



# **AMBI**RAD

ENERGY EFFICIENT HEATING SYSTEMS

## **OPTIMA**

RADIANT TUBE  
HEATING SYSTEMS

Operation, maintenance  
and servicing manual

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# GENERAL INSTRUCTIONS

# 1. Preparing the Installation

## Standards

Ambi-Rad Optima heaters must be installed in accordance with the following provisions and regulations.

- Gas safety (installation and use) regulation 1994.
- Health and Safety at work act 1974.
- IEE Regulations.
- Building standards (Scotland) consolidation regulations.
- BS5440: PArt 1, BS6891:1988  
BS6896: 1991, BS6501: Part 1 1991  
BS6500:1975
- And any other relevant British standard BS and codes of practice.

These instructions are for use in the United Kingdom (GB) and Eire (IE) on natural gas (G20) at 20 mbar and propane (G31) at 37 mbar supplied pressure.

## 2. Checking the Installation Area

- Make sure the heater is far enough away from combustible materials (see Fig.1).
- There must be 1000mm clearance between any part of the heater and a wall.
- These minimum clearances must be maintained to help with the servicing of the burner.
- Ensure the suspension is sufficiently flexible to allow for thermal expansion (see Fig.5).
- All heaters must slope towards the U-bend approximately 25mm.

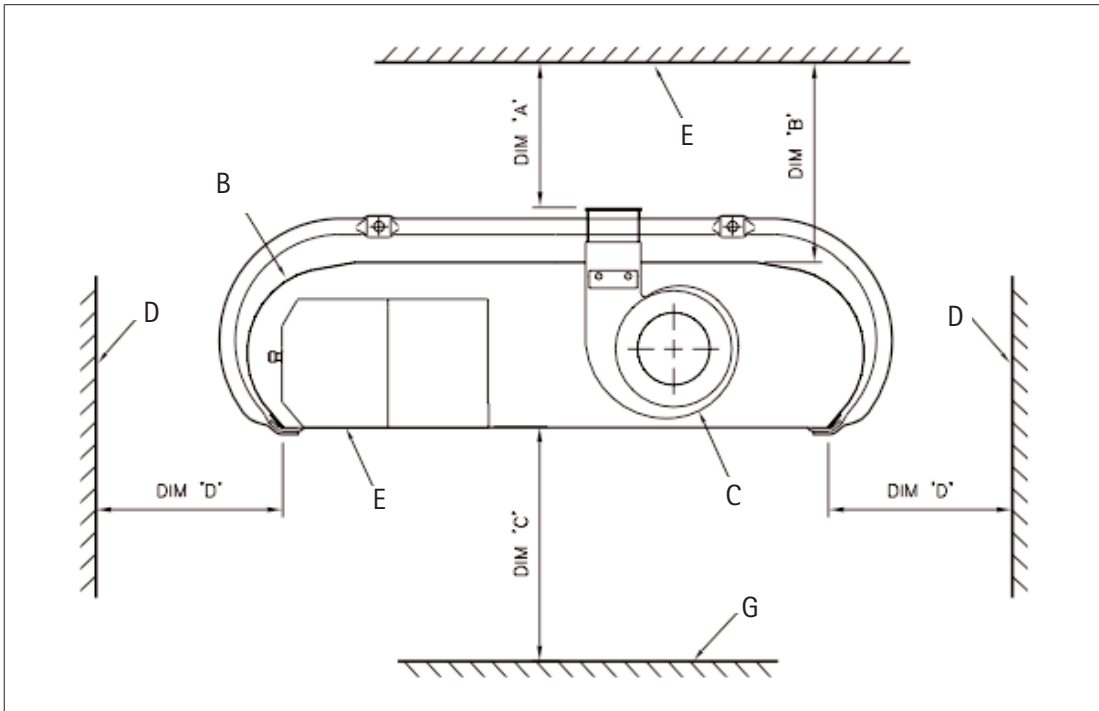


Figure 1

TABLE 1								
BURNER MODEL		SE						
		11-15	16-20	21-25	26-28	29-33	34-35	36-38
<b>DISTANCE FROM COMBUSTIBLES mm</b> (50°C rise in temperature above ambient of a black surface)								
Above Fan	DIM.A	400	400	400	400	400	400	400
Above Canopy	DIM.B	100	100	100	100	100	100	100
Below Reflector Edge	DIM.C	1300	1490	1675	1820	2060	2160	2300
Horizontally to Side	DIM.D	450	520	580	500	550	630	730
Above Canopy (inclined mounting)	DIM.B	100	100	100	200	200	200	200
Below Reflector Edge (inclined mounting)	DIM.C	1000	1200	1400	1500	1650	1760	1910

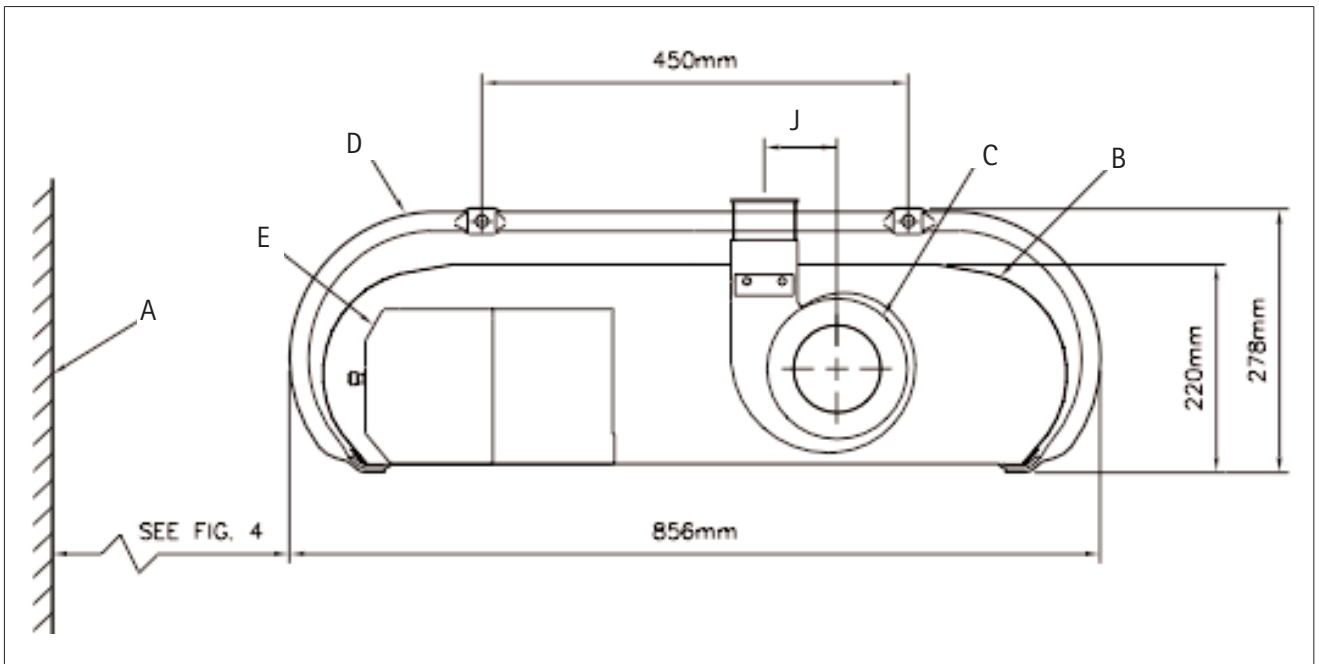


Figure 2

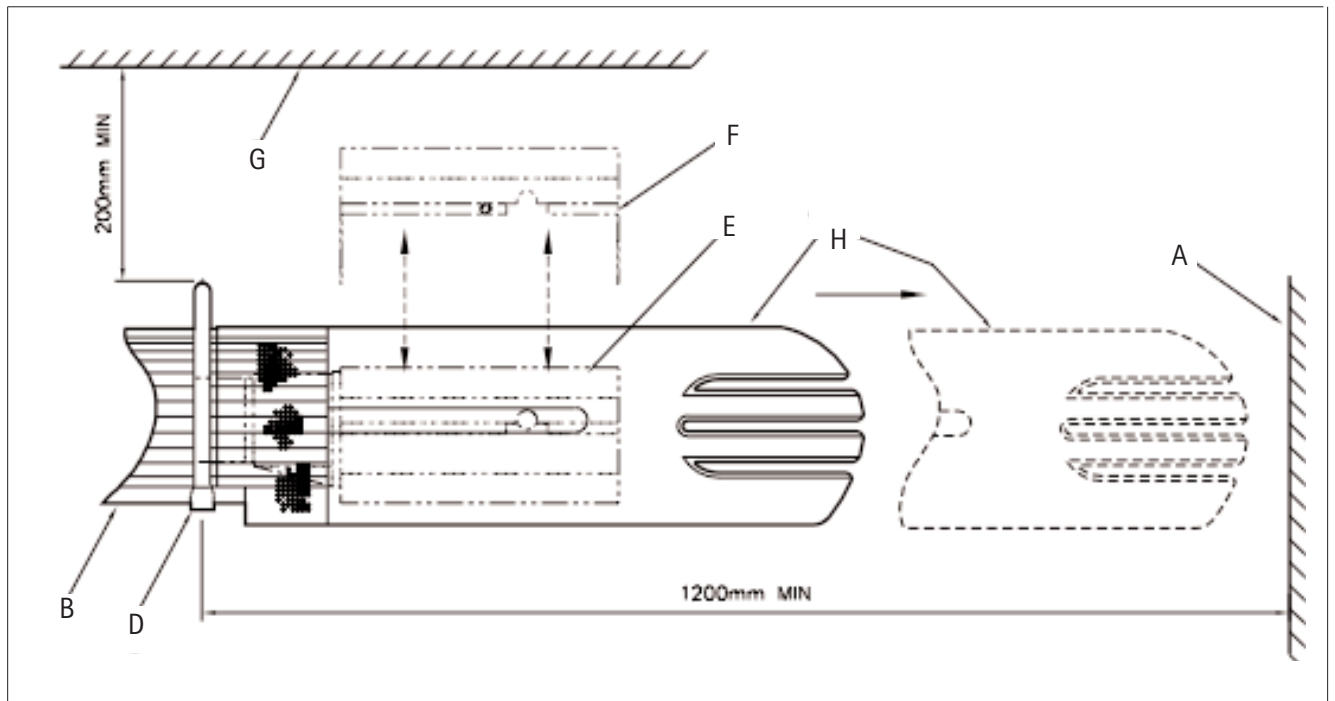



Figure 2a

A	Side Wall
B	Canopy
C	Induced Draught Fan
D	Suspension Bracket
E	Burner
F	Burner Lid
G	Obstacle above heater
H	End Moulding
J	73580 Type Fan - Dim.80mm 76634 Type Fan - Dim.85mm

### 3. Flue Connection and Ventilation Requirements

-  Optima heaters can be flued to atmosphere or remain unflued providing that the air supply and ventilation requirements within the building are complied to BS6896:1991. Also due consideration must be given to the possibilities of condensation forming on cold surfaces and glazing when using an unflued heater.

#### Unflued Installation

When installing the heaters unflued, ventilation requirements can be met by the following means:

- Natural Ventilation
- Forced Ventilation


#### Natural Ventilation

Apertures must be fitted at high and low level with a maximum vertical distance of 3m between them.


- For High and Low level ventilation - where air change rate is less than 33m<sup>3</sup>/h per kW of total rated input of the heaters installed an aperture sized to the following criteria.
- 1.4cm<sup>2</sup> for each 1m<sup>3</sup> per kW below 33m<sup>3</sup> per kW; or an aperture 52cm<sup>2</sup>/kW of total rated input of heaters.


#### Natural Ventilation

- Where heat input is up to and including 60kW - ventilation should be 4.5cm<sup>2</sup>/kW of total rated input of the heaters.
- Where heat input is over 60kW - ventilation should be 270cm<sup>2</sup> plus 2.25cm<sup>2</sup>/kW in excess of the 60kW total rated input of the heater.

-  Where apertures are unable to be installed for natural ventilation, ventilation needs to be supplied by means of a fan or blower to the following standard:

- Ensure minimum proven air flow is 33m<sup>3</sup>/h per kW of total rated input of the heaters.
- For more detailed information please contact [Ambi-Rad's](#) technical department.

-  If the heater is installed without a flue ensure that combustion gases do not impinge on any surrounding combustible materials or glazing. (see Table 1). The maximum permitted temperature rise for such material is 50°C (Ref.BS7186).1989

-  For detailed information please refer to section 7 BS6896:1991, Installation of Gas Fired Overhead Radiant Heaters for Industrial and Commercial Heating (2nd and 3rd family gases).

#### Flued Installation

(See Fig.3)

- When Optima heaters are installed with a flue, a down draft diverter (B) must be fitted to the fan exit by means of screws and clamp plates provided. (This is supplied as an optional extra by the manufacturer).
- This diverter is designed to accept a 125mm (5in) nominal bore propriety twin wall metal flue pipe (A) which complies with BS715.
- Specifically for horticulture or green house applications where combustion gases can do harm, a square to round adaptor is fitted (E).
- Fit to the outlet of the fan by means of the clamp plates and screws provided (D).
- The joints should be sealed with heat resistant caulking and faced off with fire cement.



If single wall metal flue piping complying with BS715 1993 is used then an adaptor will be required.

A flue pipe should always be adequately supported at regular intervals from the building structure and terminated externally with a British Gas tested and certified terminal.

The maximum flue length is 9m (30ft) and the maximum number of bends is 2.

All connections in the flue must be properly sealed.

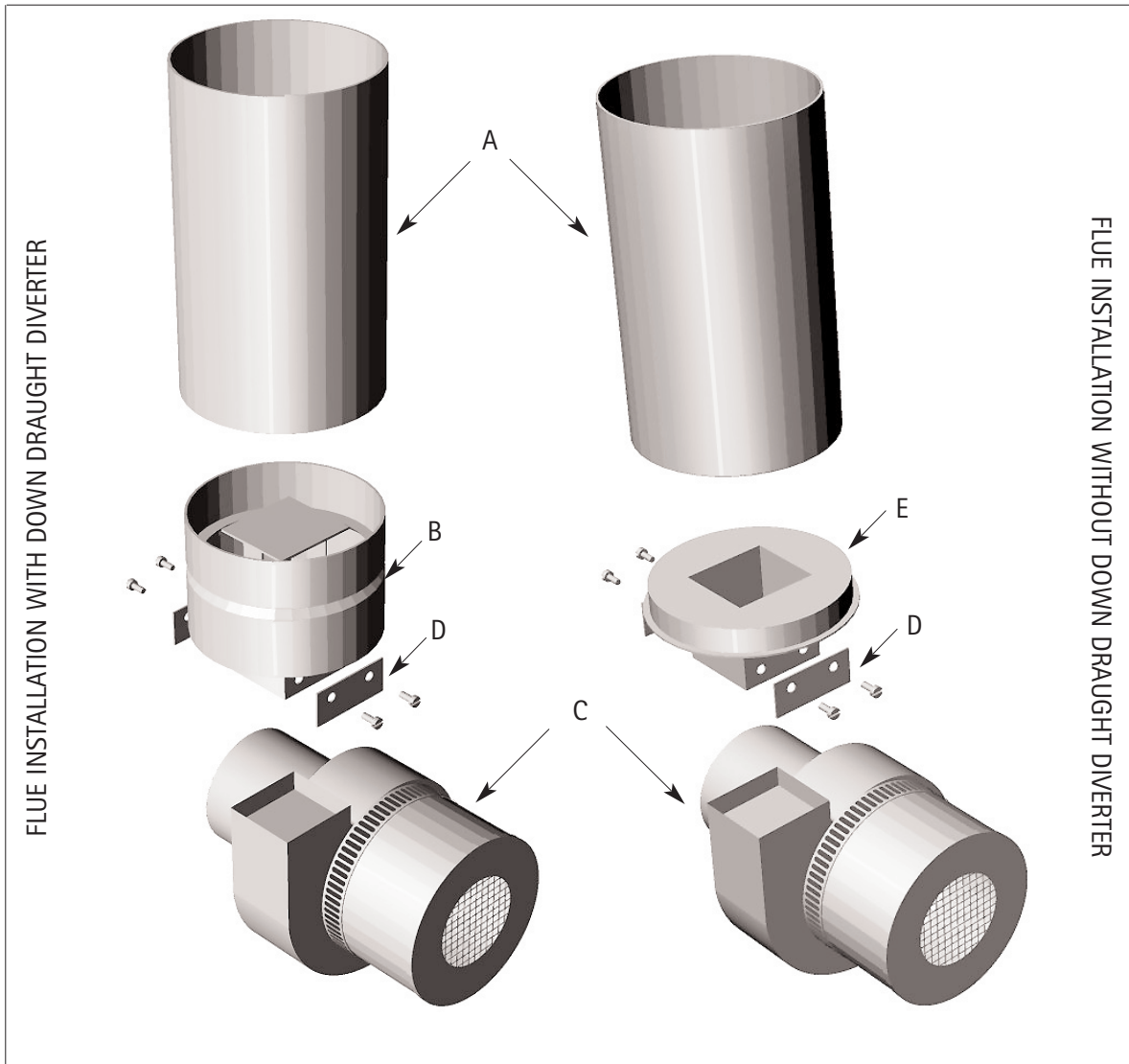



Figure 3

A	125mm Bore Twin Wall Flue
B	Down Draught Diverter
C	Fan
D	Clamp Plate Screws
E	Square to Round Adaptor



## 4. Fresh Air Ducted Inlets

 A ducted fresh air supply must be provided to the burner when Optima heaters are installed in locations where there is air born dust or where there is a polluted atmosphere e.g chlorinated vapours, process dust, foundry environments etc.

### How to fit a Fresh Air Supply

(See Fig.4)

- Remove existing air intake grill from burner.
- Fit ducted air adaptor (D) to air inlet flange on the rear of the air intake chamber using the 2 captivated screws (G).
- Attach 100mm Ø flexible duct (C) to the ducted air adaptor (D) using the jubilee clip (B).
- Attach main 100mm Ø supply duct (A) to free end of flexible duct (C) with jubilee clip (B)

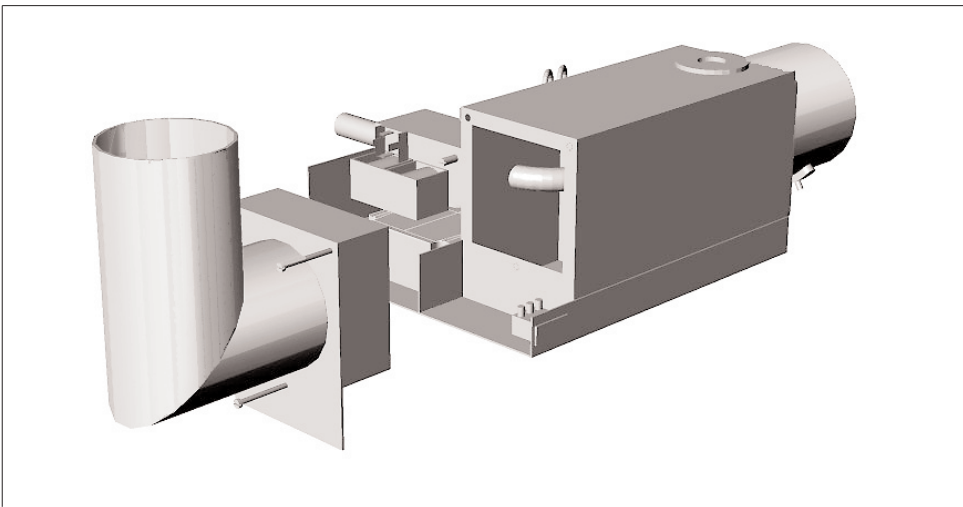
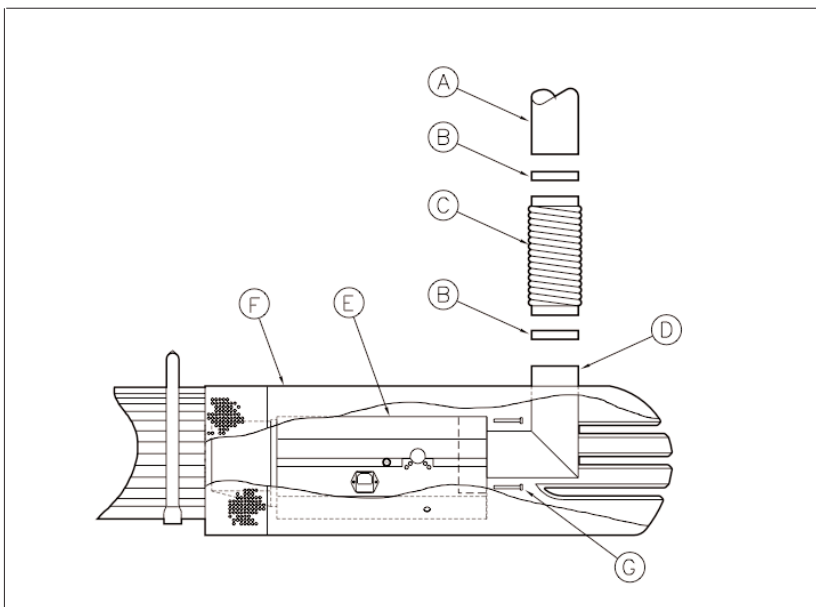



Figure 4



A	Supply Duct - 100mm Ø
B	Jubilee Clip - 100mm Ø
C	Flexible Duct
D	Ducted Air Adaptor
E	Burner
F	End Moulding
G	Set Pins M5 x 60

## 5. Suggested Methods for Heater Suspension


 Attachment of the support chains to the support brackets should be made using speedlinks. Should drop rods be used a closed loop should attach the rod to the support bracket.

Due Allowance must be made for thermal expansion of the heater.

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 and to promote free movement due to linear expansion.

In the event of suitable roof steel work not being available additional steel work should be fitted to enable vertical hangers to be used for suspending heaters.

 If there are any doubts as to the strength or suitability of roof steel work to which the heaters are to be suspended please refer to the consultant, architect, or owner of the building.

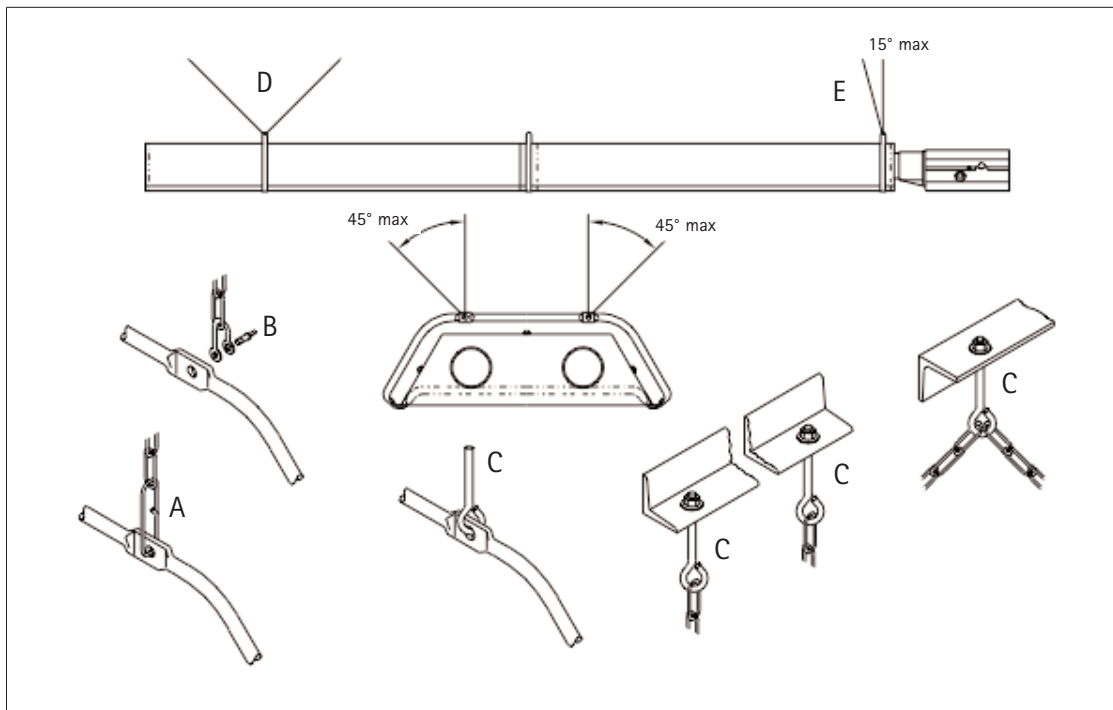



Figure 5

A	Speedlink
B	Shackle
C	Drop Rod with Formed Hook
D	Equal and opposite chain support when angle of inclination is greater than 15°
E	Vertical chain support when angle of inclination is less than 15°





## 7. Connecting Electrical Supply


(See Fig.7)

 Each component carrying an electrical supply must be earthed.

- A 230 volt 50 Hz single phase supply is required.
- The electrical connection to the burners is made by means of 3 pin plug power connector.

 Live, neutral and earth connection should be made via a flexible supply cable to the power isolator and routed clear of the heater. The power isolator should be no further than 1m from the heater.

 The flexible cable should be 0.5mmØ. the current rating per burner is 0.55 amp (inductive). each burner must be fused externally at 3 amp. All electrical work should be carried out to IEE Standards by a competent electrician.

 All controls and switch gear must be rated to handle the total inductive load of the circuit they control. For large installations the use of relays or contactors should be considered. The method of connection to the electrical supply must ensure complete isolation and should be made via a fused double pole isolator, having contact separation of at least 3mm in all poles and supplying the appliance only. Alternatively connection may be made via a 3 pin plug and switch shuttered socket both compiling with the requirements with BS1365.

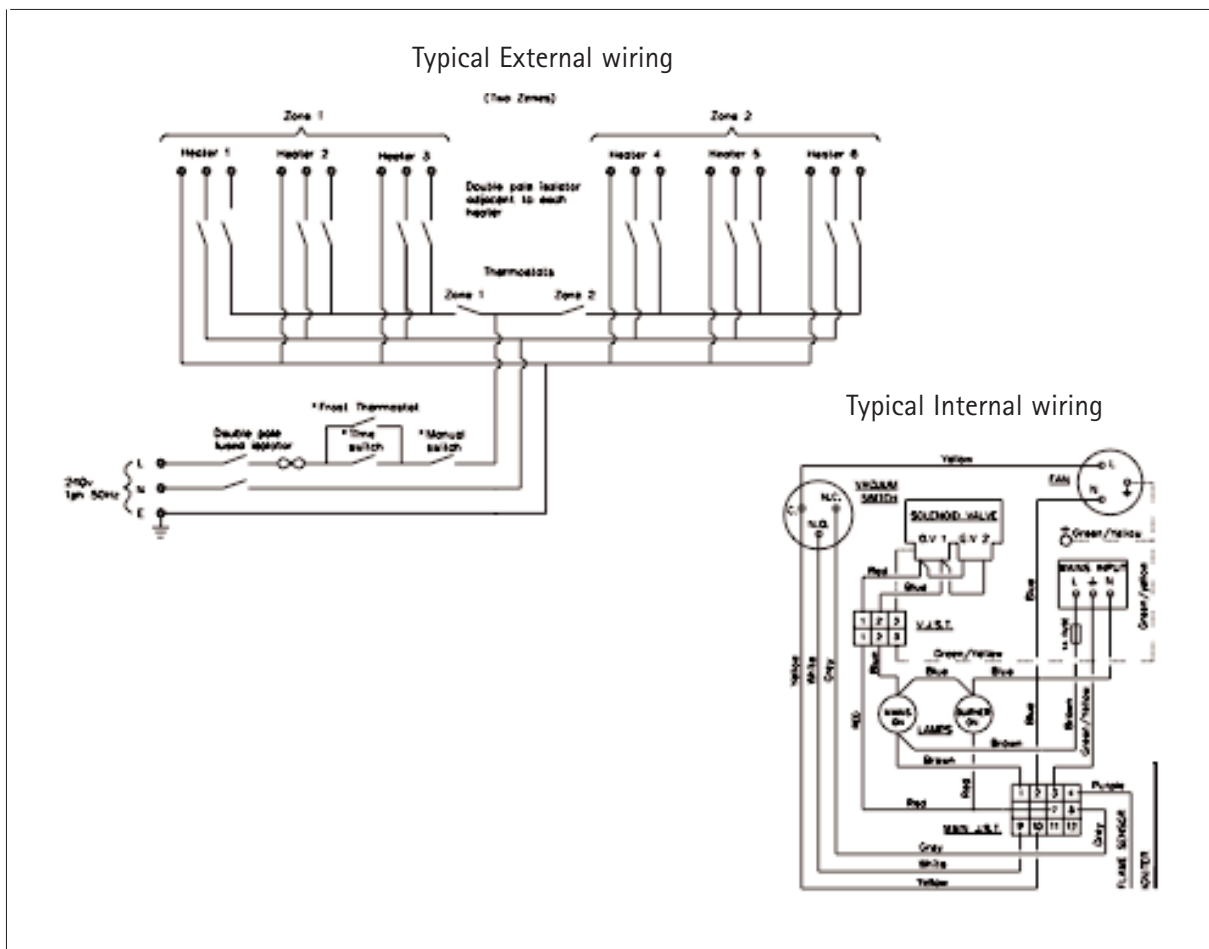


Figure 7

# ASSEMBLY INSTRUCTIONS

## 1. Assembling the Heaters

### Assembly - Stages - Check List

The following are the key stages when assembling a 2 or 3 module Optima heater.

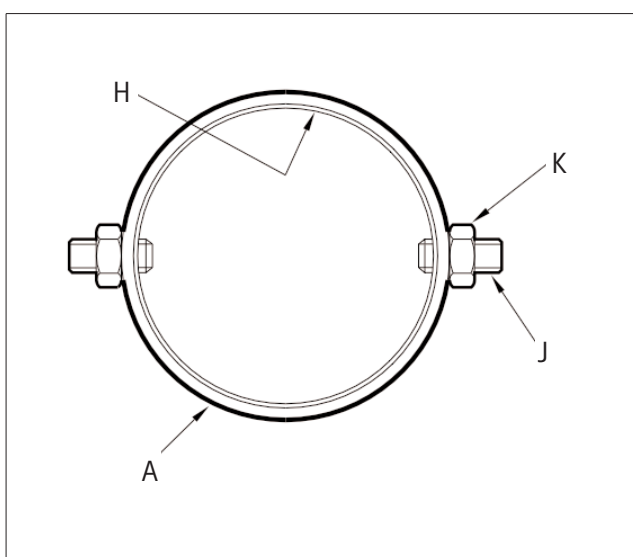
- Tube assembly
- Insertion of turbulators
- Fixing the return bend
- Positioning the bracket
- Fixing the U-bolts
- Fixing the overshield reflectors
- Assembling the inner reflectors
- Assembling the outer canopies
- Fixing the end caps
- Fitting the burner and fan
- Fixing the end mouldings

## 2. Assembling the Tubes

1. Support radiant tubes on blocks or trestles.
2. Assemble the 2 sections of the stainless steel firing leg (A) and (H) by means of pins (J). Ensure pins (J) are located in holes in the end of the first tube (A).

Note:

Do not fully tighten pins (J) but fully tighten lock nuts (K).



### 3. Insert Turbulators

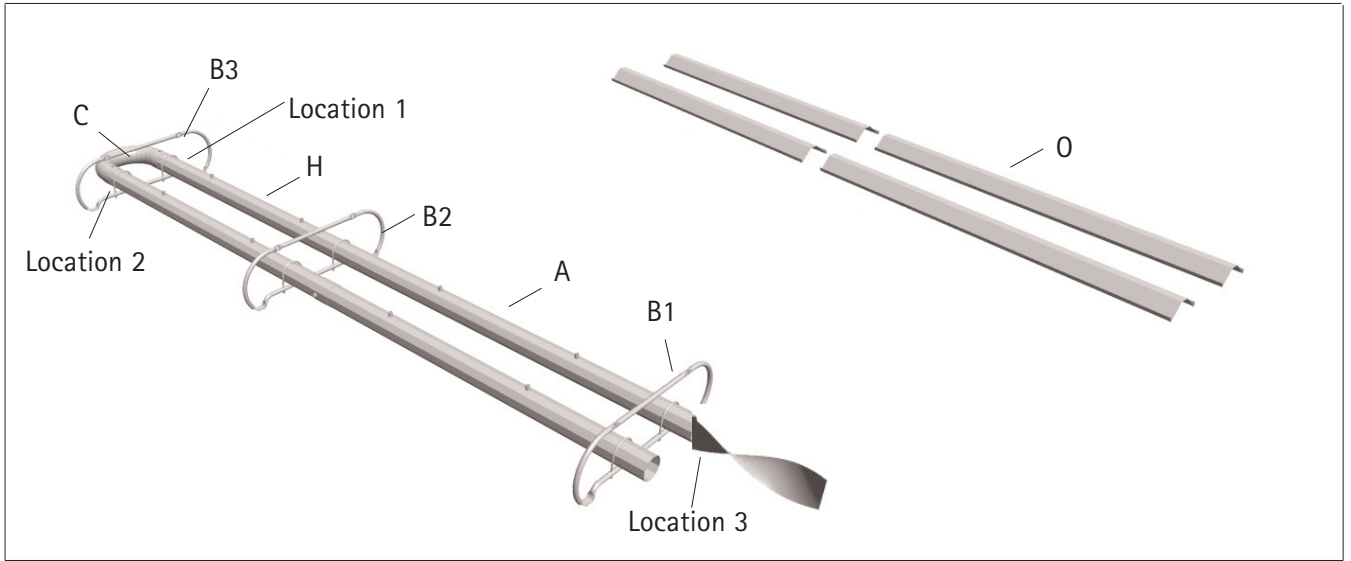
1. Insert relevant turbulators depending upon the heater model.

Heater Model	Turbulators	Insert at Location
SE 11-15 UT 2 Module	2 x 860mm 1 x 2600mm	(1) and (2) (3)
SE 16-20 UT 2 Module	1 x 976mm 2 x 2600mm	(1) (2) and (3)
SE 21-25 UT 2 Module	2 x 860mm 1 x 2600mm	(1) and (2) (3)
SE 26-35 UT 3 Module	1 x 976mm	(3)
SE 36-38 UT 3 Module	1 x 976mm 2 x 2600mm	(1) (2) and (3)

### 4. Connect Return Bend

1. Connect return bend (C) on to the tubes (H) and (G) with the U-bend clamping bolts on top. (Fig 9)
2. Ensure the fixing pins on the heater tubes (for overshield location) are vertical.
3. Tighten the U-bend clamping bolts securely taking care not to over tighten.

## 2 Module Heater



## 3 Module Heater

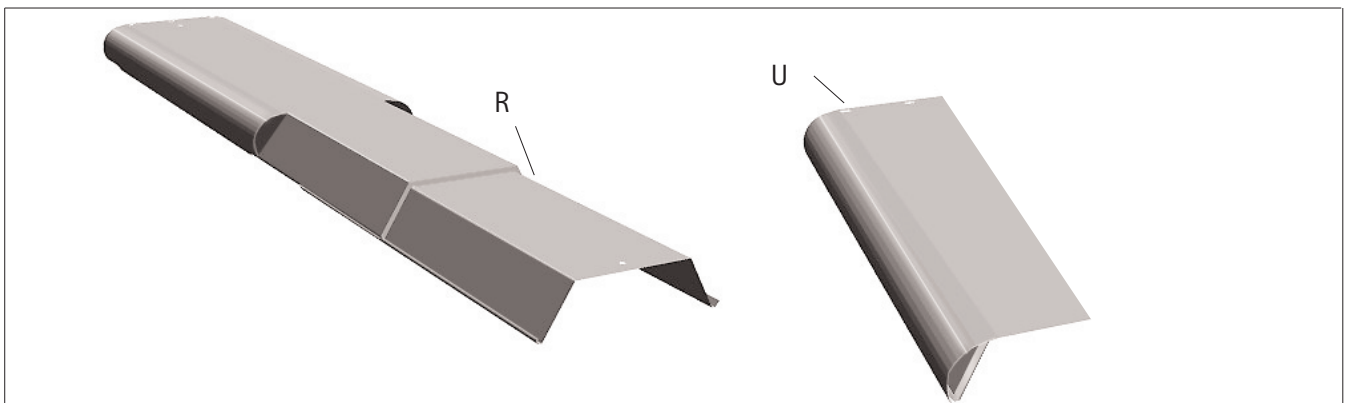
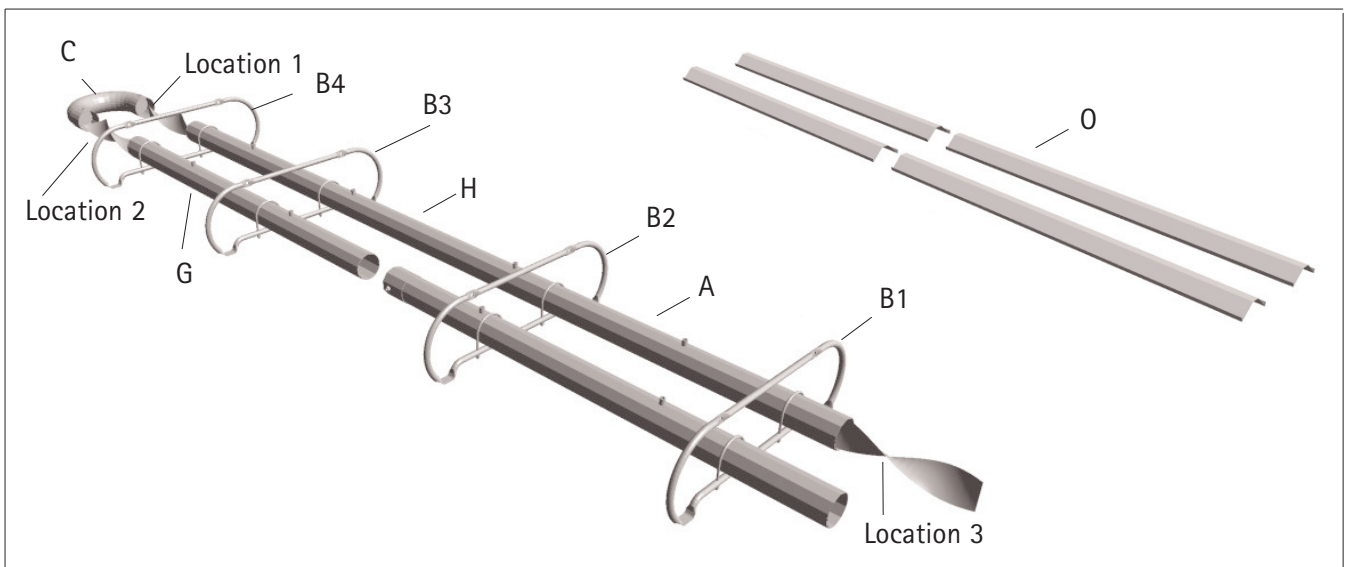


Figure 9

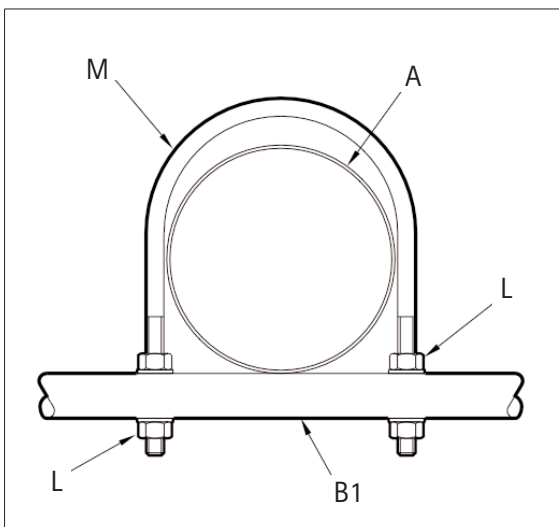


## 5. Fixing the bracket and U-bolts

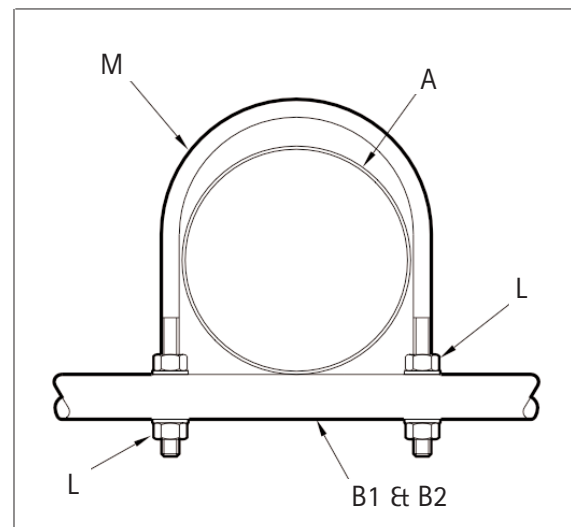
1. Slide the suspension bracket along the tubes into position (as shown in Fig 14) taking care not to damage the paint finish.
2. Eight U-bolts are supplied with the heater; two U-bolts are stainless steel and six are zinc plated. The two stainless steel U-bolts (M) are identified by having lock nut (L) and fixing nuts pre-fitted to each.
3. The stainless steel U-bolts are fitted to the firing tube (A) on brackets B1 and B2.

### Note:

A 3mm distance must be provided around the firing tube to allow thermal expansion on the 1st and 2nd stainless steel U-bolt.



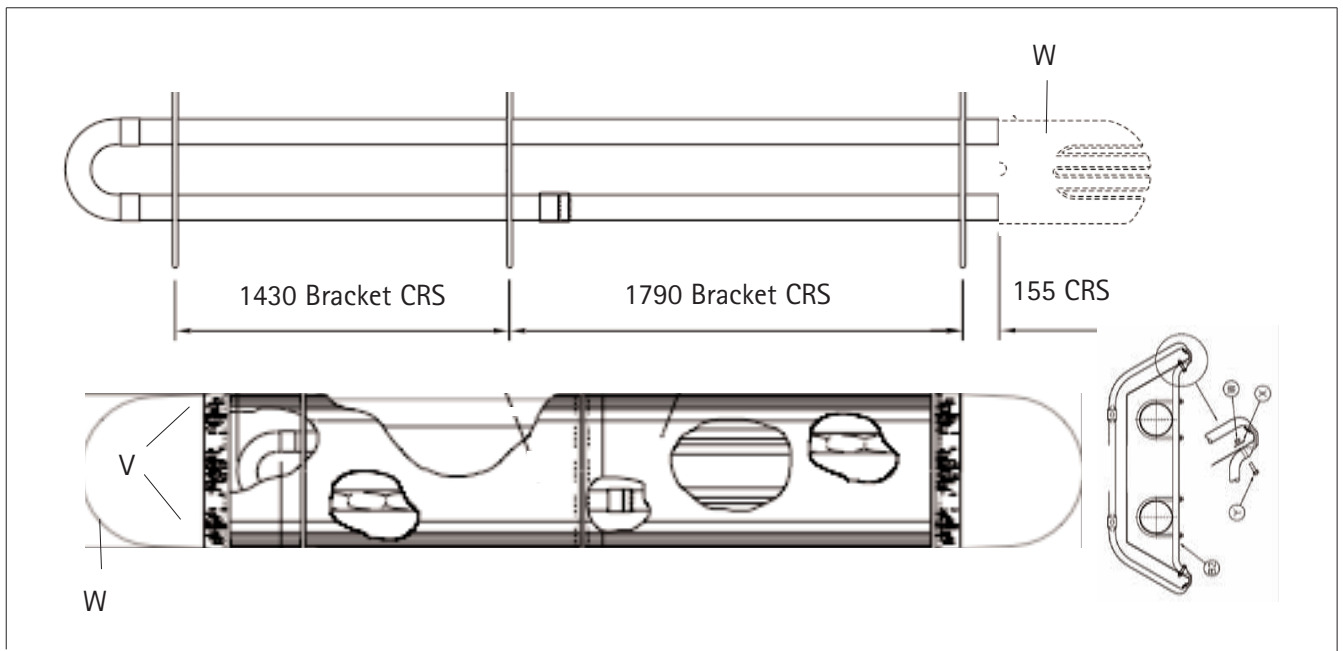
2 Module Units



3 Module Units

4. Position the four suspension brackets along the tube sets in the following intervals. (see Fig.14)
  - **1st Bracket: (B1)** 155mm is from the beginning of the tube with a loose fitting stainless steel U-bolt on the firing leg. Tighten the return leg U-bolt to maintain this position.
  - **2nd Bracket: (B2)** 1790mm from the 1st bracket. Tighten both U-bolts to maintain this position.
  - **3rd Bracket: (B3)** 1430mm from the 2nd bracket. Tighten both U-bolts to maintain this position.
4. Position the four suspension brackets along the tube sets in the following intervals. (see Fig.14)
  - **1st Bracket: (B1)** 155mm is from the beginning of the tube with a loose fitting stainless steel U-bolt on the firing leg. Tighten the return leg U-bolt to maintain this position.
  - **2nd Bracket: (B2)** 1785mm from the 1st bracket with a loose fitting stainless steel U-bolt on the firing leg. Tighten the return leg U-bolt to maintain this position.
  - **3rd Bracket: (B3)** 1795mm from the 2nd bracket. Tighten both U-bolts to maintain this position.
  - **4th Bracket (B4)** 1370mm from the 3rd bracket. Tighten both U-bolts to maintain this position.

## 2 Module Heater



## 3 Module Heater

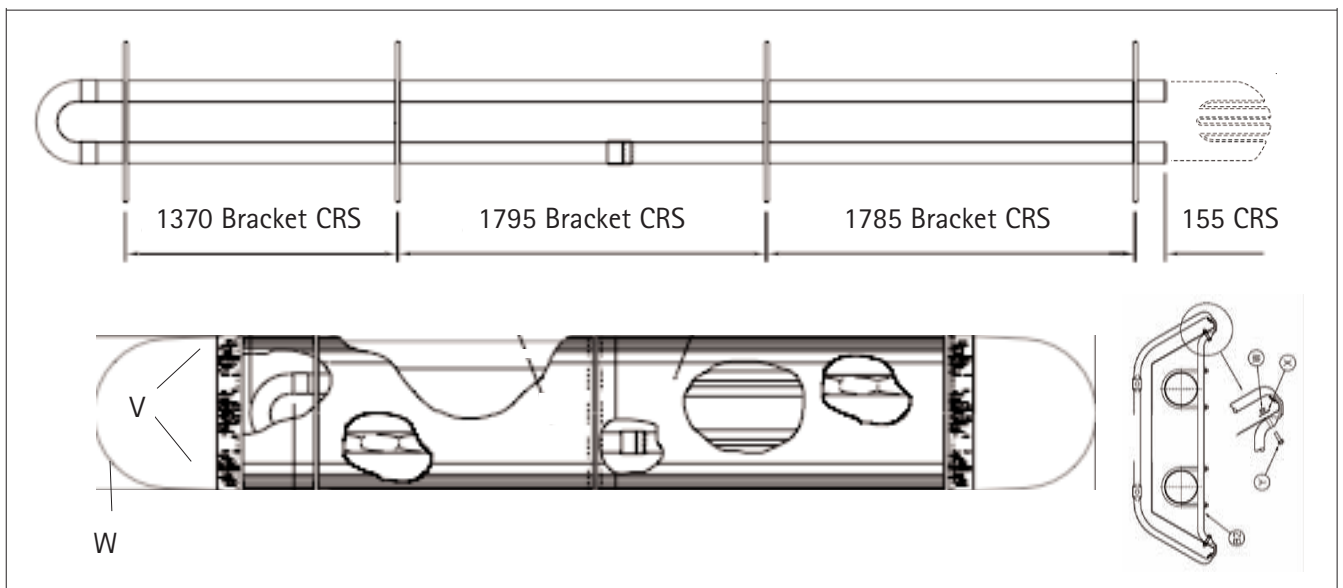
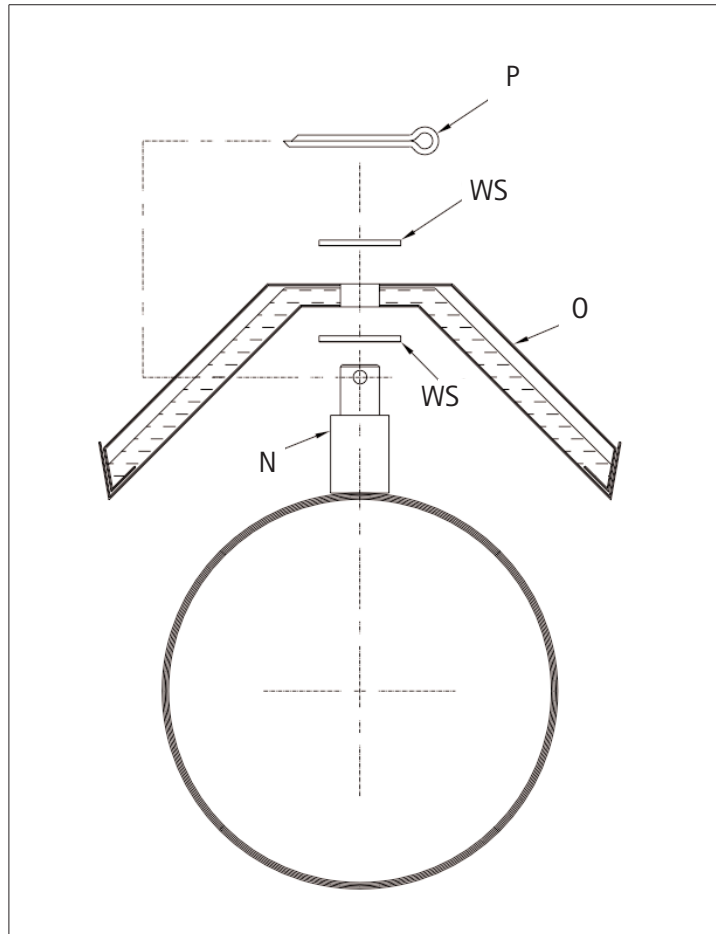


Figure 14

## 6. Overshield Reflectors

1. To attach the overshields on the heater tubes, first place washers (WS) onto fixing pins (N) before placing overshields (O) onto fixing pins. Place further washers (WS) onto fixing pins before securing with split pins (P).
2. Open the ends of the split pins after inserting them through the fixing pins (N).



## 7. Inner Reflectors

### 2 Module Units

1. Place the 1st and 2nd inner reflectors (R) on the heater by sliding the reflectors between the tubes and the brackets. (Fig.9)
2. Overlap each reflector by 15mm and bolt together i.e. utilising the two slotted holes on the sides of each reflector and the single hole in the middle of the leading edge of the reflector. Bolt the 1st reflector to the 2nd reflector.

**Make sure that the 1st reflector sits on top of the 2nd.**

### 3 Module Units

1. Place the 1st, 2nd and 3rd inner reflectors (R) on the heater by sliding the reflectors between the tubes and the brackets. (Fig.9)
2. Overlap each reflector by 15mm and bolt together i.e. utilising the two slotted holes on the sides of each reflector and the single hole in the middle of the leading edge of the reflector. Bolt the 1st reflector to the 2nd reflector to the 3rd reflector.

**Make sure that the 2nd reflector sits on top of the 1st and 3rd reflectors.**

3. Insert reflector location bolts (X) through each side of the first bracket. the end of the bolts locate into the corresponding holes in the inner reflector.
4. 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.

## 8. Outer Canopies

### 2 Module Units

The outer canopies are made up of 4 identical half covers (U) which engage into the side of the inner reflectors and join at the centre by way of a closing plate which holds the two halves together. Install the outer canopies using the following method;

1. Slide on the two halves to cover the 1st section of the heaters and fit closing plates to each end (Y) to the second set of canopies.
2. Slide on two more outer canopies.
3. Stop short of the canopies already fitted and fit closing plates (Y).
4. Insert the ends of the second set of canopies inside the first set at the central joint.
5. A slot (Z) is located 15mm from the end of each canopy. Align each slot i.e one on top of each other and insert M8 self tapping screws provided.(see Fig.13)

### 3 Module Units

The outer canopies are made up of 6 identical half covers (U) which engage into the side of the inner reflectors and join at the centre by way of a closing plate (Y) which holds the two halves together. Install the outer canopies using the following method;

1. Slide on the two halves to cover the centre section of the heaters and fit closing plates to each end (Y).
2. Slide on two more outer canopies.
3. Stop short of the canopies already fitted and fit closing plates (Y).
4. Insert the ends of the second set of canopies inside the first set at the central joint.
5. A slot (Z) is located 15mm from the end of each canopy. Align each slot i.e one on top of each other and insert M8 self tapping screws provided.
6. Repeat the procedure for 3rd set of outer canopies.

## 9. Fixing the End Caps

1. Insert the end cap (D1 and D2) into the end of the outer canopies making sure that the end cap engages inside the inner reflector before inserting eight securing screws and covering washers.

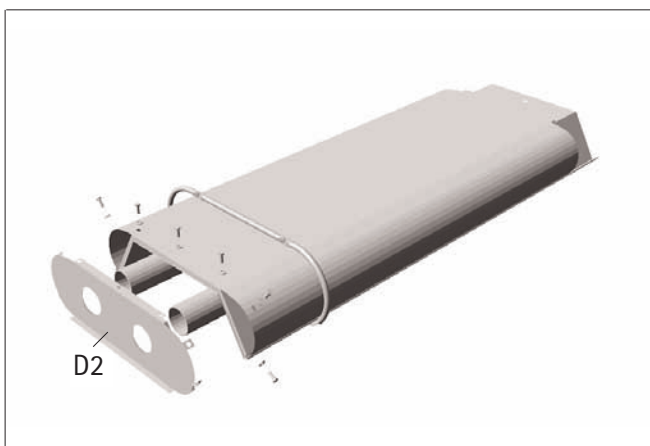


Figure 10

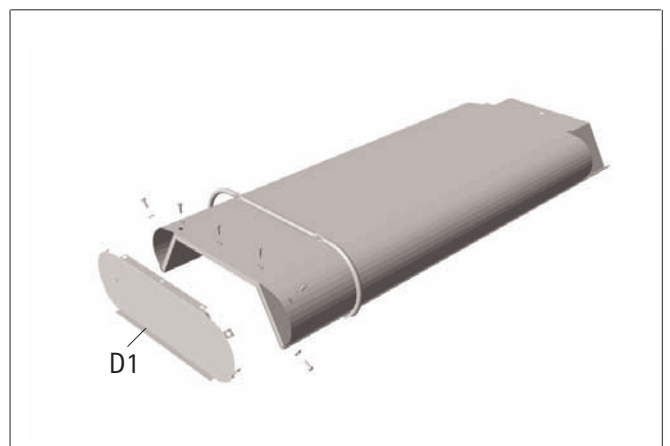



Figure 11

## 10. Fitting Burner and Fan

1. Attach the burner and fan assembly and tighten securely by the use of a 4mm allen key.

Note:

The fan is fitted to the end of the black radiant tube and secured using the grub screw on the support spinning.

-  Ensure fan discharges horizontally away from the burner if the system is unflued and vertically upwards if the system is to be flued or if end mouldings are to be fitted (see Fig.12 and section 2 of general instructions).

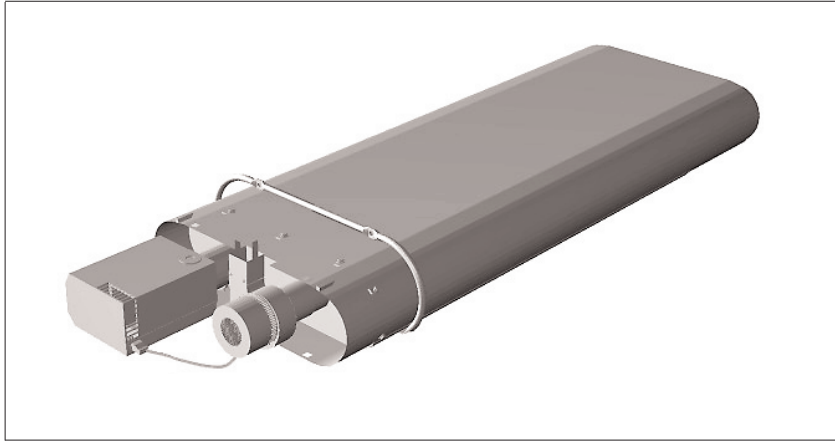

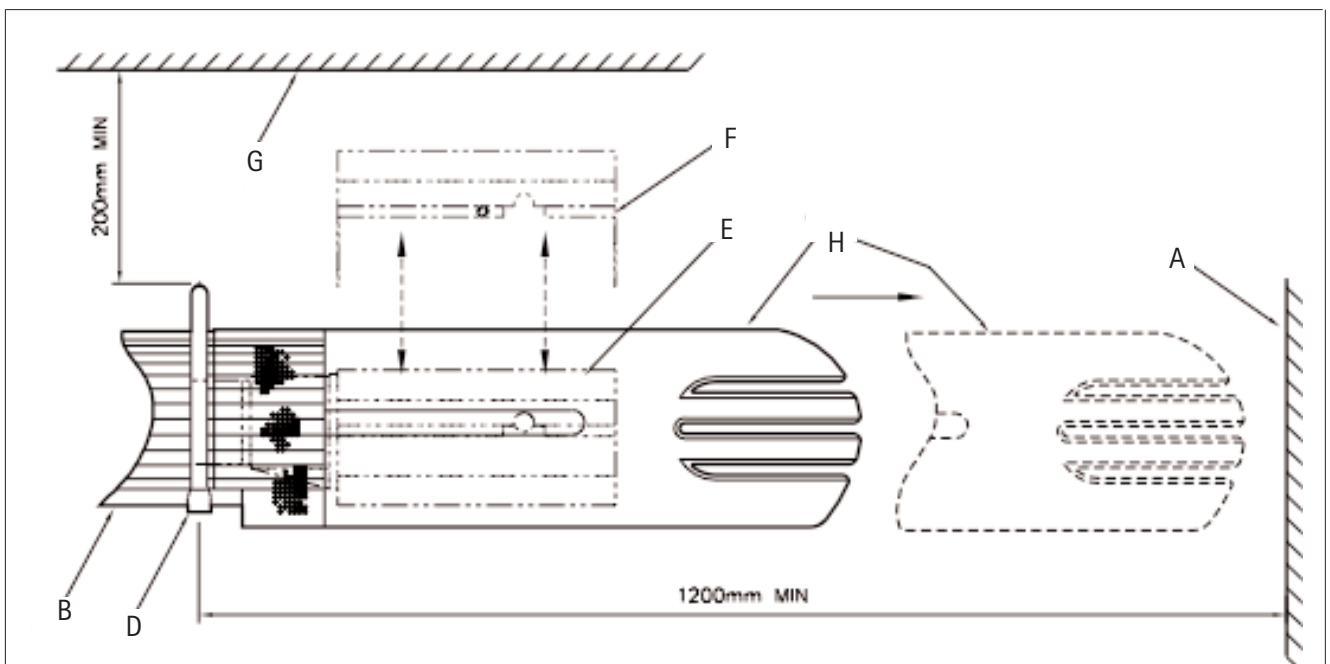


Figure 12

## 11. Fixing of End Mouldings

1. If end mouldings have been ordered (optional item) fit the end mouldings with the screws provided to the holes in top of the canopy/end mouldings.

-  When installing end mouldings with an Optima heater, the fan outlet must be positioned vertically upwards. A flue guard is supplied to prevent ingress of foreign bodies into the fan when the heater is not working.



## 12. Suspension of the Heater

1. The heater must be suspended on all 3 of the brackets. On all 4 brackets if it is a 3 module heater (see section 5 in general instructions).

All U-tube heaters must be suspended with U-bend of the heater 25mm lower than the burner end.



This procedure has been based on floor assembly of the heaters. The procedure can be undertaken in the roof area at the installing contractor's risk.



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