



INSTALLATION AND OPERATION INSTRUCTIONS

OWNER / INSTALLER: For your safety this manual must be carefully and thoroughly read and understood before installing, operating or servicing this heater.

INFRARED RADIANT TUBE HEATER Single Stage Pull Through System (Negative Pressure)

Models:

SIS SERIES: (50, 75, 100, 125, 150, 175) – N5/L5

SIU SERIES: (50, 75, 100, 125, 150, 175) – N5/L5

!INSTALLER: This manual is the property of the owner. Please present this manual to the owner when you leave the job site.

▲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.

IF YOU SMELL GAS:

- ! **DO NOT** try to light any appliance.
- ! **DO NOT** touch any electrical switch; **DO NOT** use any telephone in your building.
- ! **IMMEDIATELY** call your gas supplier from a neighbor's telephone. Follow the gas supplier's instructions. If you cannot reach your gas supplier, call the fire department.

FOR YOUR SAFETY

DO NOT store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

Scan warranty QR code on the right to register your product.



!IMPORTANT: SAVE THIS MANUAL FOR FUTURE REFERENCE.

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This heater complies with ANSI Z83.20 (current standard) and CSA 2.34. Copies of the National Fuel Gas Code (ANSI Z223.1-latest edition) are available from the CSA at 8501 East Pleasant Valley Road, Cleveland, Ohio 44131 or 55 Scarsdale Road, Don Mills, Ontario M3B 2R3. All NFPA codes are available from the National Fire Protection Association, Batterymarch Park, Quincy, Massachusetts 02269.

1.0) SAFETY

This heater is a self-contained infrared radiant tube heater. Safety information required during installation and operation of this heater is provided in this manual and the labels on the product. The installation, service and maintenance of this heater must be performed by a contractor qualified in the installation and service of gas fired heating equipment.

All personnel in contact with the heater must read and understand all safety information, instructions and labels before operation. The following symbols will be used in this manual to indicate important safety information.



Warning instructions must be followed to prevent or avoid hazards which may cause serious injury, property damage or death.



Caution instructions must be followed to prevent incorrect operation or installation of the heater which may cause minor injury or property damage.

2.0) INSTALLER RESPONSIBILITY

The installer is responsible for the following:

- The heater and venting, as well as electrical and gas supplies must be installed in accordance with these installation instructions and any applicable codes and regulations.
- Every heater shall be located with respect to building construction and other equipment so as to permit access to the heater.
- Each installer must follow the clearances to combustible materials for the heaters.
- Install the heater so that the supports and hangers are correctly spaced in accordance with these instructions. The heater must be supported by materials having a working load limit of at least 115lbs.
- Supply the owner with a copy of these Installation and Operation Instructions.
- Where unvented heaters are used, gravity or mechanical means shall be provided to supply and exhaust at least 4 CFM per 1,000 Btu/hr input of installed heaters.
- Never use the heater as a support for a ladder or other access equipment. Do not hang anything from the heater.
- Supply all installation materials necessary that are not included with the heater.
- Check the nameplate to make sure that the burner is correct for the gas type in the building and the installation altitude.

3.0) GENERAL INFORMATION

This heater is a self-contained infrared radiant tube heater for use in locations where flammable gases or vapors are not generally present (as defined by OSHA acceptable limits) and is intended for the heating of **nonresidential** spaces.

INSTALLATION REQUIREMENTS

The installation must conform to local building codes or in the absence of local codes, with the National Fuel Gas Code ANSI Z223.1/NFPA54 or the Natural Gas and Propane Installation Code CSA B149.1. Heaters shall be installed by a licensed contractor or licensed installer. Clearances to combustibles as outlined in this manual should always be observed. In areas used for storage of combustible materials where they may be stacked below the heater, NFPA54 requires that the installer must post signs that will "specify the maximum permissible stacking height to maintain the required clearances from the heater to combustibles."

Every heater shall be located with respect to building construction and other equipment so as to permit access to the heater. Each installer shall use quality installation practices when locating the heater and must give consideration to clearances to combustible materials, vehicles parked below, lights, overhead doors, storage areas with stacked materials, sprinkler heads, gas and electrical lines and any other possible obstructions or hazards. Consideration also must be given to service accessibility.

The heater, when installed in aircraft hangars and public garages, must be installed in accordance with ANSI/NFPA 409-latest edition (Standard for Aircraft Hangars), ANSI/NFPA 88a-latest edition (Standard for Parking Structures), and ANSI/NFPA 88b-latest edition (Standard for Repair Garages) with the following clearances:

- a. At least 10 feet above the upper surfaces of wings or engine enclosures of the highest aircraft that may be housed in the hangar and at least 8 feet above the floor in shops, offices, and other sections of hangars communicating with aircraft storage or service areas.
- b. At least 8 feet above the floor in public garages. **▲WARNING:** Minimum clearances marked on the heater must be maintained from vehicles parked below the heater.

(FOR CANADA ONLY)

- a. Installation of this appliance is to be in accordance with latest edition of CSA B149.1 (Natural Gas and Propane Installation Code).
- b. For installation in public garages or aircraft hangars, the minimum clearances from the bottom of the infrared heater to the upper surface of the highest aircraft or vehicle shall be 50 percent greater than the certified minimum clearance, but the clearance shall not be less than 8 feet.

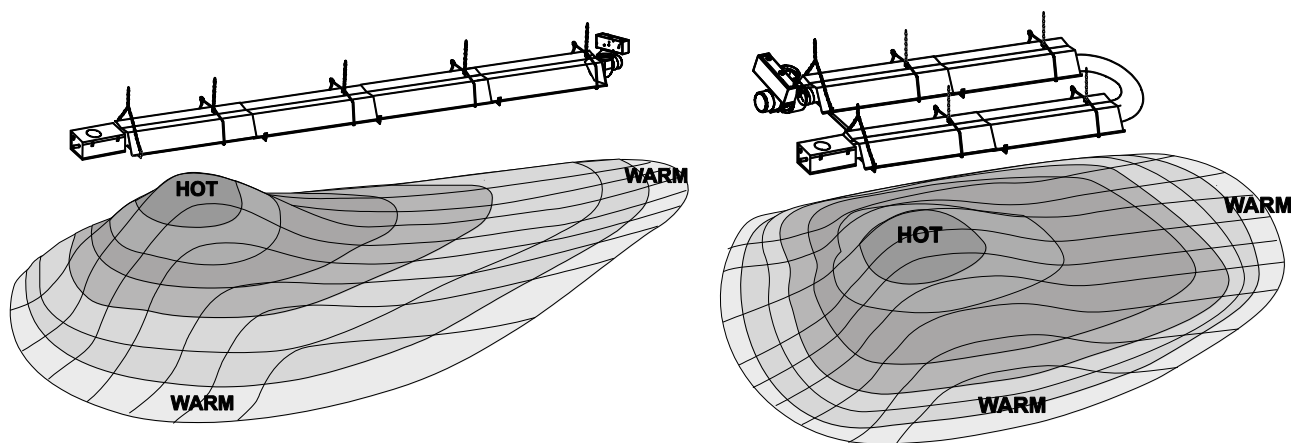
Although these heaters may be used in many applications other than space heating (e.g., process heating), SunStar will not recognize the warranty for any use other than space heating.

For indoor installation only. Not for use in residential dwellings.

This heater is for Indoor Installation and Covered Patio Installation only and can be used in either Vented or Unvented mode. The term Unvented actually means Indirect Vented. While the products of combustion are expelled into the building, national codes require ventilation in the building to dilute these products of combustion. This ventilation may be provided by gravity or mechanical means.

This heater is not an explosion proof heater. Where the possibility of exposure to volatile and low flash point materials exists, it could result in property damage or death. This heater must not be installed in a spray booth where the heater can operate during the spraying process. Consult your local fire marshal or insurance company.

SIS Series Only: Since straight tube heaters are always hotter at the control end than at the flue terminal end, always observe the minimum recommended mounting heights shown on the specification sheets in Section 5.0) of this manual. Use U-tube configuration instead of straight tubes for spot or area heating (e.g., where a single heater is utilized for space heating).



High Altitude:

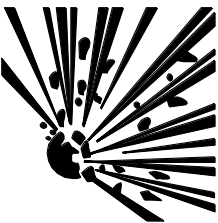
Appliances are supplied as standard for altitudes of 0 to 2,000 feet (0-610 m). High-altitude ratings are obtained by a change in the orifice size. When ordered for high altitude installations, burners are supplied by the factory ready for high altitude installation. Check the nameplate for altitude before proceeding with the installation. In Canada the adjustment for altitude is made in accordance with Standard CGA 2.17, Gas-Fired Appliances for Use at High Altitudes.



WARNING:

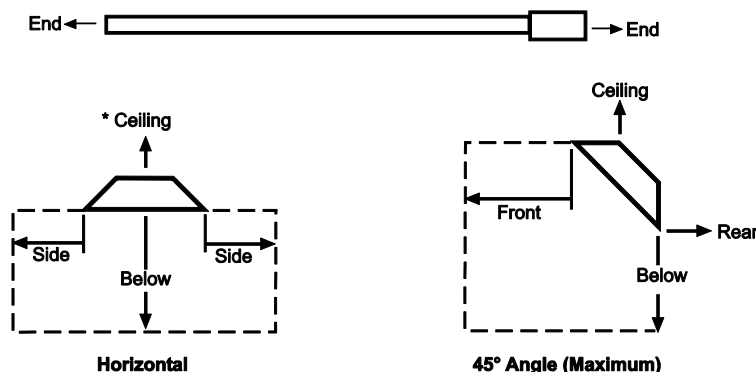
This product can expose you to chemicals including ceramic fibers, which are known to the State of California to cause cancer, and carbon monoxide, which is known to the State of California to cause birth defects or other reproductive harm. For more information go to www.p65warnings.ca.gov.

4.0) MINIMUM CLEARANCES TO COMBUSTIBLES

⚠ WARNING		
		<h3 style="margin: 0;">FIRE AND EXPLOSION HAZARD</h3> <p>Combustible material must be located outside the clearance dimensions listed.</p> <p>Failure to do so may result in death, serious injury or property damage.</p>

Install the warnings card (ordered separately) and complete the blank spaces using the clearances from combustibles table below. See Section 27 for a printed copy of the warnings card.

Minimum clearances to combustibles shall be measured from the outer surfaces as shown in the following diagram:



MINIMUM CLEARANCES TO COMBUSTIBLES						
Model No.	Mounted Horizontally				Angle Mounted at 45°	
	Sides	Ceiling*	Below	Ends	45° Front	45° Rear
SIS/SIU 50	24"	6"	40"	15"	40"	12"
SIS/SIU 75	24"	6"	60"	15"	52"	12"
SIS/SIU 100	28"	6"	76" **	15"	60"	12"
SIS/SIU 125	32"	6"	82" **	20"	66"	12"
SIS/SIU 150	36"	6"	87" **	20"	70"	12"
SIS/SIU 175	42"	6"	93" **	20"	77"	12"

* When used indirect vented, minimum clearance for CEILING must be: 12" for SIS/SIU 50-75 and 18" for SIS/SIU 100-175. If optional corner and U-bend reflectors are not used, the clearance must be 18".

** Maximum clearance below reduces by 50% once you are 25 ft. downstream from the burner box.

▲ WARNING: Certain materials or objects, when stored under the heater, will be subjected to radiant heat and could be seriously damaged. Observe the Minimum Clearances to Combustibles listed in the manual and on the heater at all times.

NOTE:

1. The clearances specified above must be maintained to combustibles and other materials that may be damaged by temperatures 90°F above ambient temperature. Clearances to combustibles are posted on the control box. In areas used for storage of combustible materials where they may be stacked below the heater, NFPA54 requires that the installer must post signs that will "specify the maximum permissible stacking height to maintain the required clearances from the heater to combustibles." SunStar recommends posting these signs adjacent to the heater thermostat or other suitable location that will provide enhanced visibility.

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

5.0) SPECIFICATIONS

Model No.	Btu/hr Input	Flue Restrictor Plate I.D. & Part #		Orifice Size				Minimum * Mounting Height	
				Natural Gas		Propane Gas		@ Horizontal	@ 45° Angle
SIS/SIU 50	50,000	1-1/8"	#42741030	3.3mm	(0.130)	#46	(0.081)	11 ft.	10 ft.
SIS/SIU 75	75,000	1-7/16"	#42741010	#20	(0.161)	#39	(0.099)	13 ft.	12 ft.
SIS/SIU 100	100,000	1-5/8"	#42741060	#14	(0.182)	#33	(0.113)	13 ft.	12 ft.
SIS/SIU 125	125,000	1-7/8"	#42741080	#5	(0.206)	#30	(0.129)	14 ft.	13 ft.
SIS/SIU 150	150,000	2-1/32"	#42741090	5.7mm	(0.224)	#28	(0.140)	15 ft.	14 ft.
SIS/SIU 175	175,000	2-1/4"	#42741100	"C"	(0.242)	3.8mm	(0.150)	15 ft.	14 ft.

* MOUNT HEATERS AS HIGH AS POSSIBLE. Minimums are shown as a guideline for human comfort and uniform energy distribution for complete building heating applications. Consult your SunStar representative for the particulars of your installation requirements.

Model Identification:

Control Option Suffix	Gas Type	Description
N5	Natural	Single Stage Gas Valve - Single Stage Input
L5	Propane	Single Stage Gas Valve - Single Stage Input

Type Gas	Gas Pipe Connection ¹	Tube Diameter	Flue Connection ²	Fresh Air Connection	Electrical Supply	Current Rating
Natural or Propane	1/2" MPT (Male)	4"	4" Round	6" Round	120 Volt, 60Hz, 1 Phase	2.6 Amp

Module Electrical Rating:	Ignition System (direct spark):
Fuse : 2 Amp 250V (for 24V Circuit) Input Power Input-Control: 18-30VAC 60 Hz (class 2 transformer) Flame Sensitivity: 0.7 uA (microamps) minimum	30 second pre-purge period 21 second trial for ignition period Single trial for ignition (local sense)

6.0) PACKING LIST

A. SIS/SIU Control/Draft Inducer Package

Part Description	QTY
Control Box Assembly	1
Draft Inducer & Junction Box Assembly	1
Flue Restrictor Plate (See Section 5.0) for plate I.D. and part no.)	1
4" Starting Collar (#40504020)	1
Control Fastener Kit (#42907110)	1
Containing: #8-32 Screws & Nuts (#02166010 & #02127030)	2
1/4 - 20 Locknuts (#02167010)	6
Tube Flange Gasket (#42921000)	2
Draft Inducer Flange (#44015251)	1
Installation & Operation Instructions (#43343310)	1
Gas connector, 5/8" OD x 36" (#30302360) - US only	1

CONTROL/DRAFT INDUCER PACKAGE NUMBERS

NATURAL GAS		PROPANE GAS	
MODEL NO.	PART NO.	MODEL NO.	PART NO.
SIS/U 50-N5	#43502030	SIS/U 50-L5	#43502040
SIS/U 75-N5	#43502070	SIS/U 75-L5	#43502080
SIS/U 100-N5	#43503050	SIS/U 100-L5	#43502060
SIS/U 125-N5	#43503110	SIS/U 125-L5	#43503120
SIS/U 150-N5	#43503170	SIS/U 150-L5	#43503180
SIS/U 175-N5	#43503210	SIS/U 175-L5	#43503220

B. SIS Body Package Descriptions*(Package Part Number is indicated on the outside of each corresponding carton.)*

System Lengths		15 Ft. System	20 Ft. System	30 Ft. System	40 Ft. System	50 Ft. System
SIS 50-175 Body Packages – Aluminized/Hot Rolled		15 Ft. Pkg. 44134000	20 Ft. Pkg. 44135000	30 Ft. Pkg. 44136000	40 Ft. Pkg. 44137000	50 Ft. Pkg. 44138000
Part #	Each Body Package Includes:	Qty.	Qty.	Qty.	Qty.	Qty.
42912180	10 Ft. Tube with 12 Hole Flange (Aluminized)	1	1	1	1	1
41932101	10 Ft. Tube less Flanges (Hot Rolled)	-	1	2	3	4
41932051	5 Ft. Tube less Flanges (Hot Rolled)	1	-	-	-	-
43319100	Reflector, 9' 11½"	1	2	3	4	5
43319050	Reflector, 4' 11½"	1	-	-	-	-
30462980	Tube Coupling	1	1	2	3	4
43318000	Tube Hanger/Support Bracket, 13"	2	2	3	4	5
43980010	Wire Hanger	2	2	3	4	5

Body Fastener Kit (included in body packages)		42907190	42907190	42907200	42907210	42907220
42873000	U-Bolt	2	2	3	4	5
02127110	Hex Nut, 5/16-18	5	5	6	8	10
02189020	HWHSM Screw, #10-16 x ½" TEKS	8	8	10	14	18

C. SIU Body Package Descriptions*(Package Part Number is indicated on the outside of each corresponding carton.)*

System Lengths		20 Ft. System	30 Ft. System	40 Ft. System	50 Ft. System
SIU 50-175 Body Packages – Aluminized/Hot Rolled		20 Ft. Pkg. 44135000	30 Ft. Pkg. 44136010	40 Ft. Pkg. 44137000	50 Ft. Pkg. 44138010
Part #	Each Body Package Includes:	Qty.	Qty.	Qty.	Qty.
42912180	10 Ft. Tube with 12 Hole Flange (Aluminized)	1	1	1	1
41932101	10 Ft. Tube less Flanges (Hot Rolled)	1	1	3	3
41932051	5 Ft. Tube less Flanges (Hot Rolled)	-	2	-	2
43319100	Reflector, 9' 11½"	2	2	4	4
43319050	Reflector, 4' 11½"	-	2	-	2
30462980	Tube Coupling	1	3	3	5
43318000	Tube Hanger/Support Bracket, 13"	2	4	4	6
43980010	Wire Hanger	2	4	4	6

Body Fastener Kit (included in body packages)		42907190	42907200	42907210	42907220
42873000	U-Bolt	2	4	4	5
02127110	Hex Nut, 5/16-18	5	8	8	10
02189020	HWHSM Screw, #10-16 x ½" TEKS	8	14	14	18

U-Bend package		43208020	43208020	43208020	43208020
42913020	U-Bend	1	1	1	1
43318500	31" Tube Support/Hanger Bracket	1	1	1	1
30462980	Tube Coupling	1	1	1	1
02189020	HWHSM Screw, #10-16 x ½" TEKS	2	2	2	2

D. "TOUGH GUY" SIS Body Package Descriptions*(Package Part Number is indicated on the outside of each corresponding carton.)*

System Lengths		15 Ft. System	20 Ft. System	30 Ft. System	40 Ft. System	50 Ft. System
SIS 50-175 Body Packages – Aluminized		15 Ft. Pkg. 44134010	20 Ft. Pkg. 44135020	30 Ft. Pkg. 44136020	40 Ft. Pkg. 44137040	50 Ft. Pkg. 44138060
Part #	Each Body Package Includes:	Qty.	Qty.	Qty.	Qty.	Qty.
42912180	10 Ft. Tube with 12 Hole Flange (Aluminized)	1	1	1	1	1
41932100	10 Ft. Tube less Flanges (Aluminized)	-	1	2	3	4
41932050	5 Ft. Tube less Flanges (Aluminized)	1	-	-	-	-
43319100	Reflector, 9' 11½"	1	2	3	4	5
43319050	Reflector, 4' 11½"	1	-	-	-	-
30462980	Tube Coupling	1	1	2	3	4
43318000	Tube Hanger/Support Bracket, 13"	2	2	3	4	5
43980010	Wire Hanger	2	2	3	4	5

Body Fastener Kit (included in body packages)		42907190	42907190	42907200	42907210	42907220
42873000	U-Bolt	2	2	3	4	5
02127110	Hex Nut, 5/16-18	5	5	6	8	10
02189020	HWHSM Screw, #10-16 x ½" TEKS	8	8	10	14	18

E. "TOUGH GUY" SIU Body Package Descriptions*(Package Part Number is indicated on the outside of each corresponding carton.)*

System Lengths		20 Ft. System	30 Ft. System	40 Ft. System	50 Ft. System
SIU 50-175 Body Packages – Aluminized		20 Ft. Pkg. 44135020	30 Ft. Pkg. 44136030	40 Ft. Pkg. 44137040	50 Ft. Pkg. 44138070
Part #	Each Body Package Includes:	Qty.	Qty.	Qty.	Qty.
42912180	10 Ft. Tube with 12 Hole Flange (Aluminized)	1	1	1	1
41932100	10 Ft. Tube less Flanges (Aluminized)	1	1	3	3
41932050	5 Ft. Tube less Flanges (Aluminized)	-	2	-	2
43319100	Reflector, 9' 11½"	2	2	4	4
43319050	Reflector, 4' 11½"	-	2	-	2
30462980	Tube Coupling	1	3	3	5
43318000	Tube Hanger/Support Bracket, 13"	2	4	4	6
43980010	Wire Hanger	2	4	4	6

Body Fastener Kit (included in body packages)		42907190	42907200	42907210	42907220
42873000	U-Bolt	2	4	4	5
02127110	Hex Nut, 5/16-18	5	8	8	10
02189020	HWHSM Screw, #10-16 x ½" TEKS	8	14	14	18

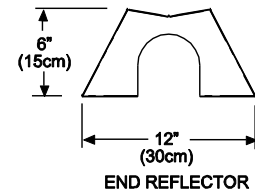
U-Bend package		43208020	43208020	43208020	43208020
42913020	U-Bend	1	1	1	1
43318500	31" Tube Support/Hanger Bracket	1	1	1	1
30462980	Tube Coupling	1	1	1	1
02189020	HWHSM Screw, #10-16 x ½" TEKS	2	2	2	2

6.1) ACCESSORY PACKAGES

A. End Reflector Accessory Package, Part #43341010 (1 pkg. per SIS Series or 2 pkgs. per SIU Series)

Contains:

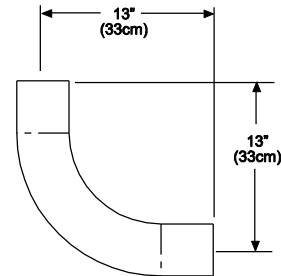
End Reflector, #43320000.....QTY-2
Speed Clips, #02266010.....QTY-4



B. Elbow Accessory Package, Part #43208010 (Option for SIS Series Only)

Contains:

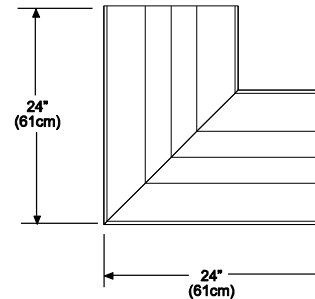
Elbow, #43175000.....QTY-1
#10-16 x 1/2 Self-Drilling Screws, #02189020.....QTY-2
Tube Coupling, #30462980.....QTY-1



C. Corner Reflector Accessory Package, Part #43342000 (Option for SIS Series Only)

Contains:

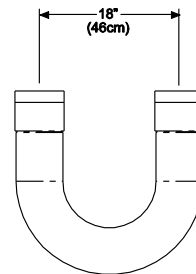
Corner Reflector Assembly, #43345000.....QTY-1
Speed Clips, #02266010.....QTY-4



D. U-Bend Package, Part #43208020 (Option for SIU Series Only)

Contains:

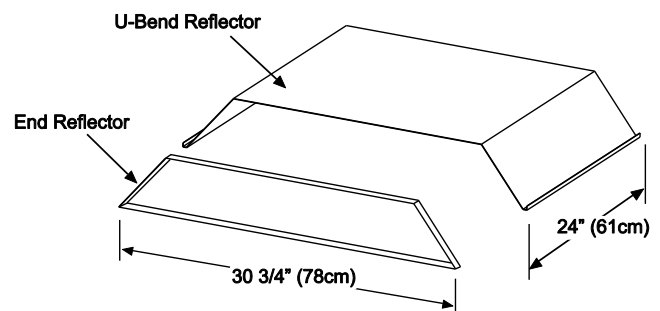
U-Bend, #42913020.....QTY-1
#10-16 x 1/2 Self-Drilling Screws, #02189020.....QTY-2
Tube Coupling, #30462980.....QTY-1
31" Tube Support/Hanger Bracket, #43318500.....QTY-1



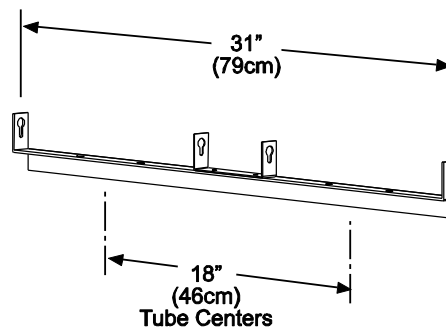
E. U-Bend Reflector Package, Part #43488000 (Option for SIU Series Only)

Contains:

U-Bend Reflector, #43490000.....QTY-1
U-Bend End Reflector, #43490050.....QTY-1
Speed Clips, #02266010.....QTY-11
#10-16 x 1/2 Self-Drilling Screws, #02189020.....QTY-4
Installation Form, #43489000.....QTY-1



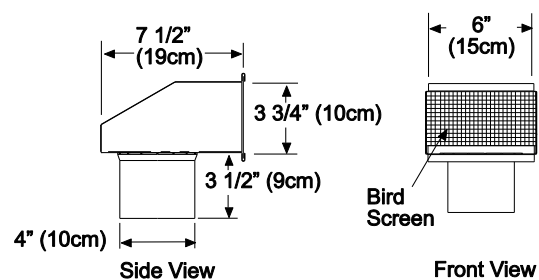
F. 31" Hanger/Tube Support, Part #43318500
(Option for Angle Mounting of SIU Series)



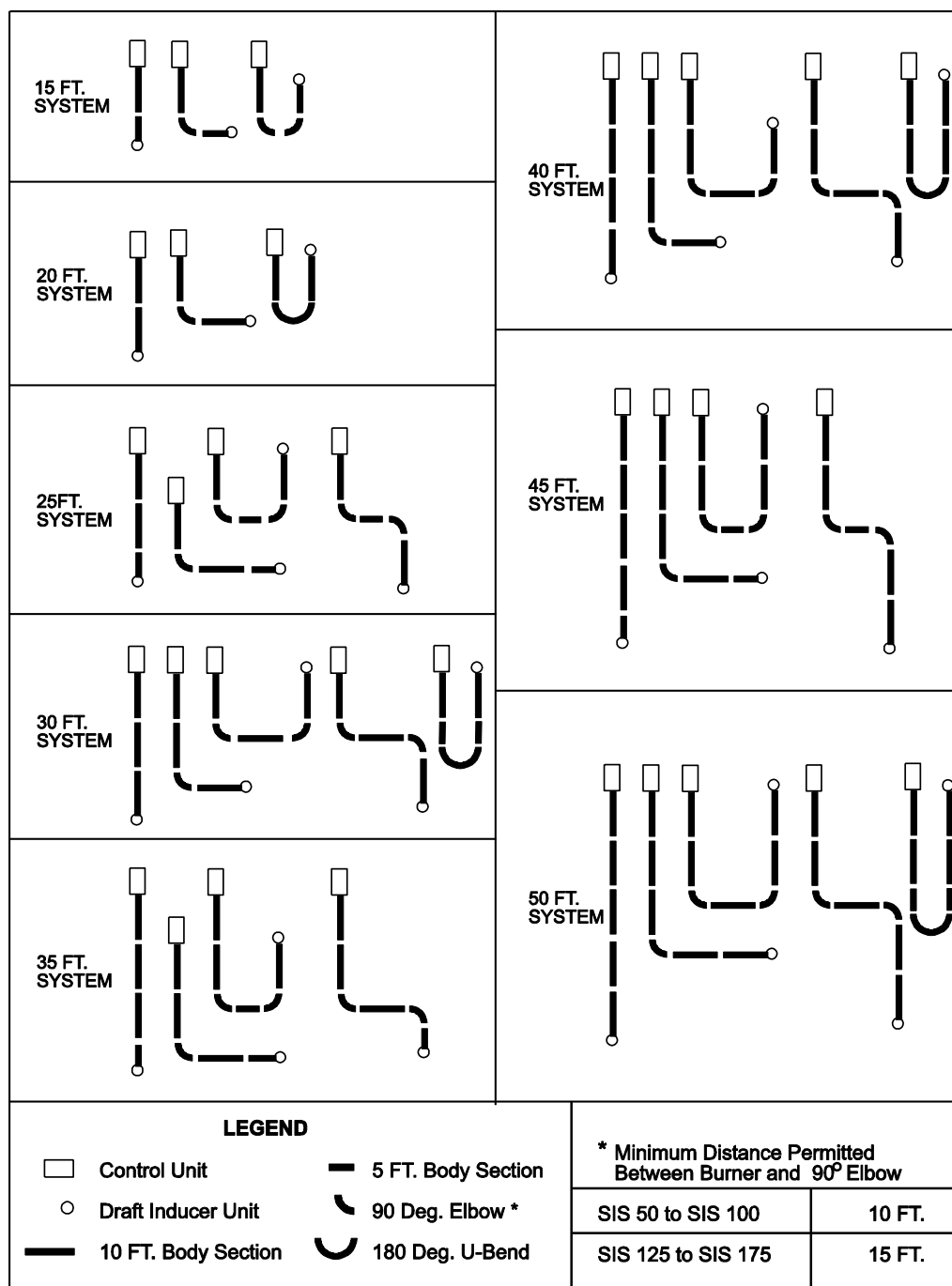
G. Exhaust Hood Package, Part #42924000

Contains:

Exhaust Hood Assembly, #42925540.....QTY-1
#8-18 x 1/2 Self-Drilling Screws, #02189030.....QTY-2



7.0) TYPICAL LAYOUTS

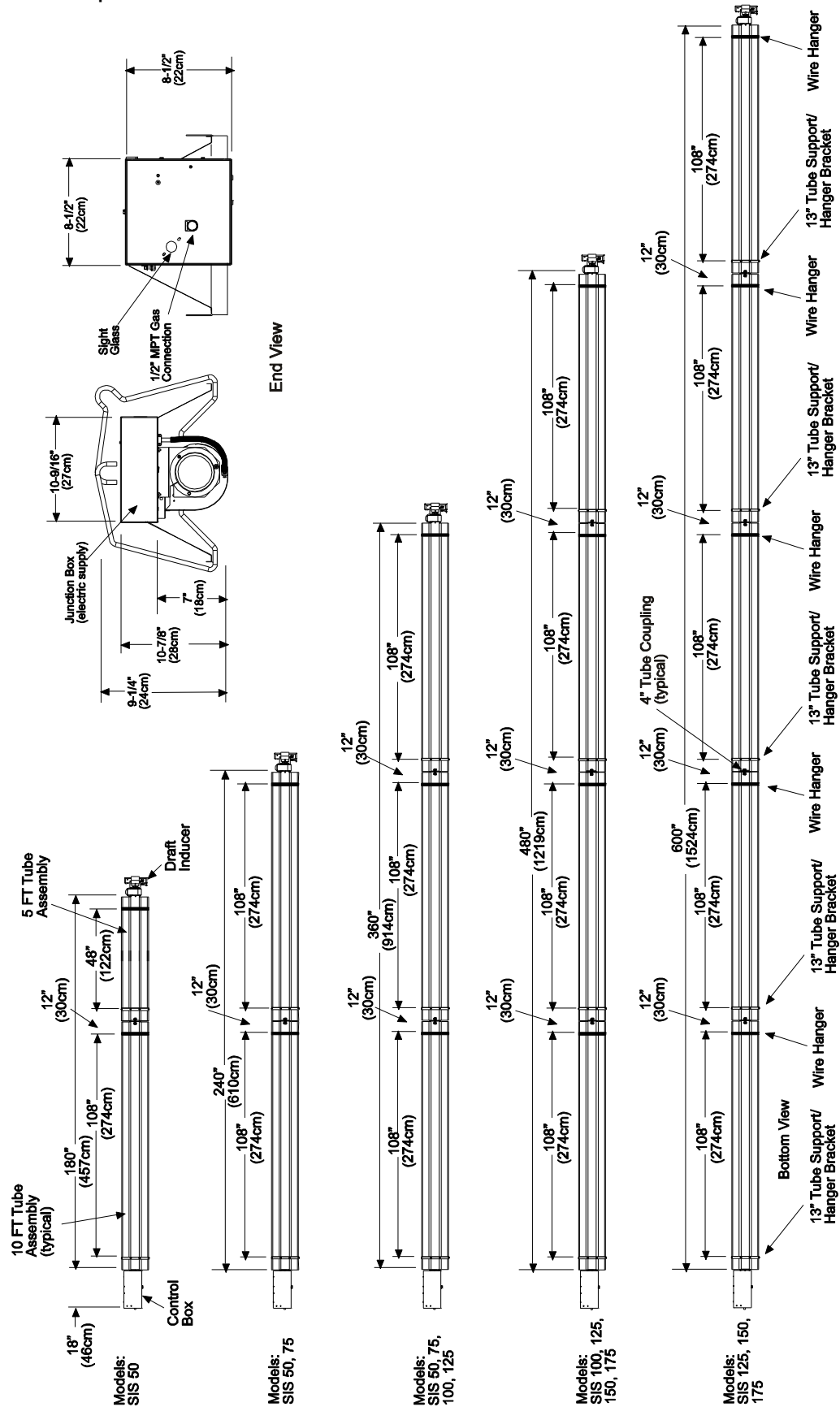


NOTES:

1. In all configurations, the control unit must be connected directly to the 24-hole flange of the 10 ft. aluminized steel start/end body section.
2. Joining of two 90° elbows directly together to form a “Z” shape **IS NOT** permitted.
3. Any configuration of components not shown in the illustrations may be used except as noted in 1 and 2 above.

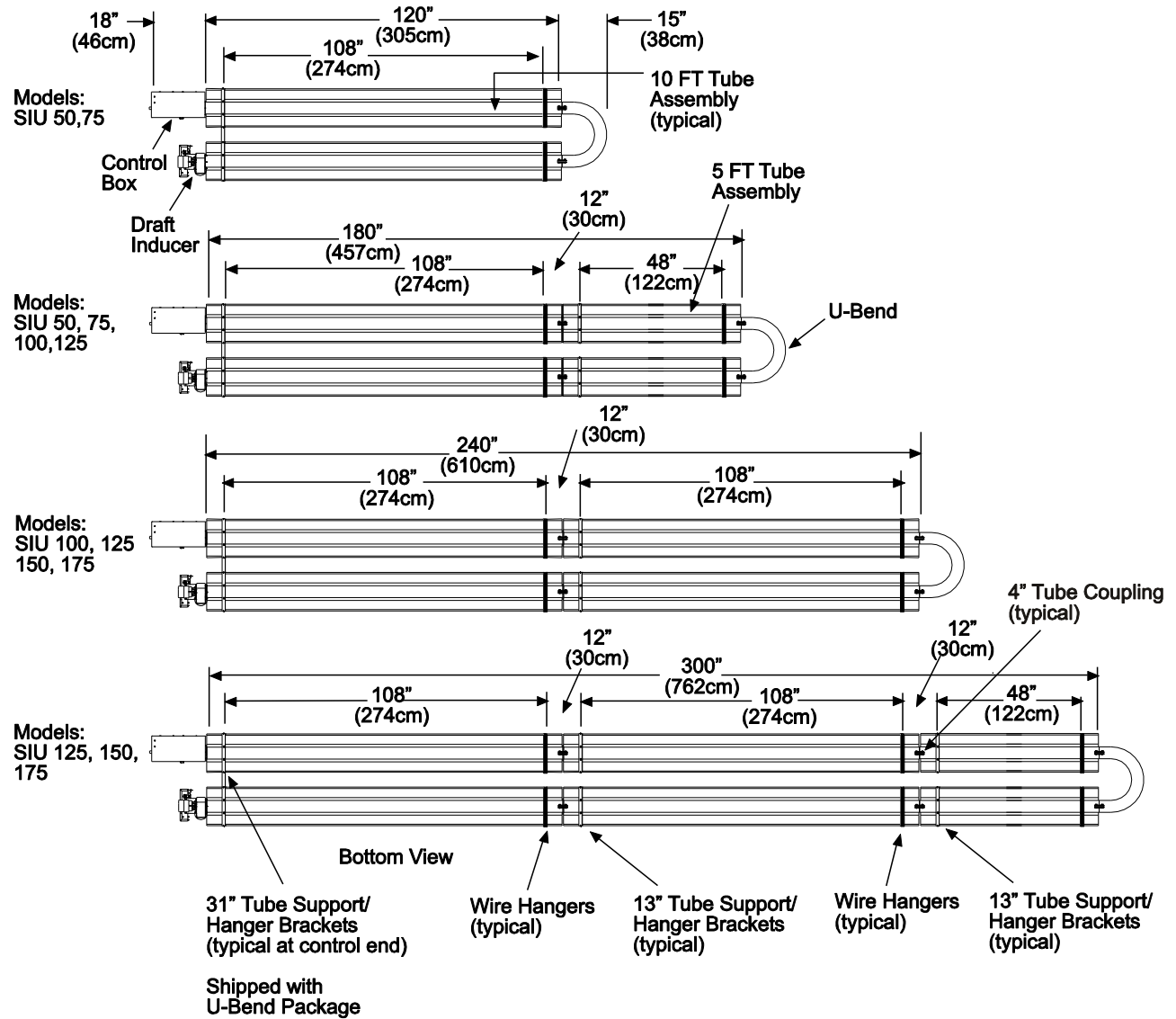
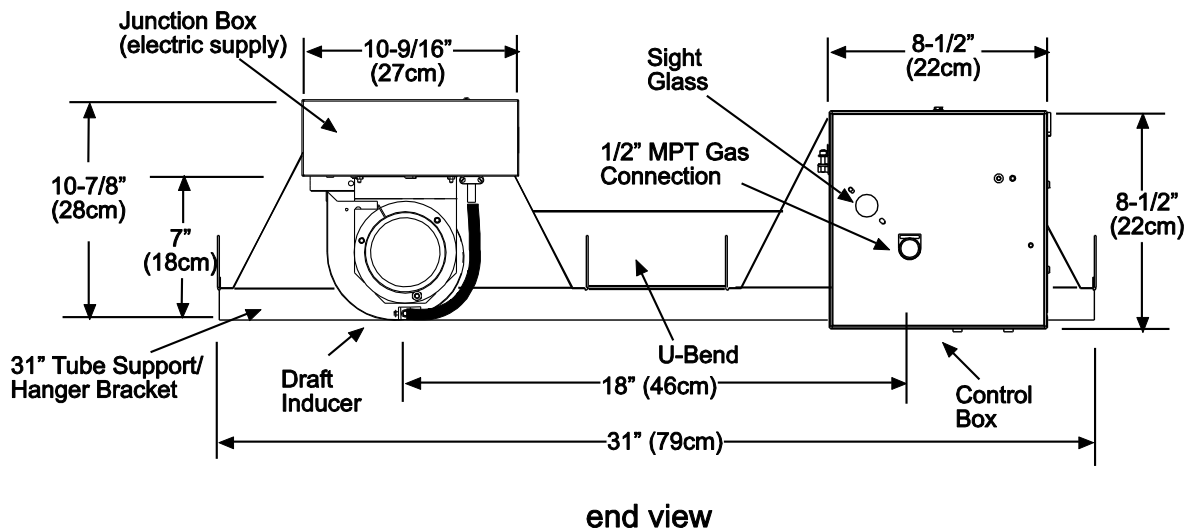
MODEL	EMITTER LENGTH		MODEL	EMITTER LENGTH	
	Min.	Max.		Min.	Max.
SIS 50	15 Ft.	30 Ft.	SIU 50	20 Ft.	30 Ft.
SIS 75	20 Ft.	30 Ft.	SIU 75	20 Ft.	30 Ft.
SIS 100	30 Ft.	40 Ft.	SIU 100	30 Ft.	40 Ft.
SIS 125	30 Ft.	50 Ft.	SIU 125	30 Ft.	50 Ft.
SIS 150	40 Ft.	50 Ft.	SIU 150	40 Ft.	50 Ft.
SIS 175	40 Ft.	50 Ft.	SIU 175	40 Ft.	50 Ft.

Typical Dimensions Up to 50 Ft. Shown.

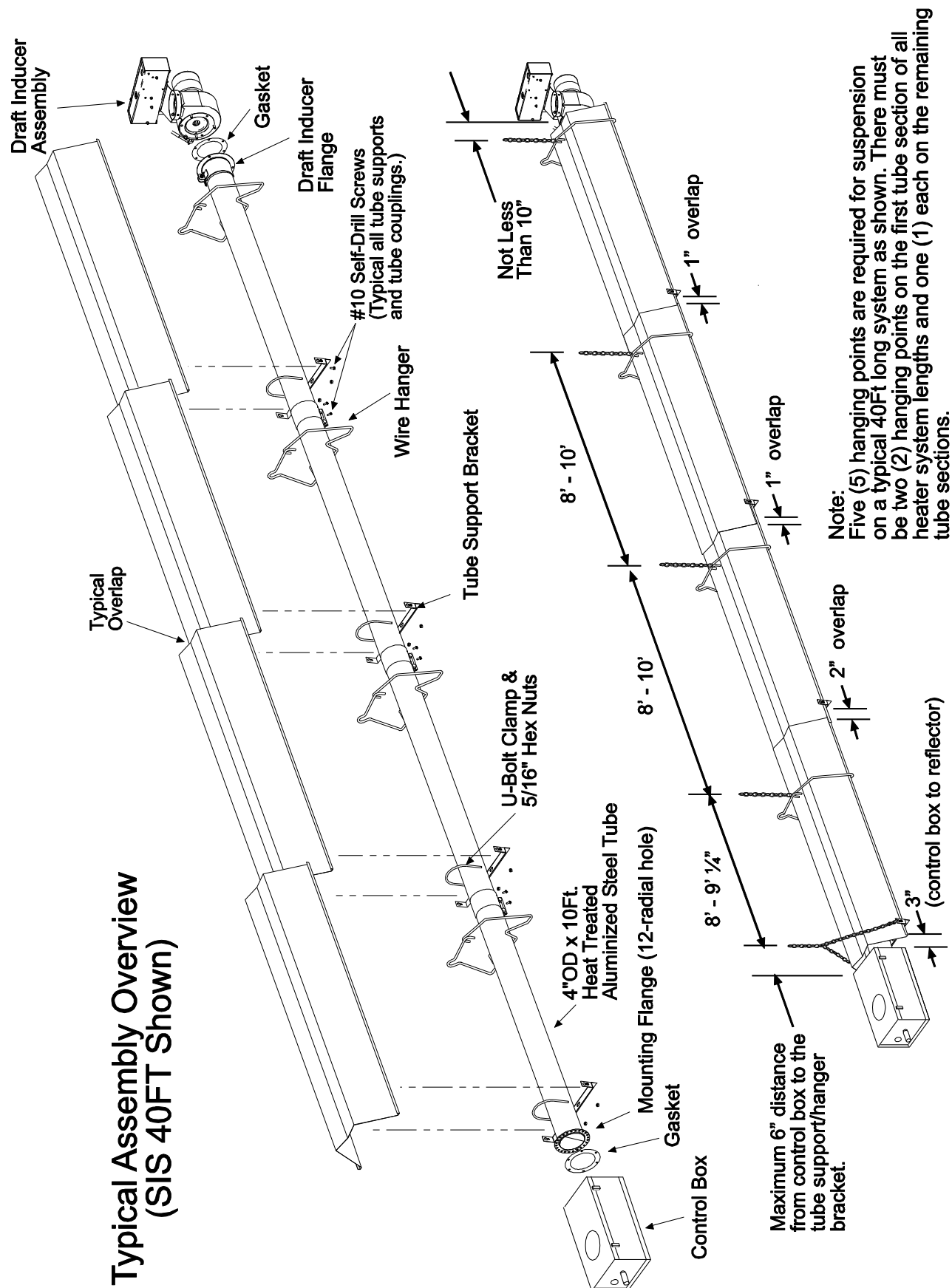


8.1) DIMENSIONS – SIU SERIES

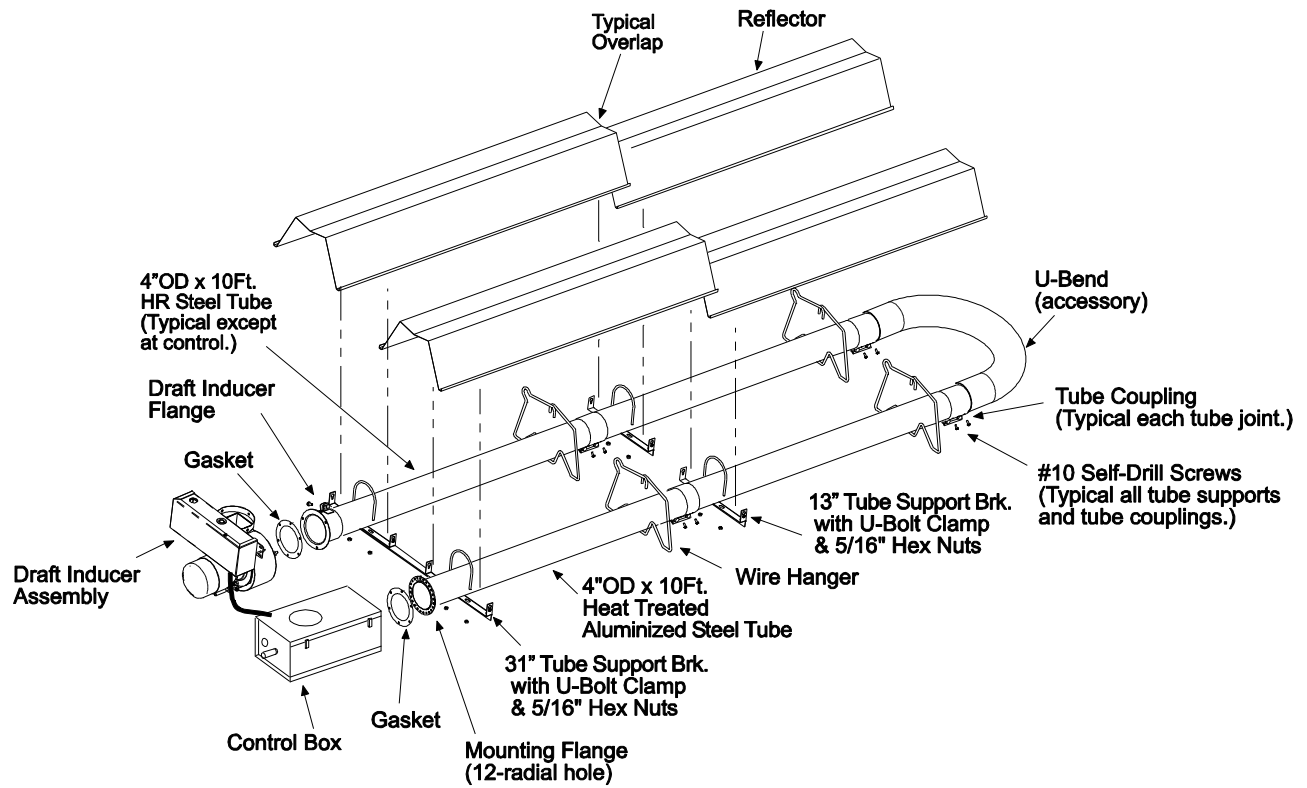
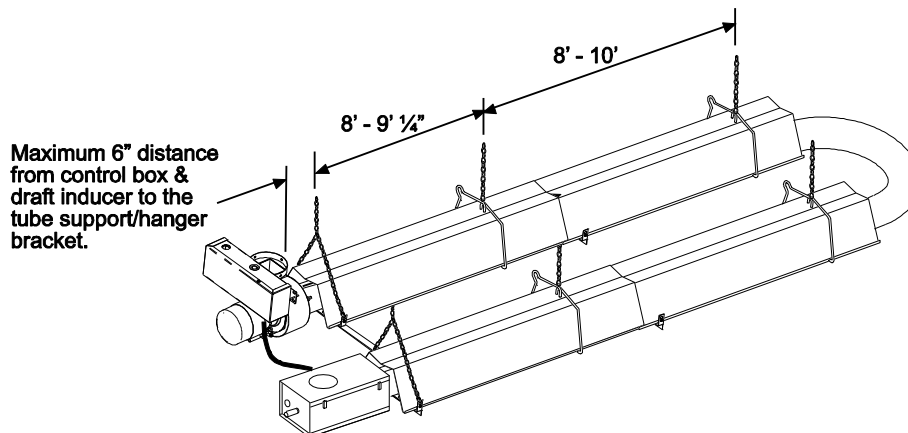
Typical Dimensions Up to 50 Ft. Shown.



8.2) HEATER ASSEMBLY / JOINING OF TUBE SECTIONS



Typical Assembly Overview (SIU 40FT Shown)



6 hanging points to be used for suspension. There must be two hanging points on the first tube and one on each of the other tubes

9.0) TYPICAL SUSPENSION METHODS

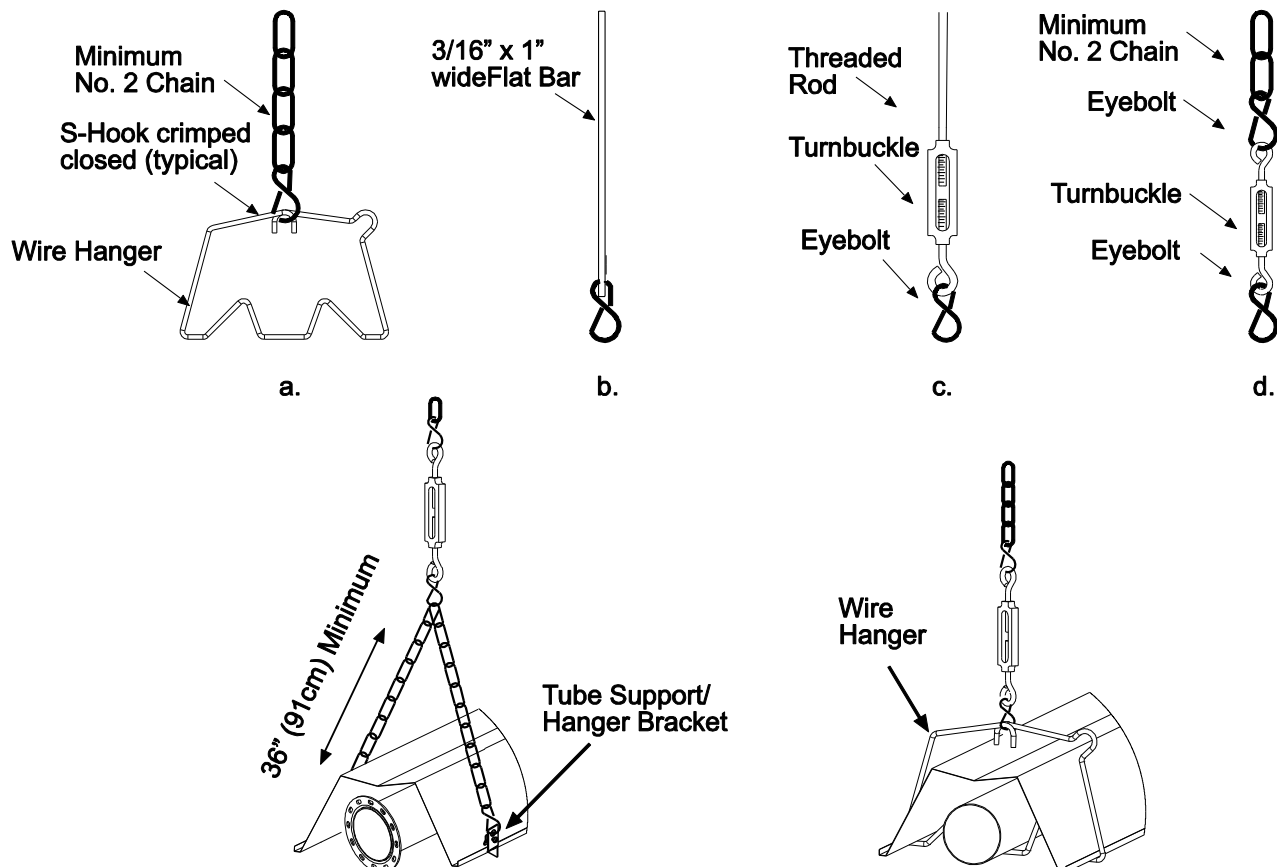
⚠ WARNING	
	<p style="text-align: center;">SUSPENSION HAZARD</p> <p>Burner must be secured to the mounting flange with nuts.</p> <p>All materials used to suspend the heater must have a minimum working load of 115 lbs.</p> <p>All "S" Hooks must be crimped closed.</p> <p>Never use the heater to support a ladder or other access equipment.</p> <p>Failure to do so may result in death, serious injury or property damage.</p>

Various means of suspending the heater can be used. See the following drawings for typical examples.

1. Use only noncombustible materials for suspending hangers and brackets.
2. A minimum No. 2 chain with a working load limit of 115 lbs. is required.
3. Turnbuckles can be used with chains to allow leveling of the heater. All "S" hooks and eye bolts must be manually crimped closed by the installer.
4. When using rigid means for heater suspension (rod, flat bar, etc.) provide sufficient lengths or swing joints to compensate for expansion. See Figures b and c.
5. Heaters subject to vibration must be provided with vibration isolating hangers.
6. Heaters must not be supported by gas or electric supply lines and must be suspended from a permanent structure with adequate load capacity.

SunStar recommends that the body sections be suspended using chains with turnbuckles. This will allow slight adjustments after assembly and heater expansion/ contraction during operation.

If a "trapeze" method is used for tube support/hanger brackets (shown below), the minimum chain length for the two connecting chains is 36" to minimize any vibration that might be generated by the draft inducer assembly. If these chains must be less than 36", then do not use the trapeze method and, instead, use individual chains on each tube support/hanger bracket.



9.1) ANGLE MOUNTING OF HEATERS

1. Angle mounting can be accomplished by shortening one length of the chain to achieve the desired angle or using notched section of the wire hanger for angle mounting.



CAUTION

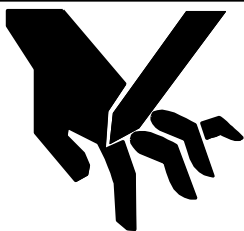
Angle mounting can result in up to 30 % lower radiant output on the floor level and result in lower tube temperatures when compared to horizontal mounting. Angle mounting of straight tubes for spot or area heating (e.g. where a single heater is used for space heating) is not recommended unless you have additional capacity or larger heaters specified/installed. If you are using straight tube heaters, you might have to install two smaller size tube heaters with burners located at opposite ends, to provide more uniform energy distribution and improved comfort level on the floor. Consult your Sunstar Representative if you have any questions prior to the installation concerning particulars of your application.

2. Based on the location of the wire hangers and spacing between the suspension points, it might be necessary to use additional tube support brackets to support the reflector system. Please order additional Tube Hanger Support Bracket (#43318000), U-bolt (#42873000), and 2 pieces of Hex Nut (#02127110) for each 10 ft. length of emitter tube.

10.0) ASSEMBLY OF TUBE SECTIONS



CAUTION



CUT HAZARD

Sheet metal parts, particularly reflectors and vent have sharp edges. Always use gloves when handling.

Failure to do so may result in death, serious injury or property damage.

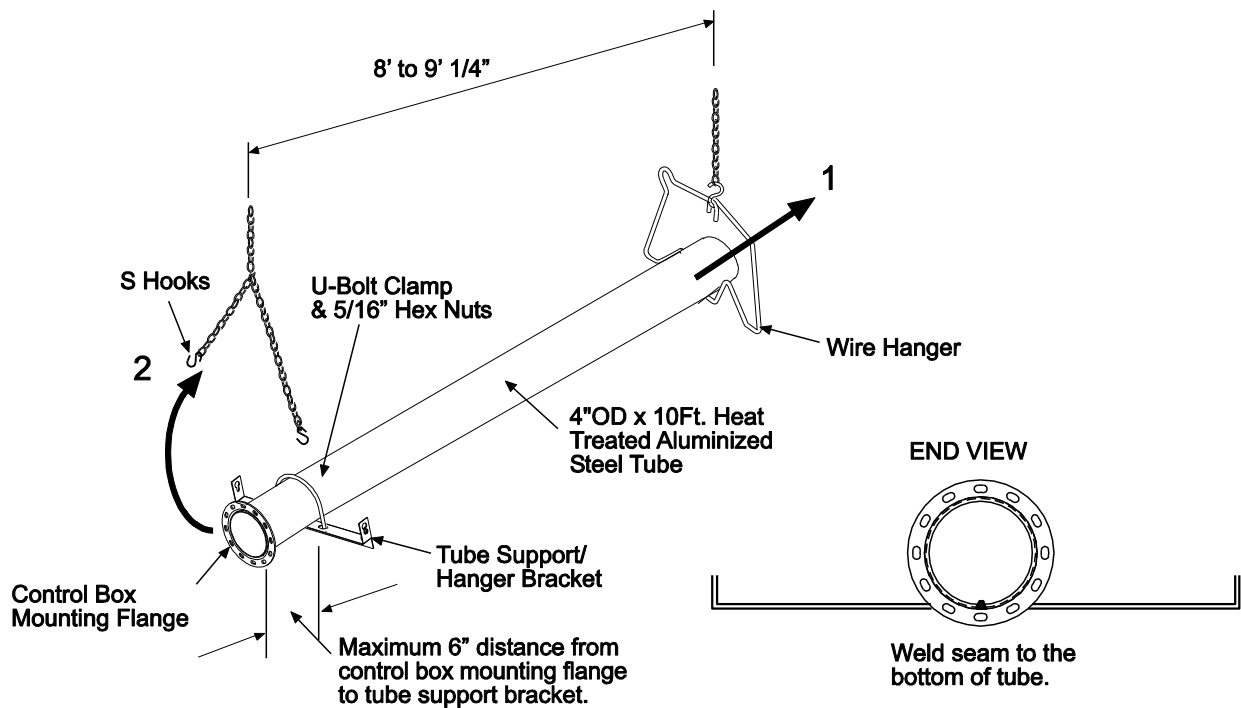
During field assembly of the heater body sections, the recommended procedure is as follows:

1. Before hanging heater sections, first determine the actual layout of the system (see Sections 7.0) & 8.0) for details). Consideration must also be taken for flue pipe, fresh air ducting, gas piping, clearances to combustibles, etc. before hanging heater. Typical suspension methods are shown in Section 9.0).
2. Hang each tube section individually. **DO NOT** attach the heater tube sections together on the ground and attempt to hang the entire system.
3. The first 10' tube section must be aluminized steel (with 12-radial hole flange) as the primary heat exchanger and the control box connected directly to these tube sections. **Failure to attach the control box to the flange end as indicated above will void the manufacturer's warranty.**
4. Place a tube support/hanger bracket on the end of the heat exchanger tube having the mounting flange. Align the tube such that the welded seam is facing down toward the ground. **Failure to assemble the tube with the seam facing down will VOID the manufacturer's warranty.**
5. Space the tube support/hanger bracket 6 inches from center of its slotted holes to the front face of the mounting flange. Secure the tube to the support/hanger bracket using a "U" Bolt clamp and two (2) 5/16-18 nuts provided. For U-tube configuration, see typical assembly overview illustration in Section 8.2)
6. Suspend the chain to attach the wire hanger and the tube support bracket. Insert the tube into the wire hanger and then raise the tube support bracket end up to the suspension chain, use "S" hooks to attach the wire hanger and tube support bracket to the chain.

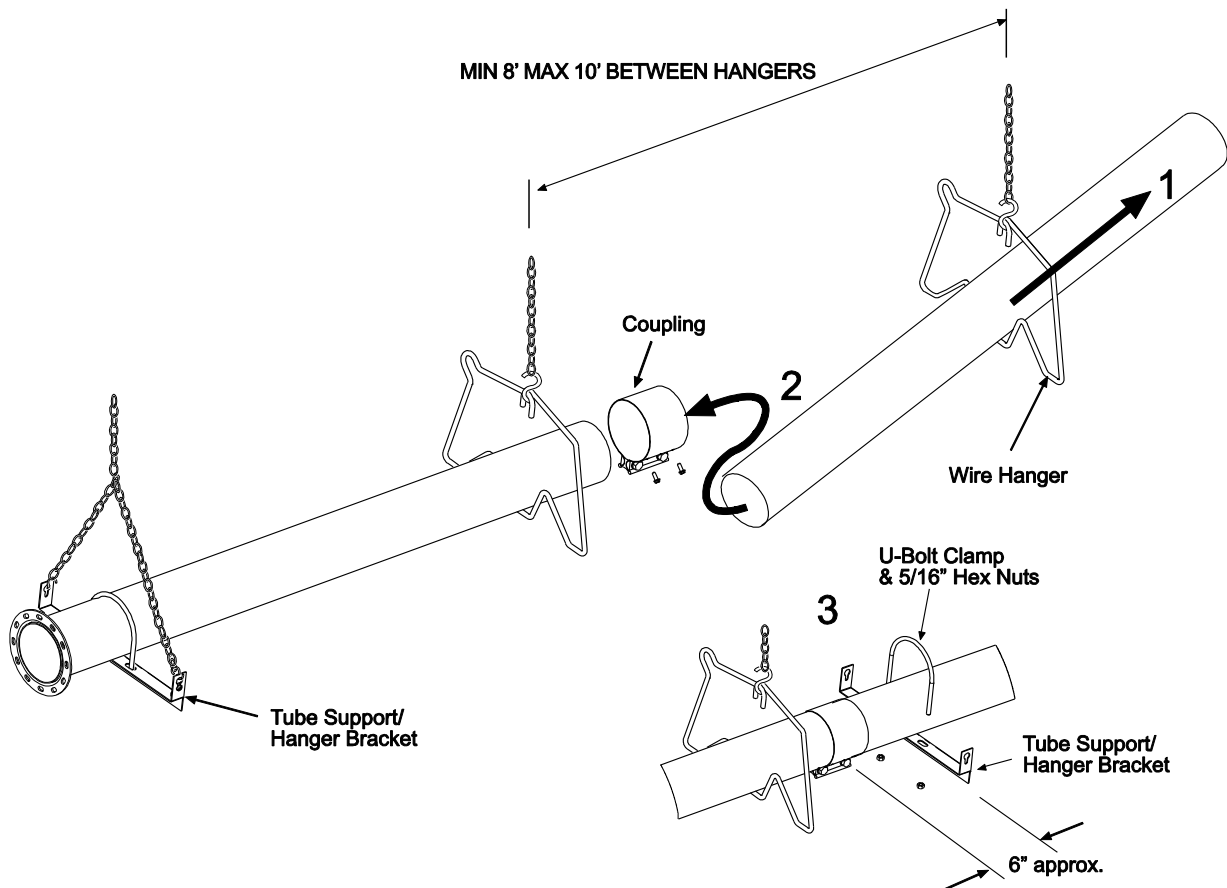


CAUTION

Failure to assemble the tube with the seam facing down and installing the first tube support/hanger bracket more than 6" from the burner box will VOID the manufacturer' warranty.



10.1) ASSEMBLY OF EXTENSION SECTIONS



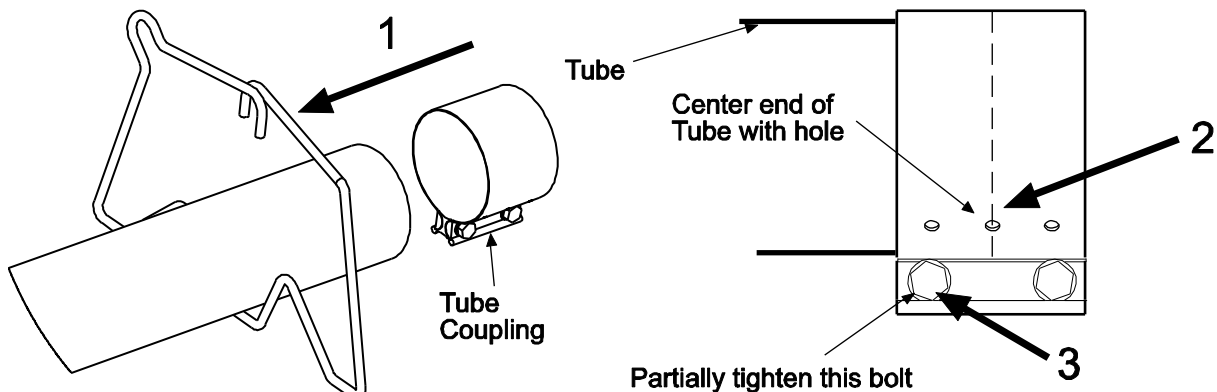
See typical assembly overview (Section 8.0) for typical complete assembly. Assemble additional extension sections as required for all systems. (See Sections 7.0) and 8.0) for typical layout details.)

Join the tube sections together and secure with tube couplings as described below:

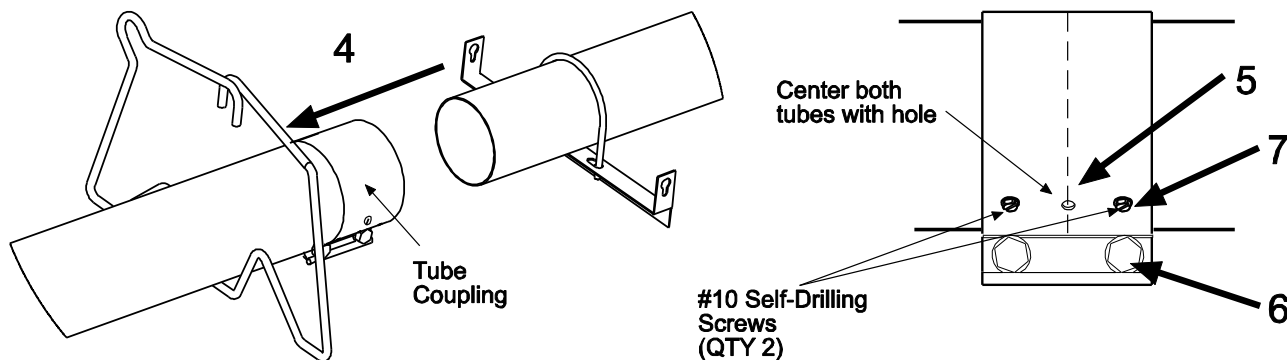
⚠ WARNING

The following coupling tightening instructions **MUST** be followed properly to ensure the integrity of the tube connections. Two #10 self-drilling screws **MUST** be installed at every coupling as shown in the instructions below. Failure to do so may result in serious injury or property damage.

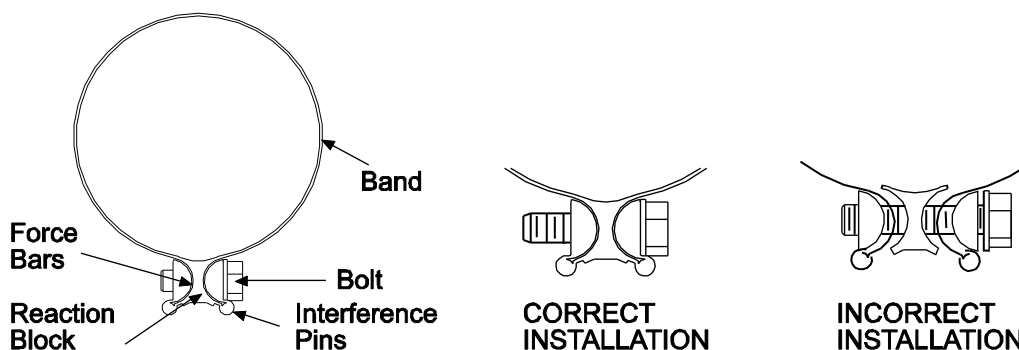
1. Place the compression coupling over the end of the tube.
2. Use the small hole at the centerline of the coupling to check that the coupling is inserted correctly.
3. Partially tighten the bolt nearest the end of the tube (approximately half closed).



4. Slide the next tube into the coupling.
5. Make sure both tube ends are butted together.
6. Finish tightening both bolts to 40-60 ft.lbs. torque to ensure a complete seal.
7. Use the two Self-drilling screws through the pre-punched holes to secure the tubes in the coupling.



8. Check to ensure that the hardware is completely closed and the band is seated on the reaction block and interference pins as illustrated above.
9. Once all the heater body sections are attached, make sure that the heater system is level. If it is not, slight adjustments can be made using the turnbuckles. (See Section 9.0)

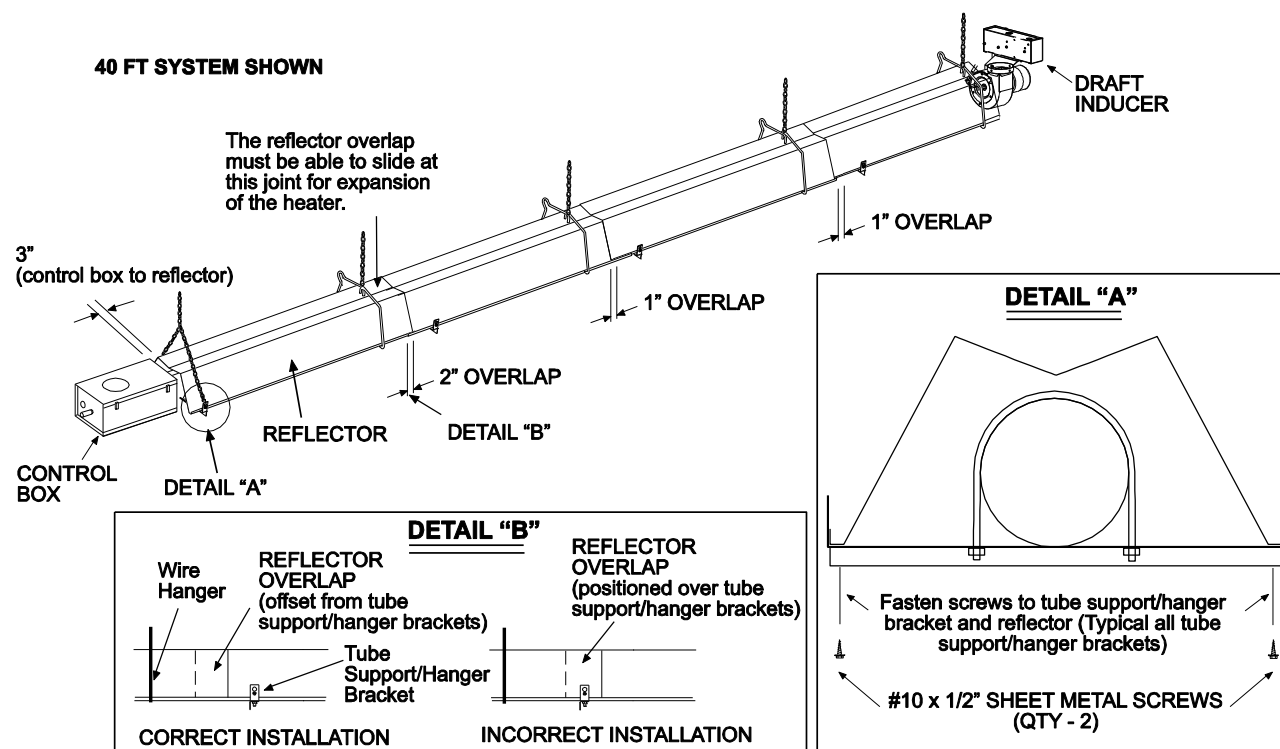


! CAUTION

Important: NEVER reuse a coupling.. Always install a new coupling only and torque as per instructions above and the diagrams below.

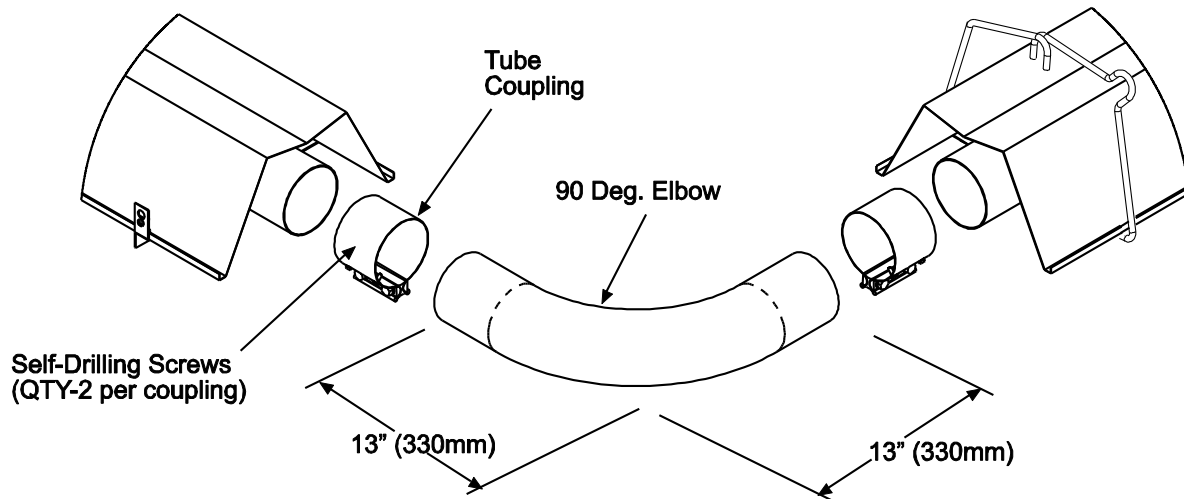
10.2) ADDING REFLECTORS

1. Slide the reflectors on the tube support/hanger brackets and through the wire hangers.
2. The tube at the coupling joints must be covered. Slide the reflectors together and provide an overlap of two (2") inches for the first reflector overlap after the control unit. All remaining reflector overlaps will be approximately one (1") inch. This will allow for the natural expansion and contraction of the heater when in operation. **Note: The heaters can expand and contract up to 1-3/4 inch.** See Detail "B" for the correct installation of reflector overlaps.
3. Secure the reflectors as shown in Detail "A" using #10 x 1/2" self-drilling sheet metal screws at each tube support/hanger bracket.



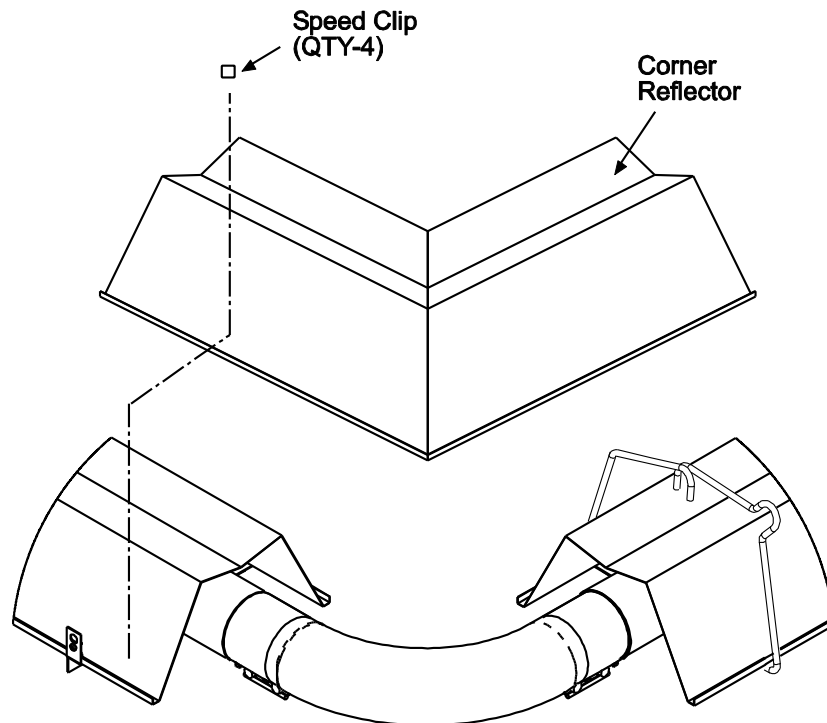
10.3) ADDING OPTIONAL 90° ELBOW (SIS ONLY)

1. The optional 90° elbow must be located a minimum of 10 ft. after the control box.
2. Hang the body sections in a 90° ("L") shaped pattern. Allow spacing for the elbow. The distance from one end of the elbow to the centerline of the opposite leg is 13" as shown.
3. Join the tube ends of the body sections and the elbow together and secure with tube couplings as described in Section 10.1).



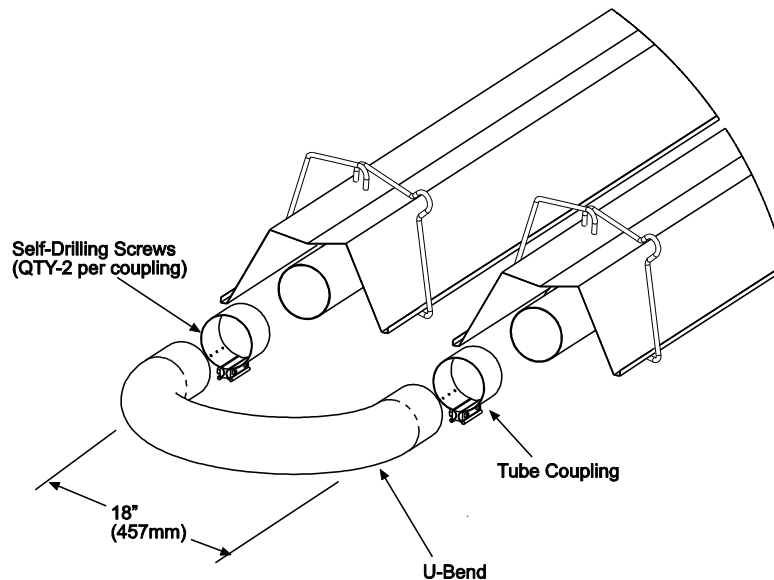
10.4) ADDING OPTIONAL CORNER REFLECTOR (SIS ONLY)

1. Place the corner reflector over the reflectors of both body sections.
2. Secure by sliding speed clips on the reflector edges. One speed clip is required for each side of reflector.
3. The corner reflector can be used only when the long axis of the heater is level and mounted in a horizontal position.



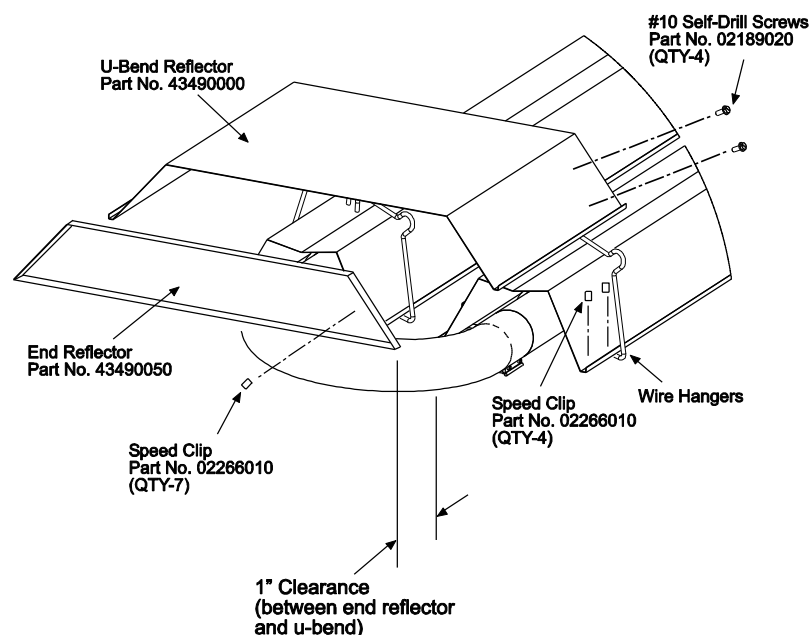
10.5) ADDING 180° U-BEND (SIU ONLY)

1. Hang body sections parallel with each other. The centerline distance from tube at each body section should be 18" as shown.
2. Join tube ends of body sections and the U-Bend together and secure with tube couplings as described in Section 10.1).



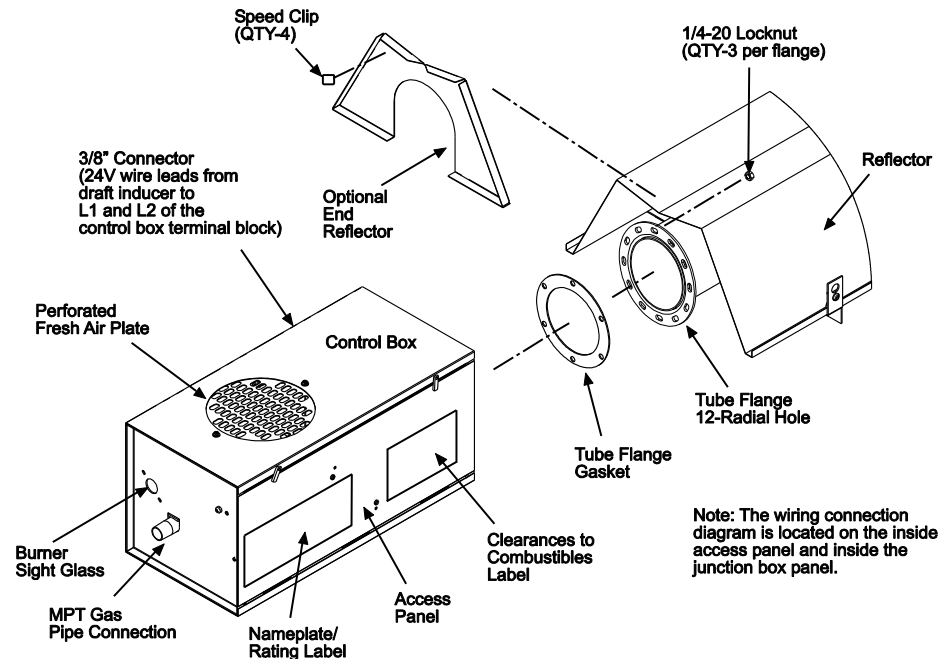
10.6) ADDING OPTIONAL U-BEND REFLECTOR (SIU ONLY)

1. Place the **U-Bend Reflector** over the reflectors of each body section with the end resting next to the tube wire hangers as shown.
2. Slide the speed clips on the reflector edges towards the end of the body section reflectors. Two speed clips are required for each side of the **U-Bend Reflector**. Make sure that the speed clips fit tightly over both the **U-Bend Reflector** and the reflector on each body section. Use two self-drilling screws to permanently secure both sides to the reflectors.
3. Place the **End Reflector** flush with the **U-Bend Reflector** as shown. **Note:** Clearance between end of the **U-Bend Reflector** and the **U-Bend** must be a minimum of 1". Secure by sliding speed clips onto the end reflector edges. Evenly space the speed clips on the sides (two each side) and top (three each) of the reflectors to provide a snug fit.



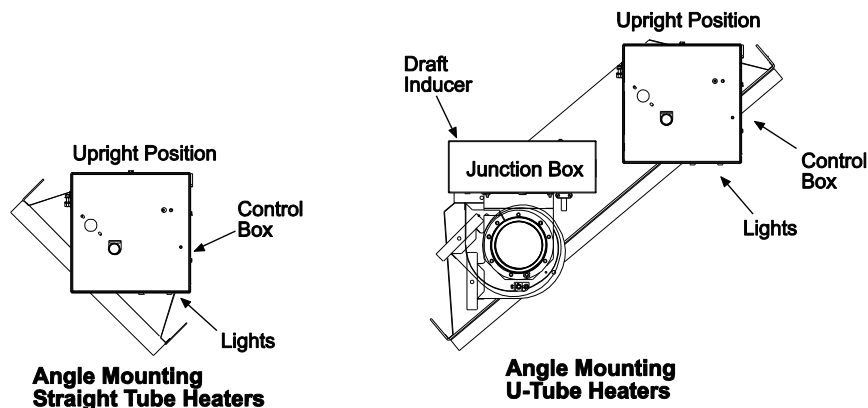
11.0) ATTACHING CONTROL BOX ASSEMBLY

1. Attach the control box and gasket to end of tube flange and secure with 1/4-20 locknuts. **NOTE: The control box must be mounted to a 10 ft. aluminized steel body section regardless of configuration used. Failure to attach the control box to the flange end as indicated above will void the manufacturer's warranty.**
2. A 3/8" connector is located on the left side of the control cabinet to provide strain relief for field wiring to the draft inducer junction box (refer to Section 16.0) on Electrical Connections and Connection Wiring Diagram for wiring between the control box and the draft inducer.)
3. Assemble the end reflector (optional on SIS/SIU series) flush with the end of the main body reflector. Secure by sliding speed clips onto the reflector edges. Evenly space the speed clips on the sides (one each side) and top (two required) of the reflectors to provide a snug fit. Leave a 3" space between the end reflector and the control box assembly.
4. The control box must be mounted with the perforated fresh air plate on top, facing the ceiling.



5. The heater can be mounted **horizontally** or at an angle of up to **45 degrees** maximum from horizontal.

When angle mounting, the **control box** must be positioned **upright** as shown below. **Failure to install the control box in an UPRIGHT position will VOID the manufacturer's warranty.** For additional instructions see Section 13.0) for multiple hanging and draft inducer positions.



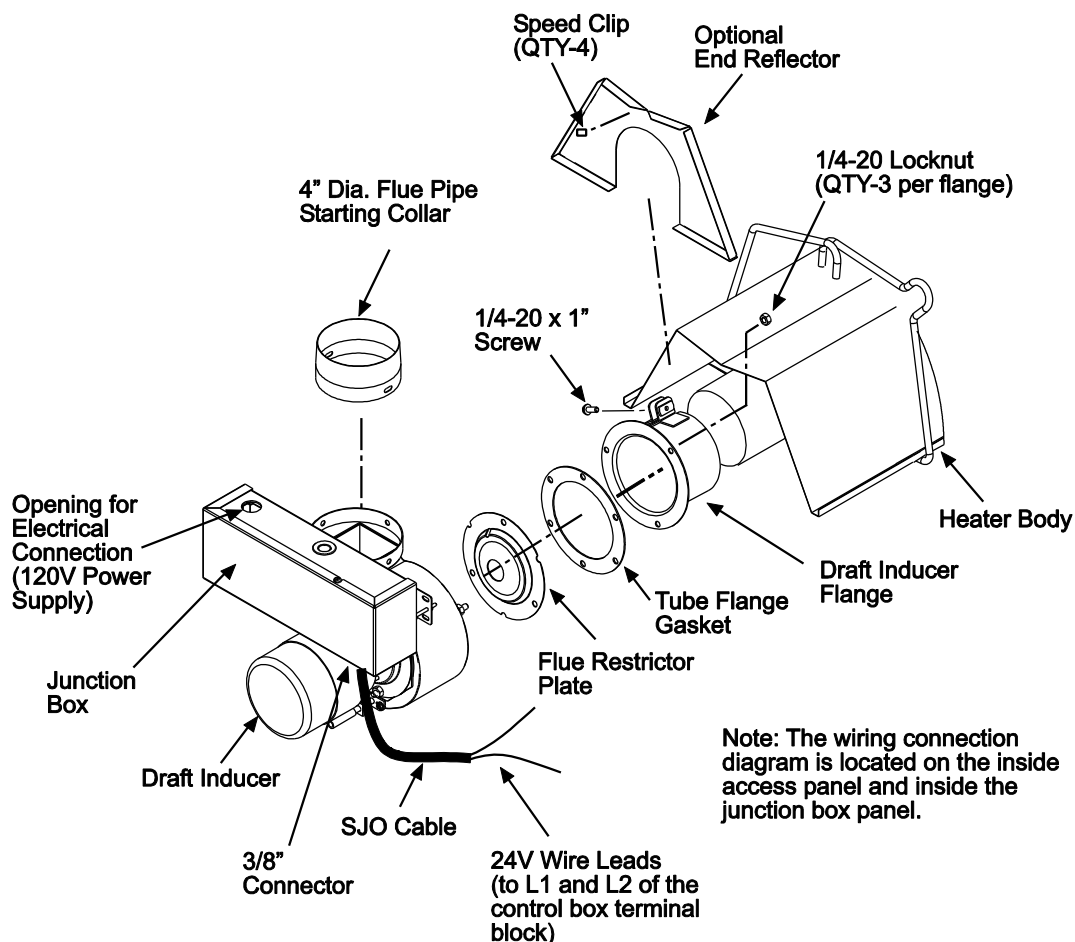
6. **Control box** can be installed in lower side when angle mounting. Please ensure that there is adequate clearance to open the **control box** access panel for servicing the heater.

CAUTION

Failure to install the burner box in an upright position and lights facing the floor will void the manufacturer's warranty.

12.0) ATTACHING DRAFT INDUCER ASSEMBLY

1. Slide the draft inducer flange over the end of tube. Rotate the flange until the tightening brackets are in the upright position. Secure the flange by tightening the 1/4-20 screw located on the tightening brackets to 66 inlb (5.5 ftlb).
2. Attach the draft inducer assembly and gasket to end of the draft inducer flange and secure with 1/4-20 locknuts. A flue restrictor plate is attached to the draft inducer weld studs. **DO NOT DISCARD RESTRICTOR PLATE** and make sure this remains in place while the draft inducer is being attached to the heater body. **NOTE:** The draft inducer can be mounted in a vertical, a 45°, or a horizontal position. Refer to Section 13.0).
3. The 3/8" connector used to hold the SJO cable will remain to provide strain relief for field wiring of the control box and the draft inducer (refer to the Electrical Connections and Connection Wiring Diagram for wiring between the control box and the draft inducer in Section 16.0).
4. If the heater is to be VENTED to the outside of the building, place the starting collar on the outlet of the draft inducer and secure with the #8-32 screws and nuts. Place the flue pipe directly onto the starting collar, secure with the #8 sheet metal screws, and terminate with an approved vent cap.
5. If the heater is for UNVENTED use, place the exhaust hood (supplied as an accessory) directly onto the outlet of the draft inducer (starting collar is not necessary for unvented use). Secure with the #8 sheet metal screws. **The exhaust hood must be mounted only in an upright position and directed toward the reflector body.**
6. Assemble the end reflector (optional on SIS/SIU series) flush with the end of the main body reflector. Secure by sliding speed clips onto the reflector edges. Evenly space the speed clips on the sides (one each side) and top (two required) of the reflectors to provide a snug fit. Leave a 3" space between the end reflector and the draft inducer assembly.

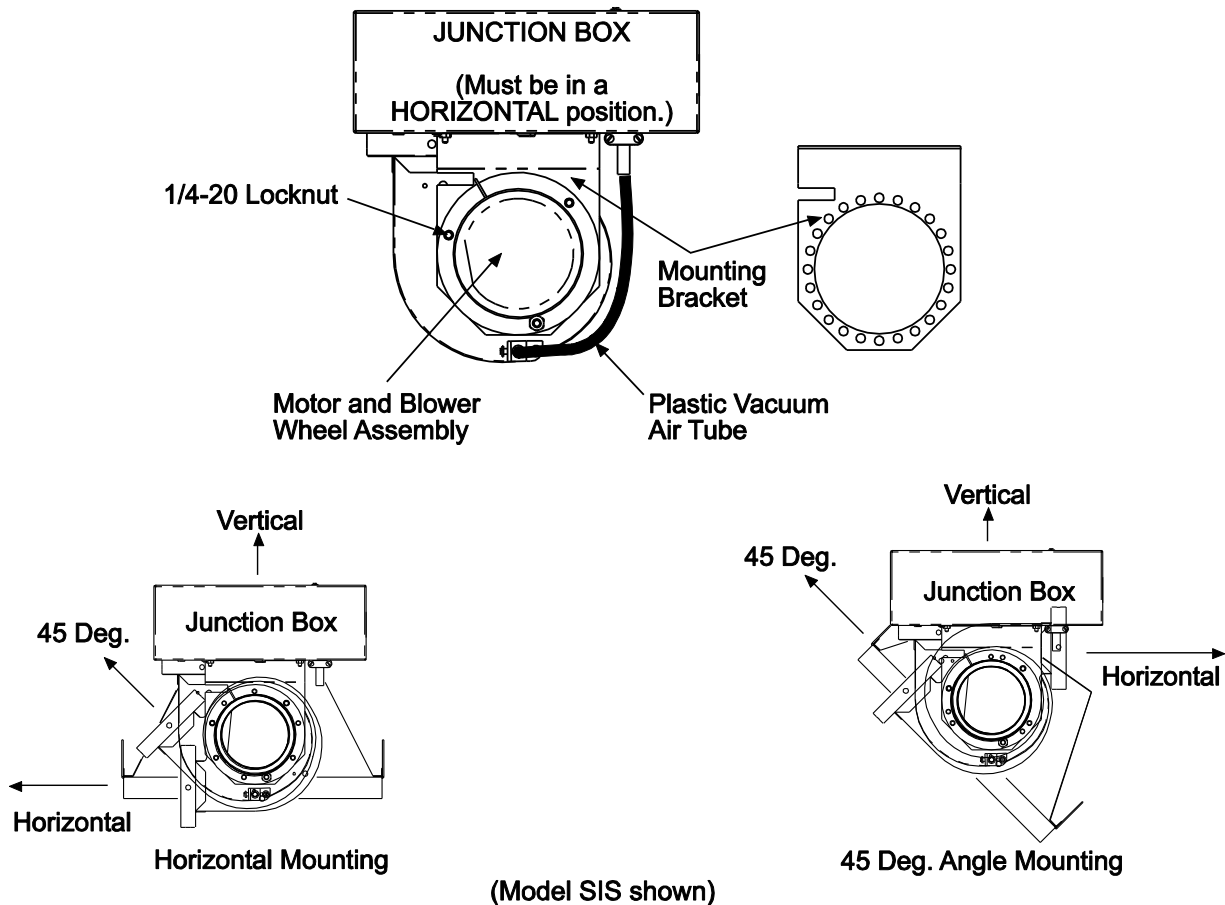


13.0) MULTIPLE HANGING & DRAFT INDUCER POSITIONS

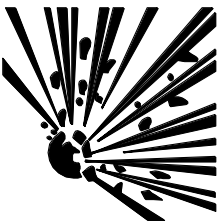
The heater can be mounted horizontally or at an angle of 45° maximum from horizontal. Make sure the long axis of heater is level.

Multiple draft inducer positions can also be used as shown in the diagrams. This allows for the desired configuration of flue venting. Regardless of the position chosen, the junction box must remain horizontal as shown. This may be achieved as follows:

1. Remove the three (3) 1/4-20 locknuts securing the motor and blower wheel assembly.
2. Pull the motor and blower wheel assembly with the motor plate slightly from the end of the housing studs. Use care not to damage the motor leads.
3. Rotate the junction box assembly to the upright position using the multi-hole mounting bracket.
4. Replace the motor and blower assembly. Tighten the locknuts.
5. Horizontal and 45° draft inducer positions can allow the plastic vacuum air tube to sag. The air tube should be shortened to prevent a downward sag that could allow condensation build-up in the tube.



14.0) GAS CONNECTIONS AND REGULATIONS

⚠ WARNING		
		<p>FIRE AND EXPLOSION HAZARD</p> <p>Tighten flexible gas hose and components securely.</p> <p>Flexible metal gas hoses must be installed without any twists or kinks in them. The hose will move during operation of the heater and it can crack if it is twisted.</p> <p>Failure to do so may result in death, serious injury or property damage.</p>

IMPORTANT BEFORE CONNECTING THE GAS TO THE HEATER

1. Connect to the supply tank or manifold in accordance with the latest edition of National Fuel Gas Code (ANSI Z223.1), and local building codes. Authorities having jurisdiction should be consulted before the installation is made. (In Canada, refer to the latest edition of CSA B149.1, Natural Gas and Propane Installation Code.)
2. Check that the gas fuel on the burner rating plate matches the fuel for the application.
3. Check that the gas supply piping has the capacity for the total gas consumption of the heaters and any other equipment connected to the line.
4. Check that the calculated supply pressure with all gas appliances and heaters operating will not drop below the minimum supply pressure required for these heaters. Check inlet supply pressures on Section 15.0).
5. All gas supply lines must be located in accordance with the required clearances to combustibles from the heater as listed on the clearances label of the heater and Section 4.0) of this manual.
6. Pipe joint compounds must be resistant to the action of liquefied petroleum gases.
7. Tube heaters will expand/contract during operation. Where local codes do not prohibit, a CSA or U.L. approved flexible connector supplied with this heater is required for connections between the rigid piping and the heater. A union should be installed before the control box inlet. An approved shut off valve should be installed within 6 feet of the union.
8. The gas pipe, flexible hose and connections must be self supporting. The gas pipe work must not bear any of the weight of the heater or any other suspended assembly.
9. This appliance is equipped with a step-opening, combination gas valve. **The maximum supply pressure to the appliance is 14" W.C. or 1/2 P.S.I.** If the line pressure is more than the maximum supply pressure, then a second stage regulator which corresponds to the supply pressure must be used.
10. After all gas connections have been made, make sure the heater and all gas outlets are turned off before the main gas supply is turned on slowly. Turn the gas supply pressure on and check for leaks. To check for leaks, check by one of the methods listed in Appendix D of the National Fuel Gas Code.
11. If a 2nd stage regulator is used, the ball valve down stream in the supply line must be closed when purging the gas lines to prevent gas seeping through it. If initial gas pressure is higher than 14" w.c. the redundant combination gas valve is designed to lock out. Pressure build-up in the supply lines prior to the heater must be released before proper heater operation.

⚠ WARNING
DO not use an open flame of any kind to test for leaks.