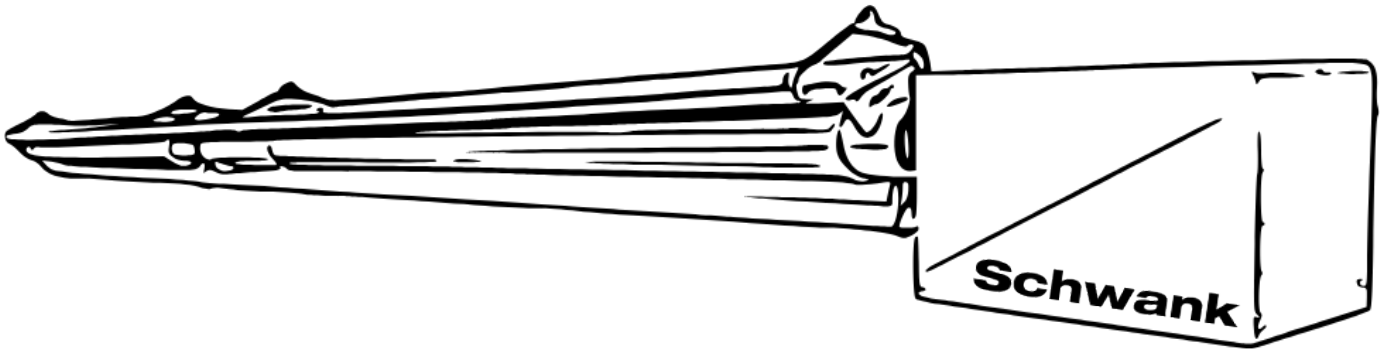
Schwank
Heating. Design. Comfort.



Schwank
Installation Manual

builderSchwank S100 - S100U Models

Single-Stage Low Intensity Tube Type Infrared Heaters

WARNING

Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death.

Read the installation and operating and maintenance instructions thoroughly before installing or servicing this equipment.

SAFETY ALERT

This heater must be installed and serviced only by a trained gas service technician. Failure to comply could result in personal injury, death, fire and/or property damage.

Do not store or use gasoline or other flammable vapours and liquids in the vicinity of this or any other gas fired appliance.

IF YOU SMELL GAS:

- Extinguish any open flame
- Do not attempt to light this or any other appliance
- Don't touch any electrical switch, or telephone
- Immediately call your gas supplier from a neighbor's phone
- Follow any and all instruction from your gas supplier
- If your gas supplier is not available, call the fire department

FIELD CONVERTIBILITY:
This appliance is field convertible to Propane.

Keep this manual in a secure place .
Record for future reference:

Model #: _____

Serial #: _____

(located on heater rating label)

GAS-FIRED
c UL us
LISTED

S100 F I&O Manual
IM101230
RD: NOV 2021
RL: 15A

S100 - S100 U Series
Gas Fired Infrared Low Intensity Tube Type

Table of Contents

Topic	Page
INSTALLATION	
IMPORTANT INFORMATION - *READ FIRST*	
APPLICATION	5
HEATER EXPANSION	6
GAS CONNECTION	6
VENTING	6
START UP 'SMOKE'	6
THERMOSTAT SETTING / COMFORT	6
TUBE 'GLOW'	7
CLEARANCE TO COMBUSTIBLES	7
Clearances Figure & Table	8
STACKING HEIGHT SIGN	9
1. LABOR REQUIREMENTS	10
2. INSTALLATION IN AIRCRAFT HANGARS	10
3. INSTALLATION: COMMERCIAL GARAGES	10
4. INSTALLATIONS OTHER THAN SPACE HEATING	10
5. PRE-INSTALLATION SURVEY	11
6. MOUNTING CLEARANCES	11
6A. SERVICE CLEARANCE	11
HEATER PLACEMENT GUIDELINES	12
7. SYSTEMS WITH 90° & 180° ELBOWS	12
ELBOW KIT DIMENSIONS	13
8. SUSPENDING THE SYSTEM	14
9. BURNER & TUBE INSTALLATION	15
9.1. STRAIGHT TUBE SYSTEM	16
9.2. 'U' TUBE SYSTEM	
9.3. SPECIAL COUPLING 100,000 Btuh	17
9.4. SPECIAL COUPLING 175,000 & 200,000	20
9.5. STRAIGHT TUBE SEISMIC RESTRAINT	22
9.6. SEISMIC RESTRAINT 'U' TUBE	23
10. REFLECTOR INSTALLATION	24
11. FLUE VENTING	25
COMBINED SYSTEM LENGTH	26
HEATER EXPANSION/VENT CONFIGURATION	27
VERTICAL VENT THROUGH ROOF	28
HORIZONTAL VENT THROUGH WALL	29
12. COMBUSION AIR DUCT	31
13. GAS SUPPLY	32
HEATER EXPANSION	33
FLEXIBLE GAS CONNECTION	34
14. ELECTRICAL AND THERMOSTAT	35
15. HIGH ALTITUDE INSTALLATION	35
16. LIGHTING INSTRUCTIONS	35
17. RECOMMENDED MAINTENANCE	35
18. WIRING DIAGRAM: FENWAL DSI	36
24V OR 120V THERMOSTAT	
18A. WIRING DIAGRAM: MULTIPLE HEATERS PER THERMOSTAT	37
19. FENWAL SEQUENCE OF OPERATION	39
SPARK IGNITER SET UP	40
FENWAL DSI SERVICE CHECK	40
20. TROUBLESHOOTING GUIDE: HEATER	41
21. START-UP / COMMISSIONING SHEET	43
PRODUCT DIMENSIONS & DATA	
22. BURNER/TUBE KIT ASSEMBLY CHART	45
23. 'U' TUBE SYSTEM	46
24. MODEL INPUTS, DIMENSIONS, WEIGHTS	47
INSTALLATION DIMENSIONS	48
25. TURBULATORS - STRAIGHT & 'U' TUBE	49
TURBULATORS - ILLUSTRATED	50
26. GAS CONVERSION OF BURNERS	51
27. HIGH ALTITUDE INSTALLATION	52
ORIFICE CHART - ALTITUDE CONVERSION	53
28. OPTIONAL ACCESSORIES	54-56
29. REPLACEMENT PARTS	57-59
29. TUBE SYSTEM PARTS LIST	60-61
WARRANTY STATEMENT	62

Installation

WARNING

Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death. Read and understand this installation and operation manual thoroughly prior to assembly, installation, operation or service to this appliance.

This heater must be installed and serviced only by a trained gas service technician.

Do not store or use gasoline or other flammable vapours and liquids in the vicinity of this or any other gas fired appliance.

Failure to comply could result in personal injury, death, fire and/or property damage.

Do not store or use gasoline or other flammable vapours and liquids in the vicinity of this or any other gas fired appliance.

This appliance may have sharp edges and corners. Wear protective clothing such as gloves and protective eye wear when servicing this or any other appliance.

WARNING

California Proposition 65:
This product can expose you to chemicals including 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

Application

A gas-fired radiant tube heater may be installed for heating of commercial/industrial non-residential spaces. It is beyond the scope of these instructions to consider all conditions that may be encountered. Installation must conform with all local building codes or, in the absence of local codes, with the National Fuel Gas Code, ANSI Z223.1/NFPA 54 in the U.S.A. or the Natural Gas and Propane Installation Code, CSA B149.1 in Canada. The latest edition Electrical Code ANSI/NFPA N0 70 in the U.S.A. and PART 1 CSA C22.1 in Canada must also be observed.

Installation of a gas fired tube heater must conform to all heating installation design procedures including clearance to combustibles, connection to the gas and electrical supplies, and ventilation.

This heater is not for installation in a Class 1 or Class 2 explosive environment, nor a residence.
If installation of this equipment is in question, consult with local authorities having jurisdiction (Fire Marshall, labor department, insurance underwriter, or others).

Revisions to codes and/or standards, may require revision to equipment and installation procedures. In case of discrepancy, the latest codes, standards, and installation manual will take priority over prior releases.

Model S100 may be installed for heating of commercial/industrial non-residential indoor spaces.

Model available for other applications:
Model SPW-JZ has a powder coated water resistant burner enclosure and may be installed for heating of commercial / industrial non-residential outdoor spaces and wet indoor environments.

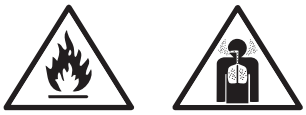
Models STW-JZ has a stainless steel water resistant burner enclosure and may be installed for heating of commercial/industrial non-residential outdoor spaces and harsh wet indoor environments.

WARNING

Heater Expansion

It is a normal condition that during heat-up and cool-down a tube heater will expand and contract. Allowances for heater expansion must be made in the gas connection, venting and combustion air ducting. Improper installation, alteration, or adjustment can result in property damage, injury or death.
Refer to Section 13

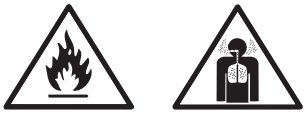
WARNING



Gas Connection

Improper installation, connection, or adjustment can result in property damage, toxic gases, asphyxiation, injury or death. Using an approved flexible gas connector in the USA or Type 1 hose connector in Canada, the gas supply to the heater must be connected and tested in accordance with all local, state, provincial, and national codes (ANSI Z223.1/NFPA 54 in USA; B149.1 in Canada) and as indicated in this manual.
Refer to Section 13

WARNING



Venting

Inadequate venting of a heater may result in asphyxiation, carbon monoxide poisoning, injury or death. This heater may be directly or indirectly vented from the space. Venting must be in accordance with all local, state, provincial, and national codes (ANSI Z223.1/NFPA 54 in USA; B149.1 in Canada) and as indicated in this manual.
Refer to Sections 11 & 12

WARNING

Start-Up 'SMOKE' Condition

During start up, the heating of material coatings used in the production process of tubes and reflectors will create smoke during the initial period of operation. This condition is normal and temporary.
Ensure that there is sufficient ventilation to adequately clear any smoke from the space. Notify site and safety personnel to ensure that alarm systems are not unduly activated.

IMPORTANT

Thermostat setting for comfort

Infrared radiant (IR) heating system provide comfort with the effect of radiant heat and ambient air heat.
If your IR system is controlled with a thermostat (TruTemp or ThermoControl Plus) that senses radiant heat, then set the thermostat to the desired comfort temperature (ie: 65°; 68°; 20°C).
If your IR system is controlled with a standard 24V or 120V thermostat that senses only air temperature, then start with a thermostat setting that is 5° to 7°F (3° to 5°C) lower than the desired comfort temperature. Some trial and error setting may be required to 'fine tune' the comfort temperature that best suits your site and provides most economical operation.

WARNING

Tube "Glow"

It is a normal condition that the combustion tube (1st tube) can appear to "glow red". For inputs up to 150,000 Btuh, the top surface of the tube can appear red where heat is trapped between the reflector and the tube. The stainless steel tube used for inputs 175,000 and greater can appear to entirely glow red. The tube material is designed into the heater because it can withstand the high temperature of combustion, and the "red glow" is a normal occurrence.

WARNING

Clearance to combustibles

Location of flammable or explosive objects, liquids or vapors close to the heater may cause fire or explosion and result in property damage, injury or death. Do not use, store or locate flammable or explosive objects, liquids or vapors in proximity of the heater.

The clearance to combustible material represents the minimum distance that must be maintained between the outer heater surface and a nearby surface. The stated clearance to combustibles represents a surface temperature of 90F° (50C°) above room temperature. It is the installer's responsibility to ensure that building materials with a low heat tolerance which may degrade at lower temperatures are protected to prevent degradation. Examples of low heat tolerance materials include vinyl siding, fabrics, some plastics, filmy materials, etc.

In locations used for the storage of combustible materials, signs must be posted to specify the maximum permissible stacking height to maintain the required clearances from the heater to the combustibles. Such signs must either be posted adjacent to the heater thermostats or in the absence of such thermostats in a conspicuous location. In addition to stored or stationary material, consideration must also be given to moveable objects such as cranes, vehicles, and overhead doors, and structural objects such as sprinkler heads, electrical and gas lines, and electrical fixtures.

It is beyond the scope of these instructions to consider all conditions that may be encountered. Consult local authorities such as the Fire Marshall, insurance carrier, or safety authorities if you are uncertain as to the safety or applicability of the proposed installation.

Refer to Figure 1 and Table 1 for the certified clearances to combustibles for the appropriate model input/size.

GAS-FIRED

c UL us

LISTED

S100F I&O Manual
IM101230
RD: NOV 2021
RL: 15A

Minimum Clearances to Combustibles

Figure 1 - refer to Table 1 for values

NOTE:

A 'Peel & Stick' Sign is supplied: Use an indelible marker to enter values 'H', 'S', 'F', & 'B' on. Post the sign adjacent to the heater thermostat or in a prominent location. See next page for details.

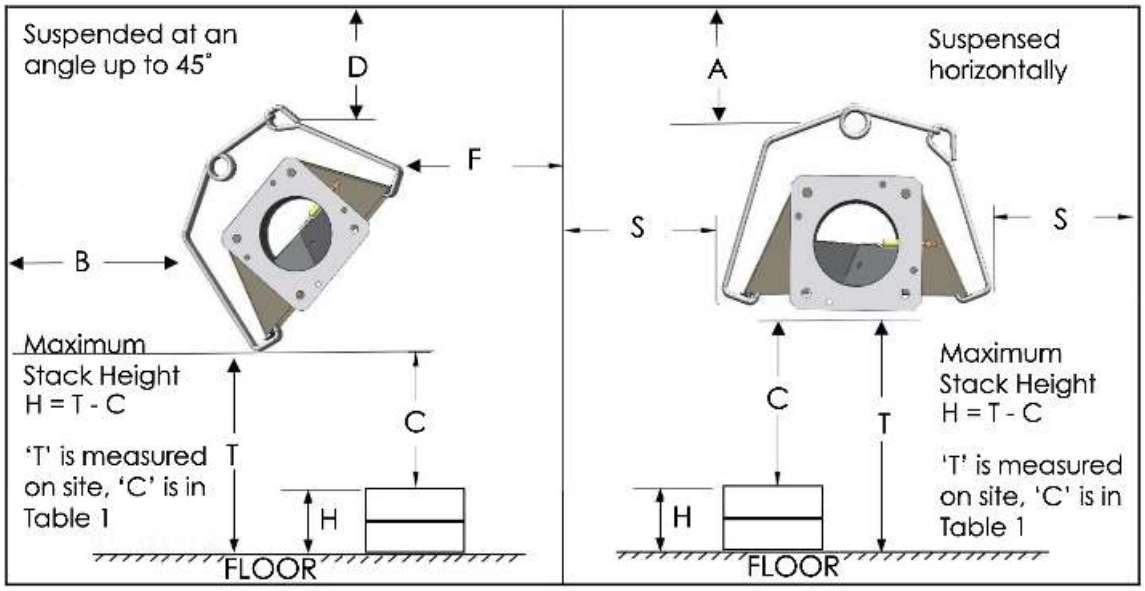


Table 1 - Minimum Clearances to Combustibles*

Model	Suspended at an angle up to 45 Degrees				Suspended Horizontally		
Both "Straight" & "UTube"	D inches	B inches	F inches	C inches	A inches	S inches	C inches
S100 (U) **200**	13	6	74	70	14	44	76
S100 (U) **175**	12	6	72	68	13	42	74
S100 (U) **155**	10	4	50	64	11	34	70
S100 (U) **130**	10	3	45	60	10	32	65
S100 (U) **110**	9	3	36	54	9	30	60
S100 (U) **80**	7	2	31	38	7	24	42
S100 (U) **60**	7	2	25	34	7	20	34
S100 **45**	7	2	29	32	7	16	32
S100 **100**	10	4	57	68	11	32	68

***Note**: Clearances are measured from the reflector.

S100 is only available in 20ft therefore requires a higher minimum clearance.
The clearance to combustible materials represents the minimum distance that must be maintained between the heater and a nearby surface. **The stated clearance to combustibles represents a surface temperature of 90F° (50C°) above room temperature. It is the installer's responsibility to ensure that building materials with a low heat tolerance which may degrade at lower temperatures are protected to prevent degradation.**

Vent End Clearance: Clearances from the vent pipe are determined by local or national installation codes, but must not be less than 6 inches. For 'unvented' installation, a minimum distance of 48 inches is required from the end of heater to a combustible surface.

WARNING

In locations used for the storage of combustible materials:
Signs must be posted specifying the maximum permissible stacking height to maintain the required clearances from the heater to the combustibles.

The signs must be posted either adjacent to the IR heating system thermostats or in the absence of such thermostats, in a conspicuous place.

For your convenience a "peel and stick" sign is provided with this heater. Use a permanent marker to record the required dimensions on the sign for the pertinent heater model.

To calculate the value 'H': (H = T - C)

- Measure the on site distance between bottom of the heater and the floor = 'T' inches (cm).
- Refer to Table 1 to get the value 'C' that corresponds to the model you are installing
- Subtract the clearance below the heater 'C' from 'T' to get value 'H'.
- Enter this value 'H' on the sign.

Refer to the information for the heater model being installed in Figure 1 and Table 1 to get the values for dimensions 'S', 'F' and 'B'.

Post this sign as instructed above.

1. Labor Requirements

Two persons are required to safely install this equipment. Wear gloves and other required safety protection.

2. Installation in Commercial Aircraft Hangars

Low intensity radiant tube heaters are suitable for use in aircraft hangars when installed in accordance with the latest edition of the Standard for Aircraft Hangars, ANSI/NFPA No 409 in the USA, or the Canadian Natural Gas and Propane Installation Code, B149.1.

A. A minimum clearance of 10 ft above either the highest fuel storage compartment or the highest engine enclosure of the highest aircraft which may occupy the hangar. The clearance to the bottom of the heater shall be measured from the upper surface of either the fuel storage compartment or the engine enclosure, whichever is higher from the floor.

B. A minimum clearance of 8 ft must be maintained from the bottom of the heater to the floor in other sections of the aircraft hangar, such as offices and shops, which communicate with areas for servicing or storage. Refer to Section 1 for proper mounting clearances to combustibles.

C. Heaters must be located so as to be protected from damage by aircraft and other objects, such as cranes and movable scaffolding.

D. Heaters must be located so as to be accessible for servicing and adjustment.

3. Installation in Commercial Garages and Parking Structures

Low Intensity Heaters are suitable for use in commercial garages when installed in accordance with the latest edition of the Standard for Parking Structures, ANSI/NFPA 88A, or the Standard for Repair Garages, ANSI/NFPA No. 88B, or the Canadian Natural Gas and Propane Installation Code, B149.1.

WARNING

An overhead heater shall be located high enough to maintain the minium distance to combustibles, as shown on the heater rating plate, from the heater to any vehicles parked below the heater.

Overhead heaters shall be installed at least 8 ft above the floor.

4. Installations other than space heating

Use for process or other applications that are not space heating will void the C.S.A. certification and product warranty. Process application requires field inspection and/or certification by local authorities having jurisdiction.

WARNING

Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death. Read and understand this installation and operation manual thoroughly prior to assembly, installation, operation or service to this appliance.

This heater must be installed and serviced only by a trained gas service technician.

Do not store or use gasoline or other flammable vapours and liquids in the vicinity of this or any other gas fired appliance.

Failure to comply could result in personal injury, death, fire and/or property damage.

Do not store or use gasoline or other flammable vapours and liquids in the vicinity of this or any other gas fired appliance.

5. Pre-Installation Survey

It is recommended that a full heating design including heat loss calculation be conducted on the structure or area to be heated. Heater sizing and placement must consider available mounting height, sources of greatest heat loss, and the certified clearances to combustibles with respect to stored material, moveable objects (cranes, vehicles, lifts, overhead doors, etc), sprinkler system heads, and other obstructions on the site. Consideration must also be given to vent / duct placement and the allowable combined lengths of vent and duct. Carefully survey the area to be heated, and for best results place burner and combustion chamber in the coldest area(s).

Installation must conform with all local, state, provincial and national code requirements including the current latest edition ANSI Z223.1 (NFPA 54) in the U.S.A. and B149.1 installation code in Canada, for gas burning appliances and equipment. The latest edition Electrical Code ANSI/NFPA N0 70 in the U.S.A. and PART 1 CSA C22.1 in Canada must also be observed.

The heating system must have gas piping of the correct diameter, length, and arrangement to function properly.

For this reason, a layout drawing is necessary.

6. Mounting Clearances

This heater must be mounted with at least the minimum clearances between the heater and combustibles as shown in FIG-1, TABLE 1, Page 7. It is the installer's responsibility to ensure that building materials with a low heat tolerance which may degrade at lower temperatures are protected to prevent degradation. Examples of low heat tolerance materials include vinyl siding, fabrics, some plastics, filmy materials, etc.

Positioning of lights, sprinkler heads, overhead doors, storage areas, gas and electrical lines, parked vehicles, cranes and any other possible obstruction or hazard must be evaluated prior to installation.

Ensure adequate clearance around the air intake at the burner to allow sufficient combustion air supply to the heater. For this reason, a layout drawing is necessary.

6A. Service Clearance

The lower 'jaw' of the burner cabinet swings down to provide convenient service access to burner components. Provide a minimum clearance from any wall or obstruction of 6 inches to the access end of the burner housing, and a minimum of 24 inches to any ONE side to allow servicing of burner, blower and controls. (See Figure 2) - the minimum clearances to combustibles must always be maintained.

For guidelines to heater placement refer to Table 2 (below).

Figure 2

Table 2: Guidelines for Heater Placement

Model Both "Straight" & "UTube"	Mounting Height ft	Maximum Distance Between Heaters ft	Distance - Outside wall to heater long axis (Parallel to wall) in "feet"	
			Horizontal ft	Angle
S100 200	18 - 25	50	17 - 25	Combustible Clearance Behind (refer to Table 1)
S100 175	18 - 25	50	17 - 25	
S100 155	16 - 21	45	15 - 20	
S100 130	15 - 21	40	15 - 20	
S100 110	13 - 19	35	13 - 18	
S100 100	13 - 19	35	13 - 18	
S100 80	10 - 16	30	12 - 16	
S100 60	8 - 14	25	11 - 15	
S100 45	8 - 12	20	8 - 12	

* Recommended Mounting Heights are typical to provide optimum comfort in general space heating applications. Variance to these typical heights can occur in some applications:

- Higher mounting heights due to structure or application requirements
- Lower mounting heights for area or 'spot' heat, or in areas with greater infiltration losses (near overhead doors, etc)

Single or multiple heater placement must be such that continuous operation of heater(s) will not cause combustible material or materials in storage to reach a temperature in excess of ambient temperature plus 90F° (50C°).

IMPORTANT

It is the installer's responsibility to ensure that building materials with a low heat tolerance which may degrade at lower temperatures are protected to prevent degradation. Examples of low heat tolerance materials include vinyl siding, fabrics, some plastics, filmy materials, etc.

Refer to "Clearance to Combustibles" information on pages 6 to 8, and Figure 1 and Table 1.

7. Systems Incorporating 90° Elbows & 180° Elbows

The radiant tube heater can be installed in configurations as illustrated in FIGURE 4. (below) with a maximum of two 90° elbows per heater. The use of elbows reduces the total maximum vent allowable. (See Section 11 : Flue venting) 90° elbows (JS-0528-SM) are shipped as a kit with one coupler, and two reflector end caps.

The S100 is available in a "U-Tube" model - S100U - using a 180° turn box. A double wide reflector covers the double tube run.
Alternately, for a 180° elbow, order 2 x 90° kits that connect to create a 180°.

Models with input 100 Mbh x 20 ft must only be installed as a straight system with no elbows allowed at the 10 ft location.

Elbow Location/Input:
A minimum run of straight radiant tube must be connected to the burner before any elbow as follows: Inputs 200 (60 kW) and 175 Mbh (51 kW) = 25 ft (7.6 m); Input 150 Mbh (44 kW) = 20 ft (6 m); Inputs 125 Mbh (37 kW) and 110 Mbh (32 Kw) = 15 ft (4.6 m); and Inputs 80 Mbh (23 kW), 60 Mbh (18 kW), and 45 Mbh (13 kW) a minimum of 10 ft (3 m) straight tube before elbow.

Figure 3 - System Elbow Kit - see page 50 for 180° elbow dimensions

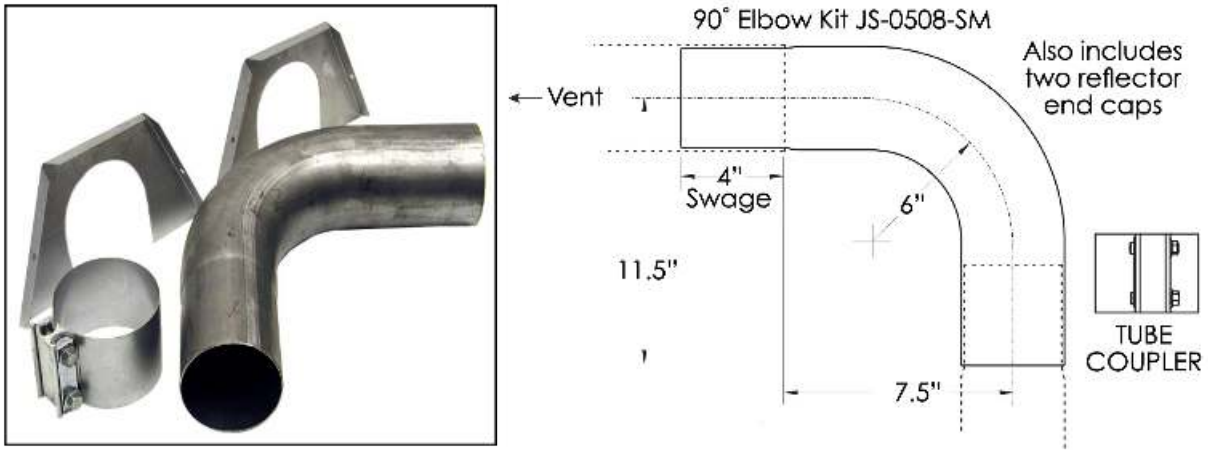
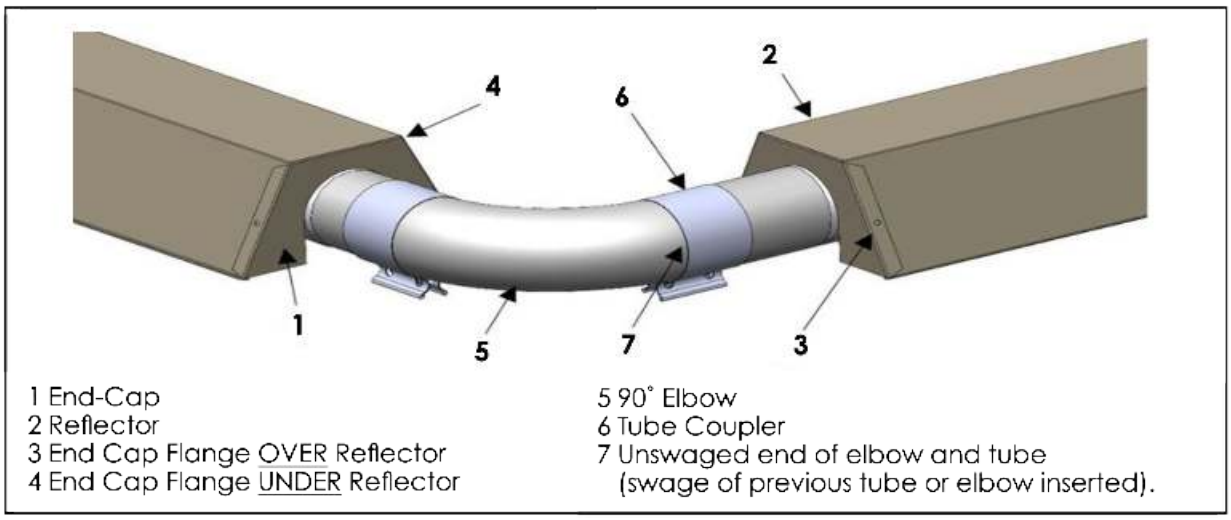


Figure 4 - 90° Elbow Installation



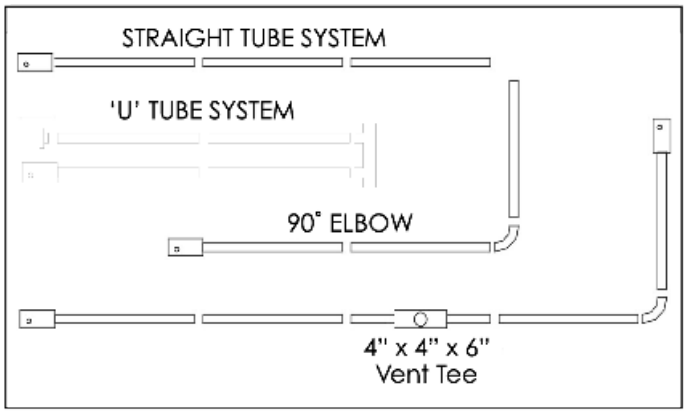
8. Suspending the system - General

Inadequate or improper suspension of the tube heater can result in collapse of the system, property damage, and personal injury or death.

It is the installer's responsibility to ensure that the hardware and structural supports from which the heater is suspended are sound and of adequate strength to support the weight and expansion forces of the heater.

Consider that the heater will expand in length as much as 1/2 inch or more for every 10 ft of system length – typically the greater the firing rate, the greater the expansion.
Refer to Sections 13 & 14

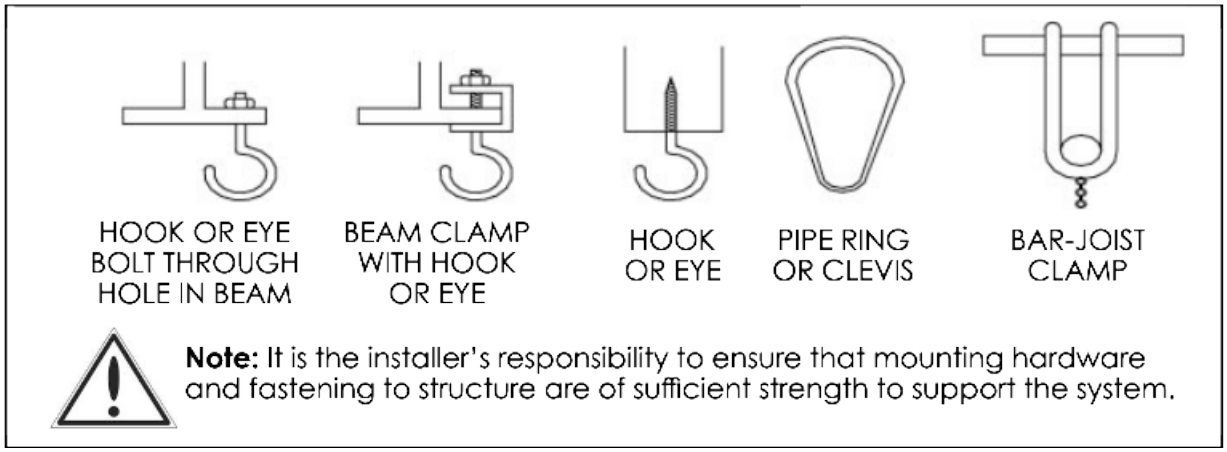
Figure 5 - System Configurations



1. Survey the available structural supports, considering the system configuration and heat requirements of the area to establish the optimum heater location.
   a) Locating a heater directly under joists or beams, or installing supplemental steel support rail or angle iron can substantially reduce labor and materials
2. Hardware with a minimum 60 lb. (30 kg) work load must be used at each heater suspension point. A #8 Jack Chain or equivalent is typically used for suspending the heater.
   a) Connect to the structure using typical hardware as illustrated in FIGURE 6 (below) or by other mechanically sound means
   b) If rigid devices such as 3/8" threaded rods are used for suspension, swing joints or other means must be provided to allow for system expansion - approximately ½ inch to 1 inch for every 10 ft of system length.
3. Tube system hangers must be located:
   i. Straight in line
   ii. At a common height (level)

   Note: It is important that the tubes in the system are installed in alignment horizontally (level) and vertically (in line) – this will ensure system integrity.

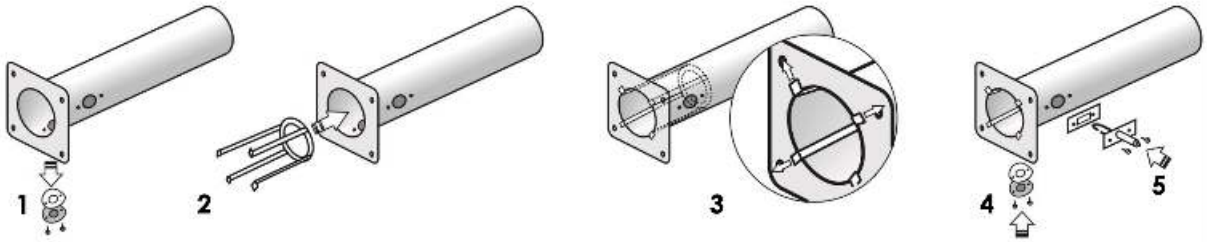
Figure 6 - Typical Mounting Hardware



9. Installation of Hangers, Tubes and Burners

Important Special Notes: Read First

1. S100 **100 x 20 ft ONLY**: Special Tube Connection - Refer to Section 9.3, Fig 15
2. S100 **175 & 200 ONLY**: Special Tube Connection - Refer to Section 9.4, Fig 16
   These input rates have an unpainted titanium alloy stainless steel first tube with a flange (painted "white"), and an unpainted aluminized steel tube as the second tube; all subsequent tubes are hot rolled steel. The first tube (titanium alloy stainless steel) will "glow red" while heater is in operation - THIS IS A NORMAL CONDITION
3. Prior to installing the igniter and burner onto the flanged tube, Install Flame Rectifier included with burners: **NG & Propane - 60,000, 80,000, 110,000, 125,000; Propane ONLY - 200,000.**

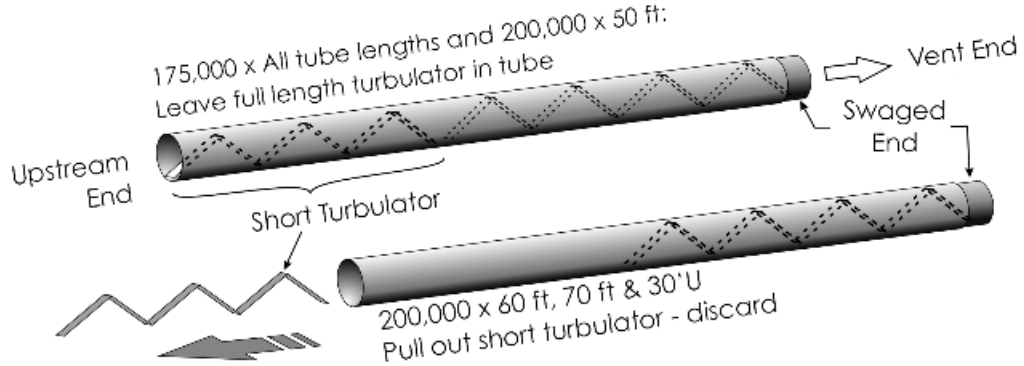


1. Remove & retain sight glass
2. Insert Flame Rectifier into tube
3. Feet of the flame rectifier seat against the tube flange and point toward flange corners.
4. Reinstall sight glass
5. Install igniter with gasket into tube port

4. IF a 90° elbow is to be installed in the system, refer NOW to Section 7 and the Elbow Kit installation instructions supplied with the kit

Turbulator Notes: Also refer to Table & Illustration pages 49, 50 & 51

1. **60,000 & 80,000 Btuh:**
   - 30 ft heater: Remove 5 ft Turbulator from the 2nd Tube (Aluminized Steel) in the system. Steel Tube with 8 ft Turbulator Installs at Vent End.
2. **200,000 Btuh:**
   - 60 ft & 70 ft: Remove short piece of Turbulator from Up-Stream End of last tube prior to installation of tube
3. In a Tube Kit package tubes with turbulators are labelled as to their location in the system. Also refer to the Turbulator Table and Illustration in Sections 25A & 25B.



9.1. S100 Straight Tube System ~ Burner and Tube Installation
For "U-Tube" System S100U refer to section 9.2 page 17

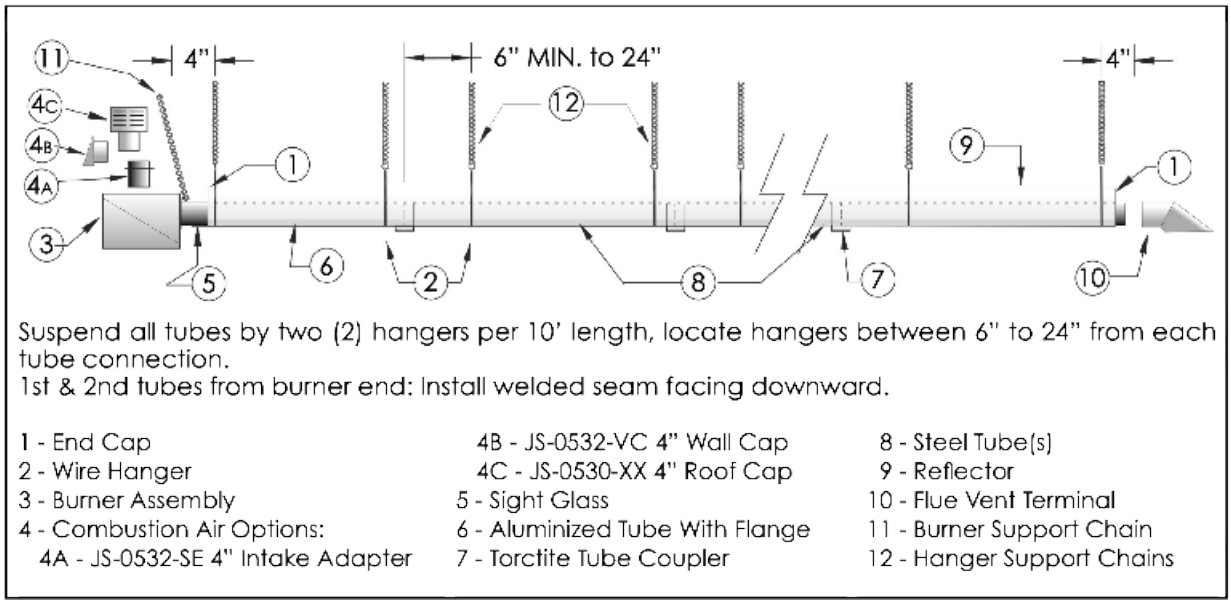
1. Install Hangers:
   i) No closer than 3" and no further than 5 from the burner/tube flange
   ii) No closer than 6" either side of a tube connection in the system
   iii) No further than 24" either side of a tube connection in the system
2. With all hangers in alignment and suspended at the same height, insert first aluminized tube section, through 4" hole into first two wire hangers.

   Note: Install the first and second tubes (from burner end) with the welded seam along the tube length (facing downward.

   Labels on tubes identify those with turbulators and indicate their location in the system.
3. Bolt burner to flange on first tube section. SEE FIGURE 8.

   Important Note: Models with inputs 100,000, 175,000 & 200,000 refer to section 9.3- 9.4.
4. Slide a Torctite tube coupler over the swaged end of the first tube, then join the second tube over the swage in the first tube
5. Slide the Torctite coupler into position across the center of the joint - SEE FIGURE 9
6. **Important**: Tourque the coupler bolts to 40 ft-lbs
7. Subsequent lengths of tube can then be installed, by joining them together swaged portion inside the next tube and locking the joints using the Torctite coupler. SEE FIGURE 9.
8. If there is a 90° elbow in the system refer to Section 7 and Figures 3 & 4

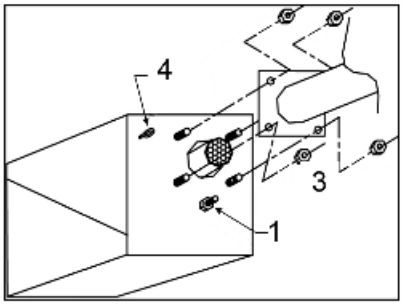
Figure 7: Straight Tube Typical Hanger & Support Spacings



Suspend all tubes by two (2) hangers per 10' length, locate hangers between 6" to 24" from each tube connection.
1st & 2nd tubes from burner end: Install welded seam facing downward.

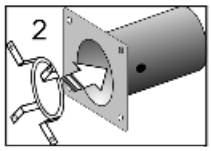
1 - End Cap
2 - Wire Hanger
3 - Burner Assembly
4 - Combustion Air Options:
4A - JS-0532-SE 4" Intake Adapter
4B - JS-0532-VC 4" Wall Cap
4C - JS-0530-XX 4" Roof Cap
5 - Sight Glass
6 - Aluminized Tube With Flange
7 - Torctite Tube Coupler
8 - Steel Tube(s)
9 - Reflector
10 - Flue Vent Terminal
11 - Burner Support Chain
12 - Hanger Support Chains

Figure 8: Bolt Burner to Tube Flange



Note:

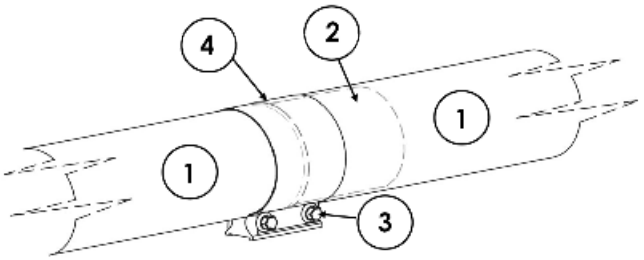
1. Fifth Nut (Holds Inner Burner to Housing - Do Not Loosen or Remove)
2. Prior to installing the burner, Install Flame Rectifier for inputs: NG & Propane - 60,000, 110,000, 130,000; Propane ONLY - 200,000:
   - Flame rectifier is supplied in burner kit when required
   - Remove and retain the sight-glass assembly (2 screws)
   - Insert flame rectifier into the tube with 'feet' pointed to the tube flange corners
   - Reinstall the sight-glass assembly



3. Insert four burner bolts through the tube flange, secure tightly with lock nuts.
4. Secure suspension chain to eye bolt to stabilize burner
5. Install igniter with gasket on to tube

Figure 9: Coupler Installation

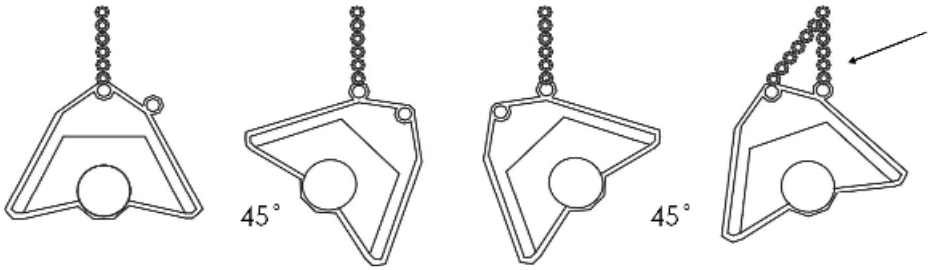
Note: See Section 9.3 - 9.4 for 'Special Couplers' at first tube joint: 100,000 x 20 ft & 175 / 200,000 models)



1. Tube
2. Swaged end of upstream tube
3. Tube Coupler
4. Centre coupler over tube joint

Tighten coupler bolts to 40 ft-lbs.

Figure 10: Hanger/Reflector Orientation Horizontal to 45°



⚠ **9.2. S100U 'U'-TUBE SYSTEM ~ BURNER AND TUBE INSTALLATION**
For "Straight-Tube" Systems S100 refer to section 9.1 page 15

IMPORTANT SPECIAL NOTES: READ FIRST

1. S100U **175 & 200 ONLY**:
   Special Tube Connection - Refer to Section 9.4, Fig 16.
   These input rates have an unpainted titanium alloy stainless steel first tube with a flange (painted "white"), and an unpainted aluminized steel tube as the second tube; all subsequent tubes are hot rolled steel.
   The first tube (titanium alloy stainless steel) will "glow red" while heater is in operation - THIS IS A NORMAL CONDITION

2. TURBULATORS: Refer to Section 25 pages 49-50 continued...

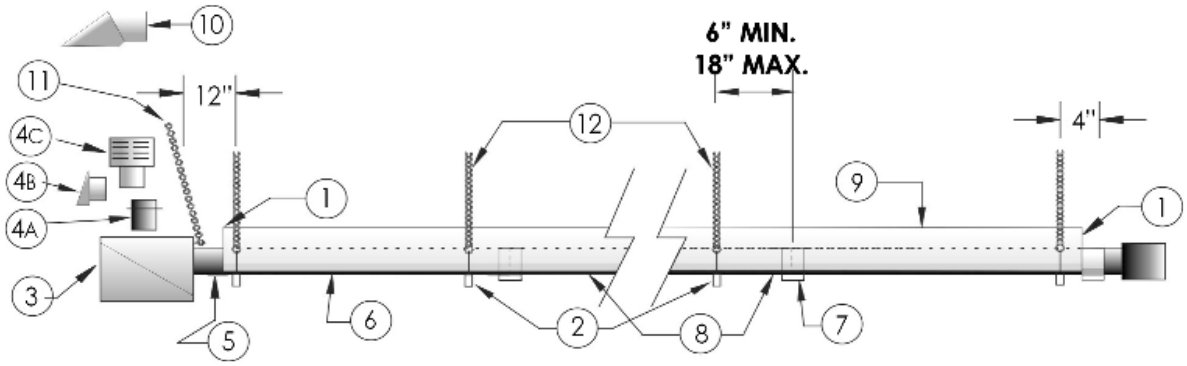
1. Install Hangers using chain or other suitable suspension hardware at each side of the hanger: See Figure 11 next page
   ii) Two hangers for first section (from burner), and one hanger for each additional section
   iii) No closer than 12" (30 cm) and no further than 14" (35 cm) from the burner/tube flange
   iv) No closer than 6" (15 cm) from a tube connection in the system
   v) No further than 18" (61 cm) from a tube connection in the system
   vi) If angle mounting a 'U' Tube model, the vent side must be in the upper position
2. With all hangers in alignment and suspended at the same height (and angle), insert first aluminized tube section on to the first two hangers: See Figure 12A next page
   - Also lay the vent end tube on to the first two hangers - check tubes for turbulator label to ensure the correct tube is located at the vent end

     Note: Install the first and second tubes (from burner) with the welded seam along the tube length facing downward
3. Fasten flanged tube to hangers with 'U' bolts:
   - All tubes on the burner-side of the heater are bolted to the hangers with 'U' bolts
   - Tubes on vent-side simply rest in the hanger notch and do not fasten to the hanger.
4. Bolt burner to flange on first tube section - SEE FIGURE 8 previous page.

IMPORTANT NOTE: Models with inputs 175,000 & 200,000 refer to section 9.3

5. Slide a Torctite tube coupler over the swaged end of the first tube, then join the second tube over the swage in the first tube
6. Slide the Torctite coupler into position across the center of the tube joint - SEE FIGURE 9
7. **Important:** Tourque the coupler bolts to 40 ft-lbs
8. Subsequent lengths of tube can then be installed on both sides of the hangers by joining them together swaged portion inside the next tube and locking the joints using the Torctite coupler. SEE FIGURE 9.
9. Install Turn Box: See Fig 12B
   - The Turn Box has "long" and "short" tube legs
   - The 'long' leg attaches to the burner-run tubes
   - The 'short' leg attaches to the vent-run tube side - tubes end short of burner for connection of vent pipe

Figure 11: 'U'-Tube Typical Hanger & Support Spacing



Suspend first tubes by two (2) hangers, then subsequent sections by one hanger
- Locate Hangers between 6" to 18" from each tube coupler.
- Install first and second tubes (from burner end) with welded seam facing downward.

1 - END CAP
2 - WIRE HANGER
3 - BURNER ASSEMBLY
4 - COMBUSTION AIR OPTIONS:
4A - JS-0532-SE 4" INTAKE ADAPTER
4B - JS-0532-VC 4" WALL CAP
4C - JS-0528-XX 4" ROOF CAP
5 - SIGHT GLASS
6 - ALUMINIZED TUBE WITH FLANGE
7 - TORCTITE TUBE COUPLER
8 - STEEL TUBE(S)
9 - RELECTOR
10 - FLUE VENT TERMINAL
11 - BURNER SUPPORT CHAIN
12 - HANGER SUPPORT CHAINS

Figure 12: 'U' Tube Models

Figure 12A: 'U' Tube Hanger

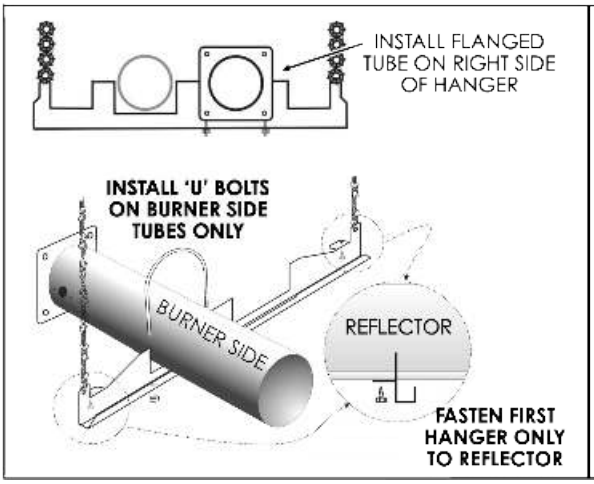


Figure 12B: Turn Box Connection

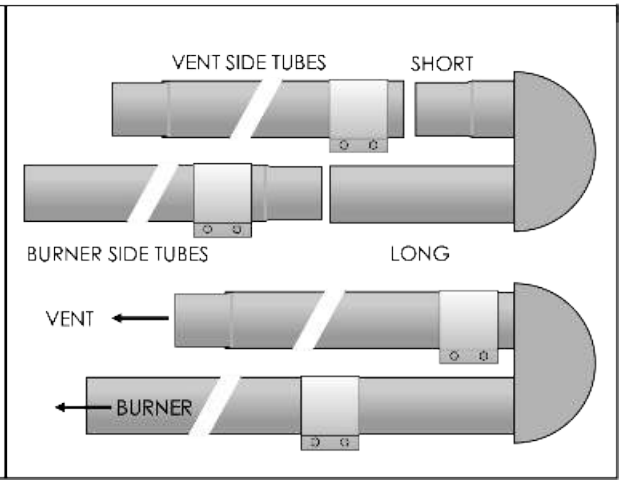
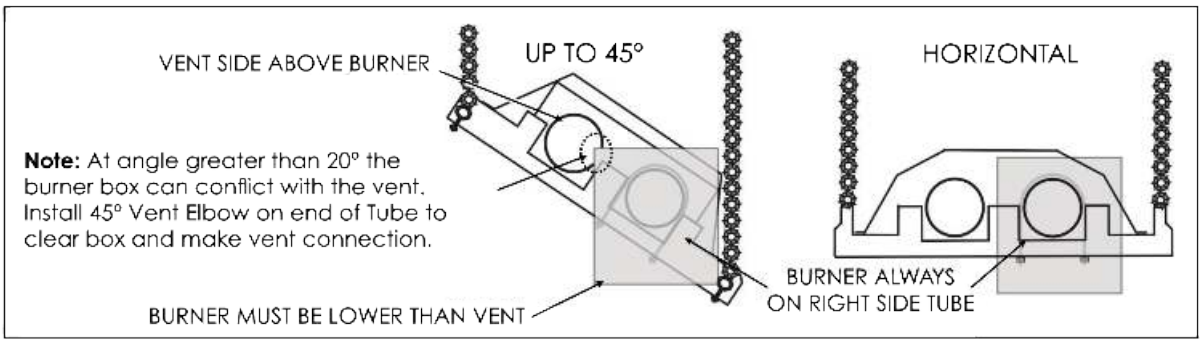


Figure 13: 'U' Tube Model Orientation



9.3. Special Coupling: 100,000 Btuh x 20 ft

Note: The joint of 1ST & 2ND tubes of the 100,000 x 20 ft heater experiences strong forces of expansion. Follow instructions below for special coupling of the tubes and orientation of the turbulator in the 2nd tube.

Special Coupler Installation

1) Install first tube so that the welded seam along the tube length is in the lower half of the tube facing downward
2) Slide the loosened tube coupler on to the first tube, past the swage
3) The second tube is supplied with a ¼" hole in the tube at the female end.
4) Slide second tube over swaged end of first tube so that ¼" hole is located 90° up from the bottom (3 or 9 o'clock position)
5) Note that the spine of the turbulator should be oriented in a vertical position
6) Through the existing ¼" hole , drill a ¼" hole through the wall of the first tube
7) Insert ¼" rivet into the hole
8) Slide coupler into position – half onto each tube – covering the rivet head
9) Tighten coupler bolts to 40 ft-lb
10) Install reflectors

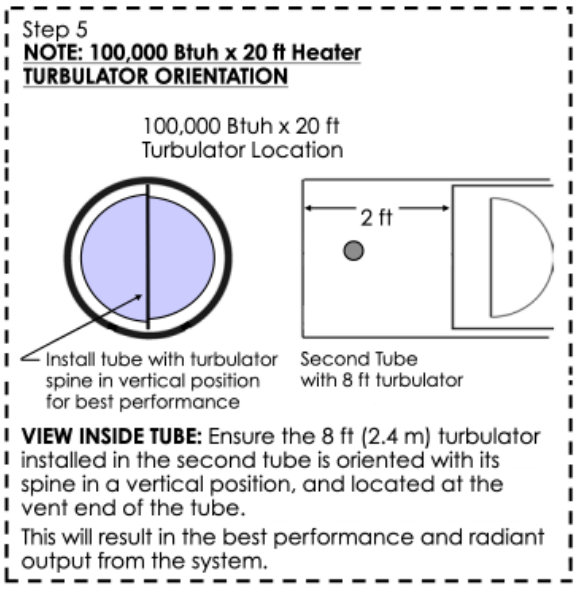
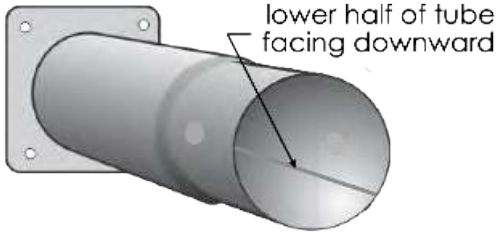


Figure 15: Special Coupling: 100,000 x 20 ft

TOOLS REQUIRED: ✓ Electric Drill
✓ 1/4 " Drill Bit (supplied)

Fasten Second Tube to First Tube

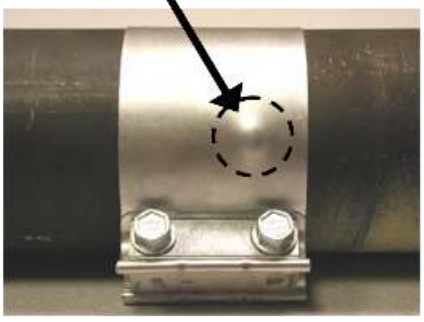
Step 1



Step 2 thru 6

Step 7

Step 8 & 9



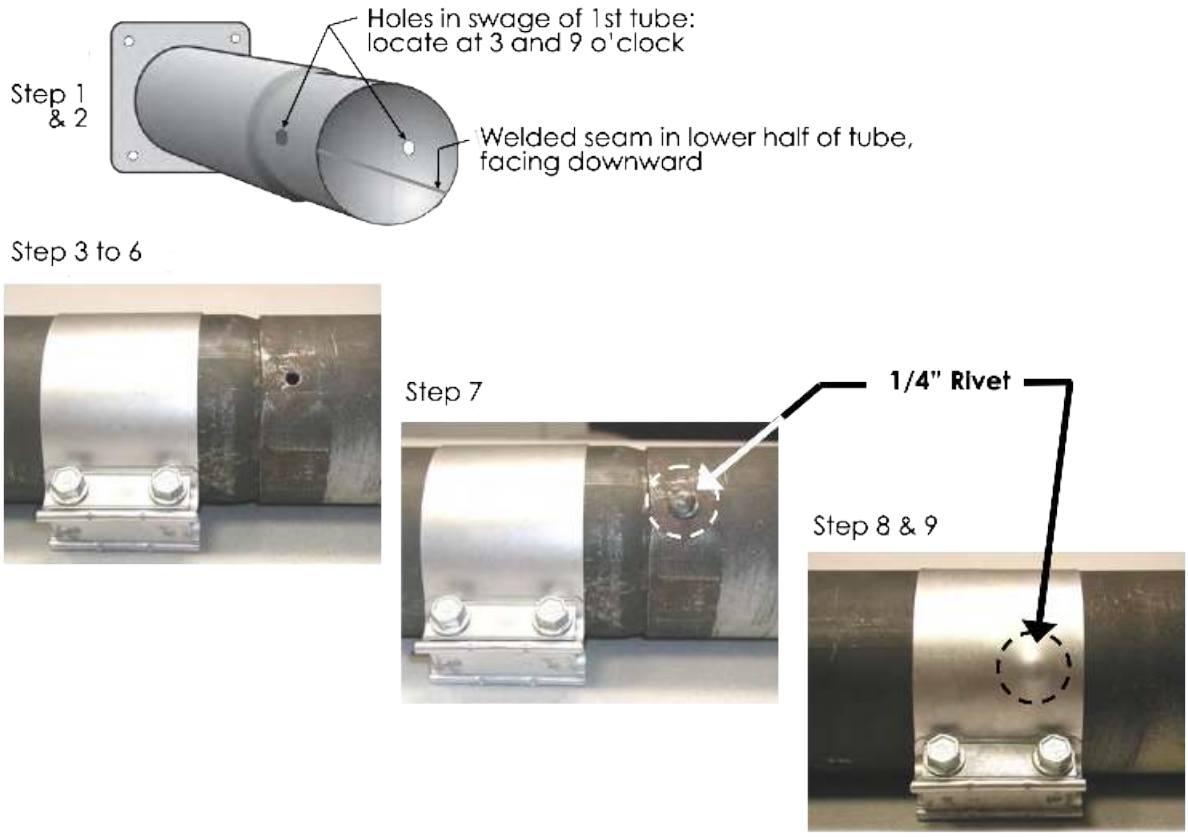
9.4. Special Coupling: 175,000 & 200,000 Btuh

Note: The joint of 1ST & 2ND tubes of 175,000 & 200,000 heaters experience strong forces of expansion. Follow instructions below for special coupling of the tubes.

Special Coupler Installation

1) Note the 2 holes opposite each other at the swaged end of the first tube (flanged)
2) Install the first tube with 2 holes (swaged end) at the 3 and 9 o'clock position, with the welded seam located in the lower half of tube, facing downward
3) Slide the loosened tube coupler on to the first tube, past the swage
4) The second tube has a ¼" hole at the female end.
5) Slide second tube over swaged end of first tube to align the hole in the second tube with one of the holes in the first tube
6) Final alignment of the holes can be accomplished using a screw driver or other tool
7) IMPORTANT: Insert ¼" rivet into the hole to secure the tube connection
8) Slide coupler into position – half onto each tube – covering the rivet head
9) Tighten coupler bolts to 40 ft-lb
10) Install reflectors

Figure 16: Special Coupling: 175,000 & 200,000 Btuh - Fasten Second Tube to First Tube



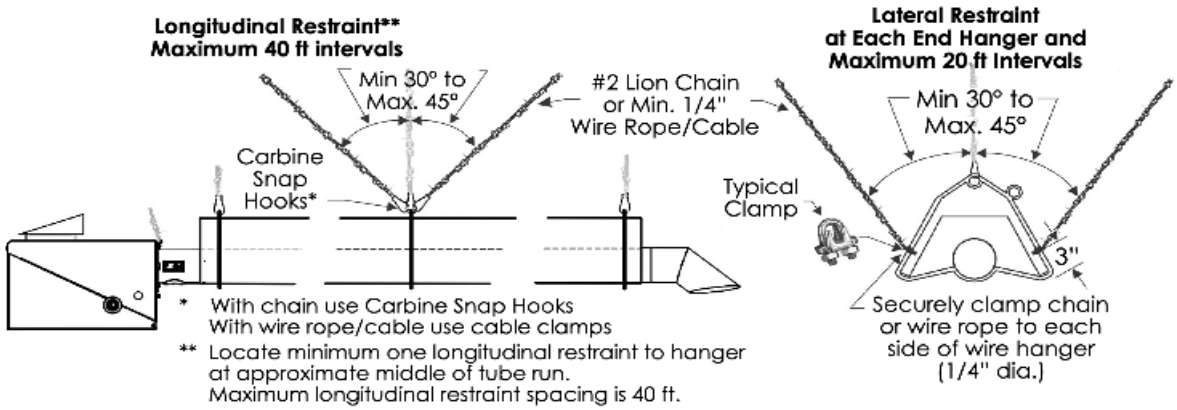
9.5. Straight Tube Seismic Restraint - Lateral and Longitudinal

In areas prone to earthquake, or as specified on a project, install lateral and longitudinal seismic restraints as indicated in Figure 15. If the heater location can be impacted by wind (outdoors, aircraft hangars, etc) refer to High Wind Restraint Section 9.5, Figure 16.

These restraint systems indicate typical suspension of and attachment to the heater. Attachment of suspension hardware to the structure will be as required by site structural conditions, installation codes, and/or local engineering design requirements. Other material or systems of restraint may be specified by local or national codes, or by project engineering specifications.

Schwank offers optional items: #2 Lion Chain 115 lb work load x 200 ft roll (PN: JL-0800-XX); and Safety Snap Hooks (PN: JL-0800-SH = pkg 24; JL-0800-SH-B = pkg 100). Any and all other required seismic mounting hardware is field supplied by the installer.

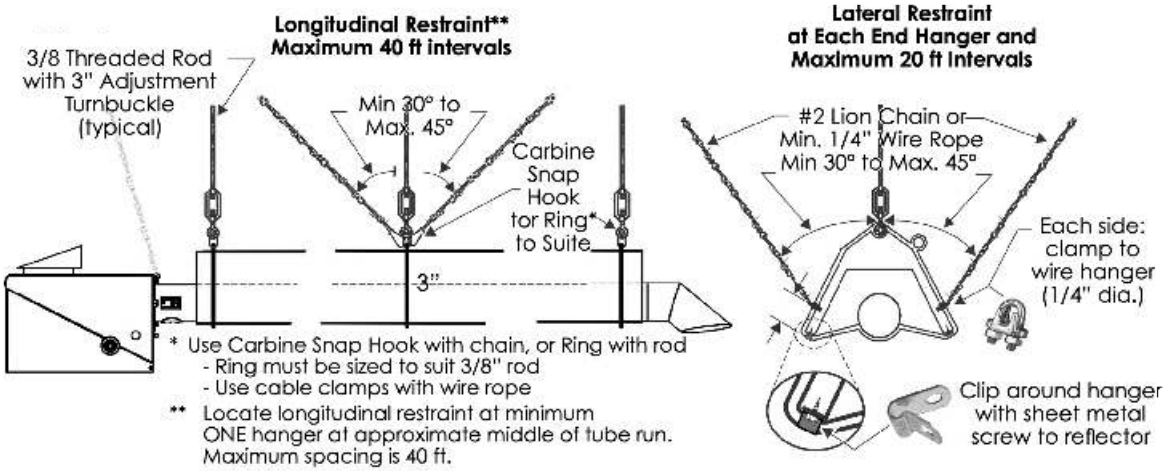
Figure 15



9.6. Straight Tube High Wind Restraint -Lateral, Longitudinal, and Vertical

In areas with wind conditions (aircraft hangers, etc) in addition to lateral and longitudinal restraint the heater must be restrained from vertical movement. Suspend the heater using 3/8" threaded rod with 3" adjustment turnbuckle through a safety ring at each hanger location.

Figure 16



9.7. 'U' Tube Seismic Restraint

In areas prone to earthquake, or as specified on a project, install lateral and longitudinal seismic restraints as indicated in Figures 17 & 18. Typical suspension of the 'U'-Tube heater is with #2 Lion Chain, or minimum 1/8" wire rope. If the heater location can be impacted by wind (outdoors, aircraft hangars, etc) then rigid suspension such as 3/8" rod with turnbuckle adjustment can be used to provide vertical restraint for the heater. In all cases, fasten reflector to the hangers using sheet metal screws.

These restraint systems indicate typical suspension of and attachment to the heater. The attachment of suspension hardware to the structure will be as required by site structural conditions, installation codes, and/or local engineering design requirements. Other types or systems of restraint may be specified by local or national codes, or by project engineering design specifications.

Schwank offers optional items: #2 Lion Chain 115 lb work load x 200 ft roll (PN: JL-0800-XX); and Safety Snap Hooks (PN: JL-0800-SH = pkg 24; JL-0800-SH-B = pkg 100). Any and all other required seismic mounting hardware is field supplied by the installer.

Figure 17

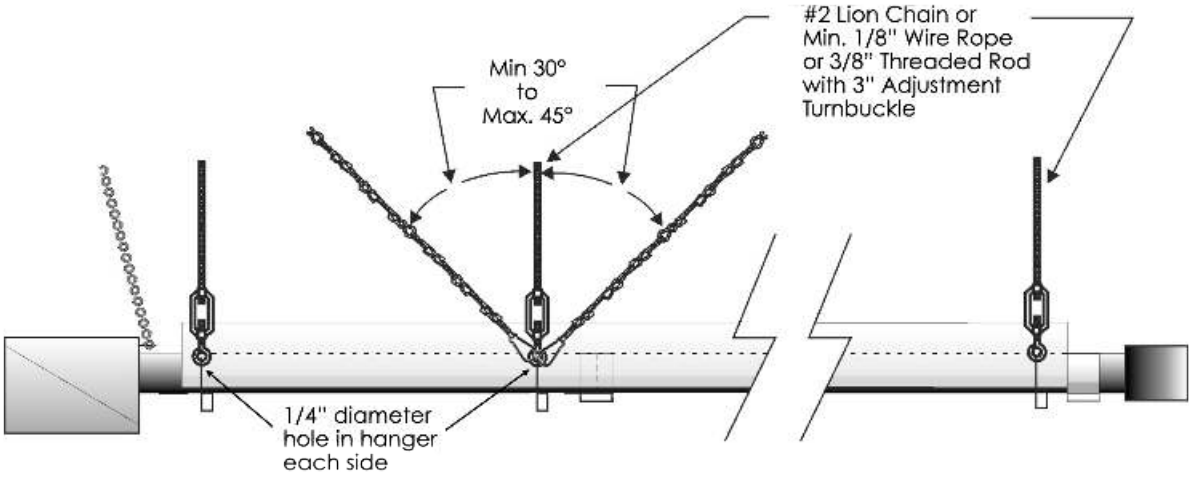
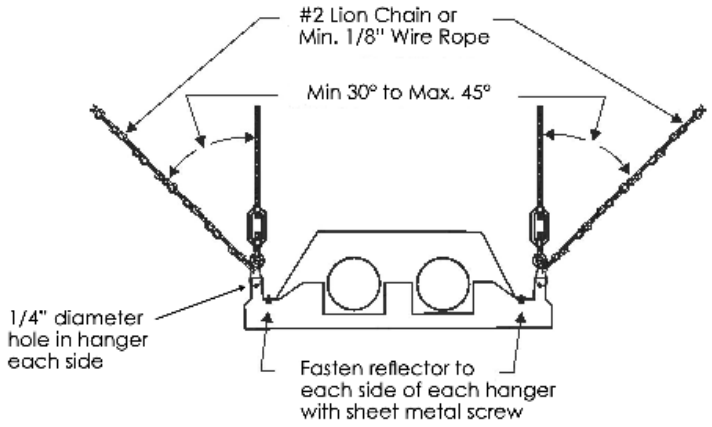


Figure 18



10. Reflector Installation

Note: Ensure that you are installing a single reflector - reflectors can 'stick together' in packaging - take care to separate them.

S100 - Straight Tube: After burner and tubes have been installed, slide the reflectors one at a time into the wire hangers. As each successive reflector is installed on an in-line installation, the ends of the reflectors will overlap to provide continuous coverage over the entire tube system. The overlapping joints **must be fastened together** with a sheet metal screw.

Note that for either horizontal or angle mounting of the reflector, the tube must be level along its length. Improper mounting can result in overheating of controls and combustible materials.
Reflector extensions can be added to the heaters as an option. See instructions below

S100-U - U'-TUBE: After burner and tubes have been installed, slide the double-wide reflectors one at a time onto the hangers. Fasten the FIRST hanger nearest the burner to the reflector with a sheet metal screw up through the hole in the tab at each end of the hanger.
Do not fasten any other hangers in the system to reflectors. SEE FIGURE 12A

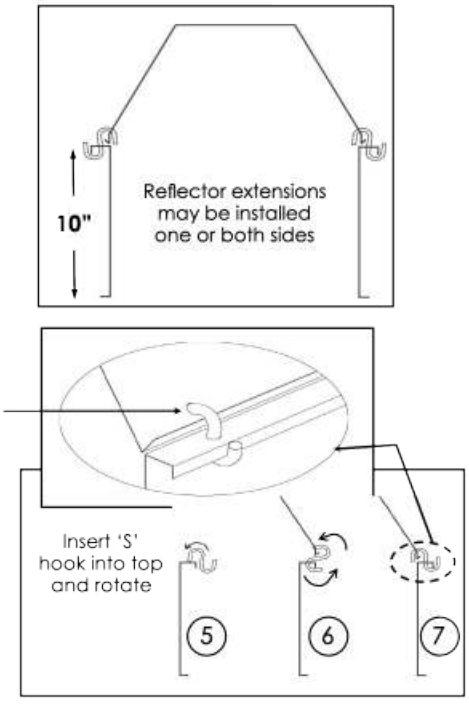
As each successive reflector is installed, the ends of the reflectors will overlap to provide continuous coverage over the entire tube system. The overlapping joints **must be fastened together** with sheet metal screws - Note that for both horizontal and angle mounting, the tube must be level along its length. Improper mounting can result in overheating of controls and combustible materials.
Reflector extensions can be added to the heaters as an option. See instructions below

Figure 19 - Reflector Extensions (Optional - if required)

Reflector Extension Kit JS-0509-KT
Includes:

- **Qty 1 x 10 ft long x 10 inch deep reflector extension**
- **Qty 3 x "S" Hooks**

1. Reflector extensions may be installed on one side or both sides of the reflector
2. Reflector extensions are 116" long
3. Holes (3) in the reflector extension for "S" hooks are located 2.25" from each end and one at the center
4. Drill 1/4" holes in the reflector 3/4" up from the bottom edge of the reflector to align with the 3 holes in the top of the reflector extensionInsert "S" hook down through hole in the top of the reflector extension
5. Insert "S" hook down through hole in the top of the reflector extension
6. Rotate "S" hook approx. 90°, and insert into hole drilled in reflector
7. Settle reflector extension into place



11. Flue Venting - Radiant Tube Heater

Important: Effective January 1, 2019: Changes to the ANSI/CSA standard that governs Radiant Tube Heaters specify the following appliance CATEGORIES and VENTING:

- Vertical Vent Through Roof (Category I): For vertical vent, this tube heater series operates with a negative static vent pressure and a vent temperature that does not result in excessive condensate in the vent and is defined as a Category I appliance. Refer to details below.
- Horizontal Vent Through Wall (Category III): For horizontal vent, this tube heater series operates with a positive static vent pressure and a vent temperature that does not result in excessive condensate in the vent and is considered a Category III appliance. Refer to details below.

WARNING

Inadequate venting of a heater may result in asphyxiation, carbon monoxide poisoning, injury or death. This heater may use a vent connection or indirect venting system to remove products of combustion from the space. Seal all vent connections with high temperature sealant. Venting must be in accordance with all local, state, provincial, and national codes (ANSI Z223.1/NFPA 54 in USA; B149.1 in Canada) and as indicated below in this manual.

This tube heater is certified for venting directly to the outside or unvented (indirect venting) applications.

Unvented (Indirect Mechanical Venting System)

USA: Natural or mechanical means shall be provided to supply and exhaust at least 4ft 3/min/1000Btuh (0.38m3/min/kW) input of installed heaters. Some local codes may require an electrical interlock to a dedicated exhaust fan. Exhaust must be located as high as practicable in the structure above the level of the heater(s). Consult your local code and ANSI Z223.1 latest edition for all venting requirements and practices.

Canada: It is required that the heater(s) be electrically interlocked to dedicated exhaust fan(s) by means of an Air Proving Switch. Exhaust fan(s) must be sized to create 300 cfm (8.5 cu m/min) exhaust for every 100,000 Btuh (30 kW) or any fraction thereof of total input of installed equipment. Exhaust must be located as high as practicable in the structure above the level of the heater(s). Sufficient supply air must be provided. Consult the latest edition of CSA. B149.1 Section 8 for venting system and air supply requirements.

Vented To The Outside - General Requirements

It is the responsibility of the installer to adhere to these instructions and all current local codes and/or ANSI Z223.1 (NFPA 54) or CSA.B149.1 latest editions for all venting requirements, and practices. All vent pipe will be certified to meet Category I (vertical vent) or Category III (horizontal vent) appliance requirements, depending on the vent configuration of a particular installation.

It is a normal condition that during heat-up and cool-down a tube heater will expand and contract. Allowances for heater expansion must be made in the venting and combustion air ducting. Improper installation can result in property damage, injury or death.

- When vented: The system must not be operated in a negative air condition unless combustion air is ducted from outside to the burner. If negative pressure is experienced or anticipated, the open port (barb) on each of the blocked flue and proving air switches must be Tee'd together and connected directly to outside air using a field supplied 1/4" plastic hose from the tee between the switches to outside of building.
- All approved vent pipe, connectors, and adapters are supplied locally by others according to appliance Category, and specifications below.
- All venting must meet requirements of Local Codes or, in the absence of local codes, with the National Fuel Gas Code, ANSI Z223.1/NFPA 54; or the Natural Gas and Propane Installation Code CSA B149.1.
- A vent connector shall comply with local codes and be firmly attached to the flue collar by 3 x 1/2" sheet metal screws. Seal penetrations and connections with high temperature RTV silicone sealant.
- Install a minimum 12" straight vent connector before any Tee or 90° Elbow.
- The connection of vent components must be secured as specified in the installation instructions by the vent manufacturer.
- For vertical vent, any horizontal vent section will slope upwards away from the heater not less than 1/4 inch rise per foot of run.
- For horizontal vent, slope downward away from heater a maximum of 1/4 inch down per foot of run.
- When the vent pipe passes through a cold or unheated area where the ambient temperature is likely to produce condensation of the flue gases, the vent pipe will be insulated with a suitable material as certified and specified by the insulation manufacturer to withstand temperature up to 460°F (238°C).
- The vent system must **always** be adequately supported to prevent sagging.
- The vent configuration will allow for expansion and contraction in length of the tube heater.
- As an Option for vertical vent, two heaters may be vented through an approved common 4" x 4" x 6" Vent Tee supplied by the manufacturer, or by using approved components as indicated in local codes. Vent pipe from each heater is not required to be equidistant to the vent Tee, but must comply with local code requirements. A common thermostat or "ON/OFF" switch must control commonly vented heaters. **Common vent is not allowed for Category III horizontal vent application.**

Combined System Length: Tube Heater + Vent + Combustion Air Duct:

- **Refer to Table 4, Combined System Length: Tube + Air Duct + Vent.** Lengths in the table apply to either Vertical or Horizontal vent.
- **Combined System Length includes**: Tube Heater length + combustion air duct + vent + elbows. Each 90° elbow in the system has an equivalent length of 5 ft.
- A maximum of 2 elbows is allowed in any portion (duct, tube heater, vent) with the exception of up to three 90° elbows in a vertical vent run through the roof, for a total of maximum 6 (vertical vent: 7) 90° elbows in the combined system.
- Combustion air duct is not to exceed lengths in table below and may be 4" or 5" diameter for inputs less than 200,000 Btuh, but must be 5" diameter for inputs 200,000 Btuh and greater.
    - 5" diameter duct requires a reducer to 4" diameter at the connection to blower inlet.
- Exceeding the allowable lengths in the table below can create combustion and/or condensation issues and will void Certification and the heater warranty.
- Do not exceed the **Maximum Combined System Length** regardless of the allowed maximum length of individual vent or combustion air duct.

TABLE 4: Combined System Length
- Installations up to 4500 ft - Higher altitudes refer to Section 27

High Input Rate (Btuh)	Do Not Exceed Maximum Combined System Length		Max. Air Duct Length (by Duct Diameter)		Max. Vent Length Individual: 4"Ø OR Combined: 6"Ø from each heater
	Using 4" Air Duct	Using 5" Air Duct	4" Ø	5" Ø	
45,000 & 60,000	**60 ft**	**80 ft**	20 ft	40 ft	20 ft
80,000	**70 ft**	**90 ft**	20 ft	40 ft	20 ft
110,000 & 150,000	**100 ft**	**120 ft**	30 ft	50 ft	30 ft
175,000	**120 ft**	**140 ft**	30 ft	50 ft	40 ft
200,000	**-**	**130 ft**	Use 5" Ø	30 ft	40 ft

Example	
150,000 Btuh Heater:	
Tube Heater Length	50 ft
1 x 90° elbow (vent)	5 ft
Straight vent	20 ft
Air Duct: 4" Ø	17 ft
Combined Length	97ft
Max. Allowed	100 ft
Additional 20' for 5" Ø Air Duct	

Heater Expansion and Vent Configuration

A radiant tube heater will expand and contract as it heats and cools. Configuration of the vent must allow for heater expansion.

Vertical Vent: Orientation of the vent at 90° to heater will allow for heater expansion and contraction.

Horizontal Vent: (See Fig. 22)

- Wall Thimble or flashing at wall that allows movement of the vent through the opening. Do not seal the vent to the thimble or flashing with caulking.

OR

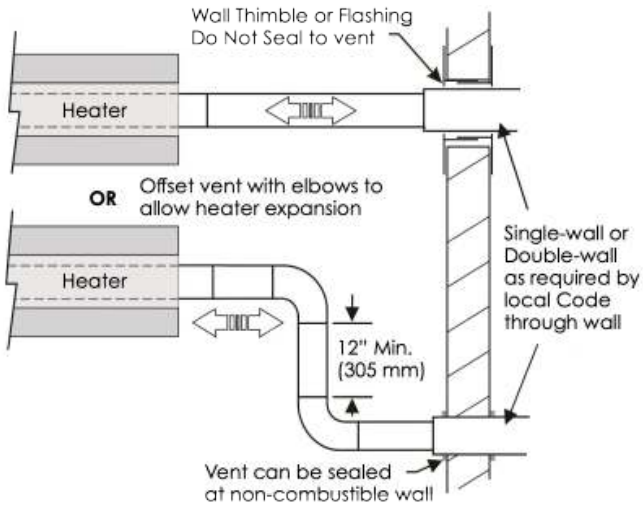
- Offset vent with two x 90° elbows. Install minimum 12 inch length of straight vent between elbows. Vent can be sealed with caulking at non-combustible wall.
- Other means of slip fit installation of the vent are acceptable providing there is adequate allowance for free expansion and contraction of the system, and free flow of vent gases.

Common Venting

For vertical vent only, two heaters can be commonly vented using 4"x 6"x 4" Vent Tee JA- 0514-XX. Both heaters must be operated using one common thermostat.
Common vent is 6 inch diameter.

Category III (horizontal vent) heaters cannot be common vented.

Figure 20: Allow for Heater Expansion - Horizontal Vent - Top View



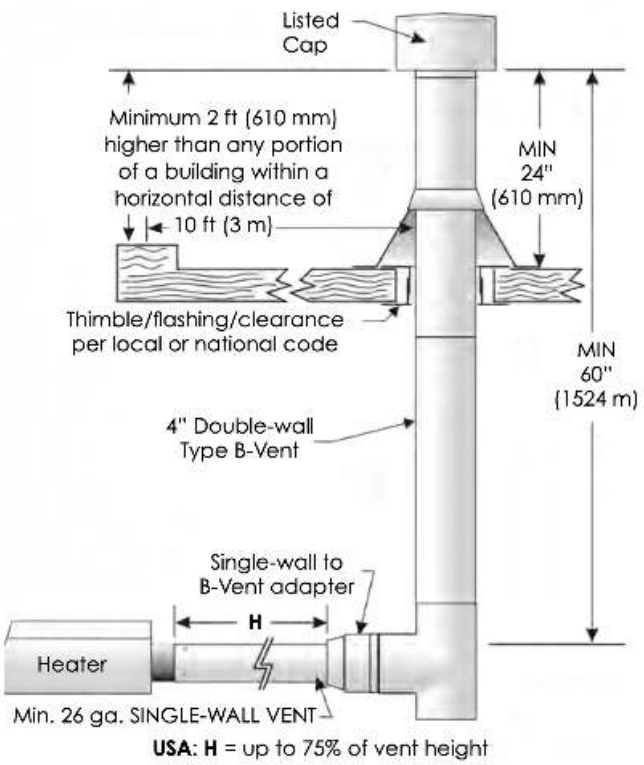
Vertical Vent Through The Roof (Category I):

It is the sole responsibility of the installer to adhere to all current local codes and/or ANSI Z223.1 / CSA.B149.1 latest editions for all venting requirements, and practices. Also adhere to instructions below, and the instructions of the vent manufacturer. Use vent materials certified for Category I.

All models of this series heater are certified Category I for vertical venting. See FIG. 21.

- The vertical Type B-vent must extend at least 5 feet above the flue collar of the highest connected heater.
- USA: Horizontal run of single wall vent or vent connector ("H" in FIG. 21) must not exceed 75% of the vertical height of the vent. If it does, then the vent system must be for Category III.
- Single wall vent connector material must be corrosion-resistant galvanized steel with a minimum thickness specified in local code.
- A vent connector must be secured to the flue collar using quantity 3 x #8 x 1/2" sheet metal screws. Seal penetrations and connections with high temperature RTV silicone sealant.
- A horizontal vent connector shall be installed and supported without any dips or sags and shall slope upward toward the vent or chimney at least 1/4 in./ft.a
- Use a certified termination cap as supplied by the manufacturer of the vent.
- When vent and combustion air are taken through the roof, the exhaust vent should always terminate higher than the combustion air intake, to prevent recycling the products of combustion back into the heater.
- The vent must extend at least 2 feet above the highest point where it passes through a roof. The vent must also extend at least two feet higher than any portion of a building within a horizontal distance of 10 feet (3 m).
- Keep vent connector runs as short as possible with a minimum number of elbows. Refer to the current edition of ANSI Z223.1 (NFPA 54) or CSA-B149 installation codes for maximum length of horizontal vent and vent connector.
- Total length of the vent connector and vent pipe cannot exceed the values in Table 4 above.
- A single-wall vent connector shall not be insulated.
- For single–wall vent clearance to combustibles is 6" except where a listed clearance thimble is used. Clearance to combustible material for Type B-Vent or factory-built vent per the vent manufacturer's instructions.
- When an existing Category I heater is removed or replaced, the original venting system may no longer be sized to properly vent the attached appliances. Improperly sized venting systems can result in vent gas leakage or condensation.

Figure 21: Vertical Vent



Horizontal Vent Through The Sidewall (Category III)

All vent must be installed in accordance with local codes or, in the absence of local codes, with the National Fuel Gas Code in the USA, ANSI Z223.1/NFPA 54; or the Natural Gas and Propane Installation Code CSA B149.1 in Canada.

When installed with a horizontal vent through a sidewall, this heater is a Category III appliance, and the vent system must be approved for Category III application in accordance with UL-1738 or ULC-S636. Do not use PVC or plastic vent pipe.

- Use either a certified Category III venting system, or single wall vent pipe with all of the joints and seams sealed with a heat-resistant pliable sealant.
- The vent system must be installed in accordance with these instructions, and the instructions of the vent manufacturer.
- A single wall vent system may use a single continuous 36 inch section of double wall vent pipe to pass through an exterior wall:
    - Single wall galvanized vent pipe (C-Vent): Minimum 26 ga.
    - Single Wall to Double Wall Adapter: Duravent 4PVP-AD Adapter or equivalent.
    - 36 Inch Double wall vent through outside wall: Duravent PelletVent Pro (PVP) or equivalent:
- Single-wall vent: Seal all joints and seams in the pipe, and the adapter with high temperature Red RTV sealant for temperatures up to 600°F (315°C). The sealant must remain pliable when in use. Follow the instructions of the vent manufacturer for sealing vent pipe connections.
- All vent sections and vent connector must be secured using quantity 3 x #8 x 1/2" sheet metal screws. Seal penetrations and connections with high temperature RTV silicone sealant.
- Any horizontal portion of the flue vent system must slope downwards away from the heater a minimum of 1/4" per foot run toward the vent terminal.
- Horizontally vented Category III heaters must be individually vented and cannot use a common vent.
- Use approved 4" (JA-0528-XX) horizontal wall vent terminal or an approved high-wind termination cap.
- Installation of the vent must prevent blockage by snow and protect building materials from degradation by flue gases.
- Install termination cap a minimum of 18 inches from the outside wall to the inside edge of terminal opening to alleviate back pressure caused by turbulent wind conditions (See Fig. 8). This also ensures flue gases are directed away from the structure to protect building materials from degradation by the exhausted flue gases.
- At most two 90° elbows can be installed in a horizontal vent.
- All seams and joints must be checked for gas tightness after installation. With the heater in operation, conduct a leak test on all vent connections, joints, and seams using a soap solution.
- A horizontal flue vent will not terminate less than 1 ft above grade level, unless its location is adjacent to a public walkway, then it must not terminate less than 7 ft above the walkway.
- Clearance above vent terminal under a combustible overhang or soffit:
    - As indicated in FIG. 6 for approved terminations: 4" JA-0528-XX.
    - For other approved terminations: Will terminate 3 ft or more below a combustible soffit or overhang.
- A horizontal vent termination must be a minimum of 6 feet from an inside corner formed by two exterior walls.
- All vent pipe, adapters, thimbles, supplied locally by others.

Specific requirements for horizontal vent in the USA and Canada are on the next page.

Horizontal Vent Requirements:

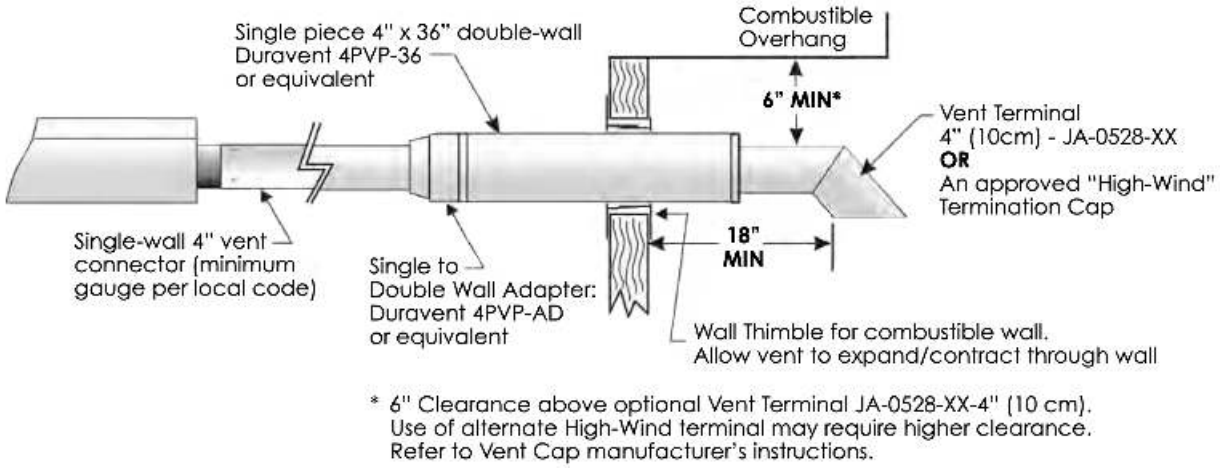
USA:

- The vent terminal of an appliance with an input up to 50,000 Btu/hr (14.7kW) shall be installed with a 9 inch vent termination clearance from any air opening into a building, and an appliance with an input over 50,000 Btu/hr (14.7kW) shall have at least a 12 inch vent termination clearance. The bottom of the vent terminal and the air intake shall be located at least 12 inches above grade.
- A horizontal vent will not terminate:
  - Less than 3 ft above a mechanical air inlet located within 10 ft .
  - Less than 4 ft below, 4 ft horizontally from, and 1 ft above any window or door that opens, or gravity air inlet to a building.
  - Less than 4 ft horizontal clearance from gas and electric meters, regulators and relief equipment.

Canada:

- A horizontal vent will not terminate:
  - Within 6 ft of a mechanical air supply inlet to any building.
  - Above a gas utility meter and regulator assembly within 3 ft horizontally of the vertical centerline of the regulator vent outlet to a maximum vertical distance of 15 ft.
  - Within 3 ft of any gas pressure regulator vent outlet.
  - Within the following distances of a window or door that can be opened in any building, of any non-mechanical air-supply inlet to any building, or of the combustion air inlet of any other appliance:
    - 12 inches for inputs up to and including 100,000 Btuh (30 kW).
    - 3 ft for inputs exceeding 100,000 Btuh (30 kW).

Figure 22: Horizontal Vent Through Wall



12. Combustion Air Ducting

Do not install filters on the combustion air intake. Ensure adequate clearance around the air intake to allow sufficient combustion air supply to the heater.

Standard air duct is 4" diameter, but can be increased to 5" diameter (reduce to 4" at burner) to provide up to an additional 20 feet of duct length. Vent size must remain at 4" for single vent or 6" for combined vent of two heaters - do not increase vent size.

Combustion air duct must be constructed of noncombustible material. **Do not use a 'soft wall' flexible hose** for air duct, the corrugated sides of this tubing will contract and restrict air flow. A good quality industry approved hard-wall flex is allowed.

When a tube heater is operated in a negative air condition or air-born dust or contaminants are present as in woodworking and welding shops, air for combustion must be ducted from outside the negative or contaminated area to the 4 inch diameter intake flange supplied on the blower. Maximum system, vent and duct length is listed above.

- Do not exceed lengths listed above for total system and individual vent or air duct
- Total combined system length is reduced by five feet for every 90° elbow installed in the vent or duct and in the tube system (see above for allowable total lengths)
- Exceeding the allowable lengths may create condensation or soot conditions and will void CSA Design Certification and product warranty

The air intake will not be located less than:

- Three feet above grade
- Twelve inches from flue vent terminal of any heater with input up to 100,000 Btu/hr
- Three feet from flue vent terminal of any heater over 100,000 Btu/hr

This heater has an optional fresh air intake duct hood for wall (JS-0532-VC) or roof cap (JS-0530-XX) to bring combustion air to the heater from outside. Ensure adequate clearance around the air intake to allow sufficient combustion air supply to the heater. If drawing fresh air from outside, it is recommended that any single wall pipe containing cold air be insulated to prevent or reduce condensation on the pipe.

CAUTION

In locations where chlorinated Hydrocarbons are in use, such as Trichloroethylene or Chloroethylene Nu it is essential that combustion air be brought in from a non-contaminated area. Burning the fumes from these gases will create Hydrochloric acid fumes, which are detrimental to humans, equipment and buildings. Typical sources of other contaminants are paint removers, paints, refrigerants, solvents, adhesives, degreasers, lubricants, pesticides, etc.

The heater manufacturer cannot anticipate all types and chemical composition of possible contaminants at project sites. Confer with project site safety, health and engineering staff and/or local authorities having jurisdiction such as the Fire Marshall and Department of Labor for possible contaminants and any conflict with the installation of hot surface heating equipment.

13. Gas Supply - Heater Expansion - Flexible Gas Connection

The gas supply must be installed to the heater using:

- **USA:** an approved Stainless Steel Flexible Gas Connector certified for use on an infrared radiant tube heater (ANSI Z21.24 CSA 6.10);
- **CANADA:** an approved Type 1 Hose Gas Connector (CAN/CGA 8.1).
- The heater must be isolated from the gas supply piping system by closing its individual manual shut off valve (field supplied) during any pressure testing of the gas supply piping system.

CAUTION

Compensation for normal gas supply pipe expansion, and radiant tube heater expansion must be provided. All piping must conform to local codes.

Provide a 1/8 in NPT plugged tapping, accessible for test gauge connection, immediately upstream of the gas supply connection to the heater.

DO NOT use pressure greater than 1/2 psig to pressure check the heater.

Test for Leaks: All gas piping and connections must be tested for leaks after the installation is completed.

Apply soap suds solution to all connections and joints and if bubbles appear, leaks have been detected and must be corrected. **DO NOT USE A MATCH OR OPEN FLAME OF ANY KIND TO TEST FOR LEAKS. NEVER OPERATE THE HEATER WITH LEAKING CONNECTIONS.**

The supply system should be checked first with heater turned "OFF" followed by another check with heater turned "ON".

Important: Minimum supply line pressure at the inlet to the heater regulator must not be lower than 5.0 inches of water column pressure for natural gas.
The supply gas pressure must be checked with all heaters in operation.

Installation of a gas line (trap) "drip leg" is required at the inlet connection tee following the pipe drop to the heater. Failure to provide a "drip leg" could result in condensation and foreign matter passing into the gas valve. Failure to install a "drip leg" in the gas line can cause property damage, injury or death and will void the heater warranty.

TABLE 5:

Gas Type	Line Pressure Inches Water Column		Manifold Pressure (tap at gas valve outlet) Inches Water Column
	Minimum	Maximum	
Natural Gas	5.0	14.0	3.5

Note: Access to the manifold pressure test port is on the top of the valve. A 3/16" Allen Wrench is necessary to check this. When checking or setting the manifold pressure, a **water manometer** should be used. Gauges which measure in ounces per square inch or pounds per square inch are not accurate enough to properly measure or set the pressure.

This heater will expand in length as it heats up. It is a normal condition that during heat-up and cool-down a tube heater will expand and contract. Allowances for heater expansion must be made in the gas connection, venting and combustion air ducting. Improper installation, alteration, or adjustment can result in property damage, injury or death.

The Btuh input and the tube length determine the overall expansion that occurs. A typical infrared tube installation will expand toward both the Burner and the vent end.

To allow heater expansion the gas supply must be installed using the flexible gas connector supplied in the burner kit:

In the USA: a stainless steel Flexible Gas Connector certified for use on an infra-red radiant tube heater (ANSI Z21.24 CSA 6.10);

in CANADA: a Type 1 Hose Connector (CAN/CGA 8.1). Also the flue vent, and combustion air intake (if used) must be installed in such a manner that the normal expansion of the heater will be accommodated.

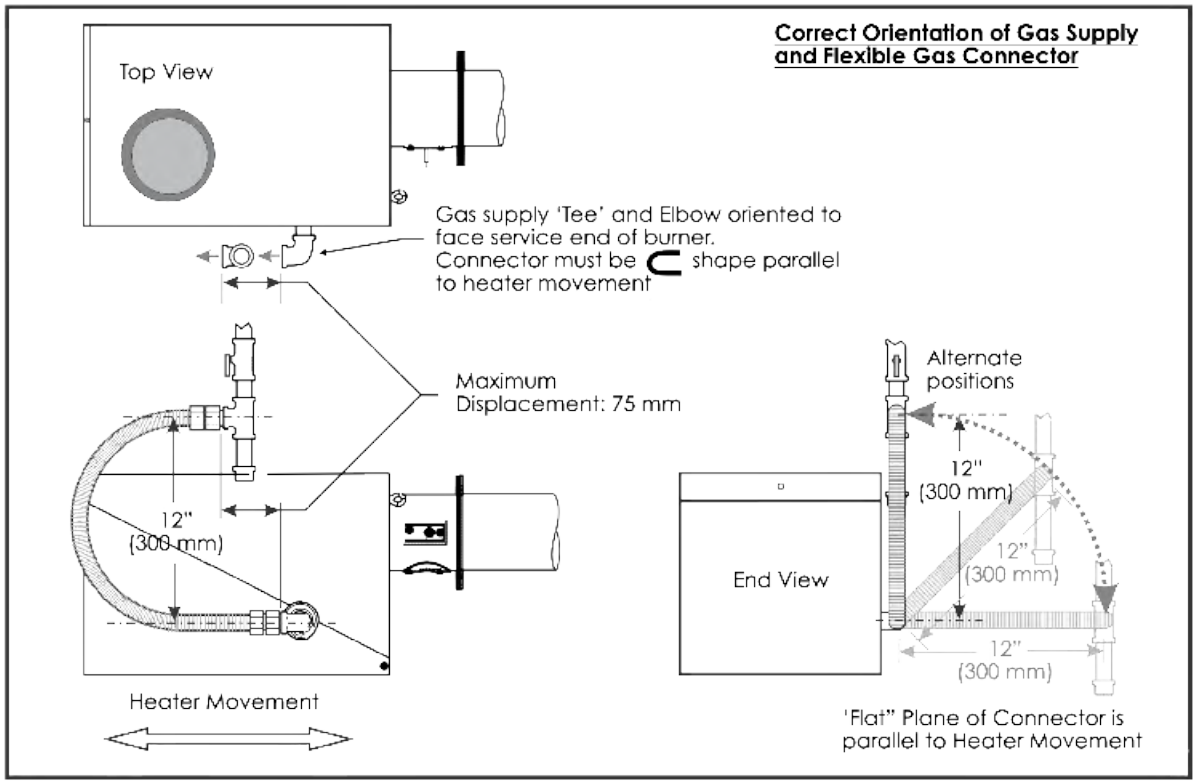
IMPORTANT See next page: orientation of connection between heater and gas supply.

TABLE 6:

Input Rating Btuh	Tube Length Feet	Approx. Expansion in Length	USA: Mandatory Flexible Gas Connector ID x Length - Part #	Canada: Mandatory Type '1' Gas Host Size - Part #
45,000	20	1 1/4"	1/2" x 24" - JL-0771-XX	1/2" x 30" - JL-0771-RC
60,000	20 / 30	1 1/2"	1/2" x 24" - JL-0771-XX	1/2" x 30" - JL-0771-RC
80,000	20 / 30 / 40	1 3/4"	1/2" x 24" - JL-0771-XX	1/2" x 30" - JL-0771-RC
100,000	20	2"	1/2" x 24" - JL-0771-XX	1/2" x 30" - JL-0771-RC
110,000	30 / 40 / 50	2"	1/2" x 24" - JL-0771-XX	1/2" x 30" - JL-0771-RC
125,000	30 / 40 / 50	2"	1/2" x 24" - JL-0771-XX	1/2" x 30" - JL-0771-RC
150,000	40 / 50 / 50	2 1/2"	3/4" x 36" - JL-0771-YY	3/4" x 30" - JL-0771-RB
175,000	50 / 60 / 70	2 3/4"	3/4" x 36" - JL-0771-YY	3/4" x 30" - JL-0771-RB
200,000	50	2 3/4"	3/4" x 36" - JL-0771-YY	3/4" x 30" - JL-0771-RB
200,000	60 / 70	3 1/4"	3/4" x 36" - JL-0771-YY	3/4" x 30" - JL-0771-RB

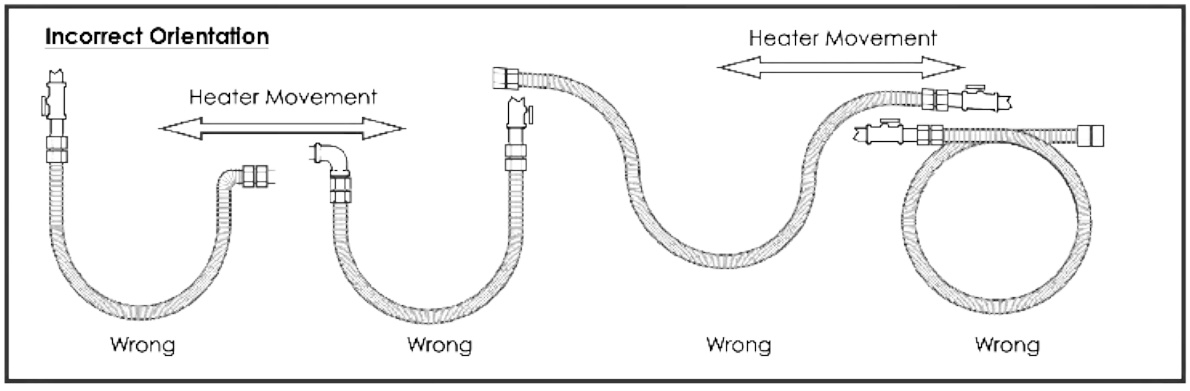
Figure 23: Orientation of Flexible Gas Connector

The flexible gas connector MUST be installed in the orientation shown below as required by national installation codes and by the certification standard of this heater.
This orientation protects the flexible gas connector from damage due to movement during heater expansion.
It is the responsibility of the installer to ensure correct installation of the flexible gas supply.



WARNING

Connector must be installed in a "⊂" configuration.
Use only the connector of proper length and diameter as indicated in Table 5 on the previous page.



14. Electrical and Thermostat Wiring

- Wiring diagrams pages 35 & 36)

The heater must be electrically grounded in accordance with the National Electrical Code. ANSI / NFPA 70 or current Canadian Electrical code CSA C22.1.

Appliance and control wiring must be in accordance with all applicable local codes. The total load of all heaters must be considered in determining the required contact rating of the controlling thermostat or switch. Each tube heater requires 120V, 60 HZ electrical power sized for 145VA. Maximum power flow for internal 24V burner components is 21VA.

The ignition control includes a 24V/120V relay switch that provides a 45 second post-purge of the system. **A 24V Thermostat, TruTemp Thermostat, or 24V controller signal must be used for the post-purge feature to function**. A line voltage Thermostat or an "ON/OFF" switch will disable the post-purge feature.

A maximum night set-back of 9°F (5°C) is recommended for optimum economy and comfort. To maintain satisfactory comfort levels do not turn off the heating system over night/weekends.

15. High Altitude Installations

- Refer to chart in Section 26 for Restrictions

When installed above the altitude stipulated below, the input must be de-rated by 4% for each 1000 ft above the altitude listed. Refer to the tables in Section 28 for orifice size and restrictions that apply to high altitude installation (including total system length restrictions). Check with your local utility regarding the gas supply and the de-rating of this appliance. Maintain gas supply pressure indicated in Table 4, page 33.

USA: The factory installed orifice for this appliance is approved for altitudes zero to 2000 feet above sea level. When installed above 2000 feet, refer to Section 26.

Canada: The factory installed orifice for this appliance is approved for altitudes zero to 4500 feet above sea level. When installed above 4500 feet, refer to Section 26.

16. Lighting Instructions

- Refer to the lighting instructions label on the outside of the burner housing.

If the unit locks out on safety, main power to the unit must be manually interrupted for a 30 second reset period before the heater can be restarted.

Note: On initial installation, the unit may lock out on safety owing to the length of time required to bleed air from the gas piping system.

17. Recommended Maintenance

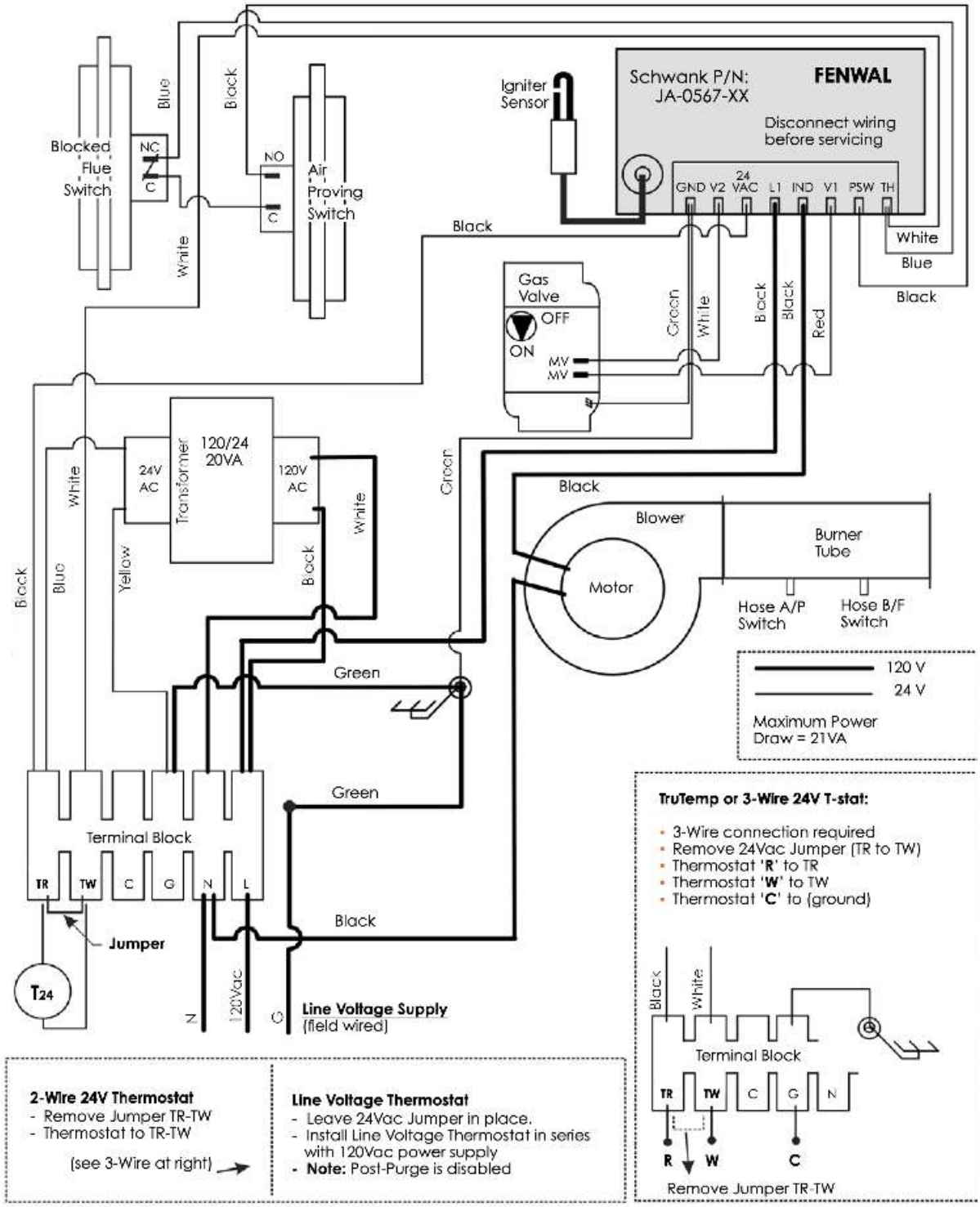
Improper adjustment, alteration, service or maintenance can cause property damage, injury or death.
This heater must be installed and serviced only by a trained gas service technician.

1. Inspect the entire heater system, venting, and gas supply connections at least annually prior to the heating season. Replace worn parts and repair deficiencies.
2. Check the inlet air opening and the blower periodically, cleaning off any lint or foreign matter. It is important that the flow of combustion and ventilation air must not be obstructed.
3. Lubricate Blower motor, by adding several drops of oil to oil ports located on the left hand side of the motor.

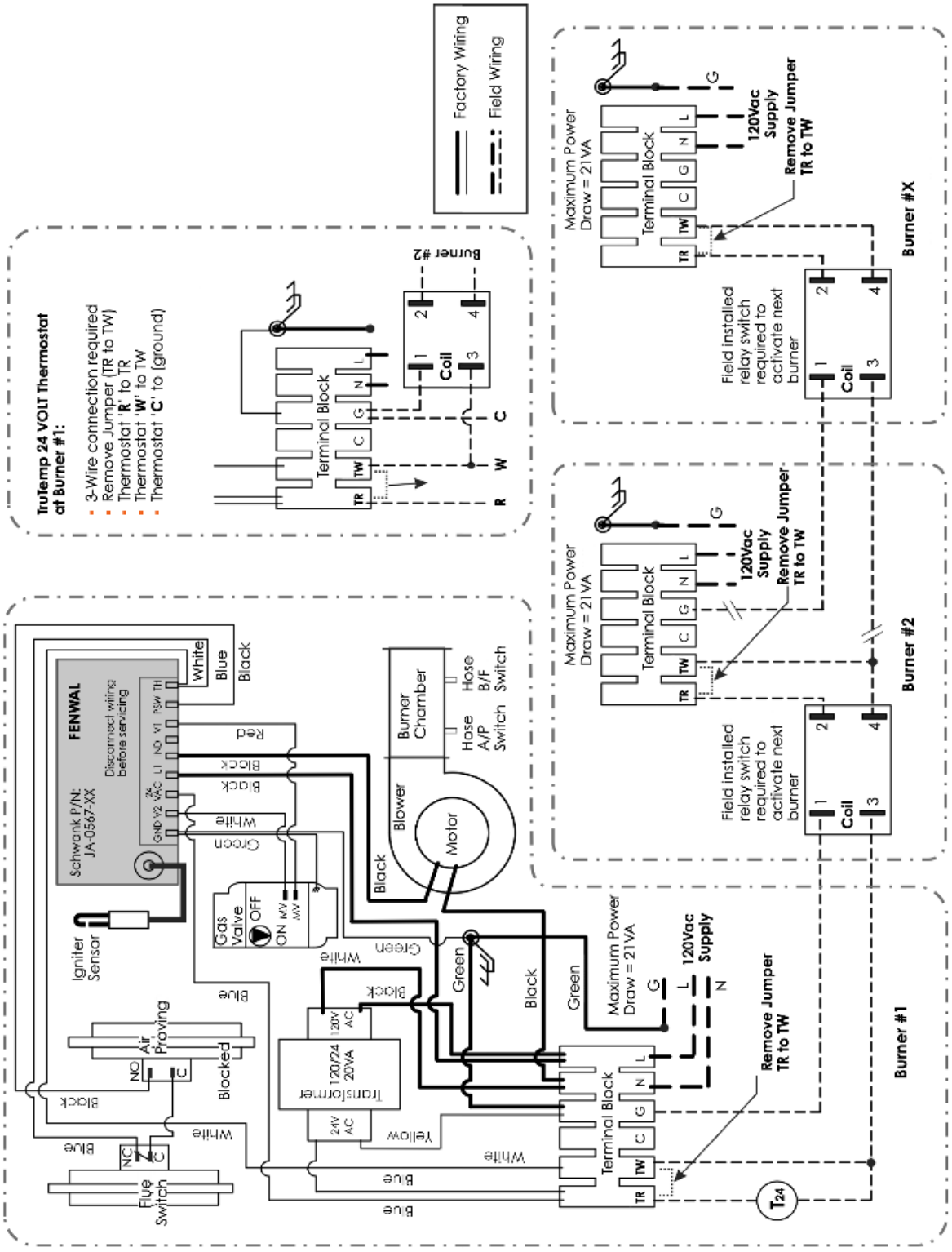
The tube heater burner is completely factory assembled and tested. Any alteration voids the CSA Certification and Manufacturer's Warranty. For additional information, contact your local distributor or the manufacturer.

18. Fenwal DSI: Wiring Diagram: 24V or 120 Volt Thermostat Operation Single Heater Per Thermostat (Multiple Heaters per Thermostat - next page)

Note: Models produced with FENWAL DSI have model designation: S100-F.



18A. Multiple Tube Heaters per 24VAC Thermostat (Fenwal DSI)



19. FENWAL DSI: Sequence of Operation/ Flame Recovery/Safety Lockout

Power Up/Stand By

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

Heat Mode

When a call for heat is received from the thermostat supplying 24 volts to TH, the control checks the pressure switch for normally open contacts. The combustion blower is then energized and once the pressure switch contacts close, a 30 second purge delay begins. Following the purge period the gas valve is energized and spark commences for the 15 second trial for ignition.

When flame is detected during the trial for ignition, spark is shutoff immediately and the gas valve combustion blower remains energized. The thermostat, pressure switch, and main burner flame are constantly monitored to assure the system continues to operate properly. When the thermostat is satisfied and the demand for heat ends, the main valve is de-energized immediately, the control senses the loss of flame signal and initiates a 30 second post-purge period before de-energizing the combustion blower.

Failure to Light - Lockout (Three Trial Model)

This three-try control will attempt two additional ignition trials with a 30 second inter-purge between trials, before going into 'soft' lockout. The valve relay will be de-energized immediately, and the combustion blower will be turned off following the 30 second post purge period.

If the thermostat continues to call for heat after one hour the control will automatically reset and attempt to ignite the burner again (three trials).

At any time less than the 1 hour auto-reset, recovery from lockout requires a manual reset by either resetting the thermostat or removing 24 volts for a period of 5 seconds.

Flame Failure - Re-Ignition

If the established flame signal is lost while the burner is operating, the control will respond within 0.8 seconds. The HV spark will be energized for a trial ignition period in an attempt to relight the burner. If the burner does not light the control will de-energize the gas valve. Two more attempts will be made to relight the burner. If the burner does not relight the control will go into 'soft' lockout as noted above in "Failure to Light". If flame is re-established, normal operation resumes.

Combustion Airflow Problems - Lockout

Combustion air flow is continually monitored during an ignition sequence by the air flow switch (PSW). If during the initial call for heat the pressure contacts are in the closed position for 30 seconds without an output to the Combustion Blower, an air flow fault will be declared and the control will remain in this mode with the combustion blower off.

If the air flow switch remains open for more than 30 seconds after the combustion blower output (L1 & IND) is energized, an air flow fault will be declared and the control will stay in this mode with the combustion blower on, waiting for the air flow switch to close.

When proper air flow is detected from the air flow switch input (PSW) the control begins the pre-purge period followed with a 15 second ignition sequence.

If the air flow signal is lost while the burner is firing, the control will immediately de-energize the gas valve and the combustion blower will remain on. If the call for heat remains, the control will wait for proper air flow to return. If proper air flow is not detected after 30 seconds an air flow fault signal will be declared. If proper air flow is detected at any time, a normal sequence will begin with the pre-purge period.

Flame Fault

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

Fault Conditions

The LED will flash on for 1/4 second, then off for 1/4 second during a fault condition. The pause between fault codes is 3 seconds.

Error Mode	LED Indication
Internal Control Failure	Steady on
Air Flow Fault	1 flash
Flame with No Call for heat	2 flashes
Ignition Lockout	3 flashes

Mounting and Wiring

The Series 35-61 is not position sensitive and can be mounted vertically or horizontally. The case may be mounted on any surface with #6 sheet metal screws. All wiring must be done in accordance with local and national electrical code. Refer to wire diagram page 35 when connecting the Series 35-61 to other components in the burner.

WARNING

The Series 35-61 DSI Control uses voltages of shock hazard potential. Wiring and initial operation must be done by a qualified service technician. The control must be secured in an area that will experience a minimum of vibration and remain below the operating temperature of 160°F. All connections should be made with UL approved 105°C rated 18 gauge, stranded, .054 thick insulated wire. Refer to wire diagram page 35 when connecting the Series 35-61 to other components in the burner.

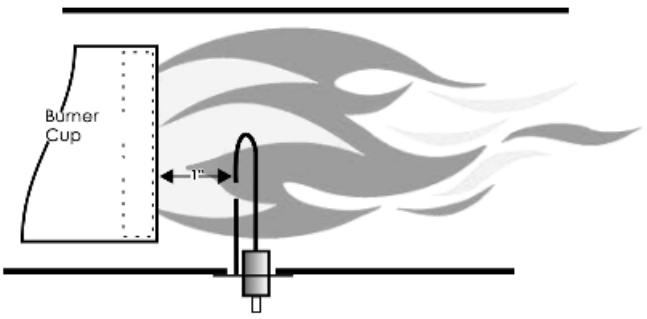
Terminal	Spade	Designation
TH	1/4"	Thermostat Input
PSW	1/4"	Pressure Switch Input
V1	1/8"	Valve Power (MV)
IND	1/4"	Inducer Blower Output
NC	-	Alarm (Not used)
L1	1/4"	120/240 VAC Input (Hot)
24 Vac	1/4"	24 VAC Supply to Processor
V2	1/8"	Valve (MV)
GND	1/8"	Valve & System Ground
Spark	1/4"	Spark & Local Flame Sense

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

Proper Electrode Location

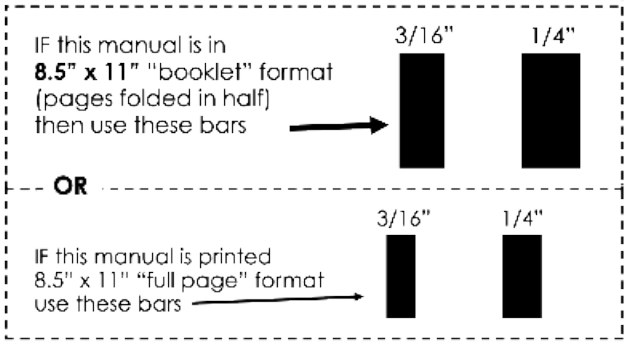
Proper location of the electrode assembly is important for optimum system performance. The electrode assembly should be located so that the spark gap is inside the flame envelope about 1 inch (2.5 cm) from the base of the flame at the burner cup.

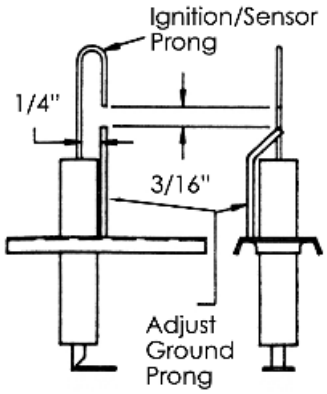
Electrodes should have a gap spacing of 3/16" (0.188" ± 0.031" or 4.76 mm ± 0.81 mm). If this spacing is not correct, the assembly must be adjusted or replaced. DO NOT adjust the curved igniter/sensor prong. Adjust/bend only the ground prong (also see next page).



Spark Igniter Set Up

Use the following diagram to check the Igniter gap. If the gap is incorrect adjustments should be made to the **Ground Prong/Pin only! Do not bend the igniter prong!!!!**
Use the black bars below as a guide for adjustment.
Use the bars that coincide with the format & size of this publication.



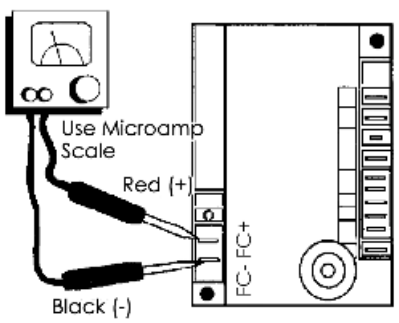


Service Checks

Flame current passes through the flame from the sensor to ground. The minimum flame current necessary to keep the system from lockout is 0.7 microamps. To measure flame current, connect an analog DC microammeter to the FC- FC+ terminals per figure at right.

Meter should read 0.7 µA or higher. If the meter reads below "0" on scale, meter leads are reversed. Disconnect power and reconnect meter leads for proper polarity.

Multipurpose Meter



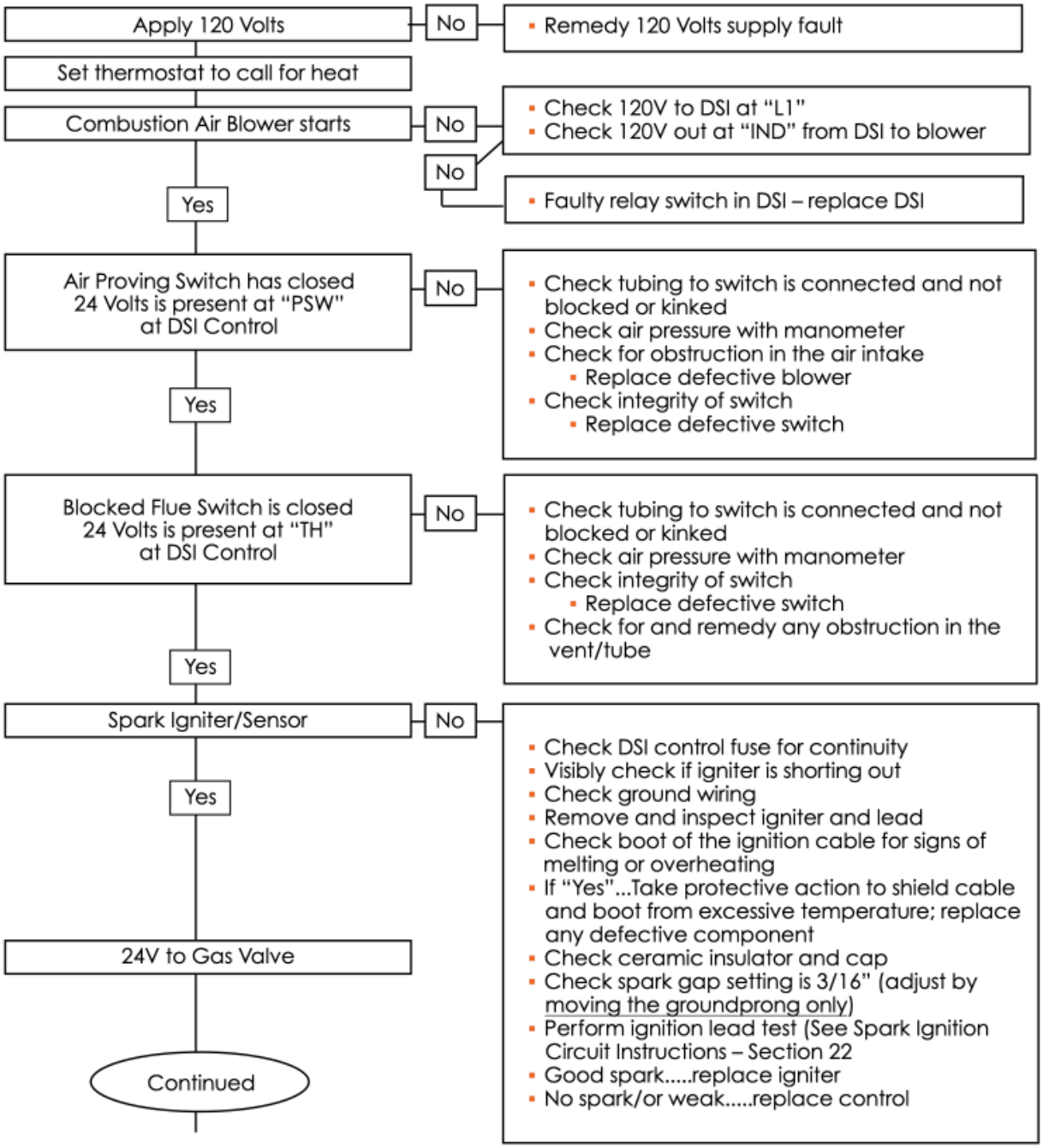
Symptom	Recommended Action (s)
1. Dead	A. Miswired - check electrical supply (120Vac ± 5%) B. Transformer bad (24Vac ± 10%) C. Fuse/Circuit breaker bad D. Bad control (check LED for steady on)
2. Thermostat on - no blower output	A. Miswired B. Bad thermostat no voltage @ terminal W C. Bad control (check LED for steady on)
3. Pressure switch input OK, but no Trial-for-Ignition after purge delay	A. Miswired (check PSW terminal voltage: 24Vac ± 10%) B. Flame sense problem (existing flame: check LED - 2 flashes) C. Bad control (check line voltage between L1 & IND)
4. Valve on, no spark	A. Shorted electrode B. Open HV cable C. Bad control
5. Spark on, no valve	A. Valve coil open B. Open valve wire C. Bad control (check 24Vac voltage between V1 & V2)
6. Flame ok during TFI, no flame sense (after TFI)	A. Bad electrode B. Bad HV igniter wire C. Poor ground at burner D. Poor flame (check flame current)

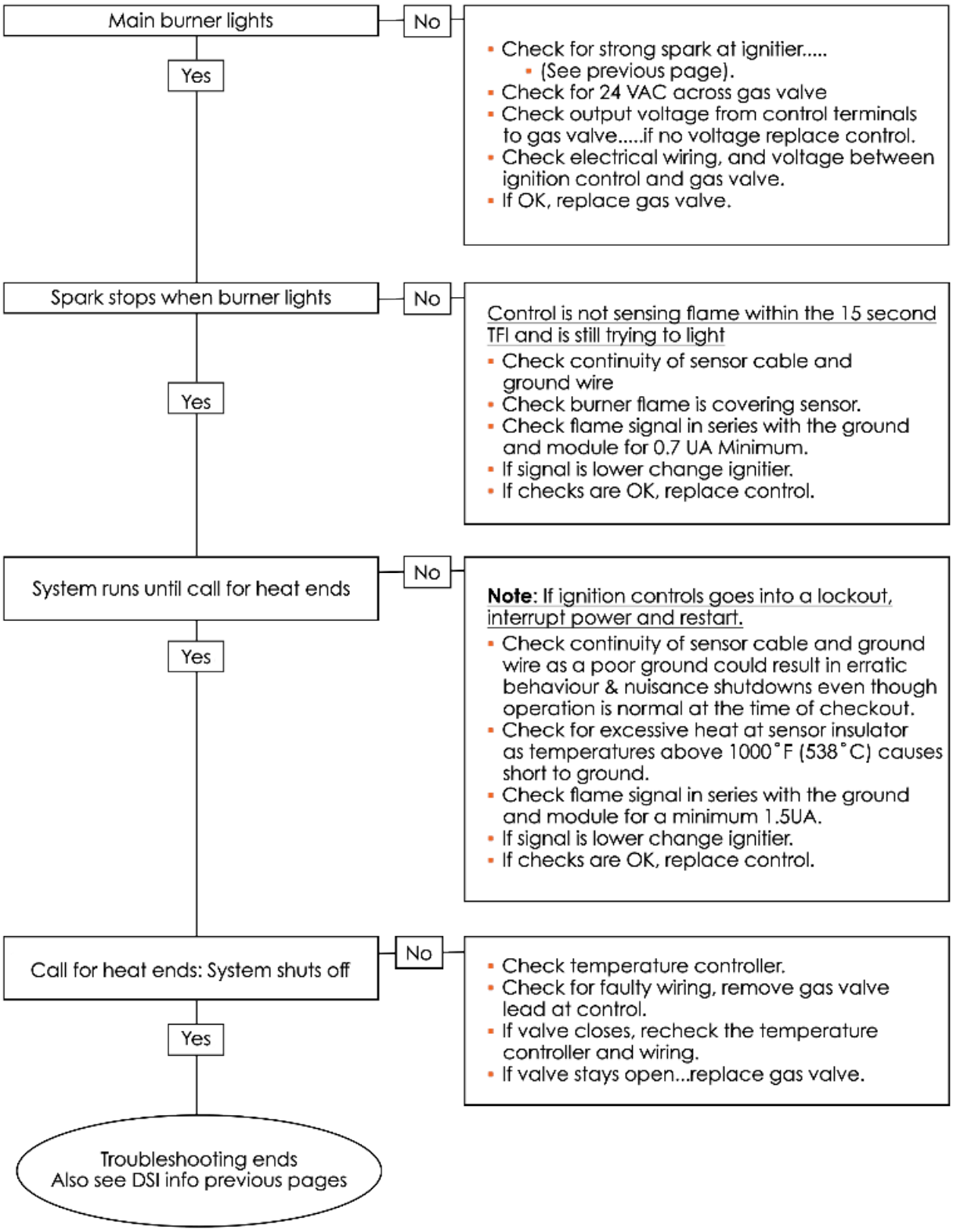
20. Troubleshooting Guide - Heater Operation

WARNING

Improper adjustment, alteration, service or maintenance can cause property damage, injury or death. This heater must be installed and serviced only by a trained gas service technician

Sequence of Events (Also see DSI Troubleshooting previous page)




Main burner lights
No
Check for strong spark at ignitier.....
(See previous page).
Check for 24 VAC across gas valve
Check output voltage from control terminals to gas valve.....if no voltage replace control.
Check electrical wiring, and voltage between ignition control and gas valve.
If OK, replace gas valve.
Yes
Spark stops when burner lights
No
Control is not sensing flame within the 15 second TFI and is still trying to light
Check continuity of sensor cable and ground wire
Check burner flame is covering sensor.
Check flame signal in series with the ground and module for 0.7 UA Minimum.
If signal is lower change ignitier.
If checks are OK, replace control.
Yes
System runs until call for heat ends
No
Note: If ignition controls goes into a lockout, interrupt power and restart.
Check continuity of sensor cable and ground wire as a poor ground could result in erratic behaviour & nuisance shutdowns even though operation is normal at the time of checkout.
Check for excessive heat at sensor insulator as temperatures above 1000°F (538°C) causes short to ground.
Check flame signal in series with the ground and module for a minimum 1.5UA.
If signal is lower change ignitier.
If checks are OK, replace control.
Yes
Call for heat ends: System shuts off
No
Check temperature controller.
Check for faulty wiring, remove gas valve lead at control.
If valve closes, recheck the temperature controller and wiring.
If valve stays open...replace gas valve.
Yes
Troubleshooting ends
Also see DSI info previous pages

21. Start-Up/Commissioning Sheet

WARNING

This equipment has been factory fired and tested prior to shipment.
However, this appliance is not "Plug & Play".
It requires commissioning and field adjustment/specifications confirmation to ensure safe and efficient operation

Commissioning Report as per I&O Manual and Local Codes

Contractor Name: ..... **Date:** .....

Address: .....

.....

City: .....

Phone: .....

Cell: .....

Job Site: ..... **City:** .....

Heater Model Number: .....
Located on burner rating plate
Heater Serial Number: .....
Located on burner rating plate

To ensure that site conditions are compatible with the heater's performance and to alleviate nuisance call-backs, the following start-up needs to be completed by the qualified gas installer.

A technician calling for technical support must provide the information from the completed commissioning report on the next page.

Fax completed report to technical services:
Fax: 1-866-361-0523
Phone: 1-877-686-3779

WARNING

Start-Up 'Smoke'
During start up, material coatings used in the production process of tubes and reflectors will "burn off" and create smoke during the first hour of operation. This is temporary and normal.
Please ensure that there is sufficient ventilation to adequately clear the smoke from the space.
Notify site and safety personnel to ensure that alarm systems are not unduly activated.

Qualified installer to complete this tube heater commissioning report

Type of gas:	NG ☐	LP ☐
Does building have a negative condition:	Yes ☐	No ☐
If this is a high altitude area what is the altitude above sea level		FT
Does application require fresh air to burner	Yes ☐	No ☐
Is heater exposed to chemical or corrosive atmosphere	Yes ☐	No ☐
Are actual minimum clearances as per table 3	Yes ☐	No ☐
Can heater be affected by overhead cranes/vibration	Yes ☐	No ☐
Are gas supply lines adequately sized for system	Yes ☐	No ☐
Gas lines and branches have been purged of air	Yes ☐	No ☐
This heater fired without any malfunction	Yes ☐	No ☐
Inlet gas supply pressure with heater operating		WC"
Gas valve outlet (Manifold) pressure with heater operating		WC"
What is the line voltage reading at the heater		VOLTS
What is the voltage reading at the ignition module		VOLTS
What is the flame signal strength in uA from sensor		uA (microamps)
Is heater controlled by a thermostat	Yes ☐	No ☐
Is the thermostat strategically located	Yes ☐	No ☐
What is total length of installed thermostat wire		Feet
What is the gauge of the thermostat wire		Gauge
What is the heater tube length (10ft per Tube section)		Feet
What the total length of the vent (add 10ft for each bend)		Feet
What length is combustion air intake (add 10ft for each bend)		Feet
If required.....what is the length of the turbulator(s)		Feet
If installed.....is turbulator at flue end of system	Yes ☐	No ☐
"Maximum stacking height" sign(s) - posted at thermostat(s)	☐	

This heater must be electrically grounded

Fax completed report to technical services: **Fax: 1-866-361-0523**
Phone: 1-877-686-3779

22. Burner & Tube Kit Assembly Chart Models S100

Model S100 is approved for indoor commercial / industrial non-residential applications.
For outdoor, wet and harsh environment applications refer to models SPW-JZ
(powder coated burner box) and/or STW-JZ (stainless steel burner box).

Before installing: Ensure you have the **correct tube kit(s)** for the burner input.

		S100 - Tube Kit Part # & Quantity Required								
		Stand-Alone Kits					Primary Kits		+ Secondary Kits	
Tube Kit Gross Weight (lbs) →		80	120	120	170	210	165	165	120	165
Tube Length (ft) →		10'	20'	20'	30'	40'	30'	30'	20'	30'
Input (Btuh) ↓		TM-4510-SX	TM-1020-SX	TM-1420-SX	TM-1430-SX	TM-1040-SX	TM-F030-SX	TM-1030-SX	TM-0020-SX	TM-0030-SX
45,000	10'	1								
	20'			1						
60,000	20'			1						
	30'				1					
80,000	20'			1						
	30'				1					
	40'					1				
100,000	20'		1							
110,000	30'				1					
	40'					1				
	50'						1+		1	
130,000	30'				1					
	40'					1				
	50'						1+		1	
155,000	40'					1				
	50'						1+		1	
	60'						1+			1
175,000	50'							1+	1	
	60'							1+		1
	70'							1+	2	
200,000	50'							1+	1	
	60'							1+		1
	70'							1+1	2	

Note: S100 Series tubes are NOT emissive coated (except 10' x 45,000 & 20' x 100,000 Btuh tubes are emissive coated)
Stand-Alone tube kits require no additional tube kits.
Primary tube kits require at least one additional Secondary tube kit.
Secondary tube kit require a Primary tube kit.

Flexible Gas Connector (Included in Burner Kit) - Must Install - see Section 13

USA - Stainless Steel Flexible Gas Connector

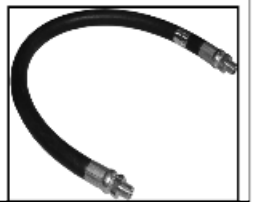
125,000 or less:
JL-0771-XX - 1/2" x 24"

150,000 or more:
JL-0771-YY - 3/4" x 36"

Canada - Type 1 Hose Gas Connector

125,000 or less:
JL-0771-RC - 1/2" x 30"

150,000 or more:
JL-0771-RB - 3/4" x 30"



23. Burner & Tube Kit Assembly Chart Models S100U

Model S100U is approved for indoor commercial / industrial non-residential applications.
For outdoor, wet and harsh environment applications refer to models SPW-JZ
(powder coated burner box) and/or STW-JZ (stainless steel burner box).

Before installing: Ensure you have the **correct tube kit(s)** for the burner input.

		S100U - Tube Kit Part # & Quantity Required					
		Stand-Alone **			Primary **		+ Secondary Kits
Tube Kit Gross Weight (lbs) →		100	145	170	170	170	65
Side-by-Side Tubes Length →		10'	15'	20'	20'	20'	10'
Input (Btuh)		TM-1410-SU	TM-1415-SU	TM-1020-SU	TM-0020-SU	TM-A120-SU	TM-0010-SU
60,000	2 x 10'	1					
80,000	2 x 10'	1					
	2 x 15'		1				
110,000	2 x 15'		1				
	2 x 20'			1			
130,000	2 x 15'		1				
	2 x 20'			1			
155,000	2 x 20'			1			
	2 x 30'				1+		1
175,000	2 x 30'					1+	1
200,000	2 x 30'					1+	1

* These kits include Turn Box JS-0513-BU packed and shipped in a separate carton

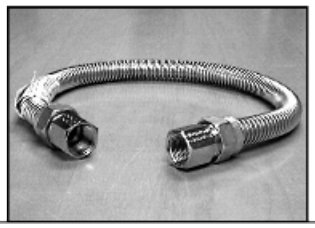
***Note:** S100U series tubes are NOT emissive coated
Stand-Alone tube kits require no additional tube kits.
Primary tube kits require at least one additional Secondary tube kit.
Secondary tube kit require a Primary tube kit.

Flexible Gas Connector (Included in Burner Kit) - Must Install - see Section 13

USA - Stainless Steel Flexible Gas Connector

125,000 or less:
JL-0771-XX - 1/2" x 24"

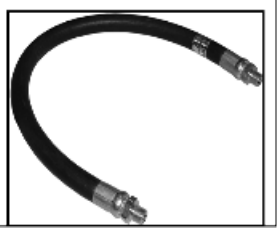
150,000 or more:
JL-0771-YY - 3/4" x 36"



Canada - Type 1 Hose Gas Connector

125,000 or less:
JL-0771-RC - 1/2" x 30"

150,000 or more:
JL-0771-RB - 3/4" x 30"



24. Model Input Ratings (Btuh) and Dimensions

Model	Btuh Input 0' to 4500' above sea level	Nominal Straight Tube Length (ft)	Overall Heater Length Strength (ft)	Nominal 'U'-Tube Length (ft)	Overall Heater Length 'U'-Tube (ft)	Approx Net Weight (lbs)
S100 200	200,000	70	69' 8"			324
S100 200	200,000	60	60'	30'U	31'-11"	282
S100 200 NG Only	200,000	50	50' 4"			239
S100 175 NG Only	175,000	70	69' 8"			324
S100 175	175,000	60	60'	30'U	31'-11"	282
S100 175	175,000	50	50' 4"			239
S100 155	150,000	60	60'	30'U	31'-11"	282
S100 155	150,000	50	50' 4"			239
S100 155	150,000	40	40' 8"	20'U	22'-3"	197
S100 130	125,000	50	50' 4"			239
S100 130	125,000	40	40' 8"	20'U	22'-3"	197
S100 130 NG Only	125,000	30	31'	15'U	17'-3"	154
S100 110	110,000	50	50' 4"			239
S100 110	110,000	40	40' 8"	20'U	22'-3"	197
S100 110	110,000	30	31'	15'U	17'-3"	154
S100 100 NG Only	100,000	20	21' 4"	-		111
S100 80	80,000	40	40' 8"	20'U	22'-3"	197
S100 80	80,000	30	31'	15'U	17'-3"	154
S100 80	80,000	20	21' 4"	10'U	12' 7"	111
S100 60	60,000	30	31'			154
S100 60	60,000	20	21' 4"	10'U	12' 7"	111
S100 45	45,000	20	21' 4"			111

See next page for dimensions of heater components (Burner, tube, reflector, turn box)

Figure 24: Heater Dimensions

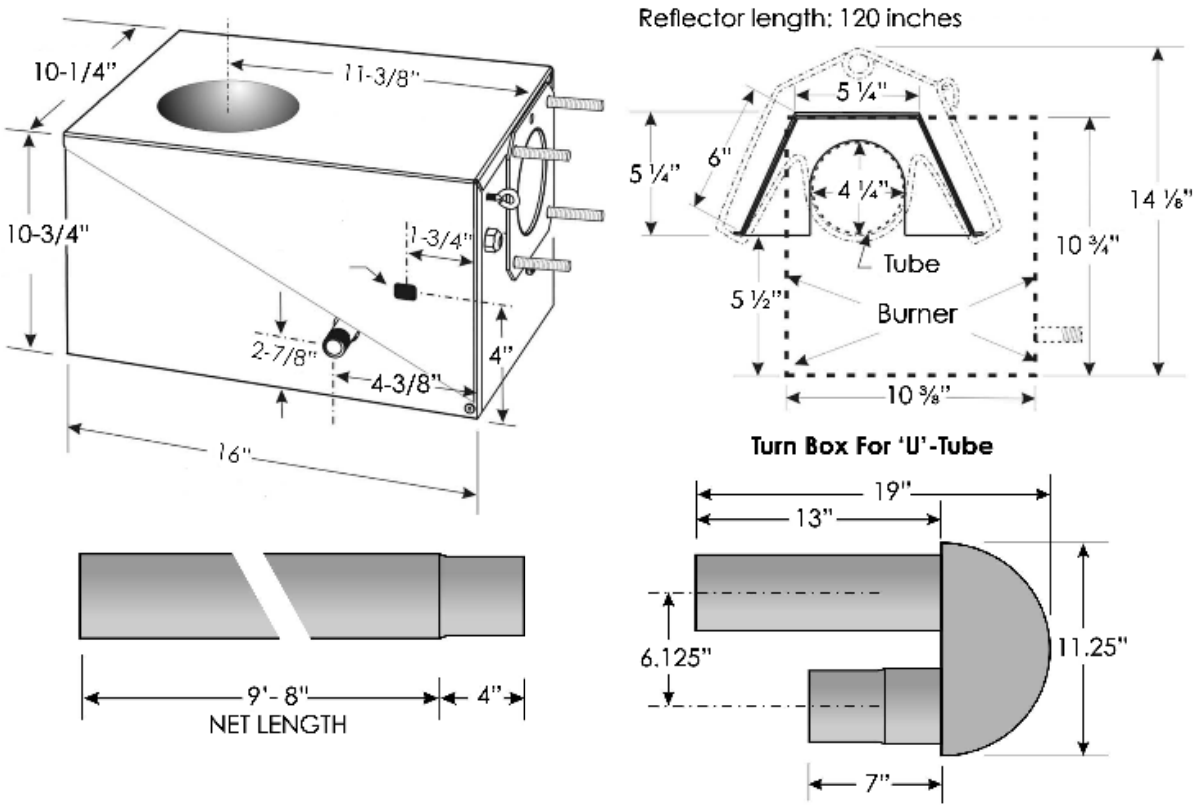
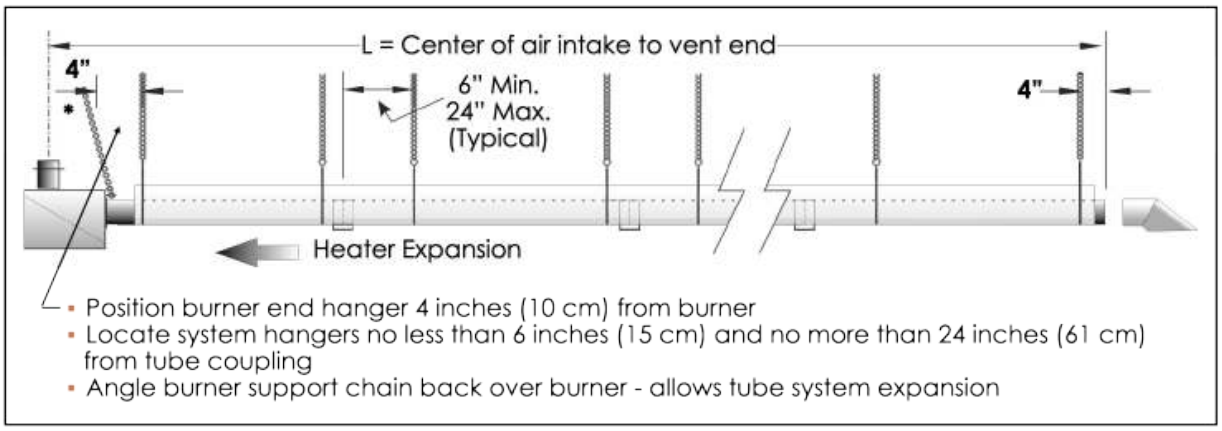


Figure 25: Hangar Spacing/Length - Air Intake to Vent End - Straight



Tube Length	'L' = center air intake to end
10'	11'- 3 ¾" ; 135 ¾"
20'	20'- 11 ¾" ; 251 ¾"
30'	30'- 7 ¾" ; 367 ¾"
40'	40'- 3 ¾" ; 483 ¾"

Tube Length	'L' = center air intake to end
50'	49'-11 ¾" ; 599 ¾"
60'	59 -7 ¾" ; 715 ¾"
70'	69'-3 ¾" ; 831 ¾"

25. Turbulator Length & Location in System: S100 - Straight Tube

Note: Improper location of a turbulator can cause malfunction of the heater, property damage, and will void the heater warranty.
Tubes with turbulators are clearly labeled for easy identification.
Refer to footnotes below the table.

Straight Tube Systems

Gas Type	Model x Length (ft)	Turbulator Length (s)
NG or Propane	45 x 20	39" + 96"
NG or Propane	60 x 20	39" + 96"
NG or Propane	60 x 30 [1]	96" [1]
NG or Propane	80 x 20	39" + 96"
NG or Propane	80 x 30 [1]	96" [1]
NG or Propane	80 x 40	24" + 109"
NG ONLY	100 x 20	Stamped S/S
NG or Propane	110 x 30	60" + 96"
NG or Propane	110 x 40	24" + 109"
NG or Propane	110 x 50	24" (3rd Tube)
NG ONLY	130 x 30	60" + 96"
NG or Propane	130 x 40	24" + 109"
NG or Propane	130 x 50	24" (3rd Tube)
NG or Propane	155 x 40	24" + 109"
NG or Propane	155 x 50	24" (3rd Tube)
NG or Propane	155 x 60	24" (3rd Tube)
NG or Propane	175 x 50/60 [2]	40" + 72" [2]

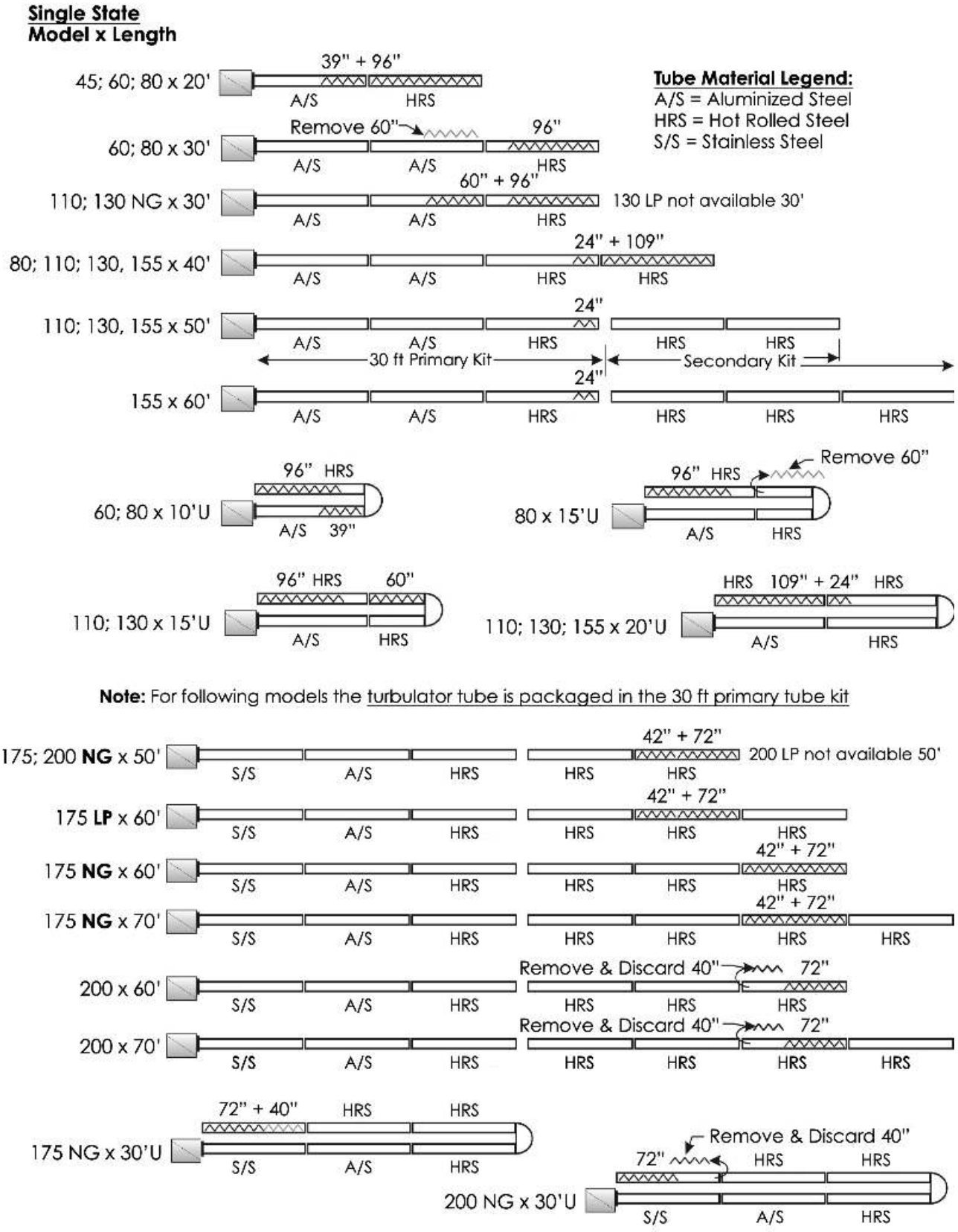
U-Tube Systems

Gas Type	Model Length (ft)	Turbulator Length (s)
NG ONLY	175 x 70 [2]	40" + 72" [2]
NG ONLY	200 x 50	40" + 72"
NG or Propane	200 x 60/70 [3]	40" + 72" [3]
NG or Propane	60 x 10U	39" + 96"
NG or Propane	80 x 10U	39" + 96"
NG or Propane	80 x 15U	96" [1]
NG or Propane	110 x 15U	60" + 96"
NG or Propane	110 x 20U	24" + 96"
NG ONLY	130 x 15U	60" + 96"
NG or Propane	130 x 20U	24" + 96"
NG or Propane	155 x 20U	24" + 96"
NG or Propane	155 x 30U	None
NG ONLY	175 x 30U	40" + 72"
NG or Propane	200 x 30U	40" + 72" [3]

See next page for an illustration of turbulator length and location.

1. **60 / 80 x 30'**: Remove 5 ft section of turbulator from the aluminized steel tube (**2nd tube** in system); install tube with 96" turbulator at the vent end of the system
2. **175 Propane x 60'**: Install tube with turbulators as **5th tube** in the system
   175 NG x 60' & 70': Install tube with turbulators as **6th tube** in the system
3. **200 x 60' & 70' & 30'U**: Remove 40" piece of turbulator from the upstream end of tube with turbulator, and install the tube with turbulator as the **6th tube** in the system

Turbulator Length & Location in System:



26. Gas conversion of burners

Tube Heater Burners are factory produced and supplied to operate on natural gas.

100,000 Btuh input model is available in natural gas only and is not convertible to propane gas.

For models with inputs 60,000, 80,000, 110,000, 125,000, and 150,000 Btuh a field conversion kit is available to convert from natural gas to propane gas, or vice versa. Refer to the table below for kit part numbers. Each kit contains the specific instructions required to install the kit.

Models with inputs 175,000 and 200,000 Btuh are field convertible between gas types, but the conversion is relatively more extensive and expensive than lesser input models. When ordering, Model & Serial Numbers are required. For inputs 175,000 and 200,000 it is recommended that the burner be ordered and factory produced for the specific type of fuel gas using the following complete burner kit part numbers:

- Natural gas: 175,000 Btuh: JS-S175-AN (USA) or JS-S175-CN (Canada);
  - 200,000 Btuh: JS-S200-AN (USA) or JS-S200-CN (Canada)
- Propane gas: 175,000 Btuh: JS-S175-AL (USA) or JS-S175-CL (Canada);
  - 200,000 Btuh: JS-S200-AL (USA) or JS-S200-CL (Canada)
- The natural gas 175,000 burner can be connected to a 50, 60, or 70 foot tube system.
- The propane gas 175,000 burner can be connected only to a 50 or 60 foot tube system.
- The natural gas 200,000 burner can be connected to a 50, 60, or 70 foot tube system.
- The propane gas 200,000 burner can be connected only to a 60 or 70 foot tube system.

Gas Conversion Kits - Order by Part Number:

Input Rate (Btuh)	Conversion Kit NG to Propane	Conversion Kit Propane to NG
45,000	JS-0556-XC	JS-0556-XD
60,000	JS-0557-XX	JS-0558-XX
80,000	JS-0559-XX	JS-0560-XX
100,000	NG Only - Not convertible	
110,000	Check with factory: Provide Model & Serial #'s	
130,000	Check with factory: Provide Model & Serial #'s Note: 30 ft heater is **NG ONLY**	
150,000	JS-0565-XX	JS-0566-XX
175,000	Order new burners for specific fuel type Check with factory: Provide Model & Serial #'s	
200,000	Order new burners for specific fuel type Check with factory: Provide Model & Serial #'s	

27. High Altitude Installation

Canada: Heaters can be installed to an altitude of 4500 ft without revision.
- To install above 4500 feet refer to recommendation of local authority having jurisdiction.

USA: The factory installed orifice is approved for normal altitude up to 2000 ft.
When this appliance is installed above an altitude of 2000 feet in the USA, the input must be de-rated by 4% for each 1000 ft . Refer to the table next page for orifice sizing and restrictions that apply to high altitude installation. Check with your local authority regarding de-rating.

Note: Installations above 4,500 ft: Restrict the Total Combined System Length as indicated in the Total System Length Restrictions Table below.

Minimum Vent Length: Vented or Unvented (indirect mechanical ventilation))
- Minimum vent length of 3 ft is required (NOTE: 200,000 Propane: Minimum 8 ft.

Note: Installations above 4,500 ft: Restrict the Total Combined System Length as indicated in the Total System Length Restrictions Table below.

High Altitude Maximum System Length: (above 4,500 ft):
Includes: Tube Heater length + combustion air duct + vent:
- Each 90° elbow in the system has an equivalent length of 5 ft.
- A maximum of 2 elbows are allowed in any portion (duct, tube heater, vent) with the exception of up to three 90° elbows in a vertical vent run through the roof
- Combustion air duct may be 4" or 5" diameter and is not to exceed lengths in table below
- Exceeding the allowable lengths in the table below can create combustion and/or condensation problems and will void CSA Certification and the heater warranty.
- Do not exceed the Maximum Combined System Length regardless of the allowed maximum length of individual vent or combustion air duct

Total System Length Restrictions:
Installations above 4,500 feet (Lower altitudes refer to Section 12A)

Input (Btuh)	Do Not Exceed Maximum Combined System Length		Max. Air Duct Length (by Duct Diameter)		Max. Vent Length Individual: 4"Ø OR Combined: 6"Ø
	4" Air Duct	5" Air Duct	4" Ø	5" Ø	
45,000 & 60,000	**40 ft**	**60 ft**	20 ft	40 ft	20 ft
80,000	**50 ft**	**70 ft**	20 ft	40 ft	20 ft
100,000	**40 ft**	**60 ft**	30 ft	50 ft	30 ft
110,000 to 155,000	**80 ft**	**100 ft**	30 ft	50 ft	30 ft
175,000 & 200,000	-	**120 ft**	Use 5" Ø	50 ft	40 ft

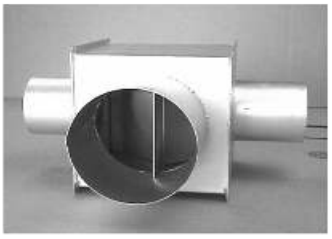
Example	
150,000 Btuh Heater:	
Tube Heater Length	40 ft
1 x 90° elbow (vent)	5 ft
Straight vent	15 ft
Air Duct: 4" Ø	13 ft
Combined Length	78 ft
Max. Allowed	80 ft
Additional 20' for 5" Ø Air Duct	

27. High Altitude Installation continued

Orifice Chart - Altitude Conversion - see notes on previous page

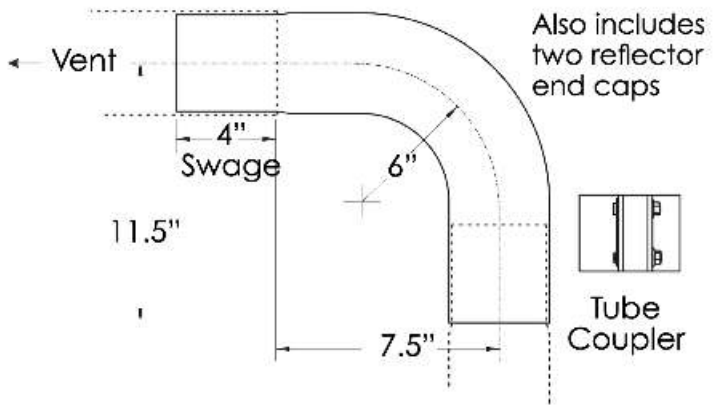
Model No	For Use at Altitudes above (Feet) Gas Orifice Drill Size/Part #							
	Supplied	USA						
	0	2000	3000	4000	5000	6000	7000	8000
S100-45 NG	30 DMS JS-0730-DM	30 DMS JS-0730-DM	30DMS JS-0730-DM	30DMS JS-0730-DM	30DMS JS-0730-DM	30DMS JS-0730-DM	31DMS JS-0731-DM	31DMS JS-0731-DM
S100-45 Propane	46 DMS JS-0746-DM	46 DMS JS-0746-DM	46 DMS JS-0746-DM	48 DMS JS-0748-DM	48 DMS JS-0748-DM	48 DMS JS-0748-DM	49 DMS JS-0749-DM	49 DMS JS-0749-DM
S100-60 NG	24 DMS JS-0724-DM	26 DMS JS-0726-DM	27 DMS JS-0727-DM	27 DMS JS-0727-DM	28 DMS JS-0728-DM	28 DMS JS-0728-DM	29 DMS JS-0729-DM	29 DMS JS-0729-DM
S100-60 Propane	42 DMS JS-0742-DM	42 DMS JS-0742-DM	43 DMS JS-0743-DM	43 DMS JS-0743-DM	43 DMS JS-0743-DM	44 DMS JS-0744-DM	44 DMS JS-0744-DM	45 DMS JS-0745-DM
S100-80 NG	17 DMS JS-0717-DM	19 DMS JS-0719-DM	19 DMS JS-0719-DM	20 DMS JS-0720-DM	21 DMS JS-0721-DM	22 DMS JS-0722-DM	23 DMS JS-0723-DM	24 DMS JS-0724-DM
S100-80 Propane	36 DMS JS-0736-DM	38 DMS JS-0738-DM	39 DMS JS-0739-DM	39 DMS JS-0739-DM	40 DMS JS-0740-DM	41 DMS JS-0741-DM	42 DMS JS-0742-DM	42 DMS JS-0742-DM
S100-100 NG	5.2 mm JS-0752-MM	5.1 mm JS-0751-MM	5.0 mm JS-0750-MM	9 DMS JS-0709-DM	11 DMS JS-0711-DM	0.19 i N JS-0719-IN	13 DMS JS-0713-DM	14 DMS JS-0714-DM
S100-110 NG	5.2 mm JS-0752-MM	5.1 mm JS-0751-MM	5.0 mm JS-0750-MM	9 DMS JS-0709-DM	11 DMS JS-0711-DM	0.19 i N JS-0719-IN	13 DMS JS-0713-DM	14 DMS JS-0714-DM
S100-110 Propane	31 DMS JS-0731-DM	32 DMS JS-0732-DM	32 DMS JS-0732-DM	32 DMS JS-0732-DM	33 DMS JS-0733-DM	34 DMS JS-0734-DM	35 DMS JS-0735-DM	36 DMS JS-0736-DM
S100-130 NG	5.8 mm JS-0758-MM	5.7 mm JS-0757-MM	5.6 mm JS-0756-MM	5.5 mm JS-0755-MM	3 DMS JS-0703-DM	4 DMS JS-0704-DM	5 DMS JS-0705-DM	0.20 in JS-0720-IN
S100-130 Propane 30 FT IS NG ONLY	29 DMS JS-0729-DM	29 DMS JS-0729-DM	30 DMS JS-0730-DM	30 DMS JS-0730-DM	30 DMS JS-0730-DM	1/8" JS-0713-IN	31 DMS JS-0731-DM	31 DMS JS-0731-DM
S100-155 NG	0.25 in JS-0725-IN	6.4 mm JS-0764-MM	6.3 mm JS-0763-MM	6.2 mm JS-0762-MM	6.1 mm JS-0761-MM	6.0 mm JS-0760-MM	5.9 mm JS-0759-MM	5.8 mm JS-0758-MM
S100-155 Propane	0.14 in JS-0714-IN	3.5 mm JS-0735-MM	29 DMS JS-0729-DM	3.4 mm JS-0734-MM	3.3 MM JS-0733-MM	3.3 MM JS-0733-MM	30 DMS JS-0730-DM	0.13 in JS-0713-IN
S100-175 NG	6.7 mm JS-0767-MM	6.6 mm JS-0766-MM	6.6 mm JS-0766-MM	6.5 mm JS-0765-MM	6.5 mm JS-0765-MM	6.4 mm JS-0764-MM	6.3 mm JS-0763-MM	6.3 mm JS-0763-MM
S100-175 Propane	24 DMS JS-0724-DM	25 DMS JS-0725-DM	26 DMS JS-0726-DM	27 DMS JS-0727-DM	28 DMS JS-0728-DM	28 DMS JS-0728-DM	29 DMS JS-0729-DM	29 DMS JS-0729-DM
S100-200 NG	0.30 in JS-0730-IN	7.4 mm JS-0774-MM	7.3 mm JS-0773-MM	7.3 mm JS-0773-MM	7.2 mm JS-0772-MM	0.28 in JS-0728-IN	7.1 mm JS-0771-MM	7.0 mm JS-0770-MM
S100-200 Propane	19 DMS JS-0719-DM	20 DMS JS-0720-DM	20 DMS JS-0720-DM	21 DMS JS-0721-DM	22 DMS JS-0722-DM	23 DMS JS-0723-DM	25 DMS JS-0725-DM	26 DMS JS-0726-DM

28. Optional Accessories

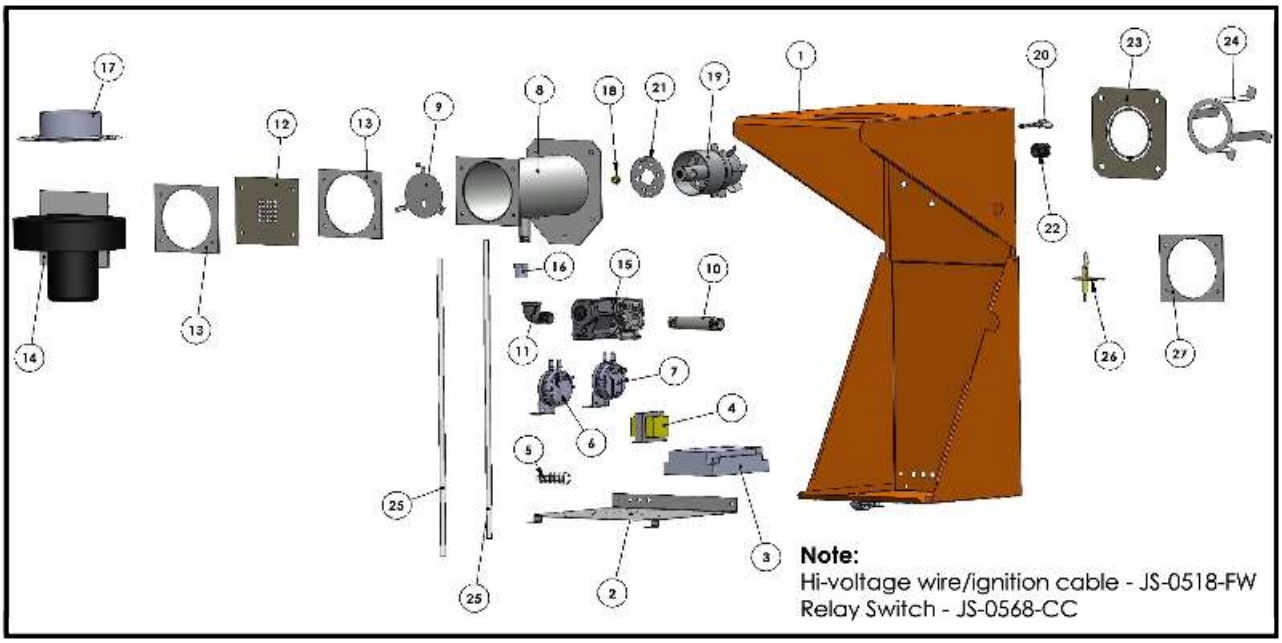
#2 Lion Chain (115 lb work load) - 200 ft roll **Safety Snap Hooks** - 2" - package 25 - package 100	JL-0800-XX JL-0800-SH JL-0800-SH-B	
Flue Vent Terminal 4" wall horizontal	JA-0528-XX	
Torctite Coupler Sufficient quantity supplied with heater Use for connection of vent tee, or replacement part	JA-0516-SW	
Vent Tee 4" x 4" x 6" (Couplers optional - see above)	JA-0514-XX	
Combustion Air Intake Cap - Wall	JS-0532-CC	
Clearance Sign - Required in some jurisdictions: ▪ Vehicle service garages ▪ ¾" high red lettering on white background	JS-0532-CC	⚠ **WARNING** Maintain _____" Clearance from tube heater to vehicles and combustible materials

Options For 24V Thermostat Control:
Note: Fenwal DSI has an onboard relay switch to control the blower motor (120 Vac) and allows for heater control with either 24V or 120V thermostat.
The Fenwal DSI has a post-purge feature.
A 24V Thermostat MUST be used to enable the post-purge feature.
A line voltage thermostat will disable the post-purge feature

TruTemp Thermostat (24Vac - 3-Wire) True comfort control for radiant heating systems - senses and averages ambient and radiant temperatures. Occupancy sensor with auto set-back of 9°F (5°C). Do not use in wet or corrosive environments	JM-0150-XX	
Low Voltage Digital Thermostat (24 Volts - °F or °C selectable) Not for use in corrosive or wet environments	JS-0569-WR	
Multiple Heaters per 24V Thermostat **Relay Switch:** One required for each burner after the first burner in a zone (1st burner connects to 24V thermostat) Refer to wiring diagram Page 36 (field installed at or in burner) **Note:** FENWAL DSI has built in relay for blower operation	JS-0568-CC	
Line Voltage Control: (Disables post-purge feature of the Fenwal ignition control)		
Line Voltage Thermostat: **Dual Scale:** °F or °C Not for use in corrosive or wet environments	JL-0772-XX	

90 degree Aluminized Steel Elbow Kit (Kit includes: aluminized steel elbow, coupler, and two end plate hangers) For 180° elbow use two x JS-0508-SM, or use Model S100U	JS-0508-SM	
	90° Elbow Kit JS-0508-SM 	
Side Reflector Extension Kit 10" deep, 10 ft long Each	JS-0509-KT	
Tube Protection Screen -5 foot lengths	JA-0780-XS For Builder Model	

29. Replacement Parts

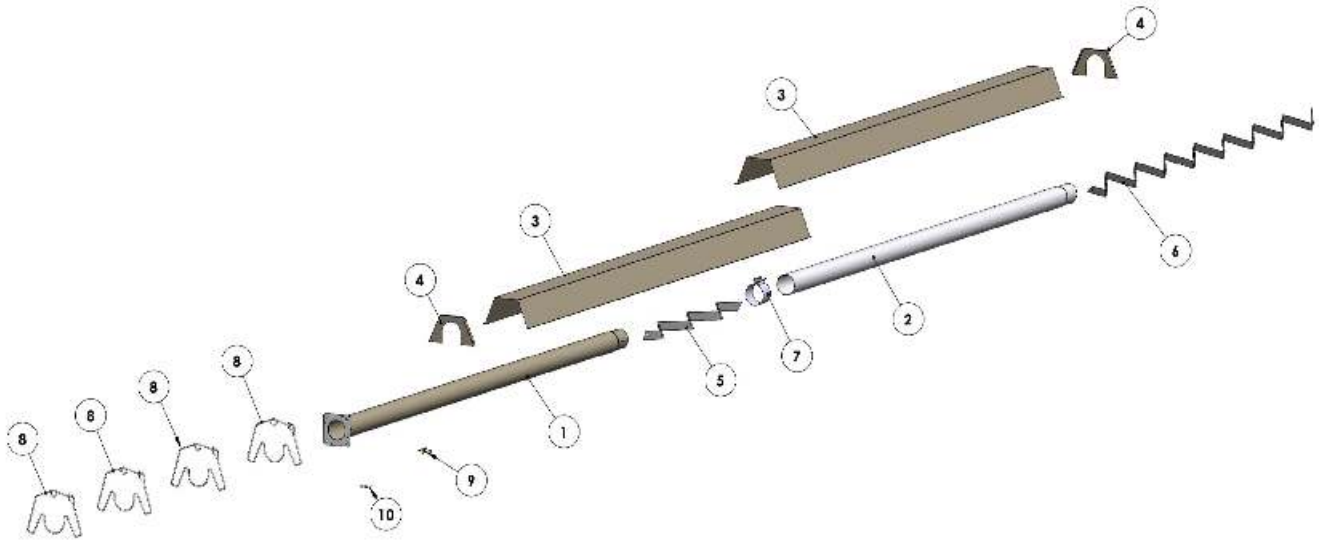


#	Part Description	Model	Model Dash # Gas Type	Part #	Part Description Primary
1	**Burner Housing**	**All**	**Schwank**	JS-0582-XX	Burner housing coated orange
		All	**Schwank**	JJ-0582-XX	Burner housing coated gray
2	**Component Plate**	**All**		JS-0581-SE	Component mounting plate SE
3	**Fenwal DSI Control**	**All**		JA-0567-XX	Control, 24 Vac
4	**Fenwal Replaces S87J: Replacement Kit**	**All**		JA-0567-RK	Fenwal Control + Wire Harness + Cable + Ignitor
5	**Terminal Block**	**All**		JM-0455-DD	Terminal block
6	**Step Down Transformer**	**All**		JA-0775-XX	Transformer 120/24V, 20VA AT120B1028
7	**Combustion Air Proving Switch**	**45**	**-C; -UH**	JS-0576-XX	Air proving Switch 0.48" WC
		60		JS-0576-YY	Air proving Switch 0.30" WC
		80		JS-0576-XX	Air proving Switch 0.48" WC
		110		JS-0575-YY	Air proving Switch 0.65" WC
		130		JS-0575-YY	Air proving Switch 0.65" WC
		155		JS-0575-YY	Air proving Switch 0.65" WC
		45, 100	**-X1**	JS-0576-AA	Air proving Switch 0.85" WC
		60	**-FB;NG**	JS-0576-XX	Air proving Switch 0.48" WC
		80	**-FB;NG**	JS-0575-UL	Air proving Switch 0.70" WC
		110	**-FB;LP**	JS-0576-UL	Air proving Switch 1.10" WC
		110	**-FB:NG**	JS-0575-ZB	Air proving Switch 0.90" WC
		130	**-FB**	JS-0576-UL	Air proving Switch 1.10" WC
		155	**-A, F;NG**	JS-0576-UG	Air proving Switch 1.00" WC
		175	**-S; NG**	JS-0576-AA	Air proving Switch 0.85" WC
		175	**-S; LP**	JS-0576-XY	Air proving Switch 1.15" WC
		200	**-S;NG,LP**	JS-0575-ZA	Air proving Switch 1.40" WC

#	Part Description	Model	Model Dash # Gas Type	Part #	Part Description Primary
8	**Blocked flue pressure switch**	**45**	**-C; -UH**	JS-0577-ZZ	Blocked flue switch 1.41" WC
		60	**NG**	JS-0577-SS	Blocked flue switch 0.58" WC
		80130	**NG**	JS-0577-YY	Blocked flue switch 0.90" WC
		45	**-X1**	JS-0577-YY	Blocked flue switch 0.90" WC
		100	**-X1;NG**	JS-0577-ZZ	Blocked flue switch 1.41" WC
		60,80,110	**-FB**	JS-0578-UL	Blocked flue switch 1.03" WC
		110	**-FB; LP**	JS-0577-XY	Blocked flue switch 1.20" WC
		130	**-FB**	JS-0577-XZ	Blocked flue switch 1.25" WC
		155	**-A.F;NG**	JS-0577-YY	Blocked flue switch 0.90" WC
		175	**-S;NG**	JS-0577-ZZ	Blocked flue switch 1.41" WC
		175	**-S;LP**	JS-0577-XY	Blocked flue switch 1.20" WC
		200	**-S;LP**	JS-0577-UW	Blocked flue switch 1.33" WC
		200	**-S;NG**	JS-0578-BB	Blocked flue switch 1.50" WC
9	**Burner Chamber**	**ALL**		JS-0504-XX	Burner Chamber
10	**Burner Air Restrictor**	**45**	**NG**	JS-0592-AR	Burner air restrictor (45 Only)
11	**4" Nipple**	**ALL**		JS-0590-XX	Nipple 1/2" x 4"
12	**90 Degree Elbow Fitting 1/2"**	**ALL**		JS-0588-XX	Street elbow fitting 90 deg 1/2"X1/2"
13	**Equalizer Plate**	**45**	**NG**	JS-0593-NG	Outlet equalizer plate 45 NG - 25 Holes
		60 to 155	**NG & LP**	JS-0593-XX	Outlet equalizer plate 60 to 155 LP & NG
		175	**LP**	JS-0593-XY	Outlet equalizer plate 175-S LP
		175	**NG**	JS-0593-XX	Outlet equalizer plate 175 -NG
		200	**NG & LP**	JS-0593-YE	Outlet equalizer plate 200-S LP & NG
14	**Blower Gasket**	**ALL**	**Each**	JS-0578-XX	Outlet blower gasket
15	**Blower Assembly**	**45 to 175**		JS-0579-AA	Blower Assembly 1/35 HP - 45 to 175
		200		JS-0579-ZZ	Blower Assembly 1/20 HP - 200,000
16	**Gas Valve**	**45 to 155**	**NG**	JL-0701-AA	Valve gas comb 3.5" WC 24VAC VR8 NG
		110	**LP**	JL-0703-AA	Valve gas comb 10" WC 24VAC VR8 LP
		175, 200	**NG**	JA-0506-XX	Gas Valve - Slow Open 3.5" WC NG
		175, 200	**LP**	JA-0507-XX	Gas Valve - Slow Open 10" WC LP
17	**Manifold Bushing**	**ALL**		JS-0589-XX	Manifold bushing 3/8" to 1/2"
18	**Air Inlet C/W Screen**	**45**	**NG**	JS-0595-SC	Air Inlet Adapter 45 NG , 1-1/2" Hole
		60	**NG**	JS-0594-ST	Air Inlet Adapter 60 NG & LP
		80	**NG**	JS-0595-SP	Air Inlet Adapter 80 NG & LP
		100	**NG**	JS-0595-UG	Air Inlet Adapter 100NG
		110	**NG**	JS-0595-AE	Air Inlet Adapter 110-200 NG & LP
		110	**LP**	JS-0595-AA	Air Inlet Adapter 110 LP
		130 to 200	**NG & LP**	JS-0595-AA	Air Inlet Adapter 110-200 NG & LP

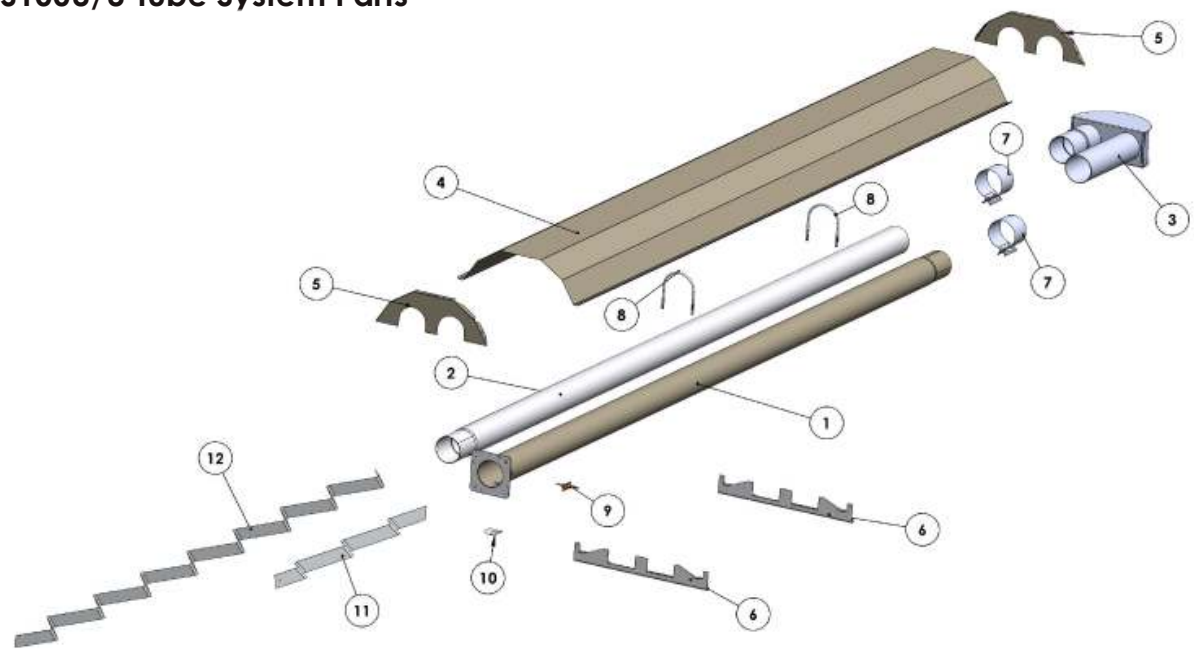
#	Part Description	Model	Model Dash # Gas Type	Part #	Part Description Primary
19	**Main Burner Office**	**45**	**NG**	JS-0730-DM	Gas orifice low intensity HR 30 DMS
		60	**NG**	JS-0724-DM	Gas orifice low intensity HTR 24 DMS
		80	**NG**	JS-0717-DM	Gas orifice low intensity HTR 17 DMS
		100	**NG**	JS-0752-MM	Gas orifice low intensity HTR 5.2 mm
		110	**LP**	JS-0731-DM	Gas orifice low intensity HTR 31 DMS
		110	**NG**	JS-0752-MM	Gas orifice low intensity HTR 5.2 mm
		130	**NG**	JS-0758-MM	Gas orifice low intensity HTR 5.8 mm
		155	**NG**	JS0725-IN	Gas orifice low intensity HTR 1/4 inch
		175	**LP**	JS-0724-DM	Gas orifice low intensity HTR 24 DMS
		175	**NG**	JS-0767-MM	Gas orifice low intensity HTR 6.7 mm
		200	**LP**	JS-0719-DM-S	Gas orifice low intensity HTR 19 DMS
		200	**NG**	JS-0750-IN	Gas orifice low intensity HTR 5/16 inch
20	**Burner Cup**	**45**	**NG**	JS-0510-LP-45	Burner Cup w/ Center Hole
		60-100	**NG; LP**	JS-0510-LP	Burner Cup
		110-155	**NG; LP**	JS-0512-XX	Burner Cup
		175	**NG**	JS-0512-XX	Burner Cup
		175	**LP**	JS-0512-UL	Burner Cup - Cast Aluminum - No Hole
		200	**NG; LP**	JS-0512-UL	Burner Cup - Cast Aluminum - No Hole
21	**Eye Bolt**	**ALL**		JF-1012-EB	Eye Bolt
22	**Burner Cup Air Restrictor Ring**	**45**	**NG**	JS-0596-AA	Burner Cup air restr ring 9/32"
		60175	**NG**	JS-0596-XX	Burner Cup air rest ring 0.375
		110	**LP**	JS-0597-XX	Burner head air rest. ring .500
		175	**S; LP**	JS-0597-XY	Burner Cup air rest ring 175S LP
		200	**S; LP**	JS-0597-YE	Burner Cup air rest ring 200-S LP
		200	**S; NG**	JS-0597-YY	Burner Cup air rest ring 200-S NG
23	**Grommet**	**ALL**		JP-2033-XX	Grommet - Strain Relief
24	**Flame Rectification Plate**	**175**	**S LP**	JS-0591-XY	Flame Rectifier Plate 175-S LP
25	**Flame Rectification**	**60**		JS-0592-RR	Flame Rectifier 40 –R
		110	**FB**	JS-0592-RT	Flame Rectifier 110, 130- FB Models
		130	**FB**	JS-0592-RT	Flame Rectifier Plate 175-S LP
		200	**S LP**	JS-0592-RZ	Flame Rectifier 200-S LP
26	**Pressure Switch Tubing**	**ALL**		JS-0572-SG	Tubing set 1/4" x 20" PVC
27	**Igniter Kit**	**ALL**		JA-0571-KT	Igniter & gasket kit / DSI tube heater
28	**Flange Gasket**	**ALL**		JS-0591-XX	Gasket For Flange Adaptor

S100 Tube System Parts



#	Part Description	Model	Model Dash # Gas Type	Part #	Part Description Primary
1	**Flanged Tubes**	**45 to 155**		JS-0501S-WP	Flanged, Aluminized Steel tube, swaged, ports
		45 x 10FT, 100 x 20FT		JS-0501PAP	Aluminized Steel Flanged tube, swaged, painted
		175 & 200		JS-0500-SS-P	Flanged, Stainless Steel tube, swaged, ports; replaces JS0499SWP
2	**Swaged Tubes - No Flange**	**60 to 200 x 30FT & Above**		JS-0501-SW	Aluminized tube, 10' with hole for rivet
		ALL		JS-0515-SW	Steel tube 10' swaged
3	**Reflector**	**ALL**		JS-0502-EM	Reflector (18" x 120")
4	**End Cap**	**ALL**		JS-0502-ES	S100 series reflector end cap
5-6	**Turbulator (see Table 4 in Manual)**			JS-0533-UA	Turbulator 24" x 1.25" - Aluminized
				JS-0533-SK	Turbulator 39" x 2"- Stainless Steel
				JS-0533-SH	Turbulator 40" x 1.25"- Aluminized
				JS-0533-SS	Turbulator 60" x 1.25" - Stainless Steel
				JS-0533-UG	Turbulator 72" x 1.25"- Aluminized
				JS-0533-SL	Turbulator 96" x 2" - Stainless Steel
				JS-0533-LG	Turbulator 109" x 1.25" - Aluminized
		100 x 20FT		JS-0535-XX	Turbulator 10' Special - 100,000 Btuh ONLY
7	**Coupler**	**ALL**		JA-0516SW	4" swaged tube coupler torctite
		175 & 200	**1st to 2nd tube connections**	JA-0516-RK	Tube Connection Kit: Coupler + Rivet + Drill Bit
8	**Wire Hanger**	**ALL**		JS-0505-EH	Small wire hanger
9	**Igniter Kit**	**ALL**		JA-0571-KT	Igniter & gasket kit / DSI tube heater
10	**Sightglass Assembly**	**ALL**		JS-0536-XX	Sight glass assembly tube heater

S100U/U Tube System Parts



#	Part Description	Model	Model Dash # Gas Type	Part #	Part Description Primary
1	**Flanged Tubes**	**45 to 155**		JS-0501-SW-P	Flanged, Aluminized Steel tube, swaged, ports
		175 & 200		JS-0500-SS-P	Flanged, Stainless Steel tube, swaged, ports; replaces JS-0499-SW-P
2	**Swaged Tubes - No Flange**	**175 & 200**		JS-0501-SW	Aluminized tube, 10' with hole for rivet
		ALL		JS-0515-SW	Steel tube 10' swaged
		15FT		JS-0515-SW-5S	Steel tube 5' swaged
3	**Turn Box**	**ALL**		JS-0513-TB	U tube turn around box
4	**Reflector**	**ALL**		JS-0502-BU	Reflector (24" x 120")
		15FT		JS-0502-BU-5	Reflector (18" x 60")
5	**End Cap**	**ALL**		JS-0502-ND	S100U series reflector end cap
6	**Double Steel Hanger**	**ALL**		JS-0505-BU-A	U tube reflector hanger
7	**Coupler**	**ALL**		JA-0516-SW	4" swaged tube coupler torctite
		175 & 200	**1st to 2nd tube connections**	JA-0516-RK	Tube Connection Kit: Coupler + Rivet + Drill Bit
8	**U-Bolt**	**ALL**		JA-0516-UH	U Bolt 4" for U-Tube Hanger
9	**Igniter Kit**	**ALL**		JA-0571-KT	Igniter & gasket kit / DSI tube heater
10	**Sight Glass Assembly**	**ALL**		JS-0536-XX	Sight glass assembly tube heater
11-12	**Turbulator (See Table 4 in Manual)**			JS-0533-UA	Turbulator 24" x 1.25" - Aluminized
				JS-0533-SK	Turbulator 39" x 2"- Stainless Steel
				JS-0533-SH	Turbulator 40" x 1.25"- Aluminized
				JS-0533-SS	Turbulator 60" x 1.25" - Stainless Steel
				JS-0533-UG	Turbulator 72" x 1.25"- Aluminized
				JS-0533-SL	Turbulator 96" x 2" - Stainless Steel
				JS-0533-LG	Turbulator 109" x 1.25" - Aluminized

Schwank
Heating. Design. Comfort.

Limited Warranty Certificate

For gasfired infrared low intensity tube heaters: S100/S100U Series

The Manufacturer warrants that this product is free from defects in material or workmanship under normal use and service subject to the terms of this document.

TWO YEAR WARRANTY
Subject to the conditions and limitations stated herein, during the term of this limited warranty, we will supply any component part (at our option a new or repaired component part) of the heater as defined below, excluding any labor, which the Manufacturer's examination determines to be defective in workmanship or material for a period of two years (2 years) from the date of installation, unless otherwise specified below. This warranty applies to the heater's original owner, and subsequent transferees and only if the unit is installed and operated in accordance with the printed instructions accompanying the unit and in compliance with all applicable installation codes and good trade practices.
Warranty is only applicable to Schwank components, other parts are limited to their own Manufacturers warranty period of one year (1 year).

FIVE YEAR WARRANTY
The Manufacturer warrants the burner sub-assembly comprising of ceramic and immediate metal tubing, and the radiating tubes (excluding couplings) for a period of five years (5 years).

WHAT IS NOT COVERED
The Manufacturer shall not be responsible for any expenses, including service, labor, diagnosis, analysis, material or transportation charges incurred during removal or reinstallation of this product, or any of its components or parts.
All labor or service charges shall be paid by the owner. This warranty does not cover heating products improperly installed, misused, exposed to or damaged by negligence, accident, corrosive or contaminating atmosphere, water, excessive thermal shock, impact, abrasion, normal wear due to use, alteration or operation contrary to the owner's manual or if the serial number has been altered, defaced or removed. This warranty shall not apply if the input to the heating product exceeds by more than 2% of the rated input on the rating plate. The Manufacturer shall not be liable for any default or delay in performance by its warranty caused by any contingency beyond its control, including war, government restrictions, or restraints, strikes, fire, flood, acts of God, or short or reduced supply of raw materials or products.

WARRANTY PROCEDURE
To establish the installation date for any purpose under this Limited Warranty, you must retain the original records that can establish the installation date of your unit. If you do not provide such documents, the start date of the term of this Limited Warranty will be based upon the date of unit manufacture, plus thirty (30) days. Failure to maintain the equipment through regular annual service maintenance by a qualified service technician shall void the warranty.

LIMITATIONS AND EXCLUSIONS
This document contains all warranties made by the Manufacturer and may not be varied, altered or extended by any person. There are no promises, or agreements extending from the Manufacture other than the statements contained herein.
THIS WARRANTY IS IN LIEU OF ALL WARRANTIES EXPRESSED OR IMPLIED, TO THE EXTENT AUTHORIZED BY THE LAWS OF THE JURISDICTION, INCLUDING SPECIFICALLY THE WARRANTIES OR MERCHANTIBILITY OF FITNESS FOR A PARTICULAR PURPOSE.
It is understood and agreed that the Manufacturer's obligation hereunder is limited to repairing or replacing parts determined to be defective as stated above. In no event shall the Manufacturer be responsible for any alleged personal injuries or other special, incidental or consequential damages. As to property damages, contract, tort or other claim the Manufacturer's responsibility shall not exceed the purchase priced paid for the product. All replacement parts will be warranted for the unused portion of the warranty coverage period remaining on the applicable unit.

Some Authorities do not allow certain warranty exclusions or limitations on duration of warranty or the exclusions or limitations of incidental or consequential damages. In such cases, the above limitations or exclusions may not apply to you and are not intended to do so where prohibited by law. This warranty gives you specific legal rights.
You may also have other rights which vary by jurisdiction.

1-877-686-3779 (toll-free)
1-706-554-6191

2 Schwank Way, Waynesboro, GA. 30830
6485 Ordan Dr., Mississauga, ON. L5T 1X2

csr@schwankgroup.com
www.schwankgroup.com

1-877-686-3779 (toll-free)
1-706-554-6191

csr@schwankgroup.com
schwankgroup.com

USA

2 Schwank Way,
Waynesboro, GA
30830

Canada

6485 Ordan Dr.,
Mississauga, ON
L5T 1X2