AMBIRAD

AMBIRAD VISION® VSX

RADIANT TUBE HEATER

INSTALLATION AND OPERATING MANUAL



INDEX **Section**

Introduction and Document Index
Installation Requirements ---------- 1
Assembly Instructions ---------- 2
Commissioning Instructions ---------- 3
Servicing Instructions ---------- 4
Spare Parts ---------- 5
Fault Finding Guide ---------- 6
Replacing Parts ---------- 7
User and Operating Instructions ---------- 8

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.

Part No. 700015

CE

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

Introduction.

Welcome to the range of high efficiency AmbiRad Vision 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
- 1.1 Health & Safety
- 1.2 Model Definitions
- 1.3 Heater Suspension
- 1.4 Clearance to Combustibles
- 1.5 Gas Connection & Supply Details
- 1.6 Electrical Connections
- 1.7 Ventilation Requirements
  - 1.7.1 Unflued Radiant Heater
  - Mechanical Ventilation
  - Natural Ventilation
  - 1.7.2 Flued Radiant Heater
  - Mechanical Ventilation
  - Natural Ventilation
- 1.8 Flue & Combustion Air Inlet
  - 1.8.1 Important Information
  - 1.8.2 Flue Installation
  - 1.8.3 Condensation Considerations
  - 1.8.4 Flue Connections
- 1.9 Technical Details

2 Assembly Instructions
- 2.1 Tools Required
- 2.2 Assembly Notes
  - 2.2.1 Turbulators
  - 2.2.2 Brackets
  - 2.2.3 Tube Alignment Sections
  - 2.2.4 Couplers
  - 2.2.5 Reflectors
  - 2.2.6 Burner/Heat Exchanger Assembly
- 2.3 Identification Check List
- 2.4 Prior to Assembly
- 2.5 Step by Step Installation
  - 2.5.1 Tubes and Turbulators
  - 2.5.2 Brackets, U Bolts and U Bend
  - 2.5.3 Reflectors
  - 2.5.4 End Caps
  - 2.5.5 Canopies
  - 2.5.6 Canopy End Caps
  - 2.5.7 General
- 2.6 Detailed Assembly Drawings

3 Commissioning Instructions
- 3.1 Tools Required
- 3.2 Commissioning Chart for VSX Unitary Heaters

4 Servicing Instructions
- 4.1 Tools required
- 4.2 Burner Description
- 4.3 Burner Removal
- 4.4 Burner Gas Injector Servicing
- 4.5 Burner Head and Electrode Servicing
- 4.6 Combustion Fan Assembly
- 4.7 Radiant Tube Servicing
- 4.8 Heat Exchanger Servicing
- 4.9 Reflector Servicing
- 4.10 Inspection of Flue
- 4.11 Re-commissioning after Service

5 Spare Parts

6 Fault Finding Guide

7 Replacing Parts
- 7.1 Burner Controller Replacement
- 7.2 Air Pressure Switch Replacement
- 7.3 Gas Valve Replacement

8 User and Operating Instructions
- 8.3 To Start Heater
- 8.2 To Switch off Heater
- 8.3 Routine Maintenance Between Service Intervals
- 8.4 Frequency of Servicing

1. Installation Requirements.

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

1.1 Health and Safety

Nortek gas fired 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 (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

VSXUT = AmbiRad Vision High efficiency U Tube heater with painted powered burner, deep profile stainless steel reflector and end caps, reflector canopy and end caps in Aluzink.

1.3 Heater Suspension

See fig 1b. 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.

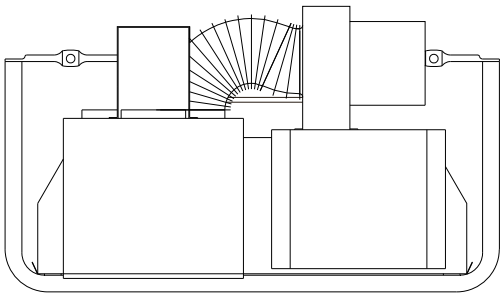
These methods are illustrated in Figure 1.b. If there are any doubts as to the strength or suitability of roof steelwork to which heaters are to be suspended, please refer to a Consultant, Architect or owner of the building.

The recommended mounting heights for VSX heaters are given in the table below.

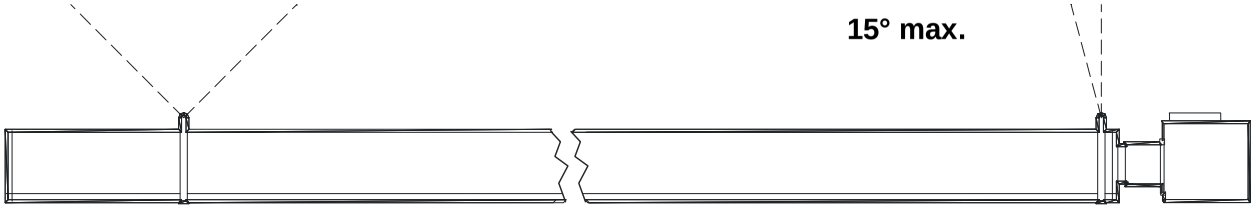
Model	Recommended Mounting Height (m)
kW	Horizontal
20	5.5 - 8.0
25	6.0 - 9.0
30	6.5 - 10.0
35	7.0 - 11.0
40	7.5 - 12.0
45	8.0 - 13.0
50	8.5 - 14.0

The burner ***MUST*** be positioned on the right hand side of the heat exchanger and mounted on a level horizontal plane. See fig 1a.

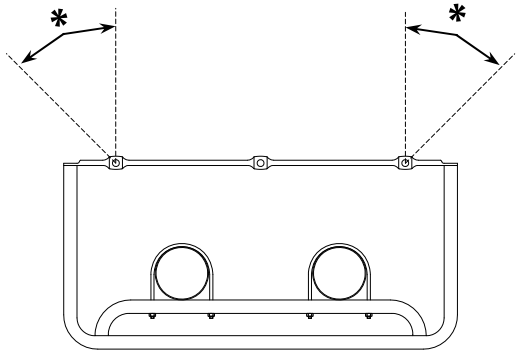
Figure 1.a.



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



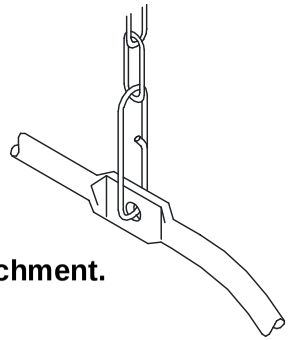
Vertical suspension chain ideal. Where supports are inclined, maximum recommended angle of inclination is 15°.



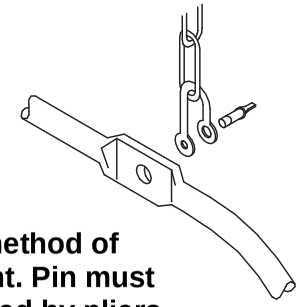
Vertical or inclined suspension on this plane is acceptable.

* These angles to be equal and not more than 45°.

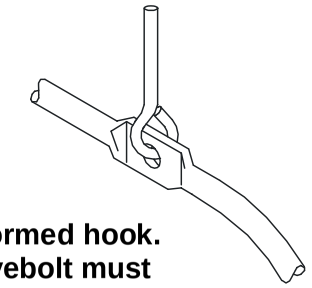
THE HEATER SHOULD SLOPE DOWNWARDS TOWARDS THE RETURN BEND BY APPROX. 10mm FOR BOTH HORIZONTAL AND WALL MOUNTED INSTALLATIONS.



Typical Speedlink attachment.



Shackle method of attachment. Pin must be tightened by pliers.



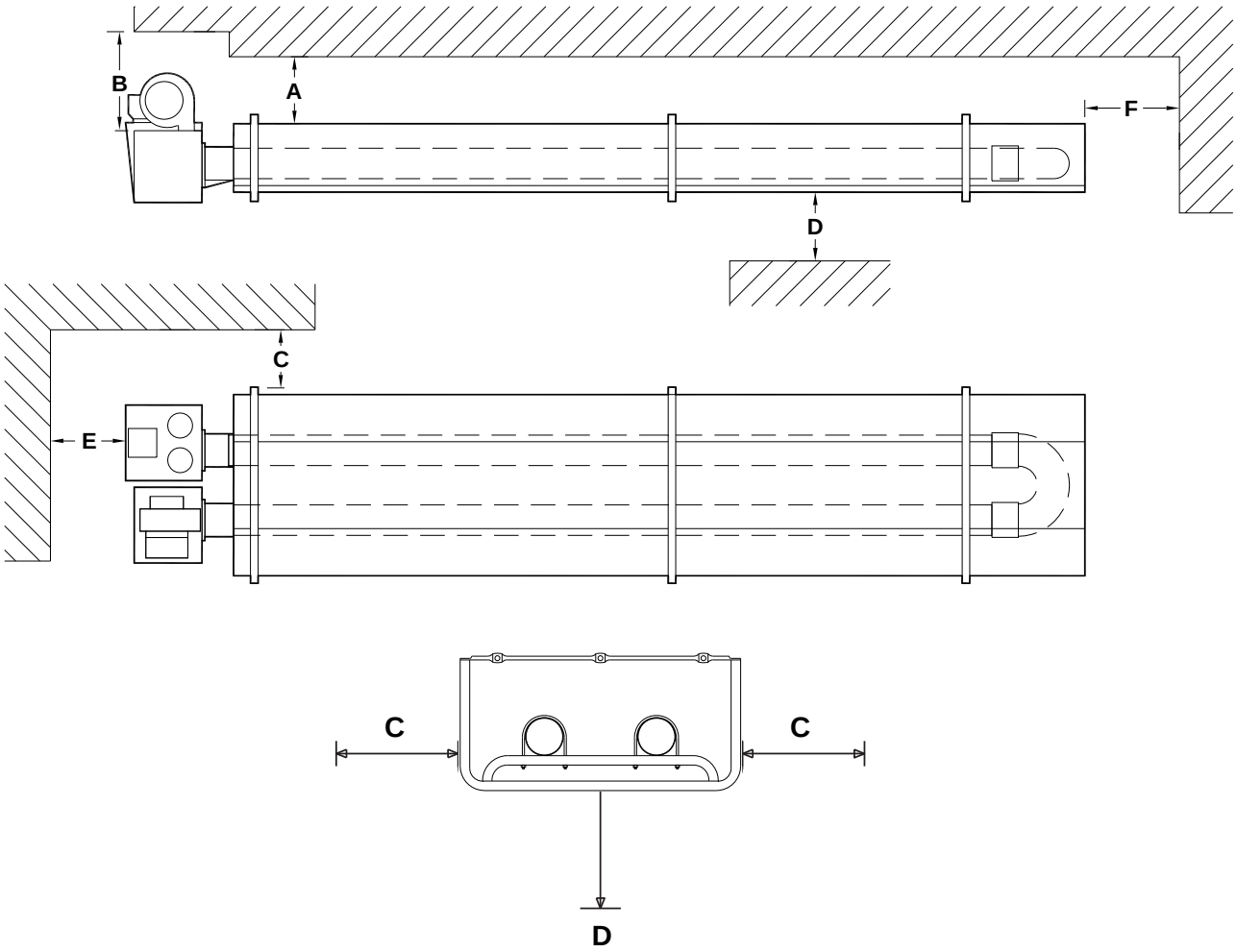
Drop rod with formed hook. note. hook or eyebolt must be closed tight.

Figure 1.b. 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.

Figure 2 Diagram illustrating the clearance to combustibles



VSXUT		20/25/30	35/40	45/50
Above Reflector	**A**	100	100	100
Above Burner / Heater Outlet	**B**	500	500	500
To the Sides	**C**	1300	1300	1300
Below Tubes	**D**	2300	2500	2500
Horizontally from Heater Outlet (UNFLUED)	**E**	1200	1200	1200
End Wall	**F**	700	700	700

1.5 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, so that the supply pressure, as stated in Table 2 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.

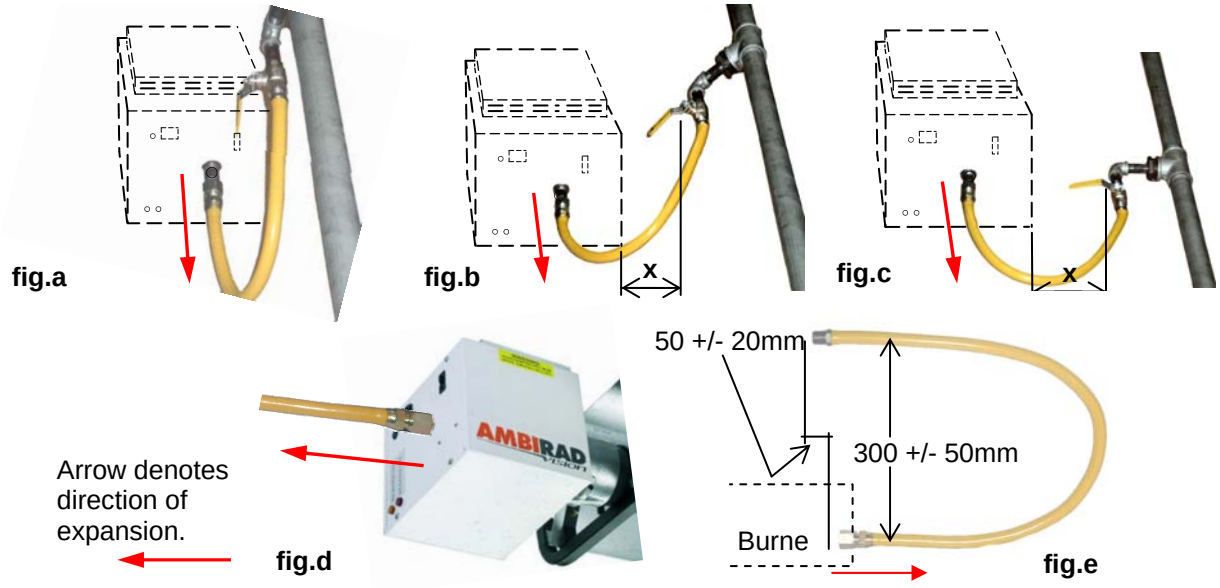
Take care when making a gas connection to the heater not to apply excessive turning force to the internal controls.

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, 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 later is the only method recommended by the institute of gas engineers, the hose manufacturer, and Nortek Global HVAC (UK) Ltd and must only be carried out by a qualified/ competent gas engineer.

Figure 3. 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.

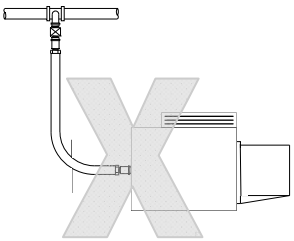


fig.f

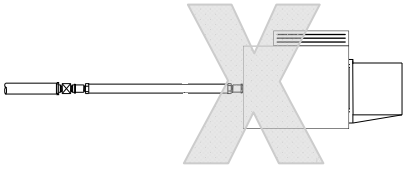


fig.g

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

Table 2 Gas Supply Pressures

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

1.6 Electrical Connection

This appliance must be earthed.

Supply 230V 50Hz single phase.

Standard heater 116W.

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. 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 Nortek Global HVAC (UK) Ltd 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.

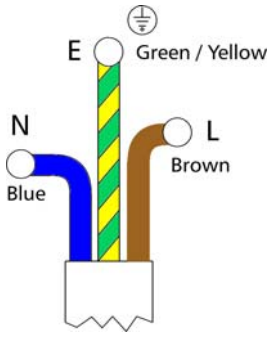


Figure 4.a Single Phase Wiring

Figure 4.b Typical Wiring Connections

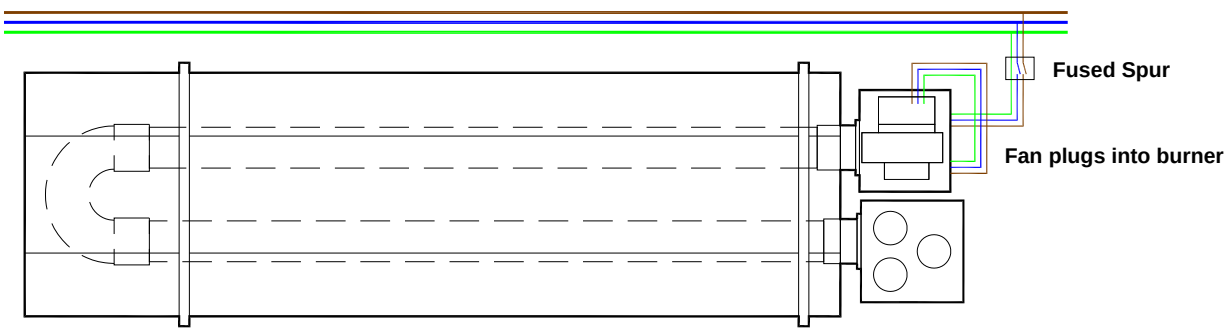
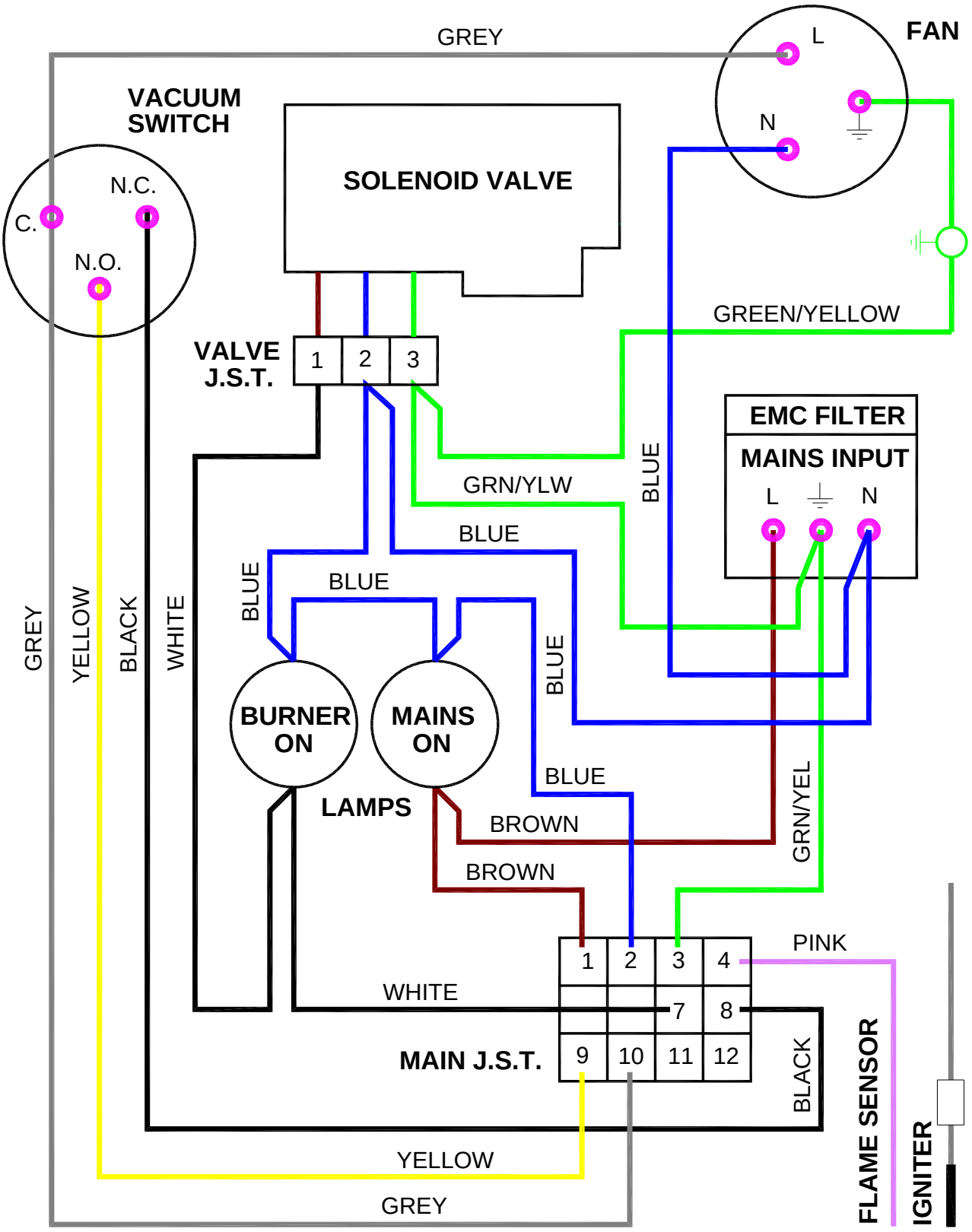


Figure 5. Internal Burner Wiring Diagram.



1.7 Ventilation Requirements

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

1.7.1 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 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 1.5). It should be ensured that the combustion gases do not impinge on any combustible materials.

Mechanical Ventilation
Mechanical ventilation must be rated at minimum 10m³/h per kW input using appropriately sized fans and interlocked with heaters.
Natural Ventilation
BS EN 13410 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 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.

1.7.2 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 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.

1.8 Flue and Combustion Air Inlet - Options

Dependent on the type of burner fitted to your heater it is possible to have configurations of flue and combustion air inlet options to those shown overleaf:

- **Option 1**
  For flued products of combustion and no ducted air please refer to Figure 6.a.
- **Option 2**
  For ducted air and products of combustion to ventilated area please refer to Figure 6.b.
- **Option 3**
  For flued products of combustion and ducted air via concentric pipe please refer to Figure 6.c.

1.8.1 Important Information

1.8.1.1 Option 1 and 2
A suitable flue system complying with EN1856-1 (type T250 N1 D Vm L11040 O50) should be used. Flue size 125mm diameter twin wall.

Flue systems can run either vertically or horizontally up to a **maximum length of 9.5m** (including up to 2 x 90° bends plus the terminal). The minimum flue length shall be 1m.

The flue system **must be terminated in a vertical position** and in accordance with the British Standard Code of Practice BS 5440: Part 1 - Installation and maintenance of flues and ventilation for gas appliances of rated input not exceeding 70kW net (1st, 2nd and 3rd family gases), and the flue system manufacturers instructions as supplied with the flue.

1.8.1.2 Option 3
A suitable flue system complying with EN1865-1 (type T200 P1 W V2 L50050 O00) should be used. Flue size 100mm diameter single wall.

The **maximum flue length** shall be 9.0m (including up to 2 x 90° bends plus the terminal). The minimum flue length shall be 1m.

The flue system **must be terminated vertically only** and in accordance with the British Standard Code of Practice BS 5440: Part 1 - Installation and maintenance of flues and ventilation for gas appliances of rated input not exceeding 70kW net (1st, 2nd and 3rd family gases), and the flue system manufacturers instructions as supplied with the flue.

1.8.2 Installation

Connection to an appliance which is not connected to the fuel supply may be carried out by a competent person. However, connection to an appliance that is connected to the fuel supply **must** be carried out by a registered installer.

If the flue passes through a wall, ceiling, or roof made from combustible material then it has to be sleeved so as to provide a minimum of a 50mm void between the exterior of the flue and the internal wall of the sleeve. A minimum of 50mm must be maintained as a clearance distance to all other combustible materials.

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.

The maximum distance between supports is 1.5m for horizontal runs.

Wall bands are not load bearing and give lateral support only. If used, wall bands should be fitted every 3m on vertical runs to ensure the system is rigidly held. The system should be braced immediately below passing through the roof line to ensure the flashing does not suffer lateral pressures.

The maximum height unsupported above the roof line is 1.5m. Where a joint is above the roofline it should be determined that in extreme wind conditions this joint would not be over exerted. If there is any doubt then a guy wire should be used. Beyond this guy wires should be installed every meter.

The POCED is capable of withstanding its own weight when installed in accordance with these instructions and the Regulations shown below.

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 – Installation and maintenance of flues and ventilation for gas appliances of rated input not exceeding 70kW net (1st, 2nd and 3rd family gases), and the flue system manufacturers instructions as supplied with the flue.

See reference BS 6896. Condensate drain pipes must be protected against the effects of freezing.

1.8.3 Condensation

When designing the flue system the prevention of the formation and entrapment of condensation must be a key consideration.

Horizontal flue should be fitted ensuring a slight gradient approx 5° towards the terminal.

Where condensation is unavoidable traps should be included to encourage the condensates to flow freely to a point from which they may be released, preferably into a gully. The condensate pipe from the flue to the disposal point must be made from corrosion resistant pipe of not less than 25mm internal diameter.

1.8.4 Method of Jointing Tube

1.8.4.1 Option 1

All pipe lengths and flue gas carrying components are joined together by a twist lock, bayonet system. The system should be installed with the visible male collar pointing upwards, this is reaffirmed by the directional arrow pointing upwards, indicating the directional flow of flue gases. Taping of the joints is unnecessary.

1.8.4.2 Option 3

The components are joined by pushing the male spigot and female socket together until the stop is reached. No sealant is required, but can be applied if the formation of condensation is anticipated.

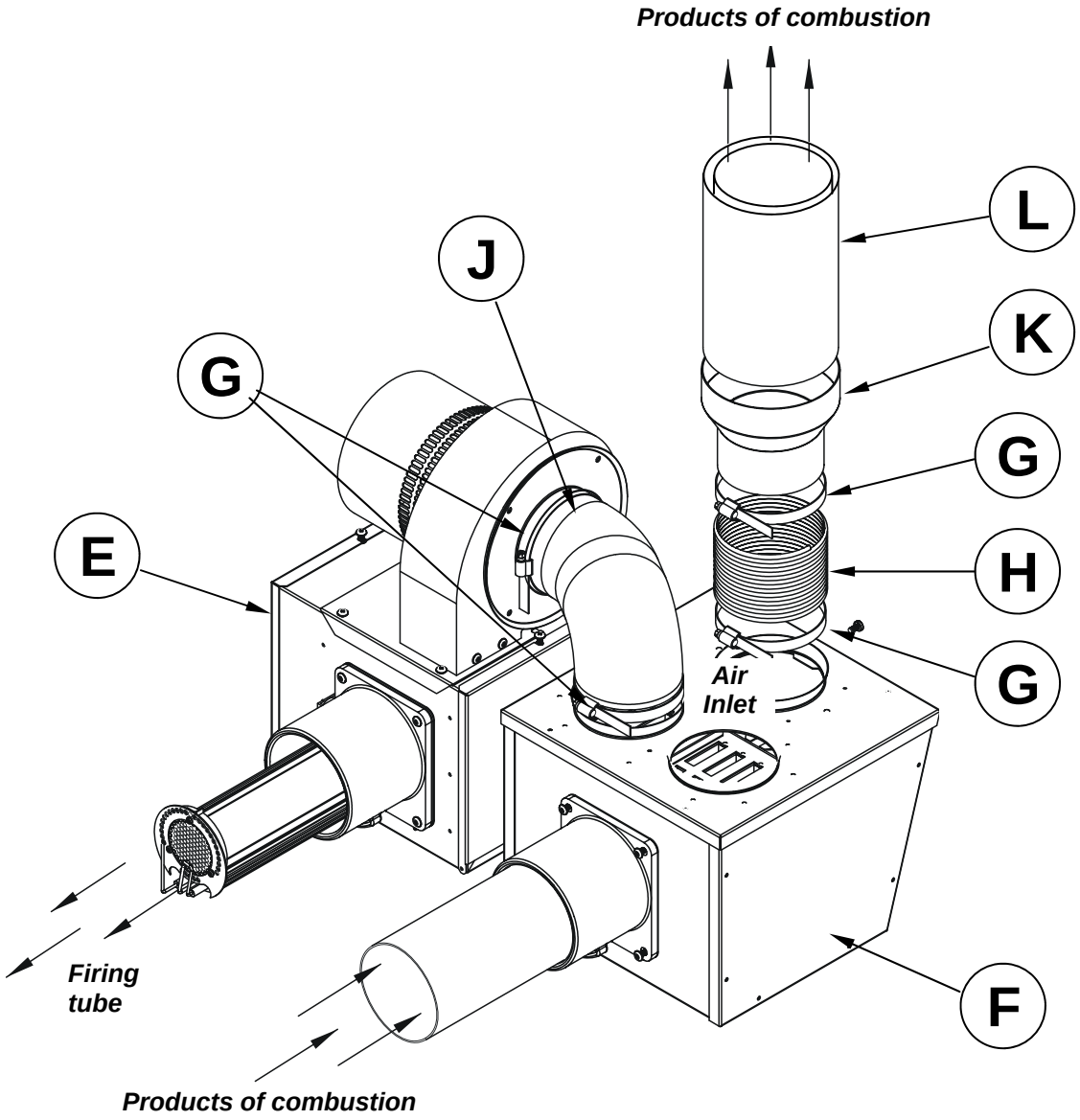
To seal use an applicator gun and apply a 4mm diameter bead of high temperature silicon jointing compound externally round the end of the male spigot and internally round the end of the female socket.

Push the male spigot into the female socket using a slight rotating movement to spread the jointing compound uniformly until both fittings have fully engaged.

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

Option 1 - Figure 6.a. Forced Burner with Heat Exchanger (Standard Flue)

For flued products of combustion and no ducted air



Maximum flue length = 9.5m @ Ø125mm
Maximum no of bends = 2
All flues must **terminate** vertically.
For further information on flue runs, please refer to section 1.9.1 BS 5440 pt.1

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

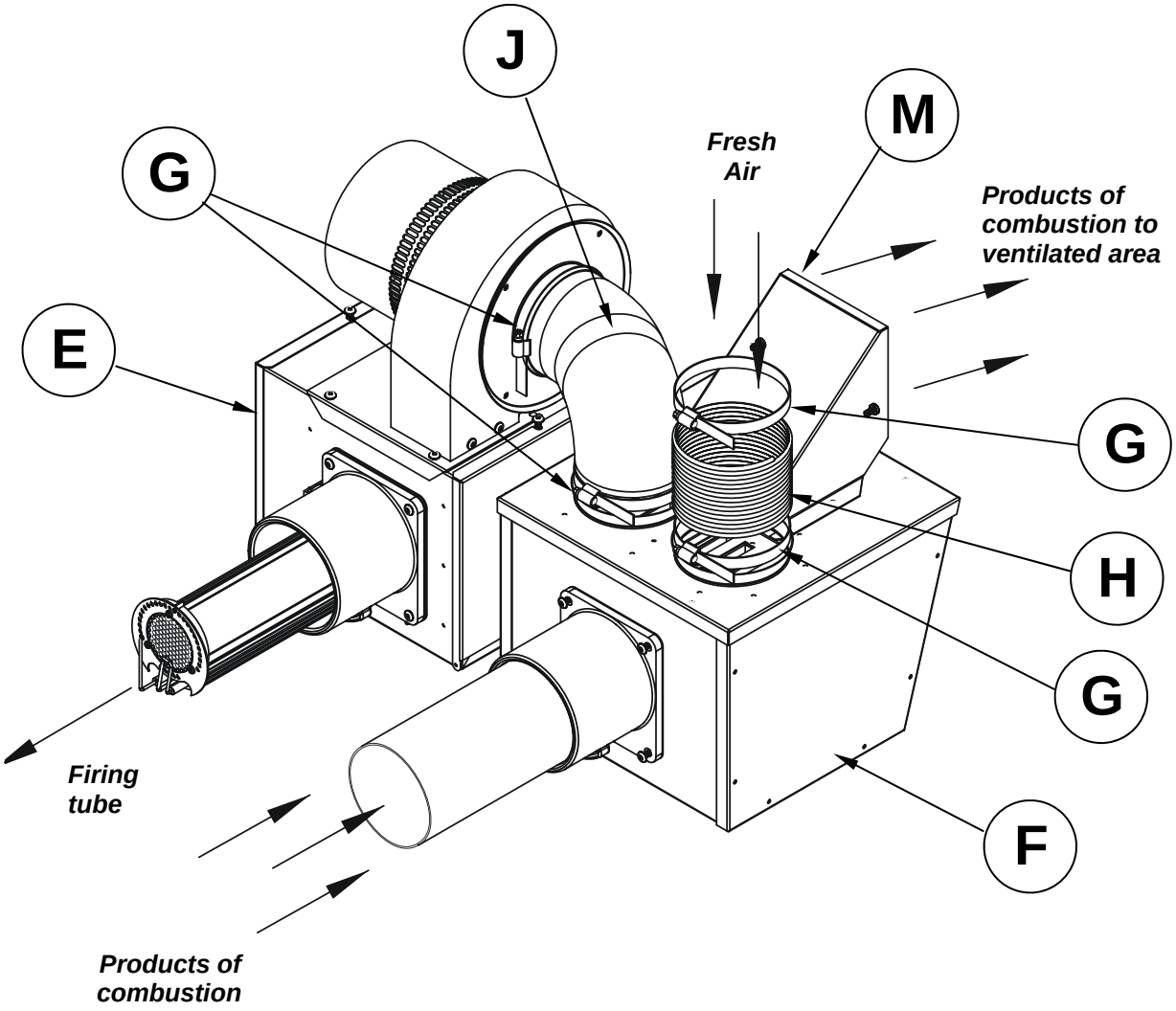
Maximum length = 9m
Minimum diameter = 100mm
Maximum no of bends = 2

E	**Forced Burner**
F	**Heat Exchanger**
G	**100mm (4ins) Clips x2**
H	**100mm (4ins) Flexible Flue**
J	**100mm (4ins) Flexible Flue to Fan**
K	**127mm (5ins) to 100mm (4ins) Reducer**
L	**127mm (5ins) Twin Wall Flue Pipe**

Ventilation requirements are as detailed in section 1.7

Option 2 - Figure 6.b. Forced Burner with Heat Exchanger (No External Flue)

For ducted air and products of combustion to ventilated area



E	**Forced Burner**
F	**Heat Exchanger**
G	**100mm (4ins) Clips x2**
H	**100mm (4ins) Flexible Flue**
J	**100mm (4ins) Flexible Flue to Fan**
M	**Shroud for unflued heater installation**

Ventilation requirements are as detailed in section 1.7

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

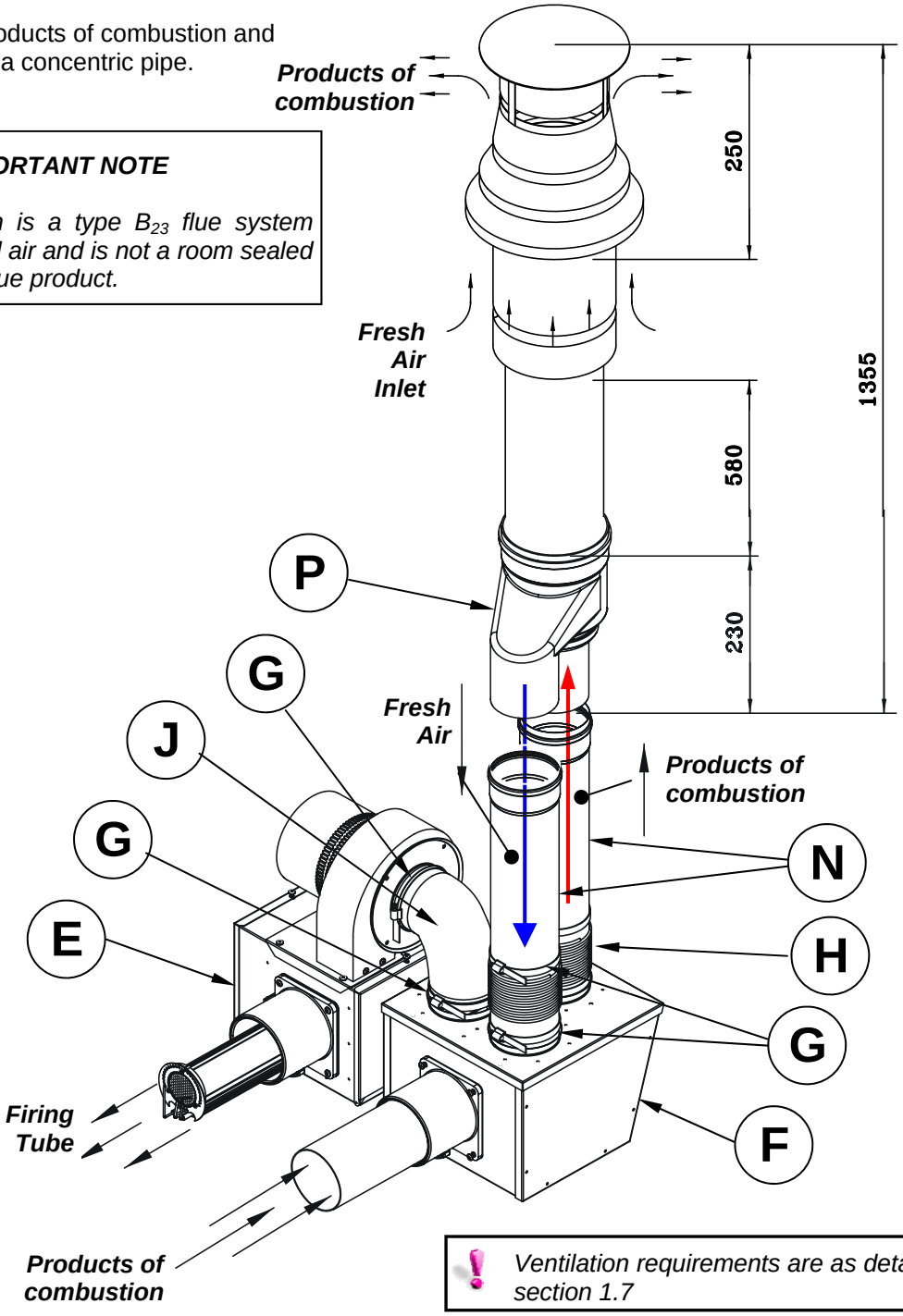
Maximum length = 9m
Minimum diameter = 100mm
Maximum no of bends = 2

Option 3 - Figure 6.c. Forced Burner with Heat Exchanger (with Concentric Flue)

For flued products of combustion and ducted air via concentric pipe.

IMPORTANT NOTE

This option is a type B_{23} flue system with ducted air and is not a room sealed balanced flue product.



E	**Forced Burner**
F	**Heat Exchanger**
G	**100mm (4ins) Clips x2**
H	**100mm (4ins) Flexible Flue**
J	**100mm (4ins) Flexible Flue to Fan**
N	**Flue Extension optional (0.25m/0.5m/1.0m)**
P	**Concentric Flue Terminal**

Ventilation requirements are as detailed in section 1.7

Maximum flue length = 9.0m @ Ø125mm
Maximum no of bends = 2
All flues must **terminate** vertically.
For further information on flue runs, please refer to section 1.9.1 BS 5440 pt.1

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

1.9 Table 3. Technical Details.

All heaters to run on **Natural Gas (G20)**

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

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							
VSX20UT2M	20.0	18.0	1.9	10.0	1.7	450x4047x746	114	0.5	2501
VSX25UT2M	25.0	22.5	2.4	9.4	1.9	450x4047x746	114	1.0	2507
VSX30UT2M	30.0	27.0	2.9	10.5	2.0	450x4047x746	114	1.0	2507
VSX30UT3M	30.0	27.0	2.9	10.5	2.0	450x5927x746	158	1.0	2507
VSX35UT3M	36.0	32.4	3.4	12.3	2.3	450x5927x746	158	1.0	2507
VSX40UT3M	40.0	36.0	3.8	12.8	2.4	450x5927x746	158	0.5	2560
VSX45UT3M	44.0	39.6	4.2	11.6	2.9	450x5927x746	158	0.5	2560
VSX45UT4M	44.0	39.6	4.2	11.6	2.9	450x7692x746	205	0.5	2560
VSX50UT4M	49.5	44.6	4.7	12.8	2.5L	450x7692x746	205	0.5	2560

Table 4. Flue details

Heater Model	Mass Flow Rate of Flue Gasses (kg/s)	Flue Pressure (Pa) Maximum Flue Resistance	Flue Gas Temp (°C)
VSX20UT	0.0116	35 - 42	190 - 250
VSX25UT	0.0132		
VSX30UT	0.0133		
VSX35UT	0.0166		
VSX40UT	0.0173		
VSX45UT	0.0196		
VSX50UT	0.0220		

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



Spanner Set



4 & 5mm Allen keys



Tape Measure

2.2 Assembly Notes.

Please read these assembly notes in conjunction with the correct assembly drawings (figs 7 to 10).

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.



2.2.4 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.

Ensuring the bolts are not over tightened.

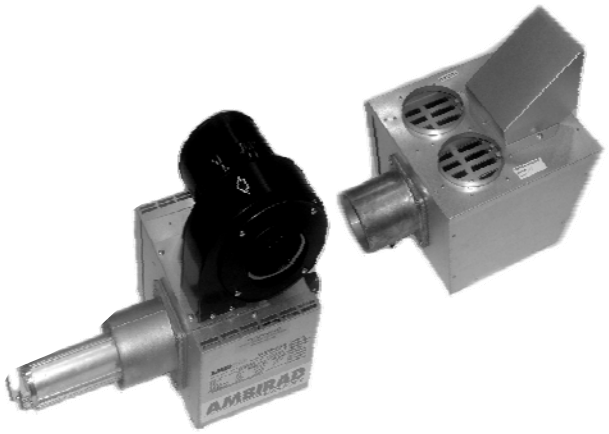


2.2.6 Burner and Heat Exchanger Assembly.

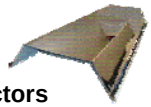
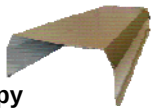
Slide the burner assembly onto the **RIGHT HAND TUBE** when viewed from above**,** ensuring it is fully engaged.

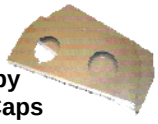
Slide heat exchanger onto the **LEFT HAND TUBE** when viewed from above**,** ensuring it is fully engaged. The hose connections should face vertically.

Secure both assemblies with grub screws.



2.3 Identification check list

COLOUR CODE	VSX2M 20/25/30	VSX3M 30/35/40/ 45	VSX4M 45/50
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
No.5 Torque Screw 	13x	14x	15x
M6 Mudwasher 	12x	16x	20x

COLOUR CODE	VSX2M 20/25/30	VSX3M 30/35/40/ 45	VSX4M 45/50
Inner End Caps 	2x	2x	2x
Outer Canopy End Caps 	2x	2x	2x
Tubes 	2x	2x	4x
Turbulators 	2x	3x	3x
Couplers 	2x	2x	4x
M8 U Bolt 	6x	8x	10x
M8 Full Nut 	16x	22x	28x
M4 x 10 Pozi Setpin 	7x	8x	9x

COLOUR CODE	VSX2M 20/25/30	VSX3M 30/35/40/ 45	VSX4M 45/50
M6 Washer 	4x	6x	8x
M6 Full Nut 	6x	10x	14x
M6 x 35 Setpin 	4x	6x	8x

COLOUR CODE	VSX2M 20/25/30	VSX3M 30/35/40/ 45	VSX4M 45/50
M4 Full Nut 	1x	2x	3x
M4 Washer 	7x	8x	9x
M6 x 15 Setpin 	2x	4x	6x

2.4 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 below. All reflectors, tubes, brackets and canopies are bolted together.

2.5 Step by step installation.

2.5.1 Tubes and 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 **VSX50 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

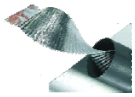






3 Locate and insert turbulator(s) into tube(s) ensuring the correct length and quantity are inserted into the correct tube. See assembly drawings section for location & length.

2x 3x 3x





CAUTION — SHARP EDGES!



2.5.2 Brackets, U Bolts and U bend.

4 Fit the M8 U bolts over the tubes into the holes in the bracket & loosely secure with M8 nuts & washers, noting that all the brackets on the firing tube (right hand) except the bracket adjacent to the U bend should have nuts & washers on both sides of the bracket to allow bracket to be tightened whilst still allowing a 3mm gap for expansion between the tube & U bolt. Refer to sketch below..

3x 4x 5x



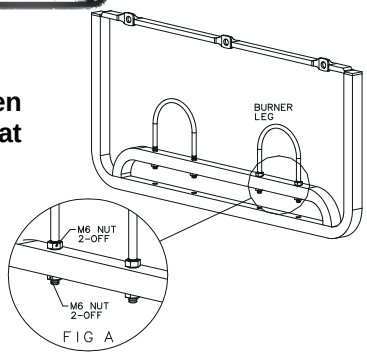
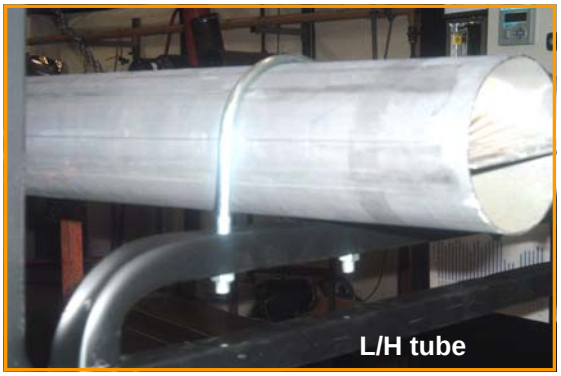


FIG A



DO NOT tighten any of the nuts at this stage.



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 locating holes in the tubes. **Do not fully tighten at this stage.**

2x 2x 2x





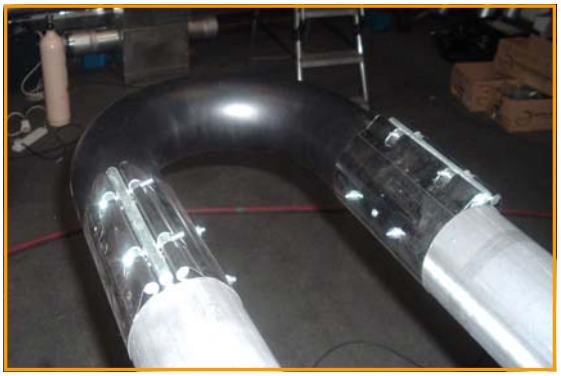


6 Slide U bend into the open end of the couplers ensuring the pre-fitted bolts engage in the pre-cut holes in the U tube section. Tighten all four clamping bolts to provide a tight grip between tubes & U tube section.

1x 1x 1x







2.5.3 Reflectors.

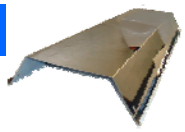
Remove protective film before starting.

Reflectors are supplied pre-punched and are universal throughout the VSX series.



7 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 3x





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, washers & nuts.

2x 2x 2x





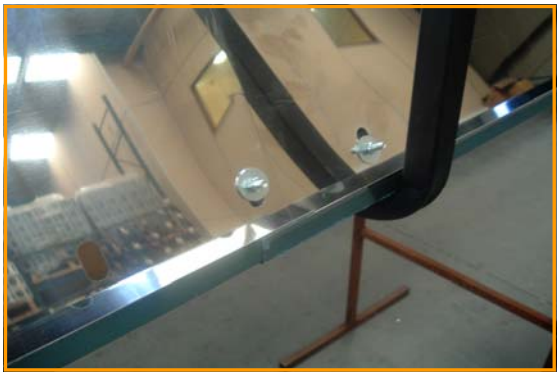


9 Slide 2nd bracket to line up with innermost slotted hole in 1st reflector, & bolt together using M6 x 35mm pins, washers & nuts. Bolt 1st & 2nd reflectors together using end elongated holes in each. Refer to notes 'W', 'X', 'Y' and Z in fig.12 for further details.

4x 4x 4x







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)



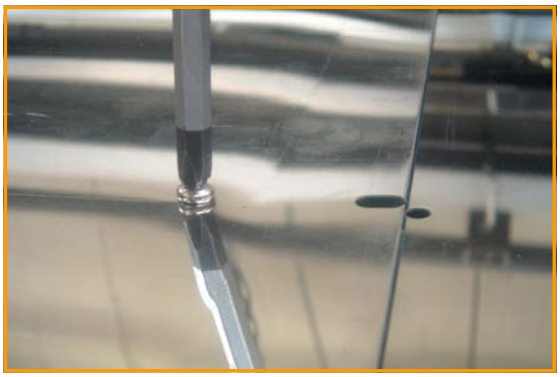
At this stage all the U bolts should be fully tightened.

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

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







2.5.4 End Caps

12 Using M4 setpins & 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
2x	2x	2x







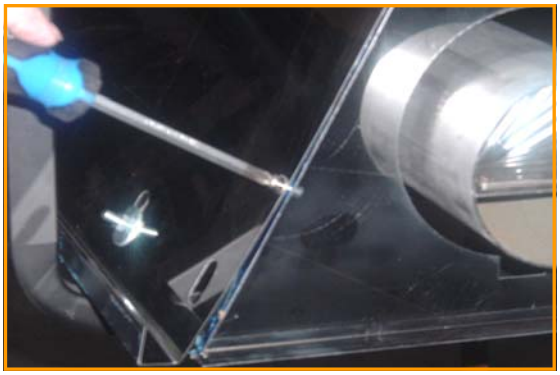


13 Using M4 setpins & washers fix the 'cut out' end cap beneath the reflector profile at the burner end with the **flanges facing outwards.**

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



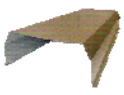




2.5.5 Canopies

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 one No.5 torque screw on every canopy overlap.

1x	2x	3x

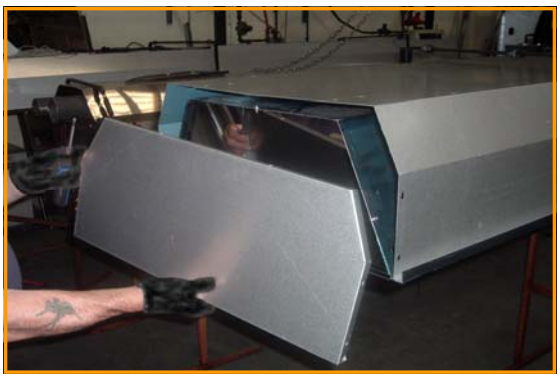






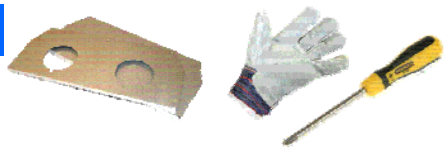
2.5.6 Canopy End Caps

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!

2.5.7 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



2.6 Detailed Assembly Drawings

The following pages show the technical dimensional details of the VSX heaters.

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

Refer to figure 12 for details of **'W', 'X', 'Y' and 'Z'** fastening and locations.

Figure 7. VSX2M 20/25/30

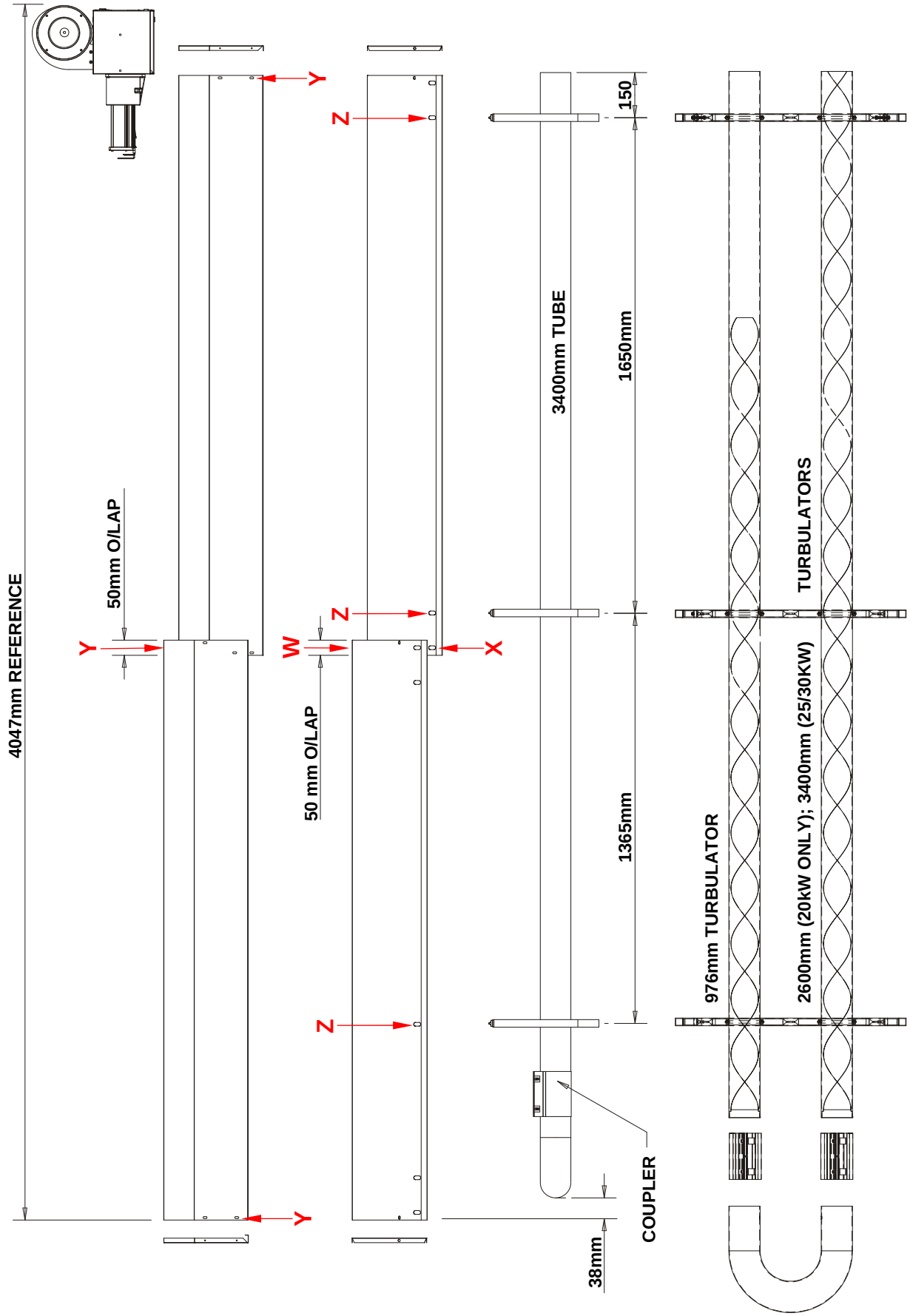


Figure 8. VSX3M 30/35/40/45

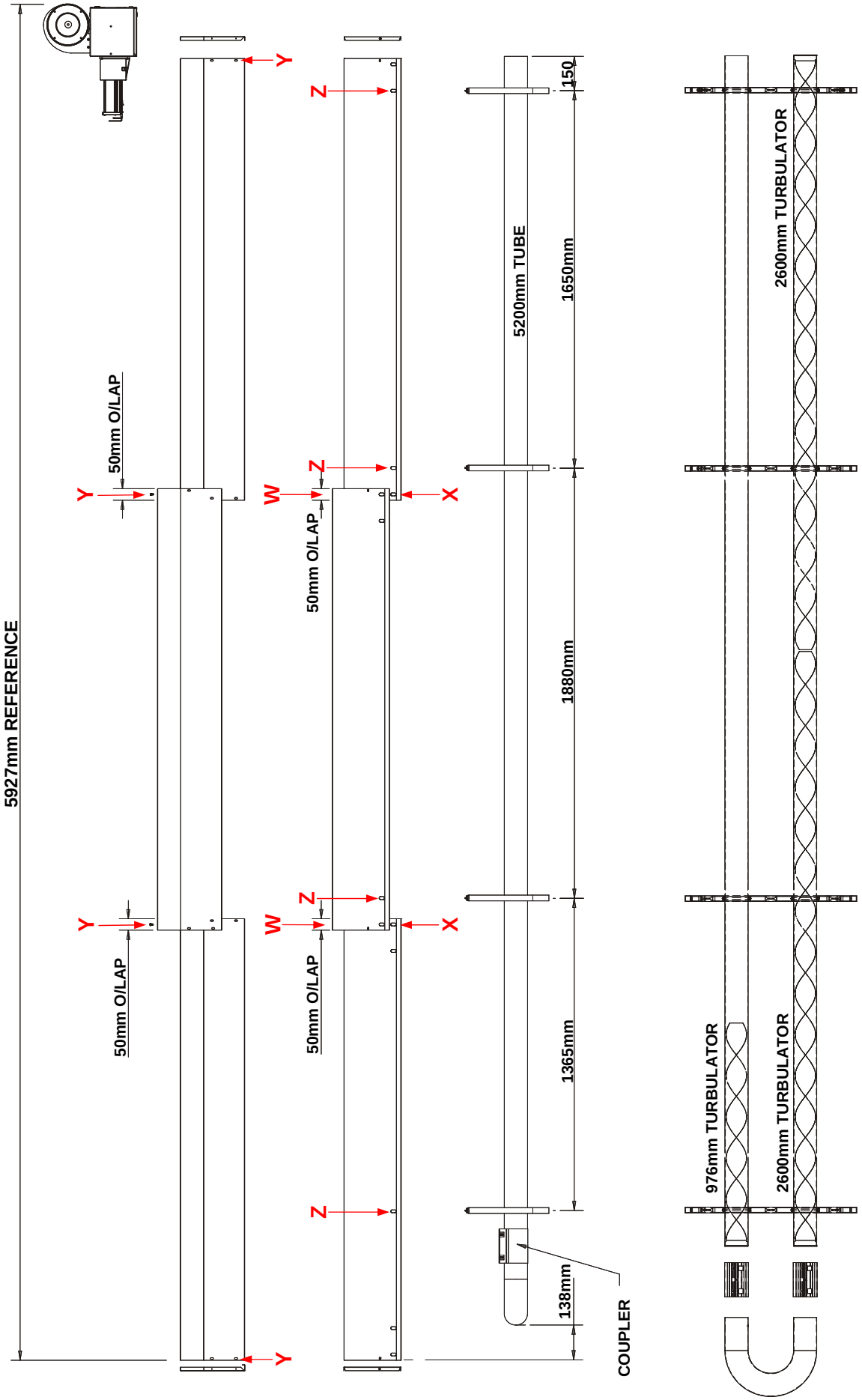


Figure 9. VSX4M 45/50

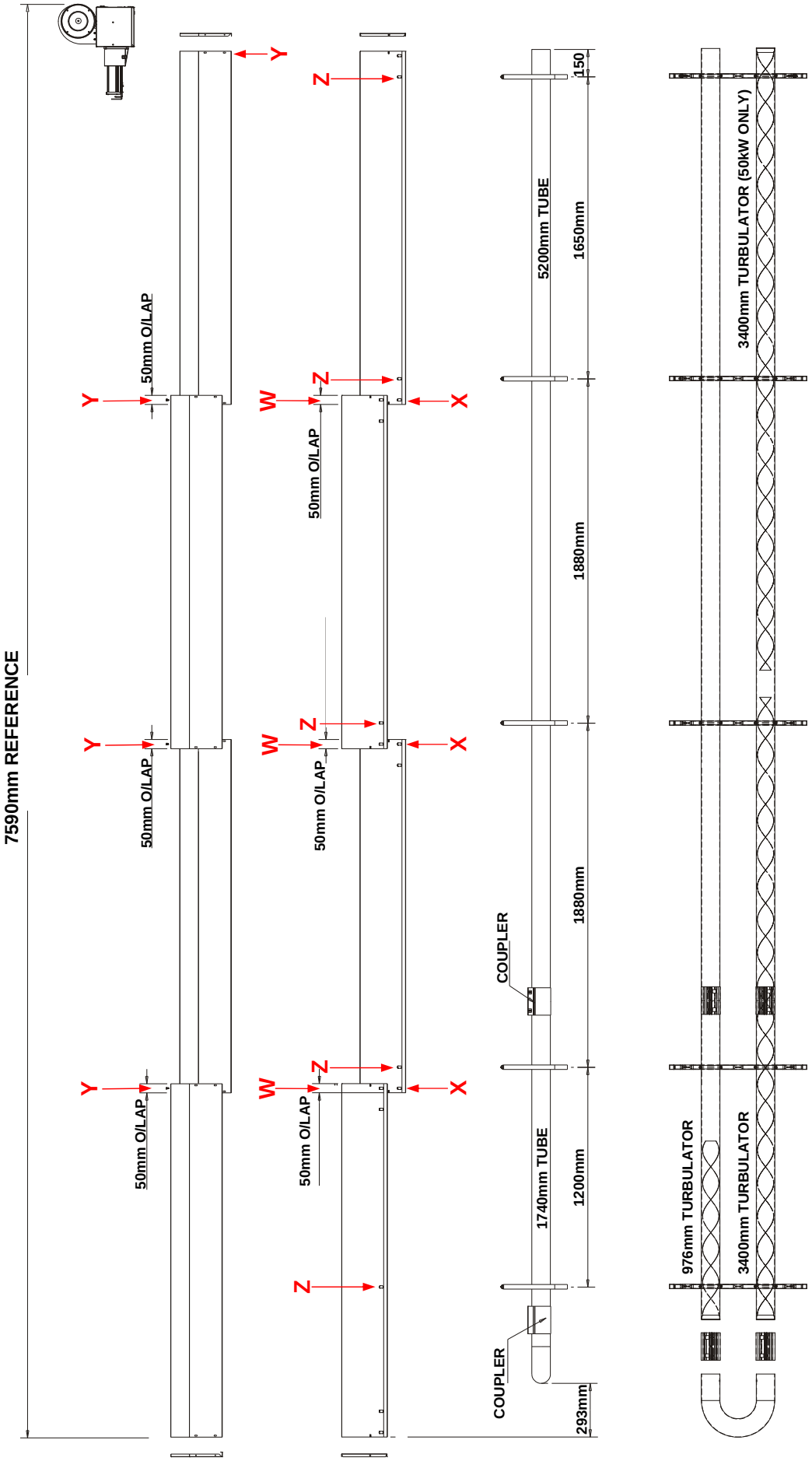
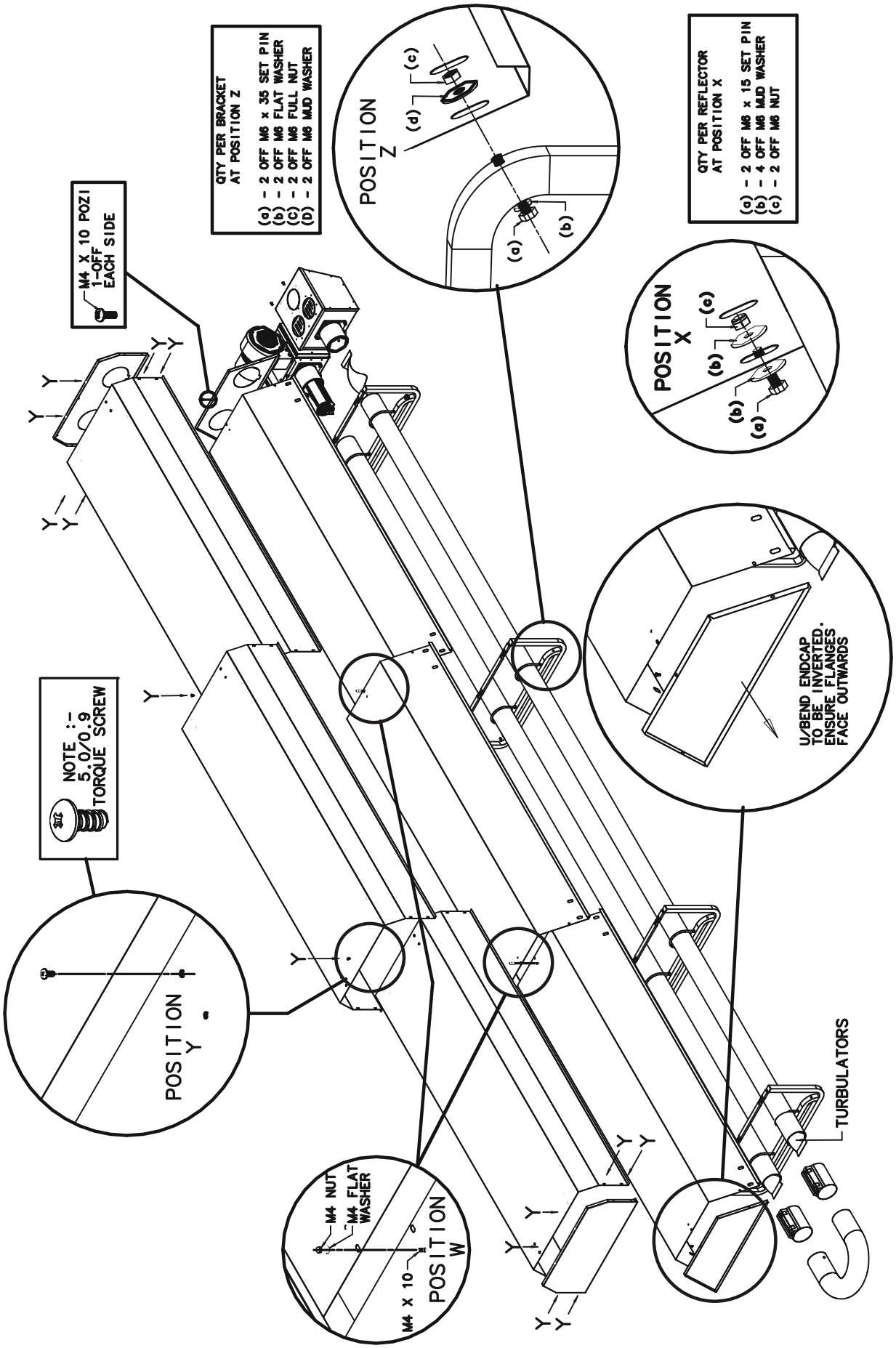


Figure 10. VSX Heater Breakdown (3 module shown)



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

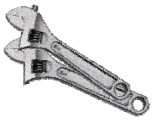


Pozidrive Screwdriver



Small Head Screwdriver

Flat



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



12mm Spanner



4mm Allen Key



Manometer



Wrench with Extension



13mm Socket

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.

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

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

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

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

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

Has the burner lit?

NO

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

YES

Check gas pressure.

Check operation of air pressure switch

Check operation on flame failure. Check gas pressure.

Leave the instructions with a responsible person.

Close control housing

Adjustment screw under cap to set injector pressure



Injector pressure test point. Gas inlet test point.

Figure 11. VSX Gas Valve adjustment

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



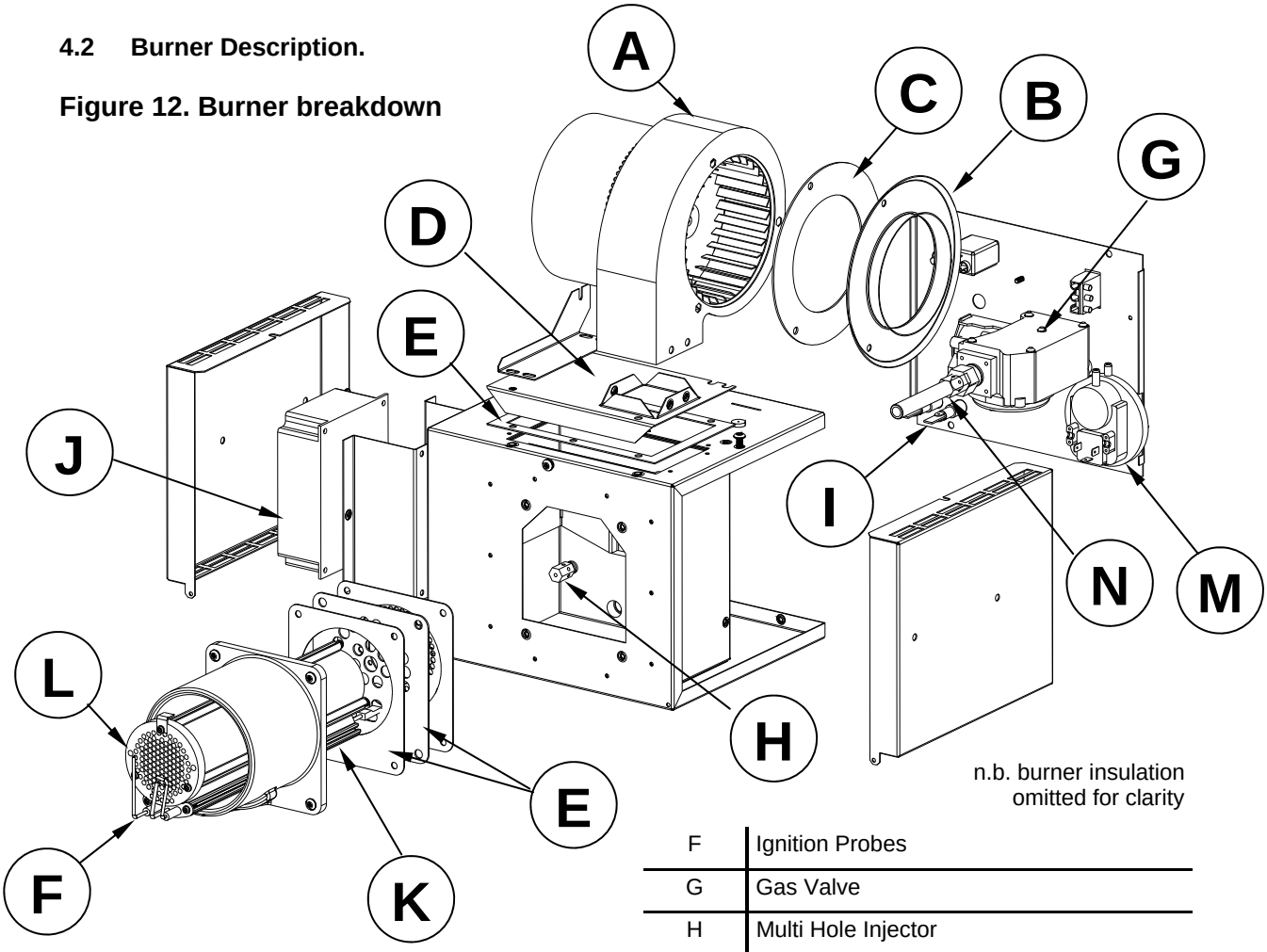
Wrench with 13mm Socket



Soft Brush

4.2 Burner Description.

Figure 12. Burner breakdown



n.b. burner insulation omitted for clarity

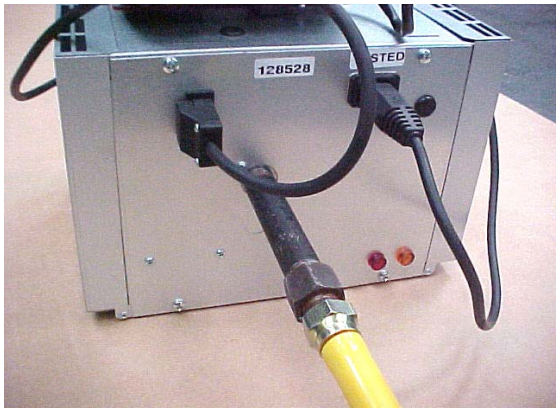
A	2501/2507 or 2560 Fan
B	Ducted Air Spigot (option)
C	Fan Orifice
D	Fan Mount Plate
E	Fan Mount Plate Gasket
	Please refer to spares for burner components

F	Ignition Probes
G	Gas Valve
H	Multi Hole Injector
I	Neon's (Red/Amber)
J	Ignition Controller
K	Extrusion Burner Head
L	Pepperpot Head
M	Pressure Switch
N	Jet Carrier

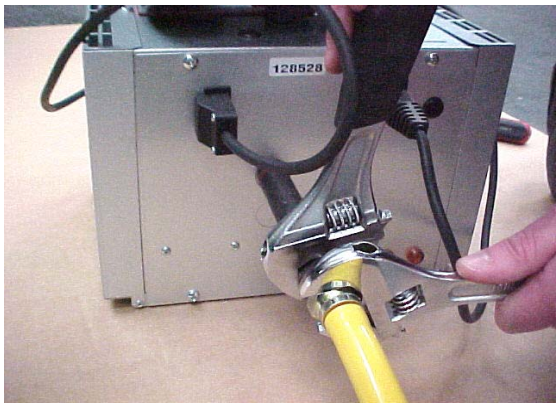
4.3 Burner Removal

Step 1 Isolate power and gas supplies.

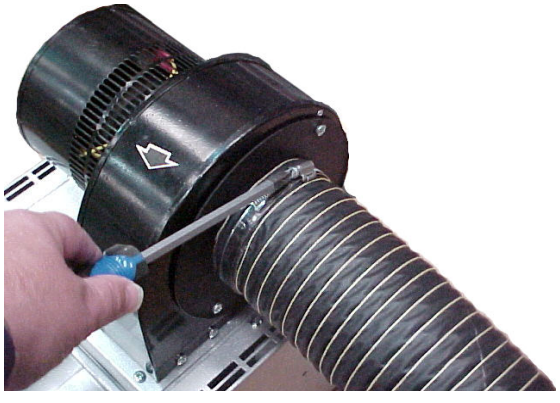
Step 2 Unplug the power connectors.



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



Step 4 If ducted air is connected, slacken hose clip and remove the flexible hose from the burner.



Step 5 slacken the jubilee clip attaching the pre-heated air hose to the heat exchanger and remove the flexible hose from the burner.



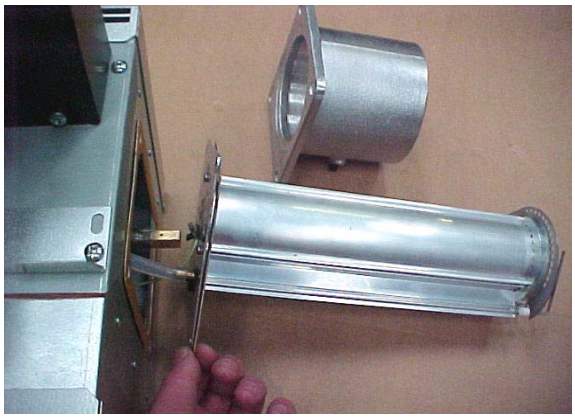
Step 6 Slacken the set screw on the burner support casting to enable the burner to be removed from the radiant tube.

Step 7 Remove the burner and position the burner in a safe area to prevent the burner or components attached to the burner from falling to the ground.

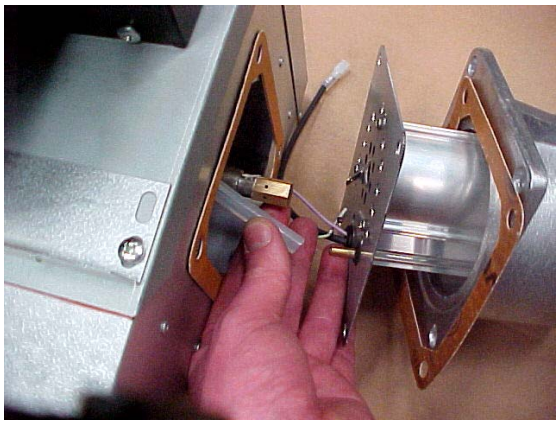


4.4 Burner Gas Injector Servicing

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.

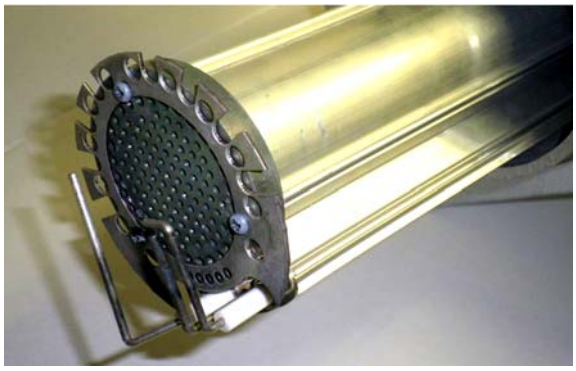
4.5 Burner Head and Electrode Servicing

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.

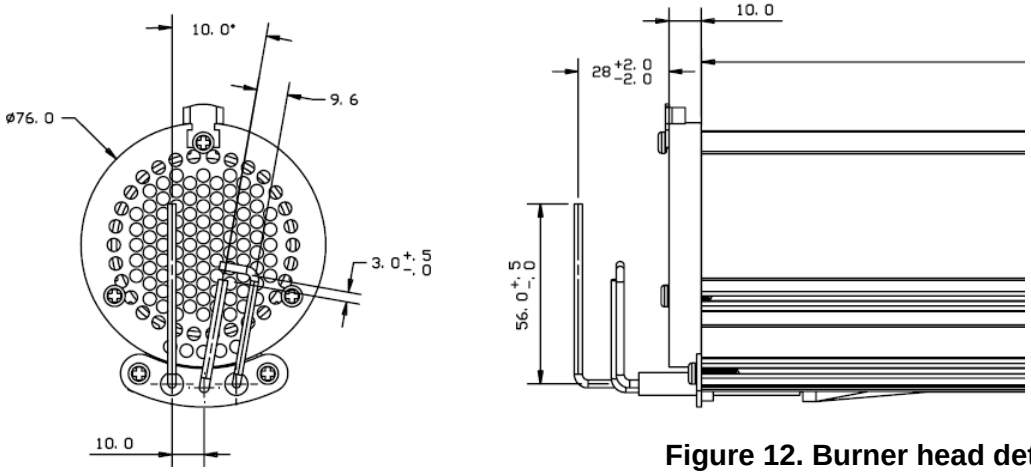


Figure 12. Burner head detail

4.6 Combustion Fan Assembly

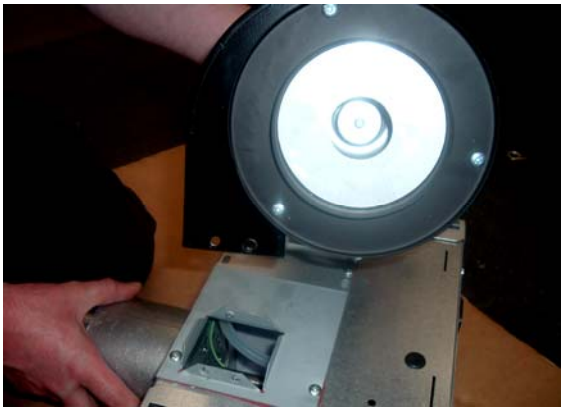
Step 1 Slacken jubilee clip and remove the flexible hose from the fan.



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.

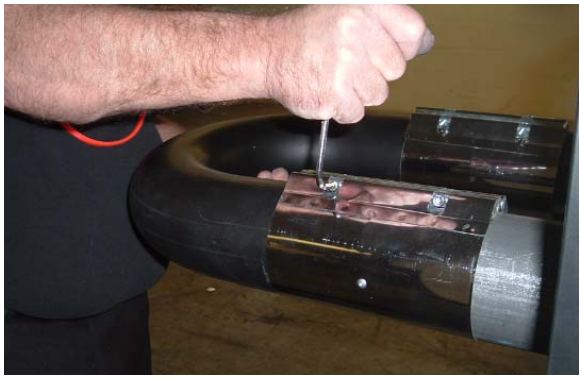
Step 8 Refit components.

4.7 Radiant Tube Servicing

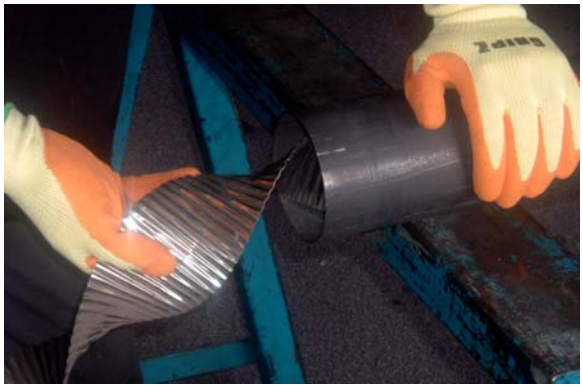
Step 1 Brush any dust from the exterior of the tubes.

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 3 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 4 Refit components.

4.8 Heat exchanger Servicing

Step 1 Remove the flue 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 Flue

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 Recommissioning After Service

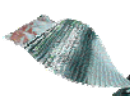
After servicing of the heater has been undertaken, it will be necessary to re -commission the heater as detailed in Section 3 of these instructions.

5. Spare Parts.

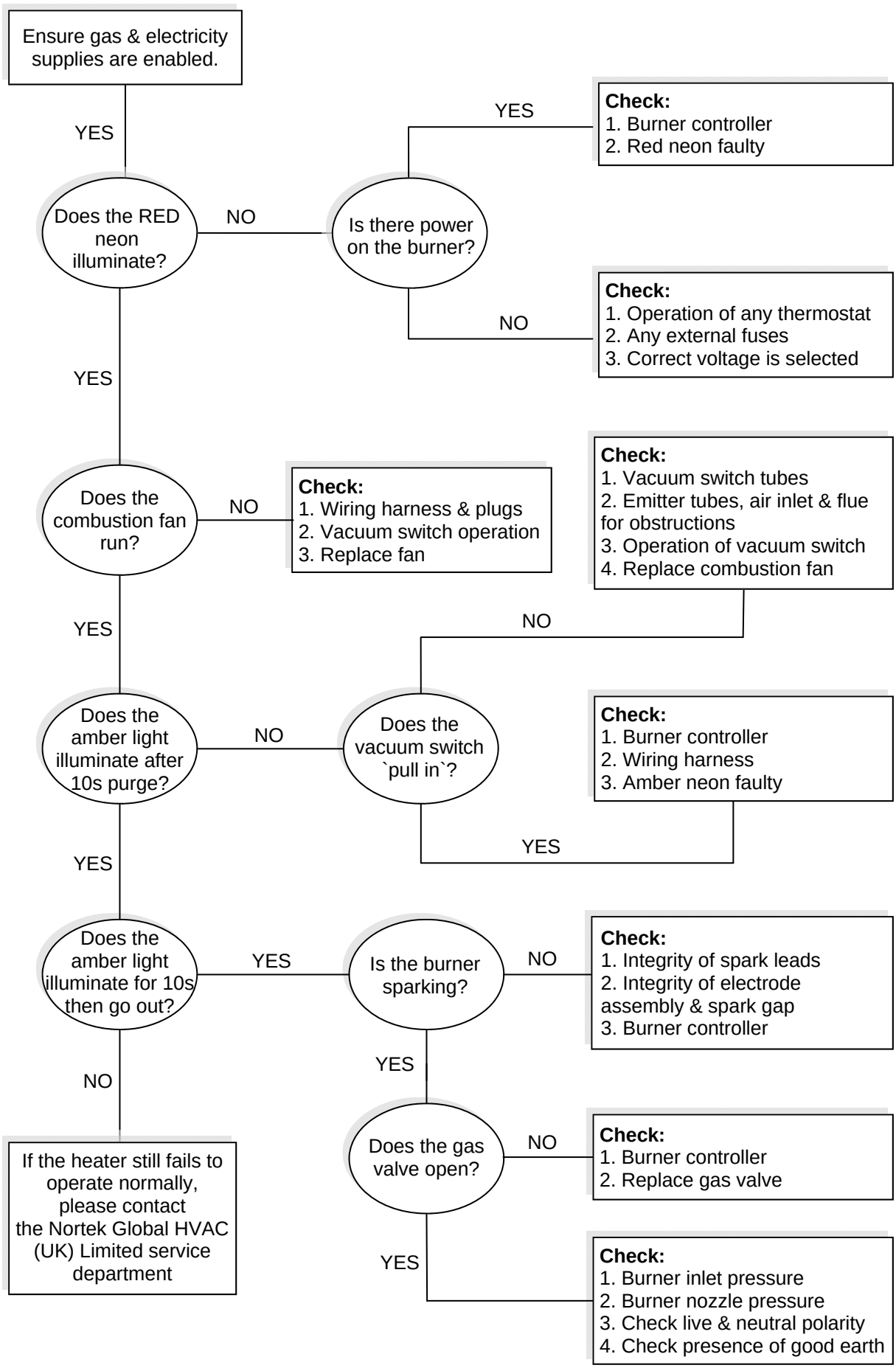
Required Spares

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* Nortek Global HVAC (UK) Ltd *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:	201676
	Nat Gas Valve Twin sol reg 220/240	202658		Amber Neon (Burner On)	2175
	Mains Input Filter	201292		Red Neon (Mains On)	2180
	Ignitor Assembly	201284		Combustion Fan	See Section 1.10
	Pepperpot Head	200988		Gasket Set	201488
	Injector	See section 1.10		Cables: Spark Electrode *(black)* Rectification lead *(purple)* Earth lead *(green/yellow)*	 900225-2 900225-3 900225-1
	Jet Carrier (all except *)	200420			
	Jet Carrier * VSX50 ONLY	201630		Ducted Air Hose	201321
	Flame Plate (20/25 ONLY)	201358		Hose Clamp	7541
	Turbulators Burner tube Return tube 25/30(2M)/45(4M)/50 Return tube others			 6618T 200015T 6619T	

6. Fault Finding Guide.



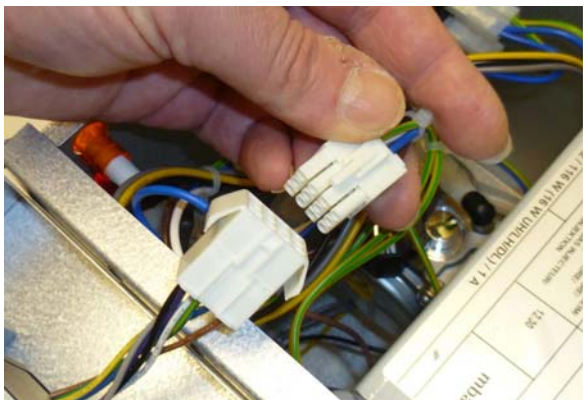
7. Replacing Parts.

Turn of gas any electrical supplies to the heater before starting repair work.

7.1 Burner Controller Replacement

Step 1 Slacken screw in burner lid and open the right hand burner access door.

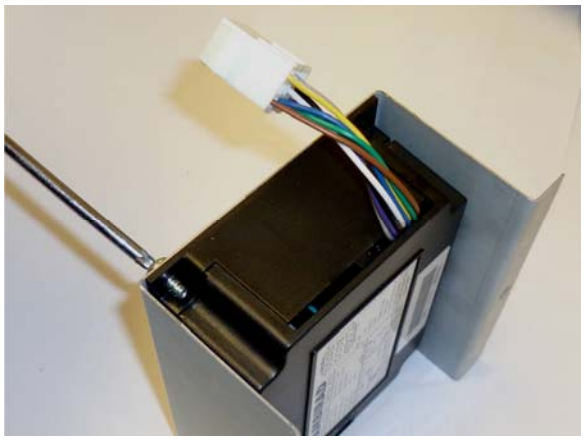
Step 2 Undo 2 screws from the lid to the controller bracket and remove. Disconnect burner controller from the wiring harness.



Step 3 Disconnect the HT Lead from burner controller.



Step 4 Remove the two screws attaching the controller to the bracket and remove.



Step 5 Fit new burner controller

Step 6 Refit HT leads and refit burner controller to wiring harness.

Step 7 Test product and close access doors.

7.2 Air Pressure Switch Replacement

Step 1 Disconnect the two silicone impulse tubes and three wiring connections making note of replacement positions.



Step 2 Remove the two screws as shown below.



Step 3 The air pressure switch can now be removed.

Step 4
Fit the new air pressure switch ensuring the impulse tubes are connected as shown opposite.



Step 5
Test product and close access doors.

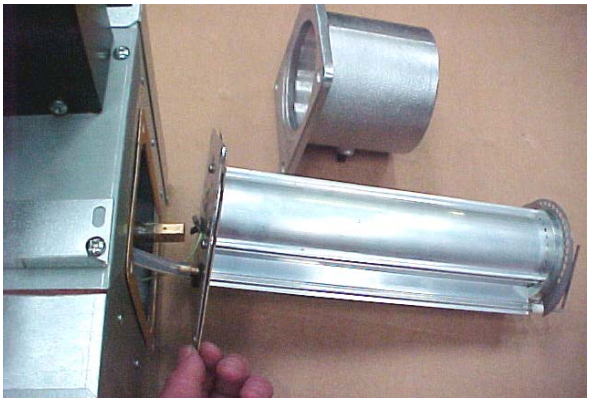
7.3 Gas Valve Replacement

Step 1 Remove the burner assembly as described in the section 4.3 Servicing.

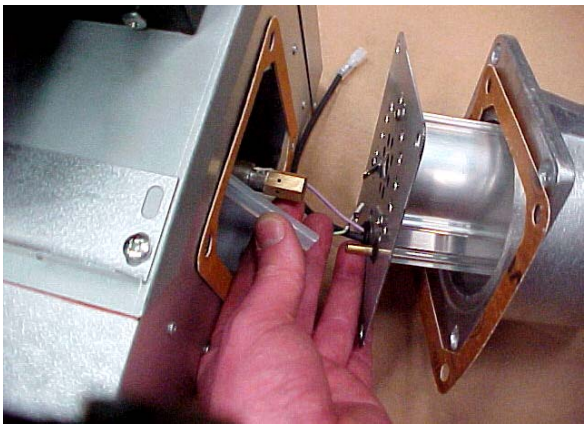
Step 2 Open the left hand access door and detach the impulse hoses from the air pressure switch.



Step 3 Remove the 4 screws holding the burner head onto the burner assembly and carefully pull burner head assembly from housing.



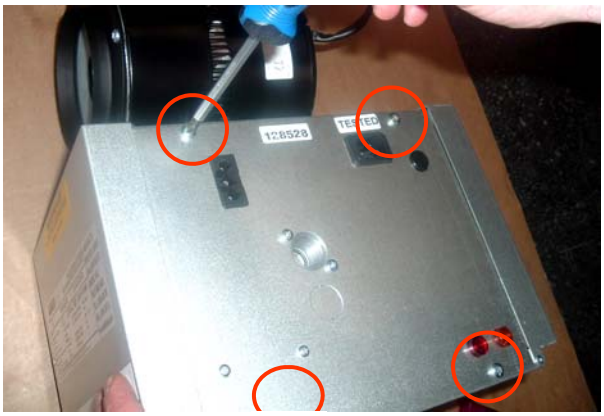
Step 4 The burner head can now be detached by disconnecting the impulse tube and the burner head wiring (ignition and rectification leads).



Step 5 From within the combustion chamber, remove the two screws holding the front of the gas valve.



Step 6 Turning the housing over, remove the four screws holding the rear burner plate in position.



Step 7 Open the two side doors and remove the rear plate assembly.

Step 8 Whilst the valve is still attached to the plate, the jet carrier, gas inlet, and wiring harness can now be detached from the gas valve.

Step 9 The two screws retaining the gas valve can then be removed.



Step 10 The gas valve can now be replaced.

Step 11 Refit all components in reverse order.

Step 12 Set gas pressures to data badge or as per section 1.11 and ensure reliable burner performance.

Step 13 Test product and close access doors.

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 *Nortek Global HVAC (UK) Ltd* 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 *Nortek Global HVAC (UK) Ltd.*

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

Document reference number **GB/VS/190/0815**
Replaces GB/VS/190/0813

NORTEK GLOBAL HVAC (UK) LTD
Fens Pool Avenue
Brierley Hill
West Midlands DY5 1QA
United Kingdom

Tel: **01384 489 250**
Fax: **01384 489 707**

ambiradsales@nortek.com
www.ambirad.co.uk

NORTEK™ GLOBAL HVAC

Registered in England No. 1390934. Registered office: 10 Norwich Street, London, EC4A 1BD

Nortek Global HVAC is a registered trademark of Nortek Global HVAC Limited. Because of continuous product innovation, Nortek Global HVAC reserves the right to change product specification without due notice.