SPACE-RAY®
INFRARED GAS HEATERS

INSTALLATION AND OPERATION INSTRUCTIONS

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

INFRARED RADIANT TUBE HEATER

Models:

LTU SERIES: (40, 50, 60, 75, 80, 90, 100, 110, 120, 125, 130, 140, 150, 160, 175, 180, 200, 225, 250)

LTS SERIES: (40, 50, 60, 75, 80, 90, 100, 110, 120, 125, 130, 140, 150, 160, 175, 180, 200, 225, 250)

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

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

IMPORTANT: SAVE THIS MANUAL FOR FUTURE REFERENCE.

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▫ WHAT TO DO IF YOU SMELL GAS:

- **Do not try to light any appliance. Extinguish any open flame. Open windows.**
- **Do not touch any electrical switch; do not use any telephone in your building.**
- **Immediately call your gas supplier from a neighbor's telephone. Follow the gas supplier's instructions.**
- **If you cannot reach your gas supplier, call the fire department.**

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

1.0) GENERAL INFORMATION

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

INSTALLATION REQUIREMENTS

The installation must conform to local building codes or, in the absence of local codes, with the National Fuel Gas Code ANSI Z223.1/NFPA54 or the Natural Gas And Propane Installation Code CSAB149.1. Heaters shall be installed by a licensed contractor or licensed installer. Clearances to combustibles as outlined in this manual should always be observed. In areas used for storage of combustible materials where they may be stacked below the heater, NFPA54 requires that the installer must post signs that will "specify the maximum permissible stacking height to maintain the required clearances from the heater to combustibles."

The higher capacity LTS, LTU, 180–250 models generate intense radiant heat. Therefore, the minimum recommended mounting height is 18 ft. above floor level for the LTS, LTU 180-200 models and 20 ft. above floor level for the LTS, LTU 225-250 models. Heaters may be mounted at various heights and angles depending on the application. If you have any questions, please consult your local Space-Ray representative.

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

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

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

(FOR CANADA ONLY)

a. Installation of this appliance is to be in accordance with latest edition of CAN 1-B149.1 (Installation Code for Natural Gas Burning Appliances and Equipment), and/or CAN B149.2 (Installation Code for Propane Gas Burning Appliances and Equipment).
b. For installation in public garages or aircraft hangars, the minimum clearances from the bottom of the infrared heater to the upper surface of the highest aircraft or vehicle shall be 50 percent greater than the certified minimum clearance, but the clearance shall not be less than 8 feet.

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

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

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

LTS Series Only: **Since straight tube heaters are always hotter at the control end than at the draft inducer end, always observe the minimum recommended mounting heights shown on the specification sheets** and in Section 2 of this manual. Use U-tube configuration instead of straight tubes for spot or area heating (e.g., where a single heater is utilized for space heating).

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

□**ATTENTION: SAVE THIS MANUAL FOR FUTURE REFERENCE.**

2.0) LTU 40-250 SERIES — SPECIFICATIONS

Model No.	Btu/hr Input	Heat Exchanger Length	Total Heater Length	Flue Restrictor Plate I.D. & Part #		Orifice Size *Natural Gas*		Orifice Size *Propane Gas*		Minimum ✶ Mounting Height @ *Horizontal*	Minimum ✶ Mounting Height @ *45° Angle*
LTU40	40,000	30'	16'-10"	1"	#42741040	#31	(0.120)	#49	(0.073)	10'	9'
LTU50	50,000			1-1/8"	#42741030	3.3mm	(0.130)	#46	(0.081)	11'	10'
LTU60	60,000			1-7/32"	#42741020	#27	(0.144)	#43	(0.089)	12'	11'
LTU75	75,000			1-7/16"	#42741010	#20	(0.161)	#39	(0.099)	13'	12'
LTU80	80,000	30'	17'-6½"	1-1/2"	#42741050	#19	(0.166)	#38	(0.102)	13'	12'
LTU90	90,000			1-1/2"	#42741050	#16	(0.177)	#36	(0.106)	13'	12'
LTU100	100,000			1-5/8"	#42741060	#14	(0.182)	#33	(0.113)	13'	12'
LTU110	110,000			1-3/4"	#42741070	#10	(0.194)	#31	(0.120)	14'	13'
LTU120	120,000			1-3/4"	#42741070	13/64	(0.203)	1/8	(0.125)	14'	13'
LTU125	125,000			1-7/8"	#42741080	#5	(0.206)	#30	(0.129)	14'	13'
LTU130	130,000			1-7/8"	#42741080	#4	(0.209)	3.3mm	(0.130)	14'	13'
LTU125 [1]	125,000	40'	22'-6½"	1-7/8"	#42741080	#5	(0.206)	#30	(0.129)	14'	13'
LTU130 [1]	130,000			1-7/8"	#42741080	#4	(0.209)	3.3mm	(0.130)	14'	13'
LTU140 [1]	140,000			2-1/32"	#42741090	5.5mm	(0.216)	#29	(0.136)	15'	14'
LTU150 [1]	150,000			2-1/32"	#42741090	5.7mm	(0.224)	#28	(0.140)	15'	14'
LTU160 [1]	160,000			2-1/4"	#42741100	5.8mm	(0.228)	#27	(0.144)	15'	14'
LTU175 [1]	175,000			2-1/4"	#42741100	"C"	(0.242)	3.8mm	(0.150)	16'	15'
LTU180 [2]	180,000	50'	27'-6½"	2-1/4"	#42741100	"C"	(0.242)	#24	(0.152)	18'	17'
LTU200 [2]	200,000			2-3/8"	#42741130	"F"	(0.257)	#21	(0.159)	18'	17'
LTU225 [2]	225,000			2-1/2"	#42741140	6.9mm	(0.272)	#18	(0.170)	20'	19'
LTU250 [2]	250,000			2-3/4"	#42741150	"K"	(0.281)	4.5mm	(0.177)	20'	19'

NOTES: 1) These models require the use of an additional 5' body section.
2) These models require the use of an additional 10' body section.
✶ **MOUNT HEATERS AS HIGH AS POSSIBLE** for greatest human comfort and uniform heat distribution. Minimums are given to advise of the lowest mounting height allowable that still provides adequate energy distribution and comfort.

Type Gas:	Gas-Pipe Connection: [3]	Tube Diameter: [4]	Flue Connection:	Fresh Air Connection:	Electrical Supply:	Current Rating:
Natural or Propane	½" NPT (Female)	4"	6" Round	6" Round	120 Volt, 60Hz, 1 Phase	2.6 Amp

Fuse Rating:		Ignition System:
In-line: 2 Amp 250V (for 24V Circuit)	*Spark Module:* 3 Amp 250V (for 24V Circuit)	Direct Spark (with 30-second prepurge period)

NOTES: 3) LTS/LTU200 and above require a minimum 3/4" flex connector.
4) 3" diameter on models LTU40–75

3.0) LTU 40-75 SERIES — PACKING LIST

A) Control/Draft Inducer Package — **QTY**

- Control Box Assembly (Refer to Package Part Numbers at right) 1
- Draft Inducer Assembly *(with 4" Starting Collar)* (Refer to Package Part Numbers at right) 1
- Control Fastener Kit (#42787000) 1
  - *containing:* ¼-20 Locknuts (#02167010) 3
- Installation & Operation Instructions (#43155250) 1

B) Body Package Descriptions

#42734000, 15 Ft. Body Package (QTY=1) *containing:*

a) #42736000, Pre-assembled 15' ALC steel tube assembly with reflectors
b) #42762010, Control End Reflector (QTY=1)
c) #42761010, Foot End Reflector (QTY=1)
d) #02266010, Speed Clips (QTY=12)

CONTROL/DRAFT INDUCER PACKAGE NUMBERS:

MODEL NO.	*PART NO.*
–NATURAL GAS–	
LTU40-N5	#42735070
LTU50-N5	#42735050
LTU60-N5	#42735030
LTU75-N5	#42735010
–PROPANE GAS–	
LTU40-L5	#42735080
LTU50-L5	#42735060
LTU60-L5	#42735040
LTU75-L5	#42735020

3.1) LTU 80-250 SERIES — PACKING LIST

A) Control/Draft Inducer Package — **QTY**

- Control Box Assembly (Refer to Package Part Numbers at right) 1
- Draft Inducer & Junction Box Assembly (Refer to Package Part Numbers at right) 1
- 4" x 6" Starting Collar (#42892009) 1
- Control Fastener Kit (#42907010) 1
  - *containing:* #8-32 Screws (#02166010) & Nuts (#02127030) ..... 2 ea.
  - ¼ - 20 Locknuts (#02167010) 6
- Tube Flange Gasket (#42921000) 2
- Installation & Operation Instructions (#43155250) 1

CONTROL/DRAFT INDUCER PACKAGE NUMBERS:

MODEL NO.	*PART NO.*
–NATURAL GAS–	
LTU80-N5	#42883010
LTU90-N5	#42883030
LTU100-N5	#42883050
LTU110-N5	#42883070
LTU120-N5	#42883090
LTU125-N5	#42883110
LTU130-N5	#42883130
LTU140-N5	#42883190
LTU150-N5	#42883210
LTU160-N5	#42883230
LTU175-N5	#42883250
LTU180-N5	#42883270
LTU200-N5	#42883290
LTU225-N5	#42883310
LTU250-N5	#42883330
–PROPANE GAS–	
LTU80-L5	#42883020
LTU90-L5	#42883040
LTU100-L5	#42883060
LTU110-L5	#42883080
LTU120-L5	#42883100
LTU125-L5	#42883120
LTU130-L5	#42883140
LTU140-L5	#42883200
LTU150-L5	#42883220
LTU160-L5	#42883240
LTU175-L5	#42883260
LTU180-L5	#42883280
LTU200-L5	#42883300
LTU225-L5	#42883320
LTU250-L5	#42883340

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

■ **LTU 80–130** (30' TUBE)

Each 30' LTU tube heater contains **one 15' Body Package** as listed below.

(1)	**#42881000, 15 Ft. Body Package** (QTY=1) *containing*: a) #42914000, Pre-assembled 15' ALC steel U-tube (two 24-hole flanges) with Reflector (QTY=1) b) #42895000, Control End Reflector (QTY=1) c) #42896000, Foot End Reflector (QTY=1) d) #02266010, Speed Clips (QTY=20)

■ **LTU 125–175** (40' TUBE)

Each 40' LTU tube heater contains **one 15' Body Package** and **one 5' Body Package** as listed below.

(1)	**#42881000, 15 Ft. Body Package** (QTY=1) (*same as listed above)*
(2)	**#42882000, 5 Ft. Body Package** (QTY=1) *containing*: a) #42915000, Pre-assembled 5' ALC steel tube (two 24-hole flanges) with Reflector (QTY=1) b) #42907020, Body Fastener Kit (QTY=1) *containing*: #02167010, ¼-20 Locknuts (QTY=12) #02259000, ¼-20 Machine Screws (QTY=12) #02266010, Speed Clips (QTY=2) c) #42921000, Tube Flange Gasket (QTY=2)

■ **LTU 180–200** (50' TUBE)

Each 50' LTU tube heater contains **one 10' Starting Body Package** and **one 15' Body Package** as listed below.

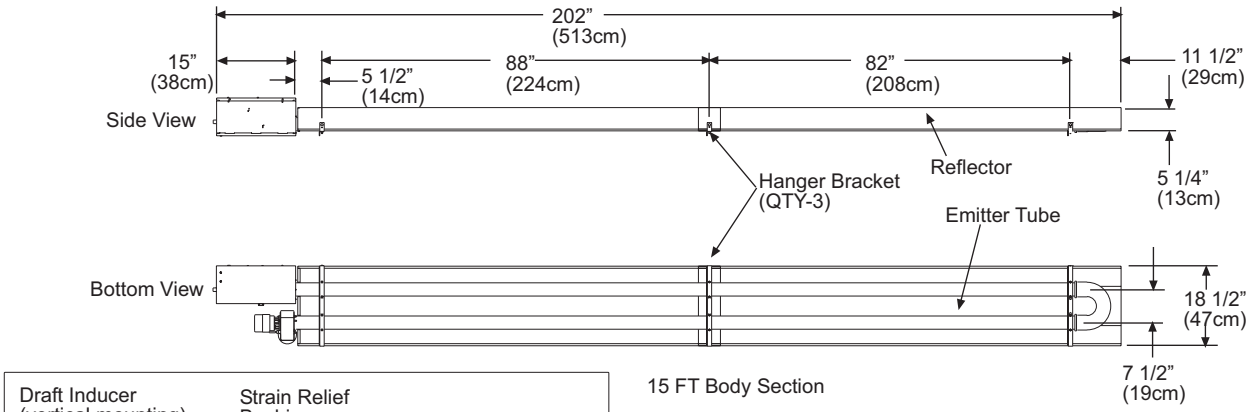
(1)	**#42882020, 10 Ft. Body Package** (QTY=1) *containing*: a) #42915020, Pre-assembled 10' ALC steel tubes (24-hole flanges) and reflector (QTY=1) b) #42907020, Fastener Kit (QTY=1) *containing*: #02167010, ¼-20 Locknuts (QTY=12) #02259000, ¼-20 Machine Screws (QTY=12) #02266010, Speed Clips (QTY=2) c) #42921000, Tube Flange Gasket (QTY=2)
(2)	**#42881000, 15 Ft. Body Package** (QTY=1) *containing*: a) #42914000, Pre-assembled 15' ALC steel tubes (24-hole flanges), U-bend and reflector (QTY=1) b) #42895000, Control End Reflector (QTY=1) c) #42896000, Foot End Reflector (QTY=1) d) #02266010, Speed Clips (QTY=20)

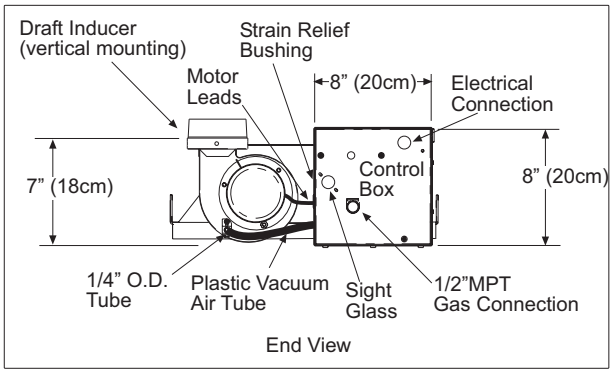
■ **LTU 225–250** (50' TUBE)

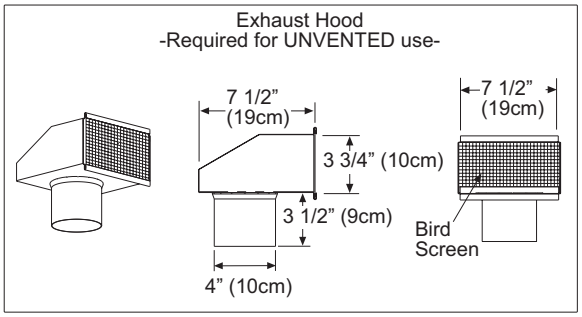
Each 50' LTU tube heater contains **one 10' Starting Body Package** and **one 15' Body Package** as listed below.

(1)	**#42882030, 10 Ft. Body Package** (QTY=1) *containing*: a) #42915030, Pre-assembled with reflector, one 10' ATC steel tube with 6-hole flanges and one 10' ALC steel tube with 24-hole flanges (QTY=1) b) #42907020, Fastener Kit (QTY=1) *containing*: #02167010, ¼-20 Locknuts (QTY=12) #02259000, ¼-20 Machine Screws (QTY=12) #02266010, Speed Clips (QTY=2) c) #42921000, Tube Flange Gasket (QTY=2)
(2)	**#42881000, 15 Ft. Body Package** (QTY=1) (*same as listed above)*

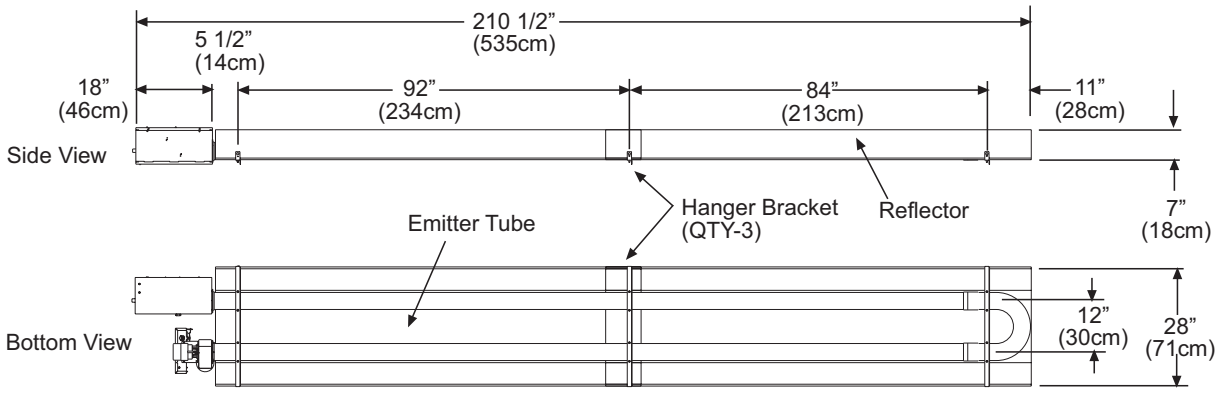
4.0) LTU (40-75)-30 SERIES — DIMENSIONS





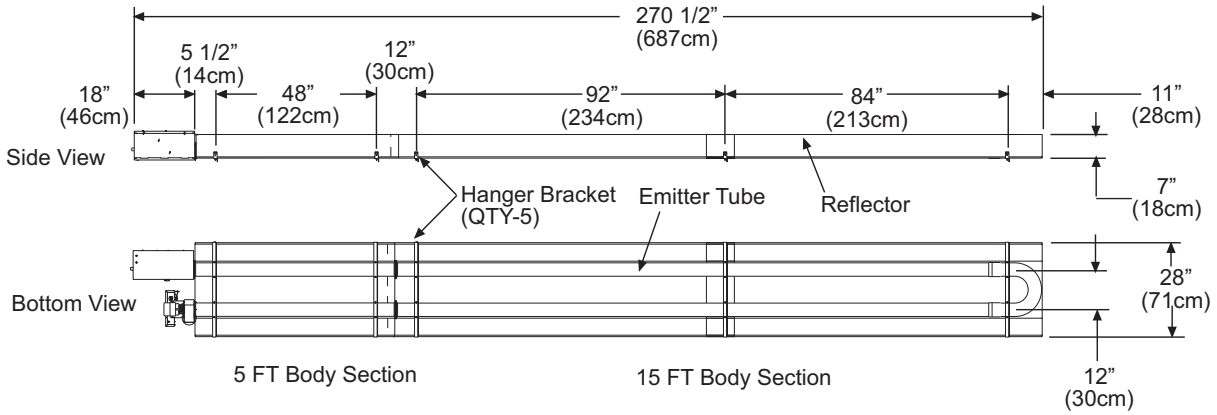


4.1) LTU (80-130)-30 SERIES — DIMENSIONS

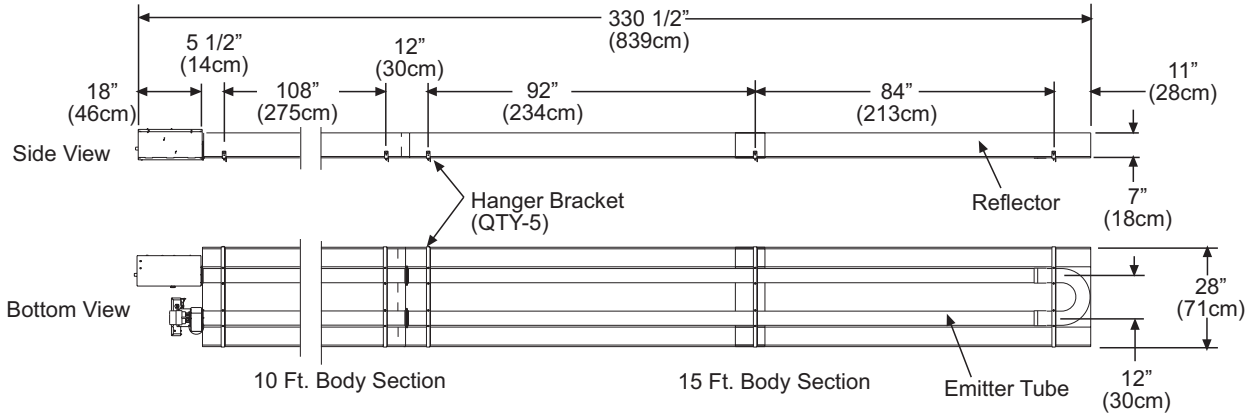


15 FT Body Section

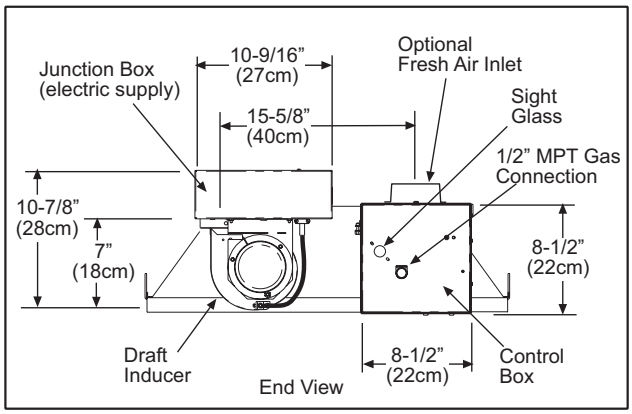
4.2) LTU (125-175)-40 SERIES — DIMENSIONS

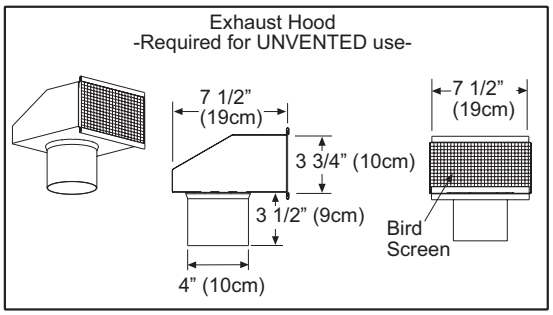


4.3) LTU (180-250)-50 SERIES — DIMENSIONS



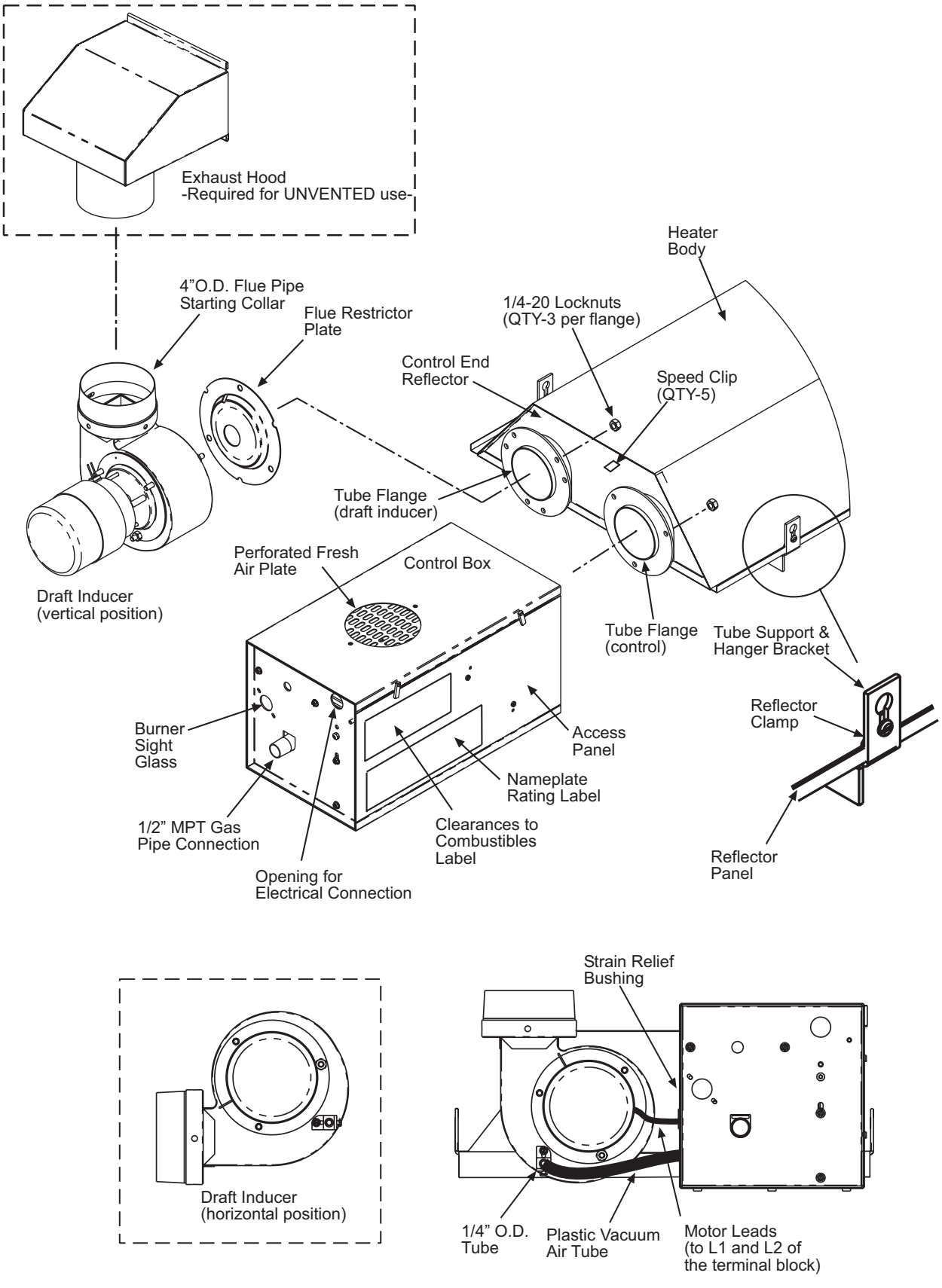
4.4) LTU 80-250 SERIES — DIMENSIONS





5.0) LTU 40-75 SERIES — HEATER ASSEMBLY

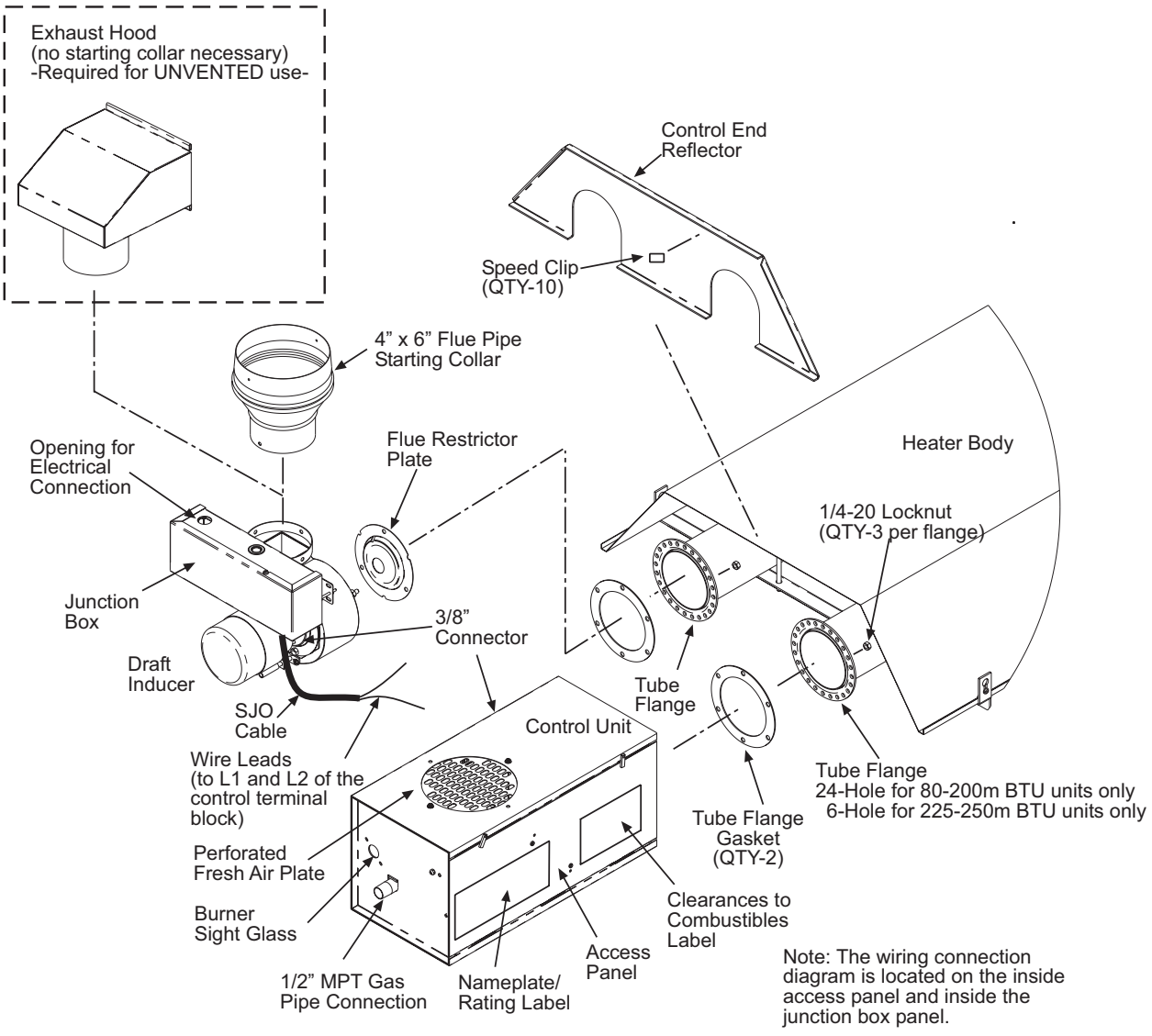
1. Loosen the reflector clamps on the tube support/hanger brackets as shown on the next page. **Do not** relocate the tube support/hanger brackets, especially at the control box end of the heater.
2. Slide the end of the main reflector back to the first tube support/hanger bracket.
3. Place the flanges of the control end reflector flush with the end of the main body reflector. Secure by sliding speed clips onto reflector edges. Evenly space speed clips on sides and top of reflectors to provide a snug fit. Place foot end reflector (not shown) on the opposite end of the body reflector and secure as above.
4. Attach the control box to the right-hand control tube flange and secure with 1/4-20 locknuts. See below.
5. The control box must be mounted with the perforated fresh air plate on top, facing the ceiling.
6. Attach the draft inducer assembly to the left-hand draft inducer tube flange and secure with 1/4-20 locknuts. See below A flue restrictor plate is attached to the draft inducer weld studs. Make sure this remains in place while the draft inducer is being attached to the heater body.
7. Slip the plastic vacuum air tube over the 1/4" O.D. aluminum tube end of the draft inducer. See below. The air tube should be shortened to prevent a downward sag which could allow condensation build-up in the tube.
8. Insert motor lead wires through the strain relief bushing of the control box and connect to L1 and L2 of terminal block. See below. Refer also to the wiring diagram in Section 18.
9. Slide the body reflector back toward the control box. Make sure that there is a two-inch gap between the control box and the main reflector.
10. Reflectors should overlap 1" to 3" and must be secured by sliding speed clips on the reflector edges. One speed clip is required for each side of the reflector. Tighten the reflector clamps once the reflectors are secured with speed clips. DO NOT OVER TIGHTEN the reflector clamp in the middle of the first body section. Make sure that the reflector can slide under the clamp during heater operation.



LTU40-75 SERIES HEATER ASSEMBLY

5.1) LTU 80-175 SERIES — HEATER ASSEMBLY

1. Place the flanges of the control end reflector (packaged with the 15' body section) flush with the end of the body reflector. Secure by sliding the speed clips onto the reflector edges. Evenly space the speed clips on the sides and top of the reflector to provide a snug fit. Place the foot end reflector (not shown) on the opposite end of the body reflector and secure as described above. **DO NOT** relocate the tube support/hanger brackets, especially at the control end of the heater. Slide the reflector toward the U-bend and leave a 3" space between the control end reflector and the control box.
2. Attach the control box and gasket to the right hand tube flange and secure with the ¼-20 locknuts. The control box must be mounted with the perforated fresh air plate on top, facing the ceiling.
3. Attach the draft inducer assembly and gasket to the left hand tube flange and secure with the ¼-20 locknuts. **A flue restrictor plate is attached to the draft inducer weld stud. Make sure this remains in place while the draft inducer is being attached to the heater body. NOTE: The draft inducer can be mounted in either a vertical, a 45° angle, or a horizontal position. Refer to the diagram on multiple hanging and draft inducer positions (Section 15.1).**
4. Take the end of the SJO cable from the junction box and insert it through the 3/8" connector of the control box. Connect the wire leads of the SJO cable to "1" and "2" of the terminal block. Refer to the Connection Wiring Diagram (Section 18.0). Tighten the screws of the connector.
5. If the heater is to be VENTED to the outside of the building, place the 4"x6" starting collar onto the outlet of the draft inducer and secure with the #8-32 screws and nuts. Place the flue pipe directly onto the starting collar, secure with the #8 sheet metal screws, and terminate with an approved vent cap.
6. If the heater is for UNVENTED use, place the exhaust hood (supplied as an accessory) directly onto the outlet of the draft inducer (starting collar is not necessary for unvented use). Secure with the #8 sheet metal screws. **The exhaust hood must be mounted only in an upright position and directed towards the reflector body.**

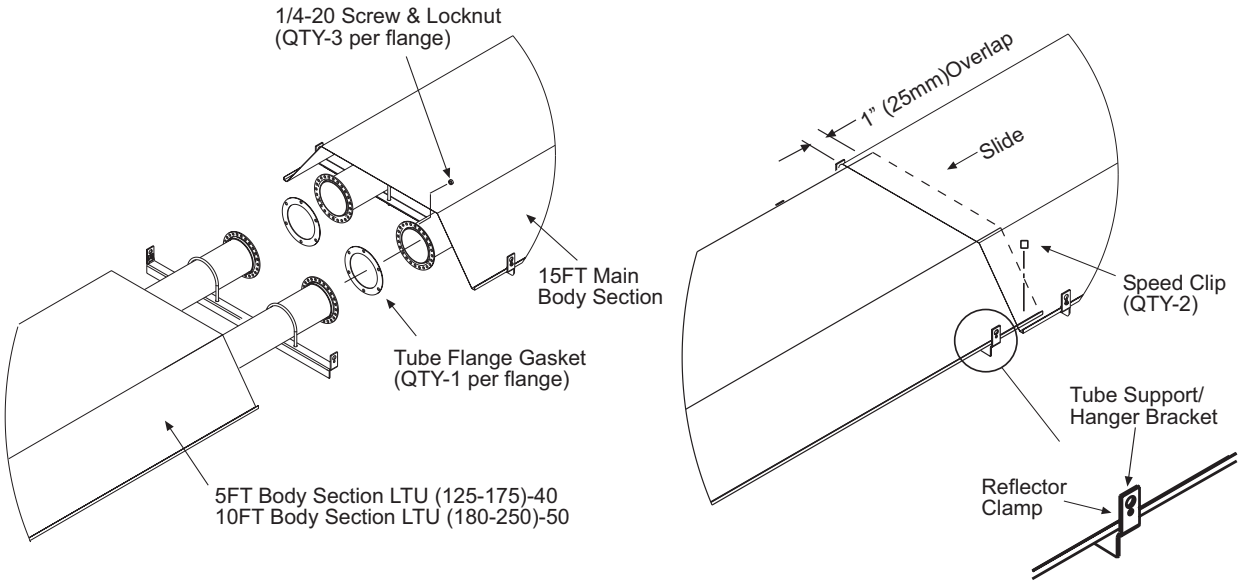


5.2) LTU 125-250 SERIES — JOINING OF BODY SECTIONS

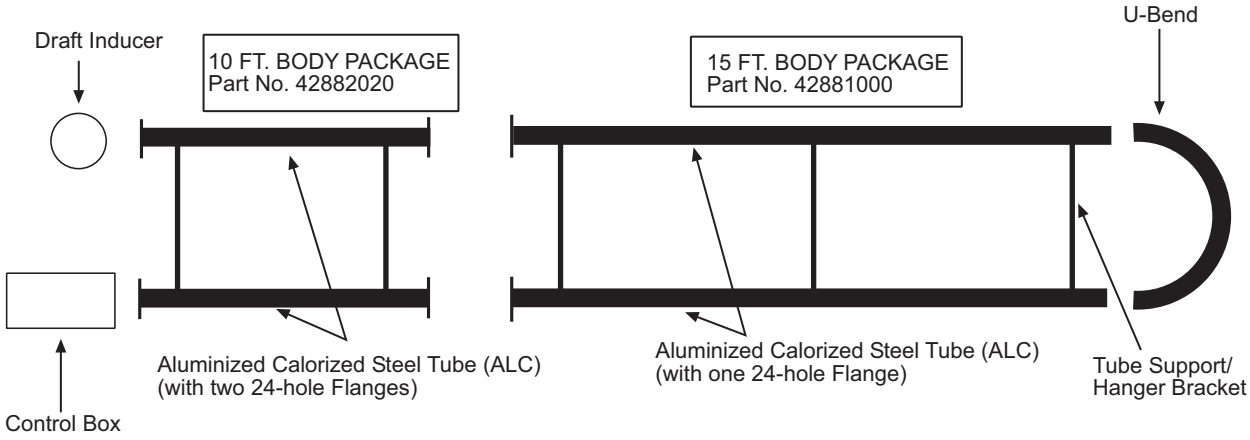
MODELS LTU(125–175)-40 →These models require the use of an additional 5 ft. body section, as shown on the heater dimension sheet.

MODELS LTU(180–250)-50 →These models require the use of an additional 10 ft. body section, as shown on the heater dimension sheet.

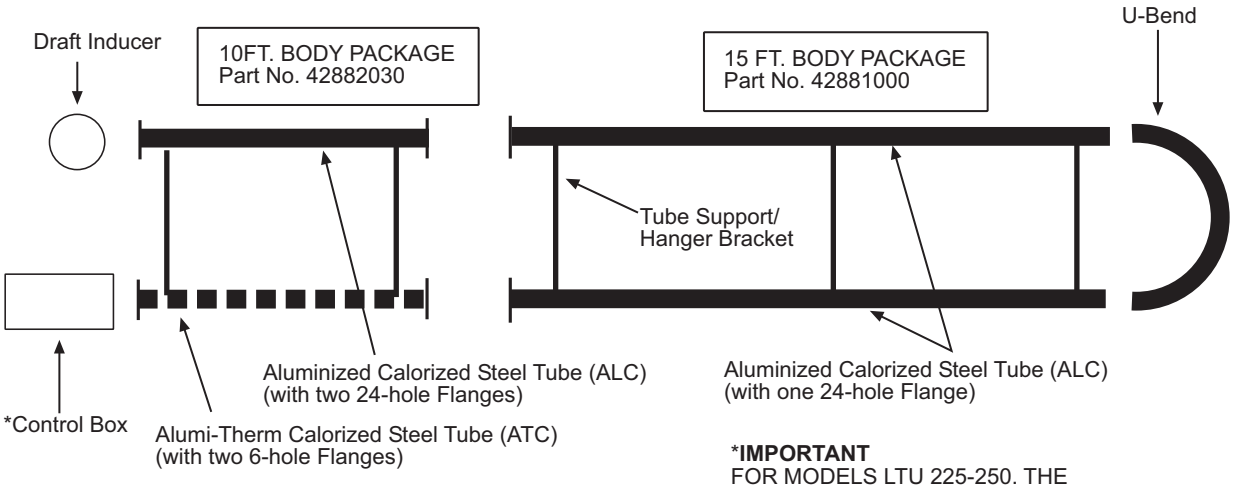
1. Join the tube flanges of the 15 ft. body section to the appropriate 5 ft or 10 ft. body sections with the tube flange gaskets in between. Secure the flanges with the ¼-20 screws and locknuts provided in the body package. **NOTE: The #42882030 body section has one tube with a 6-hole flange. This is for connection of the control box on the LTU225 or LTU250 heaters only. It is a special, high-temperature, Alumi-Therm tube designed for use with these higher input heaters only. Failure to attach the control box to the 6-hole flange will void the manufacturer's warranty.**
2. Pull the reflector on the 15 ft. body section over the reflector on the 5 ft or 10 ft body section to maintain approximately a 1-inch overlap. Secure the reflectors by sliding the speed clips on the reflector edges as shown in the following illustration. One speed clip is required for each side of the reflector. Once the reflectors are secured with the speed clips as shown, tighten the reflector clamps, making sure that the reflector can slide under the clamps during heater operation.
3. Assemble the control box, draft inducer, & other components as previously described in the heater assembly instructions.



5.3) LTU (180-250)-50 SERIES — TYPICAL ASSEMBLY LAYOUT



MODELS: LTU (180-200)-50



MODELS: LTU 225-250

***IMPORTANT**
FOR MODELS LTU 225-250. THE CONTROL BOX MUST BE ATTACHED TO AN ALUMI-THERM STEEL TUBE HAVING 6-HOLE FLANGES.

6.0) LTS 40-250 SERIES — SPECIFICATIONS

Model No.	Btu/hr Input	Flue Restrictor Plate I.D. & Part #		Orifice Size				Minimum ✳ Mounting Height	
				Natural Gas		*Propane Gas*		@ *Horizontal*	@ *45° Angle*
LTS 40	40,000	1"	#42741040	#31	(0.120)	#49	(0.073)	10 ft.	9 ft.
LTS 50	50,000	1-1/8"	#42741030	3.3mm	(0.130)	#46	(0.081)	11 ft.	10 ft.
LTS 60	60,000	1-7/32"	#42741020	#27	(0.144)	#43	(0.089)	12 ft.	11 ft.
LTS 75	75,000	1-7/16"	#42741010	#20	(0.161)	#39	(0.099)	13 ft.	12 ft.
LTS 80	80,000	1-1/2"	#42741050	#19	(0.166)	#38	(0.102)	13 ft.	12 ft.
LTS 90	90,000	1-1/2"	#42741050	#16	(0.177)	#36	(0.106)	13 ft.	12 ft.
LTS 100	100,000	1-5/8"	#42741060	#14	(0.182)	#33	(0.113)	13 ft.	12 ft.
LTS 110	110,000	1-3/4"	#42741070	#10	(0.194)	#31	(0.120)	14 ft.	13 ft.
LTS 120	120,000	1-3/4"	#42741070	13/64	(0.203)	1/8	(0.125)	14 ft.	13 ft.
LTS 125	125,000	1-7/8"	#42741080	#5	(0.206)	#30	(0.129)	14 ft.	13 ft.
LTS 130	130,000	1-7/8"	#42741080	#4	(0.209)	3.3mm	(0.130)	14 ft.	13 ft
LTS 140	140,000	2-1/32"	#42741090	5.5mm	(0.216)	#29	(0.136)	15 ft.	14 ft.
LTS 150	150,000	2-1/32"	#42741090	5.7mm	(0.224)	#28	(0.140)	15 ft.	14 ft.
LTS 160	160,000	2-1/4"	#42741100	5.8mm	(0.228)	#27	(0.144)	15 ft.	14 ft.
LTS 175	175,000	2-1/4"	#42741100	"C"	(0.242)	3.8mm	(0.150)	15 ft.	14 ft.
LTS 180	180,000	2-1/4"	#42741100	"C"	(0.242)	#24	(0.152)	18 ft.	17 ft.
LTS 200	200,000	2-3/8"	#42741130	"F"	(0.257)	#21	(0.159)	18 ft.	17 ft.
LTS 225	225,000	2-1/2"	#42741140	6.9mm	(0.272)	#18	(0.170)	20 ft.	19 ft.
LTS 250	250,000	2-3/4"	#42741150	"K"	(0.281)	4.5mm	(0.177)	20 ft.	19 ft.

✳**MOUNT HEATERS AS HIGH AS POSSIBLE**. Minimums are are shown for human comfort and uniform heat distribution.

Type Gas:	Gas-Pipe Connection: [1]	Tube Diameter:	Flue Connection: [2]	Fresh Air Connection: [2]	Electrical Supply:	Current Rating:
Natural or Propane	½" NPT (Female)	4"	6" Round	6" Round	120 Volt, 60Hz, 1 Phase	2.6 Amp

NOTES: 1) LTS/LTU200 and above require a minimum 3/4" flex connector.
2) 4" round for models LTU40–75.

Fuse Rating:		Ignition System:
In-line: 2 Amp 250V (for 24V Circuit)	*Spark Module:* 3 Amp 250V (for 24V Circuit)	Direct Spark (with 30-second prepurge period)

7.0) LTS 40-250 SERIES — PACKING LIST

A) Control/Draft Inducer Package — **QTY**

- Control Box Assembly 1
- Draft Inducer & Junction Box Assembly 1
- 4" x 6" Starting Collar (#42892000) 1
- 4" Starting Collar (#40504020) LTS40-75 1
- Control Fastener Kit (#42907050) 1
  - *containing:* #8-32 x 3/8" Screws (#02166010) & Nuts (#02127030) ..... 2 ea.
  - ¼ - 20 Locknuts (#02167010) 6
  - Speed Clips (#02266010) 8
- Tube Flange Gasket (#42921000) 2
- Installation & Operation Instructions (#43155250) 1

CONTROL/DRAFT INDUCER PACKAGE NUMBERS:

MODEL NO.	*PART NO.*
— NATURAL GAS —	
LTS40-N5	#43187010
LTS50-N5	#43187030
LTS60-N5	#43187050
LTS75-N5	#43187070
LTS80-N5	#42883010
LTS90-N5	#42883030
LTS100-N5	#42883050
LTS110-N5	#42883070
LTS120-N5	#42883090
LTS125-N5	#42883110
LTS130-N5	#42883130
LTS140-N5	#42883190
LTS150-N5	#42883210
LTS160-N5	#42883230
LTS175-N5	#42883250
LTS180-N5	#42883270
LTS200-N5	#42883290
LTS225-N5	#42883310
LTS250-N5	#42883330
— PROPANE GAS —	
LTS40-L5	#43187020
LTS50-L5	#43187040
LTS60-L5	#43187060
LTS75-L5	#43187080
LTS80-L5	#42883020
LTS90-L5	#42883040
LTS100-L5	#42883060
LTS110-L5	#42883080
LTS120-L5	#42883100
LTS125-L5	#42883120
LTS130-L5	#42883140
LTS140-L5	#42883200
LTS150-L5	#42883220
LTS160-L5	#42883240
LTS175-L5	#42883260
LTS180-L5	#42883280
LTS200-L5	#42883300
LTS225-L5	#42883320
LTS250-L5	#42883340

B) LTS 40-175 Body Package Descriptions

(Package Number is indicated on the outside of each corresponding carton.)

	SYSTEM LENGTH→	15'	20'	25'	30'	35'	40'	45'	50'
(1)	**#43337040, Start/End 10 Ft. Body Package** – includes: *Quantity* =	1	2	1	2	1	2	1	2
	a) #43182060, Pre-assembled 10' ALC Steel Tube (one 24-hole flange) with reflector (QTY=1)								
	b) #30462980, Tube Coupling (QTY=1)								
	c) #43320000, End Reflector (QTY=1)								
	d) #42907140, Reflector/Coupling Fastener Kit (QTY=1)								
	containing: #02189020, Self-drilling screws (QTY=2)								
	#02266010, Speed Clips (QTY=6)								
(2)	**#43337010, 10 Ft. Body Package** – includes: *Quantity* =	–	–	1	1	2	2	3	3
	a) #43182040, Pre-assembled 10' ALC Steel Tube (no flanges) with reflector (QTY=1)								
	b) #30462980, Tube Coupling (QTY=1)								
	c) #42907140, Reflector/Coupling Fastener Kit (QTY=1)								
	containing: #02189020, Self-drilling Screws (QTY=2)								
	#02266010, Speed Clips (QTY=6)								
(3)	**#43336030, Ending 5 Ft. Body Package** – includes: *Quantity* =	1	–	1	–	1	–	1	–
	a) #43181050, Pre-assembled 5' ALC Steel Tube (one 24-hole flange) with reflector (QTY=1)								
	b) #30462980, Tube Coupling (QTY=1)								
	c) #43320000, End Reflector (QTY=1)								
	d) #42907140, Reflector/Coupling Fastener Kit (QTY=1)								
	containing: #02189020, Self-drilling Screws (QTY=2)								
	#02266010, Speed Clips (QTY=6)								

C) LTS 180-200 Body Package Descriptions

(Package Number is indicated on the outside of each corresponding carton.)

	SYSTEM LENGTH→	50'	55'	60'	65'	70'	75'	80'
(1)	**#43337040, Start/End 10 Ft. Body Package** – includes: *Quantity* =	2	1	2	1	2	1	2
	a) #43182060, Pre-assembled 10' ALC Steel Tube (one 24-hole flange) with reflector (QTY=1)							
	b) #30462980, Tube Coupling (QTY=1)							
	c) #43320000, End Reflector (QTY=1)							
	d) #42907140, Reflector/Coupling Fastener Kit (QTY=1)							
	containing: #02189020, Self-drilling screws (QTY=2)							
	#02266010, Speed Clips (QTY=6)							
(2)	**#43337010, 10 Ft. Body Package** – includes: *Quantity* =	3	4	4	5	5	6	6
	a) #43182040, Pre-assembled 10' ALC Steel Tube (no flanges) with reflector (QTY=1)							
	b) #30462980, Tube Coupling (QTY=1)							
	c) #42907140, Reflector/Coupling Fastener Kit (QTY=1)							
	containing: #02189020, Self-drilling Screws (QTY=2)							
	#02266010, Speed Clips (QTY=6)							
(3)	**#43336030, Ending 5 Ft. Body Package** – includes: *Quantity* =	0	1	0	1	0	1	0
	a) #43181050, Pre-assembled 5' ALC Steel Tube (one 24-hole flange) with reflector (QTY=1)							
	b) #30462980, Tube Coupling (QTY=1)							
	c) #43320000, End Reflector (QTY=1)							
	d) #42907140, Reflector/Coupling Fastener Kit (QTY=1)							
	containing: #02189020, Self-drilling Screws (QTY=2)							
	#02266010, Speed Clips (QTY=6)							

D) LTS 225-250 Body Package Descriptions

(Package Number is indicated on the outside of each corresponding carton.)

		SYSTEM LENGTH→	50'	55'	60'	65'	70'	75'	80'
(1)	**#43337050, Starting 10 Ft. Body Package** – includes:	*Quantity* =	1	1	1	1	1	1	1
	a) #43182023, Pre-assembled 10' ATC Steel Tube (two 6-hole flanges) with reflector (QTY=1)								
	b) #43320000, End Reflector (QTY=1)								
	c) #42907180, Body Fastener Kit (QTY=1)								
	containing: #02167010, 1/4-20 Locknuts (QTY=6)								
	#02259000, 1/4-20 Screws (QTY=6)								
	#02266010, Speed Clips (QTY=4)								
	#42910000, Tube Flange Gasket (QTY=1)								
(2)	**#43337040, Start/End 10 Ft. Body Package** – includes:	*Quantity* =	2	1	2	1	2	1	2
	a) #43182060, Pre-assembled 10' ALC Steel Tube (one 24-hole flange) with reflector (QTY=1)								
	b) #30462980, Tube Coupling (QTY=1)								
	c) #43320000, End Reflector (QTY=1)								
	d) #42907140, Reflector/Coupling Fastener Kit (QTY=1)								
	containing: #02189020, Self-drilling screws (QTY=2)								
	#02266010, Speed Clips (QTY=6)								
(3)	**#43337010, 10 Ft. Body Package** – includes:	*Quantity* =	2	3	3	4	4	5	5
	a) #43182040, Pre-assembled 10' ALC Steel Tube (no flanges) with reflector (QTY=1)								
	b) #30462980, Tube Coupling (QTY=1)								
	c) #42907140, Reflector/Coupling Fastener Kit (QTY=1)								
	containing: #02189020, Self-drilling Screws (QTY=2)								
	#02266010, Speed Clips (QTY=6)								
(4)	**#43336030, Ending 5 Ft. Body Package** – includes:	*Quantity* =	0	1	0	1	0	1	0
	a) #43181050, Pre-assembled 5' ALC Steel Tube (one 24-hole flange) with reflector (QTY=1)								
	b) #30462980, Tube Coupling (QTY=1)								
	c) #43320000, End Reflector (QTY=1)								
	d) #42907140, Reflector/Coupling Fastener Kit (QTY=1)								
	containing: #02189020, Self-drilling Screws (QTY=2)								
	#02266010, Speed Clips (QTY=6)								

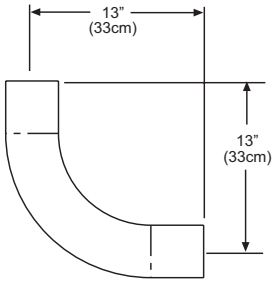
8.0) ACCESSORY PACKAGES

A) Elbow Accessory Package, Part #43208010

(Option for LTS Series Only)

Contains:

Elbow, #431750010.....*QTY–1*
#10-16 x ½ Self-Drilling Screws, #02189020.....*QTY–2*
Tube Coupling, #30462980.....*QTY–1*



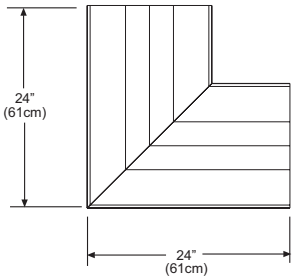
90 DEG. ELBOW

B) Corner Reflector Accessory Package, Part #43342000

(Option for LTS Series Only)

Contains:

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

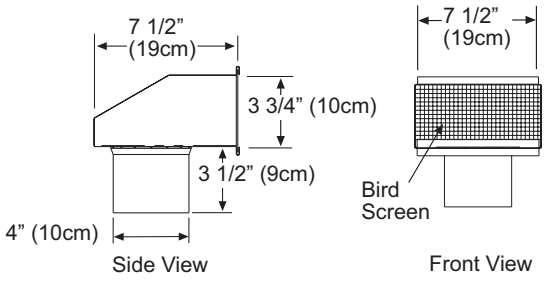


CORNER REFLECTOR

C) Exhaust Hood Package, Part #42924000

Contains:

Exhaust Hood Assembly, #42925540.....*QTY–1*
#10-16 x ½ Self-Drilling Screws, #02189020.....*QTY–2*

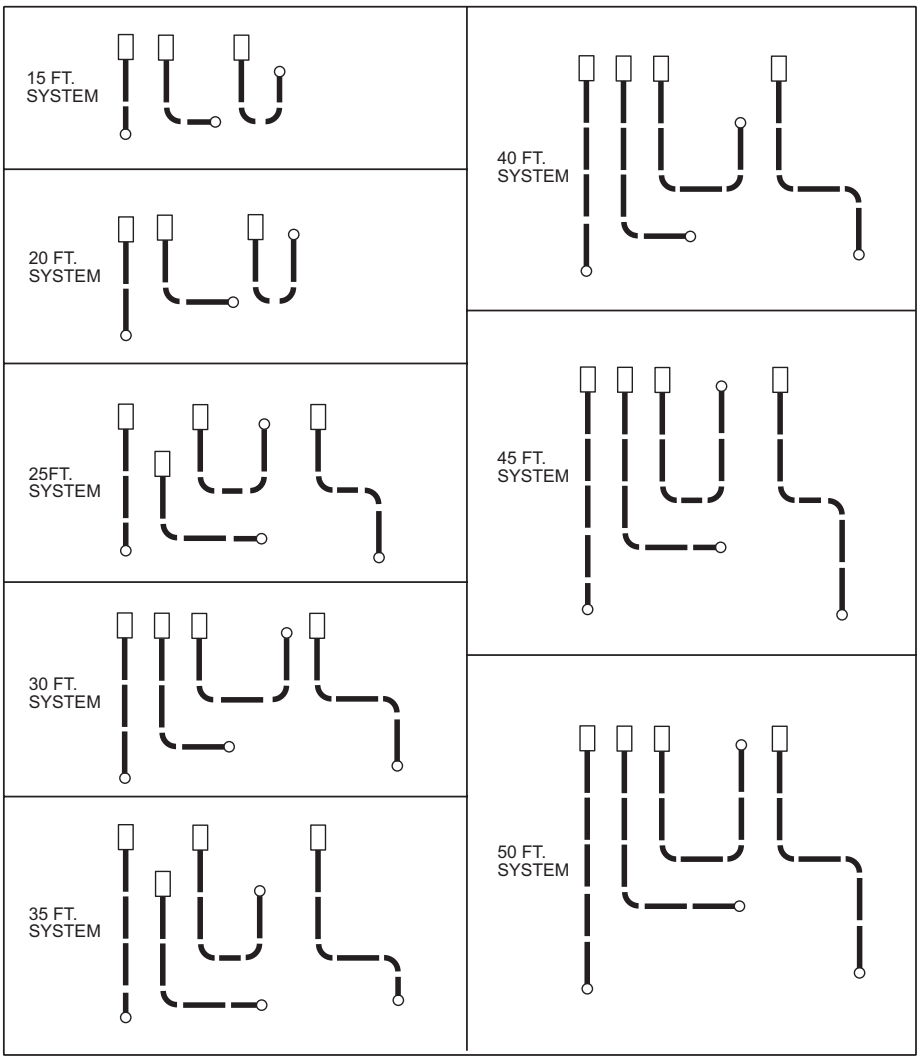


EXHAUST HOOD

9.0) LTS 40-250 SERIES — TYPICAL LAYOUTS

☑ **Straight** ☑ **U Shape**
☑ **L Shape** ☑ **Z Shape**

MODEL	EMITTER LENGTH	
	Min.	*Max.*
LTS 40	15 Ft.	20 Ft.
LTS 50	15 Ft.	30 Ft.
LTS 60	20 Ft.	30 Ft.
LTS 75	20 Ft.	30 Ft.
LTS 80	30 Ft.	40 Ft.
LTS 90	30 Ft.	40 Ft.
LTS 100	30 Ft.	40 Ft.
LTS 110	30 Ft.	40 Ft.
LTS 120	30 Ft.	40 Ft.
LTS 125	30 Ft.	50 Ft.
LTS 130	30 Ft.	50 Ft.
LTS 140	40 Ft.	50 Ft.
LTS 150	40 Ft.	50 Ft.
LTS 160	40 Ft.	50 Ft.
LTS 175	40 Ft.	50 Ft.
LTS 180	50 Ft.	80 Ft.
LTS 200	50 Ft.	80 Ft.
LTS 225	50 Ft.	80 Ft.
LTS 250	50 Ft.	80 Ft.



TYPICAL LAYOUTS UP TO 50FT. ARE SHOWN

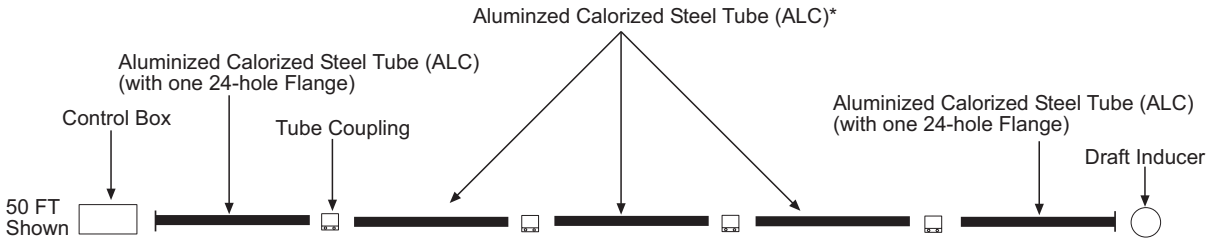
LEGEND

- Control Unit
- Draft Inducer Unit
- 10 FT. Body Section
- 5 FT. Body Section
- 90 Deg. Elbow

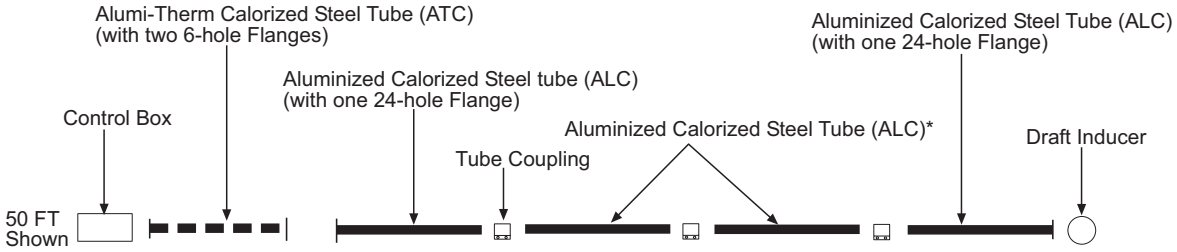
NOTES:

1) In all configurations, the control unit must be connected directly to either **a)** the 24-hole flange of the 10 ft. aluminized steel start/end body section (for LTS 40-200 models) **or b)** the 6-hole flange of the 10 ft. Alumi-Therm starting body section (for LTS225 and LTS250 models). **Failure to attach the control box to the 6-hole flange for LTS225-250 as indicated above will void the manufacturer's warranty.**
2) Joining of two 90° elbows directly together to form a "Z" shape IS NOT permitted.
3) 5 Ft. Body Packages may be utilized on any of these heaters to yield heater lengths from 50 ft. to 80 ft.
4) Any configuration of components not shown in the illustrations may be used except as noted in 1 and 2 above.

9.1) LTS 180-250 SERIES — TYPICAL ASSEMBLY LAYOUT



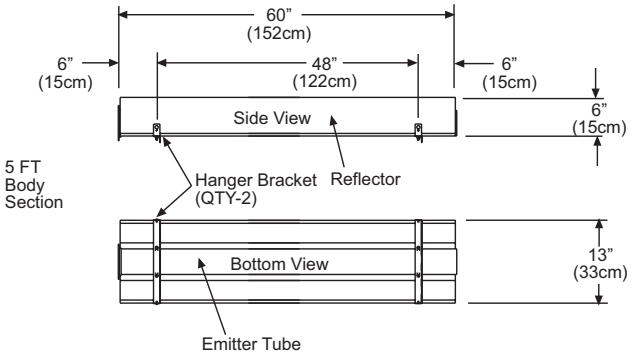
MODELS: LTS180-200

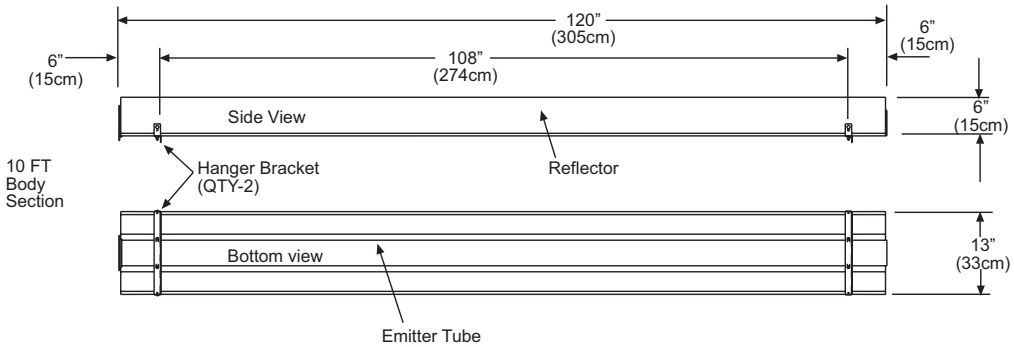


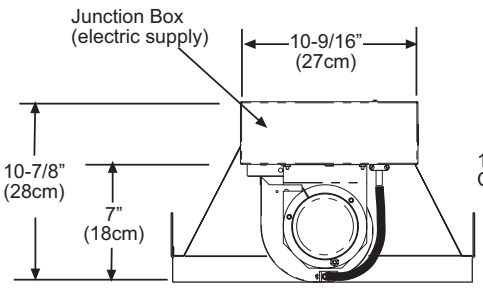
MODELS: LTS 225-250

* Additional tubes of this type are added to increase the heater length up to a maximum of 80 ft.

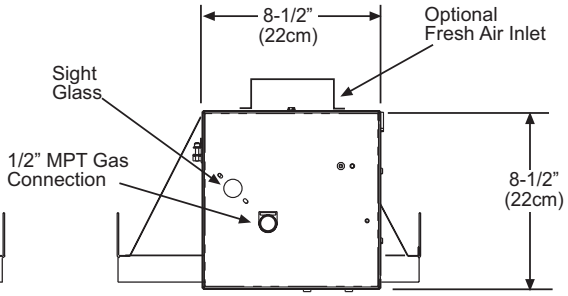
10.0) LTS 40-250 SERIES — DIMENSIONS







LTS (draft inducer end view)



LTS (control box end view)

11.0) LTS 40-250 SERIES — HEATER ASSEMBLY / JOINING OF BODY SECTIONS

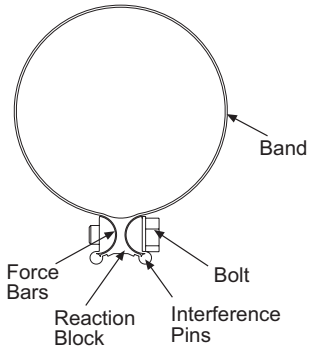
During field assembly of the LTS series heater body sections, the recommended procedure is as follows:

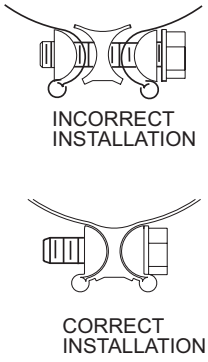
1. Before hanging heater sections, first determine the actual layout of the system (see Section 9 for details). Consideration must also be taken for flue pipe, fresh air ducting, gas piping, etc. before hanging the heater. Typical suspension methods are shown in Section 15.2. **NOTE: The control box must be mounted to a 10 ft. Alumi-Therm body section (LTS 225 and 250 models). Failure to attach the control box to the flange end as indicated above will void the manufacturer's warranty. DO NOT relocate the tube support/hanger brackets, especially at the control end of the heater.**
2. Hang each heater body section individually. See Section 15.2 for typical suspension methods. **DO NOT** attach the heater body sections together on the ground and attempt to hang the entire system at one time. **The weight of the individual heater body sections can cause misalignment and damage to the heater.**
3. Join the body sections together and secure with tube couplings as follows (see diagram on next page):

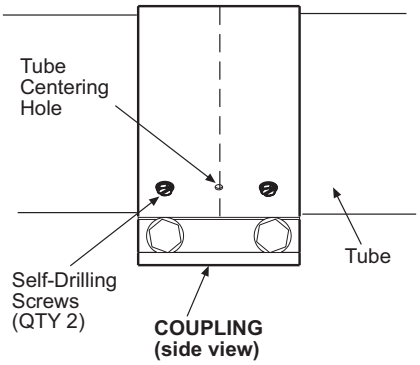
   ▲WARNING: The following coupling tightening instructions must be followed properly to avoid future problems.

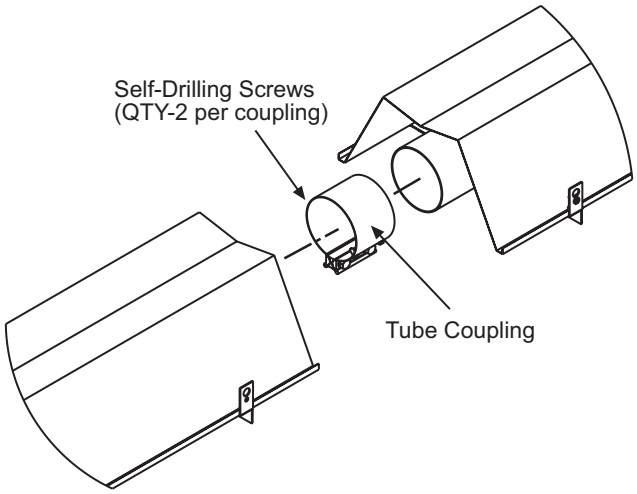
   a. Place the compression coupling over the end of the tube from one body section, with the tightening bolts located on the bottom and facing the installer. **NOTE:** There is a small hole at the centerline of the coupling that can be used to sight the end of the tube.
   b. Partially tighten the bolt nearest the end of the tube (approximately half closed).
   c. Slide the ends of the tube from the opposite body section into the coupling. Make sure both tube ends are butted together.
   d. Finish tightening both bolts to 40-60 ft.lbs. torque to ensure a complete seal.
   e. Check to ensure that the hardware is completely closed and that the band is seated on the reaction block and interference pins as illustrated below.
   f. Check to see if the reaction block is firmly seated on the tube.
   g. Self-drilling screws are provided to prevent any possible movement of the tubes from the coupling. Install the screws as shown using an electric or air screwdriver with approximately 2500 rpm speed. Pre-punched holes in the coupling make it easier to install these self-drilling screws.
   h. Once all the heater body sections are attached, make sure that the heater system is level. If it is not, slight adjustments can be made using the turnbuckles. (See Section 15.2.)

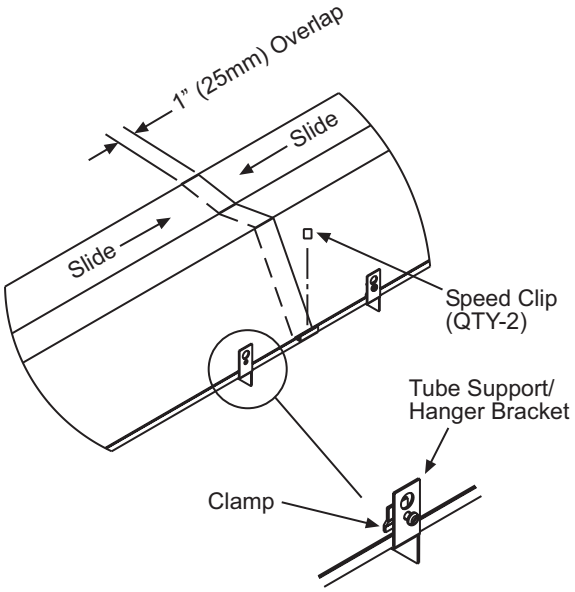
   □IMPORTANT: NEVER REUSE A COUPLING. Always install a new coupling only and torque as per instructions above and the diagrams that follows.
4. The tube at the coupling joints must be covered. Slide the reflectors together and provide a one-inch overlap. (This will allow for the natural expansion and contraction of the heater when in operation.) Secure reflectors together by sliding speed clips on the reflector joint edges. One speed clip is required for each side of the reflector. Tighten the reflector clamps. **□DO NOT OVER-TIGHTEN□ Make sure that the reflector can slide under the clamp during heater operation.**







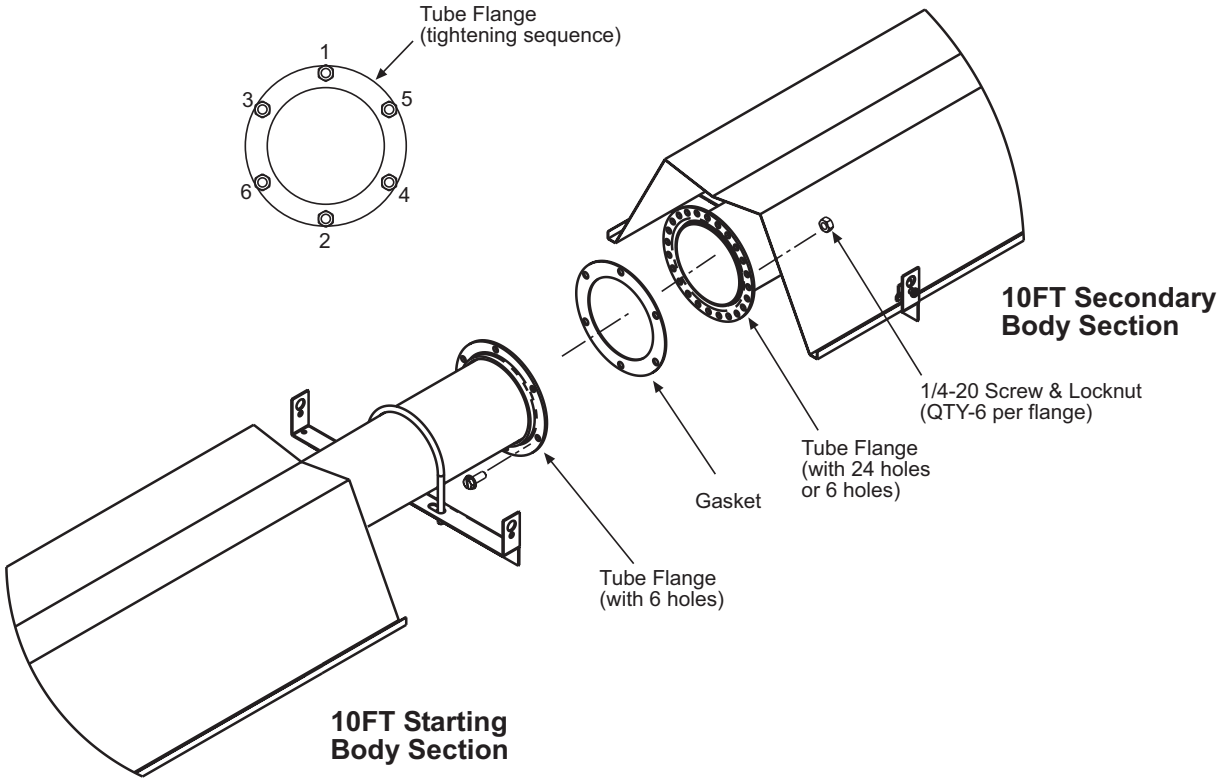




11.1) LTS 225-250 SERIES — JOINING OF BODY SECTIONS

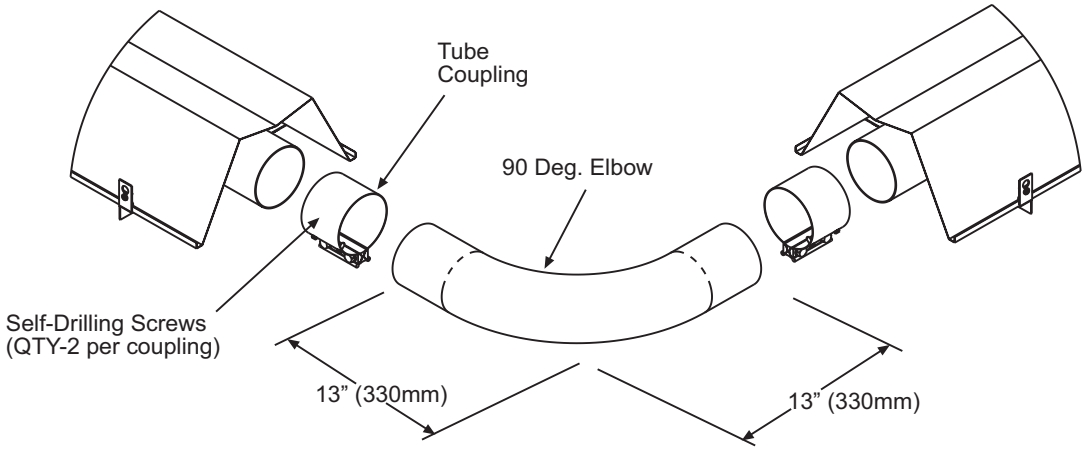
The control box must be attached to a 6-hole flange on the 10 ft. Starting Body Package (this body package has a 6-hole flange at both ends of the tube). The other 6-hole flange must be connected to a 24-hole flange on the body package for LTS225-250models. The ¼-20 screws and locknuts and flange gasket required to attach these two body packages together are included in the Body Fastener Kit of the Starting Body Package. Join the two body packages together as indicated on the next page:

1. Join the tube flanges of the body sections together with the gasket in between. Loosely attach the heater body sections together with the ¼-20 screws and locknuts provided. **DO NOT** fully tighten the screws and locknuts yet!
2. Tighten the screws and locknuts using the sequence shown. The screws and locknuts should be tightened a little bit at a time (the same way you would secure the lug nuts to a car wheel).
3. The remaining body section joints are coupled with a compression coupling. Refer to the previous instructions for the LTS40-250 models for installation of these couplings.



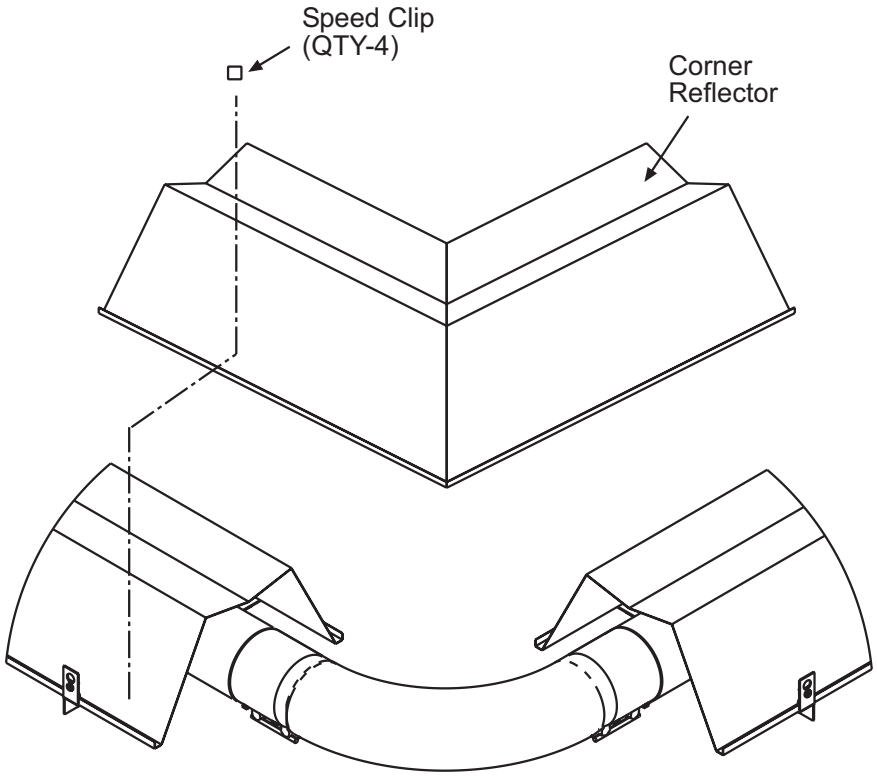
12.0) ADDING OPTIONAL 90º ELBOW (LTS ONLY)

1. The optional 90º elbow must be located a minimum of 10 ft. after the control box.
2. Hang the body sections in a 90º ("L") shaped pattern. Allow spacing for the elbow. The distance from one end of the elbow to the centerline of the opposite leg is 13" as shown.
3. Join the tube ends of the body sections and the elbow together and secure with tube couplings as described in Section 11.



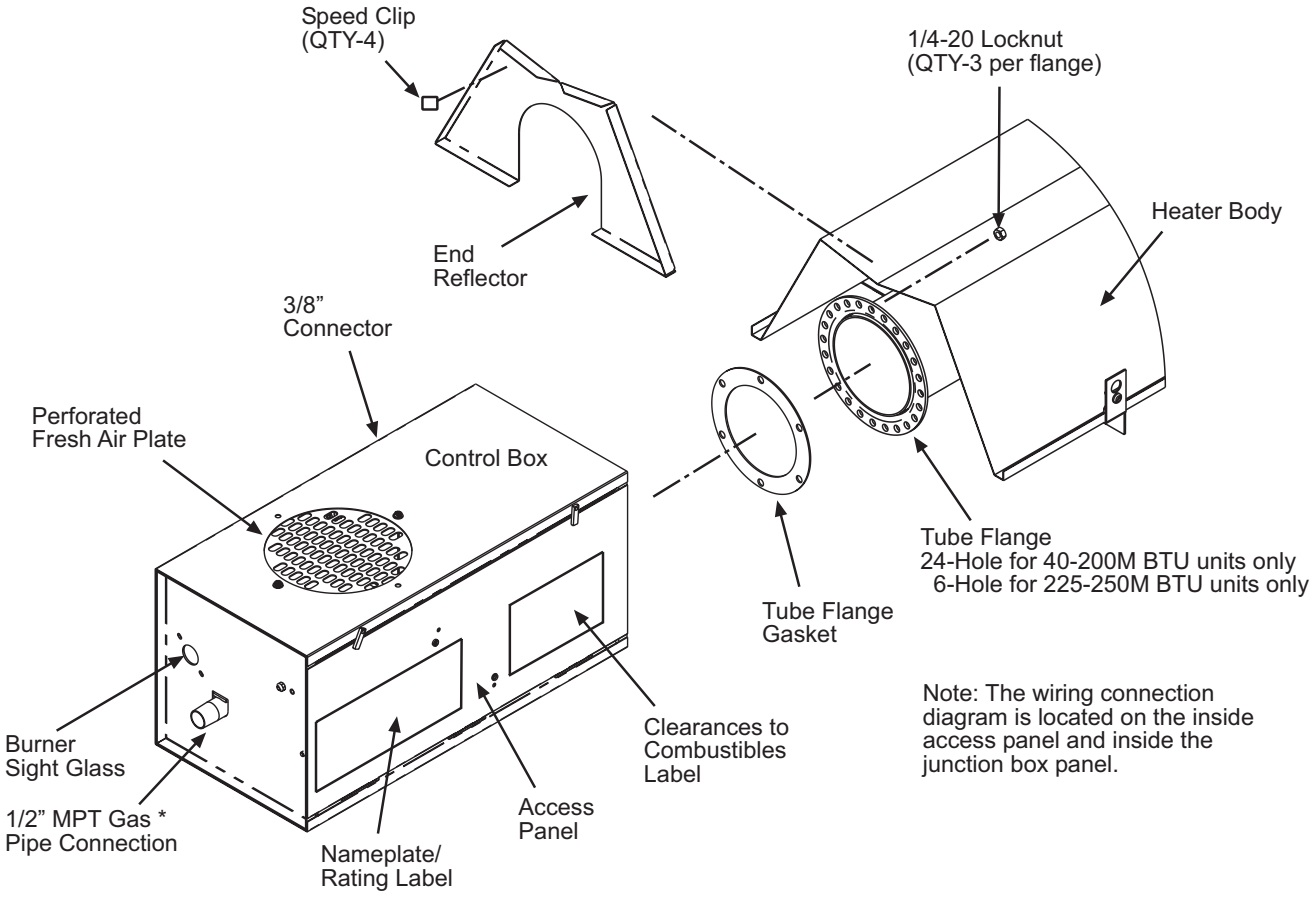
12.1) ADDING OPTIONAL CORNER REFLECTOR (LTS ONLY)

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



13.0) ATTACHING CONTROL BOX ASSEMBLY

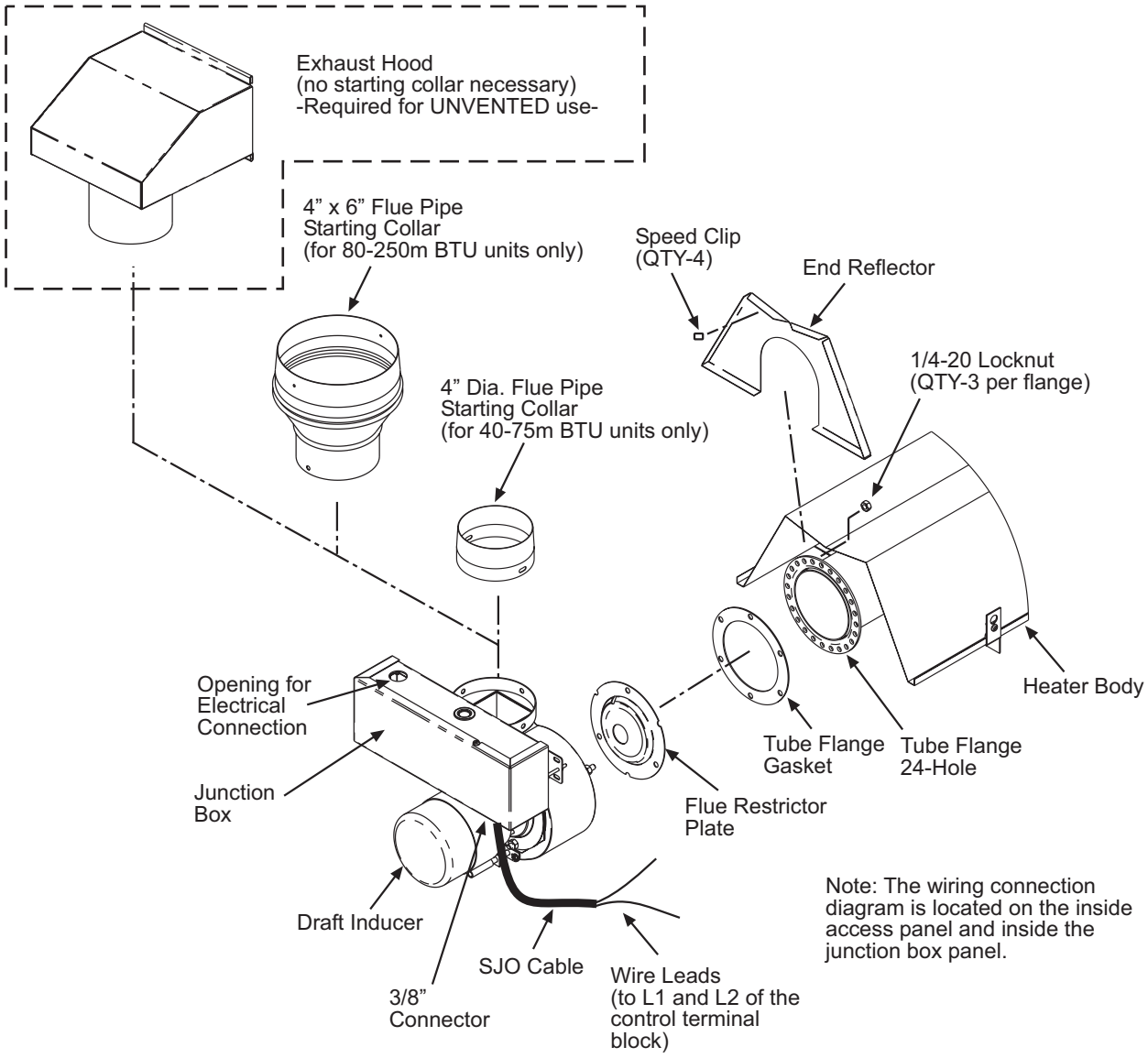
1. Attach the control box and gasket to end of tube flange and secure with 1/4-20 locknuts. **NOTE: The control box must be mounted to a 10 ft. aluminized steel body section for 40-200 MBtu/hr models, or to a 10 ft. Alumi-Therm steel body section for 225-250 MBtu/hr models, regardless of configuration used. Failure to attach the control box to the flange end as indicated above will void the manufacturer's warranty.**
2. A 3/8" connector is located on the left side of the control cabinet to provide strain relief for field wiring to the draft inducer junction box (refer to Section 18 on Electrical Connections and Connection Wiring Diagram for wiring between the control box and the draft inducer.)
3. Assemble the end reflector flush with the end of the main body reflector. Secure by sliding speed clips onto the reflector edges. Evenly space the speed clips on the sides (one each side) and top (two required) of the reflectors to provide a snug fit. Leave a 3" space between the end reflector and the control box assembly.
4. The control box must be mounted with the perforated fresh air plate on top, facing the ceiling.



* LTS 200 and above require minimum 3/4" gas connector.

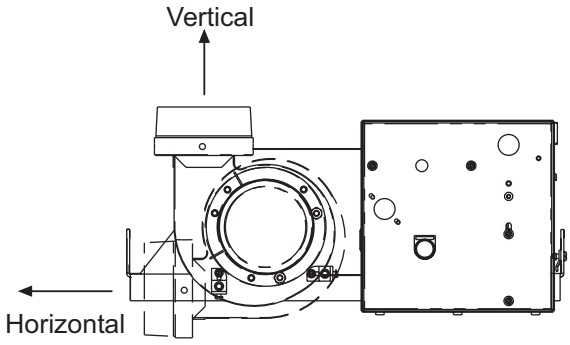
14.0) ATTACHING DRAFT INDUCER ASSEMBLY

1. Attach the draft inducer assembly and gasket to end of tube flange and secure with 1/4-20 locknuts. A flue restrictor plate is attached to the draft inducer weld studs. Make sure this remains in place while the draft inducer is being attached to the heater body. **NOTE:** The draft inducer can be mounted in a vertical, a 45º, or a horizontal position. Refer to the diagram on Multiple Hanging and Draft Inducer Positions (Section 15.1).
2. Disconnect the piece of SJO cable (if equipped) from the junction box and discard. This is used only on LTU series heaters.
3. The 3/8" connector used to hold the SJO cable will remain to provide strain relief for field wiring of the control box and the draft inducer (refer to the Electrical Connections and Connection Wiring Diagram for wiring between the control box and the draft inducer in Section 18).
4. If the heater is to be VENTED to the outside of the building, place the starting collar on the outlet of the draft inducer and secure with the #8-32 screws and nuts. Place the flue pipe directly onto the starting collar, secure with the #8 sheet metal screws, and terminate with an approved vent cap.
5. If the heater is for UNVENTED use, place the exhaust hood (supplied as an accessory) directly onto the outlet of the draft inducer (starting collar is not necessary for unvented use). Secure with the #8 sheet metal screws. **The exhaust hood must be mounted only in an upright position and directed toward the reflector body.**
6. Assemble the end reflector flush with the end of the main body reflector. Secure by sliding speed clips onto the reflector edges. Evenly space the speed clips on the sides (one each side) and top (two required) of the reflectors to provide a snug fit. Leave a 3" space between the end reflector and the draft inducer assembly.

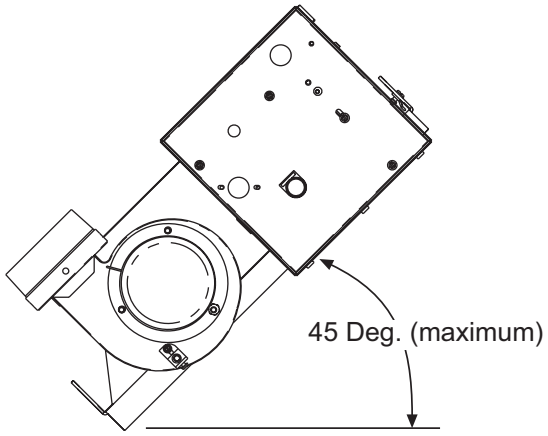


15.0) MULTIPLE HANGING & DRAFT INDUCER POSITIONS — LTU (40-75)-30 SERIES

The heater can be mounted horizontally or up to an angle of 45° maximum from horizontal. When the heater is to be angle mounted, **make sure the draft inducer assembly is on the lower side of the heater.** Make sure the long axis of heater is level. Multiple draft inducer positions can also be used as shown in the diagrams. This allows for the desired configuration of flue venting.



Horizontal Mounting



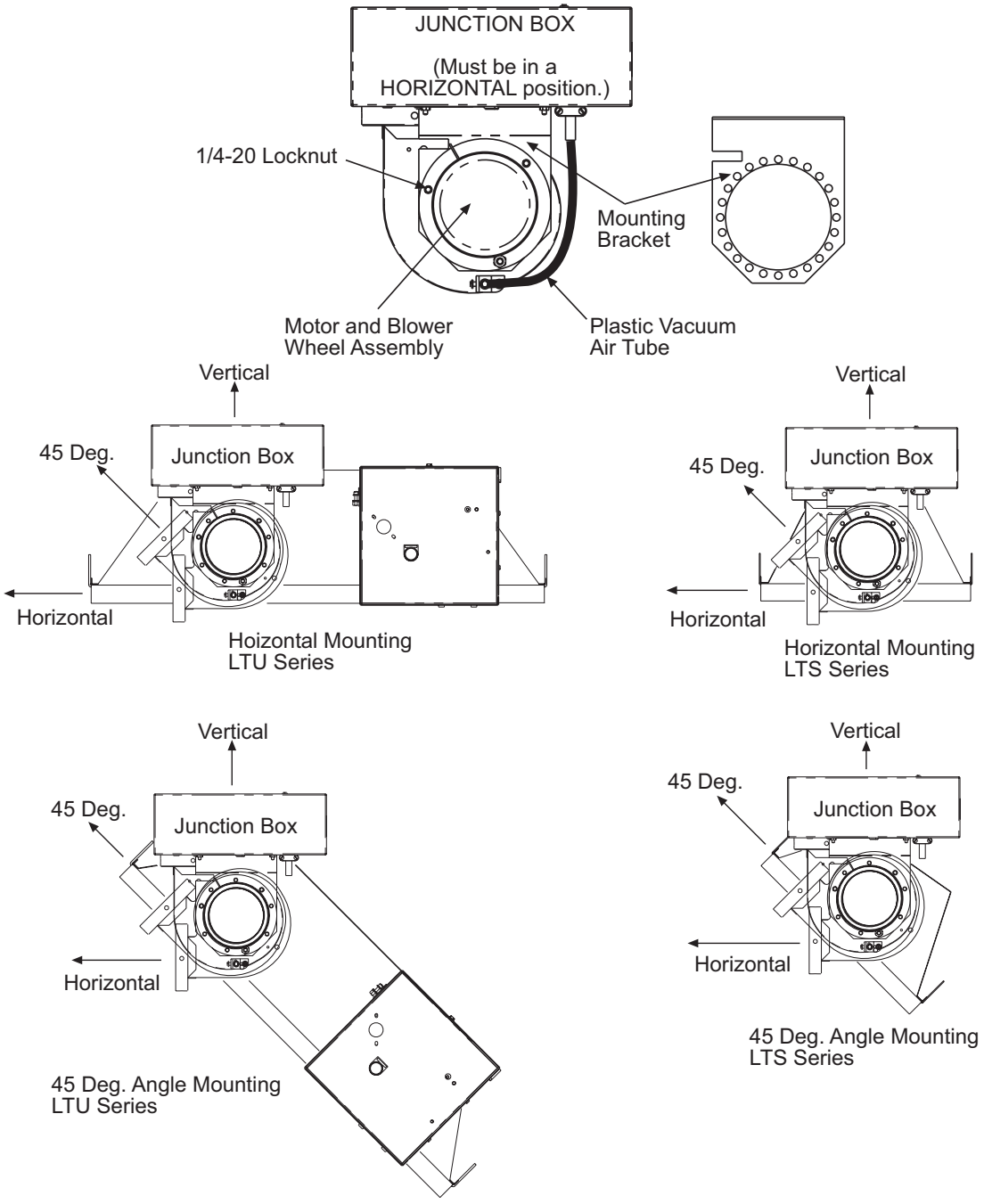
Angle Mounting

15.1) MULTIPLE HANGING & DRAFT INDUCER POSITIONS — LTU 80-250 & LTS 40-250 SERIES

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

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

1. Remove the three (3) ¼-20 locknuts securing the motor and blower wheel assembly.
2. Pull the motor and blower wheel assembly with the motor plate slightly from the end of the housing studs. Use care not to damage the motor leads.
3. Rotate the junction box assembly to the upright position using the multi-hole mounting bracket.
4. Replace the motor and blower assembly. Tighten the locknuts.
5. Horizontal and 45° draft inducer positions can allow the plastic vacuum air tube to sag. The air tube should be shortened to prevent a downward sag that could allow condensation build-up in the tube.


JUNCTION BOX
(Must be in a
HORIZONTAL position.)
1/4-20 Locknut
Mounting
Bracket
Motor and Blower
Wheel Assembly
Plastic Vacuum
Air Tube
Vertical
45 Deg.
Junction Box
Horizontal
Hoizontal Mounting
LTU Series
Vertical
45 Deg.
Junction Box
Horizontal
Horizontal Mounting
LTS Series
Vertical
45 Deg.
Junction Box
Horizontal
45 Deg. Angle Mounting
LTU Series
Vertical
45 Deg.
Junction Box
Horizontal
45 Deg. Angle Mounting
LTS Series

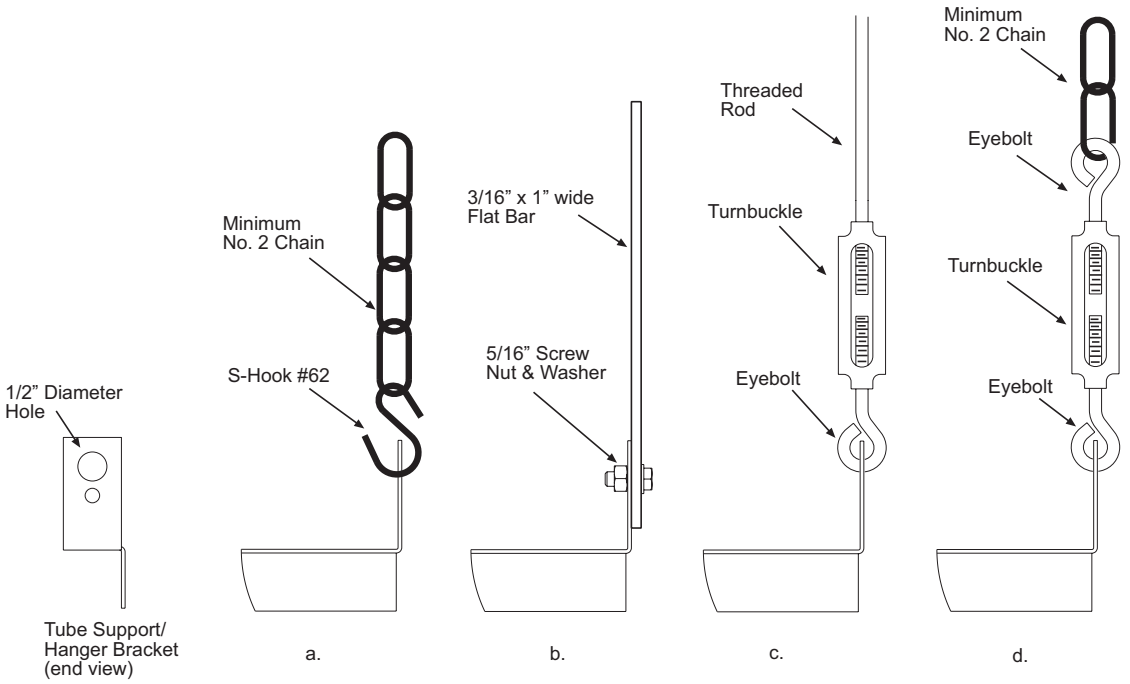
15.2) TYPICAL SUSPENSION METHODS

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

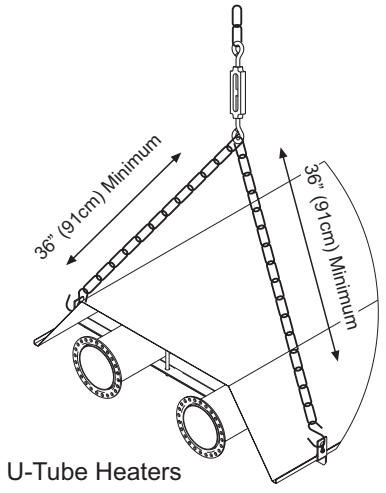
1. Use only noncombustible materials for hangers and brackets.
2. A minimum No. 2 chain with a working load limit of 115 lbs. is required.
3. Turnbuckles should be used with chains to allow leveling of the heater. All "S" hooks and eye bolts must be manually crimped closed by the installer.
4. When using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

Space-Ray recommends that the body sections be hung by chains with turnbuckles. This will allow slight adjustments after assembly and heater expansion/ contraction during operation.

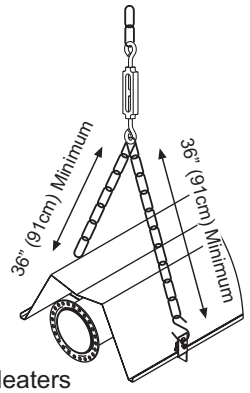
If a "trapeze" method is used (shown below), the minimum chain length for the two connecting chains is 36". If these chains must be less than 36", then do not use the trapeze method and, instead, use individual chains on each tube support/hanger bracket.



TYPICAL SUSPENSION METHODS



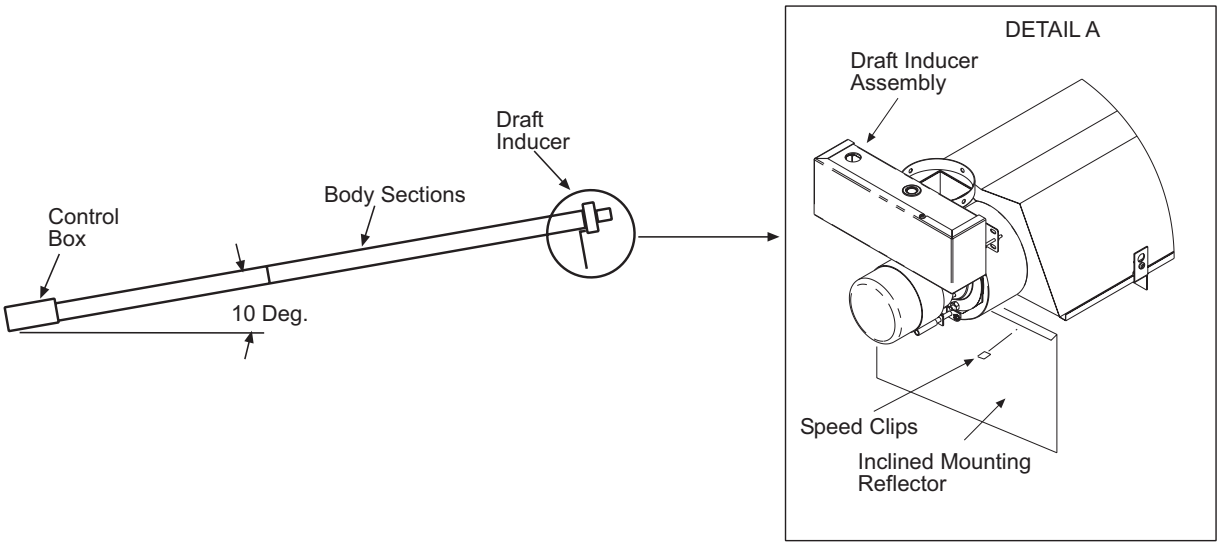
U-Tube Heaters



Straight Tube Heaters

15.3) INCLINED MOUNTING INSTRUCTIONS (LTS ONLY)

These inclined mounting instruction relate to LTS series heaters (straight tubes) that do not utilize the elbow accessory. These heaters have been tested and design certified by the CSA for 2"/12" pitch (10º) inclined mounting of the heater from the control box to the draft inducer assembly as shown in the following diagram.



These parts are included in the inclined mounting kit.

The purpose of this type mounting is to allow the heater to be mounted in the plane of the roof (particularly in modern "Butler" type buildings frequently used today). This will typically put the heater out of the way while still providing the warmth and comfort. The heater can be inclined upwards from the control box to the draft inducer at a distance of 2 inches up for every linear foot of the heater length. The total rise for each draft inducer is tabulated in the table below:

TOTAL DRAFT INDUCER HEIGHT ABOVE HORIZONTAL FOR 2"/12" PITCH INSTALLATIONS

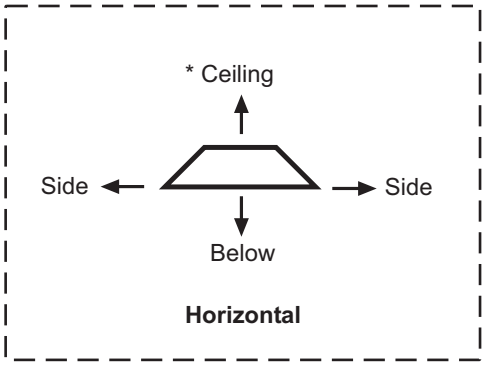
Models	Tube Length							
	15 Ft.	20 Ft.	25 Ft.	30 Ft.	35 Ft.	40 Ft.	45 Ft.	50 Ft
LTS 40–LTS 75	30"	40"	50"	60"				
LTS 80–LTS120				60"	70"			
LTS125–LTS130				60"	70"	80"	90"	100"
LTS140–LTS175						80"	90"	100"

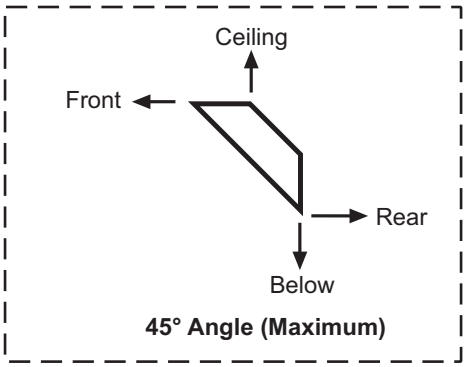
Models	Tube Length							
	50 Ft.	55 Ft.	60 Ft.	65 Ft.	70 Ft.	75 Ft.	80 Ft.	
LTS180–LTS250	100"	110"	120"	130"	140"	150"	160"	

The heater is subject to all other requirements presented in these Installations Instructions, particularly the Clearances to Combustibles. If you plan to use this type of installation, order the Space Ray **Inclined Mounting Kit, Part #43238000.**

16.0) MINIMUM CLEARANCES TO COMBUSTIBLES

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





MINIMUM CLEARANCES TO COMBUSTIBLES

Model No.	Mounted Horizontally				Angle Mounted at 45°	
	Sides	Ceiling✳	Below	Ends	45° Front	45° Rear
LTS, LTU 40, 50	27"	6"	40"	30"	48"	12"
LTS, LTU 60, 75	27"	6"	60"	30"	48"	12"
LTS, LTU 80, 90	52"	6"	84"◆	30"	52"	12"
LTS, LTU 100	66"	6"	88"◆	40"	66"	20"
LTS, LTU 110, 120, 125, 130	66"	6"	101"◆	40"	66"	20"
LTS, LTU 140, 150, 160, 175	84"	6"	106"◆	48"	84"	24"
LTS, LTU 180, 200, 225, 250	84"	6"	132"◆	48"	84"	24"

✳ When used indirect vented, minimum clearance for CEILING must be: 12" for LTU, LTS 40-75 and 18" for LTU, LTS 80-250. If optional corner reflectors are not used, the clearance must be 18".

◆ Minimum clearance BELOW reduces to 72" once you are 20 ft. downstream from the control box.

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

17.0) GAS CONNECTIONS AND REGULATIONS

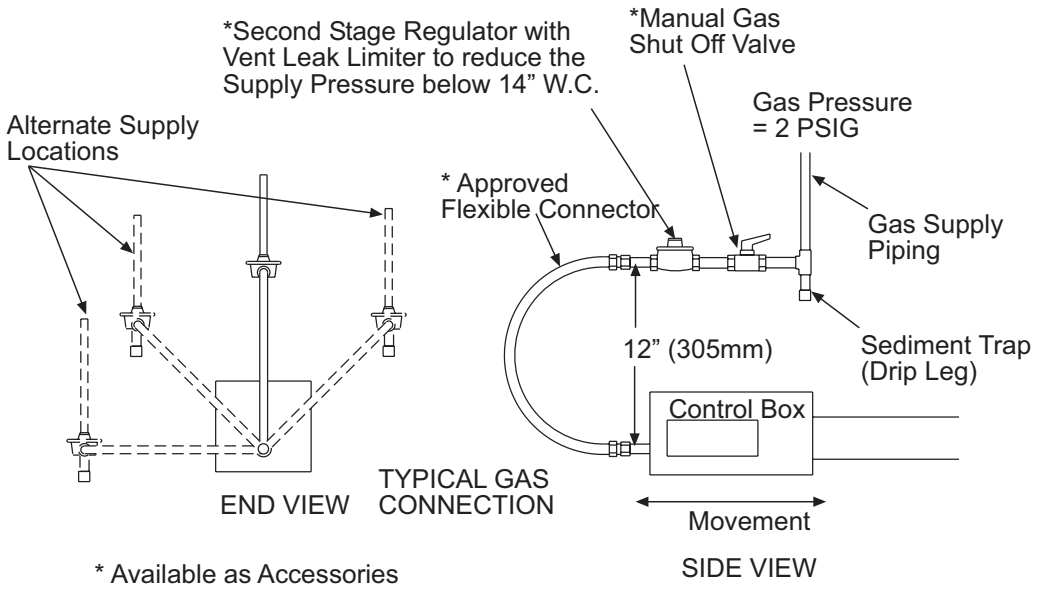
1. Connect to the supply tank or manifold in accordance with the latest edition of National Fuel Gas Code (ANSI Z223.1), and local building codes. Authorities having jurisdiction should be consulted before the installation is made. (In Canada, refer to the latest edition of CAN Standard B.149-1 & -2, Installation Codes for Gas Burning Appliances and Equipment.)
2. All gas supply lines must be located in accordance with the required clearances to combustibles below the heater as listed on the nameplate of the heater.
3. Pipe joint compounds must be resistant to the action of liquefied petroleum gases.
4. Straight tube heaters (LTS series) can expand/contract during operation. If rigid pipe connections are planned, provisions for expansion/contraction must be provided. Where local codes do not prohibit, a CSA or U.L. approved flexible connector (minimum 5/8" I.D.) is recommended between the rigid piping and the heater. A union and an approved shut off valve should be installed before the control valve inlet. The shut off valve should be installed within 6 feet of the union.
5. This appliance is equipped with a step-opening, combination gas valve. **The maximum supply pressure to the appliance is 14" W.C. or 1/2 P.S.I.** If the line pressure is more than the maximum supply pressure, then a second stage regulator which corresponds to the supply pressure must be used.
6. If a 2nd stage regulator is used and gas seeps through it, the redundant combination gas valve is designed to lock out. Pressure build-up in the supply lines prior to the heater must be released before proper heater operation.
7. After all gas connections have been made, make sure the heater and all gas outlets are turned off before the main gas supply is turned on. Turn the gas pressure on and check for leaks. To check for leaks, apply a soap suds solution to all connections and joints or check by one of the methods listed in Appendix D of the National Fuel Gas Code.

□□DO NOT USE AN OPEN FLAME OF ANY KIND TO TEST FOR LEAKS.

Certified connectors are recommended to be installed as shown, in one plane, and without sharp bends, kinks or twists. The gas take off from the drop line must be parallel to the burner gas inlet connection.

If the maximum supply pressure is less than ½ psig, a second stage regulator is not required.

NOTE: LTS, LTU 200M BTU and above require a 3/4" flex connector.



17.1) INSTRUCTIONS FOR PRESSURE TEST GAUGE CONNECTION

SUPPLY PRESSURE

1. The installer will provide a 1/8" N.P.T. plugged tapping, accessible for test gauge connection immediately upstream of the gas supply connection to the heater.

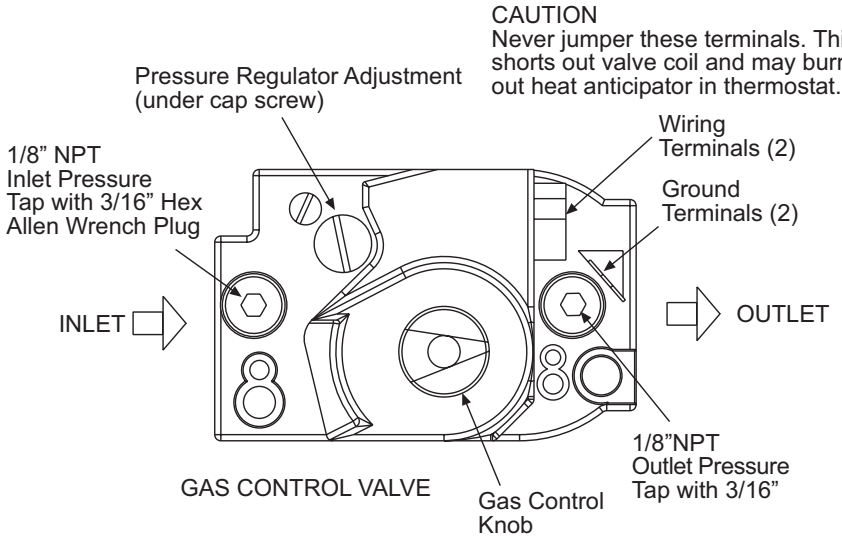
MANIFOLD PRESSURE

1. Turn the gas valve to the "OFF" position. Remove the 1/8" plug from the combination gas valve at the outlet pressure tap and connect a 1/8" nipple to the tapped hole. Connect the gauge to the nipple. Turn on the gas supply.
2. With the main burner operating, check the burner manifold pressure using a water manometer. Gauges that measure pressure in pounds per square inch are not accurate enough to measure or set the manifold pressure. All measurements **MUST BE** made when this heater and all other gas burning equipment that is connected to the gas supply system are operating at maximum capacity.
3. The combination gas valve is factory set and should not be adjusted. If full rate adjustment is required, remove the cover screw. Using a small screwdriver, turn the adjustment screw clockwise ↻ to increase or counterclockwise ↺ to decrease the gas pressure to the burner. Replace the cover screw. **NOTE: The step opening pressure of this gas valve is not adjustable.**
4. Check the burner at step pressure, observing burner ignition and flame characteristics. The burner should ignite properly and without flashback to the orifice, and should remain lit. Cycle the burner several times. Wait 30 seconds between cycles to allow the step opening combination gas valve or servo regulator to resume the first step action. Also, observe the burner operation at full pressure. Repeat after allowing to cool. (Gas pressures are shown in the following table.)

GAS PRESSURE TABLE

GAS TYPE	MANIFOLD PRESSURE	SUPPLY PRESSURE *Minimum*✳	SUPPLY PRESSURE *Maximum*
Natural Gas	3.5" W.C.	5" W.C.	14" W.C.
Propane Gas	10.0" W.C.	11" W.C.	14" W.C.

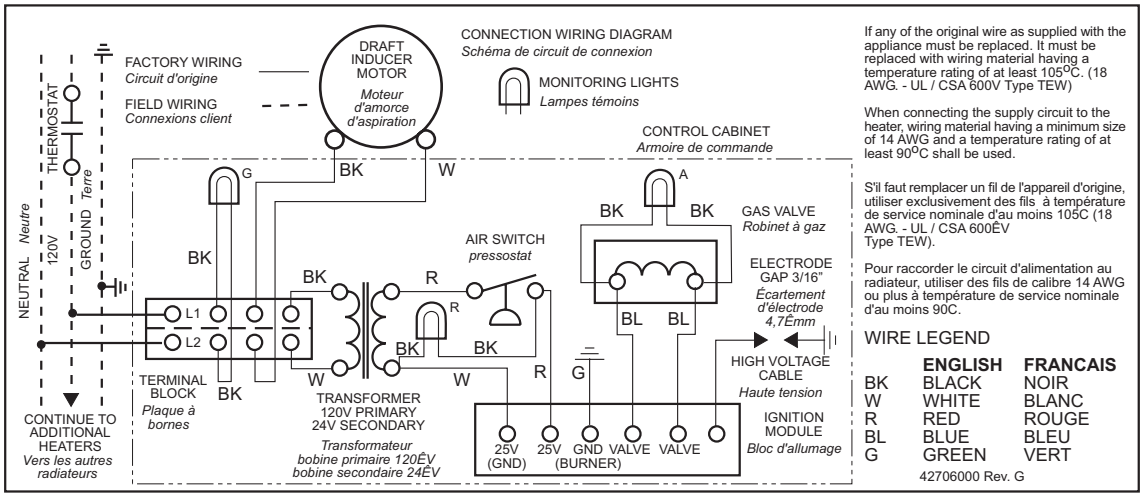
✳ Minimum permissible gas supply pressure for purpose of input adjustment.



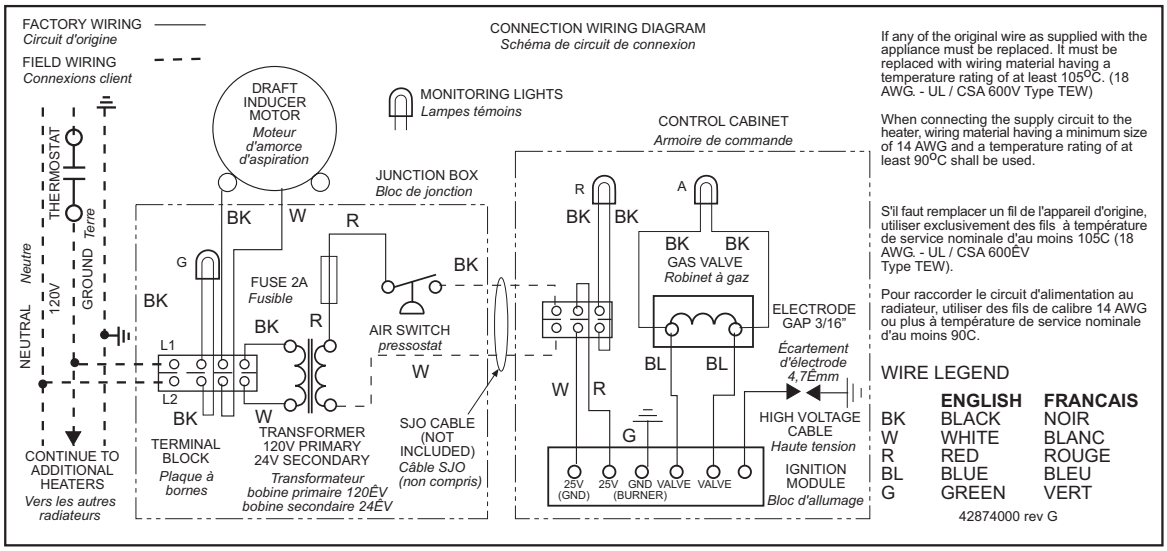
18.0) ELECTRICAL CONNECTIONS

1. All electric wiring shall conform to the latest edition of the National Electrical Code (ANSI/NFPA No. 70), or the code legally authorized in the locality where the installation is made.
2. The unit must be electrically grounded in accordance with the National Electrical Code (ANSI/NFPA No. 70-latest edition). In Canada, refer to current standard C22.1 Canadian Electrical Code Part 1.
3. The wiring providing power to the heater shall be connected to a permanently live electrical circuit, one that is not controlled by a light switch.
4. The power supply to the unit should be protected with a fused disconnect switch or circuit breaker. A service switch, as required by local codes, shall be located in the vicinity of the heater (check local codes for allowable distances) and should be identified as Heater Service Switch. All electrical wiring must be located in accordance with the required Clearances to Combustibles below the heater as listed on the nameplate on the heater.
5. When connecting the **supply circuit** to the heater, wiring material having a minimum size of 14 AWG and a temperature rating of at least 90ºC shall be used.
6. **LTS SERIES ONLY**: The installer will provide type SJO wire cable having minimum size of 18 AWG and connect the ends to the draft inducer junction box and the control box. Secure with 3/8" connectors as previously described in the attachment of the control box and draft inducer. Connect wire leads as shown in the Connection Wiring Diagram. The SJO cable should be located and secured to protect it from mechanical damage.
7.

CONNECTION WIRING DIAGRAM — Direct Spark Ignition — (LTU40-75 MODELS ONLY)



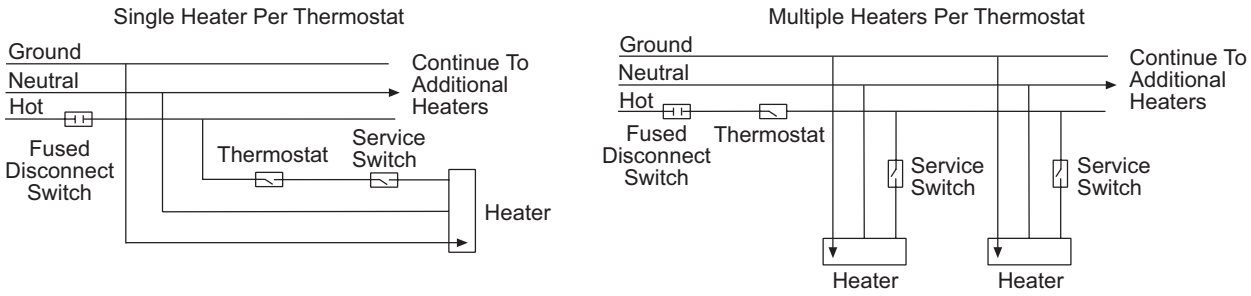
CONNECTION WIRING DIAGRAM — Direct Spark Ignition — (LTU80-250, LTS40-250 MODELS ONLY)



NOTES:

1. If any of the original wire as supplied with the appliance must be replaced, it must be replaced with wiring material having a temperature rating of at least 105°C. (18 Ga. CSA 600V Type TEW)
2. When connecting the supply circuit to the heater, wiring material having a minimum size of 14 AWG and a temperature rating of at least 90°C shall be used.
3. A replaceable 3-amp fuse (1-1/4" long) is fitted to the Ignition Control Module.

TYPICAL WIRING AND THERMOSTAT CONNECTIONS



19.0) VENTING

A. **BASIC FLUE VENTING —** Venting must comply with the latest edition of the National Fuel Gas Code (ANSI Z223.1-latest edition) or the authority having jurisdiction. Other venting references are in the equipment volume of the ASHRAE Handbook.

SINGLE HEATER VENTING (VERTICAL THROUGH THE ROOF)

1. When venting the heater to outside of building through a roof, use single-wall metal pipe. This is to be constructed of galvanized sheet metal or other approved noncombustible corrosion-resistant material as allowed by state or local codes.
2. A vent passing through a combustible roof shall extend through a 2-inch clearance roof thimble. Double-wall, Type B vent must be used for the portion of the vent system which passes through the roof. An approved vent cap (Leslie "VersaCap"-Type B) must be attached to end of the flue.
3. The maximum equivalent length of vent pipe should be carefully observed. A safety switch in the heater is designed to shut the heater off before excessive flue restriction causes bad combustion. Refer to the Vent Sizing Table at the end of this section for required vent pipe diameter.
   - Minimum Equivalent Length = 5 ft. of Pipe
   - Maximum Equivalent Length = 100 ft. of Pipe

   Use the following correction factors to obtain the equivalent length:
   a. Subtract 15 ft. if the run is horizontal.
   b. Subtract 10 ft. for an approved vent cap.
   c. Subtract 10 ft. for each elbow beyond 15 ft. from the heater.
   d. Subtract 15 ft. for each elbow within 15 ft. of the heater.
4. Avoid locating elbows in the first 5 ft. of vent pipe whenever possible. Limit to (2) 90° elbows. When vent pipe is in a horizontal run, it must have 1/4 inch per foot rise.
5. Joints between sections of piping shall be fastened by sheet metal screws or other approved means and should be sealed to prevent leakage of flue gas into building. Aluminum or Teflon tape suitable for 550°F (3M Company tapes 433 or 363) or silicone sealant is recommended.
6. All portions of the vent pipe shall be supported to prevent from sagging.
7. When the vent pipe passes through areas where the ambient temperature is likely to induce condensation of the flue gases, the vent pipe should be insulated and a condensation drain should be provided.
8. Minimum clearance for single-wall flue pipe to combustible material shall be 6 inches. This may be reduced when the combustible material is protected as specified in the National Fuel Gas Code or the authority having jurisdiction.
9. Single-wall metal pipe shall not originate in any unoccupied attic or concealed space and shall not pass through any attic, inside wall or concealed space, or through any floor. For the installation of a single-wall metal pipe through an exterior combustible wall, refer to latest edition of the National Fuel Gas Code or the authority having jurisdiction.
10. A venting system shall terminate at least 3 ft. above any forced air inlet located within 10 ft.

SINGLE HEATER VENTING (HORIZONTAL THROUGH SIDEWALL)

When venting the heater horizontally through a combustible outside sidewall, the same requirements listed previously for venting **Vertical Through The Roof** apply *except* as follows:

1. A vent passing through a combustible wall must pass through a 2-inch clearance thimble (Air-Jet #4VT or #6VT or Ameri-Vent #4EWT or #6EWT) or other thimbles that are listed by a nationally recognized testing agency.
2. An approved vent cap (Breidert-Type L or equal) must be attached to the end of the vent pipe.
   - Minimum Equivalent Length = 5 ft. of Pipe
   - Maximum Equivalent Length = 75 ft. of Pipe

   NOTE: To minimize problems associated with condensation in long horizontal runs, vent pipe can be insulated.
3. When venting through a sidewall, the horizontal vent pipe shall rise not less than 1/4 inch per foot from the start of the vent system to the vent terminal. All portions of the vent pipe shall be supported to prevent sagging.
4. A minimum clearance of 6 inches must be maintained between the outside wall and vent cap.
5. The horizontal venting system shall not terminate:
   a. Less than 4 ft. (1.2m) below, 4 ft. (1.2m) horizontally from or 1 ft. (30cm) above any door, window or gravity air inlet into any building. The bottom of the vent terminal shall be located at least 7 ft. (2.1m) above grade or above snow accumulation level as determined by local codes.
   b. Less than 3 ft. (0.9m) from a combustion air inlet.
   c. Less than 3 ft. (0.9m) from any other building opening or any gas service regulator.
   d. Directly over areas where condensate or vapor could create a nuisance or hazard or be harmful to the operation of gas utility meters, regulators, relief valves, or other equipment. Building materials should be protected from flue gases and condensate.
6. In regions of the country where prevailing winds are consistently higher than 40 mph, it may be necessary to terminate the vent system above the roof level.

MULTIPLE HEATER VENTING (CONNECTIONS INTO A COMMON VENT OR MANIFOLD)

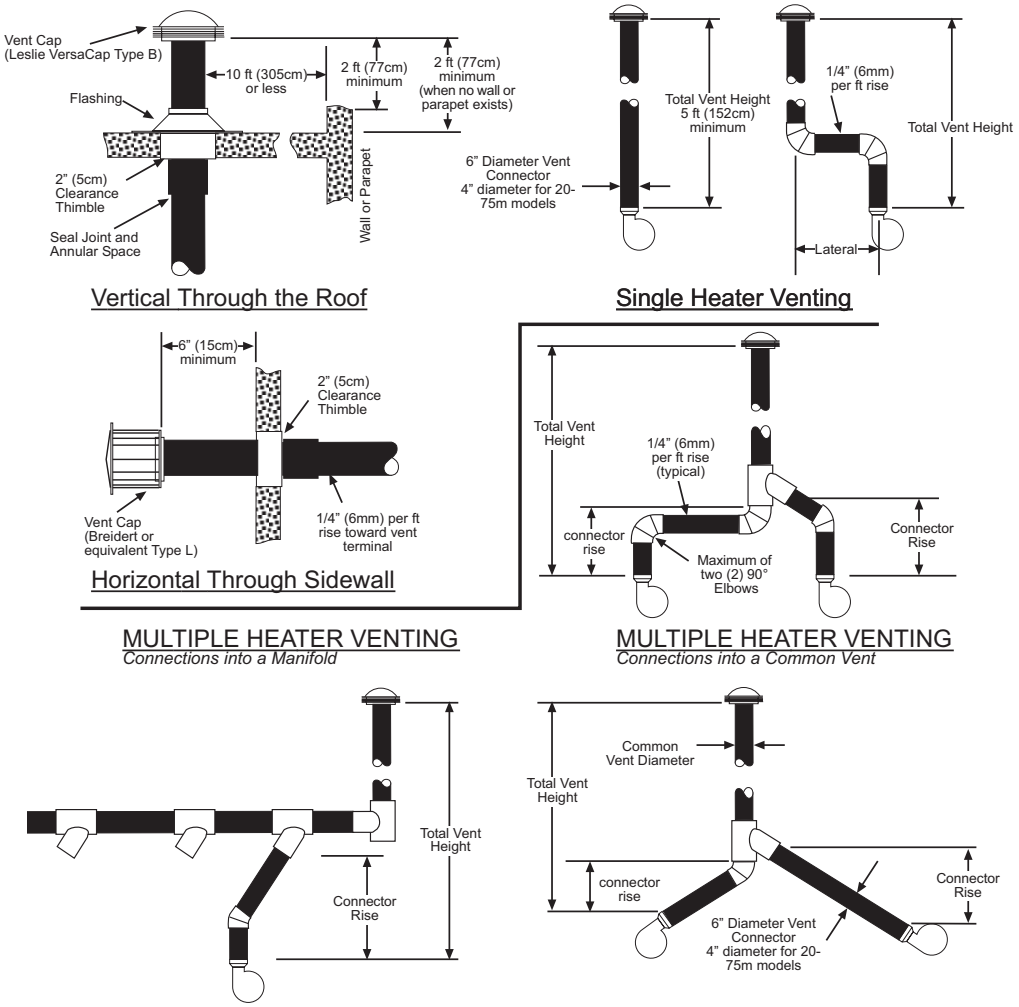
Requirements for venting of multiple heaters are the same as described for **SINGLE HEATER VENTING** *except* as follows:

1. The common vent size and total vent height is normally determined by the number of heaters per common vent, length of horizontal connector runs, and connector rise. Connector lengths should be as short as possible and have a minimum ¼" per ft. rise. Without regard to connector rise and total vent height due to many possible venting configurations, the following should be observed:
   a. Common vent pipe & vent connector diameter should be no less than that shown in the following Vent Sizing Table.
   b. The connector length should be no more than 75% of the vertical portion of vent above the connector.
   c. Where possible, use a Y-connector to the common vent.
2. Material for connectors should be constructed of galvanized sheet metal or other approved noncombustible corrosion resistant material as allowed by state or local codes. All common vent pipe should be double wall, Type B vent.
3. Avoid unnecessary bends. Limit to two (2) 90° elbows.
4. The entire length of vent connector shall be readily accessible for inspection, cleaning and replacement.
5. Groups of heaters with a common vent must be controlled by a common thermostat.

▲WARNING: COMMON VENTING OF MULTIPLE HEATERS IN CONFINED SPACES IS PROHIBITED. If any heater connected to a common vent system for multiple heaters is found inoperative, the heater should be disconnected from the vent system and its entrance into the vent system capped.

B. INDIRECT VENTING (UNVENTED HEATERS) — This heater requires ventilation in the building to dilute the products of combustion and provide fresh air for efficient combustion. Where unvented heaters are used, gravity or mechanical means shall be provided to supply and exhaust at least 4 CFM per 1,000 Btu/hr input of installed heaters. Exhaust vents must be located at the highest point above and in the vicinity of the heaters, and the inlet vents must be located below the level of the heaters. An exhaust hood (Part #42924000) must be placed on the outlet collar of the draft inducer or on the existing 4" starting collar for 20-75 MBtu/hr models when used unvented and **must be mounted only in an upright position and directed towards the reflector body.**

BASIC FLUE VENTING



THE FOLLOWING ILLUSTRATIONS AND TABLE OF VENT SIZES FOR COMMON VENTING OF MULTIPLE HEATERS ARE IN ACCORDANCE WITH THE NATIONAL FUEL GAS CODE ANSI Z223.1-LATEST EDITION, NFPA #54-LATEST EDITION, EQUIPMENT VOLUME OF 1988 ASHRAE HANDBOOK, CURRENT CAN/CGA-B149.1/2-M86 INSTALLATION CODE, AND AGA PUBLICATION NO. 10M5.85 2.5-2 ON FUNDAMENTALS OF GAS APPLIANCE VENTING AND VENTILATION-REVISED BUT ARE NOT A PART OF THE CSA CERTIFICATION.

VENT SIZING TABLE — Multiple Heater Venting					
	Number of Heaters				
	1	2	3	4	5
LTS, LTU 40 - 50	4"	4"	5"	5"	6"
LTS, LTU 60 - 75	4"	5"	6"	6"	7"
LTS, LTU 80 - 100	6"	6"	6"	7"	8"
LTS, LTU 110 - 130	6"	6"	7"	8"	9"
LTS, LTU 140 - 175	6"	8"	8"	9"	10"
LTS, LTU 180 - 200	6"	8"	9"	10"	11"
LTS, LTU 225 - 250	6"	9"	10"	11"	12"
	COMMON VENT DIAMETER (If a size is not available use the next larger size.)				

19.1) AIR FOR COMBUSTION

If indoor combustion air is to be supplied for a tightly enclosed area, one square inch of free area opening shall be provided below the heater for each 1,000 Btu/hr of heater input. Adequate clearances around the perforated fresh air plate must be maintained at all times. In larger open areas of buildings, infiltration normally is adequate to provide air for combustion.

19.2) DIRECT OUTSIDE AIR FOR COMBUSTION

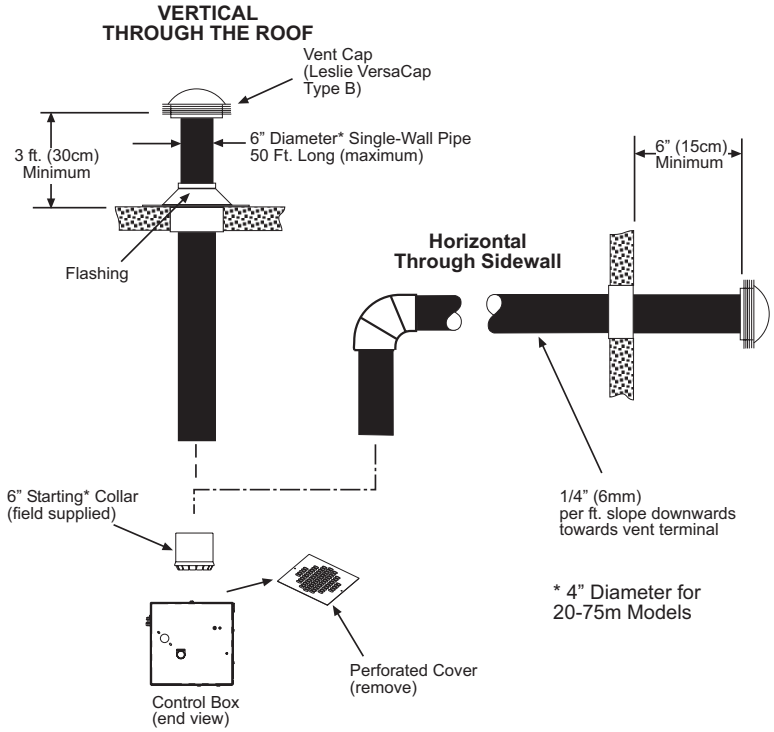
Outside combustion air should be supplied directly to the heater when the building is subject to negative pressure, or when contaminants or high humidity are present in the building air. These contaminants include paints, solvents, corrosive vapors or any other foreign particles that may cause damage to the heater or result in poor combustion.

Outside combustion air can be brought directly to the heater by a 6" diameter✳ duct less than 50 ft. long or equivalent. This is attached to a 6" diameter✳ starting collar. The starting collar is fitted to the top of the control cabinet **after first removing and discarding the perforated cover**. An approved vent cap must be placed directly on the end of the outside combustion air inlet pipe. The combustion air inlet should be a minimum of 3 ft. (0.9m), either vertically or horizontally, from the flue vent termination. The air intake terminal must be located not less than 1 ft. (30cm) above grade. It is good installation practice to supply combustion air from the same pressure zone as the vent outlet. Avoid bringing combustion air to the heater from an attic space. There is no guarantee that adequate combustion air will be supplied.

If the heater is installed less than 2 ft. from the ceiling, a flexible transition section (e.g., flexible aluminum duct) must be provided to allow for expansion/contraction of straight tube heaters (LTS series).

In colder climates, where necessary, insulate the outside combustion air duct. Avoid locating the outside combustion air duct directly above the control box. Provide a capped cleanout T as necessary. In high humidity applications, the control box should be sealed with silicone sealer.

In multiple heater applications, the combustion air intake may be ducted individually or common ducted in the same configuration as shown for venting in Section 19. For combustion air intake duct sizing, please refer to the **Vent Sizing Table** and use the diameter indicated, based on the number of heaters per duct.



20.0) LIGHTING AND SHUTDOWN INSTRUCTIONS

1) Turn on the gas supply.
2) Set the thermostat to call for heat.
3) Ignition should occur after the 30-second air purge.
4) If ignition fails, the unit will spark for approximately 21 seconds and go into safety lockout. Turn the thermostat (power) off for 60 seconds to take the system out of lockout.
5) If the heater does not light, shut off gas completely for 5 minutes before attempting to relight.
6) ▲**CAUTION: The heater must be grounded.** Poor grounding will give nuisance lockouts, particularly during momentary power interruptions.
7) To shut down the heater, turn off the gas and the electrical supply.

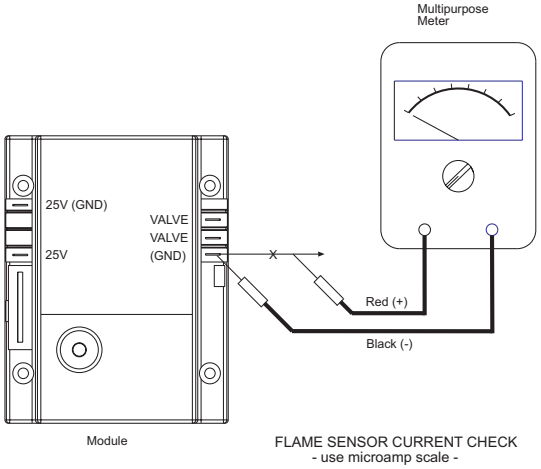
NOTE:
The Lighting and Shutdown Instructions are also shown on the permanent nameplate attached to the heater control box.

21.0) IGNITION SYSTEM CHECKS

➤ **STEP 1: CHECK IGNITION CABLE.**
a) Make sure that the ignition cable does not touch any metal surface.
b) Make sure that connections to the stud terminal and the igniter/sensor are clean and tight.
c) Make sure that the ignition cable provides good electrical continuity.

➤ **STEP 2: CHECK IGNITION SYSTEM GROUNDING.**
(Nuisance shutdowns are often caused by a poor or erratic ground.) A common ground is required for the module, igniter, flame sensor and main burner.
a) Check for good metal-to-metal contact between the igniter bracket and the main burner.
b) Check the ground lead from the GND (BURNER) terminal on the module to the igniter bracket. Make sure connections are clean and tight. If the wire is damaged or deteriorated, replace it.
c) Replace igniter/sensor with factory replacement part if insulator is cracked.

➤ **STEP 3: CHECK SPARK IGNITION CIRCUIT.**
⓫**WARNING: THE IGNITION CIRCUIT GENERATES A 20,000 VOLT OPEN CIRCUIT AND ELECTRICAL SHOCK CAN RESULT.**
a) Check ignition cable.
b) Check external fuse on the module.
c) Verify power (24V) at module input terminals and output terminal to gas valve.
d) Replace spark module if fuse and power are OK.

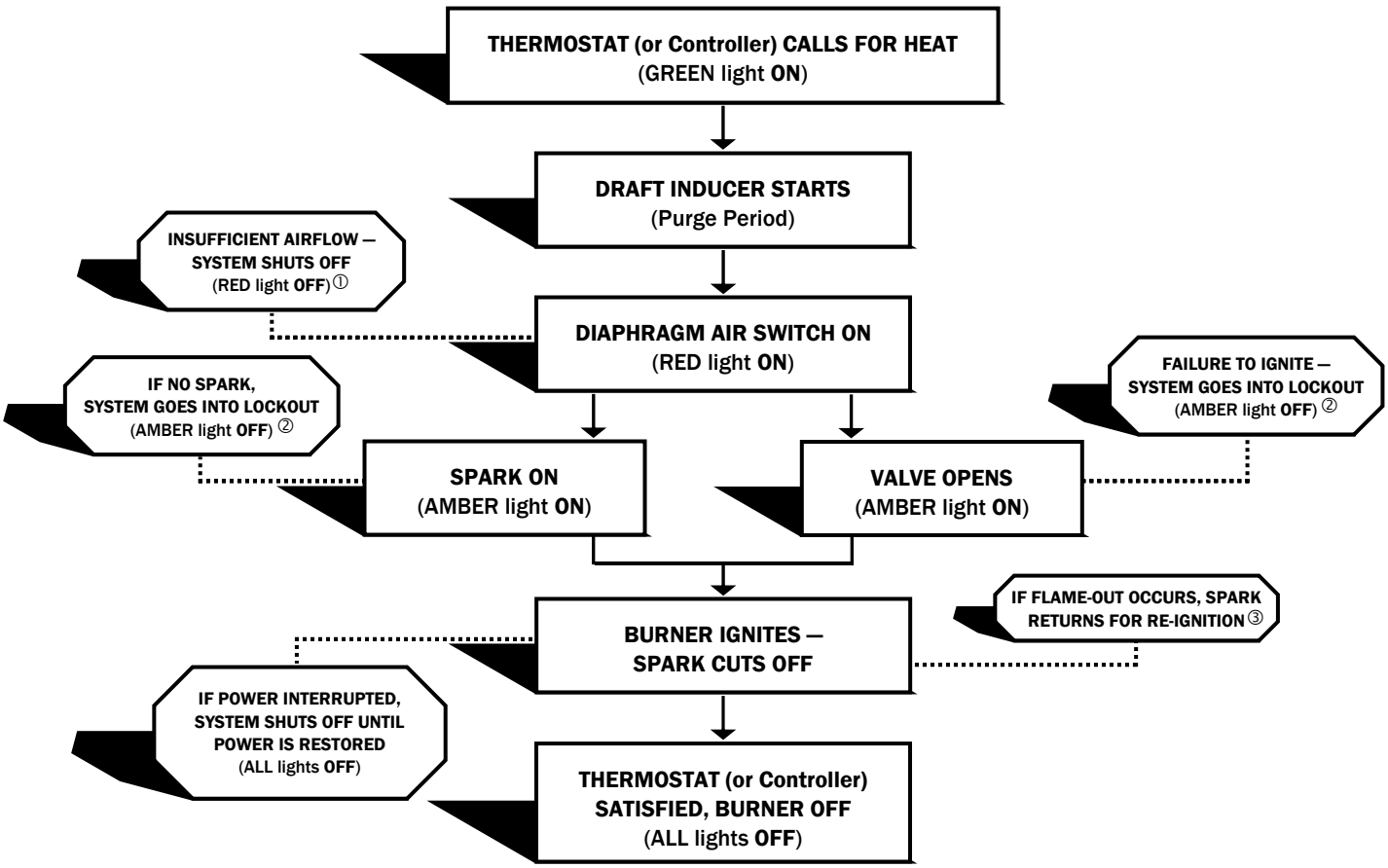


➤ **STEP 4: CHECK FLAME SENSOR CIRCUIT.**
a) Turn off heater at thermostat.
b) Connect a meter (dc microammeter scale) in series with the ground lead as shown in the diagram. Use a Honeywell W136 Test Meter or equivalent. Connect the meter as follows:
- Disconnect the ground lead at the electronic control.
- Connect the black (negative) meter lead to the electronic control GND terminal.
- Connect the red (positive) meter lead to the free end of the ground lead.

c) Restart the system and read the meter. The flame sensor current must be steady and measure at least 1.5 micro amps.
d) If the meter reads less than the minimum or if reading is unsteady:
- Make sure burner flame is capable of providing a good rectification signal.
- Make sure fasteners securing igniter/sensor are tightened to assure correct positions. DO NOT relocate igniter/sensor.
- Check for excessive (over 1000°F) temperature at ceramic insulator on flame sensor. Excessive temperature can cause short to ground. DO NOT relocate igniter/sensor.
- Check for cracked ceramic insulator, which can cause short to ground, and replace sensor if necessary.
- Make sure that electrical connections are clean and tight. Replace damaged wire

e) Remove microammeter and reconnect ground wire. Return system to normal operation.

22.0) SEQUENCE OF OPERATION



NOTES:

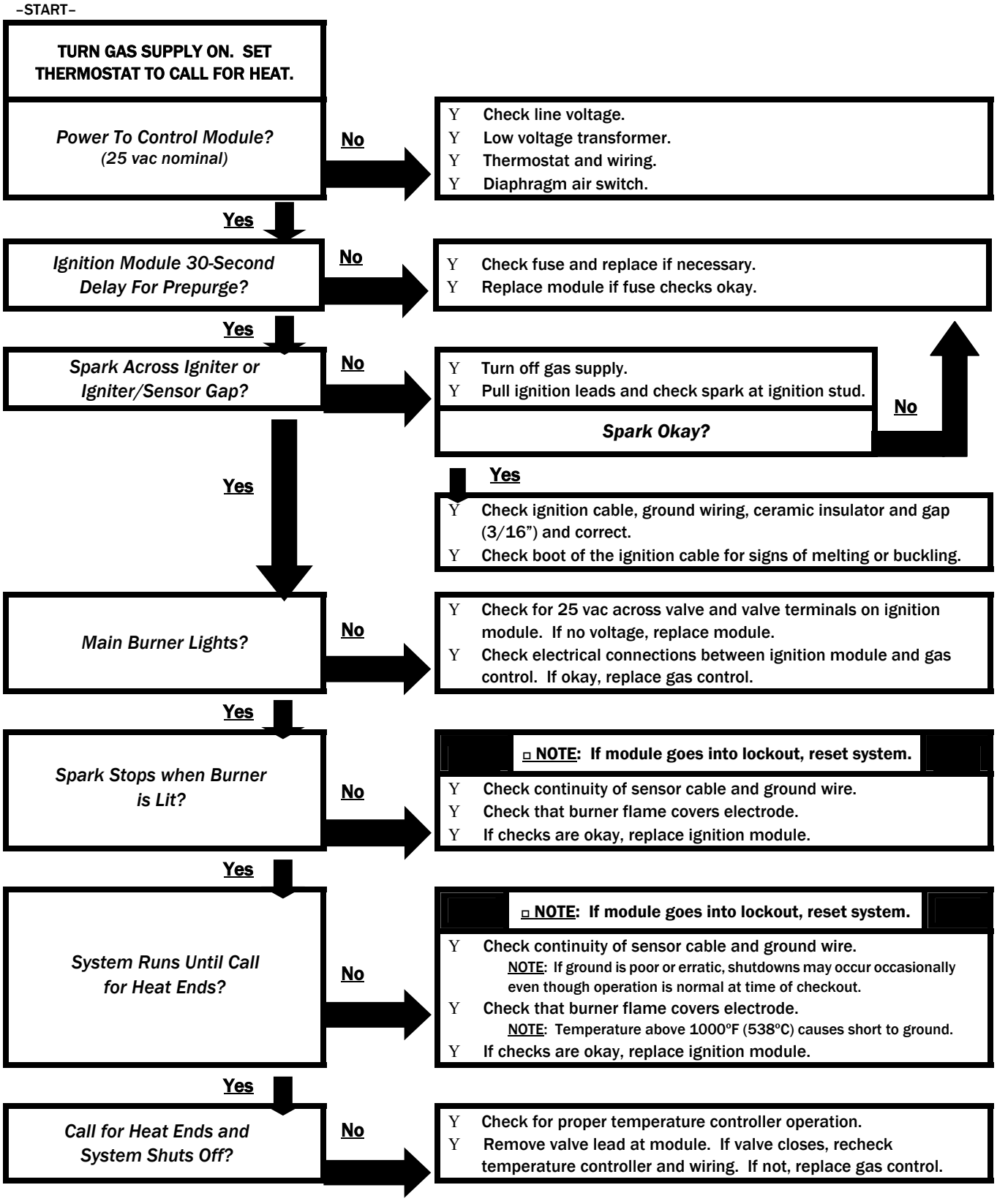
① – Insufficient airflow indicates defective draft inducer or restricted flue.

② – Corrective action and system reset are necessary.

③ – If burner does not re-ignite, system goes into lockout. Corrective action and system reset are necessary.

ERROR -- Octagons represent actions resulting from possible malfunction.

23.0) TROUBLESHOOTING GUIDE OF DIRECT SPARK IGNITION SYSTEM



–END TROUBLESHOOTING–
REPEAT PROCEDURE UNTIL TROUBLE-FREE OPERATION IS OBTAINED.

24.0) MOTOR AND BLOWER WHEEL CHECK

If draft inducer motor fails to run: A) Check power supply to junction box. B) Check for loose or broken motor lead wire. C) Check to see that blower wheel turns freely and is not rubbing housing. Blower wheel may have worked loose from shaft and jammed against housing. D) Check for blower wheel damage; replace if necessary. If no damage, readjust blower wheel on shaft & retighten set screw. E) If all above does not correct, replace motor.

25.0) CLEANING AND ANNUAL MAINTENANCE

This heater must be cleaned and serviced annually before the start of each heating season and at any time excessive accumulation of dust and dirt is observed. Maximum heating efficiency and clean combustion will be maintained by keeping the heater clean. To clean the heater, follow these instructions: 1) Turn off all electrical and gas supply to the heater. 2) Open the control box access panel. 3) Clean the access panel, the inside of the control box, the emitter tube and the reflector panels. (Dirty reflectors will reduce output.) 4) Visually inspect the spark electrode. Remove any foreign objects from electrode tip. Set the spark gap to the proper value of 3/16". **□CAUTION: The ceramic portion of the electrode is very fragile so any cleaning or adjustments must be done with care.** 5) Disconnect the vent stack and remove any foreign material that may have collected on the blower wheel. Make sure the blower wheel is clean. A dirty wheel can reduce the volume of air pulled and can result in premature tube failure.

26.0) REPLACING PARTS

Ensure that at all times when parts are being replaced, both gas and electrical supplies are disconnected. Various parts are available from the factory for replacement by a licensed person. Refer to the Replacement Parts Guide in Section 28 for all replacement parts.

27.0) INSTALLATION DATA

Date of Installation: _____ # of Heaters in System: _____

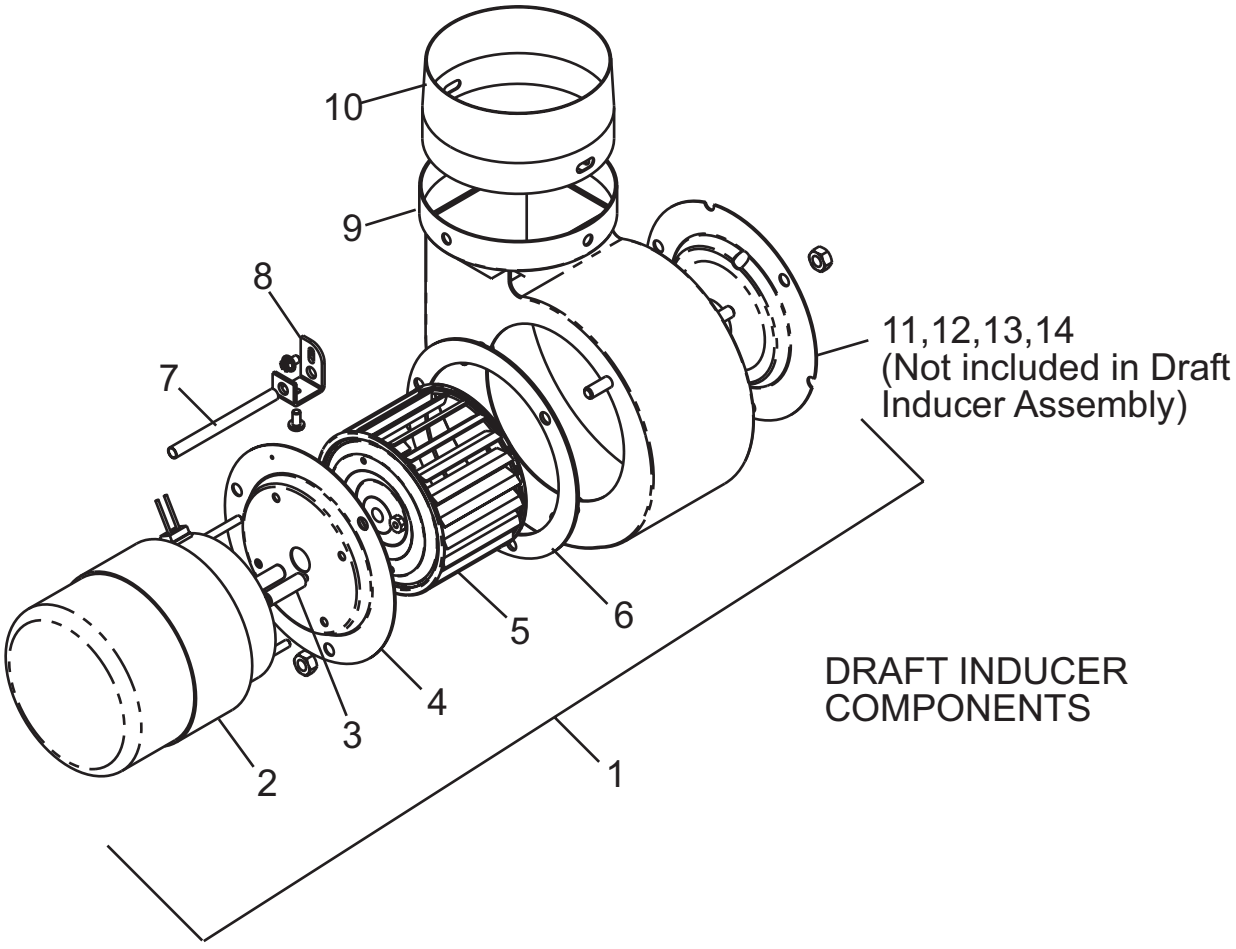
Serial No. _____

Model: **LTS** *or* **LTU** _____ ° □ _____ N = Natural Gas L = Propane Gas

28.0) REPLACEMENT PARTS GUIDE

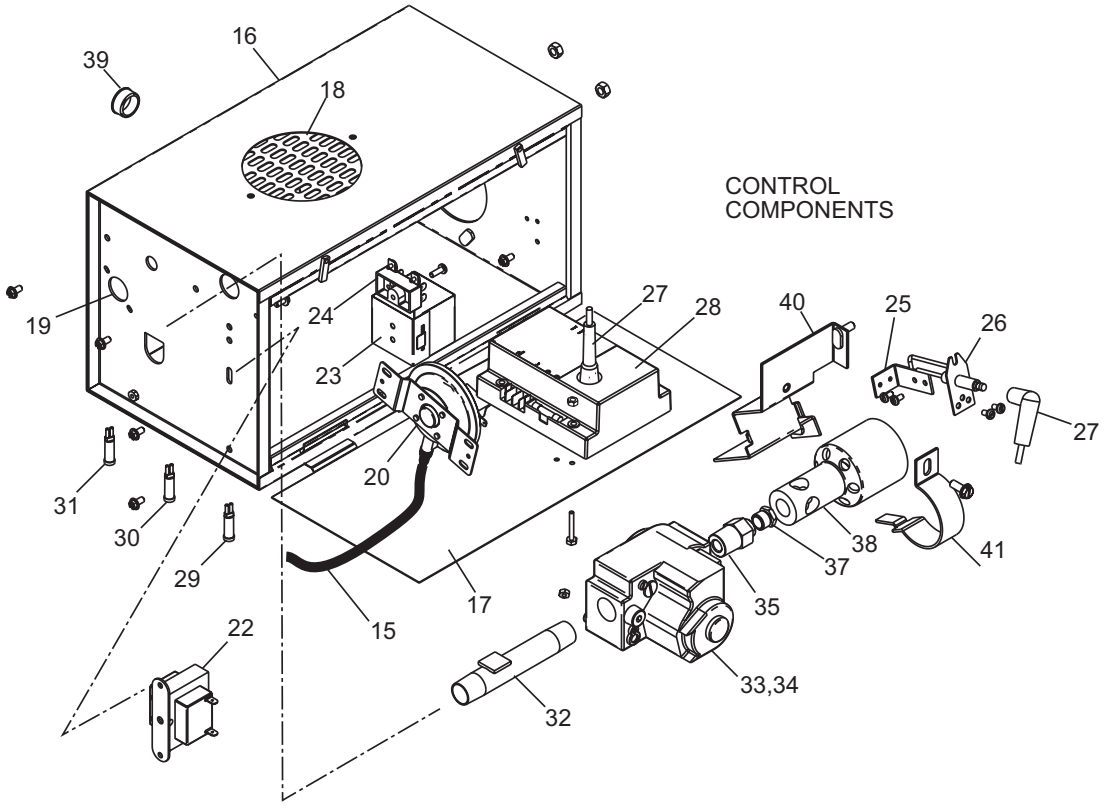
DRAFT INDUCER COMPONENTS — **MODELS: LTU 40-75**

ITEM NO.	PART NO.	DESCRIPTION
1	42917000	Draft Inducer Assembly
2	03721000	Motor, JB1R061N
3	30347000	Motor Spacer (4 per motor)
4	42740000	Motor Plate
5	03723000	Blower Wheel
6	43221000	Draft Inducer Gasket
7	42744000	Sensing Tube, Draft Inducer
8	42742000	Sensing Tube Bracket
9	42739000	Blower Housing Sub-Assembly
10	40504020	4" O.D. Flue Pipe Starting Collar
11	42741010	Restrictor Plate, 1" I.D. (40M Btu/hr)
12	42741020	Restrictor Plate, 1-1/8" I.D. (50M Btu/hr)
13	42741030	Restrictor Plate, 1-7/32" I.D. (60M Btu/hr)
14	42741040	Restrictor Plate, 1-7/16 " I.D. (75M Btu/hr)



CONTROL COMPONENTS — MODELS: LTU 40-75

ITEM NO.	PART NO.	DESCRIPTION
15	03988150	Plastic Vacuum Air Tube, 15" long
16	42750000	Cabinet Assembly
17	42751000	Access Panel
18	42752000	Air Inlet Plate (Perforated)
19	42447000	Sight Glass
20	30186201	Air Switch, set @0.11" W.C., #RSS-495-307
22	30279000	Transformer, AT120B1051
23	42709000	Terminal Block Shield
24	30281000	Terminal Block, EK-204
25	42759000	Electrode Bracket
26	30295000	Electrode PSE-GF1 (Igniter/Sensor)
27	30314070	Ignition Cable, 7" long
28	30331040	Spark Module, S87J-1034
29	30220010	Monitoring Light, Green
30	30220020	Monitoring Light, Red
31	30220030	Monitoring Light, Amber
32	42757000	Restrainer Nipple, 4" long
33	30333070	Valve -- VR8205P-2408 @3½" W.C. *(Natural Gas)*
34	30333080	Valve -- VR8205P-2416 @10" W.C. *(Propane Gas)*
35	42701000	Orifice Fitting & Test Gauge Connection
36	03339020	1/8" Plug
37	03259xxx	Orifice for LTU 40-75 (**State Model & Gas Type for Size**)
38	42700000	Main Burner
39	03868010	3/8" Connector
40	42755000	Burner Bracket Sub-Assembly
41	42753000	Burner Clamp
42	42785000	Ladder Wire Diagram *(not shown)*
43	42874000	Connection Wire Diagram *(not shown)*
44	43155260	Installation And Operation Instructions *(not shown)*



DRAFT INDUCER COMPONENTS

ITEM NO.	PART NO.	DESCRIPTION
1	42917010	Draft Inducer Assembly, 180M–250M Btu/hr models
2	42917000	Draft Inducer Assembly, 40M–75M Btu/hr models
3	03723020	Blower Wheel, Beckett
3a	03723000	Blower Wheel, Revcor
4	03988120	Plastic Vacuum Air Tube, 12" long
5	42739010	Blower Housing Sub-Assembly
6	42740000	Motor Plate
7	42742000	Sensing Tube Bracket
8	42744000	Sensing Tube, Draft Inducer
9	30347000	Motor Spacer (4 per motor)
10	03868010	3/8" Connector
11	30186200	Air Switch, set @0.37" W.C., #RSS495306
11a	30186202	Air Switch, set @0.60" W.C., #RSS495308
13	30267000	½" Knockout Plug
14	30279000	Transformer, AT120B1051
15	30281000	Terminal Block, EK-204
16	30330000	Terminal Block, TFB-323
17	42709000	Terminal Block Shield
18	30220010	Monitoring Light, Green
19	02175040	Strain Relief
21	42909000	Junction Box
22	42910000	Junction Box Cover
23	42911000	Junction Box Support Bracket
24	42923000	SJO Cable Assembly
25	03721000	Motor, JB1R061N
26	03979000	Braided Fiber Glass Sleeving, 4" Lg
27	43221000	Draft Inducer Gasket
28	42874000	Connection Wire Diagram *(not shown)*
29–38	Restrictor Plates, *see list below*	
29	42741040	Restrictor Plate, 1" I.D. (40M Btu/hr)
30	42741030	Restrictor Plate, 1-1/8" I.D. (50M Btu/hr)
31	42741020	Restrictor Plate, 1-7/32" I.D. (60M Btu/hr)
32	42741010	Restrictor Plate, 1-7/16" I.D. (75M Btu/hr)
33	42741050	Restrictor Plate, 1-1/2" I.D. (80M & 90M Btu/hr)
34	42741060	Restrictor Plate, 1-5/8" I.D. (100M Btu/hr)
35	42741070	Restrictor Plate, 1-3/4" I.D. (110M & 120M Btu/hr)
36	42741080	Restrictor Plate, 1-7/8" I.D. (125M & 130M Btu/hr)
37	42741090	Restrictor Plate, 2-1/32" I.D. (140M & 150M Btu/hr)
38	42741100	Restrictor Plate, 2-1/4" I.D. (160M, 175M, 180M Btu/hr)
38a	42741130	Restrictor Plate, 2-3/8" I.D. (200M Btu/hr)
38b	42741140	Restrictor Plate, 2-1/2" I.D. (225M Btu/hr)
38c	42741150	Restrictor Plate, 2-3/4" I.D. (250M Btu/hr)
39	42892000	Starting Collar, 4" *x* 6" (80M–250M Btu/hr)
40	40504020	Starting Collar, 4" (40M–75M Btu/hr)

NOTES:

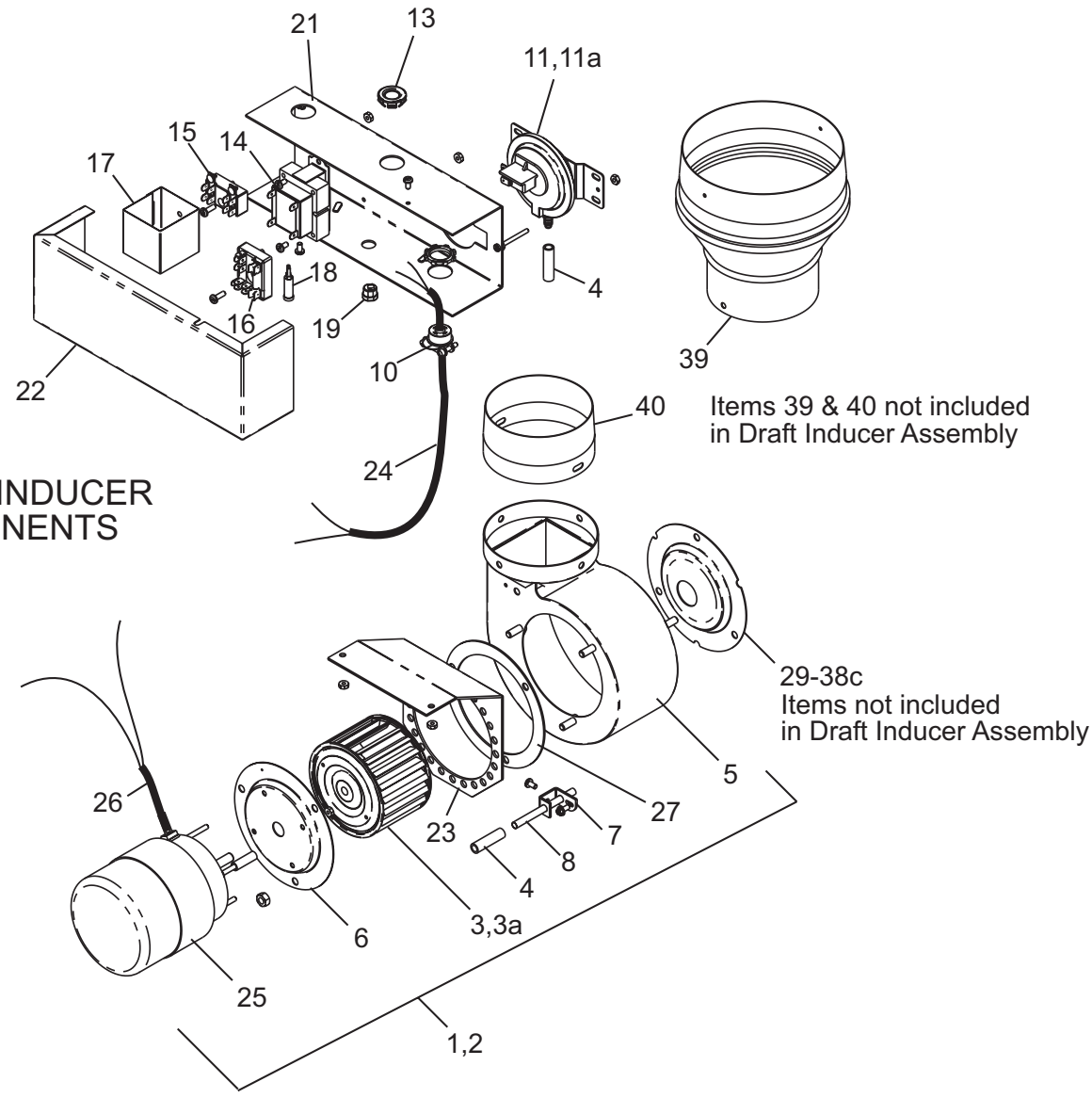
1) Screws, Nuts and Washers are standard hardware items and can be purchased at any local hardware store.
2) Please order by **PART NUMBER** - not by *Item Number*.
3) Replacement Part Prices are available when ordering.
4) Please refer to complete Model Number when ordering.

Model Number Suffixes

N = Natural Gas
L = Propane Gas
5 = Direct Spark Ignition of Main Burner

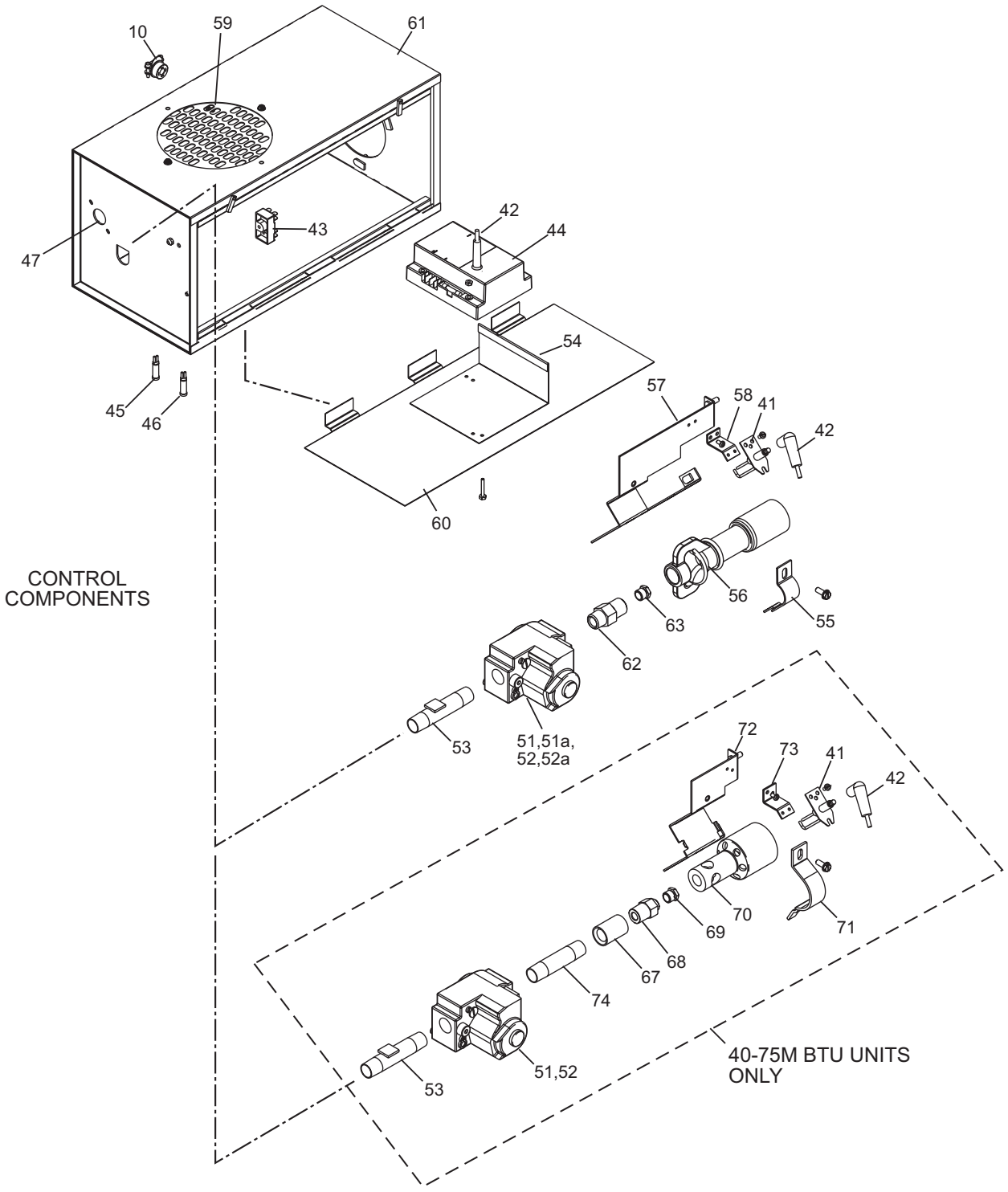
ALL ILLUSTRATION ARE INTENDED TO GIVE THE GENERAL IMPRESSION OF UNITS ONLY. WE RESERVE THE RIGHT TO ALTER ANY SPECIFICATION WITHOUT NOTICE.

DRAFT INDUCER COMPONENTS



CONTROL COMPONENTS

ITEM NO.	PART NO.	DESCRIPTION
10	03868010	3/8" Connector
28	42874000	Connection Wire Diagram (not shown)
41	30295000	Electrode PSE-GF1 (Igniter/Sensor)
42	30314120	Ignition Cable, 14" long
43	30324000	Terminal Block, EK-104
44	30331040	Spark Module, S87J-1034
45	30220020	Monitoring Light, Red
46	30220030	Monitoring Light, Amber
47	42447000	Sight Glass
48	03339020	1/8" Plug
51	30333070	Valve, VR8205P-2408 @3½" W.C. (Natural Gas) –for 40M–220M Btu/hr Models
52	30333080	Valve, VR8205P-2416 @10" W.C. (Propane Gas) –for 40M–220M Btu/hr Models
51a	30475050	Valve, VR8305P-2208 @3½" W.C. (Natural Gas) –for 225M–250M Btu/hr Models
52a	30475010	Valve, VR8305P-2224 @10" W.C. (Propane Gas) –for 225M–250M Btu/hr Models
53	42757010	Restrainer Nipple, 4" long
54	42885000	Spark Module Shield
55	42887000	Burner Clamp
56	42890010	Burner Assembly
57	42899000	Burner Bracket Sub-Assembly
58	42888000	Electrode Bracket
59	42893000	Air Inlet Plate (Perforated)
60	42905000	Access Panel
61	42906000	Cabinet Assembly
62	42889000	Orifice Fitting & Test Gauge Connection
63	03258***xxx***	Orifice for 80M–250M Btu/hr **(State Model & Gas Type for Size)**
64	43155260	Installation and Operation Instructions
67	03540090	Coupling, ½"
68	42701000	Orifice Fitting & Test Gauge Connection
69	03259***xxx***	Orifice for 40M-75M Btu/hr **(State Model & Gas Type for Size)**
70	42700000	Burner
71	43169000	Burner Clamp
72	43172000	Burner Bracket Sub-assembly
73	43170000	Electrode Bracket
74	03333120	Nipple, ½"x3½" long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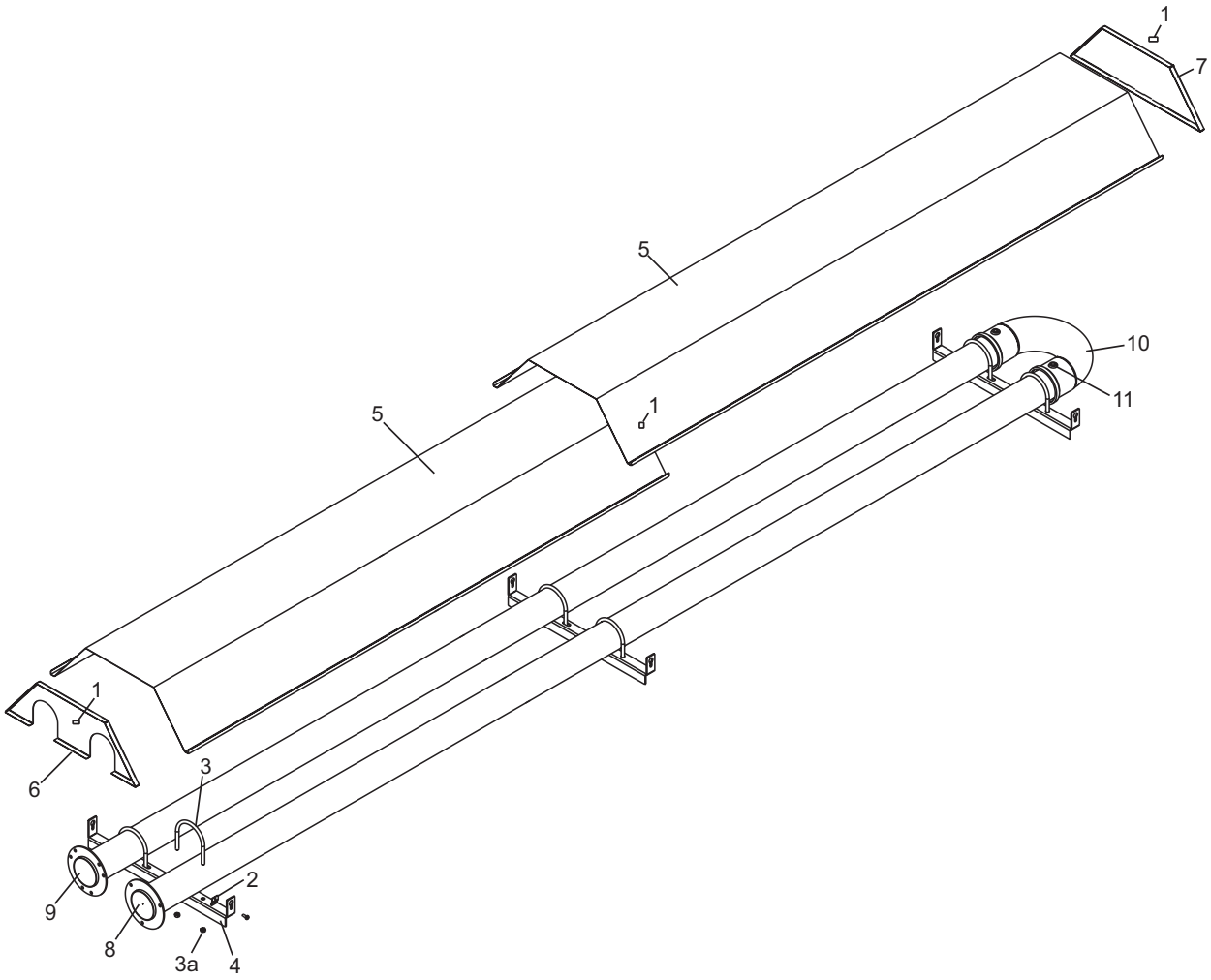
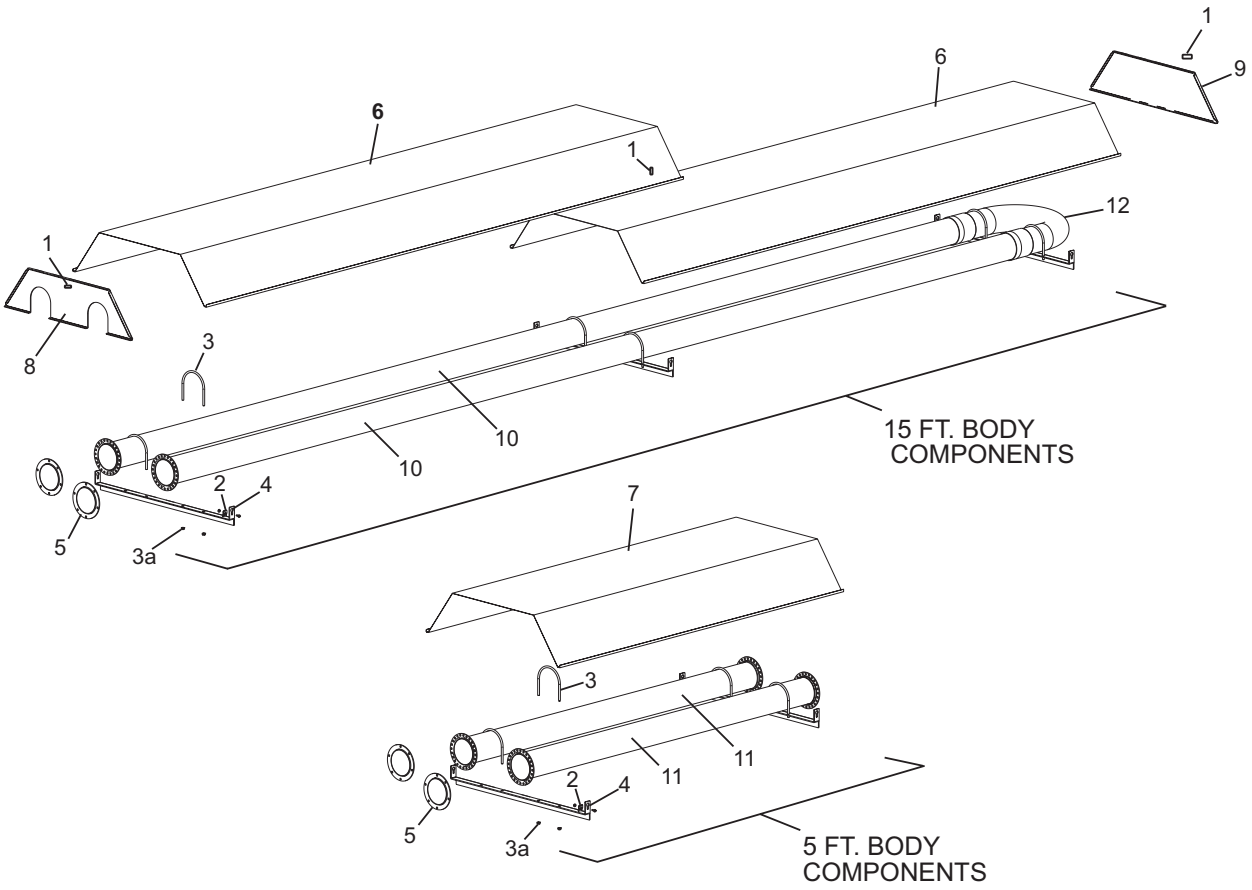
CONTROL
COMPONENTS
40-75M BTU UNITS
ONLY

LTU BODY COMPONENTS		MODELS: LTU 40-75
ITEM NO.	PART NO.	DESCRIPTION
1	02266010	Reflector Speed Clip
2	42769011	Reflector Clamp with screw
3	42770000	"U" Bolt Clamp, 3" OD Tube
3a	02127110	"U" Bolt Hex Nut, 5/16-18 (2 per "U" Bolt)
4	42773000	Tube Support/Hanger Bracket, 18" (3 per heater)
5	42763080	Reflector, 8' long (2 per heater)
6	42762010	Reflector, control end
7	42761010	Reflector, foot end
8	42765010	15' Tube Assembly, 3" OD, ALC w/one 3-hole flange **(Firing tube) –for LTU40-75**
9	42765020	15' Tube Assembly, 3" OD, ALC w/one 6-hole flange **(Exhaust tube) –for LTU40-75**
10	42764000	U Bend, 3" OD x 3-3/4" centerline radius
11	02251040	Set Screw, 5/16-24 x 1/2" (2 per heater)



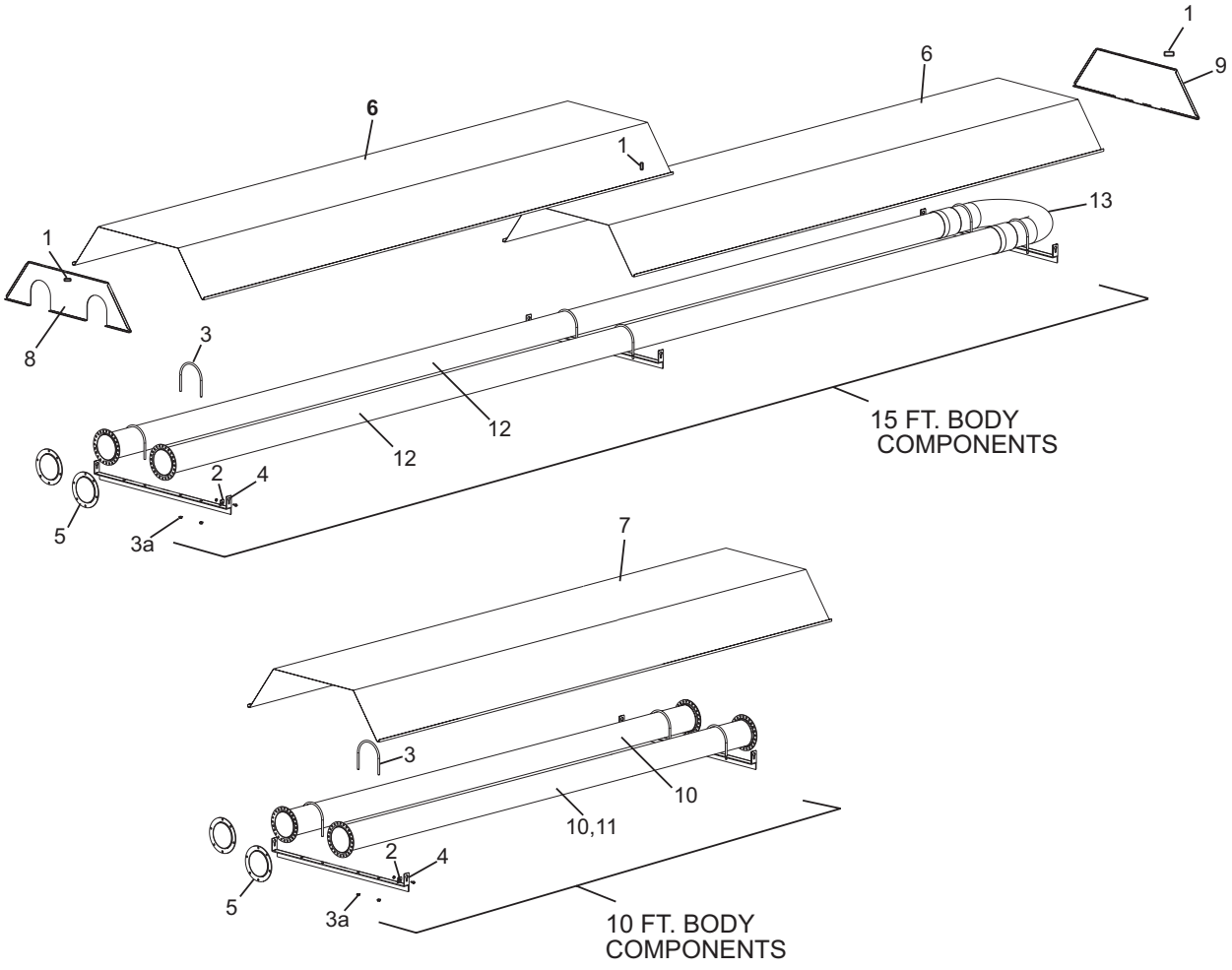
LTU40-75
BODY COMPONENTS

LTU BODY COMPONENTS		MODELS: LTU 80-175
ITEM NO.	PART NO.	DESCRIPTION
1	02266010	Reflector Speed Clip
2	42769011	Reflector Clamp with screw
3	42873000	"U" Bolt Clamp, 4" OD Tube
3a	02127110	"U" Bolt Hex Nut, 5/16-18 (2 per "U" Bolt)
4	42898000	Tube Support/Hanger Bracket, 28" (5 per heater)
5	42921000	Tube Flange Gasket
6	42894080	Reflector, 8'-4" long (2 per heater; 15 ft. section only)
7	42894100	Reflector, 9'-11½" long (1 per heater; 10 ft. section only)
8	42895000	Reflector, control end
9	42896000	Reflector, foot end
10	42912010	15 ft. Tube Assembly, 4" OD, ALC w/one 24-hole flange **(Firing tube)**
11	42912130	5 ft. Tube Assembly, 4" OD, ALC w/two 24-hole flanges **–for LTU125-175**
12	42913000	U Bend, 4" OD x 6" centerline radius



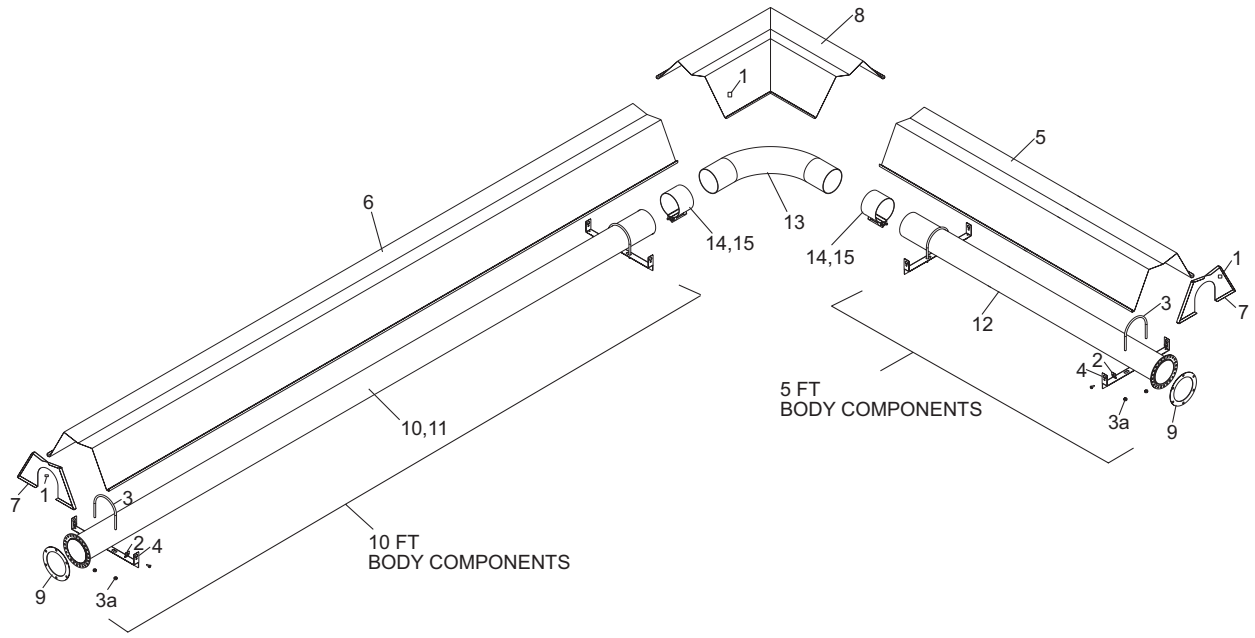
LTU80-175
BODY COMPONENTS

LTU BODY COMPONENTS		MODELS: LTU 180-250
ITEM NO.	*PART NO.*	*DESCRIPTION*
1	02266010	Reflector Speed Clip
2	42769011	Reflector Clamp with screw
3	42873000	"U" Bolt Clamp, 4" OD Tube
3a	02127110	"U" Bolt Hex Nut, 5/16-18 (2 per "U" Bolt)
4	42898000	Tube Support/Hanger Bracket, 28" (5 per heater)
5	42921000	Tube Flange Gasket
6	42894080	Reflector, 8'-4" long (2 per heater; 15' section only)
7	42894100	Reflector, 9'-11½" long (1 per heater; 10' section only)
8	42895000	Reflector, control end
9	42896000	Reflector, foot end
10	42912070	10' Tube Assembly, 4" OD, ALC w/two 24-hole flanges **(firing tube) –for LTU180-200**
11	42912129	10' Tube Assembly, 4" OD, ATC w/two 6-hole flanges **(firing tube) –for LTU225-250**
12	42912010	15' Tube Assembly, 4" OD, ALC w/one 24-hole flange (extension tube) **–for LTU180-250**
13	42913000	U Bend, 4" OD x 6" centerline radius



LTU180-250
BODY COMPONENTS

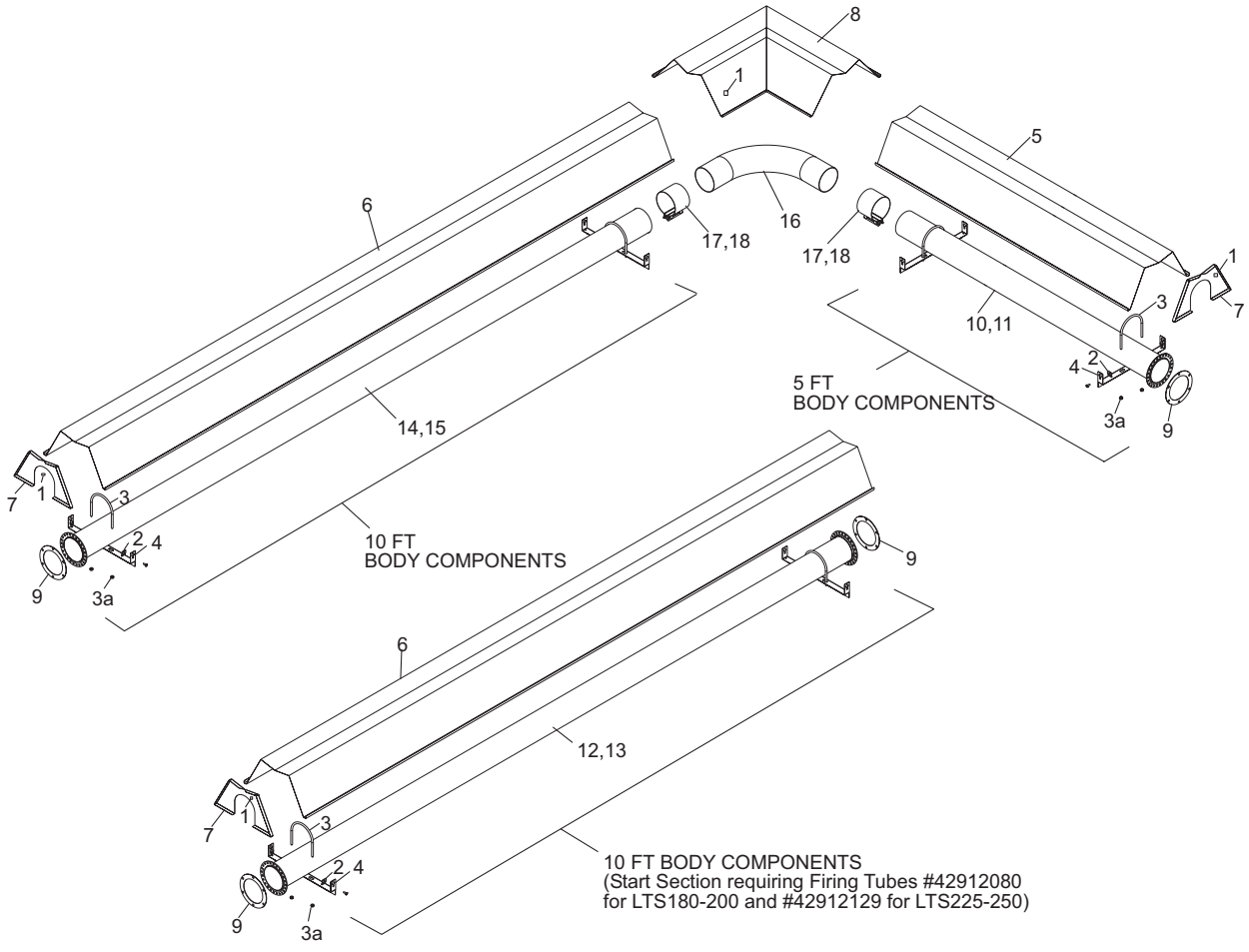
LTS BODY COMPONENTS		MODELS: LTS 40-175
ITEM NO.	PART NO.	DESCRIPTION
1	02266010	Reflector Speed Clip
2	42769011	Reflector Clamp with screw
3	42873000	"U" Bolt Clamp, 4" OD Tube
3a	02127110	5/16-18 Hex Nut (2 per "U" Bolt)
4	43318000	Tube Support/Hanger Bracket - - 13" (2 per 5 ft. or 10 ft. body section)
5	43319050	Reflector - - 4'-11½" long (5 ft. section only; 1 per 5 ft. body section)
6	43319100	Reflector - - 9'-11½" long (10 ft. section only; 1 per 10 ft. body section)
7	43320000	End Reflector (2 per heater)
8	43342000	Corner Reflector Package
9	42921000	Tube Flange Gasket
10	42912080	10 ft. Tube Assembly, 4" OD, ALC w/one 24-hole flange **(Start/End Tube)**
11	41932100	10 ft. Tube Assembly, 4" OD, ALC w/out flange **(Extension Tube)**
12	42912100	5 ft. Tube Assembly, 4" OD, ALC w/one 24-hole flange **(Exhaust Tube)**
13	43208010	4" O.D. Elbow Package
14	02189020	#10 x ½" Self-Drilling Screw (2 per coupling)
15	30462980	4" OD Tube Compression Coupling w/bolts



LTS40-175
BODY COMPONENTS

LTS BODY COMPONENTS — MODELS: LTS 180-250

ITEM NO.	PART NO.	DESCRIPTION
1	02266010	Reflector Speed Clip
2	42769011	Reflector Clamp with screw
3	42873000	"U" Bolt Clamp, 4" OD Tube
3a	02127110	5/16-18 Hex Nut (2 per "U" Bolt)
4	43318000	Tube Support/Hanger Bracket - - 13" (2 per 5 ft. or 10 ft. body section)
5	43319050	Reflector - - 4'-11½" long (5' section only; 1 per 5 ft. body section)
6	43319100	Reflector - - 9'-11½" long (10' section only; 1 per 10 ft. body section)
7	43320000	End Reflector (2 per heater)
8	43342000	Corner Reflector Package
9	42921000	Tube Flange Gasket
10	41932050	5' Tube Assembly, 4" OD, ALC w/out flanges (extension tube)
11	42912100	5' Tube Assembly, 4" OD, ALC w/one 24-hole flange (exhaust tube)
12	42912080	10' Tube Assembly, 4" OD, ALC w/one 24-hole flange **(firing tube) –for LTS180-200**
13	42912129	10' Tube Assembly, 4" OD, ATC w/two 6-hole flanges **(firing tube) –for LTS225-250**
14	42912099	10' Tube Assembly, 4" OD, ATC w/one 6-hole flange (second firing tube) **–for LTS225-250**
15	41932100	10' Tube Assembly, 4" OD, ALC w/out flange (extension tube)
16	43208010	4" O.D. Elbow Package
17	02189020	#10 x ½" Self-Drilling Screw (2 per coupling)
18	30462980	4" OD Tube Compression Coupling w/bolts



LTS180-250
BODY COMPONENTS

ALL ILLUSTRATIONS ARE INTENDED TO GIVE THE GENERAL IMPRESSION OF UNITS ONLY. OTHER COMBINATIONS OF 5 FT. AND 10 FT. SECTIONS, AND ONES WITH OR WITHOUT THE ELBOW PACKAGE ARE POSSIBLE. PLEASE CONSULT WITH YOUR SPACE-RAY SALES REPRESENTATIVE. WE RESERVE THE RIGHT TO ALTER ANY SPECIFICATION WITHOUT NOTICE.

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