DET3 Series
Insert Manual

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

The DET3 Series Infra-Red 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 DET3 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.

Form No. LIODET3-11-07.r1_6.08 (DRP)
Replaces Form No. LIODET3-1M-11/07

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

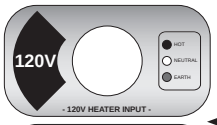
1.0 Safety

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.

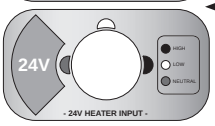
Safety Labels and Their Locations

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.

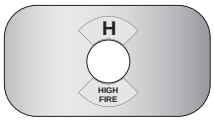
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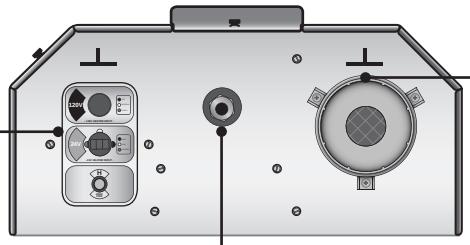


F/N: LLV3EP2



F/N: LLV3EP7

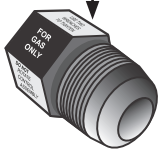




Rear Panel

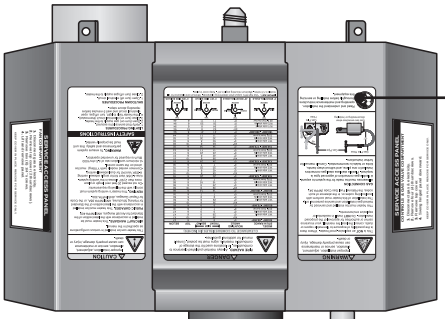


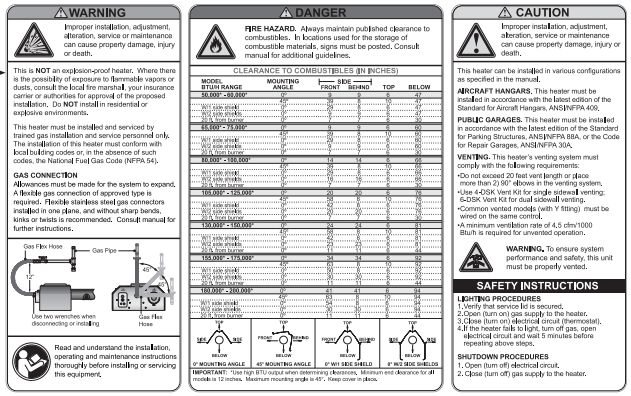
F/N: LLAC
Air Metering Orifice



F/N: LLTB018 (Natural Gas)
F/N: LLTB019 (LP Gas)

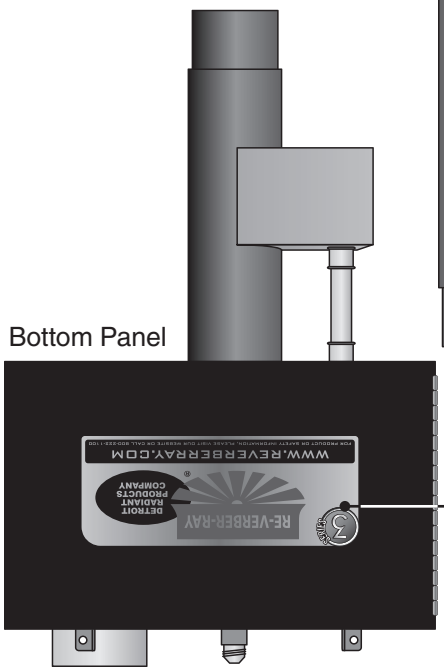
Top Panel

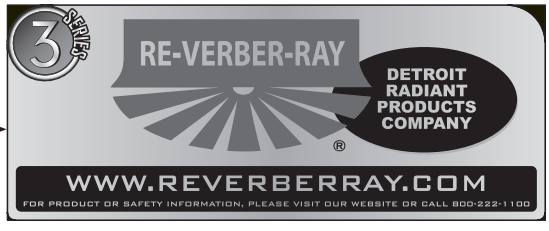




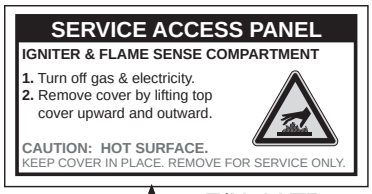
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Clearance to Combustibles Labels

Bottom Panel

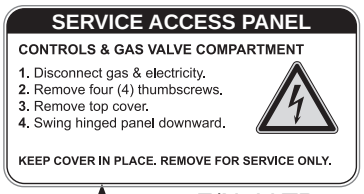




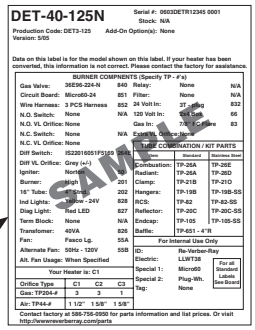
F/N: LLLOGO4 Logo Label



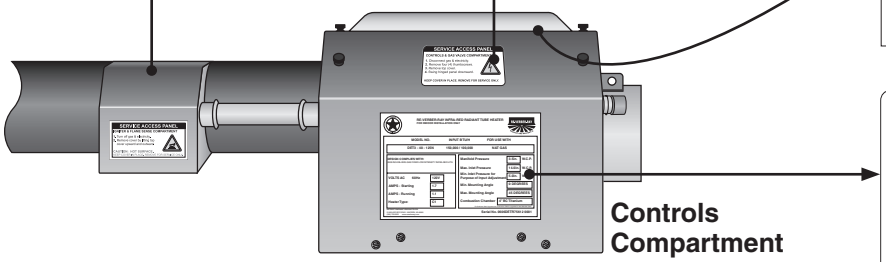
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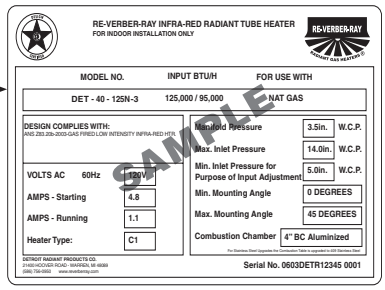
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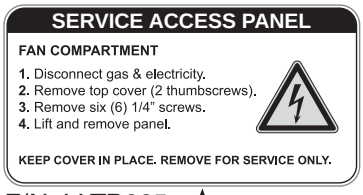
Burner Control Box Component Label (affixed to center valve compartment lid)



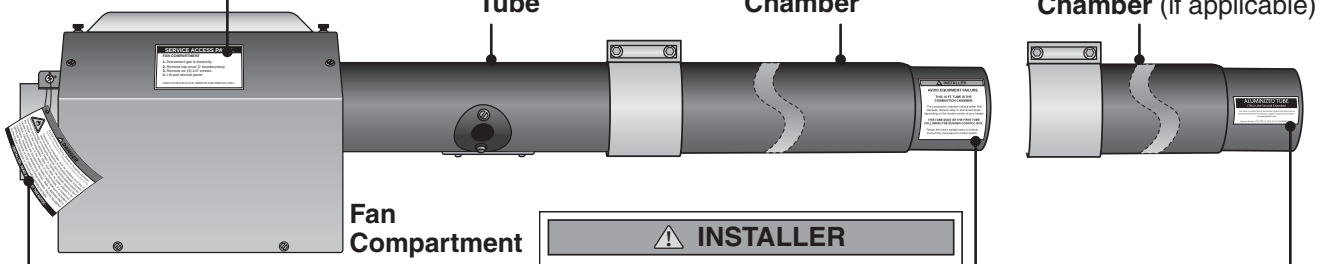
Controls Compartment



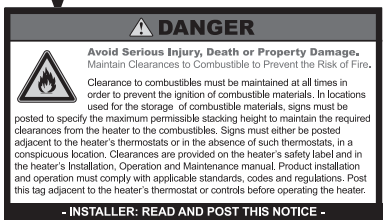
Rating Plate



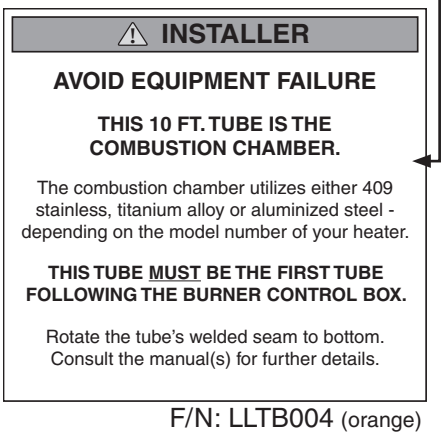
F/N: LLTB025



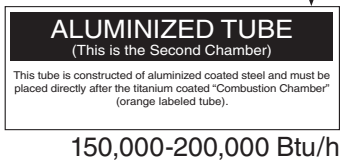
Fan Compartment



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



F/N: LLTB004 (orange)



150,000-200,000 Btu/h models only

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 and vapor in the vicinity 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.

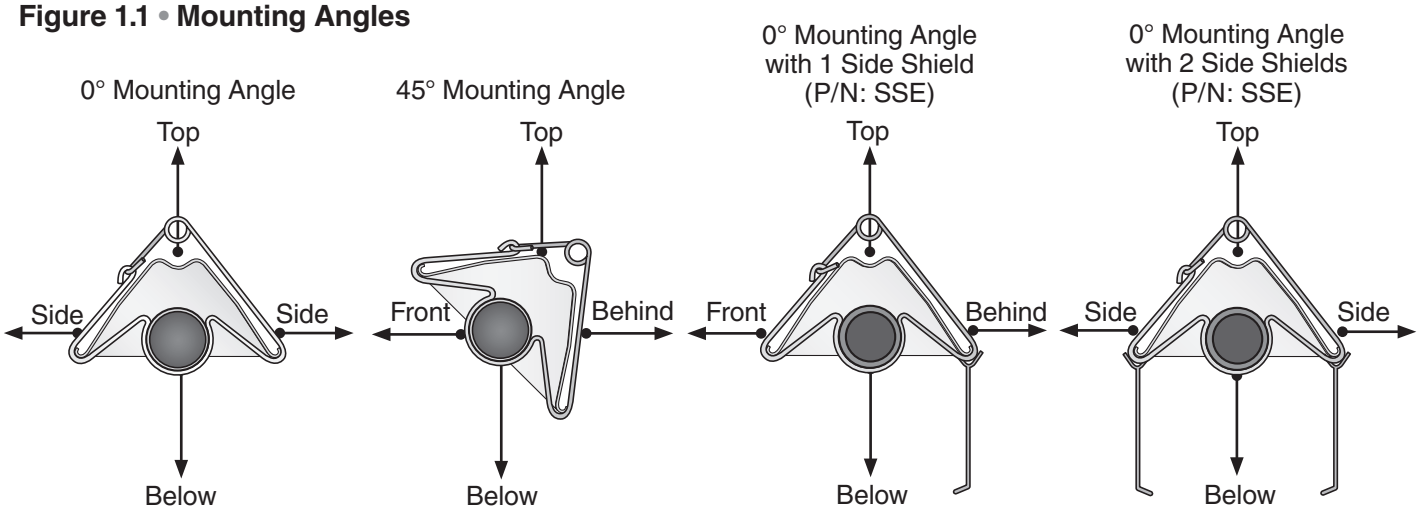
When installing the tube heater system, clearances to combustibles for the model tube heater and configuration must be maintained. Refer to Chart 1.1 below to determine the required distances for your model.

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

Model Number	Mounting Angle*	Side		Top	Below
		Front	Behind		
DET (20, 30, 40) - (65, 75) [N, P] (-3)	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
DET (30, 40) - 100 [N, P] (-3)	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
DET (40, 50) - 125 [N, P] (-3)	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
DET (40, 50, 60) - 150 [N, P] (-3)	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
DET (50, 60) - 175 [N, P] (-3)	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
DET (50, 60) - 200 [N, P] (-3)	0°	41	41	6	94
	45°	63	8	10	94
with 1 side shield	0°	54	8	6	94
with 2 side shields	0°	30	30	6	94
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

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 in. W.C.P.	5.0 in. W.C.P.	14.0 in. W.C.P.
Liquefied Petroleum	10.0 in. W.C.P.	11.0 in. W.C.P.	14.0 in. W.C.P.

⚠ **IMPORTANT:** Consult the Tube Heater General Manual for gas connection requirements.

Electrical Requirements

- 120 volt - 60 Hz, single-phase, 3-wire.
- 24 volt thermostat connection.
- Starting current 1.7 amps
- Running current 1.1 amps

NOTICE

Connecting the thermostat with a voltage other than 24V may damage the heater. The DET3 Series requires a 24V connection to the thermostat. The DET3 Series is equipped with an internal relay board. A field supplied external transformer must be installed, see wiring diagram (Figures 2.1A-B).

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

Wiring

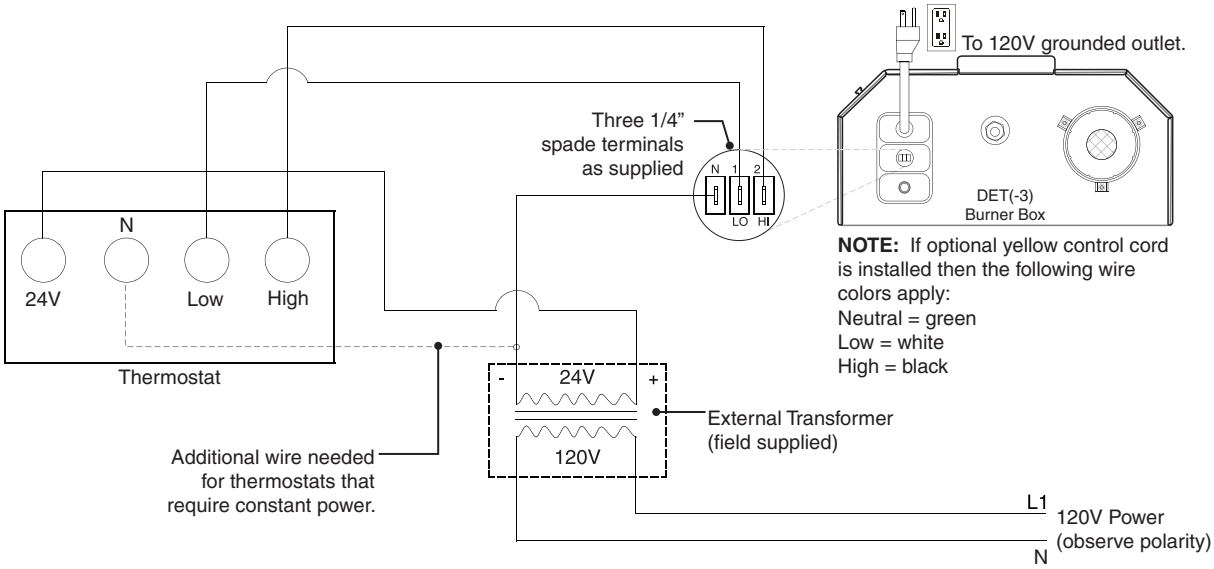
⚠ WARNING

Electric Shock

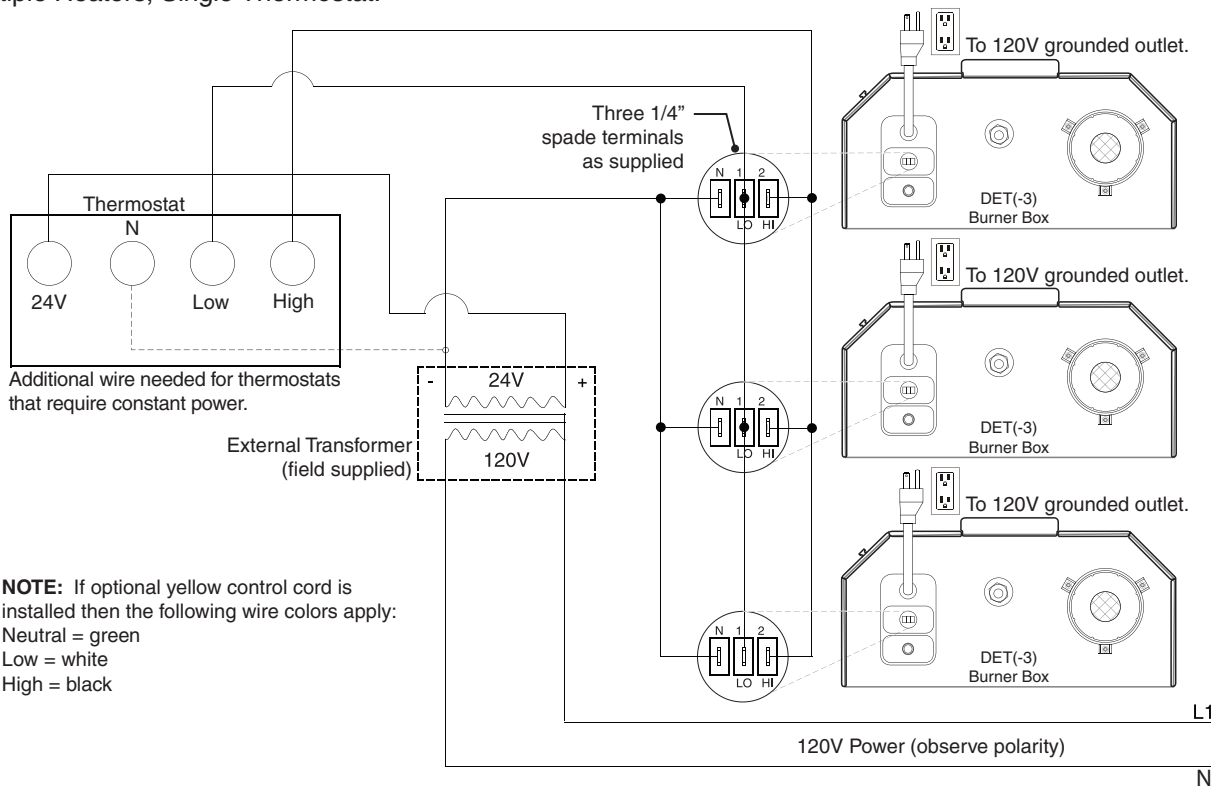
Field wiring to the tube heater must be connected and grounded in accordance with national, state, provincial, local codes and to the guidelines in the Tube Heater General Manual and Series Insert Manual. In the United States refer to the most current revisions to the ANSI/NFPA 70 Standard, and in Canada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



B. Multiple Heaters, Single Thermostat.

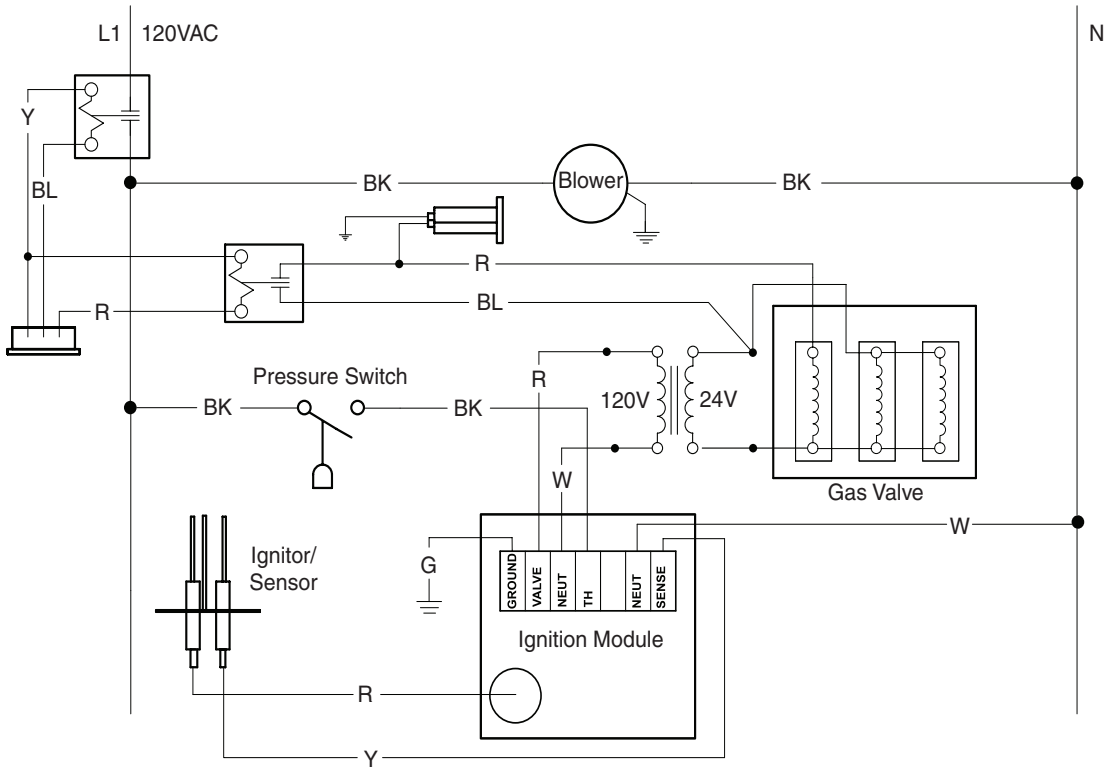


Before field wiring this appliance - Check existing wiring; replace if necessary.

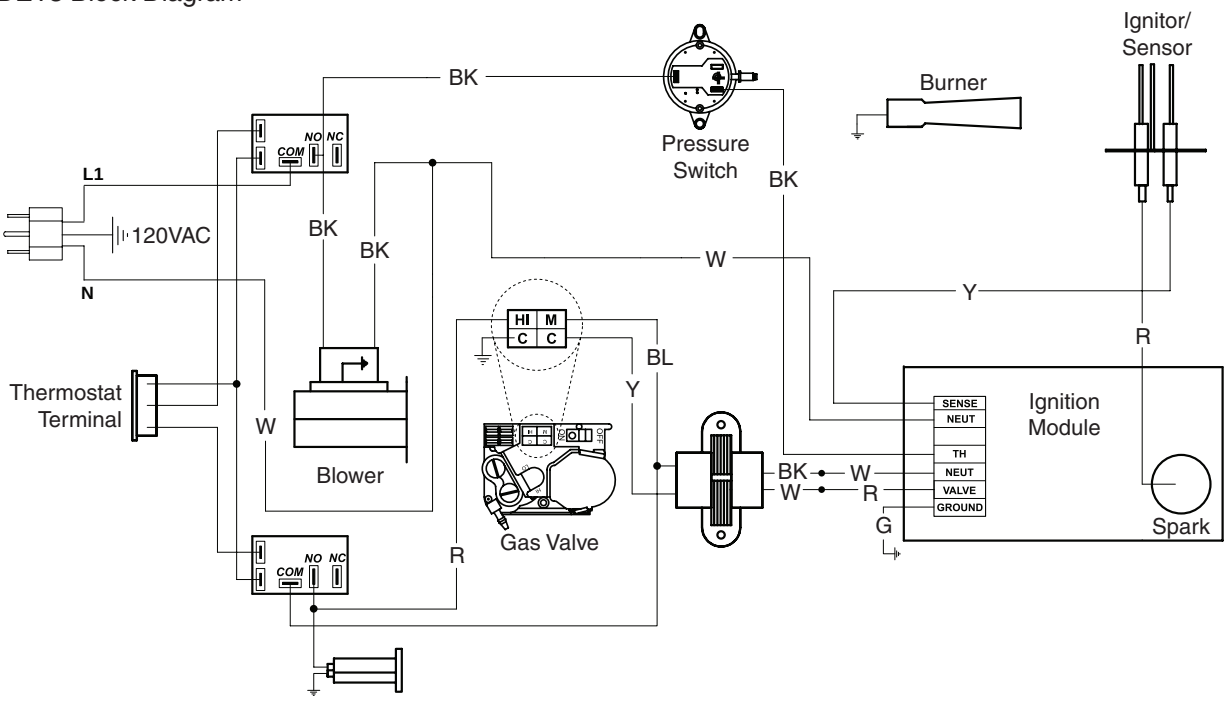
NOTE: If any of the original wire supplied with the appliance must be replaced, it must be replaced with wiring material having a temperature rating of at least 105° C.

Figure 2.2 • Internal Wiring Diagrams

A. DET3 Ladder Diagram



B. DET3 Block Diagram



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There are no alternative wiring diagrams for the DET3 Series

Specifications

Chart 2.1 • Specifications

Model Number	Gas Type (Select One)	BTU/H (High Fire)	BTU/H (Low Fire)	Straight Length	U-Tube Length	Weight (lbs.)	Recommended Mounting Heights^	Combustion Chamber(s) (Black Coated)	Radiant Emitter Tube(s) (Uncoated)	Radiant Surface Area (sq. ft.)
DET-20-65(-3)	N or LP	65,000	50,000	21'-9"	13'-1"	120	9' to 14'	Alum	HRT	20.2
DET-20-75(-3)	N or LP	75,000	50,000	21'-9"	13'-1"	120	10' to 15'	Alum	HRT	20.2
DET-30-65(-3)	N or LP	65,000	50,000	31'-5"	**17'-9"	160	10' to 15'	Alum	HRT	30.4
DET-30-75(-3)	N or LP	75,000	50,000	31'-5"	**17'-9"	160	11' to 18'	Alum	HRT	30.4
DET-30-100(-3)	N or LP	100,000	65,000	31'-5"	**17'-9"	160	12' to 20'	Alum	HRT	30.4
DET-40-65(-3)	N or LP	65,000	50,000	41'-1"	22'-9"	190	11' to 18'	Alum	HRT	40.5
DET-40-75(-3)	N or LP	75,000	50,000	41'-1"	22'-9"	190	11' to 18'	Alum	HRT	40.5
DET-40-100(-3)	N or LP	100,000	65,000	41'-1"	22'-9"	190	12' to 20'	Alum	HRT	40.5
DET-40-125(-3)	N or LP	125,000	95,000	41'-1"	22'-9"	190	13' to 23'	Alum	HRT	40.5
DET-40-150(-3)	N or LP	150,000	100,000	41'-1"	22'-9"	190	14' to 25'	Titan/Alum	HRT	40.5
DET-50-125(-3)	N or LP	125,000	95,000	50'-9"	**27'-5"	235	15' to 27'	Alum	HRT	50.6
DET-50-150(-3)	N or LP	150,000	100,00	50'-9"	**27'-5"	235	15' to 27'	Titan/Alum	HRT	50.6
DET-50-175(-3)	N or LP	* 175,000	125,000	50'-9"	**27'-5"	235	16' to 30'	Titan/Alum	HRT	50.6
DET-50-200(-3)	N or LP	* 200,000	145,000	50'-9"	**27'-5"	235	17' to 35'	Titan/Alum	HRT	50.6
DET-60-150(-3)	N or LP	150,000	100,000	60'-5"	32'-5"	265	16' to 30'	Titan/Alum	HRT	60.7
DET-60-175(-3)	N orLP	* 175,000	125,000	60'-5"	32'-5"	265	16' to 30'	Titan/Alum	HRT	60.7
DET-60-200(-3)	N or LP	* 200,000	145,000	60'-5"	32'-5"	265	17' to 35'	Titan/Alum	HRT	60.7

* Model requires stainless steel tube clamp (P/N: TP-220) to be located at the seam between the primary combustion chamber and the secondary combustion tube downstream of the burner control box.

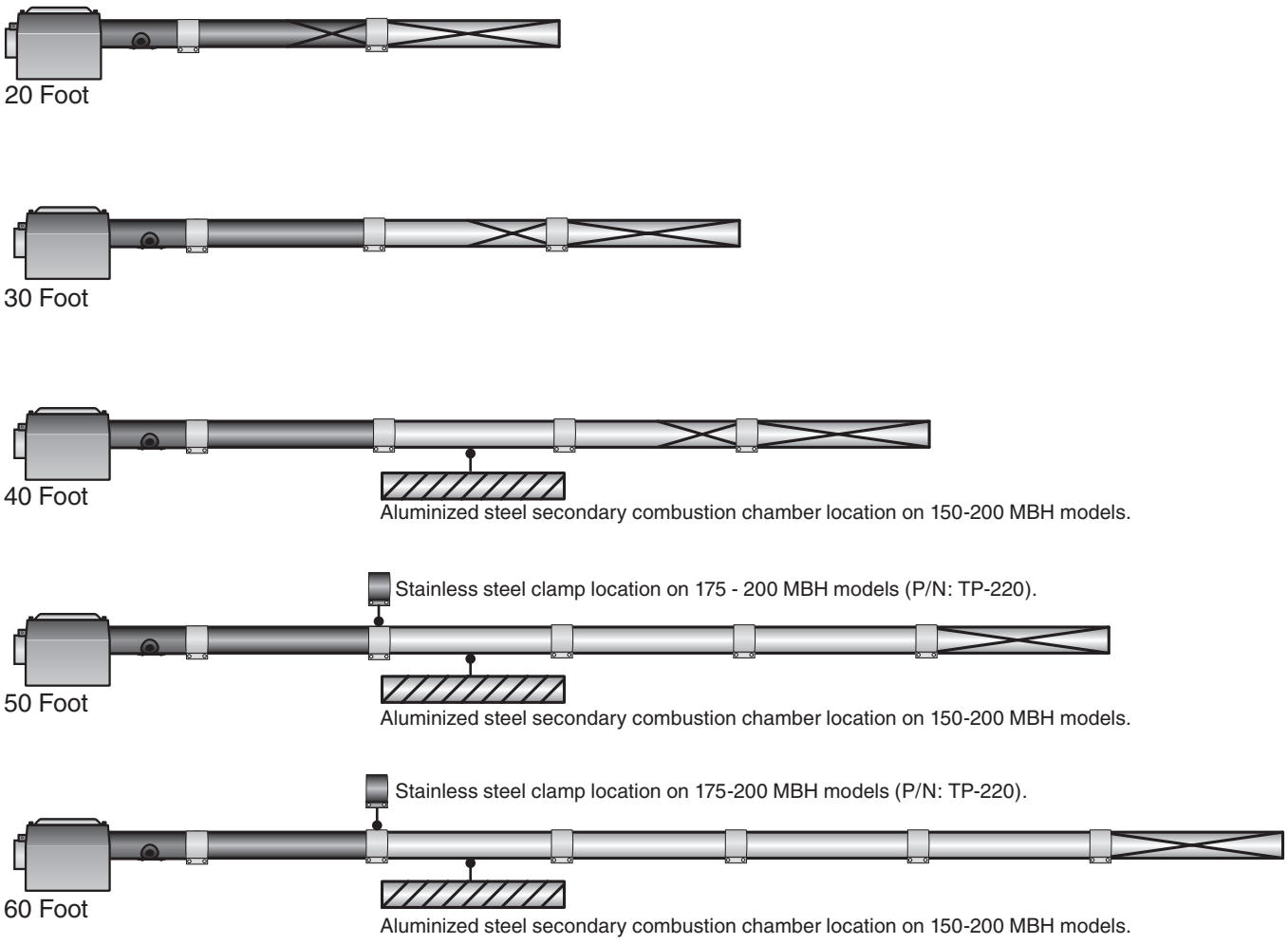
** Model requires 5EA-SUB accessory package when installing in a 'U' configuration (P/N: TF1B).

^ Factory recommended mounting heights are listed as a guideline.

IMPORTANT: Reference box label to determine the quantity of required baffle sections for each model heater.

Figure 2.4 • Tube Installation Sequence

Important! The combustion chamber(s) & radiant tube section(s) must be installed in the following order.



Key

- Burner Control Box with 16” Burner Tube
- Primary Combustion Chamber Tube
- Secondary Aluminized Steel Combustion Chamber (150-200 MBH models only)
- Hot-rolled Steel Radiant Emitter Tube
- Standard Tube Clamp
- Stainless Steel Tube Clamp (P/N: TP-220)
  175-200 MBH models only - Located between 1st and 2nd 10 ft. tube sections.
- Baffle Location

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 Tube Heater General Manual for installation requirements.

Sequence of Operation

Two voltages (120V supply and 24V control) must be supplied to the DET3 Series burner control box for proper operation.

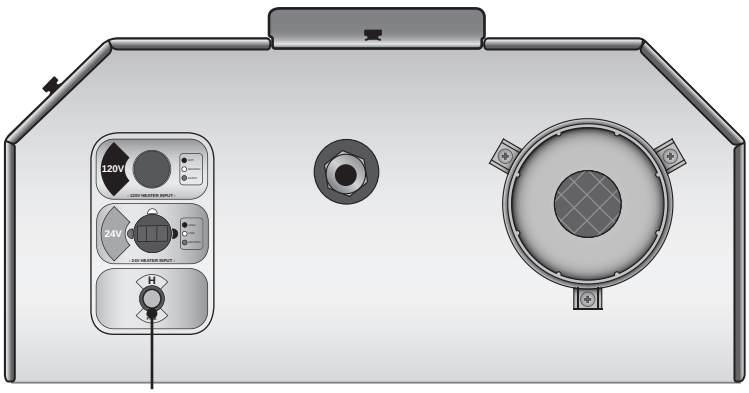
Starting Circuit: Upon a call for heat, the low fire relay is energized by 24V from the thermostat. The relay is closed sending 120V to the blower beginning the sequence of operation.

Air pressure generated by the blower causes the normally open pressure switch to close, sending power to the ignition module. After a seven-second pre-purge, the spark electrode, transformer and gas valve are simultaneously energized. The trial for ignition is 15 seconds.

Single Stage 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 15 seconds, the heater will attempt two (2) additional ignition sequences before proceeding to lockout mode. The control can be reset by briefly interrupting the power source.

Two Stage Running Circuit: High fire operation is actuated by the thermostat sending a 24V signal to the high fire relay. The energized coil of the relay is closed, allowing 24V to continue onto the high fire of the gas valve.

Figure 3.1 • Operational Indicator Light



Light 1
Indicates High Fire Mode

Thermostat

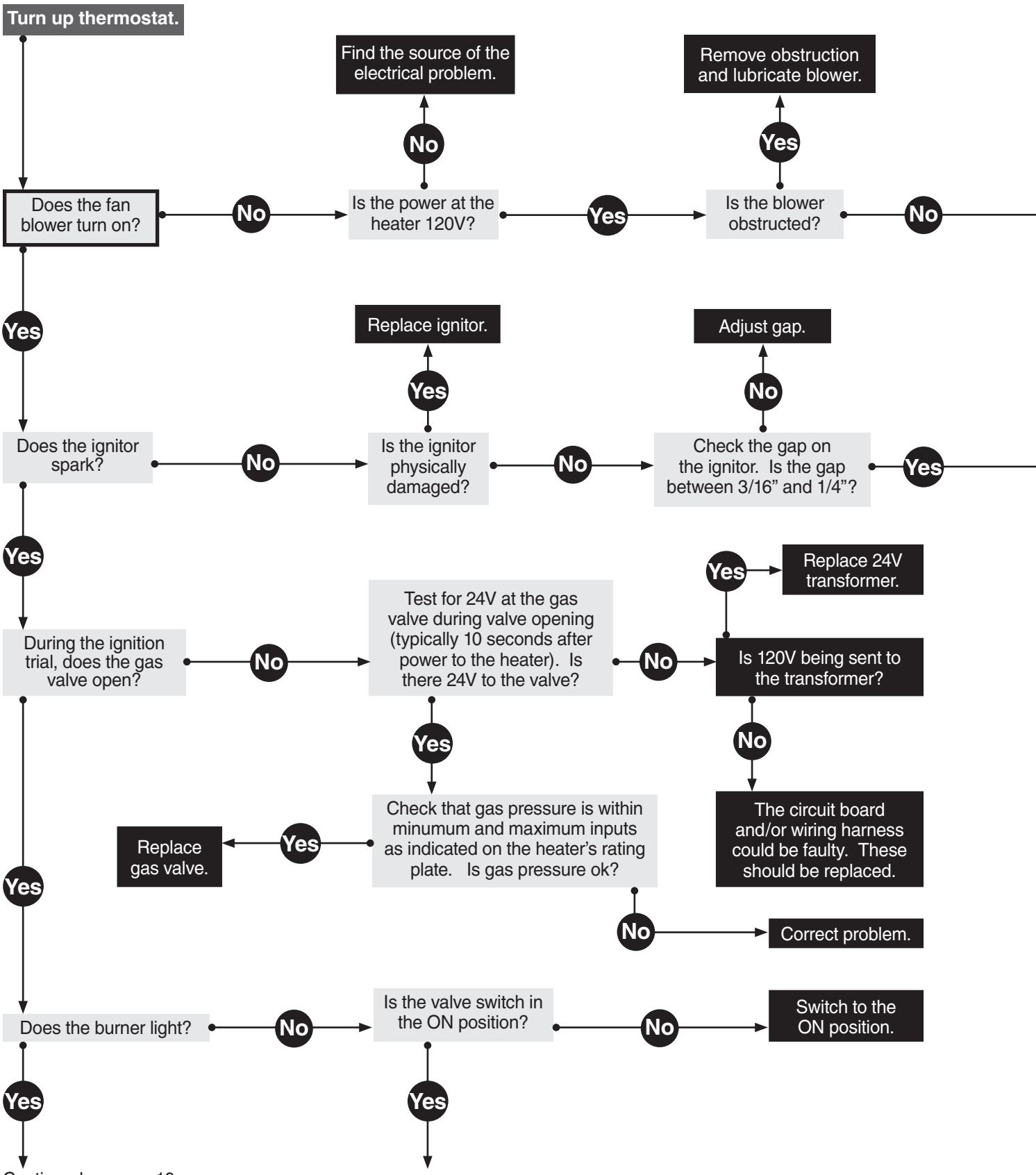
NOTE: Different thermostats operate according to their particular features. Refer to thermostat specifications for details.

DET3 Series heaters require a 24V, two-stage thermostat to operate. The burner control box is equipped with a round terminal strip that accepts three (3) 1/4" female spade terminals. Do not supply 120V to the 24V connection.

> **Example**: Desired room temperature is 65° F. The preset differential of the thermostat is 1° F. The preset differential for High fire mode is 3° F.

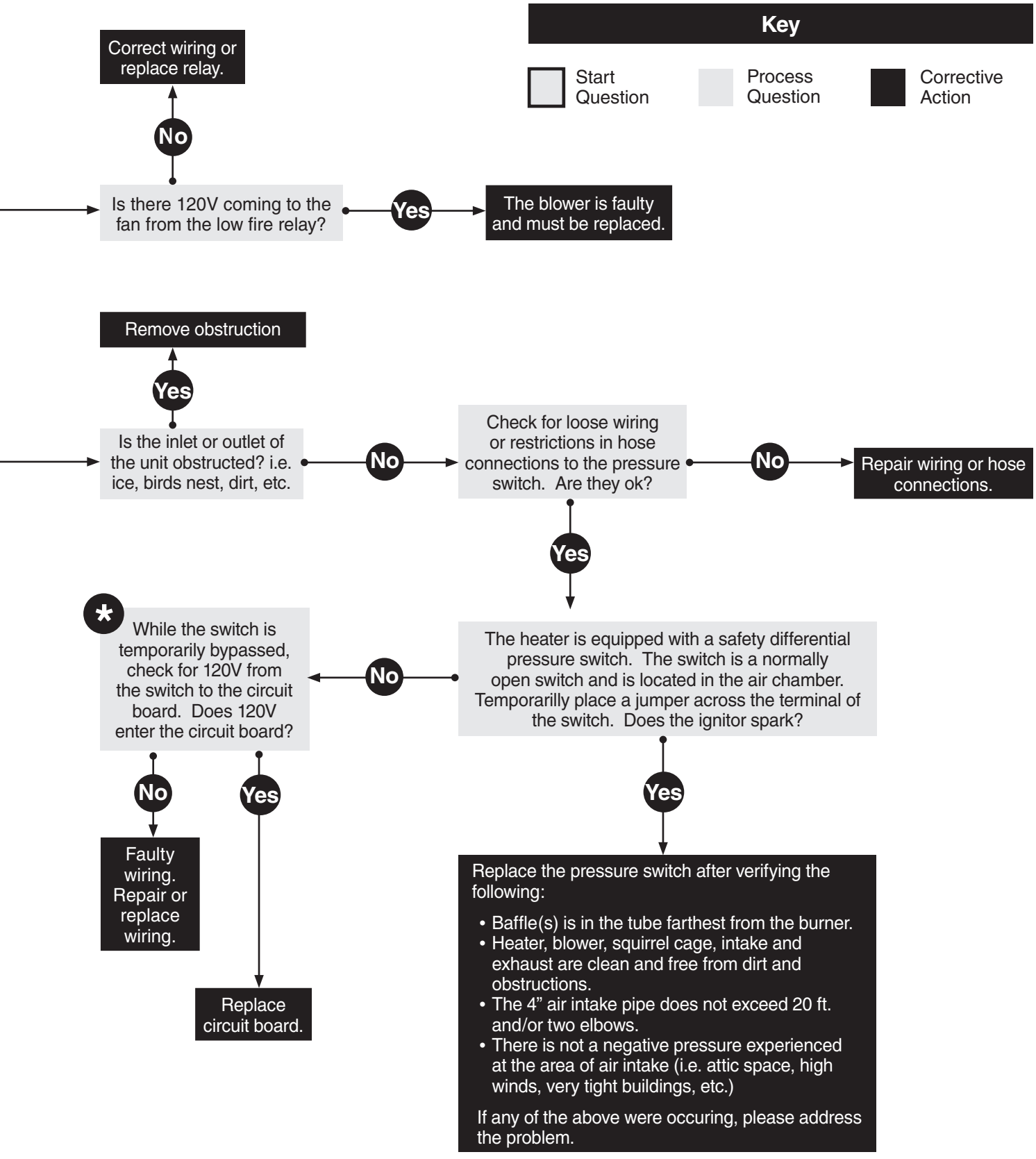
When the temperature drops below the Low Fire preset differential of the thermostat (63° F), Low Fire will activate. If the temperature continues to drop below the preset differential for High Fire, High Fire will activate bringing the temperature back up to the Low Fire preset quickly.

4.0 Troubleshooting Guide

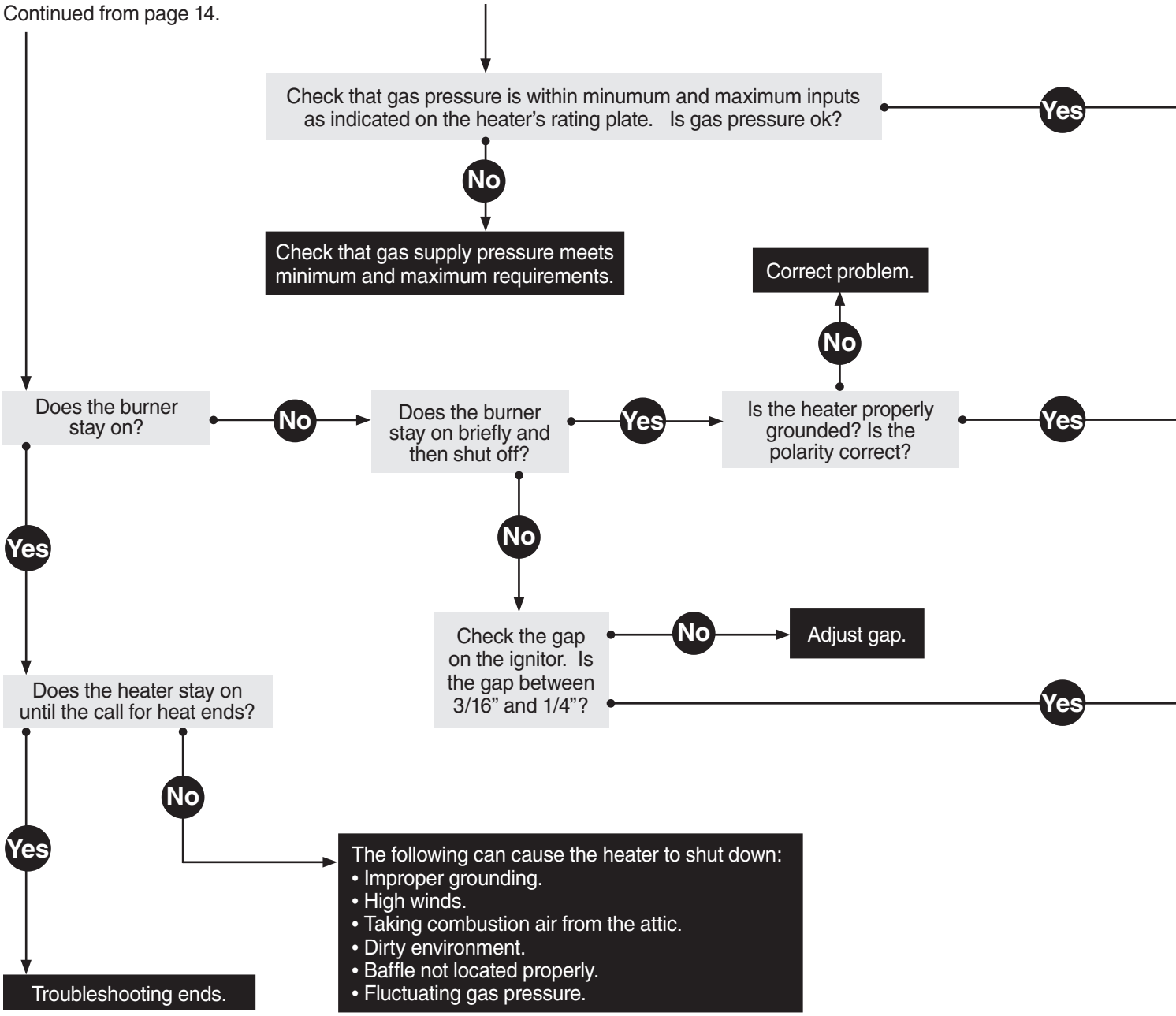


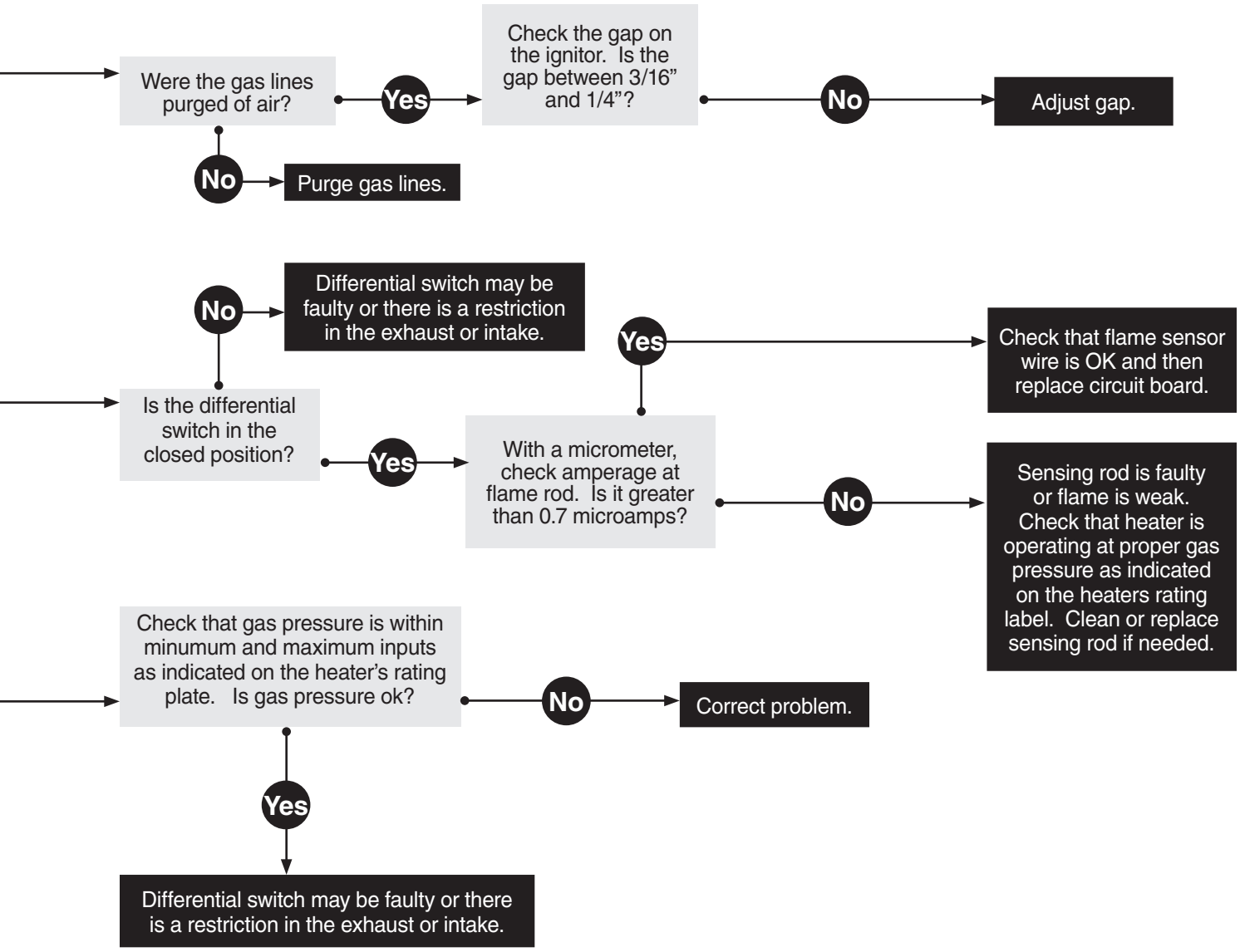
Continued on page 16.

*** 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.



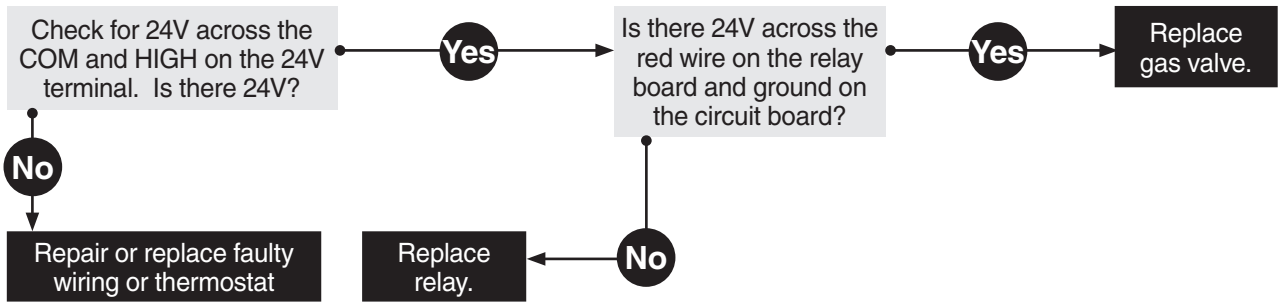
Continued from page 14.





If heater does not enter high fire mode, check the following:

NOTE: To confirm the heater is not in high-fire mode, check the manifold pressure (3.5" natural or 10" propane). If the indicator light is not illuminated, it is faulty and should be replaced. If the manifold pressure ranges from 2.3" to 2.8" Natural (model dependent) and 6.0" to 7.5" propane (model dependent), the heater is in low fire mode and the troubleshooting steps described below should be followed.



5.0 Parts

Figure 5.1 • Burner Assembly Components

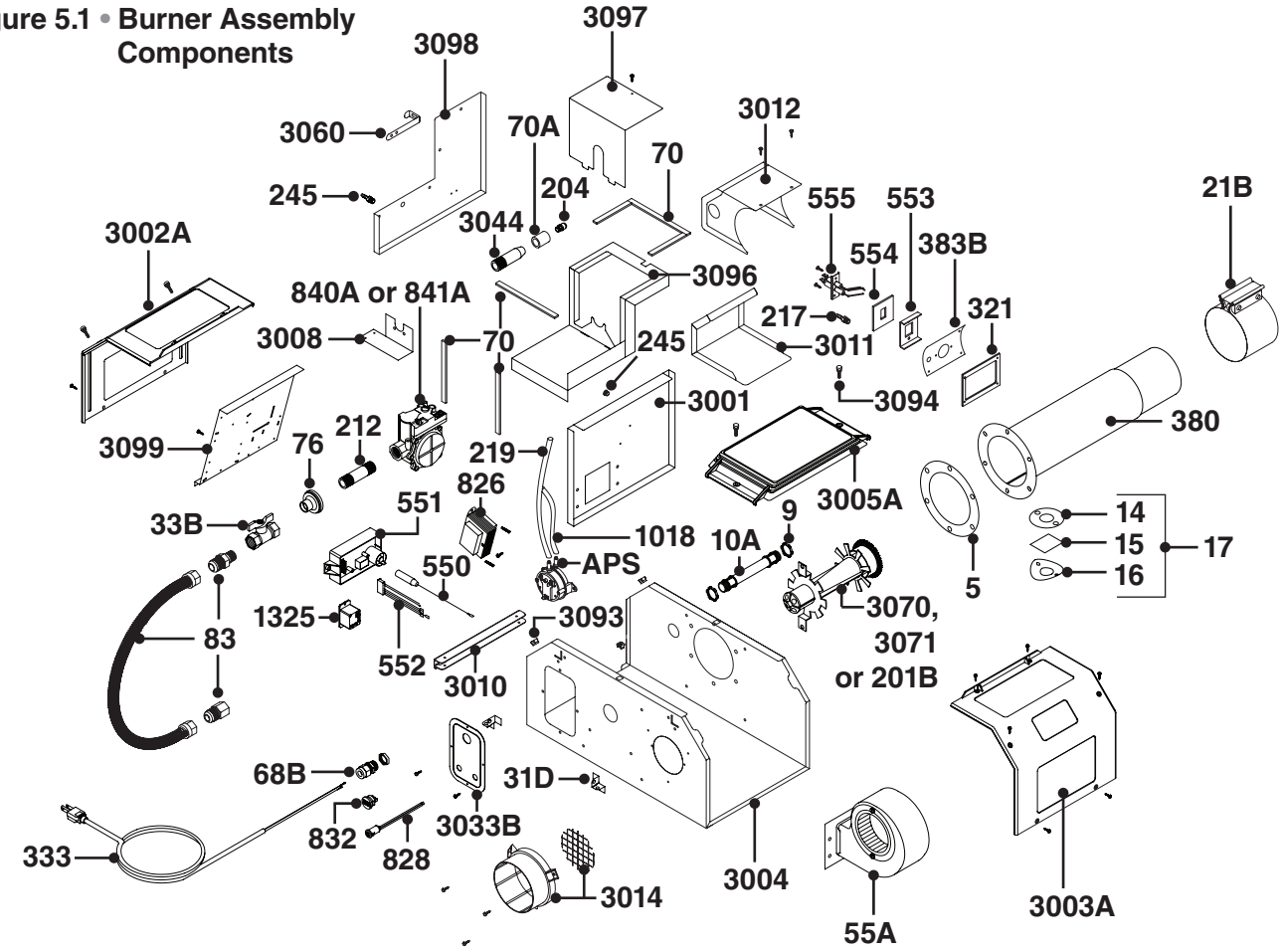
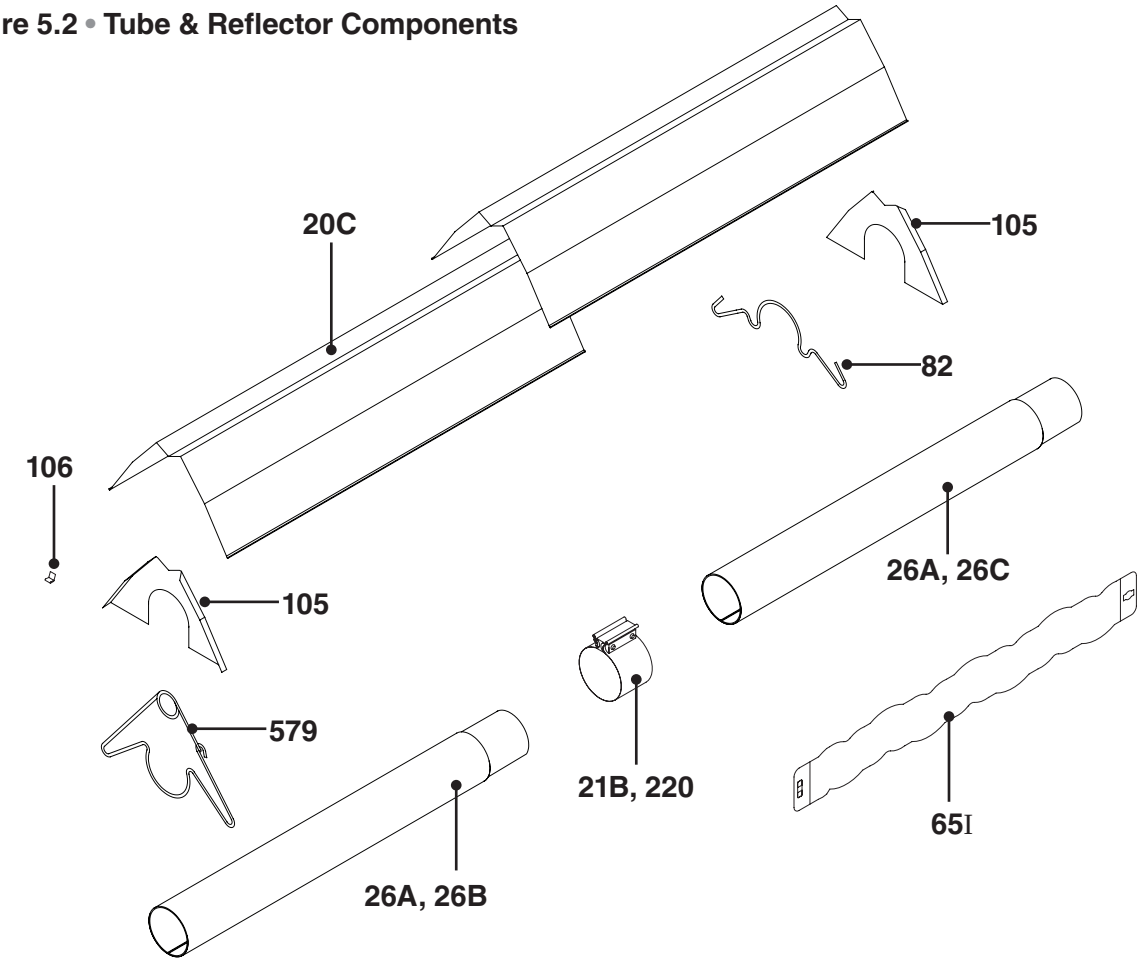


Chart 5.1 • Parts List

Part #	Description	Part #	Description
TP-5	Flange Gasket	TP-70A	1” Control Box Gasket (6 inches)
TP-9	Conduit Coupling	TP-76	Rubber Grommet
TP-10A	Conduit 4” x 3/4”	TP-82	Reflector Center Support
TP-14	Sight Glass Gasket	TP-83	Stainless Steel Flexible Gas Connector
TP-15	Sight Glass	TP-105	Reflector End Cap
TP-16	Sight Glass Washer	TP-106	Reflector End Cap Clips (8 pcs.)
TP-17	Sight Glass Kit	TP-108*	5 Ft. Coated Alum-Titan Tube w/ Clamp
TP-20C	10 Ft. Aluminum Reflector	TP-111*	5 Ft. Coated Aluminized Tube w/ Clamp
TP-20D*	10 Ft. Stainless Steel Reflector*	TP-112*	5 Ft. Aluminum Reflector
TP-21B	4” Tube Clamp	TP-201B	V.3 Mid SS Burner (125-150 MBH)
TP-25	1/4” Female Spade Terminal	TP-204	Gas Orifice - Consult Factory
TP-26A	10 Ft. Aluminized Combustion Tube	TP-212	1/2” x 3” Pipe Nipple
TP-26B	10 Ft. Titanium Primary Combustion Tube	TP-217	Pressure Switch Barb
TP-26C	10 Ft. Uncoated Hot Rolled Radiant Tube	TP-219	Differential Vinyl Sensing Tube
TP-31D	Interlocking Mounting Bracket (Qty. 2)	TP-220	4” Stainless Steel Tube Clamp
TP-33B*	1/2” Shut-off Ball Valve/Inlet Tap*	TP-321	Ignition Plate Gasket
TP-55A	Fan Blower	TP-332	Divider Grommet
TP-65I	36” Interlocking Turbulator Baffle Section	TP-333	36” Black 120V Power Cord
TP-68B	Large Strain Relief Bushing	TP-380	16” Burner Tube with Flange
TP-70	1/2” Control Box Gasket (per foot**)	TP-383B	Spark Ignitor Plate

*Optional add-on or accessory item. ** 3 foot total required to cover all applicable surfaces.

Figure 5.2 • Tube & Reflector Components



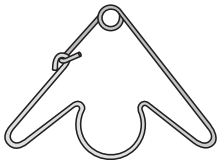
Part #	Description	Part #	Description
TP-550	Spark Transfer Wire - Orange	TP-3010	Service Panel Hinge
TP-551	MARK 10DX-117 DSI Circuit Board w/ Pre-Purge	TP-3011	Spark Ignitor Box
TP-552	Wiring Harness	TP-3012	Spark Ignitor Box Cover
TP-553	Spark Ignitor Mounting Bracket	TP-3014	Plastic Air Orifice w/ Screen - Contact Factory
TP-554	Spark Ignitor Mounting Bracket Gasket	TP-3033B	DET3 Power Entry Plate
TP-555	Spark Ignitor Electrode	TP-3044	Gas Manifold
TP-579	4" Wire Hanger	TP-3060	Pressure Switch Mounting Bracket
TP-826	40VA Transformer	TP-3070	V.3 Low SS Burner (50-100 MBH)
TP-828	Yellow 24V High Fire Indicator Light	TP-3071	V.3 High SS Burner (175-200 MBH)
TP-832	Thermostat Terminal Strip	TP-3093	#8-32 Cage Nut
TP-840A	36G54-224 Gas Valve - Natural Gas Assembly	TP-3094	#8-32 x ½" Black Nylon Shoulder Screw
TP-841A	36G54-226 Gas Valve - LP Gas Assembly	TP-3096	Valve Compartment Bottom Panel
TP-1018	APS 1/4" Silicone Sensing Tube	TP-3097	Valve Compartment Top Panel
TP-1325	24V Switching Relay Board (Qty. 2)	TP-3098	Valve Compartment Side Panel
TP-3001	Divider Panel	TP-3099	Controls Mounting Panel
TP-3002A	Plastic Control Compartment End Panel	**APS**	Select Pressure Switch Below (BTU Dependent)
TP-3003A	Plastic Fan Compartment End Panel	(TP-264D)	Atmospheric Pressure Switch (75 MBH)
TP-3004	Main Control Box Panel	(TP-1264A)	Atmospheric Pressure Switch (100 MBH)
TP-3005A	Plastic Valve Compartment Lid	(TP-264F)	Atmospheric Pressure Switch (125-150 MBH)
TP-3008	Gas Valve Mounting Bracket	(TP-1064B)	Atmospheric Pressure Switch (175-200 MBH)

Kit Contents Check List

Chart 5.2 • Kit Contents for DET3 Series - Reference the length column for your model.

DET3 Series Kit Contents

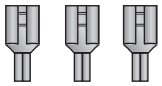
TP-579 4" Hanger



TP-82 4" Reflector Center Support (RCS)



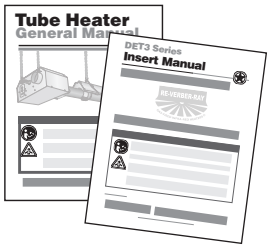
TP-25* 1/4" Female Spade Terminals



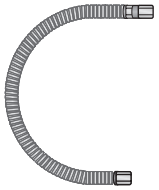
TP-106 Reflector End Cap Clips



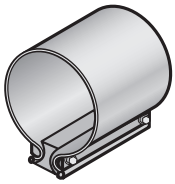
General Manual and DET3 Series Insert F/N: LIOGT3 & LIODET3



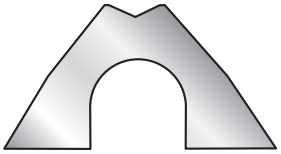
TP-83 24" Stainless Steel Flexible Gas Connector



TP-21B 4" Tube Clamp



TP-105 Reflector End Cap



Part No.	Description	20 ft.	30 ft.	40 ft.	50 ft.	60 ft.
TP-21B	4" Tube Clamps	2	3	4	5**	6**
TP-25*	1/4" Female Spade Terminals*	3	3	3	3	3
TP-82	4" Reflector Center Support	1	1	1	1	1
TP-83	24" S.S. Flexible Gas Connector	1	1	1	1	1
TP-105	Reflector End Caps	2	2	2	2	2
TP-106	Reflector End Cap Clips	8	8	8	8	8
TP-579	4" Wire Hanger	3	4	5	6	7
LIOGT3	Tube Heater General Manual	1	1	1	1	1
LIODET3	DET3 Series Insert Manual	1	1	1	1	1

Filled By: _____

* Not included when heater is equipped with yellow control cord.
** One 4" stainless steel tube clamp (P/N: TP-220) is provided for each 175,000 - 200,000 BTU model. Place as shown on page 11.

Approvals

- CSA
- Commercial approval.

Limited Warranty

- 1 year - Burner box components.
- 2 years - Combustion and radiant tubes.
- 3 years - Stainless steel burner.
- See page 36 of the General Tube Heater Manual for Terms and Conditions.

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