



# **LAARS E-THERM™**

**ELECTRIC AIR SOURCE  
HEAT PUMP WATER HEATER**

**CO<sub>2</sub> NATURAL REFRIGERANT**

**PLUG-AND-PLAY DESIGN**

**LAARS®**   
**Heating Systems Company**

**COMMERCIAL ELECTRIC HEAT PUMP  
COLD CLIMATE EQUIPPED**

# LAARS E-THERM<sup>TM</sup> ADVANTAGE

The Laars E-Therm<sup>TM</sup> is a fully packaged, commercial Air-to-Water Heat Pump water heater with a nominal heating capacity of 325,000 Btu/hr. (95kW) and a COP of 4 at AHRI standard 1300 test conditions. The Laars E-Therm uses R744 (CO<sub>2</sub>), a natural refrigerant, which allows the unit to operate well at very cold or warm incoming air temperatures.

The Laars E-Therm can easily output sanitizing hot water temperatures of 180°F across a wide operational range. An advanced control system allows for up to 16 Laars E-Therm heat pumps to be joined into a high output domestic water heating system. Laars E-Therm heat pumps can easily be paired with the Laars heat pump ready storage tank system.



## UNPARALLELED PERFORMANCE

- COP efficiency of 4.0 at AHRI standard 1300 test conditions



## COLD CLIMATE EQUIPPED

- Can operate down to 0°F incoming air temperatures with a COP greater than 1.0
- Many traditional chemical refrigerant-based systems cannot operate below 35°F



## SANITIZING HOT WATER

- Can output sanitizing hot water, up to 180°F, including in cold climates



## ENVIRONMENTALLY RESPONSIBLE DESIGN

- Natural Refrigerant R744, CO<sub>2</sub>
- Global warming potential of 1.0
- Ozone depletion potential of zero



## FUTURE PROOF, SAFE REFRIGERANT

- Natural Refrigerant CO<sub>2</sub> will not be "phased out" over time like chemical-based systems
- R744 CO<sub>2</sub> is a Non-flammable and non-toxic refrigerant



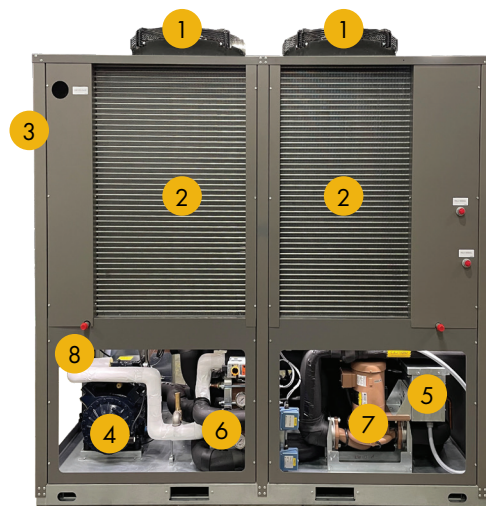
## DURABLE, THOUGHTFUL DESIGN

- Double walled gas cooler/heat exchanger, and domestic water pump included
- Evaporator corrosion protective coating option for coastal or heavily polluted areas
- Energy saving ECM fans
- Indoor or outdoor installations

# PLUG & PLAY BY DESIGN

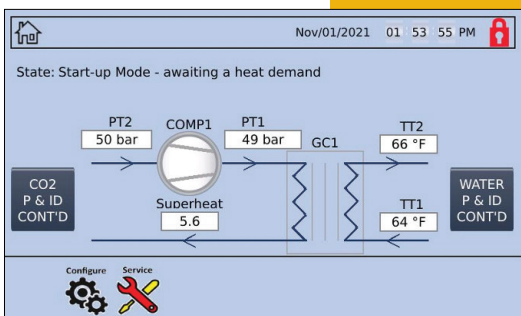
Laars E-Therm™ air-to-water heat pumps include everything needed for a “plug-and-play” installation. Unlike other units on the market, the Laars E-Therm comes pre-charged with CO<sub>2</sub> refrigerant, includes a double-wall gas cooler, DHW pump, and refrigerant expansion tank. Pulling this all together is an intuitive to use, powerful control system – the Laars Linc® control platform. Simply supply electricity and hook up your water connections to your storage, and the Laars E-Therm is ready to go!

1. Axial Fans
2. Evaporators
3. High voltage control panel
4. Compressor
5. Expansion Valve
6. Double wall gas cooler
7. DHW pump
8. Variable frequency drive
9. Low voltage control panel
10. Large, easy to navigate, touch screen
11. CO<sub>2</sub> expansion tank

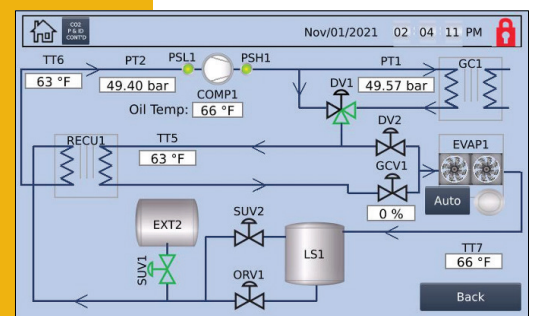


## LAARS LINC®

ADVANCED EASE OF USE FUNCTIONALITY

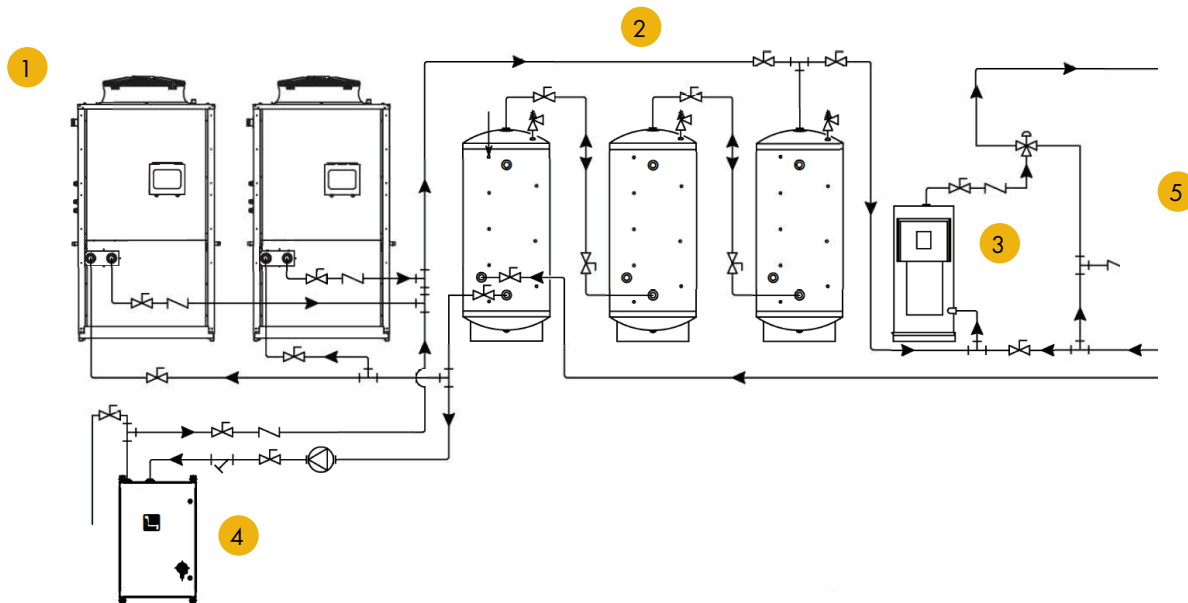


Powerful control logic is easily managed via icon driven, touch screen technology. The result is an intuitive to use control system with the intelligence to manage installations from the simple to the complex.



- Cascade up to 16 units to form large heating plant
- Easy to understand P&ID layout with operational status clearly displayed
- On screen informational “info boxes” that expand on functionality, operational status, and trouble shooting details
- Building Automation Systems connectivity via Bacnet or Modbus
- Plug-and-Play via Laars Linc® Pro-I/O™ tank system control for advanced tank farm integration
- Optimize storage tank performance via 5 sensors that monitor the tank farm's stratification temperature profile. Laars Linc then adjusts heat pump output to ideally balance tank target temperatures
- Utility Demand Response interoperability via CTA-2045 protocol, aka “grid connected”

# TYPICAL THERMAL STORAGE SYSTEM



- 1 Laars E-Therm™ Commercial Air-to-Water Heat Pumps:** Can be installed as a single unit or paired with multiple units to best meet the hot water demand profile of your application. Typically, the heat pump(s) will operate the majority of the day, efficiently charging an array of storage tanks over time. Hot water will be drawn from the tanks to meet the variable load. Heat pumps will turn on or off based on tank temperature set points that are monitored via sensors placed within the storage tank array.
- 2 Laars Heat Pump Ready Stratified Tanks:** Serve several purposes; storage volume, temperature stratification, and space management. A large amount of stored hot water is needed to meet peak demand. Utilizing multiple tanks allows the overall space requirement to be customized per location. Tank temperatures are maintained such that the hottest water is always available at the tank feeding the distribution loop piping.
- 3 Laars Temperature Maintenance Tanks:** For applications that maintain a distribution loop temperature, a temperature maintenance tank is required. An electric resistance storage water heater is ideal for this purpose as the required heat input is much lower than that of the full system. The temperature maintenance tank holds only what is required to keep the distribution loop at setpoint, maximizing the efficiency of the total system.
- 4 Full Electric Heat Pump Back-up with Laars Commercial Electric Tankless Water Heaters:** These units can engage whenever the heat pumps cannot keep up with hot water demand. Whether it is due to an extreme cold weather condition or if a heat pump is non-operational. Rest assured that enough hot water can be generated for full hot water production. A similar back-up system can also be deployed with the use of gas fired volume water heaters if desired.
- 5 System Loop Performance:** The heat pump system feeds into a building distribution loop or process loop if in an industrial or other commercial application. When a hot water demand is being met, hot water from the heat pump system is mixed with incoming cold-water supply to reach the required loop temperature. When no demand is present, but the loop temperature falls below the setpoint, hot water from the temperature maintenance tank circulates through the loop until the temperature setpoint is met. Understanding system demand requirements and load profile throughout the day is key to proper system sizing.



# LAARS THERMAL STORAGE MAJOR COMPONENTS



**Laars Stratified Storage Tanks for Heat Pump Systems** are designed specifically to optimize installed heat pump system performance. Pipe tapings are located at the ideal locations to promote proper temperature stratification to maximize energy efficiency.

Tanks are offered in carbon steel with an exclusive, corrosion-resistant enamel coating or in stainless steel materials such as 316L or Duplex for long service life. A 2-1/4" insulating high-density polyurethane foam and acrylic top coat is applied for increased energy savings.

Typical tank configurations include multiple 340-gallon, 500-gallon, or 1000-gallon tanks that are piped to maximize temperature stratification.



**Included Laars-Jet® Stainless-Steel Diffusers** greatly reduce the velocity and turbulence of incoming water at the top and bottom of the storage tank. By minimizing turbulence, desirable thermal stratification inside the storage tank is preserved. The result is an efficient and automatic migration of usable hot water whenever there is a draw from the storage tank.



**Laars Electric Temperature Maintenance Tanks** are available in a wide range of kW inputs with typical storage sizes of 200 and 300 gallons to meet the needs of most any temperature maintenance loop or process.

These field proven electric water heaters are designed with the required connections to properly pipe with high efficiency heat pump systems, are 150 psi ASME rated, and approved for 180°F operation.

Tanks are offered in carbon steel with an exclusive, corrosion-resistant enamel coating that is bonded to the interior surfaces at 1600°F for long life operation. High density open cell foam insulation is used to minimize heat loss, allowing a maximum of 4 watts per square foot of tank surface energy loss.



**Laars Expansion Bladder Tanks** are used to help eliminate the expansion forces caused by heating and cooling of pressurized water systems. A heavy-duty replaceable NSF 61 butyl rubber bladder keeps the system water separate from the tank, eliminating tank corrosion. The expansion tanks designed for commercial potable water applications are available in glass lined carbon steel or stainless steel, and can be manufactured with insulating foam and topcoat for increased energy savings.



**LaarsLinc® Pro-I/O™ Tank System Control** is another "plug-and-play" feature available with the Laars E-Therm® Heat Pump offering. The LaarsLinc® Pro-I/O™ panel is a location to neatly organize all sensors and related inputs and outputs from the tank farm. Data is sent to the heat pump via an Ethernet cable and all heat pump functions can be accessed via the built in touch screen user interface. Ideal for installations where the tanks are located far from the heat pumps or when deployed within a demand response utility program.

# APPLICATION

## DOMESTIC HOT WATER

### TYPICAL APPLICATIONS

- Multi-Family  
*Condos, Apartments, etc.*
- Universities, Dormitories, & Schools
- Hotels
- Senior Living
- Hospitals / Healthcare
- Office Buildings
- Prisons
- Industrial



## BENEFITS OF USING LAARS E-THERM™ TECHNOLOGY

**Reduce Operational Energy Costs:** High COP efficiencies result in greatly reduced electrical usage as compared to electric resistance systems.

**Meet Governmental Requirements:** State, Provincial, and municipal decarbonization goals are driving towards highly efficient electrical heating solutions. The Laars E-Therm heat pump is ideally suited to meet the requirements of “electrification”.

**Minimize Carbon Emissions:** Heat pumps offer site free emissions and, due to operational efficiencies up to 5 times that of traditional electric resistance heating, further reduce their carbon footprint by using much less electricity to produce the same amount of hot water.

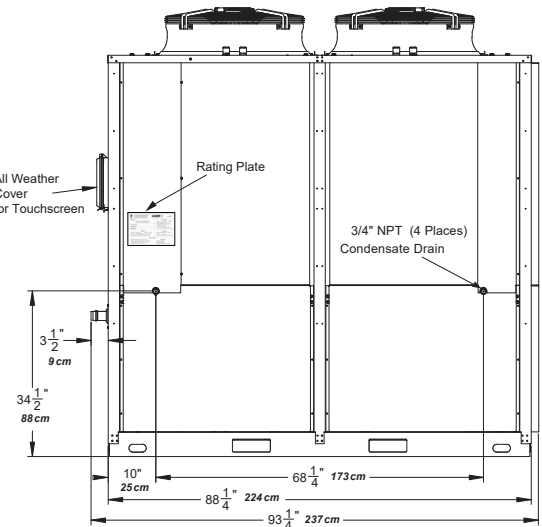
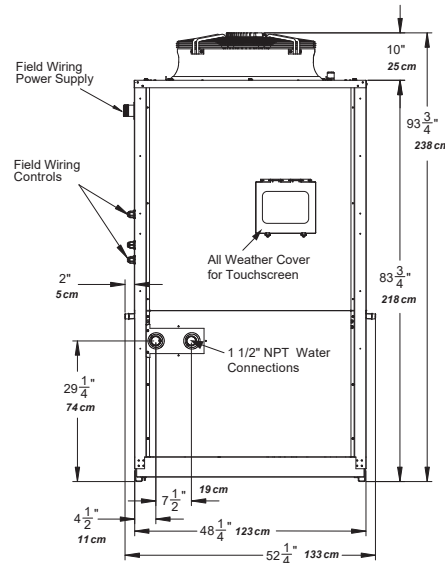
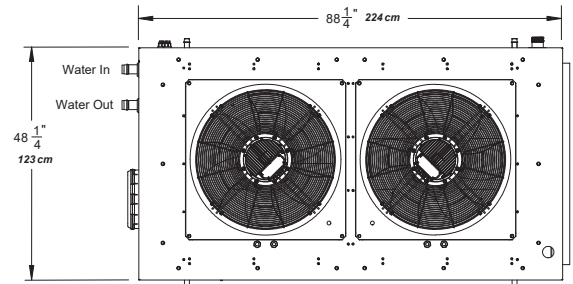
**Participate in Demand Response Programs:** Many utilities use Load Shifting strategies to better manage their supply of electricity by shifting use from high demand periods to lower demand periods when possible. Utilities offer incentivized pricing to those that participate. The Laars E-Therm control utilizes the CTA-2045 protocol to communicate with utility demand response systems.

**Value Engineered Hybrid Heating Systems:** To provide system flexibility, system redundancy, or to enhance hot water production in extremely cold climates a hybrid system may be the solution of choice. Laars can offer a full range of gas fired or electric resistance water heaters to supplement Laars E-Therm heat pump hot water production.

# HEAT PUMP SPECIFICATIONS

Nominal Heating Capacity	Per AHRI Standard 1300	322 MBH	94.5 kW
Nominal COP	Per AHRI Standard 1300	4.0	
Domestic Hot Water Data	Maximum Outlet Temp Range	120°F to 180°F	49°C to 82°C
	Flow Rate Range	2.8 gpm to 15 gpm	10.5 to 57.8 lpm
Operating Conditions	Inlet Water Pressure, Maximum	150 psi	21.8 kPa
	Inlet Water Temp Range	38°F to 95°F	3°C to 32°C
	Entering Air Temp Range	0°F to 115°F	-18°C to 46°C
	Ambient Temp Range	0°F to 115°F	-18°C to 46°C
Electrical Data	Voltage	480V	
	Phase	3-Phase	
	MCA	70 A	
	MOP	110 A	
	FLA	58 A	
Refrigerant	Type	R744 (CO2)	
	Refrigerant Charge	50 lbs.	22.7 kg
	Discharge Pressure, Maximum	1740 psi	120 bar
	Suction Pressure, Maximum	1088 psi	75 bar
Defrost Type		Hot Gas Bypass	
Sound Level, A-Weighted Average	dB(A) @ 1 meter	76 dB(A)	
Sound Level, A-Weighted Average	dB(A) @ 4 meter	67 dB(A)	
Fan	Type (Qty)	Axial (2)	
	Maximum Total Air Flow Rate	26000 cfm	12271 lps
Gas Cooler / DHW Heat Exchanger	Type	Double Wall	
	Material, Portable Side	Stainless Steel	

Product Operating Weight		3080 lbs.	1397 kg
Product Shipping Weight		3820 lbs.	1733 kg
Dimensions	Height	93 ¾"	238 cm
	Width	52 ¼"	133 cm
	Length	93 ¼"	237 cm
Connections	Water Inlet	1 ½" NPT	
	Water Outlet	1 ½" NPT	
	Condensate Drains (4)	¾" NPT	





Check out our Full Line of Commercial Electric Products  
Electric Heat Pumps, Water Heaters, Boilers, and Storage Tanks



Learn more  
about the  
Laars E-Therm

**LAARS®**  
*Heating Systems Company*

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