CAL-SERIES Specifications, Installation, Operation Service and Spare Parts Manual

Vented Radiant Tube Heater/ L'Appareil de chauffage de Tube Rayonnant donné vent
Gravity Vented Wall Furnace/ La gravité A Donné vent Fournaise de Mur
Low Intensity Infrared Heater/Radiateur à infrarouge a faible intensité
Also for Brooder Use/Aussi pour l'eveage des poules
For either indoor or outdoor installation/Installer à l'intérieur ou à l'extérieur
For Industrial, Commercial, Agricultural, Restaurant, Patio and
Residential Garage Applications.

⚠ WARNING: Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death. Read (refer to) the installation operating and maintenance instructions thoroughly before installing or servicing this equipment. For assistance or additional information consult a qualified installer, service agency or the gas supplier.

⚠ ADVERTISSEMENT. L'installation déplacée, l'ajustement, le changement, le service ou l'entretien peuvent causer les dommages de propriété, la blessure ou la mort. Lire (se référer à) l'installation qui fonctionne et les instructions d'entretien à fond avant d'installer ou entretenir cet équipement. Pour obtenir de l'aide ou les informations supplémentaires consultent un programme d'installation, une agence de service ou le fournisseur de gaz qualifié.

⚠ WARNING: If the information in these instructions is not followed exactly, a fire or explosion may result; causing property damage, personal injury or loss of life.

-Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

⚠ DANGER: WHAT TO DO IF YOU SMELL GAS:

1) **Extinguish any open flame**
2) **DO NOT try to light any appliance.**
3) **DO NOT use or touch any electrical switches.**
4) **DO NOT use any phone in your building**
5) **Turn off gas.**
6) **Open Windows**
7) **Leave the building**
8) **Immediately call your gas supplier from a neighbor's phone or after you have left the building. Follow the gas supplier's instructions.**
9) **If you cannot reach your gas supplier, call the fire department.**

- Installation and service must be performed by a qualified installer, service agency or the gas supplier

⚠ ADVERTISSEMENT: Assurez-vous de bien suivre les instructions données dans cette notice pour réduire au minimum le risqué d'incendie ou d'explosion ou pour éviter tout dommage matériel, toute blessure ou la mort.

- Ne pas entreposer ni utiliser d'essence ni d'autres vapours ou liquidés inflammables à proximité de cet appareil ou de tout autre appareil.

⚠ DANGER: QUE FAIRE SI VOUV SENTEZ UNE ODEUR DE GAZ:

1) **Éteindre la flamme ouverte**
2) **Ne pas tenter d'allumer d'appareils**
3) **Ne touchez à aucun interrupteur.**
4) **Ne pas vous server des téléphonés dans le bâtiment ou vous vous trouvez.**
5) **le Virage du gaz.**
6) **Ouvrir Windows**
7) **Part le bâtiment**
8) **Appelez immédiatement votre fournisseur de gaz depuis un voisin ou âpres que vous êtes parti le bâtiment. Suivez les instructions du fournisseur.**
9) **Si vous ne pouvez rejoindre le service des incendies.**

- L'installation et I' entretien doivent être assures par un installateur ou un service d'entretien qualifié ou par fournisseur de gaz.

⚠ WARNING: Heat exchanger surface is hot. Do not touch surface or burn may result. Combustible material or articles should not be placed on or near heater. Observe clearance to combustibles as noted on heater and in this manual.

INSTALLER: Leave this manual with the appliance.
CONSUMER: Retain this manual for future reference.

INSATLLATEUR: Laissez cette notice avec l' appareil.
CONSOMMATEUR: Conservez cette notice pour consultation ultérieure.

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WHEN AN EXISTING CATEGORY I HEATER IS REMOVED OR REPLACED, THE ORGINAL VENTING SYSTEM MAY NO LONGER BE SIZED TO PROPERLY VENT THE ATTACHED APPLIANCES.
The effects of an improperly sized venting system can include but not limited to: the formation of condensate, leakage, spillage etc. The following test procedure is required:

⚠ WARNING
CARBON MONOXIDE POISONING HAZARD

Failure to follow the steps outlined below for each appliance connected to the venting system being placed into operation could result in carbon monoxide poisoning or death.
The following steps shall be followed for each appliance connected to the venting system being placed into operation, while all other appliances connected to the venting system are not in operation:
1) Seal any unused openings in the venting system.
2) Inspect the venting system for proper size and horizontal pitch, as required in the National Fuel Gas Code, ANSI Z223.1/NFPA 54 or the Natural Gas and Propane Installation Code, CSA B149.1 and these instructions. Determine that there is no blockage or restriction, leakage, corrosion and other deficiencies which could cause an unsafe condition.
3) As far as practical, close all building doors and windows and all doors between the space in which the appliance(s) connected to the venting system are located and other spaces of the building.
4) Close fireplace dampers.
5) Turn on clothes dryers and any appliance not connected to the venting system. Turn on any exhaust fans, such as range hoods and bathroom exhausts, so they are operating at maximum speed. Do not operate a summer exhaust fan.
6) Follow the lighting instructions. Place the appliance being inspected into operation. Adjust the thermostat so appliance is operating continuously.
7) Test for spillage from draft hood equipped appliances at the draft hood relief opening after 5 minutes of main burner operation. Use the flame of a match or candle.
8) If improper venting is observed during any of the above tests, the venting system must be corrected in accordance with the National Fuel Gas Code, ANSI Z223.1/NFPA 54 and/or Natural Gas and Propane Installation Code, CSA B149.1.
9) After it has been determined that each appliance connected to the venting system properly vents when tested as outlined above, return doors, windows, exhaust fans, fireplace dampers and any other gas-fired burning appliance to their previous conditions of use.

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1.0 OWNERS RESPONSIBILITY

Thank you for purchasing our product. We have designed this unit to provide you with years of trouble-free heating enjoyment.

READ THIS MANUAL IN ITS ENTIRERTY! If you do not understand any of the safety or hazardous warnings contained in this manual, or have questions or concerns about the installation, operation, maintenance or service of this heater, or any other questions or concerns relating to this heater, you MUST CALL THE FACTORY at the telephone number noted on the front cover of this manual or as detailed on the rating plate on the heater before operating this heater. Store this manual in a location near the heater, for future reference. Make sure installation is performed by well qualified, licensed contractors in the required field of work. If in doubt, DO NOT allow unit to be installed.

DO NOT park vehicles or place combustible objects close to the heater other than specified on the Clearance to Combustible chart located in this manual and on the heater. Failure to observe the clearance to combustibles can result in property damage, injury or death.

IMPORTANT NOTICE: The installation portion of these instructions are for the use of qualified individuals specially trained, licensed and experienced in the installation of this type of equipment and related system components.

NOTE: - *The words "shall" or "must" indicate a requirement which is essential to satisfactory and safe performance.*

⚠ **GENERAL HAZARD WARNING:** The heater and related gas piping, fitting & wiring must be installed by individuals or firms qualified, licensed and specially trained and experienced in installation of this type of equipment and related system components.

Only persons who can understand and follow the instructions shall install or service this heater.

Persons not qualified shall not install this equipment nor interpret these instructions.

Failure to comply with the precautions and instructions provided with this heater can result in death, serious bodily injury and property loss or damage from hazards of fire, explosion, burn, asphyxiation, carbon monoxide poisoning or electrical shock.

⚠ **WARNING:** Installation and repair should be done by a qualified service person. The heater should be inspected before use and at least annually by a qualified service person and prior to heating season. Heaters used in dusty locations such as brooder barns, sawmills, woodworking shops, etc. will require maintenance on a more regular basis and more frequent cleaning may be required as necessary. It is imperative that the control compartments, burner(s) and circulating air passageways of the appliance be kept clean. Periodic examination of the venting system is to be performed.

No one should work on a heater unless they are a licensed/qualified gas fitter or contractor. For all repairs, parts MUST originate from the manufacturer of this heater in order not to void CGA/AGA certification. Safety devices are not allowed to be rendered inoperative and left unattended as this action can cause property damage, injury or death. Failure to do so will void your warranty.

⚠ **WARNING:** Do not store or use halogen-emitting substances in the vicinity of this heater. Such substances include chlorine based cleaners and swimming pool chemicals, water softening chemicals, de-icing salts and chemicals, cleaning solvents such as carbon tetrachloride or perchloroethylene, halogen type refrigerants, printing inks, paint and paint removers, varnishes, hydrochloric acid, cements and glues, and masonry acid washing materials, The air used by the burner for combustion must be free of halogens to avoid possible corrosion to the heating surfaces, which could result in asphyxiation, fire and/or death.

⚠ **WARNING:** Children and adults should be alerted to the hazards of high surface temperatures and should stay away to avoid burns or clothing ignition.

Young children should be carefully supervised when they are in the same place as the heater.

Clothing or other flammable materials should not be hung from the heater, or placed on or near the heater.

Any safety screen, guard or other protective device removed for servicing a heater must be replaced prior to operating the heater.

⚠ **WARNING: Do not operate heater in a residential garage application without an approved (exhaust) venting system installed and connected to the heater. When this heater is installed in a residential garage, the operation of the heater, when not connected to a properly installed and maintained venting system, can result in carbon monoxide (CO) poisoning and possible death.**

Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

Ne pas se server de cet appareil sil a été plongé dans I 'eau, complètement ou en partie, Faire inspecter I' appareil par un technicien qualifié et remplacer toute partie du système de control et toute commande qui ont été plongée dans I' eau.

2.0 INSTALLER RESPONSIBILITY

⚠ WARNING:

FIRE OR EXPLOSION HAZARD

The heater and related gas piping and wiring must be installed only by individuals or firms well qualified and licensed in the required field of work.

Read and understand this manual in its entirety BEFORE you install this heater. If you have any questions call your local representative. Verify that the fuel on the installation site is the same as what is required for this heater. Check heater for damage or missing parts. If damage has occurred, notify carrier or point of purchase at once for reconciliation of damaged goods. We are not responsible for transit damage. Do not install if heater is damaged.

If you do not understand any of the safety or hazardous warnings contained in this manual, or have questions or concerns about the installation, operation, maintenance or service of this heater, or any other questions or concerns relating to this heater, you MUST CALL THE FACTORY at the telephone number noted on the front cover of this manual or as detailed on the rating plate on the heater before operating this heater.

Verify that model, input & length is what was ordered and is appropriate for installation. If heater is too small for the heating load of the building, property damage can occur due to freezing. If unit is too large, severe heat damage call occur to the building and/or its contents, fire, explosion, injury or death. If in doubt compare heat loss of building with unit on site. If you are unable to calculate heat loss, call your local representative for assistance.

Installation shall be in accordance with local codes. (See 'CODE COMPLIANCE').

If installation requires tilting, DO NOT over tilt the unit. Units are certified for installations up to 45°; however, the maximum recommended tilt is 25°.

Install unit according to the "Clearance to Combustibles" for that particular heater and type of installation. Make sure that clearances are maintained from vehicles parked below or in front of heater. Take into consideration hoists. Failure to do so could result in property damage, injury or death.

Make sure unit is adequately suspended from ceiling or roof. Select hanging location that has adequate strength to support heater.

This heater needs fresh air for safe operation and must be installed so there are provisions for adequate combustion and ventilation air. In the USA, do not operate this heater without installing air intake hood or duct (pin #800209) and exhaust/chimney vent in a residential garage application. In Canada, the outside air intake is optional for residential garages. This heater must not be connected to a chimney flue serving a separate solid-fuel burning appliance. This heater must only be installed with the venting that it is certified for. Refer to the installation instructions for installation details. See pages 34 & 35)

If unit is to be sidewall vented, use part #800208 (Sidewall Vent Kit). Make sure vent cap is past eave. (See pages 36 titled "VENTING").

Check line and manifold pressure with a manometer to confirm unit is set according to the specification on the rating plate. Perform check with all gas-fired appliances operating. (See pages 48, 58 & 59 for further details).

Provide adequate accessibility clearances for servicing.

Leave copy of this manual with owner (or a copy) for future reference.

HEATER OPERATION NOTE: Heater will have a higher heat output at the burner end as compared to the exhaust end.

SPACE HEATING: As a general rule, it is suggested to locate the burner end toward the highest heat-loss area (doors) of the space being heated. If you have any concerns or questions concerning orientation or layout of the heater in your application, contact factory for assistance.

SPOT HEATING: On heaters with a straight-line configuration as well as units that have the maximum length of radiant tube selected for the input capacity of a given burner, there will be a noticeable and more pronounced perception of greater heat output from the burner end of the heater as compared to the exhaust end. As a general rule, it is suggested for spot heating applications, to use a u-tube configuration to provide a more even source of heat. If you have any concerns or questions concerning orientation or layout of the heater in your application. Contact factory for assistance.

NOTE: Condensation from the exhaust may occur from this heater when it starts the heating cycle. The condensation will stop once the heater warms up. Make sure venting is sealed according to section titled "VENTING".

3.0 CODE COMPLIANCE

Installation shall be in accordance with local building codes, or in the absence of local codes, in accordance with:

A. **FUEL SUPPLY:**

CANADA: ***Natural Gas and Propane Installation Code, CSA B149.1*** *or latest edition.*
USA: ***National Fuel Gas Code, ANSI Z223.1/NFPA 54,*** *or latest edition.*

B. **ELECTRICAL GROUNDING:**

CANADA: ***Canadian Electrical Code, CSA C22.1*** *or latest edition.*
USA: ***National Electrical Code, ANSI/NFPA 70*** *or latest edition*

In Canada: Electrical equipment and wiring shall comply with the applicable provisions of the current ***Canadian Electrical Code, CAN/CSA C22.1, Part I and Part II, and CAN/CSA C22.2 No.3, Electrical features of Fuel Burning Equipment****.*

C. **PUBLIC GARAGE INSTALLATION:**

Adequate clearances must be maintained according to the following standards:
CANADA: ***Natural Gas and Propane Installation Code, CSA B149.1*** *or latest edition.*
USA: ***Parking Structures, ANSI/NFPA 88A*** *or the standard for* ***Repair Garages, ANSI/NFPA 88B*** *or latest edition.*

Heaters must be installed a minimum of eight feet above the floor. Minimum required safe distances to combustibles must be maintained from vehicles parked below the heater.

- When installed over hoists, the minimum required safe distances to combustibles must be maintained from the uppermost point of the combustible materials placed on the hoist.

D. **AIRCRAFT HANGERS:**

Adequate clearances must be maintained according to the following standards:
CANADA: ***Enforcing Authority****.*
USA: ***Aircraft Hangers, ANSI/NFPA 409***

- Heaters in aircraft storage or service areas must be installed a minimum of ten feet above the upper surface of wings or engine enclosures of the highest aircraft which may be housed in the hangar. (This should be measured from the bottom of the heater to the top of the wing or engine enclosure, whichever is highest from the floor.)
- In other sections of aircraft hangars, such as shops or offices, heaters must be installed a minimum of eight feet above the floor.
- Heaters installed in aircraft hangars shall be located so as not to be subject to damage by aircraft, cranes, movable scaffolding or other objects.
- When installed over hoists, the minimum safe distances to combustibles must be maintained from the uppermost point of the combustible materials placed on the hoist.

E. **OTHER TYPES OF INSTALLATIONS:**

If the installation is such that it doesn't meet the above-mentioned criteria or there is a possibility of airborne combustible vapor or material in the building (HAZARDOUS LOCATION), consult the local Fire Marshall, the Fire Insurance Carrier or other authorities for approval of the proposed installation prior to installing the heater.

4.0 SPECIFICATIONS: GENERAL SPECIFICATIONS

Rating: (Input: Natural and Propane Gas)

In Canada: 0-4500' (1372 m) In USA: 0-2000' (610 m) - De-rate Above 2000' (610 m) (see pg 48)

MODEL	BURNER INPUT BTU/hr		TUBE LENGTH	
	MIN	MAX	MIN	MAX
CAL-35A	n/a	35,000	10' (3 m)	20’ (6.1 m)
CAL-35AHL	17,500	35,000	10' (3 m)	20’ (6.1 m)
CAL-35AM	17,500	35,000	10' (3 m)	20’ (6.1 m)
CAL-40A	N/A	40,000	10' (3 m)	20’ (6.1 m)
CAL-40AHL	20,000	40,000	10' (3 m)	20’ (6.1 m)
CAL-40AM	20,000	40,000	10' (3 m)	20’ (6.1 m)
CAL-50A	N/A	50,000	15' (4.2 m)	20’ (6.1 m)
CAL-50AHL	25,000	50,000	15' (4.2 m)	20’ (6.1 m)
CAL-50AM	25,000	50,000	15' (4.2 m)	20’ (6.1 m)
CAL-75A	N/A	75,000	20' (6.1 m)	30’ (9.14 m)
CAL-75AHL	37,500	75,000	20' (6.1 m)	30’ (9.14 m)
CAL-75AM	37,500	75,000	20' (6.1 m)	30’ (9.14 m)
CAL-80A	n/a	80,000	20' (6.1 m)	40’ (12.2m)
CAL-80AHL	40,000	80,000	20' (6.1 m)	40’ (12.2m)
CAL-80AM	40,000	80,000	20' (6.1 m)	40’ (12.2m)
CAL-100A	n/a	100,000	30’ (9.14 m)	50’ (15.2m)
CAL-100AHL	50,000	100,000	30’ (9.14 m)	50’ (15.2m)
CAL-100AM	50,000	100,000	30’ (9.14 m)	50’ (15.2m)
CAL-125A	n/a	125,000	40’ (12.2m)	50’ (15.2m)
CAL-125AHL	62,500	125,000	40’ (12.2m)	50’ (15.2m)
CAL-125AM	62,500	125,000	40’ (12.2m)	50’ (15.2m)

GAS PRESSURE at MANIFOLD:

	SINGLE INPUT:	VARIABLE INPUT:	
Natural Gas:	3.5" (8.89 cm) W.C.	Lo: 1.5" (3.8 cm) W.C.	Hi 3.5" (8.89 cm) W.C.
Propane Gas:	10.5" (26.67 cm) W.C.	Lo: 5.5" (13.97 cm) W.C.	Hi: 10.5" (26.67 cm) W.C.
Gas Connection	0.5" (1.27 cm) N.P.T.		

GAS INLET PRESSURE:

GAS:	MINIMUM:	MAXIMUM:
Natural	4.5" (11.43 cm) W.C.	14.0" (35.56 cm) W.C.
Propane	11.5" (29.21 cm) W.C.	14.0" (35.56 cm) W.C.

ELECTRICAL RATING:

DSI Ignition, 120v. 60hz, 1 Amps, Appliance, 3 prong plug connection, 24-volt low voltage thermostat.

STANDARD EQUIPMENT:

Burner control housing is pre-assembled and pre-wired; unit comes complete with the following: industry standard gas, electrical and venting connections, balanced air rotor, thermal overload protected motor, visual burner inspection sight glass, combustion and air proving safety switches, 3-try spark ignition control, low voltage thermostat connection, 4" aluminized steel combustion tube, polished aluminum standard reflector, 4" aluminized steel radiant heat exchanger, tube couplers, joint/hanger pieces, heat economizer baffle, low/line voltage thermostat, and hanging chain kit.

Optional Equipment:		
- 90° Elbow Kit	- Hi/Lo Control	- Sidewall Vent Kit
- Variable Input Control (Modulator)	- Two Piece Construction	- Protective Screen
- Stainless Steel Construction	- 180° U-Bend Kit	- Three Piece Construction
- 24 Volt input	- Fresh Air Kit	- Four Piece Construction

5.0 DIMENSIONS

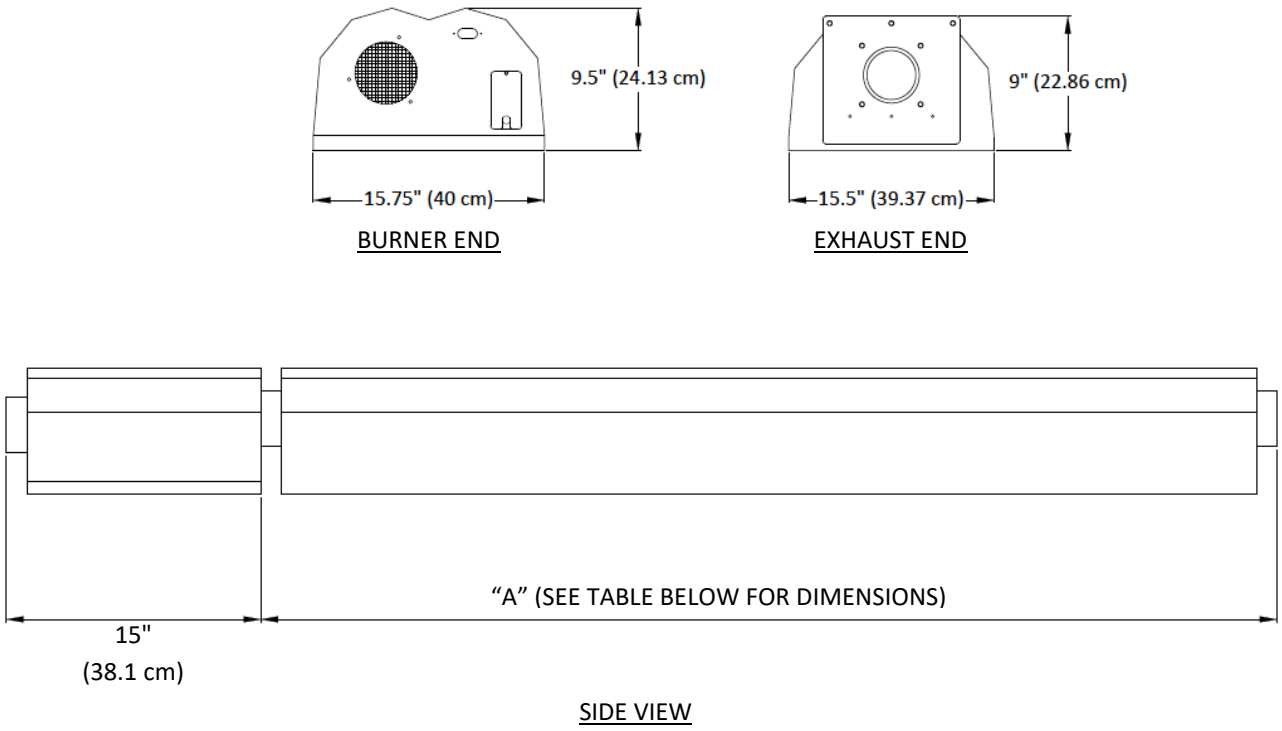


Figure 1. EQUIPMENT DIMENSION

Table of Dimensions:

UNITS	DIMENSION "A" LENGTH	
BURNER INPUT:	**MIN**	**MAX**
40,000 Btu/hr	10'-4" (3.15 m)	20’-4” (6.4 m)
50,000 Btu/hr	15'-4" (4.7 m)	20’-4” (6.4 m)
75,000 Btu/hr	20'-4" (6.4 m)	30’-4” (9.25 m)
80,000 Btu/hr	20'-4" (6.4 m)	40’-4” (12.13m)
100,000 Btu/hr	30’-4” (9.25 m)	50’-4” (15.13m)
125,000 Btu/hr	40’-4” (12.13m)	50’-4” (15.13m)

Table of Weights:

WEIGHTS	
LENGTH	**WEIGHTS INCLUDE BURNER HEAD**
10’	85 LBS (39 KG)
15’	105 LBS (48.6 KG)
20’	125 LBS (57 KG)
25’	145 LBS (66 KG)
30’	165 LBS (75 KG)

6.0 INSTALLATION CLEARANCES AND CLEARANCE TO COMBUSTIBLES

Installation of overhead heaters in garages or hangars MUST meet the requirements for bottom (below) clearances detailed in **CANADA:** ***Natural Gas and Propane Installation Code, CSA B149.1*** or latest edition or **USA:** ***National Fuel Gas Code, ANSI Z223.1/NFPA 54***, or latest edition.

⚠ **WARNING:** In all situations, clearances to combustibles must be maintained. Minimum clearance from heater must be maintained from vehicles parked below heater. The posting of signs may be required in storage areas referring to clearances to combustibles to the heater and/or limiting the stacking height of stored Items near the heater specifying a maximum height. Clearances are not for use in four (4) sided enclosures. Certain materials or items, when stored under the heater, will be subjected to radiant heat and could be seriously damaged.

⚠ **WARNING:** The stated clearance to combustibles represents a surface temperature of 90°F (32°C) above room temperature. Building material with low heat tolerance (such as plastics, vinyl siding, canvas, tri-ply, etc) may be subject to degradation at lower temperatures. It is the installer's responsibility to assure that adjacent materials are protected from degradation. When in doubt, check heat tolerance of building material(s) with their manufacturer.

END CLEARANCES

(BURNER HEAD END)

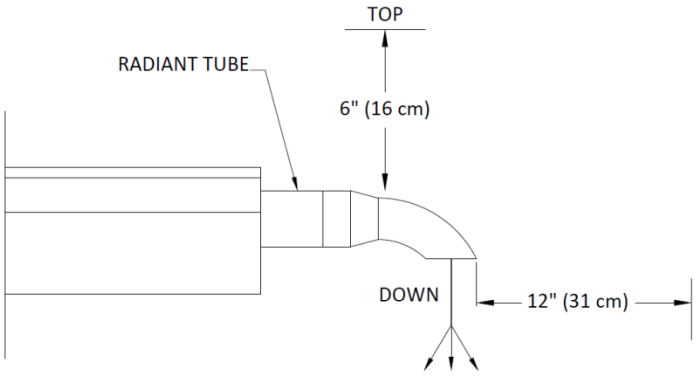
Minimum clearances from air intake end of burner head to object is 12" (30.5 cm).

Provide adequate accessibility clearances for servicing and proper operation. Do not install unit in such a manner that the combustion air entering the heater is reduced in any manner

OUTDOOR APPLICATIONS ONLY

(EXHAUST END)

OUTDOOR APPLICATIONS ONLY



WARNING: DO NOT INSTALL IN RESIDENTIAL GARAGE WITHOUT AN APPROVED VENTING SYSTEM. For Brooder use and some industrial applications, unvented installations are permitted.

In these applications refer to page 44 for details on clearances and ventilation requirements.

Figure 2. OUTDOOR END CLEARANCES

VENTED

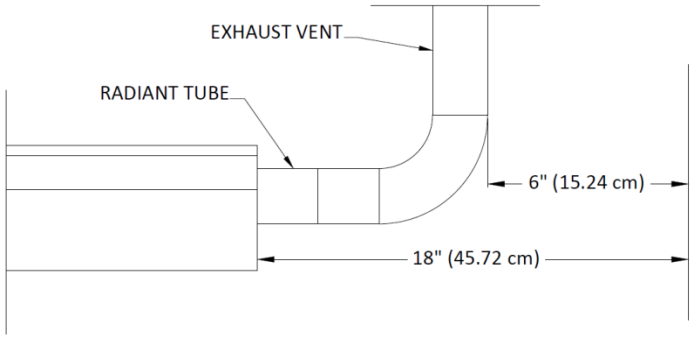


Figure 3. VENTED CLEARANCES

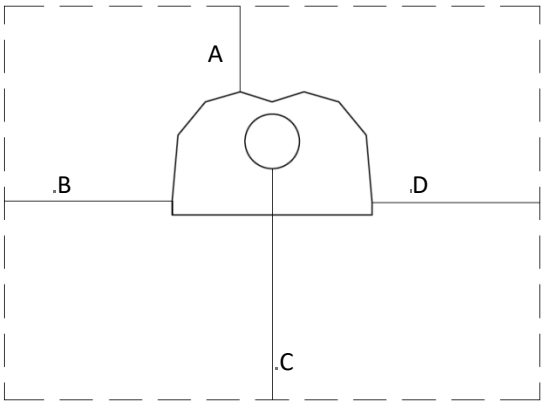
6.1 CLEARANCE TO COMBUSTIBLES FOR SPACE HEATING AND BROODER INSTALLATION

IN THE USA: Residential Garage heater installations with less than an 8' (2.44 m) clearance from the bottom of the tube to the floor require the installation of the Protective Screen Kit PIN#3900212 (see page 20 for details) The minimum floor clearance is 6' (1.83 m) from the floor to the bottom of the reflector.

IN CANADA: Residential Garage heater installations with less than an 7' (2.14 m) clearance from the bottom of the tube to the floor require the installation of the Protective Screen Kit PIN#3900212 (see page 20 for details) The minimum floor clearance is 6' (1.83 m) from the floor to the bottom of the reflector.

⚠ **WARNING:** In all situations, clearances to combustibles must be maintained. Minimum clearance from heater must be maintained from vehicles parked below heater. The posting of signs may be required in storage areas referring to clearances to combustibles to the heater and/or limiting the stacking height of stored Items near the heater specifying a maximum height. Clearances are not for use in four (4) sided enclosures. Certain materials or items, when stored under the heater, will be subjected to radiant heat and could be seriously damaged.

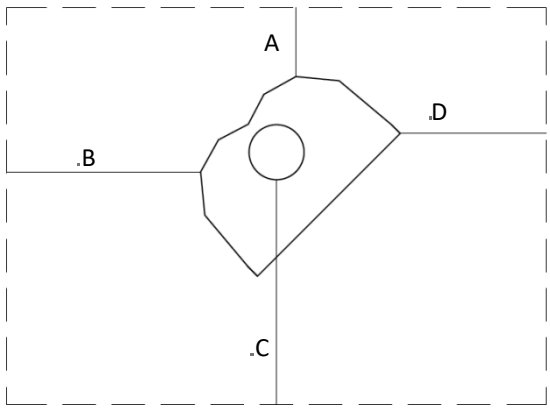
⚠ **WARNING:** The stated clearance to combustibles represents a surface temperature of 90°F (32°C) above room temperature. Building material with low heat tolerance (such as plastics, vinyl siding, canvas, tri-ply, etc…) may be subject to degradation at lower temperatures. It is the installer's responsibility to assure that adjacent materials are protected from degradation. When in doubt, check heat tolerance of building material(s) with their manufacturer.



INSTALLATION TYPE 1

Input*	A	B	C	D
40	4" (10.2 cm)	12" (31 cm)	36" (92 cm)	12" (31 cm)
50	4" (10.2 cm)	12" (31 cm)	43" (110 cm)	12" (31 cm)
75	4" (10.2 cm)	15" (32 cm)	48" (122 cm)	15" (32 cm)

Figure 4. STANDARD REFLECTOR



INSTALLATION TYPE 2

Input*	A	B	C	D
40	4" (10.2 cm)	4" (10.2 cm)	36" (92 cm)	28" (72 cm)
50	4" (10.2 cm)	4" (10.2 cm)	40" (102 cm)	28" (72 cm)
75	4" (10.2 cm)	4" (10.2 cm)	45" (115 cm)	31" (79 cm)

Figure 5. 25' TO 45' TILT

7.0 PRE-INSTALLATION INSPECTION:

Refer to pages 13 to 20 for packaging contents.
Inspect the shipping container and heater for any evidence of shipping damage. If heater damage is found, notify freight carrier and file a claim.

⚠ WARNING:

IF HEATER IS DAMAGED, DO NOT INSTALL

Check that all parts and pieces are present and accounted for. Report any missing items to carrier or point of purchase at once.

Check that overall general appearance, source of fuel required and model numbers match unit requested. Report any discrepancy to carrier or point of purchase at once.

THOROUGHLY INSPECT THE EQUIPMENT

IMMEDIATELY UPON ARRIVAL

OUR RESPONSIBILITY FOR THIS SHIPMENT CEASED WHEN THE CARRIER SIGNED THE WAYBILL.

If goods are received short or in damaged condition, it is important that you notify the carrier and insist on a notation of the loss or damage across the face of the freight bill; otherwise no claim can be enforced against the transportation company.

If concealed loss or damage is discovered, notify your carrier at once and request an inspection. This is absolutely necessary. A concealed damage report must be made within 15-days of delivery of shipment. Unless you do this, the carrier will not entertain any claim for loss or damage. The Agent will make an Inspection and grant a concealed damage notation. If you give the Transportation Company a clear receipt for goods that have been damaged or lost in transit, you do so at your own risk and expense.

WE ARE WILLING TO ASSIST YOU IN EVERY POSSIBLE MANNER TO COLLECT CLAIMS FOR LOSS OR DAMAGE, BUT THIS WILLINGNESS ON OUR PART DOES NOT MAKE US RESPONSIBLE FOR COLLECTION OF CLAIMS OR REPLACEMENT OF MATERIAL. THE ACTUAL FILING AND PROCESSING OF THE CLAIM IS YOUR RESPONSIBILITY.

WE ARE NOT RESPONSIBLE FOR FREIGHT DAMAGED IN TRANSIT!

IF CONTENTS ARE DAMAGED:

EVEN THOUGH CARTON DOES NOT LOOK DAMAGED:

A. MAKE CLAIM TO DELIVERY CARRIER AT ONCE

B. SAVE CARTONS FOR INSPECTION BY CARRIER

8.0 PACKAGING CONTENTS & DESCRIPTION OF PARTS:

A. **CAL-40A-10’ (3 M)**
Preassembled Model
(For two piece model see page 13 for details)

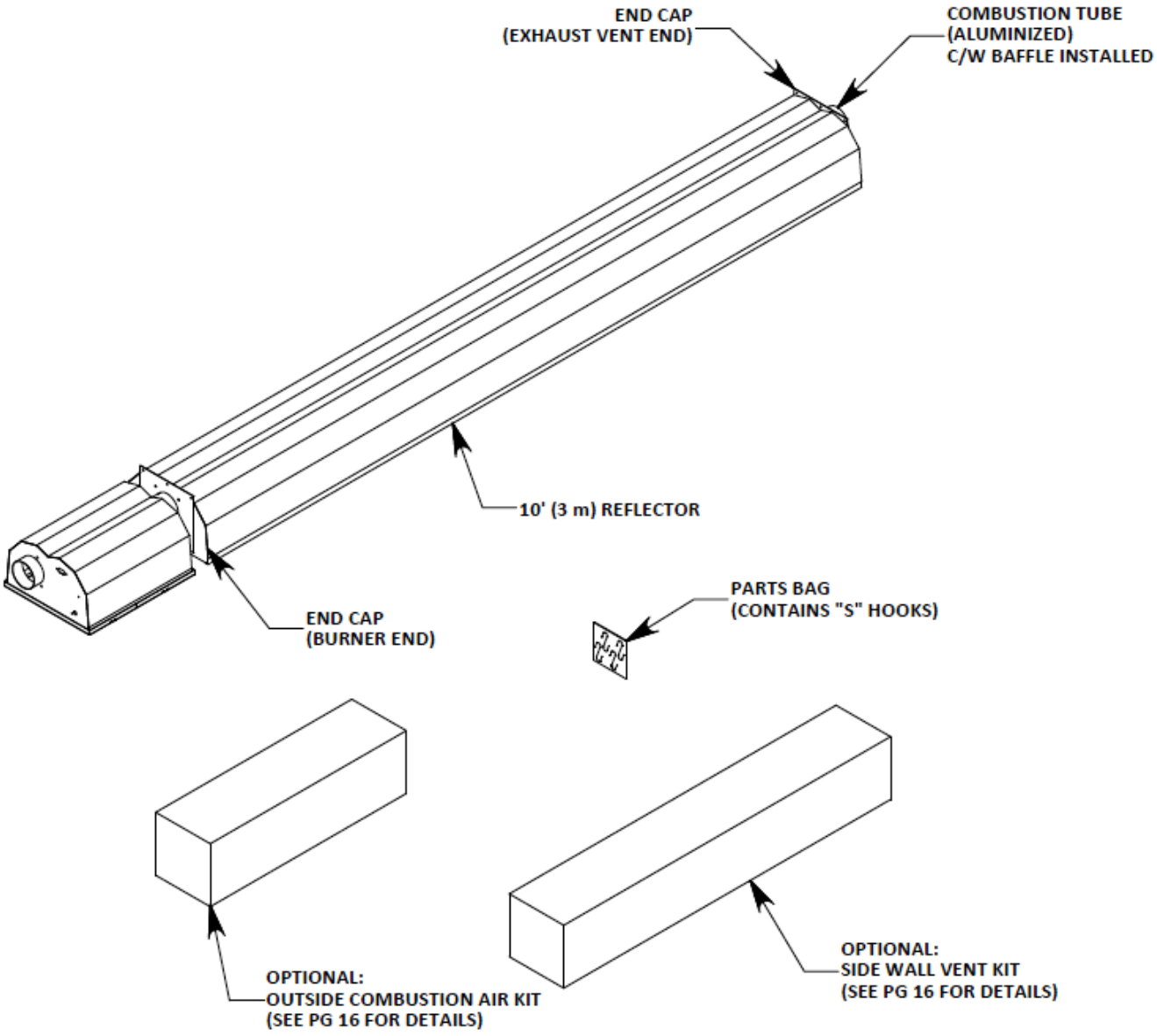


Figure 6. CAL-40A-10’ (3 M)

B. **CAL-40A/50A-15' (4.16 M)**

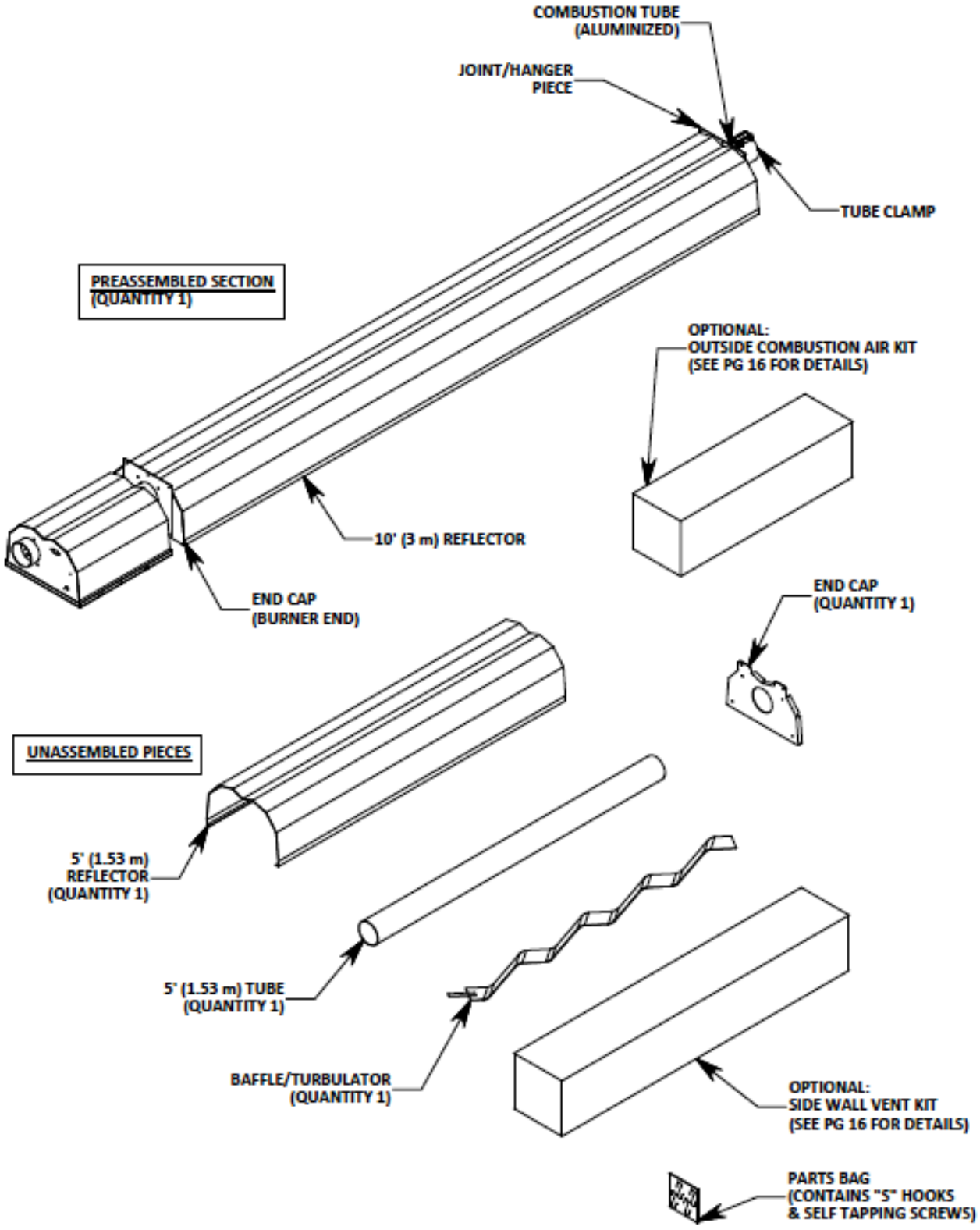


Figure 7. CAL-40A/50A-15' (4.16 M)

C. **CAL-40A-10’ (3 M) (TWO PIECE MODEL) OR CAL-40A/50A/75A-20’ (6.1 M)**

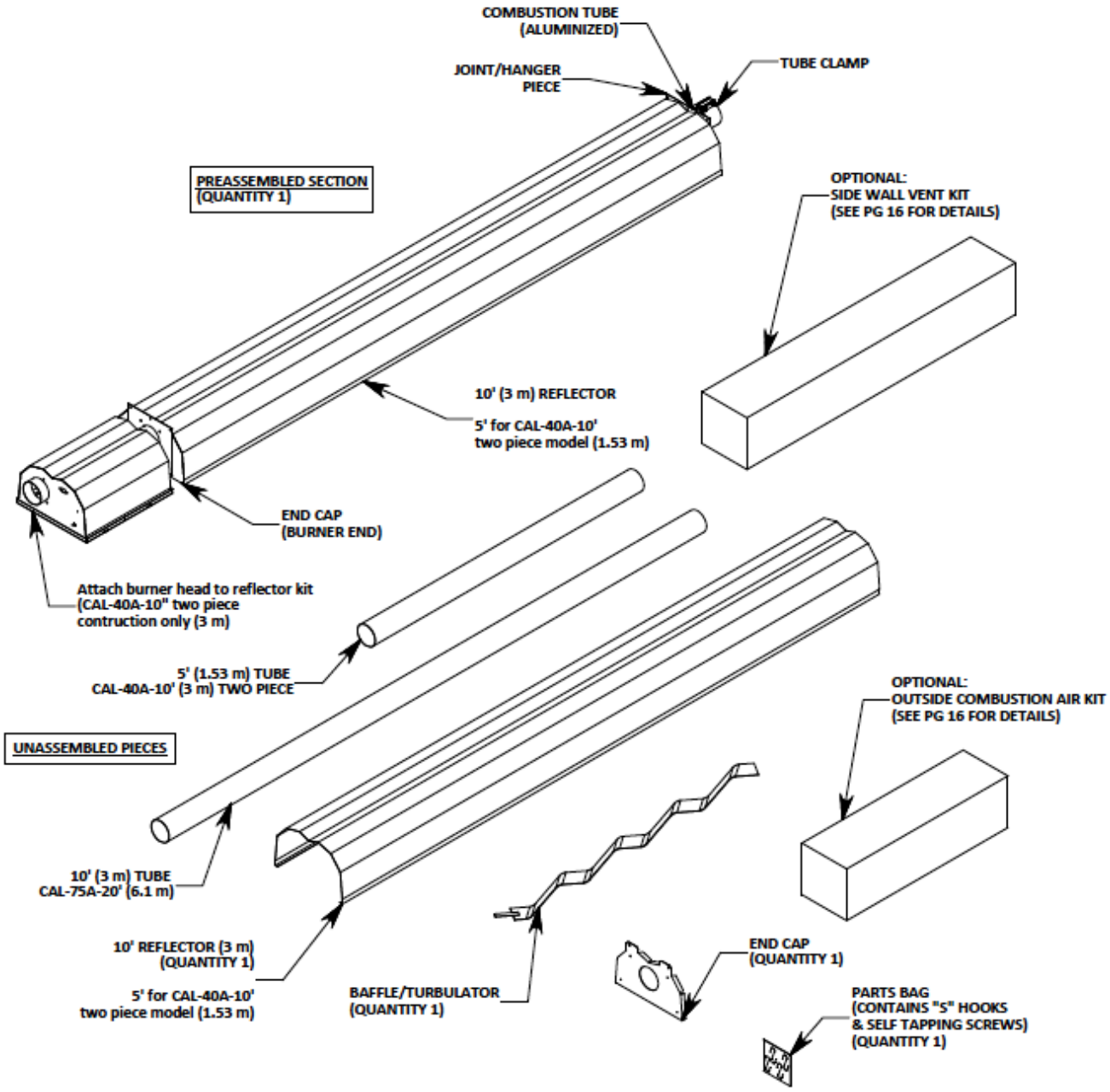


Figure 8. CAL-40A-10’ (3 M) (TWO PIECE MODEL) OR CAL-40A/50A/75A-20’ (6.1 M)

D. **CAL-40A/50A-15’ (4.16 M) (THREE PIECE MODEL)**

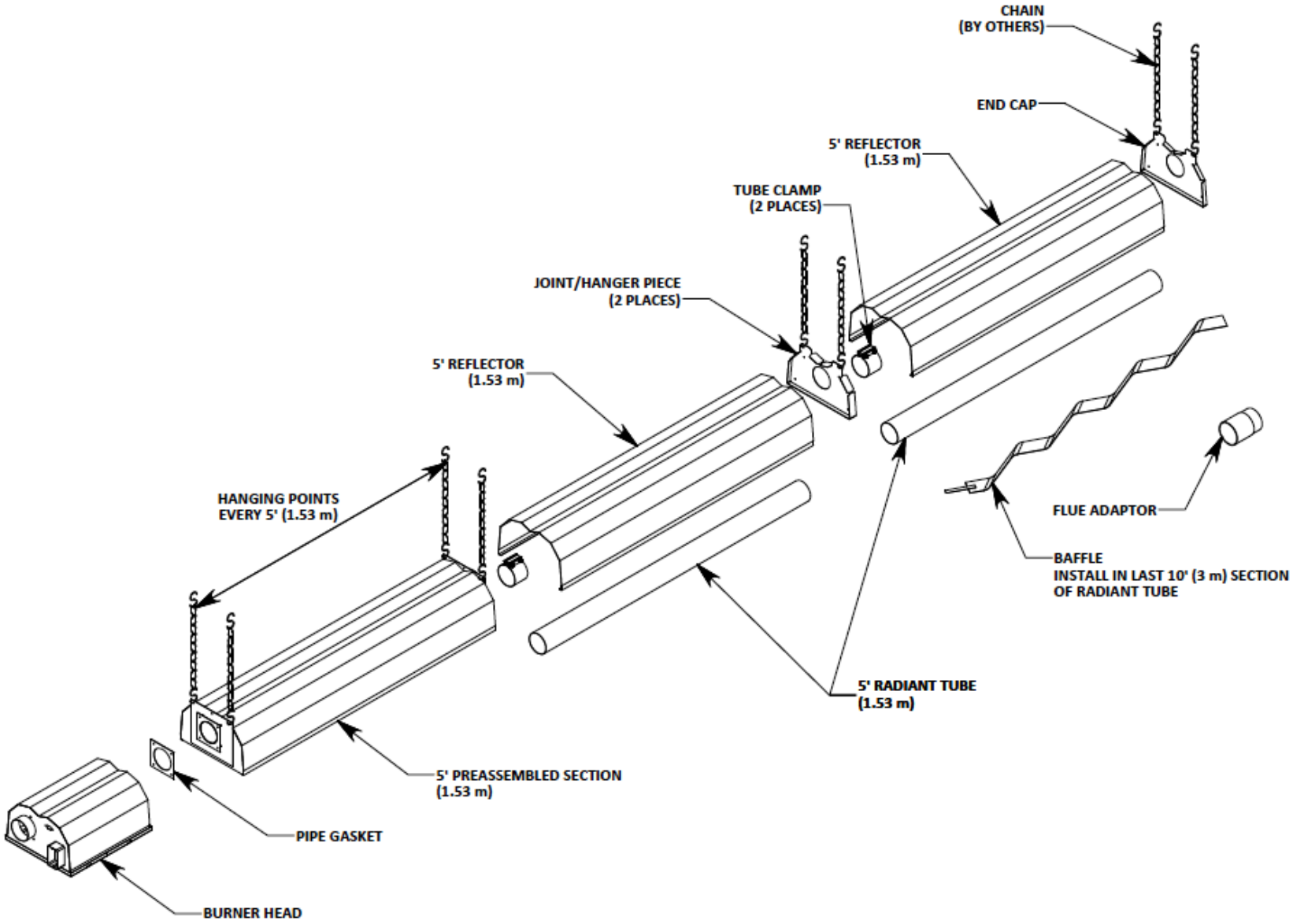


Figure 9. CAL-40A/50A-15’ (4.16 M) (THREE PIECE MODEL)

E. CAL-40A/50A/75A-20’ (6.1 M) (FOUR PIECE MODEL)

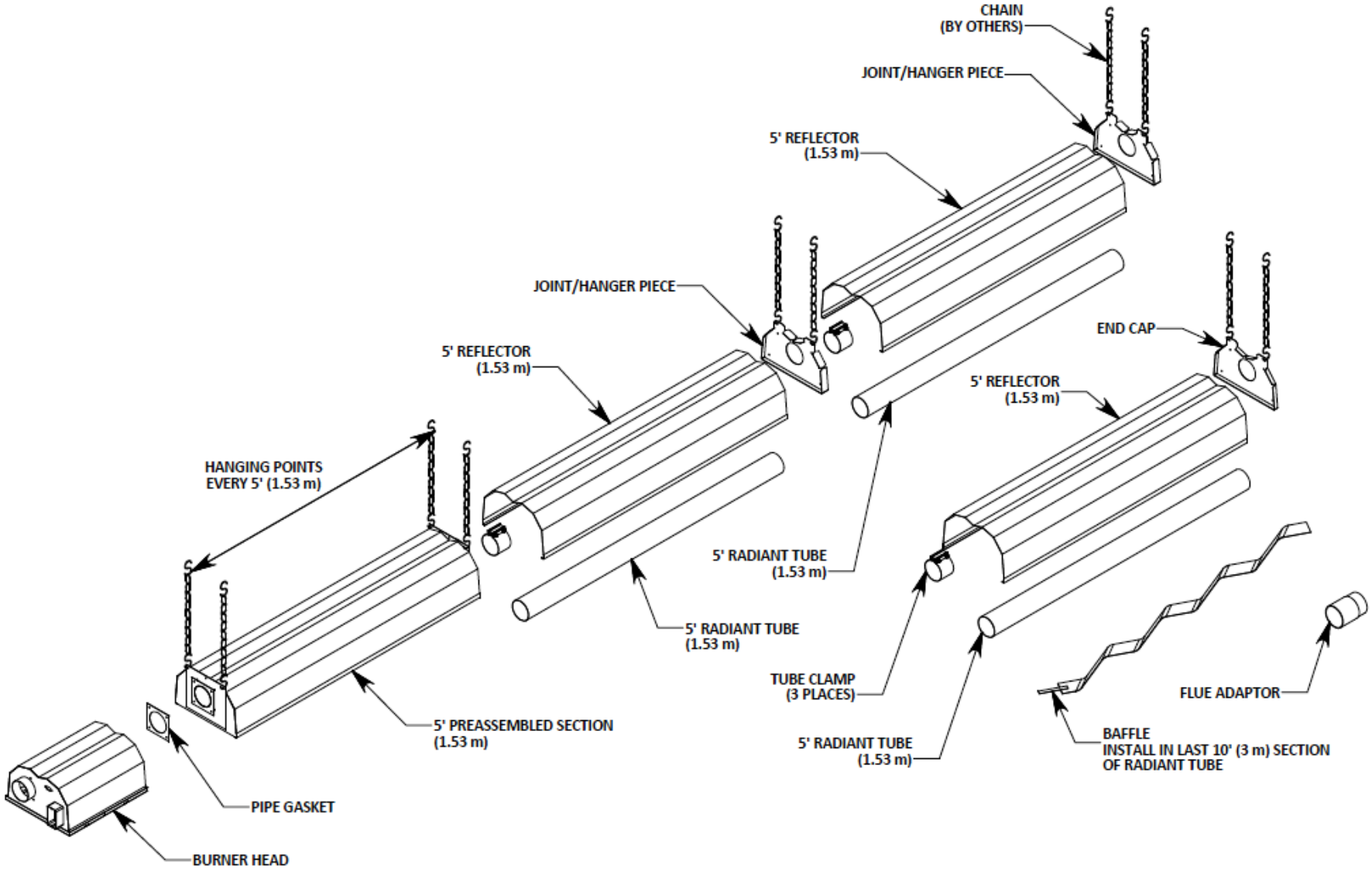


Figure 10. CAL-40A/50A/75A-20’ (6.1 M) (FOUR PIECE MODEL)

F. OUTSIDE: COMBUSTION AIR KIT

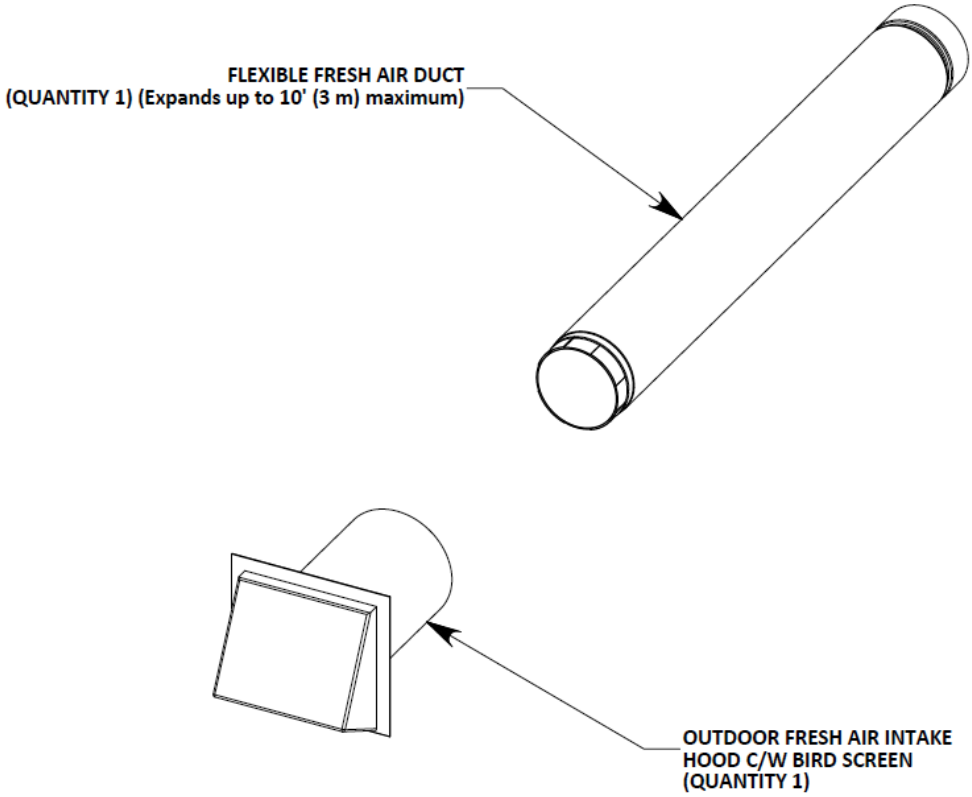


Figure 11. OUTSIDE: COMBUSTION AIR KIT

G. SIDE WALL VENT KIT

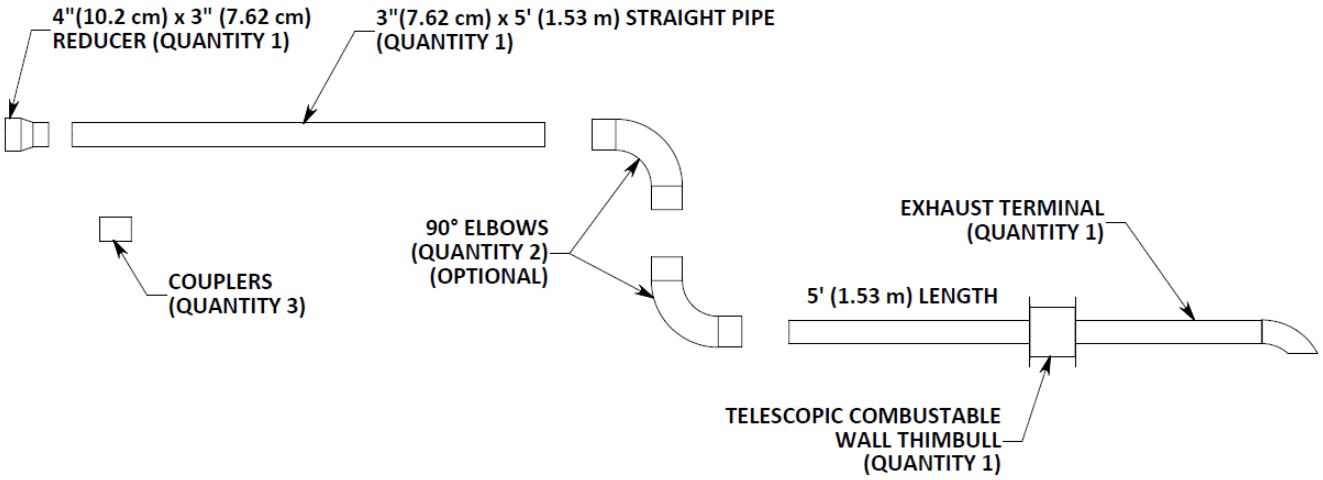


Figure 12. SIDE WALL VENT KIT

H. 90° ELBOW PACKAGE

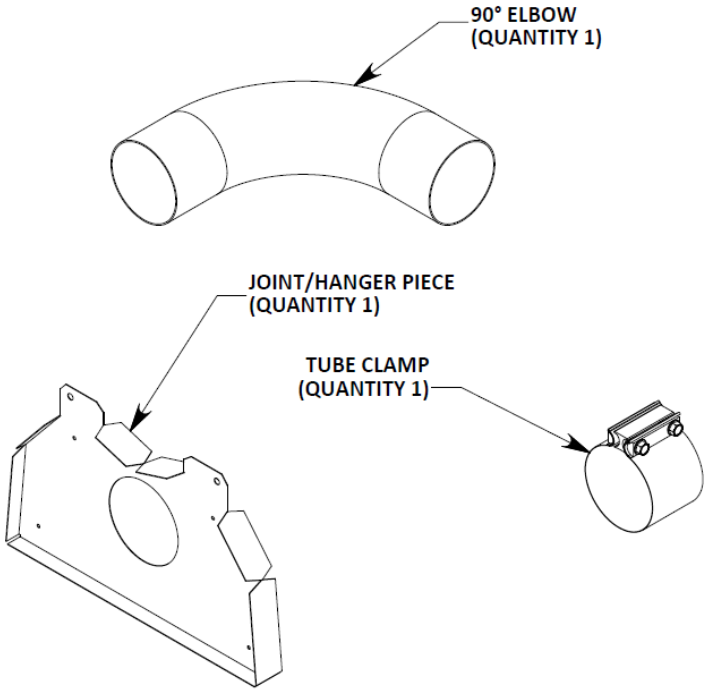


Figure 13. 90° ELBOW PACKAGE

I. 180° U-BEND PACKAGE

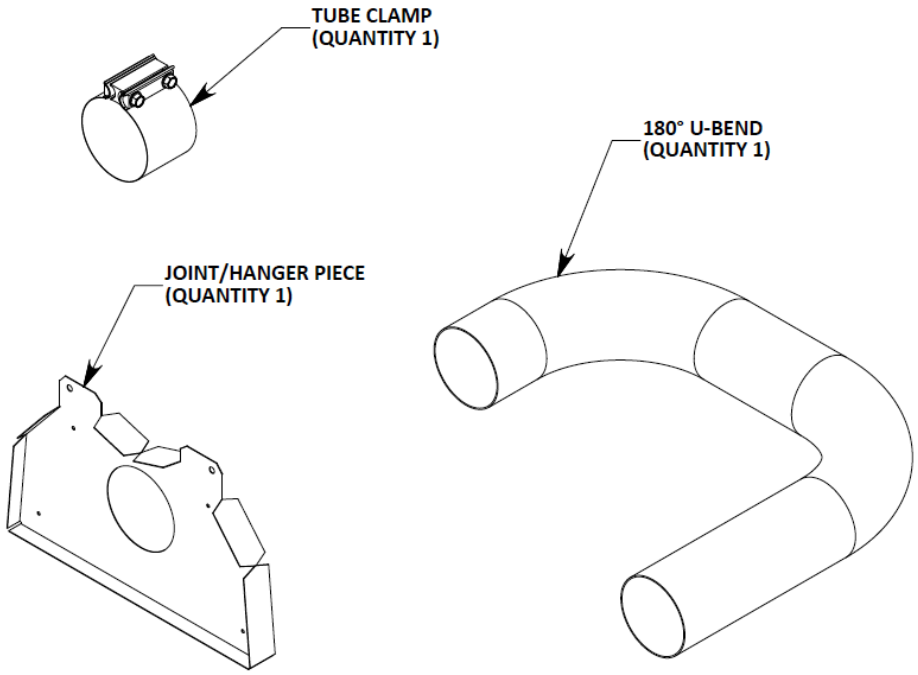


Figure 14. 180° U-BEND PACKAGE

J. PROTECTIVE SCREEN KIT

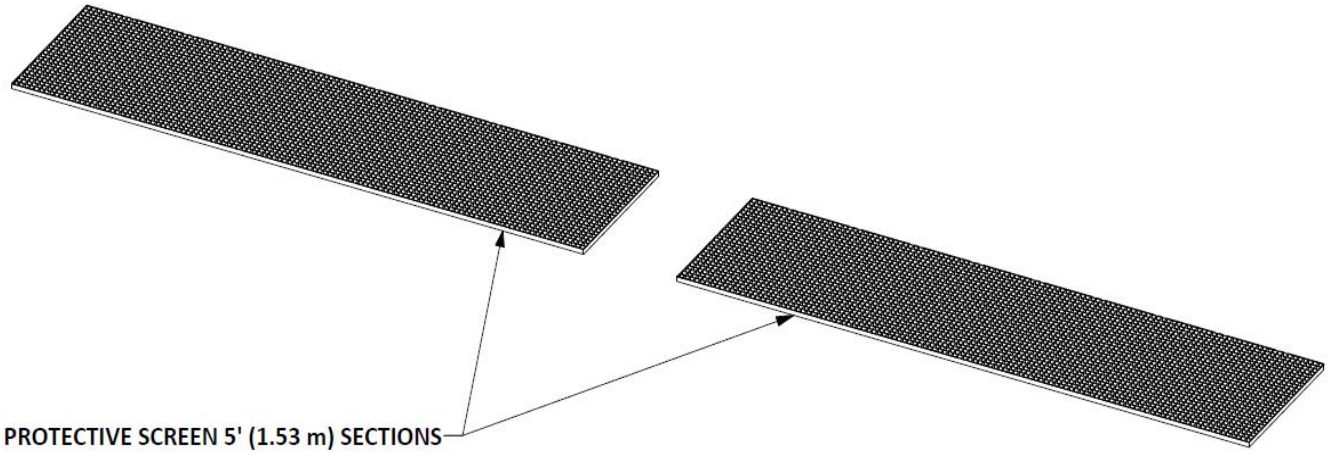


Figure 15. PROTECTIVE SCREEN KIT

K. PROTECTIVE SCREEN INSTALLATION

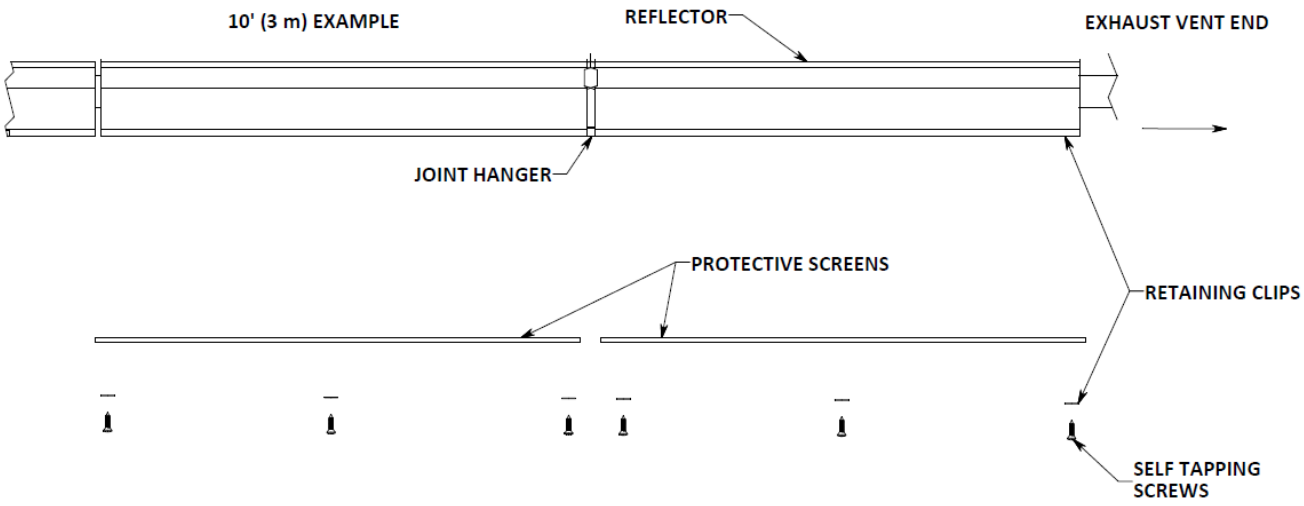


Figure 16. PROTECTIVE SCREEN INSTALLATION

9.0 INSTALLATION

Provide for adequate clearance around air openings into the combustion chamber, clearances from combustible material, provisions for accessibility and for combustion and ventilating air supply.

9.1 PLANNING

- Familiarize yourself with the equipment and any accessories that you may require.
- Locate the area where unit is to be installed.
- Locate area where any holes might have to be cut for:
    a) Venting
    b) Any gas piping requirements
- Make sure that there is no obstruction such as hidden electrical wiring, water lines etc... in the areas of concern.
- Locate the thermostat location.

> ⚠ **WARNING:** Observe minimum clearance to combustibles.
> REFER TO PAGES 9 & 10.

- Locate a grounded, three prong electrical source.
- Measure the required amount of the various materials required to do the installation, and have these materials on site in an organized manner prior to commencement.

9.2 TYPICAL GARAGE INSTALLATION

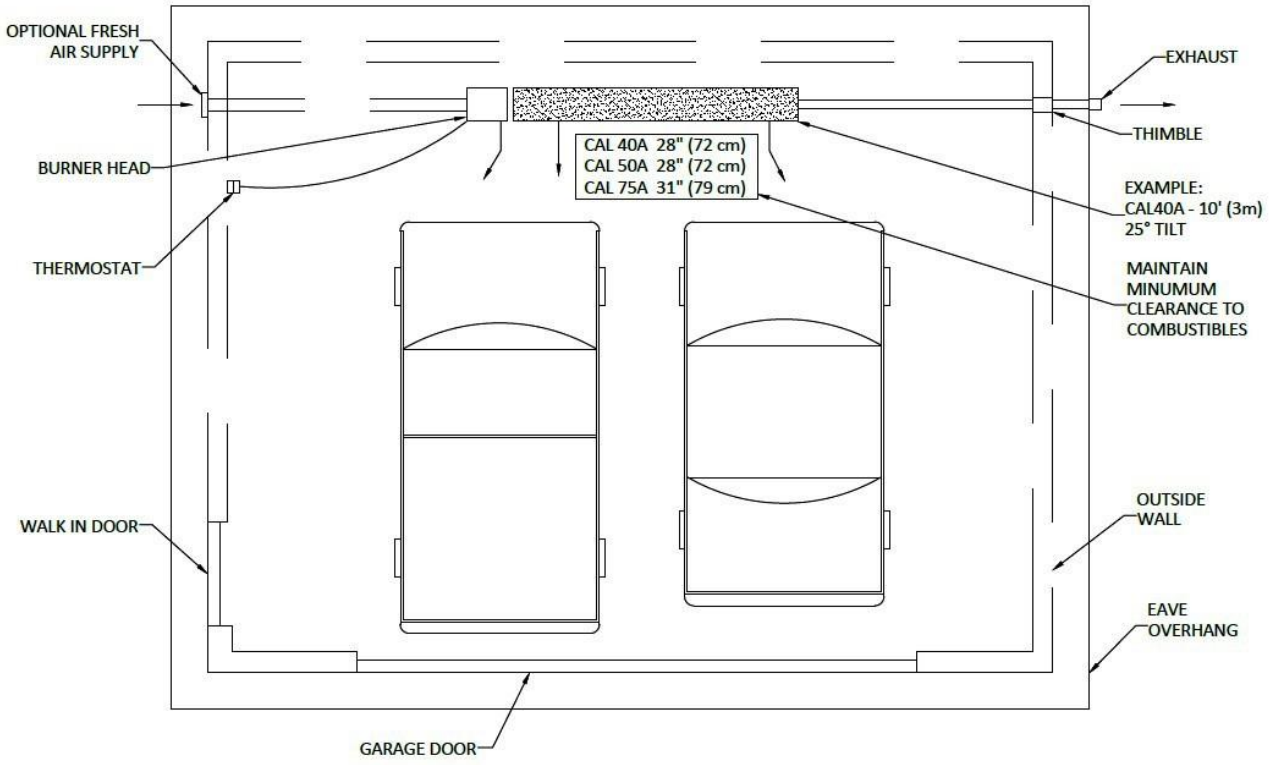


Figure 17. TYPICAL GARAGE INSTALLATION

10.0 SUSPENSION OF HEATER:

10.1 HORIZONTAL INSTALLATION

Locate suspension points on ceiling or roof. Heater is suspended at standard 10' (3m) intervals (refer to Figure 19). Adequately secure chains to beam (refer to Figure 18) Suspension Points. Hang chains down from suspension point to desired level. Heater is to be hung level. **NOTE:** Front & rear end caps are double chained.

A. **SUSPENSION POINTS**

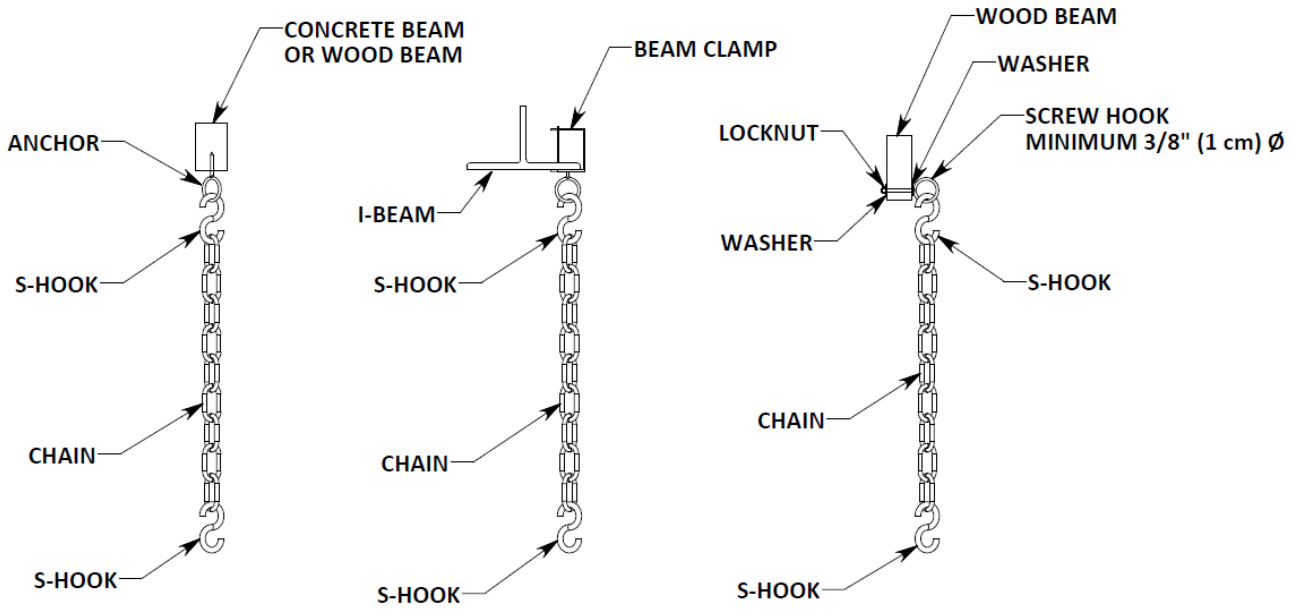


Figure 18. EXAMPLE SUSPENSION DETAILS

⚠ **WARNING: It is the responsibility of the installer to use hanging chain that is a minimum of 2/0 or with a minimum support capacity of no less than 75 lbs. Also make sure all suspension points are adequate to support weight of heater and any accessories. Also make sure all S-Hooks are affixed properly and the open ends squeezed closed. If the suspension system fails, it is the responsibility of the installer. A failed suspension system can cause property damage, severe injury and/or death.**

B. **HORIZONTAL INSTALLATION**

SUSPENSION LOCATIONS CAL-40A-10’ (3m) REFLECTOR PKGS

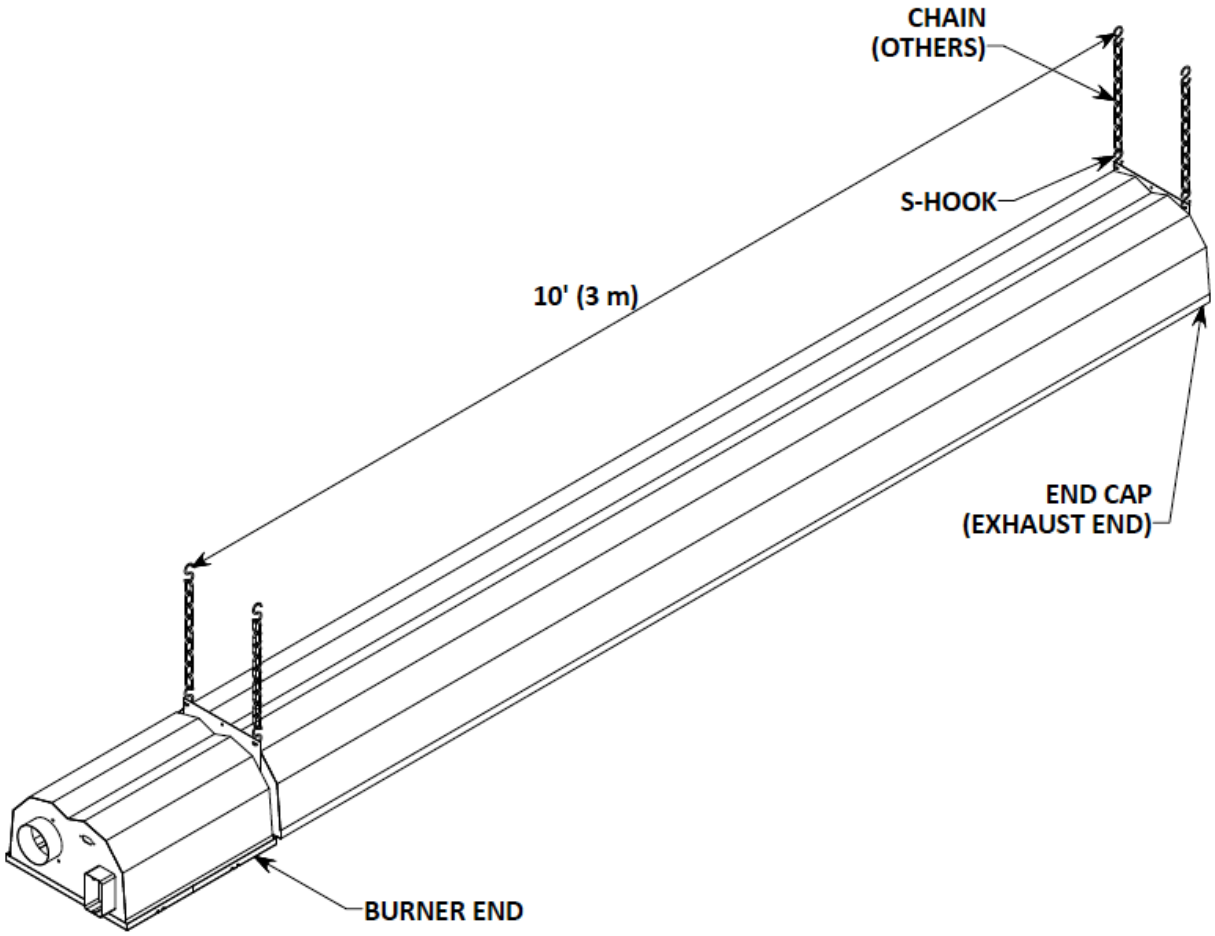


Figure 19. HORIZONTAL INSTALLATION - 10' (3m) PKG

C. **HORIZONTAL INSTALLATION - MULTI**

SUSPENSION LOCATIONS FOR MULTI-PIECE REFLECTOR KITS (5’ (1.53m) sections: 10’, 15 and 20’ MULT-PIECE
And for 10’ (3m) standard sections; 10’ (3m) to 30’ (9.14m) STANDARD REFLECTOR PKGS

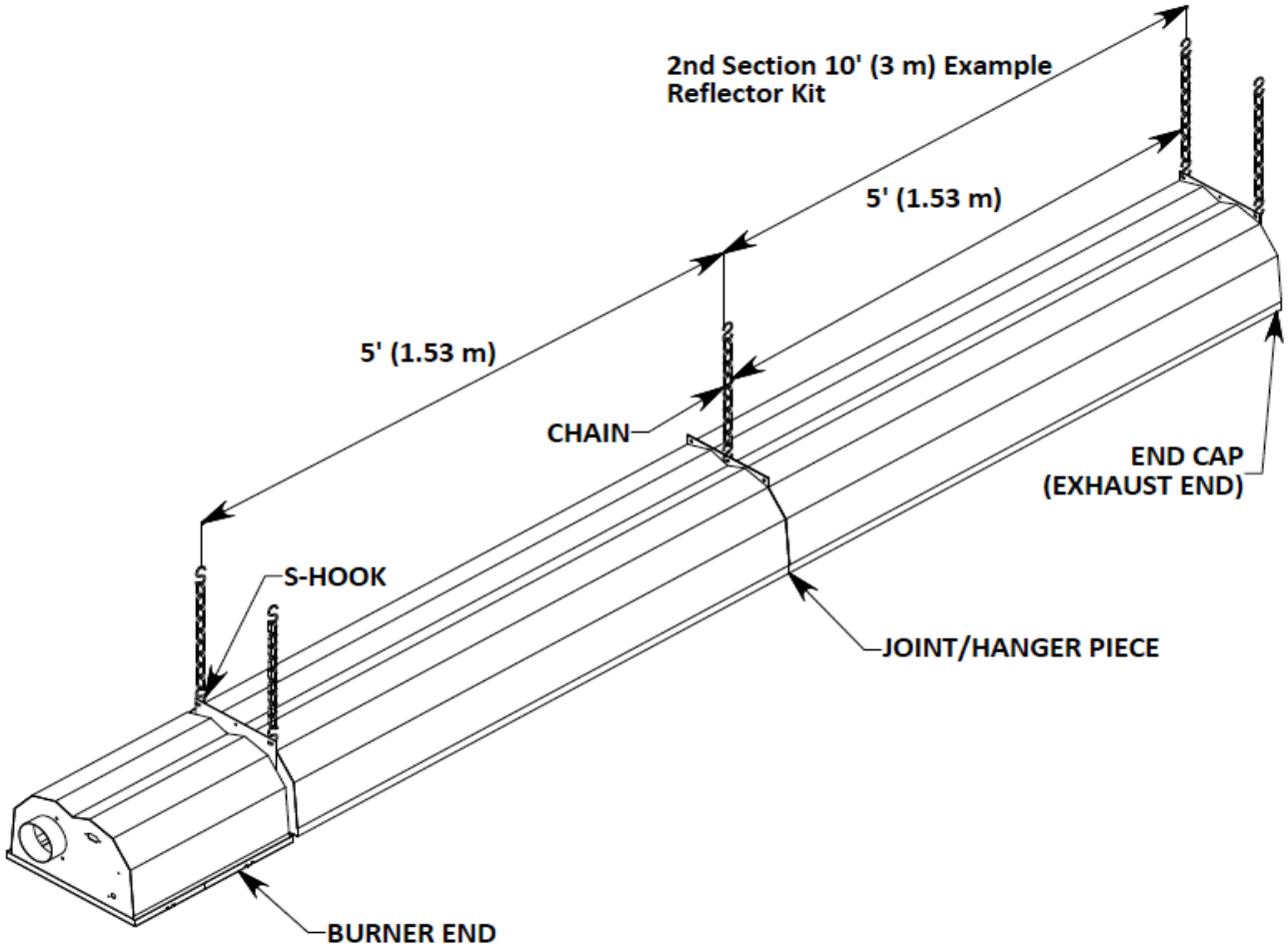


Figure 20. HORIZONTAL INSTALLATIONS

Note: 15’ (4.6 m) MULTI-PIECE Kit has 3 sections.
20’ (6.1 m) MULTI-PIECE Kit has 4 sections.

10.2 TILT INSTALLATION

Refer to Figure 21 & Figure 22, for 25° to 45° tilts. Locate suspension points as described above under the title “HORIZONTAL INSTALLATION”. It is important NOT to over-tilt the heater. Units are certified for installation up 45°; however, the MAXIMUM recommend tilt is no greater than 25°.

> ⚠ **WARNING: It is the responsibility of the installer to use hanging chain that is a minimum of 2/0 or with a minimum support capacity of no less than 75 lbs. Also make sure all suspension points are adequate to support weight of heater and any accessories. Also make sure all S-Hooks are affixed properly and the open ends squeezed closed. If the suspension system fails, it is the responsibility of the installer. A failed suspension system can cause property damage, severe injury and/or death.**

Refer to page 27 “ASSEMBLY OF COMPONENTS” to page 31 “ASSEMBLY OVERVIEW”.

D. **25° TILT (ALL LENGTHS)**

NOTE: 25° Tilt is maximum recommended tilt for most installations.

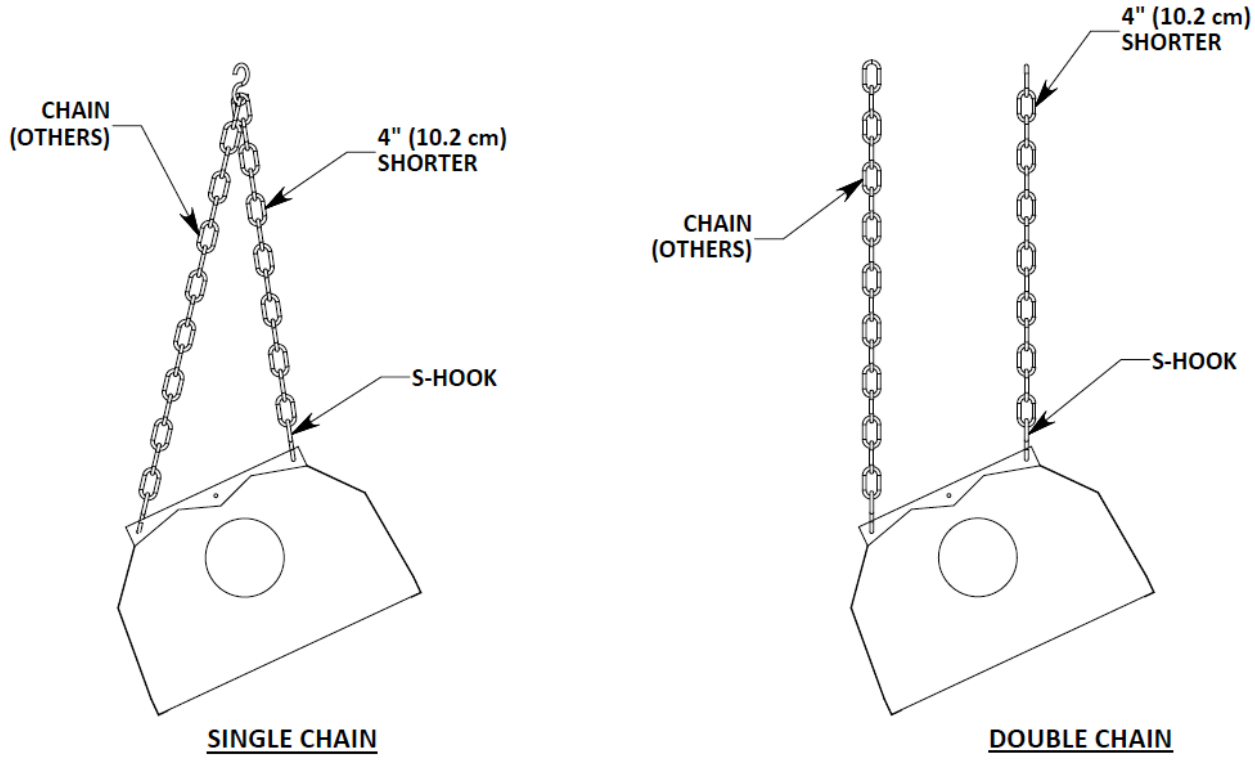


Figure 21. 25° TILT

E. **45° TILT (ALL LENGTHS)**

NOTE: 45° Tilt is NOT RECOMMENDED. This angle of tilt causes the ambient air to form a convection current over the tube. The net effect of this action is reduced infrared output (decreased heating capacity) as well as decreased exhaust temperature which may increase the chance of condensation of combustion by-products.

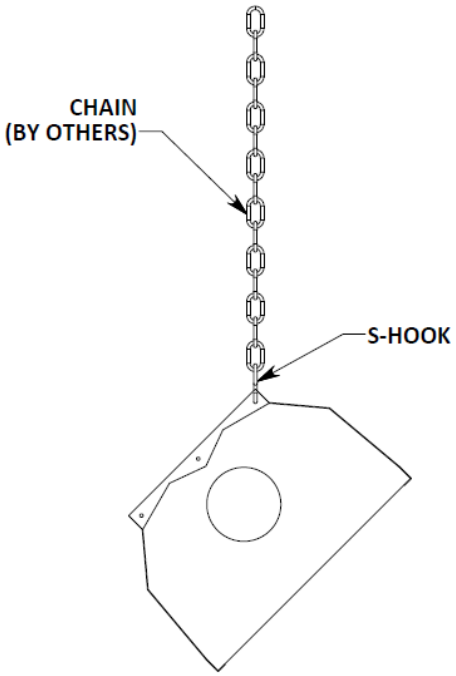


Figure 22. 45° TILT

11.0 ASSEMBLY OF COMPONENTS

11.1 GENERAL INSTRUCTIONS

Refer to text & figures in section titled “ASSEMBLY OVERVIEW” (see page 31).
Refer to “COMPONENT ASSEMBLY” (see pages 28 to 30)

A. **CAL-40A-10’ (3M) TWO PIECE**

1) Attach burner head to 5' (1.53 m) preassembled reflector section via bolts and washers.
2) Assemble two piece baffles by inserting end with locking tabs into receiving end at 90° angle then rotating 90° until tabs are locked and baffle is in a straight line (see Figure 26 on page 30). Set these baffles aside. They must be installed in the tube in the last 10' (3 m) of the heater. (See page 30).
3) Install S-hooks onto joint hangers. Hang pre-assembled burner box, combustion tube and reflector, first 5' (1.53 m) of heater from chains. (See warnings on page 21).
4) Secure joint/hanger piece to one end of a reflector by overlapping onto joint/hanger piece 3/4 inch (see page 28) and securing via provided self-tapping screws.
5) Attach the above-mentioned reflector to the pre-assembled joint/hanger by overlapping reflector on hanger and securing via provided self-tapping screws. (See page 28)
6) Hang assembly from suspended chains via ‘S’ hooks, installed from ceiling trusses. (See warnings on page 22)
7) Install radiant tube by positioning one end into the joint hanger and butting the other end to the previously installed radiant tube. Secure with clamp and self-tapping screws.

IMPORTANT: Make sure to secure clamp to tube via self-tapping screws. (See Figure 24 on page 29)

8) Secure remaining joint/hanger pieces to reflectors as per item #4.
9) Install baffle assembly into the last (exhaust - vent end) 10’ (3 m) of the heater. (See page 30).
10) If side wall venting, install side wall vent adaptor/reducer and continue with the installation of the venting.
11) If venting through the roof, install optional flue/vent adaptor and connect to approve "8" vent chimney system.
12) If required, install outside combustion air hood and ducting. (see pages 34 for details)
13) Connect fuel supply (see pages 45 to 47)
14) Connect electrical supply and thermostat (see pages 50 to 57)

B. **CAL-50A-15' (4.8M) THREE PIECE**

1) Follow CAL-40A-10’ (3 m) Two Piece instructions item #1 thru #8 and then repeat from #4 thru #8 for the remaining items.
2) Continue to item #9

C. **CAL-75A-20' (8.1M) FOUR PIECE**

1) Follow CAL-40A-10’ (3 m) Two Piece instructions item #1 thru #8 and then repeat from #4 thru #8 for the remaining items.
2) Continue to item #9

11.2 COMPONENT ASSEMBLY

A. **JOINT HANGER TO REFLECTOR**

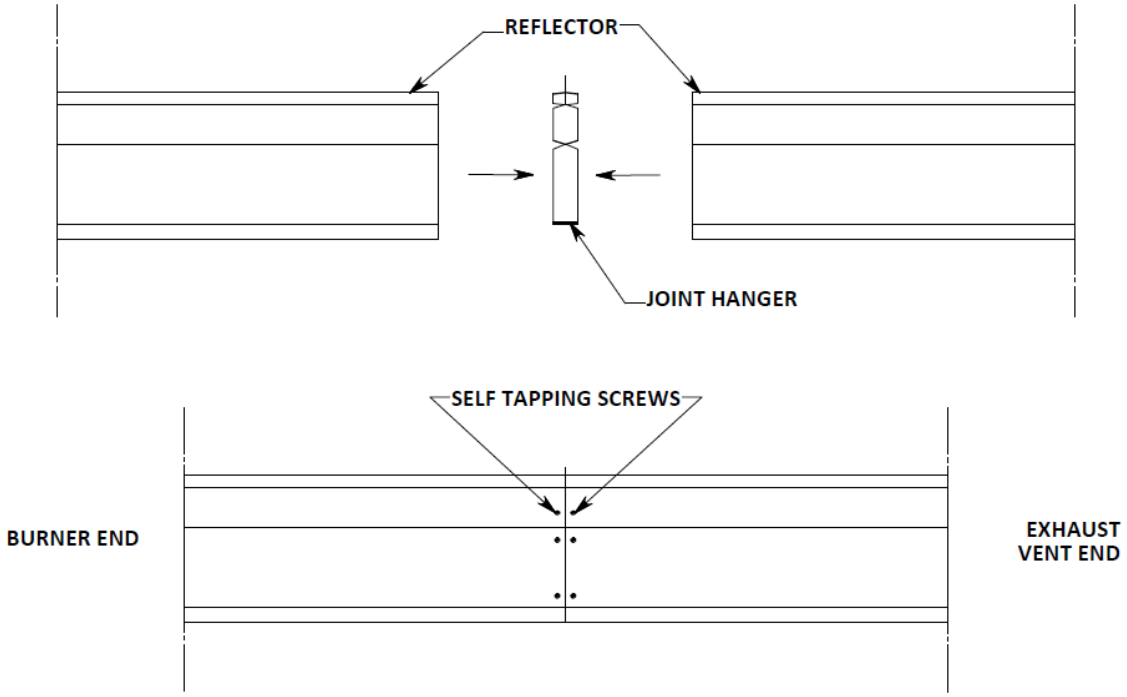


Figure 23. JOINT HANGER INSTALLATION

B. **CLAMP COUPLER**

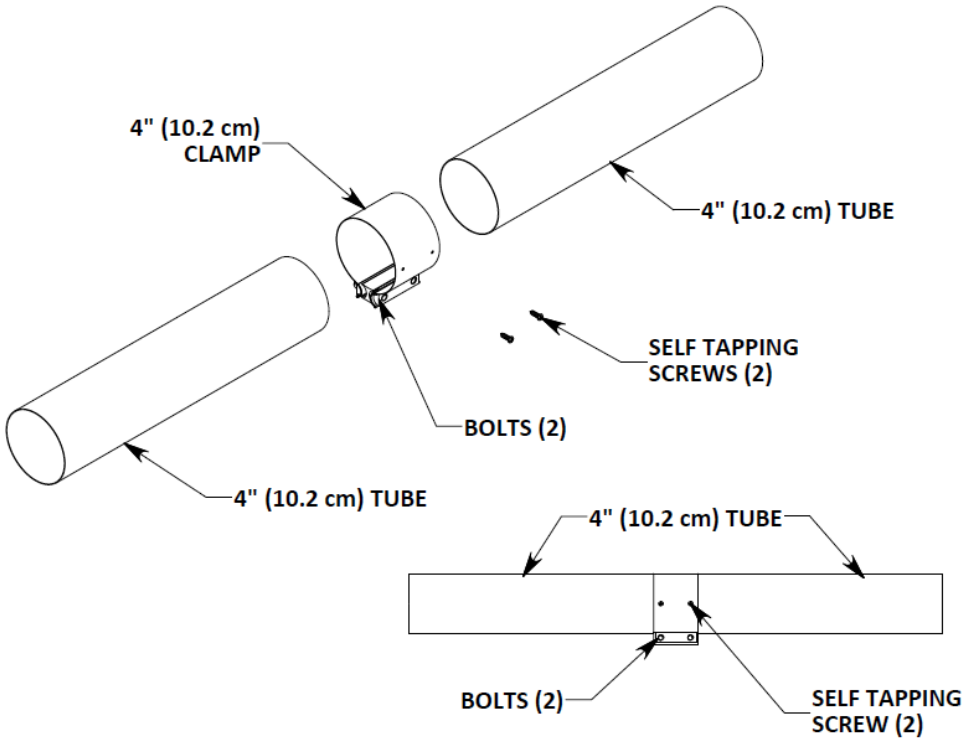


Figure 24. CLAMP COUPLER INSTALLATION

C. **END CAP TO REFLECTOR**

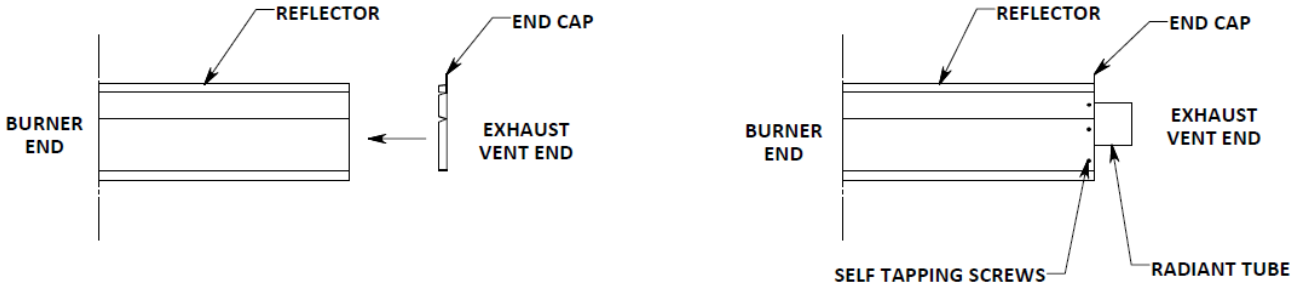


Figure 25. END CAP INSTALLATION

D. BAFFLE/TURBULATOR INSTALLATION

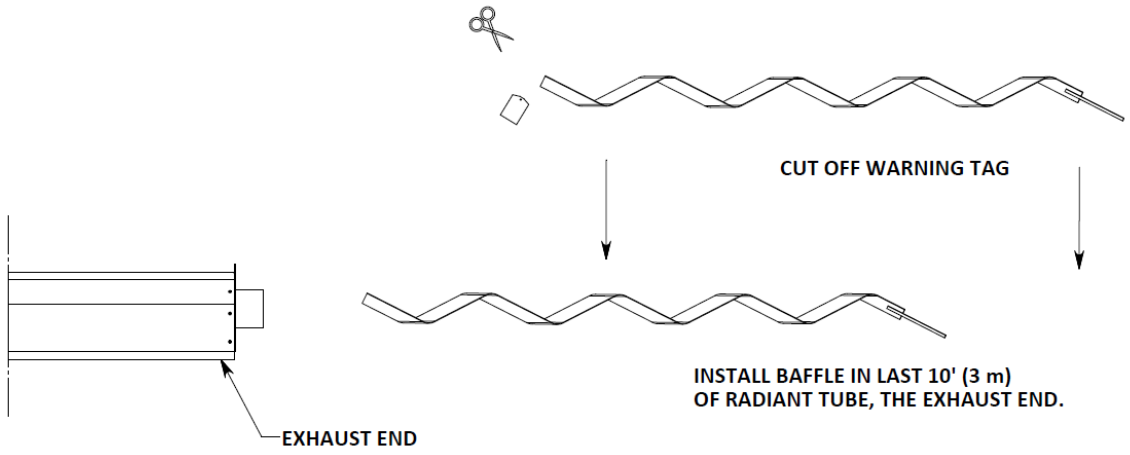


Figure 26. BAFFLE / TURBULATOR INSTALLATION

E. VENT ADAPTOR INSTALLATION

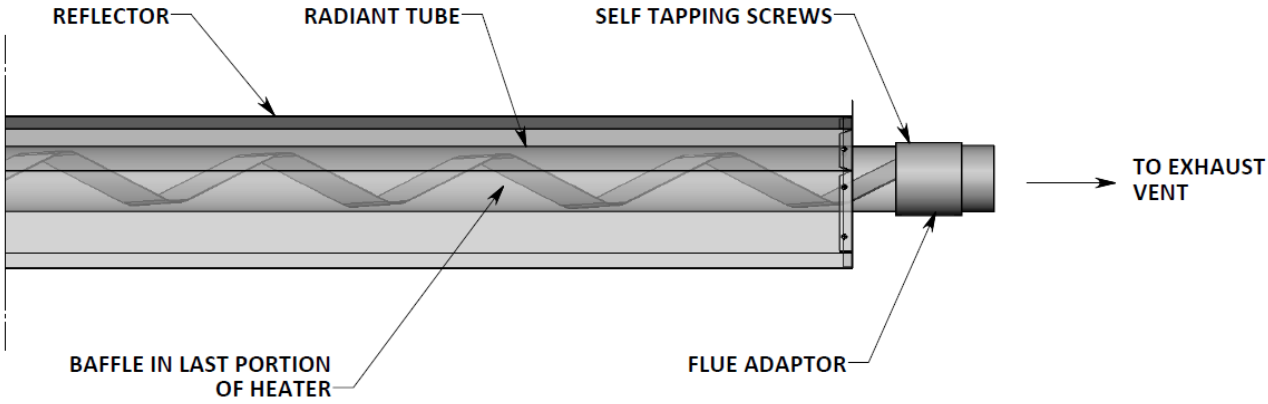


Figure 27. BAFFLE / TURBULATOR + FLUE ADAPTOR INSTALLATION

12.0 ASSEMBLY OVERVIEW

1) Verify length of reflector package to be installed. Read “ASSEMBLY OF COMPONENTS", on page 27 and view related diagrams on pages 28 - 30.
2) Locate section of manual that corresponds with length to be installed. View the corresponding exploded view. The illustration contains the details required to install the unit.

REFLECTOR PACKAGE LENGTH	CORRESPONDING PAGE
10' (3m)	**32**
15' (4.6m)	**32**
20' (6.1m)	**32**

12.1 ASSEMBLY OF OPTIONS

Refer to section of manual containing option to be installed.

OPTIONS	CORRESPONDING PAGE
90° Elbow Kit	**33**
180° U-Bend Kit	**33**
Combustion Air Kit	**35**
Sidewall Vent Kit	**39**
Outdoor Installation Kit	**43**
Low Voltage Thermostat	**56**
Line Voltage Thermostat	**57**

View exploded illustration, install accordingly.

12.2 REFLECTOR ASSEMBLY: ALL LENGTHS

A. **10' (3M) REFLECTOR PACKAGE**
B. **15' (4.16M) REFLECTOR PACKAGE**
C. **20' (6.1M) REFLECTOR PACKAGE**

10' (3 m) - 2 - 5' (1.53 m) Sections
15' (4.6 m) - 3 - 5' (1.53 m) Sections
20' (6.1 m) - 4 - 5' (1.53 m) Sections

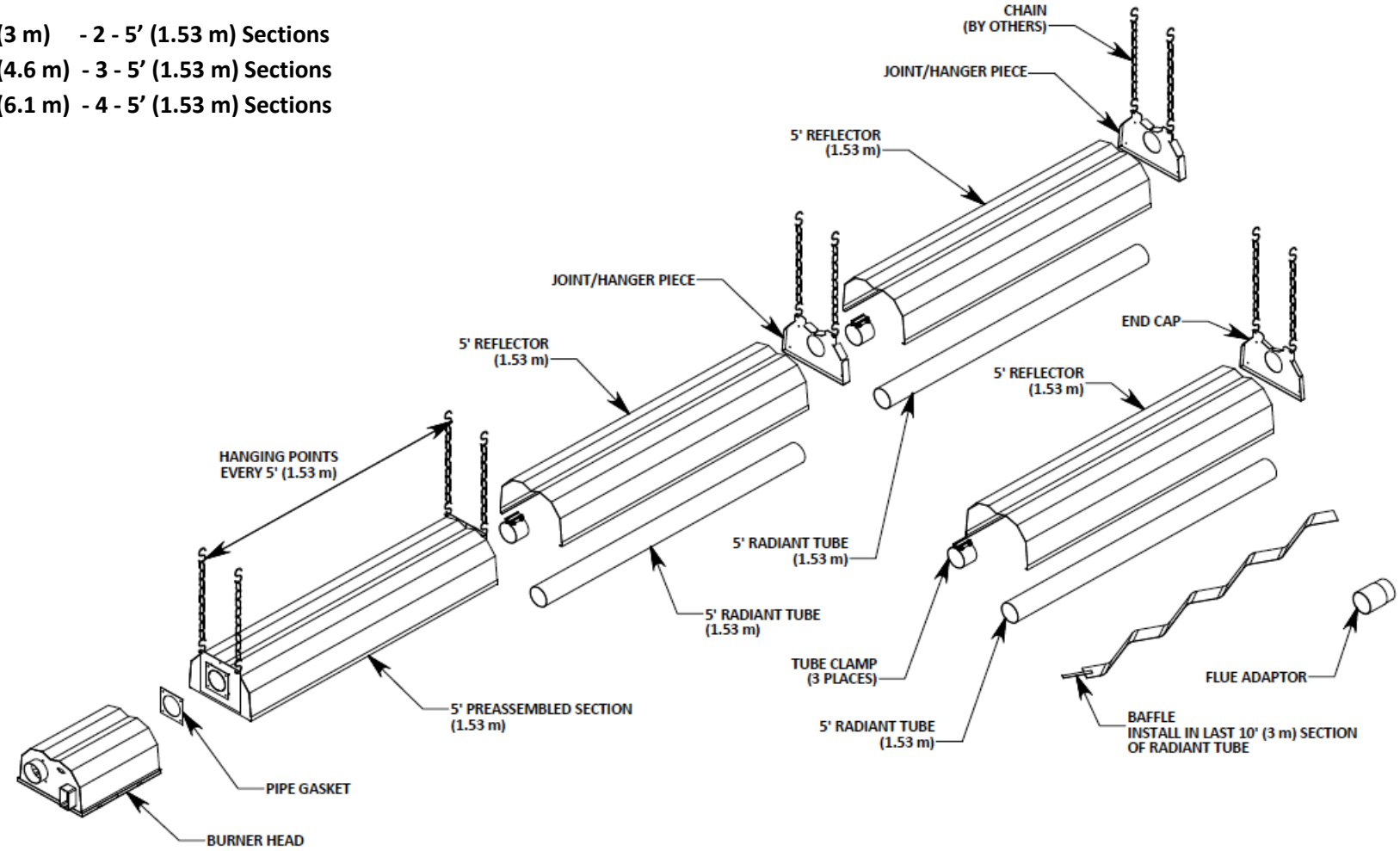


Figure 28. 10' (3m), 15' (4.16m), 20' (6.1m) REFLECTOR PKG ASSEMBLY & INSTALLATION DETAILS

D. 90° ELBOW KIT

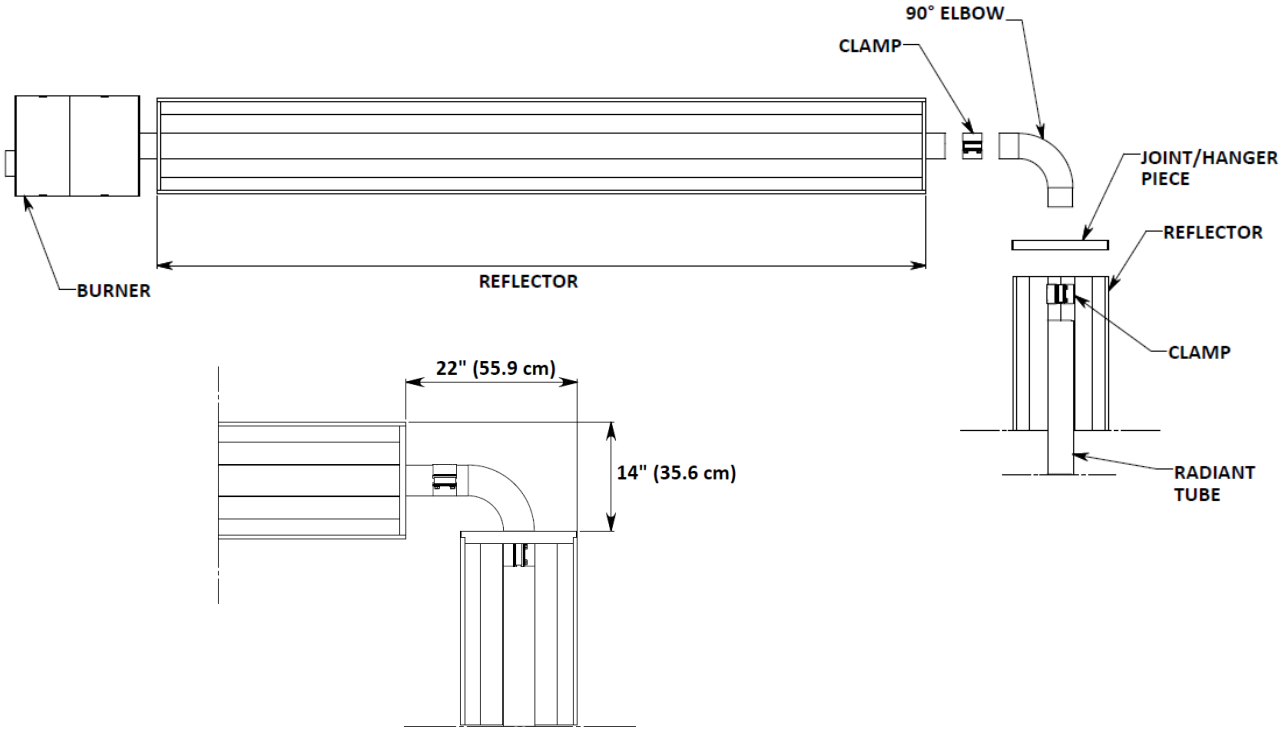


Figure 29. 90° ELBOW KIT INSTALLATION

E. 180° U-BEND KIT

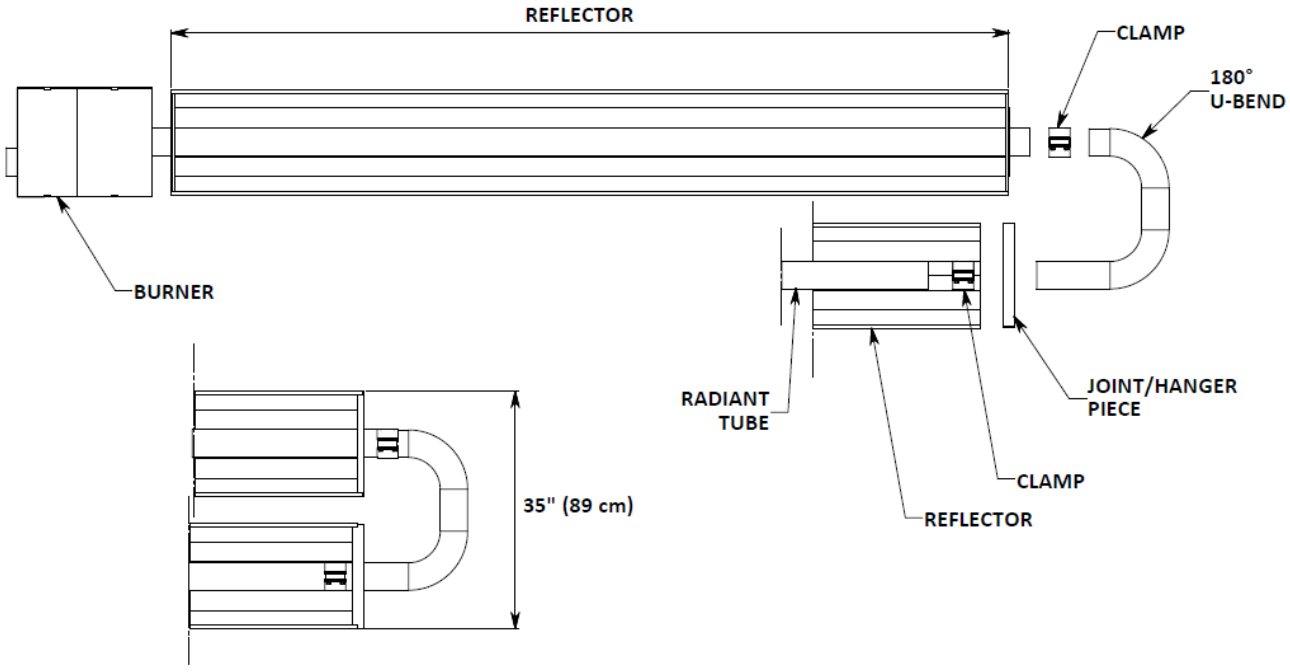


Figure 30. 180° U-Bend Kit

13.0 OUTSIDE COMBUSTION AIR SUPPLY

(Refer to page 35)

The heater must be installed in a location where there is adequate air supply for combustion to take place.

Outside Combustion Air is required for U. S. Residential Garage Heater Installations, and optional for others. Outside air can either be ducted directly to the burner head or a 4" (10.2 cm) fresh air hood can be installed in the wall in such a fashion that the outside air can enter the space that the heater is installed in.

In other installations: If the heater is: 1.) Installed in a tightly closed building that has less than one (1 sq inch (2.54 sq cm) of free opening for each 1,000 b.t.u input of heater or less than 100 square inches of free opening. Or, 2.) If the building has contaminants in the air or the air is under a slight negative pressure.

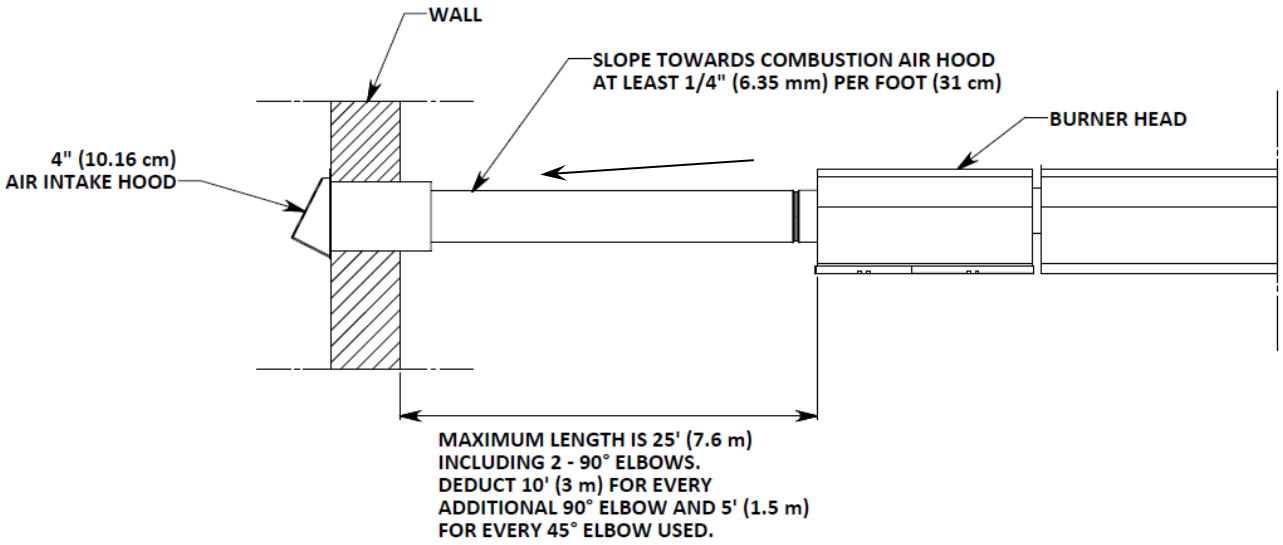
Provisions for adequate combustion and ventilation air must be provided. Adequate clearances around air openings into the combustion chamber must be provided.

NOTE: Maximum Duct Length for is 25' (7.6 m). This length can have up to 2 - 90° elbows included, thereafter, deduct 10' (3 m) for every 90° elbow and 5' (1.53 m) for every 45° elbow used.

If condensation occurs, insulate duct or contact distributor for alternate methods for your installation. Slope duct down, away from burner box towards the combustion air intake hood. The combustion air intake hood must be installed at a height sufficient enough to prevent any blockage by snow.

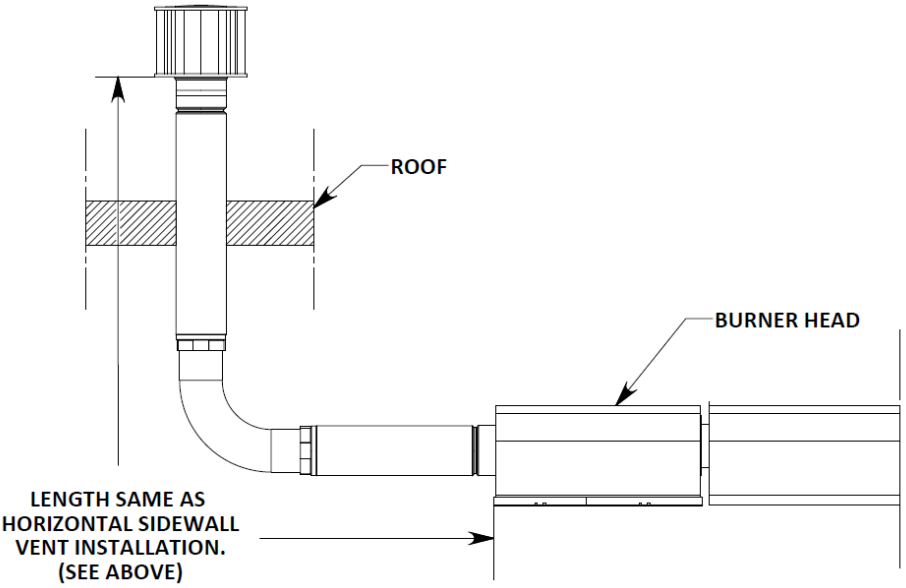
A. **COMBUSTION AIR OPTION A DUCTED**

HORIZONTAL



B. **COMBUSTION AIR OPTION A DUCTED**

VERTICAL



C. **COMBUSTION AIR OPTION B UN-DUCTED**

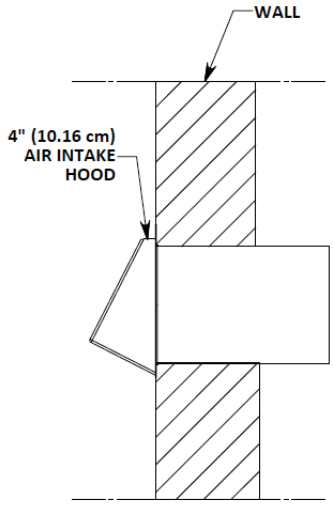


Figure 31. OUTSIDE COMBUSTION AIR SUPPLY

14.0 VENTING

ANSI Z83.20-2016/CSA 2.34-2016
GAS PRODUCTS NO. 405
JANUARY 1, 2019

APPROVED CATEGORY III Venting Method

In North America (Canada and the USA) the SPECIAL VENTING method, as detail below, is approved as a Category III venting system for Calcana installations where venting is required.

The venting system is to be provided by the installer. The use of readily available, single wall venting materials with a thickness no less than 26 gauge is to be used. If 26 gauge "C-vent" or galvanized "stove pipe" is selected, each joint will need to be sealed with high temperature silicone as prescribed below, as well as the connection will require a minimum of three (3) #8 sheet metal or self tapping screws to be used in a pattern such that each screw is installed at a distance that is equal between the number of fasteners selected. If material other than the aforementioned is employed, connect sections of material in such a fashion that each connection is secure and sealed. A minimum 36" (91 cm) length of 3" (7.62 cm) (CAL-40A, 50A or CAL-75A) or 4" (10 cm) (for all models) single wall material, with a thickness no less than 26 gauge is to be installed at the exhaust end of heater. This length can include elbows. If a portion of venting is to pass through a wall, installer can continue the single wall vent as long as a combustible wall thimble is used to provide adequate clearance to combustibles, or "B-vent (and related accessories) can be used. If a portion of venting is to pass through a roof, installer to use "B-vent" (and related accessories) for these sections. Use approved chimney cap for vertical installations and approved high wind terminal, as described below in subsection B and C for HORIZONTAL VENTING. Installer is to adequately support vent system to prevent sagging in a manner that is in accordance with codes for the area.

Installer is to make sure all flue joints are sealed. Use only suitable products equal to General Electric RTV106 or Permatex 81160 High-Temp Red RTV, Red High Temperature Silicone Adhesive Sealant (not supplied). Apply a minimum of ¼ " x ¼" (6.35mm x 6.35 mm) bead of silicone to each joint, and to each seam. The bead should be applied to venting material with a smaller diameter as compared to the larger opening of the mating material or in some instances, clamp, in such a fashion that when the joint is secured, the silicone is squeezed between the two materials to form a sealed connection. Apply additional silicone if needed to accomplish a sealed joint or seam.

Follow the silicone manufacturer's instructions for curing, and after the material has cured, the installer is to perform a leak test on the venting system. A soap and water solution test, on the venting installed inside the occupied space, can be used. If seamed, 26 gauge "C-vent" material is used, seal seam(s) with RTV high temperature silicone. Once the installer is satisfied that the venting system is sealed, the heater can be placed in permanent operation.

HORIZONTAL AND VERTICAL VENTING APPLICATIONS

Venting of the unit must comply with the Installation Codes CAN/CGA-B149.1. In the USA, refer to ***NATIONAL FUEL CODE ANSI Z223.1/NFPA 54***; current edition or local codes.

A. Select exhaust point:

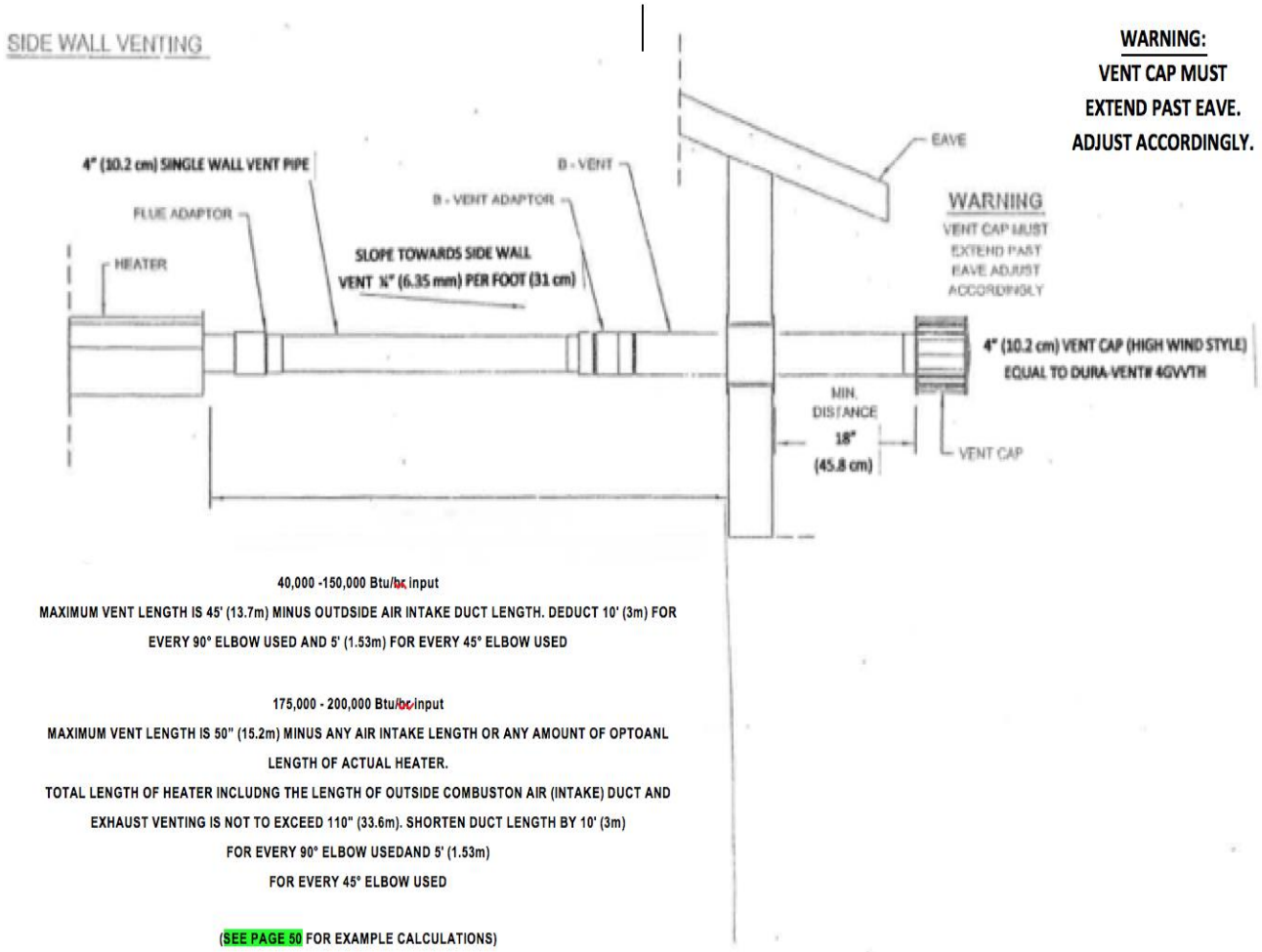
A vent shall not terminate:

a. within 6 feet (1.8 m) of a mechanical air supply inlet to a building;
b. above a meter/regulator assembly within 3 feet (.9 m) horizontally of the vertical center line of the regulator,
c. within 6 feet (1.8 m) of any gas service regulator vent outlet,
d. less than 1 foot (.3 m) above grade level;
e. less than 7 feet (2.1 m) above a paved sidewalk or a paved highway;
f. within 3 feet (.3 m) of a Window or door which can be opened in any building , any non-mechanical air supply inlet to any building or the combustion air Inlet or any other appliances.

NOTE: May be reduced to 1 foot for inputs up to 100,000 BTUH (30kW) and 3 feet (.9 m) for inputs exceeding 100,000 BTUH.

In the U.S.: The National Fuel Gas code, ***ANSI Z223.1/NFPA 54***, specifies a 4 foot (1.22 m) vent terminal clearance from gas and electrical meters, regulators and relief equipment.

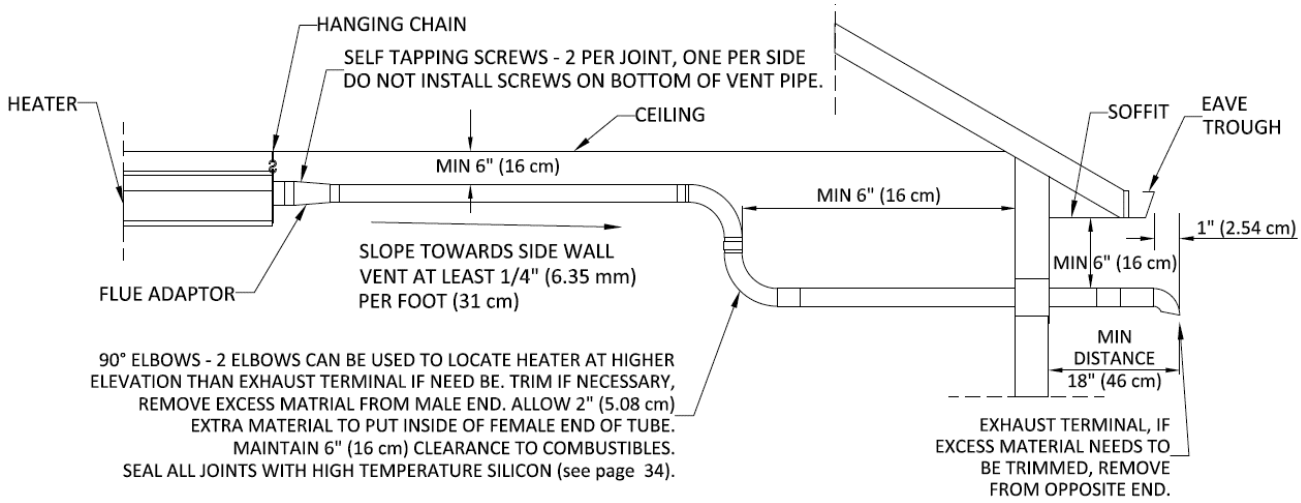
B. **HORIZONTAL VENTING – SINGLE UNIT**: For horizontal, sidewall venting a single unit, use 4" (10.16 cm) "B-Vent" equal to DuraVent PIN# 4GV36 in combination with a combustible wall thimble, a "B-vent" to "C-Vent" (single wall) adaptor equal to DuraVent PIN#4GVC, and HIGH WIND VENT TERMINAL equal to DuraVent PIN# 4GVVTH.



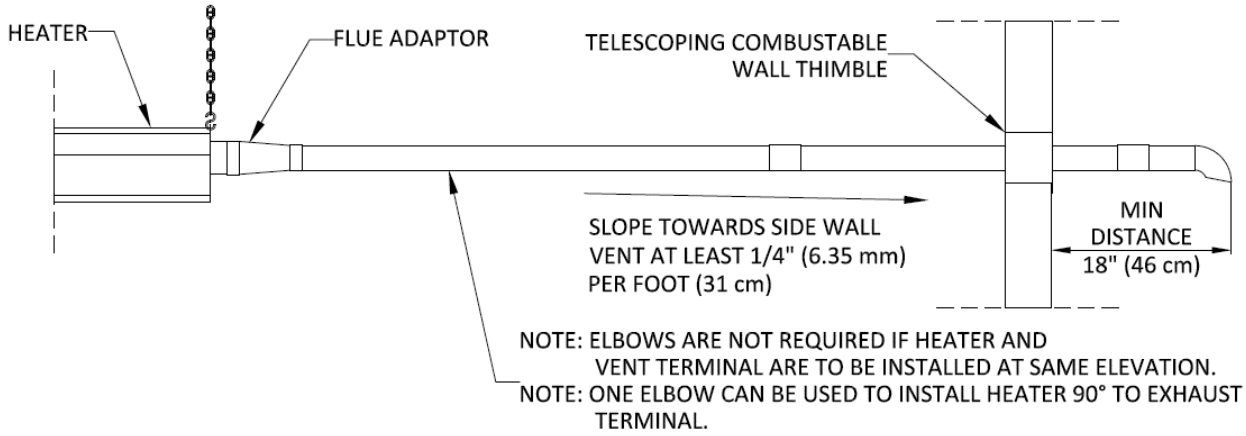
NOTE: MAKE SURE THAT ALL FLUE/EXHAUST JOINTS (AND SEAMS IF NECESSARY) INSIDE AN OCCUPIED BUILDING ARE SEALED. USE ONLY SUITABLE PRODUCTS EQUAL TO GENERAL ELECTRIC RTU 106 OR PERMATEX FORM A GASKET RED HIGH TEMPERATURE SILICONE ADHESIVE SEALANT. (NOT SUPPLIED)

Figure 54. SIDE WALL VENTING, SINGLE UNIT

ALTERNATIVELY, for models CAL-40A (ALL) CAL-50A (ALL) and CAL-75A (ALL) installer can use material equal to Calcana 3" x 16 gauge sidewall vent kit PIN#800208, c/w 4" x 3" 16 gauge reducer.



NOTE: MAKE SURE THAT ALL FLUE/EXHAUST JOINTS ARE SEALED. USE ONLY SUITABLE PRODUCTS EQUAL TO GENERAL ELECTRIC RTU 106 OR PERMATEX FORM A GASKET RED HIGH TEMPERATURE SILICONE ADHESIVE SEALANT. (NOT SUPPLIED)



D

NOTE: VENT PIPE CAN BE TRIMMED IF NEEDED. CUT EXCESS MATERIAL AS REQUIRED. MAINTAIN 6" (16 cm) CLEARANCE TO COMBUSTIBLES. SEAL ALL JOINTS WITH HIGH TEMPERATURE SILICON (SEE PAGE 36).

Figure 32. SIDE WALL VENTING, SINGLE UNIT

NOTE: Maximum length is 25 feet including, two (2) 90° elbows, deduct 10' for every additional 90° elbow and 5' for every 45° elbow.

C. **ROOF EXHAUST – VERTICAL VENTING:** Use 'B' style chimney.

SIDE VIEW

WARNING: MAKE SURE VENT CAP IS NOT OBSTRUCTED BY SNOW. ADJUST ACCORDINGLY.

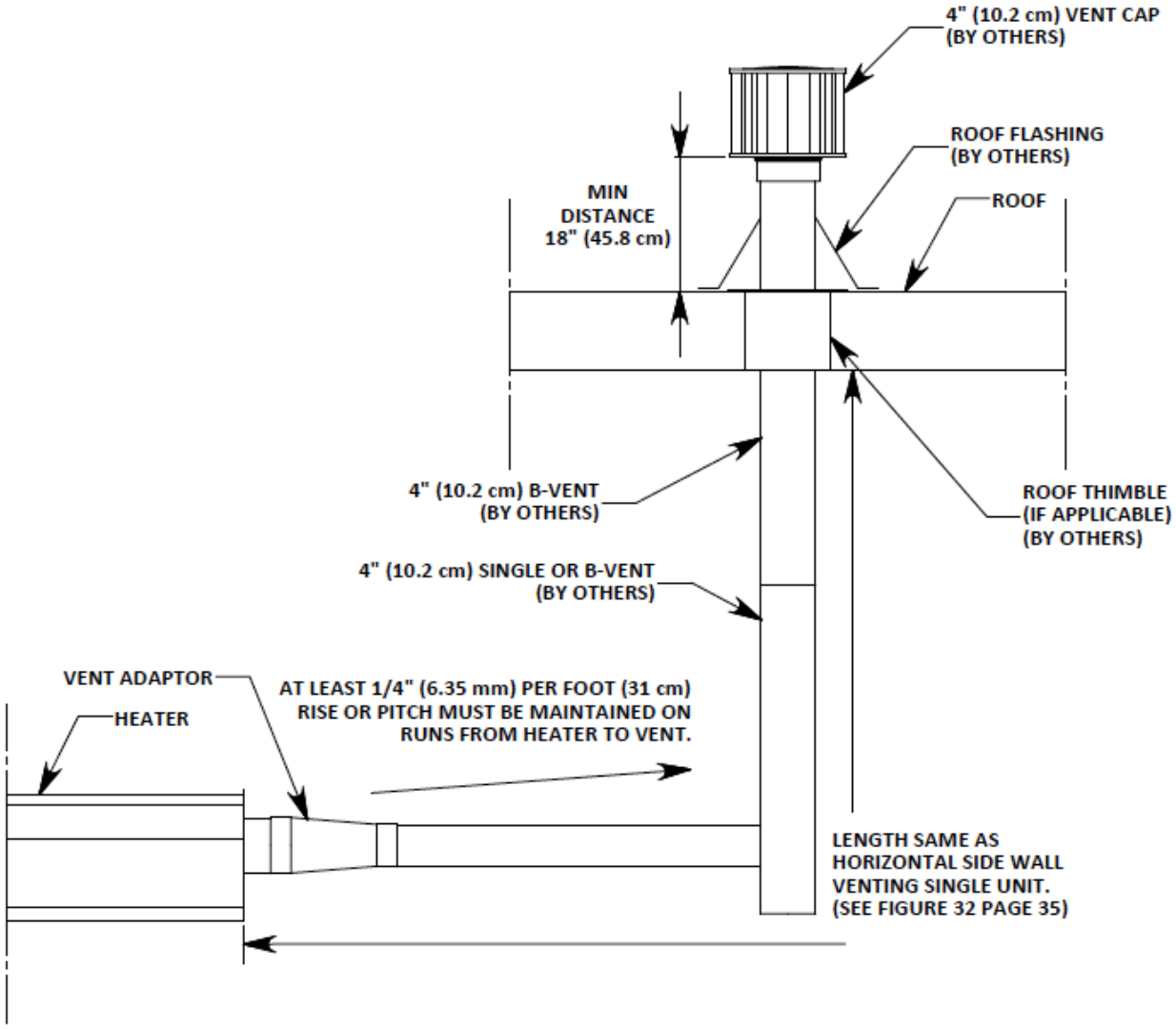


Figure 33. VERTICAL VENTING, SINGLE UNIT

VERTICAL VENTING (CONTINUED) ROOF EXHAUST : **TWO OR MORE UNITS - USE 'B' STYLE CHIMNEY.**

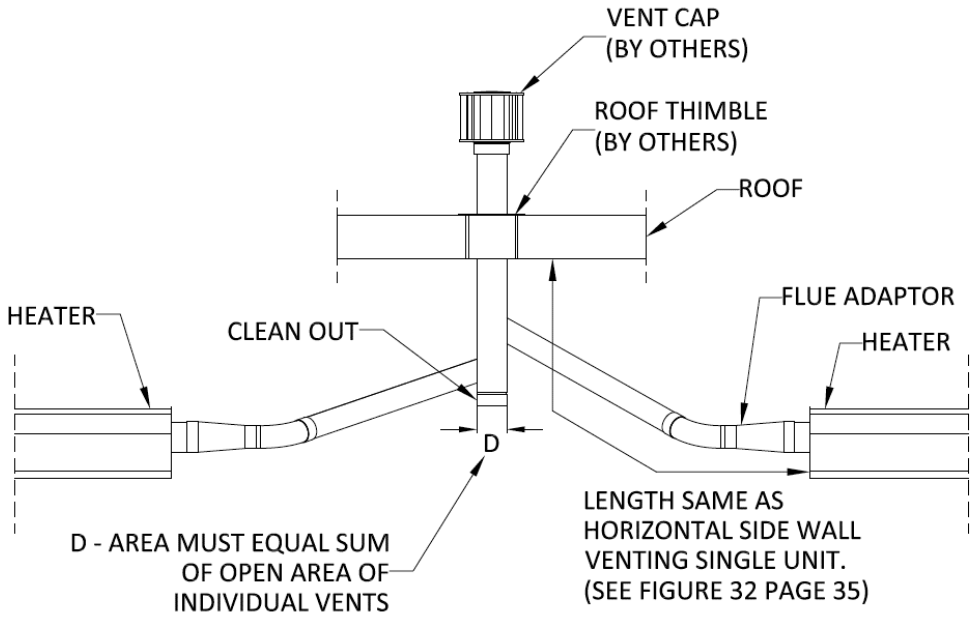
TWO OR MORE UNITS INTO A COMMON CHIMNEY – SIDE VIEW

NOTE: For venting of two or more heaters into one common chimney, in Canada refer to the ***Natural Gas and Propane Installation Code, CSA B149.1*** or latest edition and in the USA, the ***National Fuel Gas Code, ANSI Z223.1/NFPA 54*** or latest edition.

Units that are commonly vented must be controlled by the same line voltage thermostat.

SIDE VIEW

WARNING: MAKE SURE VENT CAP IS NOT OBSTRUCTED BY SNOW. ADJUST ACCORDINGLY.



TOP VIEW

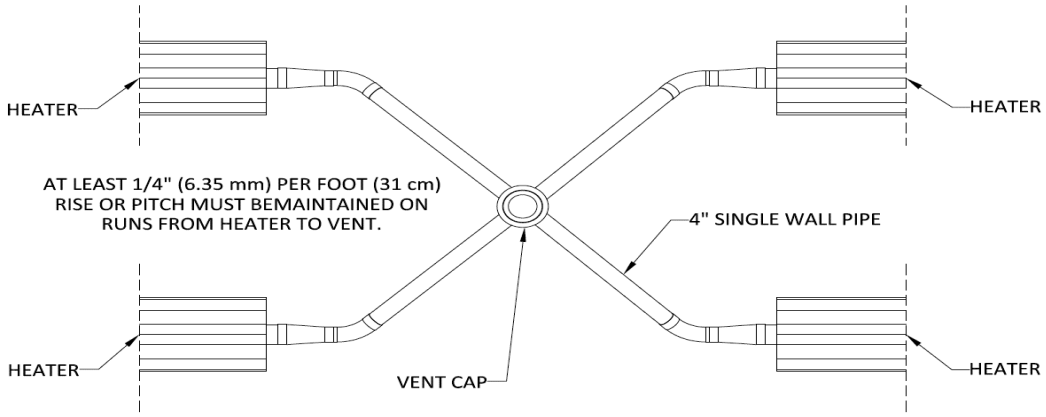


Figure 34. COMMON VERTICAL VENTING, TWO OR MORE UNITS INTO ONE COMMON VENT

D. Vent terminal must be installed at a height sufficient to prevent any blockage by snow.

E. Protect building materials from any degradation that may be caused by flue gases.

F. Support vent to prevent sagging.

Make sure that all flue joints are sealed. Use only suitable products equal to General Electric RTU106 or Permatex Form a Gasket Red High Temperature Silicone Adhesive Sealant (not supplied).

For sidewall venting, the heater must not be connected to a separate chimney, but must be installed using the venting system supplied with the heater.

If condensation in flue is present then flue should be insulated or shortened. Install according to Codes CAN/CGA-B149.1. In the USA., refer to ***ANSI Z223.1/NFPA 54 NATIONAL FUEL GAS CODE*** current edition.

NOTE: Refer to the CAN/CGA-B149.1 code for venting of two or more heaters into one common vertical chimney. In the USA., refer to ***ANSI Z223.1/NFPA 54 NATIONAL FUEL GAS CODE*** current edition.

NOTE: A small amount of condensation may occur from the heater, when it starts the heating cycle. The condensation will stop once the heater warms up. Make sure all venting is sealed.

15.0 OUTDOOR APPLICATIONS

Units can be installed in outdoor locations.

Procedure:

- Attach Outdoor Air Intake Hood to air intake collar located on end of burner box with three (3) screws. Apply silicone adhesive to seal joint.
- Attach vent cap to exhaust end of heater with two (2) screws. Trim excess length from vent cap prior to installing into adaptor.
- FUEL SUPPLY: Via approved flexible connector for your area. (see page 47)
  CANADA: ***Natural Gas and Propane Installation Code, CSA B149.1*** or latest edition.
  USA: ***National Fuel Gas Code, ANSI Z223.1/NFPA 54***, or latest edition.
- Electrical connections for outdoor locations must be made in accordance with:
  ELECTRICAL GROUNDING:
  CANADA: ***Canadian Electrical Code, CSA C22.1*** or latest edition.
  USA: ***National Electrical Code, AN51/NFPA 70*** or latest edition

  In Canada: Electrical equipment and wiring shall comply with the applicable provisions of the current Canadian Electrical Code, CAN/CSA C22.1, Part I and Part II, and CAN/CSA C22.2 No. 3, Electrical features 0/ Fuel Burning Equipment.

A. OUTDOOR INSTALLATIONS

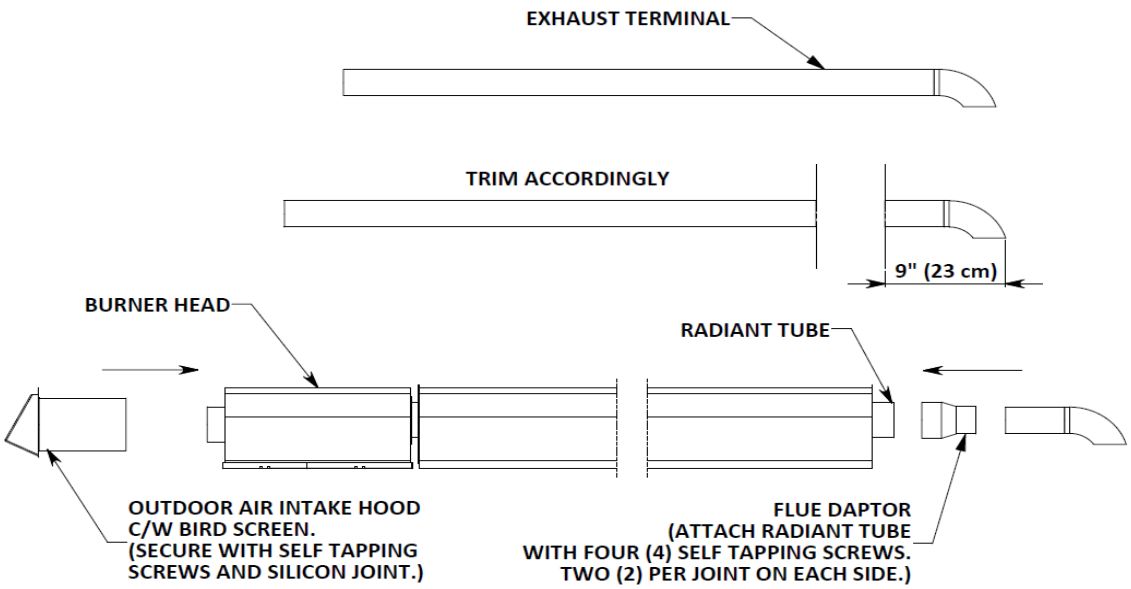


Figure 35. OUTDOOR INSTALLATIONS

16.0 UNVENTED APPLICATIONS

UNVENTED INSTALLATIONS: BROODER OR APPROVED INDUSTRIAL APPLICATIONS

> ⚠ **WARNING: UNVENTED INSTALLATIONS ARE NOT APPROVED FOR RESIDENTIAL GARAGES.** Do not operate heater in a residential garage application without an approved (exhaust) venting system installed and connected to the heater. When this heater is installed in a residential garage, the operation of the heater, when not connected to a properly installed and maintained venting system, can result in carbon monoxide (CO) poisoning and possible death.

Units may ONLY be installed in unvented installations such as brooder barns or industrial buildings if the following conditions are met:

1) A 4" (10.2 cm) diameter by 90° elbow must be attached to the flue, vent or exhaust end of heater and turned down pointing towards the floor. (see Figure 36)
2) The heater must be interlocked with an exhaust fan sized at 4 (four) CFM (114 Liters) for every 1000 Btu/hr input.
3) For BROODER NSTALLATION ONLY, the fan interlock is not required only if the maximum input does not exceed 30 Btu/hr per cubic foot (28.32 Liters) of volume of air in the building or the input specified by local codes or authorities.
4) Maintain clearance to combustibles at exhaust (vent) end as noted below.

A. **UNVENTED INSTALLATIONS**

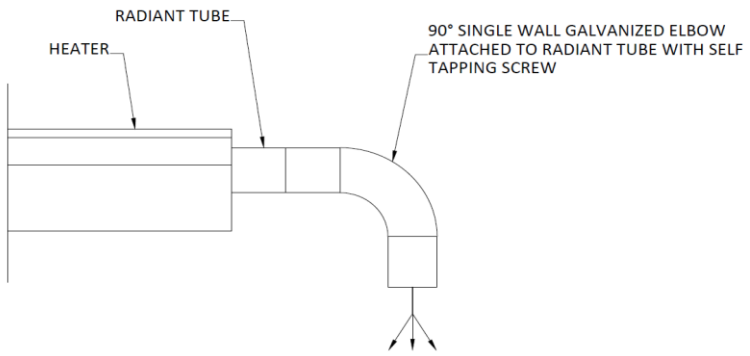


Figure 36. UNVENTED INSTALLATIONS

B. **UNVENTED INSTALLATION END CLEARANCES**

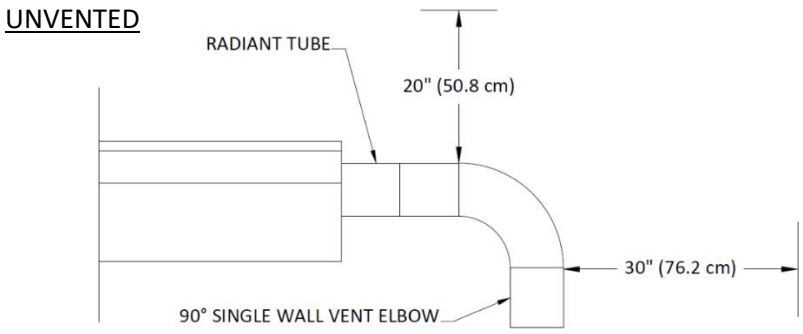


Figure 37. END CLEARANCES UNVENTED INSTALLATIONS

17.0 GAS PIPING

⚠ **WARNING:** All gas work MUST be performed by qualified/licensed personnel with adequate training and experience in this field.

⚠ **WARNING:** Use only the type of gas for which the heater is equipped. Using the wrong gas could create a hazard, resulting in damage, personal injury or death.

In Canada refer to the *Natural Gas and Propane Installation Code,* CSA B149.1 or latest edition and in the USA, the *National Fuel Gas Code, ANSI Z223.1/NFPA* 54 or latest edition.

a) Adequate supply of gas to the heater is required for it to produce the designed amount of heat output. The gas meter must have a large enough capacity to handle the extra consumption required by the heater.
b) The gas line must be of an adequate size to deliver the necessary amount of fuel to the unit.
c) If there is any question concerning 1.) or 2.) call your local gas company for further assistance.
d) Make sure that all piping is supported properly.
e) All connections must have special sealing compound applied to them.
f) A drip leg must be installed before the heater to prevent contaminating matter interfering with the operation of the unit.
g) Check piping for leaks via pressure test. **Install a 1/8" (3.175 mm) N.P.T plugged tapping** immediately ahead of heater in gas supply. Use this location for test gauge. A soap and water test can be used to verify location of any possible leak.

⚠ **WARNING: Do not use an open flame for testing!**

⚠ **WARNING:** For high pressure testing, disconnect heater(s) and shut-off cocks and cap off pipe for test. Failure to do so will damage pressure ratings on the above mentioned equipment and cause a complete replacement of these parts.

⚠ WARNING:

The heater and its individual shutoff valve must be disconnected from the gas supply piping system during any pressure testing for that system at test pressures in excess of ½ psig.

The heater must be isolated from the gas supply piping system by closing its individual manual shutoff valve during any pressure testing of the gas supply piping system at test pressures equal to or less than ½ psig.

Refer to pages 46 & 47 for gas connection to heater.

18.0 GAS CONNECTION

A. **FLEX CONNECTOR**

⚠ WARNING:

FIRE AND/OR EXPLOSION HAZARD

Can cause properly damage, severe injury or death.

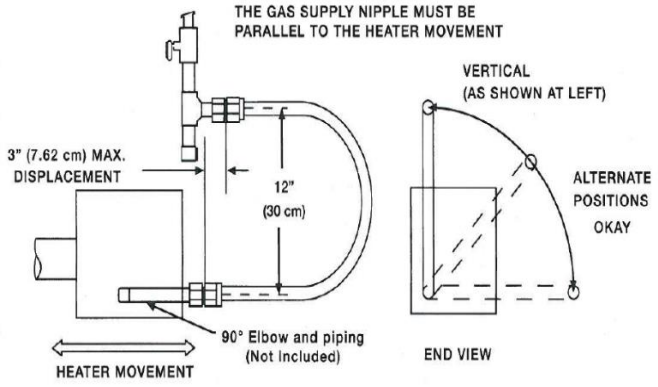
With each firing cycle, the radiant pipe will expand and contract which can cause the burner head to move horizontally with reference to the gas supply line.

If the gas connection Is not Installed In strict accordance as shown in Figure 38, a gas leak can occur resulting in an extreme unsafe condition.

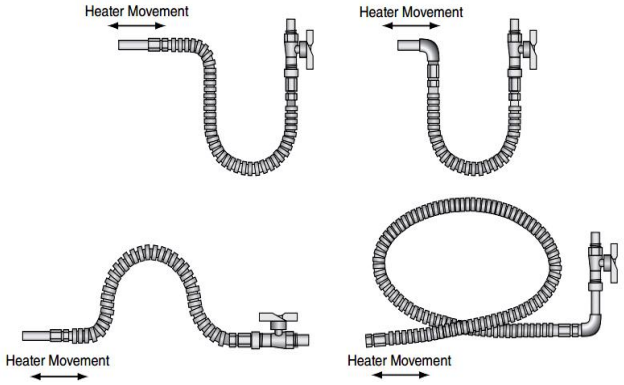
"Certified connectors are recommended to be installed as shown, (Figure 38, page 47) in one plane, and without sharp bends, kinks, or twists. The gas take off must be parallel to the burner gas inlet connection. "

(CSA)

CORRECT POSITIONS



INCORRECT POSITIONS



⚠ WARNING:

CONNECTOR MUST BE INSTALLED AS PER THE CONFIGURATION ILLUSTRATED ABOVE.

USE ONLY THE 36" (90 cm) CONNECTOR OF ½" (1.27 cm) NOMINAL ID FOR LENGTHS FROM 10' (3m) TO 70' (21.3 m) AND A 36" (90 cm) CONNECTOR OF ¾" (1.905 cm) NOMINAL ID FOR LENGTHS GREATER THAN 70' (21.3m).

IN CANADA: "A radiant tube-type infrared heater shall only be connected with a Type 1 hose connector that is (a) certified as being in compliance with the Standard for Elastomeric Composite Hose and Hose couplings for Conducting Propane and Natural Gas, CAN/CGA 8.1 and (b) of a length of 36 +/- 6" (90 +/-15 cm)."

IN USA: Flexible Metallic connectors must be certified for use on a radiant tube-type infrared heater as per the Standard tor Connectors for Gas Appliances, ANSI Z21.24/CSA 6.10.

Connector is available from manufacturer.

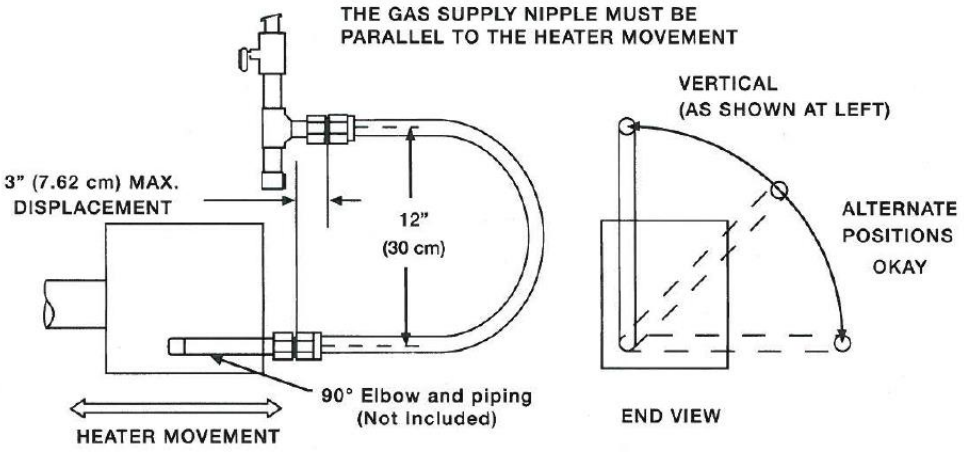


Figure 38. GAS LINE CONNECTION WITH CERTIFIED FLEXIBLE GAS CONNECTION

19.0 GAS INPUT RATE

⚠ WARNING:

Natural gas heating values can vary widely. It is the responsibility of the Installer to make sure that the input rate to the heater as installed does not exceed the nameplate rating of the heater. Failure to do so can cause radiant tube failure, resulting in injury or death.

The maximum BTUH input capacity for each model is shown on the heater's rating plate and in the specification table. This input must not be exceeded.

The input shown may be used in geographic area where the elevation is from 0 to 4,500 feet (1372m) above sea level (Canada only) in accordance with CGA 2.17-M91 (R2003), no change required to main orifice. For installations above 4,500 (1372 m) refer to ***Natural Gas and Propane Installation Code, CSA*** **B149.1** or latest edition, or contact the factory. In the USA: For installations above 2000 feet (610 m), the appliance shall be de-rated 4 percent (%) for each 1000 feet (305 m) of elevation above sea level. The Btu/hr input depends on the calorific heating value of the gas, orifice size, and manifold pressure. Orifice sizes are based upon values of 1000 Btu/hr/cu. ft (.028316 cubic meter) and 2500 Btu/hr/cu. ft. (.028316 cubic meter) for L.P.G. (propane).

⚠ WARNING:

NEVER ATTEMPT TO MODIFY THIS HEATER - FIRE, EXPLOSION, OR ASPHYXIATION MAY RESULT. If malfunction is apparent, contact qualified service agency and or gas utility for assistance.

How to Determine Gas Input Rate:

Where gas is metered, the input rate may be determined by the following method, Contact the gas supplier, Public Utility Company or Propane gas distributor to obtain the calorific gas value of the gas being used. When checking the gas input rate, any other gas burning appliances connected to the same meter must be completely off. The heater should be allowed to operate for 5 minutes before attempting to check the gas input rate.

To check flow rate, observe the one cubic foot dial on the gas meter and determine the number of seconds required for the dial hand to complete one revolution (seconds to flow one cubic foot).

To determine the number of seconds per cubic foot that is necessary to achieve the correct input rate, use the following formula:

GAS VALUE X *3600 /* DESIRED INPUT = SECONDS NEEDED

Example: 1000 BTU gas, heater input 100,000 BTUH

Seconds for one cubic foot = 1000 X 3600 /100,000 = 36 seconds

If when clocking the meter, the one cubic foot dial makes a complete revolution in less time than was calculated that it should be de-rated. It if takes more time for the meter to make one revolution than was calculated, the unit is under-fired.

The orifice size must be changed to correct an over-fired or under-fired condition. If it is determined that different orifices are needed, please contact your distributor for assistance in selecting the correct replacement.

20.0 ELECTRICAL CONNECTION

Refer to rating plate on heater for electrical specifications. All electrical connections must be made by a qualified/licensed experienced electrician.

Supply grounded, adequate electricity to the three prong electrical cord attached to the burner head.

> ⚠ **WARNING:** DO NOT operate heater until it has been thoroughly installed, inspected and is ready for initial fire-up.

NOTE: All electrical connections and wiring must be made in accordance as follows:

CANADA: *Canadian Electrical Code, CSA C22.1* or latest edition.
USA: *National Electrical Code, ANSI/NFPA* 70 or latest edition

In Canada: Electrical equipment and wiring shall comply with the applicable provisions of the current *Canadian Electrical Code, CAN/CSA C22.1, Part I and Part II, and CAN/CSA C22.2 No.3, Electrical features of Fuel Burning Equipment.*

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 105 degrees C (221 °F).

This heater is equipped with a three-prong (grounding) plug for your protection against shock hazard and should be plugged directly into a property grounded three-prong receptacle. Do not cut or remove the grounding prong from this plug.

21.0 WIRING DIAGRAM

21.1 CAL WIRING DIAGRAM

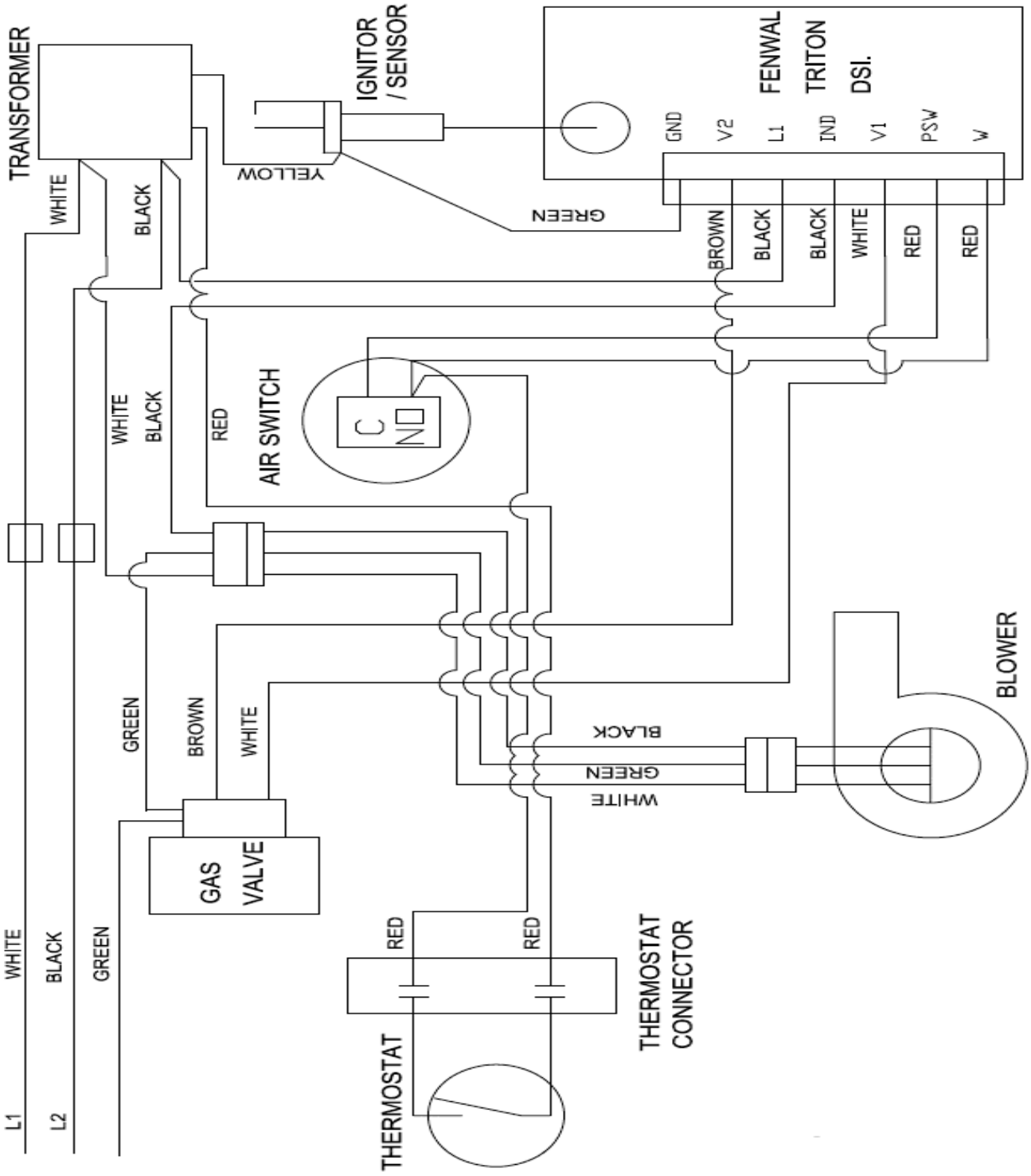


Figure 39. SINGLE INPUT 120 VOLT WIRING DIAGRAM

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* 105 degrees C (221 °F).

21.2 CAL HIGH/LOW WIRING DIAGRAM

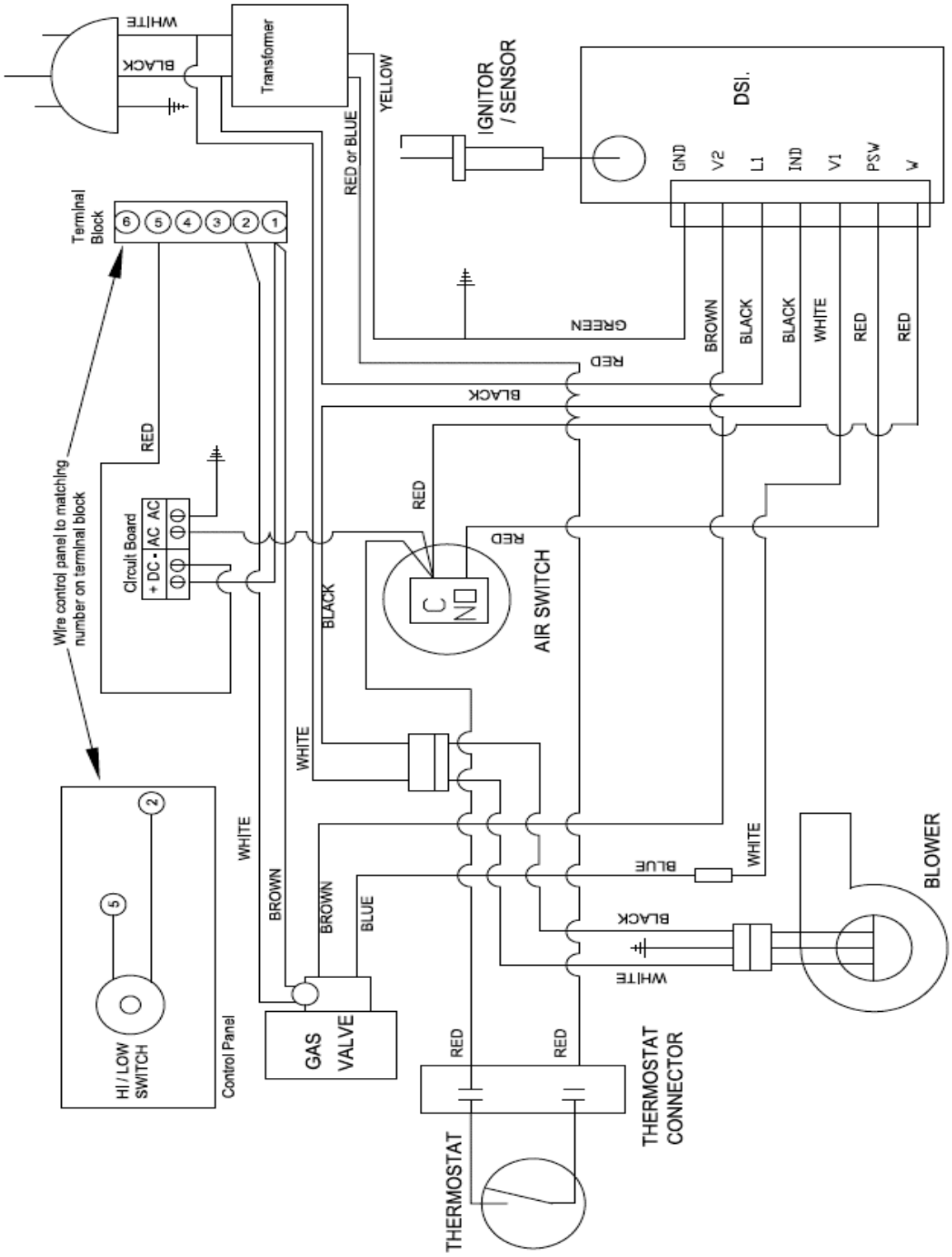


Figure 40. HIGH/LOW 120 VOLT WIRING DIAGRAM

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* 105 degrees C (221 °F).

21.3 CAL MODULATING WIRING DIAGRAM

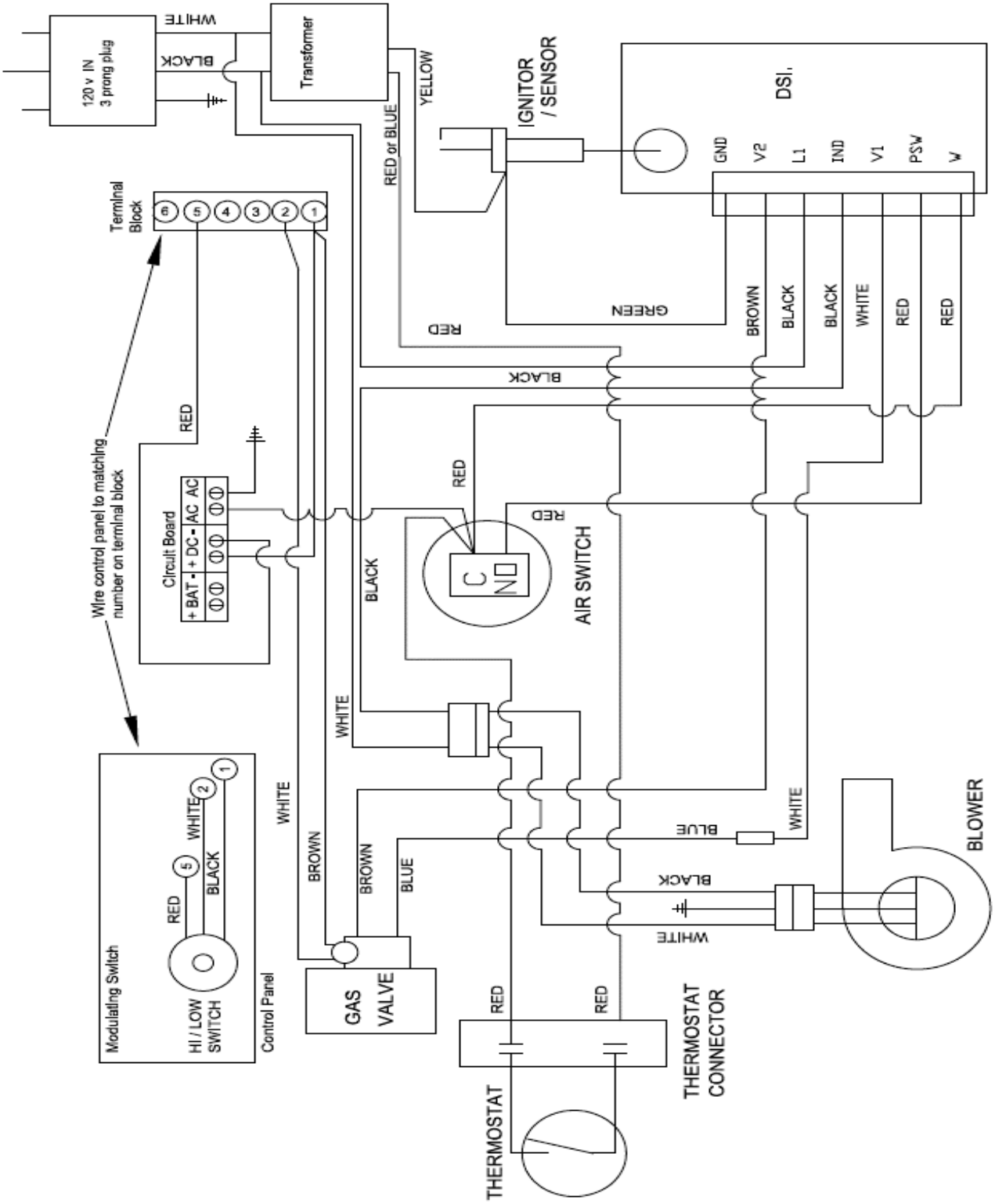


Figure 41. MODULATING 120 VOLT WIRING DIAGRAM

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* 105 degrees C (221 °F).

21.4 CAL SINGLE INPUT 24 VOLT WIRING DIAGRAM

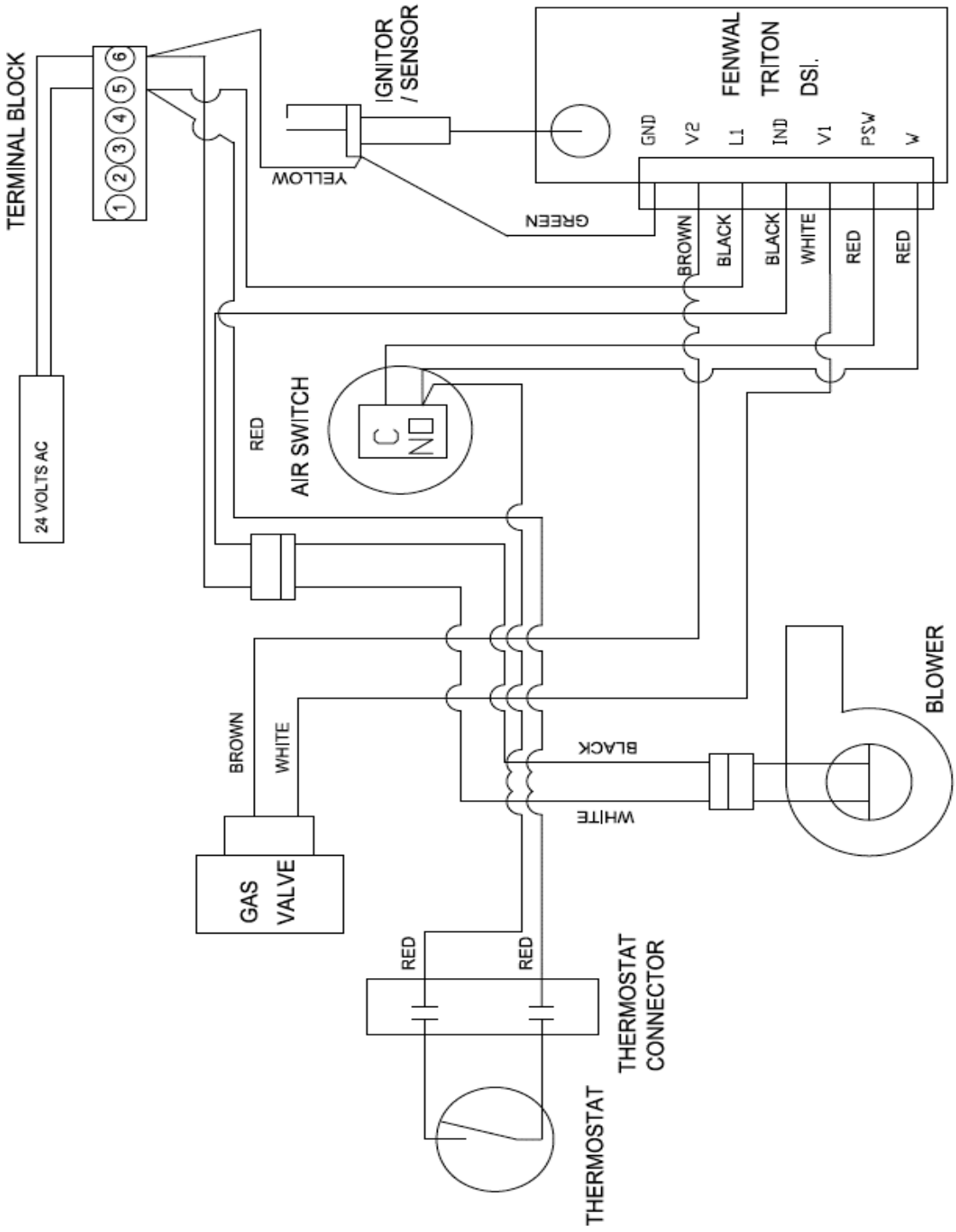


Figure 42. SINGLE INPUT 24 VOLT WIRING DIAGRAM

Drawing #: **WCS24 R1**

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* 105 degrees C (221 °F).

21.5 CAL HIGH/LOW 24 VOLT WIRING DIAGRAM

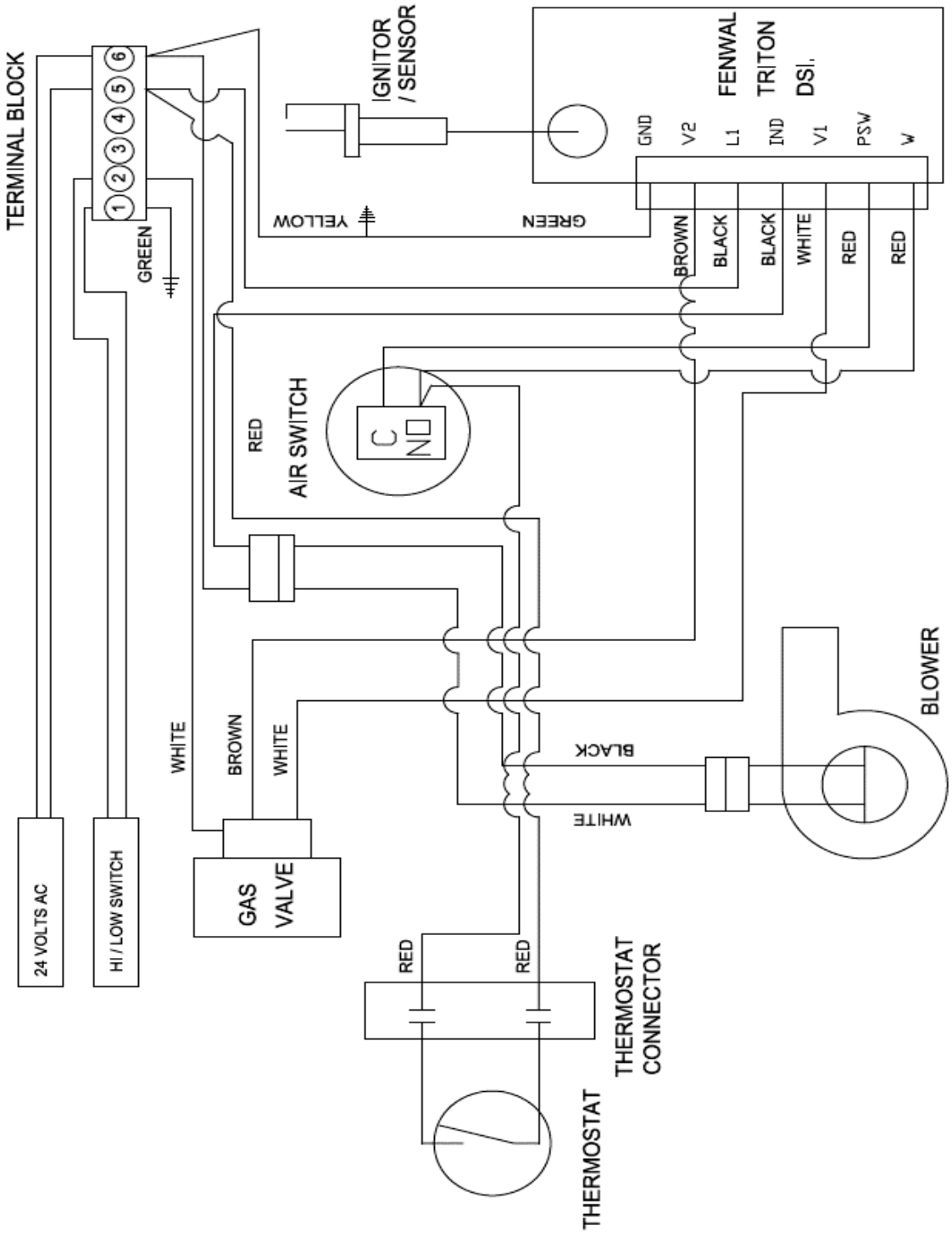


Figure 43. HIGH/LOW 24 VOLT WIRING DIAGRAM

Drawing #: **WCHL24 R1**

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* 105 degrees C (221 °F).

21.6 CAL SS 24 VOLT MODULATING WIRING DIAGRAM

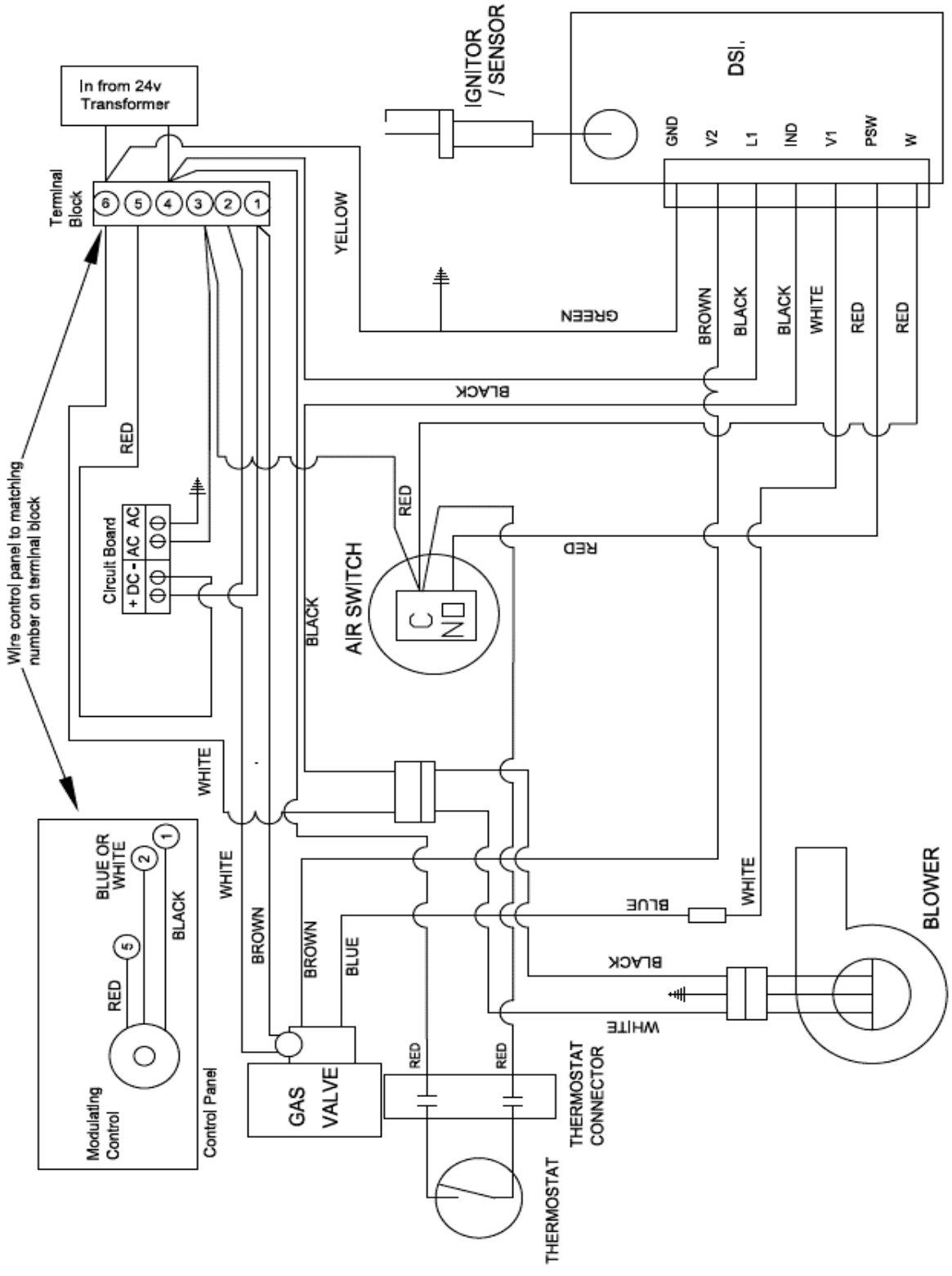


Figure 44. MODULATING 24 VOLT WIRING DIAGRAM

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* 105 degrees C (221 °F).

22.0 THERMOSTATS

22.1 LOW VOLTAGE (SINGLE HEATER)

(For wiring diagrams, refer to pages 50 to 57)

DO NOT use thermostats that have heat anticipators in them. The heat anticipators ***will*** cause the unit to cycle unnecessarily reducing its heating capacity, which can cause incomplete combustion and tile combustion by products to condensate. **A suitable thermostat can be purchased from Calcana.**

Use (part # 3060225) for this heater.

a) Locate thermostat in a convenient location away from drafts.
b) Mount thermostat to wall with hardware supplied.
c) Attach low voltage wire to connector block on heater.
d) Run wire from unit to thermostat securing wire to joists or studs along the way.
e) Trim excess wire and attach to thermostat accordingly.

NOTE: Thermostat part #3060225 can be used for line or low voltage applications. For low voltage applications, simply connect the two wire leads on the thermostat to the low voltage wiring that is attached to the low voltage thermostat connector on heater and ignore the line voltage wiring diagram on the thermostat packaging. DO NOT CONNECT LINE VOLTAGE TO THE THERMOSTAT WHEN USING THE *LOW* VOLTAGE OPTION TO CONTROL THE HEATER OTHERWISE SEVERE, UNWARANTABLE DAMAGE WILL RESULT.

A. **LOW VOLTAGE: ONE THERMOSTAT - ONE HEATER**

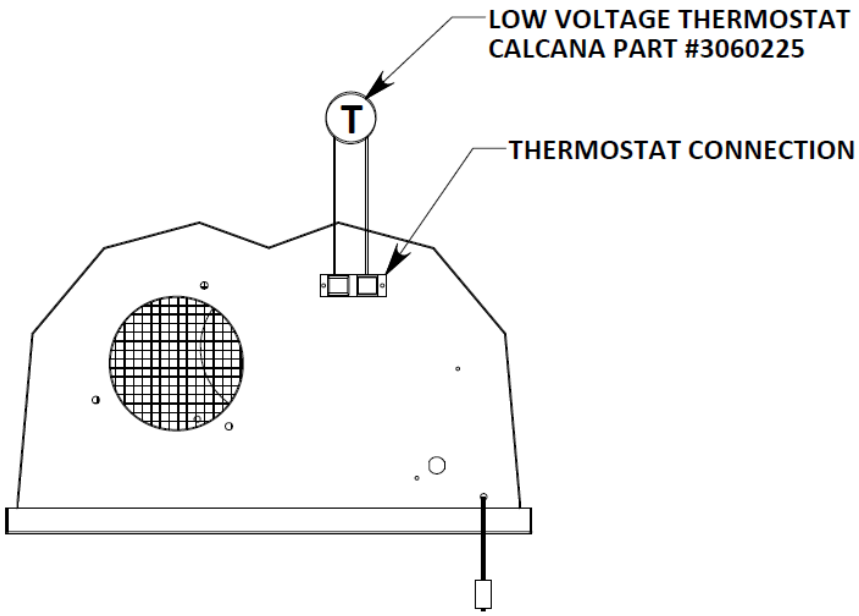


Figure 45. LOW VOLTAGE THERMOSTAT WIRING

22.2 LINE VOLTAGE (TWO OR MORE HEATERS)

If two or more heaters are to be controlled by one common thermostat, proceed as follows:
(For wiring diagrams, refer to pages 50 to 57)

a) Provide a common switched line voltage circuit to heaters controlled by a line voltage thermostat.
b) Connect a short piece of wire between the two low voltage thermostat connections to close low voltage circuit.

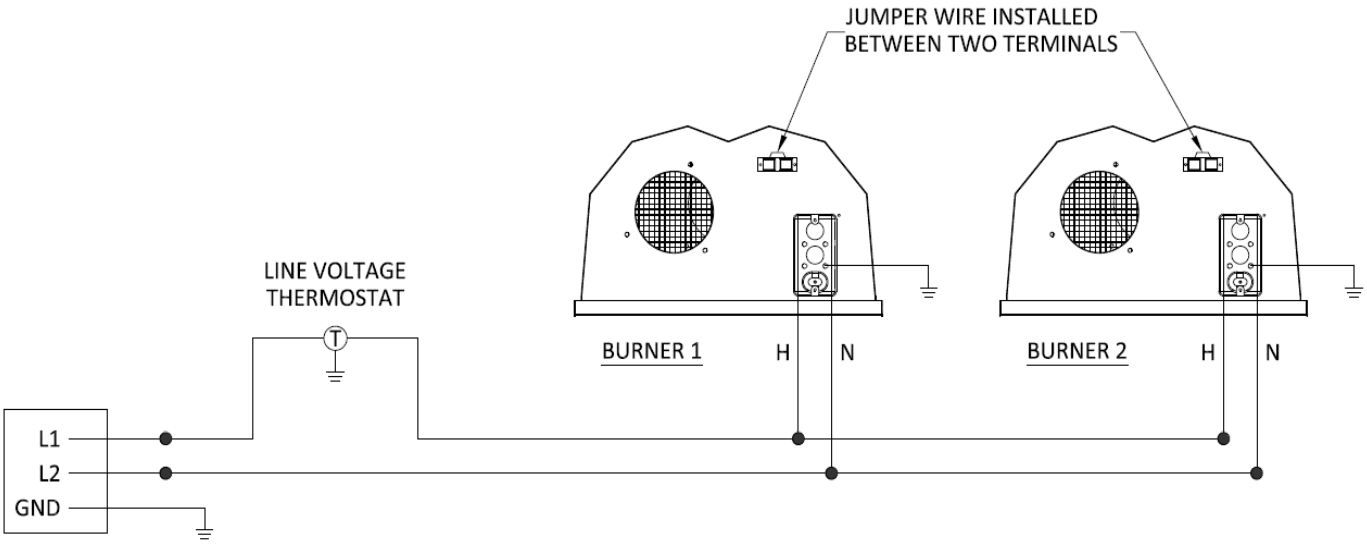
Recommended line voltage thermostats are as follows:

Honeywell (or equivalent):

- T631
- T409BA
- T410A

Thermostat part (#3060225) can be purchased from Calcana.

B. **LINE VOLTAGE: ONE THERMOSTAT – TWO OR MORE HEATERS**



MAXIMUM BURNERS PER THERMOSTAT IS DETERMINED

BY THERMOSTAT RATED AMPERAGE CAPACITY

Figure 46. LINE VOLTAGE THERMOSTAT WIRING

23.0 INITIAL START-UP

⚠ WARNING:

DO NOT ATTEMPT TO IGNITE HEATER BY HAND!!

IMPORTANT NOTICE: This heater is not to be used as a construction heater to supply heat to an unfinished building during the finishing phases of Construction. This practice exposes the unit to an abnormally corrosive atmosphere from sources such as paint, varnish and adhesives, which can lead to premature radiant tube exchanger or vent failure. The practice also allows foreign materials such as sawdust or sheet rock dust to enter the combustion blower, burner, heat exchanger and vent system, resulting in shorter life of the unit.

Use of the heater as a construction heater will void the warranty.

Procedure:

a) Make sure gas is turned on.
b) Check for any possible blockages in combustion air intake and exhaust areas of unit.
c) Make sure that venting material is properly fastened to the unit.
d) Make sure all options are attached securely.
e) Make sure electricity is on to unit.
f) Turn thermostat up past room temperature.
g) Check the flame port to see flame has established,
h) If flame is not established, turn the thermostat down for 5 seconds then turn back up or interrupt electrical supply to unit for 5 seconds, and allow unit to try again.
i) Verify that the manifold pressure (outlet pressure tap) on the gas valve is the same pressure as stated on the rating plate of the unit. Use a manometer that measures inches of water column for this procedure. If adjustment is required, remove the cap-screw from the pressure regulator housing. Adjust the white pressure regulator adjusting screw clockwise (in) to increase pressure, counterclockwise (out) to reduce pressure. Replace cap-screw. After measurement has been taken, replace pipe plug in outlet pressure tap. Check for leaks. (see pages 3, 4 & 59)
j) Verify gas input rate. (see page 48)

NOTE: Oil smoke might appear off of exchanger tube after it heats up for initial firing. Do not be alarmed. The smoke is just a small amount of oil on the surface of the tube from manufacturing. If smoke is excessive, open door and 'air out' the building until smoke is removed.

NOTE: Heater will have a higher heat output at the burner end as compared to the exhaust end. This is normal.

NOTE: A small amount of condensation may occur from the heater when it starts the heating cycle. The condensation will stop once the heater warms up. Make sure venting is sealed.

24.0 GAS VALVES

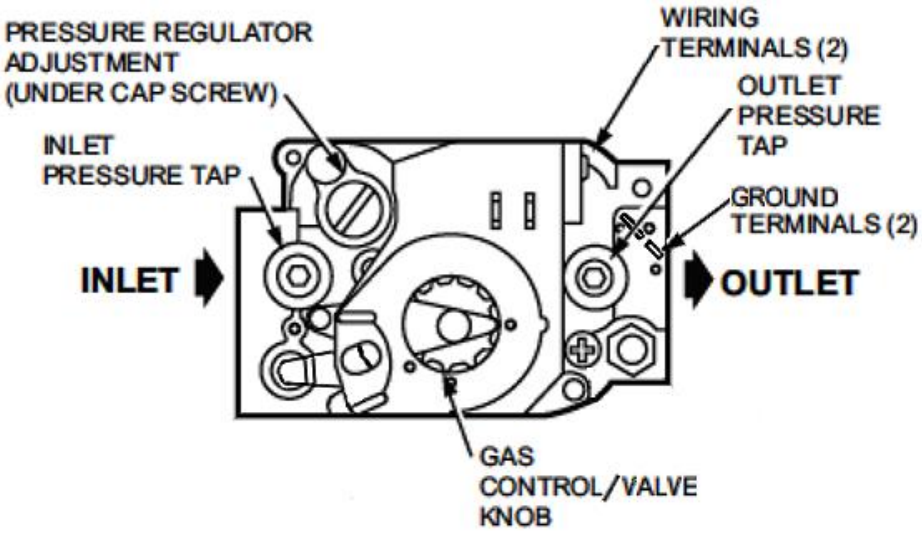
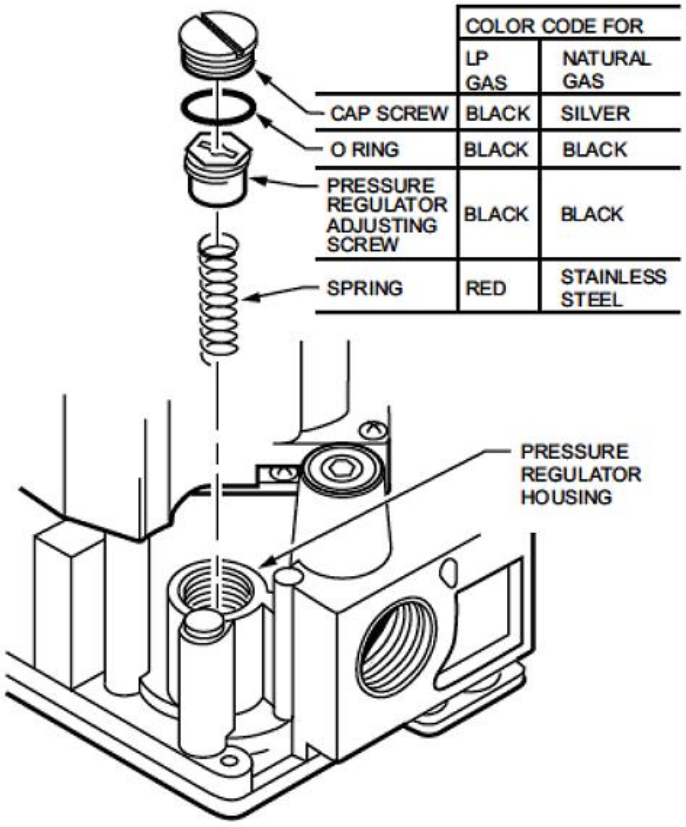


Figure 47. GAS VALVE



	COLOR CODE FOR	
	LP GAS	NATURAL GAS
CAP SCREW	BLACK	SILVER
O RING	BLACK	BLACK
PRESSURE REGULATOR ADJUSTING SCREW	BLACK	BLACK
SPRING	RED	STAINLESS STEEL

24.2 GAS VALVE DETAILS HI/LO

Check and Adjust Gas input and Burner Ignition

IMPORTANT:

1) Do not exceed input rating stamped on appliance nameplate, or manufacturer recommended burner orifice pressure for size orifice(s) used.

2) **IF CHECKING GAS INPUT BY CLOCKING GAS METER:** Make certain there is no gas flow through the meter other than to the appliance being checked. Other appliances must remain off with the pilots extinguished (or deduct the consumption from the meter reading) Convert flow rate to BTUH and compare BTUH input rating on appliance nameplate.

3) **IF CHECKING GAS INPUT WITH MANOMETER:** Make sure the gas control knob or the ignition control switch is in the OFF position before removing outlet pressure tap plug to connect manometer (pressure gauge). Also move the gas control knob or the ignition system control switch to the OFF position when removing the gauge and replacing the plug. Before removing the inlet pressure tap plug, shut off the gas supply at the manual valve in the gas piping to the appliance or, for Propane, at the tank. Also shut off the gas supply before disconnecting the manometer and replacing the plug. Repeat the Gas Leak Test at the plug with the main burner operating.

NOTE: Check the inlet pressure before adjusting the pressure regulation.

Two-stage regulator models require that you check and adjust both high and low pressure regulator settings. Two-stage appliance operating sequences vary, consult the appliance manufacturer instructions for the specific operating sequence and regulator adjustment procedures for the appliance in which the control is installed: The regulator adjustment instruction is as Follows:

1) Turn ON/OFF switch to ON. Set HI/LO switch to HI.

2) Carefully check the main burner light-off. Make sure that the main burner lights smoothly and that all ports remain lit.

3) Wait for control to move to high pressure (second stage) and then check the full rate manifold pressure listed on the appliance nameplate for high pressure. The gas control full rate outlet pressure should match this rating.

4) With main burner operating, check the gas control flow rate using the meter clocking method or check pressure using a manometer connected to the outlet pressure tap on the control.

5) If necessary, adjust the high pressure regulator to match the appliance rating.

   a) Remove the pressure regulator adjustment cap.

   b) Using a screwdriver, turn the inner adjustment screw for HI pressure clockwise to increase or counterclockwise to decrease the gas pressure to the burner.

6) After high pressure is checked; check low pressure regulation by setting HI/LO switch to LO.

7) Check the low rate manifold pressure listed on the appliance nameplate. Gas control low rate outlet pressure should match the rating.

8) With Main burner operating, check the control flow rate as before (using the meter clocking method or check pressure using a manometer connected to the outlet pressure tap on the control.)

9) If necessary, adjust the low pressure regulator to match the appliance rating.

   a) Remove the pressure regulator adjustment cap.

   b) Using a screwdriver, turn the inner adjustment screw for LO pressure clockwise to increase or counterclockwise to decrease the gas pressure to the burner.

10) Once high and low pressures have been checked and adjusted, replace pressure regulator adjustment cap. If the desired outlet pressure or flow rate cannot be achieved by adjusting the gas control, check the gas control inlet pressure using a manometer at the inlet pressure tap of the gas control. If the inlet pressure is in the nominal range (see rating plate) replace the gas control. Otherwise take the necessary steps to provide proper gas pressure to the control.

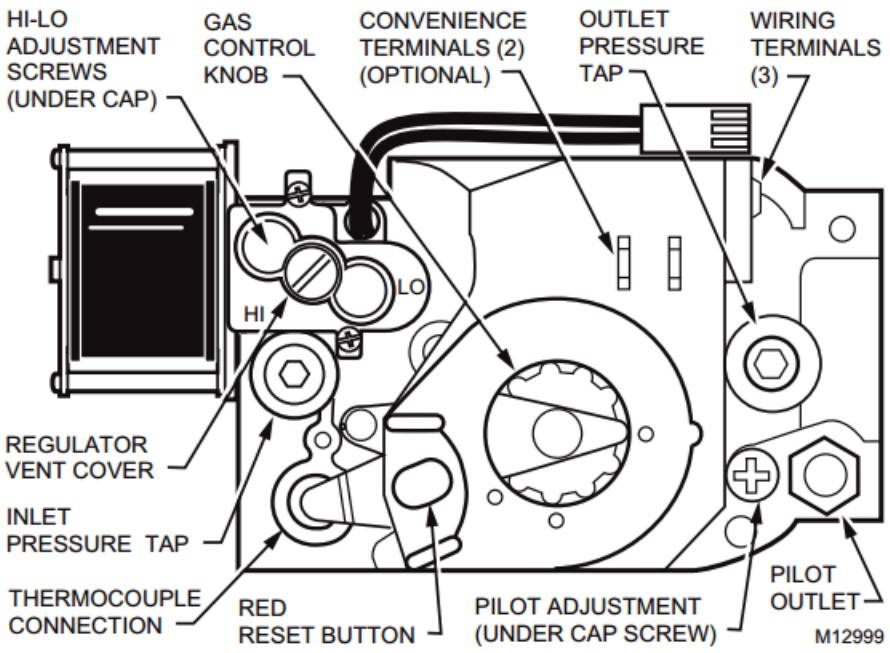


Figure 48. HI/LO GAS VALVE

25.0 MANIFOLD PRESSURE REGULATOR ADJUSTMENT AND PRESSURE VERIFICATION PROCEDURE:

⚠WARNING ⚠

INSTALLER MUST VERIFY AND ADJUST, IF NECESSARY, THE MANIFOLD OPERATING PRESSURE OF THIS HEATER

ACCORDING TO THE INSTALLATION MANUAL AND RATING PLATE OF THIS HEATER.

FAILURE TO DO SO WILL VOID ALL WARRANTIES AND MAY CAUSE DAMAGE, INJURY AND/OR DEATH.

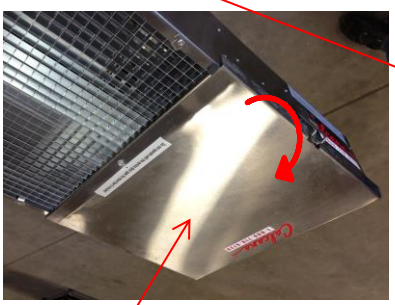
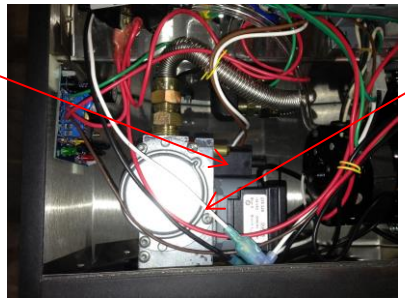
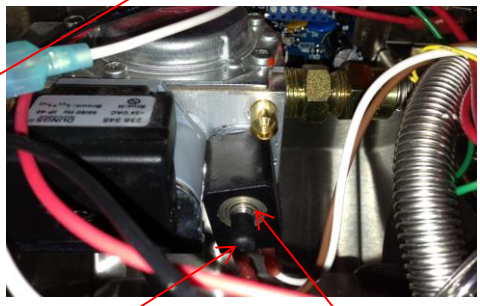
IF YOU HAVE ANY QUESTIONS CONCERNING THESE INSTRUCTIONS, CALL CALCANA AT 800-778-6729 BEFORE YOU VERIFY AND/OR ADJUST THE MANIFOLD FUEL PRESSURE ON THE HEATER. No one should work on or install this heater unless they are a licensed/qualified and insured contractor trained in the appropriate trade or technical fields (Gasfitting-HVAC-Electrician) related to the installation and/or service of this heater.
Person(s) who service and/or install this unit accept full liability and responsibility for its operation.

TOOLS REQUIRED

-Small Flat Blade Screw Driver
-2 mm (millimeter) allen wrench
-3 mm (millimeter) allen wrench
-Manometer that measures inches of water column (" W.C.)
-Volt Meter capable of reading AC and DC voltage in a range of 0 to at least 30 volts

INITIAL STEPS:

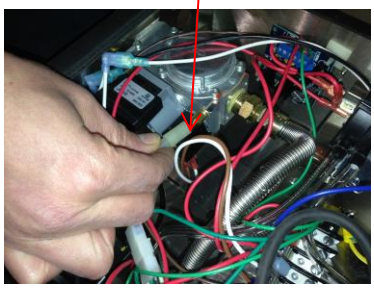
1) **The installer must verify that the heater being installed is of the correct fuel type for the available fuel that is supplied for this installation. This includes any high altitude correction that may be applicable for your installation. Confirm site has adequate fuel supply to operate all gas fired appliances, including this/these heater(s), at their maximum rated capacity simultaneously (at the same time). Make sure gas lines and pressure regulators are of a capacity to deliver the correct line pressure within the specified range for your fuel type (5" to 14" w.c. for natural gas and 12" to 14" w.c. for propane or Propane fuel) to the heater's gas line inlet connection, with all gas fired appliances on site operating at the same time. If you are unable to achieve the stated line pressures during operation, you will not be able to verify and/or adjust the gas manifold pressure setting on this heater, and the heater will not operate correctly. If fuel pressure is too low, the heater will not have enough fuel to achieve its maximum heat level. Alternatively, if the fuel line pressure is too high, the valve can be damaged.**
2) **Make sure all gas-fired appliances on site, other than this heater, are on and operating at the same time. Otherwise, an inaccurate reading of manifold pressure may occur.**
3) **Make sure this heater is not operating and is turned off when you start this procedure.**
4) ***START BY*** **opening the service door and identifying the location of the gas valve and the modulator. Remove the black plastic cap from the adjustment tower.**

SERVICE DOOR **BLACK PLASTIC CAP** **ADJUSTMENT TOWER**

5) **Locate manifold pressure tap. Open the manifold pressure tap by using a small flathead screwdriver to turn the screw inside the brass fitting counterclockwise 3 turns. DO NOT REMOVE THIS SCREW.**

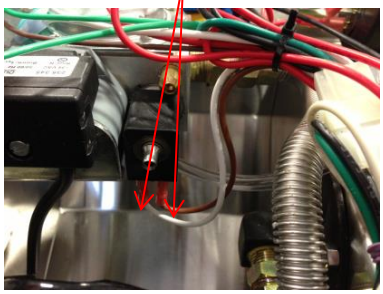
6) **Connect a manometer that registers pressure in inches of water column ("W.C.) to the manifold pressure tap.**

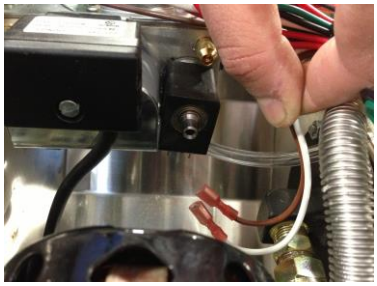


FOR LOW PRESSURE VERIFICATION and/or ADJUSTMENT:

CAUTION: Always adjust low pressure setting first since the low setting will affect the high setting.

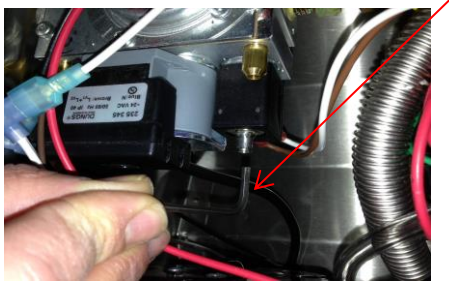
7) **Remove the electrical connection from the modulator. (Brown and White Wires)**

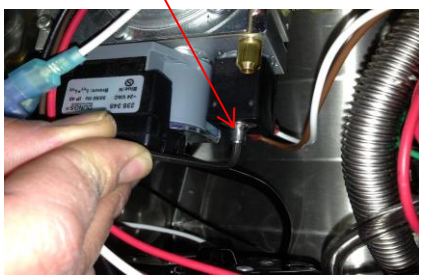




8) **Start the heater and take a pressure reading. The manifold pressure required on the low setting for natural gas is 1.25 "W.C. For liquefied petroleum gas, the manifold pressure should be 5.25" W.C. on low. The manifold pressure setting information is also contained on the rating plate which is affixed to the side of the heater near where the service lid is located.**

9) **If adjustment is needed, insert a 3mm allen wrench into the adjustment tower and turn clockwise to lower pressure and counterclockwise to increase pressure.**

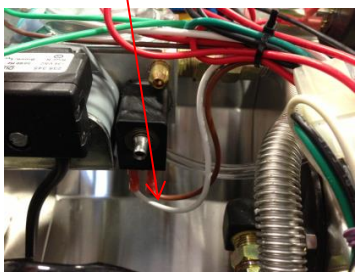




10) **Once proper pressure is confirmed, turn off the heater, and go to step 11) for high pressure verification and/or adjustment instructions.**

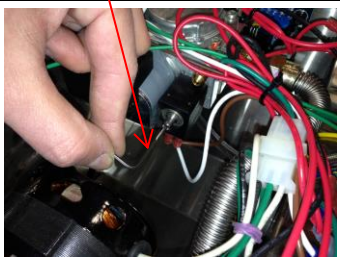
FOR HIGH PRESSURE VERIFICATION and/or ADJUSTMENT:

11) **Rotate the modulator control knob on the control panel to high. Connect electrical meter to the modulator control wires. Operate heater by turning it on. Voltage output should be between 24 to 28 volts D.C. current. If voltage is correct, turn off heater and connect the electrical supply wires to the terminals on the modulator. If voltage is incorrect, determine cause for deficient voltage and repair before you continue.**



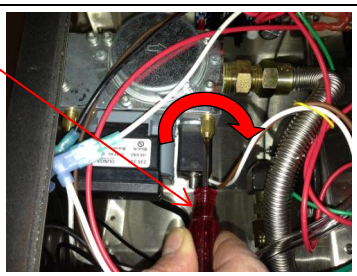
12) **Start heater and take a pressure reading. For natural gas, manifold pressure should be 3.5 " W.C. on high. For liquefied petroleum gas, manifold pressure should be 10.5" W.C. on high.**

13) **If adjustment is needed, insert a 2mm allen wrench into the adjustment tower and turn clockwise to lower pressure and counterclockwise to increase pressure.**



FINAL STEPS:

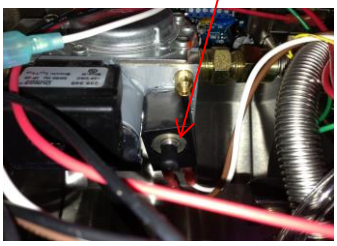
14) **Once proper pressure is confirmed, turn off the heater, remove the manometer and use a small flathead screwdriver to turn screw inside brass fitting clockwise until tight.**
DO NOT OVER TIGHTEN.



15) **Replace the black plastic cap on**

16) **Close and secure the service lid.**

the adjustment tower.



26.0 SEQUENCE OPERATION

26.1 DESCRIPTION OF 3-TRY DIRECT SPARK IGNITION SYSTEM:

The TRITON 2461D is a 24 VAC Microprocessor Based Direct Spark Ignition Control designed for use in all types of heating applications such as gas furnaces, boilers, water heaters and other similar appliances: The control utilizes a microprocessor to continually and safely monitor, analyze and control the proper operation of the gas burner. Value added features such *as:* combustion blower control, LED diagnostics, automatic one hour reset, and flame current test pins highlight the controls benefits.

26.2 OPERATIONS:

A. **POWER UP/STANDBY**

- Upon applying power (24 volts) to 24 VAC/R, the control will reset, perform a self-check routine, initiate fulltime flame sensing, flash the diagnostic LED for up to four seconds, and enter the thermostat scan state.

B. **HEAT MODE**

- When a call for heat is received from the thermostat supplying 24 volts to TH/W, the control will check the pressure switch for normally open contacts. The combustion blower is then energized and once the pressure switch contacts close, a pre-purge delay begins. Following the pre-purge period the gas valve is energized and sparks commence for the trial for ignition period.
- When flame is detected during the trial for ignition, sparks are shut off immediately and the gas valve and combustion blower remains energized. The thermostat, pressure switch, and main burner flame are constantly monitored to assure the system continues to operate properly. When the thermostat is satisfied and the demand for heat ends, the main valve is de-energized immediately, the control senses the loss of flame signal and de-energizes the combustion blower.

C. **FLAME FAILURE - RE-IGNITION**

- If the established flame signal is lost while the burner is operating, the control will respond within 0.8 seconds. The HV spark will be energized for a trial for ignition period in an attempt to re-light the burner. If the burner does not light, the control will make two more attempts to re-light the burner. If the burner does not re-light, the control will go into lockout and flash the LED 3-times. If flame is re-established, normal operation resumes.

27.0 TROUBLESHOOTING

A. NO POWER TO HEATER

CAUTION: Prior to performing any service or maintenance work on the unit:

a) disconnect the electrical supply
b) shut off gas to supply unit
c) make sure unit has cooled down before opening service panel

⚠ Warning:

Only allow qualified, licensed, service people trained to service gas fired heating equipment to perform any repairs on this unit. All replacement parts **MUST** originate from the manufacturer of this heater in order not to void CGA/AGA certification.

Safety devices are not allowed to be rendered inoperative and left unattended. Failure to do any of the above can cause property damage, injury or death.

B. **INITIAL ELECTRICAL CHECKS**

a) Make sure thermostat is calling for heat.
b) Make sure electrical connection is secure.
c) Check electrical supply for blown fuse or breaker.
d) Test for power to burner head.
e) Check wiring to components. Refer to wiring diagrams on pages 50 to 57. Also refer to legend below; this legend is located on the control module.

TERMINAL DESIGNATIONS

S1	**NOT USED**
GND	**SYSTEM GROUND (GREEN)**
V2	**VALVE GROUND (BROWN)**
R	**NOT USED**
L1	**120/240 VAC INPUT (HOT) (BLACK)**
IND	**INDUCER FAX OUTPUT (BLACK)**
V1	**VALVE POWER (WHITE)**
PSW	**PRESSURE SWITCH INPUT (RED)**
W	**THERMOSTAT INPUT (RED)**

CAUTION: *Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. A functional checkout of a replacement control is recommended. Verify proper operation after servicing.*

Attention. Au moment de I' entretien commandes, étiquetez tous les fils avant Ie débranchement. D'erreurs de câblage peuvent entraîner un fonctionnement inadéquat et dangereux. S'assurer que I' appareil fonctionne adéquatement une fois I' entretien termine.

C. **INITIAL GAS CHECKS**

a) Make sure manual valve is turned on.
b) Make sure gas valve knob is turned on.
c) Check for gas supply and proper pressure to valve.
d) Check wires and make sure that they and their connections are in good condition.
e) Check for power to valve.
f) If no power, check control board. (see page 69)

D. **ELECTRICITY AND GAS TO HEATER, BUT STILL INOPERATIVE**

If after confirming that adequate gas and electricity are present and unit still does not operate, review the symptoms below. After the symptom has been identified, refer to the corresponding cause/cure, Review CHECK CONTROL BOARD section, and finalize troubleshooting procedure.

Symptom	Cause/Cure
1. Dead	**A) Mis-wired** **B) Transformer bad** **C) Fuse/circuit breaker bad** **D) Bad control (check LED for steady on)**
2. Thermostat on - No Blower Output	**A) Mis-wired (check PSW terminal voltage)** **B) Bad thermostat - Do voltage @terminal W** **C) Bad control (check LED for steady on)**
3. Pressure Switch input okay but no Trial for Ignition after purge delay	**A) Mis-wired (check PSW terminal voltage)** **B) Flame sense problem (existing flame-check LED-2 Flashes)** **C) Bad control (check voltage between L1 & IND)**
4. Valve on, no spark	**A) Shorted electrode** **B) Open HV cable** **C) Bad Control**
5. Spark on, no valve	**A) Valve coil open** **B) Open valve wire** **C) Bad control (check voltage between V1 &V2)**
6, Flame okay during TFI, no flame sense (after TFI)	**A) Bad electrode** **B) Bad S1 or HV wire** **C) Poor ground at burner** **D) Poor flame (check flame current)**

NOTE: TFI = Trial For Ignition

E. CHECK CONTROL BOARD

Open access door and view the diagnostic red LED, located on the grey direct spark ignition module.

F. FAULT CONDITIONS

Error Mode	LED Indication
Internal Control Failure	Steady On
Air Flow Fault	1 flash
Flame with No Call for Heat	2 flashes
Ignition Lock Out	3 flashes

The LED will flash on for ¼ second, then off for ¼ second during a fault condition. The pause between fault codes is 3-seconds.

G. INTERNAL CONTROL FAULT

- If power supply cycles are fluctuating beyond 50/60 cycles such as with an un-stabilized power supply from a generator, unit will not operate. If the circuit board is faulty the unit will not operate.

H. AIRFLOW FAULT - LOCK OUT (COMBUSTION AIR FLOW PROBLEMS)

- Combustion airflow is continually monitored during an ignition sequence by the airflow switch (PSW). If during the initial call for heat the pressure switch contacts are in the closed position for 30-seconds without an output to the Combustion Blower, an airflow fault will be declared and the control will remain in this mode with the combustion blower off.
- If the airflow switch remains open for more than 30-seconds after the combustion blower output (L1 & IND) is energized, an airflow fault will be declared and the control will stay in this mode with the combustion blower off.
- If the airflow signal is lost while the burner is firing, the control will immediately de-energize the gas valve and the combustion blower will remain on. If the call for heat remains, the control will wait for proper airflow to return. If proper airflow air is not detected after 30-seconds an airflow fault signal will be declared.

Proceed as follows to verify reason for airflow lockout:

1. Check air intake and exhaust for blockage. Remove any blockage.
2. Check combustion air blower for dirt. Clean and/or replace as necessary.
3. If there is no blockage, disconnect fresh air intake at burner head (if equipped). Retry for ignition. If unit does ignite, check to verify that duct size to unit is of proper size and length and that there is no blockage. Replace ducting as necessary to reduce amount of air restriction to unit.
4. If unit still does not ignite, disconnect exhaust vent at heater and retry for ignition. If unit does ignite, check to verify that vent size to unit is of proper size and length and that there is no blockage. (Refer to “VENTING” on pages 36). Replace venting as necessary to reduce amount of restriction.
5. If after 2, 3 and 4 are performed and unit still does not operate, replace air switch.
6. Reconnect venting and ducting, verify operation of unit.

I. **FLAME WITH NO CALL FOR HEAT (FLAME FAULT)**

- If at any time the main valve fails to close completely and maintains a flame, the full time flame sense circuit will detect it and energize the combustion blower. Should the main valve later close off completely removing the flame signal, the combustion blower will power off.

J. **IGNITION LOCK OUT (FAILURE TO LIGHT)**

- FENWAL DSI Module will attempt three ignition trials before going into lockout. The valve relay will be de-energized immediately, and the combustion blower will be turned off.
- Recovery from lockout requires a manual reset by either resetting the thermostat or removing 24 volts, or removing the electrical power supply for a period of 5-seconds.
- If the thermostat is still calling for heat after one hour, the control will automatically reset and attempt to ignite the burner again.

If unit still does not operate, proceed as follows:

- Check flame sensor current. (see below)
- Check electrode for cracks and proper location, (see page 71)

K. **FLAME SENSOR CURRENT CHECK**

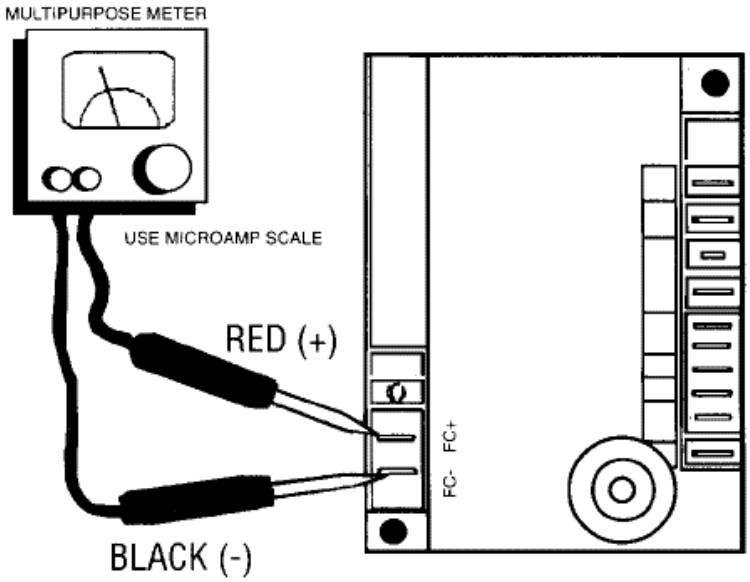


Figure 49. FLAME SENSOR CURRENT CHECK

SERVICE CHECKS

Flame current is the current which passes through the flame from the sensor to the ground. The minimum flame current necessary to keep the system from lockout is .7 micro amps. To measure flame current, connect an analog DC micro ammeter to the FC- FC terminals per figure. Meter should read. 7 uA or higher. If meter reads below "0" on scale, meter leads are reversed. Disconnect power and reconnect meter leads for proper polarity.

L. PROPER ELECTRODE LOCATION

Proper location of the electrode assembly is important for optimum system performance. The electrode assembly should be located so that the tips are inside the flame envelope about ¾" (1.9 cm) to 1" (2.54 cm).

CAUTIONS:

1) Ceramic insulators should not be in or close to the flame
2) Electrode assemblies should not be adjusted or disassembled, Electrodes should have a gap spacing of .125" (3.175 mm). If this spacing is not correct, the assembly must be replaced.
   Electrodes are NOT field adjustable.
3) Exceeding the temperature limits can cause nuisance lockouts and premature electrode failure.

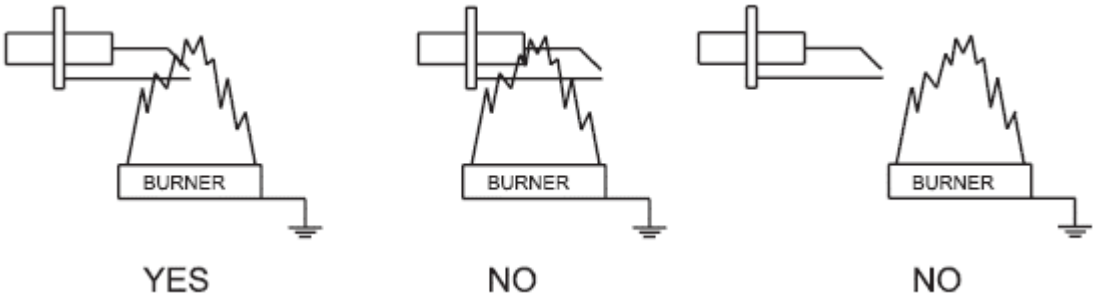


Figure 50. PROPER ELECTRODE LOCATION

28.0 MAINTENANCE

Maintenance is required once a year. Annually inspect your heater, before the heating season starts. If unit is in a dusty environment, maintenance will be required more often. If dust conditions are extreme, monthly or weekly maintenance may be required.

⚠ WARNING:

Disconnect electrical supply to heater and shutoff gas prior to inspection.

A. Check combustion air intake for blockage.
B. Check vent terminal and/or roof terminal for blockage. Remove as necessary for cleanliness and reinstall. Check for cracks or holes. Replace as necessary.
C. Open service door.
D. Check blower motor and scroll for dirt and/or locked rotor. Remove dirt with compressed air or vacuum cleaner. If rotor is locked, replace assembly.
E. If burner needs cleaning, remove burner head from tube and use a combination of compressed air and/or a wire brush to remove any deposits or debris that may be on the actual burner.
F. Make sure all wiring is intact and in good condition.
G. Check electrode for proper gap and cleanliness. Clean or replace as necessary.
H. Check ignition system for spark. Replace as necessary.
I. Check exchanger tube for holes and/or cracks, dirt and/or deposits. Clean and/or replace as necessary.
J. Wash any dirt or just off of the unit with a soap and water solution.
K. Check any gas connections that were disconnected during maintenance for leaks. Use soap and water solution. Do not use flame.
L. Test fire unit by setting thermostat above room temperature. Make sure unit is operating quietly and efficiently.
M. Periodically visually check burner through view port to confirm proper operation.
N. Check all couplers for tightness and/or leakage.

⚠ WARNING:

Only allow qualified/licensed service people, trained to service gas fired heating equipment, to perform any repairs on this unit. All replacement parts MUST originate from the manufacturer of this heater in order not to void CGA/AGA certification. Safety devices are not allowed to be rendered inoperative.

⚠ 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.

The heater area must be kept clear and free from combustible materials, gasoline and other flammable vapors and liquids. The flow of combustion and ventilation air to heater must not be obstructed.

29.0 PARTS:

29.1 BURNER HEAD AND RELATED PARTS

(Refer to pages 75 & 70 for part number & description)

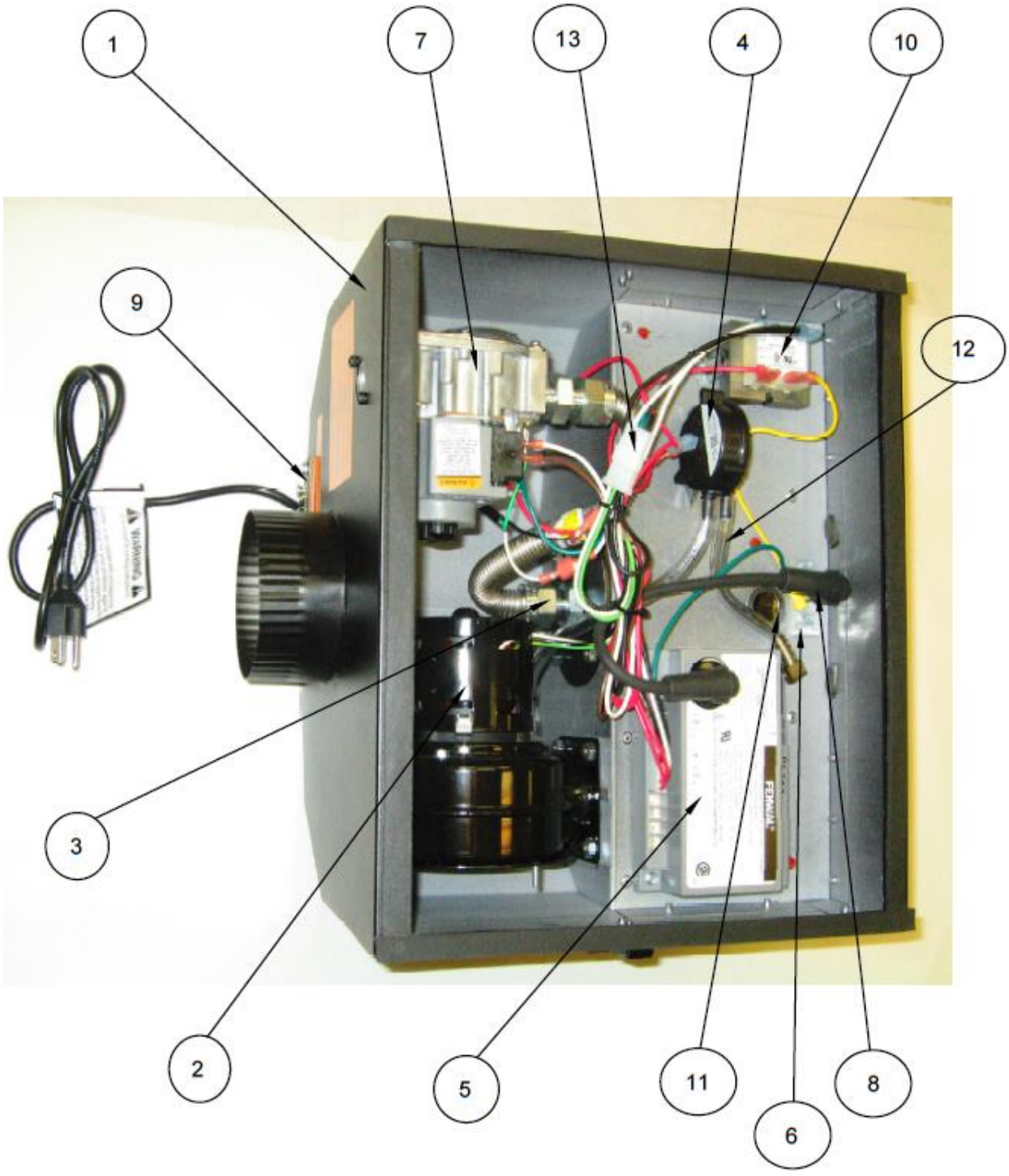


Figure 51. BURNER HEAD PARTS

29.2 REFLECTOR AND TUBE PARTS

(Refer to page 75 & 70 for part number & description)

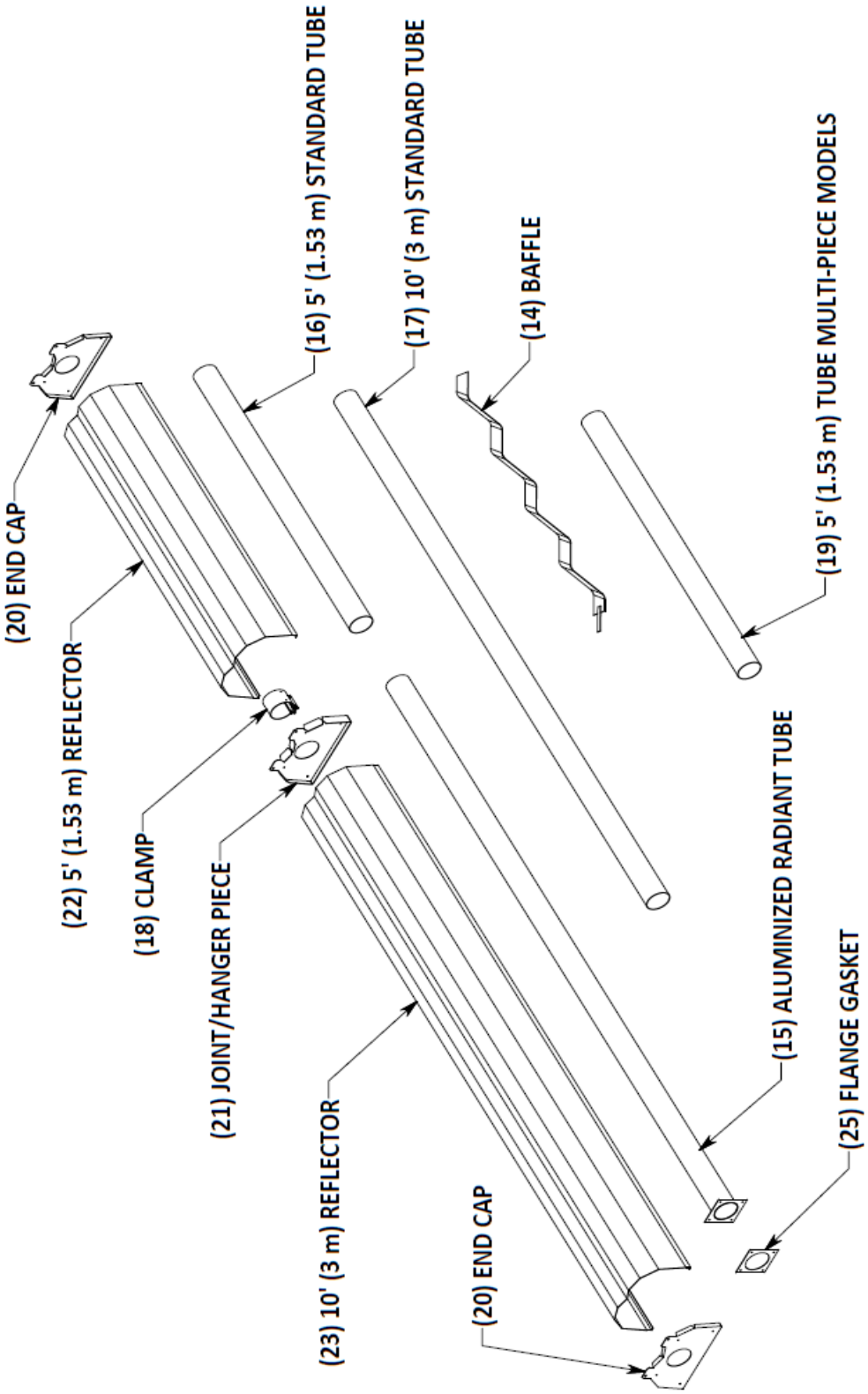


Figure 52. REFLECTOR AND TUBE PARTS

29.3 PARTS LIST:

(See page 73 & 74 for visual details)

REPLACEMENT BURNER HEADS:				
ITEM	**PIN**	**INPUT**	**FUEL**	**WEIGHT**
1	5120173	20,000	NG	36 lbs (16.4 kg)
1	5120174	20,000	Propane	36 lbs (16.4 kg)
1	5120175	40,000	NG	36 lbs (16.4 kg)
1	5120176	40,000	Propane	36 lbs (16.4 kg)
1	5120177	50,000	NG	36 lbs (16.4 kg)
1	5120178	50,000	Propane	36 lbs (16.4 kg)
1	5120179	75,000	NG	36 lbs (16.4 kg)
1	5120180	75,000	Propane	36 lbs (16.4 kg)
BURNER HEAD COMPONENTS:				
ITEM	**PIN**	**DESCRIPTION**		**WEIGHT**
2	3010001	Blower Motor Assembly		**
3	5090437	Burner Assembly		**
4	3070416	Air Switch 20,000 BTU		**
4	3070417	Air Switch 40,000 BTU		**
4	3070418	Air Switch 50,000 BTU		**
4	3070419	Air Switch 75,000 BTU		**
5	3030021	Direct Spark Ignition Module (Fenwal)		**
6	3030633	Electrode Assembly		**
7	3020005	Gas Valve Propane		**
7	3020003	Gas Valve NG		**
8	3030026	High Voltage Ignition Wire		**
9	3070025	Thermostat Connector		**

10	3070016	Transformer	**
11	3110022	View Port - Mica Window assembly	**
12	5040374	Vinyl Hose for Differential Air Proving Switch	**
13	3070321	Wire Harness	**
TUBE COMPONENTS:			
ITEM	**PIN**	**DESCRIPTION**	**WEIGHT**
14	5170743	Baffle/Turbulator	5 lbs (2.3 kg)
15	5170163	Flanged Tube Aluminized 124" (315 cm)	30 lbs (13.7 kg)
16	5170171	Tube 4" (10.2 cm) x 5' (1.53 m) Standard	15 lbs (6.8 kg)
17	5170169	Tube 4" (10.2 cm) x 10' (3 m) Standard	30 lbs (13.7 kg)
18	3170201	Tube Clamp	**
19	3090076	Tube 5" (10.2 cm) Multi-Piece Units	15 lbs (6.8 kg)

** UNDER 5 LBS

REFLECTOR COMPONENTS:			
ITEM	**PIN**	**DESCRIPTION**	**WEIGHT**
20	5190139	End Cap	**
21	5190137	Hanger/Joint Piece	5 lbs (2.3 kg)
22	5180161	Reflector 5' (1.52 m)	5 lbs (2.3 kg)
23	5180162	Reflector 10' (3 m)	15 lbs (6.8 kg)
24	5180202	Reflector Support Strap (One per reflector)	**
25	5080319	Flange Gasket	**

** UNDER 5 LBS

30.0 WARRANTY

Non-Transferable / Limited Warranty - Calcana Heaters

Calcana Industries Ltd. (''the Manufacturer") warrants to the original owner at the original installation site that the heater manufactured by the manufacturer (''the Product") will be free from defects in material and workmanship for one (1) year from date of shipment from the factory. Calcana further warrants that the heat exchanger, reflectors, brackets, burner and burner box will be free from defects in material and workmanship for three (3) years from the date of shipment from the factory. If upon examination by the Manufacturer the Product is shown to have a defect in the material or workmanship during the warranty period, the Manufacturer will repair or replace, at its option, that part of the Product which is shown to be defective. In no event shall the customer be entitled to consequential, indirect or special damages of any nature for defective merchandise, and in no instance may damages include loss of profit. Calcana reserves the right to inspect the system involved in any claim against the warranty. The warranty is null and void if any of the components installed are not original Calcana parts or the installation does not conform to the supplied installation manual.

This limited warranty does not apply:

a) If the Product has been subjected to misuse or neglect, has been accidentally or intentionally damaged, has not been installed, maintained or operated in accordance with the furnished written instructions, or has been altered or modified in any way by an unauthorized person.
b) To any expenses, including labor or material, incurred during removal or reinstallations of the Product.
c) To any damage due to corrosion by chemicals, including halogenated hydrocarbons precipitated in the air.
d) To any workmanship of the Installer of the Product
e) If Product is not paid for in a timely manner and in accordance with payment terms
f) If Product or any part of it is damaged by any act of nature including, but not limited to; hurricanes, gales, tornadoes, wind snow, sleet, hail, rain, flood, fire or any other similar or dissimilar condition, or by normal wear and tear, which included marks and/or dents to the reflector caused by improper transportation or installation.
g) If Product or any part of it is damaged by vandalism, improper use, accumulation of weight or heavy loads on the heater.
h) If Product is damaged due to lack of cleaning or maintenance, whether routine or otherwise.

The limited warranty is conditional upon:

a) Advising the installing contractor, who will in turn notify the distributor or Manufacturer.
b) Shipment to the Manufacturer of that part of the Product thought to be defective. Goods can only be returned with prior written approval of the Manufacturer. All returns must be freight prepaid.
c) Determination in the reasonable opinion of the Manufacturer that there exists a defect in material or workmanship.

Repair or replacement of any part under the Limited Warranty shall not extend the duration of the warranty with respect to such repaired or replaced part beyond the stated warranty period.

All labor during the warranty period is the responsibility of the installing person or contractor.

This Limited Warranty is in lieu of all other warranties, either express or implied, and all such other warranties, including without limitation implied warranties of merchantability and fitness for a particular purpose, are hereby disclaimed and excluded from this limited warranty. The warranty cannot be transferred or assigned by the Customer. All disputes arising from this warranty are to be governed by the laws of the Province of Alberta and any action to enforce this warranty must be initiated in the Province of Alberta. In no event shall the Manufacturer be liable, in any way for any consequential, special, or incidental damages of any nature whatsoever, or for any amounts in excess of the selling price of the Product or any parts thereof found to be defective. This Limited Warranty gives the original owner of the Product specific legal rights. You may also have other rights which may vary by each jurisdiction.

Calcana USA Ltd.
30201 Country Road 49
Loxley, AL, 36551
Tel: 251-964-4400
Fax: 251-964-4404

31.0 FUEL CONVERSION

31.1 CONVERSION KIT FOR WHITE RODGERS OR HONEYWELL SINGLE INPUT GAS VALVE

USE WITH WHITE RODGERS PART #F92-0656 Propane Gas AND #F92-0659 Natural Gas or

WITH HONEY WELL PART #393691 Propane Gas AND #394588 Natural Gas - Conversion Kits used in:

The conversion shall be carried out in accordance with the requirements of the provincial/state authorities having jurisdiction and in accordance with the requirements as follows:

CANADA: ***Natural Gas and Propane Installation Code, CSA B149.1*** or latest edition.
USA: ***National Fuel Gas Code, ANSI Z223.1/NFPA 54***, or latest edition.

⚠ **WARNING:** This conversion kit shall be installed by a qualified service agency in accordance with the manufacturer's instructions and all applicable codes and requirements of the authority having jurisdiction. If the information in these instructions is not followed exactly, a fire, explosion or production of carbon monoxide may result causing property damage, personal injury or loss of life. The qualified service agency is responsible for the proper installation of this kit. The installation is not proper and complete until the operation of the converted appliance is checked as specified in the manufacturer's instructions supplied with the kit. The installer of this conversion kit assumes full responsibility and liability for the installation of this conversion kit. If you do not understand these instructions or the information contained in the installation manual, DO NOT INSTALL THIS CONVERSION KIT OR OPERATE THE UNIT ASSOCATED WITH THIS GAS CONVERSION.

DIRECTIONS:

1) Caution the gas supply shall be shut off prior to disconnecting the electrical power, before proceeding with the conversion.
2) Turn off electrical supply to heater
3) Disconnect gas supply line to heater
4) Disconnect electrical supply to heater
5) Disconnect thermostat control wire from heater
6) Remove burner head from reflector assembly being careful to support burner head in such a fashion that it will not fall from the location overhead where it was installed. Use two people if necessary.
7) Remove service door that provides access to gas valve location
8) Remove igniter assembly
9) Use deep wall socket to remove orifice spud.
10) Install correct orifice for the fuel that you are converting to. CHECK TWICE TO MAKE SURE. Reference chart below:
11) Locate gas valve. Identify manufacturer of gas valve. Make sure you are using the correct kit as manufactured for the gas valve that is installed in heater and following instructions as detailed on the enclosed White Rodgers or Honey Well instruction sheets for the associated Gas Conversion Kits. Make sure you have the correct conversion spring for the fuel type you are converting to.
12) Verify Manifold pressure using a manometer. Adjust pressure if necessary. (see valve instructions for details) Manifold Pressure is: NG: 3.5" w.c. for Propane: 10.5" w.c. Leak Test all Fittings Prior to Operation
13) When the conversion is complete, fill out the information as required on the enclosed conversion label.
14) Attach completed label on or near the rating plate

Conversion Chart With Part Numbers and Corresponding Orifice Sizes

MODEL	PIN	FROM	TO	ORIFICE
CAL-40	3025000	NG	Propane	#51
CAL-50	3025001	NG	Propane	#48
CAL-75	3025002	NG	Propane	#42

MODEL	PIN	FROM	TO	ORIFICE
CAL-40	3025011	Propane	NG	#32
CAL-50	3025012	Propane	NG	3.3mm
CAL-75	3025013	Propane	NG	#21

NOTE: CONVERSION KITS COME WITH GAS VALVE CONVERSION SPRING, PREDRILLED ORIFICE AND CONVERSION LABEL.
CONVERSION KITS ARE FOR UNITS RATED FOR THE FOLLOWING LOCATIONS AND ELEVATIONS: **CANADA: 0 – 4500 FT (1372 m) USA: 0 – 2000 FT (610 m)**
FOR INSTALLATIONS ABOVE THE DESIGNATED ELEVATIONS, CONTACT FACTORY.

White-Rodgers

F92-0659 and F92-0836

Regulated Natural to L.P. Gas
Conversion Kit

INSTALLATION INSTRUCTIONS

Installer: Save these instructions for future use!

FAILURE TO READ AND FOLLOW ALL INSTRUCTIONS CAREFULLY BEFORE INSTALLING OR OPERATING THIS CONTROL COULD CAUSE PERSONAL INJURY AND/OR PROPERTY DAMAGE.

⚠ WARNING

This conversion kit shall be installed by a qualified service agency in accordance with the manufacturer's instructions and all applicable codes and requirements of the authority having jurisdiction. If the information in these instructions is not followed exactly, a fire, explosion, or production of carbon monoxide may result, causing property damage, personal injury, or loss of life. The qualified service agency performing the work assumes the responsibility for the proper conversion of this appliance with this kit.

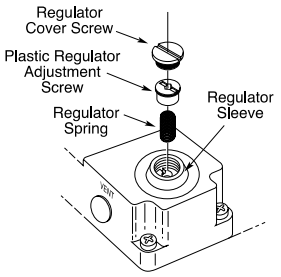


Figure 1. 36C and 36D Models

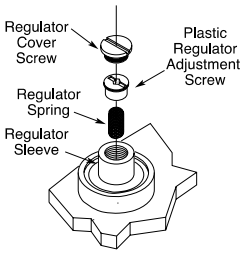


Figure 2. 36E, 36F, 36G and 36J Single Stage Models

APPLICATION

This regulated Natural Gas to regulated L.P. Gas conversion kit allows the 36C, 36D, 36E, 36F, 36G, 36H and 36J Series gas valves to be used on L.P. gas applications. **This conversion kit is for use on all single stage, fast and slow open models and 36G, 36H and 36J two stage models.**

TO CONVERT FROM NATURAL TO L.P. GAS

1. Remove regulator cover screw.
2. Remove regulator adjustment screw (beneath the cover screw).
3. Remove Natural Gas regulator spring from regulator sleeve.
4. Insert the L.P. regulator spring (provided in the conversion kit) into the regulator sleeve.
5. Replace the regulator adjustment screw. Then adjust the outlet pressure to the appliance manufacturer's specified outlet pressure.
6. Replace the regulator cover screw.
7. Attach the WARNING label (provided in the kit) to the gas valve where it can be readily seen. Also attach the small round L.P. label to the top of the regulator cover screw.
8. If present pilot burner is to be used, the pilot orifice must be replaced.

Conversion back to Natural Gas use may be made at a later date by retaining the Natural Gas spring (removed in step 3, above) and following the same procedures (except for burner pressure given in step 5).

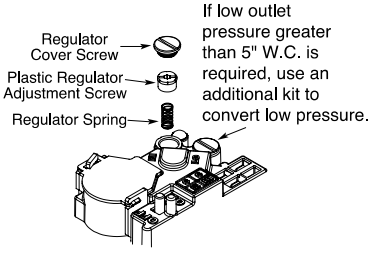


Figure 3. 36G and 36J 2-Stage models

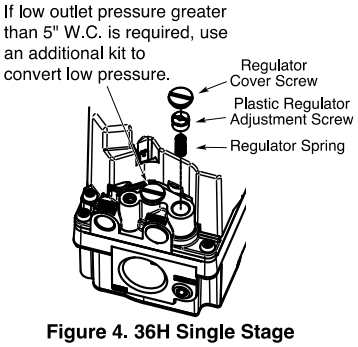


Figure 4. 36H Single Stage and 2-Stage models

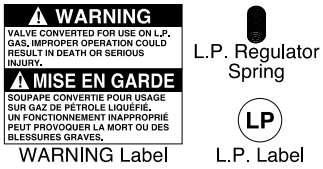


Figure 5. Contents of kit

EMERSON Climate Technologies

White-Rodgers is a division of Emerson Electric Co.
www.white-rodgers.com

PART NO. 37-5379F
Replaces 37-5379E
0616

31.2 CONVERSION KIT FOR VARIABLE INPUT GAS VALVES

The conversion shall be carried out in accordance with the requirements of the provincial/state authorities having jurisdiction and in accordance with the requirements as follows:

CANADA: ***Natural Gas and Propane Installation Code, CSA*** **B149.1** or latest edition.
USA: ***National Fuel Gas Code, ANSI Z223.1/NFPA*** **54,** or latest edition.

⚠ **WARNING:** This conversion kit shall be installed by a qualified service agency in accordance with the manufacturer's instructions and all applicable codes and requirements of the authority having jurisdiction. If the information in these instructions is not followed exactly, a fire, explosion or production of carbon monoxide may result causing property damage, personal injury or loss of life. The qualified service agency is responsible for the proper installation of this kit. The installation is not proper and complete until the operation of the converted appliance is checked as specified in the manufacturer's instructions supplied with the kit. The installer of this conversion kit assumes full responsibility and liability for the installation of this conversion kit. If you do not understand these instructions or the information contained in the installation manual, DO NOT INSTALL THIS CONVERSION KIT OR OPERATE THE UNIT ASSOCATED WITH THIS GAS CONVERSION.

DIRECTIONS:

1) Caution the gas supply shall be shut off prior to disconnecting the electrical power, before proceeding with the conversion.
2) Turn off electrical supply to heater
3) Disconnect gas supply line to heater
4) Disconnect electrical supply to heater
5) Disconnect thermostat control wire from heater
6) Remove burner head from reflector assembly being careful to support burner head in such a fashion that it will not fall from the location overhead where it was installed. Use two people if necessary.
7) Remove service door that provides access to gas valve location
8) Remove igniter assembly.
9) Use deep wall socket to remove orifice spud.
10) Install correct orifice for the fuel that you are converting to. **CHECK TWICE TO MAKE SURE.** Reference chart below:
11) Locate gas valve and **REPLACE WITH THE GAS VALVE IN CONVERSION KIT.** Verify you have the correct valve for the fuel type you want to convert to. **CHECK TWICE TO MAKE SURE.**
12) Verify Manifold pressure using a manometer. Adjust pressure if necessary. (see valve instructions for details**)**

Manifold Pressure is: **NG: Hi 3.5" w.c. Lo 1.5" w.c.**
Propane: Hi 10.5" w.c. Lo 5.5" w.c.

Leak Test all Fittings Prior to Operation

13) When the conversion is complete, fill out the information as required on the enclosed conversion label.
14) **Attach completed label on or near the rating plate**

Conversion Chart With Part Numbers and Corresponding Orifice Sizes

MODEL	PIN	FROM	TO	ORIFICE
CAL-40	3025000	NG	Propane	#51
CAL-50	3025001	NG	Propane	#48
CAL-75	3025002	NG	Propane	#42

MODEL	PIN	FROM	TO	ORIFICE
CAL-40	3025011	Propane	NG	#32
CAL-50	3025012	Propane	NG	3.3mm
CAL-75	3025013	Propane	NG	#21

NOTE: CONVERSION KITS COME WITH GAS VALVE CONVERSION SPRING, PREDRILLED ORIFICE AND CONVERSION LABEL.
CONVERSION KITS ARE FOR UNITS RATED FOR THE FOLLOWING LOCATIONS AND ELEVATIONS: **CANADA: 0 – 4500 FT (1372 m) USA: 0 – 2000 FT (610 m)**
FOR INSTALLATIONS ABOVE THE DESIGNATED ELEVATIONS, CONTACT FACTORY.

32.0 EXAMPLE OF CONVERSION KIT LABEL
TO BE COMPLETED AS PER INSTRUCTIONS IN KIT

This appliance was converted on DAY: _____

MONTH: _____YEAR: _____

to NG: _____Propane. _____ gas with Kit # _____

by: NAME: _____

COMPANY: _____

ADDRESS: _____

CITY/TOWN: _____ STATE/PRO: _____

TELEPHONE: _____

Orifice Size: _____ leak Test Performed: Yes: _____

Manifold Pressure: Min_____ Max_____

Input: _____ Altitude: _____

(The name of the individual and organization making this conversion accepts the responsibility that this conversion has been properly made and has performed a leak test on the appliance prior to placing into service.) Locate label in a conspicuous location on the appliance near rating plate.

==========

Cet appareil a ete converti au: _____

Injecteur: _____Date: _____

Pression a la tubulure d'alimertation: _____

Debit calorifique: _____

33.0 SAFETY AND OPERATING INSTRUCTIONS

! WARNING: !

Failure to follow these instructions will cause death, personal injury or property damage. Read the installation, operating and maintenance instructions thoroughly before installing or servicing this equipment.

SAFETY INSTRUCTIONS READ BEFORE OPERATING

A) This gas heater does not have a pilot. It is equipped with an Ignition device which automatically lights the burner. DO NOT try to light the burner with a match, or flame.

B) BEFORE OPERATING, smell all around the heater area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle to the floor.

WHAT TO DO IF YOU SMELL GAS

- **Do not try to operate heater.**
- **Do not touch any electric switch; do not use any phone in your building.**
- **Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.**
- **If you cannot reach your gas supplier, call the fire department.**

C) Use only your hand to turn the gas valve handle. Never use tools. If handle will not turn by hand, do not try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.

D) Do not use this heater if any part has been under water. Immediately call a qualified service technician to inspect the heater and to replace any part of the control system which has been under water.

OPERATING INSTRUCTIONS

1. **STOP! Read the safety Instructions on this label.**
2. **Open the manual gas valve in the heater supply line.**
3. **Turn on electric power to the heater.**
4. **Set the thermostat to the desired setting.**
5. **This heater is equipped with an Ignition device, which automatically lights burner. Do not try to light the burner with a match, or flame.**
6. **If heater will not operate, follow instructions "To Turn Off Gas To Heater" and call your service technician or gas supplier.**

TO TURN OFF THE GAS TO HEATER

1. **Set the thermostat to the lowest setting.**
2. **Turn off electric power to the heater if service is to be performed.**
3. **Turn off the manual gas valve in the heater supply line.**
4. **Wait 5 minutes before attempting to relight heater.**