

THERMOELECTRIC PRODUCTS

Catalog NO.

Liquid Chillers

14.1

A large, light blue, stylized snowflake graphic is centered in the background of the page. It has a complex, symmetrical design with multiple branches and smaller sub-branches, resembling a snowflake or a crystalline structure. The snowflake is semi-transparent, allowing the text and other elements to be seen through it.

Uteca

What We Stand On

Our mission

TECA's fundamental purpose is to provide world-class products of superior quality. Our goal is to continue setting the standard in thermoelectric cooling by monitoring and improving our operations to meet our customers' needs and exceed their expectations.

A former division of Borg-Warner, **TECA** was spun-off as an independent company in 1984.

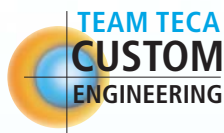
Today the Chicago-based corporation manufactures a wide range of solid state cooling products, including air-cooled and liquid-cooled air conditioners, cold plates, and liquid chillers.

Our guiding principles

Quality is our top priority. We are "**TEAM TECA**," recognizing that our success depends upon the involvement, commitment, and performance of every team member, including suppliers.

How to use this catalog

We hope you'll view this catalog as a working guide to the possibilities of thermoelectric cooling. We've included a foundation of information designed to help you think about the applications for your company, in addition to detailed descriptions of the off-the-shelf products we offer.



Our solutions

We can fulfill all of your cooling requirements, whatever your application. In fact, our engineers may have already developed a solution for an application similar to yours.

We offer complete engineering services, prototype development, and custom-built cooling equipment on an exclusive and confidential basis, enabling us to meet the needs of all our customers, including those in the Original Equipment Market.

We will continue to focus our efforts on the people we serve and the products we produce in order to ensure quality without sacrificing health, safety, or the environment in which we live.

TECA web site

There are numerous things you can get from the web site that you cannot get from this catalog! www.thermoelectric.com

- Drawings and 3D solid model of most products.
- Product Information Packets are downloadable. These are the installation and service documents and schematics which are shipped with the products when you buy them.
- Example applications.
- This catalog is downloadable, so you can print pages or sections of interest for your own use.
- The site is often updated with news and other current items of interest ...articles, stories, links, etc.
- Teca Sizing Software is downloadable. This is a handy, easy to use program which is very helpful in choosing air conditioners of the appropriate capacity for your job.

General Information

Thermoelectric Technology
Product notes
TLC Notes
Ratings & Curves

Liquid Chillers

TLC-1400
TLC-900
TLC-1200
TLC-700
RLC-1800
RLC-900
RLC-1400
TLC³

Liquid Chiller Accessories

Temperature Controllers

TC-4600
TC-3400
Relay Pack
Temperature Control Accessories
Power Supplies

Please keep in mind that we are always willing and available to customize existing products or to design and build new products to meet your needs.

Call us at 888-TECA-USA – we're here to help!

888-832-2872

Thermoelectric Technology

The Peltier Effect

Thermoelectric cooling, is a solid-state method of heat transfer through dissimilar semiconductor materials.

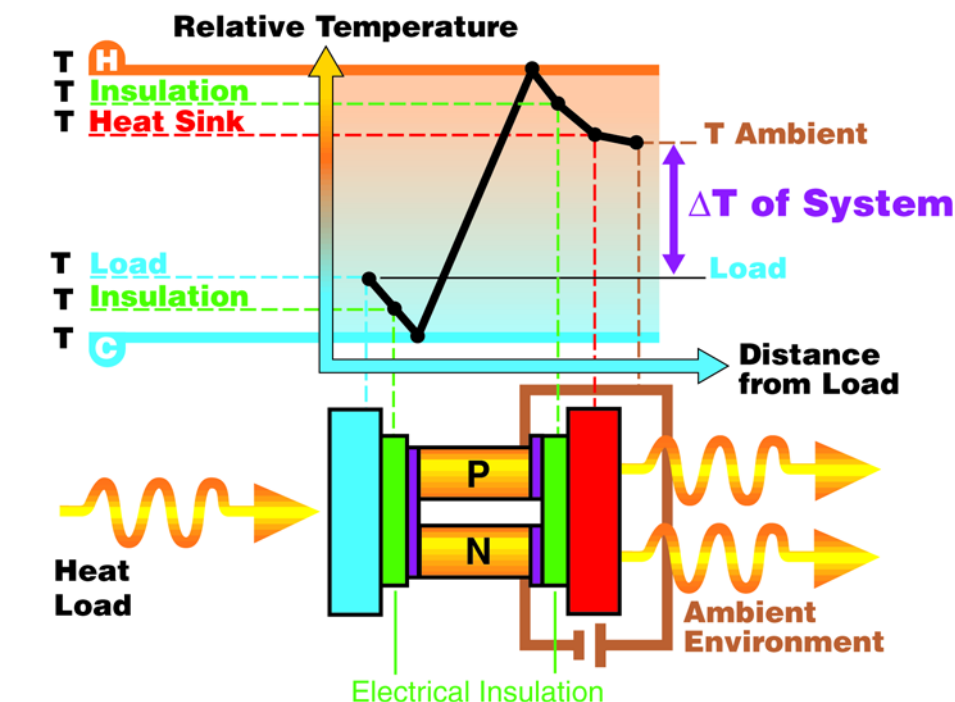
It is also called "the Peltier Effect" after the French watchmaker who discovered the phenomenon in the early 19th century. Like their conventional refrigeration counterparts, thermoelectric cooling systems obey the basic laws of thermodynamics. However, the actual system for cooling is different.

In a conventional refrigeration system, the main working parts are the evaporator, condenser, and compressor.

The evaporator surface is where the liquid refrigerant boils, changes to vapor, and absorbs heat energy. The compressor circulates the refrigerant and applies enough pressure to increase the temperature of the refrigerant above ambient level. The condenser helps discharge the absorbed heat into surrounding room air.

The three main working parts in a thermoelectric refrigeration system are a cold junction, a heat sink, and a DC power source.

Two dissimilar conductors replace the refrigerant in both liquid and vapor form. The cold sink (evaporator surface) becomes cold through absorption of energy by the electrons as they pass from one semiconductor to another, instead of energy absorption by the refrigerant as it changes from liquid to vapor. The DC power source pumps the electrons from one semiconductor to another, and the heat sink (condenser) discharges the accumulated heat energy from the system.



Therefore, the thermoelectric cooling system refrigerates without refrigerant and without the use of mechanical devices, except perhaps in the auxiliary sense.

The semiconductor materials used in thermoelectric cooling are N and P type, named because they either have more electrons than necessary to complete a perfect molecular lattice structure (N-type) or not enough electrons (P-type). The extra electrons in the

N-type material and the holes left in the P-type material are called "carriers," responsible for moving the heat energy from the cold to the hot junction. Good thermoelectric semiconductor materials such as bismuth telluride greatly impede conventional heat conduction from hot to cold areas, yet provide an easy flow for the carriers.

Product Notes

Liquid Chillers:

TECA offers benchtop and rack mount recirculating liquid chillers. Benchtop liquid chillers have a small footprint and are designed as stand alone units. Rack mount liquid chillers are designed to mount into a standard 19" rack. All models are air-cooled thermoelectric liquid chillers for closed loop recirculating systems. Some include pump, reservoir and temperature control, others are work-horse coolers meant to work inside your product, system or process. Various cooling capacities, input voltage and features (such as heat and temperature control options) are available.

TLC

1400

HC

TLC

Bench top air cooled liquid chillers, for closed loop recirculating systems. These liquid chillers are stand alone units, with integral power supply, reservoir, pump and temperature controller.

RLC

Rack mount air cooled liquid chillers, for closed loop recirculating systems. These liquid chillers are similar to TLC (bench top) liquid chillers, built on standard 19" rack.

FAMILY	COOLING CAPACITY (Watts)	INPUT VOLTAGE	TLC OVERALL DIMENSION (inches)	RLC OVERALL DIMENSION (inches)
1800	620	100-240 VAC		19 X 10.5 X 24
1400	410	120 VAC; 240 VAC	14.3 X 13.1 X 12.3	19 X 8.75 X 24
900	310 - 360	100-240 VAC	7.6 X 16.3 X 15.5	19 X 8.75 X 24
1200	160 - 190	24 VDC	15 X 7.3 X 6.1	
702	215	240 VAC	7.2 X 13.1 X 15.7	
700	215	120 VAC	7.2 X 13.1 X 12.3	
CUBE	100 - 360	24 VDC	VARIES	

OPTIONAL HEATING FUNCTION

HC

Denotes the heat/cool functionality of the unit. Applies to TLC-1400, TLC-1200, TLC-700, TLC-702 and RLC-1400. Heating is standard on TLC-900, RLC-900 and RLC-1800.

Liquid Chiller Notes

Things you need to know to start sizing a liquid chiller:

Temperatures: The ambient temperature is the air temperature around the liquid chiller. The desired temperature is the fluid temperature at the outlet or at a location at the item being cooled. The difference between the two is the design temperature differential (ΔT). Typically the fluid temperature has to be a little cooler than the item being cooled. Make sure to include any gradients from the fluid to the test item. Also include any increase or decrease in the fluid due to the hoses. While these differences are typically small large hose lengths and poor thermal coupling between the fluid and the device under test can increase them.

Heat Loads Active and Ambient: We define an active load as any source of heat. Waste electric heat or exothermic reactions are examples. Loads can also be related to the specific heat of a sample when cycle times are important. Ambient loads are caused by the temperature differential between the ambient and the fluid in the hoses and the device under test. Uninsulated hoses and test items will have higher ambient loads than insulated ones. These values are often difficult to estimate but quickly measured.

Performance Curves: The total load and temperature differential (ΔT) can be applied to the performance curves of the liquid chillers to determine if the capacity is sufficient.

Fluid flow requirements: What flow rate is required? What is the pressure drop at that flow rate? Will the hoses significantly affect the pressure drop? Graphs of the flow vs. pressure drop are available for each liquid chiller.

Things you should consider when selecting a liquid chiller:

Purpose: What is the real need for cooling: maintaining electronics temperatures, precision temperature control, maintaining sample temperatures, cooling a process, temperature cycling? Is this a laboratory or industrial setting? Do I need portability? Is this an OEM application where the chiller must be packaged into your product? Answering these questions will help in selecting the correct liquid for your application.

Temperature Control: Some applications simply require cooling with no fancy temperature controls. The TLC-1200 and the TLC Cubed products often best fit these needs. When better control and more control features are needed the TLC-700 and TLC-900 are used. The TLC-900 has a remote sensor feature standard allowing you to control the temperature at a point downstream or on the device under test. Each application should be evaluated independently to assure safe and proper control.

Type of Fluid: TECA recommends using distilled water. Regular tap water can be used also, although "hard" water may cause mineral deposits to build up. For those applications which may go below 0 C a mixture of 25% ethylene glycol and distilled water is recommended. Algaecides are also commonly used additives. Fluids other than water

must be evaluated on a case by case basis.

Cooling Medium: All standard TECA liquid chillers are air cooled products.

Environment: In general our standard liquid chillers can handle factory, lab and office environments. No standard unit is made for outdoor or wash-down environments. Typical locations are bench top, under bench and rack mount. Custom versions have been made for many environments.

Power Input: Liquid chillers requiring 120 VAC, 240 VAC, 120/240 VAC and 24 VDC are available.

Connections: Most liquid chillers have connectors, hoses, clamps and hose insulation included as part of their standard package. What sort of connection is required at the device under test? NPT tap? Hose barb? What sizes? It's best to answer these questions up front to avoid problems down the road.



Liquid Chiller Applications

CHEMICAL VAPOR DISTRIBUTION SYSTEM

An OEM customer integrates TECA's Model TLC-900 Liquid Chiller into a bubbler system designed to distribute chemical vapor via a carrier gas. The bubbler vessel is filled with the liquid chemical. The carrier gas is bubbled through the vessel and TECA's TLC-900 Liquid Chiller maintains the chemical at a temperature determined by the end user, to maximize process control.

The customer chose TECA's TLC-900 Liquid Chiller over others because of its heating and cooling capability and the versatility of its universal input voltage (100-240 VAC). The customer's system is sold worldwide and quality and reliability are key. The customer shared with us: "Before we used TECA products, we had half a dozen failed units over in China that my boss had to fix. I'm talking chillers that have only been in service for less than 4 months. In all, there have been at least ten of them go bad over the years. Some of the current orders we have with you are replacement units for the failed ones. We love your products. You are putting the competition to shame. Keep up the good work."



TESTING PROPERTIES OF MATERIALS

A materials scientist at a state university uses TECA's TLC-900 Liquid Chiller to cool transducers for an elastic modulus apparatus. The apparatus measures the elastic modulus as a function of temperature. The elastic modulus is a material property. It defines the stiffness of material. It varies with temperature and is used in design. The customer uses the TLC-900 Liquid Chiller to cool a plate, which then cools from 400C to between 30C and 50C.

LIQUID CHILLER COLD PLATE CASCADE

Here are pictures of the TLC-900 thermoelectric liquid chiller with LHP-150CP Peltier liquid cooled cold plate set up run in the lab. The "load" is a plate with 10 power resistors mounted to the top and a series of thermocouples measuring the surface of the LHP-150CP's thermoelectric cold plate. During the test the power to the resistors is increased in steps with enough time in between for the temperatures to stabilize. Plotting the data resulted in performance curves. The test was made with the load insulated and with the load simply covered. Later on we used a TLC-900CAS, a version of the TLC-900 made specifically for running and controlling secondary cold plates like the LHP-150CP and ran some step, ramp and soak profiles.



COSMETIC TREATMENT

Photofacial treatments using intense pulsed light are said to remove spider veins and age spots, but are uncomfortable for the patient. The apparatus shown uses a TECA Model TLC-700 Peltier based liquid chiller to cool the tip of the hand piece which rests on the skin area under treatment. This enhances the comfort of the patient; allowing for a better quality treatment. The chiller is a closed loop system so no water gets on the patient or the instruments. Water temperature is closely adjustable over a wide range.

AIRBORNE THERMOELECTRIC LIQUID CHILLER

A customer serving the national security market specializes in remote sensing solutions. TECA Corporation's thermoelectric, rack-mounted RLC-1400 Liquid Chiller improves the customer's product efficiency by reliably cooling a laser and high-power electrical components, as part of an airborne system.



CHILLING PROCESS INK

Here's the way they're all supposed to work:

September: Initial contact: Need help sizing unit that can maintain a liquid temperature between 25C - 35C in ambient conditions of 15C - 40C. I need a unit for testing ASAP. In conjunction with sizing a chiller, I am also trying to size a heat exchanger. I need chiller flow rate and output temperature. Please call to discuss details. Results: The application was for controlling the ink temperature in a very high speed, continuous inkjet and commercial printing system scheduled for release. The initial purchase was for retrofit of approximately 30 in house test systems. Production quantities for the first year were in the 100 - 200 range. The following year another product was released where quantities were substantially higher.

Conversations with the customer, quick engineering tests and evaluations, loaner recommended, loaner ordered and shipped.

October: Customer testing of the loaner leading to more conversations, drawings....We were set up and had begun testing [the loaner]. Everyone that had seen the unit was quite impressed with the performance. Typically, around here, when the level of excitement increases the schedule gets compressed.

A prototype was designed

"I just got feedback from the top that I'm taking the right approach with ThermoElectrics. Instead of proceeding with 2 prototypes I've been told to go forward with 10 or more. Please modify your quote for 10, 15 & 20 units."

and ordered.

November: Prototypes shipped, design and testing for production continued.

December: Testing was satisfactory, design was completed and first production order was received.

TLC-1400

Liquid Chiller

Air Cooled

120 VAC, 240 VAC Input
410 Watts

FEATURES

- Compact (only 12" X 14" bench top footprint)
- Weighs approximately 59 lbs. (27 kg)
- Integral PID "tunable" temperature control
- Ambient temperature up to +50°C
- No compressor, fluorocarbons or filters
- Virtually maintenance-free operation
- Remote Sensibility™
- Un-cooled, 500mL reservoir
- Front to back air-flow system
- Stainless steel exterior housing
- Low fluid level and low flow warning
- Integral power supply
- Self priming pump/reservoir
- Cool and Heat/Cool versions



TC-3400 FEATURES

- RS-485 communications (optional)
- Communications Software (optional)

INCLUDES

- 3/8" ID Hose (12')
- Hose insulation (12')
- 3/8" CPC low pressure drop shut off fittings

SPECIFICATIONS

MODEL	PART NUMBER	PERFORMANCE RATING	VOLTAGE VAC BTU/HR	CURRENT AMPS. 50/60 HZ	WEIGHT LBS. (KG)	MAX OPERATING TEMP °C	TEMP. CONTROL	HEATING OPTION (HC SUFFIX) AMBIENT	FLUID TEMP RANGE °C
TLC-1400	6-B0G0-0-000	1400-1450	120 VAC	7.0	59 (26.7)	50°C (+122 F)	TC-3400		-5/65
TLC-1400HC	6-B0G0-1-000	1400-1450	120 VAC	7.0	59 (26.7)	50° C(+122 F)	TC-3400	400 Watt	-5/65
TLC-1402	6-B0G2-0-000	1400-1450	240 VAC	4.0	59 (26.7)	50°C (+122 F)	TC-3400		-5/65
TLC-1402HC	6-B0G2-1-000	1400-1450	240 VAC	4.0	59 (26.7)	50°C (+122 F)	TC-3400	400 Watt	-5/65

TLC-1400

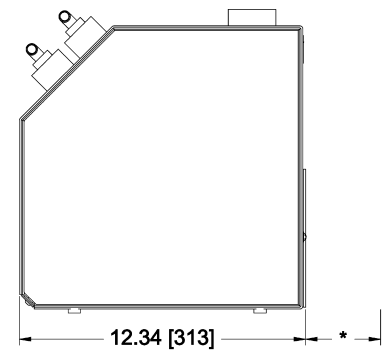
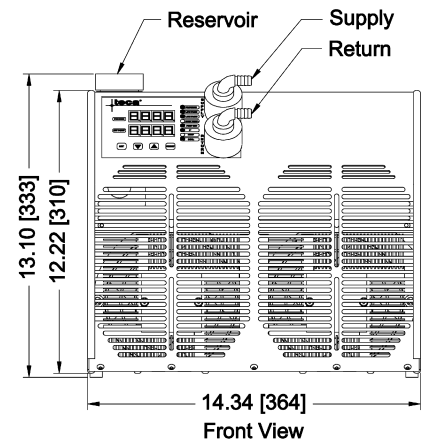
ENVIRONMENTS

Bench top
Laboratory
Industrial

COOLING CAPACITY

410 Watts @ 0 °C ΔT (standard)

DIMENSIONS

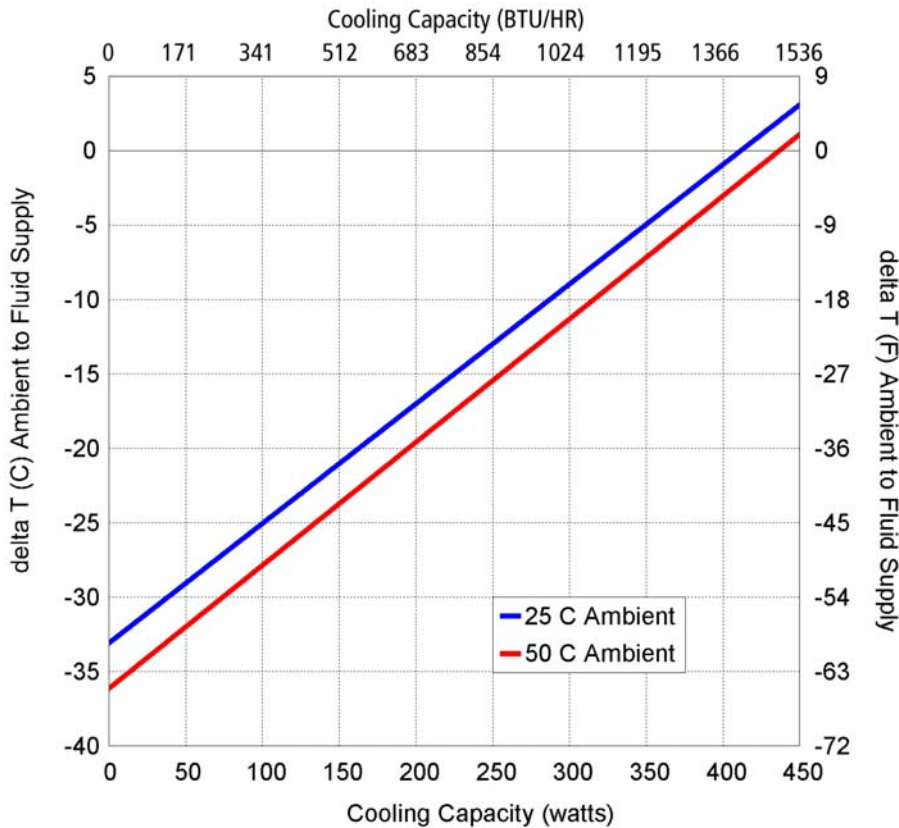


* Minimum recommended clearance 3".
Dimensions: Inches [Millimeters]



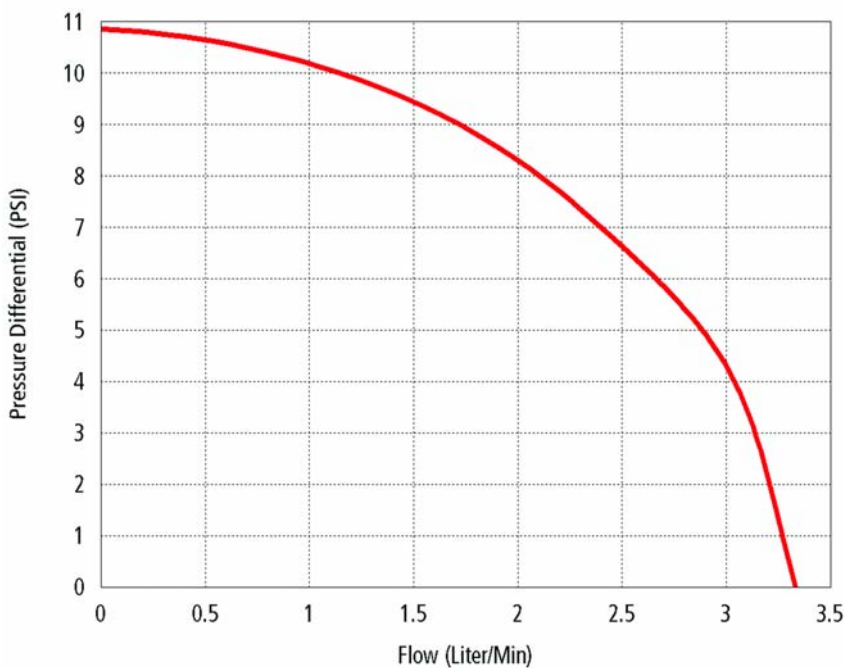
Ambient Air Path

PERFORMANCE CURVE



Equation of line: $y = \Delta T(^{\circ}\text{C})$ $x = \text{Capacity (Watts)}$		
Ambient Temp	25°C	50°C
Fluid Supply	$y = .08x - 33.1$	$y = .08x - 36.1$

PUMP CURVE



TLC-900

Liquid Chiller

Air Cooled
Bench Top

100-240 VAC and 24 VDC Input
350 Watts

STANDARD FEATURES

- 90-265 VAC universal integrated power supply
- Heats and cools 0 to 50 °C or -20 to 90 °C
- 750 mL uncooled reservoir
- Low pressure drop 3/8 ID fluid quick connects
- PWM controlled fan for quieter operation
- User friendly front fill design
- Easy prime/pump reset feature
- Wide process fluid temperature range
- Multiport bottom to top air flow for easier bench use
- Over temperature protection
- No compressor, fluorocarbons or filters
- Virtually maintenance free operation



CONTROL FEATURES

- Integral "tunable" PWM temperature control
- PWM, Bi-directional temperature control
- 4 Programable temperature zones with 4 independent PID settings
- Multi-segment ramp and soak programs with loops
- Internal RTD sensor, built into the fluid circuit
- Remote Sensibility™ switchable to exterior accessory RTD sensor
- USB communication with easy to use software
- Labview VI examples available

PUMP OPTIONS

- Option #1 - Standard Magnetic Drive, Can Pump, 0 to 50 °C process temperature
- Option #2 - Low Temperature Magnetic Drive, Impeller Pump, -20 to 90 °C process temperature
- Option #3 - Gear pump, 3.75 Liter/Min, -20 to 90 °C process temperature
- Option #4 - High Flow Magnetic Drive, Can Pump, 0 to 50 °C process temperature

SPECIFICATIONS

MODEL	PART NUMBER	PUMP OPTION	PERFORMANCE RATING BTU/HR	VOLTAGE VAC 50/60 HZ	CURRENT AMPS.	WEIGHT LBS. (KG)	MAX OPERATING AMBIENT	FLUID TEMP. RANGE °C
TLC-900	6-E5KB-1-0A1	1	1260-1330	100-240	4.0†	42 (19)	50 °C (+122 F)	0 to 50
TLC-900	6-E5KB-1-0A2	2	1260-1330	100-240	4.0†	42 (19)	50 °C (+122 F)	-20 to 90
TLC-900	6-E5KB-1-0A3	3	1260-1330	100-240	4.0†	42 (19)	50 °C (+122 F)	-20 to 90
TLC-900	6-E5KB-1-0A4	4	1260-1330	100-240	4.0†	42 (19)	50 °C (+122 F)	0 to 50
TLC-900	6-E4K5-1-0A1	1	1050-1100	24 VDC	22	42 (19)	50 °C (+122 F)	0 to 50
TLC-900	6-E4K5-1-0A2	2	1050-1100	24 VDC	22	42 (19)	50 °C (+122 F)	-20 to 90
TLC-900	6-E4K5-1-0A3	3	1050-1100	24 VDC	22	42 (19)	50 °C (+122 F)	-20 to 9
TLC-900	6-E4K5-1-0A4	4	1050-1100	24 VDC	22	42 (19)	50 °C (+122 F)	0 to 50
TLC-900	6-E5KB-1-CAS*	1	1260-1330	100-240	4.0†	42 (19)	50 °C (+122 F)	0 to 50

* This part number is ready for use with a low temperature cascade option and includes power input and control provisions to the cascade. For other pump options for cascade unit consult the factory. Refer to accessory pages for cascades and other options available for liquid chillers.

† Reflects the current draw @ 120 VAC, 60 Hz input

TLC-900

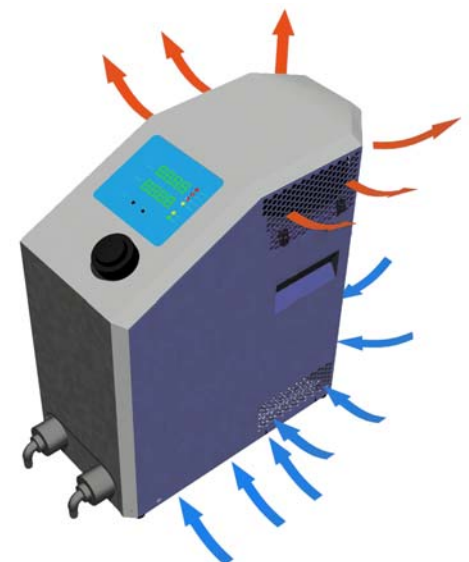
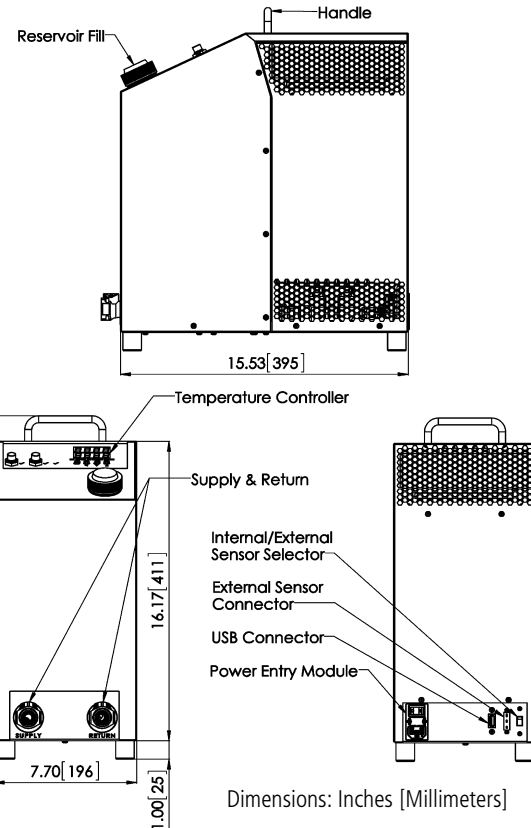
ENVIRONMENTS

Bench top
Laboratory
Industrial

COOLING CAPACITY

310 Watts @ 0 °C ΔT (24 VDC)
350 Watts @ 0 °C ΔT (100-240 VAC)

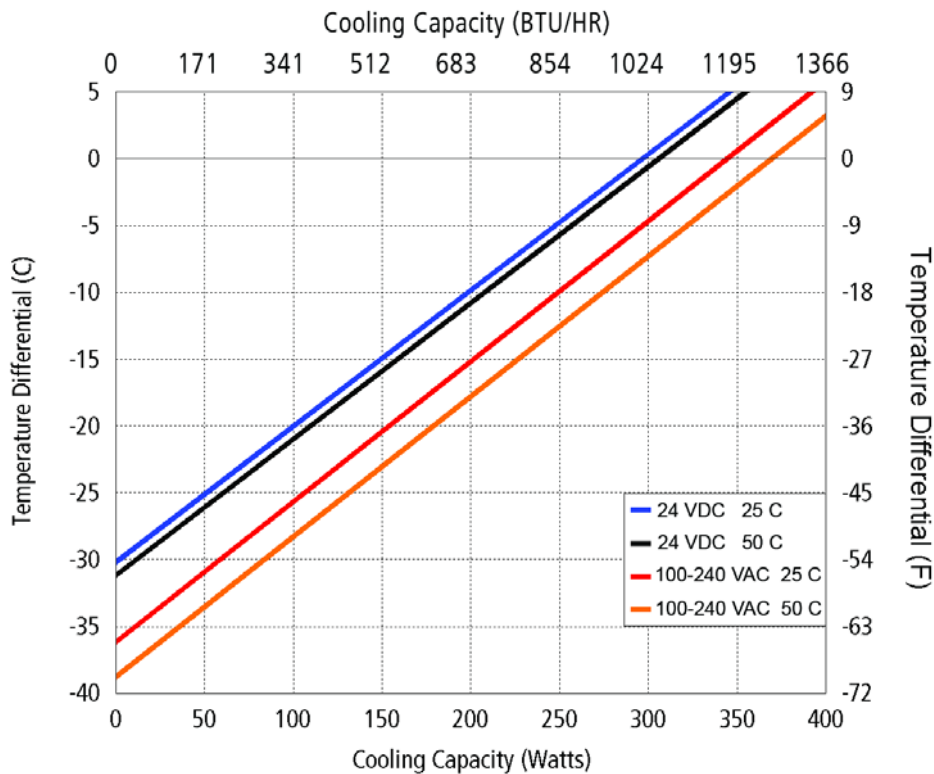
DIMENSIONS



Ambient Air Path

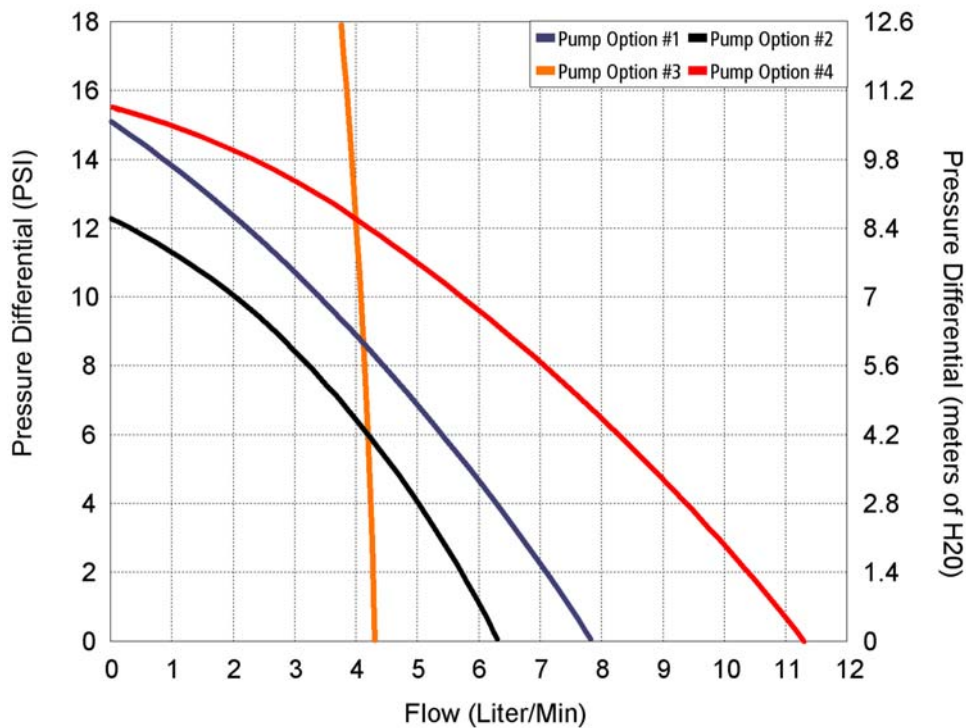
PERFORMANCE CURVE

Curves below represent performance of TLC-900 with pump option 1



Equation of line: $y = \Delta T(^{\circ}\text{C})$ $x = \text{Capacity (Watts)}$		
Ambient Temp	25°C	50°C
24 VDC	$y = .102x - 30.3$	$y = .102x - 31.2$
100-240 VAC	$y = .105x - 36.2$	$y = .105x - 38.7$

PUMP CURVE



TLC-1200

Liquid Chiller

Air Cooled

General Purpose 24 VDC input
162 Watts

FEATURES

- Two separate fluid cooling circuits
- Weighs only 20 lbs. (9.1 kg)
- Mount through bench top or enclosure wall
- No compressor, fluorocarbons or filters
- Virtually maintenance-free operation
- Stainless steel exterior housing
- Mounts in any orientation
- 3/8" OD Stainless steel tubing



INCLUDES

- Internal H-Bridge for reverse polarity operation on heat/cool versions
- Rubber feet
- Power input leads

SPECIFICATIONS

MODEL	PART NUMBER	PERFORMANCE RATING BTU/HR	VOLTAGE VDC	CURRENT AMPS.	WEIGHT LBS. (KG)	MAX OPERATING AMBIENT	HEATING OPTION	TEMP. CONTROL	FLUID TEMP RANGE °C
TLC-1200	6-3095-0-000	830-950	24	9.0	20 (9.1)	50 °C(+122 F)	Cool Only	None	-5/65
TLC-1200	6-3055-0-000	830-950	24	9.0	20 (9.1)	50 °C(+122 F)	Cool Only	EXT*	-5/65
TLC-1200HC	6-3055-1-000	830-950	24	9.0	20 (9.1)	50 °C(+122 F)	Heat/Cool	EXT**	-5/65

* Unit is set for 5-32 VDC external control signal, relay included

** Unit is set for 5-32 VDC external control signal, H-Bridge relay(s) included

TLC-1200

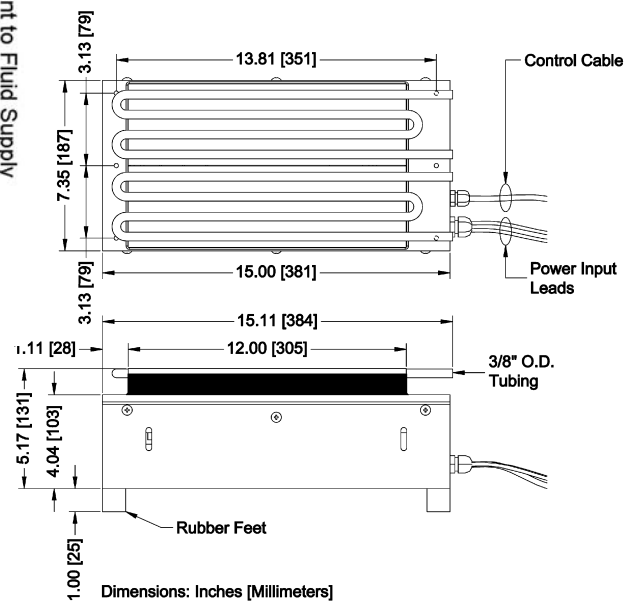
ENVIRONMENTS

Bench top
OEM
Industrial

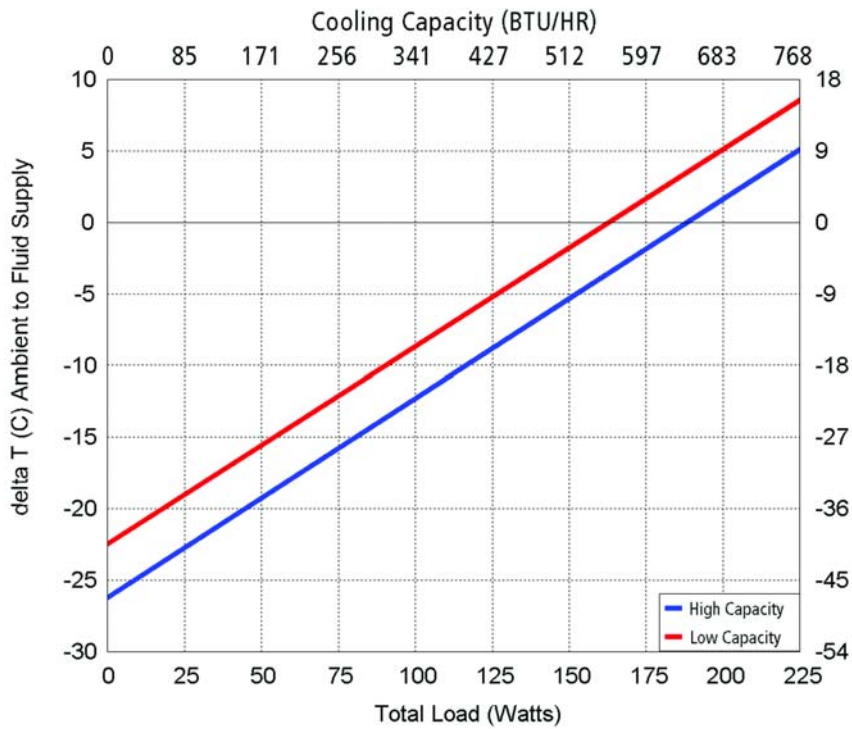
COOLING CAPACITY

162 Watts @ 0 °C ΔT (standard)
190 Watts @ 0 °C ΔT (high capacity)

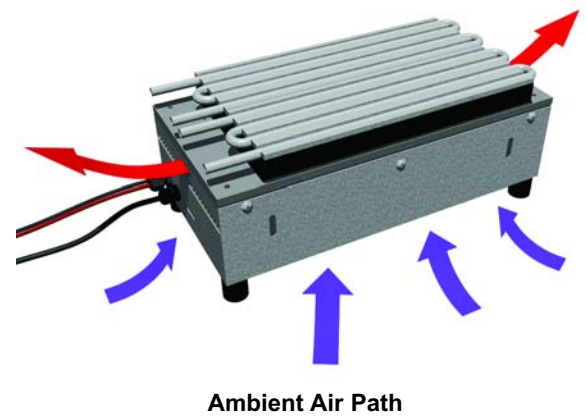
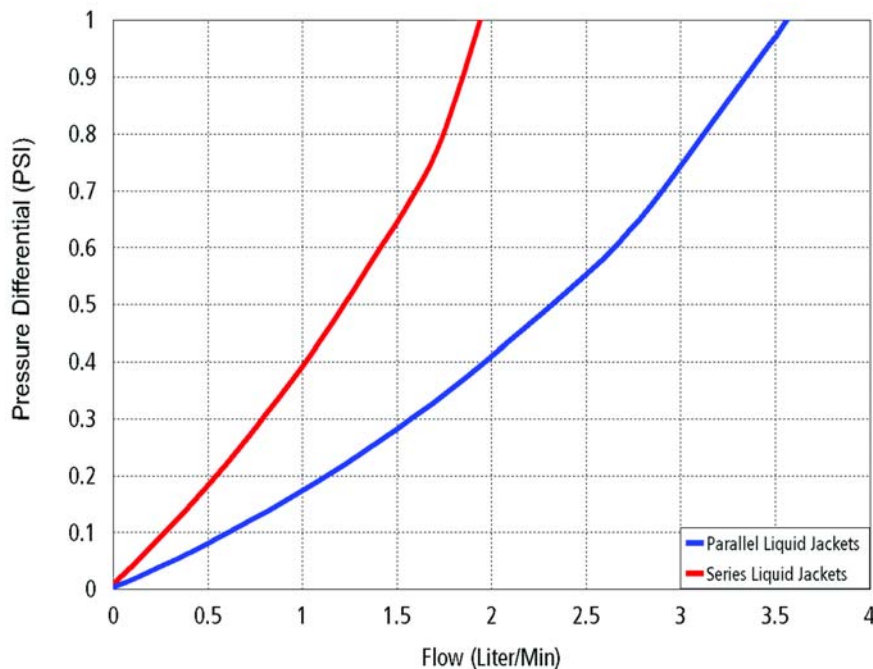
DIMENSIONS



PERFORMANCE CURVE



FLOW CHARACTERISTICS



TLC-700 Liquid Chiller

Air Cooled

120 VAC, 240 VAC and 24 VDC Input
215 Watts

FEATURES

- Compact (only 15.5" X 7.6" bench top footprint)
- Easy prime pump design
- Integral PID "tunable" temperature control
- No compressor, fluorocarbons or filters
- Un-cooled, 500mL reservoir
- Front to back air-flow system
- Stainless steel exterior housing
- Ergonomic sloping front design
- Low fluid level and low flow warning
- Integral power supply
- Self priming pump/reservoir
- Cool and Heat/Cool versions



TC-3300 FEATURES

- RS-232 communications (optional)
- Communications Software (optional)

INCLUDES

- 3/8" ID Hose (12')
- Hose insulation (12')
- 3/8" CPC low pressure drop shut off fittings

SPECIFICATIONS

MODEL	PART NUMBER	PERFORMANCE RATING BTU/HR	VOLTAGE VAC 50/60 HZ	CURRENT AMPS.	WEIGHT LBS. (KG)	MAX OPERATING AMBIENT	HEATING OPTION (HC SUFFIX)	TEMP. CONTROL	FLUID TEMP RANGE °C	AGENCY APPROVALS (ETL)
TLC-700	6-A0D0-0-000	730-800	120 VAC	4.2	32(14.5)	50 °C(+122 F)		TC-3300	-5/65	UL3101-1/CSA22.2, CE
TLC-700HC	6-A0D0-1-000	730-800	120 VAC	4.2	32(14.5)	50 °C(+122 F)	200 Watt	TC-3300	-5/65	UL3101-1/CSA22.2, CE
TLC-702	6-A0D2-0-000	730-800	240 VAC	2.9	42(19)	50 °C(+122 F)		TC-3300	-5/65	UL3101-1/CSA22.2, CE
TLC-702HC	6-A0D2-1-000	730-800	240 VAC	2.9	42(19)	50 °C(+122 F)	200 Watt	TC-3300	-5/65	UL3101-1/CSA22.2, CE

TLC-700

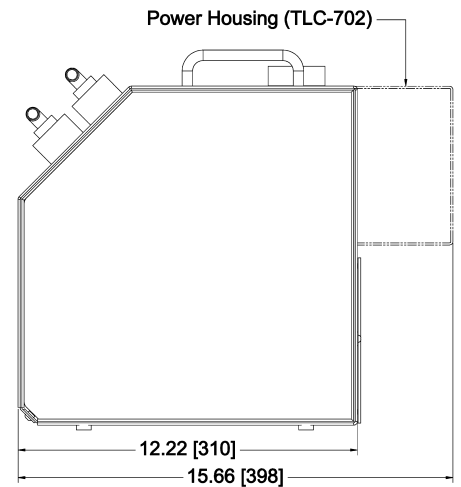
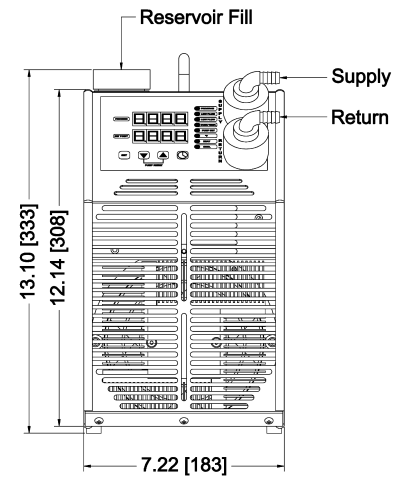
ENVIRONMENTS

Bench top
Laboratory
Industrial

COOLING CAPACITY

215 Watts @ 0 °C ΔT

DIMENSIONS

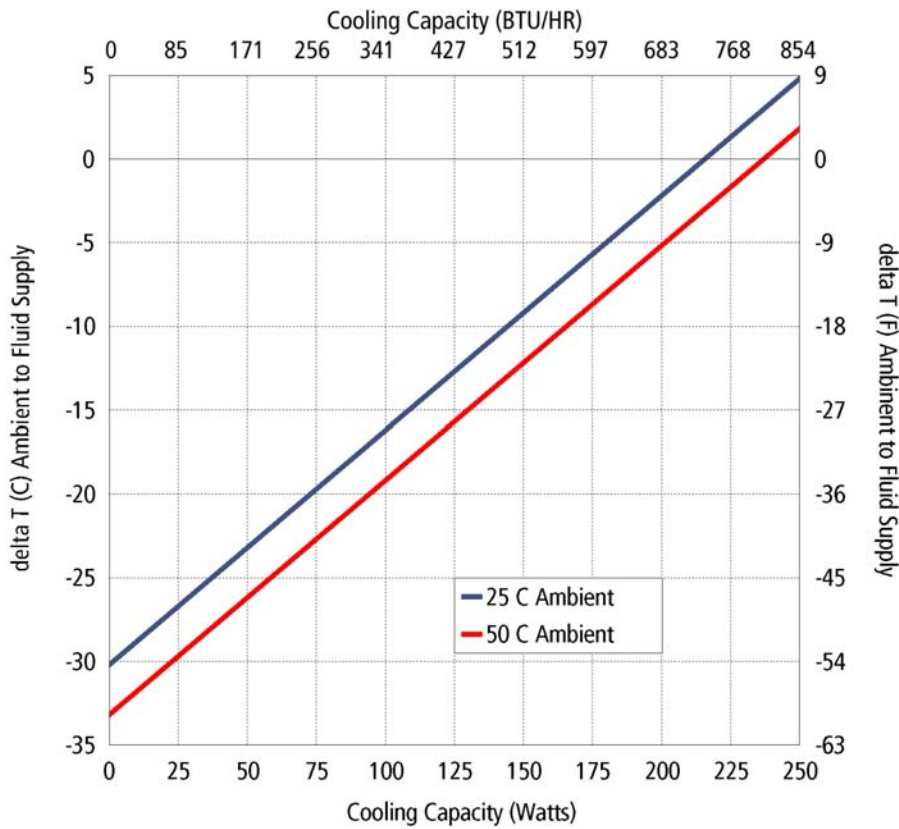


Dimensions: Inches [Millimeters]



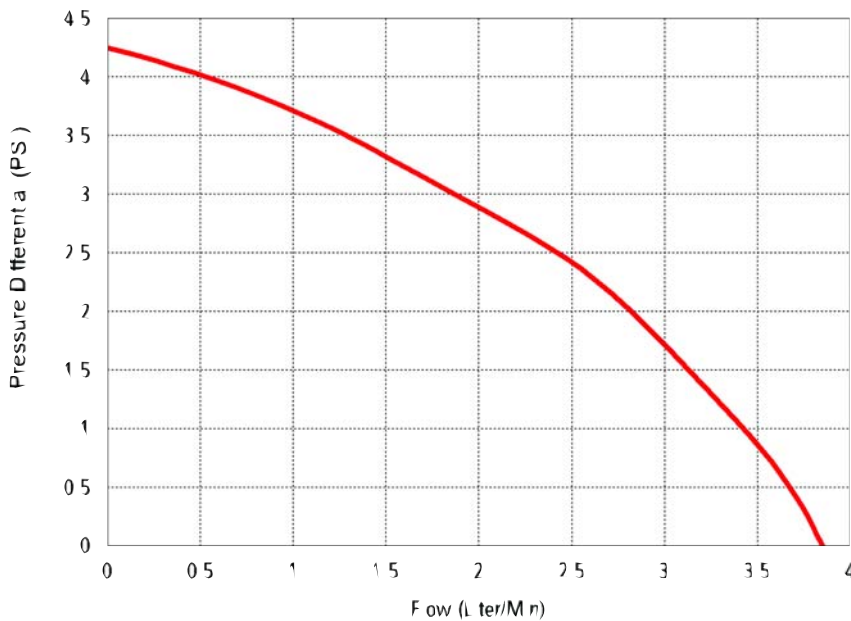
Ambient Air Path

PERFORMANCE CURVE



Equation of line: $y = \Delta T(^{\circ}\text{C})$ $x = \text{Capacity (Watts)}$		
Ambient Temp	25°C	50°C
Fluid Supply	$y = .14x - 30.2$	$y = .14x - 33.2$

PUMP CURVE



RLC-1800 Rack Mount Liquid Chiller

Air Cooled
Rack Mount

100-240 VAC Input
620 Watts

STANDARD FEATURES

- Compact only 19" x 25" x 10.5"
- Front and rear fluid ports
- Heats and cools 0 to 50 °C or -20 to 90 °C
- Standard 19" rack mounting
- Low pressure drop 3/8 ID fluid quick connects
- Remote Sensibility™
- User friendly front fill design
- Easy prime/pump reset feature
- Wide process fluid temperature range
- Stainless steel exterior housing
- Over temperature protection
- External washable aluminum air filter



CONTROL FEATURES

- Integral "tunable" PWM temperature control
- PWM, Bi-directional temperature control
- 4 Programable temperature zones with 4 independent PID settings
- Multi-segment ramp and soak programs with loops
- Internal RTD sensor, built into the fluid circuit
- Remote Sensibility™ switchable to exterior accessory RTD sensor
- USB communication with easy to use software
- Labview VI examples available

PUMP OPTIONS

- Option #1 - Standard Magnetic Drive, Can Pump, 0 to 50 °C process temperature
- Option #2 - Low Temperature Magnetic Drive, Impeller Pump, -20 to 90 °C process temperature
- Option #3 - Gear pump, 3.75 Liter/Min, -20 to 90 °C process temperature
- Option #4 - High Flow Magnetic Drive, Can Pump, 0 to 50 °C process temperature

SPECIFICATIONS

MODEL	PART NUMBER	PUMP OPTION	PERFORMANCE RATING BTU/HR	VOLTAGE VAC 50/60 HZ	CURRENT AMPS.*	WEIGHT LBS. (KG)	MAX OPERATING AMBIENT	FLUID TEMP. RANGE °C
RLC-1800	8-04KB-1-0A1	1	2000-2200	100-240	7	75 (34)	50 °C (+122 F)	0 to 50
RLC-1800	8-04KB-1-0A2	2	2000-2200	100-240	7	75 (34)	50 °C (+122 F)	-20 to 90
RLC-1800	8-04KB-1-0A3	3	2000-2200	100-240	7	75 (34)	50 °C (+122 F)	-20 to 90
RLC-1800	8-04KB-1-0A4	4	2000-2200	100-240	7	75 (34)	50 °C (+122 F)	0 to 50

* Reflects current draw @ 120 VAC, 60 Hz input

RLC-1800

ENVIRONMENTS

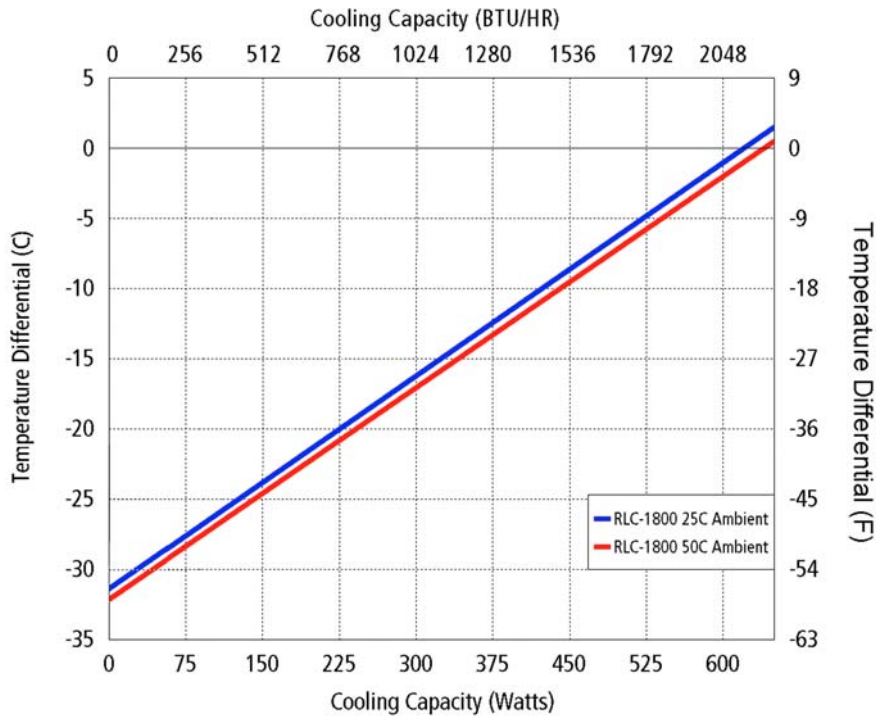
19" rack mount
Laboratory
Industrial

COOLING CAPACITY

620 Watts @ 0 °C ΔT

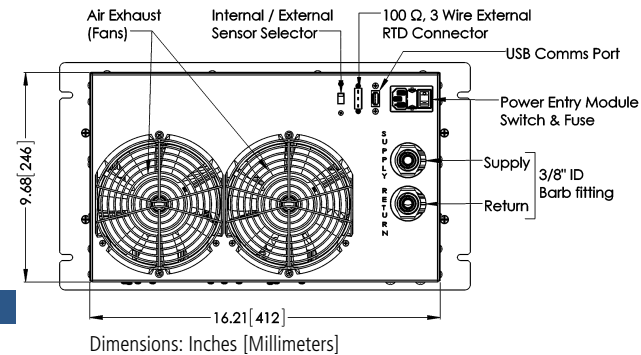
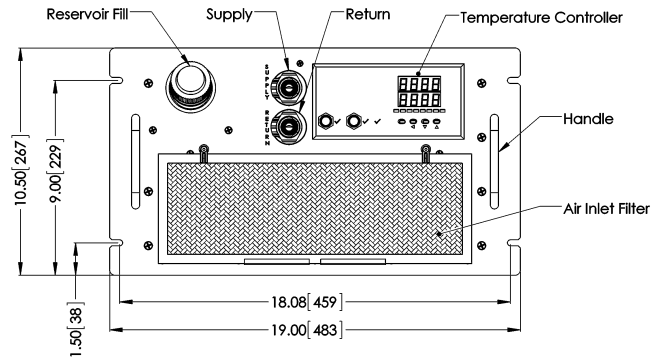
PERFORMANCE CURVE

Curves below represent performance of systems with pump option 1.
Performance curves for systems with other pumps will be different.

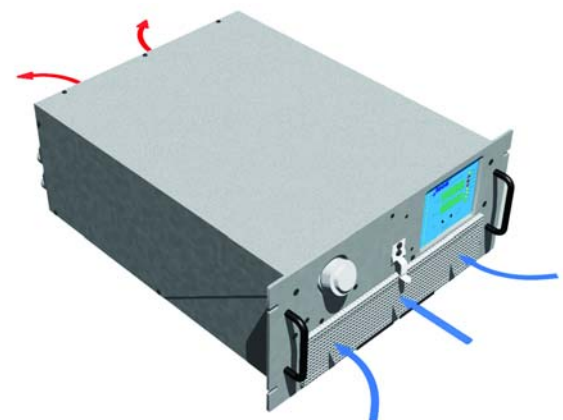
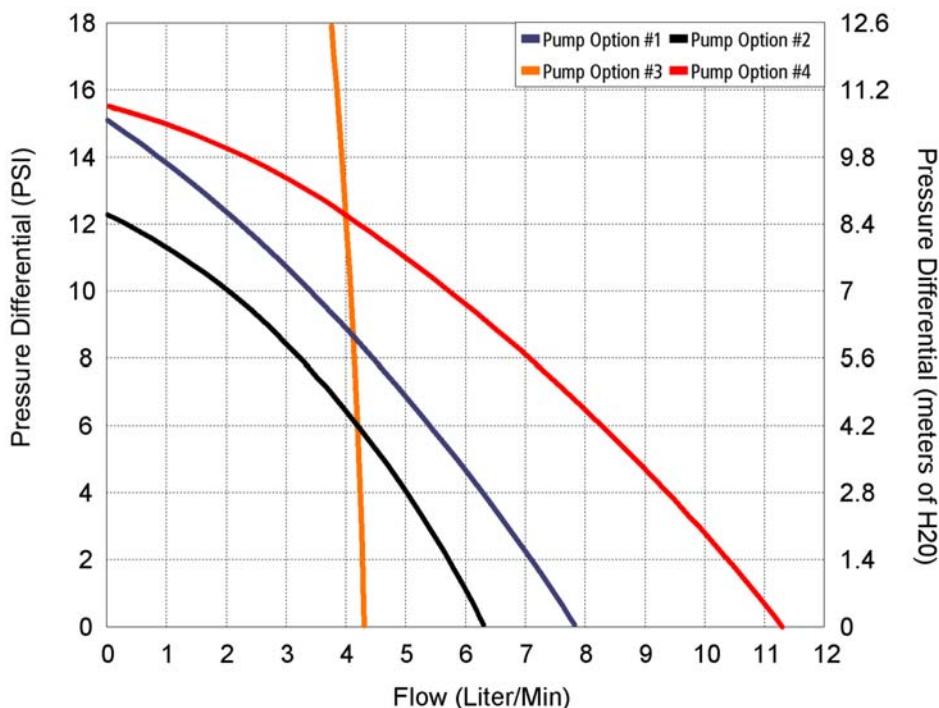


Equation of line: $y = \Delta T(^{\circ}\text{C})$ $x = \text{Capacity (Watts)}$		
Ambient Temp	25°C	50°C
	$y = .05x - 31.4$	$y = .05x - 32.1$

DIMENSIONS



PUMP CURVE



Ambient Air Path

RLC-900 Rack Mount Liquid Chiller

Air Cooled
Rack Mount

100-240 VAC Input
310 Watts

STANDARD FEATURES

- Compact only 19" x 25" x 9"
- Front and rear fluid ports
- Heats and cools 0 to 50 °C or -20 to 90 °C
- Standard 19" rack mounting
- Low pressure drop 3/8 ID fluid quick connects
- Remote Sensibility™
- User friendly front fill design
- Easy prime/pump reset feature
- Wide process fluid temperature range
- Stainless steel exterior housing
- Over temperature protection
- External washable aluminum air filter



CONTROL FEATURES

- Integral "tunable" PWM temperature control
- PWM, Bi-directional temperature control
- 4 Programable temperature zones with 4 independent PID settings
- Multi-segment ramp and soak programs with loops
- Internal RTD sensor, built into the fluid circuit
- Remote Sensibility™ switchable to exterior accessory RTD sensor
- USB communication with easy to use software
- Labview VI examples available

PUMP OPTIONS

- Option #1 - Standard Magnetic Drive, Can Pump, 0 to 50 °C process temperature
- Option #2 - Low Temperature Magnetic Drive, Impeller Pump, -20 to 90 °C process temperature
- Option #3 - Gear pump, 3.75 Liter/Min, -20 to 90 °C process temperature
- Option #4 - High Flow Magnetic Drive, Can Pump, 0 to 50 °C process temperature

SPECIFICATIONS

MODEL	PART NUMBER	PUMP OPTION	PERFORMANCE RATING BTU/HR	VOLTAGE VAC 50/60 HZ	CURRENT AMPS.*	WEIGHT LBS. (KG)	MAX OPERATING AMBIENT	FLUID TEMP. RANGE °C
RLC-900	8-E4KB-1-0A1	1	1050-1100	100-240	3.5	59 (27)	50 °C (+122 F)	0 to 50
RLC-900	8-E4KB-1-0A2	2	1050-1100	100-240	3.5	59 (27)	50 °C (+122 F)	-20 to 90
RLC-900	8-E4KB-1-0A3	3	1050-1100	100-240	3.5	59 (27)	50 °C (+122 F)	-20 to 90
RLC-900	8-E4KB-1-0A4	4	1050-1100	100-240	3.5	59 (27)	50 °C (+122 F)	0 to 50

* Reflects current draw @ 120 VAC, 60 Hz input

RLC-900

ENVIRONMENTS

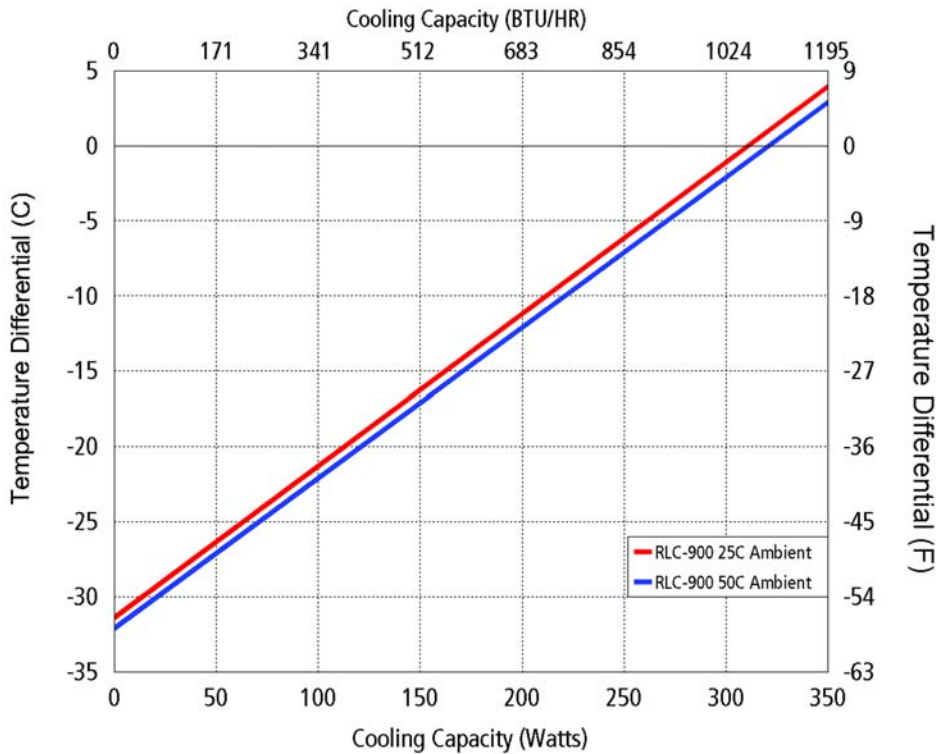
19" rack mount
Laboratory
Industrial

COOLING CAPACITY

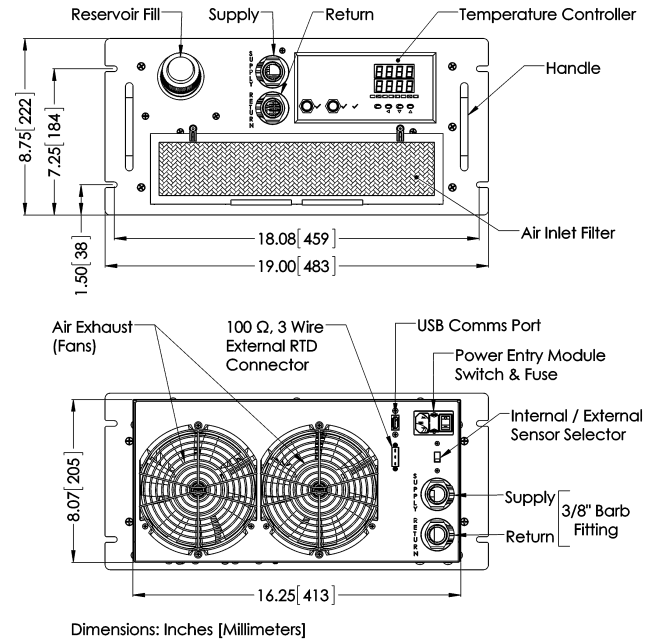
310 Watts @ 0 °C ΔT

PERFORMANCE CURVE

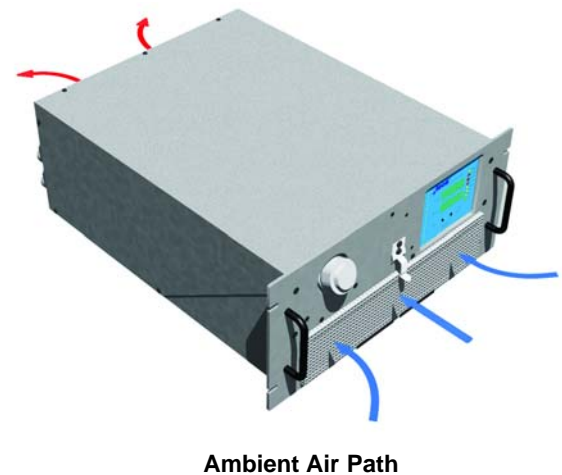
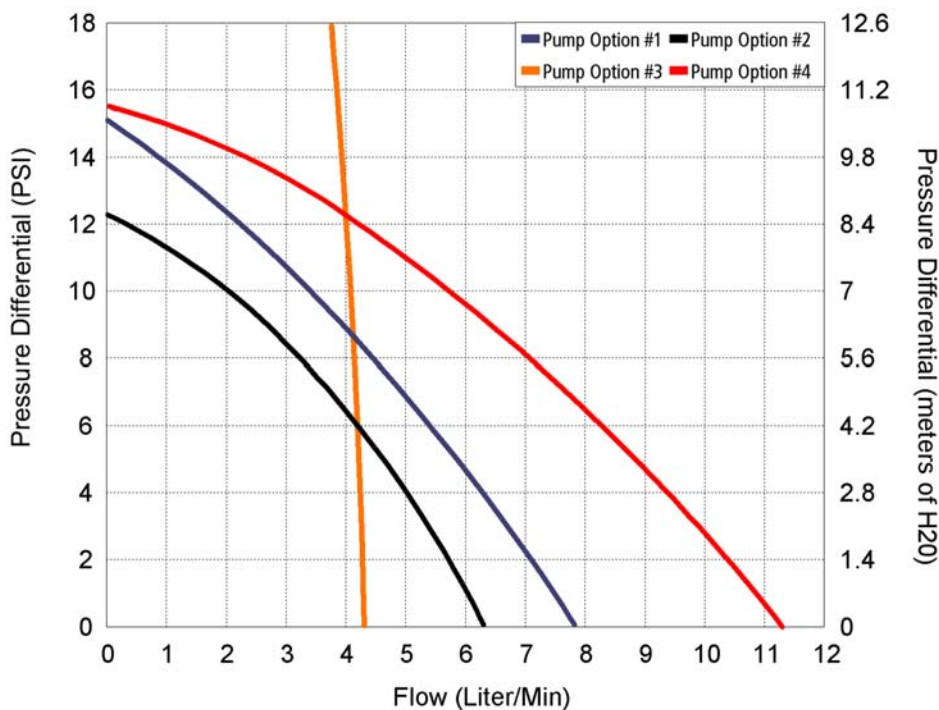
Curves below represent performance of systems with pump option 1.
Performance curves for systems with other pumps will be different.



DIMENSIONS



PUMP CURVE



RLC-1400

Rack Mount Liquid Chiller

Air Cooled
Rack Mount

120 VAC, 240 VAC Input
410 Watts

FEATURES

- Compact only 19" x 25" x 9"
- Standard 19" rack mounting
- Integral PID "Tuneable" temperature control
- Remote sensibility™
- Ambients to +50°C
- No compressor, fluorocarbons
- Virtually maintenance-free operation
- Stainless steel exterior housing
- Low fluid/flow warning

INCLUDES

- Integral power supply
- Self priming pump/reservoir
- TC-3300 temperature Control
- Low pressure drop fluid quick connect
- 3/8" ID Hose (12')
- Hose insulation (12')

OPTIONS

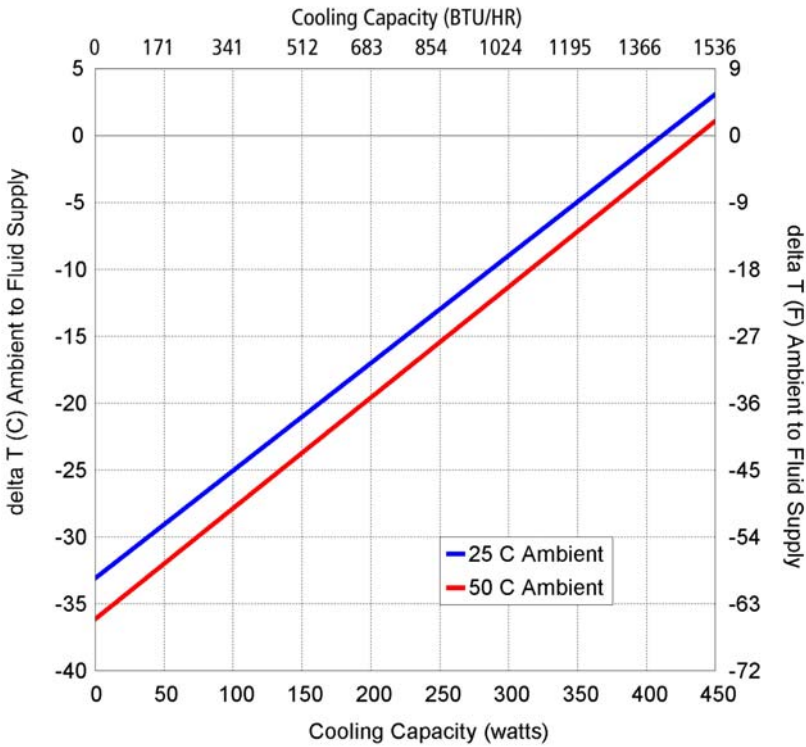
- Heating
- RS-485 interface, RS-232 interface (with external adapter)
- Computer communication software



SPECIFICATIONS

MODEL	PART NUMBER	PERFORMANCE RATING BTU/HR	VOLTAGE VAC 50/60 HZ	CURRENT AMPS.	WEIGHT LBS. (KG)	MAX OPERATING AMBIENT	HEATING OPTION (HC SUFFIX)	FLUID TEMP RANGE °C
RLC-1400	8-B0G0-0-000	1400-1450	120 VAC	7.0	59(26.7)	50 °C(+122 F)		-5/65
RLC-1400HC	8-B0G0-1-000	1400-1450	120 VAC	7.0	59(26.7)	50 °C(+122 F)	400 Watt	-5/65
RLC-1402	8-B0G2-0-000	1400-1450	240 VAC	7.0	59(26.7)	50 °C(+122 F)		-5/65
RLC-1402HC	8-B0G2-1-000	1400-1450	240 VAC	7.0	59(26.7)	50 °C(+122 F)	400 Watt	-5/65

PERFORMANCE CURVE



RLC-1400

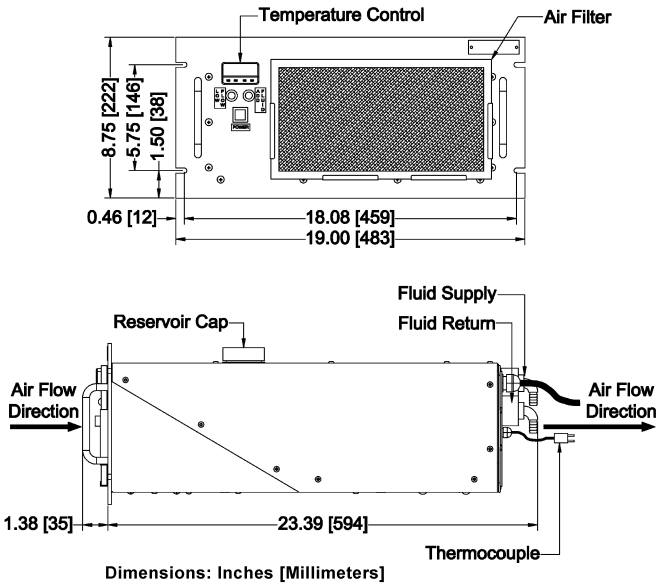
ENVIRONMENTS

- 19" rack mount
- Laboratory
- Industrial

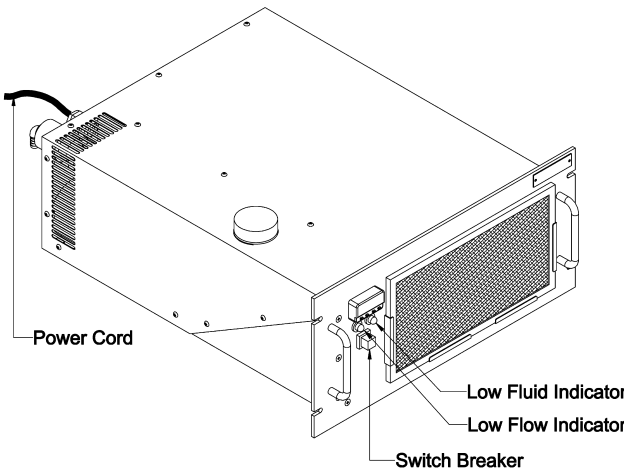
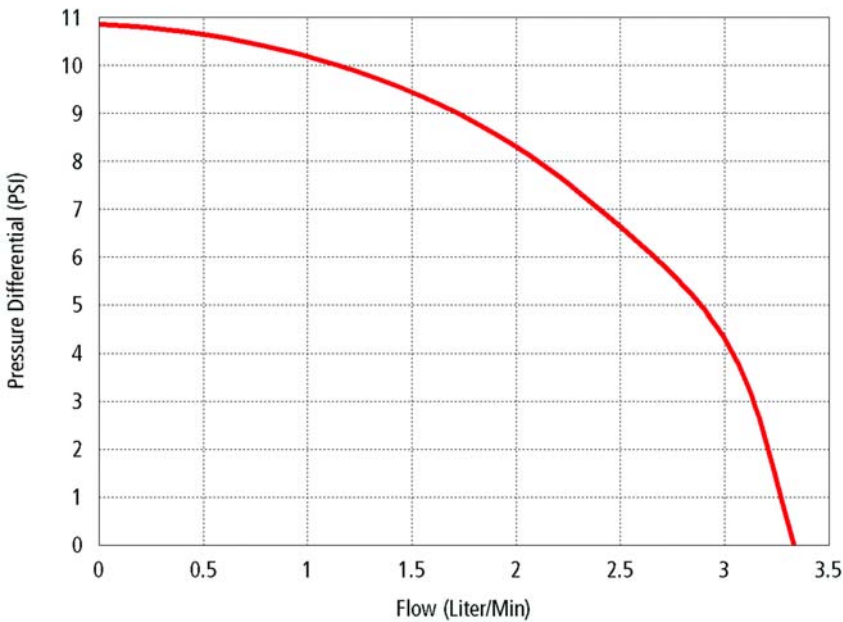
COOLING CAPACITY

410 Watts @ 0 °C ΔT

DIMENSIONS



PUMP CURVE

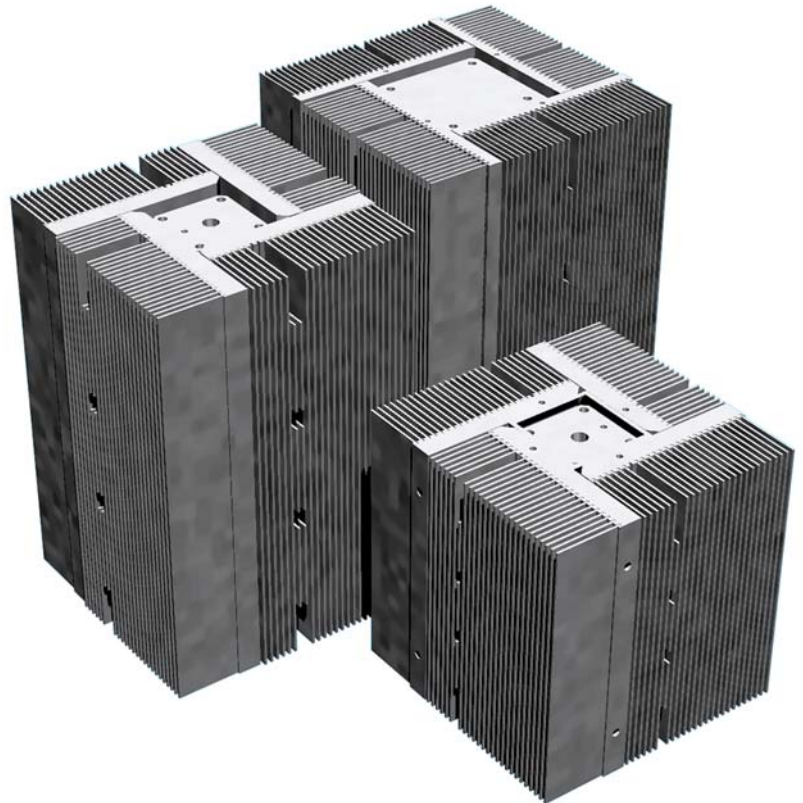


TLC³ Liquid Cooling Cube

Air Cooled

FEATURES

- Customized to fit your application
- In process fluid cooling
- Gas cooling/drying
- Aluminum hot side heat exchanger
- Aluminum cold side heat exchanger
- Various DC inputs and efficiencies
- Special finishes and materials on request
- Many fan options
- 4 and 6 pass heat exchanger
- Input/output fitting options
- Heating options



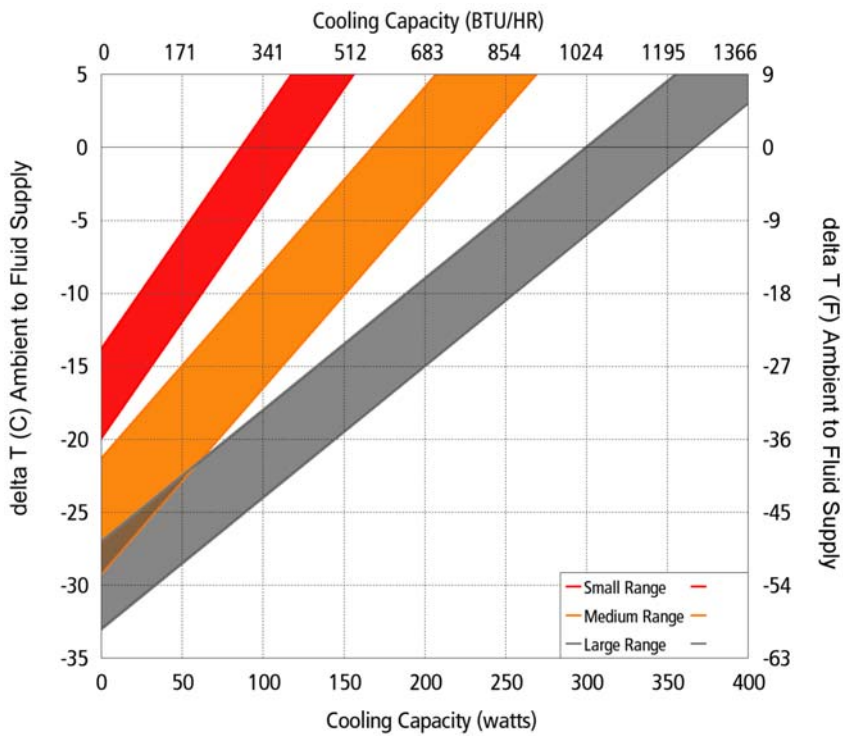
REQUIRED (NOT INCLUDED)

- Pump
- Power supply
- Tubing
- Fan
- Housing

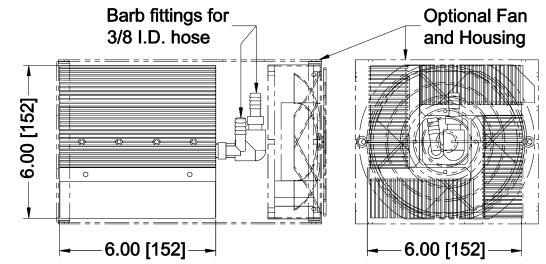
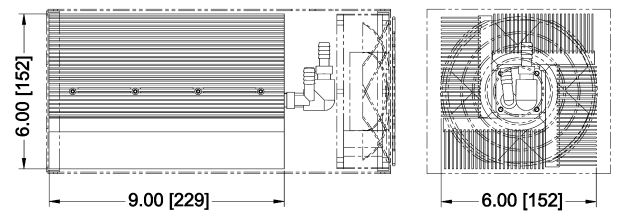
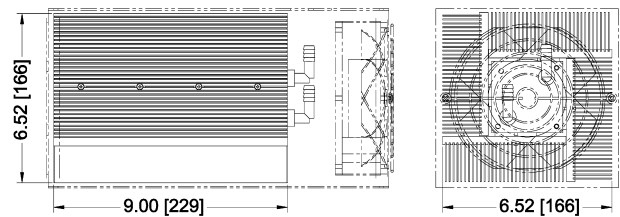
NOTES

TECA model TLC³ cooling cubes are thermoelectric cooling "engines" that the engineer or designer can use in OEM systems. Generally these are made in 100, 200 and 300 Watts capacity range, they work with a variety of fans. Small or large quantities available. Have TECA engineers help you select the best fit for your application.

PERFORMANCE CURVE

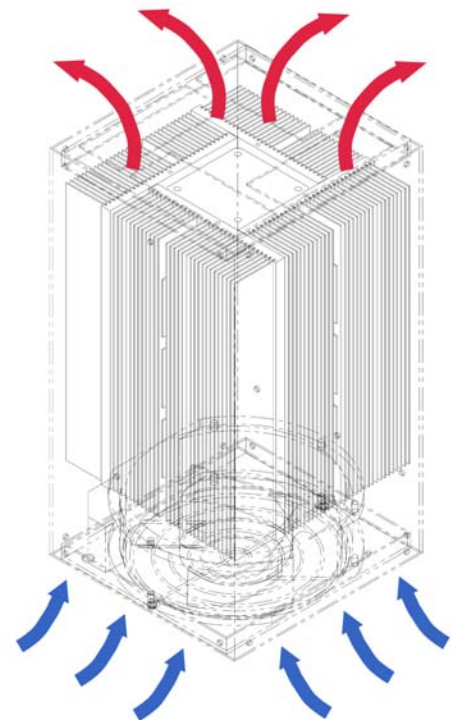
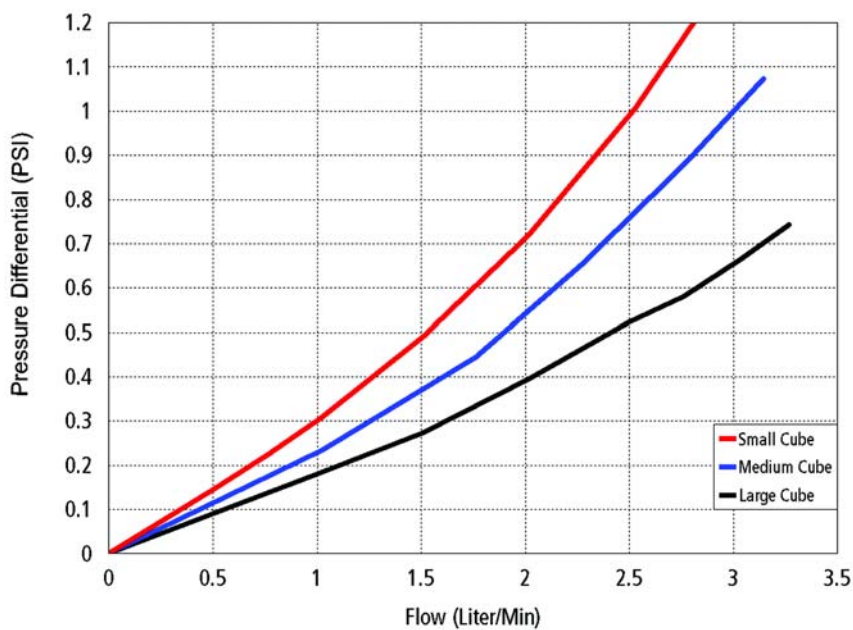


DIMENSIONS

Small TLC³ chillerMedium TLC³ chillerLarge TLC³ chiller

Dimensions: Inches[Millimeters] Housing and fan shown for reference

FLOW CHARACTERISTICS



Ambient Air Path

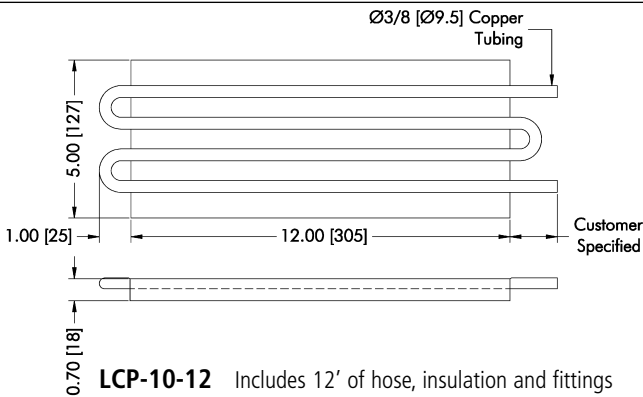
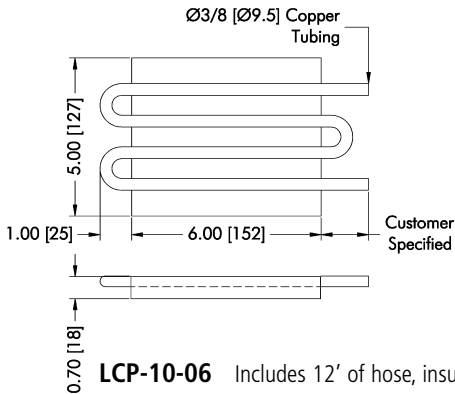
TLC Liquid Chiller Accessories

Cold Plates and Fan Coils
Fittings and Cascades

HEAT EXCHANGERS

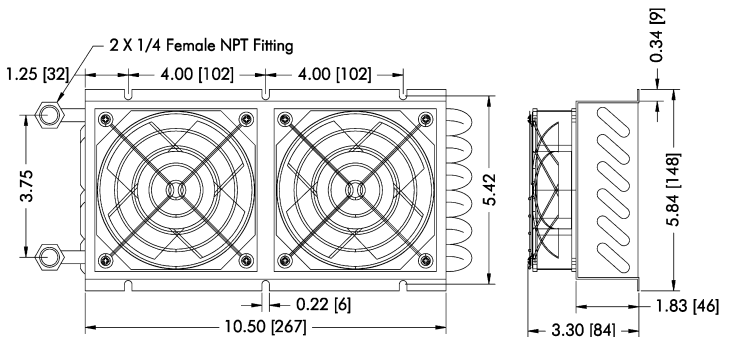
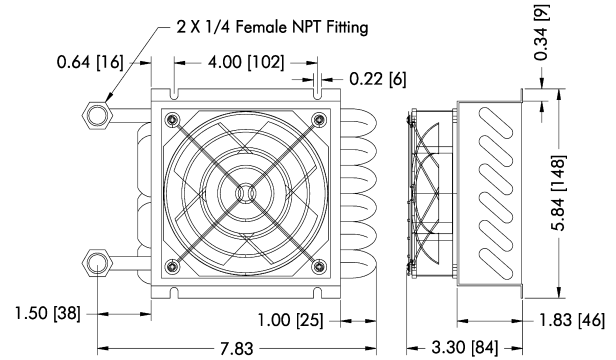
COLD PLATES

Turn your TLC water chiller into a direct contact cooler using these cold plates. Modify them with your required taps and machining, mount your components, run the flexible hose to the chiller and turn it on. With care the remote sensor feature on select TLC models can be used to control the temperature of the plate or the item being cooled.



FAN COILS

Use your liquid chiller to cool an enclosure or a flow of air. Cool the inside of your glove box with little vibration and no big holes or air conditioner on the back. Mount the fan coils in your glove box, run the flexible tubing through a port or bulkhead fitting on your glove box to the liquid chiller and begin cooling.



Dimensions: Inches [Millimeters]

FITTINGS AND QUICK CONNECTS

MALE QUICK CONNECT WITH NPT

- QCM-F3/8NPT** Male quick connect with female 3/8 NPT
- QCM-F1/4NPT** Male quick connect with female 1/4 NPT
- QCM-M1/2NPT** Male quick connect with male 1/2 NPT
- QCM-M3/8NPT** Male quick connect with male 3/8 NPT

MALE QUICK CONNECT - HIGH TEMPERATURE

- QCHM-M1/2NPT** Male quick connect, 1/2 MNPT
- QCHM-3/8B** Male quick connect, 3/8" barb
- QCHM-1/2B** Male quick connect, 1/2" barb
- QCHM-3/4B** Male quick connect, 3/4" barb

MALE QUICK CONNECT WITH BARB

- QCM-3/8B** Male quick connect with 3/8" barb
- QCM-1/4B** Male quick connect with 1/4" barb
- QCM-3/16B** Male quick connect with 3/16" barb
- QCM-3/8BE** Male quick connect with 3/8" barb elbow

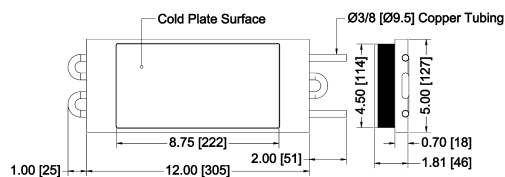
MISC. QUICK CONNECTS

- QCM-FPLCD** Male quick connect with female PLCD
- QCF-M3/8NPT** Female quick connect with male 3/8 NPT

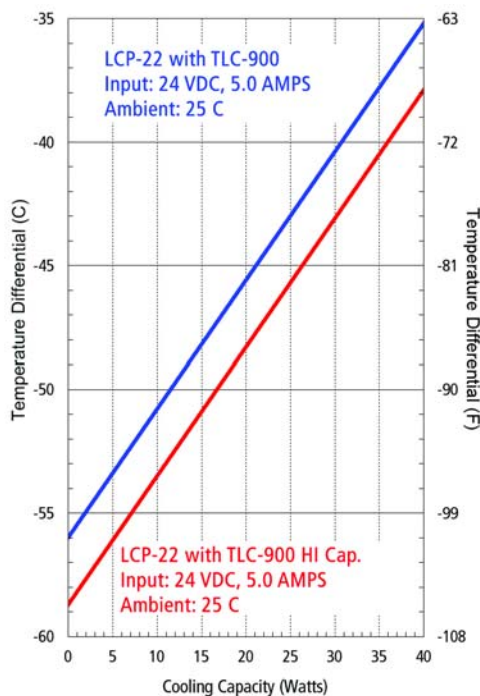
LOW TEMPERATURE CASCADES FOR USE WITH LIQUID CHILLERS

One thermoelectric stacked on top of another with the goal of increasing the maximum temperature differential is a "cascade". Use these assemblies with the liquid chiller to create 2 and 3 stage cascades. The performance will vary with the degree of insulation, with the amount of the active load and with the ambient temperature.

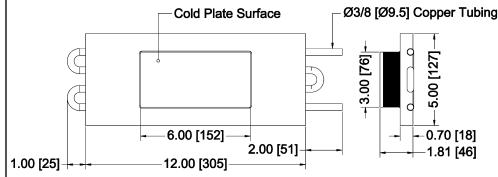
TWO STAGE - LARGE PLATE



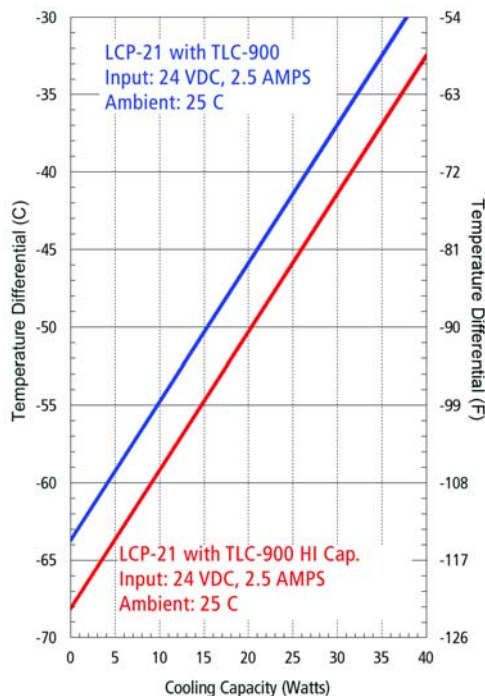
LCP-22



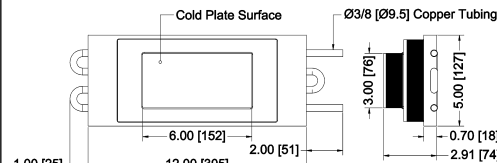
TWO STAGE - SMALL PLATE



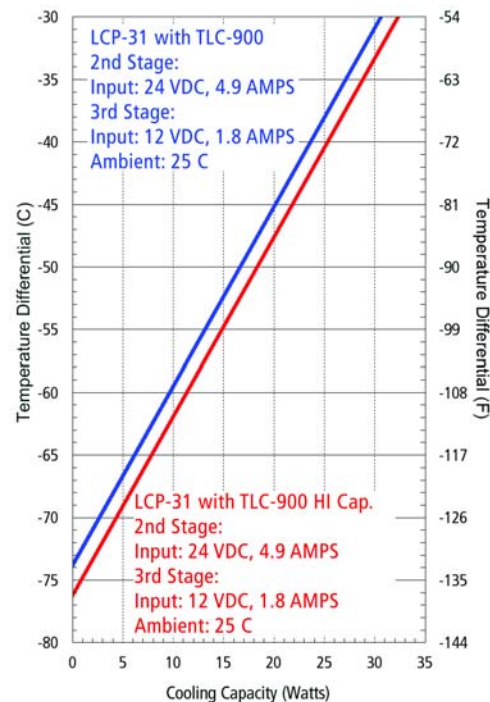
LCP-21



THREE STAGE



LCP-31



MISC. ACCESSORIES

RTD SENSOR

- RTD-PROBE** 100 Ω , 3 wire, platinum RTD 6" long, 1/8" diameter
- RTD-RING** 100 Ω , 3 wire, platinum RTD surface mount

CONVERTER

- C-USB** USB-RS-232 converter "includes adapter, cable and software"

CABLE

- C-RS232** RS-232 Cable, DB9 Male to DB9 Female 10' long

HOSE

- HOSE-01** Standard hose, 3/8" ID, per foot
- HOSE-02** High temperature hose, 3/8" ID, per foot

Purchase by the foot

INSULATION

- INS-01** Single hose insulation, 5/8" ID
6' Lengths

FILTERS

- FBL-100** Low profile filter body and bowl
- FML-20** Filter screen, 20 Mesh (915 Micron)
- FML-40** Filter screen, 40 Mesh (480 Micron)
- FML-80** Filter screen, 80 Mesh (178 Micron)
- FML-100** Filter screen, 100 Mesh (80 Micron)
- FML-250** Filter screen, 250 Mesh (40 Micron)

TC-4600 Temperature Controller

PWM Temperature Control
RS-232 Comms.

Pulse Width Modulating Temperature Controller

OVERVIEW

The TC-4600 is a bi-directional (heat/cool), H-bridge controller designed to control thermoelectric cooling/heating units with the option to set as unidirectional. The controller accepts an input voltage of 12-36VDC. The output voltage can range from 0 to 36VDC if a split supply is used. The load circuit is pulse width modulated at 2.7KHz and delivers a load of 0.1 to 25 Amps. Temperature resolution for this controller is 0.01°C, providing exceptional control stability in a well designed thermal system.

The H-bridge configuration allows for a seamless transition between heating and cooling. Using a PC with an RS232 interface, the controller can be set for any of the following control configurations: On/Off control, differential temperature control, manual control or any combination of PID control. The user friendly software requires no programming experience to set up the controller. The RS232 interface has 1500 VAC isolation from all the electronic circuitry minimizing the interference from noise or errant signals. Once the controller is set up, the computer may be disconnected and the controller becomes a stand alone unit. If the computer is left connected, it can be used for data acquisition in a half duplex mode.

The temperature may also be set through the optional display or through a remote potentiometer. The PC software also provides for several alarm types and the controller has 3 outputs for alarms with a 5VDC output rated for 25mA of current. In the set up menu the alarm function may be set as no alarm, tracking alarm, fixed value alarm or computer controlled alarm. The menu also offers selections for latching and for maintaining or cutting the power during an alarm. The alarm sensor may be the control temperature sensor or a secondary sensor.



FEATURES

- Full H-Bridge Control
- Fully PC Programmable
- P,I,D or On/Off Control
- PC Configurable Alarm Circuit
- 0-36VDC Output Using Split Power Supply
- RS232 Communications
- RoHS Compliant
- Set Temperature range of -40°C to 250°C dependent on sensor selection

ACCESSORIES

- Model TC-4600D Display: 4 Digit temperature readout for displaying set temperature or actual temperature with capability to adjust the set temperature.
- HS optional Heat Sink: Recommended for applications using 15A of load or greater.
- Thermistor-K: 2000 Ω +/- 2% at 25 °C, best for (-20 °C to 30 °C) range
- Thermistor-Z: 10000 Ω +/- 2% at 25 °C, best for (0 °C to 50 °C) range

SPECIFICATIONS

- Input Voltage: 12VDC to 36VDC
- Output Voltage: 0 to 36VDC with split supply
- Load Current: 0.1A to 25A
- Bandwidth: 0.1°C to 50°C
- Integral: 0 to 10 repeats per minute
- Derivative: 0 to 10 minutes
- PWM Base Frequency: 2.7 KHz
- Ambient Temperature range: -20°C to 70°C
- Power Dissipation: <10 Watts
- Process Control Rate: 90 times per second
- Output Power Resolution: $\pm 0.2\%$

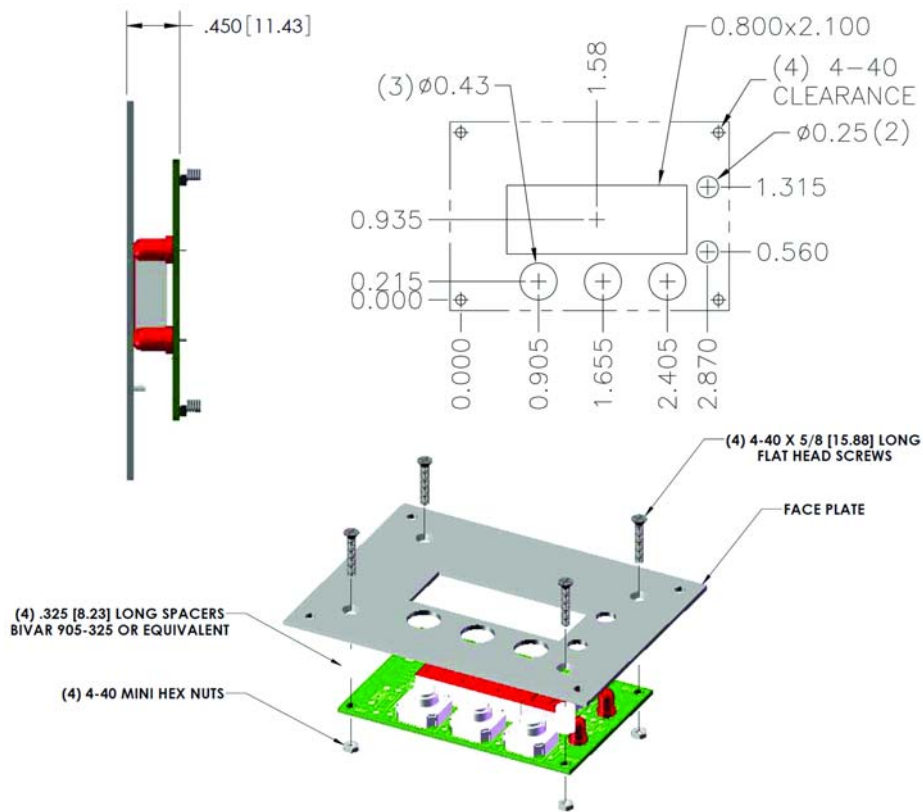
PART NUMBER AND ORDERING

MODEL NUMBER	PART NUMBER	COMMS	OPERATING VOLTAGE VDC	SWITCHING VOLTAGE VDC	MAX. SWITCHING CURRENT AMPS.	HEAT SINK	SENSOR	SENSOR RANGE (°C)	DISPLAY
TC-4600	46-44O-41-000	RS-232	12-36	0-36	15*	none	Thermistor-K	-20 to 30	none
TC-4600	46-44O-41-001	RS-232	12-36	0-36	15*	none	Thermistor-K	-20 to 30	included
TC-4600	46-44O-51-000	RS-232	12-36	0-36	15*	none	Thermistor-Z	0 to 50	none
TC-4600	46-44O-51-001	RS-232	12-36	0-36	15*	none	Thermistor-Z	0 to 50	included
TC-4600	46-44P-41-000	RS-232	12-36	0-36	25	included	Thermistor-K	-20 to 30	none
TC-4600	46-44P-41-001	RS-232	12-36	0-36	25	included	Thermistor-K	-20 to 30	included
TC-4600	46-44P-51-000	RS-232	12-36	0-36	25	included	Thermistor-Z	0 to 50	none
TC-4600	46-44P-51-001	RS-232	12-36	0-36	25	included	Thermistor-Z	0 to 50	included

* Can switch up to 25 AMPS if used with heat sink

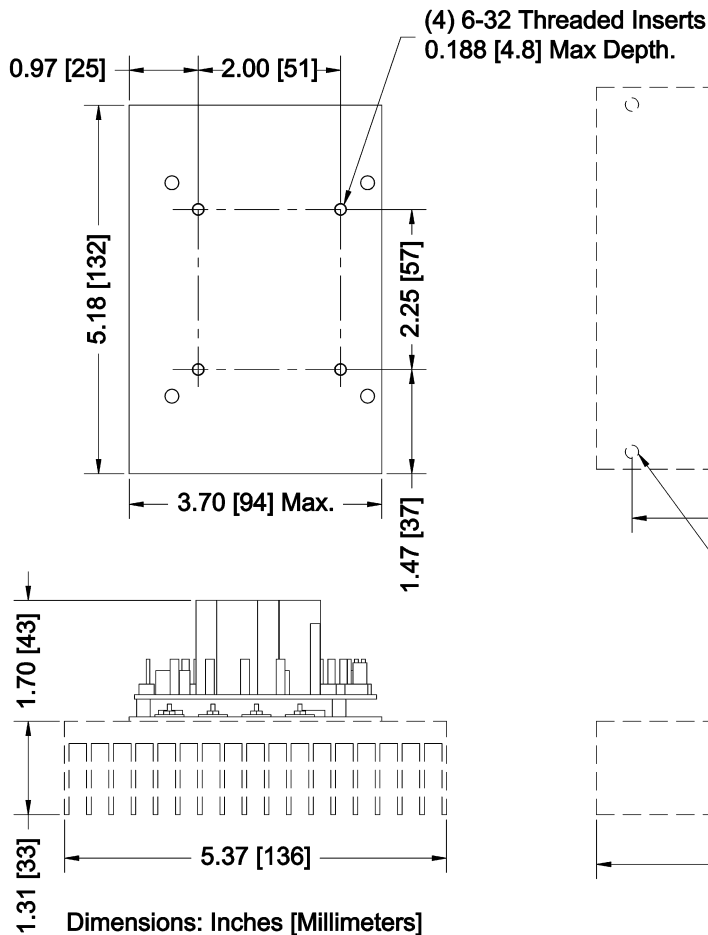
DISPLAY

TC-4600

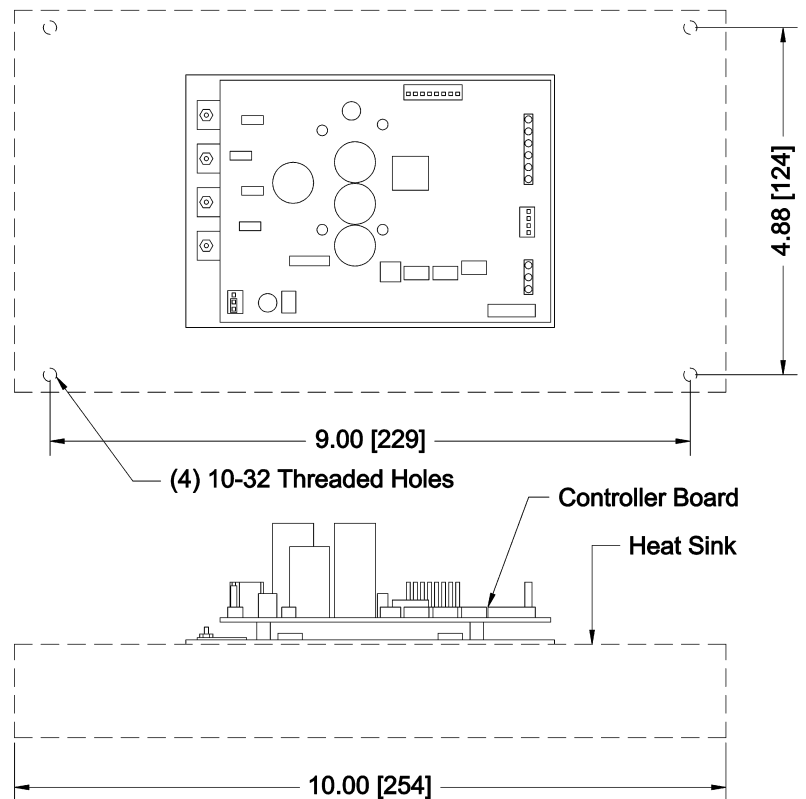


DIMENSIONS

Mounting Without Heat Sink



Mounting With Heat Sink



TC-3400 Temperature Controller

PID Temperature Control

OVERVIEW

The TC-3400 temperature controller series simplifies your temperature control requirements.

The controller options reduce system complexity and the cost of control loop ownership. The TC-3400 is a high performance PID temperature controller in space-saving, panel-mount 1/32 DIN size EIA 485 communications and standard NEMA-4X IP66 sealing make the TC-3400 versatile and suitable for wide range of environments.

FEATURES

Advanced PID Control Algorithm

- Offers TRU-Tune™ + adaptive control to provide tighter control for demanding applications
- Provides auto-tune for fast, efficient start up

Configuration

- Systems come preconfigured for PID cooling application
- "Canned" configuration for different applications available

Parameter Save and Restore Memory

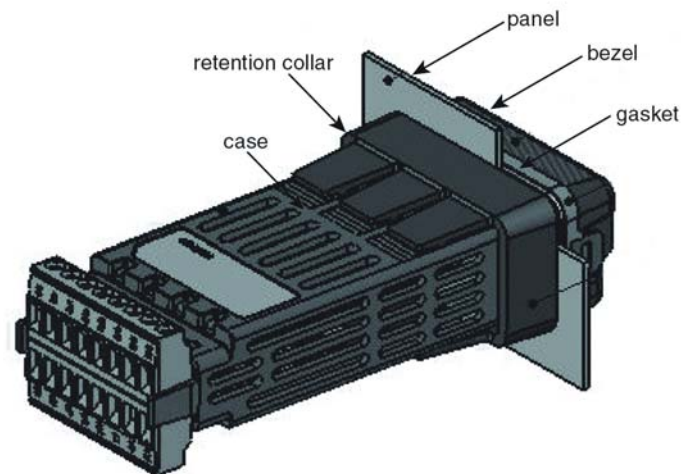
- Reduce service requirement and down time

Heat-Cool Operation

- Provides application flexibility with accurate temperature and process control

P3T Armor Sealing System

- NEMA-4X and IP66 offers water and dust resistance that can be cleaned and washed down
- Backed up by UL 50 independent certification to NEMA-4X specification



SPECIFICATIONS

Line Voltage/Power:

- 85 to 264V~(ac), 47 to 63Hz
- 12 to 40Vdc OR 20 to 28V~(ac), +10/-15 percent; 50/60Hz, ± 5 percent
- 10VA maximum power consumption
- Data retention upon power failure via nonvolatile memory
- Compliant with SEMI F47-0200, Figure R1-1 voltage sag requirements @ 24V~(ac) or higher

Environment:

- -18 to 65°C (0-149°F) operating temperature
- -40 to 85°C (-40-185°F) storage temperature
- 0 to 90 percent RH, non-condensing

Accuracy:

- Calibration accuracy and sensor conformity ± 0.1 percent of span, $\pm 1^\circ\text{C}$ @ the calibrated ambient temperature and rated line voltage
- Types R, S B; 0.2 percent

- Type T below -50°C ; 0.2 percent
- Calibration ambient temperature @ $25^\circ\text{C} \pm 3^\circ\text{C}$ ($77^\circ\text{F} \pm 5^\circ\text{F}$)
- Accuracy span 540°C (1000°F) minimum
- Temperature stability $\pm 0.1^\circ\text{C}/^\circ\text{C}$ ($\pm 0.1^\circ\text{F}/^\circ\text{F}$) rise in ambient maximum

Agency Approvals:

- UL®/EN 61010 Listed
- UL® 1604 Class 1 div. 2
- UL® 50, NEMA 4X, EN 60529 IP66
- CSA 610110 CE
- RoHS, W.E.E.E.

Controller:

- Auto-tune with TRU-TUNE™ + adaptive control algorithm
- Control sampling rates: input 10Hz, outputs 10Hz

Wiring Termination:

- Input, power and controller output terminals are touch safe removable 12 to 22 AWG

Universal Input:

- Thermocouple, grounded or ungrounded sensors
>20M Ω input impedance
3 μA open sensor detection
Maximum of 200 Ω source resistance
- RTD 2- or 3-wire, platinum, 100 Ω and 1000 Ω @ 0°C calibration to DIN curve (0.00385 Ω / $^\circ\text{C}$)

Serial Communications:

- Isolated communications EIA 485
- Industry standard RS-485 Modbus® RTU
- RS-232 via RS-485/232 converter

TC-3400

PART NUMBER AND ORDERING

34	-	X	X	X	-	X	X	-	X	X	X
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Input voltage

0: Universal AC - 85 to 264Vac, 47 to 63 Hz
 4: 12/24Vdc - 12 to 40Vdc, 20 to 28Vac

Functions

2: Heat/Cool -No relay
 3: Cooling with relay (package defined below)
 4: Heating/Cooling with relays (package defined below)

Switching Volts & Amps

A: None, drive signal only - no relays
 B: Cool only, VAC switching, 120/240Vac, 10 Amps
 C: Cool Only, VDC switching, 0-100 VDC, 12 Amps
 D: Cool Only, VDC switching, 0-100 VDC, 20 Amps
 E: Cool Only, VDC switching, 0-100 VDC, 40 Amps
 F: Heat/Cool, VDC switching, 0-100 VDC, 12 Amps
 G: Heat/Cool, VDC switching, 0-100 VDC, 20 Amps
 H: Heat/Cool, VDC switching, 0-100 VDC, 40 Amps
 I: Heat/Cool, Heat: 120/240 VAC, 10 amps Cool: VDC switching, 0-100 VDC, 12 Amps
 J: Heat/Cool, Heat: 120/240 VAC, 10 amps Cool: VDC switching, 0-100 VDC, 20 Amps
 K: Heat/Cool, Heat: 120/240 VAC, 10 amps Cool: VDC switching, 0-100 VDC, 40 Amps
 L: Heat/Cool, Heat: 0-100 VDC, 12 Amps Cool: VAC switching, 120/240 VAC, 10 amps
 M: Heat/Cool, Heat: 0-100 VDC, 20 Amps Cool: VAC switching, 120/240 VAC, 10 amps
 N: Heat/Cool, Heat: 0-100 VDC, 40 Amps Cool: VAC switching, 120/240 VAC, 10 amps
 O: Heat/Cool, Reverse Polarity, 0-100 VDC, 12 Amps
 P: Heat/Cool, Reverse Polarity, 0-100 VDC, 20 Amps
 Q: Heat/Cool, Reverse Polarity, 0-100 VDC, 40 Amps
 R: Heat/Cool, VAC switching, 120/240 VAC, 10 amps

Sensor

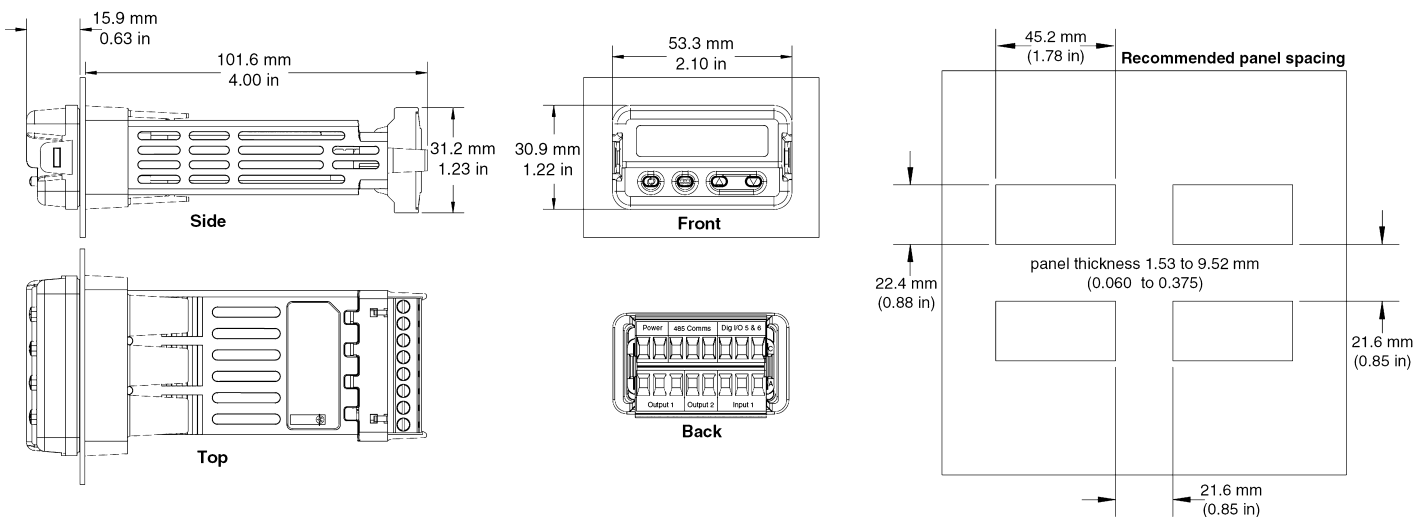
0: None
 1: 3- Wire RTD - RTD-Probe
 2: T type thermocouple (ring mount)

Communications

0: Basic communications used with standard **EZ Zone Configurator** allows the user to configure all the set up parameters including the ability to change set point, monitor the process temperature and initiate an Auto Tune
 1: RS-232 complete communication for use with standard EZ Zone Configurator and optional **SpecView** or third party software, includes RS-232/RS-485 adapter
 2: RS-485 complete communication for use with standard EZ Zone Configurator and optional **SpecView** or third party software

Options

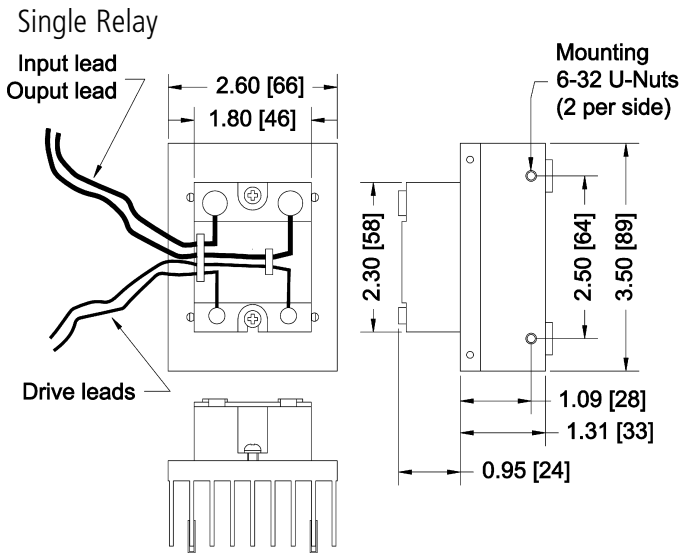
DIMENSIONS AND CUTOUT



SINGLE RELAY

RELAYS

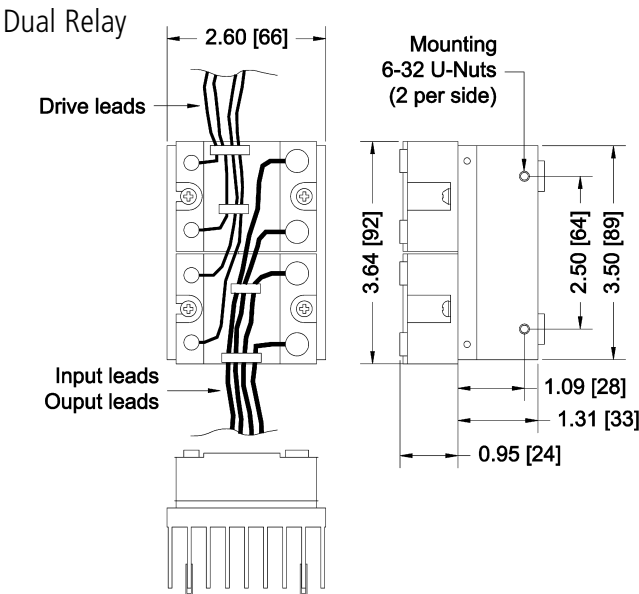
Relays
H-Bridges



DESCRIPTION

PART #

Cool only, DC Drive, VAC switching, 120/240 VAC, 10 AMPS	RELAY - B
Cool only, DC Drive, VDC switching, 0-100 VDC, 12 AMPS	RELAY - C
Cool only, DC Drive, VDC switching, 0-100 VDC, 20 AMPS	RELAY - D
Cool only, DC Drive, VDC switching, 0-100 VDC, 40 AMPS	RELAY - E
Cool only AC Drive, VAC switching, 120/240 VAC, 10 AMPS	RELAY - T

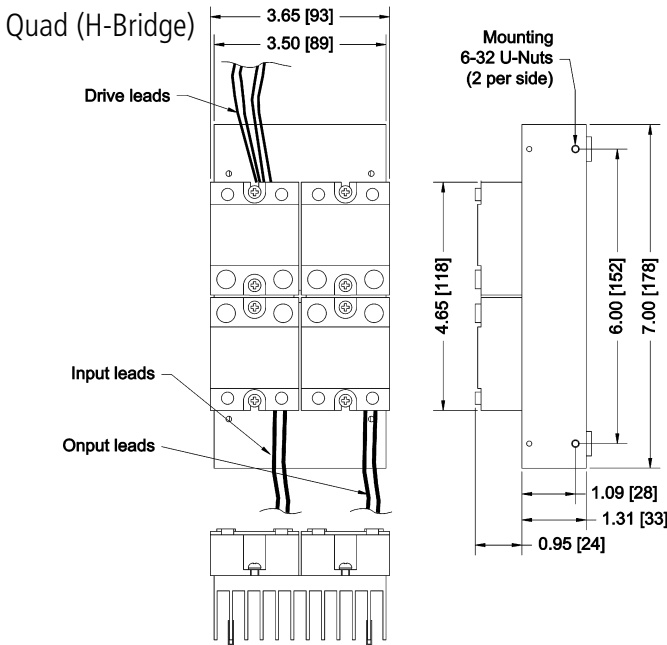


DESCRIPTION

(3-32 VDC DRIVE)

PART #

Heat/Cool, VDC switching, 0-100 VDC, 12 AMPS	RELAY - F
Heat/Cool, VDC switching, 0-100 VDC, 20 AMPS	RELAY - G
Heat/Cool, VDC switching, 0-100 VDC, 40 AMPS	RELAY - H
Heat/Cool, Heat: 120/240 VAC, 10 AMPS Cool: 0-100 VDC, 12 AMPS	RELAY - I
Heat/Cool, Heat: 120/240 VAC, 10 AMPS Cool: 0-100 VDC, 20 AMPS	RELAY - J
Heat/Cool, Heat: 120/240 VAC, 10 AMPS Cool: 0-100 VDC, 40 AMPS	RELAY - K
Heat/Cool, Heat: 0-100 VDC, 12 AMPS Cool: 120/240 VAC, 10 AMPS	RELAY - L
Heat/Cool, Heat: 0-100 VDC, 20 AMPS Cool: 120/240 VAC, 10 AMPS	RELAY - M
Heat/Cool, Heat: 0-100 VDC, 40 AMPS Cool: 120/240 VAC, 10 AMPS	RELAY - N
Heat/Cool, VAC switching, 120/240 VAC, 10 AMPS	RELAY - R



DESCRIPTION

(3-32 VDC DRIVE)

PART #

Heat/Cool, reverse polarity, 0-100 VDC, 12 AMPS	RELAY - O
Heat/Cool, reverse polarity, 0-100 VDC, 20 AMPS	RELAY - P
Heat/Cool, reverse polarity, 0-100 VDC, 40 AMPS	RELAY - Q

Temperature Controller Accessories

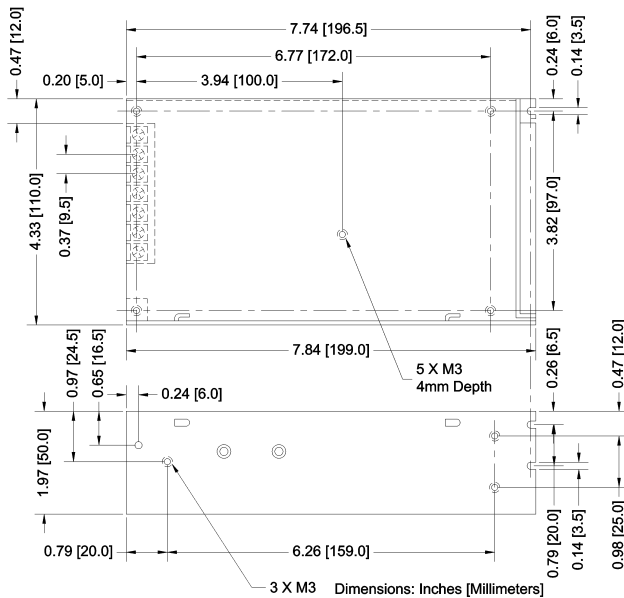
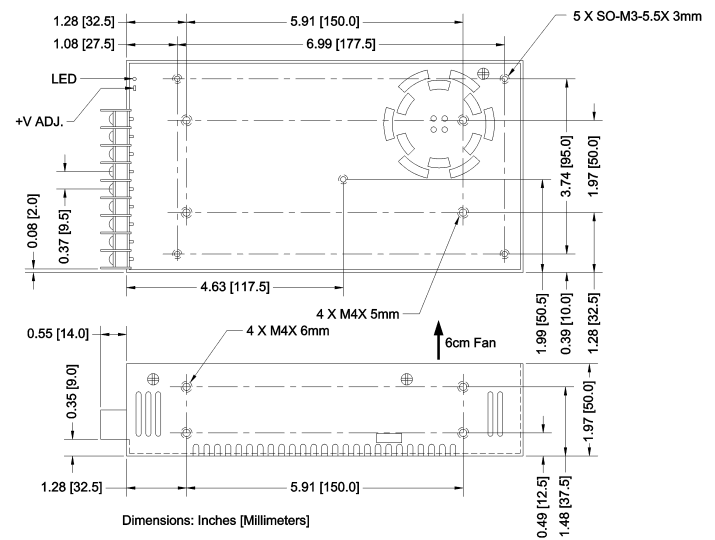
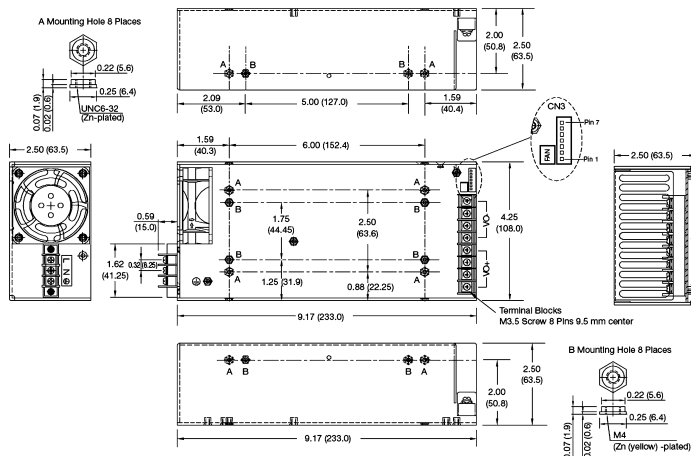
SENSORS, CABLES, ADAPTERS

TTYPE-Ring Surface mounting "T" type thermocouple with connector	
RTD-Surface Surface mounting 3 wire RTD with connector	
RTD-Probe 6" long, 1/8 DIA, 3 wire RTD with connector	
Probe-1/4NPT RTD-Probe with male 1/4 NPT compression fitting	
Probe-3/8NPT RTD-Probe with male 3/8 NPT compression fitting	
Thermocouple Wire (specify length in feet) "T" type WIRE-T-XXX "J" type WIRE-J-XXX	
RTD Wire (specify length in feet) 3 conductor cable WIRE-RTD-XXX	
C-USB RS-232 to USB converter	
C-485/232 RS-485 to RS-232 and RS-232 to RS-485 converter	
C-RS232 RS-232 cable	

SPECIFICATION

MODEL	INPUT VOLTAGE VAC 47-63 HZ	OUTPUT VOLTAGE VDC	DC OUTPUT POWER WATTS	OUTPUT CURRENT AMPS.	WEIGHT LBS.	WORKING TEMPERATURE °C 20-90%RH	DIMENSIONS L X W X H INCHES
AS150F-12	88-132 OR 176-264*	12	150	12.5	1.76	-10 - 60	7.96X4.4X2
AS150F-24	88-132 OR 176-264*	24	150	6.5	1.76	-10 - 60	7.96X4.4X2
SP300-12	90-264	12	300	24	2.6	-10 - 50	8.6X4.6X2
SP300-24	90-264	24	300	12.5	2.6	-10 - 50	8.6X4.6X2
SP500-24	90-264	24	500	20.8	3.3	0 - 70	9.2X4.25X2.5
SP800-24	90-264	24	800	33	3.3	0 - 70	9.2X4.25X2.5

* Input voltage range is switch selectable.

DIMENSIONS**AS-150F****SP-300****SP-500, SP-800**

Helpful Information

Ordering information:

- By telephone during business hours, **773-342-4900** and **888-832-2872**.
Monday – Friday 8 AM to 4:30 PM, Central Time.
- By fax or email 24 hours a day.
Fax: **773-342-0191**
email: **sales@thermoelectric.com**
- By mail on your purchase order or company letterhead.
Thermoelectric Cooling America Corporation
4048 West Schubert, Chicago, Illinois 60639

All orders are subject to written acceptance on our form "Acceptance of Order" with our required terms and conditions, depending upon quantity, price, availability of parts and other considerations.

Prices:

- Prices are quoted F.O.B. Chicago and do not include sales or other taxes. Applicable taxes will be shown as a separate item on the invoice, as will charges for freight.
- Prices are in US Dollars and are subject to change without notice.

Terms:

- Terms of payment are 30 days after shipment, subject to approved credit. New accounts must furnish necessary credit references. Until credit has been established, payment in full with order or C.O.D. may be requested. American Express, Visa and Mastercard are accepted.



Cancellation, Schedule Changes:

- A charge of 15% of net price will be assessed for cancellation of formally accepted orders. Special part numbers containing a (CD or P) prefix are non-cancelable, non-returnable (NCNR). A 100% cancellation charge applies.
- Requests for schedule changes which defer delivery may be subject to price adjustments or other charges.

Returned Goods, Restocking Charges:

- In order to return merchandise for any reason (repair, replacement or credit), a return authorization number must be issued by TECA.
- New merchandise may not be returned for credit beyond 60 days from shipment. Charges for incidental or other damages may also be made.
- All returned goods must be sent freight prepaid. A restocking charge of 15% will apply.

Limited Warranty

In the event a claimed defect in material or workmanship is discovered in any of TECA's products within one year after the date they are delivered to Buyer, and if TECA is notified of the defect in writing by certified mail within 14 days of the date of discovery, then TECA may either, at its sole discretion; a) inspect the product at the Buyer's location, or; b) require that the product be made available at Buyer's expense at TECA's premises for TECA's inspection within 14 days of notification. If after such inspection TECA deems that the products are defective and the defects result from faulty materials and/or workmanship and not in any way from accident, misuse, misapplication, mishandling, modification or alteration by the Buyer or the shipper, then TECA shall, at its sole option, repair or exchange defective products free of charge to Buyer, and return same to Buyer at Buyer's expense, or credit the Buyer the net price of the defective products. ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, ARE EXCLUDED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL TECA BE LIABLE FOR ANY CLAIM BASED ON BREACH OF EXPRESS OR IMPLIED WARRANTY OR OTHER DAMAGES WHETHER SPECIAL, INDIRECT, INCIDENTAL, CONSEQUENTIAL, LOST PROFITS, BUSINESS INTERRUPTION, OR LOSS OF BUSINESS OR CUSTOMER RELATIONSHIPS.

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