

HL-2 Series V.8/02 - 4" Tube Heater Installation, Operation, Maintenance and Parts Manual*

▲ WARNING: This heater must be installed and serviced by trained gas installation and service personnel only! Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death. Read the installation, operating and maintenance instructions thoroughly before installing or servicing this equipment. Protect yourself and others by observing all safety information. Retain instructions for future reference.

*For complete installation instructions, see the General Manual that accompanied this piece. Also available at www.reverberray.com.

HL-2 Series

Project: _____ Date: _____
 Location: _____
 City: _____ State: _____ Zip: _____
 Contractor: _____
 Engineer: _____
 Local Representative: _____
 Customer Name: _____
 Address: _____
 City: _____ State: _____ Zip: _____
 Model #: _____ Phone#: _____
 Serial #: _____ Date of Install: _____
 Notes: _____

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Models v. 8/02

Qty.	Model #	Gas Type (circle one)	MBTU's	Straight Length	U-Tube Length	Weight	Typical Mount Height	Combustion Chamber	Radiant Emitter Tube	"Type" Tube Pkg #1	"Type" Tube Pkg. #2	Baffle Pieces
	HL-2 20-65	N or LP	65 / 50	21'-7"	13'-0"	120 #	9'-14"	Aluminized	4" Aluminized	20-4 Alum	N/A	5
	HL-2 20-75	N or LP	75 / 50	21'-7"	13'-0"	120 #	10' - 15'	Aluminized	4" Aluminized	20-4 Alum	N/A	5
	HL-2 20-100	N or LP	100 / 65	21'-7"	13'-0"	120 #	11' - 18'	Aluminized	4" Aluminized	20-4 Alum	N/A	5
	HL-2 30-65	N or LP	65 / 50	31'-3"	*17'-8"	160 #	10' - 15'	Aluminized	4" Aluminized	30-4 Alum	N/A	4
	HL-2 30-75	N or LP	75 / 50	31'-3"	*17'-8"	160 #	11' - 18'	Aluminized	4" Aluminized	30-4 Alum	N/A	4
	HL-2 30-100	N or LP	100 / 65	31'-3"	*17'-8"	160 #	12' - 20'	Aluminized	4" Aluminized	30-4 Alum	N/A	5
	HL-2 30-125	N or LP	125 / 95	31'-3"	*17'-8"	160 #	13' - 23'	Aluminized	4" Aluminized	30-4 Alum	N/A	5
	HL-2 40-65	N or LP	65 / 50	40'-11"	22'-8"	190 #	11' - 18'	Aluminized	4" Aluminized	40-4 Alum	N/A	2
	HL-2 40-75	N or LP	75 / 50	40'-11"	22'-8"	190 #	11' - 18'	Aluminized	4" Aluminized	40-4 Alum	N/A	2
	HL-2 40-100	N or LP	100 / 65	40'-11"	22'-8"	190 #	12' - 20'	Aluminized	4" Aluminized	40-4 Alum	N/A	4
	HL-2 40-125	N or LP	125 / 95	40'-11"	22'-8"	190 #	13' - 23'	Aluminized	4" Aluminized	40-4 Alum	N/A	4
	HL-2 40-150	N or LP	150 / 100	40'-11"	22'-8"	190 #	14' - 25'	Titanium Coated	4" Aluminized	40-4 Titan	N/A	4
	HL-2 40-175	N or LP	175 / 125	40'-11"	22'-8"	190 #	15' - 27'	Titanium Coated	4" Aluminized	40-4 Titan	N/A	4
	HL-2 50-100	N or LP	100 / 65	50'-7"	*27'-4"	235 #	15' - 27'	Aluminized	4" Aluminized	40-4 Alum	10-4 Alum	2
	HL-2 50-125	N or LP	125 / 95	50'-7"	*27'-4"	235 #	15' - 27'	Aluminized	4" Aluminized	40-4 Alum	10-4 Alum	4
	HL-2 50-150	N or LP	150 / 100	50'-7"	*27'-4"	235 #	15' - 27'	Titanium Coated	4" Aluminized	40-4 Titan	10-4 Alum	4
	HL-2 50-175	N or LP	175 / 125	50'-7"	*27'-4"	235 #	16' - 30'	Titanium Coated	4" Aluminized	40-4 Titan	10-4 Alum	2
	HL-2 50-200	N or LP	200 / 145	50'-7"	*27'-4"	235 #	17' - 35'	Titanium Coated	4" Aluminized	40-4 Titan	10-4 Alum	2
	HL-2 60-125	N or LP	125 / 95	60'-3"	32'-4"	265 #	16' - 30'	Aluminized	4" Aluminized	40-4 Alum	20-4 Alum	2
	HL-2 60-150	N or LP	150 / 100	60'-3"	32'-4"	265 #	16' - 30'	Titanium Coated	4" Aluminized	40-4 Titan	20-4 Alum	2
	HL-2 60-175	N or LP	175 / 125	60'-3"	32'-4"	265 #	16' - 30'	Titanium Coated	4" Aluminized	40-4 Titan	20-4 Alum	2
	HL-2 60-200	N or LP	200 / 145	60'-3"	32'-4"	265 #	17' - 35'	Titanium Coated	4" Aluminized	40-4 Titan	20-4 Alum	2
	HL-2 70-175	N or LP	175 / 125	69'-11"	*37'-2"	300 #	19' - 42'	Titanium Coated	4" Aluminized	40-4 Titan	30-4 Alum	2
	HL-2 70-200	N or LP	200 / 145	69'-11"	*37'-2"	300 #	19' - 42'	Titanium Coated	4" Aluminized	40-4 Titan	30-4 Alum	2

* Model requires 5EA-SUB accessory package.

Warranty registration options:

1. Register online at www.reverberray.com/warranty
2. Complete this page and fax to Detroit Radiant Products Co.
3. Complete this page and mail to Detroit Radiant Products Co.



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 Replaces Form# LIOHL2-3M-8/02



HL-2 Series

HL-2 Series Mechanical Instructions

⚠ WARNING!

NOT FOR RESIDENTIAL USE!

Do not use in the home, sleeping quarters, attached garages, etc.

⚠ WARNING!

This heater must be installed and serviced by trained gas installation and service personnel only. Read and understand these instructions thoroughly before attempting to install, operate or service this heater. Failure to comply could result in personal injury, asphyxiation, death, fire, and/or property damage. Retain these instructions for future reference.

⚠ WARNING!

This is not an explosion-proof heater. Where there is the possibility of exposure to flammable vapors, consult the local fire marshal, the fire insurance carrier and other authorities for approval of the proposed installation.

⚠ WARNING!

Failure to comply with the stated clearances to combustibles could result in personal injury, death and/or property damage.

⚠ WARNING!

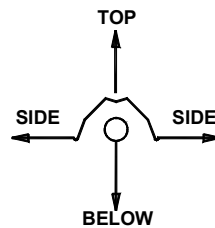
In locations used for the storage of combustible materials, signs must be posted to specify the maximum permissible stacking height to maintain the required clearances from the heater to the combustibles. Signs must either be posted adjacent to the heater thermostats or in the absence of such thermostats,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

⚠ WARNING!

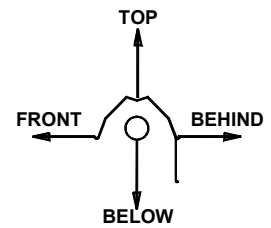
This heater should be installed so that the minimum clearances to vehicles, as marked on the heater, will be maintained. If vehicle lifts are present, ensure that these clearances will be maintained from the highest raised vehicle.

CLEARANCES TO COMBUSTIBLES (IN.)

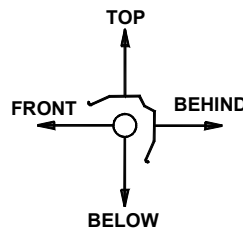
MODEL NO.	MOUNTING ANGLE	SIDE		TOP	BELOW
		FRONT	BEHIND		
HL2 (20,30,40) - 65, 75 [N,P]	0°	9	9	6	60
	45°	39	8	10	60
	0°	29	8	6	60
	0°	9	9	6	60
	0°	7	7	6	30
HL2 (20,30,40,50) - 100 [N,P]	0°	14	14	6	66
	45°	39	8	10	66
	0°	29	8	6	66
	0°	16	16	6	66
	0°	7	7	6	30
HL2 (30,40,50,60) -125 [N,P]	0°	20	20	6	76
	45°	58	8	10	76
	0°	42	8	6	76
	0°	20	20	6	76
	0°	7	7	6	30
HL2 (40,50,60) - 150 [N,P]	0°	24	24	6	81
	45°	58	8	10	81
	0°	42	8	6	81
	0°	23	23	6	81
	0°	11	11	6	44
HL2 (40,50,60,70) - 175 [N,P]	0°	34	34	6	92
	45°	63	8	10	92
	0°	50	8	6	92
	0°	30	30	6	92
	0°	11	11	6	44
HL2 (50,60,70) - 200 [N,P]	0°	41	41	6	94
	45°	63	8	10	94
	0°	54	8	6	94
	0°	30	30	6	94
	0°	11	11	6	44



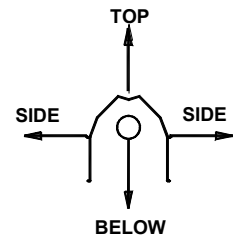
0° MOUNTING ANGLE



0° W/1 SIDE SHIELD



45° MOUNTING ANGLE



0° W/2 SIDE SHIELDS

HL-2 Series Mechanical Instructions

This supplement is designed to address the specifics of the HL-2 Series - see page 12 for product features.

Product Summary

HL-2 Series heaters are available from 20 to 70 foot, 65,000 to 200,000 BTU's, natural or LP gas. HL-2 Series are positive pressure, two-stage heaters that feature aluminized steel for it's radiant pipes.

Operational Features

HL-2 Series heaters require a 24 Volt, two-stage thermostat to operate. Each heater has a round terminal plug (or yellow cord) that accepts three 1/4 in. insulated spade terminals for the thermostat wiring. **Do not install 120V to this 24V connection.**

There are two versions of the HL-2 Series. The standard version comes without a relay board (HLRB) and the other is supplied with a relay board (HLRB) installed. A HL-2 Series unit **without** a relay board (HLRB) supplies it's own control voltage and is identified by the white band located around the terminal plug. If units are common vented or if two or more models are to be controlled by a single thermostat, they must be factory assembled with relay boards (HLRB) and installed using an external transformer (field supplied) as shown on page 6. A HL-2 Series unit **with** a relay board (HLRB) installed is identified by the orange band around the spade terminal.

On stainless steel heaters, units with a relay board (HLRB) will be labeled accordingly. All models assembled with a HLRB reference the suffix "D" on the AGA rating plate.

Specific Mechanical Instructions

Be sure to indentify the titanium coated combustion chamber (150-200 MBTU/H) and place as the first tube section directly following the burner box. The identification sticker found on the swagged end of the tubing will identify the titanium coated combustion tube.

175,000 and 200,000 BTU/H Models must be installed with a stainless steel tube clamp at the second joint of the exchanger between the first and second radiant tubes.

Note baffle quantities for your model and place baffles in the last tubes (farthest from the burner) as shown on pages 13-14 of the general manual, and below (*).

Tube Installation Sequence

	B = Burner Location					* Baffle Location
B	Aluminized (50-100 MBTU/H)	Aluminized *				
B	Aluminized (50-125 MBTU/H)	Aluminized	Aluminized			
B	Aluminized or Titanium (50-125 MBTU/H) (150-175 MBTU/H)	Aluminized	Aluminized	Aluminized		
B	Aluminized or Titanium (50-125 MBTU/H) (150-200 MBTU/H)	Aluminized	Aluminized	Aluminized	Aluminized	
B	Aluminized or Titanium (50-125 MBTU/H) (150-200 MBTU/H)	Aluminized	Aluminized	Aluminized	Aluminized	Aluminized
B	Aluminized or Titanium (50-125 MBTU/H) (150-200 MBTU/H)	Aluminized	Aluminized	Aluminized	Aluminized	Aluminized



HL-2 Series

Electrical Requirements

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

Gas Requirements

- ◆ Manifold Pressure
 - Nat. 3.5" • LP. 10.0"
- ◆ Minimum Inlet Pressure
 - Nat. 5.0" • LP. 11.0"
- ◆ Maximum Inlet
 - Nat. 14.0" • LP. 14.0"

Ventilation Requirements

- ◆ Consult the general manual for venting instructions.
- ◆ For unvented operation, there must be a positive air displacement of at least 4.0 CFM per 1000 BTU/H for natural gas or 4.5 CFM per 1000 BTU/H for LP gas. WVE-4 termination cap must also be used.

Theory of Operation

Standby:

The Micro 60U24 control continually checks for internal faults, safety circuit integrity, and relay contact positioning.

Starting Circuit:

Upon a call for heat, the control will verify that the differential safety pressure switch is in the proper position. The fan relay energizes the fan, an operational static pressure is achieved and the normally open differential pressure switch will close, initiating the ignition sequence. The glow-bar is powered and after 45 seconds the main gas valve opens. If flame is not established the heater will attempt to re-ignite for a total of three trials for ignition and then proceed to lockout.

First Stage Running Circuit:

After ignition the flame-rod monitors the main burner flame. If flame is lost, the control acts to close the gas valve within one second and a new trial sequence, identical to the start up sequence, is initiated. If proof is not established within 8.5 seconds, the unit will retry 2 additional ignition sequences and then proceed to hard lock-out. The control can be reset by interrupting the power source or at the thermostat.

Second Stage Running Circuit:

Stage two on the gas valve is powered directly from the second stage of the thermostat. In order for the second stage to flow the higher output, the first stage has to be energized as well. The thermostat will determine which stage is required to maintain the desired comfort level.

Shut Down:

When the thermostat is satisfied the fan will enter into a 2 minute post-purge cycle.

Soft Lockout:

In the event of an external interruption (wind, gas, etc.) the heater will go into a "soft-lockout" feature. In this mode the heater will attempt a normal start-up after approximately 15 minutes. In the event of continued problems, the heater will go into a hard lock-out mode.

Lockout Codes:

In event of a component failure, a red LED diagnostic light located on the burner box end panel will flash a code identifying the fault. Lockout codes are summarized in the table below. Some fault codes have a time delay before the LED will flash. Refer to the FAULT CODE DELAY on the chart to see the approximate time delay.

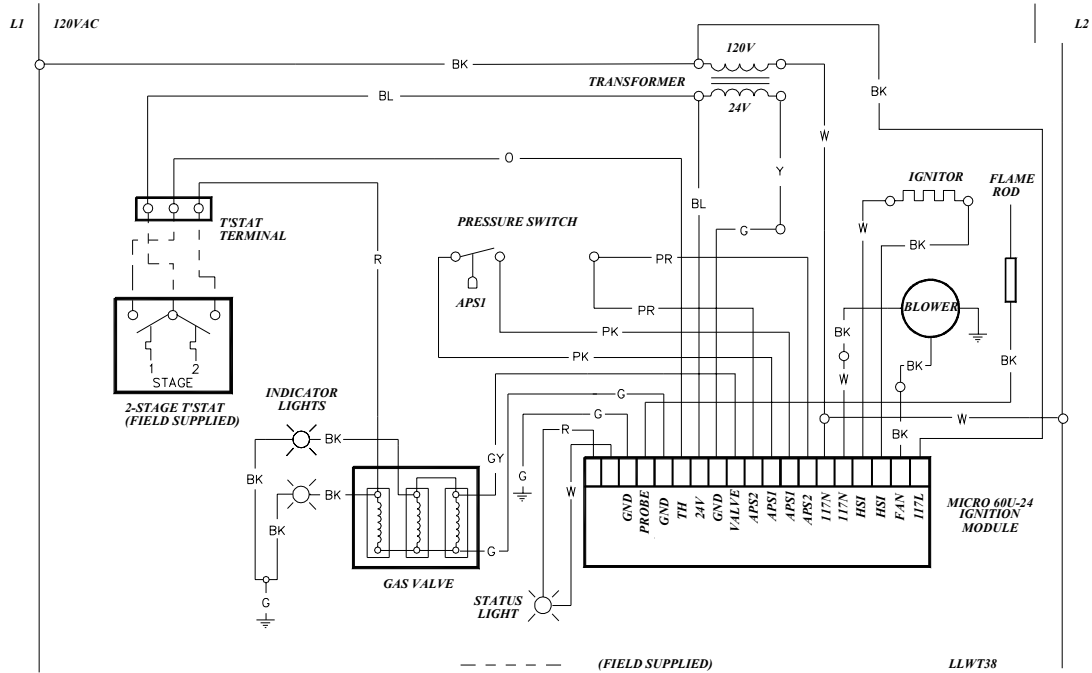
LED CODE	FAULT STATUS	FAULT CODE DELAY
Initial flash on power up, then steady off	Normal operation	Immediate
Steady on	Module failure / Internal fault	Immediate
1 flash	Ignition failure	30-32 minutes
2 or 3 flashes	APS - Note: fan / intake / exhaust	10-12 minutes
4 flashes	Solenoid valve fault / Leaky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

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

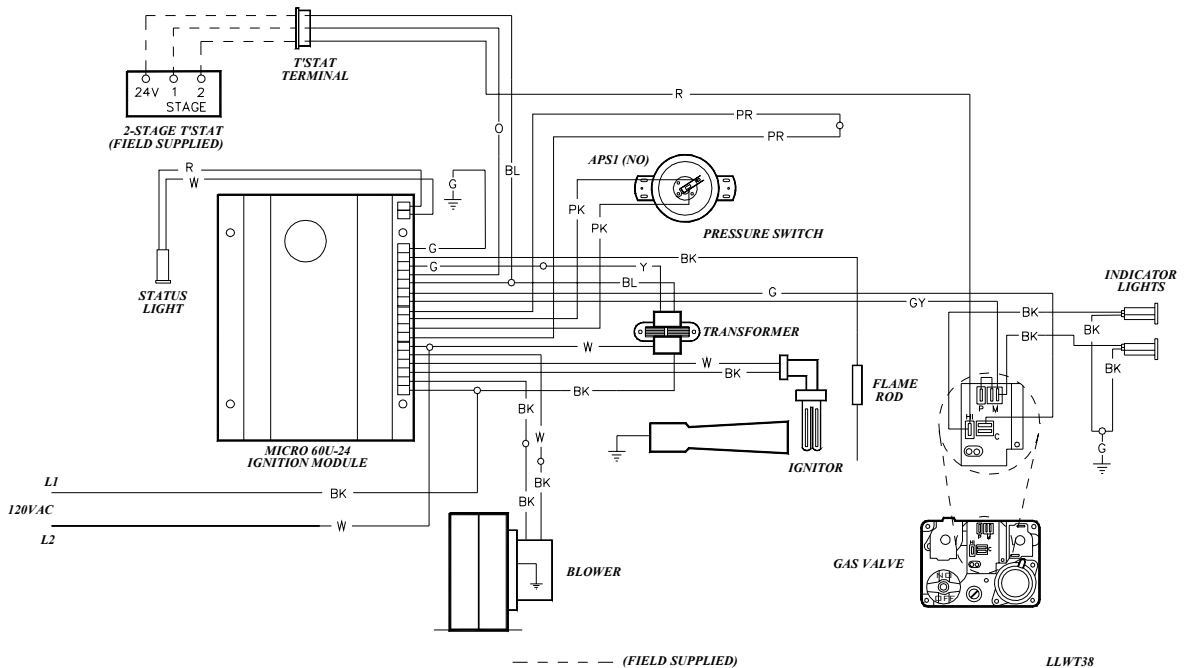
Internal Wiring Diagrams

MICRO 60U-24

MICRO 60U-24 LADDER DIAGRAM

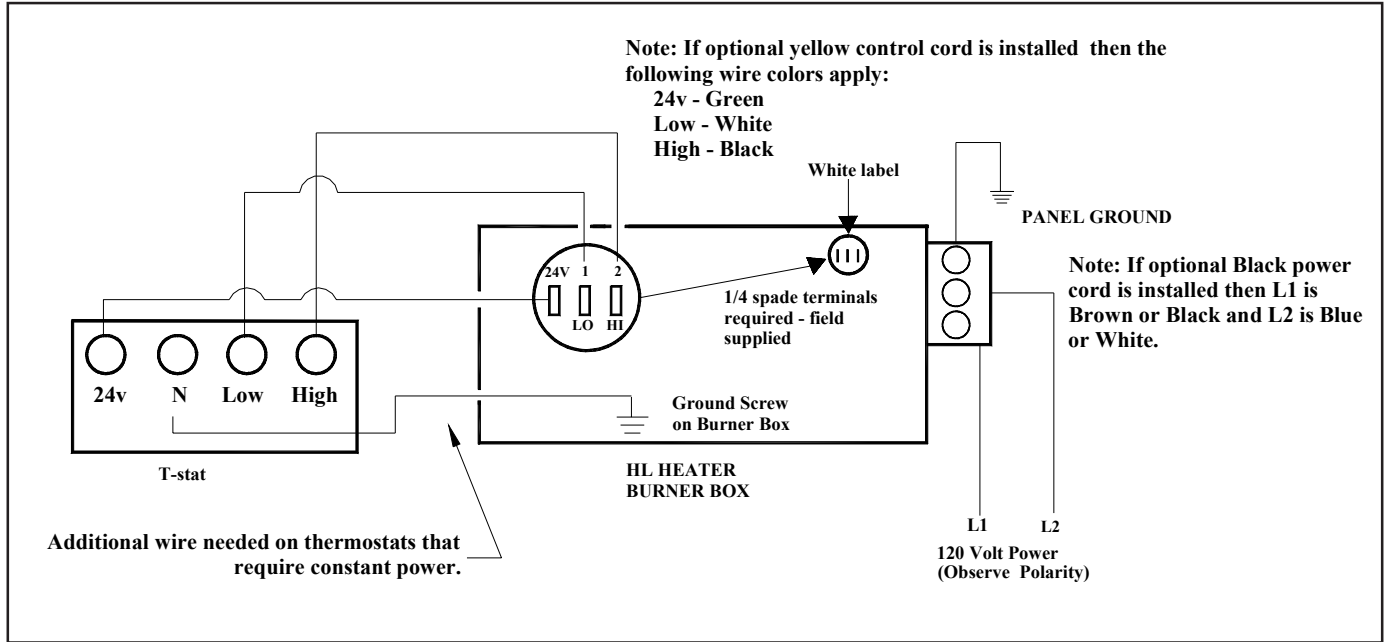


MICRO 60U-24 BLOCK DIAGRAM

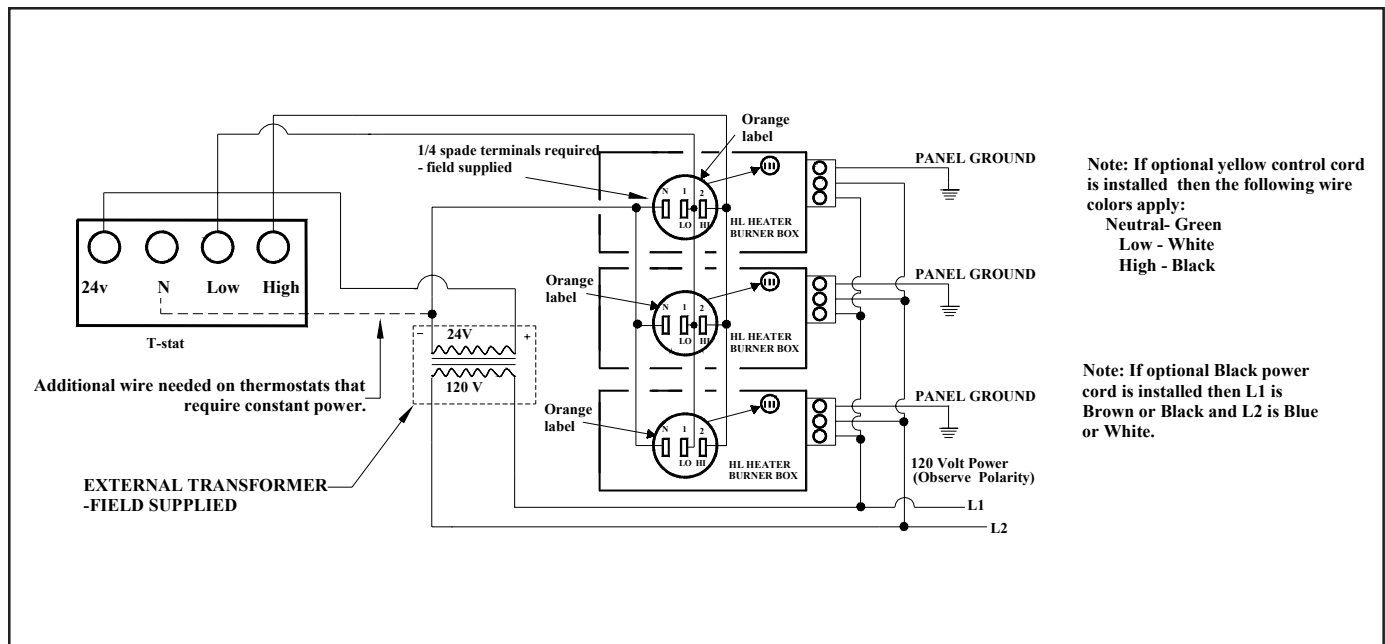


HL-2 Series

Field Wiring Diagrams



Single heater, single thermostat, no relay board (white label).

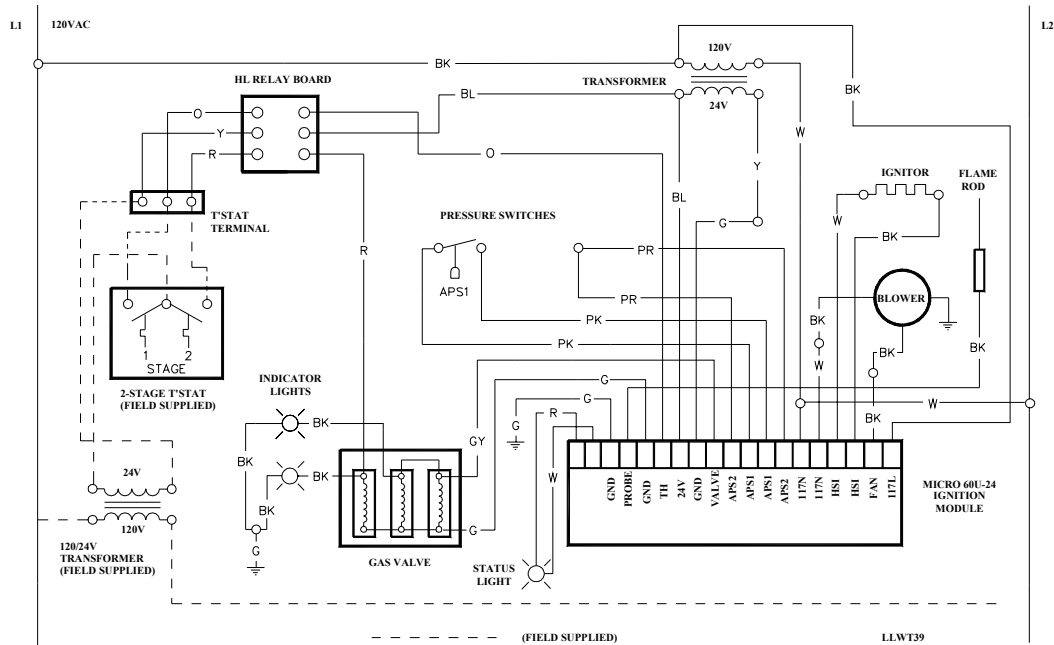


Multiple heaters, single thermostat, with a relay board (HLRB - orange label).

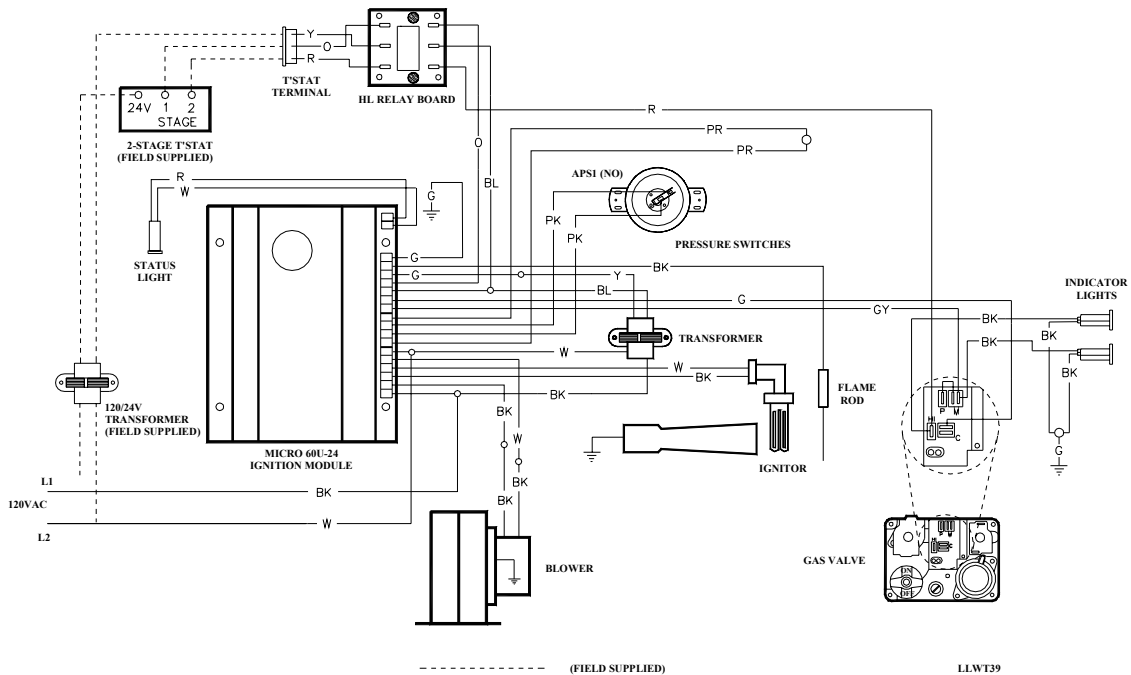
Alternative Wiring Diagrams

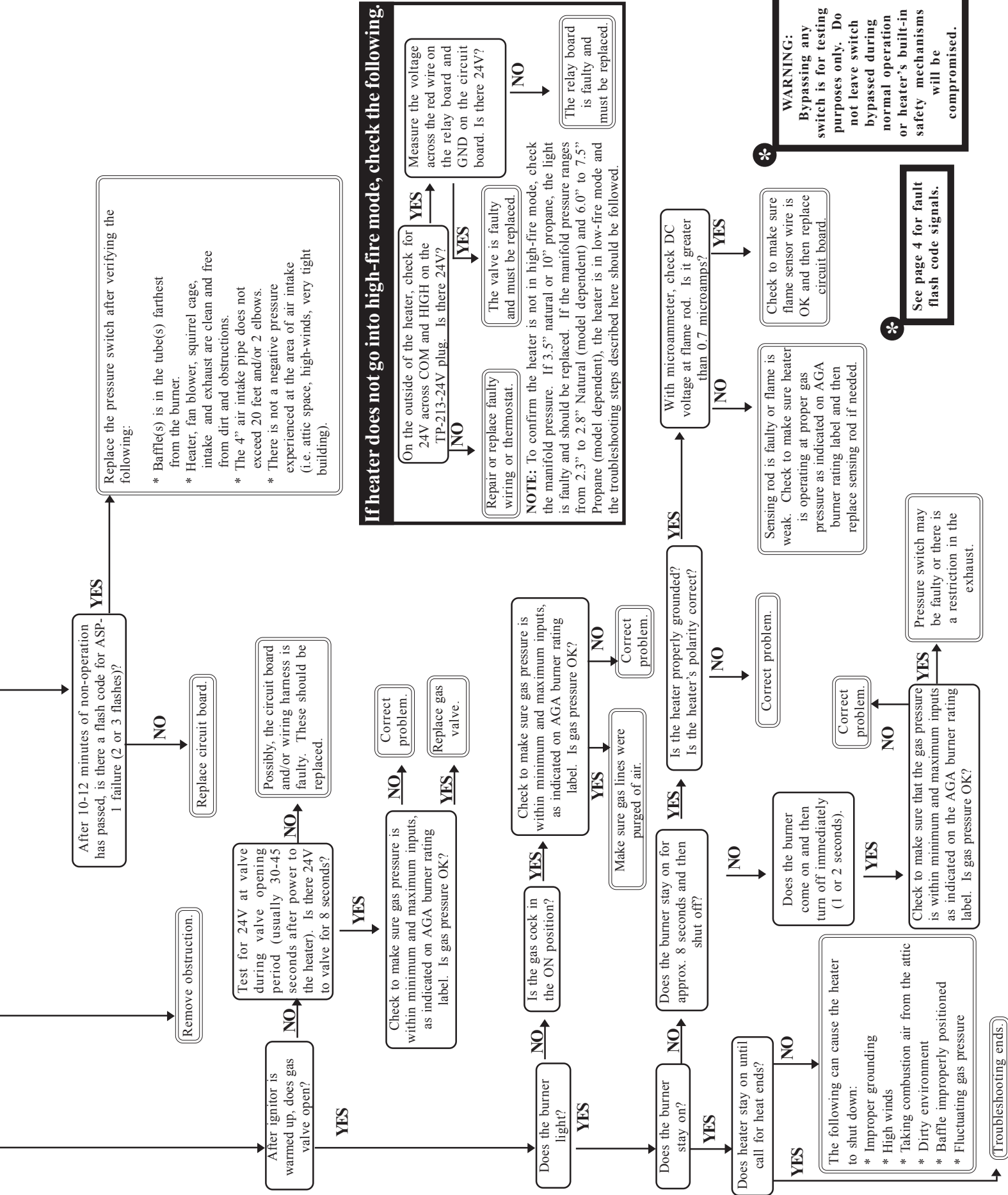
MICRO 60U-24 WITH HLRB RELAY BOARD

MICRO 60U-24 LADDER DIAGRAM - WITH RELAY BOARD



MICRO 60U-24 BLOCK DIAGRAM - WITH RELAY BOARD





If heater does not go into high-fire mode, check the following.

On the outside of the heater, check for 24V across COM and HIGH on the TP-213-24V plug. Is there 24V?

YES → Measure the voltage across the red wire on the relay board and GND on the circuit board. Is there 24V?

NO → The relay board is faulty and must be replaced.

YES → The valve is faulty and must be replaced.

NO → Repair or replace faulty wiring or thermostat.

NOTE: To confirm the heater is not in high-fire mode, check the manifold pressure. If 3.5" natural or 10" propane, the light 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 here should be followed.








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


See page 4 for fault flash code signals.

Kit Contents & Product Features

Kit contents for the HL-2 Series are shown below. Reference the proper column for your particular models length.

FILLED BY:		HL-2 SERIES KIT CONTENTS					
TP#	DESCRIPTION	20 FOOT	30 FOOT	40 FOOT	50 FOOT	60 FOOT	70 FOOT
TP-19B	4" Hangers	3	4	5	6	7	8
TP-21B	4" Tube Clamps	2	3	4	5*	6*	7*
TP-33B	1/2" Gas Cock	1	1	1	1	1	1
TP-82	4" Refl. Cntr. Sprt.	2	3	4	5	6	7
TP-83	24" SS Flex Line	1	1	1	1	1	1
TP-105	Refl. Endcaps	2	2	2	2	2	2
TP-106	Refl. Endcap Clips	8	8	8	8	8	8
IOM	Install / Op Manual	1	1	1	1	1	1

						
4" Hanger TP-19B	4" Butt Clamp TP-21B	Gas Cock 1/2" TP-33B	Bag of Reflector End Cap Clips. TP-106	24" SS Flex Connect TP-83	Reflector End Caps TP-105	Generic IOM LIOM-Tube AND Series Insert LIOM-HL-2

<p>Notes</p> <p>*One 4" stainless steel butt clamp is provided for each 175,000-200,000 BTU model. Place as shown in IOM.</p>	 <p>4" Reflector Center Support - TP-82</p>
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Product Features

APPROVALS

- IAS, CGA, AGA, CE, CSA.
- Indoor approval.
- Outdoor approval with OD-Kit.
- Commercial approval.

BURNERSIGHT GLASS

- For burner inspection.

COMBUSTION AIR INLET & VENT

- 4" Male duct.

ENAMELED CONTROL BOX

- Outside air collar (4") attached.
- Totally enclosed components.

CONTROLS

- 100% safety shut off.
- Differential pressure switch.
- Silicon carbide hot surface igniter.
- Flame rod sensing.
- Pre and post purge controls.
- Microprocessor circuit board provides soft lockout and self-diagnostic features.

EMITTER & COMBUSTION TUBES

- 16ga. 4" O.D. aluminized steel.
- All tubes coated with high temperature, corrosion resistant black coating .95 emissivity. Slip fit connection.
- Titanium treated combustion chamber (150-200 MBTU/H models).

GAS CONNECTION

- 1/2" gas cock included.
- 7/8" flare-2' S.S. flex included.

RADIANT SURFACE AREA (SQ. FT.)

- 20' Models – 20.2
- 30' Models – 30.4
- 40' Models – 40.5
- 50' Models – 50.6
- 60' Models – 60.7
- 70' Models – 70.9

WARRANTY

- 1 year - Burner box components.
- 5 years - Combustion and radiant tubes.
- 10 years - Stainless steel burner.

OTHER

- One reflector center support per reflector.
- Turbulator baffle included.
- Stainless steel upgrades available.
- Made in U.S.A.