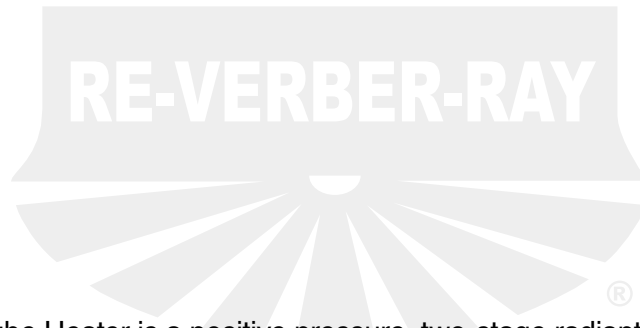


CL Series Insert Manual



For complete installation instructions, see the Tube Heater General Manual that accompanies this Series Insert Manual.



The CL Series Infrared Tube Heater is a positive pressure, two-stage radiant heater system. This insert manual is a supplement to the Tube Heater General Manual and provides specific information related to the CL Series model. All persons involved with the installation, operation and maintenance of the heater system must read and understand the information in this insert manual and the accompanying Tube Heater General Manual.

⚠ 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.

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



In locations used for the storage of combustible materials, signs must be posted to specify the maximum permissible stacking height to maintain the required clearances from the heater to the combustibles. Signs must either be posted adjacent to the heater thermostats or in the absence of such thermostats, in a conspicuous location.



Not for residential use! Do not use this heater in the home, sleeping quarters, attached garages, etc. **Installation of a commercial tube heater system in residential indoor spaces may result in property damage, serious injury, asphyxiation or death.**

For Your Safety

If you smell gas:

- Do not try to light any appliance.
- Do not touch any electrical switch.
- Do not use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone.
- Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

Keep these instructions for future reference.

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NOTE: See page 10 for a list of available models and specifications.

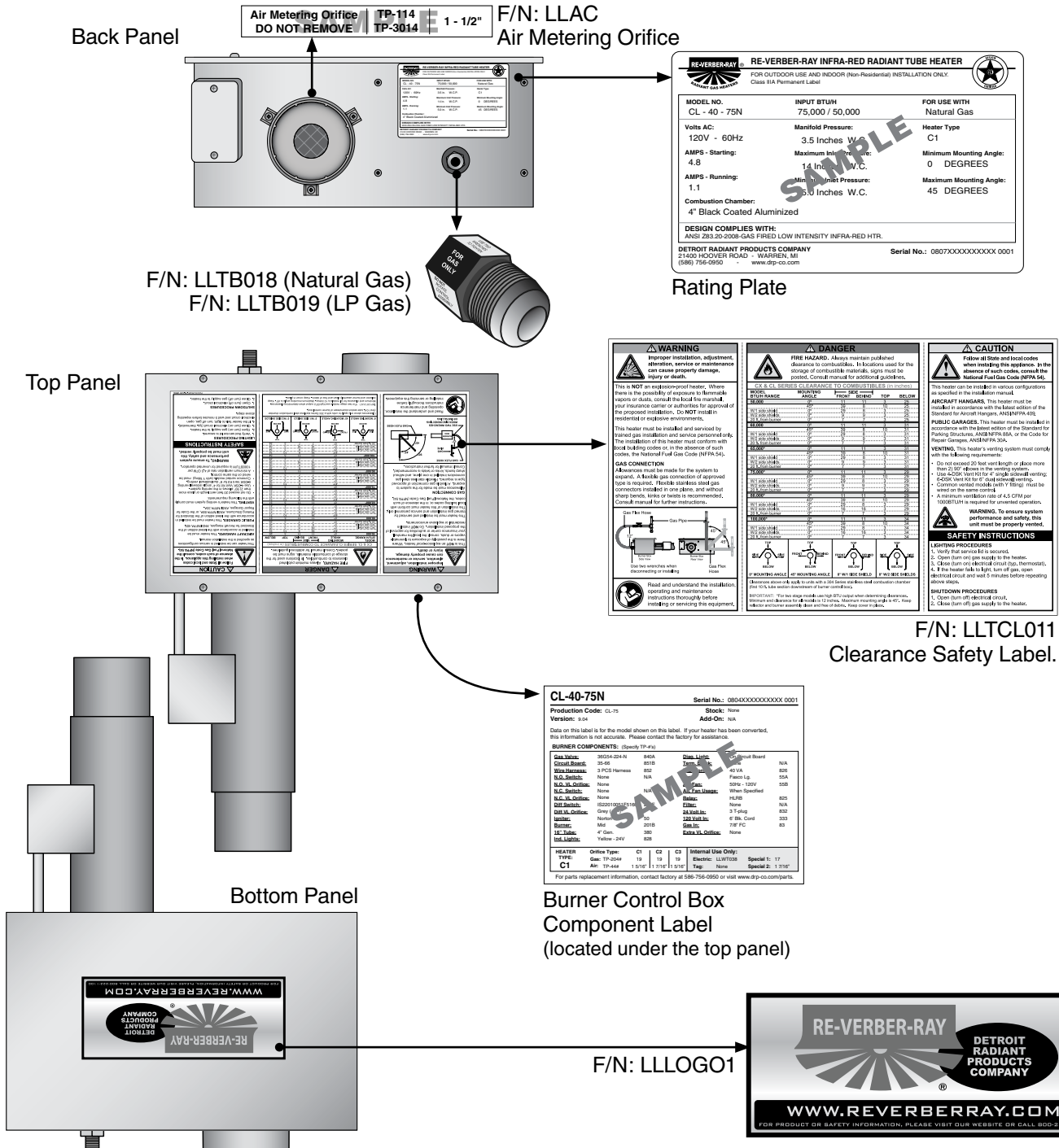
1.0 Safety



Read and understand all safety information and warnings in this insert manual and the Tube Heater General Manual before installation, operation and maintenance of the radiant tube heater system.

Safety Labels and Their Locations

Product safety signs or labels should be replaced by the product user when they no longer are legible. Contact either your local distributor or the product manufacturer for obtaining replacement signs or labels.



LED CODE	FAULT STATUS	FAULT CODE DELAY
Initial flash on power up, then steady off	Normal operation	Immediate
Steady on	Module failure / Internal fault	Immediate
1 flash	Ignition failure	30-32 minutes
2 or 3 flashes	APS - Note: fan / intake / exhaust	10-12 minutes
4 flashes	Solenoid valve fault / Leaky valve / Flame amplifier fault	Immediate
No flash on 117V start up	Transformer fault	Immediate

F/N: LLTB007(2)

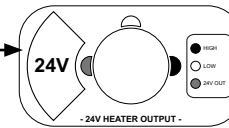
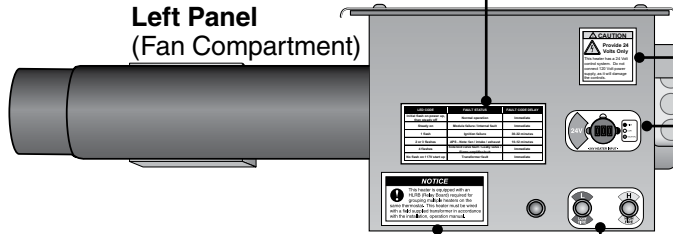
CAUTION

Provide 24 Volts Only

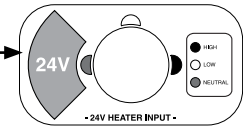
This heater has a 24 Volt control system. Do not connect 120 Volt power supply, as it will damage the controls.

F/N: LLDR003

Left Panel (Fan Compartment)



F/N: LLV3EP4
White Crescent

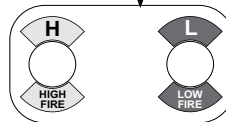


F/N: LLV3EP2
Orange Crescent
(Models with a relay board installed only).

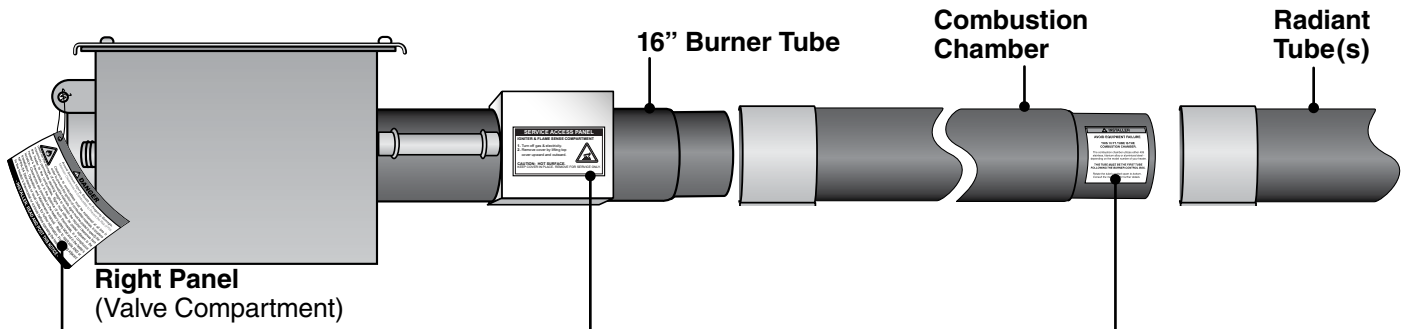
NOTICE

This heater is equipped with an HLRB Relay(s) required for grouping multiple heaters on the same thermostat. This heater must be wired with a field supplied transformer in accordance with the installation, operation manual.

F/N: LLTB031
(Models with a relay board installed only)



F/N: LLV2EP9



Right Panel (Valve Compartment)

DANGER

Avoid Serious Injury, Death or Property Damage.
Maintain Clearances to Combustible to Prevent the Risk of Fire.

Clearance to combustibles must be maintained at all times in order to prevent the ignition of combustible materials. In locations used for the storage of combustible materials, signs must be posted to specify the maximum permissible stacking height to maintain the required clearances from the heater to the combustibles. Signs must either be posted adjacent to the heater's thermostats or in the absence of such thermostats, in a conspicuous location. Clearances are provided on the heater's safety label and in the heater's Installation, Operation and Maintenance manual. Product installation and operation must comply with applicable standards, codes and regulations. Post this tag adjacent to the heater's thermostat or controls before operating the heater.

- INSTALLER: READ AND POST THIS NOTICE -

F/N: LL01 - Clearance Safety Tag
(Affix adjacent to heater's thermostat)

SERVICE ACCESS PANEL
IGNITER & FLAME SENSE COMPARTMENT

1. Turn off gas & electricity.
2. Remove cover by lifting top cover upward and outward.

CAUTION: HOT SURFACE.
KEEP COVER IN PLACE. REMOVE FOR SERVICE ONLY.

F/N: LLTB026

INSTALLER

AVOID EQUIPMENT FAILURE

THIS 10 FT. TUBE IS THE COMBUSTION CHAMBER.

The combustion chamber utilizes either 409 stainless, titanium alloy or aluminized steel - depending on the model number of your heater.

THIS TUBE MUST BE THE FIRST TUBE FOLLOWING THE BURNER CONTROL BOX.

Rotate the tube's welded seam to bottom.
Consult the manual(s) for further details.

F/N: LLTB004 (orange)

Clearance to Combustibles

⚠ WARNING



Placement of explosive objects, flammable objects, liquids and vapors close to the heater may result in explosion, fire, property damage, serious injury or death. Do not store or use explosive objects, liquids or vapor in the vicinity of the heater.

Clearance to combustibles is defined as the minimum distance that must exist between the tube surface, or reflector, and any combustible items (see Figure 1.1). It also pertains to the distance that must be maintained from moving objects around the tube heater. When installing the tube heater system, clearances to combustibles for the model tube heater and configuration must be maintained (see Chart 1.1).

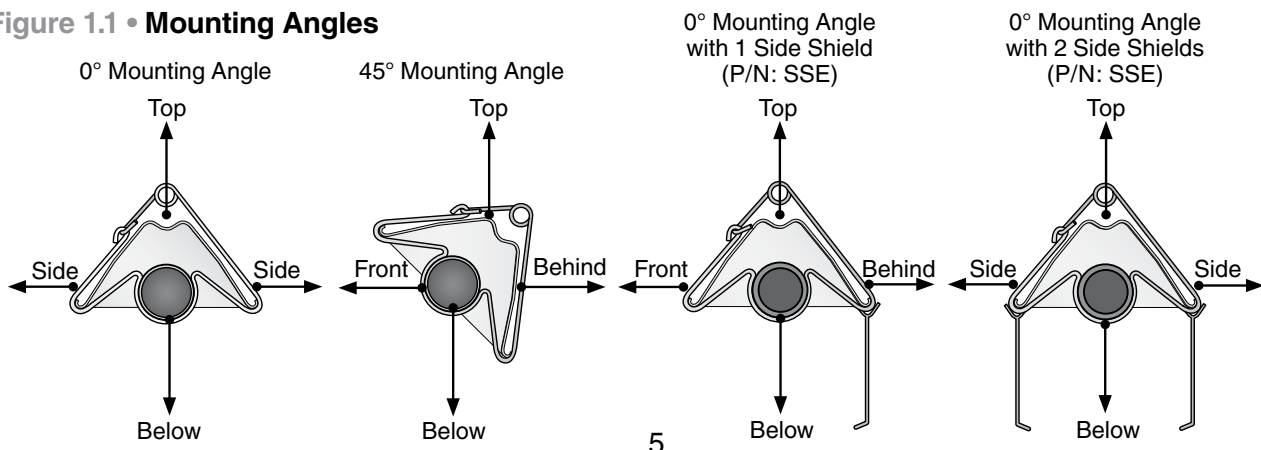
The stated clearance to combustibles represents a surface temperature of 90°F (32°C) above room temperature. Building materials with a low heat tolerance (such as plastics, vinyl siding, canvas, tri-ply, etc.) may be subject to degradation at lower temperatures. It is the installer’s responsibility to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

Chart 1.1 • Clearance to Combustibles in Inches (see Figure 1.1 for Mounting Angles)

Model Number	Mounting Angle*	Sides				
		Front	Behind	Top	Below	
CL (30, 40) - 65 [N, P]	0°	11	11	3	31	
	45°	39	8	10	31	
	with 1 side shield	0°	29	8	3	31
	with 2 side shields	0°	9	9	3	31
	20 ft. from burner	0°	7	7	3	31
CL (40, 50) - 75 [N, P]	0°	11	11	3	29	
	45°	39	8	10	29	
	with 1 side shield	0°	29	8	3	29
	with 2 side shields	0°	9	9	3	29
	20 ft. from burner	0°	7	7	3	29
CL (40,50) - 80 [N, P]	0°	11	11	3	29	
	45°	39	8	10	29	
	with 1 side shield	0°	29	8	3	29
	with 2 side shields	0°	16	16	3	29
	20 ft. from burner	0°	7	7	3	29
CL 50 - 100 [N, P]	0°	11	11	3	34	
	45°	39	8	10	34	
	with 1 side shield	0°	29	8	3	34
	with 2 side shields	0°	16	16	3	34
	20 ft. from burner	0°	7	7	3	34

* Heaters mounted on an angle between 0° to 45° must maintain clearances posted for 0° or 45°; whichever is greater.

Figure 1.1 • Mounting Angles



2.0 Installation

⚠ WARNING



Improper installation, adjustment, alteration, service or maintenance can cause property damage, serious injury or death. Read and understand, the installation, operating and maintenance instructions thoroughly before installing or servicing this equipment. Only trained, qualified gas installation and service personnel may install or service this equipment.

Not for residential use! Do not use this heater in the home, sleeping quarters, attached garages, etc. **Installation of a commercial tube heater system in residential indoor spaces may result in property damage, serious injury or death.**

Instructions for the following are detailed in the Tube Heater General Manual:

- Design considerations
- Hanger suspension and placement
- Tube layout and assembly
- Burner control box suspension
- Reflectors (and accessories)
- Venting and combustion air intake
- Gas requirements
- Baffle assembly

Note: Electronic versions of all manuals are available at www.detroitradiant.com

Gas Requirements

Type of Gas	Required Manifold Pressure	Minimum Inlet Pressure	Maximum Inlet Pressure
Natural	3.5 Inches W.C.	5.0 Inches W.C.	14.0 Inches W.C.
Liquefied Petroleum	10.0 Inches W.C.	11.0 Inches W.C.	14.0 Inches W.C.



IMPORTANT: Consult the Tube Heater General Manual (LIOGTa) for gas connection requirements.

Electrical Requirements

- 120 Volt - 60 Hz GRD, 3-wire.
- 24V thermostat connection.
- Starting current 4.8 amps
- Running current 1.1 amps

NOTICE

Connecting the thermostat with a voltage other than 24V may damage the heater. The CL Series requires a 24V connection to the thermostat. This is either supplied by the heater internally (standard) or by an external transformer (with optional relay board, P/N: HLRB). See Figure 2.1.

Wiring

⚠ WARNING



Electric Shock

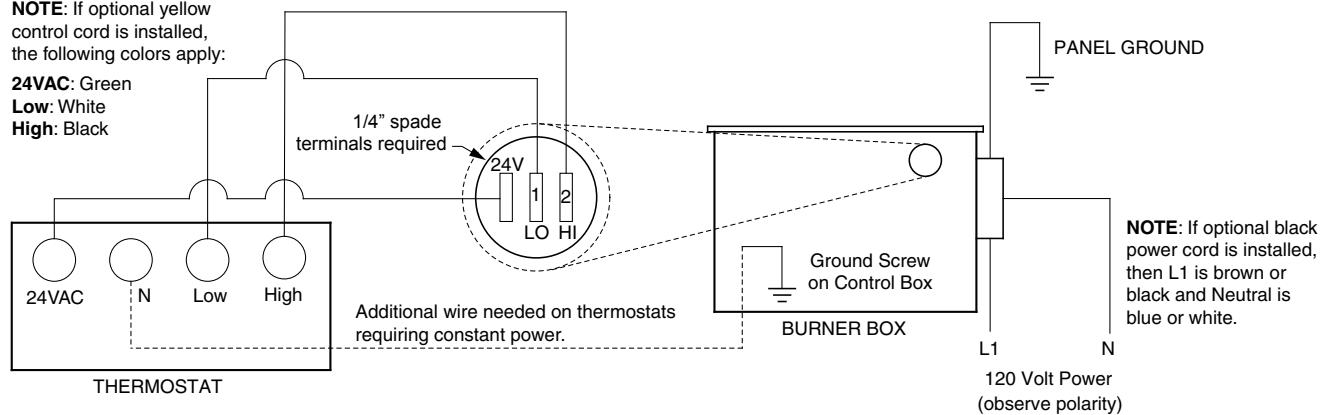
Field wiring to the tube heater must be connected and grounded in accordance with national, state, provincial, local codes and to the guidelines in the Tube Heater General Manual and Series Insert Manual. In the United States refer to the most current revisions to the ANSI/NFPA 70 Standard and in Canada refer to the most current revisions to the CSA C22.1 Part I Standard.

Figure 2.1 • Field Wiring Diagrams

A. Single Heater, Single Thermostat. No Relay Board (white label)

NOTE: If optional yellow control cord is installed, the following colors apply:

24VAC: Green
Low: White
High: Black



B. Multiple Heaters, Single Thermostat. With a Relay Board (HLRB orange label)

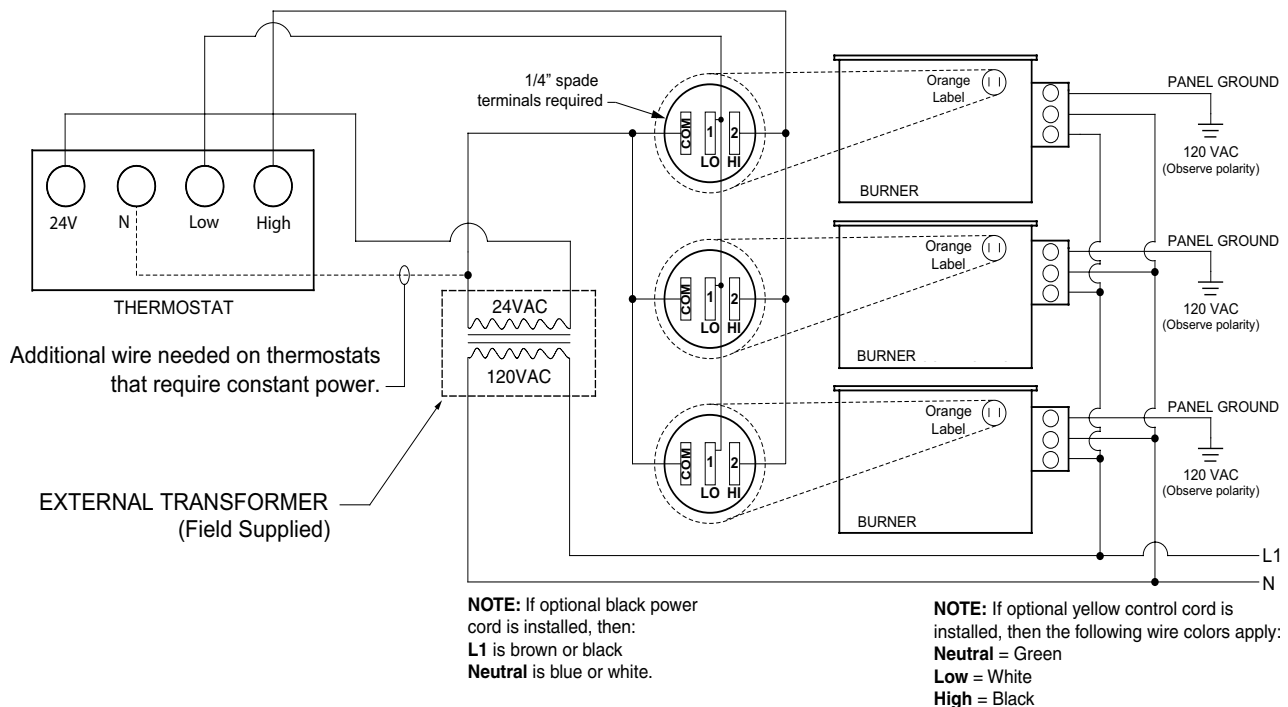
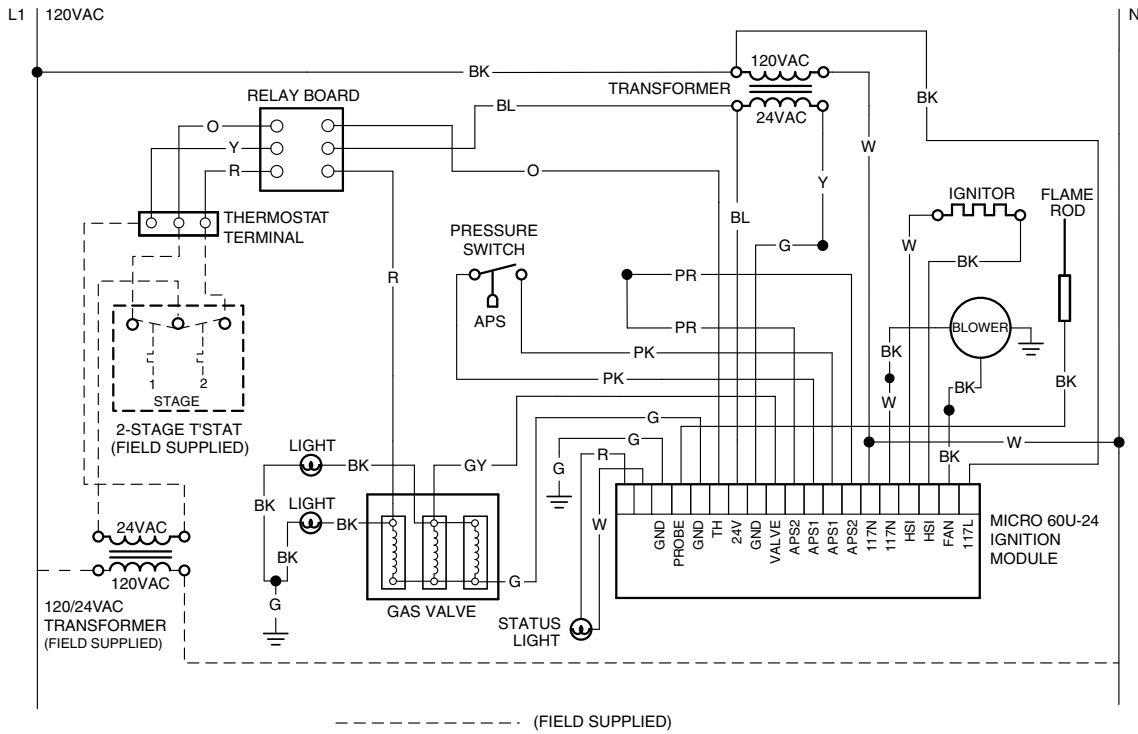
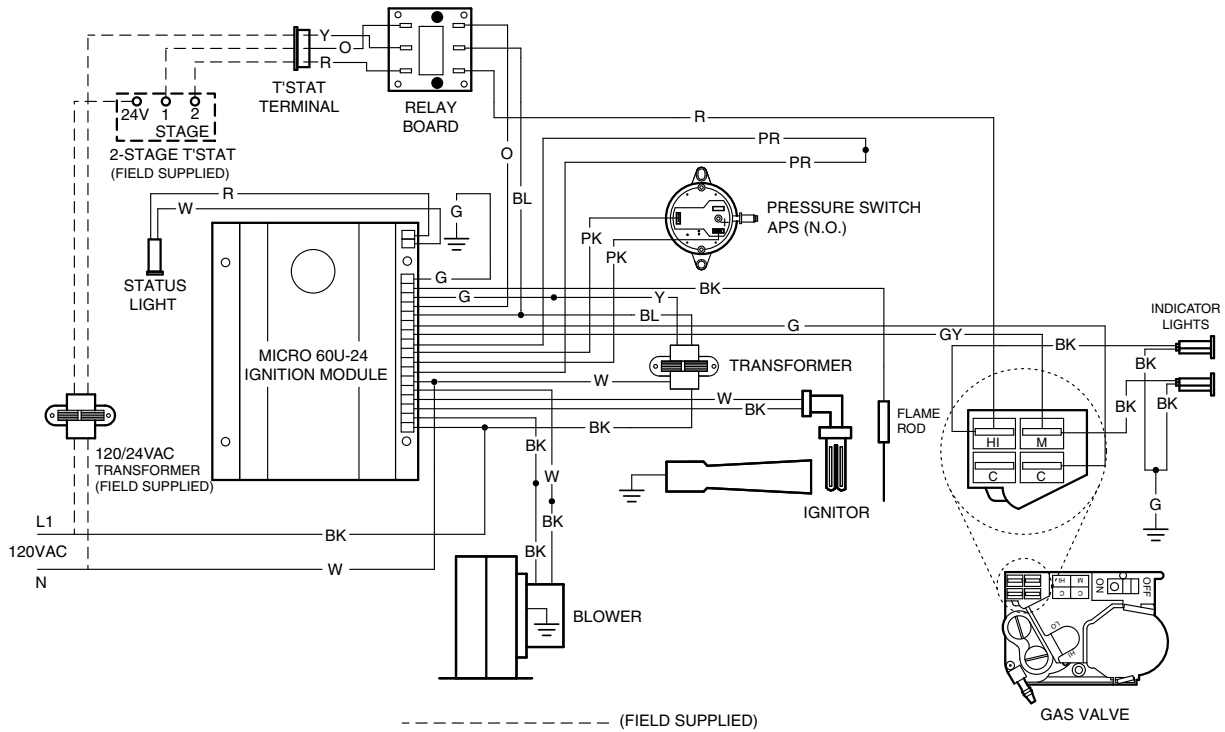


Figure 2.3 • Alternative Wiring Diagrams

A. Micro 60U-24 Ladder Diagram - With Relay Board



B. Micro 60U-24 Block Diagram - With Relay Board



Specifications

Chart 2.1 • Specifications

Model Number	Gas Type (select one)	BTU/H (High Fire)	BTU/H (Low Fire)	Straight Length	U-Tube Length	Standard Weight (lbs.)	Recommended Mounting Height	Combustion Chamber (uncoated)	Combustion Chamber (uncoated)	Radiant Emitter Tube(s) (black coated)	Radiant Surface Area (sq. ft.)	36" Baffle Sections
CL-30-65	N or LP	65,000	50,000	31'-4"	*17'-8"	160	9' to 14'	304SS	UC Alum	Alum	30.4	6
CL-40-65	N or LP	65,000	50,000	41'-0"	22'-8"	190	9' to 14'	304SS	UC Alum	Alum	40.5	6
CL-40-75	N or LP	75,000	50,000	41'-0"	22'-8"	190	10' to 15'	304SS	UC Alum	Alum	40.5	5
CL-40-80	N or LP	80,000	50,000	41'-0"	22'-8"	190	10' to 15'	304SS	UC Alum	Alum	40.5	5
CL-50-75	N or LP	75,000	50,000	50'-8"	*27'-4"	235	11' to 15'	304SS	UC Alum	Alum	50.6	5
CL-50-80	N or LP	80,000	50,000	50'-8"	*27'-4"	235	11' to 15'	304SS	UC Alum	Alum	50.6	5
CL-50-100	N or LP	100,000	70,000	50'-8"	*27'-4"	235	12' to 16'	304SS	UC Alum	Alum	50.6	5

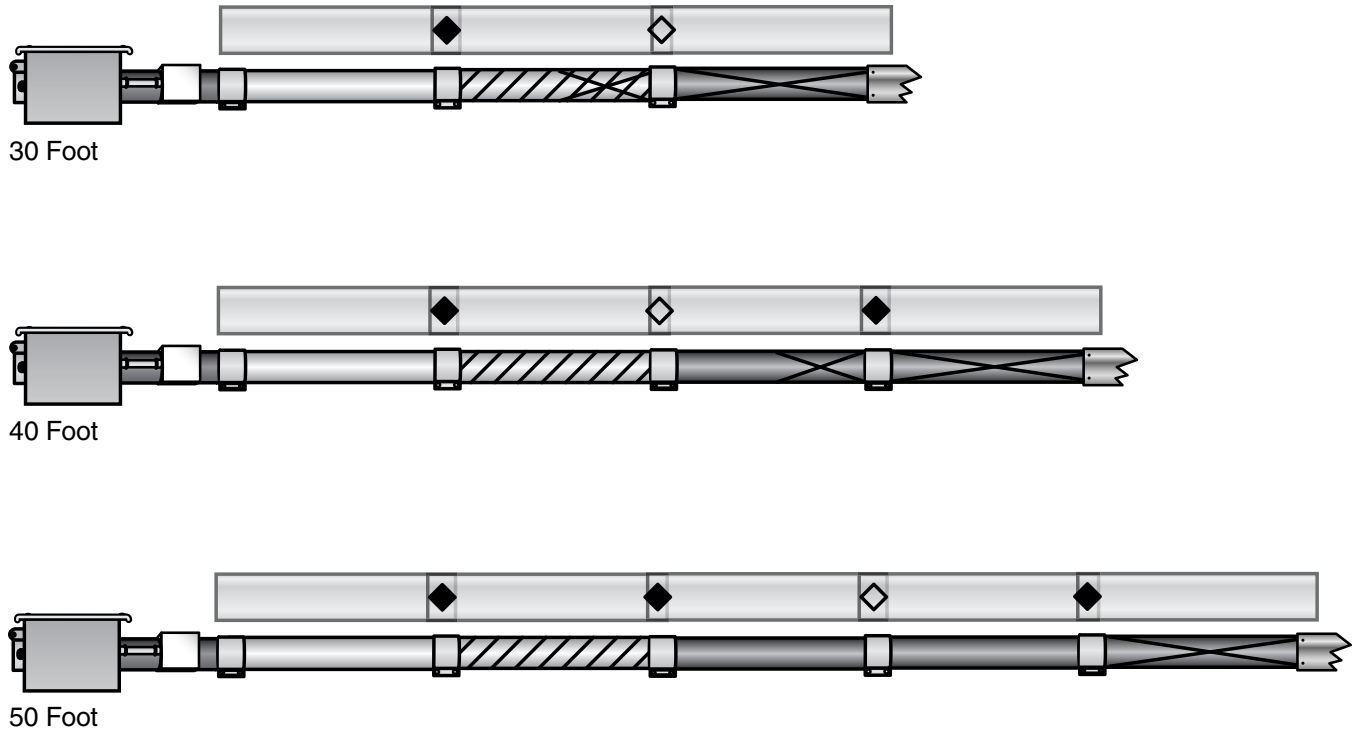
* Model requires 5EA-SUB accessory package when installing in a 'U' configuration (P/N: TF1B).

304SS = Uncoated 304 Series stainless steel.
 UC Alum = Uncoated aluminized treated steel.
 Alum = Black coated aluminized treated steel.

Tube Installation Sequence

Figure 2.4 • Tube Installation Sequence and Baffle Location

Important! The combustion chamber & radiant tube sections must be installed in the following order.



Key	
	Burner Control Box with 16" Burner Tube
	Uncoated 304 Series Stainless Steel Combustion Chamber Tube
	Uncoated Aluminized Radiant Emitter Tube
	Black Coated Aluminized Radiant Emitter Tube
	Standard Tube Clamp
	Baffle Location
	Secure vent material to exchanger with three #8 sheet metal screws. Seal with high temperature silicone sealant. Do not use tube clamp.

NOTE: Refer to the Tube Heater General Manual, Chart 3.6 (page 23) for secured reflector joints.

3.0 Operation

Sequence of Operation

Standby: The MICRO 60U-24 CONTROL continually checks for internal faults, circuit integrity and relay contact positioning.

Starting Circuit: Upon a call for heat, the control verifies that the differential switch is in the proper position (open). The control energizes the fan. Once operational static pressure is achieved, the differential switch will close initiating the ignition sequence. The hot surface igniter is powered and the gas valve opens after 45 seconds. If the flame is not sensed, the heater will attempt to re-ignite for a total of three (3) ignition trials before proceeding to soft lockout.

Single Stage Running Circuit: After ignition, the flame rod monitors burner flame. If sense of flame is lost, the control closes the gas valve within one second and a new trial sequence (identical to the starting sequence) is initiated. If flame sense is not established within 8.5 seconds, the heater will attempt two (2) additional ignition sequences before proceeding to soft lockout. The control can be reset by briefly interrupting the power source.

Two Stage Running Circuit: The second stage on the gas valve is powered directly from the second stage of the thermostat. In order for two stage to flow to a higher output, single stage must be energized as well. The thermostat determines which stage to maintain for the desired temperature.

Shut Down: When the thermostat is satisfied, the fan will enter a two (2) minute post-purge cycle. Then go to diagnostics; soft & hard lockout.

Thermostat

Note: Different thermostats operate according to their particular features. Refer to thermostat specifications for details.

CL Series heaters require a 24V, two-stage thermostat to operate. The burner control box is equipped with either a round terminal strip that accepts three (3) 1/4" insulated female spade terminals or a 36" yellow 24V control wire. Do not supply 120V to the 24V connection.

The CL Series is equipped with or without a relay board (P/N: HLRB).

Standard Configuration

Without relay board (white terminal label*):

- Single burner control box.
- Single thermostat.

Optional Configuration (must be factory installed)

With relay board (orange terminal label*):

- Required when a single thermostat controls two or more burner control boxes or when heaters are common vented.

NOTE: Units with a relay board installed must have an external transformer (field supplied), see wiring diagram. (Figure 2.1B) Stainless steel heaters, with a relay board, are indicated with the suffix 'D' on the heater's rating plate.

*A yellow control wire replaces the external terminal plug on models with stainless steel control housing or water resistant upgrades.

Diagnostics

Lockout:

The controls will automatically lockout the heater system when an external or system fault occurs. There are two types of lockout:

Soft Lockout: The heater will attempt to light three times. In the event of a failed attempt to light, (gas pressure, valve, no flame sense etc.), the heater will enter a soft lockout period for 30 minutes and then attempt to light three more times before entering Hard Lockout mode.

Hard Lockout: If proof of flame is not established, a component failure occurs or blockages are evident, the heater will enter hard lockout. If lockout occurs, the control can be reset by briefly interrupting the power source. Refer to Chart 3.1 below for a description of LED codes.

Figure 3.1 • LED Operation Indicator Lights

Note: Hard lockout LED CODE will appear upon completion of the soft lockout sequence of operation.

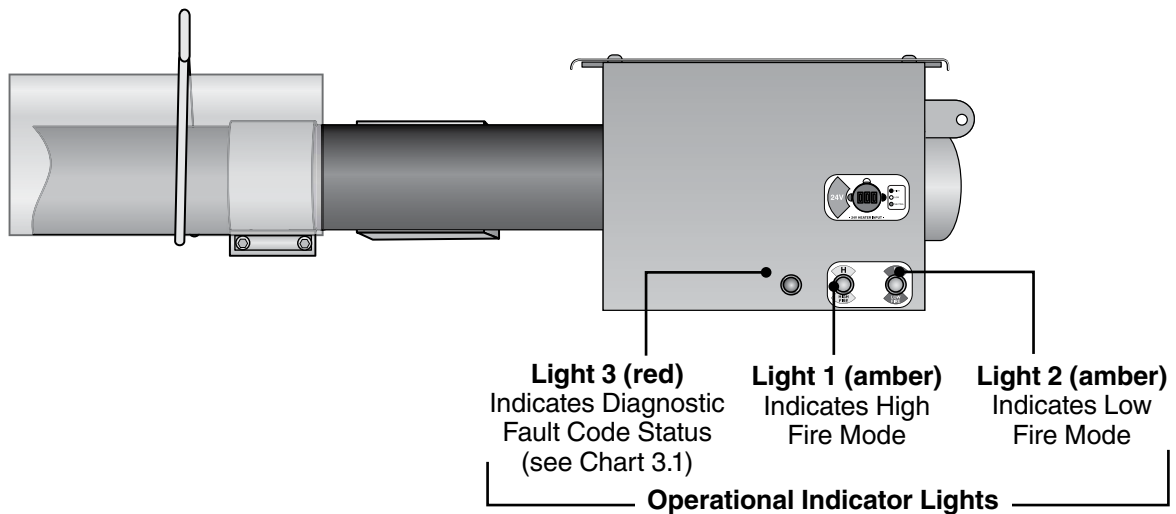


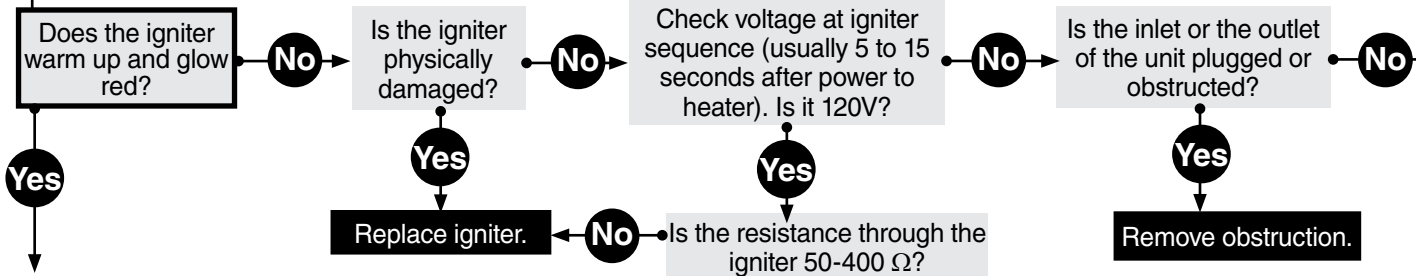
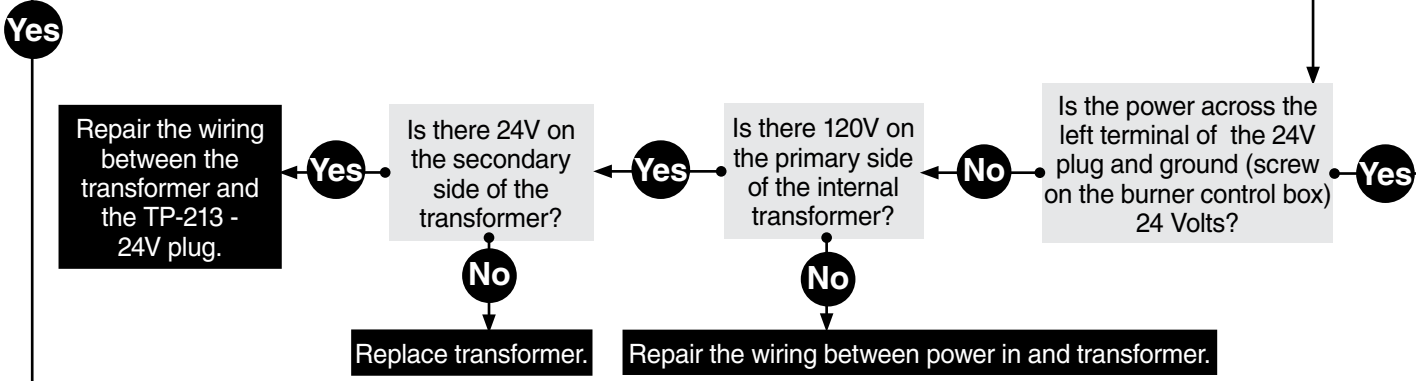
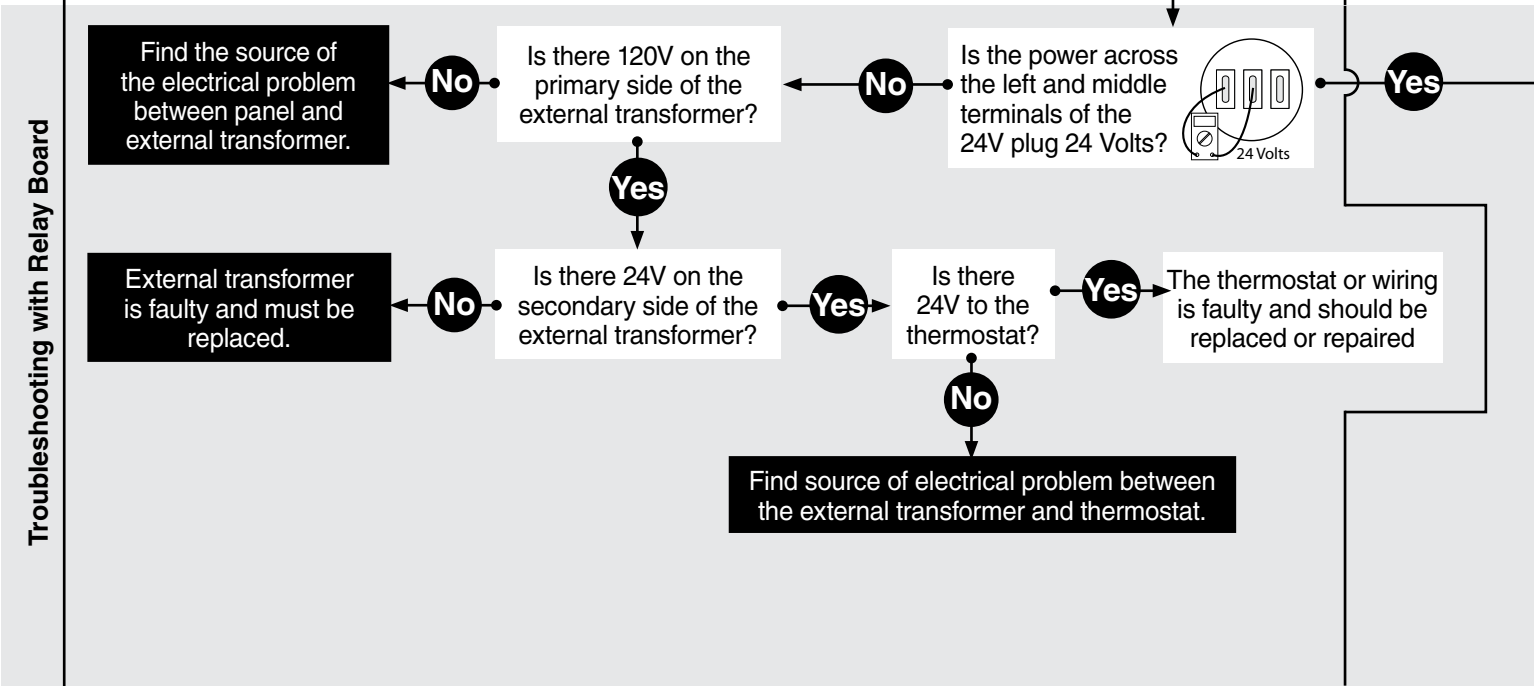
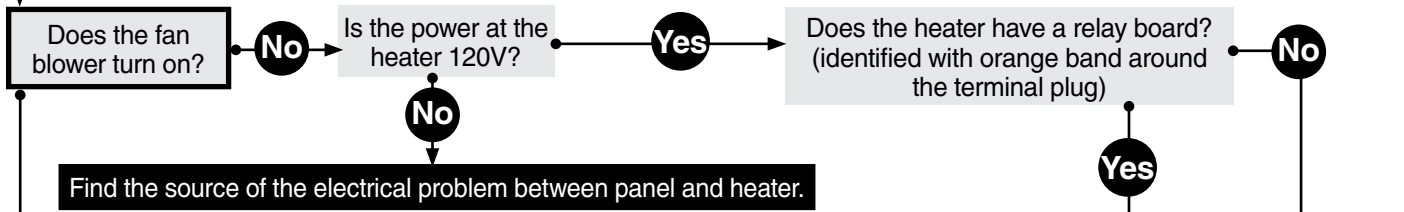
Chart 3.1 • LED Fault Code Status

LED Code	Fault Status	Fault Code Delay*
Initial flash on power up, then steady off	No fault, normal operation	No delay
Steady ON	Module failure / Internal fault	No delay
1 flash	Ignition failure	30-32 minutes
2 or 3 flashes	APS (Air Proving Switch) (Fan / Intake / Exhaust)	10-12 minutes
4 flashes	Solenoid valve fault Leaky valve Flame amplifier fault	No delay
No flash on 117V startup	Transformer fault	No delay

*Some flash codes have a time delay before the LED will flash.

4.0 Troubleshooting Guide

Turn up thermostat



Continued on page 16

NOTICE

Bypassing any switch is intended for testing purposes only. Do not leave switch bypassed during normal operation or the heater's built-in safety mechanisms will be compromised.

Key

Start Question

Without Relay Board:

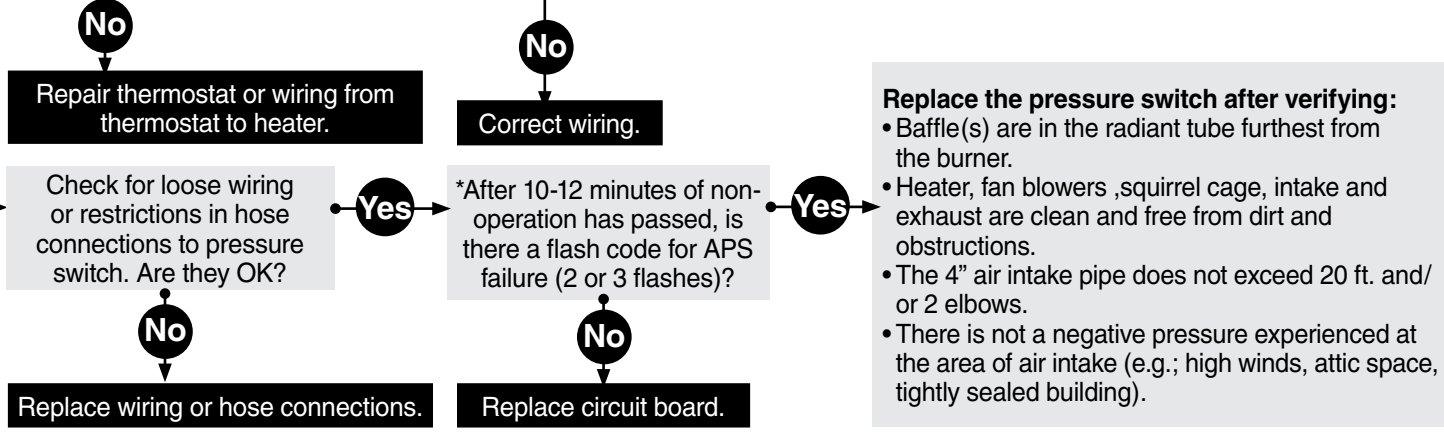
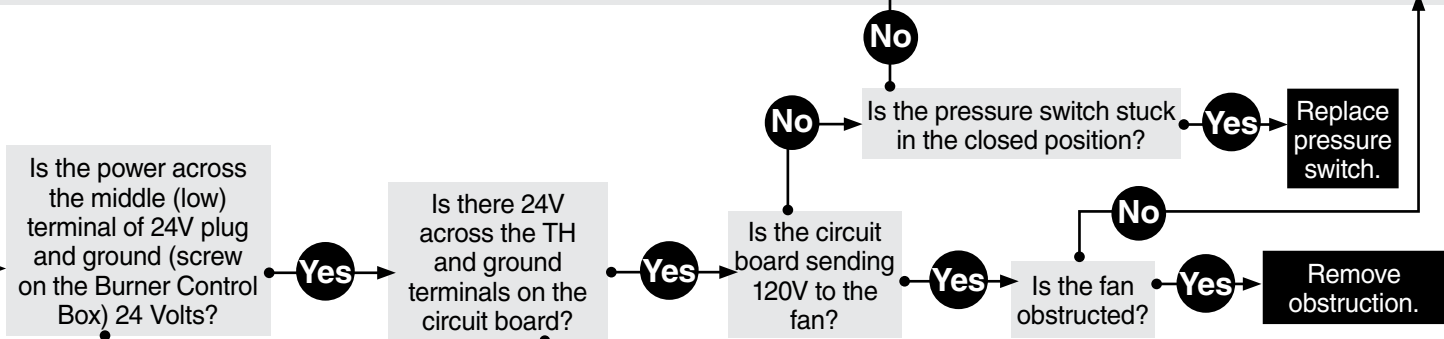
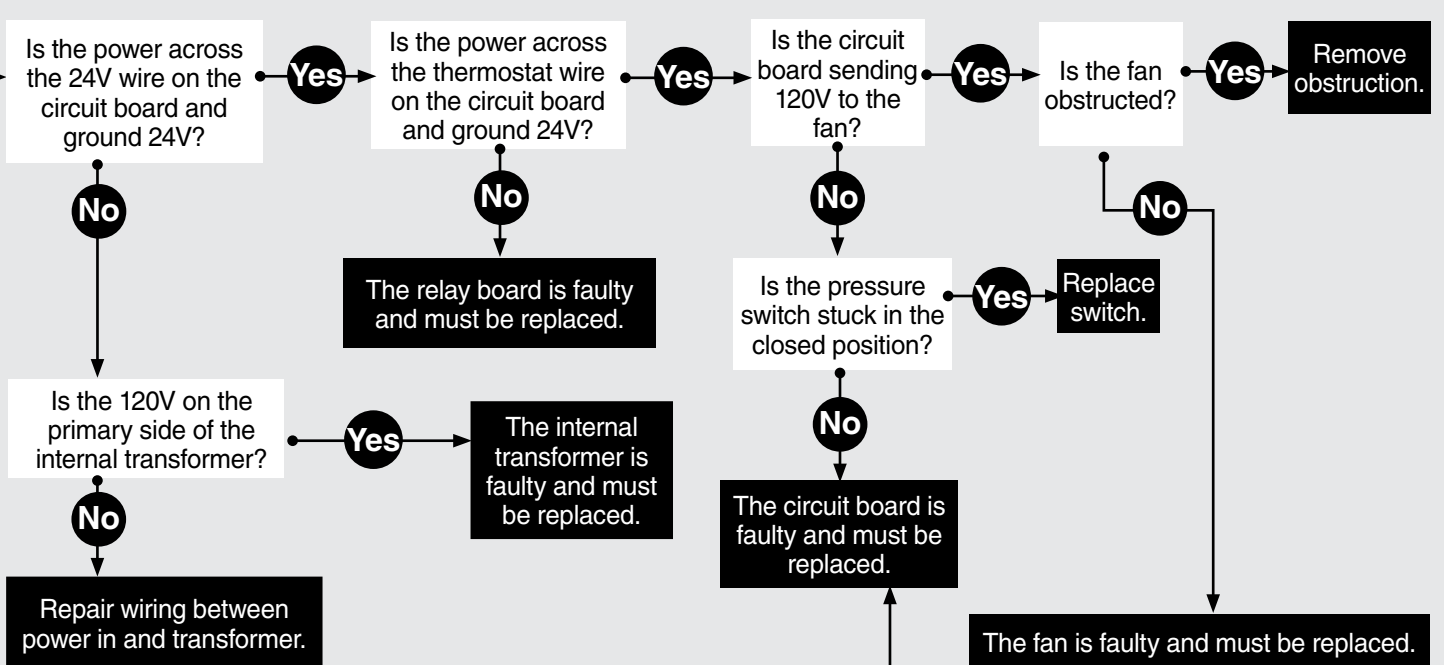
Process Question

Corrective Action

With Relay Board:

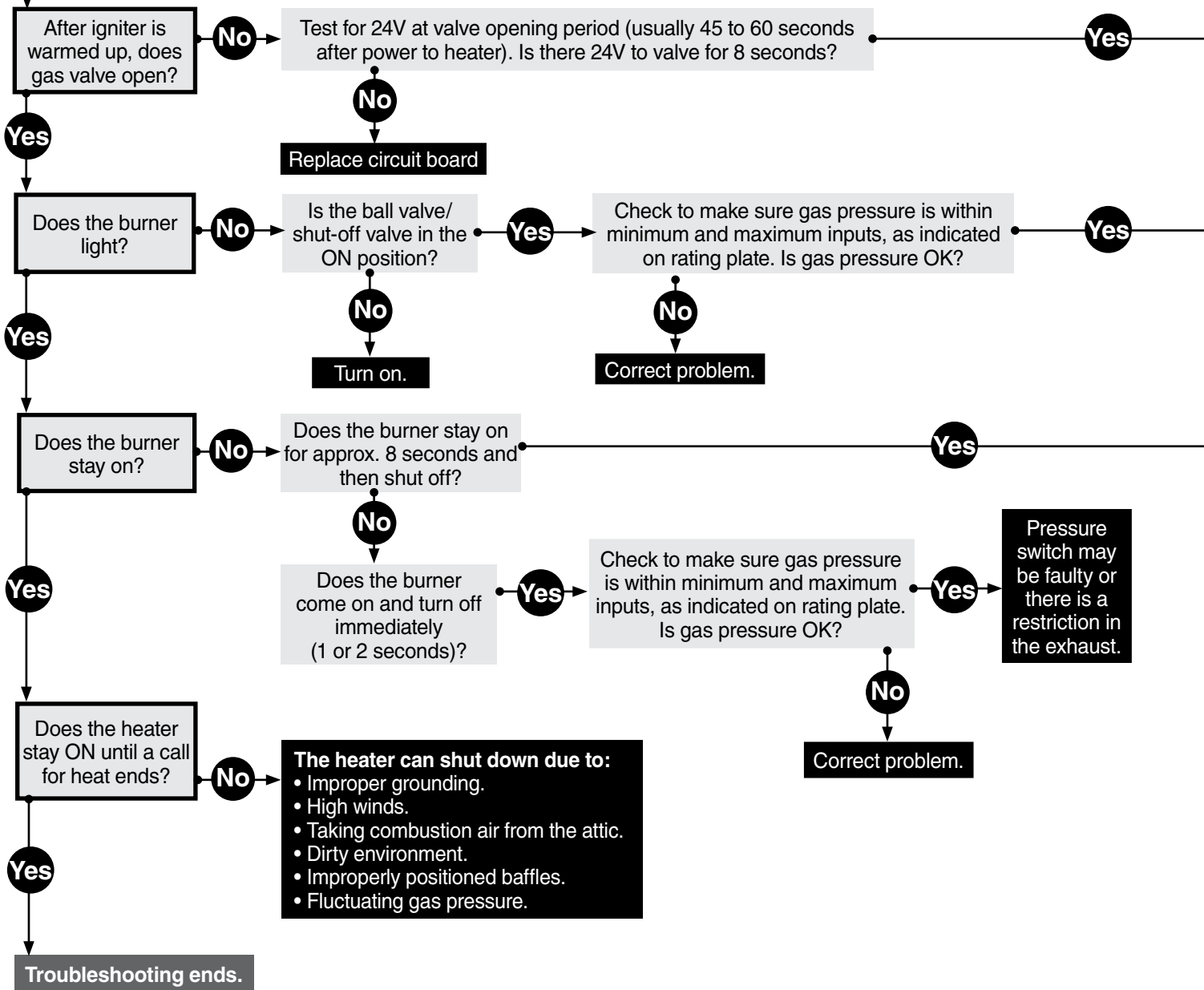
Process Question

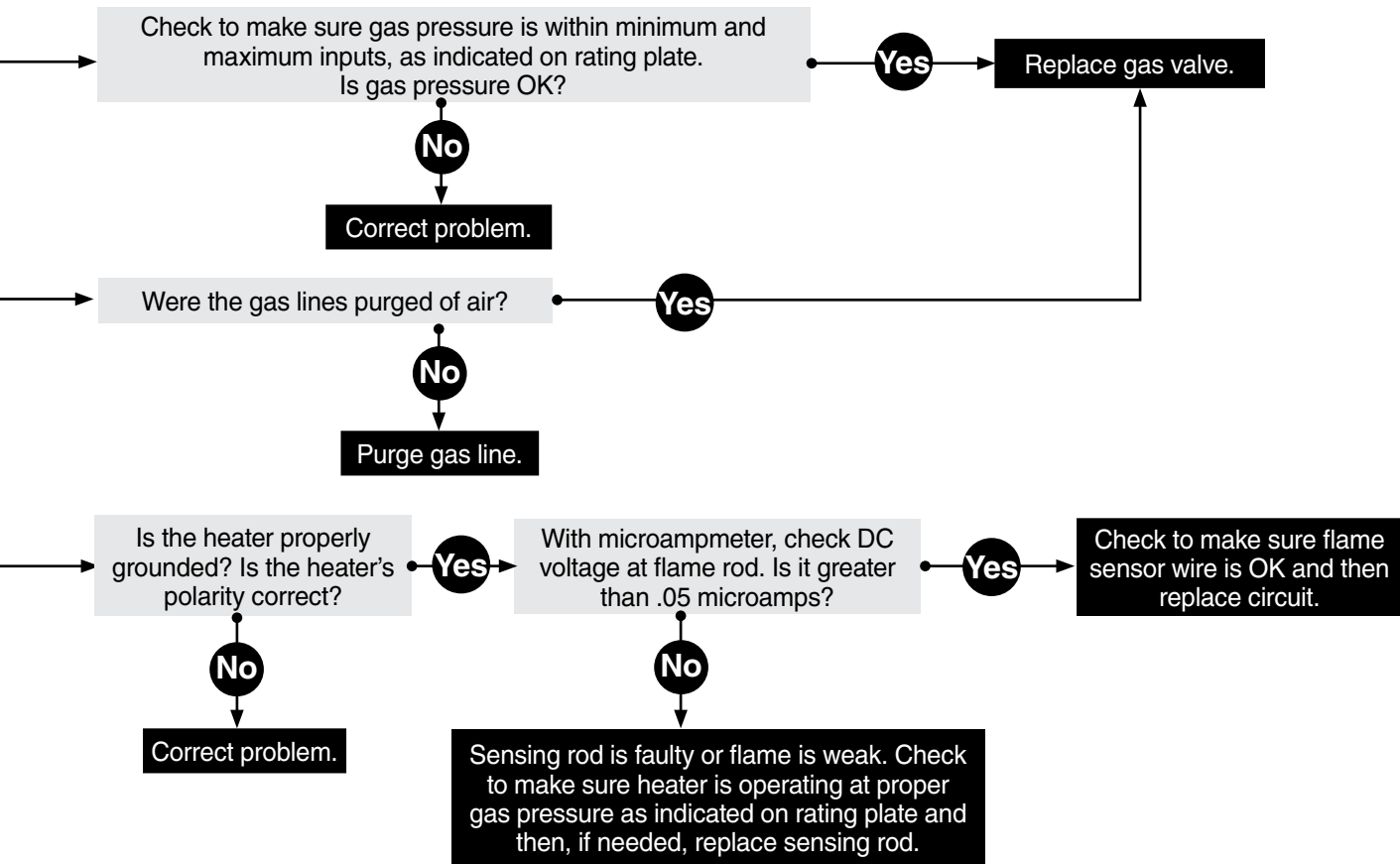
Corrective Action



* Refer to LED diagnostic Fault Code Chart.

Continued from page 14





5.0 Parts

Figure 5.1 • Burner Assembly Components

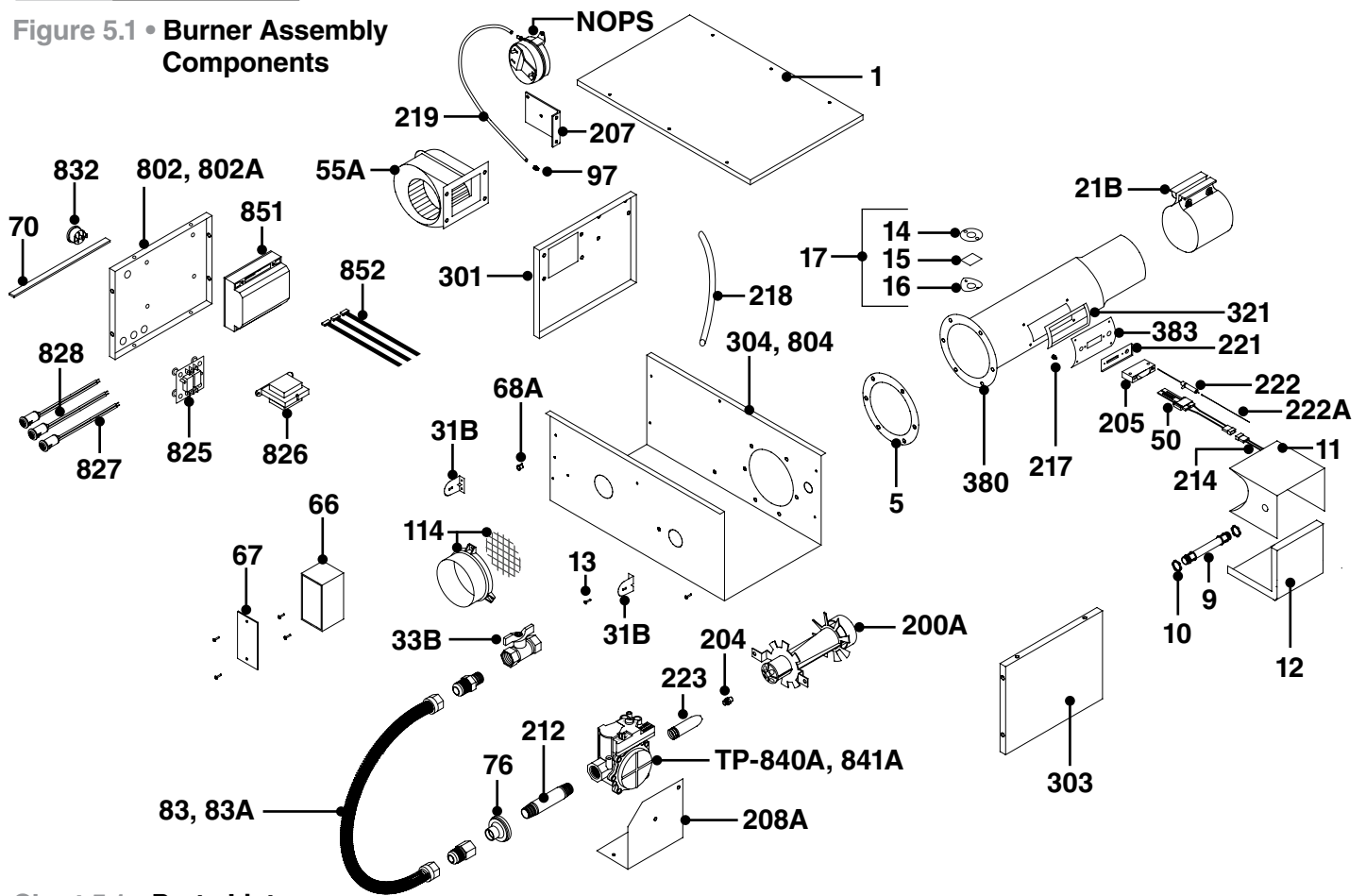


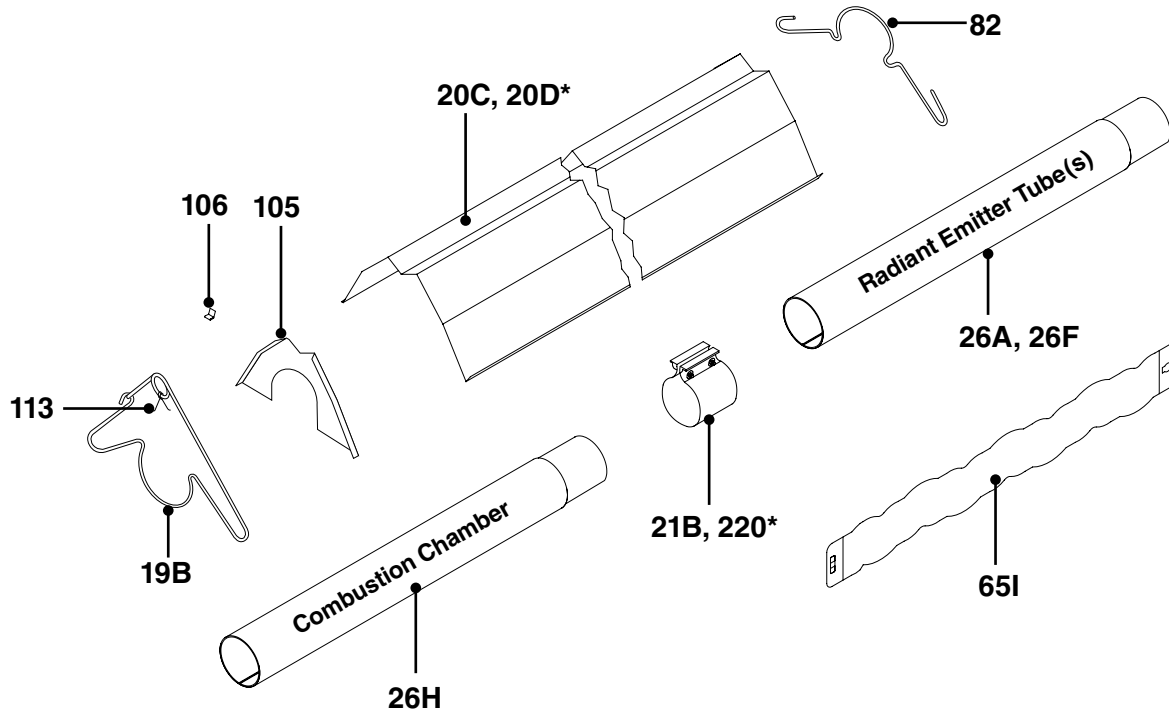
Chart 5.1 • Parts List

Part No.	Description	Part No.	Description
TP-1	Control Box Cover	TP-31B	Control Box Mounting Bracket
TP-5	Flange Gasket	TP-33B	1/2" Shut-Off Ball Valve / Inlet Tap
TP-9	Conduit Coupling	TP-50	Hot Surface Igniter
TP-10	Conduit 4" x 1/2"	TP-55A	Fan Blower
TP-11	Hot Surface Igniter Box	TP-65l	36" Interlocking Turbulator Baffle
TP-12	Hot Surface Igniter Box Cover	TP-66	2" x 4" Outlet Box
TP-13	8 x 1/2" Self-Drilling Screw	TP-67	2" x 4" Outlet Box Cover
TP-14	Sight Glass Gasket	TP-68A	Strain Relief Bushing
TP-15	Sight Glass	TP-70	Control Box Cover Gasket (per foot**)
TP-16	Sight Glass Washer	TP-76	Rubber Grommet
TP-17	Sight Glass Kit	TP-82	Reflector Center Support (RCS)
TP-19B	4" Wire Hanger with Tension Spring	TP-83	24" Stainless Steel Flexible Gas Connector
TP-20C	120" Aluminum Reflector	TP-83A	24" PVC Coated S.S. Flexible Gas Connector*
TP-20D	120" Stainless Steel Reflector*	TP-97	1/4" x 1/4" Brass Int./Ext. Atmos. Barb Fitting
TP-21B	4" Standard Tube Clamp	TP-105	Aluminum Reflector End Cap
TP-26A	10 ft. Black Coated Aluminized Radiant Tube	TP-106	Reflector End Cap Clips (8 pcs.)
TP-26F	10 ft. Uncoated Aluminized Steel Radiant Tube	TP-113	Reflector Tension Spring
TP-26H	10 ft. 304 Stainless Steel Combustion Tube	TP-114	Plastic Air Orifice with Screen

* May be used with stainless steel upgrades.

** 6 feet total required to cover edges of control housing.

Figure 5.2 • Tube & Reflector Components

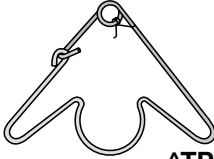

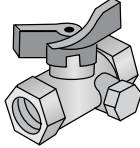


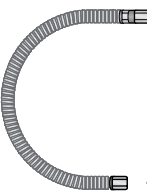

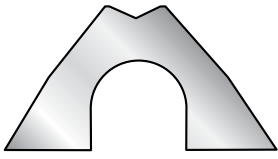
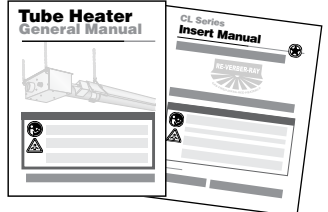


Part No.	Description	Part No.	Description
TP-200A	Burner (50-100 MBH Models)	TP-321	Ignition Plate Gasket
TP-204	Gas Orifice (consult factory)	TP-380	16" Burner Tube with Flange
TP-205	Hot Surface Igniter Holder	TP-383	Hot Surface Igniter Plate
TP-207	Pressure Switch Mounting Bracket	TP-802	End Panel, Left (with relay board)
TP-208A	Gas Valve Mounting Bracket	TP-802A	End Panel, Left (no relay board)
TP-212	1/2" x 3" Pipe Nipple	TP-804	Burner Control Box Outer Shell (no powercord)
TP-214	Hot Surface Igniter Wiring Harness	TP-825	Optional HLRB Relay Board
TP-217	Pressure Switch Barb	TP-826	40VA Transformer
TP-218	Differential Switch Vinyl Sensing Tube (exhaust)	TP-827	Red LED Display Diagnostic Light
TP-219	Differential Vinyl Sensing Tube (burner)	TP-828	Yellow Operational Ind. Light
TP-220	Stainless Steel Tube Clamp*	TP-832	Thermostat Terminal Strip
TP-221	Hot Surface Igniter Holder Gasket	TP-840A	36G54-224 Gas Valve - Natural Gas Assembly
TP-222	Flame Rod	TP-841A	36G54-226 Gas Valve - LP Gas Assembly
TP-222A	Flame Rod Wire	TP-851	Micro-60-24 Diagnostic Circuit Board
TP-223	Gas Manifold	TP-852	3-Piece Wire Harness Set for Micro 60 Board
TP-301	Burner Control Box Center Panel	TP-NOPS	Normally Open Pressure Switch (see below)
TP-303	End Panel, Right	TP-264B	Differential Pressure Switch, 50 to 65 MBH
TP-304	Burner Control Box Outer Shell (w/ powercord)	TP-264E	Differential Pressure Switch, 75 to 100 MBH

* May be used with stainless steel upgrades.

Kit Contents Check List

Chart 5.2 • Kit Contents for CL Series - Reference the length column for your model.

CL Series Kit Contents				
TP-19B 4" Hanger with Reflector Tension Spring  ^TP-19C	TP-82 4" Reflector Center Support (RCS)  ^TP-829	TP-33B 1/2" Shut-Off Valve (Ball Valve & Inlet Tap) 	TP-106 Reflector End Cap Clips 	TP-25* 1/4" Female Spade Terminal 
TP-83 24" Stainless Steel Flexible Gas Connector  ^TP-83A	TP-21B 4" Tube Clamp  ^TP-220	TP-105 Reflector End Cap  ^TP-105A	Tube Heater General Manual and CL Series Insert Manual F/N: LIOGTa & LIOCLa 	
Part No.	Description	30 ft.	40 ft.	50 ft.
TP-19B	4" Hanger w/ Tension Spring	4	5	6
TP-21B	4" Tube Clamp	3	4	5
TP-25*	1/4" Female Spade Terminal	3	3	3
TP-33B	1/2" Shut-Off Valve & Inlet Tap	1	1	1
TP-82	4" Reflector Center Support	3	4	5
TP-83	24" Stainless Steel Flexible Gas Connector	1	1	1
TP-105	Reflector End Cap	2	2	2
TP-106	Reflector End Cap Clips	8	8	8
LIOGTa	General Tube Heater Manual	1	1	1
LIOCLa	CL Series Insert Manual	1	1	1
Filled By:				

* Not included with models installed with yellow control cord.

^ Part number for models upgraded with stainless steel options.

Approvals

- CSA.
- Indoor approval.
- Outdoor approval with OD-Kit.
- Commercial approval.

Limited Warranty

- 1 year - Burner box components.
- 5 years - Combustion and radiant tubes.
- 10 years - Stainless steel burner.
- See page 36 of the General Tube Heater Manual for terms and conditions.



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