MP Series
Insert Manual

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

The MP Series Infrared Tube Heater is a positive pressure, modulating radiant heater system. This insert manual is a supplement to the Tube Heater General Manual and provides specific information related to the MP Series models. 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.

INSTALLER: Present this manual to the end user.
Keep these instructions in a clean and dry place for future reference.

Model#:_____ **Serial #:** _____
(located on rating label)

LIOMP-Rev. 13512
Print: 1M-06/21_r1-08/21 (CDS)
Replaces: LIOMP-1M-08/18 (CDS)

Contents

NOTE: See Page 16 for a list of available models and specifications.

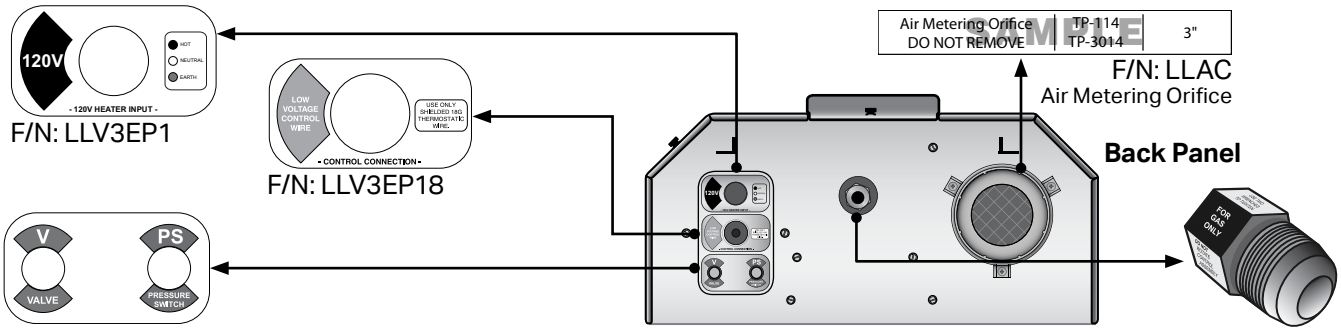
1.0 Safety

⚠ 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.

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.



F/N: LLV3EP1

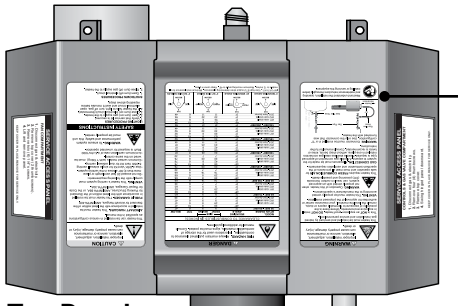
F/N: LLV3EP18

F/N: LLAC
Air Metering Orifice

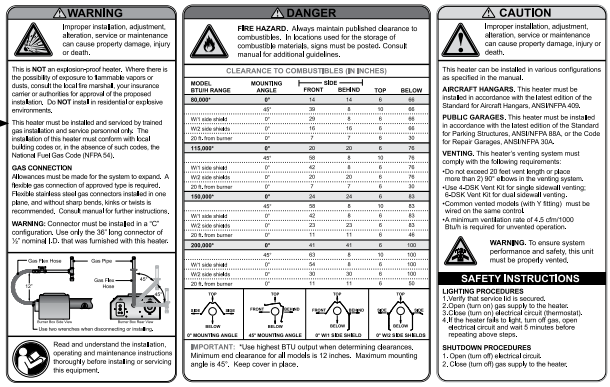
Back Panel

F/N: LLV3EP6
(Operational Indicator Lights)

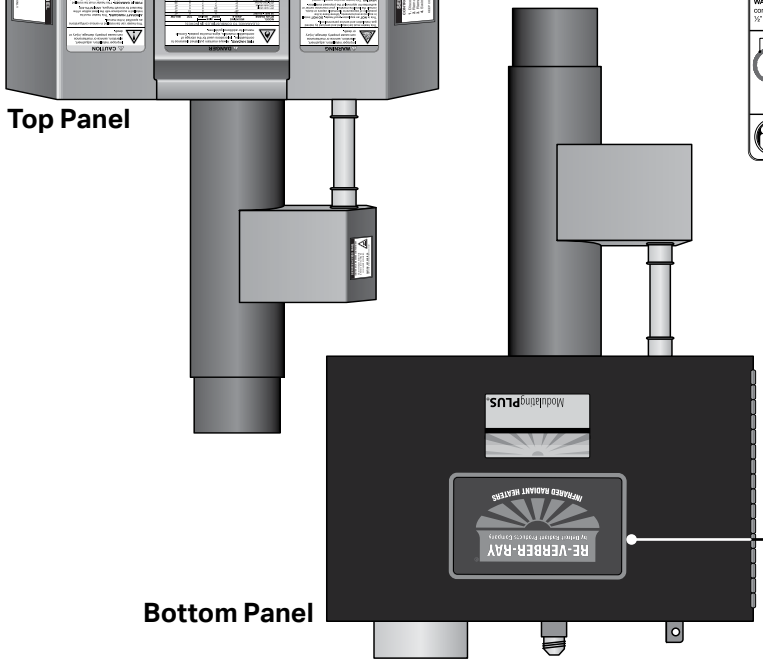
F/N: LLTB018 (Natural Gas)
F/N: LLTB019 (Propane Gas)



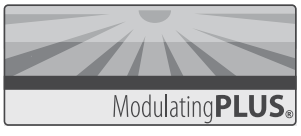
Top Panel



F/N: LLTCL001L2/LLTCL002C2/LLTCL002R
Safety and Clearance Labels

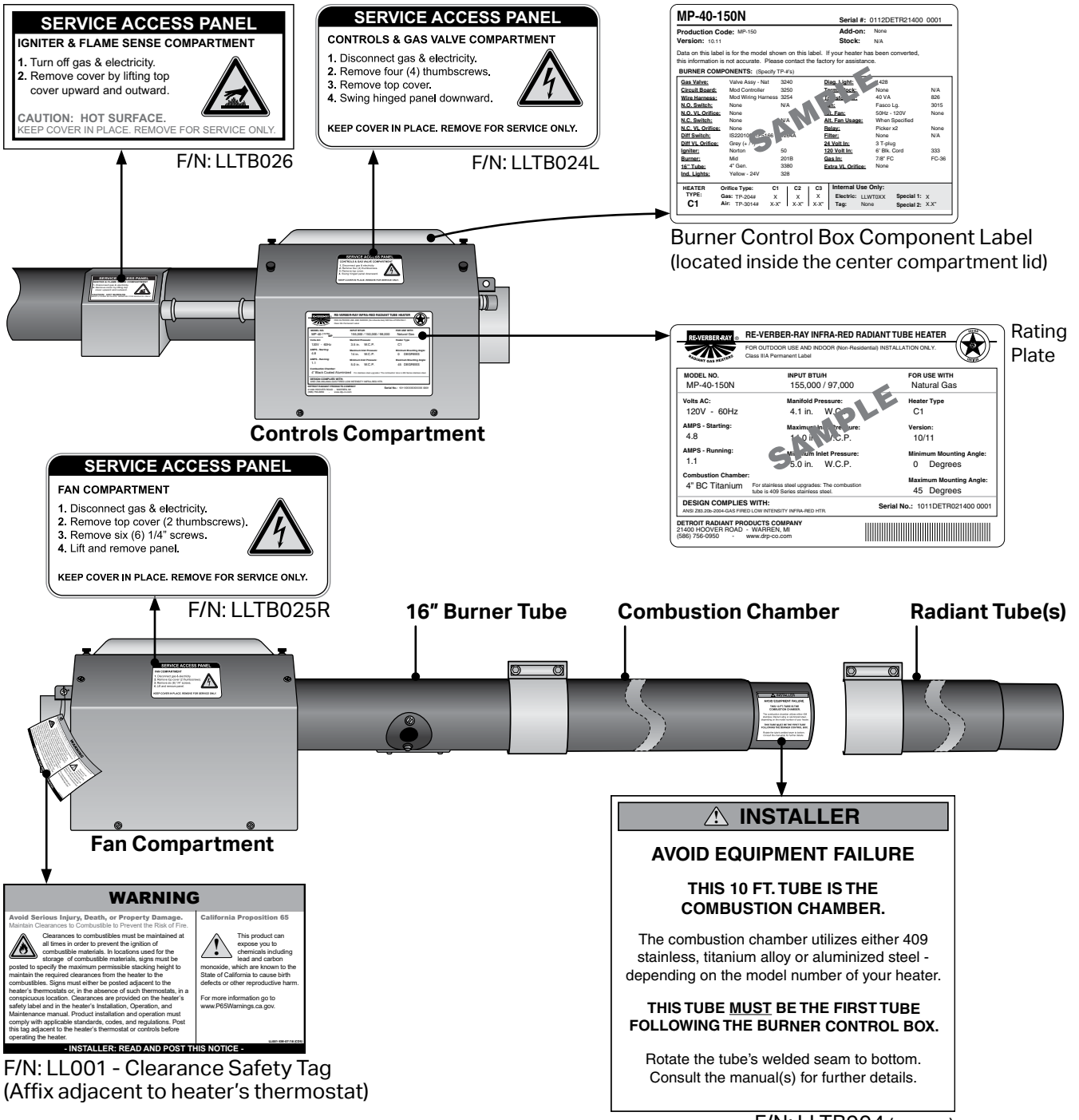


Bottom Panel



F/N: LLLOGO19
MP Series
Logo Label

F/N: LLLOGO32 Logo Label



Clearances 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 vapors 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. Refer to Chart 1.1 below to determine the required distances for your model.

Chart 1.1 • Clearances to Combustibles in Inches (See Figure 1.1 for Mounting Angles)

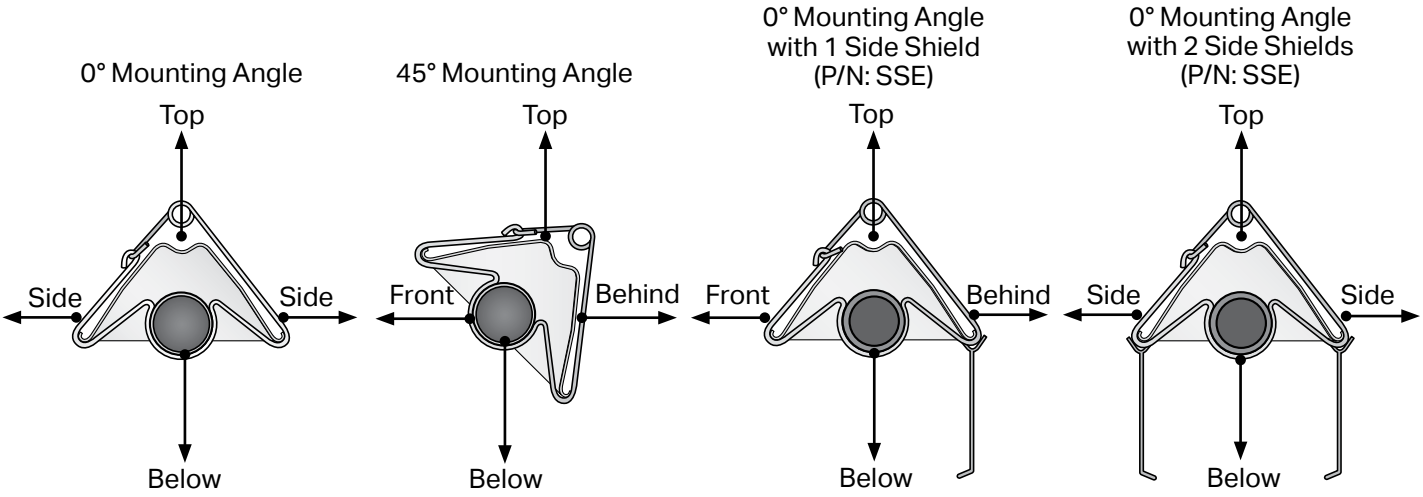
Model Number	Mounting Angle*	Sides		Top	Below
		Front	Behind		
MP-(25,30,40)-80[N,P]	0°	14	14	6	66
	45°	39	8	10	66
with 1 side shield	0°	29	8	6	66
with 2 side shields	0°	16	16	6	66
20 ft. from burner	0°	7	7	6	30
MP-(30,40,50)-115[N,P]	0°	20	20	6	76
	45°	58	8	10	76
with 1 side shield	0°	42	8	6	76
with 2 side shields	0°	20	20	6	76
20 ft. from burner	0°	7	7	6	30
MP-(40,50,60)-150[N,P]	0°	24	24	6	83
	45°	58	8	10	83
with 1 side shield	0°	42	8	6	83
with 2 side shields	0°	23	23	6	83
20 ft. from burner	0°	11	11	6	46
MP-(50,60,70)-200[N,P]	0°	41	41	6	100
	45°	63	8	10	100
with 1 side shield	0°	54	8	6	100
with 2 side shields	0°	30	30	6	100
20 ft. from burner	0°	11	11	6	50

The minimum end clearance for all models is 12 inches.

* Maximum mounting angle is 45°. Heaters mounted on an angle between 0° and 45° must maintain clearances posted for 0° or 45°, whichever is greater.

The stated clearance to combustibles represents a surface temperature of 90°F (50°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.

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, or upon request.

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.

	Manifold Pressure		Inlet Pressure	
Type of Gas	@ Maximum Rate	@ Minimum Rate	Minimum	Maximum
Natural	4.10 Inches. W.C.	1.65 Inches W.C.	6.00 Inches W.C.	14.00 Inches W.C.
Propane	11.0 Inches. W.C.	4.80 Inches W.C.	12.00 Inches W.C.	14.00 Inches W.C.

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

Electrical Requirements

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

NOTICE

Shielded thermostat wire of 18 AWG is recommended for connection to the heater from the thermostatic controller. The MP series heater is pre-set by the factory for use with the Premium User Interface (TP-PUI).

⚠ WARNING

Electric Shock
Field wiring to the tube heater must be connected and grounded in accordance with national, state, provincial, and 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.

Thermostat and Other Controls

The MP series heater is designed to operate on various control configurations. The available control options are:

- **A.** Premium User Interface.
- **B.** Potentiometer with On/Off switch.
- **C.** Single-Stage Thermostat with optional room temperature sensor**.**

"A" Premium User Interface

The Premium User Interface (TH-PUI) is a smart logic controller that offers the optimal performance out of your MP series heater. It modulates the heater(s) with a full PID Controller considering various inputs and outputs. It utilizes the current set temperature, the room temperature (based on an on-board thermistor or an externally connected zone sensor), mode selected, and other items to set the speed of modulation. Therefore, the heater output immediately responds to a change in air temperature. For installation of this device, see Figure 2.2 on Page 10.

"B" Potentiometer

A linear 10k Ohm potentiometer can be used as a control device for the MP series. This allows the user to manually control the heaters firing rate based on the dial position. The heater will modulate in increments of 1%, and vary from minimum firing rate to the full firing rate. An On/Off switch or timer is necessary to allow for the heater to shut off. For installation with this device, see Figure 2.3 on Page 11.

"C" Single-Stage Thermostat

A single stage heating thermostat can be used as a control device for the MP series. This allows the user to utilize a desired field supplied thermostat that best suits their individual needs. The heat control is designed for use with a 2-wire heating system (R & W), and is low voltage. The heater cannot power the thermostat. The thermostat selected must not have a heat anticipator. For installation with this device, see Figure 2.4 on Page 12.

NOTICE

When using a single stage thermostat, the use of a zone sensor is highly recommended. The unit will operate without this accessory, but will then only modulate based on a predetermined algorithm that considers cycle timing and history. Therefore the heater will not respond to rapid changes in air temperatures.

Zoning Heaters and Configuring 'Master/Slave' Heaters

The MP Series is designed to allow for several heaters within the same zone to simultaneously modulate in synchronization when connected to a single control device. This configuration requires one 'Master' heater that is connected directly to the heat control device, and the remaining 'Slave' heaters are to be wired to the 'Master' heater. The 'Slave' heaters will modulate based on the control signal from the 'Master' heater. During the operation of the system, all the 'Slave' heaters will modulate at the same percentage rate of the full input as the 'Master' heater.

When wiring multiple heaters together for zoning, the heaters must be wired in series with a 'Master' heater utilizing a shielded thermostat wire. Connect the heaters via the appropriate wiring diagram. See Pages 9-12 for more information.

Building Management Systems and Other Remote Analog Signals

A Building Management System or a Remote Analog Signal may be used as a controlled device for the MP Series. This allows the heater(s) to be controlled directly by the output of the Building Management System directly dictates the heaters firing rate. The analog signal can be either 0-10VDC or 4-20mA.

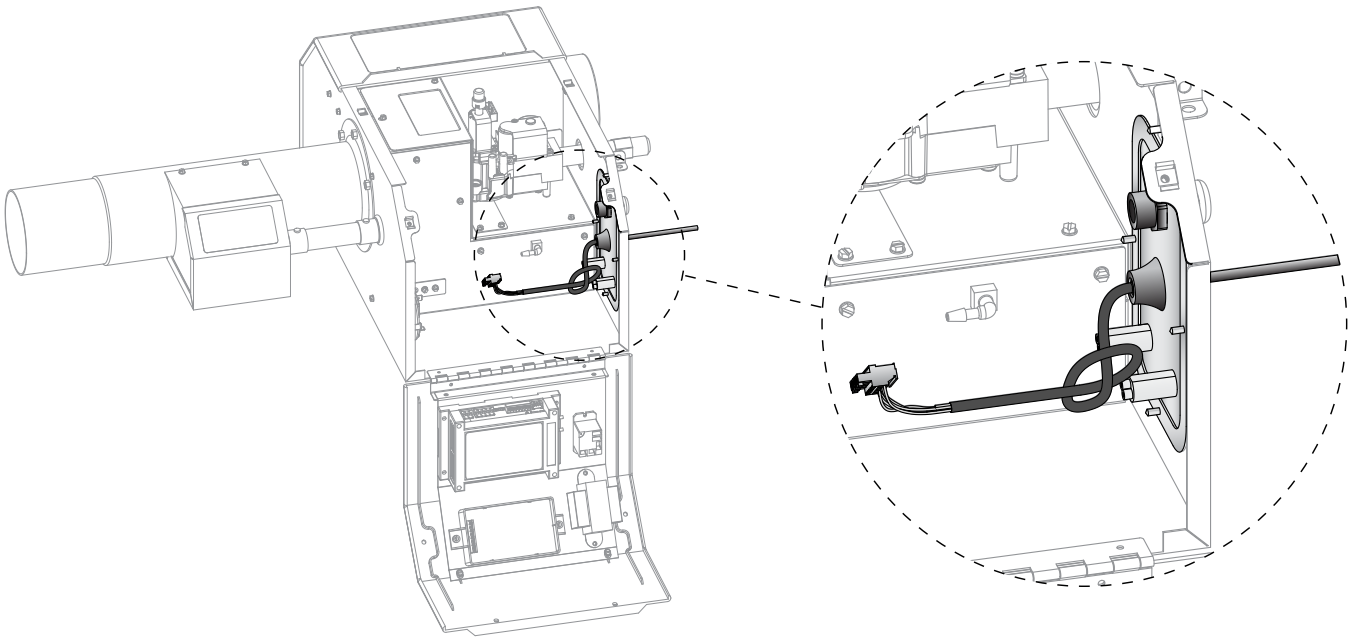
A Premium User Interface (P/N: PUI) MUST be used in order to connect the Building Management System to the heater.

Field Wiring

Field Supplied Control Wire: 18 AWG plenum rated thermostat wire that is shielded with drain wire is recommended for optimal performance.

Installing the Control Wire: Each heater includes a thermostat wire grommet to allow for thermostat wire to be brought into the burner box. Insert the grommet into the low voltage wiring access hole. Feed the thermostat wire through the grommet, piercing the rubber with the wire to ensure a tight seal. Ensure enough wire length is available to make the proper connections. Tie the thermostat wire into a loose knot, as shown in Figure 2.1. Ensure knot is loose enough to not cause any damage to the wire. This will allow for a strain relief for the connections to the heater.

Figure 2.1 • Installing the Control Wire



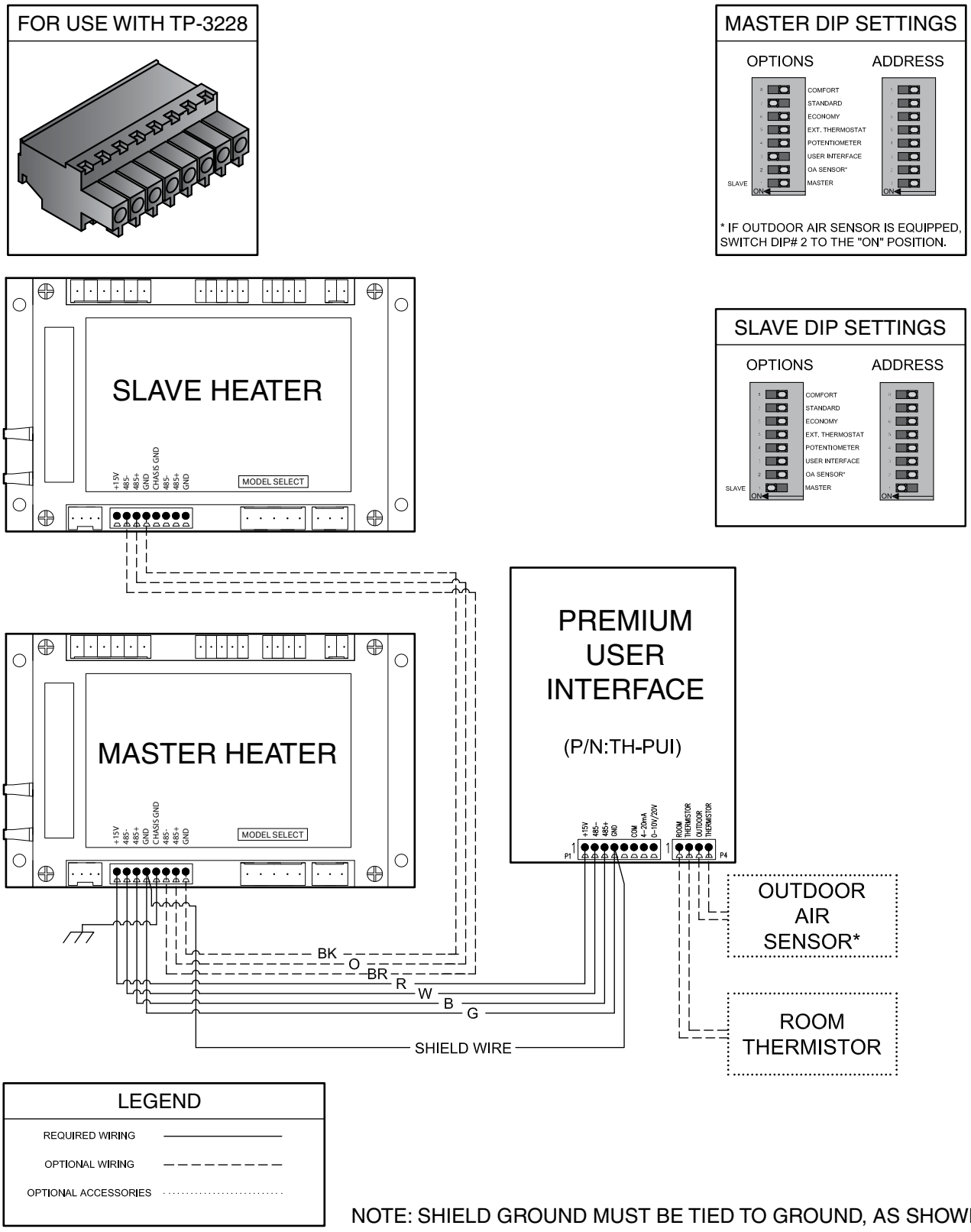
Connections to the Heater: The control devices are connected to the Modulating Circuit Board (P/N: TP-3250) via the thermostat terminal strips provided. The installer must select the appropriate thermostat terminal strip to connect to the board depending on the control configuration desired. The unit will provide the suitable voltage for each control device. **DO NOT** provide an external power supply to the thermostat terminal strips. Damage to the circuit board may result and is not covered by warranty.

Three (3) thermostat terminal strips are included with each heater to allow for connections to the heater. Note that only one terminal strip will be used for each application when installing a single heater, as selected by the installer. If installing multiple heaters in a master-slave configuration, the TP-3228 terminal strip will also be used with either the TP-3225 or TP-3224 terminal strip. The remaining thermostat terminal strip(s) can be discarded or kept with the manual for future reference. Refer to wiring diagrams on pages 10-12.

- TP-3228 – 8 circuit terminal strip to be used with Diagram “A”.
- TP-3225 – 5 circuit terminal strip to be used with Diagram “B”.
- TP-3224 – 4 circuit terminal strip to be used with Diagram “C”.

Figure 2.2 • Field Wiring Diagram "A"

A. Premium User Interface



NOTE: SHIELD GROUND MUST BE TIED TO GROUND, AS SHOWN

Figure 2.3 • Field Wiring Diagram "B"

B. 10k OHM Potentiometer

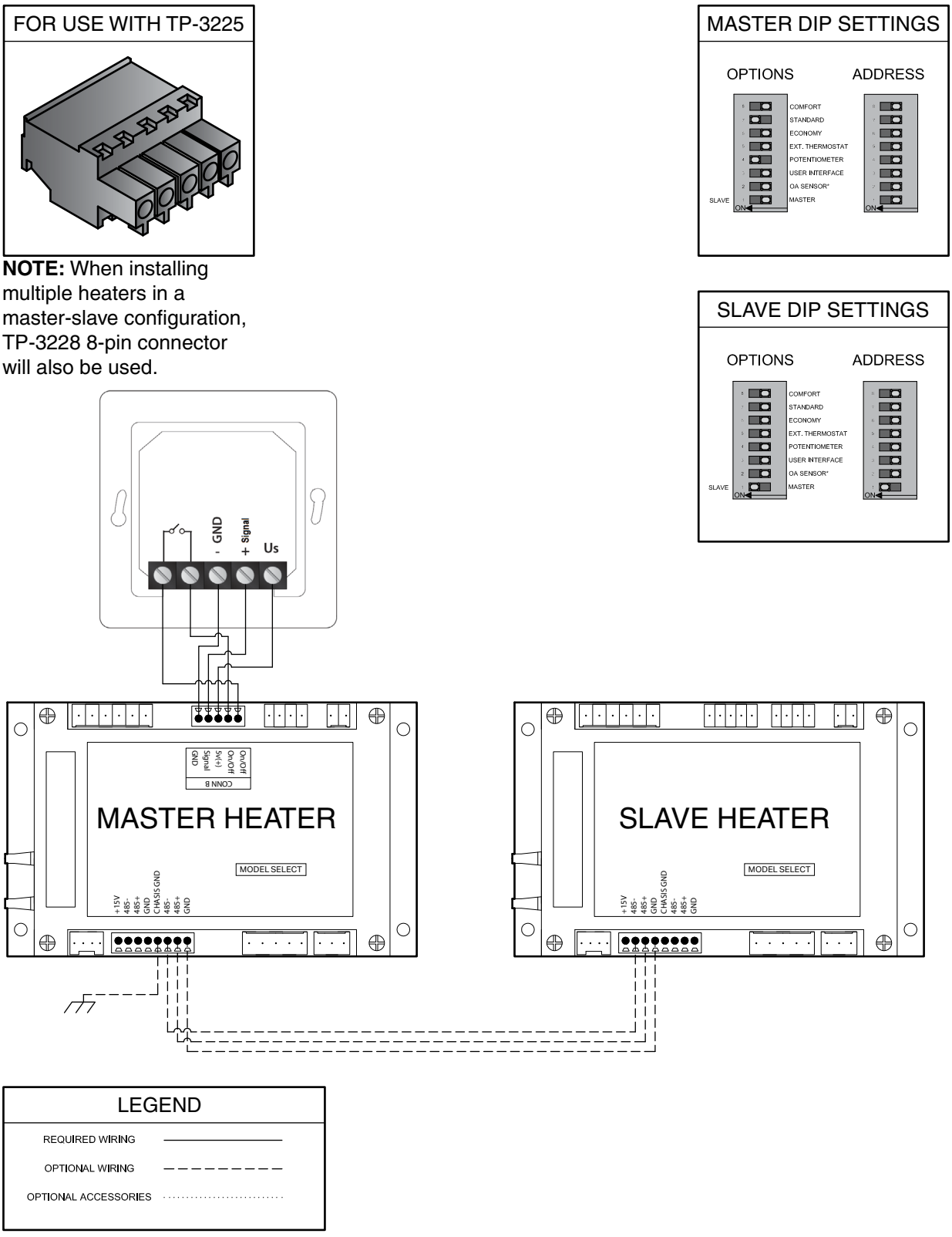
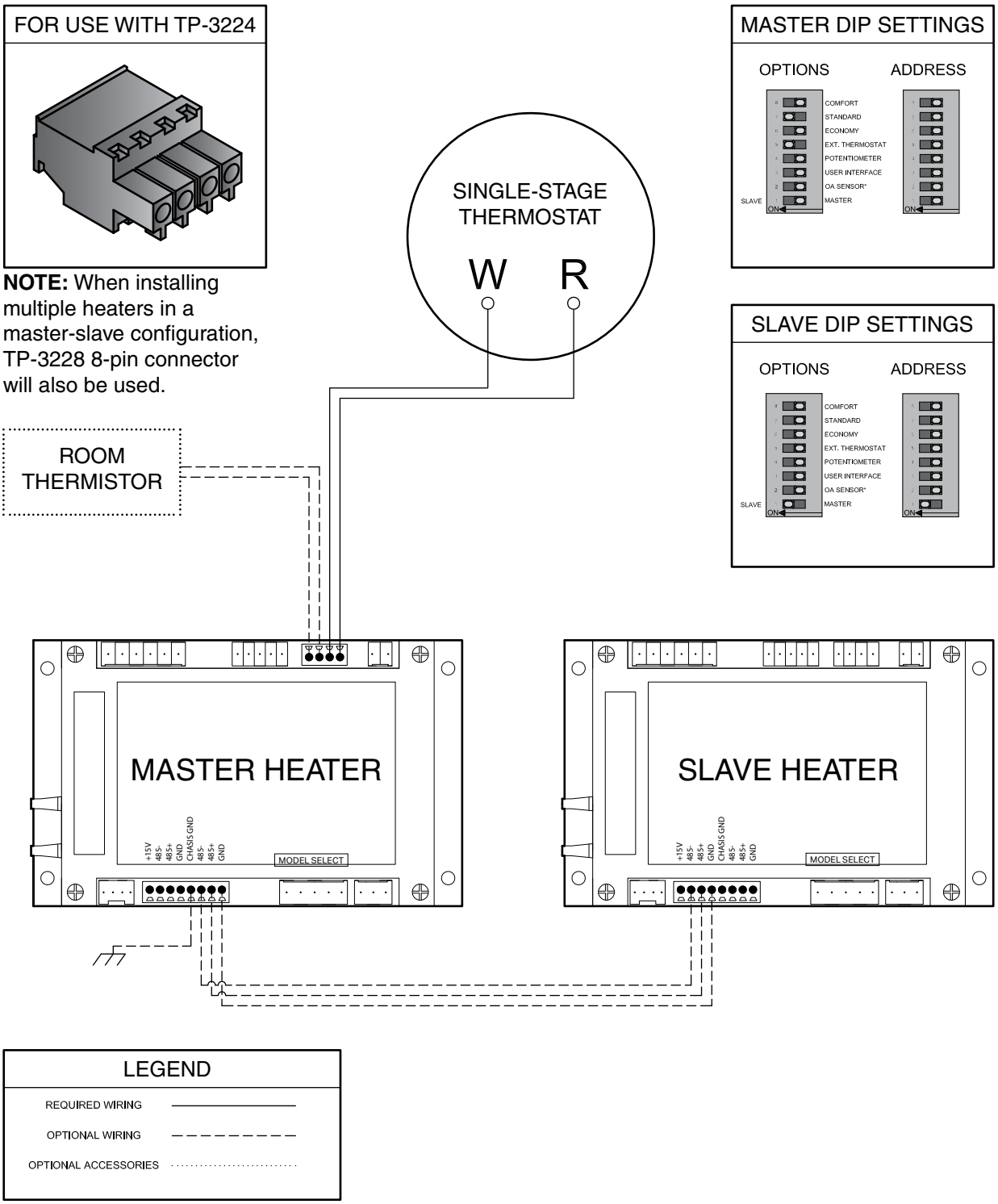


Figure 2.4 • Field Wiring Diagram "C"

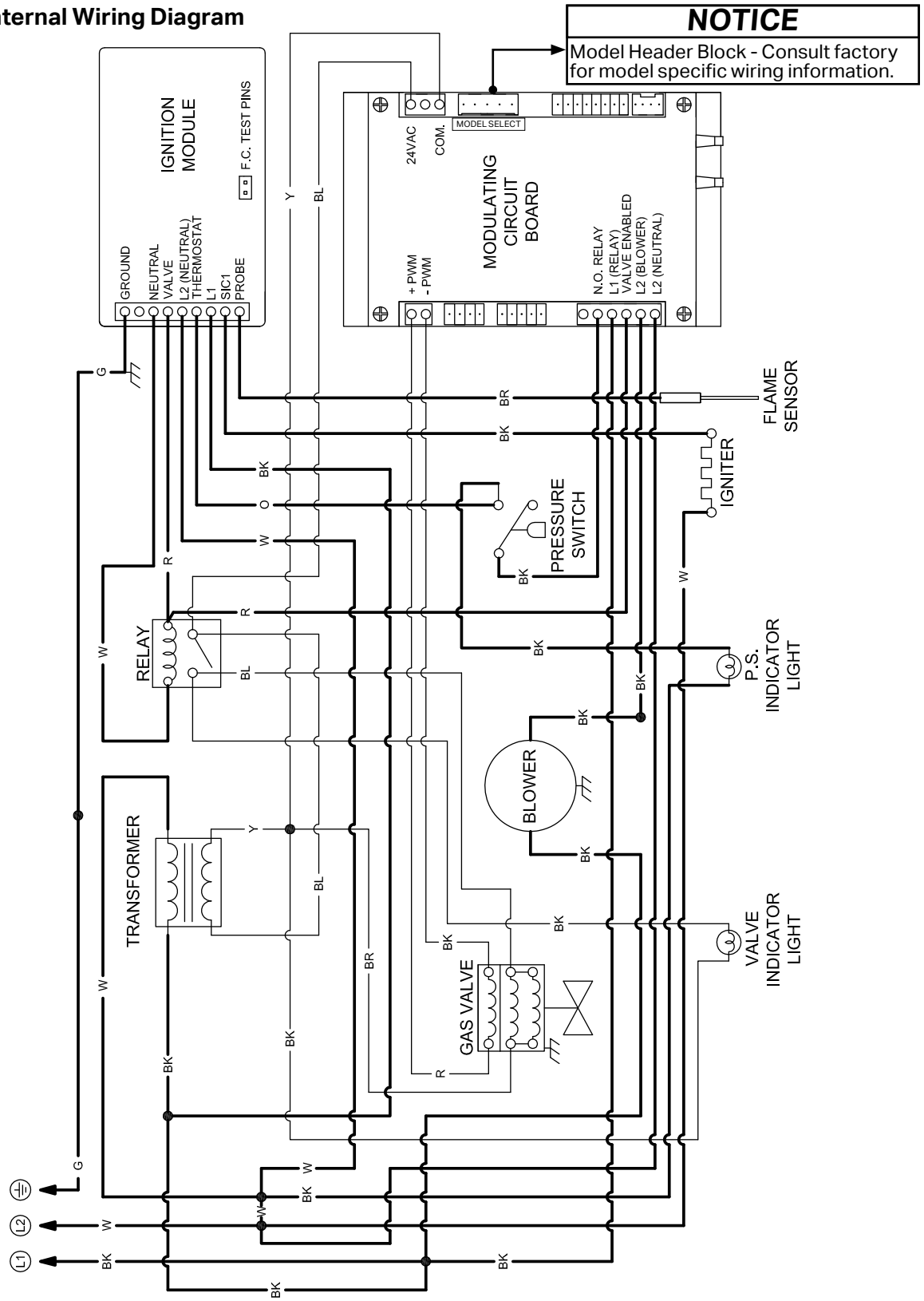
C. Single-stage thermostat



Internal Wiring Diagram

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 rating of at least 600 V, 105°C.

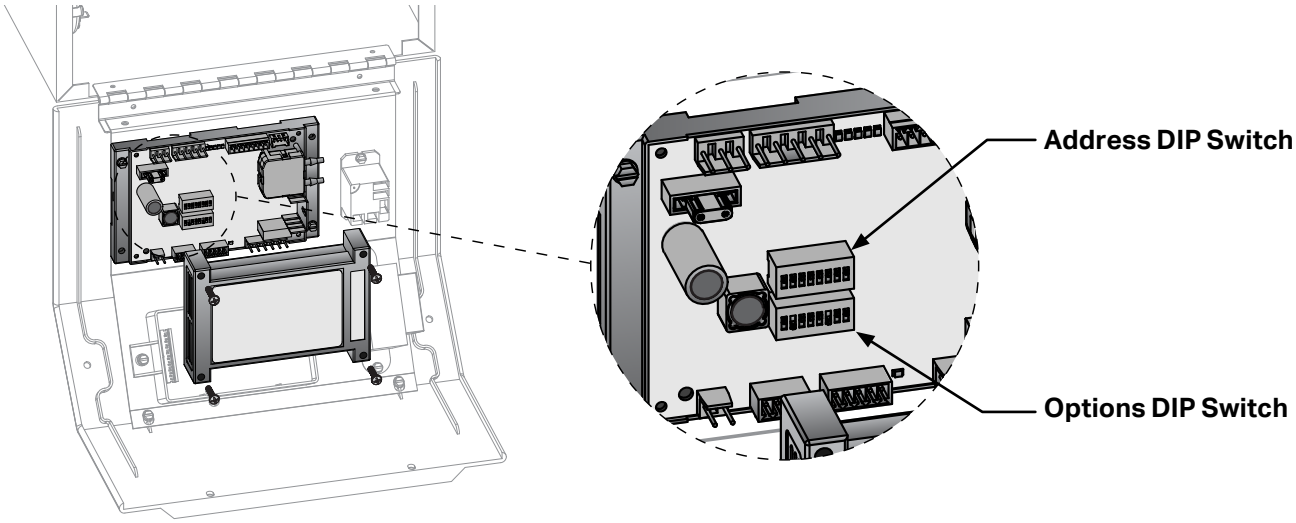
Figure 2.5 • Internal Wiring Diagram



Configuring the Heater

The MP series heater utilizes DIP switches on the modulating controller to configure various options available. The DIP switches are located under the modulating circuit board cover (See Figure 2.6), and are labeled “Options” and “Address”. These switches have to be configured correctly in order for the unit to properly function.

Figure 2.6 • Projected View of DIP Switches



‘Options’ DIP Switches

❶ **‘Master/Slave’:** This switch determines if the heater is a ‘Master’ or ‘Slave’.

- **‘Master’ Option:** Selected if heater is stand-alone or ‘Master’ of a zoned system.
- **‘Slave’ Option:** Selected if heater is a ‘Slave’ in a zoned system and is connected to a ‘Master’.

❷ **Outdoor Air Probe:** This switch determines if an outdoor air sensing probe is installed (sold separately, must be used in conjunction with a Premium User Interface).

❸ **Premium User Interface:** This switch determines if a Premium User Interface (TH-PUI) is used as a heat demand control device. (Use Field Wiring Diagram A - Figure 2.2).

❹ **Potentiometer:** This switch determines if a linear taper 10K Ohm potentiometer is used as a heat demand control device. (Use Field Wiring Diagram B - Figure 2.3).

❺ **Thermostat:** This switch determines if a single stage thermostat is used as a heat demand control device (Use Field Wiring Diagram C - Figure 2.4).

❻ **Economy Mode*:** This switch determines if ‘Economy Mode’ is the desired mode of operation.

❼ **Standard Mode*:** This switch determines if ‘Standard Mode’ is the desired mode of operation.

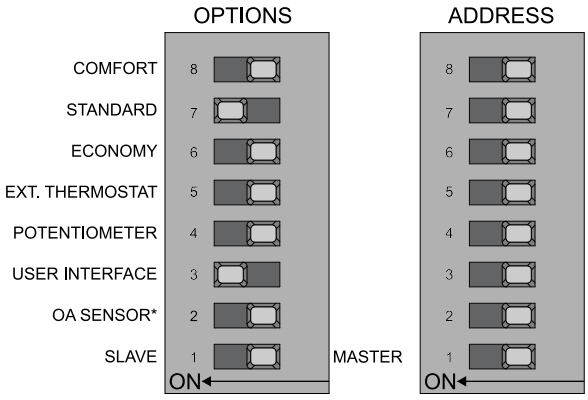
❽ **Comfort Mode*:** This switch determines if ‘Comfort Mode’ is the desired mode of operation.

*If Premium User Interface is connected, the mode selection switches are inoperative. Modes are selected from the controller. For more information on the modes, see Page 19.

Standard Configuration: From the factory, the heater is configured as follows:

1. 'Master' or 'Slave' Selector: **MASTER**
2. Outdoor Air Probe: **OFF**
3. Premium User Interface: **ON**
4. Potentiometer: **OFF**
5. Thermostat: **OFF**
6. Economy Mode: **OFF**
7. Standard Mode: **ON**
8. Comfort Mode: **OFF**

Figure 2.7 • Standard Configuration of DIP Switches



* If outdoor air sensor is equipped, switch DIP#2 to the ON position. Use Diagram "A" on Page 8 for connecting the Premium User Interface to the heater.

'Address' DIP Switches

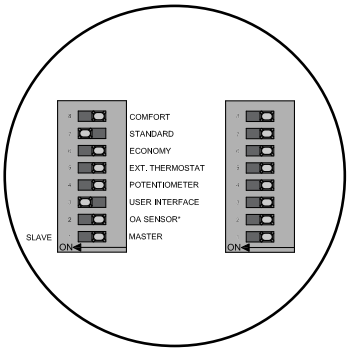
The Address DIP Switches are only utilized in a 'Master/Slave' installation or for BMS configurations. All other configurations ignore the settings of these switches. When addressing a heater for a 'Master/Slave' configuration, the 'Slave' heaters must be addressed for proper operation. Each 'Slave' must have its own unique configuration, determined by the installer. Up to 256 unique combinations can be configured.

Setting the 'Slave' Heater(s): The 'Slave' heater configuration is set by selecting the 'Slave' position on switch #1 in the "Options" DIP Switches. The address switches become active when the 'Slave' configuration is selected. On the Address DIP Switches, configure each heater so that each heater has its own unique configuration. An example is provided below for a three heater zone system.

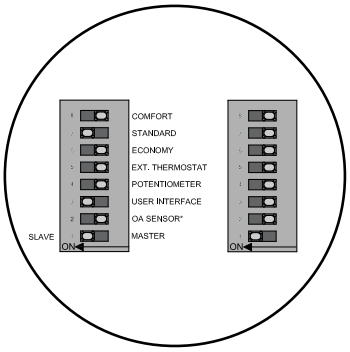
NOTICE
When choosing a configuration, the 'Slave' heater **must** be a non-zero number.

Figure 2.8 • Example of three DIP Switches

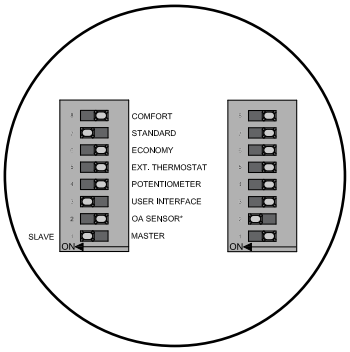
Master Heater
(Factory Default)



Slave Heater
(One Address Configuration)



Slave Heater
(Different Configuration)



Product Specifications

Chart 2.1 • Specifications

Model Number	Gas Type (Select one)	Blast Mode Rate (BTU/h Input)	Standard Modulating Range (BTU/h Input)	Straight Length	U-Tube Length	Min. Dist. From Burner to Elbow or U-bend	Standard Weight (lbs.)	Stainless Steel Weight (lbs.)	Recommended Mounting Height	Combustion Chamber (Black Coated)	Radiant Emitter Tube(s) (Black Coated)	36" Baffle Pieces
MP-25-80	N or P	85,000	52,000 - 80,000	26'-5"	**15'-3"	10 ft.	145	180	12' to 20'	Alum	Alum	5
MP-30-80	N or P	85,000	52,000 - 80,000	31'-5"	**17'-9"	10 ft.	160	195	12' to 20'	Alum	Alum	4
MP-30-115	N or P	120,000	75,000 - 115,000	31'-5"	**17'-9"	15 ft.	160	N/A	14' to 22'	Alum	Alum	5
MP-40-80	N or P	85,000	52,000 - 80,000	41'-1"	22'-9"	10 ft.	190	235	12' to 20'	Alum	Alum	3
MP-40-115	N or P	120,000	75,000 - 115,000	41'-1"	22'-9"	15 ft.	190	235	15' to 25'	Alum	Alum	4
MP-40-150	N or P	155,000	97,500 - 150,000	41'-1"	22'-9"	20 ft.	190	235	15' to 28'	Titan	Alum	5
MP-50-115	N or P	120,000	75,000 - 115,000	50'-9"	**27'-5"	15 ft.	235	290	15' to 28'	Alum	Alum	3
MP-50-150	N or P	155,000	97,500 - 150,000	50'-9"	**27'-5"	20 ft.	235	290	17' to 30'	Titan	Alum	4
MP-50-200	N or P	200,000	130,000 - 194,000	50'-9"	**27'-5"	25 ft.	235	N/A	19' to 37'	Titan	Alum	2
MP-60-150	N or P	155,000	97,500 - 150,000	60'-5"	32'-5"	20 ft.	265	330	17' to 32'	Titan	Alum	3
MP-60-200	N or P	200,000	130,000 - 194,000	60'-5"	32'-5"	25 ft.	265	330	19' to 37'	Titan	Alum	1
MP-70-200	N or P	200,000	130,000 - 194,000	70'-1"	**37'-3"	25 ft.	300	N/A	19' to 42'	Titan	Alum	1

* 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).

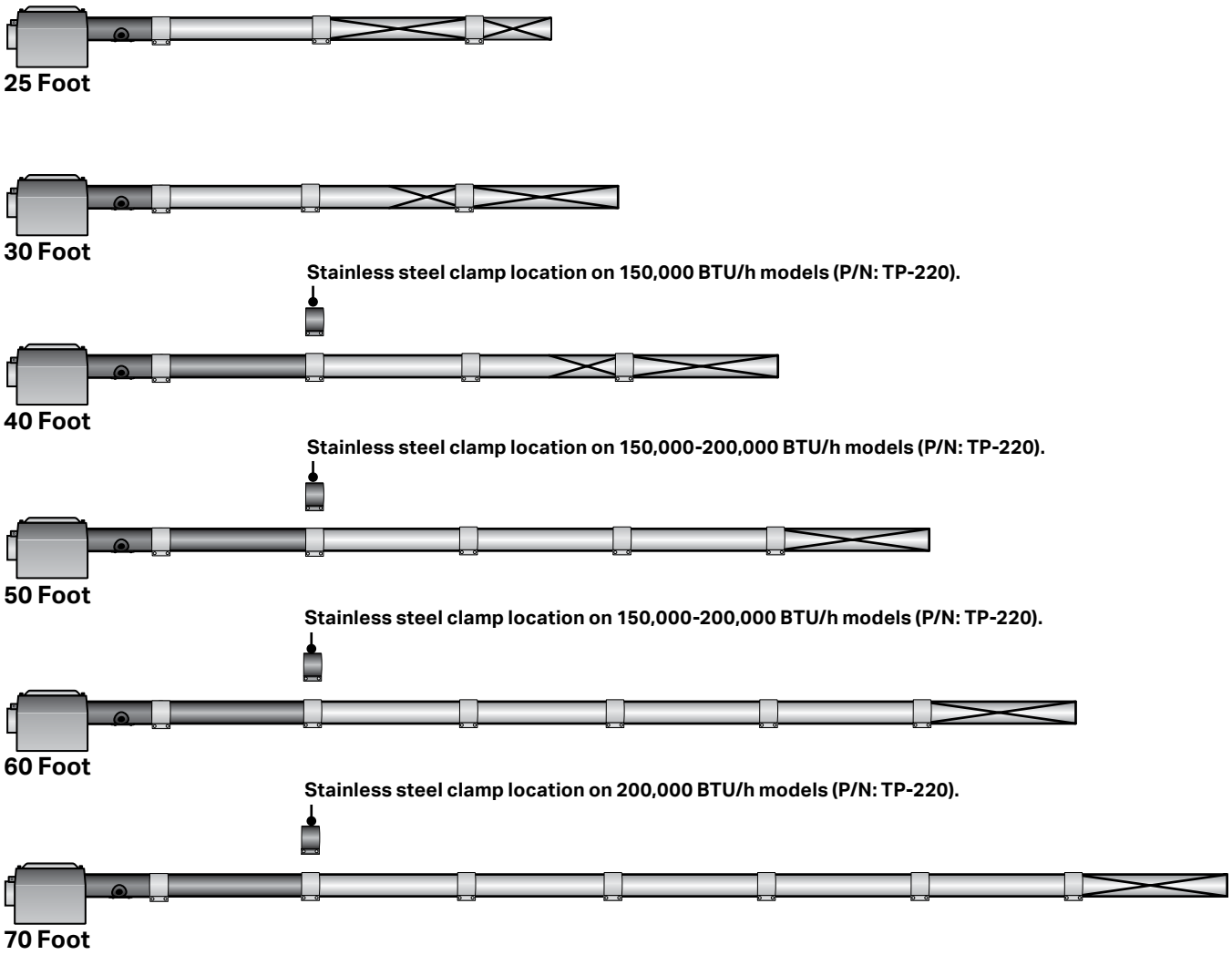
IMPORTANT: Reference box label to determine the number of required baffle sections for each model heater.

Titan = Black coated titanium stabilized aluminized steel.
Alum = Black coated aluminized treated steel.

Tube Installation Sequence

Figure 2.9 • Tube Installation Sequence

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



Key

- Burner Control Box with 16-inch Burner Tube
- Black Coated Combustion Chamber Tube* P/N: TP-26A, TP-26B
- Black Coated Aluminized Combustion Chamber/Radiant Emitter Tube P/N: TP-26A
- Standard Tube Clamp P/N: TP-21B
- Stainless Steel Tube Clamp (P/N: TP-220) *150,000-200,000 BTU/h models only. Located between 1st and 2nd 10 ft. tube sections.*
- **Baffle Location**

***** Aluminized tubes (80,000 to 115,000 BTU/h models) P/N: TP-26A.
* Titan tubes (150,000 to 200,000 BTU/h models) P/N: TP-26B.

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

There are two (2) main controllers for the MP series heater. The TP-351A is the ignition controller, and is responsible for the ignition sequence, flame monitoring, and safety lock-out features. The TP-3250 is the modulating controller, and is responsible for the call for heat, modulating the gas valve and blower speed, selecting the performance curve or mode, and handles various passive inputs and outputs for controlling devices. These two devices will be referred to as their TP-#'s during the sequence of operation.

Standby:

TP-351A - 120 VAC is held at the circuit of the circuit board.
TP-3250 - 24 VAC and 120 VAC is held at the circuit board.

Starting Circuit:

The TP-3250 checks various inputs to select the performance curve, model, and appropriate mode of operation. After successful determination of all internal checks, the TP-3250 will output the conditioned 120 VAC to the blower motor and 120 VAC to the common side of the pressure switch.

Once operational static pressure is achieved, the differential switch will close, sending the 120 VAC to the TP-351A and the PS indicator light, initiating the ignition sequence. The glo-bar is energized with 120 VAC for 45 seconds from the TP-351A. Once the time is achieved, the TP-351A switches on the 120 VAC for the valve circuit and switches off the power to the glo-bar. The 120 VAC from the TP-351A valve circuit is used to power the coil side of the isolation relay and sends power to the TP-3250 to indicate the start of the ignition sequence. The isolation relay switches 24 VAC from the transformer to the primary coil of the gas valve and valve indicator light.

Once the gas valve circuit is energized from the TP-351A, flame should be present on the burner and visible through the sight glass. The flame rod monitors the burner flame through flame rectification, and can be measured in micro-amps (this can be verified at the flame current test pins on the TP-351A). Minimum required micro-amps are 1.0 mA, and should be present during burner operation.

If the burner fails to light or flame is not detected within 8 seconds, the gas valve circuit is de-energized and the control performs an "inter-purge" delay before attempting another ignition sequence. The control will attempt 2 additional trials of ignition before entering the soft lock out sequence. In the soft lockout sequence, the gas valve will be turned off immediately. After 1 hour, if the thermostat is still calling for heat, the TP-351A will automatically reset and attempt a new trial for ignition. After multiple attempts to ignite the burner have failed, the TP-351A enters a hard lockout mode. The control will not open the gas valve unless there is an intervention by the user. The reset can be done by either resetting the thermostat or removing the 120 VAC for a period of 5 seconds.

Running Circuit:

After ignition, the flame rod continuously monitors the flame presence. If sense of flame is lost for a time of 1.0 seconds or greater, the TP-351A closes the gas valve circuit and a new trial for ignition sequence is initiated.

Modulating Circuit:

Pre-heat: During the ignition sequence, the TP-3250 operates the blower and gas valve at 100% operation to optimize ignition. Once ignition is established, the heater will enter a pre-heat cycle for 90 seconds, operating the blower motor and gas valve at 100%. However, if the heater has cycled in the previous 5 minutes, the controller will skip the pre-heat cycle, and go straight to modulating operation.

The blower motor and modulating coil on the gas valve are energized directly from the TP-3250 modulating controller. The controller utilizes PID logic to match the selected performance curve to the heater's operation. Based on the determined system configuration, the control will operate as needed to match the desired system performance.

Performance Curves

The MP series is programmed to operate on several different performance curves. These curves are to allow the user to select the desired operation that best accommodates their specific needs. The performance curves can be selected either by the Premium User Interface (TP-PUI) or by setting the DIP switches located under the control cover (Pages 14-15). The three modes are as follows:

- **Economy Mode:** Unit operates to maximize thermal efficiency.
- **Comfort Mode:** Unit operates to maximize perceived human comfort.
- **Standard Mode:** Unit operates as a balance between comfort and economy mode.

Economy Mode: Economy Mode is intended to maximize thermal efficiency. It is designed to provide a system that is more thermally efficient than the other modes due to quicker dissipation of heat. This mode is recommended for applications such as:

- Aircraft hangars
- Car washes
- Unpopulated warehouses
- Pole barns
- Foundries

Comfort Mode: Comfort Mode is designed to minimize temperature differentials across the length of the heater. It is intended to provide a system that has a greater perceived comfort than the other modes because of the reduction of extreme temperature zones. This mode is recommended for applications such as:

- Patios
- Loading docks
- Break areas and lunch rooms
- Kennels
- Parts counters and service desks
- Golf driving ranges
- Woodworking shops

Standard Mode: Standard Mode is a balance between Comfort Mode and Economy Mode. It is intended to provide a system that has moderate thermal efficiency while still minimizing the greater temperature differentials associated with economy mode. This mode is recommended for applications such as:

- Populated warehouse heating
- Service garages
- Fire Stations
- Manufacturing
- Auto showrooms

Shut-down:

When the thermostat is satisfied, the TP-3250 will de-energize the 120 VAC power to the common side of the pressure switch, de-energizing the thermostat circuit on the TP-351A. The blower motor will continue to cycle for a period of 2 minutes for a post-purge cycle.

NOTE: Due to the PID Controller optimizing the output of the heater, the unit may run for a short period after the call for heat has been satisfied.

For extended shut down periods:

1. Set external controller devices to off or lowest setting.
2. Turn OFF the 120 VAC to the heater.
3. Turn OFF the manual shut-off valve in the heater's gas supply line.
4. Prior to start up after seasonal extended shut-down, an inspection of the heater must be performed by trained gas installation and service personnel. This will help to ensure optimal operation and years of trouble-free service.

Diagnostics

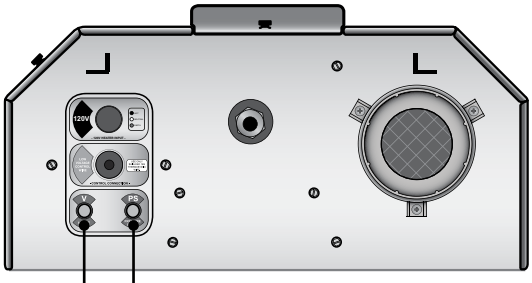
Lockout:

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 ignition, (gas pressure, valve, no flame sense, etc.), the heater will enter Soft Lockout mode for 15 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 mode. If lockout occurs, the control can be reset by briefly interrupting the power source. The control will not open the gas valve unless there is an interruption by the user.

Figure 3.1 • Operational Indicator Lights (see Charts 3.1 through 3.3 for Operation & Diagnostic LEDs)



Amber Light (24V)
Indicates Gas Valve Operation

Amber Light (120V)
Indicates Pressure Switch Actuation

Figure 3.2 • Circuit Board LEDs

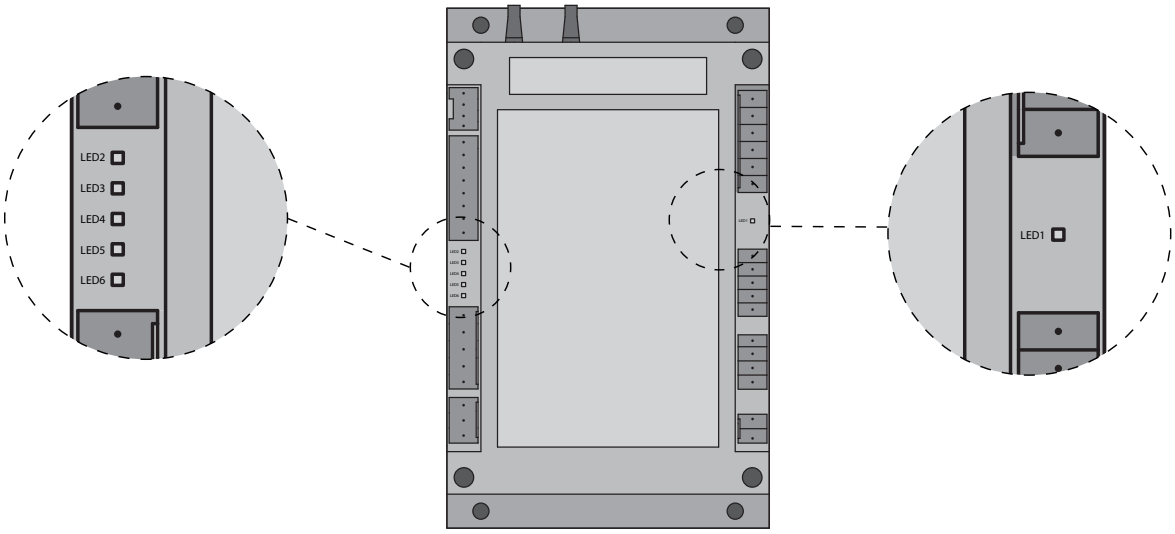


Chart 3.1 • Operation LED

LED	Color	Description	Operation
1	Green	Relay ON	On if relay ON to ignition module.

Chart 3.2 • Diagnostic LEDs

LED	Color	Description	Operation
2	Green	Power	On if power to unit.
3	Green	Heat	On if call for heat.
4	Green	Fan	On if fan energized.
5	Green	Valve	On if valve energized.
6	Red	Service	Errors (see Chart 3.3).

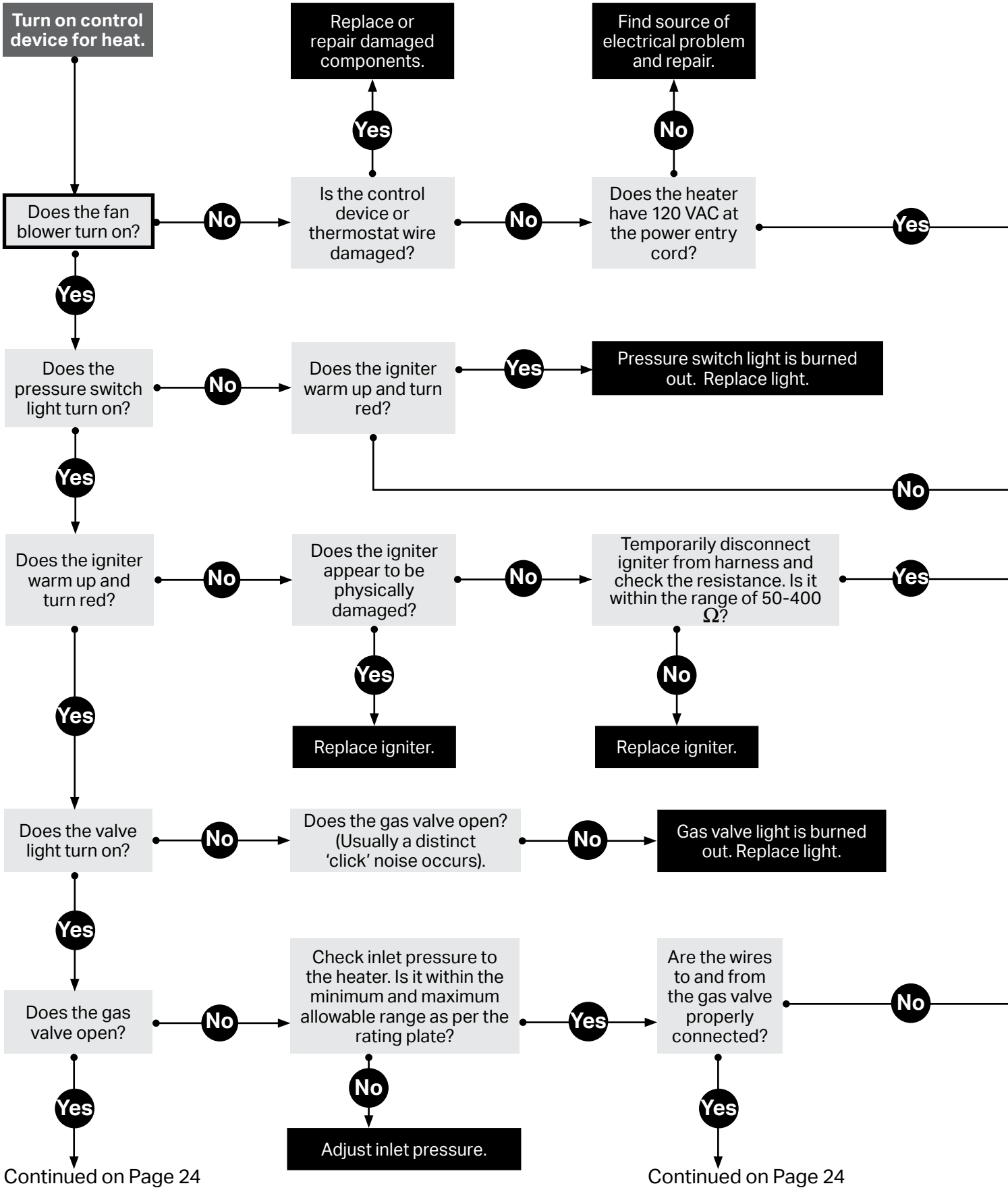
Chart 3.3 • Flash Code Status LED (located on Circuit Board)

Each of the following status codes is a two digit number with the first digit determined by the number of short flashes and the second digit by the number of long flashes.

LED Short Flash: 0.5 Seconds ON, 0.5 Seconds OFF.
LED Long Flash: 1.5 Seconds ON, 1.5 Seconds OFF.

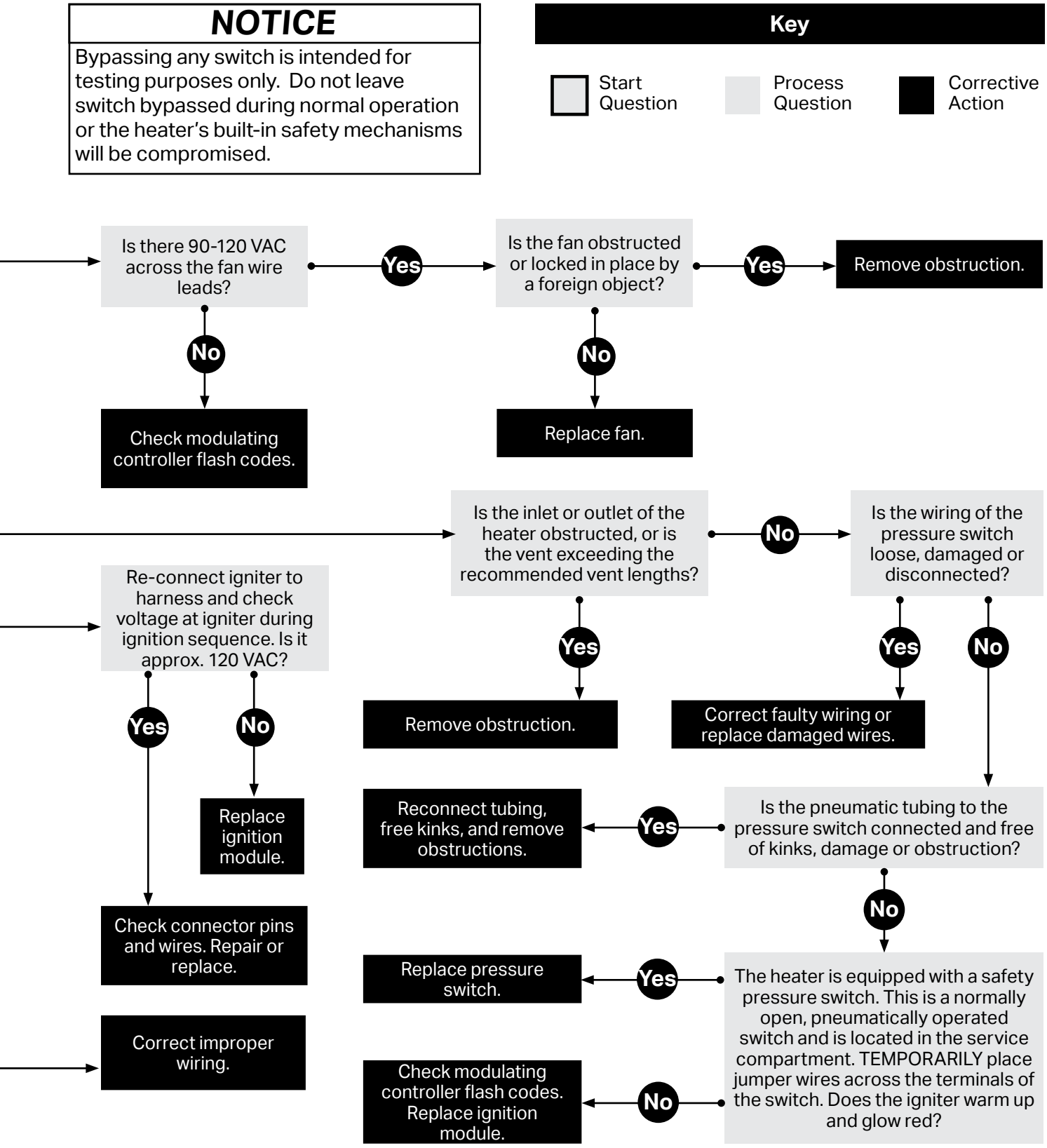
LED CODE (Number of Flashes)	STATUS / ERROR
1-1	**Long Run Time** - Actual temperature fails to rise after 4 hours of consecutive running.
1-2	**Blower** - Fan is on but static pressure is not reading properly.
1-3	**Ignition Module Failure** - Ignition module failed to initiate sequence of ignition.
1-4	**Ignition Soft Lockout** - Control will auto reset after 15 minutes. See lockout in diagnostics section.
2-1	**Ignition Hard Lockout** - Ignition module will NOT auto reset; unit will not operate unless there is an interruption by the user.
2-2	**Sensor Error** - External temperature sensor is shorted or reading open.
2-3	**Internal Software Error** - Failure with software on modulating controller.
2-4	**Model Selection or Setup Error** - Invalid model selection DIP Switch configuration
2-5	**Communication Error (PUI)** - Can't establish communication with PUI

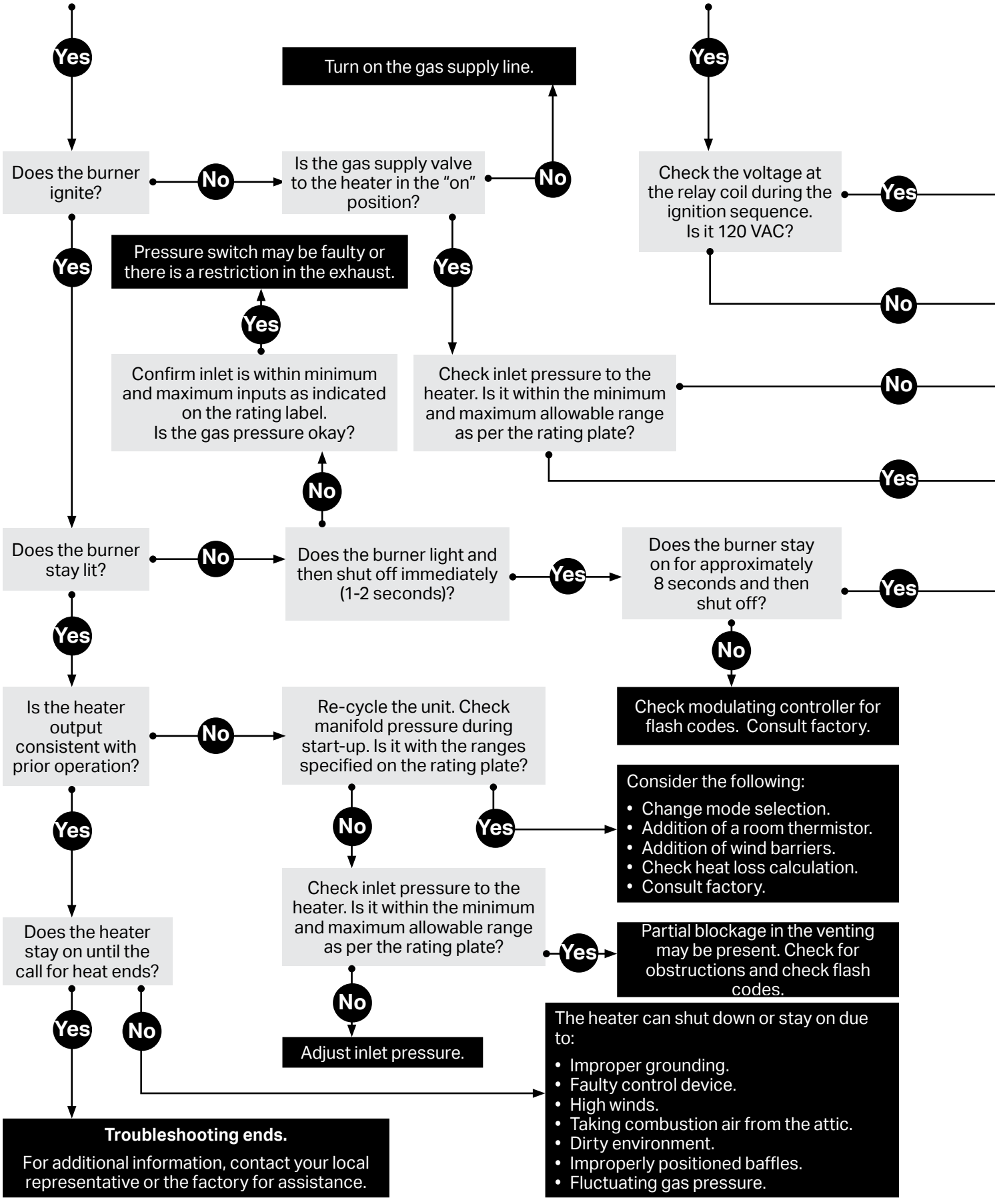
4.0 Troubleshooting Guide

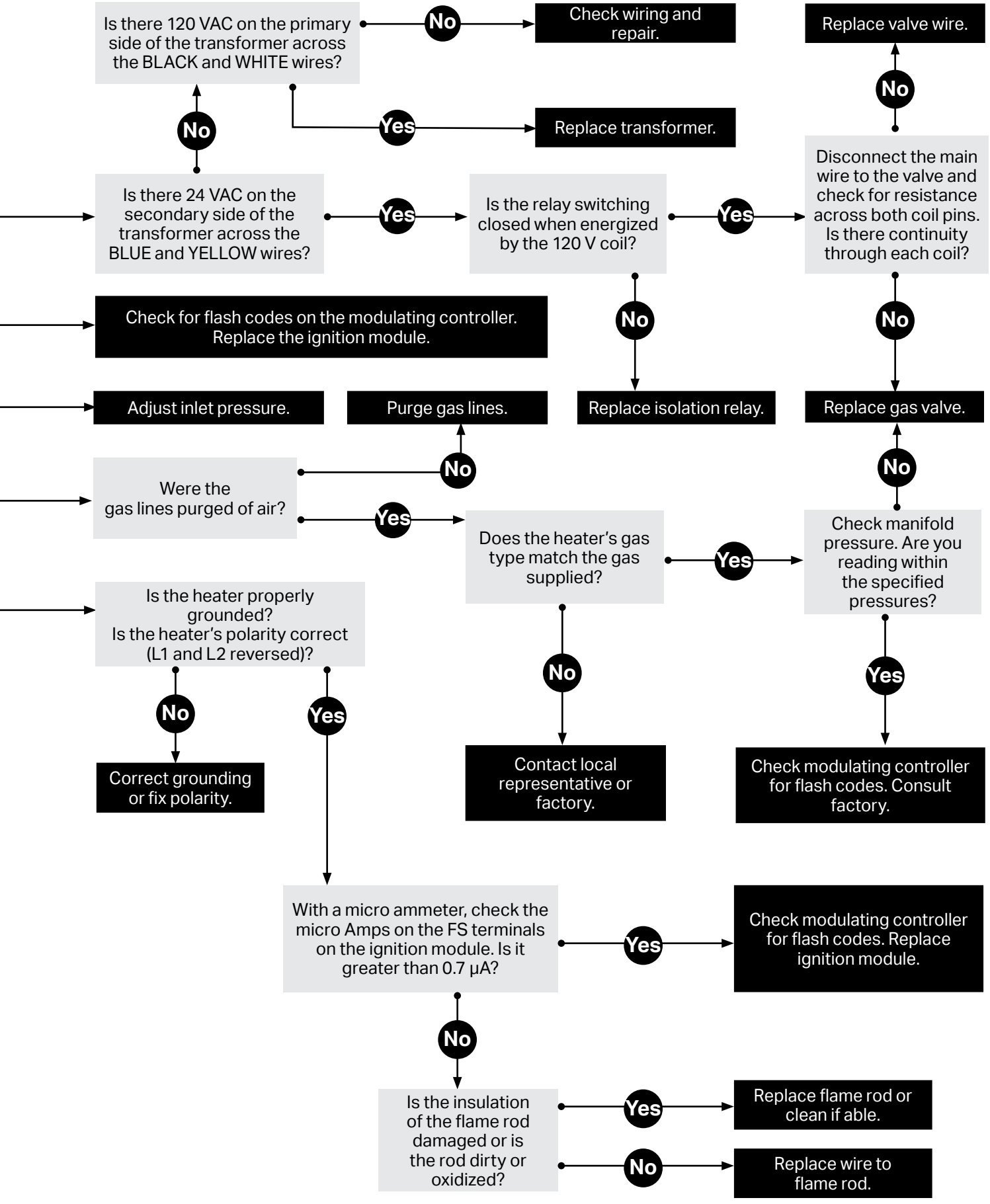


NOTICE

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 22
Yes
Does the burner ignite?
No
Is the gas supply valve to the heater in the "on" position?
No
Turn on the gas supply line.
Yes
Pressure switch may be faulty or there is a restriction in the exhaust.
Yes
Confirm inlet is within minimum and maximum inputs as indicated on the rating label. Is the gas pressure okay?
No
Yes
Check inlet pressure to the heater. Is it within the minimum and maximum allowable range as per the rating plate?
No
Yes
Does the burner stay lit?
No
Does the burner light and then shut off immediately (1-2 seconds)?
Yes
Does the burner stay on for approximately 8 seconds and then shut off?
Yes
No
Check modulating controller for flash codes. Consult factory.
Yes
Is the heater output consistent with prior operation?
No
Re-cycle the unit. Check manifold pressure during start-up. Is it with the ranges specified on the rating plate?
No
Yes
Consider the following:
• Change mode selection.
• Addition of a room thermistor.
• Addition of wind barriers.
• Check heat loss calculation.
• Consult factory.
Yes
Check inlet pressure to the heater. Is it within the minimum and maximum allowable range as per the rating plate?
Yes
Partial blockage in the venting may be present. Check for obstructions and check flash codes.
No
Adjust inlet pressure.
Yes
Does the heater stay on until the call for heat ends?
Yes
No
Troubleshooting ends.
For additional information, contact your local representative or the factory for assistance.
The heater can shut down or stay on due to:
• Improper grounding.
• Faulty control device.
• High winds.
• Taking combustion air from the attic.
• Dirty environment.
• Improperly positioned baffles.
• Fluctuating gas pressure.


Is there 120 VAC on the primary side of the transformer across the BLACK and WHITE wires?
No
Check wiring and repair.
Yes
Replace transformer.
No
Is there 24 VAC on the secondary side of the transformer across the BLUE and YELLOW wires?
Yes
Is the relay switching closed when energized by the 120 V coil?
Yes
Disconnect the main wire to the valve and check for resistance across both coil pins. Is there continuity through each coil?
No
Replace valve wire.
No
Check for flash codes on the modulating controller. Replace the ignition module.
No
Replace isolation relay.
No
Replace gas valve.
Adjust inlet pressure.
Purge gas lines.
No
Were the gas lines purged of air?
Yes
Does the heater's gas type match the gas supplied?
Yes
Check manifold pressure. Are you reading within the specified pressures?
No
Yes
Is the heater properly grounded? Is the heater's polarity correct (L1 and L2 reversed)?
No
Correct grounding or fix polarity.
Yes
No
Contact local representative or factory.
Yes
Check modulating controller for flash codes. Consult factory.
With a micro ammeter, check the micro Amps on the FS terminals on the ignition module. Is it greater than 0.7 µA?
Yes
Check modulating controller for flash codes. Replace ignition module.
No
Is the insulation of the flame rod damaged or is the rod dirty or oxidized?
Yes
Replace flame rod or clean if able.
No
Replace wire to flame rod.

5.0 Parts

Figure 5.1 • Burner Assembly Components

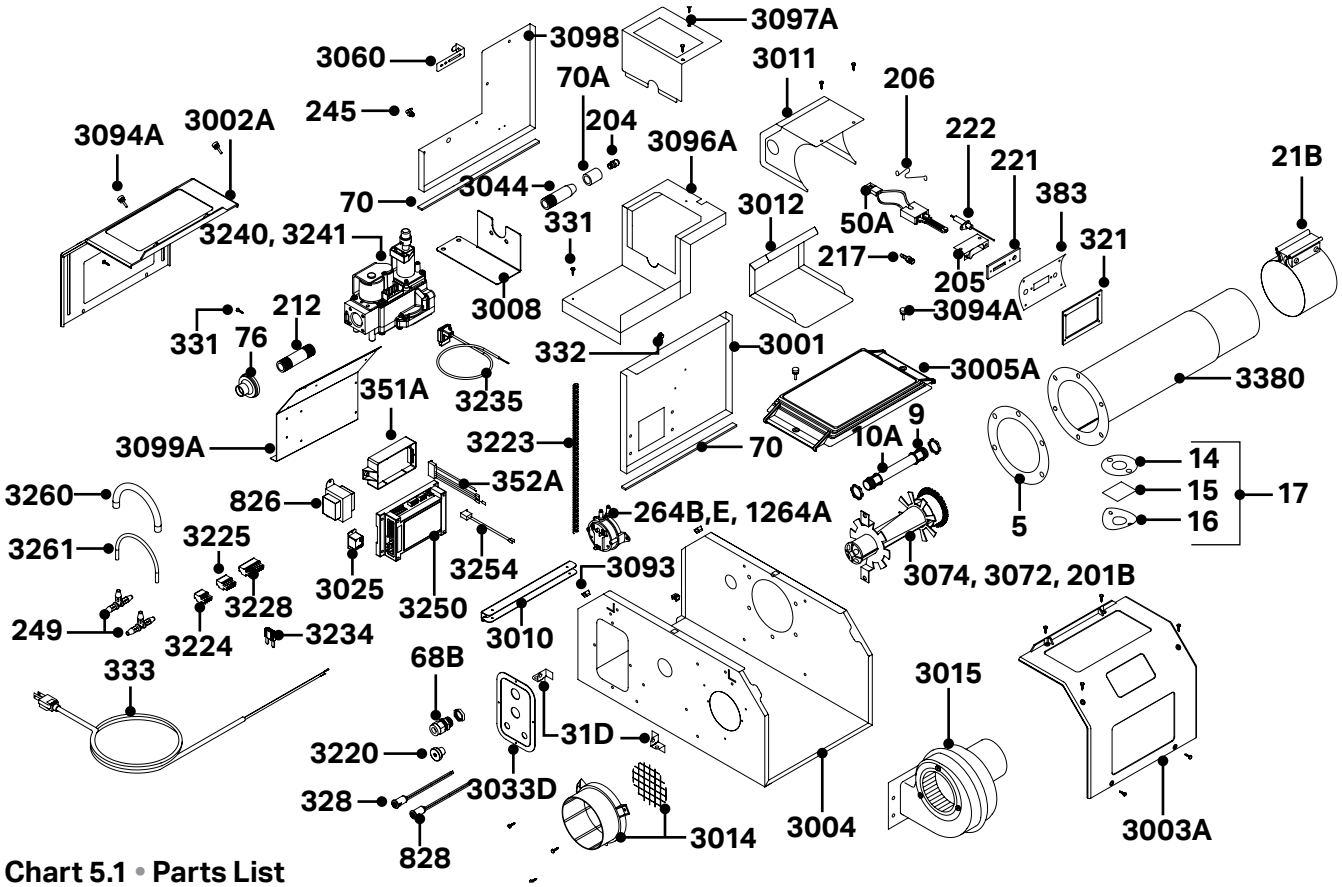
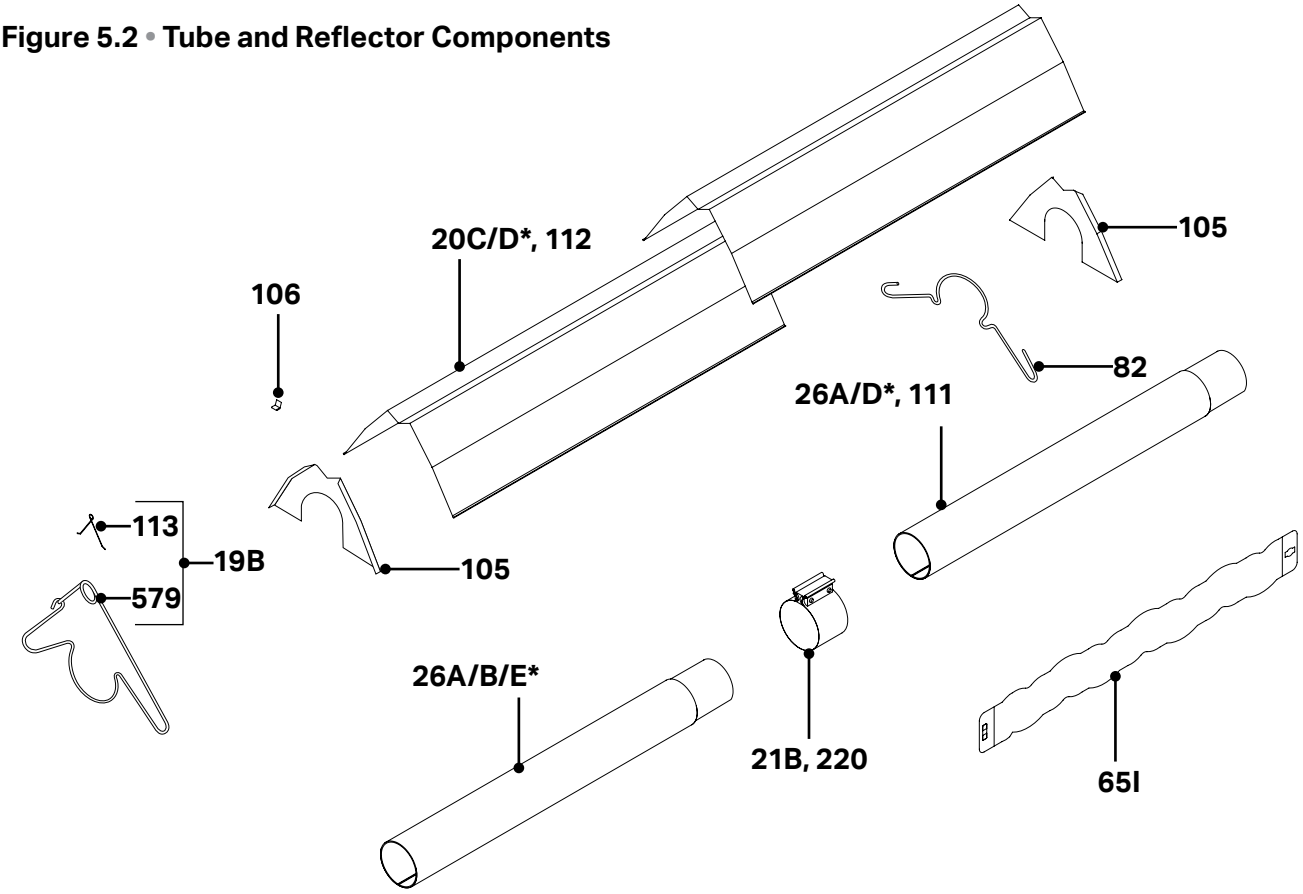


Chart 5.1 • Parts List

Part #	Description	Part #	Description
TP-5	Flange Gasket	TP-76	3/8" Rubber Grommet
TP-9	3/4" EMT Conduit Coupling	TP-82	Reflector Center Support (RCS)
TP-10A	3/4" x 4" EMT Conduit	TP-105	Aluminum Reflector End Cap
TP-14	Sight Glass Gasket	TP-106	Reflector End Cap Clips (8 pieces)
TP-15	Sight Glass	TP-111	5 ft. x 4" Black Coated Aluminized Steel Tube
TP-16	Sight Glass Washer	TP-112	5 ft. Polished Aluminum Reflector
TP-17	Sight Glass Kit	TP-113	Reflector Tension Spring
TP-19B	4" Wire Hanger w/ Tension Spring	TP-201B	High BTU Burner (Color Code - TAN)
TP-20C	10 ft. Polished Aluminum Reflector	TP-204	Gas Orifice (Consult Factory)
TP-20D	10 ft. Stainless Steel Reflector	TP-205	Glo-Bar Holder
TP-21B	4" Standard Tube Clamp	TP-206	Glo-Bar Holder Spring Clip
TP-26A	10 ft. Aluminized Radiant / Combustion Tube	TP-212	1/2" N.P.T x 3" Pipe Nipple
TP-26B	10 ft. Titanium Stabilized Combustion Tube	TP-217	Brass 1/8" N.P.T. Barb Fitting
TP-26D	10 ft. 304 Stainless Steel Radiant Tube	TP-219	12" Pneumatic Tube for Pressure Switch
TP-26E	10 ft. 409 Stainless Steel Combustion Tube	TP-220*	Stainless Steel Tube Clamp
TP-31D	Interlocking Mounting Bracket (Qty. 2)	TP-221	Glo-Bar Holder Gasket
TP-50A	Glo-Bar Igniter	TP-222	Flame Rod
TP-65I	3 ft. Interlocking Turbulator Baffle	TP-245	Plastic 1/8" N.P.T. 90° Barb Fitting
TP-68B	1/2" Strain Relief Bushing	TP-249	3/16" Pneumatic Tee (Qty. 2)
TP-70	1/2" x 10" Control Box Gasket (Qty. 2)	TP-264B	Differential Pressure Switch
TP-70A	1" x 6" Manifold Gasket	TP-264E	Differential Pressure Switch

Figure 5.2 • Tube and Reflector Components



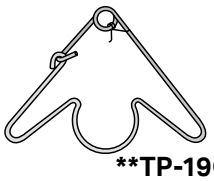
Part #	Description	Part #	Description
TP-328	120 V Amber Indicator Light	TP-3044	Gas Manifold
TP-331	Green Self-tap Ground Screw (Qty. 2)	TP-3060	Pressure Switch Mounting Bracket
TP-332	1/4" Divider Grommet	TP-3072	Low BTU Burner (Color Code - GREEN)
TP-333	6 ft. Black Power Cord w/ Ground	TP-3074	High BTU Burner (Color Code - ORANGE)
TP-351A	Potted Circuit Board - Ignition Controller	TP-3093	#8-32 Cage Nut (Qty. 4)
TP-352A	Wire Harness for Ignition Controller	TP-3094A	#8-32 X ½" Metal Thumb Screw
TP-383	Glo-Bar Igniter Plate	TP-3096A	Valve Compartment Bottom Panel
TP-579	4" Wire Hanger	TP-3097A	Valve Compartment Top Panel
TP-826	40 VA Transformer (120Primary / 24Secondary)	TP-3098	Valve Compartment Side Panel
TP-828	24 VAC Yellow Operational Indicator Light	TP-3099A	Controls Mounting Panel
TP-1018	20" Pneumatic Tube for Pressure Switch	TP-3220	Thermostat Wire Grommet
TP-1264A	Differential Pressure Switch	TP-3223	Anti-Kink Coil (Qty. 2)
TP-3001	Divider Panel	TP-3224	Thermostat Terminal Strip, 4 Circuit (C)
TP-3002A	Plastic End Panel, Control Compartment	TP-3225	Thermostat Terminal Strip, 5 Circuit (B)
TP-3003A	Plastic End Panel, Fan Compartment	TP-3228	Thermostat Terminal Strip, 8 Circuit (A)
TP-3004	Control Box	TP-3234	Mini Fuse for TP-3250 (3A)
TP-3005A	Plastic Valve Chamber Lid	TP-3235	Valve Coil Main Cord (24VRAC)
TP-3008	Gas Valve Mounting Bracket	TP-3240	Natural Gas Valve Assembly
TP-3010	Service Panel Hinge	TP-3241	Propane Gas Valve Assembly
TP-3011	Igniter Box	TP-3250	Circuit Board - Modulating Controller
TP-3012	Igniter Box Cover	TP-3254	Wire Harness for Modulating Controller
TP-3014	Plastic Air Orifice with Screen	TP-3260	4 1/2" Pneumatic Tube (Qty 3)
TP-3015	Fan Blower Assembly (PSC Motor)	TP-3261	10" Pneumatic Tube (Qty 2)
TP-3025	120 VAC Coil Relay	TP-3380	16" HSI Burner Tube w/ Flange and Fittings
TP-3033D	Power Entry Plate		

* 150,000-200,000 BTU/h models only.

Kit Contents

MP Series Kit Contents - Reference the length column for your model.

TP-19B 4" Hanger with Tension Spring

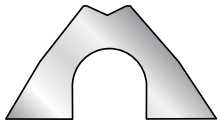


****TP-19C**

TP-82 4" Reflector Center Support (RCS)

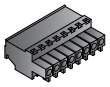
****TP-829**

TP-105 Reflector End Cap



****TP-105A**

TP-3228 Terminal Connector A



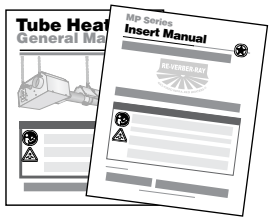
TP-3225 Terminal Connector B

TP-3224 Terminal Connector C

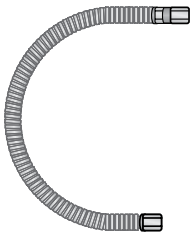
TP-106 Reflector End Cap Clips

TP-3220 Thermostat Wire Grommet

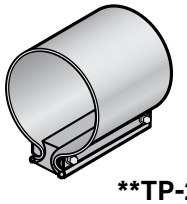
General Manual and MP Series Insert
F/N: LIOGT3 & LIOMP



FC-36
36" x 3/4"
Stainless Steel
Flexible Gas
Connector



TP-21B 4" Tube Clamp



****TP-220**

Part No.	Description	25 ft.	30 ft.	40 ft.	50 ft.	60 ft.	70 ft.
FC-36	36" x 3/4" S.S. Flexible Gas Connector	1	1	1	1	1	1
TP-19B	4" Hanger w/ Tension Spring	4	4	5	6	7	8
TP-21B	4" Tube Clamp	3	3	4	5*	6*	7*
TP-82	4" Reflector Center Support	2	3	4	5	6	7
TP-105	Reflector End Cap	2	2	2	2	2	2
TP-106	Reflector End Cap Clips	8	8	8	8	8	8
TP-3220	Thermostat Wire Grommet	1	1	1	1	1	1
TP-3224	Terminal Strip Connector 'C'	1	1	1	1	1	1
TP-3225	Terminal Strip Connector 'B'	1	1	1	1	1	1
TP-3228	Terminal Strip Connector 'A'	1	1	1	1	1	1
LIOGT3	V3 General Tube Heater Manual	1	1	1	1	1	1
LIOMP	MP Series Insert Manual	1	1	1	1	1	1
Filled By:							

* **NOTE:** One 4" stainless steel tube clamp (P/N: TP-220) is provided for each 150,000 - 200,000 BTU/h model. Place as shown on Page 17.

** Part number for models upgraded with stainless steel options.

Approvals

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

Limited Warranty

- 3 years - Burner box components
- 5 years - Combustion and radiant tubes
- 10 years - Stainless steel burner
- See Page 40 of the General Tube Heater Manual for terms and conditions.

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