

# INFRARED HEATING SYSTEM

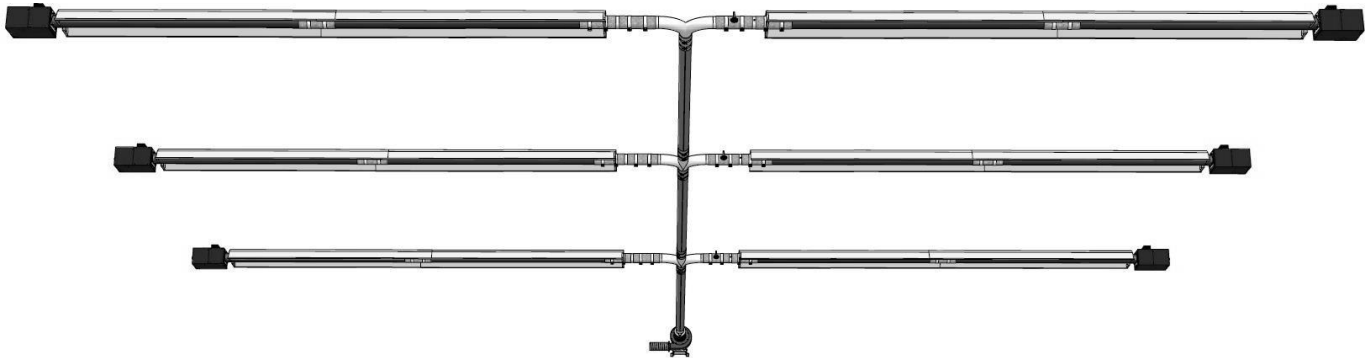


**SUPERIOR**  
RADIANT PRODUCTS



## SERIES TVX

Two Stage  
Negative Pressure  
Multiburner System



### WARNING

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

### FOR YOUR SAFETY

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

If you smell gas:

1. Open windows
2. Don't touch electrical switches
3. Extinguish any open flame
4. Immediately call your gas supplier

### OWNER

Retain this Manual & ensure available for Service. Improper installation, adjustment, alteration, service, or maintenance can cause injury, death, or property damage. Read the installation, operation, and service instructions thoroughly before installing or servicing this equipment.

### INSTALLER

Provide Manual to Owner upon completion of installation!

Read and thoroughly understand these Instructions before attempting any installation

**Canada:** 563 Barton Street, Stoney Creek, Ontario L8E 5S1

**USA:** 315 N Madison Street, Fortville, IN 46040

[www.superiorradiant.com](http://www.superiorradiant.com)

### CAUTION: FIRE OR EXPLOSION HAZARD

Maintain clearance to combustible constructions as further specified in this manual. Failure to do so could result in a serious fire hazard. Heaters should not be located in hazardous atmospheres containing flammable vapors or combustible dusts. Signs should be provided in storage areas specifying maximum safe stacking height.

### CAUTION: MECHANICAL HAZARD

This equipment expands and contracts with each operating cycle. The gas connection, suspension hardware, and the installation itself must safely allow this movement. Failure to do so could result in serious fire or explosion hazard.

### CAUTION: FIRE OR EXPLOSION HAZARD

This heater is equipped with an automatic ignition device. Do not attempt to light the burner by hand. Failure to comply could result in a serious fire and personal injury hazard.

### CAUTION: MECHANICAL HAZARD

Do not use high pressure (above ½ psi, 60 mbar) to test the gas supply system with the burners connected. Failure to do so could result in damage to the burner and its control components requiring replacement.

### CAUTION: SERVICE LIFE RISK

Do not install equipment in atmosphere containing halogenated hydrocarbons or other corrosive chemicals. Failure to do so may lead to premature equipment failure and invalidation of the warranty. Additionally, it is recommended that the equipment be installed with a downward slope, away from the burner. The rate of declination should be ¼" (6mm) in height per 10' (3m) in length to allow the start-up condensation to drain.

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## Introduction

Superior Radiant Products is a company in the infrared heating industry founded on the principles of product quality and customer commitment.

Quality commitments are evidenced by superior design, a regard for design detail and an upgrade of materials wherever justifiable.

Customer commitment is apparent through our ready responses to market demands and a never-ending training and service support program for and through our distributor network.

Superior Radiant offers its 25 years of infrared expertise in a cost effective multiburner design as culmination of that commitment.

Series **TVX** negative pressure multiburner systems are field assembled, low intensity infrared heaters that are easy to install and maintain, and which were engineered with significant input from our customers. They are designed to provide economical operation and trouble-free service for years to come.

### Important

These instructions, the layout drawing, local codes and ordinances, and applicable standards such as apply to gas piping and electrical wiring comprise the basic information needed to complete the installation, and must be thoroughly understood along with general building codes before proceeding.

Only personnel who have been trained and understand all applicable codes should undertake the installation. SRP Representatives are Factory Certified in the service and application of this equipment and can be called on for helpful suggestions about installation.

## System Description

The Series TVX negative pressure multiburner system is designed to employ two or more low intensity radiant tube heaters interconnected by manifold tube to a vacuum pump that assists in the evacuation of products of combustion.

The individual heaters are configured to provide input rate from 60,000 to 220,000 Btu/h featuring a two-stage configuration. High/low capability allows for quicker recovery on the high fire and economical steady operation on the low fire with either U-Tube or Linear configurations.

Referring to the vacuum pressure downstream the heater, damper couplings are necessary to balance system vacuum.

Any tube beyond the radiant tube length is considered tailpipe. Tailpipe can be used to lengthen tube runs beyond the radiant tube length. A common tailpipe / manifold connects multiple runs of tubing to the vacuum pump. These instructions provide recommended minimum tailpipe tube lengths.

A system can be designed by using the same or different burner inputs. Consider the maximum number of burners per vacuum pump based on the pump capacity.

The multiburner systems may be controlled by either a SRP TVX Digital System Control Panel or by a relay system.

## **Installation Codes**

Installations must comply with local building codes, or in their absence, the latest edition of the national regulations and procedures as listed below.

### **General Installation and Gas Codes**

Heaters must be installed only for use with the type of gas appearing on the rating plate, and the installation must conform to the National Fuel Gas Code, ANSI Z223.1/NFPA 54 in the USA and CSA B149.1 and B149.2

Installation Codes in Canada.

This heater is approved for indoor installation. Not for use in residential dwellings, refer to Rating plate.

### **Aircraft Hangar Installation**

Installation in aircraft hangars must conform to the Standard for Aircraft Hangars, ANSI/NFPA 409 in the USA and CSA B149.1 and B149.2 Installation Codes in Canada.

### **Public Garage Installation**

Installation in public garages must conform to the Standard for Parking Structures, NFPA-88A or Standard for Repair Garages, NFPA 88B, in the USA and CSA B149.1 and B149.2 Installation Codes in Canada.

### **Parking Structures**

Technical requirements are outlined in ANSI/NFPA 88B (USA)

### **Gas Supply Lines**

Gas supply pipe sizing must be in accordance with the National Fuel Gas Code, ANSI Z223.1/NFPA 54 in the USA and CSA B149.1 and B149.2 Installation Codes in Canada.

A 1/8" NPT plugged tap must be installed in the gas line connection immediately upstream of the burner farthest from the gas supply meter to allow checking of system gas pressure.

### **Electrical**

All heaters must be electrically grounded in accordance with the National Electric Code, ANSI/NFPA 70 in the USA, and the Canadian Electric Code, CSA C22.1 in Canada, and must comply with all local requirements.

### **Venting**

Refer to the National Fuel Gas Code, ANSI Z223.1/NFPA 54 in the US and CSA B149.1 and B149.2 Installation Codes in Canada for proper location, sizing and installation of vents as well as information on clearance requirements when penetrating combustible walls for venting purposes.

# General Specifications

## Gas Supply

### *Inlet Pressure*

Natural Gas:	Minimum	5.0" W.C.	Propane Gas:	Minimum	11.5" W.C.
	Maximum	14.0" W.C.		Maximum	14.0" W.C.

### *Manifold Pressure*

Natural Gas:	3.5" W.C.	(High Rate)	Propane Gas:	10.5" W.C.
	1.8" W.C.	(Low Rate)		6.0" W.C.

### *Inlet Connection*

Natural Gas or Propane: 1/2" female NPT

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## Electric Supply

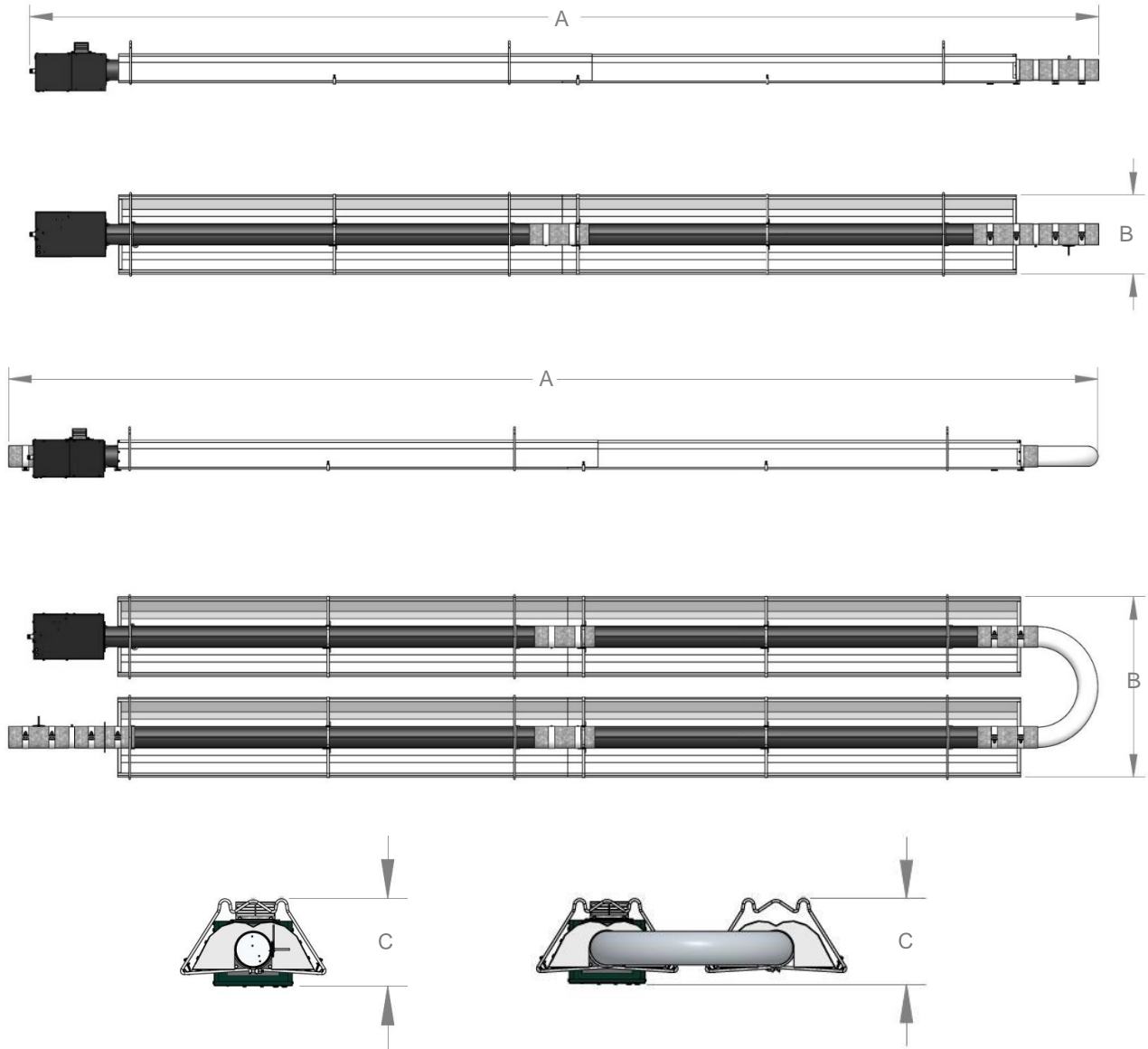
120 VAC, 60 HZ, 1 Amp: 36" cord with grounded 3 prong plug

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## Flue and Outside Air Connection

4" or 6" duct for flue adaptor and outside air (optional) provided at the heater

# Dimensional Charts



**Figure 1: Overall Dimensional Information**

Model TVX	Units	60	80	100	125	150	175	205	220
Dimensions									
A	in	274	274	394	394	514	634	634	754
B	in	16	16	16	16	16	16	16	16
C	in	10	10	10	10	10	10	10	10
Weight	lb	95	95	130	130	165	195	195	230
Model TVX U	Units	60	80	100	125	150	175	205	220
Dimensions									
A	in	157	157	157	217	217	277	337	337
B	in	36	36	36	36	36	36	36	36
C	in	10	10	10	10	10	10	10	10
Weight	lb	105	105	140	140	175	205	205	240

# Basic Components

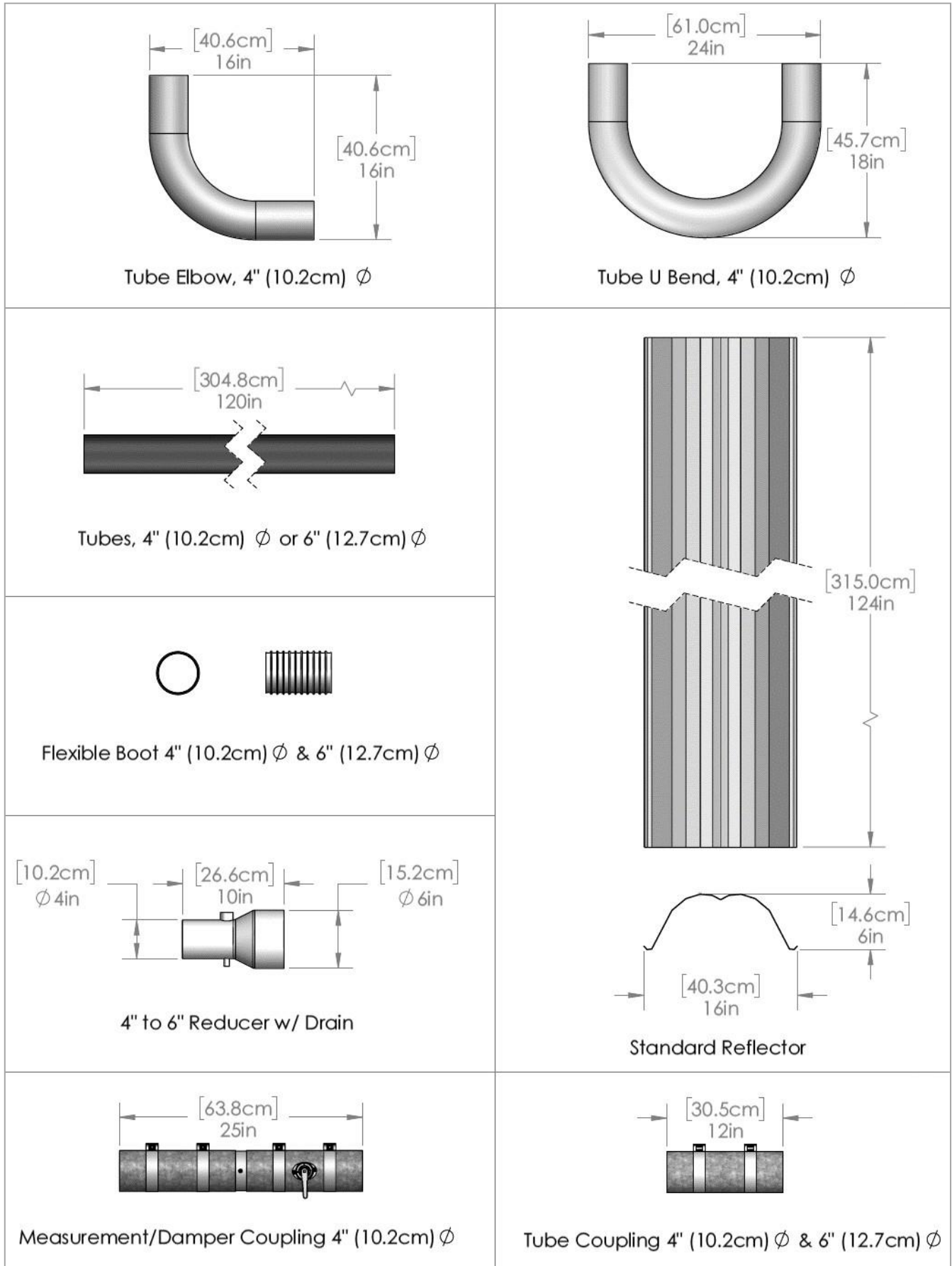
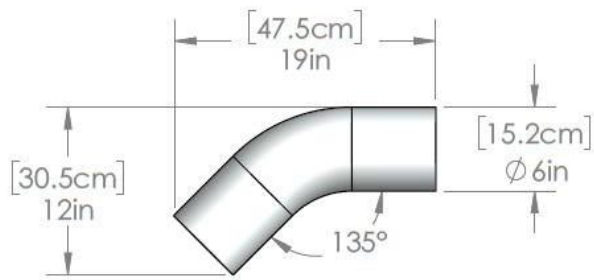
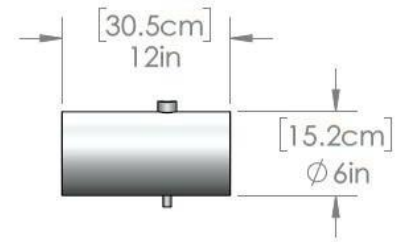


Figure 2: Component Dimensional Information

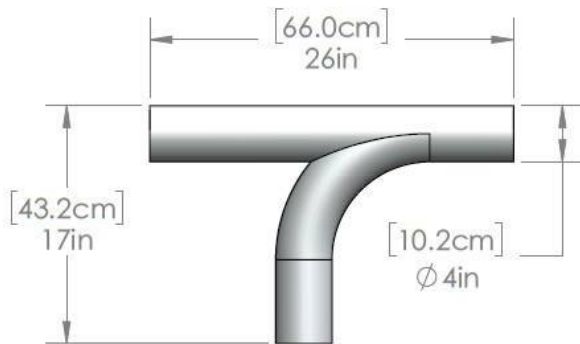




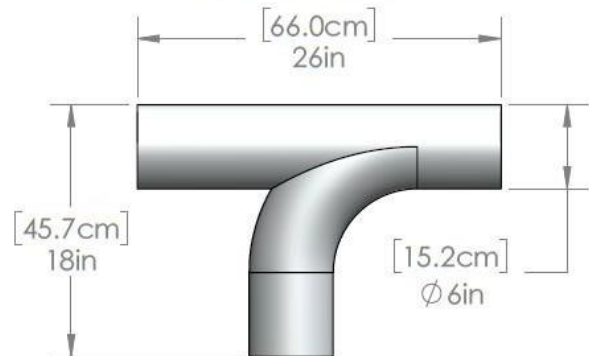
Tube Elbow 45 Deg., 6" (10.2cm)  $\phi$



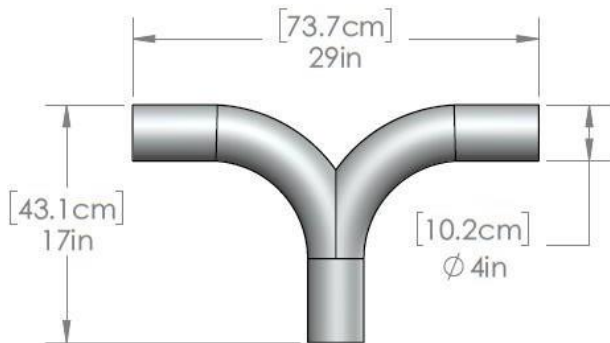
6" to 6" Connector w/ Drain



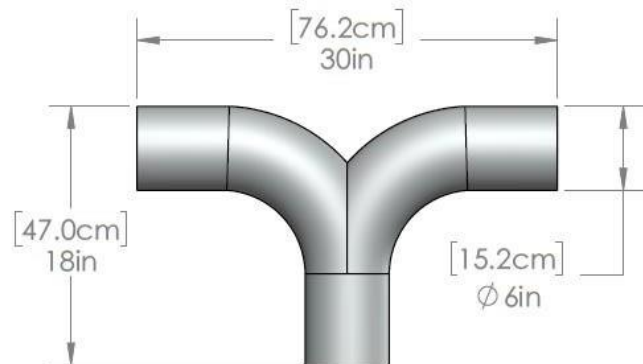
Tee Single Swept, 4" (10.2cm)  $\phi$



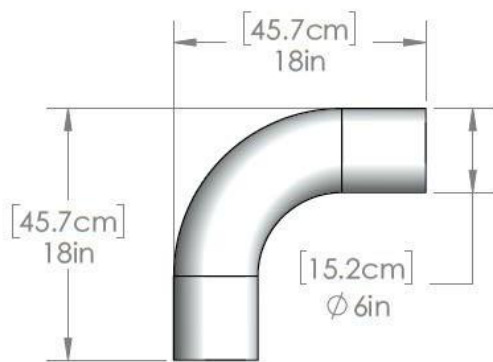
Tee Single Swept, 6" (12.7cm)  $\phi$



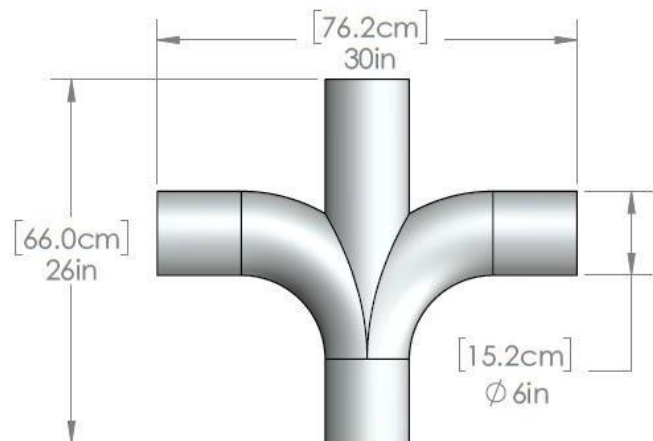
Tee Double Swept, 4" (10.2cm)  $\phi$



Tee Double Swept, 6" (12.7cm)  $\phi$



Tube Elbow, 6" (12.7cm)  $\phi$



Cross, 6" (12.7cm)  $\phi$

Figure 3: Component Dimensional Information

## Radiant Segment Configurations

Table 1: Configuration Information

Model	High Rate (BTU/Hr)	Low Rate (BTU/Hr)	Heat Exchanger Length ft. (m)	Baffle ft.(m)	Baffle Kit P/N
TVX 60	60,000	45,000	20' (6m)	6' (1.8m)	CT046
TVX 80	80,000	60,000	20' (6m)	6' (1.8m)	CT046
TVX 100	100,000	75,000	30' (9m)	6' (1.8m)	CT046
TVX 125	125,000	90,000	30' (9m)	6' (1.8m)	CT046
TVX 150	150,000	110,000	40' (12m)	6' (1.8m)	CT046
TVX 175	175,000	132,000	50' (15m)	-	-
TVX 205	205,000	150,000	50' (15m)	7.5'(2.3m)	CT174
TVX 220	220,000	165,000	60' (18m)	-	-

**Note:**

- Baffles are always placed in the last section of radiant tube.
- Baffles are aluminized steel.

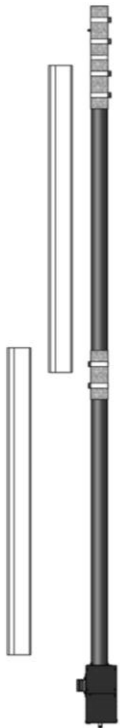
**Part numbers for reference are:**

- CT046 Baffle Kit, 6' long, aluminized steel
- CT174 Baffle Kit, 7.5' long aluminized steel

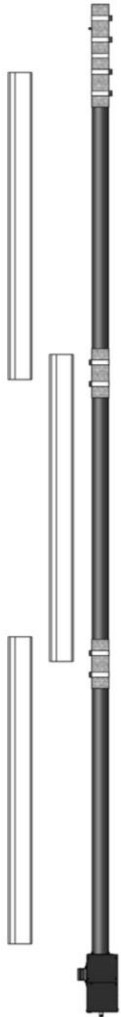
**High Altitude rating**

When installing this appliance over 4500 ft. above sea level in Canada, the appliance must be properly de-rated and installed according to local codes. In the absence of local codes the appliance must be de-rated in accordance with the most recent CSA -B149 code. In the United States for installations over 2000ft above sea level the appliance must be installed in accordance with the Current National Fuel Gas Code, ANSI Z223.1/NFPA 54. High altitude conversion kits are available, contact manufacturer for more details.

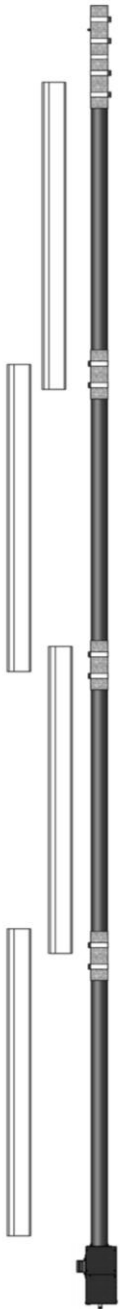
TVX60, TVX80 (20')



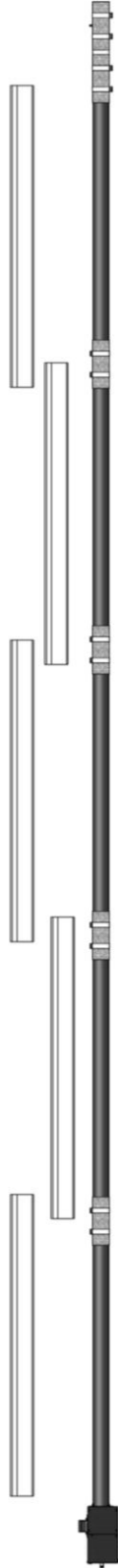
TVX100, TVX120 (30')



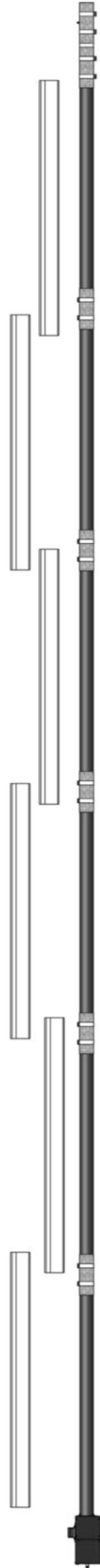
TVX150 (40')



TVX175, TVX205 (50')



TVX220 (60')



# Herringbone Manifold System

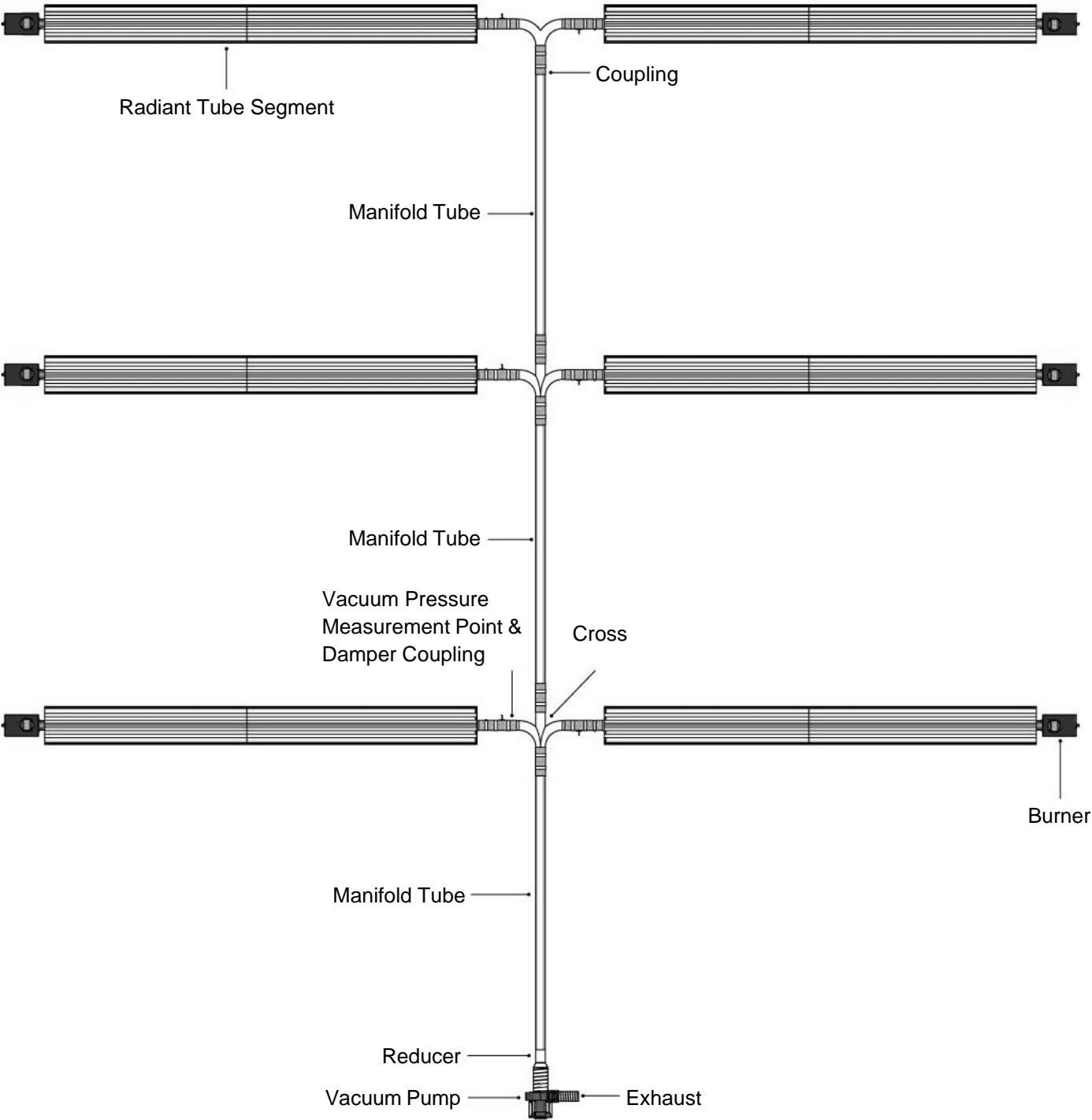


Figure 4: Example of TVX Multiburner System

## General

The Series TVX negative pressure multiburner system (Figure 4) is designed to employ two or more low intensity radiant tube heaters interconnected by manifold tube to a vacuum pump that assist in the evacuation of products of combustion and in the supply of combustion air.

The individual heaters are configured as *two-stage configurations*. High/low capability allows for quicker recovery on the high fire and economical steady operation on the low fire with either U-Tube or Linear configuration.

The burner boxes are equipped with an *air pressure switch* to ensure the safety operation of the burner. The *vacuum pressure* downstream the heater radiant tube is a controlled parameter. A test pressure port is provided at the end of the radiant tube to allow installer to measure the vacuum pressure. Downstream of the *test port* a damper coupling is used to balance the vacuum pressure throughout the radiant tube segment. Damper couplings may also be used at the end of the tailpipe just prior to the vacuum pump inlet to adjust overall system vacuum.

Any tube beyond the radiant tube length is considered *tailpipe*. *Common Tailpipe*, sometimes referred to as the *Manifold*, is a portion of Tailpipe used to tie together two or more Branches before the inlet of the Vacuum Pump. These instructions provide recommended minimum tailpipe tube lengths.

A *vacuum pump* is installed at the end of the system to exhaust the flue gases and to draw in combustion air. The vacuum pump can be installed in a supporting frame and connected to manifold and vent pipe. A low capacity vacuum pump can be installed in line with the manifold tube and vent pipe without a supporting frame.

A system can be designed by using the same or different burner inputs. Consider the maximum number of burners per pump based on the pump capacity.

The manifold sections are not subjected to condensate when the system is fully heated up and having minimum manifold length. In the case of multizone systems a condensate trap assembly must be provided at the end of the manifold system before the flue gas vacuum pump.

The flue gas vacuum pump should be positioned at the lowest point of the flue gas system. To ensure that any condensation formed in the manifold is not trapped or allowed to drain back into the heater, the manifold system should be arranged to fall slightly in the direction of the flue gas vacuum fan,  $\frac{1}{4}$ " per 10 ft. (7 mm per 3 m).

The exhaust flue should be adequately supported from the building structure and installed in accordance with the National Standards and Codes of Practice.

The individual burners are locally powered with 120 VAC. The vacuum pumps are locally powered with 120 VAC, in addition the Vacuum Pump CE408 can be powered by one of burner boxes (see electrical connection section for more details). The multiburner systems is controlled by a two-stage thermostat. Each burner box is equipped with a 24VAC control terminal.

Multi-zones control panel is available. Building Automation System connectivity is provided via thermostat. An SRP AccuRate Pro Control Panel configuration is also available.

## Radiant, tailpipe and vent lengths

<b>Burner Model</b>	<b>Units</b>	<b>60</b>	<b>80</b>	<b>100</b>	<b>125</b>	<b>150</b>	<b>175</b>	<b>205</b>	<b>220</b>
Radiant Tube	ft	20	20	30	30	40	50	50	60
Minimum Tailpipe Tube	ft	5	5	5	10	10	10	10	10
Minimum Distance to Elbow	ft	10	10	15	15	20	20	25	25
<b>Burners per CE408 Pump</b>		4	3	2	2				
<b>Burners per CE410 Pump</b>		8	6	5	4	3	3	2	2

Note: 2 Elbows allowed per burner

Note: U-tube = 2 elbows.

A system can be designed by using the same or different burner inputs.

### **The longest flow-path**

The longest flow-path is the length of the tailpipe and manifold between the end of radiant tube of the furthest heater to the vacuum pump *plus the vent length*.

When selecting a vacuum pump, the installer needs to calculate the longest flow-path.

### **Manifold Diameter**

Vacuum Pump CE408

- 4" diameter tailpipe, manifold and vent tube are used for these systems.
- The longest flow-path is 50ft or less.

Vacuum Pump CE410

- for systems containing less than 360,000 Btu/h input, the manifold and vent diameter can be 4" (10 cm) or 6" (15 cm).
- for systems containing 360,000 Btu/h input and greater, the manifold and vent diameter must be 6" (15 cm).
- Special case: For 4" tailpipe, manifold and vent diameter the longest flow-path is not more than 80 ft for up to 525,000 Btu/h.

Note: The manifold sections are not subjected to condensate when the system is fully heated up and having minimum manifold length. The maximum flow-path, including 4" and 6" manifold and vent length, is 125ft to avoid condensation.

### **Exhaust Venting**

Vent length: Maximum 25 ft; Minimum 2 ft.

Vent size may be 4" or 6" depending on the total input rate. Vent size should be the same diameter as manifold into the vacuum pump.

### **Outside Combustion Air (optional)**

In the case of Outside Air supply for Combustion, the maximum length is 25ft. Outside air duct length is not included in the calculation of the longest flow-path.

### **High Altitude**

In the United States for installations over 2000ft above sea level the appliance must be installed in accordance with the Current National Fuel Gas Code, ANSI Z223.1/NFPA 54. High altitude conversion kits are available, contact manufacturer for more details.

# Multiburner System Layouts

Note: 100 MBH = 100,000 Btu/h

## Layout Example 1

The input rate after the first heater (125 MBH) and after the second heater (125+125=250 MBH) are less than 360,000 Btu/h, so we can use 4" pipe in these sections. The input rate after the third heater (125+125+125=375 MBH) and after the fourth heater (125+125+125+125=500 MBH) are more than 360,000 Btu/h, so we should use 6" pipe in these sections. Considering 15' vent length. The longest flow-path in this case (3 x 35') + 15' = 120 ft.

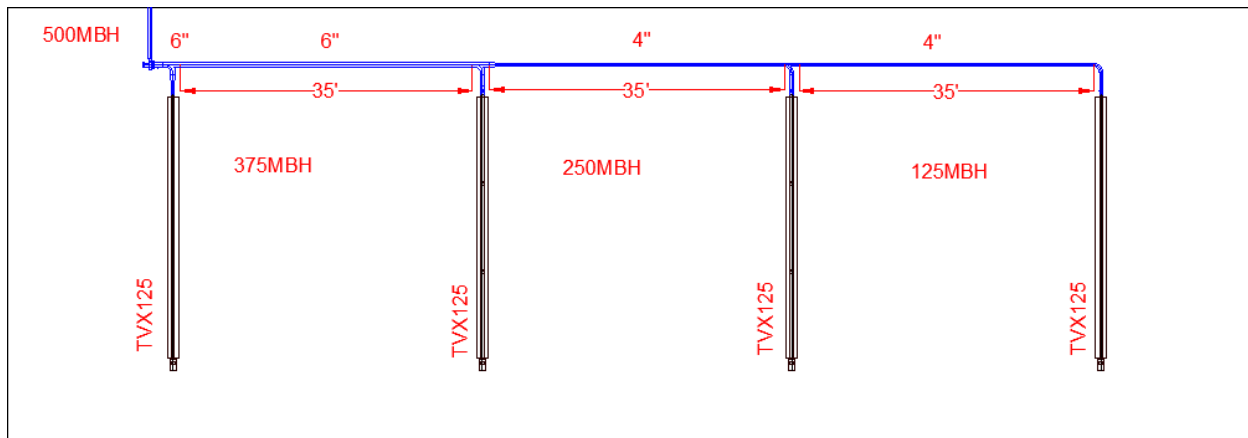


Figure 5

## Layout Example 2

The individual input rates in three branches before the last cross (80+80=160 MBH) are less than 360,000 Btu/h, so we can use 4" pipe in these sections. The input rate after the cross (80 x 6 =480 MBH) is more than 360,000 Btu/h, so we should use 6" pipe in these sections. Considering 15' vent length. The longest flow-path in this layout: 5' + 15' + 30' + 30' + 15' = 95 ft.

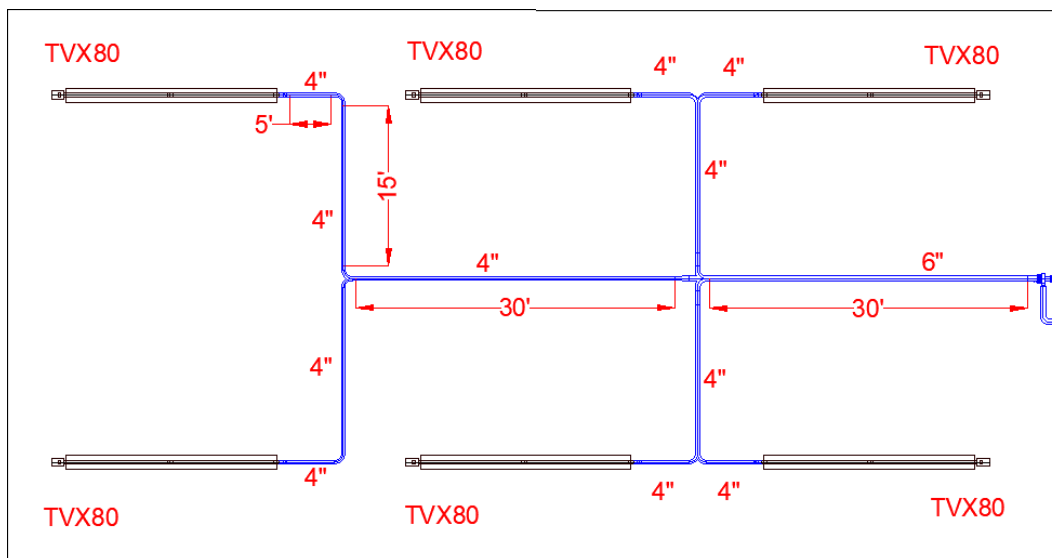


Figure 6

### Layout Example 3

The individual input rates in two branches before the last cross (100+100=200 MBH) are less than 360,000 Btu/h, so we can use 4" pipe in these sections. The input rate after the cross (100 x 5 =500 MBH) is more than 360,000 Btu/h, so we should use 6" pipe in these sections. Considering 15' vent length. The longest flow-path in this layout:  $10' + 30' + 50' + 15' = 105$  ft.

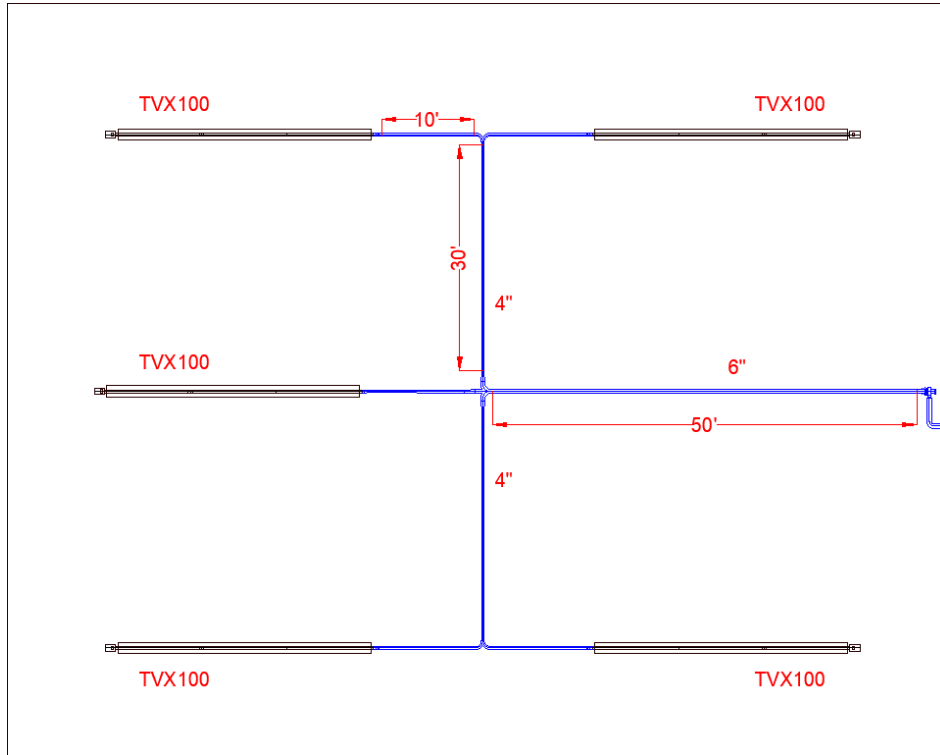


Figure 7

### Layout Example 4

The Vacuum Pump CE410 can be used to remove the flue of two TVX220. The vacuum pump will be installed in line. Considering 15' vent length. The longest flow-path in this layout:  $50' + 15' = 65$  ft.

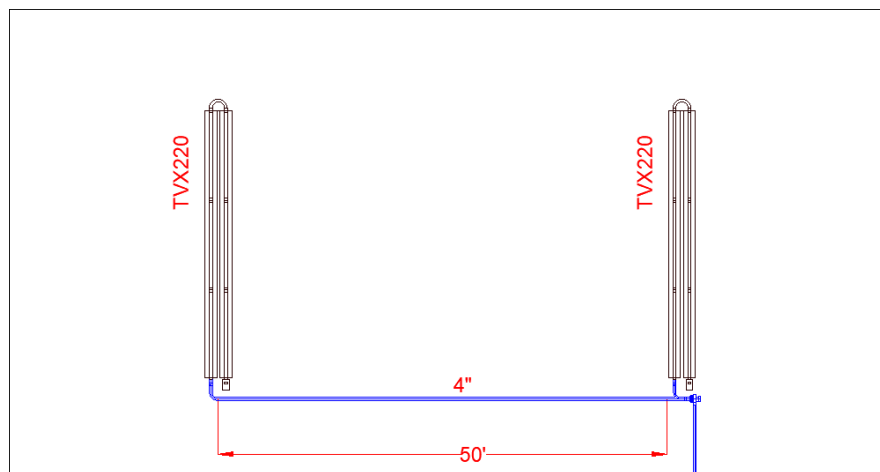


Figure 8



# PACKAGING CONTENTS – LINEAR

Get to know your heater parts (list referencing Figures 9 & 10).

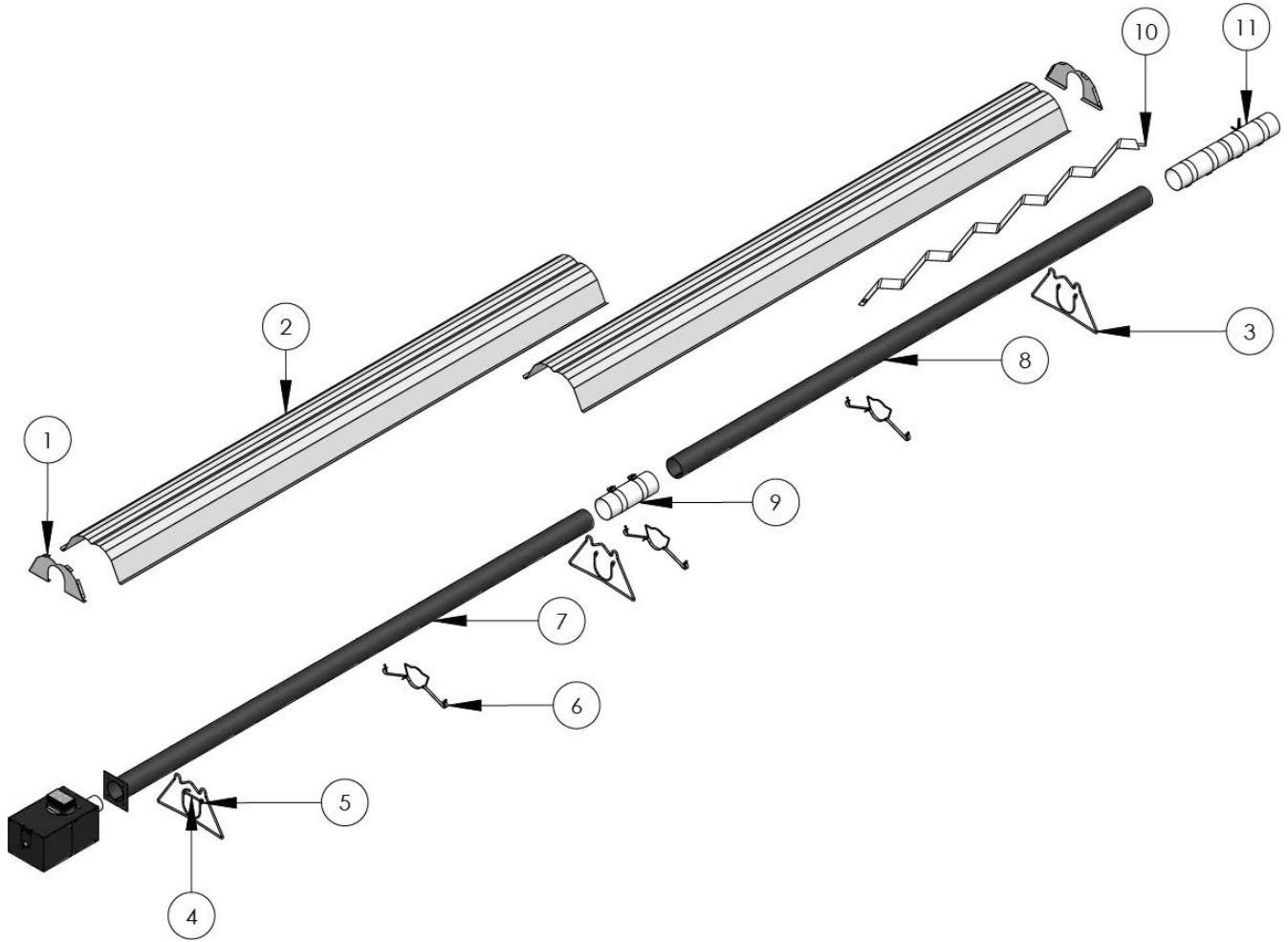


Figure 9: General Overview TVX L

## General Assembly – TVX

No.	PN	Description	Quantities							
			60	80	100	125	150	175	205	220
1	CR002	End Cap	2	2	2	2	2	2	2	2
2A	CR001	Reflector (124")	2	2	3	3	4	5	5	6
2B	CR003	Reflector (62")	0	0	0	0	0	0	0	0
3	CR003	Hanger	3	3	4	4	5	6	6	7
4	CH084	J Bolt 5/16"	1	1	1	1	1	1	1	1
5	CH223	Nut, 5/16"	1	1	1	1	1	1	1	1
6	CR024	Reflector Bracket Assembly	3	3	5	5	7	9	9	11
7	UT002	Flanged Tube (120")	1	1	1	1	1	1	1	1
8A	CT001	Tube (120")	1	1	2	2	3	4	4	5
8B	CT073	Tube (60")	0	0	0	0	0	0	0	0
9	CR010	Coupling	1	1	2	2	3	4	4	5
10	CT006	Baffle, Aluminized (6')	1	1	1	1	1	0	1	0
11	CR229	Measurement Coupling Ass'y	1	1	1	1	1	1	1	1

# General Assembly – Burner Box

No.	PN	Description	Quantities							
			60	80	100	125	150	175	205	220
1	CH019	Nut, 5/16" Hex	4	4	4	4	4	4	4	4
2	CH020	Spring Washer	4	4	4	4	4	4	4	4
3	CH001	Gasket, Flange	1	1	1	1	1	1	1	1
4	-	Choke Plate, Burner	US314	US314	US250	US250	US317	US317	US316	US316
5	CH050	Nut, 1/4" Hex	4	4	4	4	4	4	4	4
6	US247	Cage, Inlet	1	1	1	1	1	1	1	1
7	-	Choke Plate, Inlet	US312	US259	US259	US319	US318	US318	US320	US320
8	CH253	Gasket	1	1	1	1	1	1	1	1

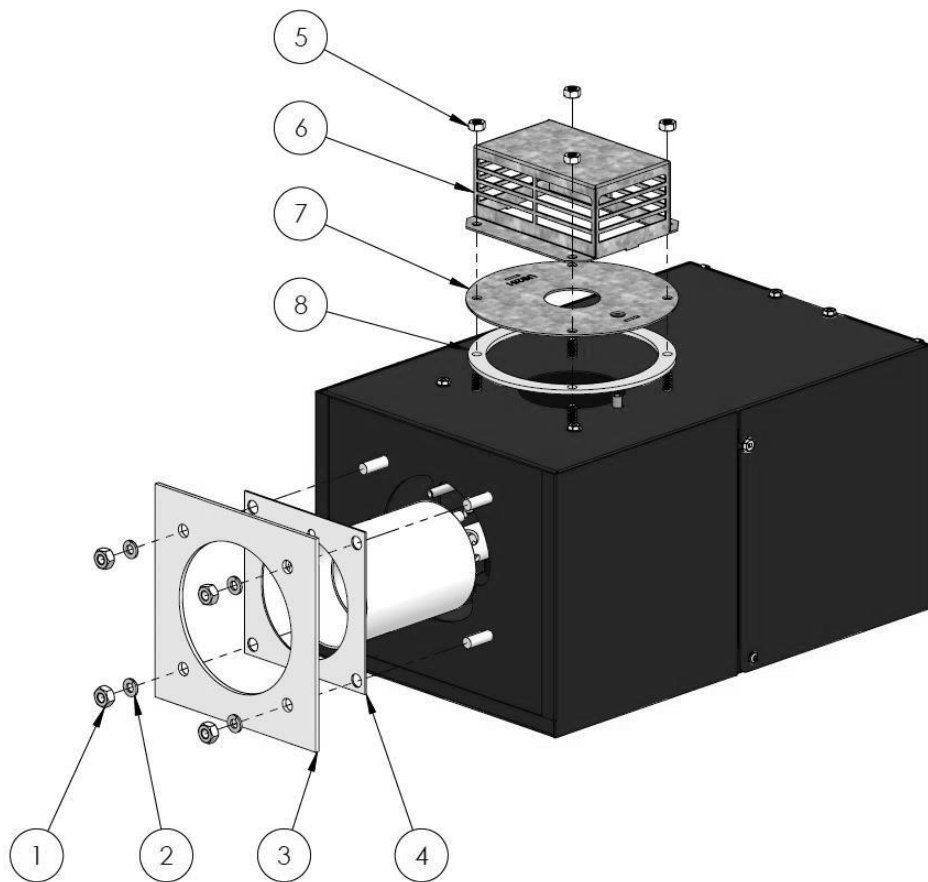


Figure 10: Burner Box

# Vacuum Pumps

## Vacuum Pump P1

(PN: CE408)

120 VAC, 1Ph,1 Amps

No.	PN	Description	QTY
1	CE406	Blower Assembly, TVX, Pump P1	1
2	CE302	Blower Inlet Connector 4" OD	1
3	US323	Collar Mount, TVX Blower	1
4	CS001	Collar, Air Inlet	1
5	CR160	Coupling 4" ID x 6" Long	1

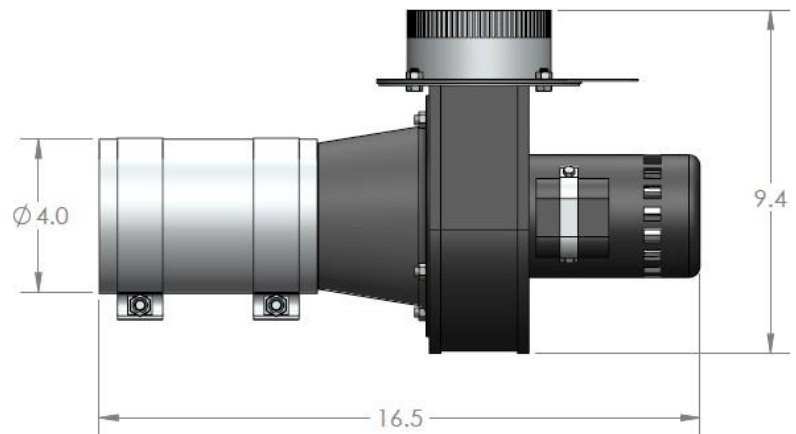
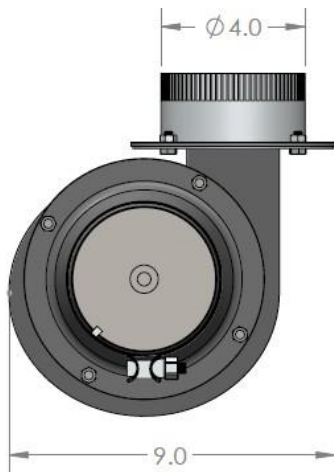
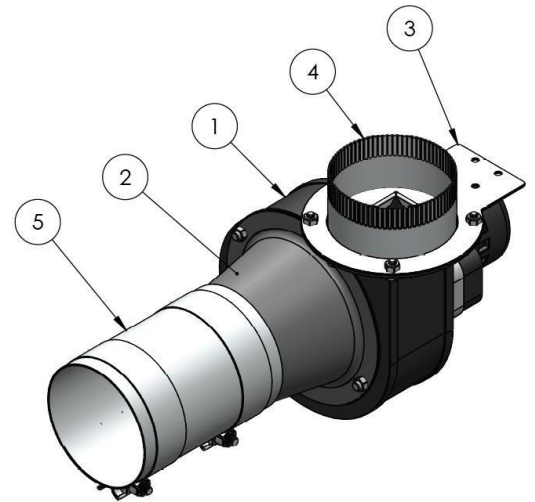
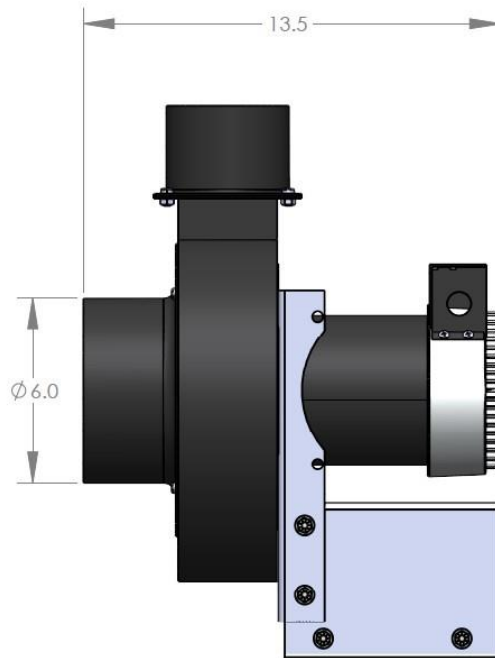
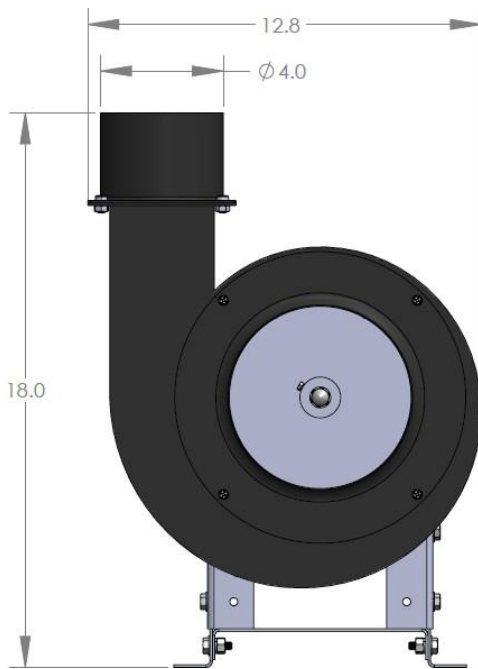
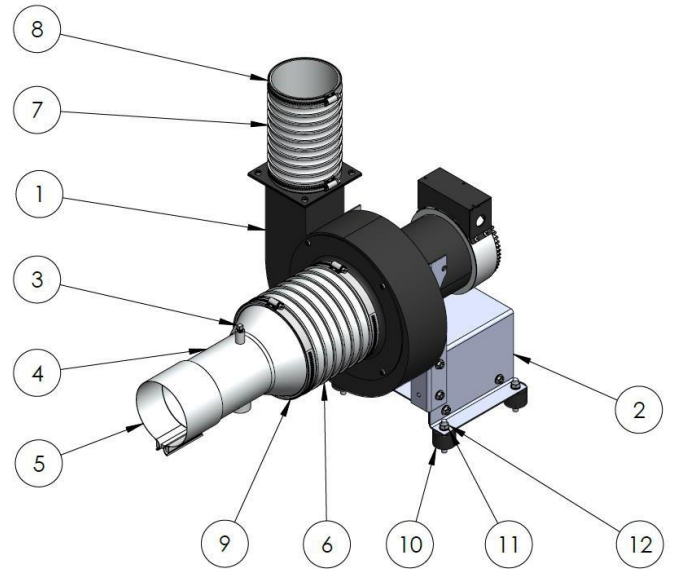


Figure 11: Vacuum Pump P1

**Vacuum Pump P2**  
(PN: CE410)  
120VAC, 1Ph, 5Amps

No.	PN	Description	QTY
1	CE407	Blower Assembly, TVX, Pump P2	1
2	-	Blower Frame Assembly	1
3	VH061	Pipe Plug 1/8 NPT SQ. HD	1
4	CT048	Reducer 6"-4"	1
5	CR046	Clamp 4" Butt Joint	1
6	VS024	Boot 6" I.D. x 11" LG	1
7	VS001	Boot 4" I.D. x 11" LG	1
8	CH046	Clamp Gear 4"	2
9	CH039	Clamp Gear 6"	2
10	VH011	Rubber Motor Mount	4
11	CH020	Lock Washer 5/16" Spring	8
12	CH019	Nut 5/16"-18 Hex	8



**Figure 12: Vacuum Pump P2**

## Clearance to Combustibles

A general clearance of 18 (0.5 m) in every direction is recommended for servicing around each Burner and air supply (at the far end of each radiant tube). Also, to ensure adequate air flow in and around the Heating System.

In addition to this, it is very important to observe the minimum clearance to combustibles at all times to avoid any possibility of property damage or personal injury.

### WARNING

- Clearances as marked on the heater body must be maintained from vehicles parked beneath. Signs should be posted identifying any possible violation of the clearance distances from the heater in all vehicle areas.
- Maximum allowable stacking height in storage areas should be identified with signs or appropriate markings adjacent to the thermostat or in a conspicuous location.

Table 2 lists the minimum clearance to combustible materials for various installation configurations. Note that standard clearances also apply to installation above T-bar ceilings and above decorative grills. Additional clearance may be required for glass, painted surfaces and other materials which maybe damaged by radiant or convective heat.

*Combustible materials are considered to be wood, compressed paper, plant fibres, plastics, Plexiglas or other materials capable of being ignited and burned. Such materials shall be considered combustible even though flame-proofed, fire-retardant treated or plastered.*

Elbows and U-bends are un-heat-treated aluminized material and are typically installed without reflectors. Reflector miter kits are available for U-bends and elbows.

Adequate clearance to sprinkler heads must be maintained.

The stated clearance to combustibles represents a surface temperature of 90°F (50°C) above room temperature. Building materials with low heat tolerance (i.e. **plastics, vinyl siding, canvas, tri-ply, etc.**) may be subject to degradation at lower temperatures. **It is the installer's responsibility to ensure that adjacent materials are protected from deterioration.**

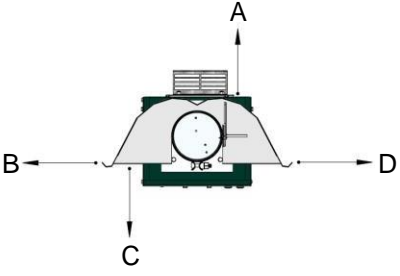
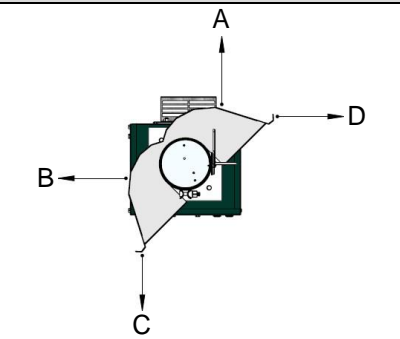
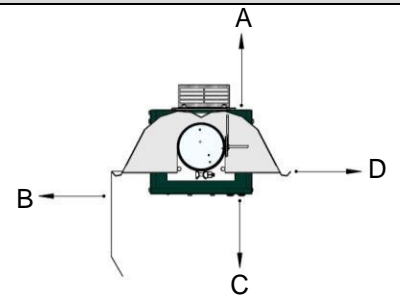
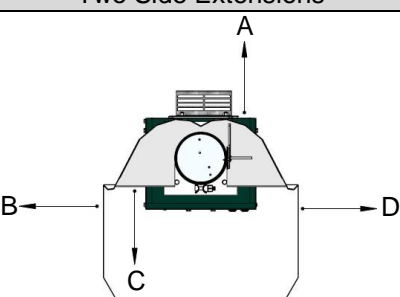
#### Note 1:

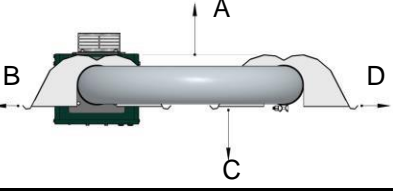
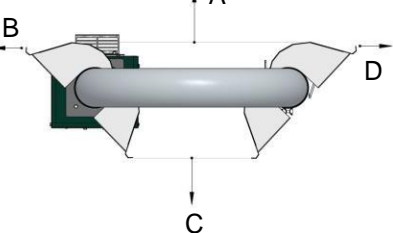
Bottom Shields are approved for all burner sizes. The below clearance (dimension C in Table 2) may be reduced by 25% when an approved Bottom Shield is used.

#### Note 2:

Reduced clearances downstream from the burner are approved for all configurations. Dimensions B, C, and D in Table 2 can be reduced for locations 25' (7.6 m) or more downstream from a burner, maximum reduction is 50%

Table 2: Minimum Clearance to Combustibles Inches (cm)

		Model No.: TVX								
Reflector Configurations	Dim In (cm)	60 MBH	80 MBH	100 MBH	125 MBH	150 MBH	175 MBH	205 MBH	220 MBH	
<b>Horizontal</b>										
	<b>A</b>	2(5)	2(5)	2(5)	4(10)	4(10)	6(15)	6(15)	6(15)	
	<b>B</b>	25(63)	26(66)	30(76)	33(84)	36(91)	40(102)	44(46)	46(117)	
	<b>C</b>	58(147)	62(157)	67(170)	71(180)	74(188)	78(198)	80(203)	83(211)	
	<b>D</b>	25(63)	26(66)	30(76)	33(84)	36(91)	40(102)	44(46)	46(117)	
<b>45° Reflector Tilt</b>										
	<b>A</b>	4(10)	4(10)	4(10)	6(15)	6(15)	8(20)	8(20)	8(20)	
	<b>B</b>	4(10)	4(10)	4(10)	4(10)	4(10)	4(10)	4(10)	4(10)	
	<b>C</b>	50(127)	58(147)	67(170)	70(178)	71(180)	74(188)	78(198)	81(205)	
	<b>D</b>	46(117)	50(127)	58(147)	63(160)	64(163)	67(170)	72(183)	77(196)	
<b>One Side Extension</b>										
	<b>A</b>	2(5)	2(5)	2(5)	4(10)	4(10)	6(15)	6(15)	6(15)	
	<b>B</b>	4(10)	4(10)	4(10)	4(10)	4(10)	6(15)	6(15)	6(15)	
	<b>C</b>	58(147)	63(160)	73(185)	76(193)	78(198)	80(203)	84(203)	84(203)	
	<b>D</b>	38(97)	42(107)	45(114)	50(127)	52(132)	54(137)	56(142)	58(147)	
<b>Two Side Extensions</b>										
	<b>A</b>	2(5)	2(5)	4(10)	4(10)	4(10)	6(15)	6(15)	6(15)	
	<b>B</b>	16(41)	18(46)	18(46)	22(56)	24(61)	26(66)	29(74)	31(79)	
	<b>C</b>	58(147)	64(163)	71(180)	78(198)	80(203)	82(208)	86(218)	88(224)	
	<b>D</b>	16(41)	18(46)	18(46)	22(56)	25(64)	26(66)	29(74)	31(79)	

		Model No.: TVX								
Reflector Configurations	Dim In (cm)		60 MBH	80 MBH	100 MBH	125 MBH	150 MBH	175 MBH	205 MBH	220 MBH
U-Tube, Horizontal 	<b>A</b>		2(5)	2(5)	2(5)	4(10)	4(10)	6(15)	6(15)	6(15)
	<b>B</b>		25(64)	28(71)	30(76)	34(86)	37(94)	40(102)	45(114)	46(117)
	<b>C</b>		59(150)	62(157)	71(180)	74(188)	76(193)	78(198)	82(208)	88(224)
	<b>D</b>		22(56)	26(66)	30(76)	33(66)	36(84)	40(102)	44(112)	46(117)
U-Tube, Opposite 45° 	<b>A</b>		4(10)	4(10)	4(10)	4(10)	4(10)	8(20)	10(25)	10(25)
	<b>B</b>		46(117)	50(127)	54(137)	63(160)	64(163)	67(170)	72(183)	74(188)
	<b>C</b>		51(129)	54(137)	64(163)	69(175)	71(180)	74(188)	78(198)	81(206)
	<b>D</b>		16(41)	18(46)	18(46)	22(56)	24(61)	26(66)	29(74)	32(81)
Unvented	<b>Above</b>		12(30)	18(46)	18(46)	18(46)	18(46)	18(46)	18(46)	18(46)
	<b>End</b>		26(66)	26(66)	26(66)	26(66)	32(81)	32(81)	32(81)	32(81)
Vented	<b>End</b>		18(46)	18(46)	18(46)	18(46)	18(46)	18(46)	18(46)	18(46)

Note: All dimensions shown are measured from outside surface of all tubes, reflectors and fittings

# HANGERS INSTALLATION AND HEATER SUSPENSION

- The heater should be installed in accordance with the relevant provisions of National standards and Codes of Practice in the destination country.
- Suspension mechanism must allow for lateral tubing expansion. A minimum 12" (300 mm) length welded link chain with a working load limit of at least 200 lbs (90 kg) is recommended (refer to Figure 5 for more details). **Manufacturer recommends and makes available "quick links" for connecting chain. If any open ended "S" hooks and turnbuckles are used, the open ends must be closed to avoid unhooking chain with inadvertent contact.**
- Locate hanging chain at predetermined suspension points in the structure.

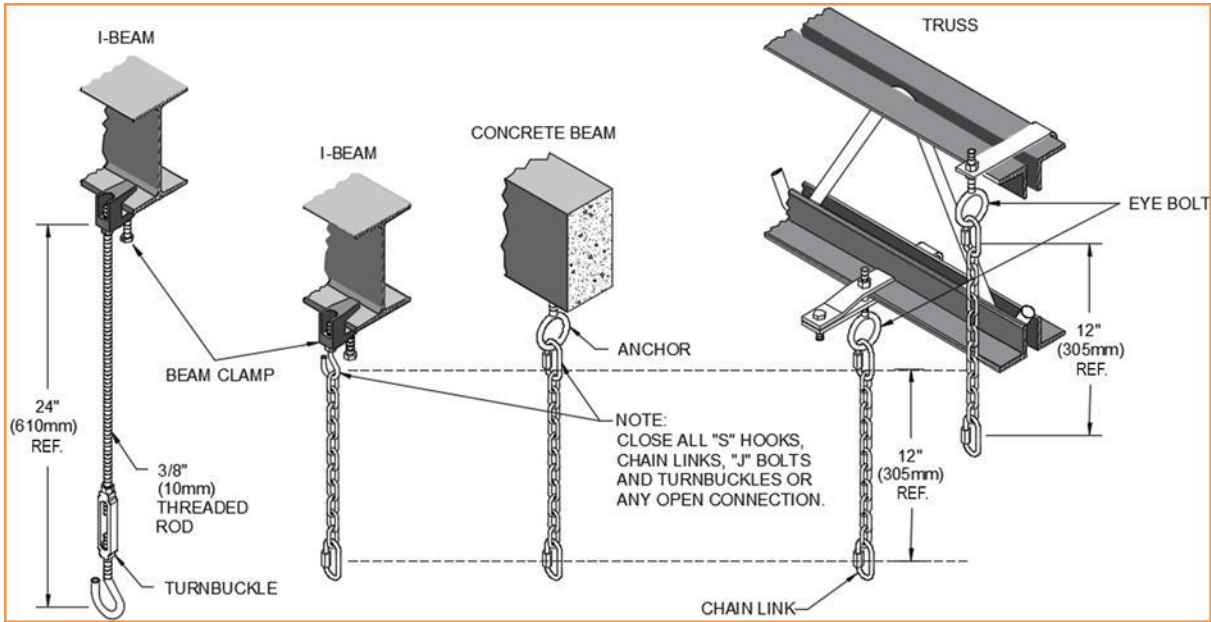


Figure 13: Suspension Mechanism

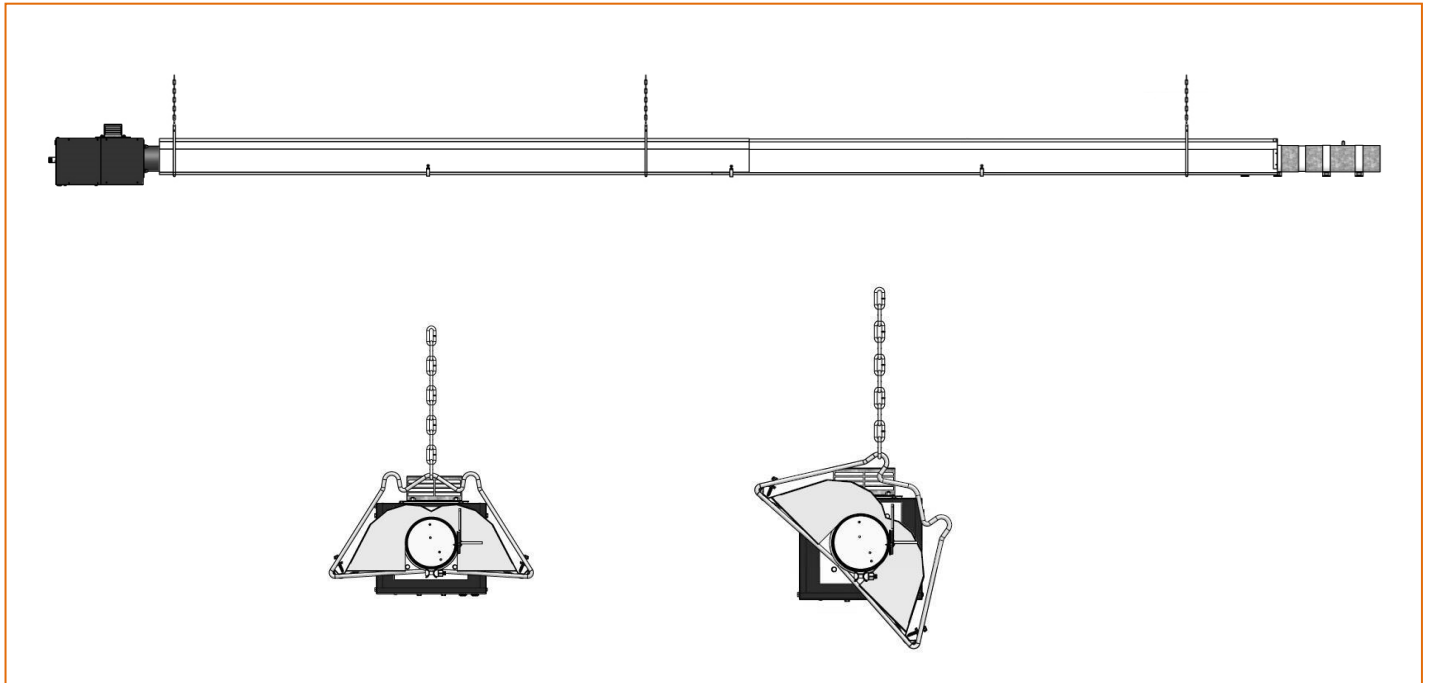
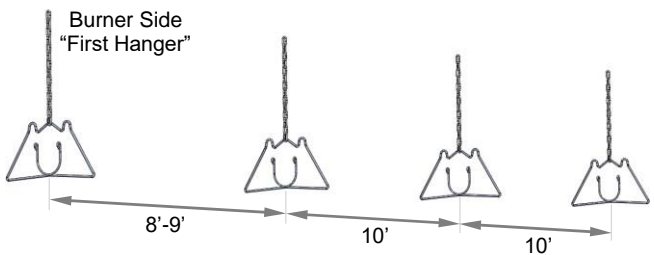
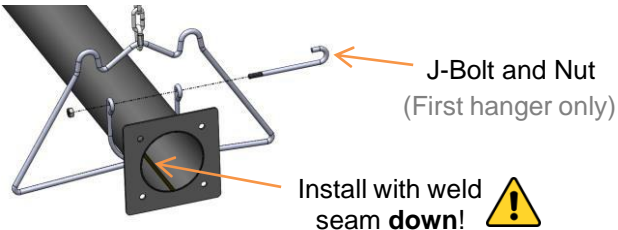

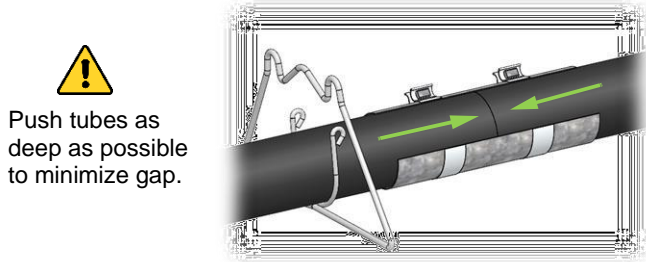
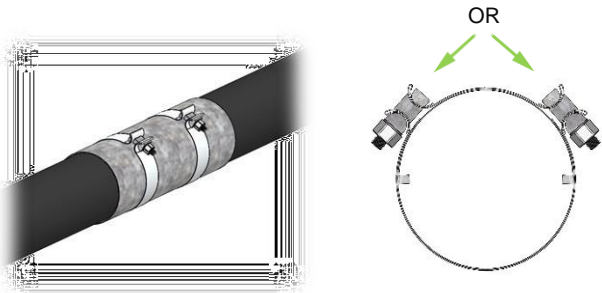


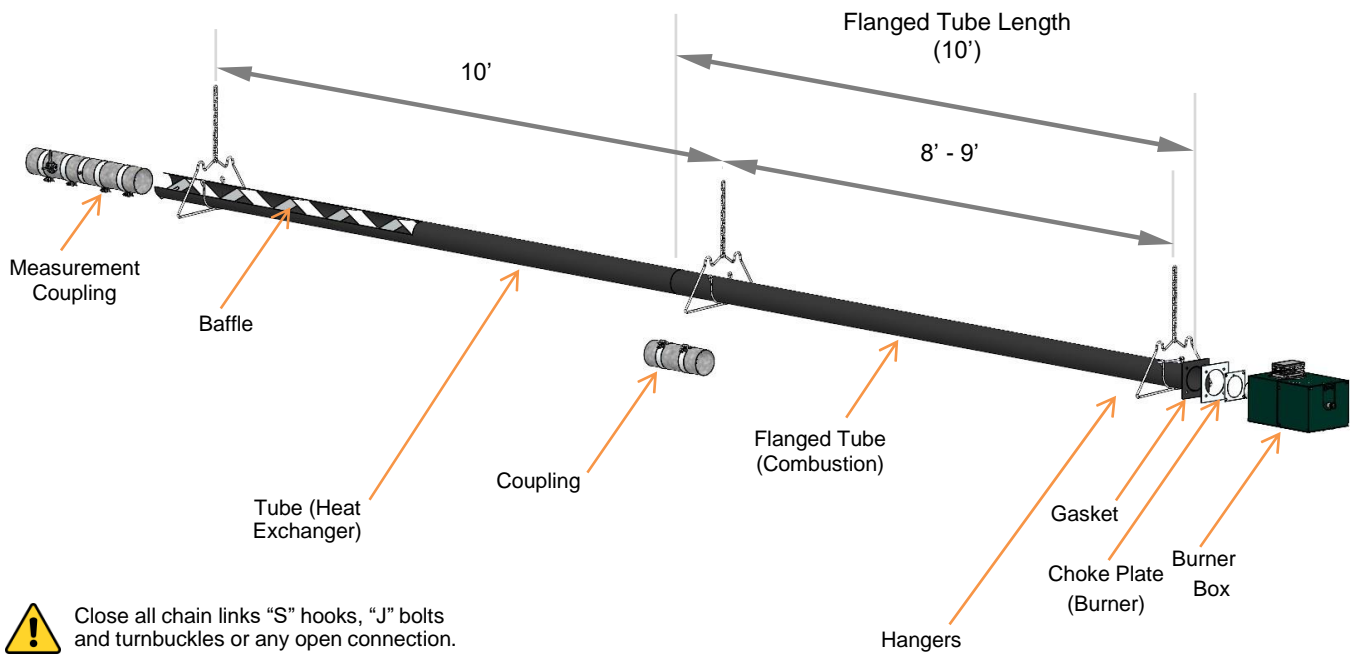
Figure 14: Heater Suspension



<p><b>Step 1</b></p> <p>The number of Hangers depends on the heater configuration. All the chains must be aligned. As a rule the combustion tube (first tube) utilizes 2 hangers and thereafter 1 hanger per 10' section.</p>	
<p><b>Step 2</b></p> <p>Mount the Flanged Tube (<b>UT002</b>) on the first two Hangers (<b>CR003</b>) and ensure that the Tube's weld seam faces downwards.</p> <p>Fasten Tube to Hanger using J-bolt and nut (required only for the first hanger, next to the flange).</p> <p><i>Note: This applies also to inclined heaters.</i></p>	
<p><b>Step 3</b></p> <p>The distance between the flange and the Hanger should be 3" - 6".</p> <p>Slide Coupling on Tube (see next page for detail).</p>	
<p><b>Step 4</b></p> <p>Ensure that both Tubes hit the middle point of the Coupling to minimize gap between Tubes, as pictured.</p>	
<p><b>Step 5</b></p> <p>Orient the Band Clamp Lock Bolts to the 10 or 2 o'clock positions for nut accessibility. This also prevents interference with the reflector.</p> <p>Torque nuts to 15 – 25 ft.-lbs</p>	

## Step 6

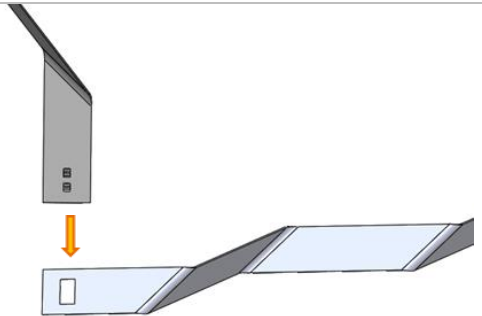
Continue assembly by sliding Tubes through Hangers and attaching all Couplings.



## Step 7

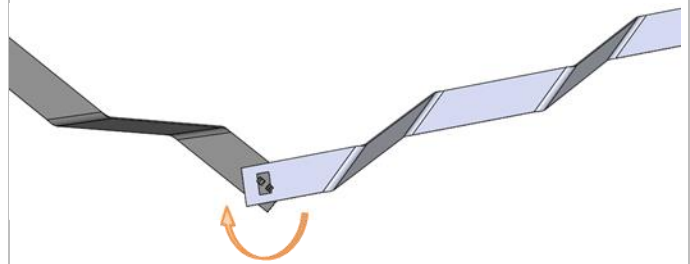
If your heater's configuration has only one Turbulator, insert it into the Tube and skip to Step 10.

Line up the Turbulators at 90 degrees. Insert the tabs into the slot.



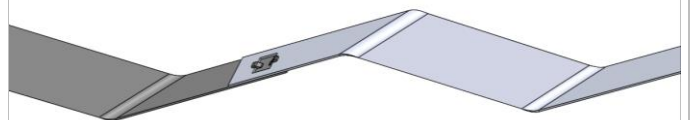
## Step 8

Twist the Turbulators 90 degrees to lock them together.



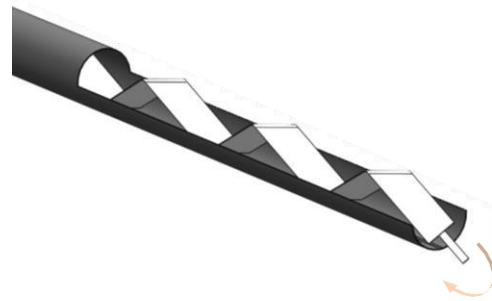
## Step 9

Turbulators are ready to be inserted into the Tubes.



### Step 10

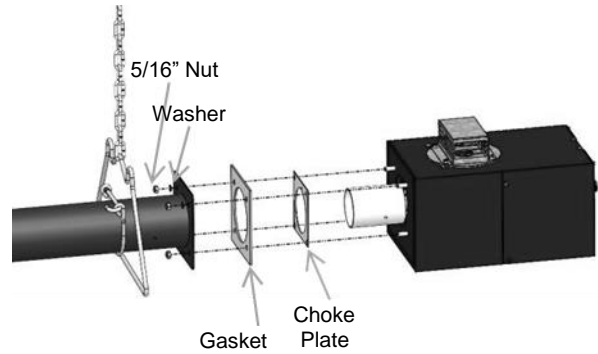
Bend Baffle Tab down, tightly over the edge of the Tube.



### Step 11

Install the Burner Box onto the flanged Tube.

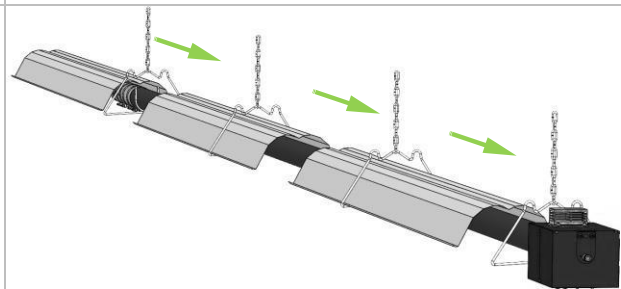
Refer to Packaging Contents page for part numbers and details.



### Step 12

Install the Reflectors by sliding them through the Hangers.

Refer to Step 13 and 14 to see how Reflectors should overlap in your configuration.

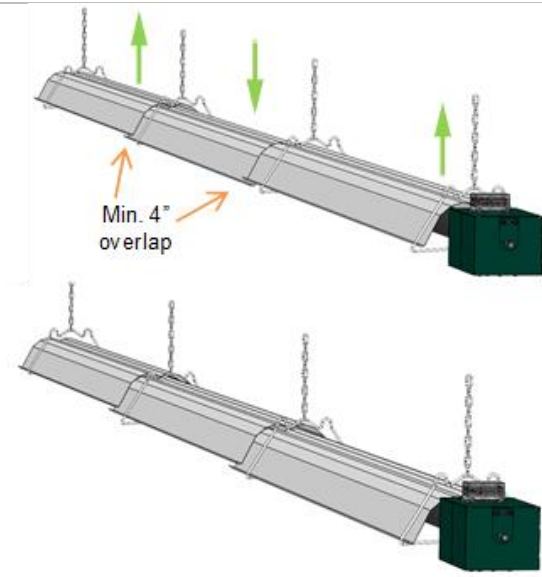


### Step 13

Ensure Reflectors are installed as shown here and Step 14.

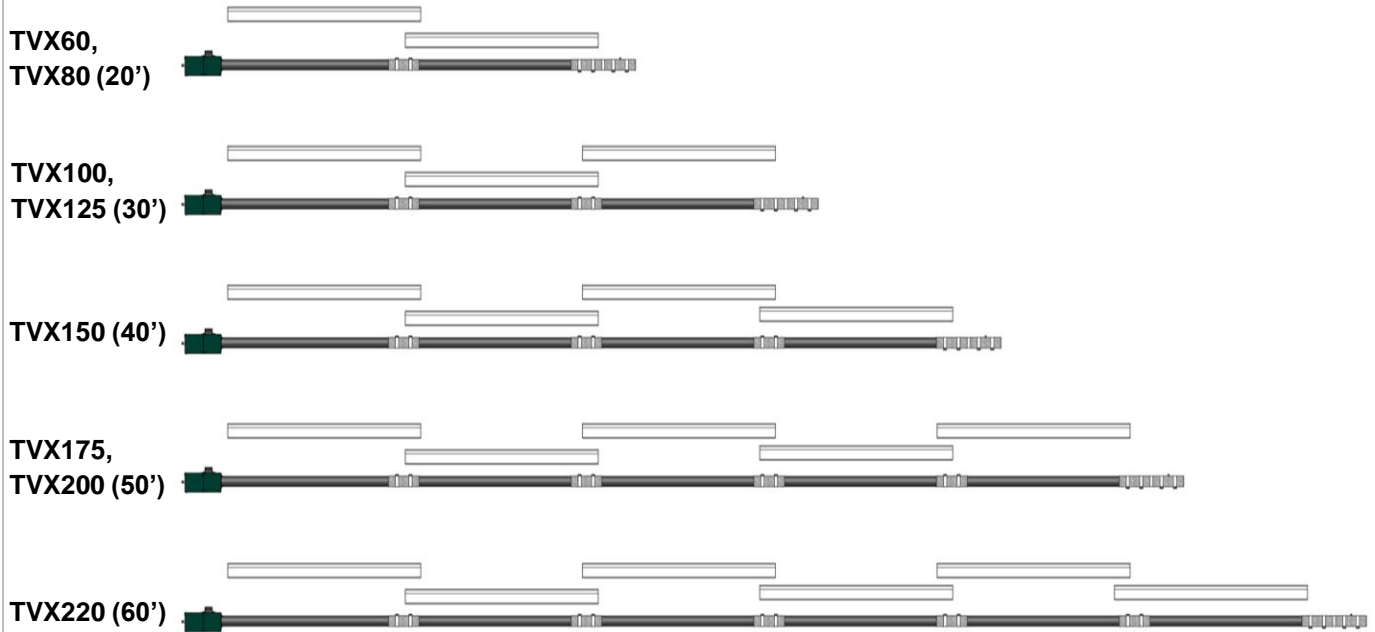


Incorrect overlap



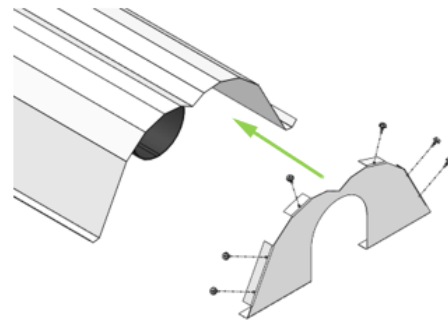
## Step 14

Reflector overlap orientations:



## Step 15

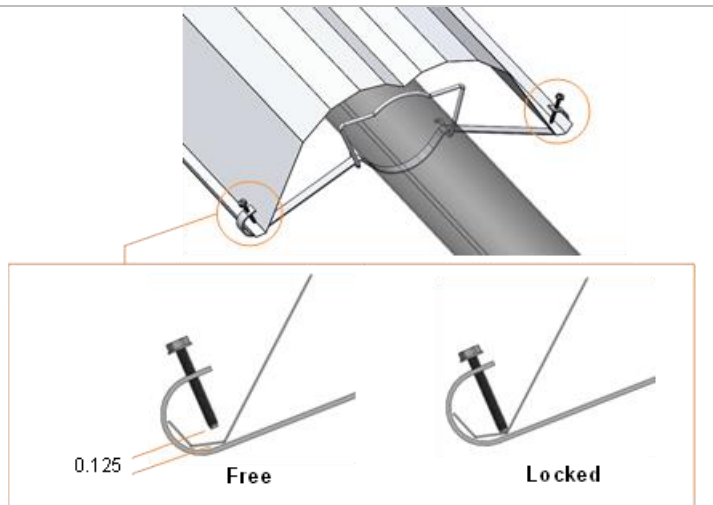
Install the End Caps using sheet metal screws.



## Step 16

Install Reflector Brackets (two parts that centralize the Tube within the Reflector).

Refer to the diagram below for Free and Locked orientations.

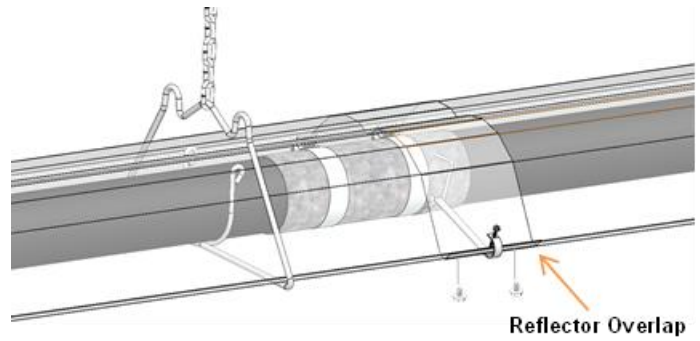


## Step 17

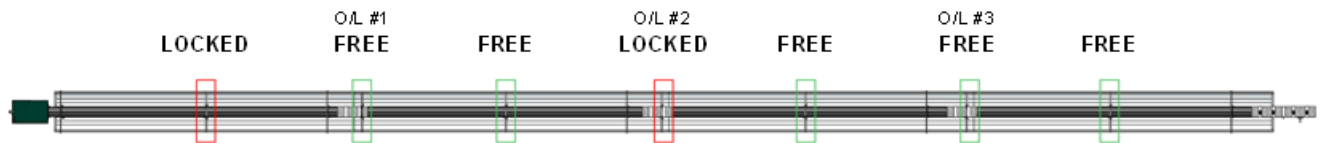


Wherever the Reflectors are overlapping, secure every **SECOND** reflector overlap with two #8 x 3/8" long screws **AND** tighten (lock) the reflector bracket screws. The first overlap is **FREE**.

Refer to the diagram below.

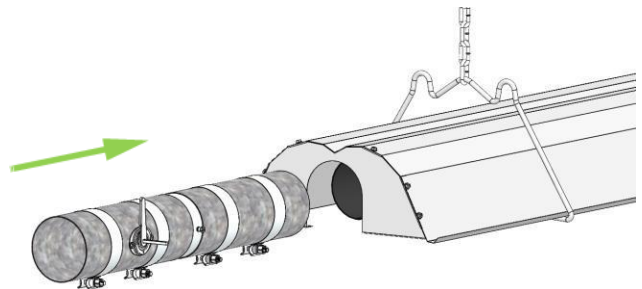


## Reflector Bracket Orientations Example

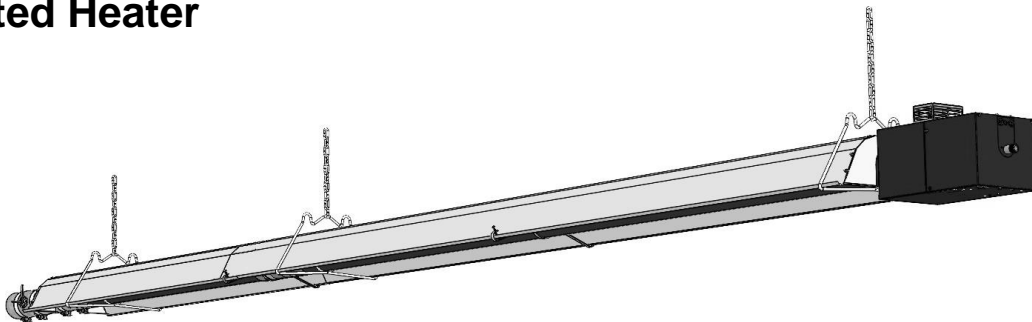


## Step 18

Attach Measurement Coupling (CR229) to end of last tube. Orient such that the damper lever and test point are horizontal (as shown) and torque as described in Step 5.



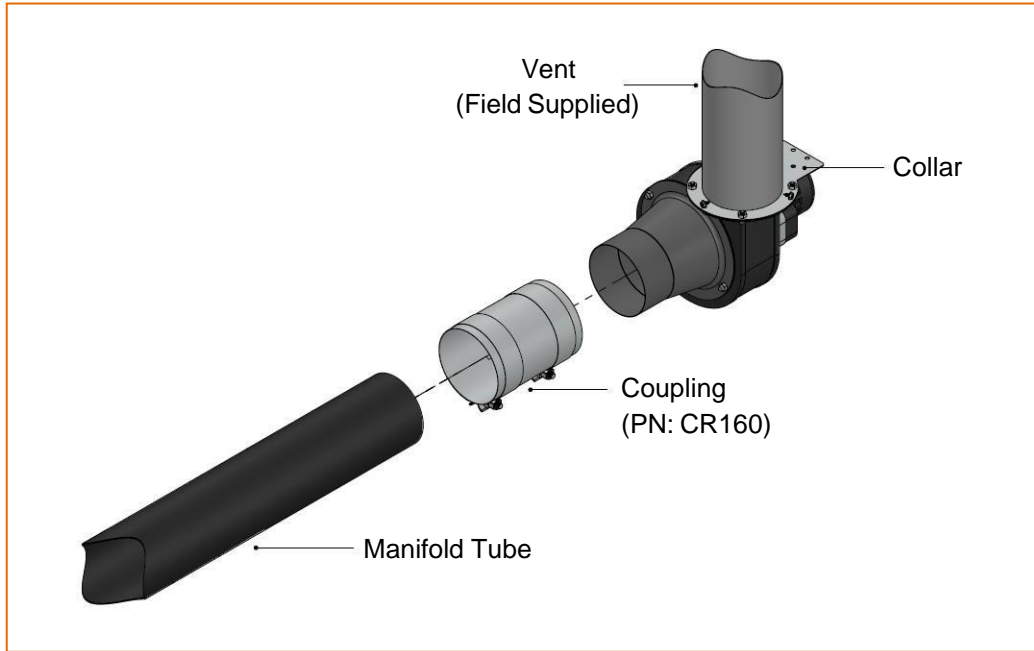
## Completed Heater



## VACUUM PUMP MOUNTING

### Vacuum Pump (CE408)

1. Vacuum pump to be mounted inline with the manifold tube as shown below.
2. Vent piping to be supplied in the field and screwed to pump collar via sheet metal screws.



**Figure 15: Vacuum Pump P1 Mounting**

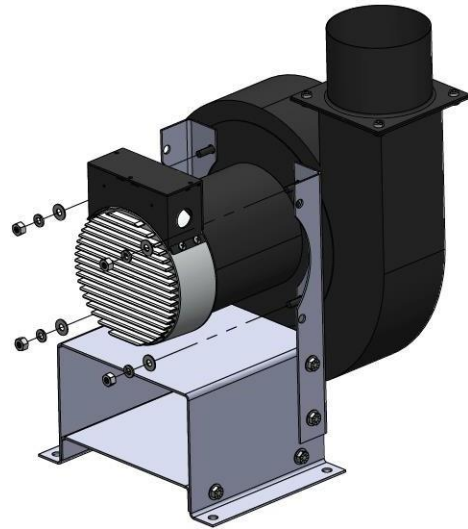
### Vacuum Pump (CE410)

1. Install Vacuum Pump as per designed system mounting location and position.
2. Ensure that mounting supports are sufficient to withstand the weight and vibration of the Vacuum Pump and Ventilation System. Welded link chain with a working load limit of at least 200 lbs. (91 kg) is recommended for mounting vacuum pumps only.
3. Install using the Vacuum Pump Mounting Kit if purchased. (Chain and threaded rods for ceiling mounting are NOT included in package.)
4. Ensure elevation of Inlet will allow for the alignment of the Tubing with a downward slope of  $\frac{1}{4}$ " per 10 ft. (7 mm per 3 m) towards the Vacuum Pump.
5. Ensure that the isolators are placed between the Pump housing and the mounting supports to reduce vibration transfer to the structure.

## Orientation Options

### Step 1

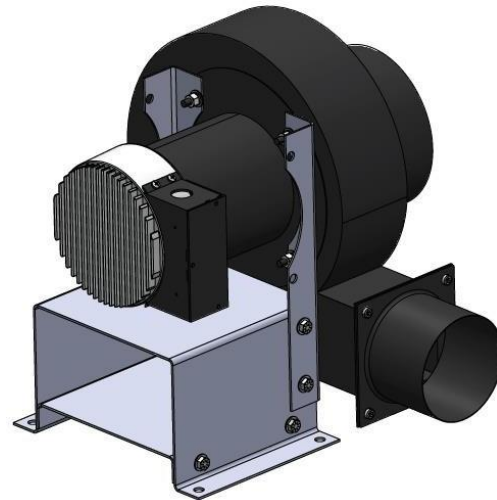
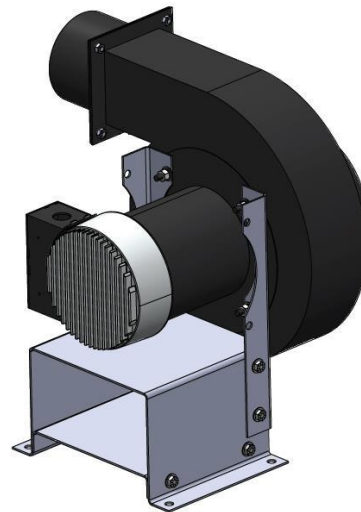
Remove 4 nuts, washers, and lock washers that mount the vacuum pump to the frame assembly.

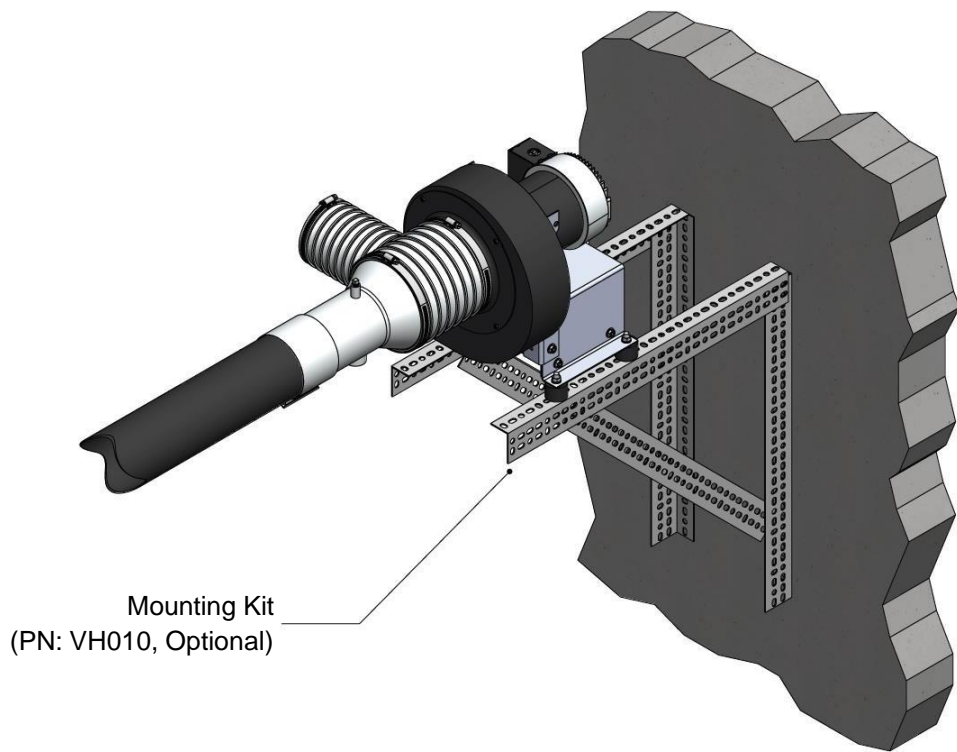


### Step 2

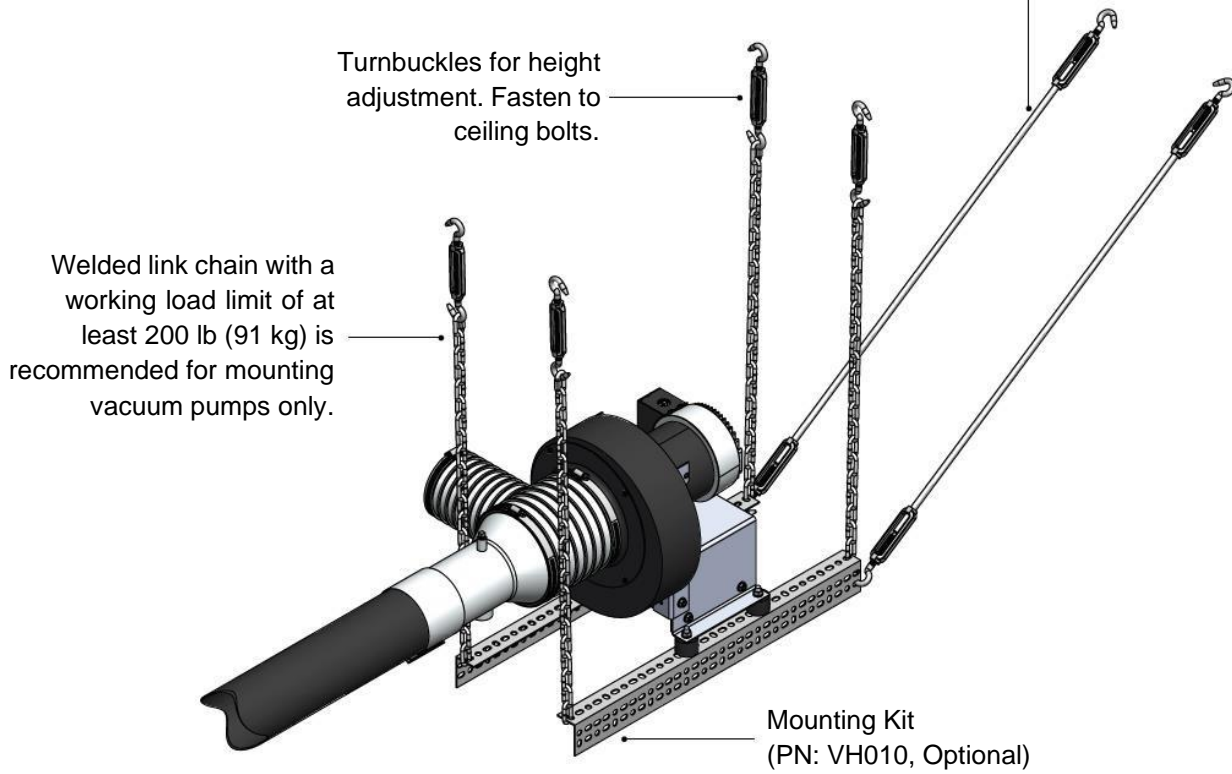
Vacuum pump housing can be rotated 90 degrees clockwise or counter-clockwise, depending on the needs of the application.

Replace fasteners from Step 1 in the same sequence as shown.





When suspended from ceiling, add threaded rod support to prevent horizontal movement of pump.



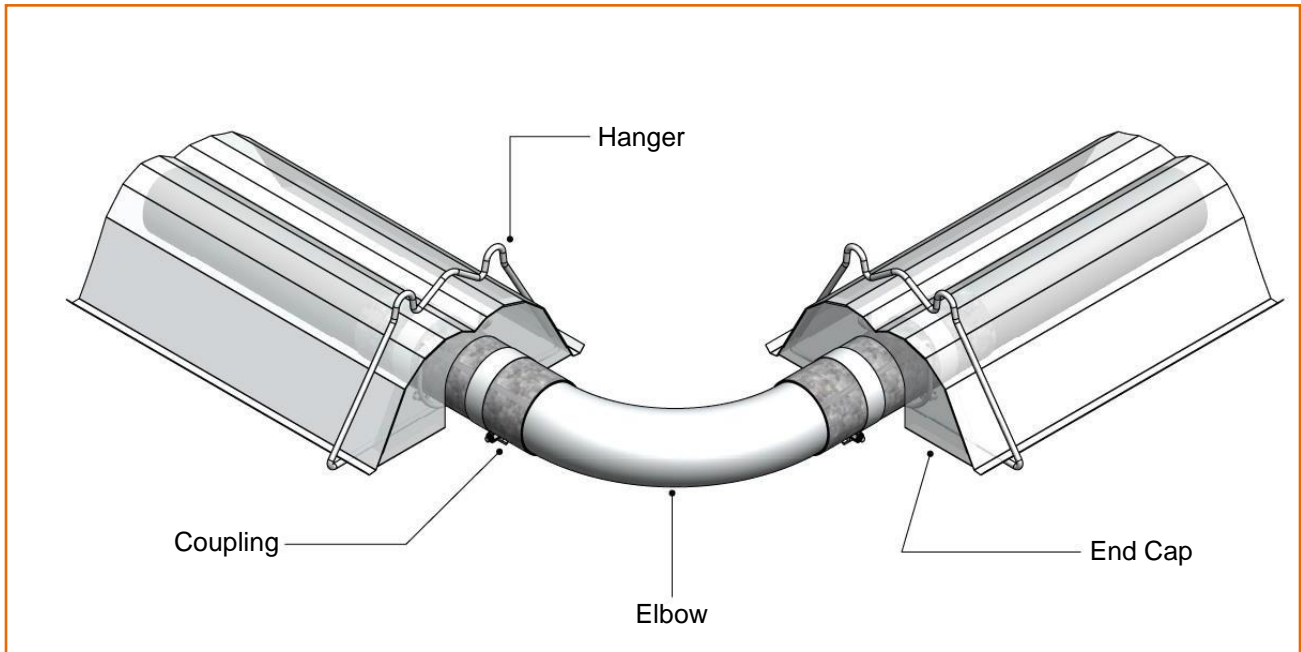
**Figure 16: Vacuum Pump P2 Ceiling & Wall Mounting**



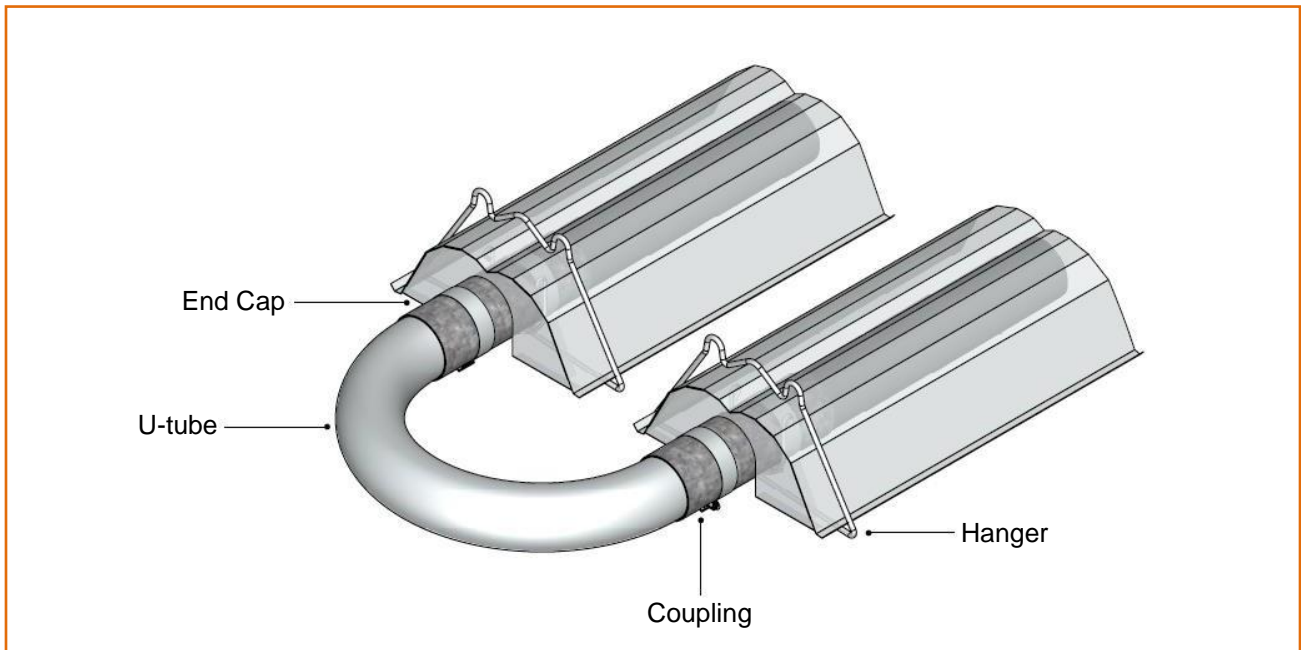
## ELBOW AND U-TUBE INSTALLATION

- If required by the heater layout, install 90° elbows or U-tube where indicated. Refer to Figure 16 & Figure 17 for details.

**Note:** Elbows or U-tubes are typically installed without reflectors.



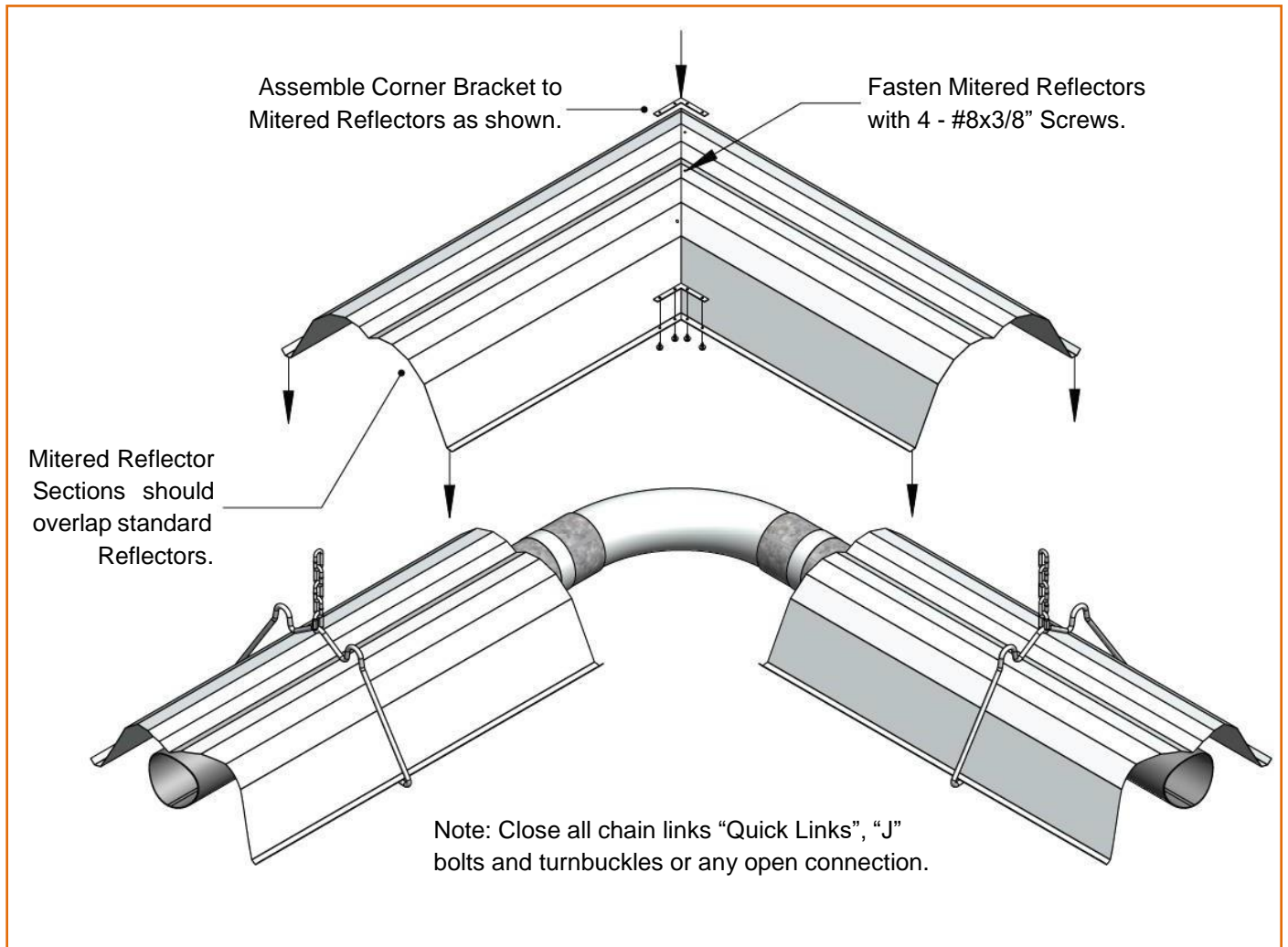
**Figure 16: 90° Elbow Detail**



**Figure 17: U-tube Detail**

## MITERED REFLECTOR INSTALLATION

- If used, install the Mitered Reflector as shown below (Figure 18).

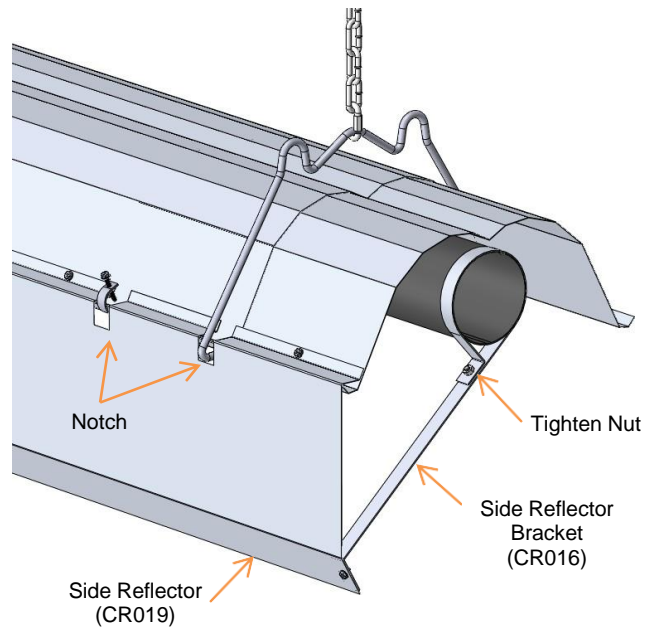


**Figure 18: Mitered Reflector Installation**

## SIDE REFLECTORS & BOTTOM SHIELDS

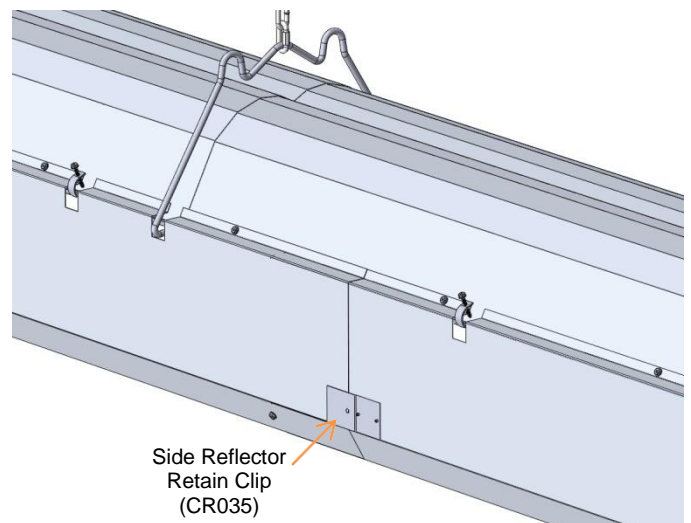
### Step 1

Side Reflectors are 124" long. Fasten one Side Reflector per Reflector with #8 x 3/8" screws (not supplied). Use three Side Reflector Brackets per Side Reflector. Space approximately 48" apart.



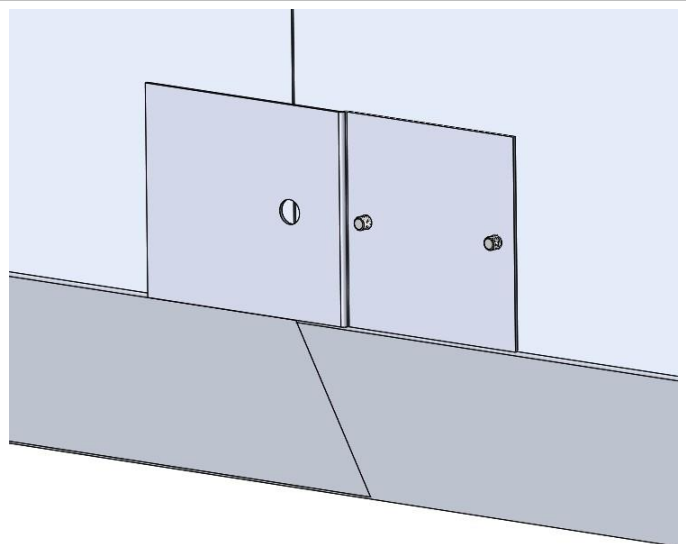
### Step 2

Overlap Side Reflectors and then install Side Reflector Retainer Clip. See details below.



### Step 3

Use the hole as a guide to position adjacent Side Reflector. The Side Reflector edge must be visible through the hole at room temperature. Screws to be installed from inside of Side Reflector. Install screws on one end of the Retainer Clip to allow movement.



## BOTTOM SHIELD REFLECTOR INSTALLATION

- Bottom shields need not overlap. Each 5' section is held with two support brackets (see Figure 19).

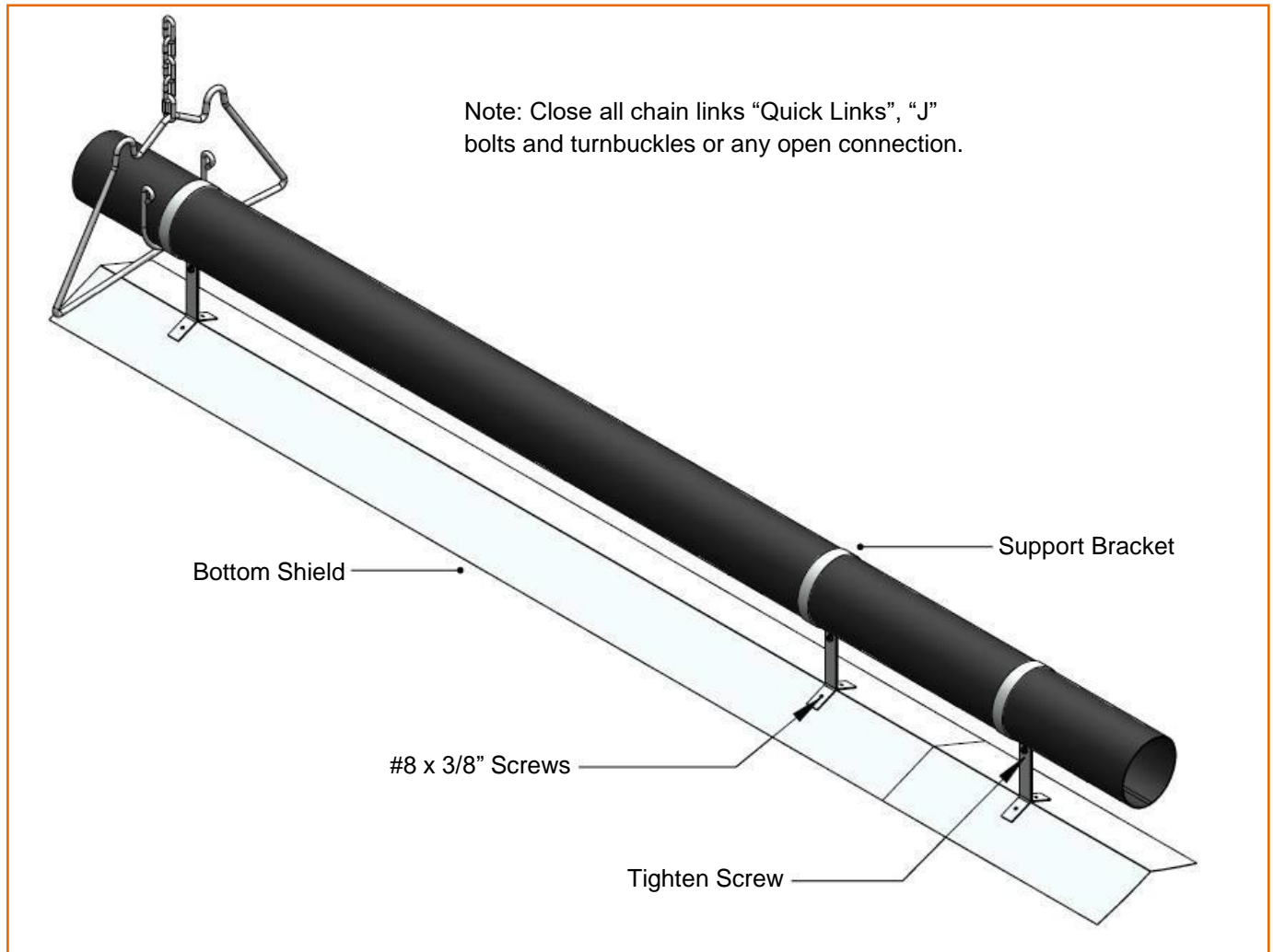


Figure 19: Bottom Shield Installation

## DECO-GRILLE (OPTIONAL)

Series TVX heaters are approved for the addition of Deco-Grille either directly to the heater reflector or as part of a T-Bar installation where the heater is above the ceiling structure. Refer to Figure 20 and Figure 21 below for details.

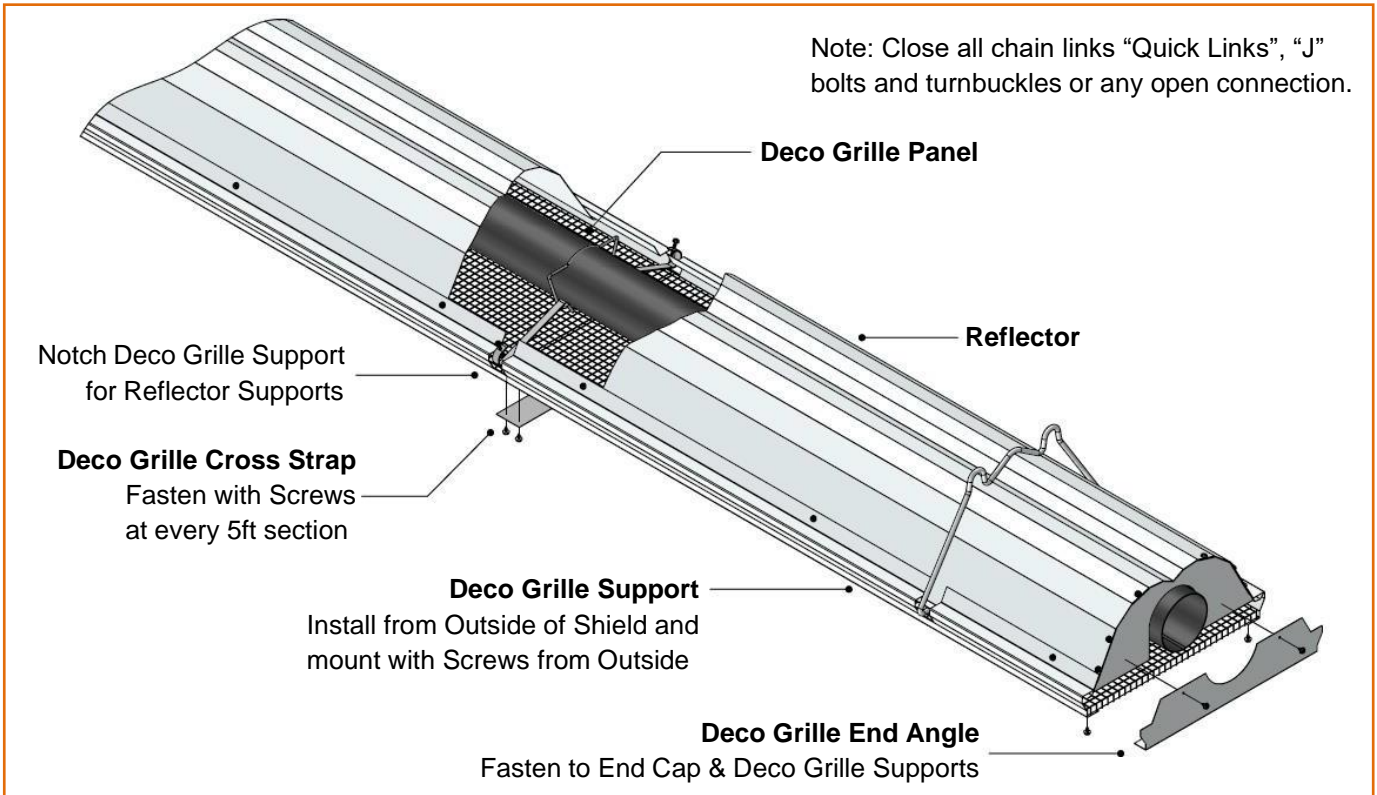


Figure 20: Deco-Grille and Heater Installation

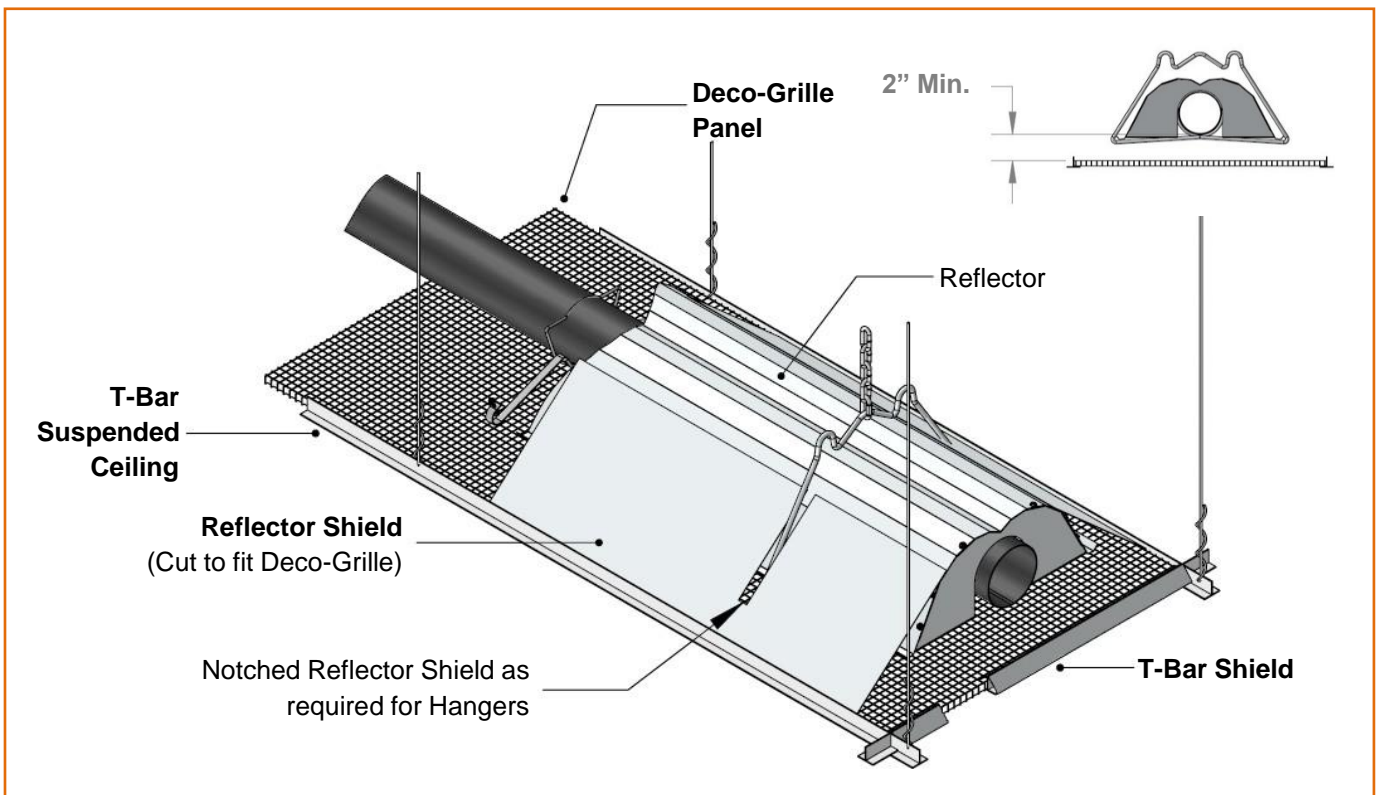


Figure 21: Deco Grille with Suspended Ceiling Installation

## Venting / Combustion Air Ducting

- Series TVX Infrared Heaters may be vented horizontally or vertically.
- This system is considered a Category III venting system.
  - The heater operates at a positive vent pressure.
  - Use an approved S636 or UL1738 Category III venting system, or a single wall vent pipe with all joints and seams sealed with heat-resistant pliable sealant, such as high temperature RTV silicone for temperatures up to 650°F [343°C]. Prior to placing the heater in operation conduct a leak test with heater running using a soap solution.

### General Requirements

- Refer to the National Fuel Gas Code, ANSI Z223.1 (NFPA 54) in the USA and CSA B149.1 Installation Codes in Canada, as well as all local requirements for general venting guidance.
- Horizontal discharge must be not less than a specified distance above grade.
- Vent must not terminate within a specified distance below, horizontally from, or above any window, door or gravity opening to a building.
- Discharge must be at least a specified distance from any opening through which vent gases can enter a building.
- Venting must terminate beyond any combustible overhead and at a height sufficient to prevent blockage by snow.
- Venting through a combustible wall requires an approved thimble.
- Vent should extend beyond wall surfaces to avoid splash-back condensation.
- Corrosion resistant materials should be employed for venting.

### General Installation Notes

- Never connect venting to a chimney flue serving a separate solid fuel burning appliance.
- Always install venting with a down-slope of at least ¼" per 10 ft. (7 mm per 3 m) towards the Vacuum Pump location.
- Ensure that ducting is well suspended to avoid low spots where condensate can gather.

### System Requirements

#### *Horizontal Venting:*

Material: Minimum 24 gauge, GALV, single wall Pipe

Size: 4 " or 6 " diameter.

Sealant: RTV Silicone Fasteners: Three sheet metal screws #8 x 3/4" per joint.

Size Conditions for Exhaust Venting

**Vent length: Maximum 25 ft; Minimum 2 ft.**

#### *Vertical Venting:*

- When venting through a roof, use single-wall vent pipe in the building and an approved clearance roof thimble. A B type vent for the portion of the vent system passing through the roof may be used. Use B type vent materials for stacks above the roof line. If using vent lengths greater than 15' (5m), condensation will form in the vent pipe. Insulation and additional sealing measures (high temperature silicone at all seams) may be required.

## Ventilation Connections

Install vent pipes as per design/conformance with required Codes and connect with Vacuum Pump Outlet. Ensure that there is a minimum of 2" (5 cm) between the Vacuum Pump outlet and the first rigid section of the vent piping to avoid mechanical contact between the two. Use the Silicone Connector Boot to connect the Vent Pipe to the Vacuum Pump Outlet. (Refer to Figure 22 or Figure 23 respectively for mounting type details.)

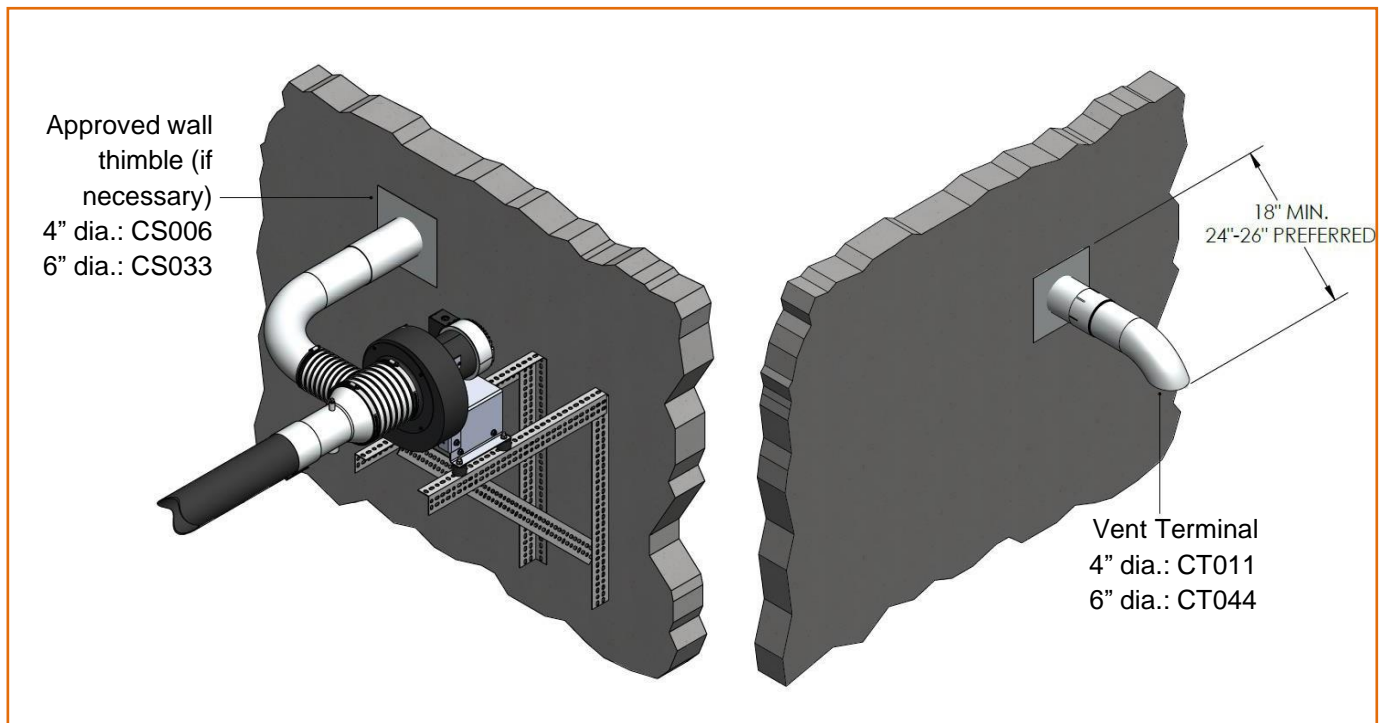


Figure 22: Side Wall Mounting - Recommended Venting (Horizontal)

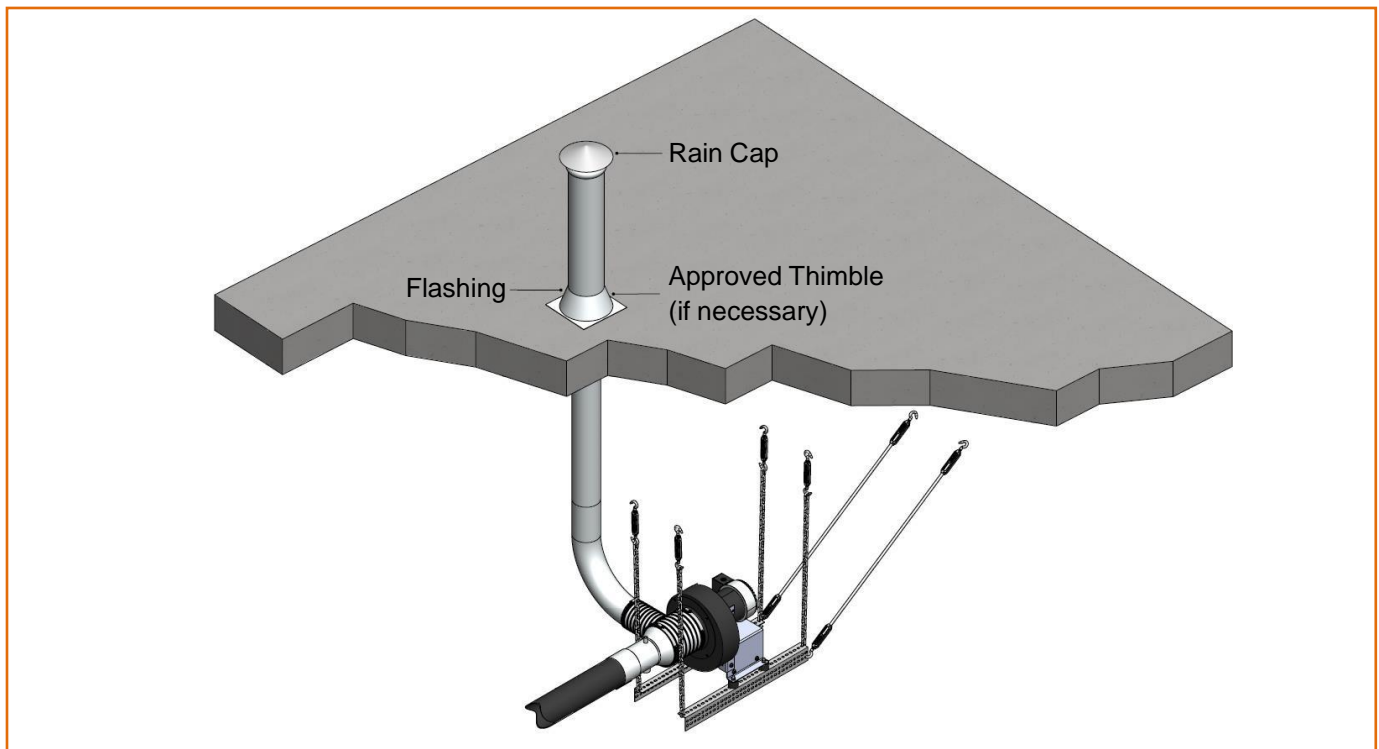


Figure 23: Ceiling Mounting - Recommended Venting (Vertical)

## Additional Pump Connections and Equipment

Manifold into vacuum pump and Vent size may be 4" or 6" depending on the total input rate. Vent size should be the same diameter as manifold into vacuum pump.

The supplied vacuum pump package is equipped with connectors for a 4" manifold into vacuum pump and Vent size.

The sequence steps of installing a 4" manifold into vacuum pump and Vent size:

1. Connect the Reducer to the end of the Common Tailpipe using a 4" Butt Joint Clamp. Ensure a minimum of 2" (5 cm) clearance between the Reducer and the Pump Inlet.
2. Install the Flexible Boot Connector between the Reducer and Pump Inlet, to reduce vibration and noise transmission, using a gear clamp at either end, as shown in Figure 24.
3. Seal all joints and seams using high temperature Silicone Sealant (RTV Silicone).
4. Where condensing designs are specified, a Condensate Drain may be installed as shown in Figure 24. Ensure connection to Drain Pipe is flexible to allow for system movement / expansion during operation, and that an appropriate Neutralization Device is installed as required.

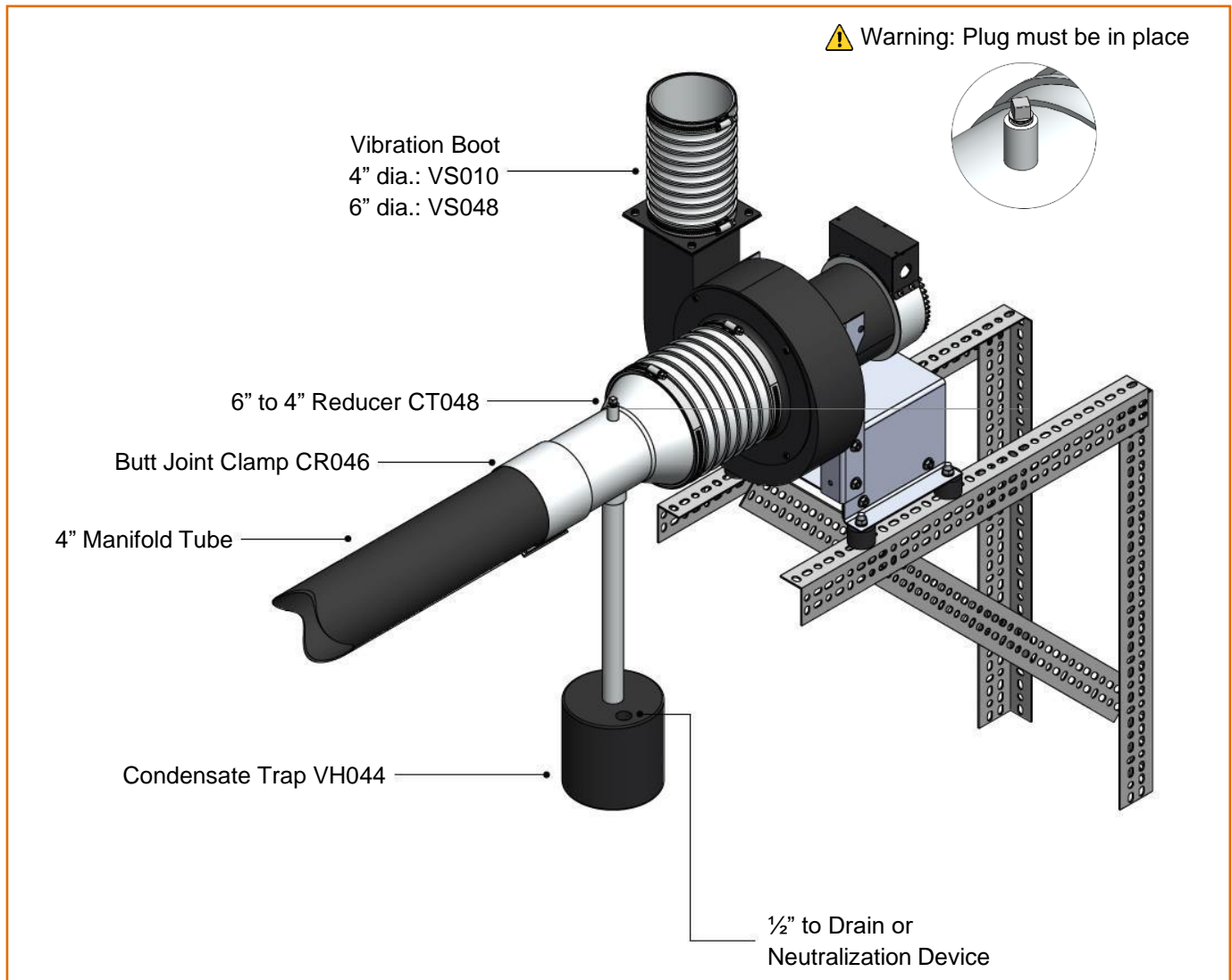
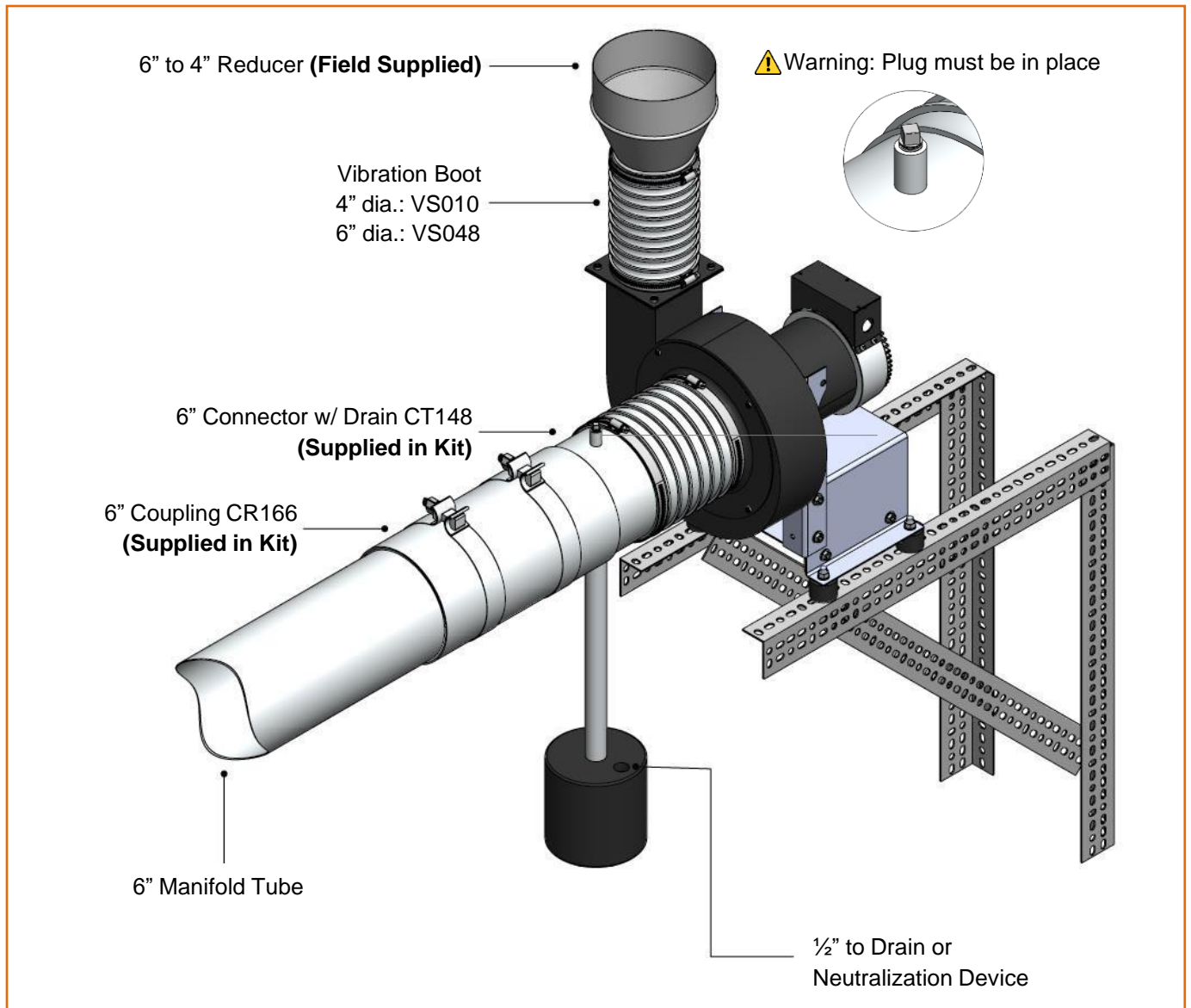


Figure 24: Condensate Drain Detail – Optional



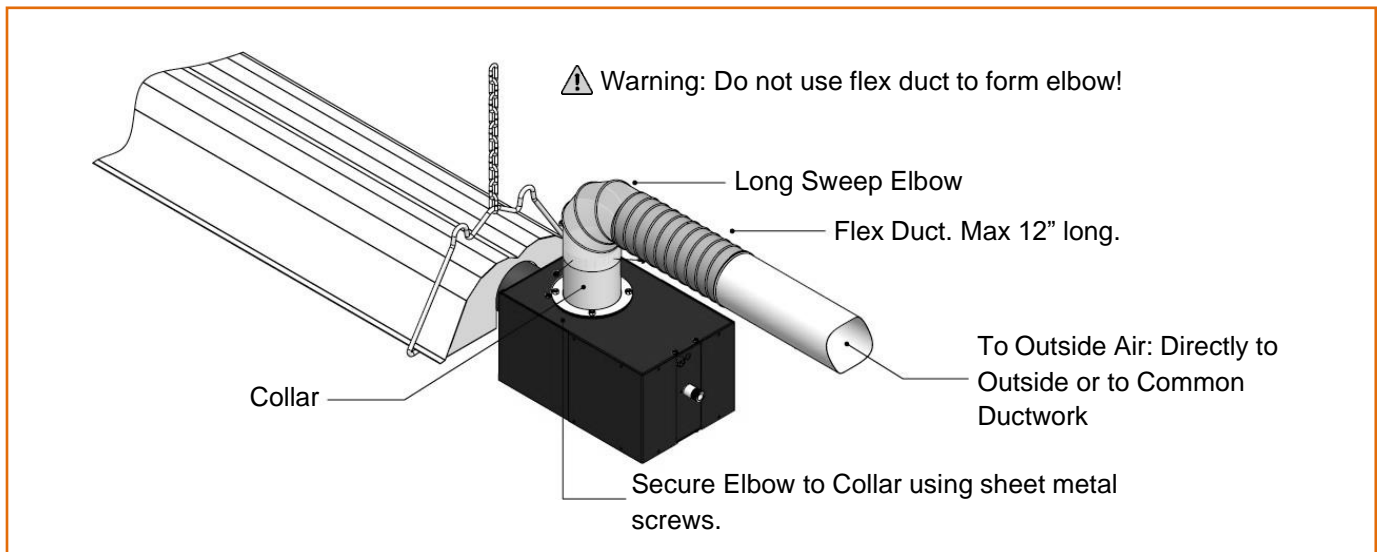
For applications requiring 6" manifold into vacuum pump and 6" vent size a **Pump Adaptor Kit (CT157)** is available.



**Figure 25: 6" to 6" Pump Adaptor Kit Detail – Optional**

## Combustion Air Supply (Optional)

- An outside combustion air supply is strongly recommended if the building space encloses a negative pressure due to exhaust etc. or if the building contains materials which would expose the heater to halogenated hydrocarbon atmospheres.
- The outside air terminal must be of an approved type and should be located at an elevation equal to or below the vent terminal elevation to prevent back-venting of flue gases into the burner compartment.
- Install single wall pipe or PVC pipe and fittings with a 12" linear section of flexible duct to allow movement of the heater. Do not use flexible duct throughout the entire length of fresh air duct. This may cause nuisance air switch tripping.



**Figure 26: Installation of Outside Air as supply for Combustion**

A Combustion Air Supply System that is connected to the fresh air outside the building may be recommended. The Combustion Air Supply System must be designed with accepted HVAC design methods to ensure adequate supply of air to each Burner and Radiant Branch.

An air supply at atmospheric pressure of 40 CFM per 100,000 BTU/hr. to each burner is usually sufficient.

This Combustion Air can be supplied using a Blower. Supply at the Burner must be at atmospheric pressure therefore it may be necessary for the Installer to insert Damper Couplings to allow adjustment of pressure just before the connection to each Burner. **The Blower must be electrically interlocked with the Vacuum Pump, details can be found in "Electrical Connections".**

Combustion Air Supply Duct Connections:

1. Install Blower if required.
2. Install Combustion Air Supply ductwork and Damper Couplings as required.
3. Each Burner can be fitted with a 4" dia. fitting to accept 4" dia. Type C-Duct or 4" PVC pipe. Provision for thermal expansion of the System must be made when considering Combustion Air Supply Ducting. Ensure that the System movement/expansion does not restrict the supply of fresh air to the Burners or the Radiant Branches.

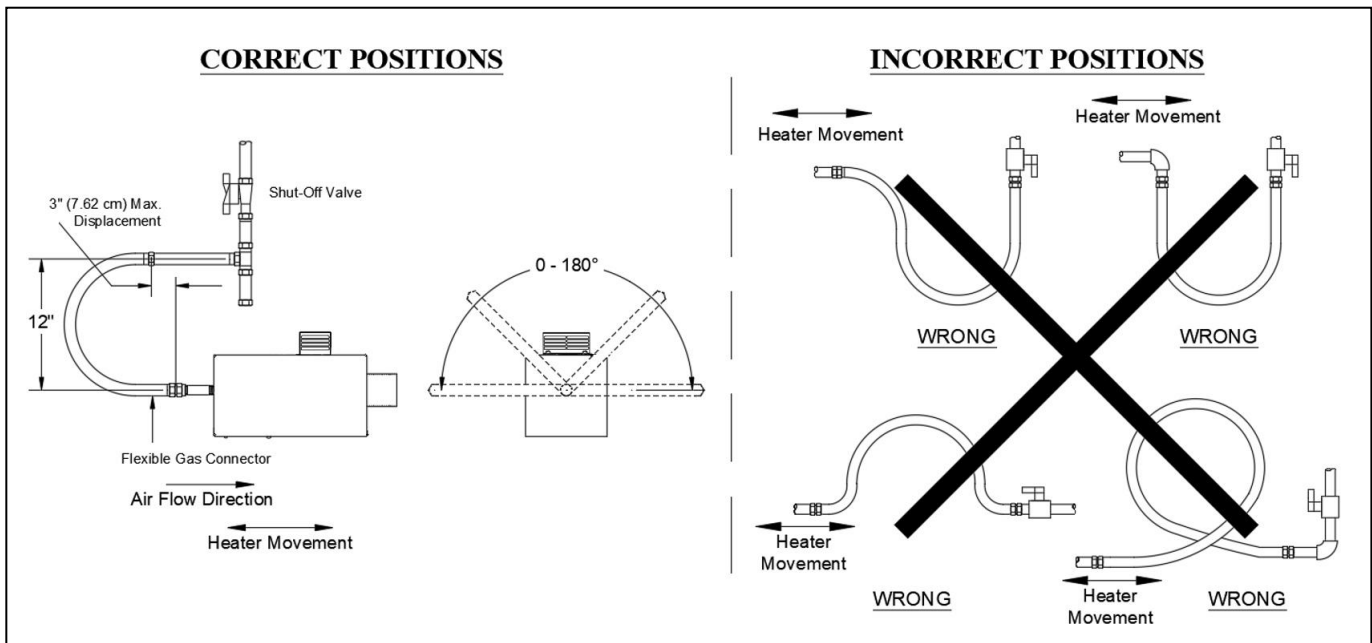
As required, connect the Supply Ductwork in the same manner as for the Burner.

# Gas Piping

## General Requirements

- The gas meter and service must be sufficiently large to supply gas to the connected building gas load including the heating equipment and any other gas fired equipment. Additionally, the gas distribution piping must be designed according to local and national ordinances. Generally, (low pressure) systems designed with a maximum ½" W.C. total pressure drop meet this requirement.
- Gas supply pipe sizing must be in accordance with the National Fuel Gas Code, ANSI Z223.1 (NFPA 54) in the USA and CSA B149.1 and B149.2 Installation Codes in Canada.
- Before connecting burners to the gas supply system, verify that high pressure testing of the system has been completed. Failure to do so may expose the burner components to damaging high pressure, requiring replacement of key components.

Flexible gas connectors of approved type must be installed as shown in Figure 27, in one plane, and without sharp bends, kinks or twists. A smooth loop of approximately 12" (40cm) in diameter is best. Failure to install the gas connection in the approved manner will result in a hazardous and potentially deadly situation due to the movement of the heat exchanger and burner in the normal course of operation.



**Figure 27: Flexible Gas Connections**

# Electrical Wiring and Controls

All burner boxes are powered locally with 120 VAC.

In all cases, heaters must be grounded in accordance with the National Electric Code, ANSI/NFPA 70 in the USA, and the Canadian Electric Code, CSA C22.1 in Canada, and must comply with all local requirements.

The multiburner systems may be controlled by a 24VAC two stage thermostat.

## Burner box internal wiring

The burner boxes are wired as in the Figure 28. Burner boxes are equipped with a control terminal that allows connection of control wires from the thermostat or from the Control Panel.

***If any of the original wire as supplied with the heater must be replaced, it must be replaced with wiring having a rating of at least 105°C temperature service and 600 volts capability.***

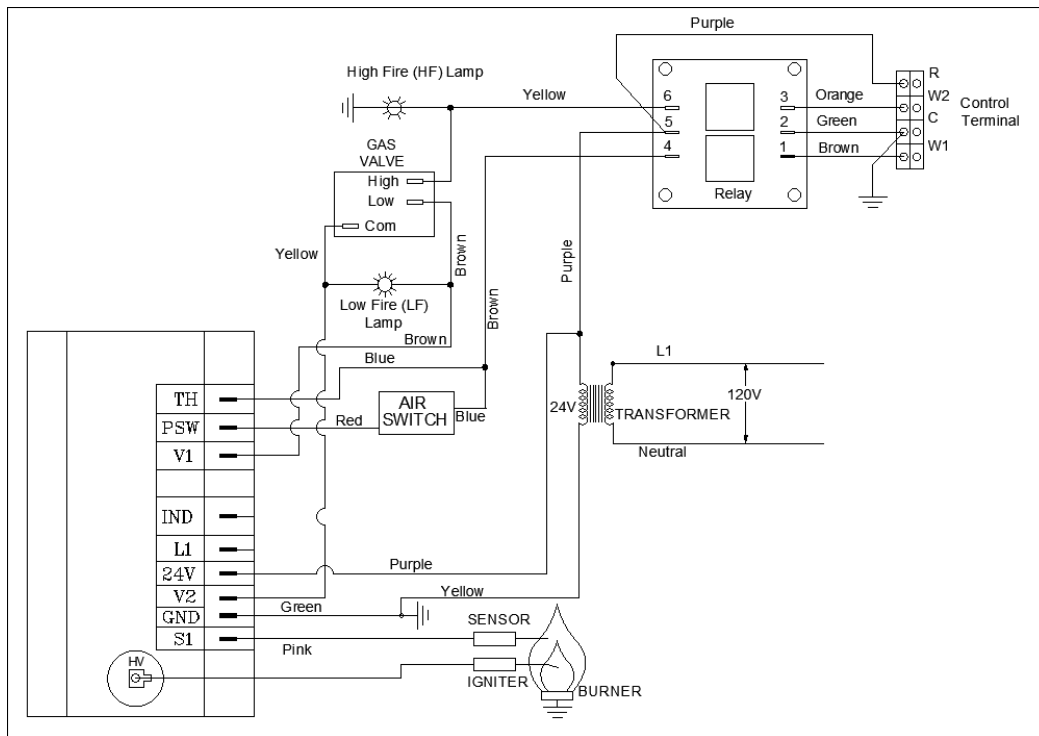


Figure 28: Wiring Diagram of Burner Box

## Vacuum Pumps connection

### One zone application

Vacuum Pump CE408 operates with 120VAC and required 1 Amp load.

The vacuum pump can be energized from one of burner boxes, see Figure 29. In this case one of the burner boxes will be configured as a master burner box. Additional wires are supplied with a vacuum pump connecting kit (VE172). One junction box will be installed on the burner housing and another junction box will be installed on the vacuum pump collar. The installer will add four wires inside the burner box and provide three of them to the junction box.

The Vacuum Pump CE410 operates with 120VAC and required 5 Amp load. The motor of this pump is an EC motor. This vacuum pump can be powered locally with a separate power line through a motor start relay (VE170) that is controlled by 120VAC signal coming from master burner box. A vacuum pump connecting kit (VE173) is available to convert one of the heaters into a master heater. The kit contains the required wires and a junction box. Wiring diagram to connect vacuum pump motor with motor start relay is showing in Figure 30.

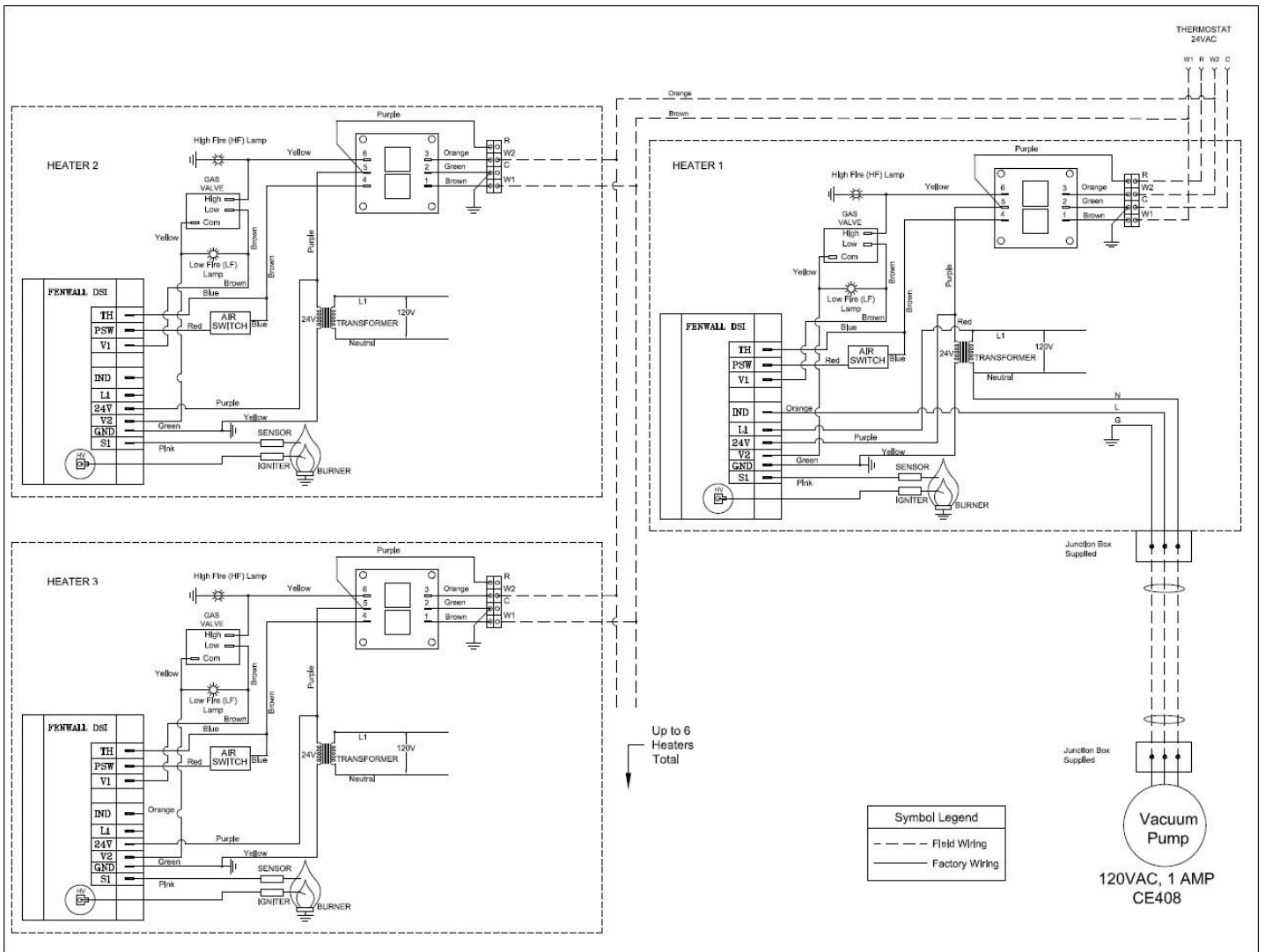


Figure 29: Wiring Diagram – Powering vacuum pump motor (CE408) from the master heater (heater #1)

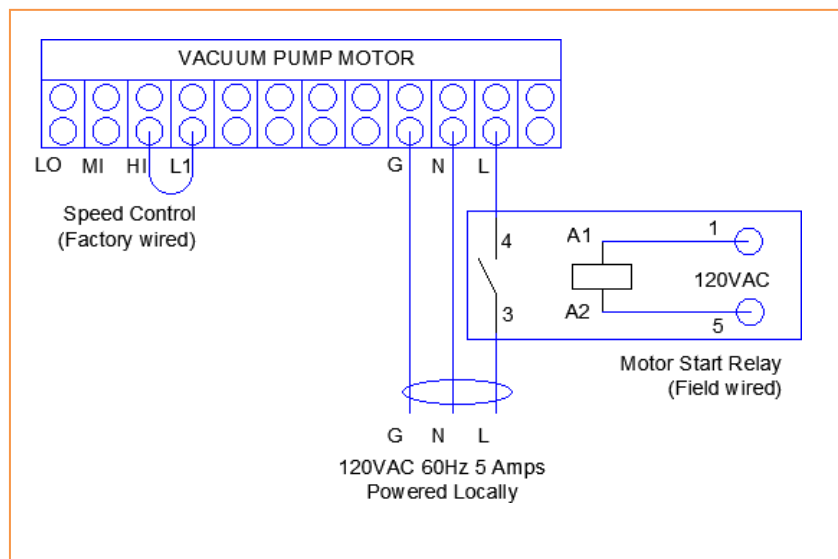


Figure 30: Wiring Diagram – vacuum pump motor CE410 controlled with 120VAC motor start relay VE170

## Two zone application

The TVX system can be connected in a two or more-zone applications. Two zone application can be controlled using control panel VE166. Th control panel VE166 is connected with the two zone thermostats and controls the motor start relay of the vacuum pump. Control panel is powered locally with 24VAC.

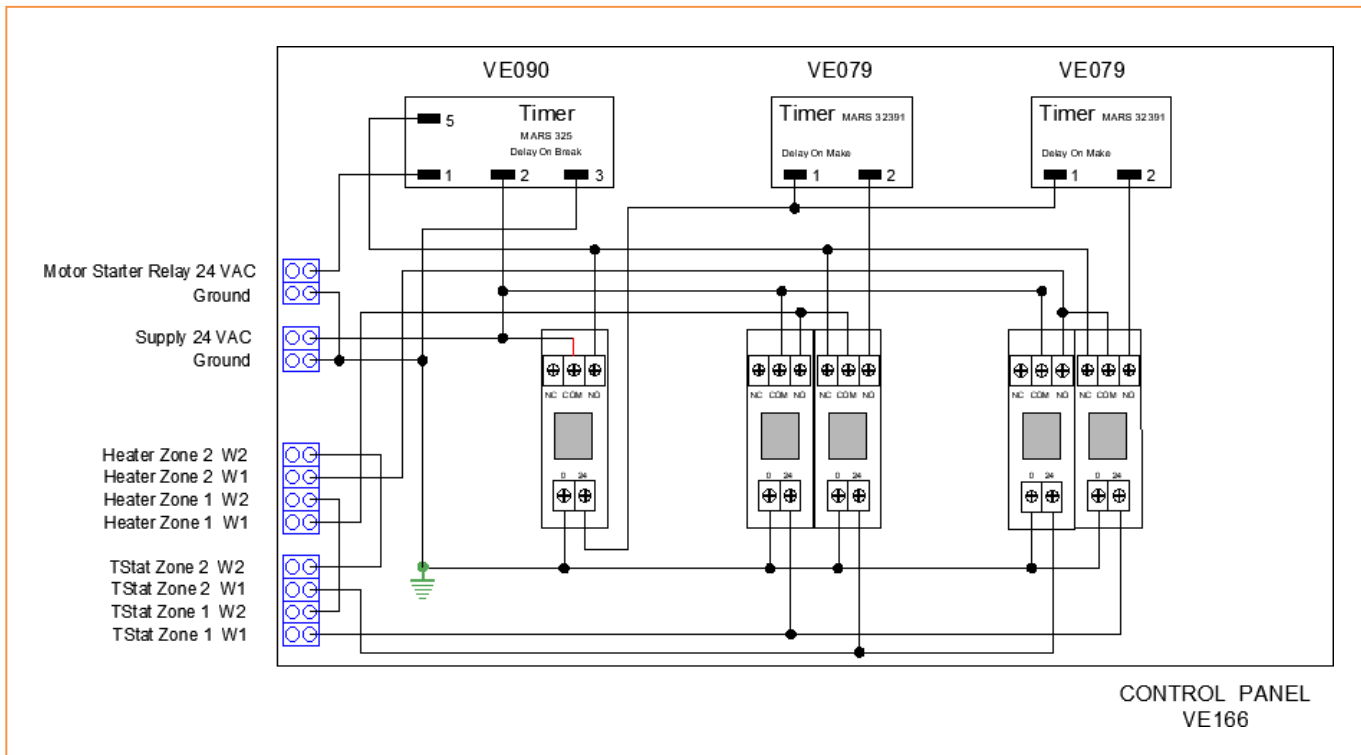


Figure 31: Control panel wiring diagram two zones system

When control panel VE166 is used, the vacuum pumps should be powered locally through a motor start relay (24VAC) that is controlled by 24VAC signal coming from the control panel VE166, see Figure 32.

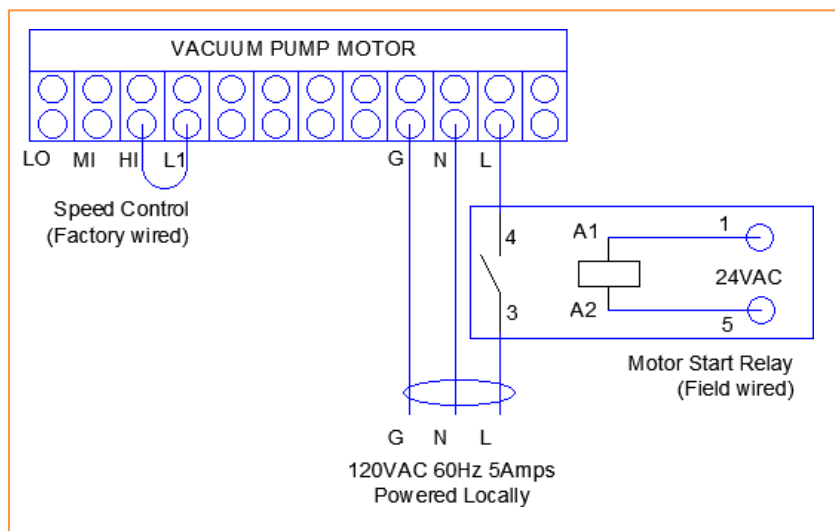
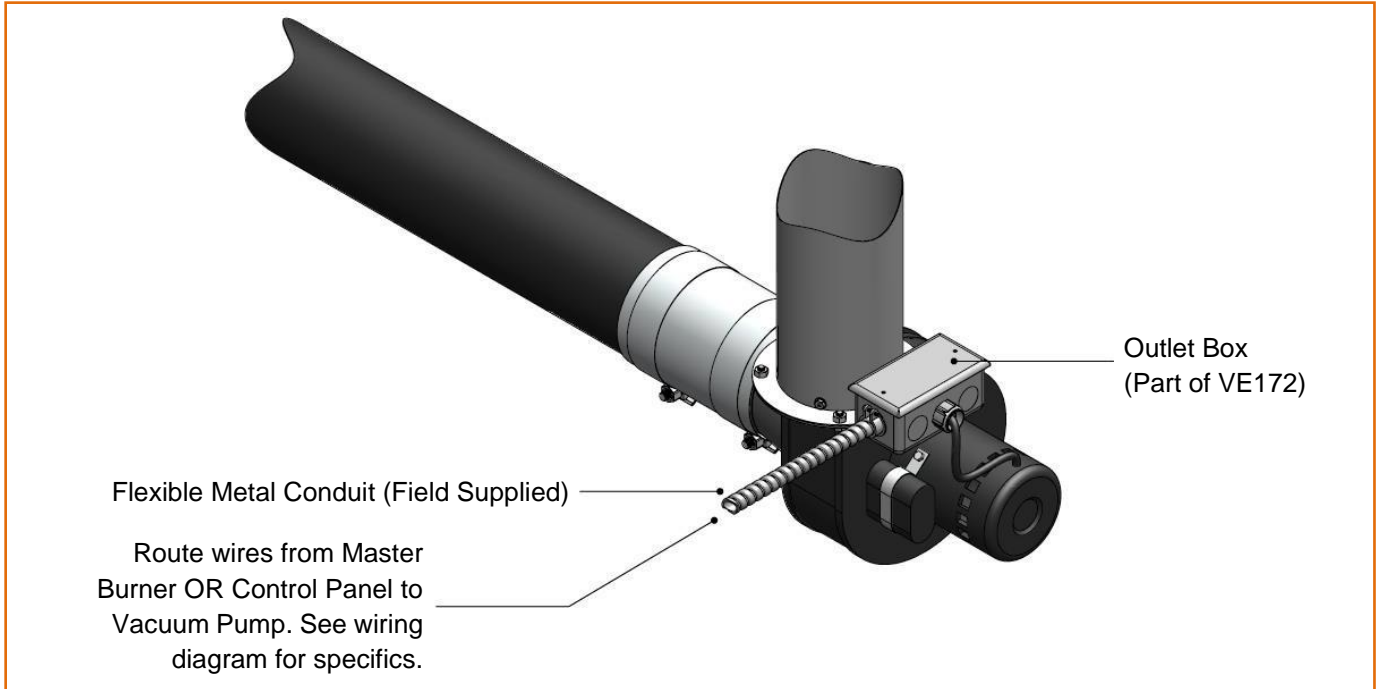


Figure 32: Wiring Diagram – vacuum pump motor CE410 controlled with 24VAC motor start relay VE171

# Vacuum Pump Wiring

## Vacuum Pump P1 (CE408)

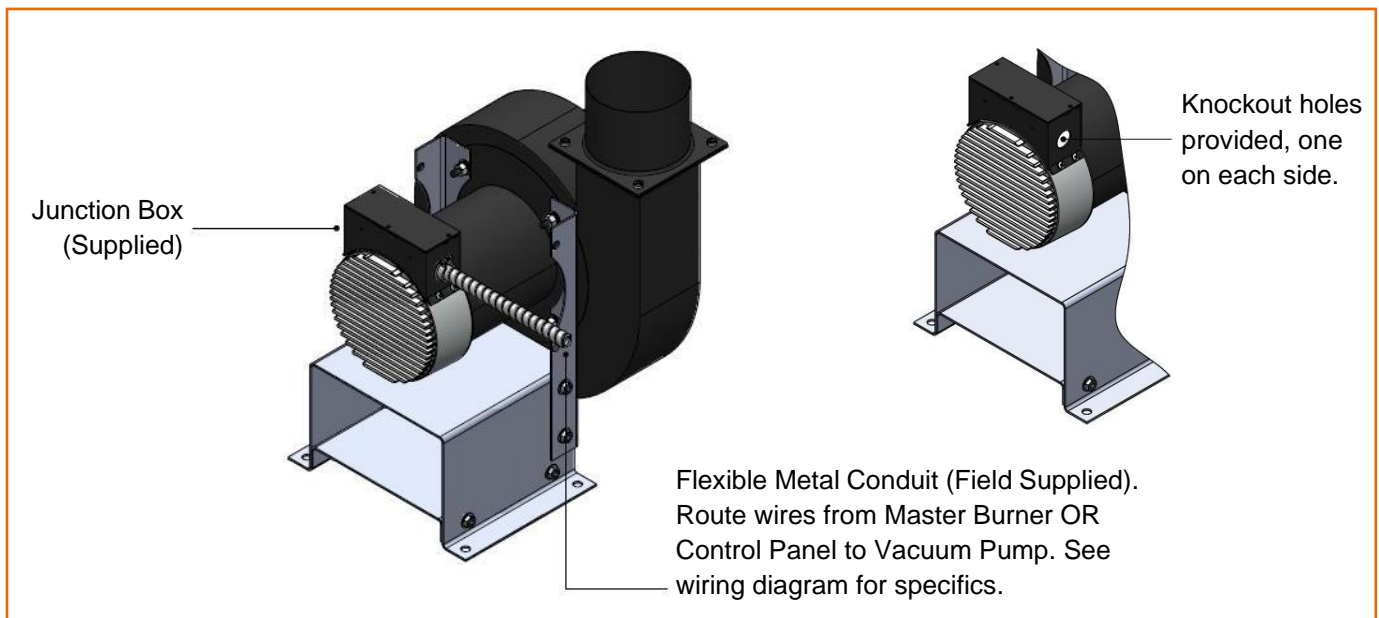
1. Mount Outlet Box using mounting holes provided on Collar.
2. Route wires from Master Burner OR Control Panel to the Vacuum Pump using Flexible Metal Conduit.
3. Connect wires according to wiring diagram.



**Figure 33: Vacuum Pump P1 Wiring**

## Vacuum Pump P2 (CE410)

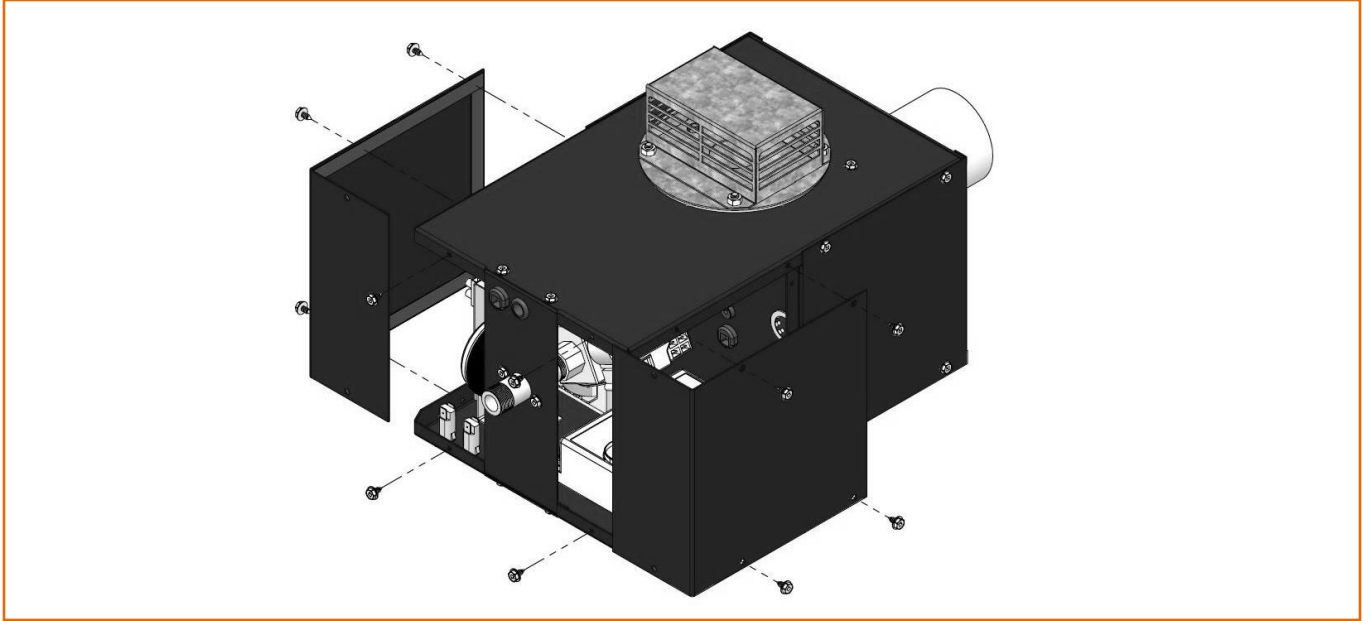
1. Route wires from Master Burner OR Control Panel to the Vacuum Pump using Flexible Metal Conduit.
2. Remove cover from Junction Box and connect wires according to wiring diagram. Replace cover.



**Figure 34: Vacuum Pump P2 Wiring**

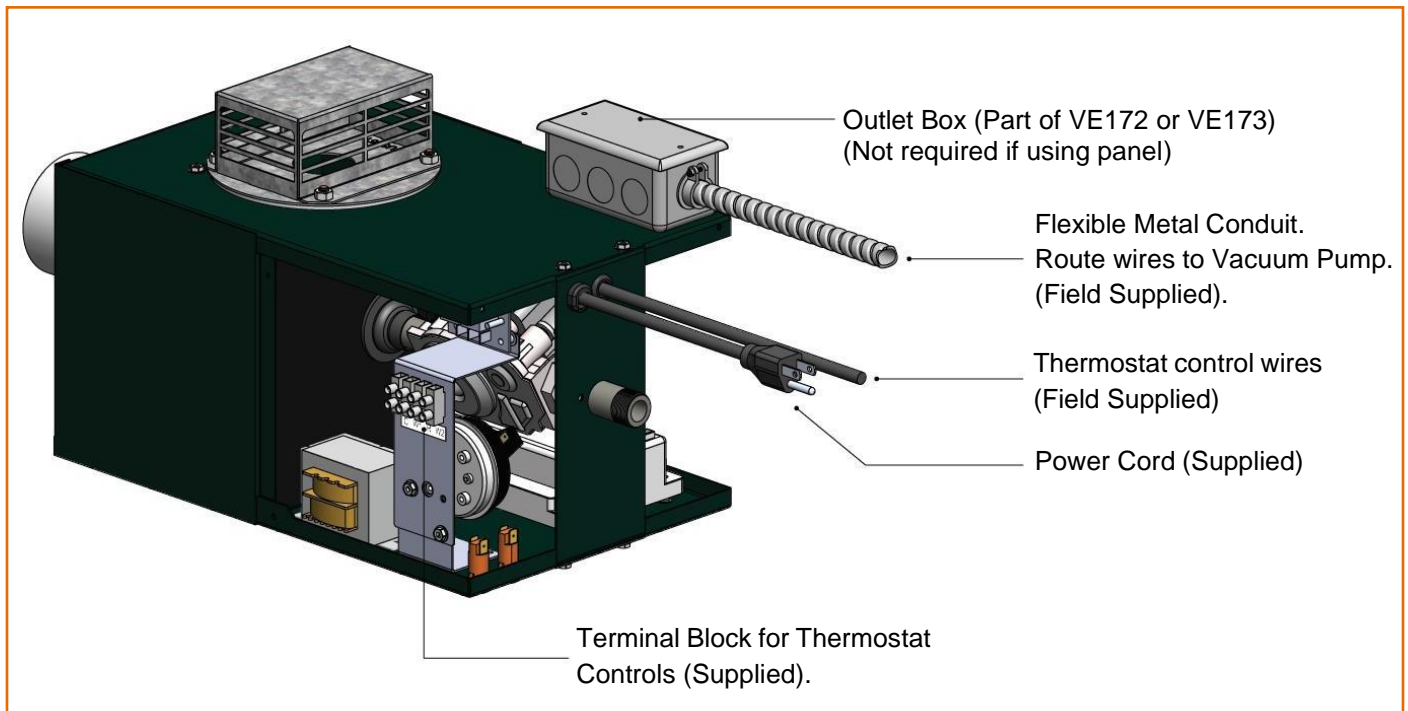
## **Burner Box (Master Only)**

1. Remove both Service Doors.



**Figure 35: Burner Box Removing Service Doors**

2. Mount Outlet Box to Burner Box.
3. Attach Flexible Metal Conduit and connect Vacuum Pump wires to corresponding wires in Burner Box using Figure 29 Wiring Diagram.
4. Route Thermostat control wires through provided Grommet and connect to Terminal Block using Figure 29 Wiring Diagram.



**Figure 36: Burner Box Wiring**



# Balancing the System Vacuum

## Cold Balancing the System Vacuum

- Turn ON the electrical supply but NOT the gas supply.
- Allow the system to run without burners operating. The flue gas vacuum pump is running.
- With a manometer, check the vacuum at the test point.
- Start setting procedure at the heater farthest away from the fan.
- With a manometer, check the vacuum at the test point upstream of the damper installed at the end of radiant tube.
- Adjust the damper to obtain the vacuum readings according to table below.
- Proceed similarly until each segment in the system is balanced / adjusted.
- Shut down the System.

## Final Balancing the System Vacuum

- Turn ON the gas supply.
- Turn up the thermostat to start the system and let it run (with burners operating) for at least 30 minutes.
- Start setting procedure at the heater farthest away from the fan.
- With a manometer, check the vacuum at the test point.
- Adjust the dampers again (Caution: dampers are now hot, adjust with caution) as required to obtain the vacuum readings of the settings in table below. The heater should now be firing at the appropriate rate.
- Proceed similarly until each individual heater in the system is balanced / re-adjusted.
- Mark the damper position and lock in place when the system has been balanced.
- Turn the thermostat down again to shut off the system.

Burner Model	Units	60	80	100	125	150	175	205	220
Cold	In.WC	1.15	1.50	2.00	1.35	1.75	1.65	2.00	1.85
Hot	In.WC	0.80	0.95	1.35	0.78	1.08	1.00	1.25	1.12

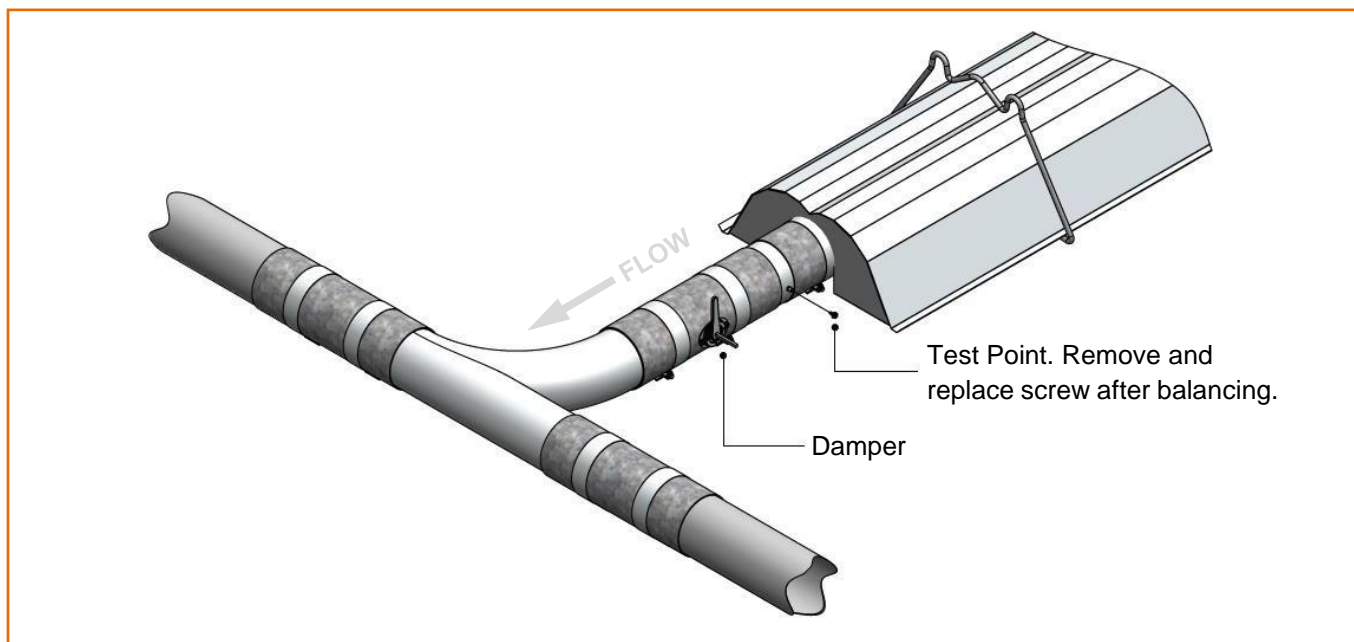


Figure 37: Balancing System Vacuum

# Burner Operation

## Starting Sequence of Operation

- Turn the thermostat up. When the thermostat calls for heat, the blower motor will energize.
- When the motor approaches nominal running RPM, the air-proving switch closes and activates the ignition module.
- The ignition module, after a pre-purge period of approximately 30 seconds, energizes the igniter. Additionally, the gas valve is energized for this ignition trial period of 15 seconds.
- If a flame is detected, the ignition sensing rod "reads" a rectification signal and the gas valve remains open. The sparking stops when the flame signal is established.
- If no flame is detected, the gas valve closes, and a 30 sec inter-purge period begins. After the inter-purge, the module repeats the trial for ignition period. If flame is still not established, a second and final inter-purge followed by a final ignition trial cycle begins. After three trials, the module will lockout for a period of approximately 1 hour or until reset. (Reset is accomplished by removing power from the module for at least 5 seconds.) After this 1-hour period, the module re-attempts the full ignition sequence.
- When using a 24V thermostat and the heat requirement has been met, the thermostat opens, the burner shuts off but the fan continues to run for approximately 30 seconds. This is referred to as a post purge. This allows the products of combustion to be removed from the heat exchanger to avoid nuisance condensation and increase heat exchanger life.

## Maintenance

For best performance, the certain minimal maintenance procedures should be performed before each heating season:

- Before performing any services or maintenance, shut off gas and electrical supply to heater.
- Check condition of forced air blower scroll and motor. Dirt and dust may be blown or vacuumed from the blower.
- Check condition of burner. Remove any foreign objects or debris from inside the burner box or burner cup.
- Inspect the igniter. Replace igniter if there is excessive wear or erosion, breakage, or other defects.
- Be sure the burner observation window is clean and free of cracks or holes. Clean or replace, as necessary.
- Check the flue pipe for soot or dirt, and clean as necessary.
- The reflector sections may be cleaned by wiping with a damp cloth.
- A service agency qualified to adjust and repair infrared heaters should be engaged for service other than routine maintenance.
- Be sure vent terminal and fresh air inlet are free from obstructions. If either pipe is restricted, the safety air switch will not operate properly, and the heater could fail to operate.
- Check the inside of the heat exchanger tube visually with a flashlight. If carbon or scale are present, scrape or otherwise remove deposits (a wire brush works well)

## Installation Checklist

1. Did you install the first hanger no more than 8 inches from the burner and tighten with the “J” bolt? (“J” bolt only required for the first hanger).
2. Is the weld seam facing down?
3. Is the tube system levelled?
4. Did you mount the tube couplings with the band clamp lock bolts oriented at the 10 o'clock or 2 o'clock position?
5. Did you robustly tighten the band clamps on the tube couplings? Recommended method is to alternate back and forth between two band clamps to ensure even torque on tube couplings.
6. Did you alternately overlap reflectors up and down as shown in the manual? Minimum overlap is 4 inches.
7. Did you close all “S” hooks or Quick links?
8. Did you install all of the reflector support brackets supplied as shown in the manual?  
e.g. One at each overlap, and one in the middle of each reflector.
9. Did you place the turbulator/flue baffle in the flue end of the heater as mentioned in the manual? Is the baffle tab located at 6 o'clock and bent as mentioned in the manual?
10. Did you install end caps?
11. Did you observe clearance to combustibles for this model according to the manual? This can also be found on the burner box.
12. Is venting in accordance with the National Fuel Gas Code, ANSI Z223.1 (NFPA 54) in the USA and CSA B149.1 and B149.2 Installation Codes in Canada?
13. Did you install flex duct according to the installation manual if outside combustion air is used?
14. Did you install the gas flex connector as shown in the manual? The legally required method – is to ensure it is arranged as shown to allow for proper expansion and contraction.
15. Did you check gas pressure at inlet of gas valve? Your heater will not perform properly if the pressure is not correct. Please check manual for reference

**Attention to detail will result in a professional installation that reflects on all of us.**

Please help us keep our customers satisfied which will result in a minimum of nuisance call backs!

# Troubleshooting

## Vacuum Pump Motor Fails to Run

- Is the thermostat calling for heat?
- Is there 120V supplied at the motor?
- Is the motor start relay closed?

## No Gas Supply

- Check to see if manual supply valve to heater is open. No manifold pressure indicates valve is closed.
- Gas pressure downstream of gas control can be measured by connecting a manometer to pressure tap on control.
- Supply gas pressure can be checked at 1/8" NPT pressure tap in gas supply system.
- Is combination gas control gas valve or the ignition module is faulty.

## Burner Does Not Light

- Is spark visible through site glass during ignition trial? If no, further electrical checks by a qualified service person are required.
- Check to see if gas lines were properly purged of air.
- Check inlet and outlet gas pressure during ignition period.

## Burner Does Not Stay Lit

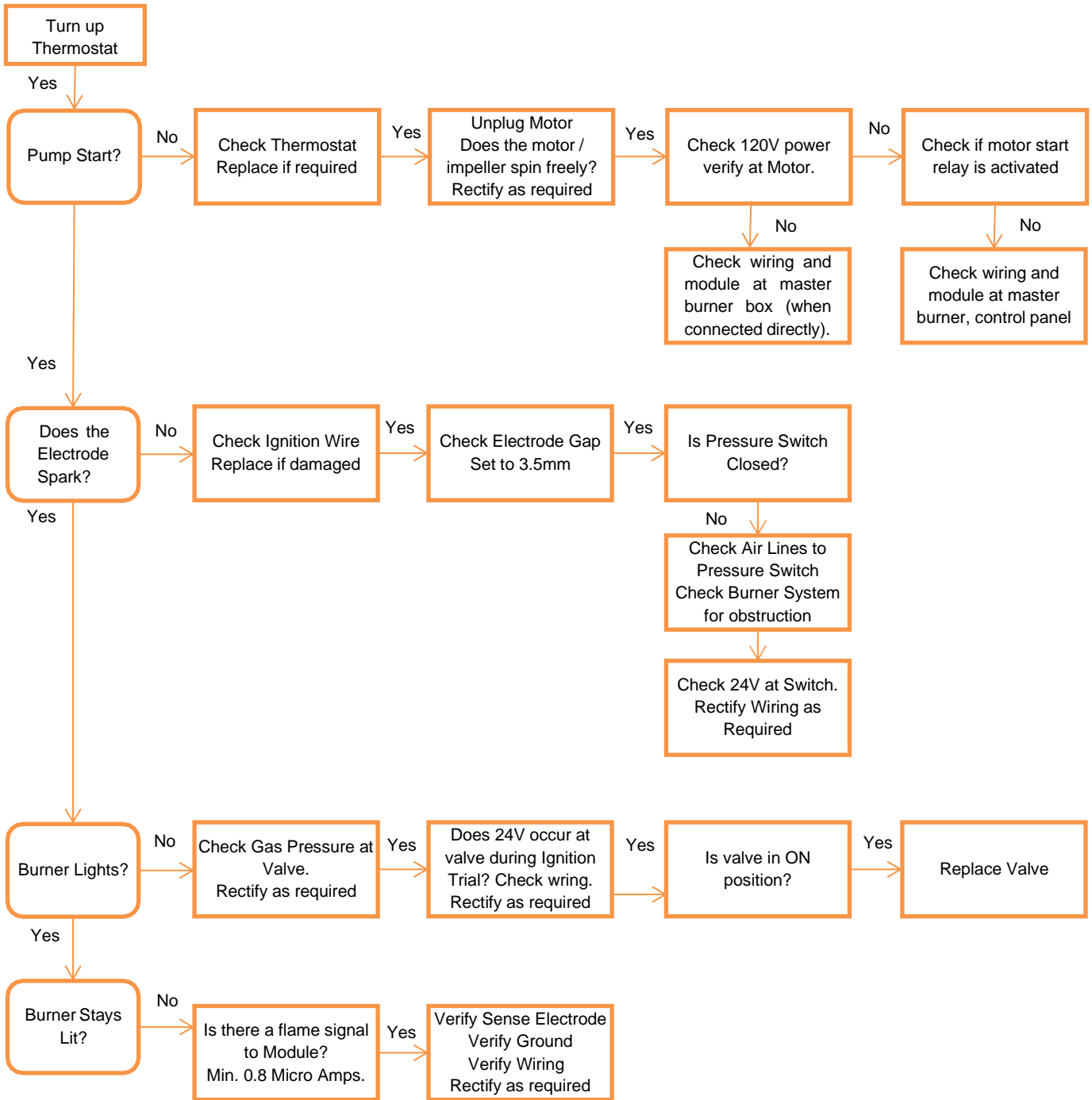
- Check ground wire continuity.
- Check insulation on the igniter leads.
- Measure flame signal current; it should be between 2 to 6 micro amps dc. Minimum 0.8 micro amps.
- Clean flame rod if necessary.
- Replace module if necessary.

## Module error codes

### MODULE CODES

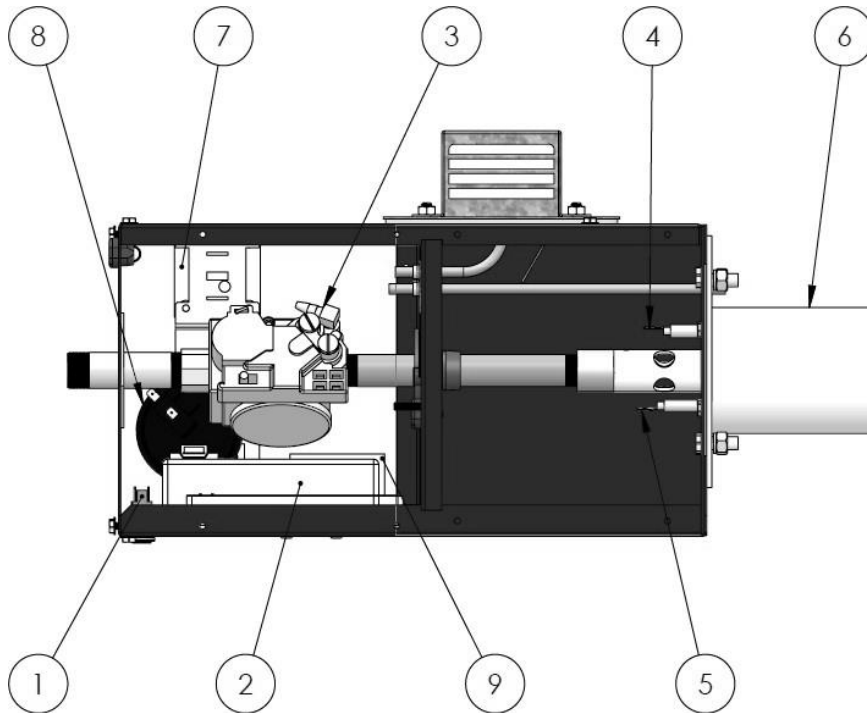
1. FLASH – Air Flow Fault
2. FLASH – Flame – No call for heat
3. FLASH – Ignition Lockout After 3 Tries
4. FLASH – Control Fault

# Troubleshooting Chart



# REPLACEMENT PARTS

ITEM	Part No.	DESCRIPTION
1	RP-CE057	Indicator Light
2	RP-CE015	Ignition Module
3	RP-CG056	Gas Valve Train (TVX06 – TVX12 NAT)
	RP-CG057	Gas Valve Train (TVX15 – TVX22 NAT)
	RP-CG070	Gas Valve Train (TVX06 – TVX12 LP)
	RP-CG071	Gas Valve Train (TVX15 – TVX22 LP)
4	RP-CE003	Flame Sensor Electrode
5	RP-CE002	Spark Electrode
6	RP-UG001P	Burner Cup
7	RP-CE081	Relay
8	RP-CE412	Air Switch (TVX06)
	RP-CE021	Air Switch (TVX08)
	RP-CE020	Air Switch (TVX10)
	RP-CE023	Air Switch (TVX12 – TVX15)
	RP-CE022	Air Switch (TVX17)
	RP-CE024	Air Switch (TVX20)
	RP-CE414	Air Switch (TVX22)
9	RP-CE058	Transformer



**Figure 38: Burner Box Replacement Parts**

# REPLACING PARTS

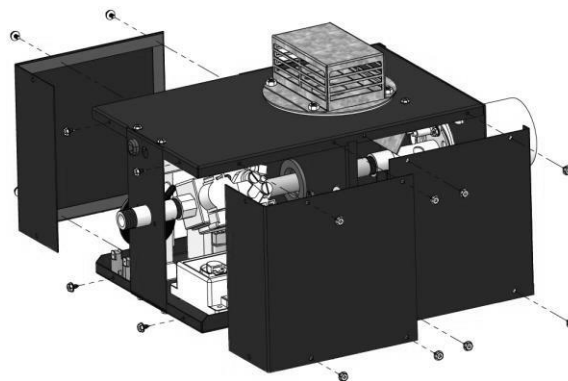
## ⚠ WARNING

### ELECTRIC SHOCK & EXPLOSION HAZARD

Disconnect electrical power and gas supply before servicing.  
Failure to do so may result in death or serious injury.

### Removal of Service Door and Combustion Door

1. Remove all screws as shown.

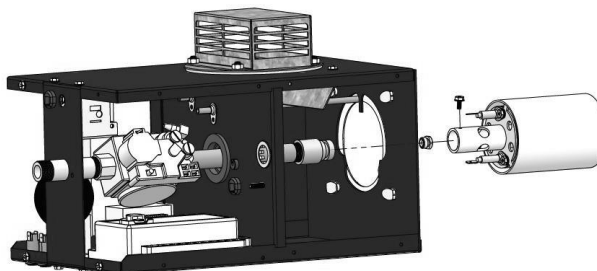


### Removal of Burner Cup and Injector

1. Remove the screw and slide the Burner Cup Assembly off of the Orifice holder.
2. Use a 1/2 inch (12.7mm) spanner to loosen and remove the Orifice.



See Burner Cup replacement instructions below.

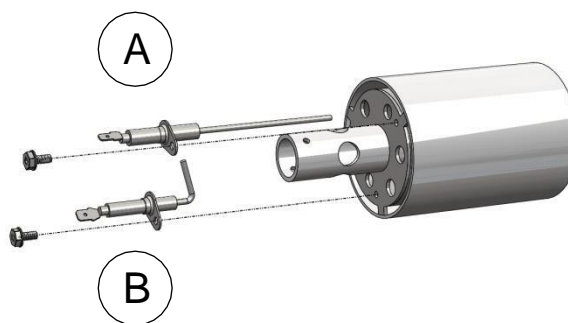


### Removal of Spark Electrode and Flame Sense Electrode

1. To remove the Flame Sense Electrode (A), remove the screw and pull straight out.
2. To remove the Spark Electrode (B), remove the screw. Pull and twist to maneuver the bend in the electrode out of the hole.

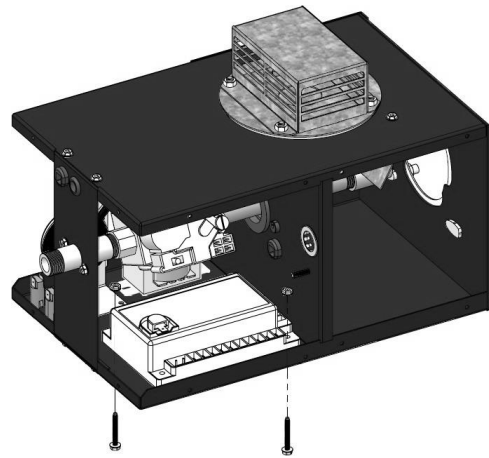


When replacing Burner Cup make sure Flame Sense Electrode (A) is oriented in the 12 o'clock position.



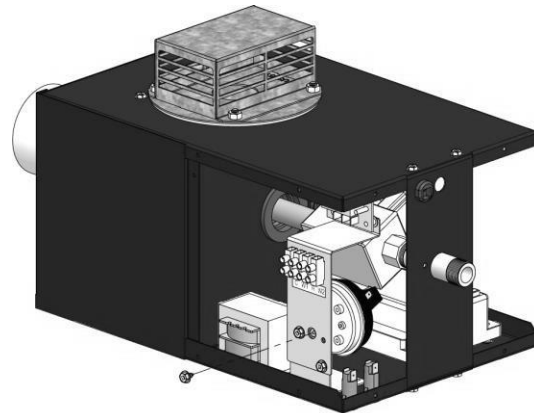
## Removal of Module

1. Disconnect all the wires.
2. Remove the two screws and nuts and remove the module from the Burner Box.



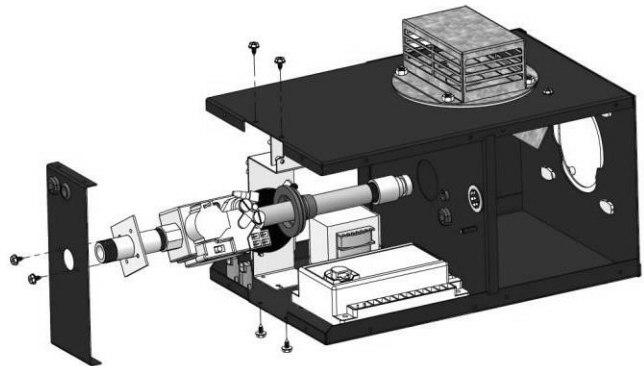
## Removal of Air Switch

1. Disconnect the two clear hoses from the air switch.
2. Unplug the two wires from the air switch.
3. Remove the screw that mounts the air switch to the bracket.



## Removal of Gas Valve Train

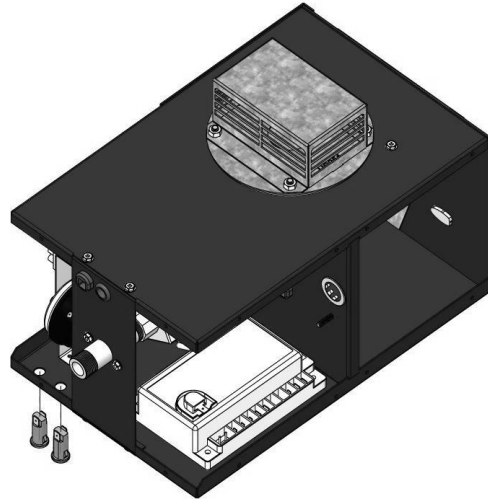
1. Remove Burner Cup as shown previously.
2. Remove the four screws, two on the top and two on the bottom from the Valve Support Plate.
3. Use a pair of pliers to pull the Grommet out of the hole.
4. Remove wires from the gas valve.
5. Remove Valve Train from Valve Support Plate.





## **Removal of Indicator Lights**

1. Disconnect the wires from the Indicator Lights.
2. Press the tabs on either side the Indicator Light and remove from Burner Box.



# Warranty

## SERIES TVX INFRARED HEATERS WARRANTY

The manufacturer warrants to the original owner that the product will be free of defects in material and workmanship as described below.

Series	Component	Warranty Period			
		3 Years	5 Years	7 Years	10 Years
TVX	Burner & Controls	x			
	Hot Rolled Heat Exchanger w/o Post Purge		x		
	Aluminized Heat Exchanger w/o Post Purge			X	
	Hot Rolled Heat Exchanger with Post Purge			x	
	Aluminized Heat Exchanger with Post Purge				X

The Manufacturer's obligation under this warranty is limited to repair or replacement, F.O.B. its facility, of the defective part. In the case of replacement parts, the warranty period shall be the longer of the original warranty or a period of 12 months from the date of purchase. In no event shall the Manufacturer be liable for incidental expense or consequential damages of any kind.

This warranty does not cover any shipping, installation or other costs incurred in the repair or replacement of the product. No materials will be accepted for return without authorization.

This warranty will not apply if in the judgment of the Manufacturer, the equipment has been improperly installed, unreasonably used, damaged or modified.

This warranty will not apply to damage to the product when used in corrosive atmospheres and in particular atmospheres containing halogenated hydrocarbons. No person is authorized to assume for the Manufacturer any other warranty, obligation or liability.

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