RH Series
Insert Manual

For complete installation instructions, reference the Tube Heater General Manual that accompanies this insert manual.

Universal-Ray

The RH Series Infrared Tube Heater is a positive pressure, single-stage radiant heater system. This insert manual is a supplement to the Tube Heater General Manual and provides specific information related to the RH 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.

LIORHa-Rev. 29111
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Replaces: LIORH-1M-5/01(MWG)

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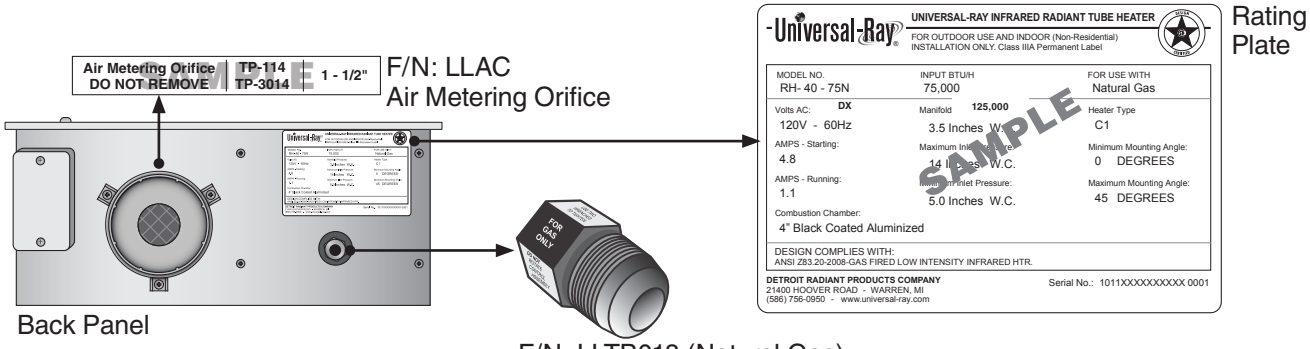
NOTE: See page 10 for a list of available models and specifications.

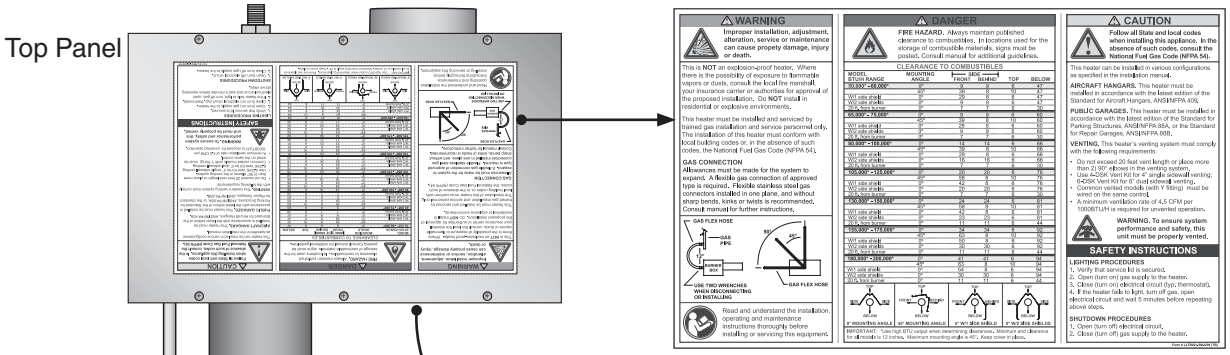
1.0 Safety

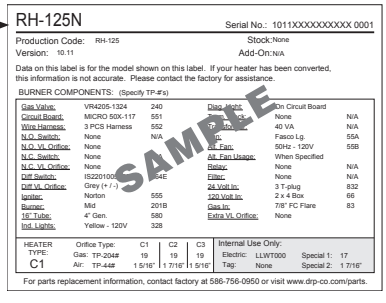
Read and understand all safety information and warnings in this insert manual and the Tube Heater General Manual before installation, operation and maintenance of the radiant tube heater system.

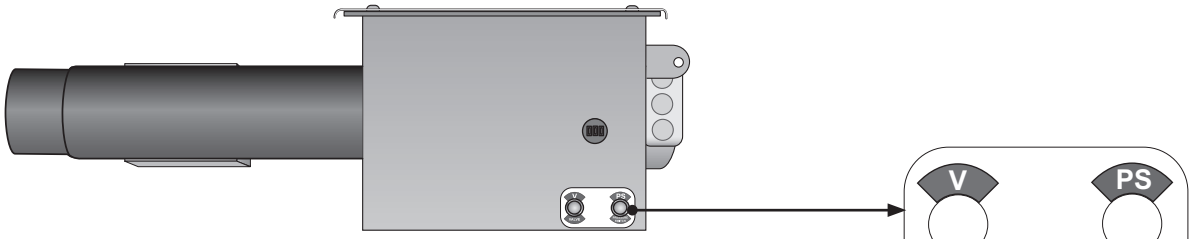
Data Labels and Their Locations

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.



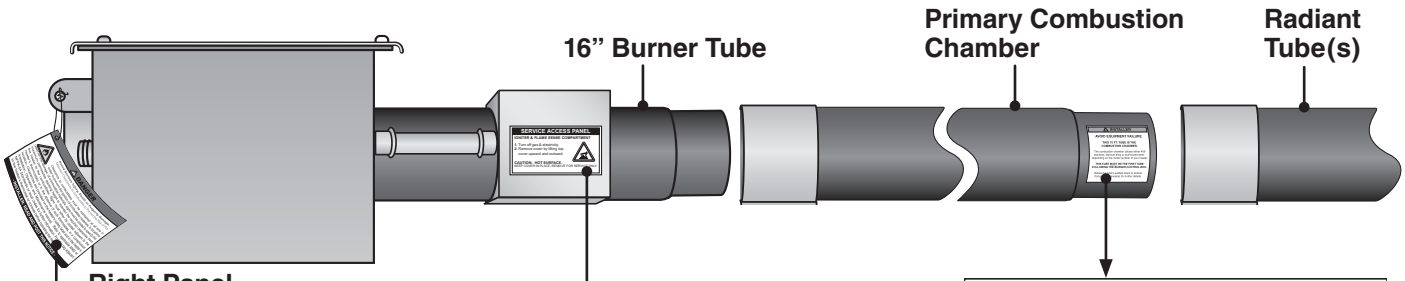






Left Panel
(Fan Compartment)

F/N: LLV3EP6



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 your series tube heater and configuration must be maintained. Refer to Chart 1.1 on the following page to determine the required distances for your model.

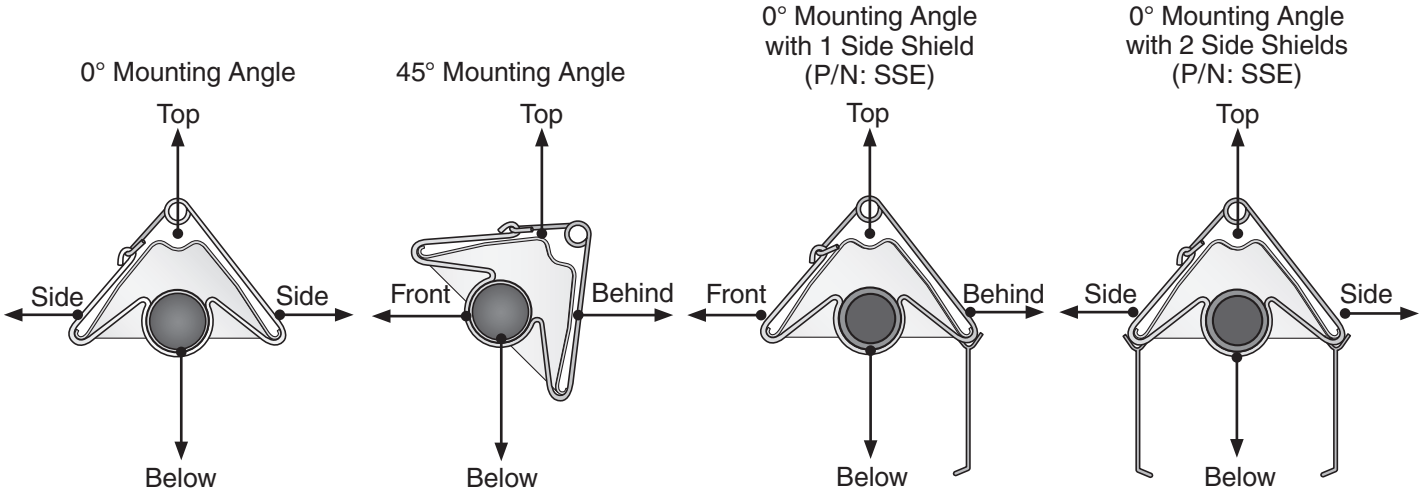
The stated clearance to combustibles represents a surface temperature of 90°F (32°C) above room temperature. Building materials with a low heat tolerance (such as plastics, vinyl siding, canvas, tri-ply, etc.) may be subject to degradation at lower temperatures. It is the installer's responsibility to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

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

Burner Model Number (Tube Length)	Mounting Angle*	Side		Top	Below
		Front	Behind		
RH-50 (20, 30, 40) [N, P]	0°	9	9	6	47
	45°	39	8	10	47
with 1 side shield	0°	29	8	6	47
with 2 side shields	0°	9	9	6	47
20 ft. from burner	0°	7	7	6	30
RH-75 (20, 30, 40) [N, P]	0°	9	9	6	60
	45°	39	8	10	60
with 1 side shield	0°	29	8	6	60
with 2 side shields	0°	9	9	6	60
20 ft. from burner	0°	7	7	6	30
RH-100 (30, 40, 50) [N, P]	0°	14	14	6	66
	45°	39	8	10	66
with 1 side shield	0°	29	8	6	66
with 2 side shields	0°	16	16	6	66
20 ft. from burner	0°	7	7	6	30
RH-125 (40, 50, 60) [N, P]	0°	20	20	6	76
	45°	58	8	10	76
with 1 side shield	0°	42	8	6	76
with 2 side shields	0°	20	20	6	76
20 ft. from burner	0°	7	7	6	30
RH-150 (40, 50, 60) [N, P]	0°	24	24	6	81
	45°	58	8	10	81
with 1 side shield	0°	42	8	6	81
with 2 side shields	0°	23	23	6	81
20 ft. from burner	0°	11	11	6	44
RH-175 (40, 50, 60) [N, P]	0°	34	34	6	92
	45°	63	8	10	92
with 1 side shield	0°	50	8	6	92
with 2 side shields	0°	30	30	6	92
20 ft. from burner	0°	11	11	6	44

***** 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

Gas Requirements

Manifold pressure of the heater is pre-set at the factory. No adjustment should be necessary. During the verification process, a tolerance of ±10% of the full scale is acceptable due to varying atmospheric conditions.

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 for gas connection requirements.

Electrical Requirements

NOTICE

- 120VAC - 60 Hz, single-phase, 3-wire.
- 120VAC thermostat connection; 24VAC with optional relay transformer.
- Starting current 1.7 amps
- Running current 1.1 amps

Wiring

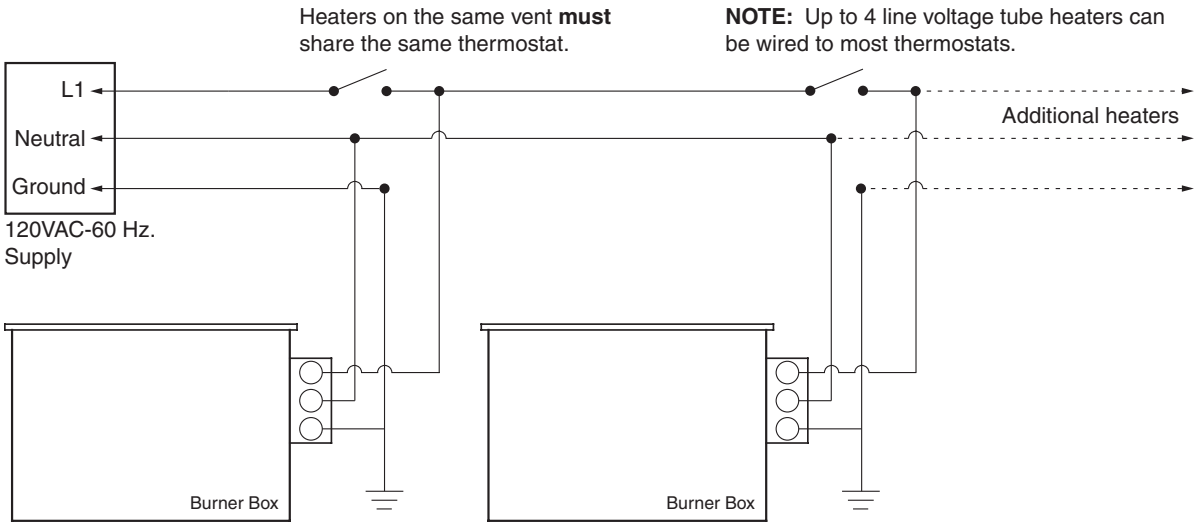
⚠ WARNING

Electric Shock

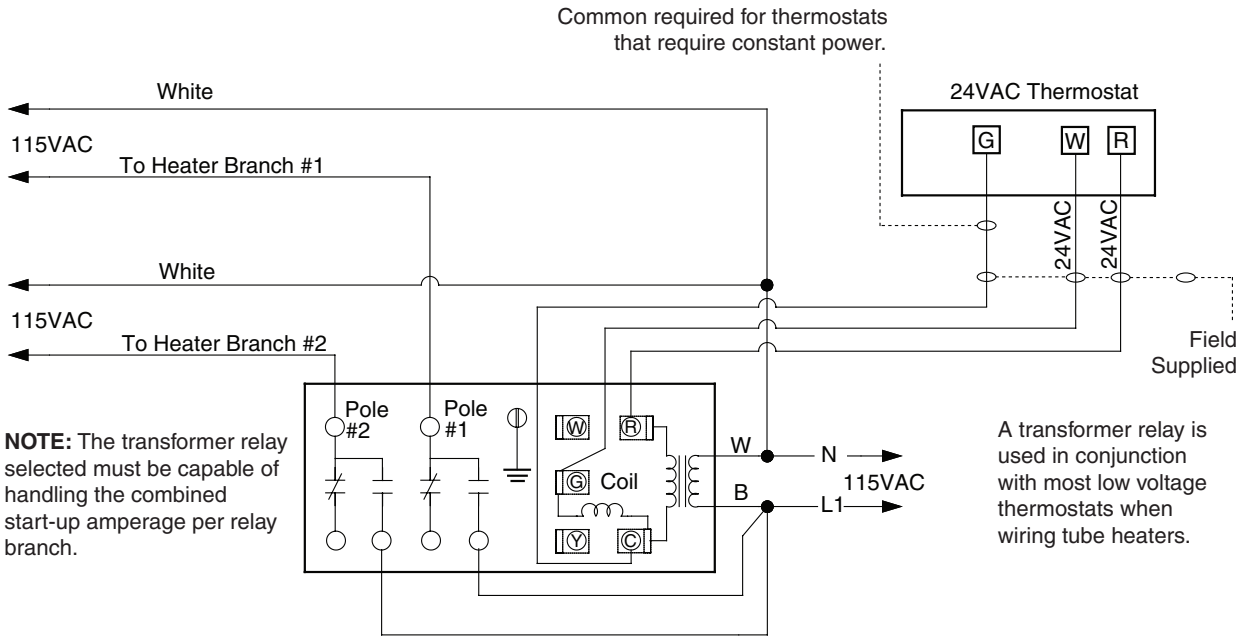
Field wiring to the tube heater must be connected and grounded in accordance with national, state, provincial, local codes and to the guidelines in the Tube Heater General Manual and Series Insert Manual. In the United States refer to the most current revisions to the ANSI/NFPA 70 Standard and in Canada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

Figure 2.1 • Field Wiring Diagrams

A. 120VAC Single/Multiple Line Voltage Heater(s)



B. 24VAC Thermostat Control (requires optional combination relay transformer P/N: R8285B).

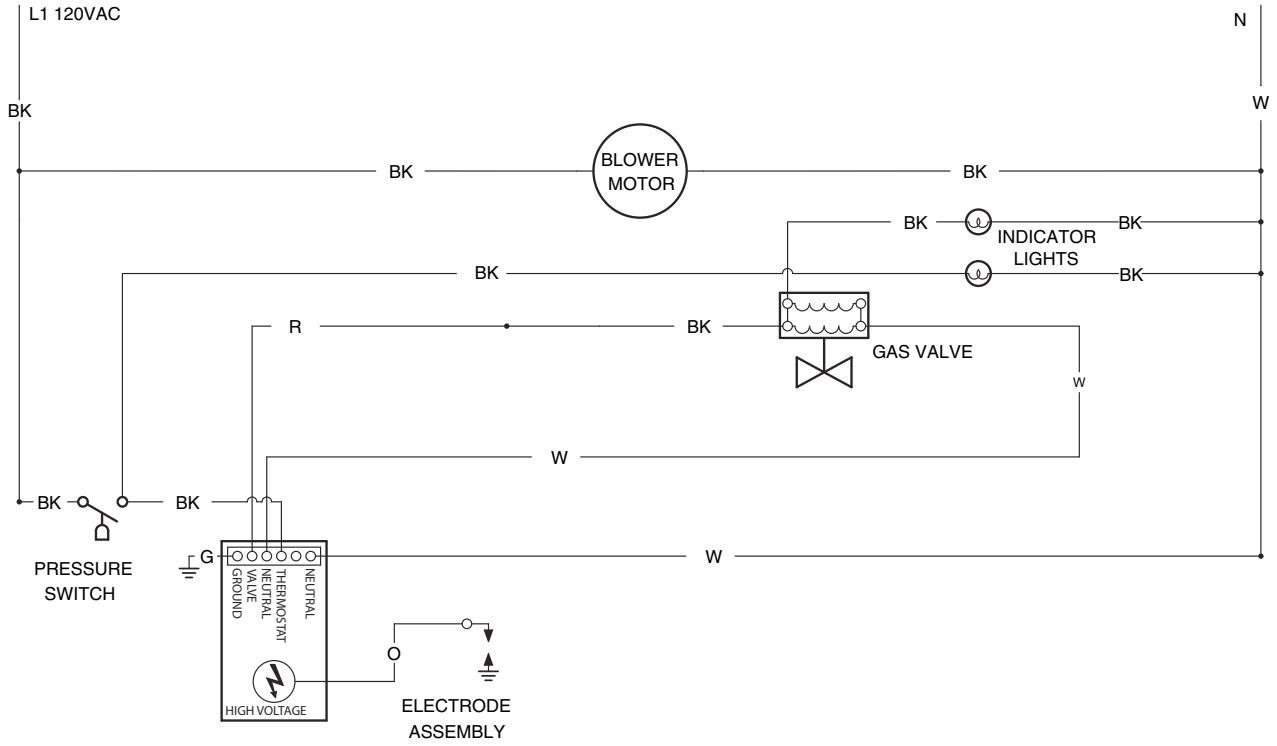


Before field wiring this appliance - Check existing wiring; replace if necessary.

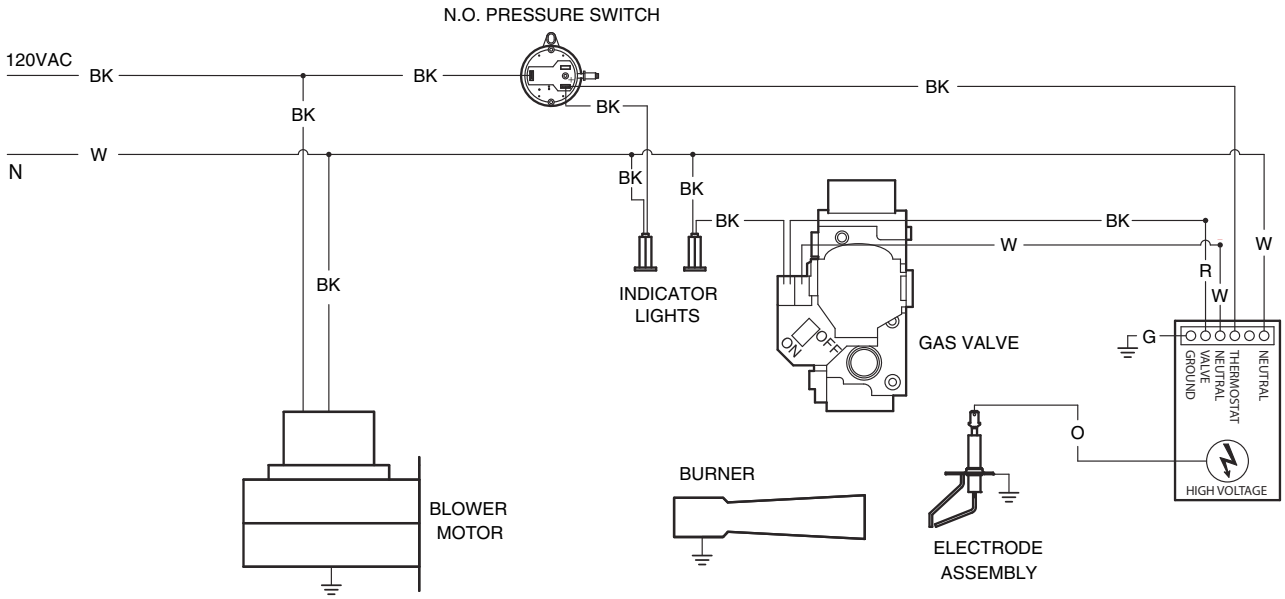
Note: If any of the original wire supplied with the appliance must be replaced, it must be replaced with wiring material having a temperature rating of at least 105° C.

Figure 2.2 • Internal Wiring Diagrams

A. Internal Ladder Wiring Diagram



B. Internal Block Wiring Diagram



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There are no alternative wiring diagrams for the RH Series

Specifications

Chart 2.1 • Specifications

Burner Model Number	Gas Type (Select One)	BTU/h	Tube Length	36" Baffle Sections	Weight (lbs.)	Typical Mounting Heights	Tube Package Options (see Chart 2.2)	
							Hot-Rolled	Aluminized
RH 50-20B	N or LP	**50,000**	**20'**	**5**	120	**10' to 16'**	**TPK-B**	**TPK-H**
RH 50-30B	N or LP	**50,000**	**30'**	**4**	160	**10' to 16'**	**TPK-D**	**TPK-I**
RH 50-40B	N or LP	**50,000**	**40'**	**2**	190	**10' to 16'**	**TPK-F**	**TPK-K**
RH 75-20B	N or LP	**75,000**	**20'**	**5**	120	**13' to 20'**	**TPK-B**	**TPK-H**
RH 75-30B	N or LP	**75,000**	**30'**	**4**	160	**13' to 20'**	**TPK-D**	**TPK-I**
RH 75-40B	N or LP	**75,000**	**40'**	**2**	190	**13' to 20'**	**TPK-F**	**TPK-K**
RH 100-30B	N or LP	**100,000**	**30'**	**5**	160	**15' to 23'**	**TPK-D**	**TPK-I**
RH 100-40B	N or LP	**100,000**	**40'**	**4**	190	**15' to 23'**	**TPK-F**	**TPK-K**
RH 100-50B	N or LP	**100,000**	**50'**	**2**	235	**15' to 23'**	**TPK-F,A**	**TPK-K,G**
RH 125-40B	N or LP	**125,000**	**40'**	**4**	190	**15' to 25'**	**TPK-F**	**TPK-K**
RH 125-50B	N or LP	**125,000**	**50'**	**4**	235	**15' to 25'**	**TPK-F,A**	**TPK-K,G**
RH 125-60B	N or LP	**125,000**	**60'**	**2**	265	**15' to 25'**	**TPK-F,C**	**TPK-K,H**
RH 150-40B	N or LP	**150,000**	**40'**	**4**	190	**16' to 30'**	**TPK-F**	**TPK-K**
RH 150-50B	N or LP	**150,000**	**50'**	**4**	235	**16' to 30'**	**TPK-F,A**	**TPK-K,G**
RH 150-60B	N or LP	**150,000**	**60'**	**2**	265	**16' to 30'**	**TPK-F,C**	**TPK-K,H**
RH 175-40B	N or LP	**175,000**	**40'**	**4**	190	**17' to 35'**	**TPK-F**	**TPK-K**
RH 175-50B	N or LP	**175,000**	**50'**	**2**	235	**17' to 35'**	**TPK-F,A**	**TPK-K,G**

Package ID	Description	Weight
TPK-A	1) 10 ft. Hot-Rolled Steel Tube	35 lbs.
TPK-B	1) 10 Ft. Aluminized and 1) 10 ft. Hot-Rolled Steel Tube	70 lbs.
TPK-C	2) 10 ft. Hot-Rolled Steel Tubes	70 lbs.
TPK-D	1) 10 Ft. Aluminized and 2) 10 ft. Hot-Rolled Steel Tubes	110 lbs.
TPK-E	1) 10 Ft. Aluminized and 3) 10 ft. Hot-Rolled Steel Tubes	145 lbs.
TPK-F	1) 10 Ft. Titanium Stabilized 1) 10 Ft. Aluminized and 2) 10 ft. Hot-Rolled Steel Tubes	145 lbs.

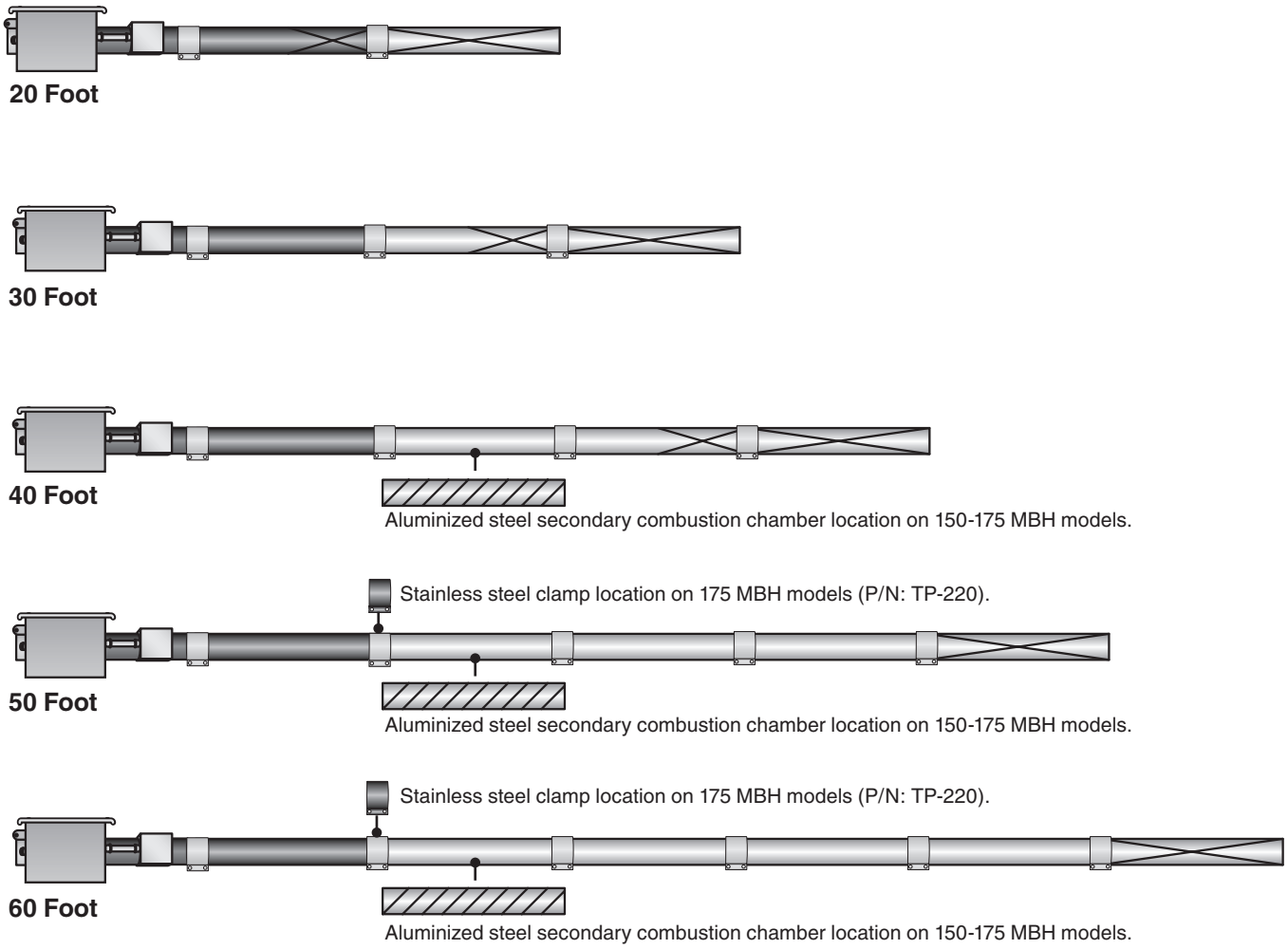
Package ID	Description	Weight
TPK-G	1) Aluminized Steel Tube	35 lbs.
TPK-H	2) Aluminized Steel Tubes	70 lbs.
TPK-I	3) Aluminized Steel Tubes	110 lbs.
TPK-K	1) Titanium Stabilized and 3) Aluminized Steel Tubes	145 lbs.

Tube packages include corresponding quantity of aluminum reflectors. All Aluminized and titanium stabilized steel tube are black coated. Hot-Rolled steel tube are uncoated. Reference RH Series Specification Chart above to determine correct burner and tube combinations for burner model.

Tube Installation Sequence

Figure 2.4 • Tube Installation Sequence

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



Key

- Burner Control Box with 16” Burner Tube
- Primary Combustion Chamber Tube*
- Secondary Aluminized Steel Combustion Chamber (150-175 MBH models only)
- Aluminized or Hot-rolled Steel Radiant Emitter Tube
- Standard Tube Clamp
- Stainless Steel Tube Clamp (P/N: TP-220)
  175 MBH models only - Located between 1st and 2nd 10 ft. tube sections.
- Baffle Location

*Aluminized steel (50,000 to 125,000 BTU/H burner models), Titanium stabilized aluminized steel (150,000 to 175,000 models). **NOTE:** Refer to the Tube Heater General Manual, Chart 3.6 (page 23) for secured reflector joints.

3.0 Operation

⚠ WARNING



This heater must be installed and serviced by trained gas installation and service personnel only.

Do not bypass any safety features or the heater's built in safety mechanisms will be compromised.

Note: Reference the Tube Heater General Manual for installation requirements.

Sequence of Operation

Starting Circuit: Upon a call for heat, the fan is energized. Once operational static pressure is achieved, the differential switch will close initiating the ignition sequence. After a 5-second delay, the Glo-bar™ is energized for 45 seconds and the control allows the gas valve to open.

The trial for ignition is 8 seconds. If flame sense is not established within 8.5 seconds, the heater will attempt two (2) additional ignition sequences before proceeding to soft lockout. Soft lockout automatically retries after one (1) hour or the control can be reset by briefly interrupting the power source.

Running Circuit: After ignition, the flame rod monitors burner flame. If sense of flame is lost, the control immediately acts to reignite the gas-air mixture (identical to the starting sequence). 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.

Thermostat

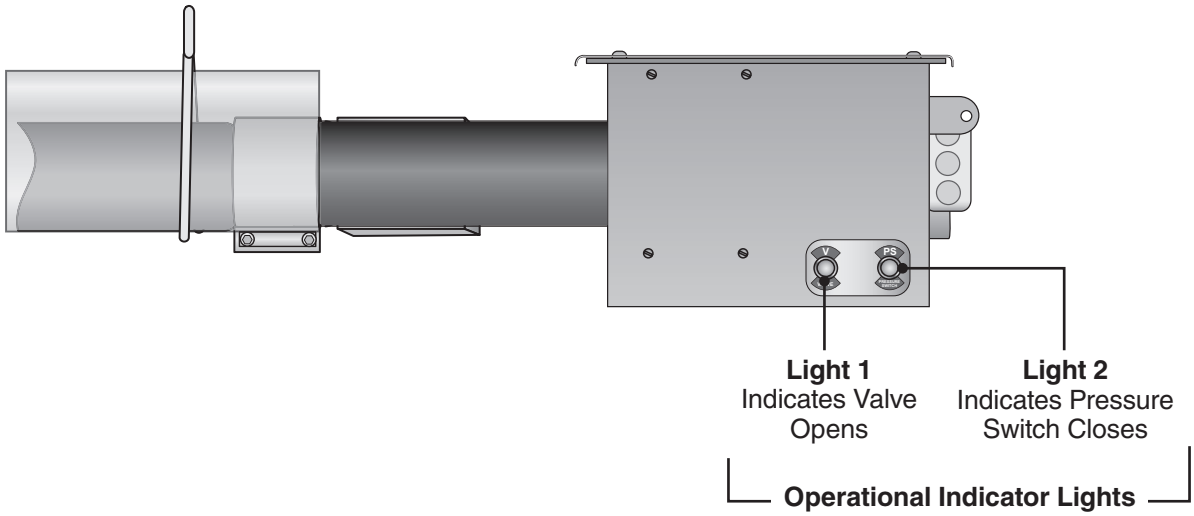
NOTE: Different thermostats operate according to their particular features. Refer to thermostat specifications for details.

The RH Series comes standard requiring a 120VAC connection to the thermostat. 24VAC control can be achieved with an optional relay transformer.

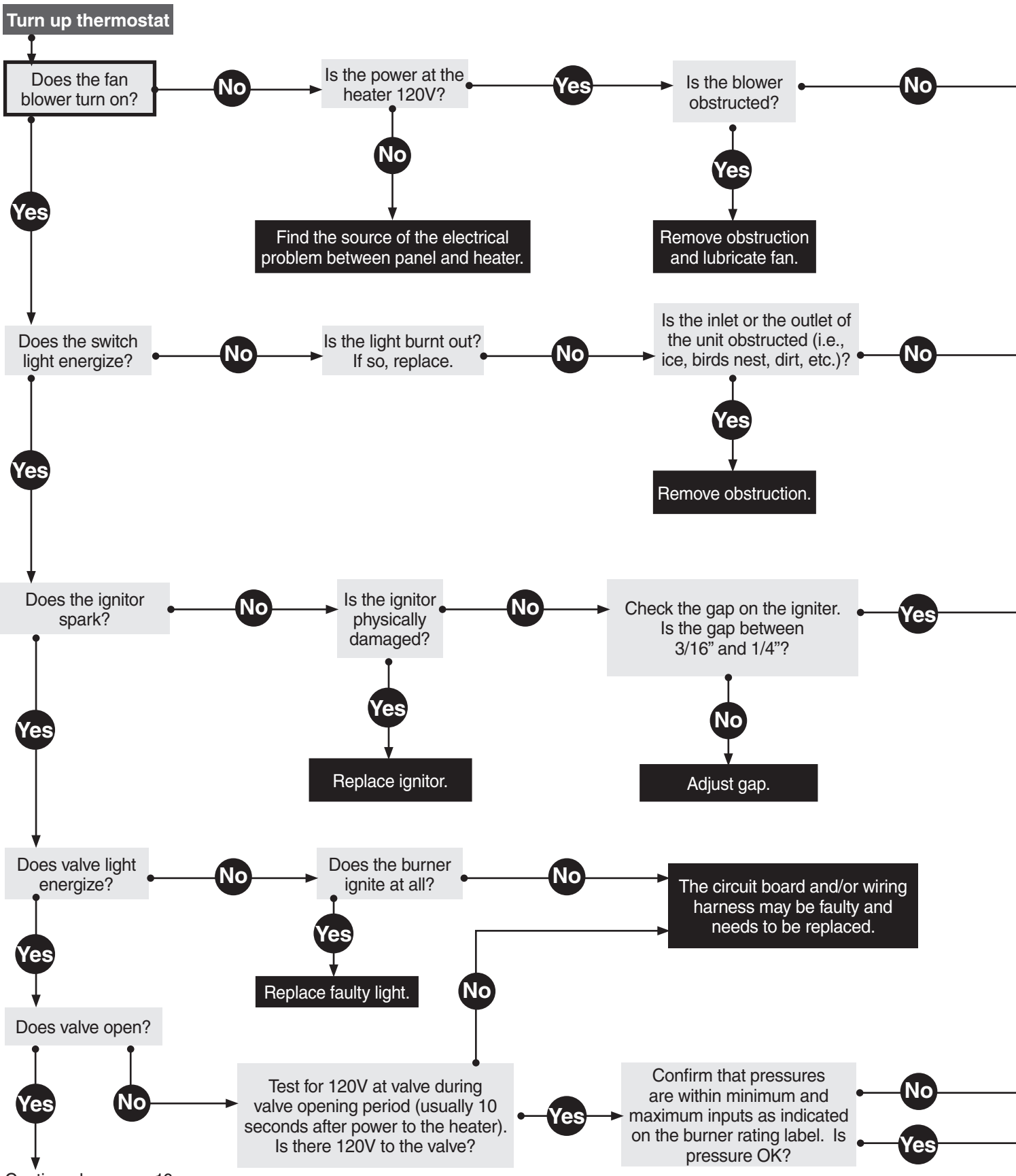
Operational Indicator Lights

The externally located operational indicator lights are provided to assist in troubleshooting of the heater. Refer to the following pages for additional troubleshooting.

Figure 3.1 • Operational Indicator Lights

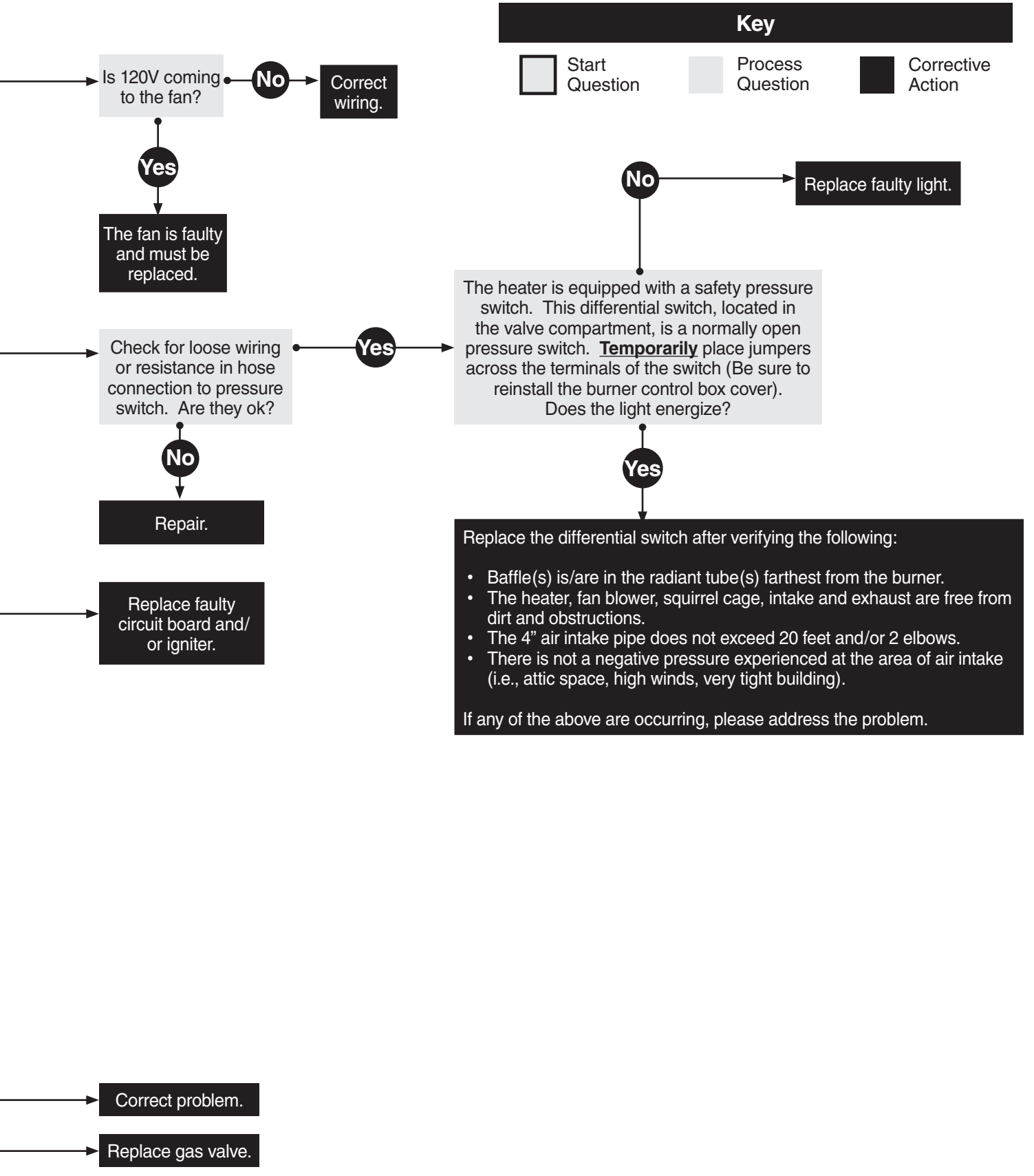


4.0 Troubleshooting Guide

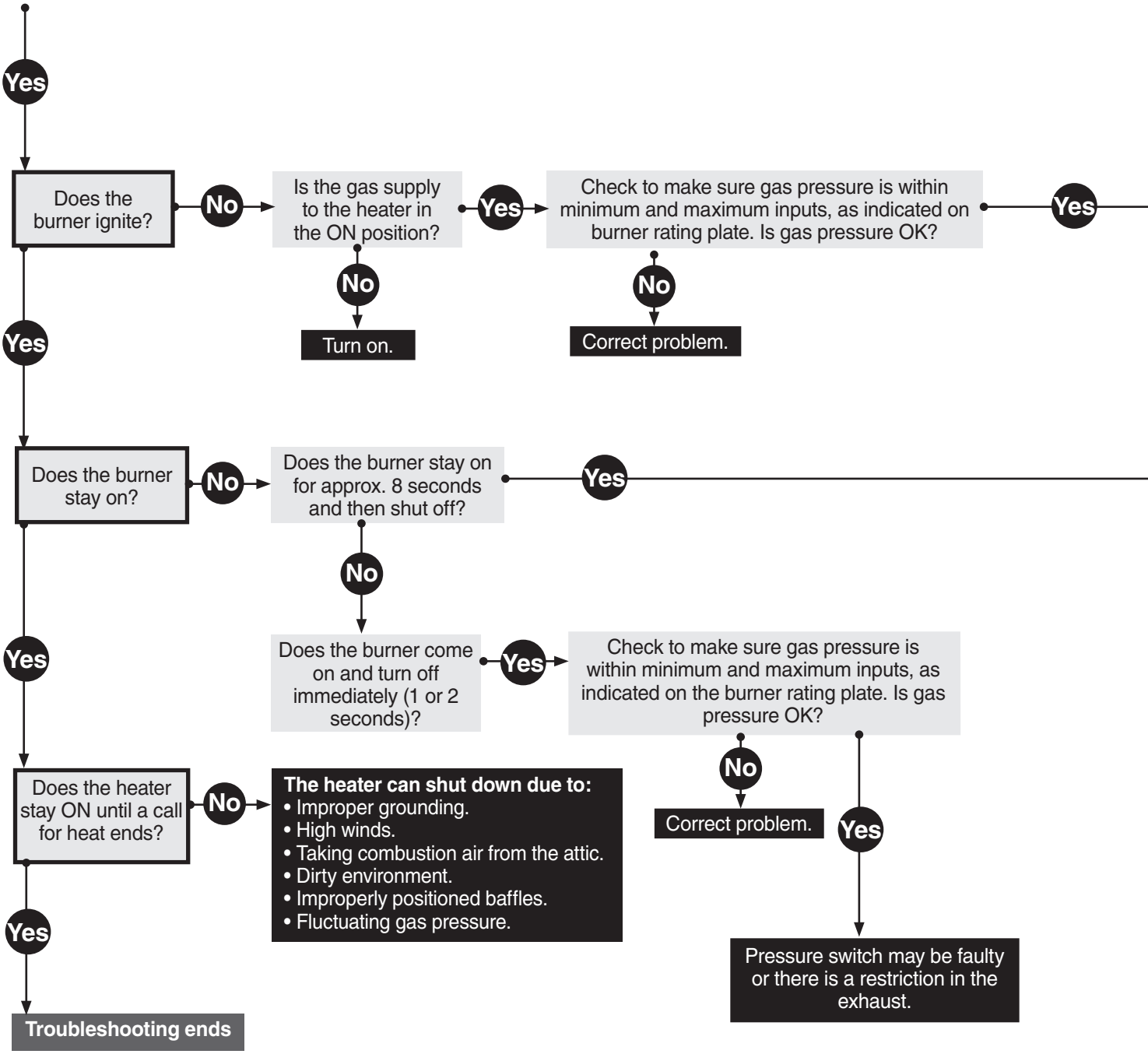


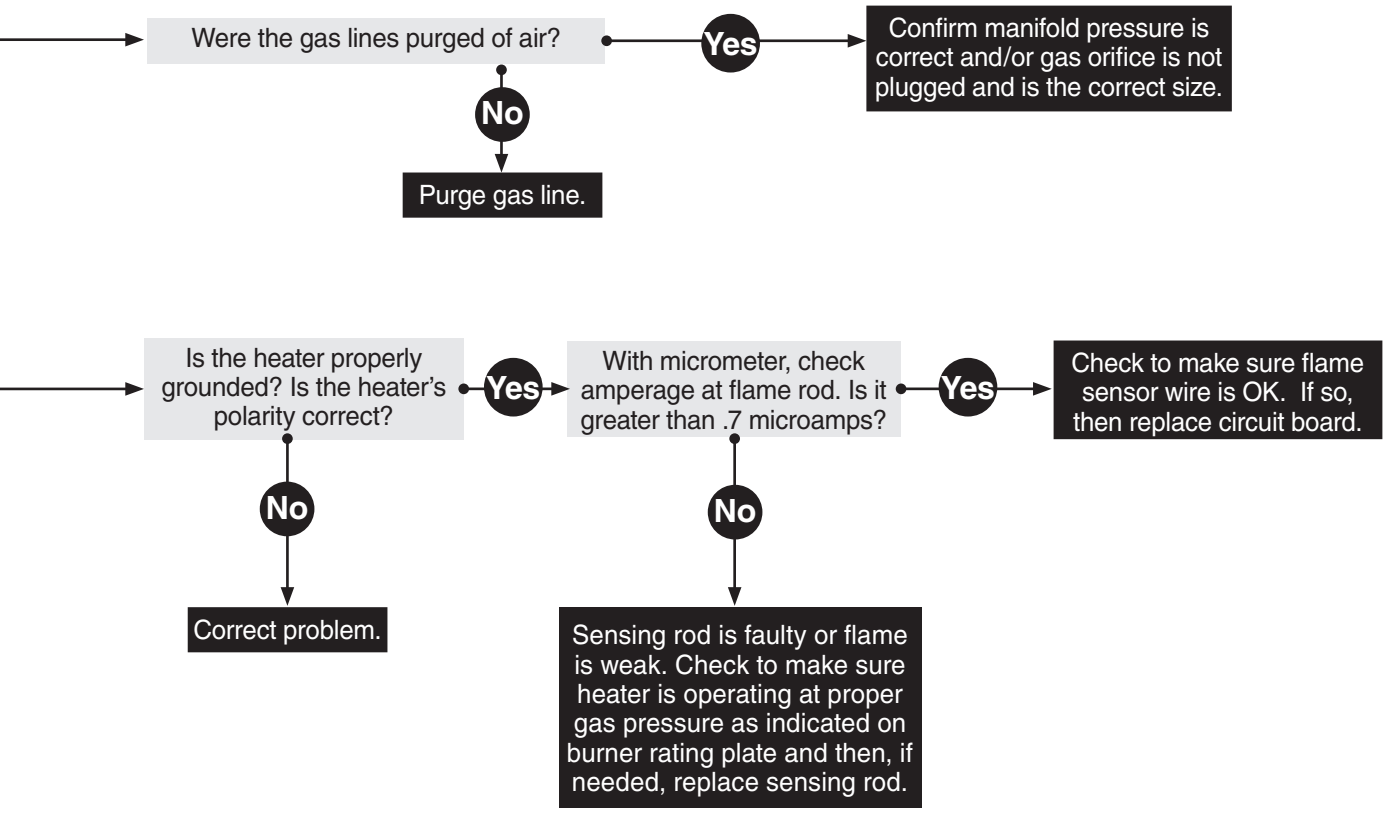
Continued on page 16.

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.



Continued from page 14




Were the gas lines purged of air?
Yes
Confirm manifold pressure is correct and/or gas orifice is not plugged and is the correct size.
No
Purge gas line.
Is the heater properly grounded? Is the heater's polarity correct?
Yes
With micrometer, check amperage at flame rod. Is it greater than .7 microamps?
Yes
Check to make sure flame sensor wire is OK. If so, then replace circuit board.
No
Correct problem.
No
Sensing rod is faulty or flame is weak. Check to make sure heater is operating at proper gas pressure as indicated on burner rating plate and then, if needed, replace sensing rod.

5.0 Parts

Figure 5.1 • Burner Assembly Components

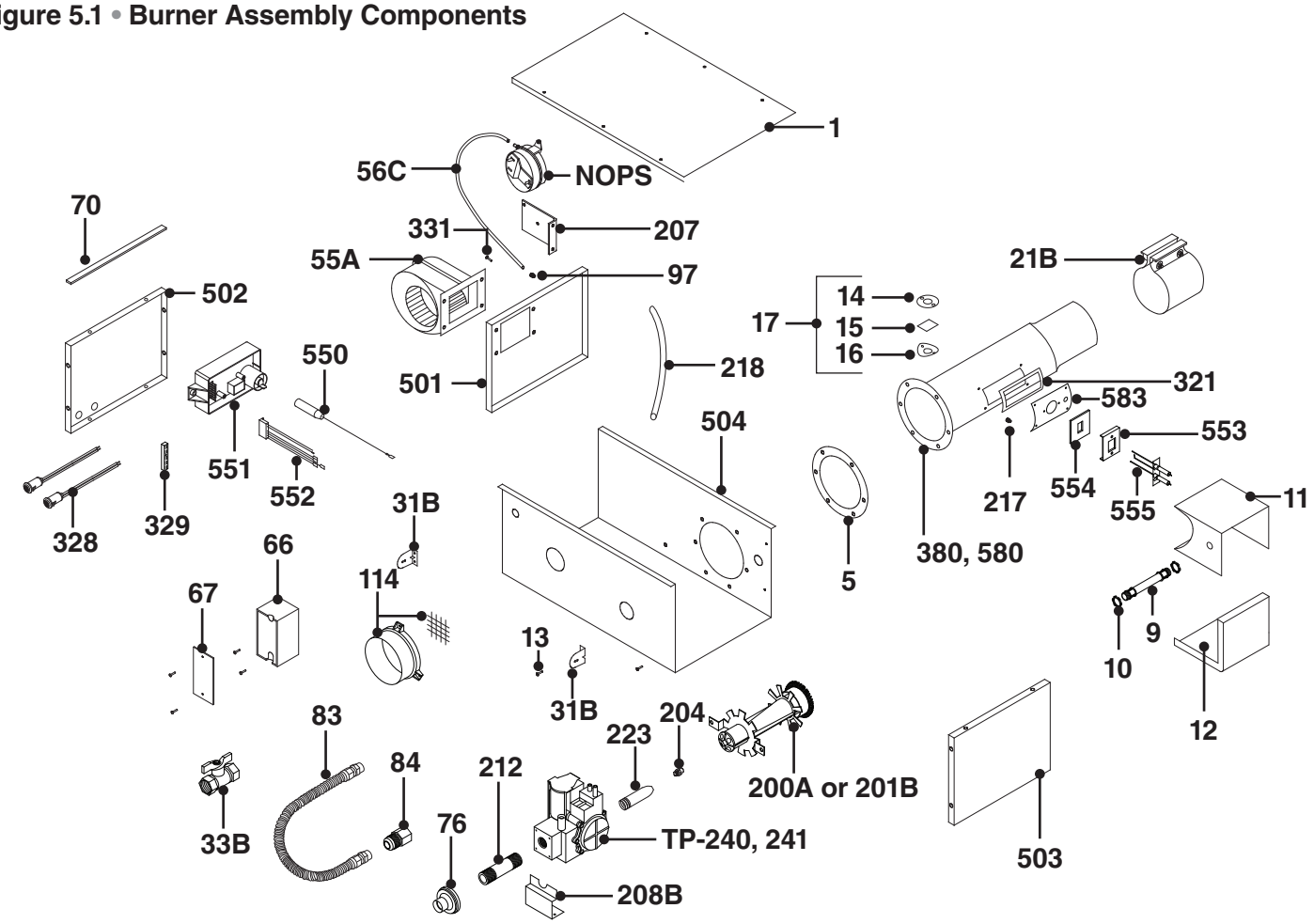
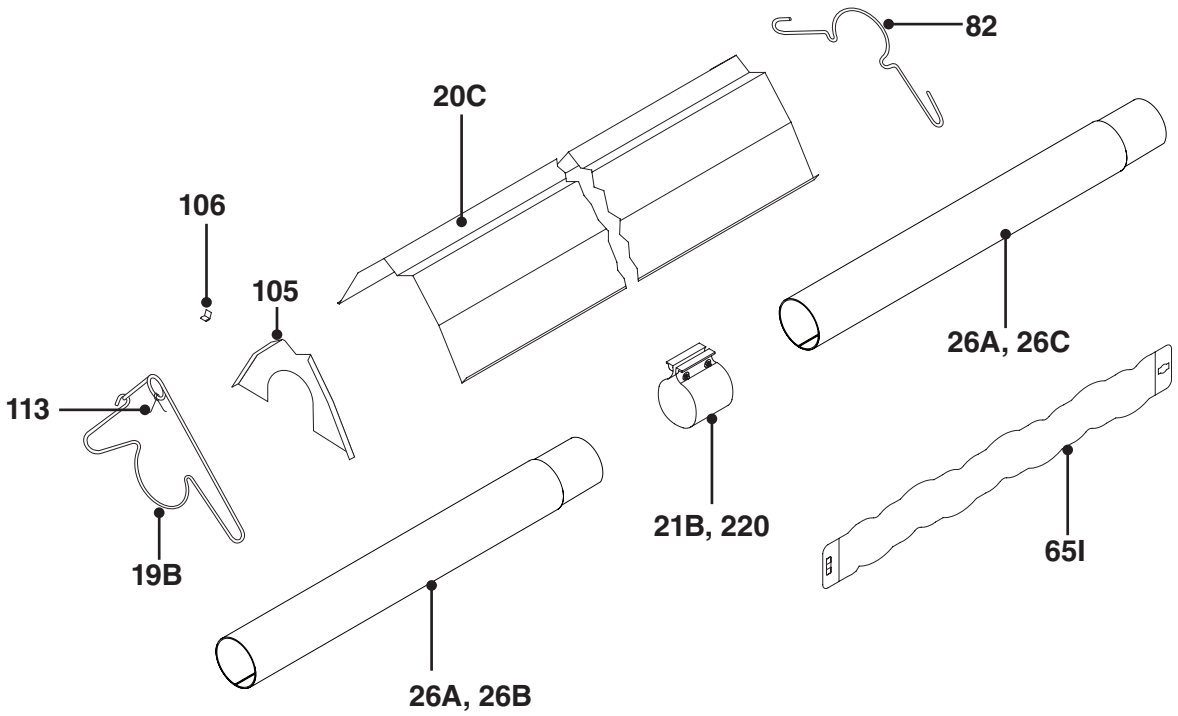


Chart 5.1 • Parts List

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-55A	Fan Blower
TP-10	Conduit 4” x 1/2”	TP-56C	1/4” Atmospheric Tube (Vinyl)
TP-11	Glo-Bar™ Ignitor Box	TP-65I	36” Interlocking Turbulator Baffle
TP-12	Glo-Bar™ Ignitor 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-70	Control Box Cover Gasket (per foot*)
TP-15	Sight Glass	TP-76	Rubber Grommet
TP-16	Sight Glass Washer	TP-82	Reflector Center Support (RCS)
TP-17	Sight Glass Kit	TP-83	24” Stainless Steel Flexible Gas Connector
TP-19B	4” Wire Hanger with Tension Spring	TP-84	1/2” Female / Male Flare Fitting
TP-20C	120” Aluminum 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. Coated-ALUM Combustion/Radiant Tube	TP-106	Reflector End Cap Clips (8 pcs.)
TP-26B	10 ft. Coated-AL-TI Combustion Tube	TP-113	Reflector Tension Spring
TP-26C	10 ft. Uncoated Hot-Rolled Steel Radiant Tube	TP-114	Plastic Air Orifice with Screen (consult factory)

* 6 feet total required to cover outer edges of the burner control box.

Figure 5.2 • Tube & Reflector Components

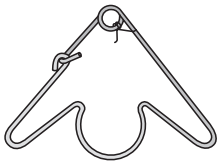
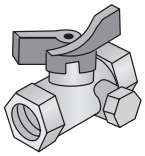
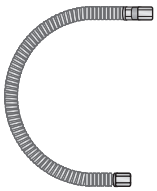
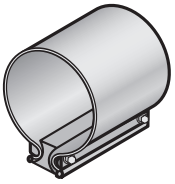
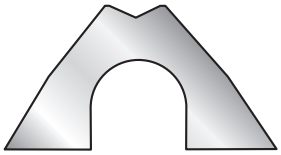
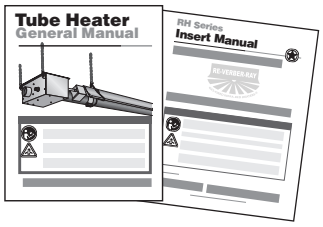


Part No.	Description	Part No.	Description
TP-200A	Low BTU Burner (Blue) consult factory	TP-502	End Panel, Left
TP-201B	Mid BTU Burner (Tan) consult factory	TP-503	End Panel, Right
TP-204	Gas Orifice (consult factory)	TP-504	Burner Control Box Outer Shell
TP-208B	Gas Valve Mounting Bracket	TP-554	Spark Igniter Gasket
TP-212	1/2” x 3” Pipe Nipple	TP-550	Spark Transfer Wire - Orange
TP-217	Pressure Switch Barb	TP-551	DSI Circuit Board
TP-218	Differential Switch Vinyl Sensing Tube (exhaust)	TP-552	Wiring Harness
TP-220	Stainless Steel Tube Clamp (175 MBH models)	TP-553	Igniter Mounting Bracket
TP-223	Gas Manifold	TP-555	DSI Igniter Gasket
TP-240	VR4205M-1324 Gas Valve Assembly - Nat. Gas	TP-580	16” Burner Tube with Flange (fittings included)
TP-241	VR4205M-1357 Gas Valve Assembly - LP Gas	TP-583	DSI Igniter Plate
TP_321	Ignition Plate Gasket		
TP-328	120V Amber Operational Indicator Light	TP-NOPS	Normally Open Pressure Switch; select below:
TP-329	1/4” Neutral Terminal Block	TP-264B	Differential Pressure Switch, 50 to 100 MBH
TP-331	Green Self Tap Ground Screw	TP-264E	Differential Pressure Switch, 125 & 150 MBH
TP-380	16” Burner Tube with Flange (no fittings)	TP-264D	Differential Pressure Switch, 175 MBH
TP-501	Center Divider Panel		

Kit Contents Check List

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

RH Series Kit Contents

TP-19B 4" Hanger with Reflector Tension Spring 	**TP-82** 4" Reflector Center Support (RCS) 	**TP-33B** 1/2" Shut-Off Valve (Ball Valve & Inlet Tap) 	**TP-106** Reflector End Cap Clips 
TP-83 24" Stainless Steel Flexible Gas Connector 	**TP-21B** 4" Tube Clamp 	**TP-105** Reflector End Cap 	Tube Heater General Manual and RH Series Insert Manual F/N: LIOGTa & LIORHa 

Part No.	Description	20 Ft.	30 ft.	40 ft.	50 ft.	60 ft.
TP-19B	4" Hanger w/ Tension Spring	3	4	5	6	7
TP-21B	4" Tube Clamp	2	3	4*	5*	6*
TP-33B	1/2" Shut-Off Valve w/ Inlet Tap	1	1	1	1	1
TP-82	4" Reflector Center Support	2	3	4	5	6
TP-83	24" S.S. Flexible Gas Connector	1	1	1	1	1
TP-105	Reflector End Cap	2	2	2	2	2
TP-106	Reflector End Cap Clips	8	8	8	8	8
LIOGTa	General Tube Heater Manual	1	1	1	1	1
LIORHa	RH Series Insert Manual	1	1	1	1	**1**
Filled By:						

***NOTE**: One 4" stainless steel tube clamp (P/N: TP-220) is provided for each 175,000 BTU model. Place as shown on page 11.

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.

DESIGN CERTIFIED

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