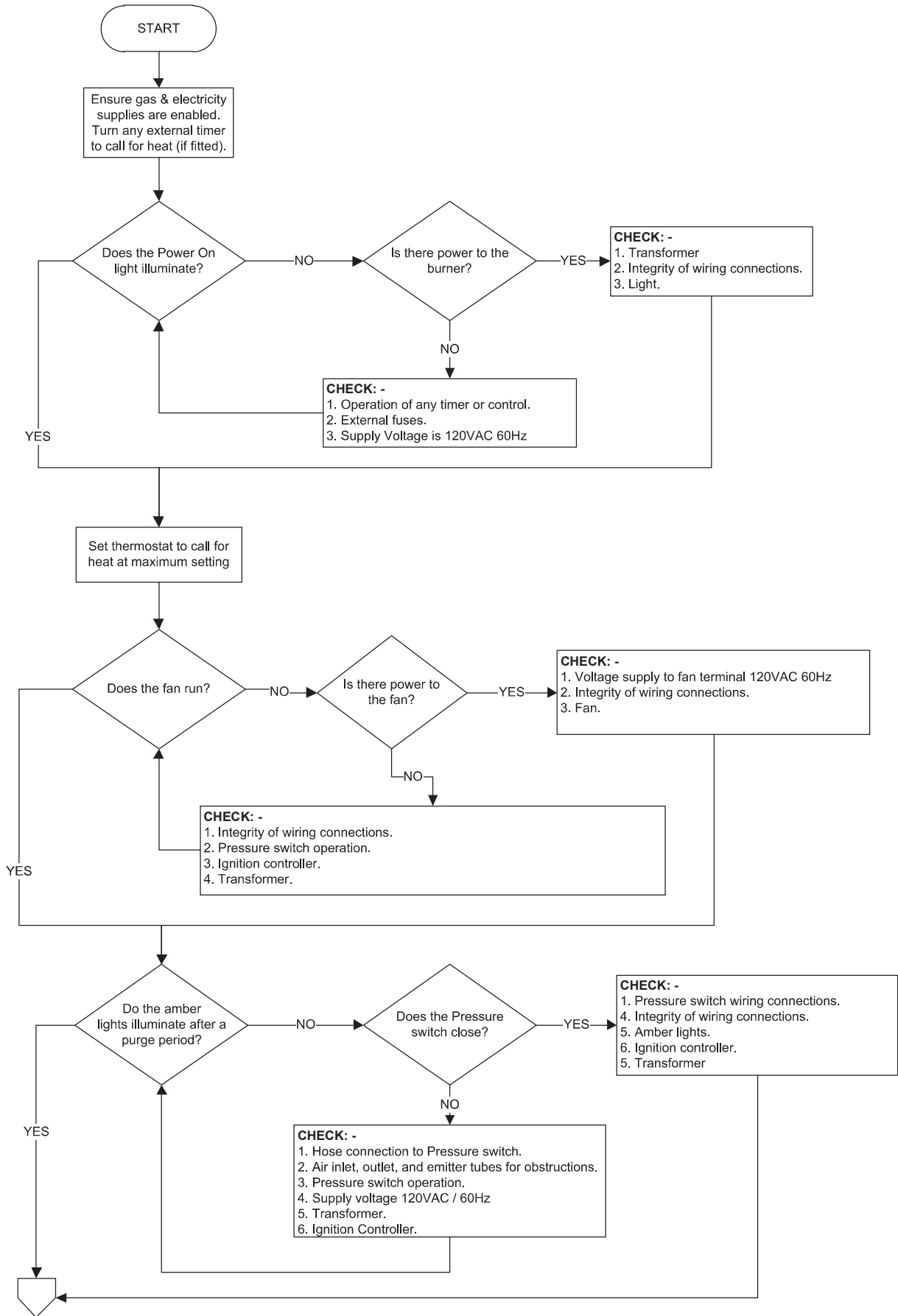
! *Note: Any spare part components that are not approved by the manufacturer could invalidate the approval of the appliance and the warranty.*

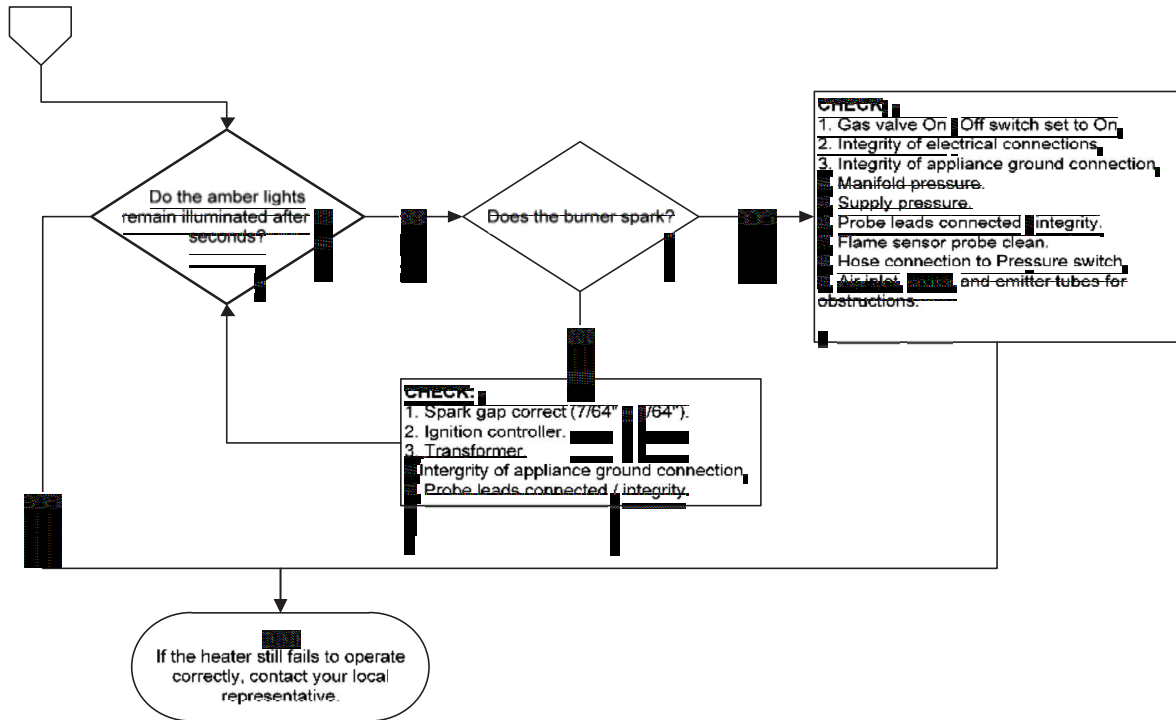
Item	Description	Part No.	Item	Description	Part No.
	Transformer (30VA)	900531		Pressure Switch	201676
	Gas Valve NG	202444		Single Probe Ignitor with Connector Lead	202531
	Jet Carriers Models 90-140 NG	202261		Amber Neon (Burner On)	2175-1
	Model 165 NG	202262		Red Neon (Power On)	2180-1
	Burner Head	200988		24V UT Ignition Controller	900545
	Burner Tube	200358		Injector	See Section 1.9
				Combustion Fans	See section 1.9

MODEL	TURBULATORS	
	Burner Side	Vent Side
90 U25	201705	200015T
90 U35	202371	6619T
115 U35	6618T	6619T x 2
140 U35	6618T	6619T x 2
140 U45	6618T	200015T
165 U45	6618T	200015T x 2

MODEL	OPTIONAL EXTRA KITS	
	Insulation Mat	Combustion Air Inlet Kit
90	202423 (U25) 202424 (U35)	202648
115	202424	
140	202424 (U35) 202423 x (2 U45)	
165	202423 x (2)	

6. Troubleshooting Guide





To aid the troubleshooting process, the UT controller has a LED flash code diagnostic sequence:

- Steady Off** No control power
- Steady On** Power applied, control OK
- 1 Flash** Combustion pressure switch open with blower on
- 2 Flashes** Combustion pressure switch closed with blower off
- 3 Flashes** Lockout from the three ignition trials
- 4 Flashes** Lockout from five flame losses
- 5 Flashes** Control hardware fault detected
- 6 Flashes** Lockout from five pressure switch losses

7. Replacing Parts.

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

7.1 Burner Controller Replacement

Step 1: Loosen screw in right hand burner access door and open.

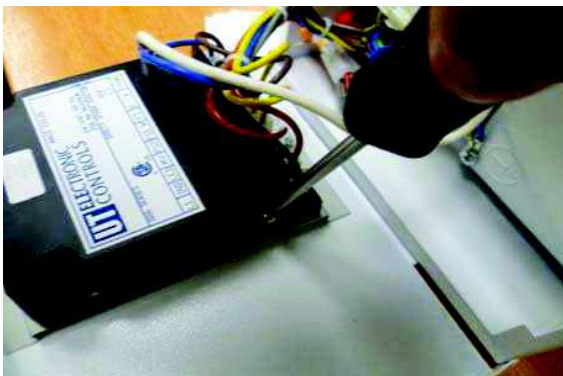
Step 2: Disconnect burner controller from the wiring harness.



Step 3: Disconnect the spark lead from burner controller.



Step 4: Remove the two screws attaching the controller to the burner door and remove.



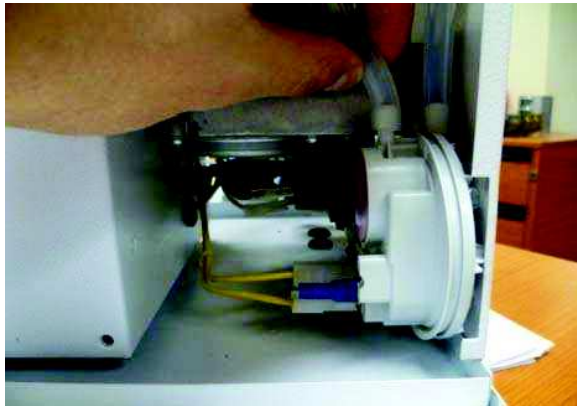
Step 5: Attach new burner controller.

Step 6: Reattach leads.

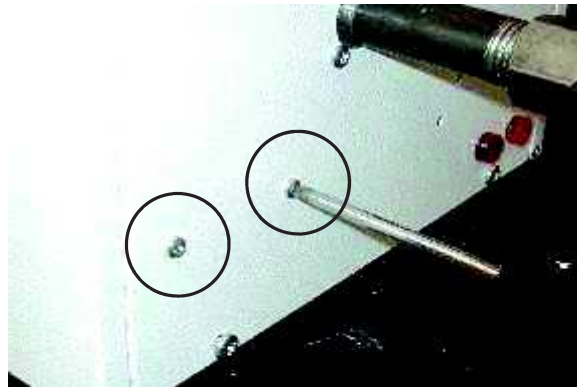
Step 7: Test product and close access door.

7.2 Air Pressure Switch Replacement

Step 1: Open left hand door. Disconnect the two silicone tubes from the pressure switch.



Step 2: Remove the two screws shown below.



Step 3: Remove electrical connections. The air pressure switch can now be removed.

Step 4: Fit the new air pressure switch ensuring the silicon tubes are connected as shown below.

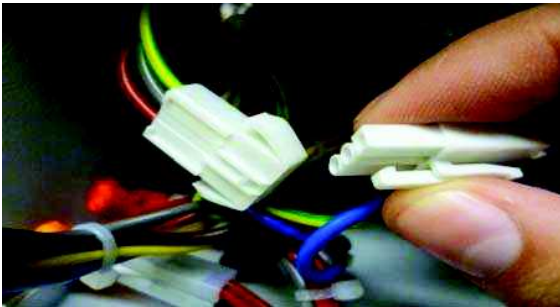


Step 5: Test product and close access doors.

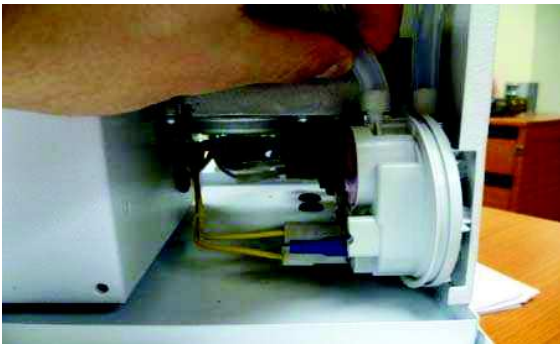
7.3 Gas Valve Replacement

Step 1: Remove the burner assembly as described in the servicing section.

Step 2: Open the right hand access door and disconnect the gas valve from the wiring harness.



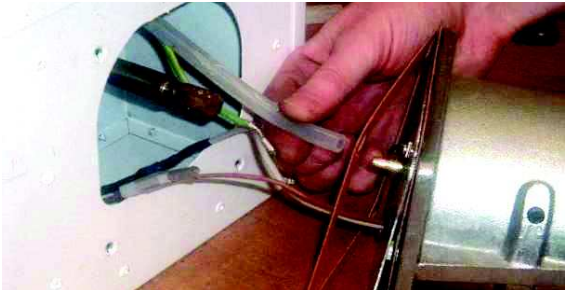
Step 3: Open the left hand access door and detach the silicon hoses from the air pressure switch.



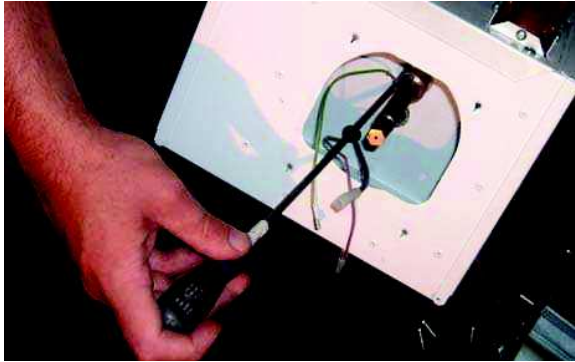
Step 4: Remove the 4 screws securing the burner head onto the burner assembly.



Step 5: The burner head can now be detached after disconnecting the silicon tube and the burner head wiring.



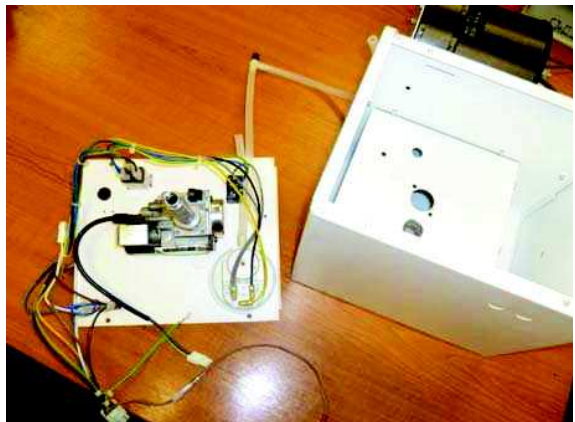
Step 6: Detach the two screws securing the front of the gas valve.



Step 7: Remove the four screws (arrowed), holding the rear burner plate in position.



Step 8: Remove the rear plate.



Step 9: The jet carrier, gas inlet, and wiring harness can now be detached from the gas valve.

Step 10: The two screws retaining the gas valve can now be removed.

Step 11: The gas valve can now be replaced.

Step 12: Reattach all components.

Step 13: Set pressures and test for reliable burner performance.

Step 14: Close access door.

8. User & Operating Instructions.

Radiant tubular infrared heaters are designed for overhead heating of industrial and commercial buildings. Individual heating units are suspended from the roof.



- 1. This appliance must only be installed by qualified installer in accordance with the requirements of local and National Codes.**
- 2. This appliance must be grounded in accordance with the National Electrical Code ANSI/NFPA No.70 or Canadian Codes.**
- 3. Never rest anything, especially ladders, against the heaters.**

8.1 To Start the Heater

1. First ensure that the gas supply to each heater is turned on by opening the main gas shut off valve.
2. Ensure that the setting of any time switch and thermostat are such that the heating system will be required to operate.
3. Switch on the electricity supply to the heater. The fan will start, the 'power on' light on the burner will illuminate and ignition commence.
4. Ignition will occur.
5. If ignition is unsuccessful the gas valve will close and the spark ignition de-energize after approximately 15 seconds. For approximately 30 seconds the fan will purge the system then re-ignition will be attempted. After 3 attempts at ignition the control unit will 'lock-out', the 'power on'

lamp will remain illuminated and the fan will continue to run. To reset after 'lockout', switch off the power supply to the heater and wait 5 minutes, then turn the power on. If repeated 'lockout' occurs investigate the cause.

8.2. To Switch Off Heater

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

8.3. Servicing

To ensure continued, efficient and safe operation it is recommended that the heater be serviced regularly by a qualified person every year in normal working environments, but in exceptionally dusty or polluted environments more frequent servicing may be needed.

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