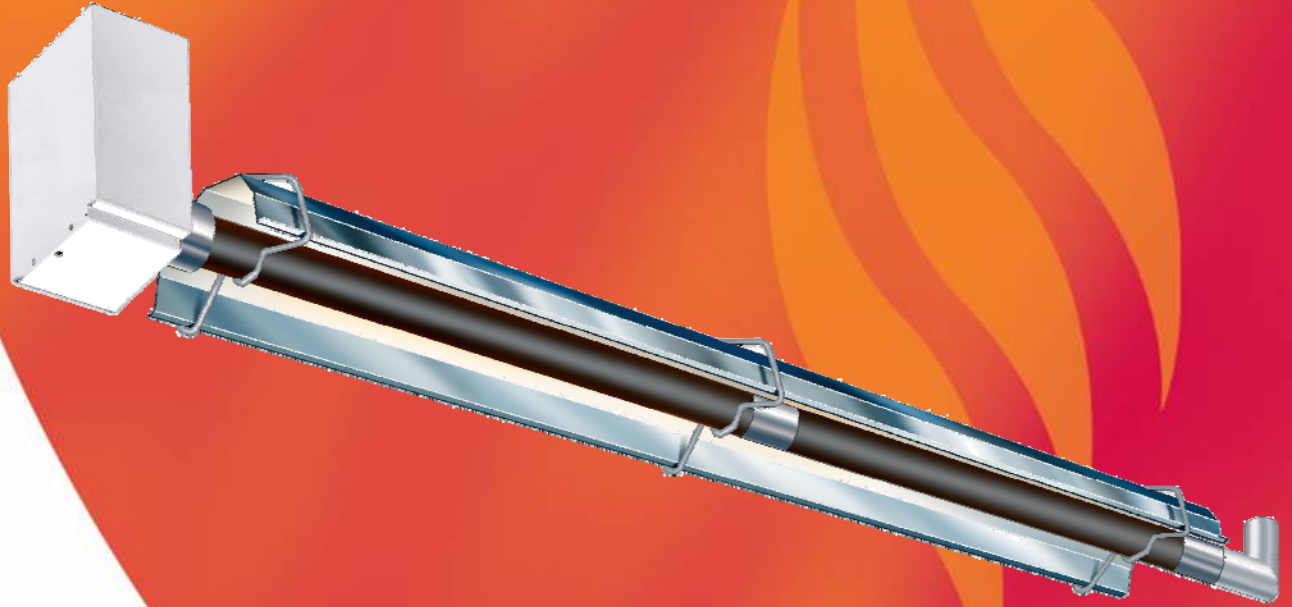


INSTALLATION / OPERATION / MAINTENANCE

Applies to: Model VCLUS/VCLUS HL 120V 60Hz
Gas-Fired, Tubular, Radiant,
Low-Intensity Infrared Heater



Vision Range

VCLUS / VCLUS HL 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

HEATING AND VENTILATION SOLUTIONS

700111


Introduction.

Welcome to the new range of powered harsh environment infrared 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 or the National Gas and Propane Installation Code CSA B149.1.

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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1. Installation Requirements.

1.1 Health and Safety

- A. Heater is intended for heating outdoor or non-residential indoor spaces and should only be installed where flammable gases or vapours are not generally present.
- B. Heaters may be suspended either horizontal or at any angle. See section 1.3 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* or the *Natural Gas*


and Propane Installation Code, CSA B149.1.

- D. The unit shall be electrically grounded in accordance with National Electric Code ANSI/NFPA 70 and Canadian Electrical Code CSA C22.1.
- E. The heater may be installed in aircraft hangars 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*, or the *Canadian Natural Gas and Propane*

Installation Code, CSA B149.1, and are so marked.

Ensure that minimum clearances will be maintained to vehicles parked below the heater.

F. These heaters are approved for installations between 0 - 2000ft (0 - 610m) for the US and 0 - 4500 ft (1370m) for Canada. Consult factory for installations above these heights in the USA.

 *Note: Any outdoor installations must be installed with a vent cap at the inlet and the flue end.*

1.2 Heater Suspension

Attachment to the heater support lugs should be made by D shackle. The hanging attachments to overhead steelwork etc. must be purpose made to sound engineering practice or supplied by others.


They must be adequately fixed and designed

to carry the whole weight of the heater. In the event of suitable roof steelwork being unavailable, additional steelwork should be fitted to enable vertical hangers to be used for suspending the heaters.

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

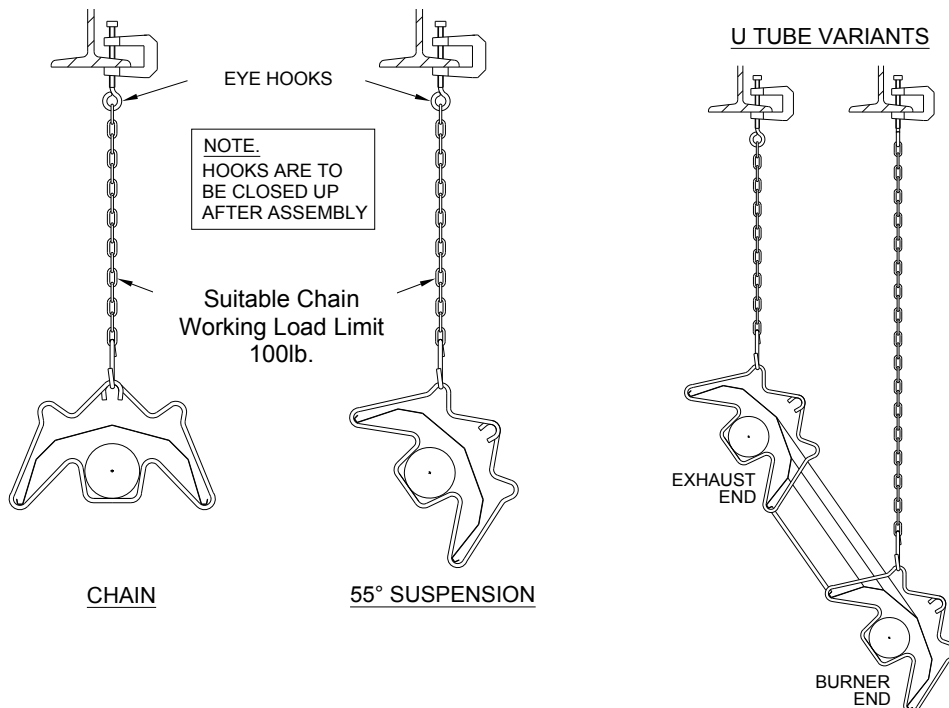
It is recommended that the heater is raised to its final position once the assembly of the tube/ bracket/reflector has been completed. Longer tube assemblies may be raised in more than one sub-assembly with final tube connection made in the air.

Ensure that the installer uses the burner roof support mounting bracket when suspending the heater. This is situated on the front of the burner. When packed the bracket is reversed and must be turned to its correct state for mounting. (ref page 18.)

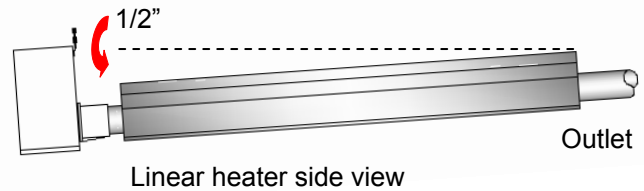
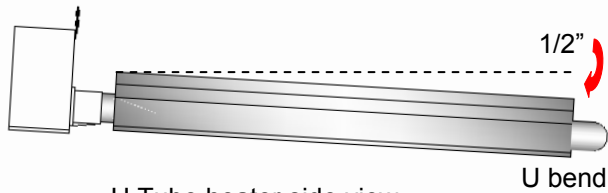
 **WARNING:**

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.

Figure 1. Recommended Methods of Heater Suspension.



ON U TUBE VARIANTS THE HEATER SHOULD SLOPE DOWNWARDS TOWARDS THE RETURN BEND AND ON LINEAR VARIANTS SHOULD SLOPE DOWNWARDS TOWARDS BURNER BY APPROX. 1/2" FOR HORIZONTAL INSTALLATIONS AS SHOWN BELOW (DIAGRAMS EXAGGERATED FOR CLARITY)



1.3 Clearance to Combustibles.

Minimum clearance to combustibles are shown in Table 1 below.

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 ensure that adjacent materials are protected from degradation.

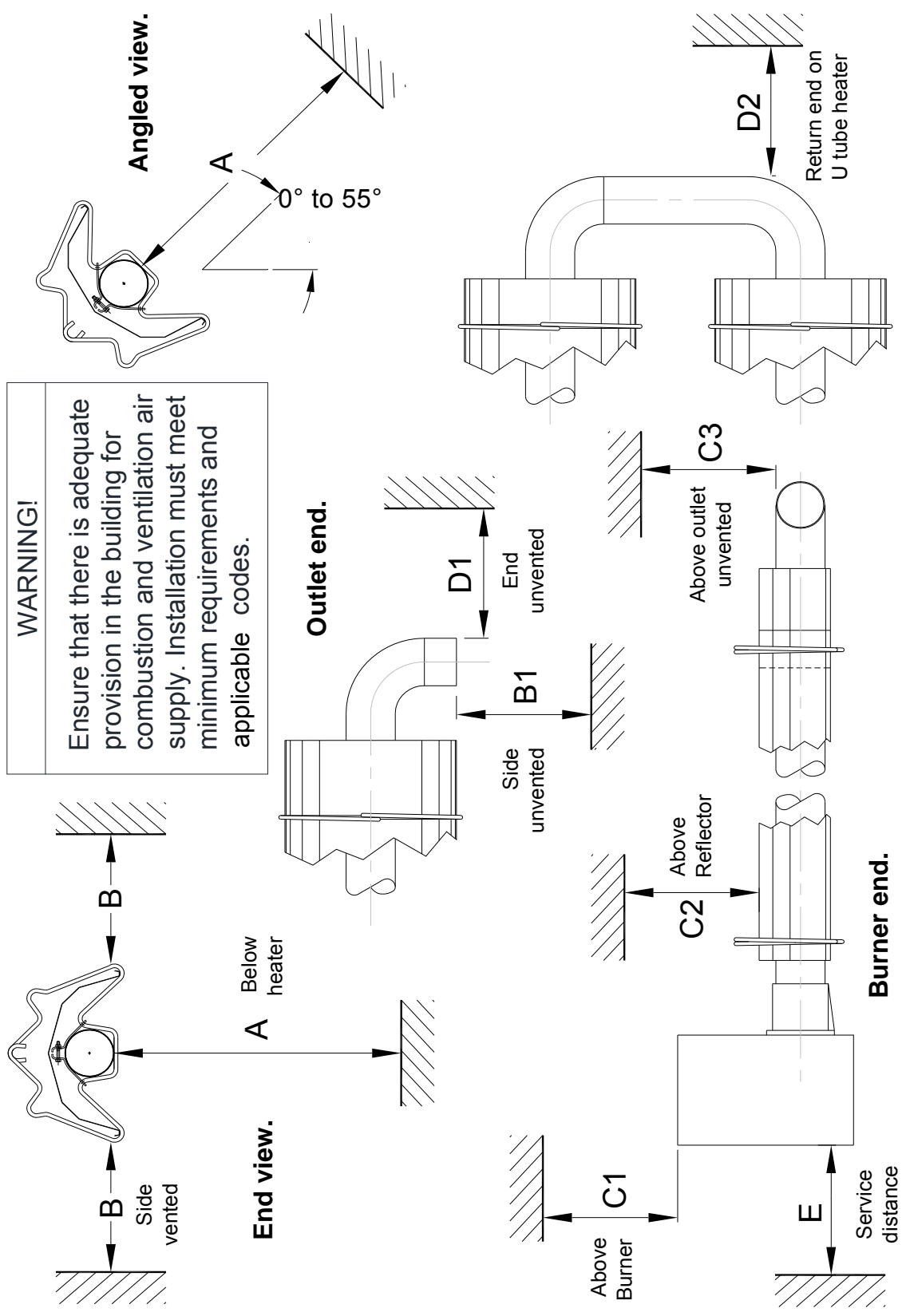
| Table 1 | Clearance to Combustibles, inches (cm) | | | | | | | | |
|---------|--|----------|----------|---------------|---------|---------|---------|---------|---------|
| MODEL | A | B | B1 | C1 | C2 | C3 | D1 | D2 | E |
| 40 | 49 (125) | 24 (74) | 41 (105) | 6(16) / 3(8)* | 8 (21) | 22 (56) | 8 (21) | 14 (36) | 10 (26) |
| 60 | 74 (188) | 29 (74) | 41 (105) | 6(16) / 3(8)* | 8 (21) | 22 (56) | 8 (21) | 14 (36) | 10 (26) |
| 80 | 74 (188) | 29 (74) | 41 (105) | 6(16) / 3(8)* | 8 (21) | 22 (56) | 8 (21) | 14 (36) | 10 (26) |
| 100 | 74 (188) | 32 (82) | 41 (105) | 6(16) / 3(8)* | 8 (21) | 22 (56) | 8 (21) | 16 (41) | 10 (26) |
| 125 | 74 (188) | 39 (99) | 47 (120) | 6(16) / 3(8)* | 8 (21) | 22 (56) | 20 (51) | 18 (46) | 10 (26) |
| 150 | 74 (188) | 39 (99) | 48 (122) | 6(16) / 3(8)* | 8 (21) | 22 (56) | 20 (51) | 18 (46) | 10 (26) |
| 170 | 86 (219) | 48 (122) | 48 (122) | 6(16) / 3(8)* | 11 (28) | 22 (56) | 20 (51) | 20 (51) | 10 (26) |
| 200 | 86 (219) | 48 (122) | 48 (122) | 6(16) / 3(8)* | 11 (28) | 22 (56) | 20 (51) | 20 (51) | 10 (26) |

* distance with end caps fitted.

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.

Figure 2 Clearance to Combustibles (Standard indoor reflectors).

! The minimum clearances to combustibles 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.



1.4 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 the table 4. 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.)

i 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", maximum 14") & pipe expansion distance (minimum 1⅛", maximum 3¾").

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

* 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 150,000Btu/h and above, ¾" ID x 36" long.

NOTE: For Canada all heaters MUST use a hose 36" long.

(See Table 3)

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

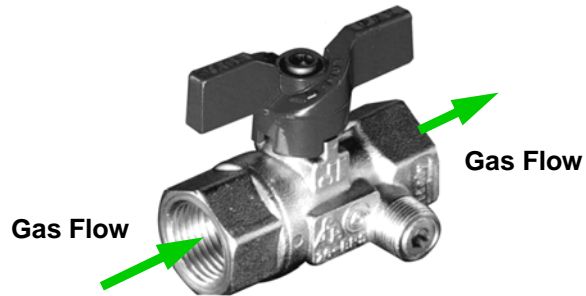
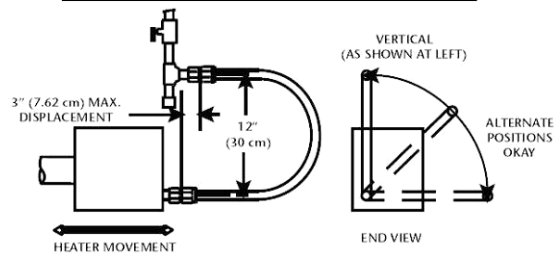


Figure 4. Correct Installation of Flexible Gas Connection

CORRECT POSITIONS



INCORRECT POSITIONS

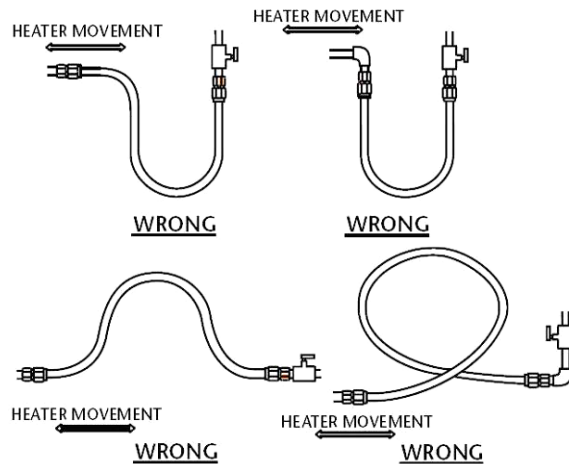


Table 3

| HOSE SIZE | PART No. |
|-----------|----------|
| ¾" | A4129 |
| ½" | A4128 |



CONNECTOR MUST BE INSTALLED IN A "U" CONFIGURATION. FOR HEATERS UPTO 150,000 BTU/H, A 24" LONG CONNECTOR OF AT LEAST 1/2" ID MUST BE USED. FOR HEATERS ABOVE 150,000 BTU/H, A 36" LONG CONNECTOR OF AT LEAST 3/4" NOMINAL ID MUST BE USED.

Table 4 Gas Supply Pressures

| Gas Type | Natural Gas | LP/Propane Gas |
|----------------------------------|------------------------------|----------------|
| Required Gas Pressure (in W.C) | 7.0 | 11.0 |
| Maximum Supply Pressure (in W.C) | 14.0 | 14.0 |
| Gas Supply | Connection 1/2" N.P.T thread | |

1.5 Electrical Connections

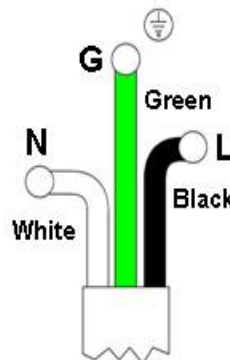


WARNING: Before making electrical connections, switch OFF the main electrical disconnect. There may be more than one disconnect switch. Lock out and tag switch with a suitable warning label. Electrical shock can cause personal injury or death.

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.

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.

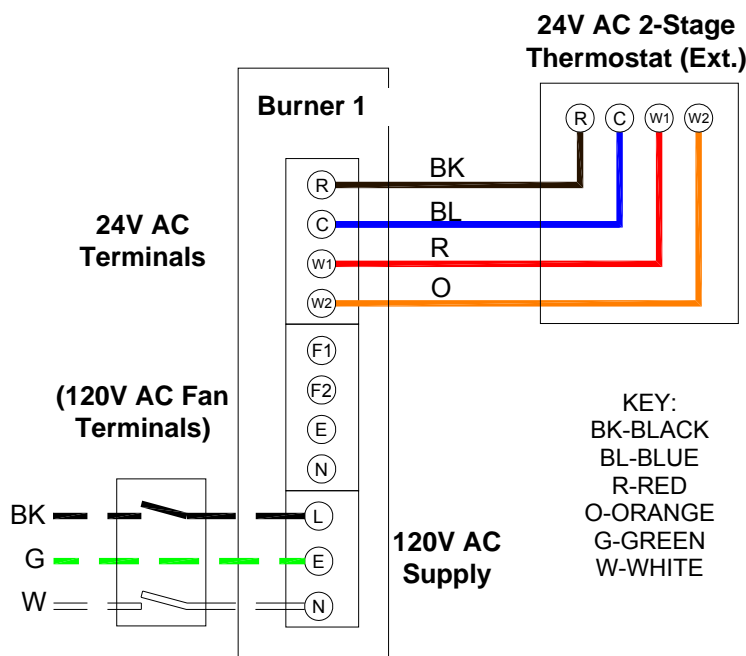


The electrical supply to the heater is by three wires: hot (Live), neutral and ground connections.

Install in accordance with all state & local codes.

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

Figure 5a. External Wiring Schematic. (VCLUS HL)

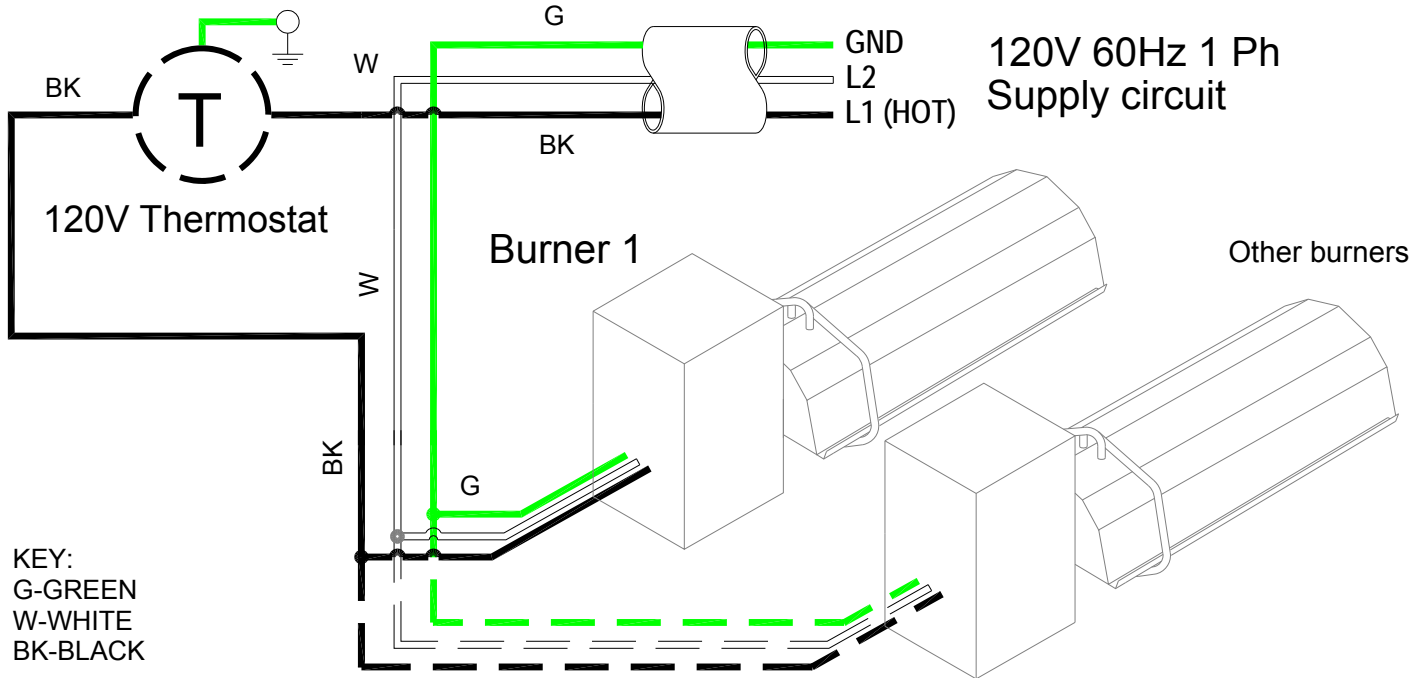


i VCLUS models can have an optional 24V AC single stage thermostat. (See Fig. 5c overleaf).

Notes:

- Use 18/4 class 2 thermostat cable between heater and thermostat.
- Max. length @ 18 Awg (0.8mm²) = 100ft.
- Only one burner can operate from one thermostat as supplied.
- When servicing heaters ensure the electricity supply is isolated from the mains.
- 120V AC supply is still present at each burner when the thermostat is switched off.

Figure 5b. Single and Multiple Heater Installations 120V Control (VCLUS)



If heaters are wired using the method shown above, a link wire must be fitted to the burner terminals as shown in the diagram opposite.

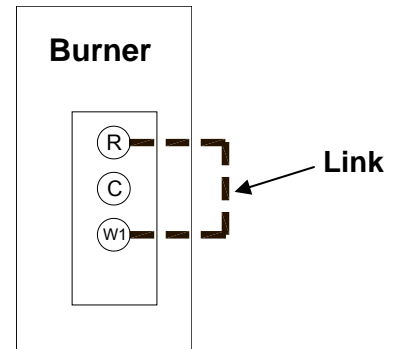
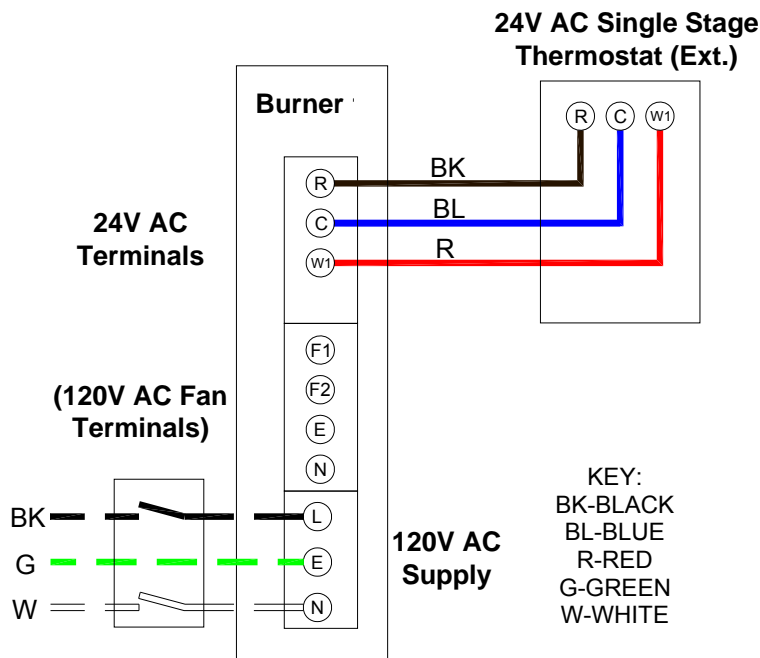


Figure 5c. External Wiring Schematic (VCLUS)



Notes:

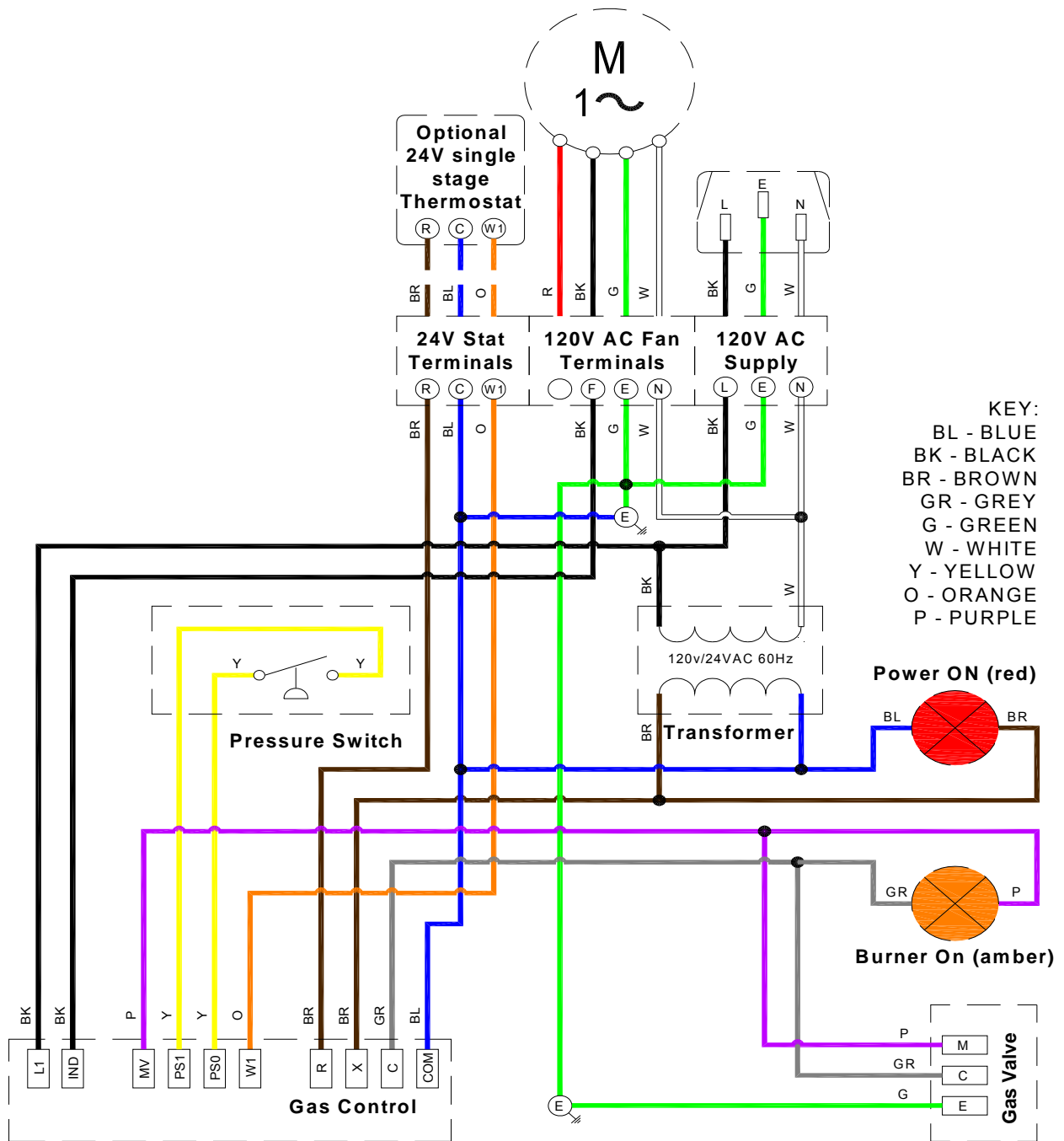
Use 18/4 class 2 thermostat cable between heater and thermostat.
Max. length @ 18 Awg (0.8mm²) = 100ft.

Only one burner can operate from one thermostat as supplied.

When servicing heaters ensure the electricity supply is isolated from the mains supply.

120V AC supply is still present at each burner when the thermostat is switched off.

Figure 6. Internal Burner Wiring Diagram. (VCLUS)



NOTES:-

Power On light is permanently illuminated when 120V / 60 Hz AC external supply is connected to burner. Additional wiring is required to install a thermostat and / or time clock.

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


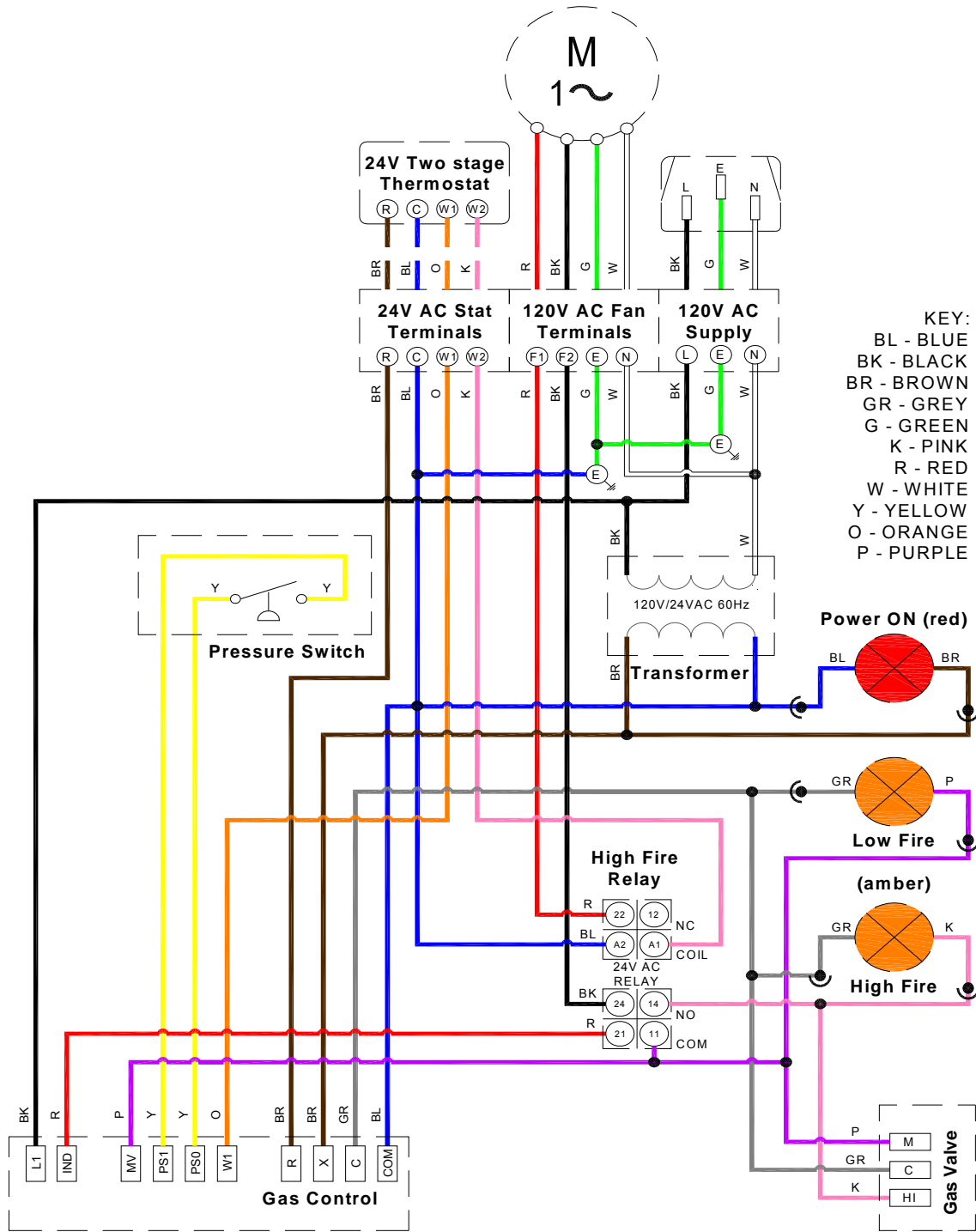
 If any of the original wire as supplied with the appliance must be replaced, it must be replaced with wiring material having a temperature rating of at least 220°F/105°C

Figure 7b. Internal Burner Wiring Diagram. (VCLUS HL)




NOTES:-

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

Additional wiring is required to install a thermostat and / or time clock.

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

1.6 Vent Requirements and Details

1.6.1 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:

- Internal volume of the heated room must be greater than 214cu.ft. per 100 BTU per hour of heaters installed.
OR
- 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.

1.6.2 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 90° elbows.** All connections should be properly sealed. (refer to fig. 8a)

1.6.3 Horizontal venting

Individual units can be vented horizontally through side walls. Recommended terminals are part numbers 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) diameter 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. Protect the building material from degradation by the vent gases.

Vent joints should be sealed and secured according to the vent manufactures instructions. 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 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) diameter should be installed from the fresh air to the air intake connection on the burner housing. A flexible jointing piece should be installed at the burner 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 to figs. 8c & 8d.

Figure 8.a Vertical Venting.

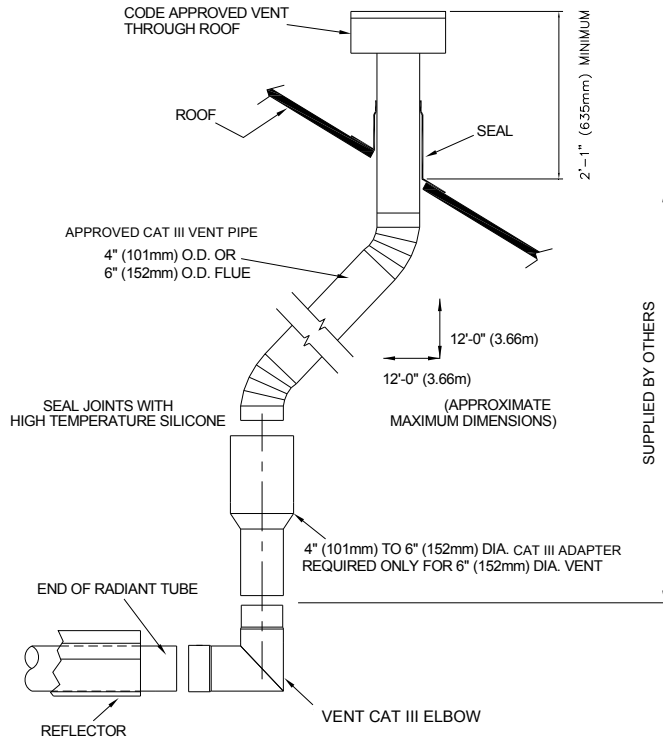


Figure 8.b Horizontal Venting.

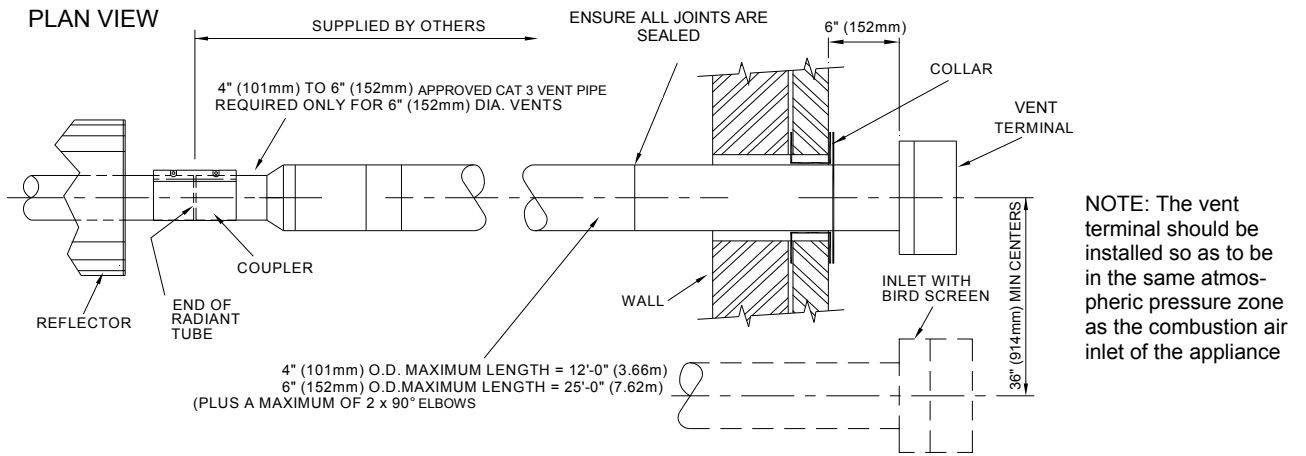


Figure 8.c Fresh Air Ducted Intake.

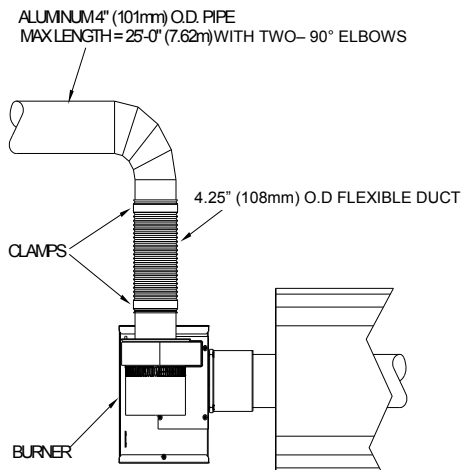
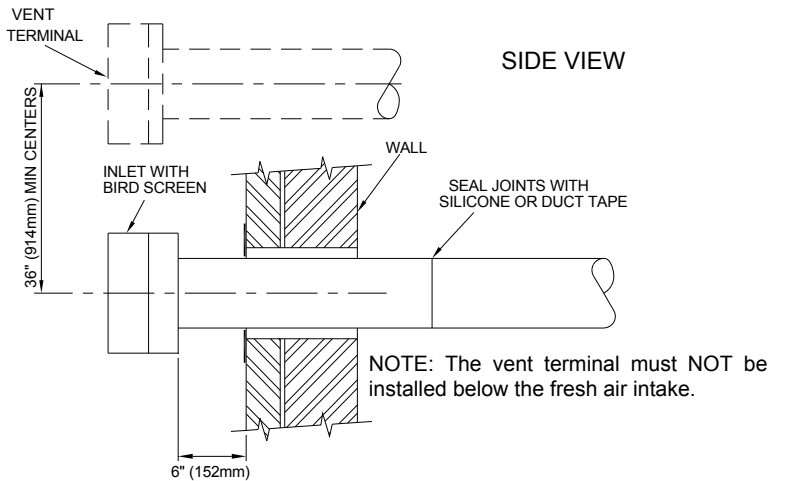


Figure 8.d Wall Terminal Intake Kit.



1.8 Technical Details - Table 5a (VCLUS)

| | |
|---------------------------|---|
| No of Injectors | 1 |
| Gas Connection | ½" N.P.T |
| Electrical Supply | 120 volt 1 phase 60Hz |
| Vent size (in) | 4" or 6" (101mm or 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 | LP Gas | Min. Heater Length | Max. Heater Length | Min. Heater Length | Max. Heater Length |
|-------|-------------|---------|--------------------|--------------------|--------------------|--------------------|
| | BTU/Hr | BTU/Hr | S ft (m) | S ft (m) | U ft (m) | U ft (m) |
| 40 | 41,500 | 41,500 | 10 (3.0) | 30 (9.1) | 20 (6.1) | 20 (6.1) |
| 60 | 60,000 | 60,000 | 20 (6.1) | 40 (12.1) | 20 (6.1) | 40 (12.1) |
| 80 | 80,000 | 80,000 | 20 (6.1) | 40 (12.1) | 20 (6.1) | 40 (12.1) |
| 100 | 100,000 | 100,000 | 30 (9.1) | 50 (15.2) | 40 (12.1) | 40 (12.1) |
| 125 | 123,500 | 125,000 | 40 (12.1) | 60 (18.3) | 40 (12.1) | 60 (18.3) |
| 150 | 150,000 | 150,000 | 40 (12.1) | 70 (21.3) | 40 (12.1) | 60 (18.3) |
| 170 | 169,000 | 169,000 | 50 (15.2) | 80 (24.4) | 60 (18.3) | 80 (24.4) |
| 200 | 200,000 | N/A | 50 (15.2) | 80 (24.4) | 60 (18.3) | 80 (24.4) |

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 | 40 | 60 | 80 | 100 | 125 | 150 | 170 | 200 |
| "WC | 3.2 | 4.2 | 3.5 | 3.5 | 4.1 | 4.2 | 3.4 | 3.5 |

| USA | LP Gas 0- 2000 ft (0-610m) | | | | | | | |
|------|----------------------------|-----|-----|-----|-----|-----|-----|-----|
| Size | 40 | 60 | 80 | 100 | 125 | 150 | 170 | 200 |
| "WC | 4.5 | 6.0 | 5.2 | 8.2 | 6.6 | 7.0 | 5.7 | N/A |

| USA | Natural Gas 2001- 4000 ft (611-1220m) | | | | | | | |
|------|---------------------------------------|-----|-----|-----|-----|-----|-----|-----|
| Size | 40 | 60 | 80 | 100 | 125 | 150 | 170 | 200 |
| "WC | 3.0 | 4.0 | 3.3 | 3.3 | 3.9 | 4.0 | 3.2 | 3.3 |

| USA | LP Gas 2001- 4000 ft (611-1220m) | | | | | | | |
|------|----------------------------------|-----|-----|-----|-----|-----|-----|-----|
| Size | 40 | 60 | 80 | 100 | 125 | 150 | 170 | 200 |
| "WC | 4.3 | 5.8 | 5.0 | 8.0 | 6.4 | 6.8 | N/A | |

| CANADA | Natural Gas 0- 2000 ft (0-610m) | | | | | | | |
|--------|---------------------------------|-----|-----|-----|-----|-----|-----|-----|
| Size | 40 | 60 | 80 | 100 | 125 | 150 | 170 | 200 |
| "WC | 3.2 | 4.2 | 3.5 | 3.5 | 4.1 | 4.2 | 3.4 | 3.5 |

| CANADA | LP Gas 0- 2000 ft (0-610m) | | | | | | | |
|--------|----------------------------|-----|-----|-----|-----|-----|-----|-----|
| Size | 40 | 60 | 80 | 100 | 125 | 150 | 170 | 200 |
| "WC | 4.5 | 6.0 | 5.2 | 8.2 | 6.6 | 7.0 | 5.7 | N/A |

| CANADA | Natural Gas 2001- 4500 ft (611-1370m) | | | | | | | |
|--------|---------------------------------------|-----|-----|-----|-----|-----|-----|-----|
| Size | 40 | 60 | 80 | 100 | 125 | 150 | 170 | 200 |
| "WC | 3.0 | 4.0 | 3.3 | 3.3 | 3.9 | 4.0 | 3.2 | 3.3 |

| CANADA | LP Gas 2001- 4500 ft (611-1370m) | | | | | | | |
|--------|----------------------------------|-----|-----|-----|-----|-----|-----|-----|
| Size | 40 | 60 | 80 | 100 | 125 | 150 | 170 | 200 |
| "WC | 4.3 | 5.8 | 5.0 | 8.0 | 6.4 | 6.8 | N/A | |

Technical Details continued

| USA & CANADA | Natural Gas 0- 2000 ft (0-610m) | | | | | | | |
|-------------------------------|---------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| MODEL | 40 | 60 | 80 | 100 | 125 | 150 | 170 | 200 |
| Burner Orifice Plate Part No. | 201063-57 | 201063-45 | 201063-29 | 201063-23 | 201063-26 | 201063-25 | 201063-24 | 201063-24 |
| Fan Type | 201957 | | | | | | | 202132 |
| Fan Orifice Part No. | 201970 | L200281 | 201654 | L200281 | L200262 | 201637 | 201425 | 201911 |
| Injector Part No. | 201007-13 | 201007-15 | 201007-18 | 201007-21 | 201007-24 | 201007-30 | 201631-28 | 201631-32 |
| Pressure Switch Part No. | 201508 | 201676 | | | | | | 201697 |

| USA & CANADA | LP Gas 0- 2000 ft (0-610m) | | | | | | | |
|-------------------------------|----------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----|
| MODEL | 40 | 60 | 80 | 100 | 125 | 150 | 170 | 200 |
| Burner Orifice Plate Part No. | 201063-75 | 201063-74 | 201063-72 | 201063-56 | 201063-55 | 201063-54 | 201063-68 | N/A |
| Fan Type | 201957 | | | | | | 202132 | |
| Fan Orifice Part No. | 201970 | L200301 | L200301 | 201825 | L200244 | L200246 | 202352 | |
| Injector Part No. | 201007-10 | 201007-11 | 201007-13 | 201007-13 | 201007-15 | 201007-17 | 201007-19 | |
| Pressure Switch Part No. | 201508 | 201676 | | | | | | |

| MODEL | U Tube | | | | Straight Tube | | | | | | | |
|-------|--------|-----|-----|-----|---------------|-----|-----|-----|-----|-----|-----|-----|
| | U20 | U40 | U60 | U80 | S10 | S20 | S30 | S40 | S50 | S60 | S70 | S80 |
| 40 | • | | | | • | • | • | | | | | |
| 60 | • | • | | | | • | • | • | | | | |
| 80 | • | • | | | | • | • | • | | | | |
| 100 | | • | | | | | • | • | • | | | |
| 125 | | • | • | | | | | • | • | • | | |
| 150 | | • | • | | | | | • | • | • | • | |
| 170 | | | • | • | | | | | • | • | • | • |
| 200 | | | • | • | | | | | • | • | • | • |

1.8 Technical Details - Table 5b (VCLUS HL)

| | |
|----------------------------------|---|
| No of Injectors | 1 |
| Gas Connection | ½" N.P.T |
| Electrical Supply | 120 volt 1 phase 60Hz |
| Vent size (in) | 4" or 6" (101mm or 152mm) |
| Unitary Fan Motor Details | 120 volt 1 phase 60Hz |
| Current Rating | 1.2A MAX |
| Ignition | Electronic Program Start up with Spark Ignition |
| Thermostat | 24Vac 60Hz 1.5A Max. total load |

| MODEL | Natural Gas | LP Gas | Min. Heater Length | Max. Heater Length | Min. Heater Length | Max. Heater Length |
|------------|------------------------|------------------------|--------------------|--------------------|--------------------|--------------------|
| | High / Low Rate BTU/Hr | High / Low Rate BTU/Hr | S ft (m) | S ft (m) | U (ft) | U (ft) |
| 40 | 41,500/31,125 | 41,500/31,125 | 10 (3.0) | 20 (6.1) | 20 (6.1) | 20 (6.1) |
| 60 | 60,000/45,000 | 60,000/45,000 | 20 (6.1) | 40 (12.1) | 20 (6.1) | 40 (12.1) |
| 80 | 80,000/60,000 | 80,000/60,000 | 30 (9.1) | 40 (12.1) | 40 (12.1) | 40 (12.1) |
| 100 | 100,000/65,000 | 100,000/65,000 | 30 (9.1) | 40 (12.1) | 40 (12.1) | 40 (12.1) |
| 125 | 123,500/95,000 | 125,000/95,000 | 30 (9.1) | 50 (15.2) | 40 (12.1) | 40 (12.1) |
| 150 | 150,000/100,000 | 150,000/100,000 | 40 (12.1) | 60 (18.3) | 40 (12.1) | 60 (18.3) |
| 170 | 169,000/125,000 | 169,000/125,000 | 50 (15.2) | 70 (21.3) | 60 (18.3) | 60 (18.3) |
| 200 | 200,000/150,000 | N/A | 50 (15.2) | 70 (21.3) | 60 (18.3) | 60 (18.3) |

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 | 40 | 60 | 80 | 100 | 125 | 150 | 170 | 200 |
| "WC Hi | 3.4 | 4.2 | 3.9 | 4.9 | 4.5 | 4.4 | 4.0 | 3.5 |
| "WC Lo | 1.9 | 2.4 | 2.3 | 2.1 | 2.7 | 2.2 | 2.4 | 2.2 |

| USA | LP Gas 0- 2000 ft (0-610m) | | | | | | | |
|--------|----------------------------|-----|-----|-----|-----|-----|-----|-----|
| Size | 40 | 60 | 80 | 100 | 125 | 150 | 170 | 200 |
| "WC Hi | 3.7 | 6.1 | 5.2 | 8.2 | 7.6 | 7.2 | 6.8 | N/A |
| "WC Lo | 2.1 | 3.5 | 3.0 | 3.7 | 4.4 | 3.3 | 3.9 | N/A |

| USA | Natural Gas 2001- 4000 ft (611-1220m) | | | | | | | |
|--------|---------------------------------------|-----|-----|-----|-----|-----|-----|-----|
| Size | 40 | 60 | 80 | 100 | 125 | 150 | 170 | 200 |
| "WC Hi | 3.3 | 4.1 | 3.7 | 4.7 | 4.3 | 4.2 | 3.8 | 3.3 |
| "WC Lo | 1.8 | 2.3 | 2.1 | 2.0 | 2.5 | 2.0 | 2.2 | 2.0 |

| USA | LP Gas 2001- 4000 ft (611-1220m) | | | | | | | |
|--------|----------------------------------|-----|-----|-----|-----|-----|-----|-----|
| Size | 40 | 60 | 80 | 100 | 125 | 150 | 170 | 200 |
| "WC Hi | 3.6 | 6.0 | 5.0 | 8.0 | 7.4 | 7.0 | N/A | |
| "WC Lo | 2.0 | 3.4 | 2.9 | 3.5 | 4.2 | 3.1 | N/A | |

| CANADA | Natural Gas 0- 2000 ft (0-610m) | | | | | | | |
|--------|---------------------------------|-----|-----|-----|-----|-----|-----|-----|
| Size | 40 | 60 | 80 | 100 | 125 | 150 | 170 | 200 |
| "WC Hi | 3.4 | 4.2 | 3.9 | 4.9 | 4.5 | 4.4 | 4.0 | 3.5 |
| "WC Lo | 1.9 | 2.4 | 2.3 | 2.1 | 2.7 | 2.2 | 2.4 | 2.2 |

| CANADA | LP Gas 0- 2000 ft (0-610m) | | | | | | | |
|--------|----------------------------|-----|-----|-----|-----|-----|-----|-----|
| Size | 40 | 60 | 80 | 100 | 125 | 150 | 170 | 200 |
| "WC Hi | 3.7 | 6.1 | 5.2 | 8.2 | 7.6 | 7.2 | 6.8 | N/A |
| "WC Lo | 2.1 | 3.5 | 3.0 | 3.7 | 4.4 | 3.3 | 3.9 | N/A |

| CANADA | Natural Gas 2001- 4500 ft (611-1370m) | | | | | | | |
|--------|---------------------------------------|-----|-----|-----|-----|-----|-----|-----|
| Size | 40 | 60 | 80 | 100 | 125 | 150 | 170 | 200 |
| "WC Hi | 3.3 | 4.1 | 3.7 | 4.7 | 4.3 | 4.2 | 3.8 | 3.3 |
| "WC Lo | 1.8 | 2.3 | 2.1 | 2.0 | 2.5 | 2.0 | 2.2 | 2.0 |

| CANADA | LP Gas 2001- 4500 ft (611-1370m) | | | | | | | |
|--------|----------------------------------|-----|-----|-----|-----|-----|-----|-----|
| Size | 40 | 60 | 80 | 100 | 125 | 150 | 170 | 200 |
| "WC Hi | 3.6 | 6.0 | 5.0 | 8.0 | 7.4 | 7.0 | N/A | |
| "WC Lo | 2.0 | 3.4 | 2.9 | 3.5 | 4.2 | 3.1 | N/A | |

Technical Details continued

| USA & CANADA | Natural Gas 0- 2000 ft (0-610m) | | | | | | | |
|--------------------------------------|---------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| MODEL | 40 | 60 | 80 | 100 | 125 | 150 | 170 | 200 |
| Burner Orifice Plate Part No. | 201063-57 | 201063-77 | 201063-67 | 201063-23 | 201063-26 | 201063-25 | 201063-24 | 201063-24 |
| Fan Type | 201957 | | | | | | 202132 | |
| Fan Orifice Part No. | 202483 | 202479 | L200301 | L200281 | L200262 | 201425 | 202133 | 201911 |
| Injector Part No. | 201007-13 | 201007-15 | 201007-18 | 201007-19 | 201007-23 | 201007-29 | 201631-28 | 201631-32 |
| Pressure Switch Part No. | 201508 | 201676 | | | | | | 201697 |

| USA & CANADA | LP Gas 0- 2000 ft (0-610m) | | | | | | | |
|--------------------------------------|----------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----|
| MODEL | 40 | 60 | 80 | 100 | 125 | 150 | 170 | 200 |
| Burner Orifice Plate Part No. | 201063-75 | 201063-74 | 201063-72 | 201063-56 | 201063-55 | 201063-54 | 201063-68 | N/A |
| Fan Type | 201957 | | | | | | 202132 | |
| Fan Orifice Part No. | 202483 | 202253 | L200301 | 201825 | L200244 | L200246 | 202141 | |
| Injector Part No. | 201007-10 | 201007-11 | 201007-13 | 201007-13 | 201007-15 | 201007-17 | 201007-19 | |
| Pressure Switch Part No. | 201508 | 201676 | | | | | | |

Technical Details continued

| MODEL | U TUBE | | | STRAIGHT TUBE | | | | | | |
|-------|--------|-----|-----|---------------|-----|-----|-----|-----|-----|-----|
| | U20 | U40 | U60 | S10 | S20 | S30 | S40 | S50 | S60 | S70 |
| 40 | • | | | • | • | | | | | |
| 60 | • | • | | | • | • | • | | | |
| 80 | | • | | | | • | • | | | |
| 100 | | • | | | | • | • | | | |
| 125 | | • | | | | • | • | • | | |
| 150 | | • | • | | | | • | • | • | |
| 170 | | | • | | | | | • | • | • |
| 200* | | | • | | | | | • | • | • |

| MODEL | TUBE TYPE MATERIAL | | MIN DISTANCE TO BEND |
|-------|--------------------|-----------------|----------------------|
| | Stainless Steel | Stainless Steel | |
| 40 | TUBE 1 | REMAINDER | 10 (3.0) |
| 60 | TUBE 1 | REMAINDER | 10 (3.1) |
| 80 | TUBE 1 | REMAINDER | 15 (4.6) |
| 100 | TUBE 1 | REMAINDER | 15 (4.6) |
| 125 | TUBE 1 | REMAINDER | 15 (4.6) |
| 150 | TUBE 1 | REMAINDER | 20 (6.1) |
| 170 | TUBE 1 & 2 | REMAINDER | 25 (7.6) |
| 200* | TUBE 1 & 2 | REMAINDER | 25 (7.6) |

Options * Not available on LP Gas

- 1 All standard units fitted with unvented vent, natural gas and stainless steel reflectors.
- 2 1 off 180° 'U' bend or up to 2 off 90° 'L' bends can be fitted at no less than 50% of the total heater length.
- 3 5ft tube kit, 4" (101mm) or 6" (152mm) vent terminal.
- 4 Combustion air kit or wind and rain hood kit for outdoor installation.
- 5 Reflector end caps.
- 6 Altitude conversion kit.
- 7 LP Gas and high altitude LP Gas conversion kits.

2. Assembly Instructions.

i **PLEASE READ** this section prior to assembly to familiarize 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.

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

i 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.



Saw Horses



Leather Faced Gloves



Phillips Screwdriver



Wrench Set



Cordless Drill



5/16" Drive



3/16" (5mm)
5/32" (4mm)
Allen wrench



Tape Measure

i Suitable alternative tools may be used.

2.2 Assembly Notes.



Please read these assembly notes in conjunction with the correct assembly drawings (figs 10 to 20).

2.2.1 Tubes

Each heating unit has two types of emitter tubes. For details of the tube types please refer to the table (page 13 of this instruction manual).

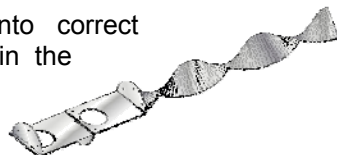
Identify and position tubes on saw horses. For aesthetics it is advisable to position **all tube seams facing down**. Position coupling fastener so that these cannot be seen from beneath the heater.

Mark out the position of the bracket centers from the dimensions shown on the assembly drawings.

i **Turbulators:** Ensure that the correct turbulator or burner insert is fitted, as this could void your warranty if they are incorrectly fitted or omitted.

2.2.2 Turbulators (where fitted)

Insert turbulator into correct tube as indicated in the assembly drawings.

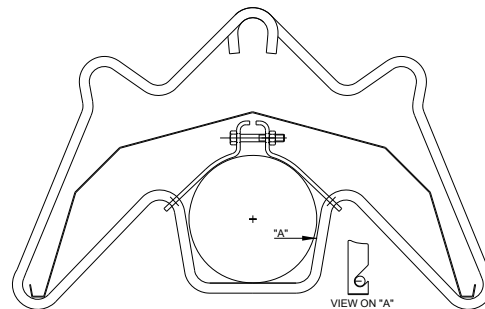


2.2.3 Brackets

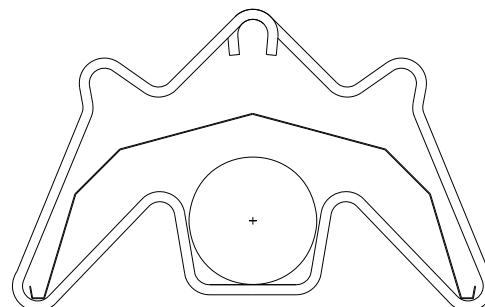
There can be four types of brackets supplied with these heaters:

2.2.3.1 Brackets for Indoor heaters

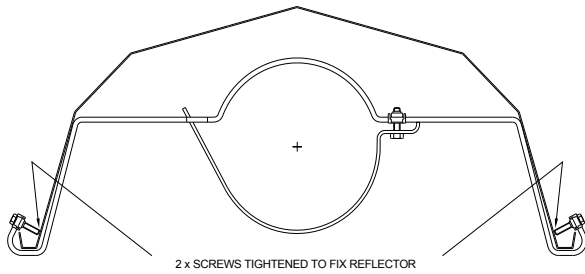
- Type 'H' are suspension brackets with tube straps.



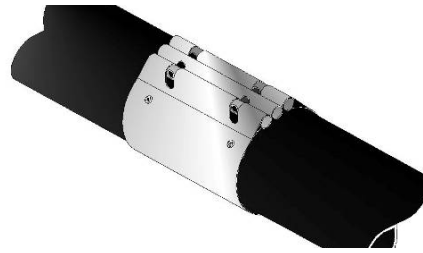
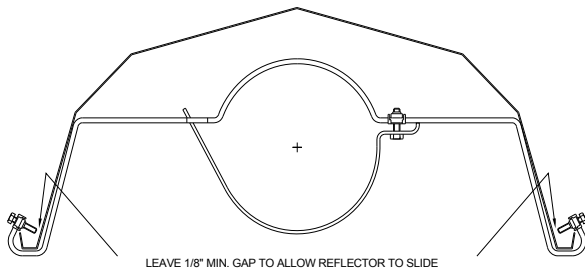
- Type 'G' are suspension brackets with no tube straps.



- Type 'F' are fixed reflector brackets.



- Type 'S' are sliding reflector brackets.



Slide the coupler over the tube ensuring that the screw stop has butted up to the tube ends. Using the Allen wrench to tighten the bolts.

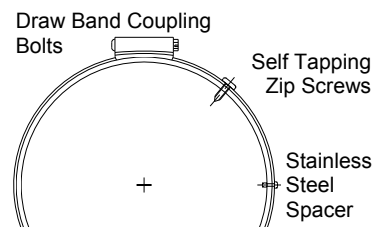
DO NOT OVERTIGHTEN.

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

A standard stainless steel 4" coupling which is used for all other fixings. Slide the coupler over the tube ensuring that the rivet stop has butted up to the tube ends. Using the 5/16" drive, tighten the bolts.

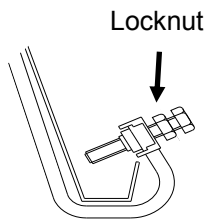


DO NOT OVERTIGHTEN!!



! At this point raise the tube assembly into position and suspend from previously fixed chains (Working Load 100lb). Longer tube assemblies may be raised in more than one sub-assembly with final tube connection made in the air.

Ensure security locknut is tightened on both fixed and sliding types of bracket.



Slip the suspension brackets onto the tube assembly. The fixed suspension point 'H' shown on the drawings are adjacent to the burner and secures the first suspension bracket to the tube with a tube strap. All other suspension brackets 'G' shown on the drawings, have floating suspension points. Reflectors are fixed at point 'F' with a reflector support bracket and reflectors are held in position with fixing screws. Fixed and sliding joints alternate along the heater at the spacing's indicated on the individual heater assembly sheets.

2.2.4 Couplers

The couplers are used for joining radiant tubes and L bends.

There are two types of couplers for joining radiant tubes and L bends. A high temperature stainless steel 4" coupling which is used as detailed in the table below.

| Model | First coupler | Second coupler |
|---------|---------------|----------------|
| 40-100 | Standard | Standard |
| 125-150 | Hi-temp | Standard |
| 170-200 | Hi-temp | Hi-temp |

2.2.5 Reflectors.

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

The first and second reflector are fixed at the point F by a type 'F' reflector support bracket and are held in place by tightening the fixing screws. Alternate fixings of further reflectors by type S and type 'F' reflector brackets and space as indicated by individual assembly sheets.

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

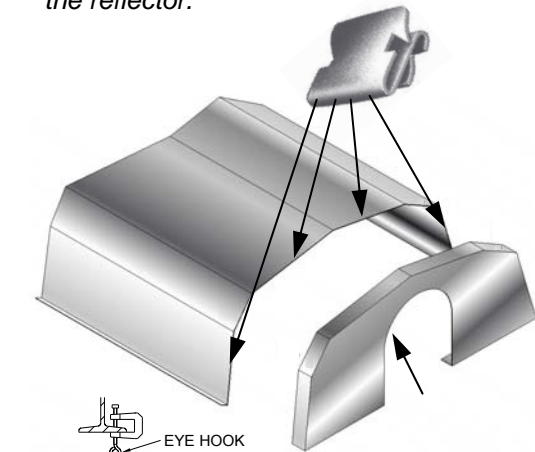
! Reflector support bracket assemblies are fitted at each reflector joint, with the clamp screws adjusted so that reflectors are fixed together.

2.2.6 End Caps (optional)

Position an end cap beneath the reflector profile (where required) with the end cap flanges facing inwards.

Fasten to reflector using the four 'Z' clips.

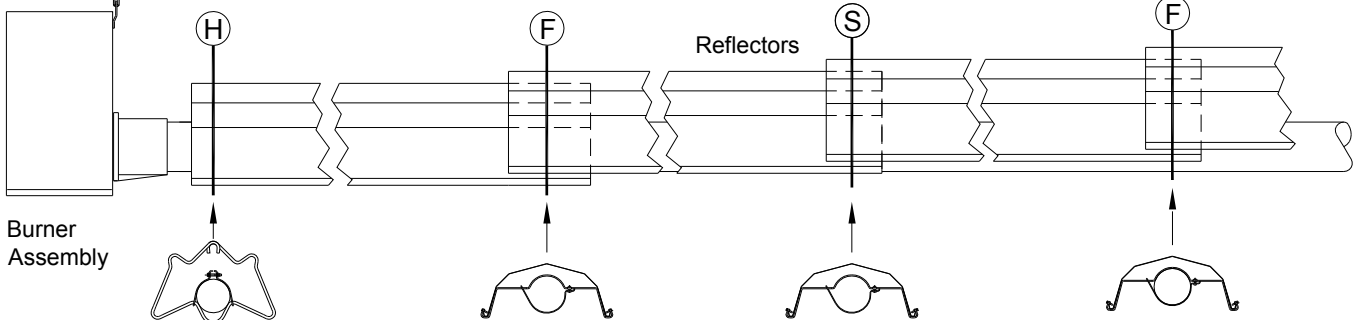
! Note: For high wind/outdoor applications use additional drill screws to secure end cap to the reflector.



EYE HOOK

NOTE:
HOOKS ARE TO BE CLOSED UP AFTER ASSEMBLY

2/0 GA CHAIN
(TWISTED LINK, PLATED)

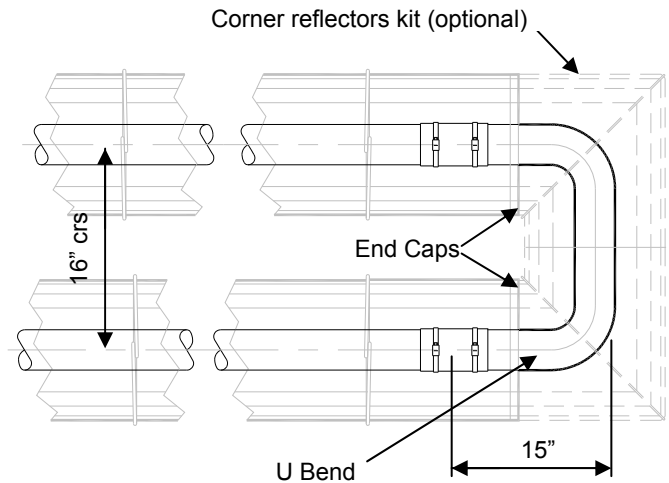
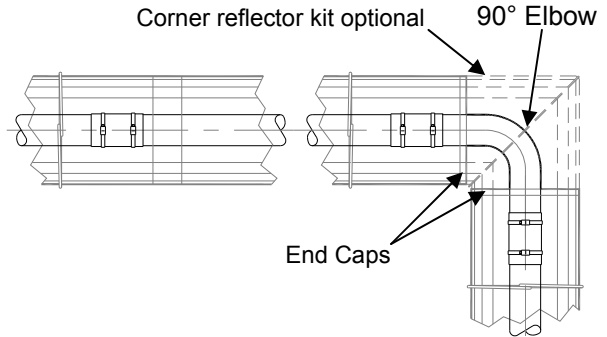


2.2.7 Bend(s) (where fitted)

The heater can be installed with 1 or 2 90° bends or a 180° U bend.

Slide the bend into the open end of the coupler ensuring that the screw stop has butted up to the tube ends. Refer to 2.2.4 for fastening.

Typical usage of optional bend kits:



! Bends must be fitted at a distance of at least 50% of the total heat exchanger e.g. for a 60ft long heater, the closest to the burner a bend can be is 30ft.

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

2.2.8 Burner/Fan Assembly.

Slide the burner assembly onto the open tube end, ensuring it is fully engaged. Secure with set screws.

For the purpose of unvented applications, a 4" 90° elbow should be used on the terminating end of the radiant tube sections. This elbow should be turned with the outlet facing either side.

Connect gas and electrical supplies as described in sections 1.4 and 1.5.

2.2.9 Heater Configurations

The sketches shown on the following page show various heater configurations for the model series dependant on heater length and rating. It is important not to configure a heater outside of these recommendations.



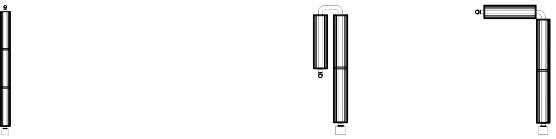
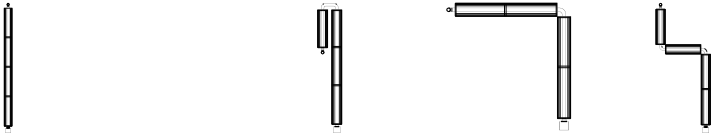
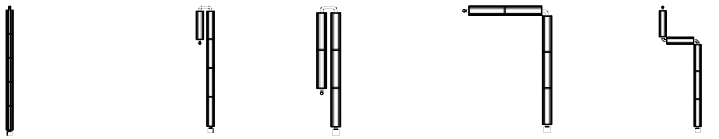
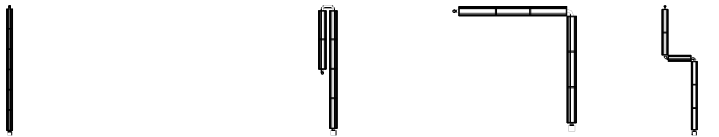
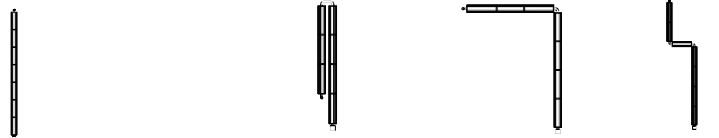
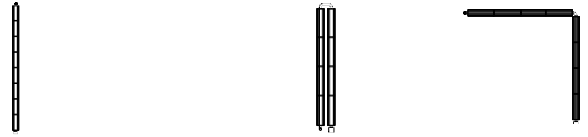




2.2.10 Detailed Assembly Drawings

The pages following that show the technical dimensional details of the range of heaters.

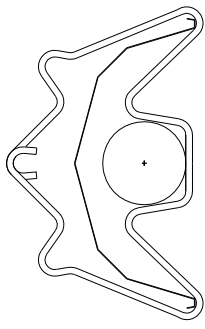
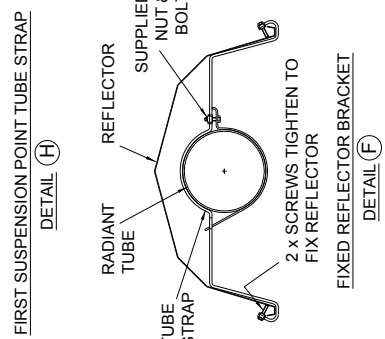
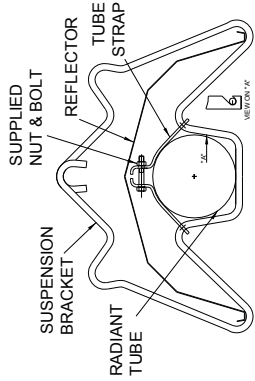
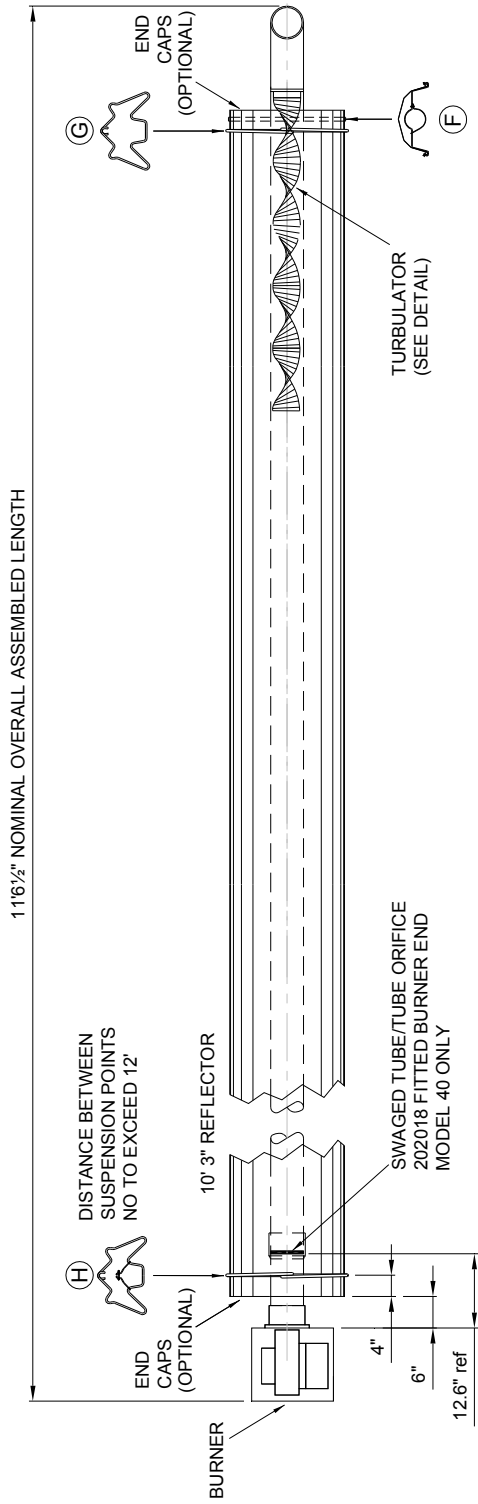
Please note the heater type, length and reference number from the delivery/advice note before identifying the correct model drawing.

Figure . 9. Possible Heater Orientations

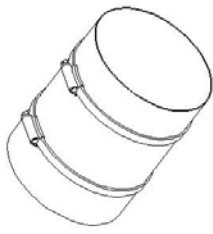
Bends must be fitted at a distance of at least 50% of the total heat exchanger e.g. for a 60ft long heater, the closest to the burner a bend can be is 30ft.

| | |
|------------|--|
| S10 |  |
| S20 |  |
| S30 |  |
| S40 |  |
| S50 |  |
| S60 |  |
| S70 |  |
| S80 |  |
| U20 |  |
| U40 |  |
| U60 |  |
| U80 |  |

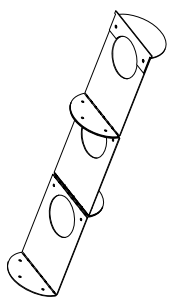
**Figure 10. Heater Assembly: Model Linear VCLUS 40-S10
VCLUS HL 40-S10**



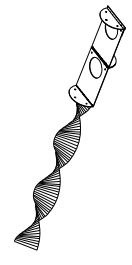
TUBE & REFLECTOR SUSPENSION BRACKET



STANDARD 4" COUPLER

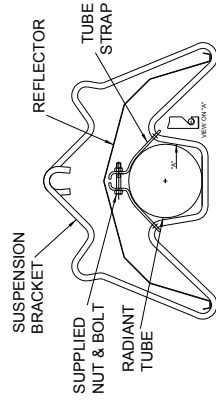
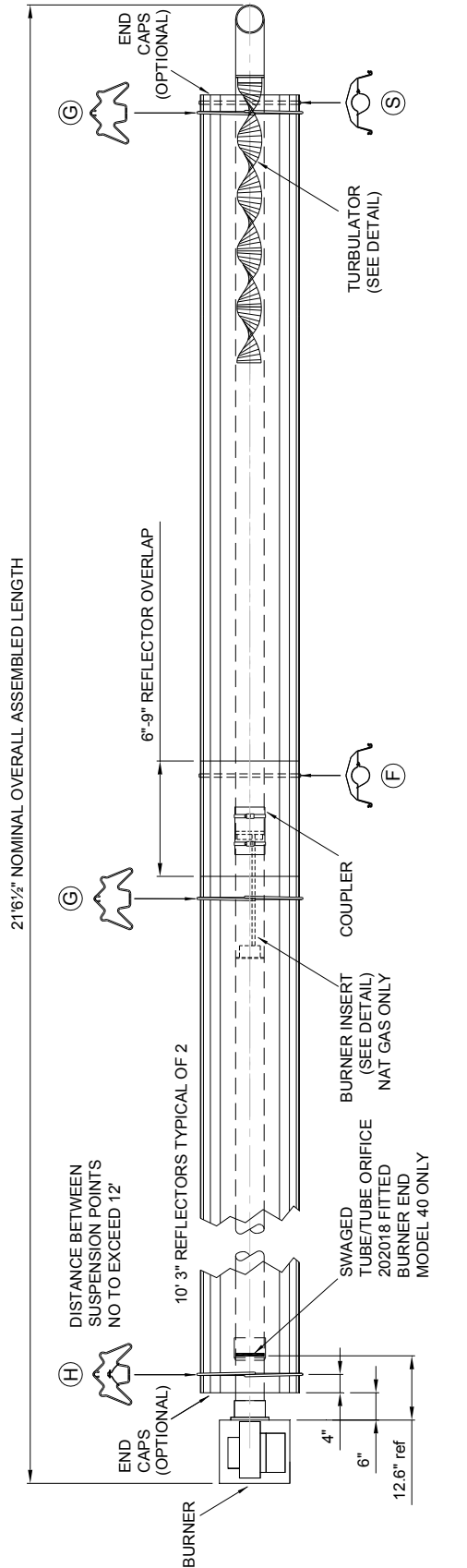


TURBLATOR DETAIL PT. NO. 201704
NOTE: FOR MODEL VCLUS 40 NAT GAS ONLY

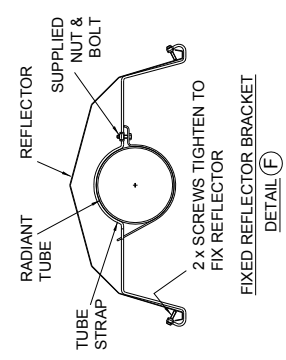


TURBLATOR DETAIL PT. NO. 202422
NOTE: FOR MODEL VCLUS 40 PROPANE
VCLUS HL 40 ALL GAS

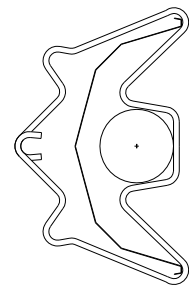
**Figure 11. Heater Assembly: Model Linear VCLUS 40-S20, 60-S20, 80-S20.
VCLUS HL 40-S20, 60-S20.**



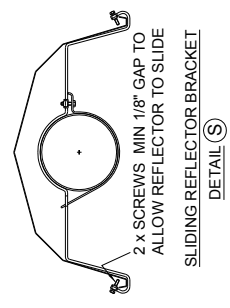
DETAIL (H)
FIRST SUSPENSION POINT TUBE STRAP



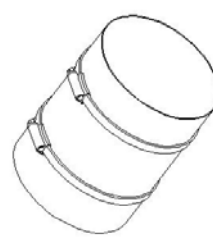
DETAIL (F)
FIXED REFLECTOR BRACKET



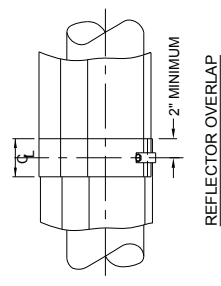
DETAIL (G)
TUBE & REFLECTOR SUSPENSION BRACKET



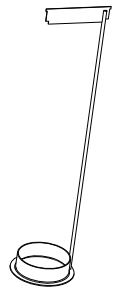
DETAIL (S)
SLIDING REFLECTOR BRACKET



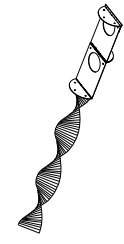
STANDARD 4\"/>



REFLECTOR OVERLAP

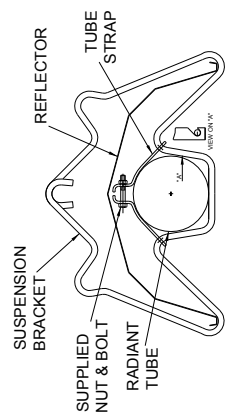
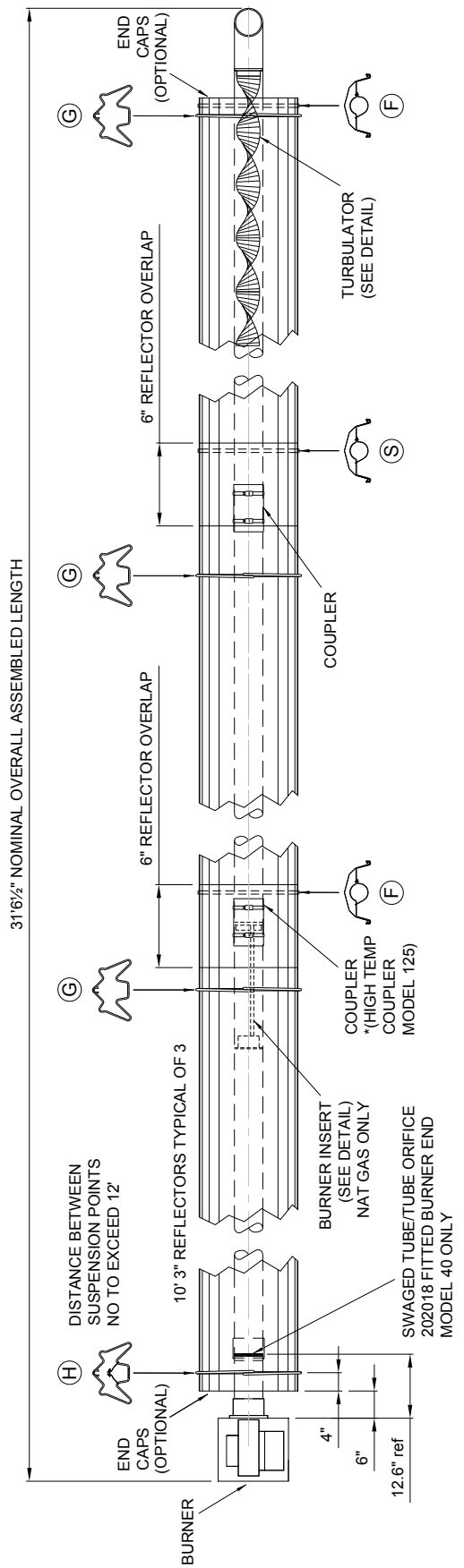


BURNER INSERT DETAIL PT. NO. 201688
NOTE: FOR MODEL VCLUS HL 60 AND VCLUS 80 NAT GAS ONLY

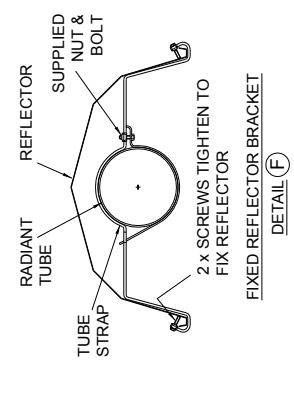


TURBULATOR DETAIL PT. NO. 202422
NOTE: FOR MODELS VCLUS HL 60 ALL GAS AND VCLUS 60/80 LP GAS ONLY

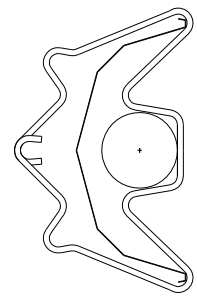
Figure 12. Heater Assembly: Model Linear VCLUS 40-S30, 60-S30, 80-S30, 100-S30.



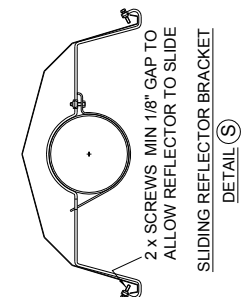
FIRST SUSPENSION POINT TUBE STRAP
DETAIL (H)



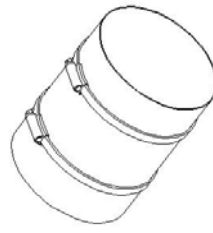
DETAIL (F)



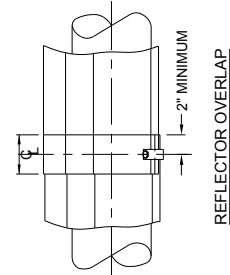
TUBE & REFLECTOR SUSPENSION BRACKET
DETAIL (G)



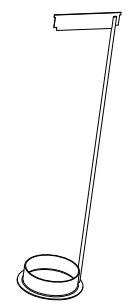
DETAIL (S)



STANDARD 4\"/>



REFLECTOR OVERLAP

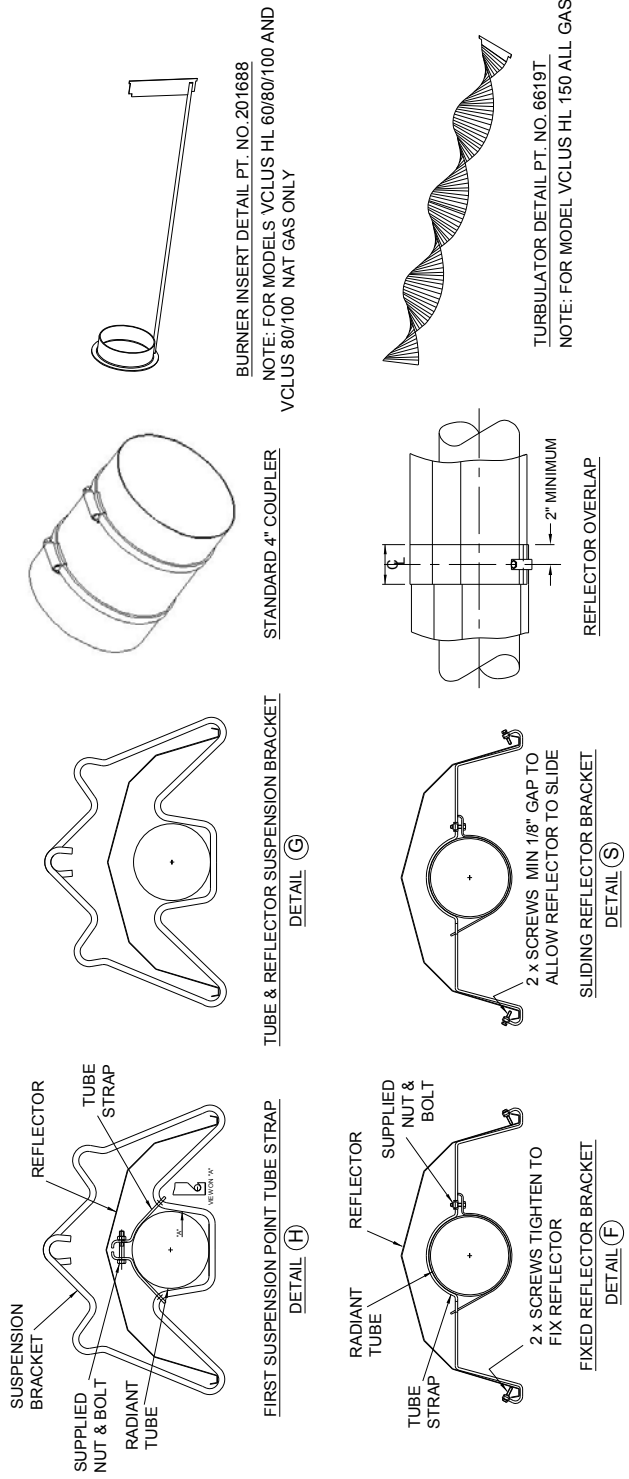
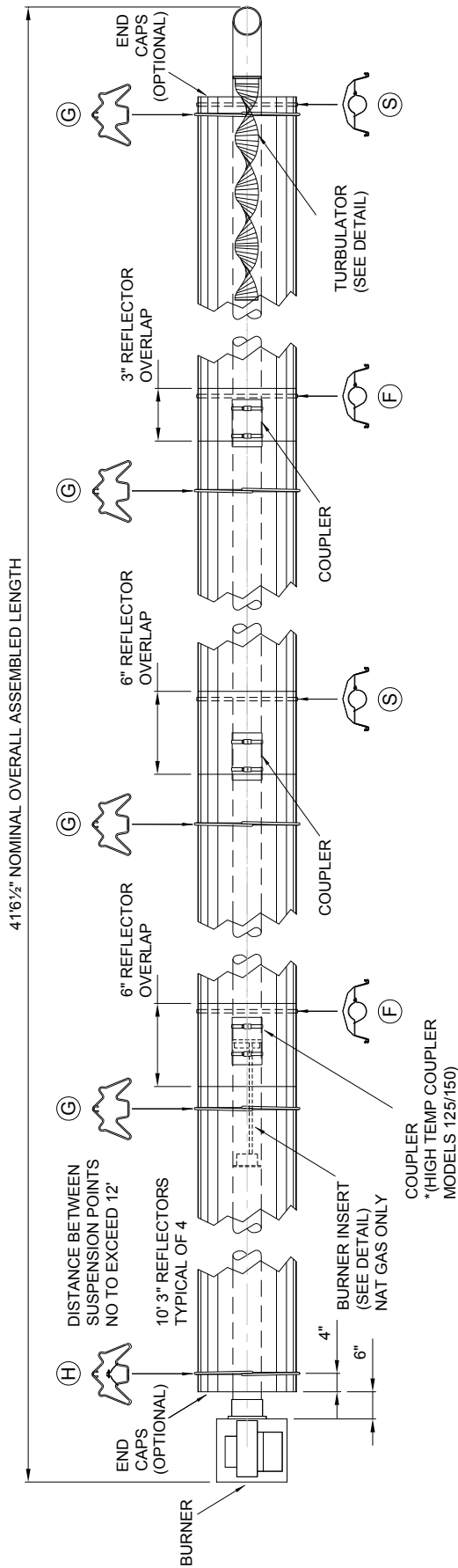


BURNER INSERT DETAIL PT. NO. 201688
NOTE: FOR MODELS VCLUSHL 60/80/100
AND VCLUS 80/100 NAT GAS ONLY

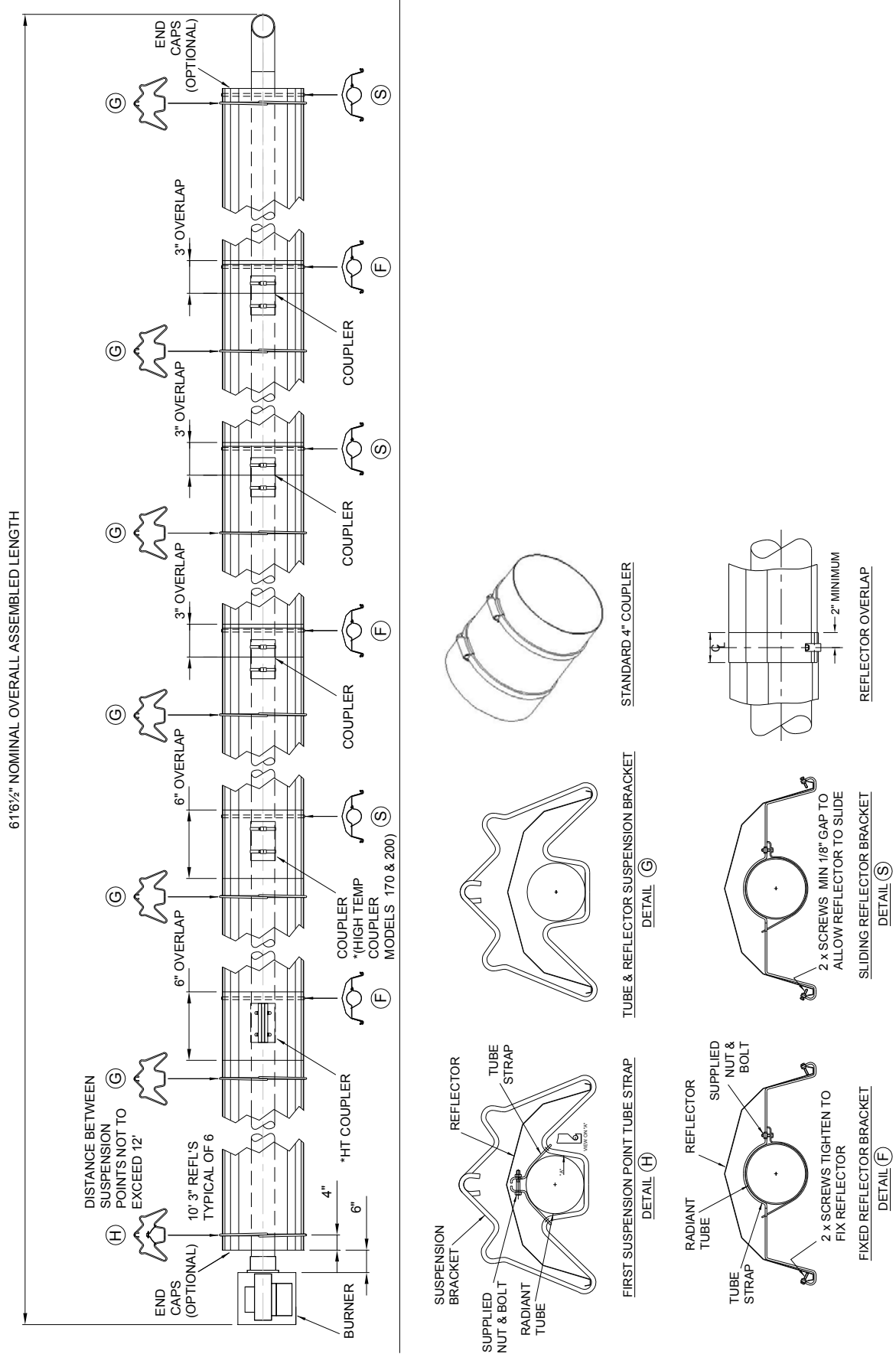


TURBULATOR DETAIL PT. NO. 6619T
NOTE: FOR MODELS VCLUSHL 100/125
ALL GAS

**Figure 13. Heater Assembly: Model Linear VCLUS 60-S40, 80-S40, 100-S40, 125-S40, 150-S40.
VCLU HL 60-S40, 80-S40, 100-S40, 125-S40, 150-S40.**



**Figure 15. Heater Assembly: Model Linear VCLUS 125-S60, 150-S60, 170-S60, 200-S60.
VCLUS HL 150-S60, 170-S60, 200-S60.**



**Figure 16. Heater Assembly: Model Linear VCLUS 150-S70, 170-S70, 200-S70.
VCLUS HL 170-S70, 200-S70.**

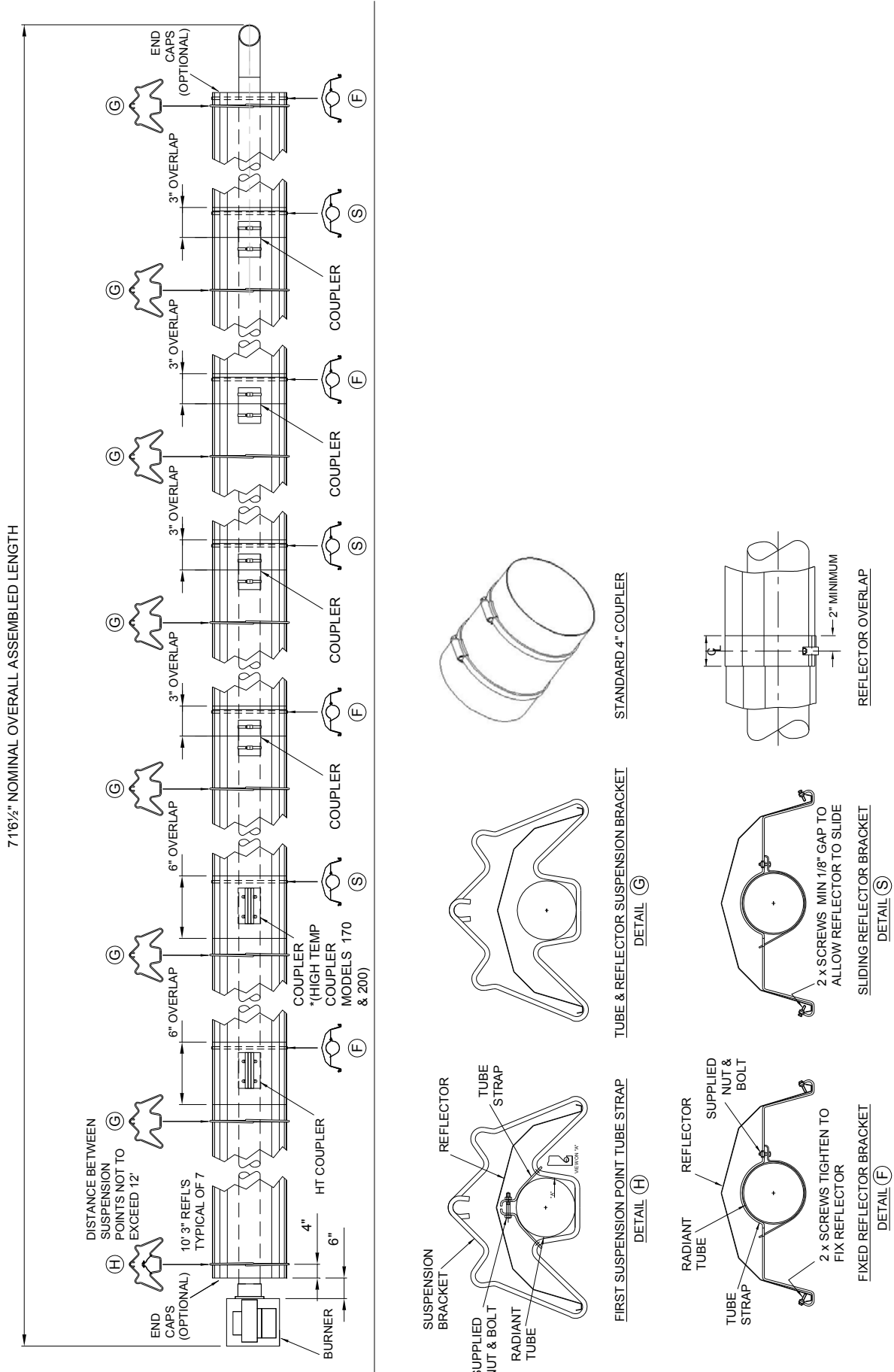


Figure 17. Heater Assembly: Model Linear VCLUS 170-S80 and 200-S80.

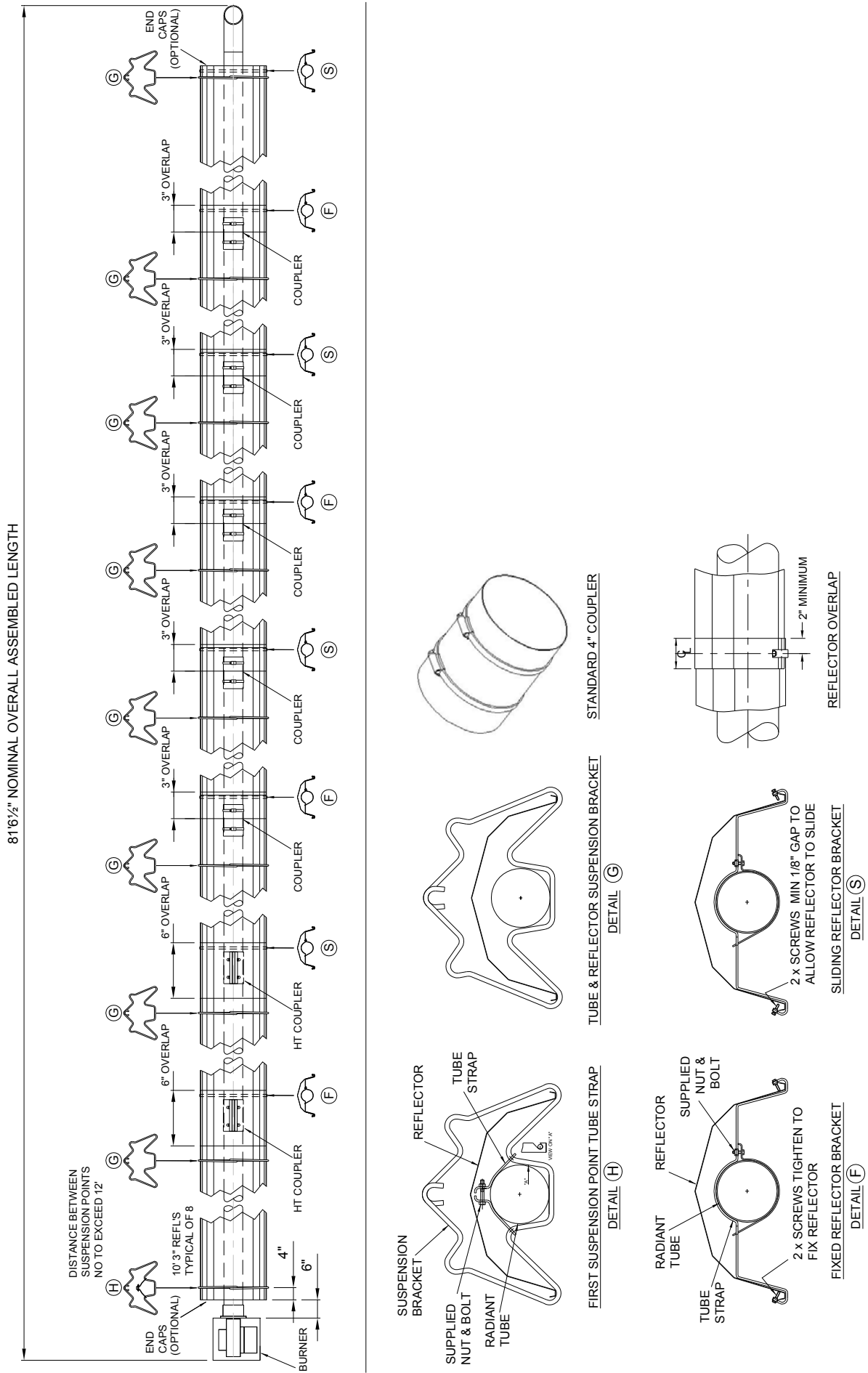
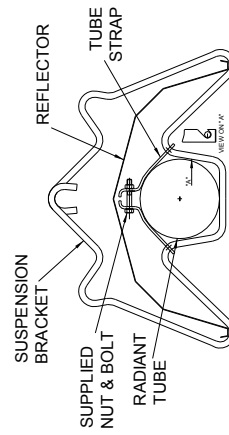
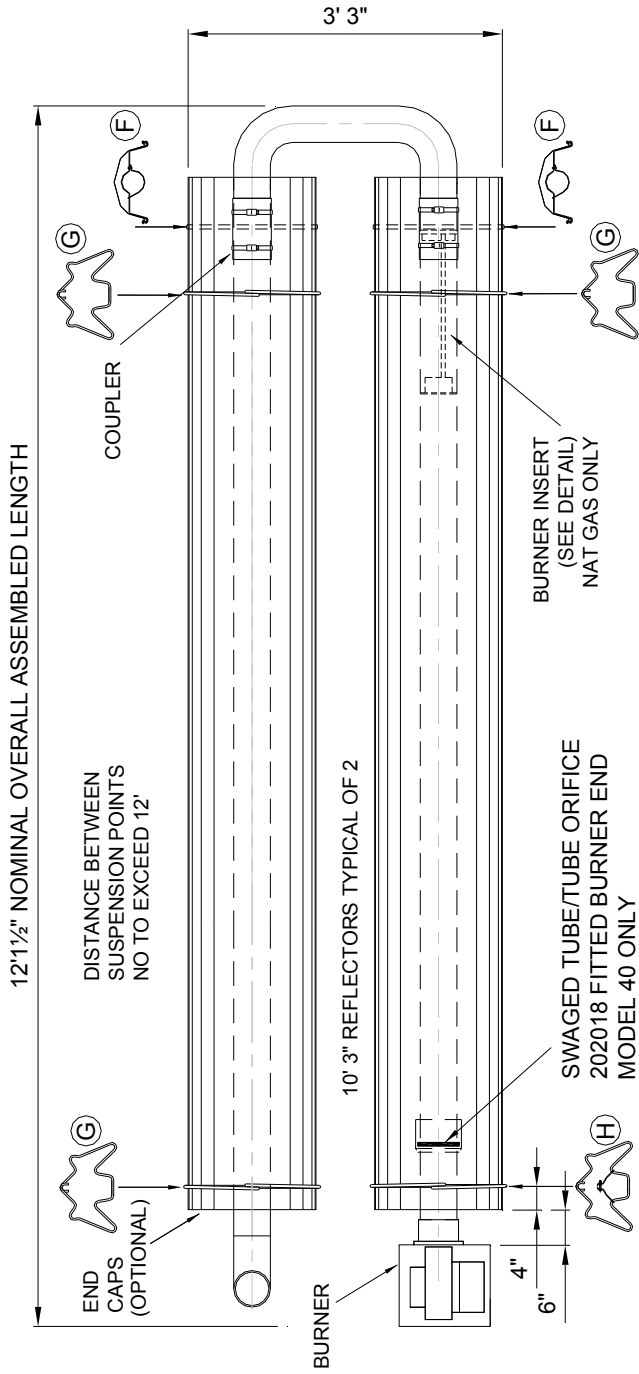
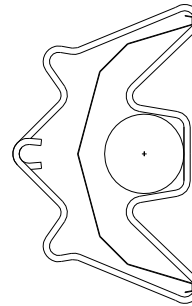


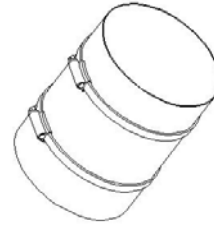
Figure 18. Heater Assembly: Model U tube VCLUS 40-U20, 60-U20, 80-U20.
VCLUS HL 40-U20, 60-U20.



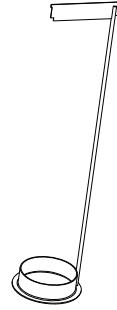
FIRST SUSPENSION POINT TUBE STRAP
DETAIL (H)



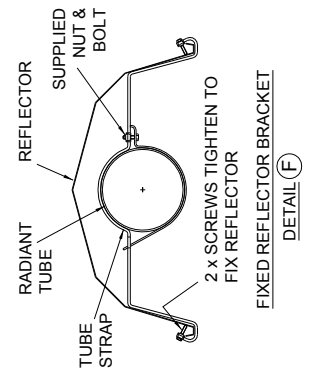
TUBE & REFLECTOR SUSPENSION BRACKET
DETAIL (G)



STANDARD 4" COUPLER
DETAIL (F)

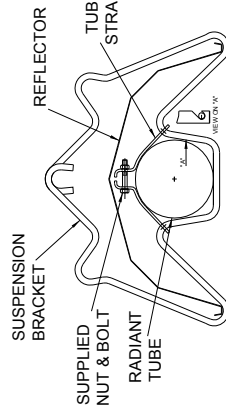
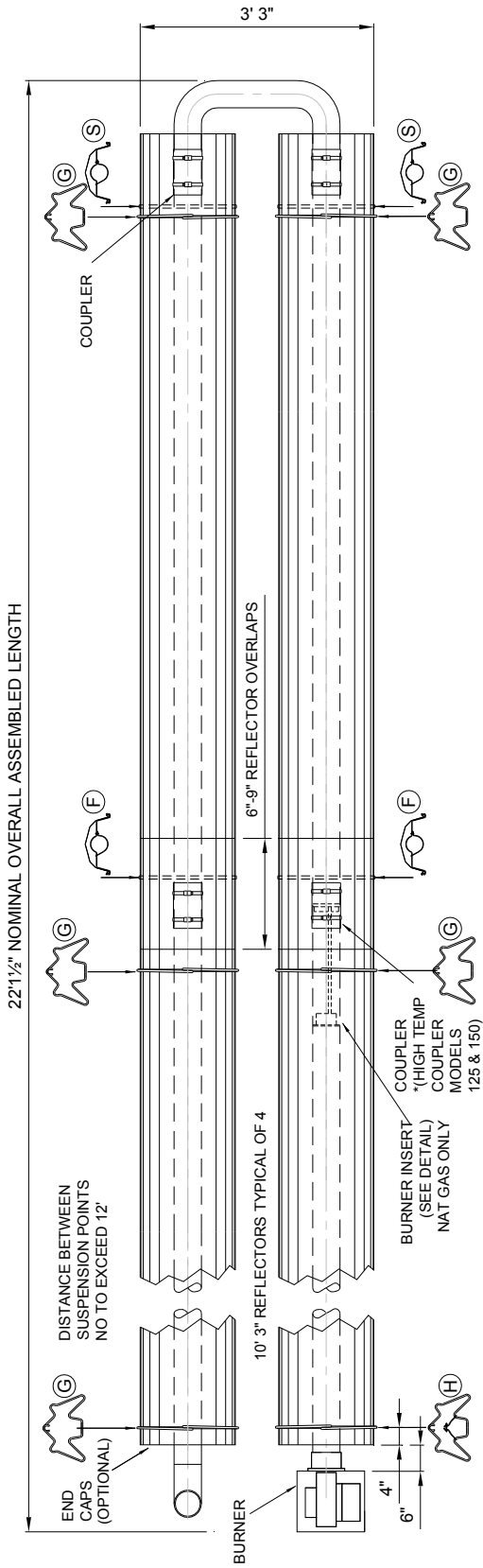


BURNER INSERT DETAIL PT. NO. 201688
NOTE: FOR MODEL VCLUS HL 60 AND VCLUS 80 NAT GAS ONLY
DETAIL (F)

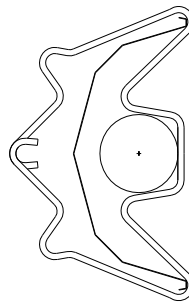


FIXED REFLECTOR BRACKET
DETAIL (F)

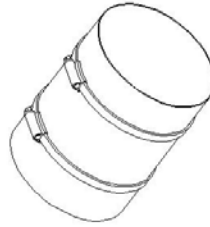
**Figure 19. Heater Assembly: Model U tube VCLUS 60-U40, 80-U40, 100-U40, 125-U40 and 150-U40.
VCLUS HL 60-U40, 80-U40, 100-U40, 125-U40 and 150-U40.**



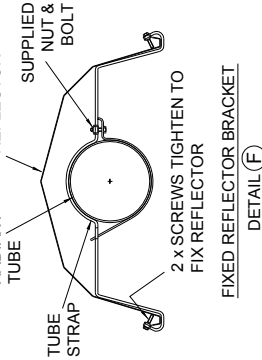
FIRST SUSPENSION POINT TUBE STRAP
DETAIL (H)



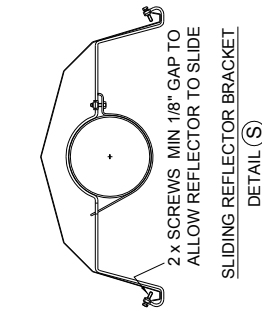
TUBE & REFLECTOR SUSPENSION BRACKET
DETAIL (G)



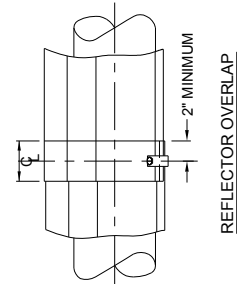
STANDARD 4" COUPLER



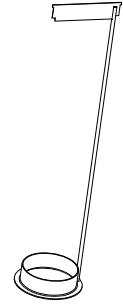
FIXED REFLECTOR BRACKET
DETAIL (F)



SLIDING REFLECTOR BRACKET
DETAIL (S)



REFLECTOR OVERLAP



BURNER INSERT DETAIL PT. NO. 201688
NOTE: FOR MODEL VCLUS HL 60/80/100 AND VCLUS 80/100 NAT GAS ONLY

**Figure 20. Heater Assembly: Model U tube VCLUS 125-U60, 150-U60, 170-U60 and 200-U60.
VCLUS HL 150-U60, 170-U60, 200-U60.**

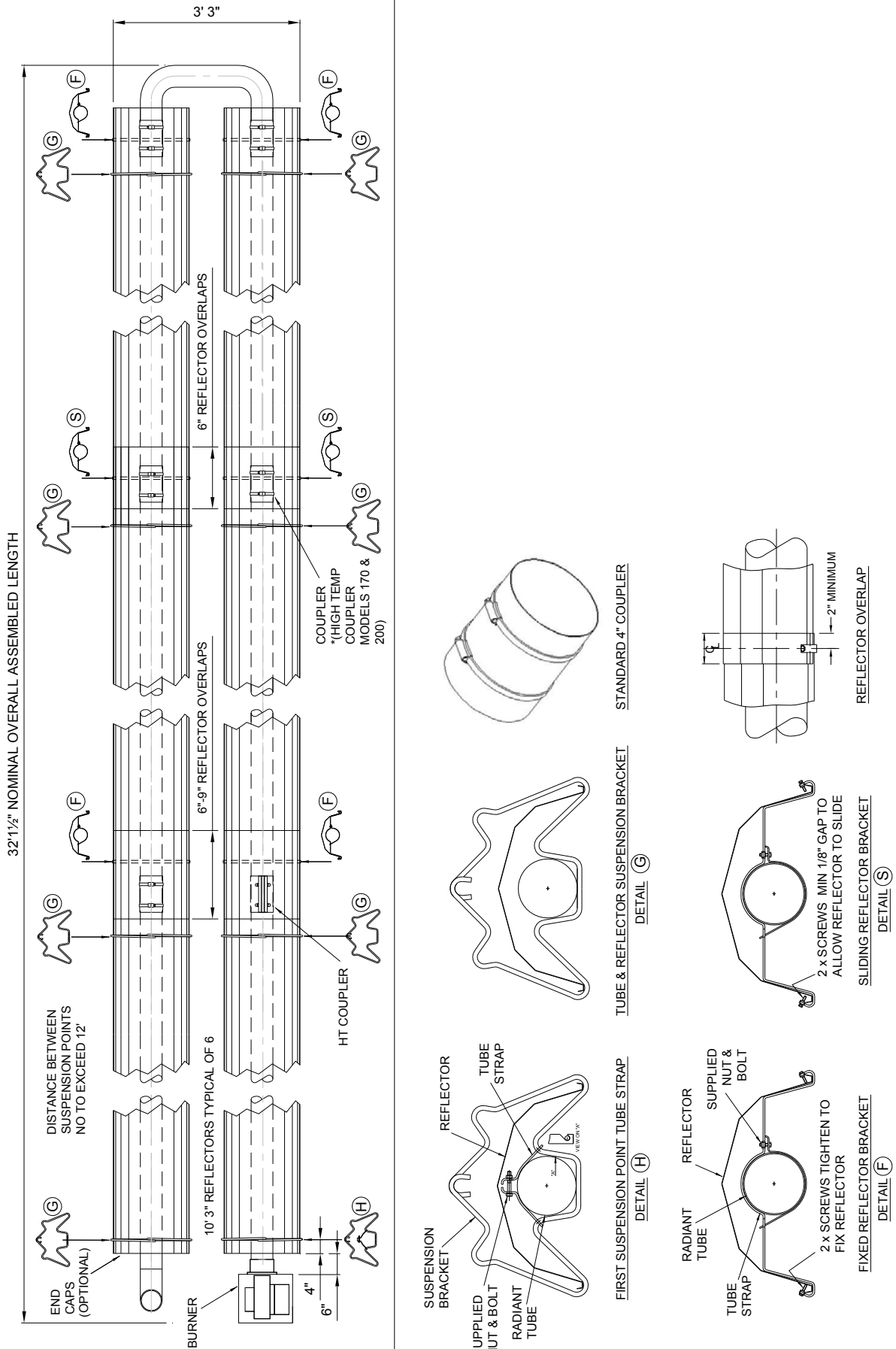
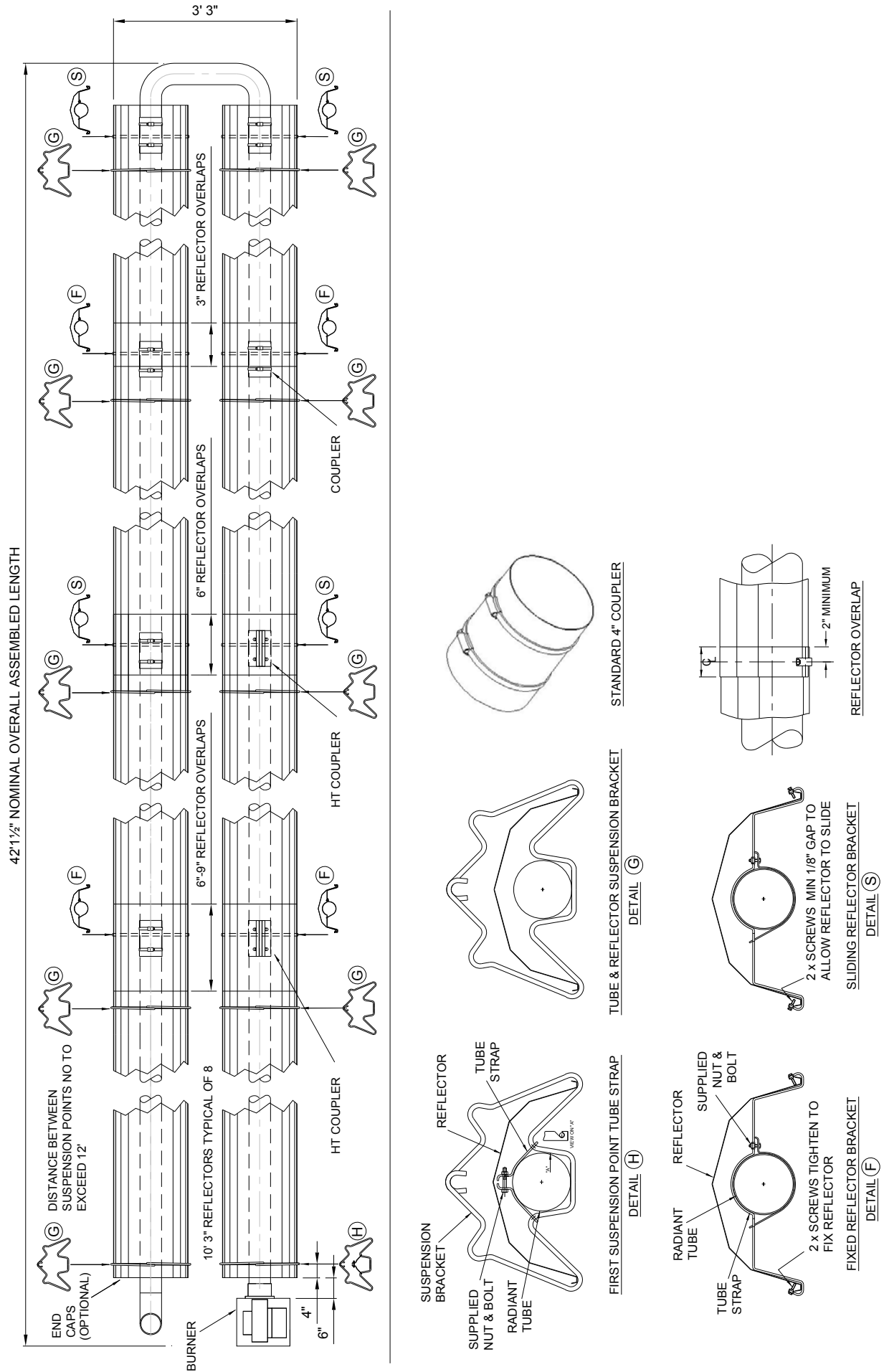


Figure 21. Heater Assembly: Model U tube VCLUS 170-U80 and 200-U80.



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



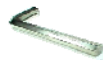
Small Flat Head Screwdriver



Large Adjustable Wrenches for fitting Of Gas Flex.



1/2" Wrench



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 energized 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 continue to 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. If the gas valve has been left off, 'lock-out' should occur. This is indicated by the 'power on' lamp being illuminated and fan running, but the 'burner on' lamp being off.

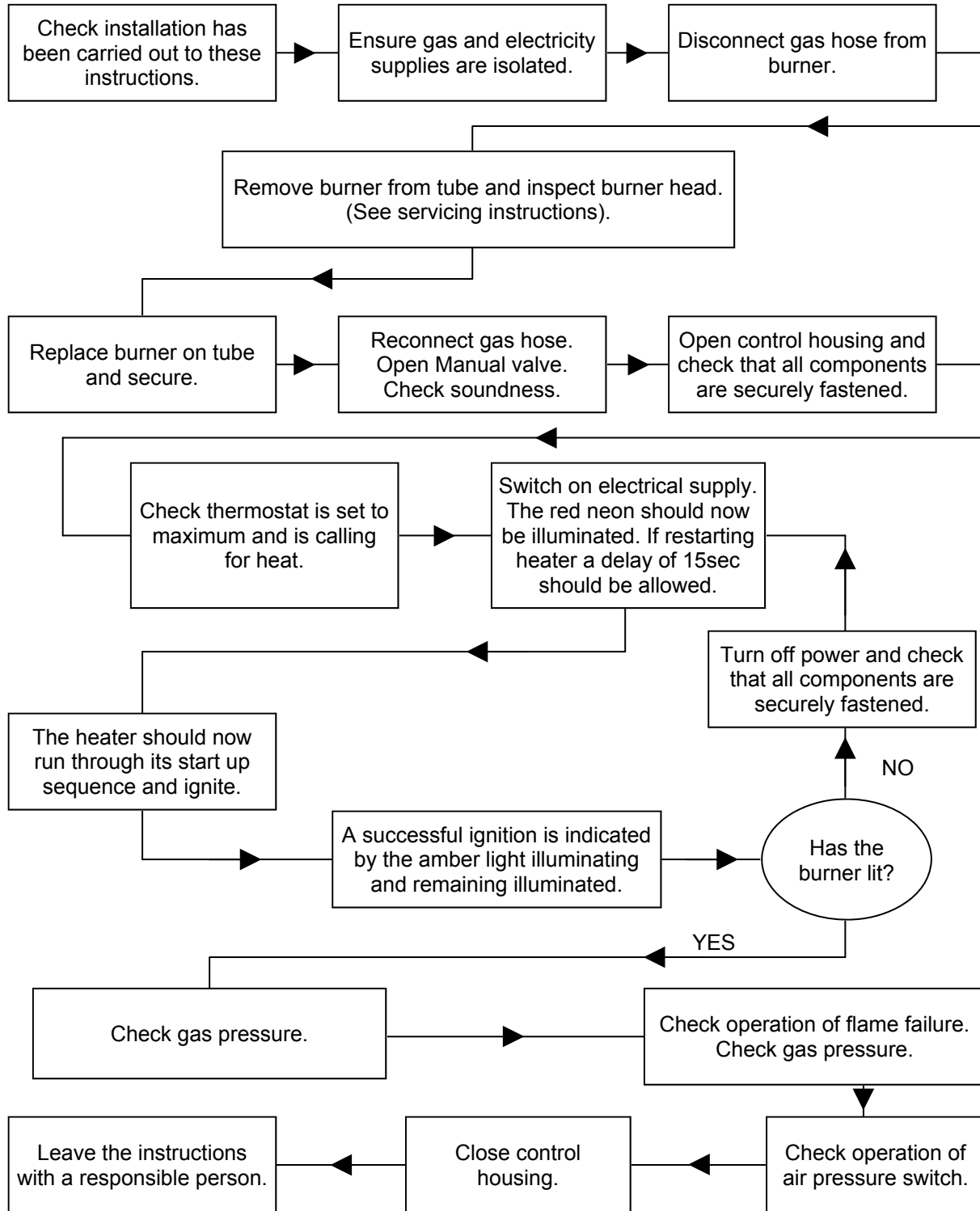
Check the operation of the pressure proving switch as follows:

With the heater running normally, pull off the silicone rubber tube connecting the vacuum switch to the combustion chamber. Within 4 seconds the burner should shut off.

Then 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.

! These appliances should be serviced annually by a competent person to ensure safe and efficient operation. In mildly dusty or polluted conditions more frequent servicing may be required. Servicing work should be carried out by a qualified mechanical contractor.

4.1 Tools Required.

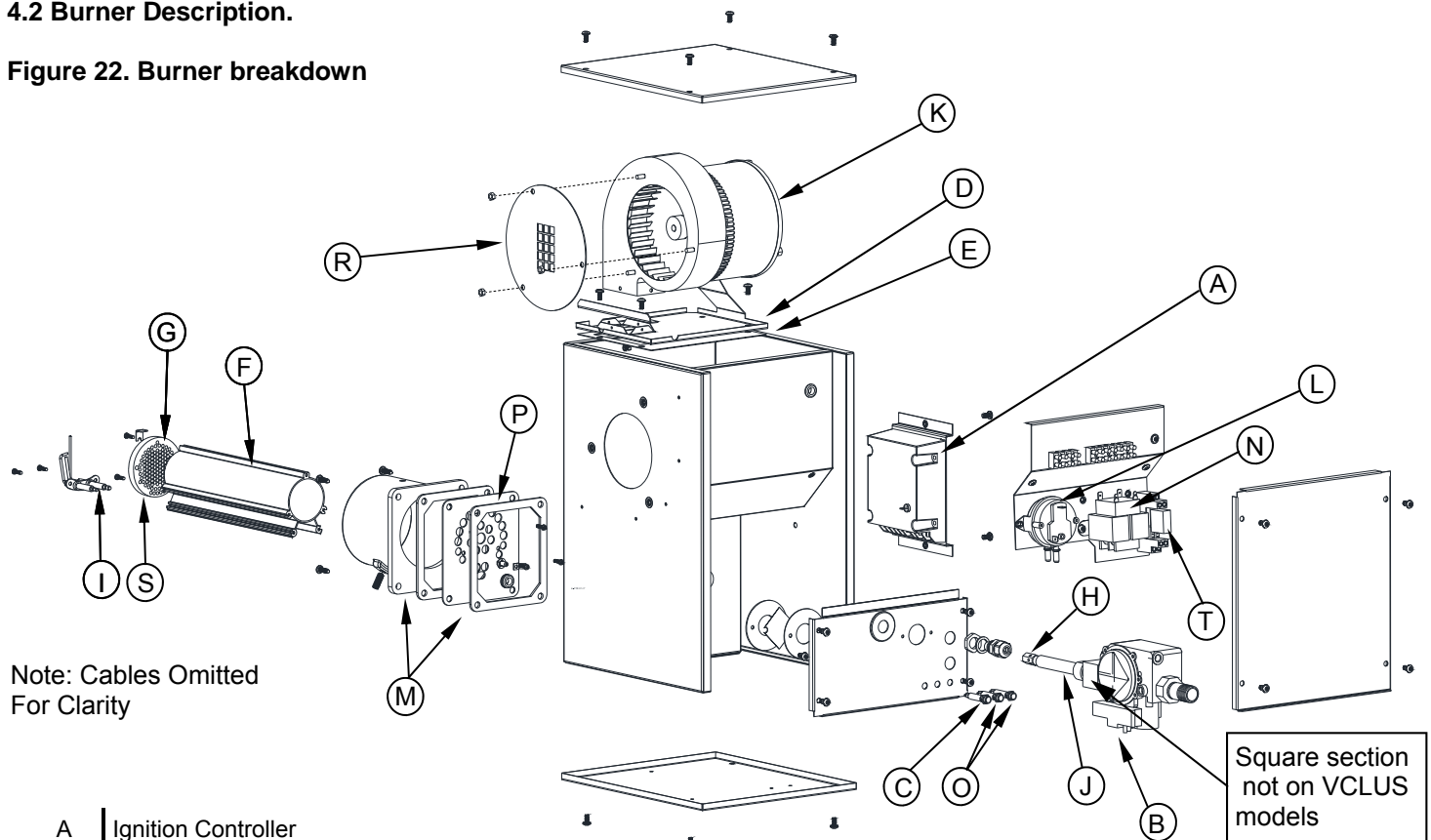
i Suitable alternative tools may be used.

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



4.2 Burner Description.

Figure 22. Burner breakdown



| | |
|---|------------------------|
| A | Ignition Controller |
| B | Gas Valve |
| C | Power On Red LED |
| D | Fan Mount Plate |
| E | Fan Mount Plate Gasket |
| F | Burner Tube |
| G | Pepper Pot Head |
| H | Injector |
| I | Igniter Assembly |
| J | Jet Carrier |

| | |
|---|----------------------------------|
| K | Combustion Fan |
| L | Pressure Switch |
| M | Gaskets |
| N | Transformer |
| O | Burner On Yellow LED |
| P | Burner Orifice Plate |
| R | Fan Orifice Plate |
| S | Flame Plate Location (if fitted) |
| T | 24V Relay (VCLUS HL only) |

4.3 Burner Removal

⚠ Step 1: Isolate power and gas supplies.

Step 2: Disconnect the external power/control connections.



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



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



Step 5: Loosen 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 its attached components from falling to the ground.

4.4 Burner Gas Injector Servicing

Step 1: Remove the 4 retaining screws, then remove the burner support casting and gasket.



Step 2: The burner head assembly can be disconnected by separating the connectors of the ignition lead assembly and removing the earth lead and pressure switch silicon tube.



Step 3: The gas injector can be inspected and

replaced if contaminated or blocked.

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

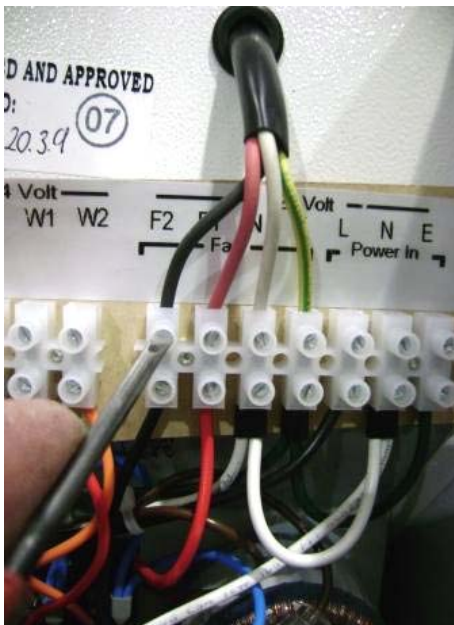
Step 4: Reconnect ignition leads and silicone tube to test nipple. Refit gasket and support casting.

4.5 Combustion Fan Servicing

Step 1: Remove the four top lid screws to reveal the combustion fan shown below.



Step 2: Disconnect the fan cables after first noting their positions, then pull cable through to fan compartment.



Step 3: Remove the four fan fixing screws then withdraw the fan complete with mounting bracket as shown .



Step 4: Remove fan orifice plate.

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.

4.6 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 as shown and separating the igniter assembly lead connectors.

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

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



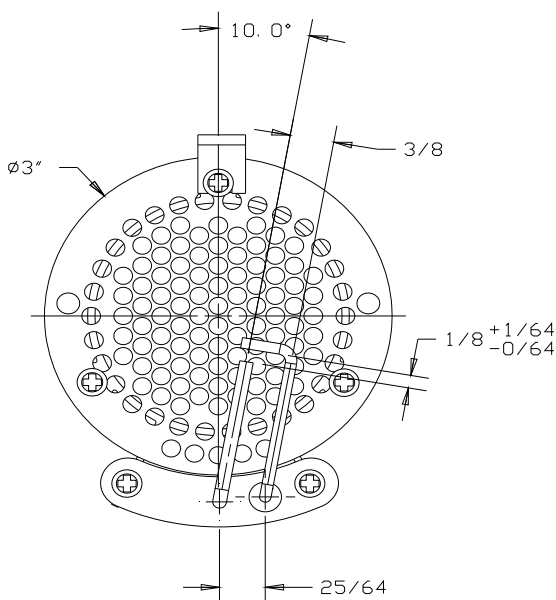
Step 6: The burner assembly is ready to refit after servicing the combustion fan and the radiant tube assembly.

Step 7: 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: If required the interior of the tubes can then be cleaned using an industrial vacuum cleaner or by using long poles and a scraper.

4.8 Reflector Servicing

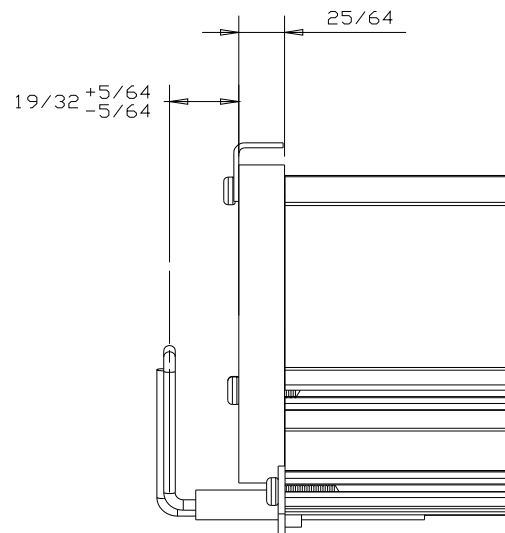
The condition of the reflectors should be noted. If necessary the reflectors can be cleaned with a mild detergent. This can significantly improve the efficiency of the appliance.

4.9 Cleaning 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.

4.10 Re-commissioning After Service

After servicing of the heater has been undertaken, it is necessary to re-commission the heater as detailed in the commissioning chart in 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.

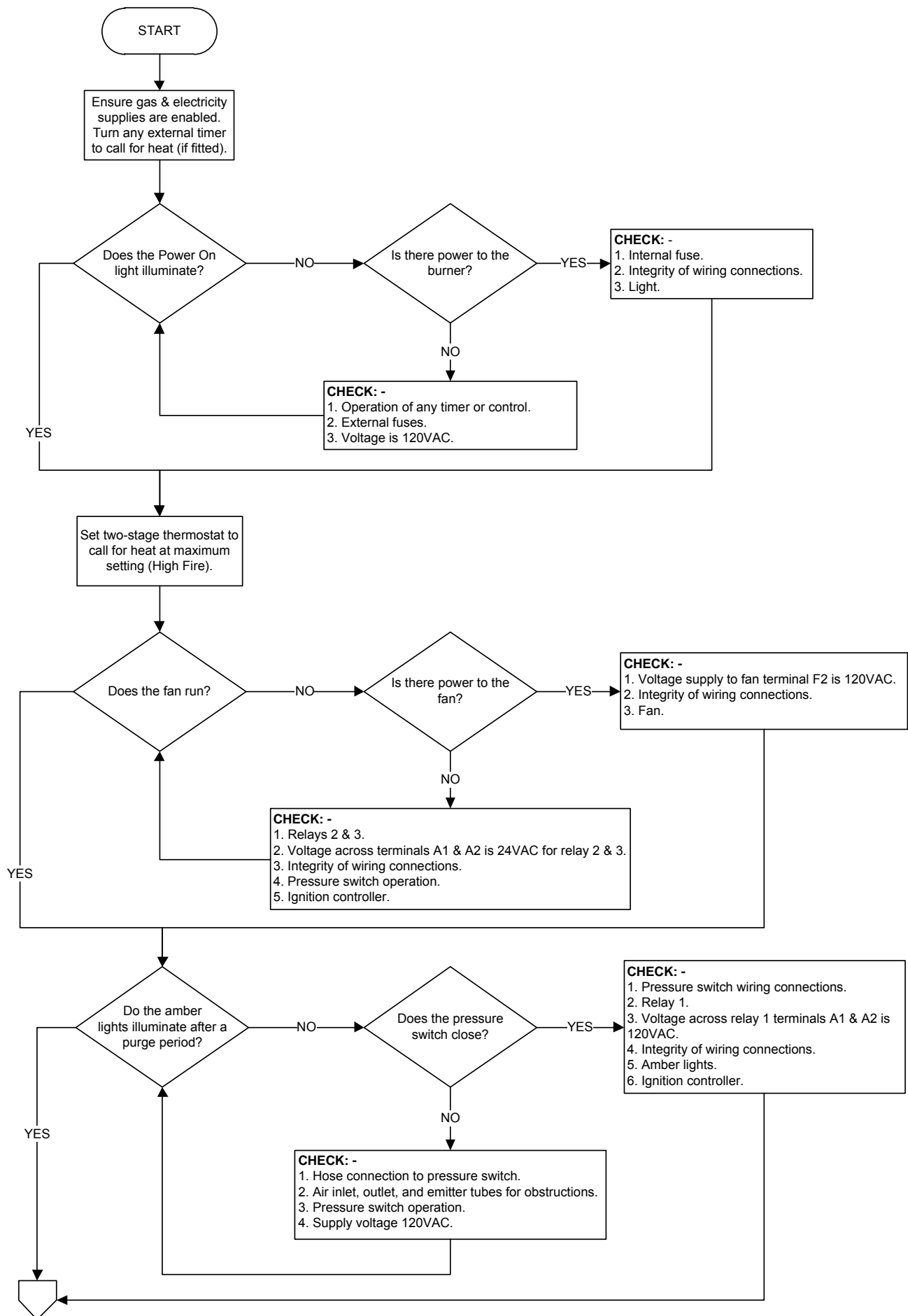
Note: Any spare part components that are not approved by the manufacturer could invalidate the approval of the appliance and the warranty.

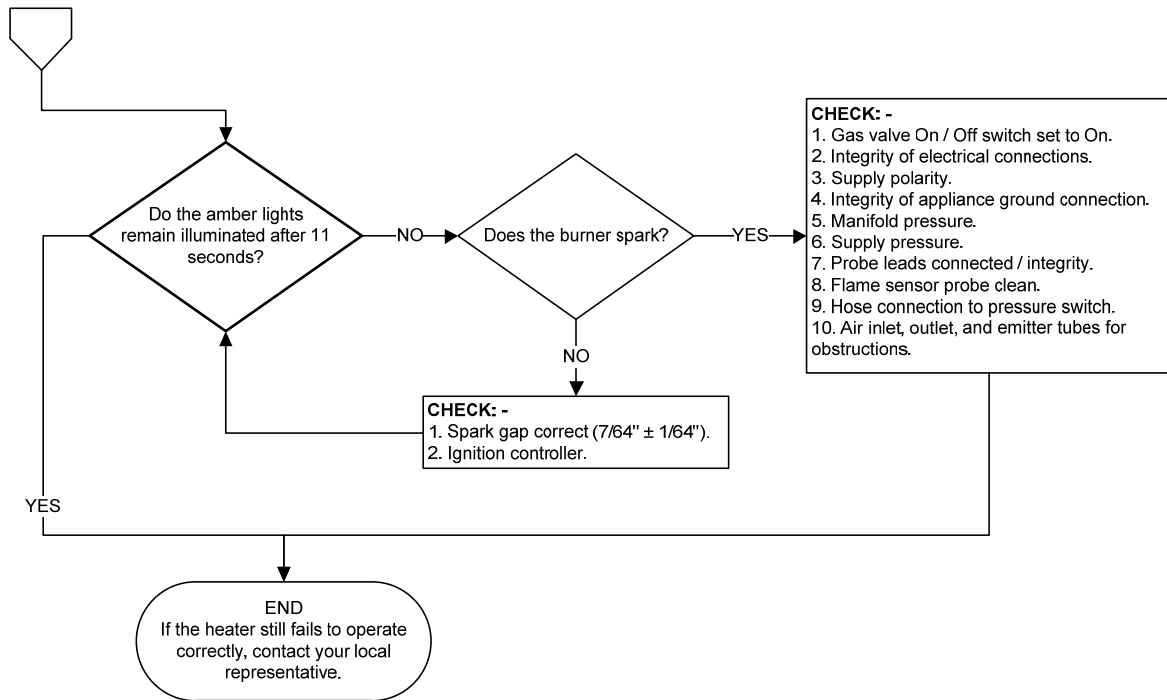
| Item | Description | Part No. | Item | Description | Part No. |
|---|---|----------|---|---|----------|
|  | Transformer (30VA) VCLUS 900531 (40VA) VCLUS HL 900532 | |  | Pressure Switch Model 40 201508 Models 60 - 170 201676 Model 200 NG 201697 | |
|  | Gas Valve NG VCLUS 202444 LPG VCLUS 202525 NG VCLUS HL 201964 LPG VCLUS HL 202527 | |  | Single Probe Ignitor with Connector Lead 202531 | |
|  | Flame Plates Models 60 NG & LPG (not NG VCLUS HL) 201358 40/80/100 LPG 201571 125 /150 LPG 201854 170 LPG 201905 | |  | 24V Yellow LED (Burner On) 201968 | |
|  | 24V UT Ignition Controller 900545 | |  | 24V Red LED (Power On) 201969 | |
|  | Burner Head 200988 | |  | Jet Carrier 40 - 150 NG 202261 40 - 170 LPG 202261 170/200 NG 202262 | |
|  | Burner Tube 200358 | |  | Injector See section 1.8 | |
|  | 24V Relay (VCLUS HL) 2104-2 | |  | Combustion Fans Models 40 - 170 NG VCLUS, 40 - 150 NG VCLUS HL, 40 - 150 LPG VCLUS 201957 40 - 150 LPG VCLUS HL Models 200 NG VCLUS, 170/200 NG VCLUS HL, 202132 170 LPG VCLUS 170 LPG VCLUS HL | |

TURBULATORS

|  |  |  |  |
|---|---|---|--|
| 202422 | 6619T | 201704 | 201688 |
| 40 S10 VCLUS LPG | 100 - S30 VCLUS HL | 40 S10 VCLUS NG | 80 NG VCLUS |
| 40 S10 VCLUS HL | 125 - S30 VCLUS HL | | 100 NG VCLUS |
| 60 LPG S20 VCLUS | 150 - S40 VCLUS HL | | 60 NG VCLUS HL |
| 80 LPG S20 VCLUS | | | 80 NG VCLUS HL |
| 60 - S20 VCLUS HL | | | 100 NG VCLUS HL |

6. Troubleshooting Guide.





**To aid in the trouble shooting 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.

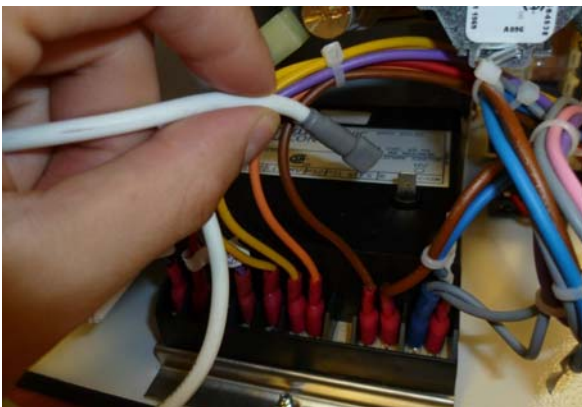
7.1 Burner Controller Replacement

Step 1: Remove the four screws securing the bottom access door.

Step 2: Disconnect burner controller from the wiring harness.



Step 3: Disconnect the spark lead from burner controller.



Step 4: Undo burner controller retaining screws and remove.

Step 5: Fit new burner controller.

Step 6: Refit spark lead and wiring harness connector.

Step 7: Test product and close access door.

7.2 Air Pressure Switch Replacement

Step 1: Disconnect the two silicone tubes from the pressure switch.



Step 2: Remove the two electrical chassis retaining screws arrowed.

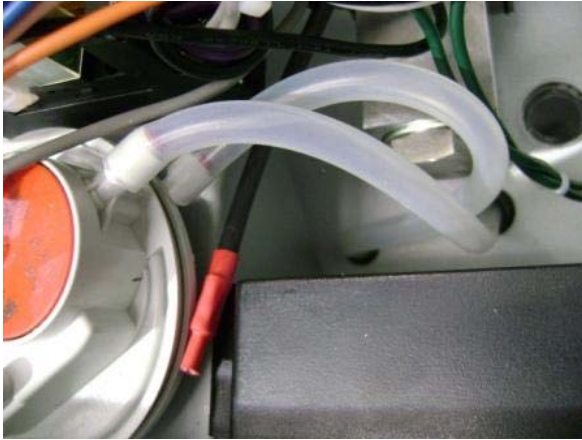


Step 3: Disconnect pressure switch wiring.



Step 4: It may be necessary to partially disconnect the chassis wiring to access the pressure switch mounting screws at the rear. The air pressure switch can now be removed by unscrewing from the back plate.

Step 5: Fit the new air pressure switch ensuring the tubes are connected as shown below.



Step 6: Re-connect wiring.

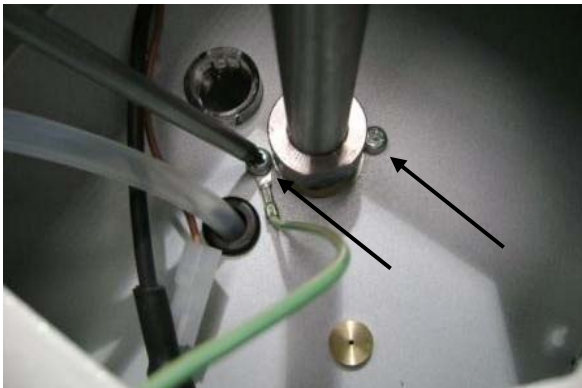
Step 7: Test product and close access door.

7.3 Gas Valve Replacement

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

Step 2: Open the rear access door.

Step 3: Remove the two securing screws (arrowed) from the base of the injector tube, noting earth terminal connection.



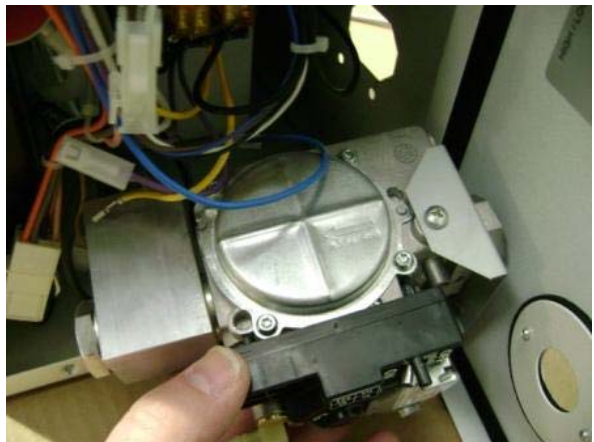
Step 4: Remove the gas valve wiring connections, noting their positions.



Step 5: Remove the four screws (arrowed) securing the gas valve inlet plate to the burner housing and remove plate.



Step 6: Remove gas valve rearwards as shown.



Step 7: The jet carrier and gas inlet can now be detached from the gas valve.

Step 8: Replace gas valve.

Step 9: Re-connect wiring.

Step 10: Set burner pressure.

Step 11: Test product and close access door.

7.4 Optional Extra Kits

Table 6a. VCLUS Optional Kit Part Numbers

| MODEL | Natural Gas Altitude Conversion Kit | Propane Gas & Propane Altitude Conversion Kit | Wind & Rain Hood Kit (Outdoor Only) | Stainless Steel End Cap Kit (1Pair) | 90° Elbow Kit (1 Off) | 180° U-Bend Kit |
|-------|-------------------------------------|---|-------------------------------------|-------------------------------------|-----------------------|-----------------|
| 40 | 202579 | 202568 | 270615 | 202588 | 202638 | 202639 |
| 60 | 202580 | 202569 | | | | |
| 80 | 202580 | 202570 | | | | |
| 100 | 202582 | 202571 | | | | |
| 125 | 202583 | 202572 | | | | |
| 150 | 202584 | 202573 | | | | |
| 170 | 202585 | 202577* | | | | |
| 200 | 202586 | 202578** | | | | |

* Burner de-rated when converted to propane

** Burner de-rated when converted to propane. Not for use at altitude.

Table 6b. VCLUS HL Optional Kit Part Numbers

| MODEL | Natural Gas Altitude Conversion Kit | Propane Gas & Propane Altitude Conversion Kit | Wind & Rain Hood Kit (Outdoor Only) | Stainless Steel End Cap Kit (1Pair) | 90° Elbow Kit (1 Off) | 180° U-Bend Kit |
|-------|-------------------------------------|---|-------------------------------------|-------------------------------------|-----------------------|-----------------|
| 40 | 202579 | 202568 | 202564 | 202588 | 202638 | 202639 |
| 60 | 202580 | 202569 | | | | |
| 80 | 202582 | 202570 | | | | |
| 100 | 202582 | 202571 | | | | |
| 125 | 202583 | 202572 | | | | |
| 150 | 202584 | 202573 | | | | |
| 170 | 202585 | 202576*** | | | | |
| 200 | 202586 | 202578** | | | | |

** Burner de-rated when converted to propane. Not for use at altitude.

*** Not for use at altitude.

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 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. Switch on the electrical supply to the heater. The 'power on' lamp will illuminate.
3. Ensure that the settings of the thermostat (single stage thermostat VCLUS, two stage thermostat VCLUS HL) and any time switch are set so that the heating system will be required to operate.
4. The fan will start and the ignition sequence will commence.
5. Ignition of the burner will occur and the 'low fire' light only will illuminate for low fire and both the 'low fire' and 'high fire' lights will illuminate for high fire.
6. 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 failed attempts 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

To switch off heater, ensure that the settings of the thermostat (single stage thermostat VCLUS, two stage thermostat VCLUS HL) and any time switch are set so that the heating system will be required to turn off. The burner will stop and 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.



Ambi-Rad Limited P.O. Box 617
Fishers, Indiana 46038
Telephone 317-577-0337
Facsimile 317-842-3989
Website www.ambirad.com/us

For the Distributor Nearest please call
1-888-330-4878

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