

Installation

Laars H Series Tankless Heater Models

LCTEH005, LCTEH006
LCTEH010 & LCTEHV010,
LCTEH015 & LCTEHV015,
LCTEH018 & LCTEHV018,
LCTEH025

Voltage options:
208V Single & Three-Phase
240V Single & Three-Phase
277V Single-Phase
380V Three-Phase
400V Three-Phase
415V Three-Phase
480V Single & Three-Phase

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DANGER

Tip over hazard. System can crush you resulting in serious injury or death. Read and follow precautions in this installation manual that accompanied the heater for instructions on how to safely transport and mount. **DO NOT** transport with the heater in the vertical position. This heater is top heavy and should not be placed in the vertical position until the site is prepared to anchor the heater to the wall or the legs to the floor.

WARNING

Read this manual **BEFORE** using this equipment. Failure to read and follow all safety and user information could result in death, serious personal injury, minor burns, property damage, or damage to the equipment. Keep this manual for future reference. Failure to comply with proper installation and maintenance instructions could contribute to the heater's failure.

A qualified plumber or electrician should install and service this system. Install system according to these instructions and in compliance with national and local codes.

ASSE standard 1016, 1069, or 1070 listed devices should be used at fixtures to prevent possible injury. Severe bodily injury including scalding, chilling, and/or death may result depending upon system water pressure changes and/or supply water temperature changes.

For safe operation of the heater, observe all warning labels as indicated.

Water heater system under pressure. **DO NOT** open enclosure while in operation.

These heaters should never be used to provide "anti-scald" or "anti-chill" service.

Hazardous voltage inside enclosure may result in serious burns or death. Disconnect power supply before performing any work in the enclosure.

Failure to ground this system may result in death or serious injury.

Make sure that all water supply lines have been flushed and then completely turned off before beginning installation. Debris in supply lines can cause valves to malfunction.

CAUTION

Hot pipes! **DO NOT** touch. May cause minor burns.

NOTICE

These heaters **DO NOT** provide protection from supply or outlet pipe freezing.

Consult local building and plumbing codes prior to installation. Should these codes differ from the information in the manual, follow the local codes. Inquire with governing authorities for additional local requirements.

Regular checking and cleaning of the heater's internal components and check stops is necessary for maximum life and proper product function. Periodic inspection and yearly maintenance by a licensed contractor is required. Corrosive water conditions, and/or unauthorized adjustments or repairs could render the heater ineffective for its intended service. Frequency of cleaning and inspection depends upon local water conditions. For heaters with adjustable output temperatures, check and adjust as needed at initial installation and on a quarterly basis.

IMPORTANT

Read this entire installation manual to ensure proper installation. When finished with the installation, file this manual with the owner or maintenance department. Compliance and conformity to local codes and ordinances is the responsibility of the installer. Product warranties may be found under "Resources" on our website at www.laars.com.

Separate parts from packaging and make sure all parts are accounted for before discarding any packaging material. If any parts are missing, do not begin installation until you obtain the missing parts.

Pre-Installation Information

General Information

The H Series Tankless Water Heater provides instant and precise temperature-controlled hot water. To ensure proper performance, install the heater according to the following installation instructions and in compliance with applicable national and local codes.

Flow rates and temperature figures are important for proper sizing. If needed to meet certain temperature demands, flow control devices are readily available. See temperature rise table for specifications. Contact Laars representatives for further information on available flow control devices.

Operation and Setup

H Series heaters supply an unlimited amount of hot water with specific flow and temperature rise capabilities. These heaters are energy efficient, reliable, and provide optimum performance in the most demanding applications.

Application Specific Requirements

The H Series can be used in many different applications that require custom tuning for specific applications to maximize performance of the heater.

For use in a re-circulation loop, the incoming loop temperature should not exceed 140°F (60°C).

For applications utilizing quick close valves or solenoid valves, it is important to install a hammer arrestor or surge tank close to the point of use to absorb pressure spikes.

Installation Considerations

Maximum operating pressure: 150 psi (10 bar)

ASME maximum operating pressure: 160psi (11 bar)

Standard flow activation: 1.5 gpm (5.7 lpm)

Certifications

Electric Tankless Water Heaters are certified by ETL to UL499, cETL listed to CSA-C22 2 No 88 and third party certified to NSF/ANSI 372.

 **WARNING** For safe operation of the heater, observe all the warning labels as indicated.

Storage Instructions

NOTICE! *Keep Electric Tankless Water Heaters stored in original packaging until installation.*

Recommended storage criteria:

Store Electric Tankless Water Heaters where temperatures exceed 35°F (2°C) at all times.

Indoor storage is recommended.

Minimize excessive on-site transport to reduce risk of shock and impact damage.

Packaging

Box dimensions approx: 30" x 15" x 6" (762mm x 381mm x 152mm)

All boxes must be stacked evenly and horizontally.

Safety issues related to packaging:

- Product should be transported with the care associated to packages labeled "FRAGILE" even if packaging is not marked accordingly.
- Standard safety procedures for forklift transport and large items less than 1000lbs (454 kgs) should be followed at all times.

1 Mounting Heater



WARNING HIGH VOLTAGE SHOCK. Disconnect power supply before performing any work inside the heater enclosure.



Installation should be performed by a qualified plumber or electrician.



For best results, install heater as close as possible to the point of use.



Long pipe runs are not recommended. A heat loss of 1°F for every 10ft (3 meters) of uninsulated pipe can occur.



When determining a mounting location, give consideration to the location of the main electrical panel and ensure accessibility of the cabinet enclosure door and other plumbing for service/maintenance.

A

Set heater in a vertical, upright position with the water outlet located at top.



Depending on the application, the unit may also be installed rotated clockwise 90° with the inlet and outlet to the right.

B

Mount heater to the wall using the (4) mounting brackets on the back of the enclosure. Bolt the heater to the vertical surface. Mounting holes are designed for a maximum bolt size of ¼" (6mm) bolt diameter..



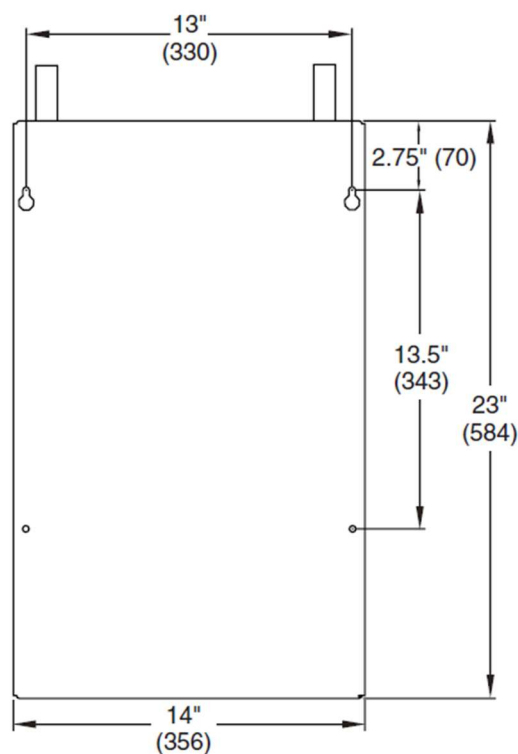
Heater should be mounted on a vertical surface and securely hold a minimum of 45 pounds. Use lead or plastic anchors when mounting directly onto concrete or block walls.

C

Install the pressure and temperature relief valve on hot water outlet immediately following the union.

NOTICE! Valve must empty into a drain.

Side View - Wall Mounting Holes



2 Plumbing Installation

Components Needed:

- (2) Union 3/4"
- Shutoff Valve
- Pressure and Temperature Relief Valve (150 psi/10 bar)
- Y-Strainer (100 mesh) or Inline Filter (150 microns)
- (2) Gate or Ball Type Valves
- Drain pipe
- Water hammer arrestor (recommended)
- Elbows, nipples and fittings as needed

CAUTION To avoid damage to the electronics or internal wiring, do not perform any brazing or sweat soldering inside the enclosure.

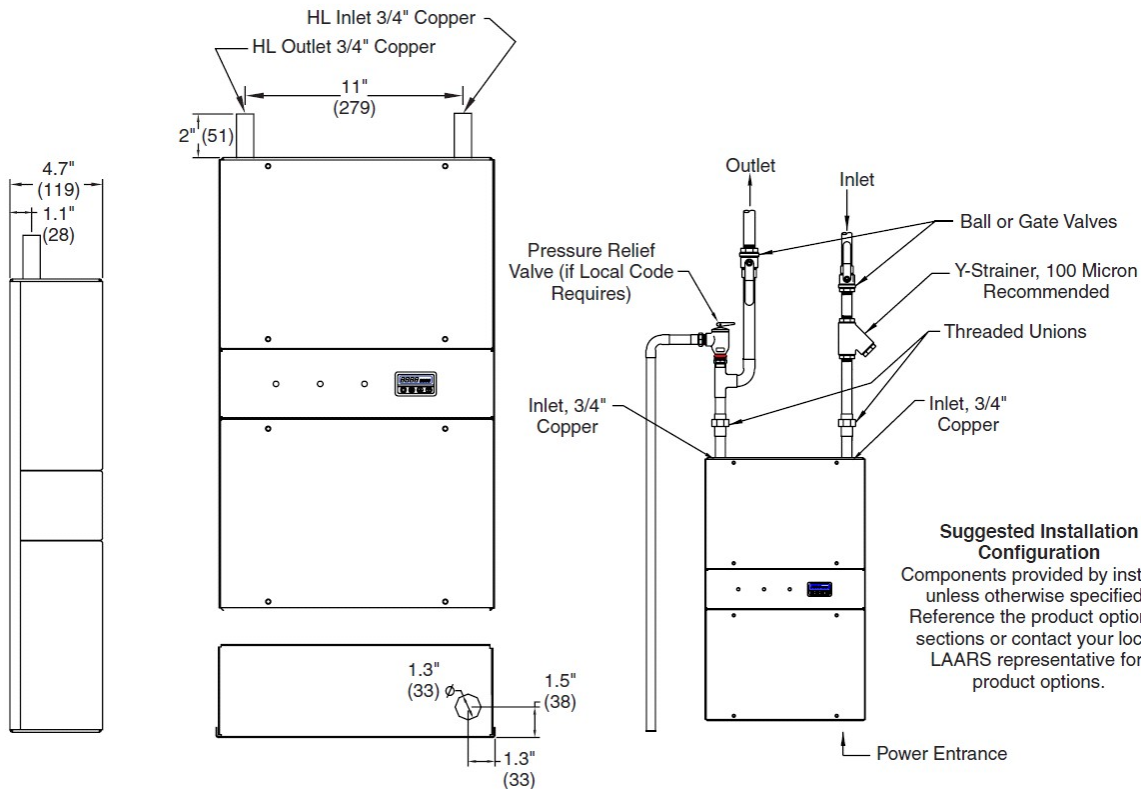
NOTICE! Failure to install proper filtration may result in a flow switch malfunction.

NOTICE! To avoid water damage, install a drain pipe from the pressure relief valve to an unrestricted drain.



If end use fixture is not at the highest point in the plumbing loop, then an automatic air vent valve must be added at the highest point in the system or at any drop to eliminate trapped air.

Dimensions, Plumbing and Electrical Configurations



V Series heaters have 1/2" inlet and outlet and require 1/2" copper tubing.

A

Install shutoff valve above (upstream of) the heater inlet.

Install one union on the water inlet side of the heater and another union upstream of the 100 Mesh (150 micron) y-strainer.

Install one union on the water outlet side of the heater and another after the T & P Relief Valve.

B

Install the pressure relief valve (150 psi/10 bar) and outlet plumbing of heater per code requirements and route relief valve discharge to drain. Make sure no shutoff valve is between the water heater outlet and the relief valve, as well as no shutoff valve between the relief valve discharge and drain. Ensure plumbing is secure and not subject to vibrations.



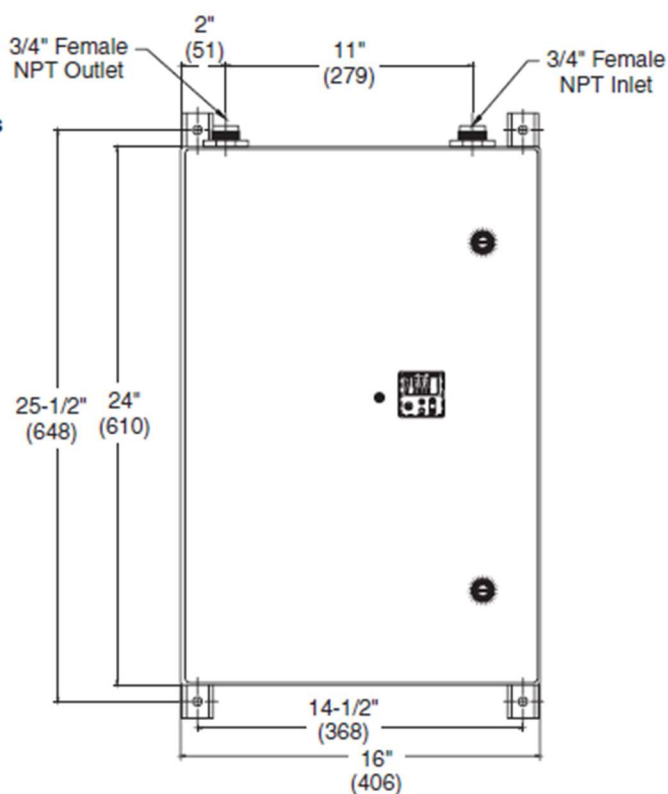
WARNING The heater must be lying flat to do any soldering on the inlet or outlet tubes. Soldering on the inlet or outlet tubes in the upright position can damage internal components. Damage caused by dripping solder or flux can make your heater inoperable.

C

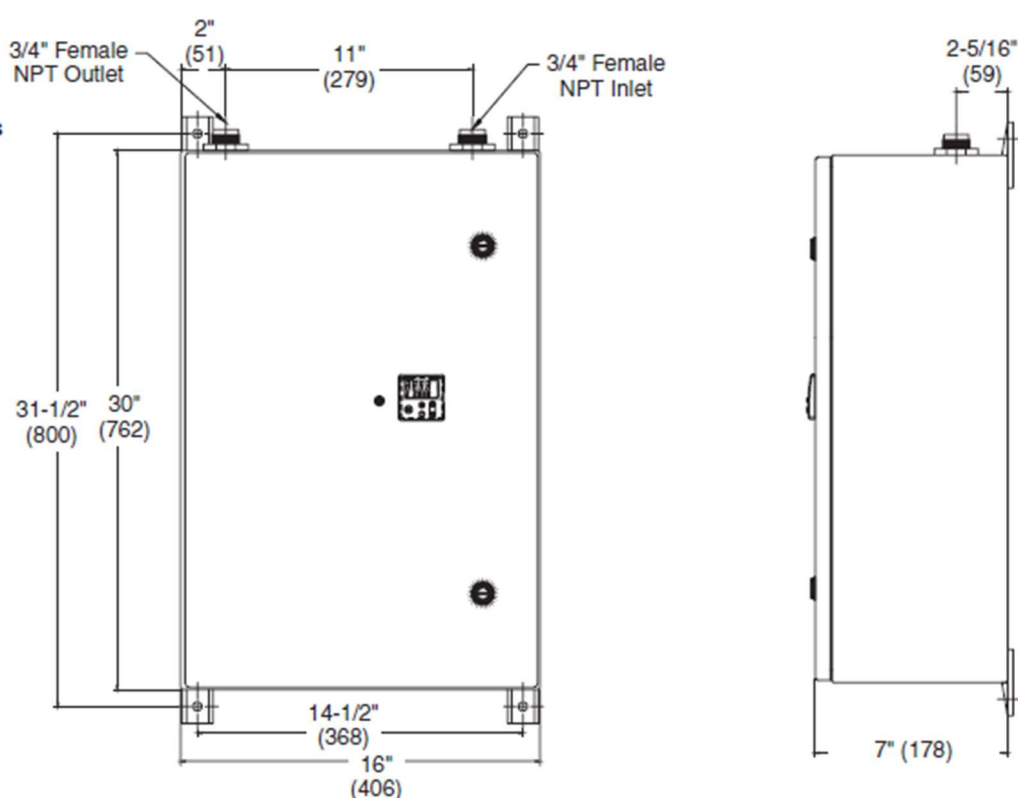
Use 3/4" hard copper tubing or pipe as needed.

2 Plumbing Installation cont...

**Dimensions,
Plumbing
and Electrical
Configurations
NEMA 4/4X
(H Models
5-18kW)**



**Dimensions,
Plumbing
and Electrical
Configurations
NEMA 4/4X
(H Model
25kW)**



3 Electric Installation

- ⚠ WARNING** Install product to rated line voltage in accordance with current local and national codes and regulations.
- ⚠ WARNING** All heaters must be fused in accordance with National Electric Code (NEC) for the full load amperage listed on the nameplate rating for each heater.
- ⚠ WARNING** Failure to properly ground the unit(s) per the National Electric Code could result in injury or death.

A For standard enclosures, remove the four screws and take the bottom cover off. For NEMA 4/4X enclosures, open the enclosure door.

NOTICE! Any option that requires field wiring must be done with 600V cable per the schematic that was shipped with the heater.

NOTICE! Use a 4-core cable or multi-stranded machine tool wire from an approved isolating 3-pole switch or circuit breaker.

NOTICE! Make sure the electrical cable is the correct size to carry 100% of the full load current. See table for proper wire sizes.

B Standard: A pre-cut hole is already sized for conduit connection. Skip to step C.
NEMA 4/4X: Using a hole punch, cut a hole the proper size for the conduit connection; large enough for the wire size for each heater. The connectors need to be rated NEMA 4/4X to ensure proper sealing of the enclosure.

C Run wires through the appropriate size conduit.

D Connect wires to the system terminal block or fused disconnect inside the enclosure.

E Connect the ground wire to the stud provided with the "Ground" label beneath it.

F If unit is ordered with a D1 or DC controller, option, the DB9 connector for hookup on a standard unit is located on the upper left/hinge side of the cabinet. Please review the appropriate Special Instruction & Operation Instructions section for information regarding controller programming and wiring. Proceed to the Start Up Checklist once the steps in the Special Installation & Operation Instructions section have been completed or if you do not have this option.

ELECTRICAL SPECIFICATIONS FOR HEATER

(Single-Phase)

Model	Voltage	Amps	kWatts	Min Wire Size
LCTEH006J	480	13	6	12 AWG*
LCTEH010J	480	21	10	10 AWG*
LCTEH018J	480	38	18	06 AWG*
LCTEH006E	277	22	6	10 AWG*
LCTEH018E	277	65	18	03 AWG*
LCTEH005D	240	21	5	10 AWG*
LCTEH006D	240	25	6	08 AWG*
LCTEH010D	240	42	10	06 AWG*
LCTEH015D	240	63	15	04 AWG*
LCTEH018D	240	75	18	03 AWG*
LCTEH005H	208	24	5	10 AWG*
LCTEH006H	208	29	6	08 AWG*
LCTEH010H	208	48	10	04 AWG*
LCTEH015H	208	72	15	03 AWG*
LCTEH018H	208	87	18	03 AWG*

ELECTRICAL SPECIFICATIONS FOR HEATER

(Three-Phase)

Model	Voltage	Amps	kWatts	Min Wire Size
LCTEH010S	480	13	10	12 AWG*
LCTEH018S	480	22	18	10 AWG*
LCTEH025S	480	51	25	06 AWG*
LCTEH015P	415	21	15	10 AWG*
LCTEH018P	415	26	18	08 AWG*
LCTEH015N	400	22	15	10 AWG*
LCTEH018N	400	26	18	08 AWG*
LCTEH010M	380	16	10	10 AWG*
LCTEH015M	380	23	15	10 AWG*
LCTEH018M	380	28	18	08 AWG*
LCTEH015L	240	36	15	06 AWG*
LCTEH018L	240	43	18	06 AWG*
LCTEH010K	208	28	10	08 AWG*
LCTEH015K	208	42	15	06 AWG*
LCTEH018K	208	50	18	06 AWG*

*Based on the NEC Table 310.15 for 75°C insulated copper wire @ 30°C Ambient. Aluminum wire requires larger gauges.



Not all available (optional) voltages are listed in the table.

4 Start Up Check List

Plumbing

- ☐ System is set in a vertical, level, and upright position with the outlet located at the top. System is mounted to the wall using the (4) mounting brackets on the back of the enclosure or bolted to the floor with the optional leg kit.
- ☐ Confirm installation of shutoff valve above (upstream of) the union on the inlet connection Confirm installation of a Y-strainer (100 mesh screen) or inline filter (150 micron) between the inlet shutoff valve and the heater.
- ☐ Pressure and temperature relief valve is installed on tepid water outlet immediately following the union No valve or restriction is between the relief valve and the system or the relief valve and drain Shutoff valve is installed after pressure and temperature relief valve on outlet if required by local or national plumbing codes.
- ☐ If the hot water process is not at the highest point in the plumbing loop, then an automatic air vent valve must be added at the highest point in the system plumbing loop to eliminate trapped air.

Electrical

- ☐ Verify supply voltage matches the indicated voltage on the Serial Tag. Serial Tag is located within the heater enclosure on the upper left corner of the back plate (mounting plate).
- ☐ Appropriate conduit is installed properly, secured and sealed to unit enclosure per NEC and hazard location requirements.
- ☐ Appropriate conductors for unit routed through conduit and secured to power block inside the enclosure All electrical is installed in accordance with national and local electrical codes, including fuse size and rating.
- ☐ Appropriate earth ground is installed to the lug provided on enclosure backplate.

5 Start Up

 **WARNING** Make sure the circuit breaker for the heater is OFF.

 Be sure that plumbing and electrical are complete per Start Up Check List.


A Slowly turn on water supply to the unit with the enclosure door open and the circuit breaker in the off position.

B Slowly turn on the water outlet valve, activate the connected process requiring heated water (faucet, shower, etc.), then flush the system for 5 minutes to ensure all air is purged from the system.

NOTICE! Failure to bleed air properly will damage elements and cause heater malfunction.


C Turn off the connected process and check the entire system to verify leak-free installation.


D Secure the enclosure cover (standard) or door (NEMA 4/4X).

 NEMA 4 is standard on model LCTEH025.

E Energize the electrical service to the unit by switching on the two or three pole switch or circuit breaker. Unit is now in the ready state.

F Turn on the connected process; observe output temperature rise to setpoint.

 On standard controller, set point and output temperatures are located side by side. On the NEMA 4/4X controller, the top portion of the temperature controller displays output temperature, bottom displays setpoint temperature.

 If unit is ordered with the D1 option, the controller is shipped with this option deactivated. **Contact a Laars representative to get the unlock code to activate the option.**

G When startup is complete, leave the two or three pole switch or circuit breaker in the ON position. The digital display should read ambient temperature and OFF.

6

Digital Controller Operation



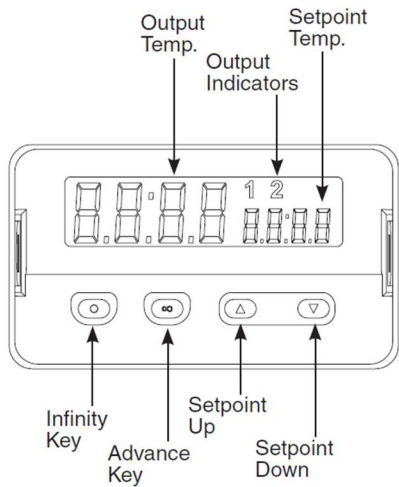
The preprogrammed digital controller is mounted through the bezel on the enclosure door. The digital controller will be powered but the bottom display will read OFF until water is flowing through the heater. The bottom display will then display the setpoint temperature (see Digital Controller Operation section for more information).



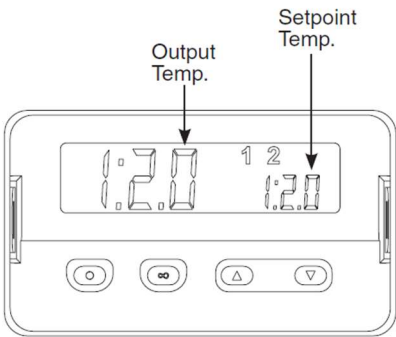
Refer to table and drawings below for instructions on changing the desired set point temperature of the controller.

Keys and Displays	Function
Setpoint Up and Down Buttons	In the Home Page, adjusts the set point in the right display. In other pages, changes the upper display to a higher or lower value, or changes a parameter selection
Infinity Key	Back to Home page
Advance Key	Advances through parameter prompts
Output Indicators (1-5)	Number lights indicate activity of outputs 1 through 5. A flashing light indicates retransmit activity.
Setpoint Temperature (Right Side Display)	Displays: <ul style="list-style-type: none">• Setpoint• Percent Power• Temperature Units °F or °C• Menu Prompt name• Alarm Code
Output Temperature (Left Side Display)	Displays: <ul style="list-style-type: none">• Actual process temp. of outgoing water• Prompt parameter value• Error Code

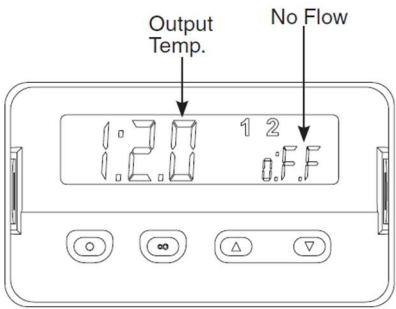
Layout Diagram



ON - Heating



OFF - No Flow



7 NEMA 4/4X Digital Controller Operation



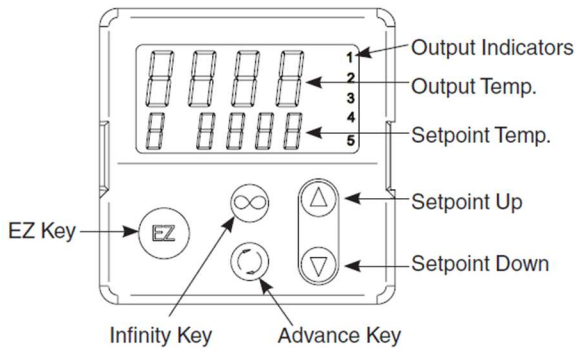
The preprogrammed digital controller is mounted through the bezel on the enclosure door. The digital controller will be powered but the bottom display will read OFF until water is flowing through the heater. The bottom display will then display the setpoint temperature (see Digital Controller Operation section for more information).



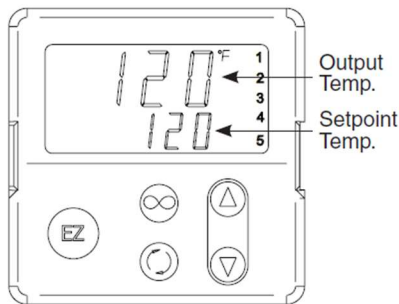
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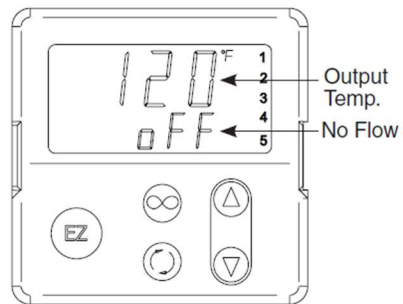
Layout Diagram



ON - Heating



OFF - No Flow



8 Perform Operational Test No. 1

A Set the 3-pole switch or circuit breaker to the ON position.

B Start the water flow through the heater by starting the process or fixture this heater is connected to in order to activate heater.

When flow rate reaches approximately 0.5gpm (1.9lpm), the flow sensor recognizes this condition and begins the heating process.

When the flow switch activates:

- C**
- The display changes from OFF to the output temperature, verifying power supply connection to the heating elements via the triac switches.
 - Element load lights may be solid or flash in unison as heating elements modulate depending on the hot water demand.
 - Digital temperature controller shows water temperature. Additional programming is not necessary.



Ensure the enclosure door is closed prior to performing operation test.

D

Press the up or down arrow keys to adjust the set temperature. The controller displays the temperature of water measured at the outlet.

E

Test water temperature and stability at outlet by viewing the display (in red) the temperature of water exiting the heater.



Heater will not energize heating elements if the inlet water temperature is equal to or greater than the temperature set on the digital controller.

9 Perform Operational Test No. 2

A Turn on hot water faucet/fixture/process. The heater should activate immediately.

B

Turn off hot water faucet/fixture/process. The flow switch will deactivate and shut off power to the heater.



If the water flow exceeds maximum heating capacity of the heater, the temperature of water at the outlet may be lower than the temperature selected on the controller. See table below to determine maximum temperature rise capabilities.

Temperature Rise (GPM & F°)											
208V, 240V, 277V, 480V	kW	1 gpm ΔT °F	1.5 gpm ΔT °F	2 gpm ΔT °F	2.5 gpm ΔT °F	3 gpm ΔT °F	3.5 gpm ΔT °F	4 gpm ΔT °F	5 gpm ΔT °F	6 gpm ΔT °F	7 gpm ΔT °F
LCTEH005	5	34	23	17							
LCTEH006	6	41	27	20							
LCTEH010	10	68	45	34	27	23	20	17			
LCTEH015	15	102	68	51	41	34	29	26			
LCTEH018	18	122	82	61	49	41	35	31			
LCTEH025	25	171	114	85	68	57	49	43	34	28	24
Temperature Rise (LPM & C°)											
208V, 240V, 277V, 480V	kW	3.8 lpm ΔT °C	5.7 lpm ΔT °F	7.6 lpm ΔT °C	9.5 lpm ΔT °C	11.4 lpm ΔT °C	13.3 lpm ΔT °C	15.1 lpm ΔT °C	18.9 lpm ΔT °C	22.7 lpm ΔT °C	26.5 lpm ΔT °C
LCTEH005	5	19	13	9							
LCTEH006	6	23	15	11							
LCTEH010	10	38	25	19	15	13	11	9			
LCTEH015	15	57	38	28	23	19	16	14			
LCTEH018	18	68	46	34	27	23	19	17			
LCTEH025	25	95	63	47	38	31	27	24	19	16	13

Output heating capacity is reduced if these heaters are installed on 415V, 400V, or 380V 3-ph.

Contact a Laars representative to supply this information.

Satisfactory performance of the heater is dependent upon a specific flow rate vs temperature rise capability. If the desired temperature is not achieved, please verify the following:

1. Circuit breaker is on and rated for the maximum power draw.
2. Heater is drawing the proper current for the supply voltage on all three phases.
3. All element load indicator lights are lit (not flashing) indicating maximum power draw and maximum amperage is being drawn.
4. Flow rate and temperature rise in the water heating process are compatible with the heater specifications.
5. Verify there is no additional supply of cold water entering the line downstream of the heater.

Product Options

AL High-Low Temperature Alarm: Alerts user to an over or under temperature situation.

FDS Fused Disconnect: Internal fused disconnect interlocks with enclosure door when energized, prohibiting access to a live cabinet. Select the FDS option for an additional level of safety and convenience at the heater location.

LS (Level Sensor): Prevents accidental dry fire.

T170, T180 & T190 High Temperature Option: High temperatures as indicated (maximum of 170°F/76.7°C, 180°F/82.2°C, 190°F/87.8°C).

D1 Control Interface: Provides 4–20ma communication interface with temperature controller.

DC Control Interface: Is an RS-485 Modbus RTU and allows Building Management Systems to view heater outlet.

TE2 Corrosive Fluid Protection: The TE2 option is a single layer of Xylan Fluoropolymeric coated heat exchanger with bright annealed stainless steel elements, FDA Approved for Food Contact (use in deionized water applications).

N4X (NEMA 4X Enclosure): The optional NEMA 4X corrosion resistant enclosure is designed for harsher environments and made from 16 gauge 304 stainless steel.

N4 (NEMA 4 Enclosure): The optional 18 gauge, NEMA 4 enclosure with ANSI61 gray, corrosion resistant paint.



NEMA 4 is standard on model LCTEH025.

Maintenance

Preventative maintenance is important for optimal performance of the heater. To ensure the heater works properly, always keep the inside of the enclosure dry. Moisture inside an enclosure increases the humidity, which condenses on cooler surfaces. This can cause electrical problems and reduce the efficiency of enclosure insulation. To prevent problems, perform the following:

- Verify the interior of the enclosure is dry.
- Verify there are no leaks in seals of enclosure and that in high humidity environments all enclosure egresses are properly sealed.
- Ensure plugs are in place on back side of enclosure.
- Check seals monthly during temperatures above 32°F (0°C) and weekly during temperatures below 32°F (0°C).
- Bimetal manual reset safeties are set to trip at 175°F (79°C). If this temperature is reached, the bimetal manual safeties will trip and need to be reset.
- All heaters require filtration of 150 microns or smaller to ensure proper operation. Y-strainers or additional filtration should be verified and cleaned at least every 6 months or more often in areas where hard water sediment is present in the water.

To clean the Y-Strainer:

1. Turn the power off at the circuit breaker panel.
 2. Shut off the installer supplied cold water isolation valve to the heater.
 3. Relieve pressure in the plumbing lines.
 4. Position a bucket under the cold water inlet to catch any water that may still be in the pipe.
 5. Loosen the plumbing connection on the Y-strainer to get to the screen.
 6. Remove screen and clean out debris. Use a wire brush to clean smaller particles from the screen.
 7. Once the screen is clean, put it back into the Y-strainer housing and secure the plumbing connection.
 8. Before switching the power back on, bleed the air out of the lines by turning heater water supply back on and the plumbing fixture or process farthest from the heater.
 9. With the air purged, turn on all circuit breakers supplying the water heater.
- At the same time the Y-strainer or additional filtration is cleaned, it is a good practice to also check all valves connected to the system. With no water flow through the heater, work both the inlet ball valves and the outlet gate valves open and shut to break up any calcium deposits that may have formed from the valve being open for an extended period of time. Power to the heater does not need to be turned off to do this.

Troubleshooting for Controller

Problem	Solution
No Power	Verify power is on.
	Turn power off. Check continuity of all internal fuses in control transformer, heating elements or optional fused disconnect circuits.
	Check all field service circuit breakers or fuses.
	Check system temperature limit control to make sure it has not activated due to excessive heat exchanger temperature or faulty sensor.
	Turn power off. Check for loose or disconnected wires.
	Check the incoming service connection. Voltage must match name plate rated voltage. Labels are located on the upper left of back plate (Serial Number Label).
Alarms do not occur.	Make sure alarm set points are correct.
	Make sure alarm is not latched.
	Make sure alarm side settings are correct.
	Make sure alarm type settings are correct.
	Make sure alarm controller is not in diagnostic mode.
Alarms do not clear.	Check power limit setting.
	Check operation mode.
	Check alarm output function.
	Check temperature setting.

Basic Troubleshooting

Problem	Solution
The heater does not work or works intermittently.	<ol style="list-style-type: none"> 1. Flow switch works properly. 2. At the wires from the flow switch, ohm meter should read Open without flow and Closed with flow. 3. Water flow through the heater is adequate to activate the flow switch at 0.5 gpm (1.9 lpm) or at the low flow options of 0.15 (0.6 lpm) or 0.25 (0.9 lpm) gpm. 4. Heater is wired with the proper breaker and wire size. 5. Refer to Electrical Specifications for Heater table in section 3 for proper requirements. <p>Unit is receiving voltage from all three phases of the power source. A load voltage reading is also helpful.</p>



Turn power OFF before recording any Ohm readings.

If the above steps do not solve the problem, some additional checks may be performed. Follow the schematic to perform the following continuity checks:

- ☐ High temperature bimetals (Manual Reset Safeties).
- ☐ Optional ground fault breaker must be in the closed position for the unit to work.
- ☐ All internal breakers must be in the ON position for the unit to work.

For additional information on Troubleshooting or other information, contact Laars Technical Support.

Please have Model No. and Serial No. available when seeking technical assistance. Serial No. tag is located in the enclosure on the upper left hand corner of the back plate.

Please record and maintain this information at all times:


H Series Model No. _____

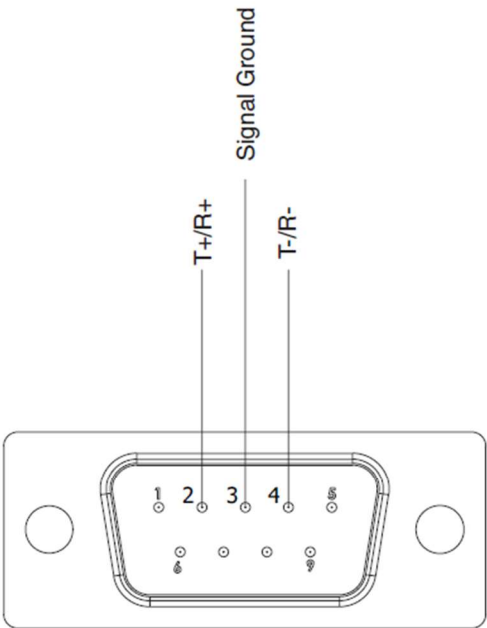
Serial No. _____

Special Installation and Operating Instructions

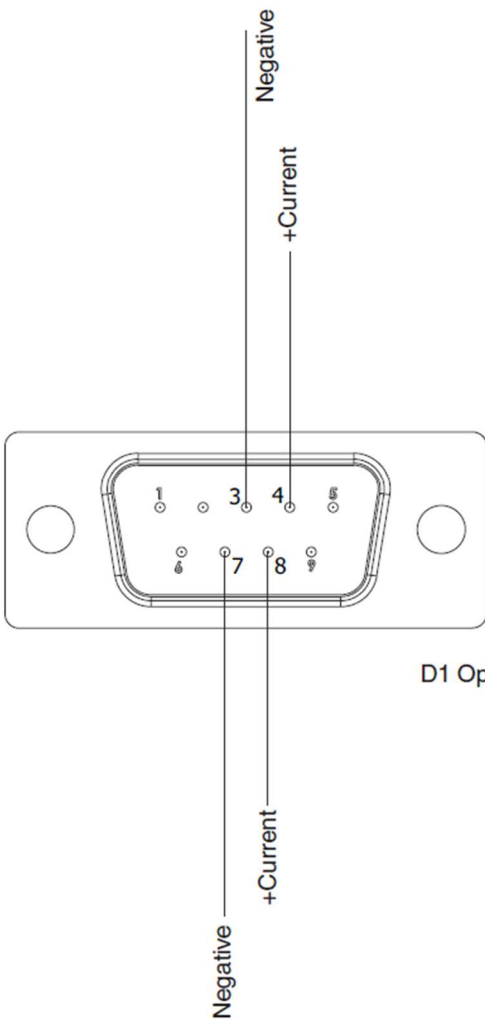
Tankless Water Heaters with Optional D1 or DC Controller Options

Pin-Out Diagram for Electrical Wiring

 The controller is shipped with the D1 option deactivated. Contact Laars to get the unlock code to activate the option.



DC Option Pin-Out



D1 Option Pin Out

DC Option Pin-Out		
Pin	Name	Description
2	T+/R+	RS-485 Transmit/Receive Non-Inverting Input/Output
3	Signal Ground	Signal Ground
4	T-/R-	RS-485 Transmit/Receive Inverting Input/Output
1, 5, 6-9	--	No Connection

D1 Option Pin-Out		
Pin	Name	Description
3	Negative	Return Current Path for +Current, Pin 4
4	+Current	Supply 4-20mA Current to Set Heater Temperature
7	Negative	Return Current Path for +Current, Pin 8
8	+Current	Supply 40-20mA Current to Monitor Heater Temperature
1, 2, 5, 6, 9		No Connection

Table of Parameters for DC Option: RS-485 Modbus

Parameter Name	Range	Map 1	Map 2	Default	Data Type	Read/ Write	H Series Meaning
Analog Input	-1999.000 to 9999.000 °F -1128.000 to 5537.000 °C	360	360	--	Float	R	Process Value
Analog Input Error	None (61) Open (65) Fail (32) Shorted (127) Measurement Error (140) Bad Calibration Data (139) Ambient Error (9) RTD Error (141) Not Sourced (246)	362	362	None	UINT	R	Process Value Sensor Error
Calibration Offset	-1999.000 to 9999.000 °F -1128.000 to 5537.000 °C	382	382	Factory Set	Float	RWES	Process Value Calibration
Digital in 5	Inactive (41) Active (5)	1328	1568	--	UINT	R	Flow Activation
Digital out 6	Off (62) On (63)	1042	1162	--	UINT	R	AL Only Alarm Status
EZ-KEY	Inactive (41) Active (5)	1328	1608	--	UINT	R	EZ-Key
Control Mode Active	Off (62) Auto (10) Manual (54)	1882	2362	Auto	UINT	R	Control Loop Mode
Heat Power	0.0 to 100.0%	1904	2384	--	Float	R	Duty Cycle Output %
Set Point	-1999.000 to 9999.000 °F -1128.000 to 5537.000 °C	2172	2652	--	Float	R	Heater Set Point
Remote Set Point	No (59) Yes (106)	220	2680	No	UINT	RWES	Remote Set Point Enable
Remote Set Point Type	Auto (10) Manual (54)	2202	2682	No	UINT	RWES	Remote Set Point Control Mode
Process Value	-1999.000 to 9999.000 °F -1128.000 to 5537.000 °C	402	402		Float	R	Process Value
Control Mode	OFF (62) Auto (10) Manual (54)	1880	2360	Auto	UINT	RWES	Control Loop Mode
Close Loop Set Point	40-160 std 40-170 T170 Option 40-180 T180 Option 40-190 T190 Option	2160	2640	Factory Set	Float	RWES	Heater Set Point
Open Loop Set Point	0 to 100.0%	2162	2642	--	UINT	RWES	Manual Mode Set Point
Display Units	Fahrenheit (30) Celsius (15)	1838	2308	°F	UINT	RWES	Controller Display Units
Address Modbus	1-247	2482	2962	1	UINT	RWE	Modbus Address
Baud Rate	9600 (188) 19200 (189) 38400 (190)	2484	2964	9600	UINT	RWE	Modbus Baud Rate
Parity Modbus	None (61) Even (191) Odd (192)	2486	2966	None	UINT	RWE	Modbus Parity
Modbus Units	Fahrenheit (30) Celsius (15)	2490	2970	°F	UINT	RWE	Communication Units
Modbus Word Order	Low-High (1331) High-Low (1330)	2488	2968	Low-High	UINT	RWE	Modbus Word Order
Non-Volatile Save	Yes (106) No (59)	2494	2974	Yes	UINT	RWE	If set to yes, all values to the control will be saved from EEPROM

NOTICE! For adjusting Modbus address, baud rate and parity, customer needs to set on controller per manufacturer's (Watlow) manual.

Legend

Uint=Unsigned 16 bit int string=ASCII (8 bit per character)
Dint=Long 32 bit float=IEEE 754 32 bit
RWES=Readable, Writeable, EEPROM (saved), User Set (saved)