HL2 Series
Insert Manual

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

The HL2 Series Infrared Tube Heater is a positive pressure, two-stage radiant heater system. This insert manual is a supplement to the Tube Heater General Manual and provides specific information related to the HL2 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.

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)
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NOTE: See page 10 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 instruction 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.

**Back Panel**
- F/N: LLAC
- Air Metering Orifice

**Top Panel**
- F/N: LLTB018 (Natural Gas)
- F/N: LLTB019 (Propane Gas)

**Bottom Panel**
- F/N: LLLOGO32

**Rating Plate**
- F/N: LLTCL001 Clearances to Combustibles Label

**Burner Control Box**
- Component Label (located under the top panel)

**F/N: LLLOGO32**

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**WARNING**

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

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

---

### CAUTION

Provide 24 Volts Only

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

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### NOTICE

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

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### 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 the heater.

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### Clearances to Combustibles

**WARNING**

Clearances 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)

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Mounting Angle*</th>
<th>Front</th>
<th>Behind</th>
<th>Top</th>
<th>Below</th>
</tr>
</thead>
<tbody>
<tr>
<td>HL2 (20, 30, 40) - (65, 75) [N, P]</td>
<td>0°</td>
<td>9</td>
<td>9</td>
<td>6</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>45°</td>
<td>39</td>
<td>8</td>
<td>10</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>with 1 side shield</td>
<td>0°</td>
<td>29</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>with 2 side shields</td>
<td>0°</td>
<td>9</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>20 ft. from burner</td>
<td>0°</td>
<td>7</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>HL2 (20, 30, 40) - (80, 96, 100) [N, P]</td>
<td>0°</td>
<td>14</td>
<td>14</td>
<td>6</td>
<td>66</td>
</tr>
<tr>
<td></td>
<td>45°</td>
<td>39</td>
<td>8</td>
<td>10</td>
<td>66</td>
</tr>
<tr>
<td></td>
<td>with 1 side shield</td>
<td>0°</td>
<td>29</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>with 2 side shields</td>
<td>0°</td>
<td>16</td>
<td>16</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>20 ft. from burner</td>
<td>0°</td>
<td>7</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>HL2 (30, 40, 50) - 125 [N, P]</td>
<td>0°</td>
<td>20</td>
<td>20</td>
<td>6</td>
<td>76</td>
</tr>
<tr>
<td></td>
<td>45°</td>
<td>58</td>
<td>8</td>
<td>10</td>
<td>76</td>
</tr>
<tr>
<td></td>
<td>with 1 side shield</td>
<td>0°</td>
<td>42</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>with 2 side shields</td>
<td>0°</td>
<td>20</td>
<td>20</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>20 ft. from burner</td>
<td>0°</td>
<td>7</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>HL2 (40, 50, 60) - 150 [N, P]</td>
<td>0°</td>
<td>24</td>
<td>24</td>
<td>6</td>
<td>81</td>
</tr>
<tr>
<td></td>
<td>45°</td>
<td>58</td>
<td>8</td>
<td>10</td>
<td>81</td>
</tr>
<tr>
<td></td>
<td>with 1 side shield</td>
<td>0°</td>
<td>42</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>with 2 side shields</td>
<td>0°</td>
<td>23</td>
<td>23</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>20 ft. from burner</td>
<td>0°</td>
<td>11</td>
<td>11</td>
<td>6</td>
</tr>
<tr>
<td>HL2 (40, 50, 60, 70) - 175 [N, P]</td>
<td>0°</td>
<td>34</td>
<td>34</td>
<td>6</td>
<td>92</td>
</tr>
<tr>
<td></td>
<td>45°</td>
<td>63</td>
<td>8</td>
<td>10</td>
<td>92</td>
</tr>
<tr>
<td></td>
<td>with 1 side shield</td>
<td>0°</td>
<td>50</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>with 2 side shields</td>
<td>0°</td>
<td>30</td>
<td>30</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>20 ft. from burner</td>
<td>0°</td>
<td>11</td>
<td>11</td>
<td>6</td>
</tr>
<tr>
<td>HL2 (50, 60, 70) - 200 [N, P]</td>
<td>0°</td>
<td>41</td>
<td>41</td>
<td>6</td>
<td>94</td>
</tr>
<tr>
<td></td>
<td>45°</td>
<td>63</td>
<td>8</td>
<td>10</td>
<td>94</td>
</tr>
<tr>
<td></td>
<td>with 1 side shield</td>
<td>0°</td>
<td>54</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>with 2 side shields</td>
<td>0°</td>
<td>30</td>
<td>30</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>20 ft. from burner</td>
<td>0°</td>
<td>11</td>
<td>11</td>
<td>6</td>
</tr>
</tbody>
</table>

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

The stated clearances to combustibles represent 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.

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

<table>
<thead>
<tr>
<th>Type of Gas</th>
<th>Required Manifold Pressure</th>
<th>Minimum Inlet Pressure</th>
<th>Maximum Inlet Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural</td>
<td>3.5 Inches W.C.</td>
<td>5.0 Inches W.C.</td>
<td>14.0 Inches W.C.</td>
</tr>
<tr>
<td>Propane</td>
<td>10.0 Inches W.C.</td>
<td>11.0 Inches W.C.</td>
<td>14.0 Inches W.C.</td>
</tr>
</tbody>
</table>

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

### Electrical Requirements

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

**NOTICE**

Connecting the thermostat with a voltage other than 24 V may damage the heater. The HL2 series requires a 24 V connection to the thermostat. This is either supplied by the heater internally (standard) or by an external transformer (with optional relay board, P/N: HLRB). See Figure 2.1.
### Wiring

**WARNING**

**Electric Shock**

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

**Figure 2.1 • Field Wiring Diagrams**

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

- **NOTE:** If optional yellow control cord is installed, the following colors apply:
  - **24VAC:** Green
  - **Low:** White
  - **High:** Black

![Wiring Diagram](image)

- **NOTE:** If optional black power cord is installed, then:
  - **L1** is brown or black
  - **Neutral** is blue or white.

- **Additional wire needed on thermostats requiring constant power.**

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

- **NOTE:** If optional yellow control cord is installed, then the following wire colors apply:
  - **Neutral** = Green
  - **Low** = White
  - **High** = Black

![Wiring Diagram](image)
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 2.2 • Internal Wiring Diagrams
A. Micro 60U-24 Ladder Diagram

B. Micro 60U-24 Block Diagram
Figure 2.3 • Alternative Wiring Diagrams

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

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

**Chart 2.1 - Specifications**

| Model     | Gas Type | BTU/H (High Fire) | BTU/H (Low Fire) | Straight Length | U-Tube Length | Standard Weight (lbs.) | Stainless Steel Weight (lbs.) | Recommended Mounting Height | Combustion Chamber (Black Coated) | Radiant Emitter Tube(s) (Black Coated) | Radiant Surface Area (sq. ft.) | 36" Baffle Sections |
|-----------|----------|-------------------|------------------|----------------|---------------|------------------------|-------------------------------|-----------------------------|---------------------------------|----------------------------------|--------------------------------------|---------------------------|----------------------|
| HL2-20-65 | N or LP  | 65,000            | 50,000           | 21'-7"        | 13'-0"        | 120                    | N/A                          | 9' to 14'                  | Alum                            | Alum                              | 20.2                             | 5                        |
| HL2-20-75 | N or LP  | 75,000            | 50,000           | 21'-7"        | 13'-0"        | 120                    | 145                          | 10' to 15'                 | Alum                            | Alum                              | 20.2                             | 5                        |
| HL2-20-80 | N or LP  | 80,000            | 52,000           | 21'-7"        | 13'-0"        | 120                    | N/A                          | 10' to 15'                 | Alum                            | Alum                              | 20.2                             | 5                        |
| HL2-20-96 | N or LP  | 96,000            | 65,000           | 21'-7"        | 13'-0"        | 120                    | N/A                          | 11' to 18'                 | Alum                            | Alum                              | 20.2                             | 5                        |
| HL2-30-65 | N or LP  | 65,000            | 50,000           | 31'-3"        | **17'-8"      | 160                    | N/A                          | 10' to 15'                 | Alum                            | Alum                              | 30.4                             | 4                        |
| HL2-30-75 | N or LP  | 75,000            | 50,000           | 31'-3"        | **17'-8"      | 160                    | 195                          | 11' to 18'                 | Alum                            | Alum                              | 30.4                             | 4                        |
| HL2-30-80 | N or LP  | 80,000            | 52,000           | 31'-3"        | **17'-8"      | 160                    | 195                          | 11' to 18'                 | Alum                            | Alum                              | 30.4                             | 5                        |
| HL2-30-100| N or LP  | 100,000           | 65,000           | 31'-3"        | **17'-8"      | 160                    | 195                          | 12' to 20'                 | Alum                            | Alum                              | 30.4                             | 5                        |
| HL2-30-125| N or LP  | 125,000           | 82,000           | 31'-3"        | **17'-8"      | 160                    | N/A                          | 13' to 23'                 | Alum                            | Alum                              | 30.4                             | 5                        |
| HL2-40-65 | N or LP  | 65,000            | 50,000           | 40'-11"       | 22'-8"        | 190                    | N/A                          | 11' to 18'                 | Alum                            | Alum                              | 40.5                             | 2                        |
| HL2-40-75 | N or LP  | 75,000            | 50,000           | 40'-11"       | 22'-8"        | 190                    | 235                          | 11' to 18'                 | Alum                            | Alum                              | 40.5                             | 2                        |
| HL2-40-80 | N or LP  | 80,000            | 52,000           | 40'-11"       | 22'-8"        | 190                    | 235                          | 11' to 18'                 | Alum                            | Alum                              | 40.5                             | 5                        |
| HL2-40-100| N or LP  | 100,000           | 65,000           | 40'-11"       | 22'-8"        | 190                    | 235                          | 12' to 20'                 | Alum                            | Alum                              | 40.5                             | 4                        |
| HL2-40-125| N or LP  | 125,000           | 82,000           | 40'-11"       | 22'-8"        | 190                    | 235                          | 13' to 23'                 | Alum                            | Alum                              | 40.5                             | 4                        |
| HL2-40-150| N or LP  | *150,000          | 100,000          | 40'-11"       | 22'-8"        | 190                    | 235                          | 14' to 25'                 | Titan                            | Alum                              | 40.5                             | 4                        |
| HL2-40-175| N or LP  | *175,000          | 125,000          | 40'-11"       | 22'-8"        | 190                    | N/A                          | 15' to 27'                 | Titan                            | Alum                              | 40.5                             | 4                        |
| HL2-50-125| N or LP  | 125,000           | 82,000           | 50'-7"        | **27'-4"      | 235                    | 290                          | 15' to 27'                 | Alum                            | Alum                              | 50.6                             | 4                        |
| HL2-50-150| N or LP  | *150,000          | 100,000          | 50'-7"        | **27'-4"      | 235                    | 290                          | 15' to 27'                 | Titan                            | Alum                              | 50.6                             | 4                        |
| HL2-50-175| N or LP  | *175,000          | 125,000          | 50'-7"        | **27'-4"      | 235                    | N/A                          | 16' to 30'                 | Titan                            | Alum                              | 50.6                             | 2                        |
| HL2-50-200| N or LP  | *200,000          | 145,000          | 50'-7"        | **27'-4"      | 235                    | N/A                          | 17' to 35'                 | Titan                            | Alum                              | 50.6                             | 2                        |
| HL2-60-150| N or LP  | *150,000          | 100,000          | 60'-3"        | **32'-4"      | 265                    | 330                          | 16' to 30'                 | Titan                            | Alum                              | 60.7                             | 2                        |
| HL2-60-175| N or LP  | *175,000          | 125,000          | 60'-3"        | **32'-4"      | 265                    | N/A                          | 16' to 30'                 | Titan                            | Alum                              | 60.7                             | 2                        |
| HL2-60-200| N or LP  | *200,000          | 145,000          | 60'-3"        | **32'-4"      | 265                    | N/A                          | 17' to 35'                 | Titan                            | Alum                              | 60.7                             | 2                        |
| HL2-70-175| N or LP  | *175,000          | 125,000          | 69'-11"       | **37'-2"      | 300                    | N/A                          | 19' to 42'                 | Titan                            | Alum                              | 70.9                             | 2                        |
| HL2-70-200| N or LP  | *200,000          | 145,000          | 69'-11"       | **37'-2"      | 300                    | N/A                          | 19' to 42'                 | Titan                            | Alum                              | 70.9                             | 2                        |

* 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).

Titan = Black coated titanium stabilized aluminized steel.
Alum = Black coated aluminized treated steel.
**Tube Installation Sequence**

**Figure 2.4 - Tube Installation Sequence**

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

- **20 Foot**

- **30 Foot**

- **40 Foot**
  - Stainless Steel Clamp on 150-175 MBH models (P/N: TP-220).

- **50 Foot**
  - Stainless Steel Clamp on 150 - 200 MBH models (P/N: TP-220).

- **60 Foot**
  - Stainless Steel Clamp on 150 - 200 MBH models (P/N: TP-220).

- **70 Foot**
  - Stainless Steel Clamp on 175 - 200 MBH models (P/N: TP-220)

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**Key**

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

*Aluminized Steel (50,000 to 125,000 BTU/H models), Alumi-Ti (titanium treated) steel tubes (150,000 to 200,000).

**NOTE:** Reference the Tube Heater General Manual, Chart 3.6 (page 23) for secured reflector joints.
3.0 Operation

Sequence of Operation

Standby: The circuit board continually checks for internal faults, circuit integrity, and relay contact positioning.

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

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

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

Shut Down: When the thermostat is satisfied, the fan will enter a two (2) minute post-purge cycle. Refer to page 13 for diagnostics; soft & hard lockout.

Thermostat

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

HL2 series heaters require a 24 V, two-stage thermostat to operate. The burner control box is equipped with either a round terminal strip that accepts three (3) 1/4-inch insulated female spade terminals or a 36-inch yellow 24 VAC control wire. Do not supply 120 VAC to the 24 VAC connection.

The HL2 series is equipped with or without a relay board (P/N: HLRB).

Standard Configuration

Without relay board (white terminal label*):
- Single burner control box.
- Single thermostat.

Optional Configuration (must be factory installed)

With relay board (orange terminal label*):
- Required when a single thermostat controls two or more burner control boxes or when heaters are common vented.

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

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

Lockout:

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

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

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

Figure 3.1 • LED Operation Indicator Lights

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

![LED Operation Indicator Lights](image)

Chart 3.1 • LED Fault Code Status

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

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

Turn up thermostat.

- Does the fan blower turn on? No → Find the source of the electrical problem between panel and heater.
- Yes → Is the power at the heater 120 V? No → Find the source of the electrical problem between panel and heater.
- Yes → Does the heater have a relay board? Yes → Is the power across the left and middle terminals of the 24 V plug 24 V? No → Find the source of the electrical problem between panel and heater.
- Yes → Turn up thermostat.

Troubleshooting with Relay Board

- Does the ignitor warm up and glow orange? No → Replace ignitor.
- Yes → Is the ignitor physically damaged? No → Replace ignitor.
- Yes → Is the resistance through the ignitor 50-400 Ω? No → Replace ignitor.
- Yes → Remove obstruction.

Is there 24 V on the secondary side of the external transformer? No → External transformer is faulty and must be replaced.
- Yes → Is there 24 V to the thermostat? No → The thermostat or wiring is faulty and should be replaced or repaired.
- Yes → Is the power across the left terminal of the 24 V plug and ground (screw on the burner control box) 24 Volts? No → Repair the wiring between the transformer and the 24 V terminal plug.
- Yes → Repair the wiring between power in and transformer.

Does the ignitor sequence (usually 5 to 15 seconds after power to heater) Is it 120 V? No → Is the inlet or the outlet of the unit plugged or obstructed? No → Is the power across the left terminal of the 24 V plug and ground (screw on the burner control box) 24 Volts? No → Repair the wiring between power in and transformer.
- Yes → Repair the wiring between power in and transformer.
- No → Replace transformer.

Find source of electrical problem between the external transformer and thermostat.

Troubleshooting Guide

HL2 Series

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.

4.0 Troubleshooting Guide

**Key**

**Without Relay Board:**

<table>
<thead>
<tr>
<th>Start Question</th>
<th>Process Question</th>
<th>Corrective Action</th>
</tr>
</thead>
</table>

- Is the power across the 24 V wire on the circuit board and ground 24 V?
  - Yes
  - No
  - The relay board is faulty and must be replaced.

- Is the power across the t-stat wire on the circuit board and ground 24 V?
  - Yes
  - No
  - The circuit board is faulty and must be replaced.

- Is there 120 V on the primary side of the internal transformer?
  - Yes
  - No
  - Repair wiring between power in and transformer.

- Is there 120 V on the primary side of the internal transformer?
  - Yes
  - No
  - The internal transformer is faulty and must be replaced.

- Is there 24 V across the TH and ground terminals on the circuit board?
  - Yes
  - No
  - Correct wiring.

- Is the circuit board sending 120 V to the fan?
  - Yes
  - No
  - Is the fan obstructed?
    - Yes
      - Remove obstruction.
    - No
      - Replace switch.

- Is the pressure switch stuck in the closed position?
  - Yes
    - Replace pressure switch.
  - No
    - Replace the pressure switch after verifying:
      - Baffle(s) are in the radiant tube furthest from the burner.
      - Heater, fan blowers, squirrel cage, intake and exhaust are clean and free from dirt and obstructions.
      - The 4" air intake pipe does not exceed 20 ft. and/or 2 elbows.
      - There is not a negative pressure experienced at the area of air intake (e.g.; high winds, attic space, tightly sealed building).

- Repair thermostat or wiring from thermostat to heater.
- Check for loose wiring or restrictions in hose connections to pressure switch. Are they OK?
  - Yes
    - Replace wiring or hose connections.
  - No
    - Replace circuit board.

- Replace wiring or hose connections.

* Refer to LED diagnostic Fault Code Chart.
After ignitor is warmed up, does gas valve open?

No

Test for 24 V at valve opening period (usually 45 to 60 seconds after power to heater). Is there 24 V to valve for 8 seconds?

Yes

Replace circuit board.

Does the burner light?

No

Is the ball valve/shut-off valve in the ON position?

Yes

Check to make sure gas pressure is within minimum and maximum inputs, as indicated on heater’s rating plate. Is gas pressure OK?

No

Pressure switch may be faulty or there is a restriction in the exhaust.

Yes

Correct problem.

Does the burner stay on?

No

Does the burner stay on for approx. 8 seconds and then shut off?

Yes

Correct problem.

No

Does the burner come on and turn off immediately (1 or 2 seconds)?

Yes

Check to make sure gas pressure is within minimum and maximum inputs, as indicated on heater’s rating plate. Is gas pressure OK?

No

Pressure switch may be faulty or there is a restriction in the exhaust.

Yes

Correct problem.

Does the heater stay ON until a call for heat ends?

No

The heater can shut down due to:
- Improper grounding.
- High winds.
- Taking combustion air from the attic.
- Dirty environment.
- Improperly positioned baffles.
- Fluctuating gas pressure.

Yes

Troubleshooting ends.
Check to make sure gas pressure is within minimum and maximum inputs, as indicated on heater's rating plate.

Is gas pressure OK?

No

Correct problem.

Yes

Is gas pressure OK?

Were the gas lines purged of air?

No

Purge gas line.

Yes

Is the heater properly grounded? Is the heater’s polarity correct?

No

Correct problem.

Yes

With microampmeter, check DC voltage at flame rod. Is it greater than .05 microamps?

No

Sensing rod is faulty or flame is weak. Check to make sure heater is operating at proper gas pressure as indicated on heater’s rating plate and then, if needed, replace sensing rod.

Yes

Check to make sure flame sensor wire is OK and then replace circuit.

If heater does not go into high fire mode:

NOTE: To confirm that the heater is not in high fire mode, check manifold pressure. If manifold pressure is 3.3 to 3.5 inches W.C. for natural gas or 9 to 10 inches W.C. for propane, the light is faulty and should be replaced.

When the heater is in low fire mode, manifold pressure is approximately 2.0 to 2.5 inches for natural gas or 5.0 to 6.5 inches for propane. If this is the case, the following troubleshooting steps should be followed:

Is there 24 V across the GROUND and HIGH (HIGH to COM on heaters with optional HLRB relay) on the terminal strip located on the outside of the control box?

No

Repair or replace faulty wiring or thermostat.

Yes

Measure voltage across the red wire on the VALVE and GROUND (red wire on RELAY to GROUND on heaters with HLRB relay). Is it 24 V?

No

Replace relay.

Yes

Replace gas valve.
5.0 Parts

Chart 5.1 • Parts List

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TP-1</td>
<td>Control Box Cover</td>
<td>TP-26E</td>
<td>10 ft. 409 Stainless Steel Combustion Tube*</td>
</tr>
<tr>
<td>TP-5</td>
<td>Flange Gasket</td>
<td>TP-31B</td>
<td>Control Box Mounting Bracket</td>
</tr>
<tr>
<td>TP-9</td>
<td>Conduit Coupling</td>
<td>TP-33B</td>
<td>1/2&quot; Shut-Off Ball Valve / Inlet Tap</td>
</tr>
<tr>
<td>TP-10</td>
<td>Conduit 4&quot; x 1/2&quot;</td>
<td>TP-50A</td>
<td>Glo-Bar™ Ignitor</td>
</tr>
<tr>
<td>TP-11</td>
<td>Glo-Bar™ Ignitor Box</td>
<td>TP-55A</td>
<td>Fan Blower</td>
</tr>
<tr>
<td>TP-12</td>
<td>Glo-Bar™ Ignitor Box Cover</td>
<td>TP-65I</td>
<td>36&quot; Interlocking Turbulator Baffle</td>
</tr>
<tr>
<td>TP-13</td>
<td>8 x 1/2&quot; Self-Drilling Screw</td>
<td>TP-66</td>
<td>2&quot; x 4&quot; Outlet Box</td>
</tr>
<tr>
<td>TP-14</td>
<td>Sight Glass Gasket</td>
<td>TP-67</td>
<td>2&quot; x 4&quot; Outlet Box Cover</td>
</tr>
<tr>
<td>TP-15</td>
<td>Sight Glass</td>
<td>TP-68A</td>
<td>Strain Relief Bushing</td>
</tr>
<tr>
<td>TP-16</td>
<td>Sight Glass Washer</td>
<td>TP-70</td>
<td>Control Box Cover Gasket (per foot**)</td>
</tr>
<tr>
<td>TP-17</td>
<td>Sight Glass Kit</td>
<td>TP-76</td>
<td>Rubber Grommet</td>
</tr>
<tr>
<td>TP-19B</td>
<td>4&quot; Wire Hanger with Tension Spring</td>
<td>TP-82</td>
<td>Reflector Center Support (RCS)</td>
</tr>
<tr>
<td>TP-20C</td>
<td>120&quot; Aluminum Reflector</td>
<td>TP-83</td>
<td>24&quot; Stainless Steel Flexible Gas Connector</td>
</tr>
<tr>
<td>TP-20D</td>
<td>120&quot; Stainless Steel Reflector*</td>
<td>TP-83A</td>
<td>24&quot; PVC Coated S.S. Flexible Gas Connector*</td>
</tr>
<tr>
<td>TP-21B</td>
<td>4&quot; Standard Tube Clamp</td>
<td>TP-84</td>
<td>1/2&quot; Female/Male Flare Fitting</td>
</tr>
<tr>
<td>TP-26A</td>
<td>10 ft. Aluminized Radiant / Combustion Tube</td>
<td>TP-97</td>
<td>1/4&quot; x 1/4&quot; Brass Int./Ext. Atmos. Barb Fitting</td>
</tr>
<tr>
<td>TP-26B</td>
<td>10 ft. Titanium Coated Combustion Tube</td>
<td>TP-105</td>
<td>Aluminum Reflector End Cap</td>
</tr>
<tr>
<td>TP-26D</td>
<td>10 ft. 304 Stainless Steel Radiant Tube*</td>
<td>TP-106</td>
<td>Reflector End Cap Clips (8 pcs.)</td>
</tr>
</tbody>
</table>

* May be used with stainless steel upgrades.
** 6 feet total required to cover outer edges of the burner control box.
## HL2 Series

### 5.0 Parts • Heater Components and Parts List

#### Figure 5.2 • Tube and Reflector Components

![Diagram of tube and reflector components]

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TP-113</td>
<td>Reflector Tension Spring</td>
<td>TP-321</td>
<td>Ignition Plate Gasket</td>
</tr>
<tr>
<td>TP-114</td>
<td>Plastic Air Orifice with Screen</td>
<td>TP-383A</td>
<td>Glo-Bar™ Ignitor Plate</td>
</tr>
<tr>
<td>TP-201B</td>
<td>Burner (Tan) - consult factory</td>
<td>TP-802</td>
<td>End Panel, Left (with relay board)</td>
</tr>
<tr>
<td>TP-202</td>
<td>16&quot; HSI Burner Tube with Flange</td>
<td>TP-802A</td>
<td>End Panel, Left</td>
</tr>
<tr>
<td>TP-204</td>
<td>Gas Orifice (consult factory)</td>
<td>TP-804</td>
<td>Burner Control Box Outer Shell</td>
</tr>
<tr>
<td>TP-205</td>
<td>Glo-Bar™ Holder</td>
<td>TP-825</td>
<td>Optional HLRB Relay Board</td>
</tr>
<tr>
<td>TP-206</td>
<td>Glo-Bar™ Holder Spring Clip</td>
<td>TP-826</td>
<td>40 VA Transformer</td>
</tr>
<tr>
<td>TP-207</td>
<td>Pressure Switch Mounting Bracket</td>
<td>TP-827</td>
<td>Red LED Display Diagnostic Light</td>
</tr>
<tr>
<td>TP-208A</td>
<td>Gas Valve Mounting Bracket</td>
<td>TP-828</td>
<td>Yellow Operational Indicator Light</td>
</tr>
<tr>
<td>TP-212</td>
<td>1/2&quot; x 3&quot; Pipe Nipple</td>
<td>TP-832</td>
<td>Thermostat Terminal Strip</td>
</tr>
<tr>
<td>TP-214</td>
<td>Glo-Bar™ Wiring Harness</td>
<td>TP-840A</td>
<td>36G54-224 Gas Valve - Natural Gas Assembly</td>
</tr>
<tr>
<td>TP-217</td>
<td>Pressure Switch Barb</td>
<td>TP-841A</td>
<td>36G54-226 Gas Valve - LP Gas Assembly</td>
</tr>
<tr>
<td>TP-218</td>
<td>Differential Switch Vinyl Sensing Tube (exhaust)</td>
<td>TP-851</td>
<td>Micro-60-24 Diagnostic Circuit Board</td>
</tr>
<tr>
<td>TP-219</td>
<td>Differential Vinyl Sensing Tube (burner)</td>
<td>TP-852</td>
<td>3-Piece Wire Harness Set for Micro 60 Board</td>
</tr>
<tr>
<td>TP-220</td>
<td>Stainless Steel Tube Clamp (150 &amp; 200 MBH)*</td>
<td>TP-NOPS</td>
<td>Normally Open Pressure Switch (see below)</td>
</tr>
<tr>
<td>TP-221</td>
<td>Glo-Bar™ Holder Gasket</td>
<td>TP-264B</td>
<td>Differential Pressure Switch, 65 to 100 MBH</td>
</tr>
<tr>
<td>TP-222</td>
<td>Flame Rod</td>
<td>TP-264E</td>
<td>Differential Pressure Switch, 125 to 150 MBH</td>
</tr>
<tr>
<td>TP-222A</td>
<td>Flame Rod Wire</td>
<td>TP-264D</td>
<td>Differential Pressure Switch, 175 MBH</td>
</tr>
<tr>
<td>TP-223</td>
<td>Gas Manifold</td>
<td>TP-264F</td>
<td>Differential Pressure Switch, 200 MBH</td>
</tr>
<tr>
<td>TP-301</td>
<td>Burner Control Box Center Panel</td>
<td>TP-3072</td>
<td>Burner (Green) - consult factory</td>
</tr>
<tr>
<td>TP-303</td>
<td>End Panel, Right</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* May be used with stainless steel upgrades.
Kit Contents Check List

Chart 5.2 • Kit Contents for HL2 Series - Reference the length column for your model.

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
<th>20 ft.</th>
<th>30 ft.</th>
<th>40 ft.</th>
<th>50 ft.</th>
<th>60 ft.</th>
<th>70 ft.</th>
</tr>
</thead>
<tbody>
<tr>
<td>TP-19B</td>
<td>4&quot; Hanger w/ Reflector Tension Spring</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>TP-21B</td>
<td>4&quot; Tube Clamp</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>TP-25</td>
<td>1/4&quot; Female Spade Terminal**</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>TP-33B</td>
<td>1/2&quot; Shut-Off Valve &amp; Inlet Tap</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>TP-82</td>
<td>4&quot; Reflector Center Support (RCS)</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>TP-83</td>
<td>24&quot; Stainless Steel Flexible Gas Connector</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>TP-106</td>
<td>Reflector End Cap Clips</td>
<td>8</td>
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<tr>
<td>TP-105</td>
<td>Reflector End Cap</td>
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<td>LIOGTa</td>
<td>General Tube Heater Manual</td>
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<tr>
<td>LIOHL2</td>
<td>HL2 Series Insert Manual</td>
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<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Filled By:

* **NOTE:** One 4" stainless steel tube clamp (P/N: TP-220) is provided for each 150,000 - 200,000 BTU model. Place as shown on page 11.
** Not included with models installed with yellow control cord.
^ Part number for models upgraded with stainless steel options.

**Approvals**

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

**Limited Warranty**

- 3 years - Burner box components
- 5 years - Combustion and radiant tubes
- 10 years - Stainless steel burner