

# THERMOELECTRIC PRODUCTS

Catalog NO.

Cold Plates

14.1



# 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](http://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

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Product notes

#### Laboratory Cold/Hot Plates

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Gradient Bar

#### General Use Cold Plates

Product Notes & Applications  
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AHP-690CP  
AHP-590CP  
AHP-570CP  
AHP-470CP  
AHP-450CP  
AHP-301CP  
AHP-300CP  
  
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LHP-800CP  
LHP-300CP

#### Temperature Controllers

TC-4600  
TC-3400  
TC-3500  
Relay Packs  
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.**

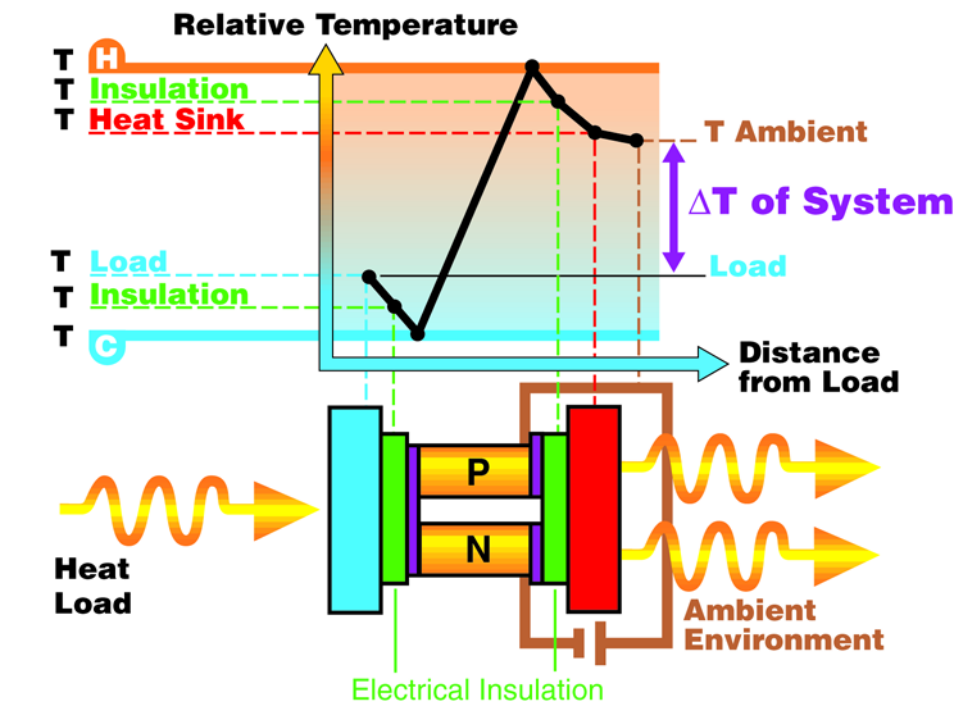
It is also called "the Peltier Effect" after the French watchmaker who discovered the phenomenon in the early 19th century. Like their conventional refrigeration counterparts, thermoelectric cooling systems obey the basic laws of thermodynamics. However, the actual system for cooling is different.

**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

## Cold Plates:

Cold plates are offered in air cooled and liquid cooled versions. The cold plate itself is a flat aluminum plate. The prefixes **"AHP"** and **"LHP"** and suffixes **"CP"**, **"CPHC"** and **"CPV"** are also used as descriptive modifiers in cold plate model numbers. **"CPV"** style cold plates were designed to fill most laboratory and bench top needs. Features such as heating, temperature control, ramp/soak programming, remote sensors and communications are standard on **"CPV"** products. **"CP"** style products are general utility type cold plates often used as components in other products, in product assembly or testing, as prototypes for future OEM development or where simple direct contact cooling with no bells or whistles are required. They can be mounted to benches, enclosures, walls or structures.

					AHP	1200	CPHC
AHP	Air Cooled Heat Pump, air cooled cold plates for direct contact cooling. The heat removed from the cold plate is transferred to the heat sink and dissipated to the ambient via forced air.						
LHP	Liquid Cooled Heat Pump, "LHP" cold plates require flow of coolant to remove heat.						
FAMILY	COOLING CAPACITY (watts)	INPUT	VOLTAGE	OVERALL DIMENSION (inches)	COLD PLATE SURFACE (inches)		
1800	430	100-240 VAC		18.7 X 15.1 X 6.5	13.3 X 12.8		
1200	260	120, 240 VAC; 24 VDC		15 X 7.3 X 6	13 X 5.38		
800	205	24 VDC		6.6 X 6.6 X 1.75	6 X 6		
300	85	12/24/48 VDC		10 X 5.4 X 4.1	6 X 4.5		
301	70	120, 240 VAC		10 X 5.5 X 6.4	6 X 4.5		
150	40	12/24 VDC		7 X 3.63 X 3.95	3.5 X 2		
CPV	These cold/hot plates are versatile thermoelectric cold plates for laboratory or similar applications, offering various standard features such as integral power supply, temperature control, RS-232 Comms, remote sensibility and various accessories and attachments.						
CAS	These models are CPV cold/hot plates made for use with cascade accessories for high delta T requirements.						
DCP	CPV systems with dual zone cold/hot plate offering two individually controlled temperature zones/plates with identical standard features to the CPV cold plates.						
MSP	Magnetic stirring cold plate offering cooling and heating of solutions in standard size beakers and bottles ranging from 600 mL to 4000 mL.						
CP	These are general purpose/OEM cold plates.						
CPHC	Same as CP products plus heating function.						



# Laboratory Cold/Hot Plate Notes

## Things you need to know to start sizing a cold plate:

**Temperatures:** The ambient temperature is the air temperature around the cold plate, often the room temperature. The desired temperature can be at the cold plate or at a location on the item being cooled. The difference between the two is the design temperature differential (delta T). TECA's remote sensibility feature allows for sensing and control at the item being cooled or using the sensor built in to the cold plate. The cold plate needs to be colder than the item being cooled. Make sure to use the difference between the ambient and the cold plate temperature when working with the performance curves. For liquid cooled models the reference "Ambient" temperature becomes the temperature of the cooling fluid.

**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 item being cooled. An un-insulated test item will have a higher ambient load than an insulated one. A fluid or gas flow will have a higher load than a static volume.

**Performance Curves:** Our curves represent the performance of a CPV cold plate in an insulated test. The active load, in Watts, is shown on the X-Axis and the temperature differential (cold plate minus ambient) is shown on the Y-Axis.

**Features:** A CPV's standard features such stainless steel skirt, drip protection, remote sensibility and noise reducing fan speed control contribute to its superior heat/cool temperature control.

## Things you should consider when selecting cold plate:

**Purpose:** The CPV family of cold/hot plates fill the need for direct contact cooling on your bench top without the need for messy, imprecise ice-baths. The CPV models have a home in Biochemical, Petrochemical and Electronics laboratories for precise cooling and control of samples and products.

**Temperature Control:** For better control and more control features the Laboratory CPV Cold/Hot plates are the best choice. Each includes an integral temperature controller, RS-232 Comms and TECA's remote sensibility which gives the user the option of using a separate RTD sensor at or in their load or the RTD built into the cold plate. The software allows complete control from your computer. Programming and data logging along with a graphical representation of the test are regular features. Ramp and soak, Time vs Temperature profiles are easily created and downloaded.

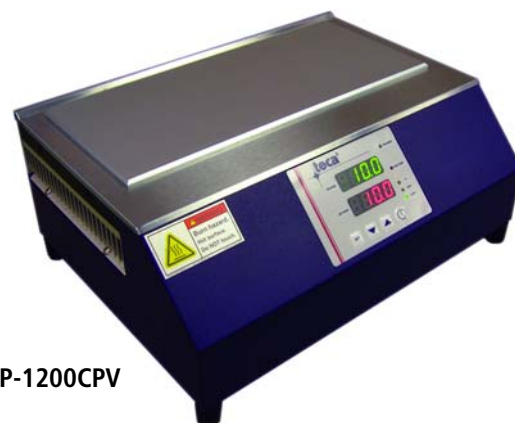
**Environment:** In general our laboratory CPV models can handle factory, lab and office environments. All CPV cold plates are protected from spills and condensations.

**Power Input:** Laboratory CPV models are available for universal AC input (100 - 264 VAC; 47 - 63 Hz) or 24 VDC.

**Cooling Medium:** TECA has both air cooled and liquid cooled cold plates. Air cooled models (AHP) use a speed controlled fan to force ambient air through a finned heat sink to dissipate the heat. Liquid cooled cold plates require a constant flow of cooling water. This can be tap water, in house chilled water or re-circulating chillers. When using the liquid cooled versions the delta T reference temperature is the liquid temperature, when using air cooled cold plates it is the ambient air temperature.

**Cold Plate Surface:** Each CPV cold/hot plate is constructed of 1/2" thick anodized aluminum flat to within +/- .002". The plate can be either a smooth flat surface or have standard or metric threaded inserts installed.

**Mounting:** Samples and components with very flat surfaces can often be set directly onto the cold plate. Sometimes the samples or devices are frozen onto the cold plate surface. Other times items can be thermally greased into place using DOW 340 heat transfer grease or similar. Many times the tackiness of the grease is enough to hold the test item in place. CPV units can also be ordered with "Tap Plates" installed. These plates have a standard tap pattern on them for customer use. Side mounting clamps are used with the accessory plate and can also be used with customer plates or loads. Alternatively a custom tap plate can be ordered plain or with taps, slots grooves etc per customer requirements. When using TAP versions components can be secured tightly to the cold plate. Custom patterns can be made to fit your component. Threads on the sides of the unit can be used to secure components or separate accessory plate.



AHP-1200CPV



AHP-1200DCP

# Laboratory Cold Plate Applications

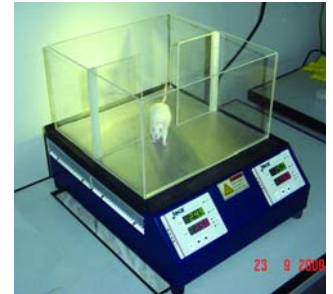


## EQUIPMENT TESTING AND MAINTENANCE

Three AHP-1200CPV Cold Plates are running continuously and in tandem at 17 °C to monitor satellite equipment. The customer has added an air deflector of his own design. TECA offers a standard air deflector accessory as well. The customer applies approximately 50 watts of heat to each cold plate.

## LABORATORY

Investigating the changes in behavioral responses due to changes in experimental floor temperature and dermal application of heating/cooling compounds in an animal model. The TECA AHP-1200DCP dual zone cold/hot thermoelectric plate with two independently controllable temperature zones provides precise regulation of the floor temperature and change of settings as deemed experimentally necessary. The Plexiglass arena allows careful monitoring of animal activity while allowing the animal to roam freely across the experimental surface.

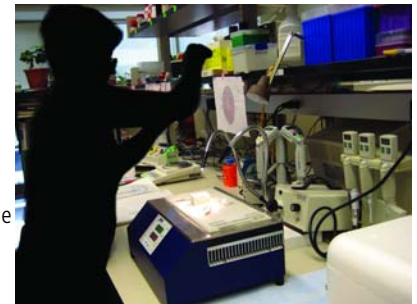


## QUALITY CONTROL

The AHP-1200CPV is used in a customer's Quality Control inspection process. The customer required a specific piece of equipment that would allow for bench top inspection of solution samples contained in small vials. Maintaining a 5C temperature throughout the QC inspection process was crucial. Ease of use and dependable control by TECA Model AHP-1200CPV Cold Plate has made the customer's process more efficient.

## RESEARCH

Keeping tissue samples frozen for dissection has been done over an ice/dry ice combination with variable results. The problem was to find a way to get reliable, consistent results. The Dept. of Psychiatry in a major U.S. university is employing the Versatile Cold Plate Model AHP1200CPV in a novel way. They are using the product to keep tissue samples frozen for dissection. The technician has placed an accessory borosilicate (Pyrex) substrate directly on the Cold Plate to provide a cut proof, frozen work area. The apparatus provides temperature stability and control. This in turn assures uniform tissue sample consistency for excellent quality dissection.



## COOLING 64 DEGREES BELOW THE AMBIENT

A medical device manufacturer uses a TECA Low-Temperature Cascade System in his design process. The Cascade System consists of a TECA Cold Plate and Cascade attachment. The system offers direct contact cooling to the customer's load. In this example, the customer was able to cool his load of Isopropyl Alcohol solution from +25C to -25C in about 35 minutes.

## AGRICULTURAL RESEARCH USING TEMPERATURE GRADIENT

A department of the Canadian government uses two TECA Thermal Gradient Bar (TGB-5030) systems to conduct thermal behavior research on insects. In the photographs shown here, the customer used two AHP-1200CPV Cold/Hot plates plus one Large Gradient Plate (p/n TGB-5030) and created a gradient area spanning from 4C to 33C.



## LABORATORY RESEARCH, MEASURING PLANT METABOLISM

A university-based agriculture research laboratory in Spain is measuring plant metabolism under various conditions. TECA Corporation's high-capacity version of the AHP-1200CPV (please refer to part number 9-35EB-1-0A0 on our product specification sheet) is used to cool the plant to 22C. Precise temperature control is important in this application as the plant's roots must not get too cold. There is a significant heat load to deal with as well, the plant is being illuminated with LED lights. Finally, thermal contact is an issue. The plant is inside a glass container, which is inside an aluminum block, which is placed on the AHP-1200CPV Cold Plate surface. Working closely with TECA engineers, the customer was successfully able to integrate the AHP-1200CPV Cold Plate into this unique experiment design and his sensitive thermal management needs were met.

# AHP-1800CPV

# Versatile Cold/Hot Plate

Air Cooled  
Bench Top

100-240 VAC Input  
400 Watts

## FEATURES

- Cools and heats (-20 °C to 90 °C)\*
- Precision machined anodized aluminum cold plate surface (~ 1100 cm<sup>2</sup> surface area, flat within +/- .005 cm)
- Stainless steel threaded inserts available (standard & custom patterns)
- Easy to clean stainless steel apron
- Integral PWM temperature controller
- 100-240 VAC universal input
- Low-profile design with ergonomic sloped front
- PWM controlled fan for quieter operation
- Weighs less than 50 lbs. (22.7 kg)
- Operating ambient temperature range of (0 °C to 50 °C)
- Compact bench top unit, 19.2" X 15.2" footprint
- Virtually maintenance-free operation
- Painted Enameled stainless steel exterior housing
- Many accessories available



## CONTROL FEATURES

- Integral "tunable" PWM temperature control
- PWM, Bi-directional temperature control
- Manually set or autotune to set point for best PID values
- 4 Programmable temperature zones with 4 independent PID settings
- Multi-segment ramp/soak programs with loops
- Internal RTD sensor, built into the cold plate
- Remote Sensibility™ switchable to exterior accessory RTD sensor
- USB communication with easy to use software
- Labview VI examples available

## SPECIFICATIONS

MODEL	PART NUMBER	NOTES	PLATE CONFIGURATION	PERFORMANCE RATING WATTS	VOLTAGE VAC 50/60 HZ	CURRENT AMPS.	WEIGHT LBS. (KG)	OPERATING AMBIENT °C
AHP-1800CPV	9-04KB-1-0A0	Heat/Cool	Smooth Surface	400	100-240	5.0-2.5	50 (22.7)	0-50
AHP-1800CPV	9-04KB-1-TAP	Heat/Cool	6-32 Tap Pattern	400	100-240	5.0-2.5	50 (22.7)	0-50
AHP-1800CPV	9-04KB-1-MET	Heat/Cool	M3 Tap Pattern	400	100-240	5.0-2.5	50 (22.7)	0-50

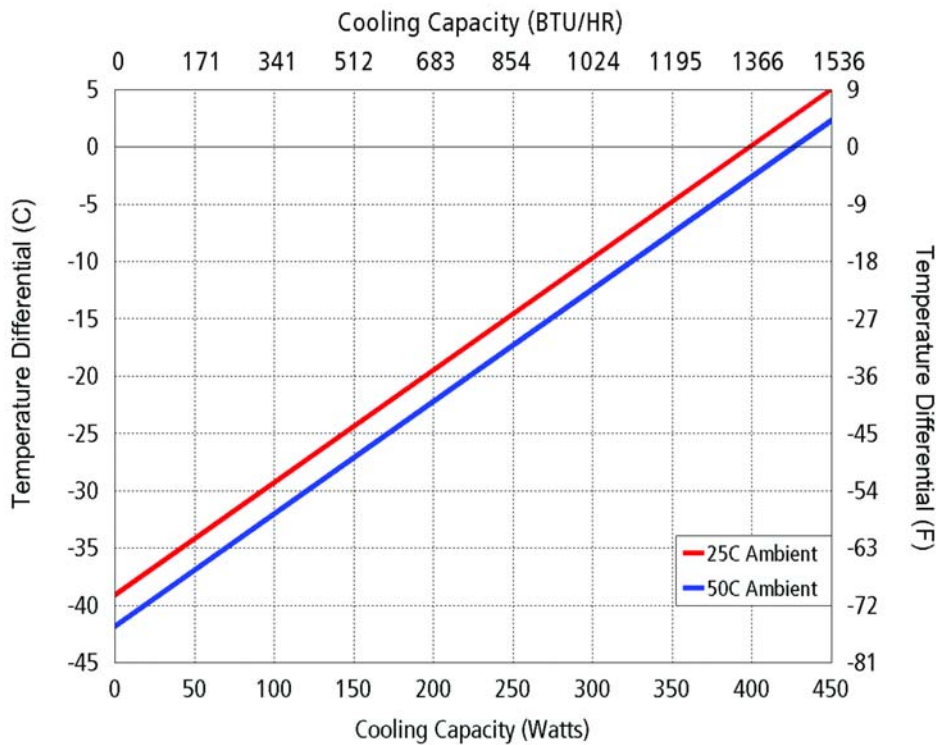
For custom threaded inserts and hole patterns contact TECA

Many options and accessories available, see CPV accessory pages

\*Under the right conditions



## PERFORMANCE CURVE



Equation of line: $y = \Delta T(^{\circ}\text{C})$ $x = \text{Capacity (Watts)}$		
Ambient Temp	25°C	50°C
Cold Plate	$y = .098x - 39.1$	$y = .098x - 41.8$

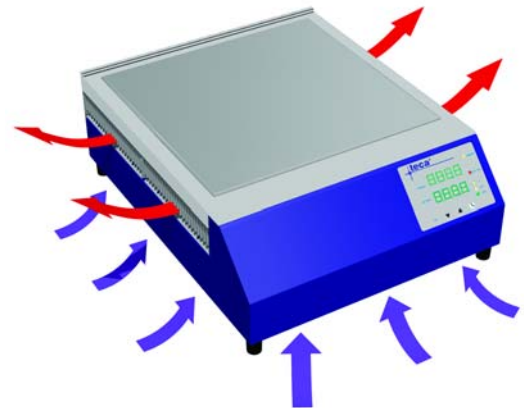
## AHP-1800CPV

## ENVIRONMENTS

Bench top  
Laboratory  
Industrial

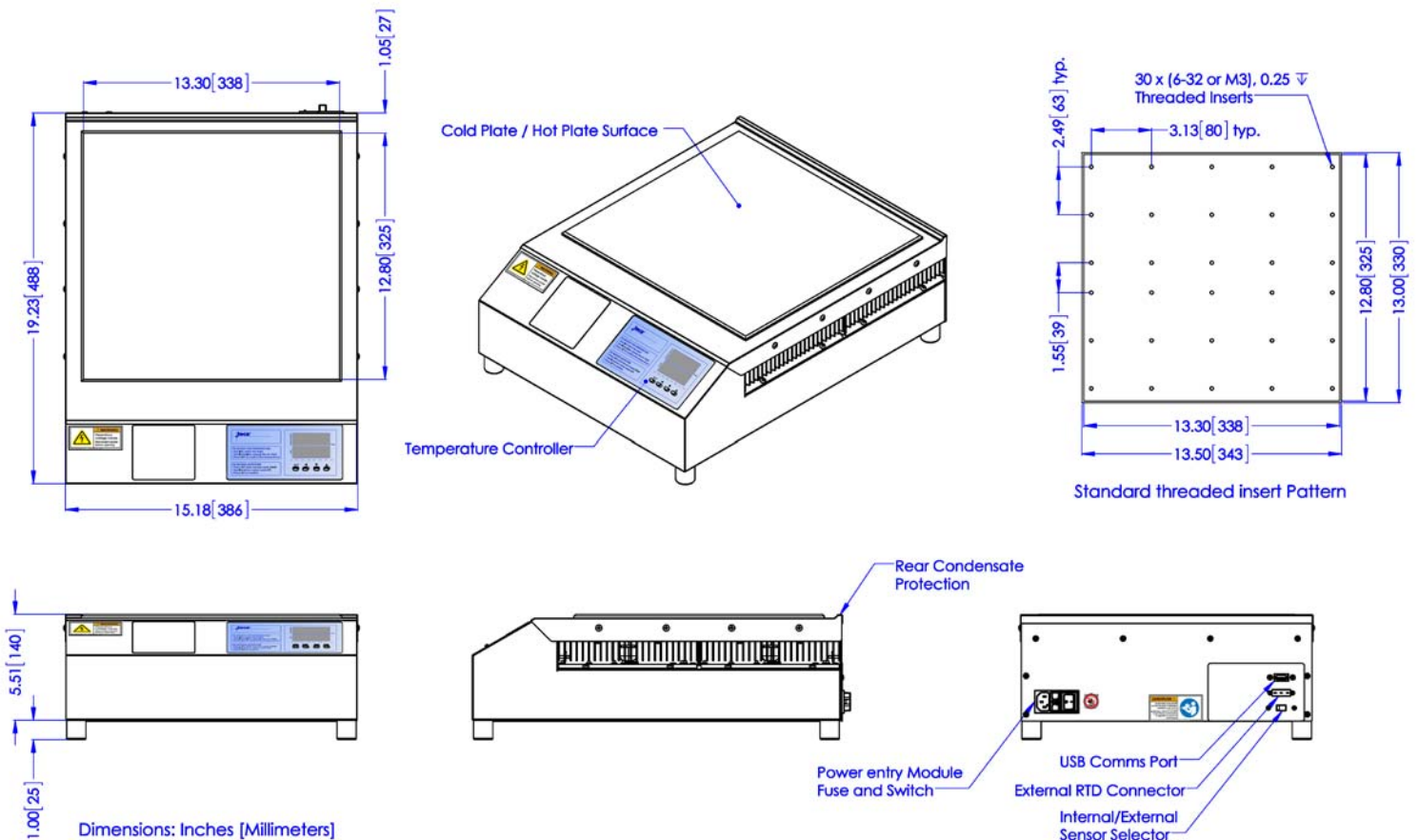
## COOLING CAPACITY

400 Watts @ 0 °C  $\Delta T$



Ambient Air Path

## DIMENSIONS



# LHP-1200CPV

# Versatile Cold/Hot Plate

Liquid Cooled  
Bench Top

100-240 VAC Input  
400 Watts

## FEATURES

- Precision machined cold plate surface
- Easy clean stainless steel cap
- Cools and heats
- 100-240 VAC universal input
- Low-profile design with ergonomic sloped front
- 9/16-18 SAE J1926-1 Fluid ports, Female 1/4-18 NPT o-ring adapter included
- Weighs less than 30 lbs. (13.6 kg)
- Compact bench top unit, 11.2" X 15.1" footprint
- Virtually maintenance-free operation
- Painted Enameled stainless steel exterior housing
- Accessories for glassware (beaker/test tube) cooling
- Stainless Steel threaded inserts



## CONTROL FEATURES

- Integral TC-4300 PID "tunable" temperature controller
- One shot smart PID control tuning or Adaptive Smart Continuous Tuning
- Heating and Cooling
- Internal 3-wire, platinum, 100Ω RTD sensor
- Remote Sensibility™ switchable exterior 100Ω RTD sensor
- Multi-segment ramp and soak programmable
- RS-232 communications
- Software for programming, charting and data acquisition

## SPECIFICATIONS

MODEL	PART NUMBER	COLD PLATE	VOLTAGE VAC (VDC)	CURRENT AMPS. 50/60 HZ	MIN. COOLANT FLOW L/MIN	TEMP. CONTROL	COOLANT TEMPERATURE RANGE °C	COLD PLATE TEMPERATURE RANGE °C
LHP-1200CPV	3-35EB-1-0A0	Smooth Surface	100-240	8 †	1	TC-4300	0 / +50	-30 / +90
LHP-1200CPV	3-35EB-1-TAP	6-32 Tap Pattern	100-240	8 †	1	TC-4300	0 / +50	-30 / +90
LHP-1200CPV	3-35EB-1-MET	M3 Tap Pattern	100-240	8 †	1	TC-4300	0 / +50	-30 / +90
LHP-1200CPV	3-35E5-1-0A0	Smooth Surface	(24)	27	1	TC-4300	0 / +50	-30 / +90
LHP-1200CPV	3-35E5-1-TAP	6-32 Tap Pattern	(24)	27	1	TC-4300	0 / +50	-30 / +90
LHP-1200CPV	3-35E5-1-MET	M3 Tap Pattern	(24)	27	1	TC-4300	0 / +50	-30 / +90
LHP-1200CPV	3-35EB-6-0A0	Smooth Surface	100-240	8 †	1	TC-4300	0 / +50	-30 / +130
LHP-1200CPV	3-35EB-6-TAP	6-32 Tap Pattern	100-240	8 †	1	TC-4300	0 / +50	-30 / +130
LHP-1200CPV	3-35EB-6-MET	M3 Tap Pattern	100-240	8 †	1	TC-4300	0 / +50	-30 / +130
LHP-1200CPV	3-35E5-6-0A0	Smooth Surface	(24)	27	1	TC-4300	0 / +50	-30 / +130
LHP-1200CPV	3-35E5-6-TAP	6-32 Tap Pattern	(24)	27	1	TC-4300	0 / +50	-30 / +130
LHP-1200CPV	3-35E5-6-MET	M3 Tap Pattern	(24)	27	1	TC-4300	0 / +50	-30 / +130
LHP-1200CAS*	3-35EB-1-CAS*	Tap Pattern	100-240	8 †	1	TC-4300	0 / +50	-30 / +90
LHP-1200CAS*	3-35EB-6-CAS*	Tap Pattern	100-240	8 †	1	TC-4300	0 / +50	-30 / +130

\* This part number is ready for use with a low temperature cascade option and includes CH-1200 hinged cover, CC-1200 rear panel for cascade power up and control, refer to next page for information on cascade options.

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

Many options and accessories available, see CPV accessory pages.

# LHP-1200CPV

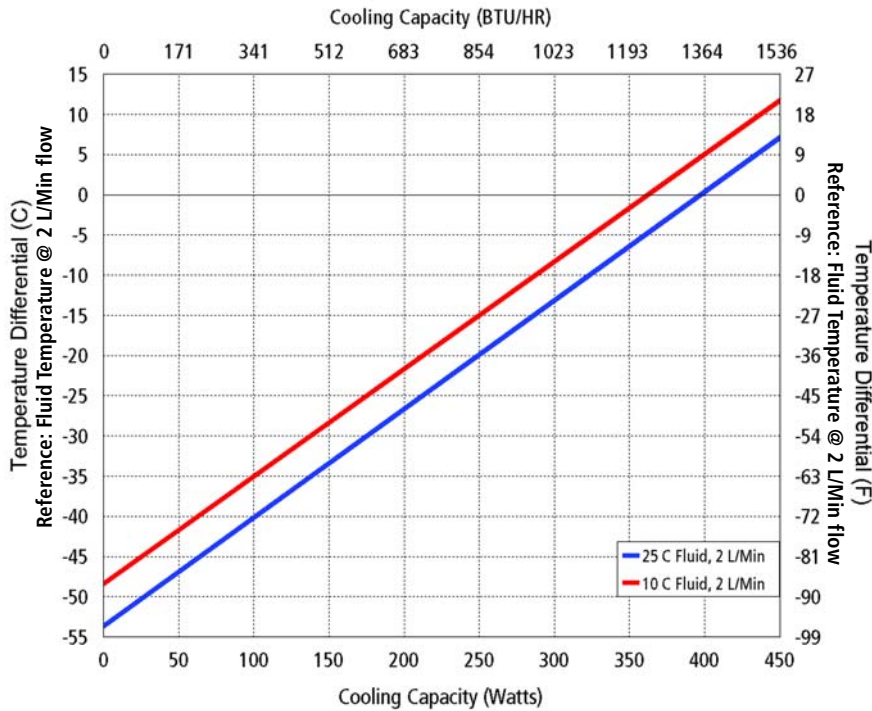
## ENVIRONMENTS

Bench top  
Laboratory  
Industrial

## COOLING CAPACITY

400 Watts @ 0 °C ΔT

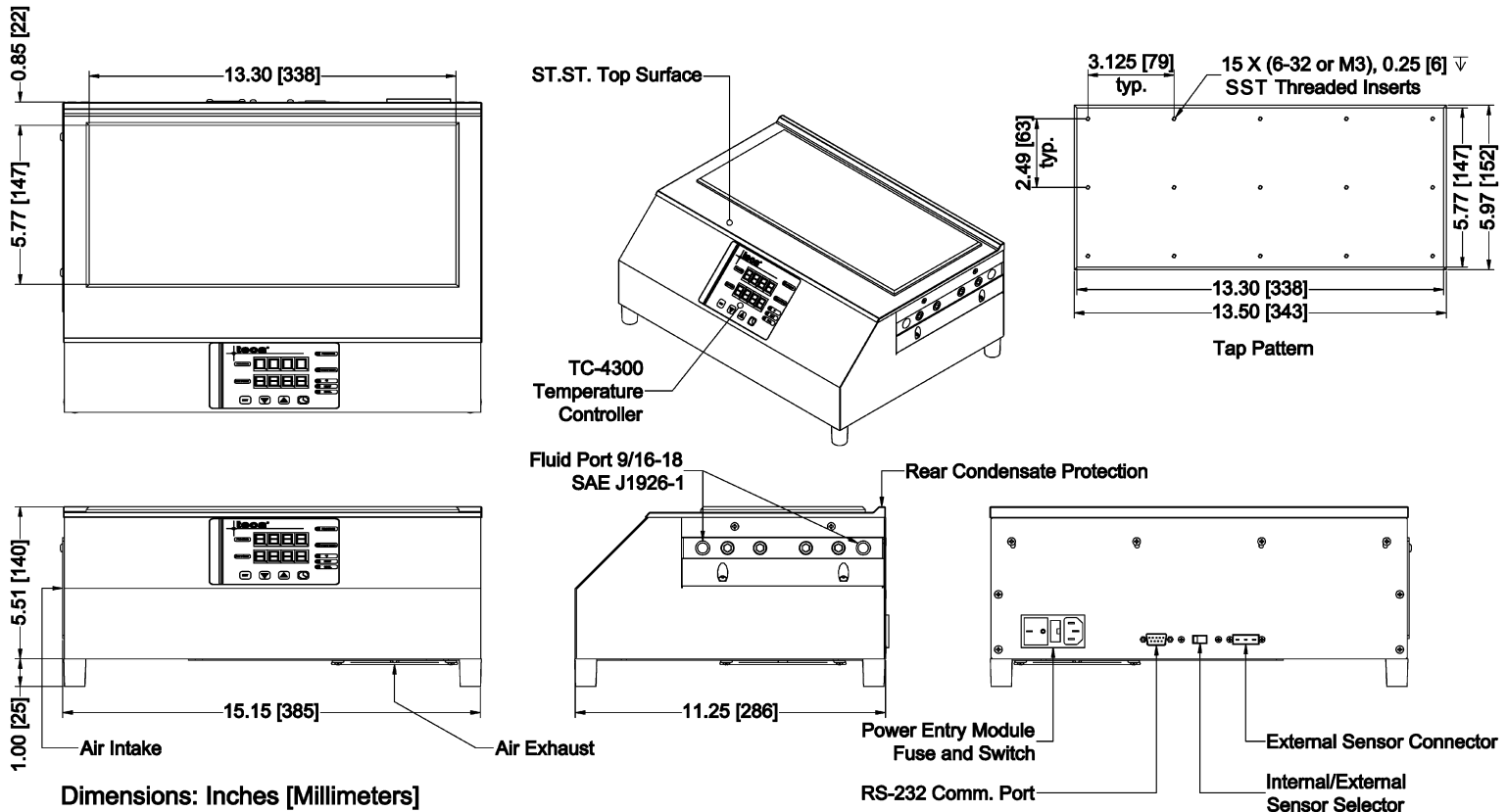
## PERFORMANCE CURVE



Equation of line: $y = \Delta T(^{\circ}\text{C})$ $x = \text{Capacity (Watts)}$			
Fluid Temp	25°C	10°C	
2 L/Min	$y = .135x - 53.7$	$y = .133x - 48.4$	
1 L/Min	$y = .135x - 48.8$	$y = .133x - 43.5$	



## DIMENSIONS



# LHP-1200CAS

## Extended Temperature Range Cold/Hot Plate

Liquid Cooled  
Bench Top

100-240 VAC Input  
360 Watts

### FEATURES

- Precision machined cold plate surface
- Easy clean stainless steel cap
- Cooling down to -70 °C
- 100-240 VAC universal input
- Low-profile design with ergonomic sloped front
- 9/16-18 SAE J1926-1 Fluid ports, Female 1/4-18 NPT o-ring adapter included
- Weighs only 30 lbs. (13.6 kg)
- Compact bench top unit, 11.2" X 15.1" footprint
- Hinged clear acrylic cover
- Virtually maintenance-free operation
- Painted Enameled stainless steel exterior housing
- Accessories for glassware (beaker/test tube) cooling
- Stainless Steel threaded inserts
- Provides power and control to cascades

### CONTROL FEATURES

- Integral TC-4300 PID "tunable" temperature controller
- One shot smart PID control tuning or Adaptive Smart Continuous Tuning
- Heating and Cooling
- Internal 3-wire, platinum, 100Ω RTD sensor
- Remote Sensibility™ switchable exterior 100Ω RTD sensor
- Multi-segment ramp and soak programmable
- RS-232 communications
- Software for programming, charting and data acquisition



LHP1200CAS with CCP-21 Cascade rear view

### SPECIFICATIONS

MODEL	PART NUMBER	CASCADE INCLUDED	VOLTAGE VAC	CURRENT † AMPS. 50/60 HZ	MIN. COOLANT FLOW L/MIN	TEMP. CONTROL	COOLANT TEMPERATURE RANGE °C	COLD PLATE TEMPERATURE RANGE °C
LHP-1200CAS*	3-35EB-1-CAS*	None	100-240	8	1	TC-4300	0 / +50	-30 / +90
LHP-1200C22	3-35EB-1-C22	CCP-22	100-240	8.4	1	TC-4300	0 / +50	-50 / +90
LHP-1200C21	3-35EB-1-C21	CCP-21	100-240	8.2	1	TC-4300	0 / +50	-55 / +90
LHP-1200C31	3-35EB-1-C31	CCP-31	100-240	8.6	1	TC-4300	0 / +50	-60 / +90
LHP-1200CAS*	3-35EB-6-CAS*	None	100-240	8	1	TC-4300	0 / +50	-30 / +130
LHP-1200C22	3-35EB-6-C22	CCP-22H	100-240	8.4	1	TC-4300	0 / +50	-50 / +150
LHP-1200C21	3-35EB-6-C21	CCP-21H	100-240	8.2	1	TC-4300	0 / +50	-55 / +150
LHP-1200C31	3-35EB-6-C31	CCP-31H	100-240	8.6	1	TC-4300	0 / +50	-60 / +150

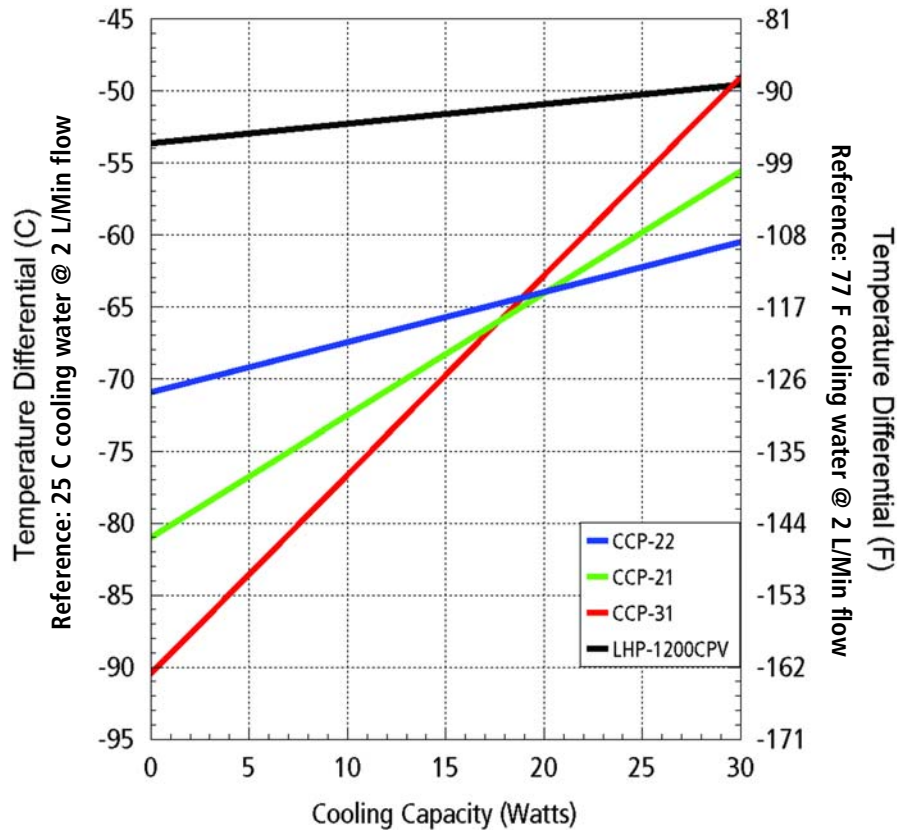
\* This part number is ready for use with a low temperature cascade option and includes CH-1200 hinged cover, CC-1200 rear panel for cascade power up and control, refer to accessory pages for information on cascades.

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

Many options and accessories available, see CPV accessory pages.



## PERFORMANCE CURVE



## LHP-1200CAS

## ENVIRONMENTS

Bench top  
Laboratory  
Industrial

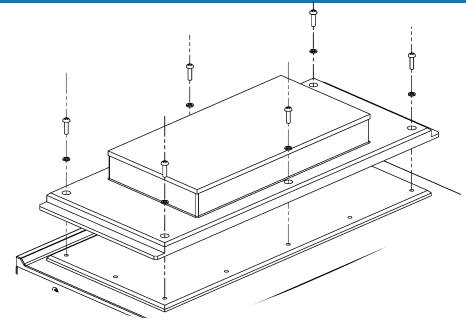
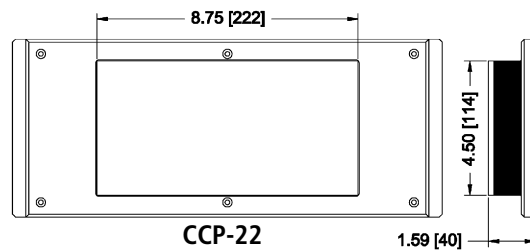
MAXIMUM  $\Delta T$  (LOAD = 0 WATTS)

LHP-1200CAS	-54 C
LHP-1200CAS/CCP-22	-72 C
LHP-1200CAS/CCP-21	-82 C
LHP-1200CAS/CCP-31	-90 C

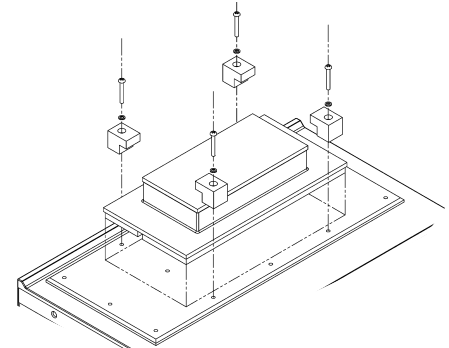
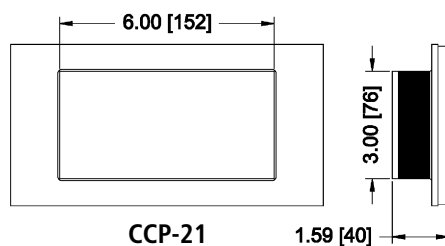


## DIMENSIONS

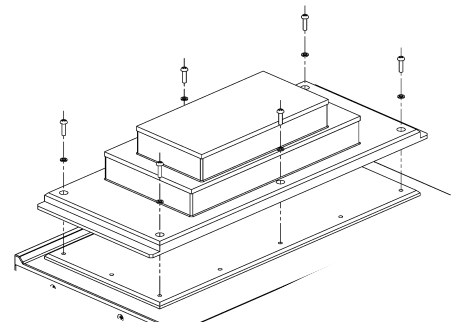
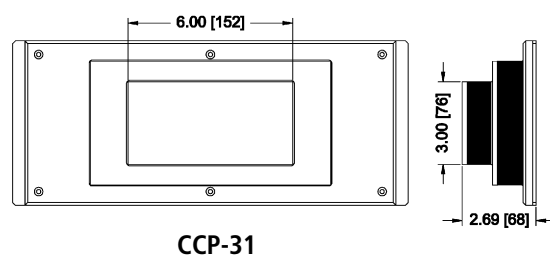
## TWO STAGE - LARGE PLATE



## TWO STAGE - SMALL PLATE



## THREE STAGE



Dimensions: Inches [Millimeters]

# AHP-1200CPV

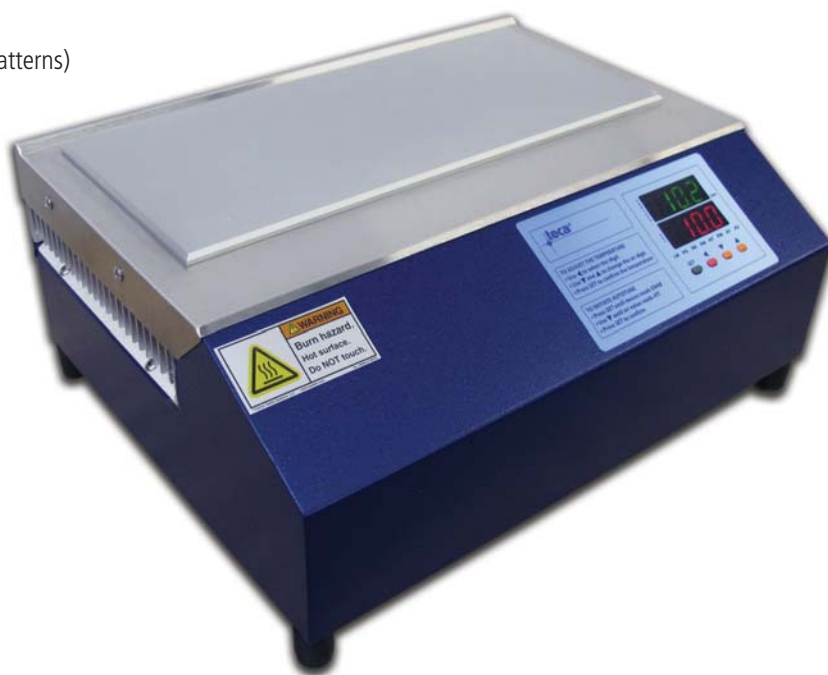
# Versatile Cold/Hot Plate

Air Cooled  
Bench Top

100-240 VAC Input  
230 Watts

## FEATURES

- Cools and heats (-20 °C to 90 °C & 120 °C)
- Precision machined anodized aluminum cold plate surface
- Stainless steel threaded inserts available (standard & custom patterns)
- Easy to clean stainless steel apron
- Integral PWM temperature controller
- 100-240 VAC universal input
- Low-profile design with ergonomic sloped front
- PWM controlled fan for quieter operation
- Weighs less than 30 lbs. (13.6 kg)
- Operating ambient temperature range of 0 °C to 50 °C
- Compact bench top unit, 11.2" X 15.1" footprint
- Virtually maintenance-free operation
- Painted Enameled stainless steel exterior housing
- Many accessories available



## CONTROL FEATURES

- Integral "tunable" PWM temperature control
- PWM, Bi-directional temperature control
- Manually set or autotune for best PID values
- 4 Programable temperature zones with 4 independent PID settings
- Multi-segment ramp/soak programs with loops
- Internal RTD sensor, built into the cold plate
- Remote Sensibility™ switchable to exterior accessory RTD sensor
- USB communication with easy to use software
- Labview VI examples available

## SPECIFICATIONS

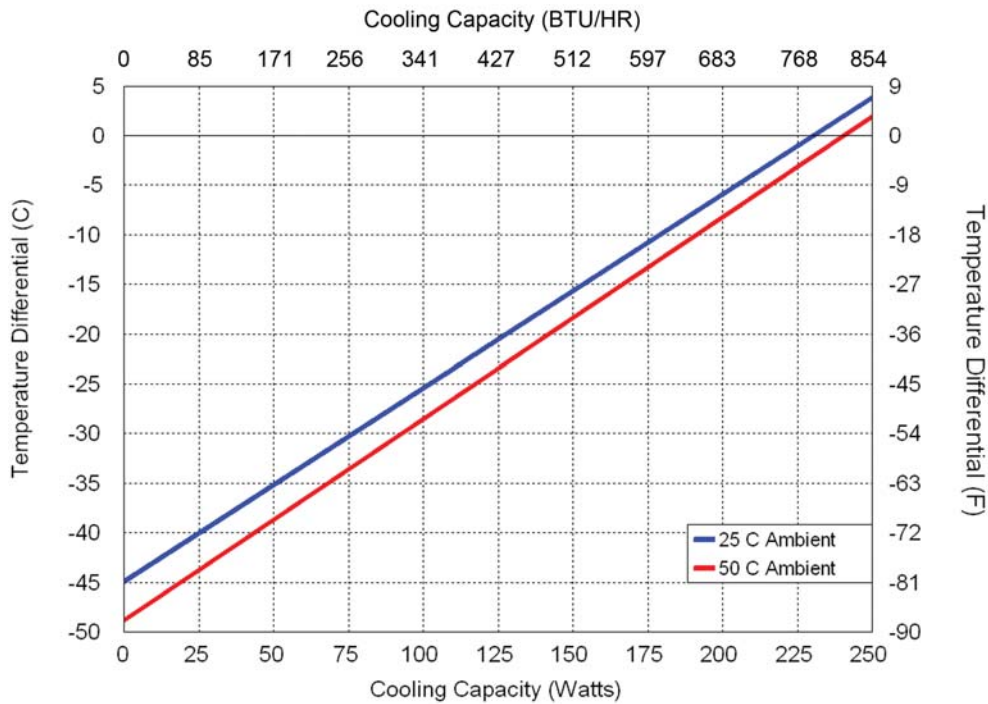
MODEL	PART NUMBER	COLD PLATE SURFACE	VOLTAGE VAC 50/60 Hz (VDC)	CURRENT DRAW AMPS. †	COLD PLATE TEMPERATURE Range °C
AHP-1200CPV	9-35KB-1-0A0	Smooth	100-240	3.5	-20 / +90
AHP-1200CPV	9-35KB-1-TAP	6-32 Inserts	100-240	3.5	-20 / +90
AHP-1200CPV	9-35KB-1-MET	M3 Inserts	100-240	3.5	-20 / +90
AHP-1200CPV	9-35K5-1-0A0	Smooth	(24)	17	-20 / +90
AHP-1200CPV	9-35K5-1-TAP	6-32 Inserts	(24)	17	-20 / +90
AHP-1200CPV	9-35K5-1-MET	M3 Inserts	(24)	17	-20 / +90
AHP-1200CPV	9-35KB-6-0A0	Smooth	100-240	3.5	-20 / +120
AHP-1200CPV	9-35KB-6-TAP	6-32 Inserts	100-240	3.5	-20 / +120
AHP-1200CPV	9-35KB-6-MET	M3 Inserts	100-240	3.5	-20 / +120
AHP-1200CPV	9-35K5-6-0A0	Smooth	(24)	17	-20 / +120
AHP-1200CPV	9-35K5-6-TAP	6-32 Inserts	(24)	17	-20 / +120
AHP-1200CPV	9-35K5-6-MET	M3 Inserts	(24)	17	-20 / +120
AHP-1200CAS*	9-35KB-1-CAS*	6-32 Inserts	100-240	5.0	-20 / +90
AHP-1200CAS*	9-35KB-6-CAS*	6-32 Inserts	100-240	5.0	-20 / +120

\* This part number is ready for use with a low temperature cascade option and includes CH-1200 hinged cover, CC-1200 rear panel for cascade power up and control, refer to AHP-1200CAS data sheet for more information.

† Reflects the current draw @ 120 VAC, 60 Hz input or 24 VDC steady state conditions.

Many options and accessories available, see accessory pages.

## PERFORMANCE CURVE



Equation of line: $y = \Delta T(^{\circ}\text{C})$ $x = \text{Capacity (Watts)}$		
Ambient Temp	25°C	50°C
	$y = .195x - 44.9$	$y = .203x - 48.8$

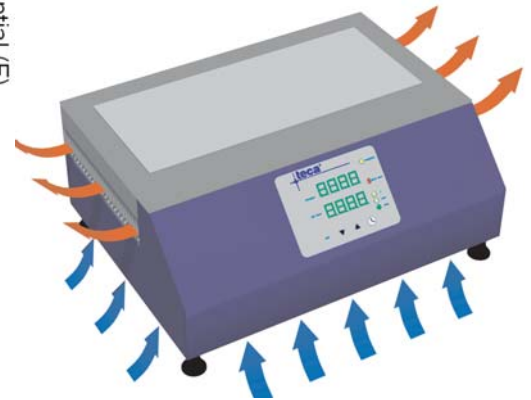
## AHP-1200CPV

## ENVIRONMENTS

Bench top  
Laboratory  
Industrial

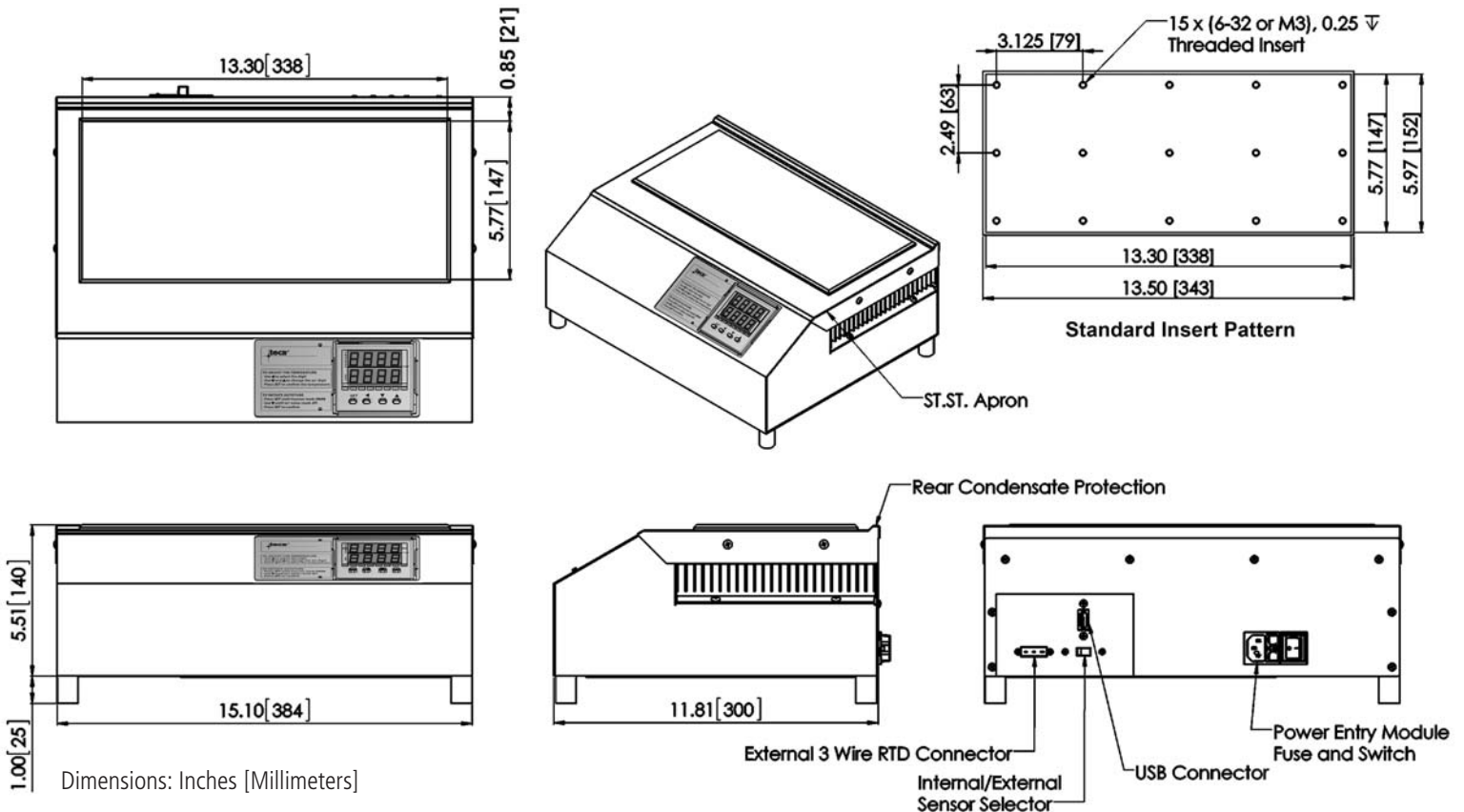
## COOLING CAPACITY

230 - 240 Watts @ 0 °C ΔT



Ambient Air Path

## DIMENSIONS



Dimensions: Inches [Millimeters]

# AHP-1200CAS

## Extended Temperature Range Cold/Hot Plate

Air Cooled  
Bench Top

100-240 VAC Input  
360 Watts

### FEATURES

- Precision machined anodized aluminum cold plate surface
- Stainless Steel threaded inserts
- Easy clean stainless steel apron
- Cools down to -50 °C
- Heats up to 150 °C
- 100-240 VAC universal input
- Low-profile design with ergonomic sloped front
- PWM controlled fan for quieter operation
- Weighs less than 30 lbs. (13.6 kg)
- Operating ambient range 0 °C to 50 °C
- Compact bench top unit, 11.2" X 15.1" footprint
- Hinged clear acrylic cover
- Virtually maintenance-free operation
- Painted Enameled stainless steel exterior housing
- Provides power and control to cascades

### CONTROL FEATURES

- Integral "tunable" PWM temperature control
- PWM, Bi-directional temperature control
- Manually set or autotune for best PID values
- 4 Programable temperature zones with 4 independent PID settings
- Multi-segment ramp/soak programs with loops
- Internal RTD sensor, built into the cold plate
- Remote Sensibility™ switchable to exterior accessory RTD sensor
- USB communication with easy to use software
- Labview VI examples available



AHP1200CAS with CCP-21 cascade rear view

### SPECIFICATIONS

MODEL	PART NUMBER	CASCADE INCLUDED	COLD PLATE SURFACE AREA INCHES	VOLTAGE VAC 50/60 HZ	CURRENT DRAW AMPS. †	AMBIENT TEMPERATURE RANGE °C	COLD PLATE TEMPERATURE RANGE °C
AHP-1200CAS*	9-35KB-1-CAS*	None	13.3 x 5.8	100-240	5.0	0 / +50	-20 / +90
AHP-1200C22	9-35KB-1-C22	CCP-22	8.8 x 4.5	100-240	6.6	0 / +50	-30 / +90
AHP-1200C21	9-35KB-1-C21	CCP-21	6.0 x 3.0	100-240	6.4	0 / +50	-40 / +90
AHP-1200C31	9-35KB-1-C31	CCP-31	6.0 x 3.0	100-240	6.8	0 / +50	-50 / +90
AHP-1200CAS*	9-35KB-6-CAS*	None	13.3 x 5.8	100-240	5.0	0 / +50	-20 / +120
AHP-1200C22	9-35KB-6-C22	CCP-22H	8.8 x 4.5	100-240	6.6	0 / +50	-30 / +150
AHP-1200C21	9-35KB-6-C21	CCP-21H	6.0 x 4.5	100-240	6.4	0 / +50	-40 / +150
AHP-1200C31	9-35KB-6-C31	CCP-31H	6.0 x 3.0	100-240	6.8	0 / +50	-50 / +150

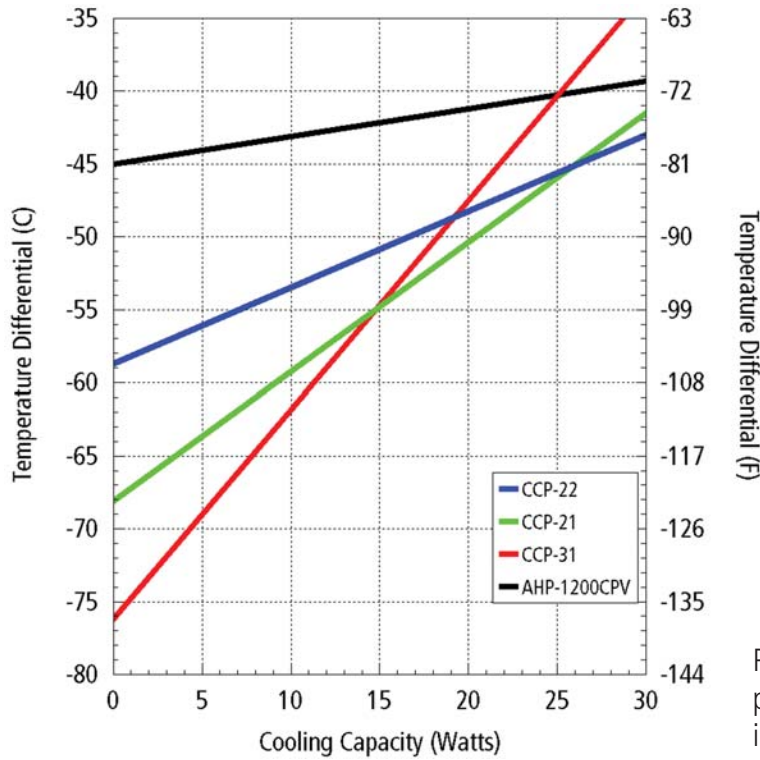
\* This part number is ready for use with a low temperature cascade option and includes CH-1200 hinged cover, CC-1200 rear panel for cascade power up and control, refer to accessory pages for information on cascades

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

Many options and accessories available, see CPV accessory pages



## PERFORMANCE CURVES



## AHP-1200CAS

## ENVIRONMENTS

Bench top  
Laboratory  
Industrial

MAXIMUM  $\Delta T$  (LOAD = 0 WATTS)

AHP-1200CAS	-45 °C
AHP-1200C22	-59 °C
AHP-1200C21	-68 °C
AHP-1200C31	-76 °C

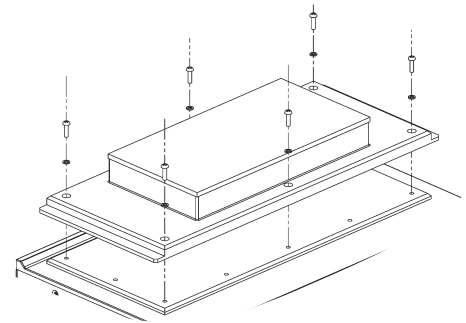
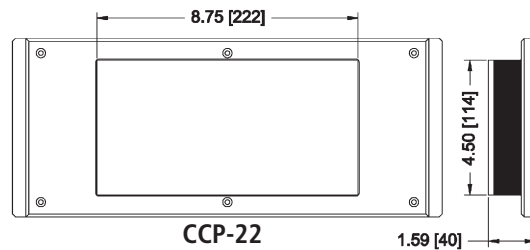
## MAXIMUM TEMPERATURE

AHP-1200CAS, C22, C21, C31	90 °C
AHP-1200CAS high temp.	120 °C
AHP-1200C22H, C21H, C31H	150 °C

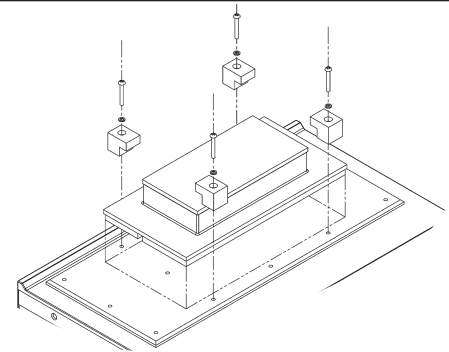
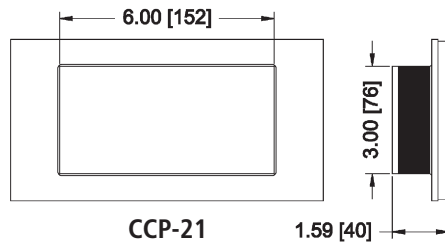
Performance curves represent tests performed in 25 °C ambient with a well insulated cold plate surface.

## DIMENSIONS

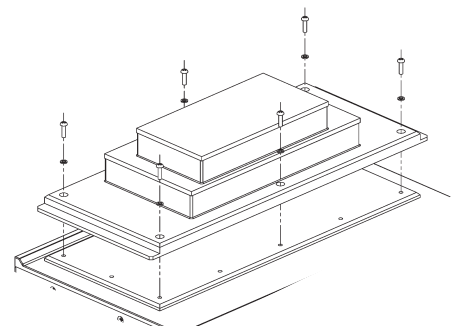
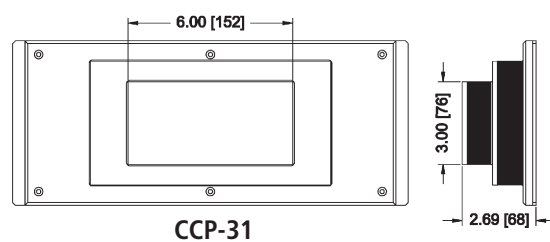
## TWO STAGE - LARGE PLATE



## TWO STAGE - SMALL PLATE



## THREE STAGE



Dimensions: Inches [Millimeters]

# AHP-301CPV

# Versatile Cold/Hot Plate

Air Cooled  
Bench Top

100-240 VAC Input  
82 Watts

## FEATURES

- Cools and heats (-15 °C to 90 °C & 120 °C)
- Precision machined cold plate surface
- Stainless steel threaded inserts, available (standard & custom pattern)
- Easy clean stainless steel apron
- Integral PWM temperature controller
- 100-240 VAC universal input
- Low-profile design with ergonomic sloped front
- Variable fan speed for quieter operation
- Weighs less than 14 lbs. (6.4 kg)
- Operating ambient temperature range of 0 °C to 50 °C
- Compact bench top unit, 9.8" X 10.1" footprint
- Virtually maintenance-free operation
- Painted Enameled stainless steel exterior housing
- Many standard accessories



## CONTROL FEATURES

- Integral "tunable" PWM temperature control
- PWM, Bi-directional temperature control
- 4 Temperature zone with 4 independent PID settings
- Multi-segment ramp and soak programmable
- Internal RTD sensor
- Remote Sensibility™ switchable to exterior accessory RTD sensor
- USB Communication with easy to use software
- Labview VI examples

## SPECIFICATIONS

MODEL	PART NUMBER	COLD PLATE	PERFORMANCE RATING BTU/HR	VOLTAGE VAC 50/60 HZ	CURRENT AMPS.	WEIGHT LBS. (KG)	OPERATING AMBIENT RANGE °C	COLD PLATE TEMPERATURE RANGE °C
AHP-301CPV	9-70KB-1-0A0	Smooth Surface	260-280	100-240	2.0*	13 (5.9)	0 / +50	-15 / +90
AHP-301CPV	9-70KB-1-TAP	6-32 Tap Pattern	260-280	100-240	2.0*	13 (5.9)	0 / +50	-15 / +90
AHP-301CPV	9-70KB-1-MET	M3 Tap Pattern	260-280	100-240	2.0*	13 (5.9)	0 / +50	-15 / +90
AHP-301CPV	9-70K5-1-0A0	Smooth Surface	260-280	24 VDC	7.0	10 (4.5)	0 / +50	-15 / +90
AHP-301CPV	9-70K5-1-TAP	6-32 Tap Pattern	260-280	24 VDC	7.0	10 (4.5)	0 / +50	-15 / +90
AHP-301CPV	9-70K5-1-MET	M3 Tap Pattern	260-280	24 VDC	7.0	10 (4.5)	0 / +50	-15 / +90
AHP-301CPV	9-70KB-6-0A0	Smooth Surface	260-280	100-240	2.0*	13 (5.9)	0 / +50	-15 / +120
AHP-301CPV	9-70KB-6-TAP	6-32 Tap Pattern	260-280	100-240	2.0*	13 (5.9)	0 / +50	-15 / +120
AHP-301CPV	9-70KB-6-MET	M3 Tap Pattern	260-280	100-240	2.0*	13 (5.9)	0 / +50	-15 / +120
AHP-301CPV	9-70K5-6-0A0	Smooth Surface	260-280	24 VDC	7.0	10 (4.5)	0 / +50	-15 / +120
AHP-301CPV	9-70K5-6-TAP	6-32 Tap Pattern	260-280	24 VDC	7.0	10 (4.5)	0 / +50	-15 / +120
AHP-301CPV	9-70K5-6-MET	M3 Tap Pattern	260-280	24 VDC	7.0	10 (4.5)	0 / +50	-15 / +120

\* Reflects the current draw @ 120 VAC, 60 Hz input

Many options and accessories available see accessory pages

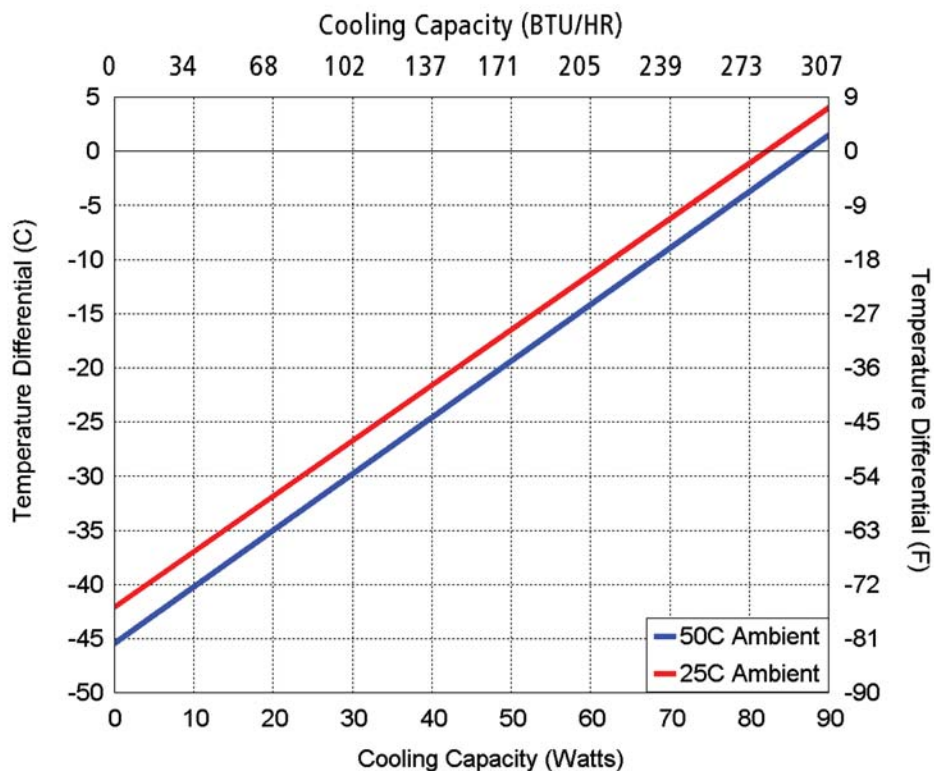
# AHP-301CPV

## ENVIRONMENTS

Bench top  
Laboratory  
Industrial

## COOLING CAPACITY

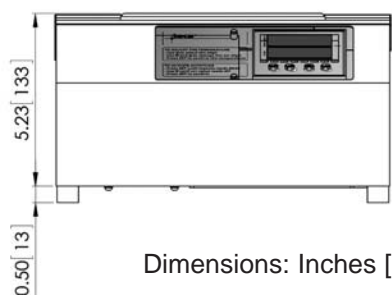
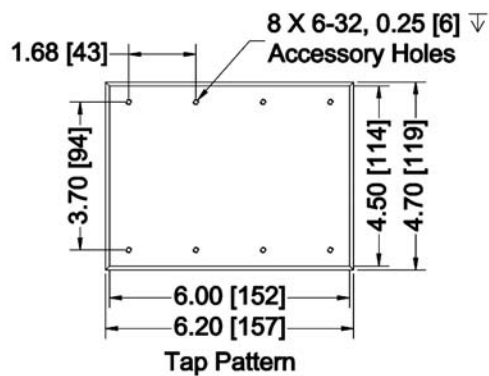
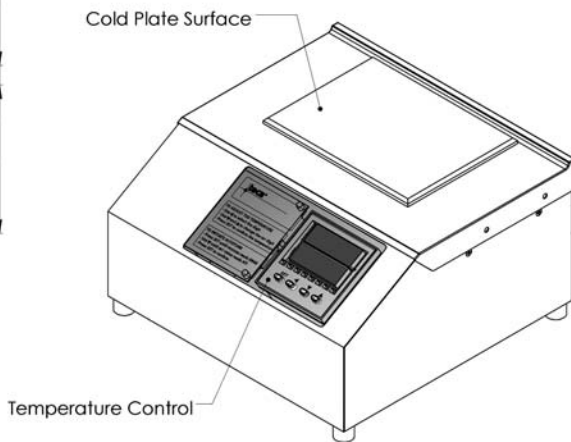
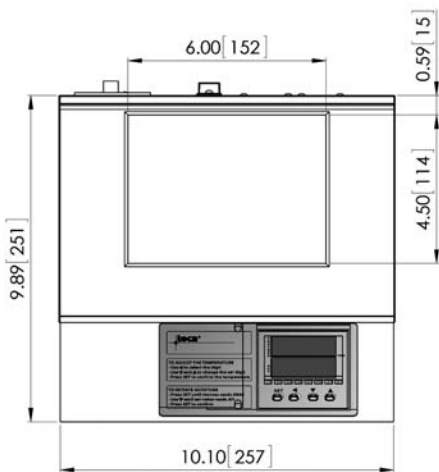
82 Watts @ 0 °C ΔT



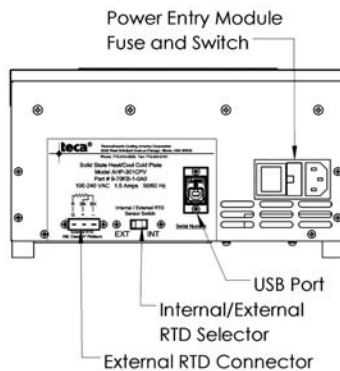
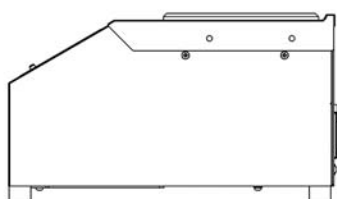
Ambient Air Path

Equation of line: $y = \Delta T(^{\circ}\text{C})$ $x = \text{Capacity (Watts)}$		
Ambient Temp	25°C	50°C
Cold Plate	$y = .51x - 42.1$	$y = .51x - 45.4$

## DIMENSIONS



Dimensions: Inches [Millimeters]



# AHP-1200DCP

# Dual Temperature Zone Plate

Air Cooled  
Bench Top

100-240 VAC Input  
400 Watts

## FEATURES

- Cools and heats two plates independently (-10 °C to 90 °C)\*
- Two precision machined aluminum plate surfaces
- Each plate is 13.3" [338 mm] x 6.3" [162 mm]
- Easy to clean stainless steel apron
- Two integral PWM temperature controllers
- 100-240 VAC universal input
- Low-profile design with ergonomic sloped front
- PWM speed controlled fan for quieter operation
- Weighs less than 50 lbs. (22.7 kg)
- Operating ambient temperature range of (0 °C to 50 °C)
- Compact bench top unit, 19.2" X 15.2" footprint
- Virtually maintenance-free operation
- Painted Enameled stainless steel exterior housing
- Accessory enclosures and barriers available



## CONTROL FEATURES

- Two integral "tunable" temperature controllers
- Pulse Width Modulating (PWM), bi-directional temperature control
- Manually set or autotune PID values for best control
- 4 Programmable temperature zones with 4 independent PID settings
- Multi-segment ramp/soak programs with loops
- Internal RTD sensor, built into each plate
- Remote Sensibility™ switchable to exterior accessory RTD sensor
- USB communication with easy to use software
- Labview VI examples available

## SPECIFICATIONS

MODEL	PART NUMBER	NOTES	PLATE CONFIGURATION	PERFORMANCE RATING BTU/HR	VOLTAGE VAC 50/60 HZ	CURRENT AMPS.	WEIGHT LBS. (KG)	OPERATING AMBIENT °C
AHP-1200DCP	9-34KB-1-0A1	Heat/Cool	Smooth Surface	670-800	100-240	2.5-5.0	50 (22.7)	0-40
AHP-1200DCP	9-34KB-1-TA1	Heat/Cool	6-32 Tap Pattern	670-800	100-240	2.5-5.0	50 (22.7)	0-40
AHP-1200DCP	9-34KB-1-ME1	Heat/Cool	M3 Tap Pattern	670-800	100-240	2.5-5.0	50 (22.7)	0-40

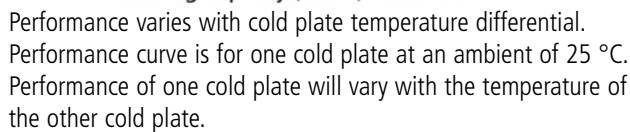
For custom threaded inserts and hole patterns contact TECA

Many options and accessories available, see accessory pages

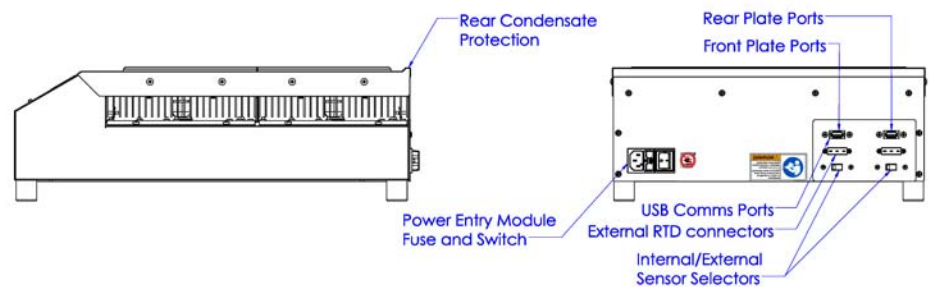
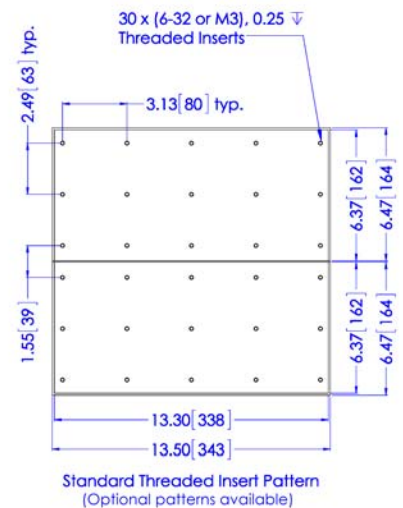
\*Under the right condition



Bench top  
Laboratory  
Industrial

200 - 240 Watts @ 0 °C  $\Delta T$ 400 - 480 Watts @ 0 °C  $\Delta T$ 

Dimensions: Inches [Millimeters]



# AHP-800MSP

## Magnetic Stirring Cold/Hot Plate

Air Cooled  
Bench Top

100-240 VAC Input

### FEATURES

- Heating and cooling
- Unique high-performance side mounting cold plate for added cooling and uniform temperatures
- Magnetic drive for stir bars from underneath the bottle
- Magnetic stir offers 5 speed settings
- Standard and custom sleeves
- Made for use with Corning Pyrex® brand 1000 mL beakers or equivalent size beakers or bottles
- 100-240 VAC universal, Integral power supply
- North American Standard power input cord set
- Variable speed fan for reduced noise
- Weighs only 38 lbs. (17.3 kg)
- Compact bench-top design
- No compressor, fluorocarbons or filters
- Virtually maintenance-free operation
- Painted stainless steel exterior housing

### INCLUDES

- Integral PID "tunable" temperature control
- One shot smart PID control tuning or Adaptive Smart Continuous Tuning
- Internal RTD sensor
- External RTD sensor included
- Remote Sensibility™ switchable exterior RTD sensor
- Multi-segment ramp and soak programs
- RS-232 communications
- i-tools software for easy programming and control tweaking
- Standard software for charting and data acquisition
- Stock bottle block for 4 liter beaker (6.25" diameter) Corning Pyrex® brand 1000 # S-34502-15



### APPLICATIONS

Laboratory or industrial environments. Testing of specimens, drugs and industrial chemicals. Process testing. Quality control.

### OPTIONAL SLEEVES

The AHP-800MSP has optional sleeves that make it adaptable to different size bottles and beakers. Install different sleeves for different diameter vessels.

PART NUMBER	CORNING PART NUMBER	VOLUME (Liter)	SIZE (Inches) H X OD
SLV-2000	S-34502-13	2	7 1/2 X 5 1/8
SLV-1500	S-34502-12	1.5	6 1/2 X 4 3/4
SLV-1000	S-34502-11	1	6 1/4 X 4 1/4
SLV-800	S-34502-10	0.8	5 1/4 X 3 7/8
SLV-600	S-34502-09	0.6	4 7/8 X 3 1/2

### SPECIFICATIONS

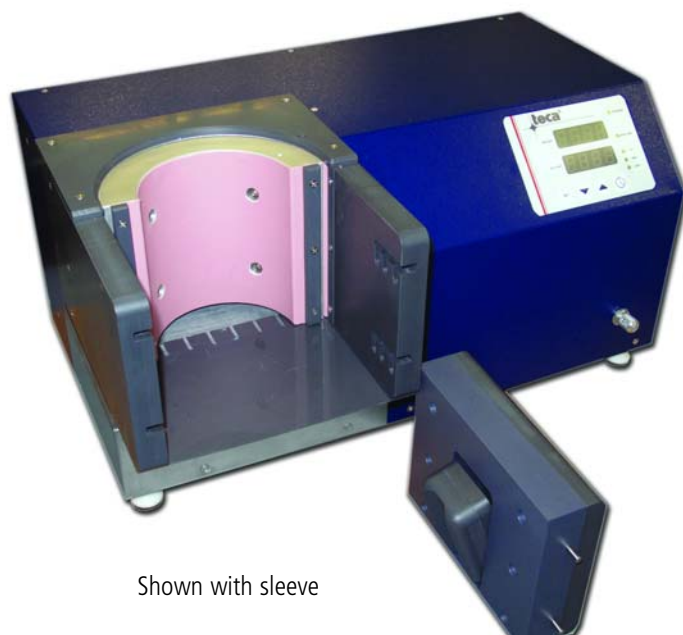
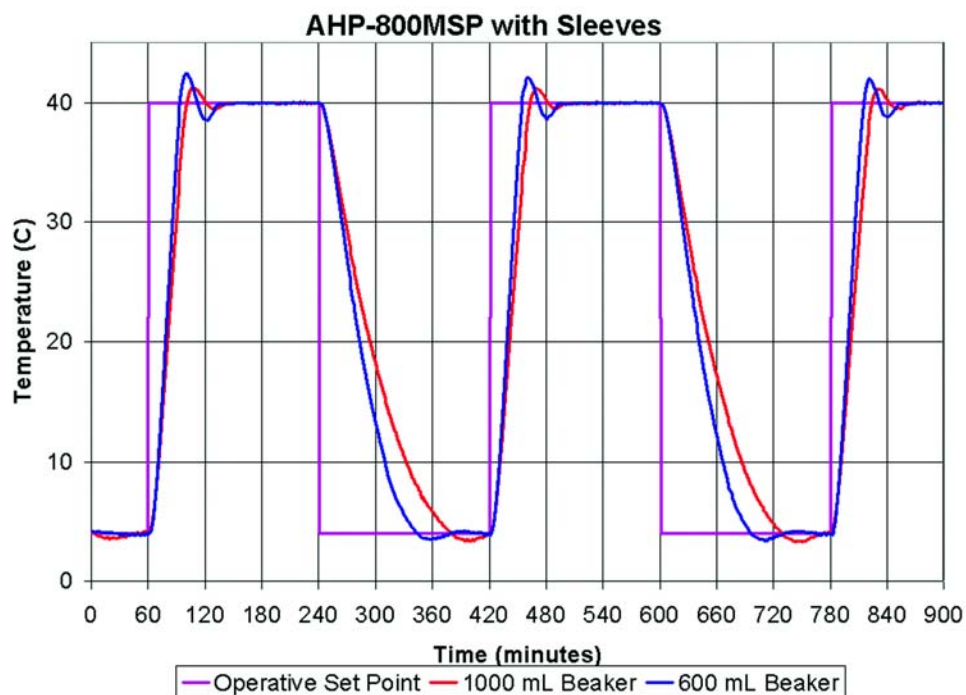
MODEL	PART NUMBER	NOTES	VOLTAGE VAC 50/60 HZ	CURRENT AMPS.	WEIGHT LBS. (KG)	TEMP. CONTROL	OPERATING AMBIENT °C
AHP-800MSP	9-50EB-1-003	Heat/Cool	100-240	1.7-4.8	38 (17.3)	TC-4300	0-45

## PERFORMANCE CURVE

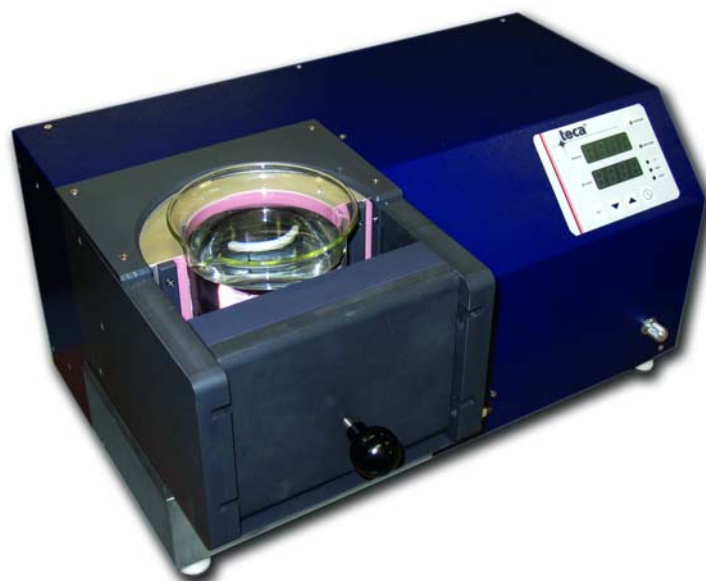
## AHP-800MSP

## ENVIRONMENTS

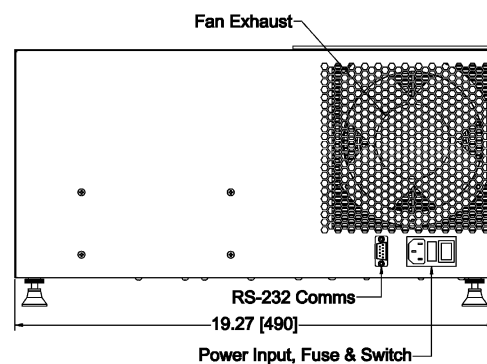
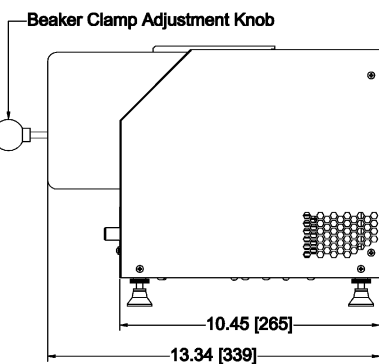
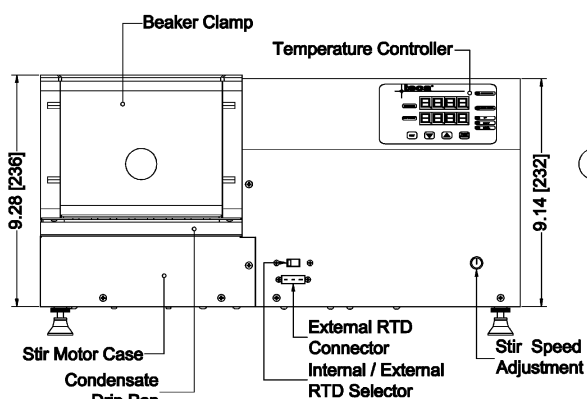
Bench top  
Laboratory  
Industrial



Shown with sleeve



## DIMENSIONS



Dimensions: Inches [Millimeters]

[www.teca-eu.com](http://www.teca-eu.com)

1-888-TECA-USA (832-2872)

TECA

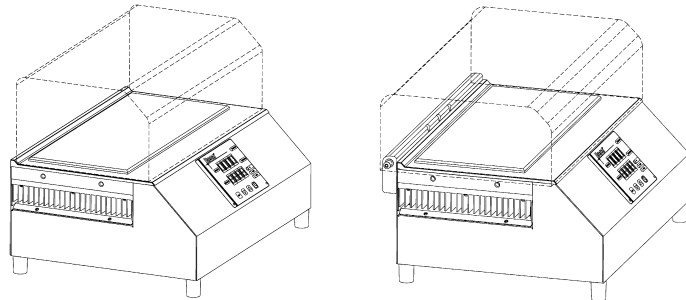


# CPV Accessories

Covers and Barriers

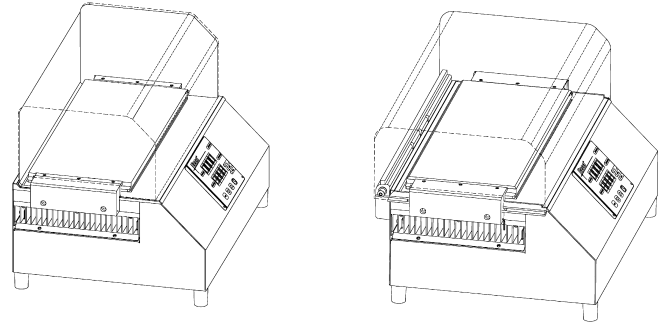
## COVERS

Clear Acrylic Covers for use on CPV cold plates.



USED ON	W X D X H SIZE (in)	PLAIN	HINGED
AHP-301CPV	10 X 6.5 X 4	C-301	CH-301
AHP-1200CPV	15 X 8 X 5	C-1200	CH-1200
AHP-1200DCP	15 X 15 X 5	C-1800	CH-1800
AHP-1800CPV	15 X 15 X 5	C-1800	CH-1800

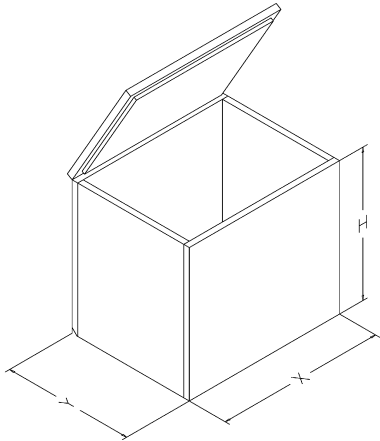
Clear Acrylic Covers for use on CPV cold plates with accessory plate option.



USED ON	W X D X H SIZE (in)	PLAIN	HINGED
AHP-301CPV	10 X 6.5 X 4	CN-301	CHN-301
AHP-1200CPV	15 X 8 X 5	CN-1200	CHN-1200
AHP-1200DCP	15 X 15 X 5	CN-1800	CHN-1800
AHP-1800CPV	15 X 15 X 5	CN-1800	CHN-1800

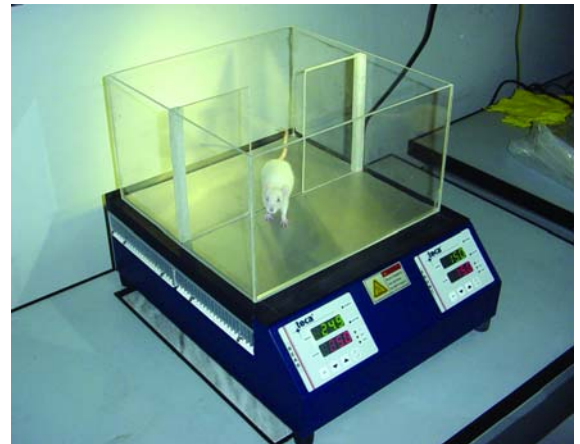
## BARRIERS

Clear acrylic barriers for use on CPV cold plates. Includes unhinged cover.



PART NUMBER	SIZE W X H in [mm]	USED WITH
BH-301	6.8X5.3 [173X135]	AHP-301CPV
BH-1200	14.2X6.7 [361X170]	AHP-1200CPV
BH-1200DCP	14.2X13.7 [361X348]	BH-1200DCP
BH-1800	14.2X13.7 [361X348]	BH-1800

H= Height in inches (customer specified)  
Example: B6-301



## PYREX PLATES

Borosilicate substrate (1/8" thick) used to protect cold plate surface from sharp instruments. These plates, GP-1200 and GP-301, can be frozen in place on the cold plates.

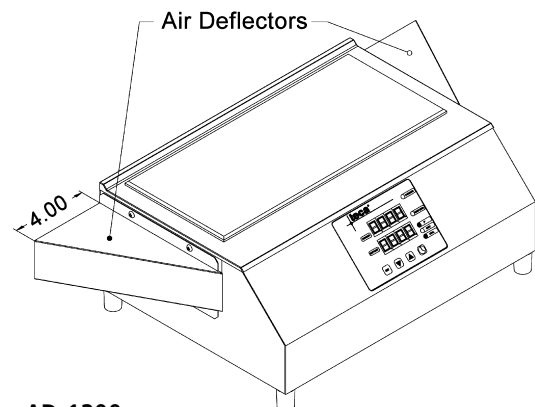
PART NUMBER	SIZE W X H in [mm]	USED WITH
GP-1200	13.3 X 5.8 [338 X 147]	AHP-1200CPV
GP-301	6.0 X 4.5 [152 X 114]	AHP-301CPV
GP-22	8.75 X 4.5 [222 X 114]	CCP-22
GP-301	6.0 X 3.0 [152 X 76]	CCP-21, CCP-31

## INSULATION

Handy sized and easily cut pieces of closed cell polyethylene insulation. Create a custom fit around your load and enhance CPV performance.

- INS-03** 15" X 2" X 8" Use with AHP-1200CPV  
**INS-04** 10" X 2" X 6" Use with AHP-301CPV  
**INS-05** 15" X 2" X 15" Use with AHP-1800CPV

## AIR DEFLECTOR



### AD-1200

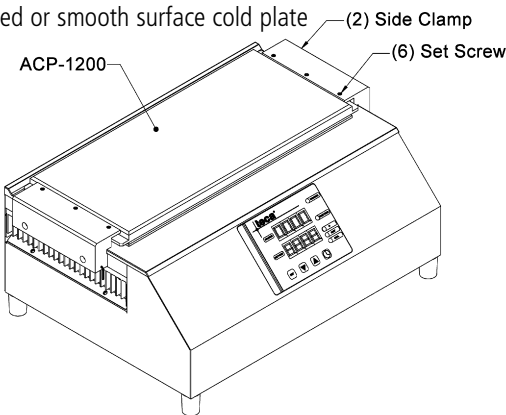
Fully reversible air deflector for AHP-1200CPV exhaust.



ACCESSORY PLATES

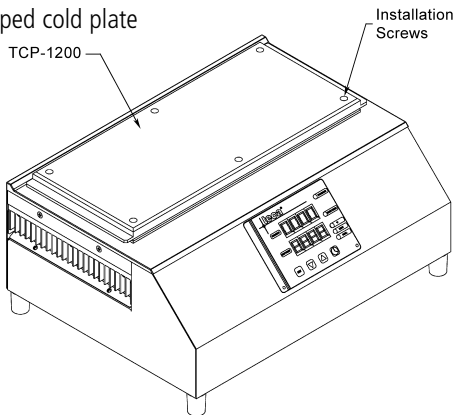
Clear anodized aluminum Feature Plates are clamped to CPV cold plates from the side. They come with the side clamps and are blank as shown below. Modify them to your needs, adding taps, grooves and other features. Swap different plates for different jobs. Use them as fixture plates.

For use with tapped or smooth surface cold plate



PART NUMBER	SIZE W X H in [mm]	USED WITH
ACP-301	6.2X4.7 [157X119]	AHP-301CPV
ACP-1200	13.3X5.8 [338X147]	AHP-1200CPV
ACP-1800	13.3X13.0 [338X330]	AHP-1800CPV

For use with tapped cold plate



PART NUMBER	SIZE W X H in [mm]	USED WITH
TCP-301	6.2X4.7 [157X119]	AHP-301CPV
TCP-1200	13.3X5.8 [338X147]	AHP-1200CPV
TCP-1800	13.3X13.0 [338X330]	AHP-1800CPV

COLD WELL



**CWB-01** Aluminum cold well block for 1000 mL Boston Round bottles. For use with AHP-1200CPV. Cover included.

For other configurations consult factory



**CWB-02** Aluminum cold well block for 35mm X 125mm Kimax Brand cold test jar. For use with AHP-301CPV. Cover included.

For other configurations consult factory

TUBE CHILLER

A Tube Chiller Plate has channels designed for specific size flexible tubing. When a fluid flows through the tubing it can be heated or cooled without introducing any type of contaminants. Temperature differentials vary with fluid flow rate and specific heat. On site evaluations recommended.

**TC-1** Accessory plate with channels for 0.125" dia tubing. Other tubing diameters available.

**TCC-1** Hinged cover for TC-1



# CPV Cascade Accessories

Cascades

Extended Temperature Range

## LOW TEMPERATURE CASCADES

One thermoelectric stacked on top of another with the goal of increasing the maximum temperature differential is a "cascade". These cascade assemblies are made to be mounted to either the air cooled model **AHP-1200CAS Part # 9-35KB-1-CAS** or the liquid cooled model **LHP-1200CAS Part # 3-35KB-1-CAS** cold plates to create 2 and 3 stage cascades.

For plate temperature above 90 °C use with **9-35KB-6-CAS** or **3-35KB-6-CAS**.

The performance curves shown are actual tests run under very well insulated conditions.

The performance will vary with the degree of insulation, with the amount of the active load and with the ambient temperature.

## INCLUDED WITH AHP-1200CAS

- All the features of AHP-1200CPV series
- Tap pattern for installation of cascades
- Rear panel controlled power output for cascades
- Clear acrylic hinged cover

## INCLUDED WITH CASCADES

- Mounting hardware
- Power input leads
- Thermally conductive substrate pad
- Precision machined cold plate surfaces
- Embedded RTD sensor and connector for use with **AHP-1200CAS** or **LHP-1200CAS**



CCP-31 3 Stage Cascade shown with AHP-1200CAS



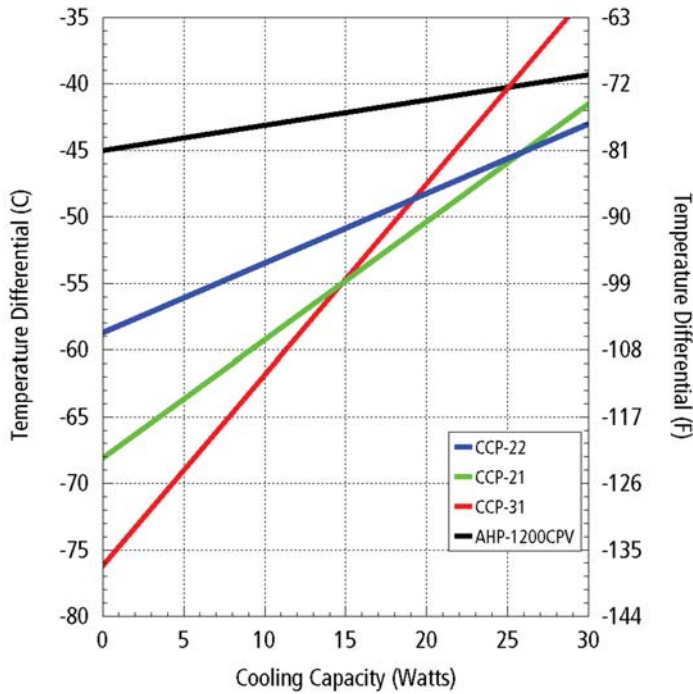
CCP-21 shown with AHP-1200CAS (rear view)

## SPECIFICATIONS AHP-300CP

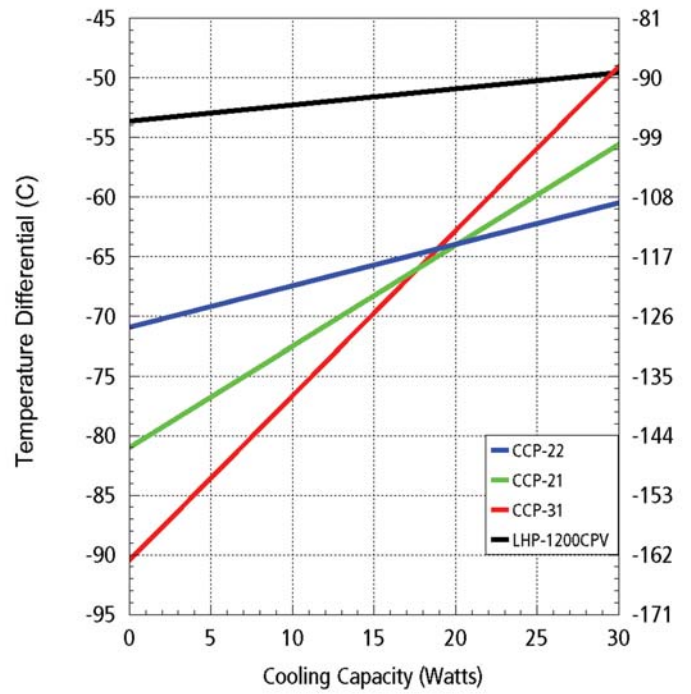
PART NUMBER	TOP SURFACE AREA INCHES	VOLTAGE VDC	CURRENT AMPS	TEMP. CONTROL	MAX DELTA T AT 25°C AMB. °C	OPERATING AMBIENT RANGE °C	COLD PLATE TEMPERATURE RANGE °C	CASCADE STAGES
CCP-22	8.8 x 4.5	24	4.6	AHP-1200CAS	-59	-10 / +70	-30 / +90	2
CCP-21	6.0 x 3.0	24	2.5	AHP-1200CAS	-68	-10 / +70	-40 / +90	2
CCP-31	6.0 x 3.0	24 & 12	4.6 & 1.8	AHP-1200CAS	-76	-10 / +70	-50 / +90	3
CCP-22H	8.8 x 4.5	24	4.6	AHP-1200CAS	-59	-10 / +70	-30 / +150	2
CCP-21H	6.0 x 3.0	24	2.5	AHP-1200CAS	-68	-10 / +70	-40 / +150	2
CCP-31H	6.0 x 3.0	24 & 12	4.6 & 1.8	AHP-1200CAS	-76	-10 / +70	-50 / +150	3

## PERFORMANCE CURVE

Cascades with AHP-1200CPV

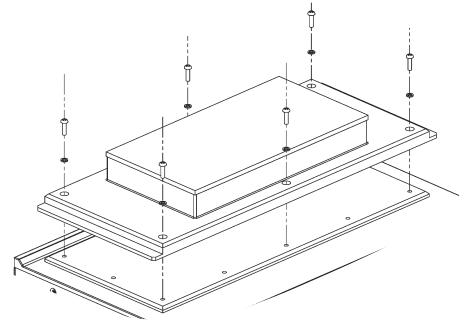
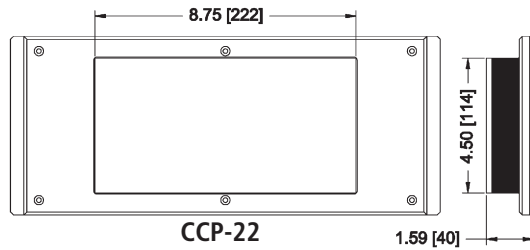


Cascades with LHP-1200CPV

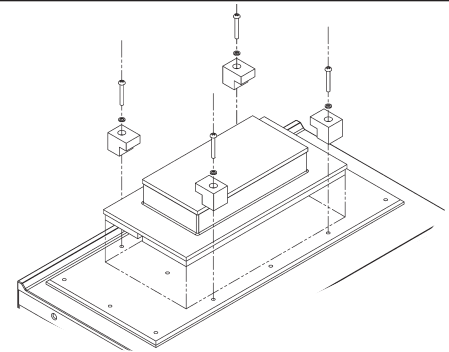
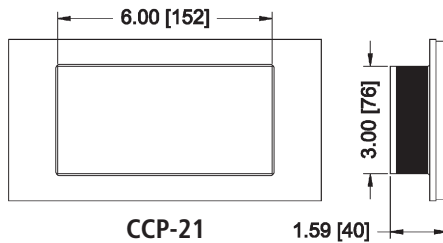


## DIMENSIONS

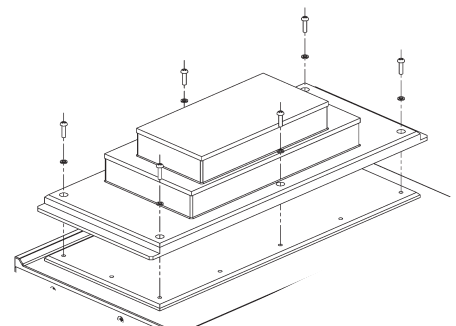
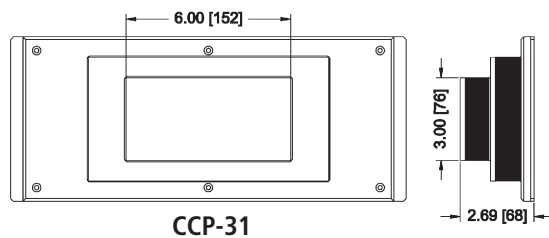
TWO STAGE - LARGE PLATE



TWO STAGE - SMALL PLATE



THREE STAGE



Dimensions: Inches [Millimeters]

# CPV Thermal Gradient Bar

Thermal Gradient Bar

## OVERVIEW

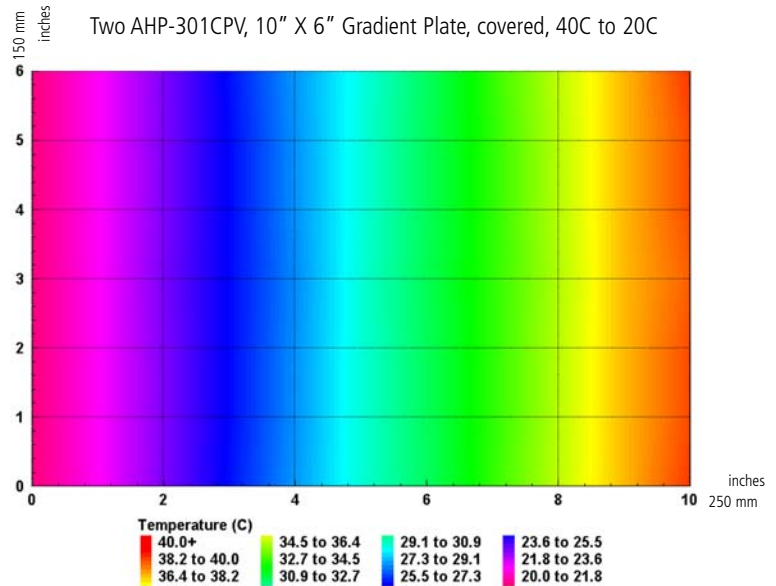
TECA's Gradient Bar options expand the use of the CPV line of Cold Plates. With a TECA model CPV cold plate at each end the gradient bar has programmable gradient areas with near linear gradients between the two ends and near uniform temperatures along the width of the bar. The temperature at each end of the gradient area can be programmed to a single set point or with a ramp/step and soak profile creating constant, expanding, contracting or moving gradients. Set the gradient profile to be large for initial observations then adjust the end set points to zoom in on a temperature range of interest. Optional external surface sensors can be used to change the size of the gradient area.

## FEATURES

- Near Linear Temperature Gradient differentials from 2C to 30C
- Independent Temperature Set points
- Includes two bottom mounted 3 wire RTD sensors
- Programmable set points, step or ramp changes
- Fixed or adjustable gradient areas
- Gradients above and below ambient
- Bench top
- Air Cooled
- Anodized aluminum surface
- Used with model AHP-301CPV or AHP-1200CPV units
- Custom sizes available
- Custom Acrylic covers and barriers available

## TEMPERATURE STUDY APPLICATIONS

- Insects
- Mammals
- Micro-organisms
- Plants
- Chemicals
- Incubation
- At rest
- Feeding
- Preference
- Soil Biochemistry
- Root Growth
- Seed Germination
- Film forming
- Paints
- Adhesives
- Melting Points
- More



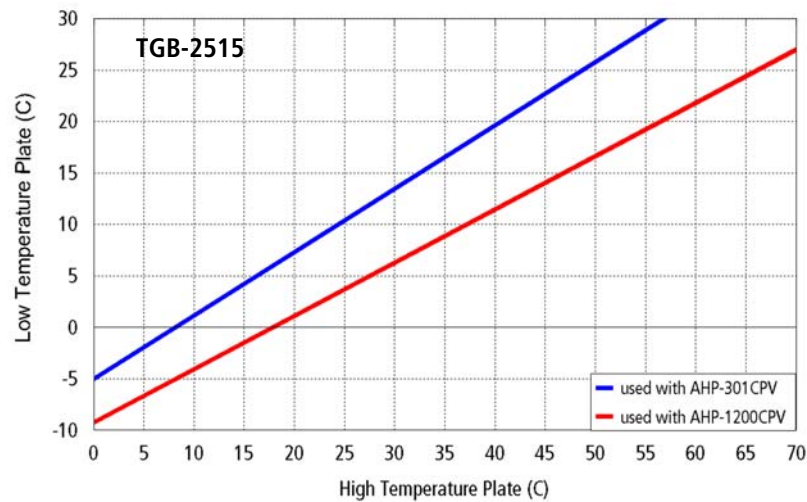
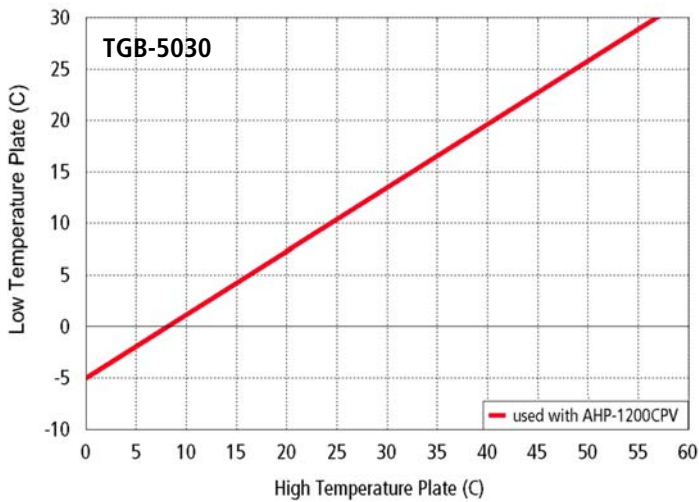
## SPECIFICATIONS

MODEL	GRADIENT PLATE SIZE (L X W X H) Inches [Millimeters]	GRADIENT AREA Inches [Millimeters]	FINISH	USE WITH 2 Each	EMBEDDED SENSOR
TGB-2515	22x5.9x1 [558x150x25]	9.8x5.9 [250x150]	Clear Anodize	AHP-301CPV or 1200 CPV	3 WIRE RTD
TGB-5030	34x11.8x1 [914x300x25]	19.7x11.8 [500x300]	Clear Anodize	AHP-1200CPV	3 WIRE RTD



# CPV Thermal Gradient Bar

## TEMPERATURE RANGE CURVES



The Red curves reflect standard capacity AHP-1200CPV use with the gradient bars

### How to use the curves to help determine the maximum gradient delta T.

On the X-axis find the temperature you want to hold on one end of the gradient.

Extend a vertical line up until you meet the characteristic line of your preferred gradient plate/CPV combination.

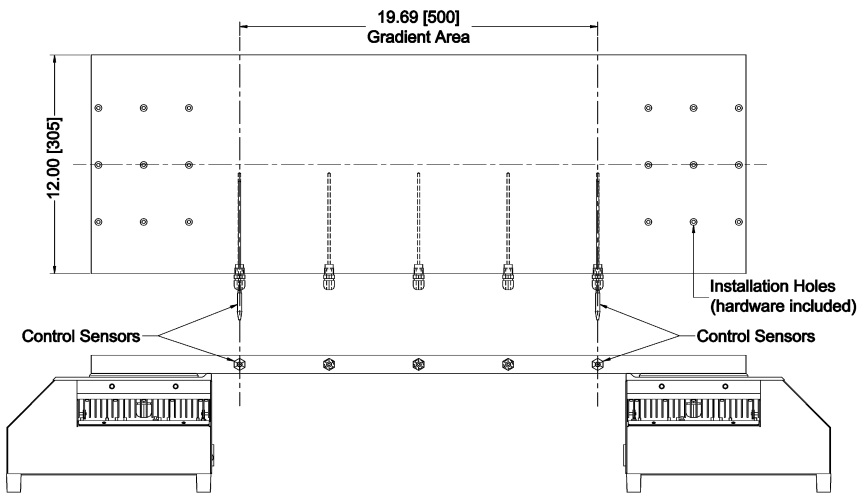
Extend a horizontal line to the Y-Axis to find the temperature you can hold on the other end of the gradient plate.

The difference between the two temperatures is the maximum delta T you can expect across the gradient plate under your defined conditions.

The curves shown, are test results in a 20 C ambient non condensing and the gradient area covered by an acrylic cover.

## DIMENSIONS

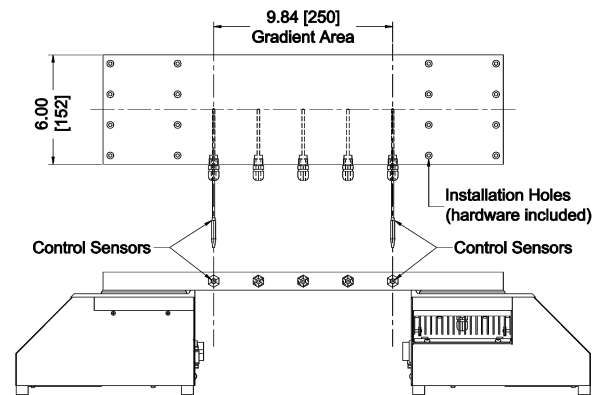
**TGB-5030**



Gradient plate shown with two AHP-1200CPV

Dimensions: Inches [Millimeters]

**TGB-2515**



Gradient plate shown with two AHP-301CPV

# General Use Cold Plate Notes

## Things you need to know to start sizing a cold plate:

**Temperatures:** The ambient temperature is the air temperature around the cold plate. The cold plate temperature is the temperature of the surface of the cold plate. The temperature differential (delta T) referenced in the performance curves is defined as the cold plate temperature minus the ambient temperature. In the case of liquid cooled cold plates the reference temperature is the cooling fluid temperature and the temperature differential is the cold plate temperature minus the cold plate temperature. Because of the nature of heat flow it is often required to get the cold plate colder than the temperature desired.

**Heat Loads:** There are typically two types of heat loads, active and passive. A passive load is heat flow due to a temperature differential from ambient. The greater the delta T the greater the ambient load. Insulation and covers help to minimize this load. Another type of passive load occurs when there is a time requirement to the cooling process, cooling from one temperature to another in a defined period of time. The shorter the time the larger the load becomes. Active loads are typically due to a process or a flow or are a result of heat generated from an electrical circuit.

**Performance Curves:** These are graphical representations of the relationship between the total load and the temperature that can be expected at the cold plate. The total load in WATTS and BTU/HR is shown on the X-axis and the temperature differential (delta T) is shown on the Y-axis.

## Things you should consider when selecting cold plate:

**Purpose:** TECA's General use "CP" model cold plates are suited for industrial and other applications where no frill, direct contact cooling or heating is required. Meant to become part of a larger system or process they have provisions for several different mounting configurations, through a wall, under a bench or where ever cooling is required.

**Temperature Control:** CP versions typically come with no temperature controller. Versions are available set up for remote temperature control using TECA's TC-3400 controller or similar. CPHC versions include heating capability.

**Environment:** Our standard general purpose cold plates are built to work in typical factory environments. Custom versions have been made for more severe hose down and outdoor applications.

**Power Input:** Cold plates requiring 120 VAC, 240 VAC, 120/240 VAC, 12VDC, 24 VDC and 12/24/48 VDC are available.

**Cooling Medium:** TECA has both air cooled and liquid cooled cold plates. When using the liquid cooled versions the delta T reference temperature is the liquid temperature, when using air cooled cold plates it's the ambient air temperature. Liquid cooled cold plates require a constant flow of cooling water. This can be tap water, in house chilled water or re-circulating chillers.

**Mounting:** Secure, thermally conductive mounting of the components to cold plate surface is needed. The cold plate is anodized aluminum. Items can be thermally greased into place using DOW 340 heat transfer grease or similar. Many times the tackiness of the grease is enough to hold the test item in place. Alternatively CP models have a tap pattern as a standard and have provision for mounting to enclosures.



# General Use Cold Plate Applications



## FLUID DISPENSING

A leading manufacturer of fluid dispensing systems uses one of our Thermoelectric Cold Plate and Temperature Controller for controlling the fluid temperature of adhesives, sealants, lubricants and other materials in meter, mix and dispensing systems. Unlike other larger, higher cost and less accurate heating and cooling devices, which use heater cartridges, refrigerant or water to heat and cool, these thermoelectric-effect temperature controllers use the Peltier-Seebeck effect to directly convert electrical voltage to thermal differential. This effect, which is reversible, either heats or cools fluid materials with precision to the temperature set point. The compact Peltier thermoelectric device, temperature sensor and the temperature control is mounted to a manifold where the fluid passes through to be precisely heated, maintained or cooled.

## 3D PRINTING PROCESS

The AHP-301CP Cold Plate has simplified the customer's process by replacing a messy hot wax system. A customer heard about TECA's Thermoelectric Cold Plates through word-of-mouth and placed an order within the week. The AHP-301CP Cold Plate is used in the customer's 3D printing process. Parts are printed on an aluminum plate which is then set on the AHP-301CP Cold Plate. As the AHP-301CP Cold Plate cools the aluminum plate, the 3D prints just pop right off of the aluminum plate. The customer is pleased with the performance, ease of use and low purchase price of this basic model.



## CANADIAN FOG BOX

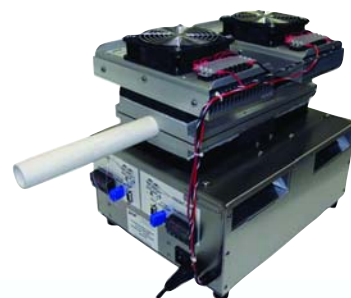
Below are few pictures of the "Canadian Fog Box" that our customer constructed using TECA's AHP-300CP cold plates, power supply, and TC-3400 PID controllers. The interior of the box is covered with mirror finished aluminum to reflect the ultraviolet rays from the bulb in the bottom. The top is normally closed as well. The interior ambient temperature of the box is maintained @ 122 F. subjecting the 2 insulated glass units (laying at a 45 degree angle) to intense UV radiation similar to strong sunlight. The upper portion of the glass is chilled to 70 F. by your cold plates. This is maintained for 1 week 24 hours/day. The insulated glass unit is then inspected for any condensation inside where the cold plates contacted the glass. Any condensation indicates impurities present inside the unit, which indicated faulty materials containing volatile gasses, which would lead to premature window unit failure. Any other 'fog boxes'

use water flow cold plates to maintain temperatures. Our customer during a research found TECA's cold plates and decided to give them a try to eliminate the hassle and mess of water plates. The thermoelectric cold plates (Peltier cold plates) have performed excellently to date, reaching and maintaining the 70 F. quickly and without incident.

## COOLING OF GAS FLOW:

A customer needed to cool and heat an aerosol flow tube. A 1 inch OD, 0.875 inch ID stainless steel flow tube mounted inside a 2-2.5 inch ID pipe.

The requirements led to direct contact cooling as being a good solution. "We would like to have the flow tube sandwiched between the cold plates with the temperature controller and power supplies attached in a similar manner so that we only need attach the temperature controller (the TC-3400 appears as if it will work) to a computer so that we can change the set points remotely. Is any of this even possible or am I dreaming in Technicolor? Less than 3 months after the initial contact the product was shipped. Several months later a follow up was made with this response. "Things are doing really well. It does exactly what we wanted it to do, and is much more efficient and better than we hoped for. We're very happy!"



## PERFORMANCE TESTING

In this application of low temperature thermoelectric cooling; the user is testing inertial measurement devices over a temperature range. The devices as well as the TECA cascaded cooling assembly are subjected to various rotational and acceleration stimuli while device temperature is controlled. The cascaded cooler was built up from a standard Model AHP301CP cold plate. The finished test fixture was able to function with a maximum rotation rate of 1700 degrees per second and 50g acceleration. The rotation is evident in the photo. By using a standard product as the basis for the cooling system, higher costs associated with a custom solution were avoided.

## HISTOLOGY

Department of histology in a major hospital needed a peltier cold plate to freeze tissue samples for examination. The Histology Division of the Department of Pathology places tissue samples from biopsies into a small block and fills it with wax. Several of these samples are then placed on one of the AHP-1200CP thermoelectric cold plates (Peltier cold plates) to "pull the heat" out of the wax so it gets really hard. The near-frozen samples are then shaved down to the desired section (slice) using a Microtome (in picture). The thin sections are then placed in the water bath to warm up the remaining wax in order to remove it and then place the section on a slide for examination.



# AHP-1200CP Cold Plate

Air Cooled  
Bench Top

General Purpose 120 VAC, 240 VAC Input  
225 Watts

## FEATURES

- Direct contact cooling as much as 46 °C below room temperature
- Weighs only 19 lbs. (8.6 kg)
- Bench top or enclosure mounting
- No compressor, fluorocarbons or filters
- Virtually maintenance-free operation
- Stainless steel exterior housing
- Mounts in any orientation



## INCLUDES

- Integral power supply (120 VAC input)
- Cold plate mounting taps
- Rubber feet
- Power input cord

## SPECIFICATIONS

MODEL	PART NUMBER	NOTES	PERFORMANCE RATING BTU/HR	VOLTAGE VAC 50/60 HZ	CURRENT AMPS.	WEIGHT LBS. (KG)	TEMP. CONTROL	OPERATING AMBIENT °C
AHP-1200CP	1-3090-0-000	Cool only	830-950	120	4.0	18(8.2)	None	-15/+60
AHP-1200CP	1-3050-0-000	Cool only	830-950	120	4.0	18(8.2)	EXT*	-15/+60
AHP-1200CPHC	1-3050-1-000	Heat/Cool	830-950	120	4.0	18(8.2)	EXT*	-15/+60
AHP-1202CP	1-3092-0-000	Cool only	830-950	240	2.5	23(10.5)	None	-15/+60
AHP-1202CP	1-3052-0-000	Cool only	830-950	240	2.5	23(10.5)	EXT*	-15/+60
AHP-1202CPHC	1-3052-1-000	Heat/Cool	830-950	240	2.5	23(10.5)	EXT*	-15/+60

\* Unit is set for 5-32 VDC external control signal

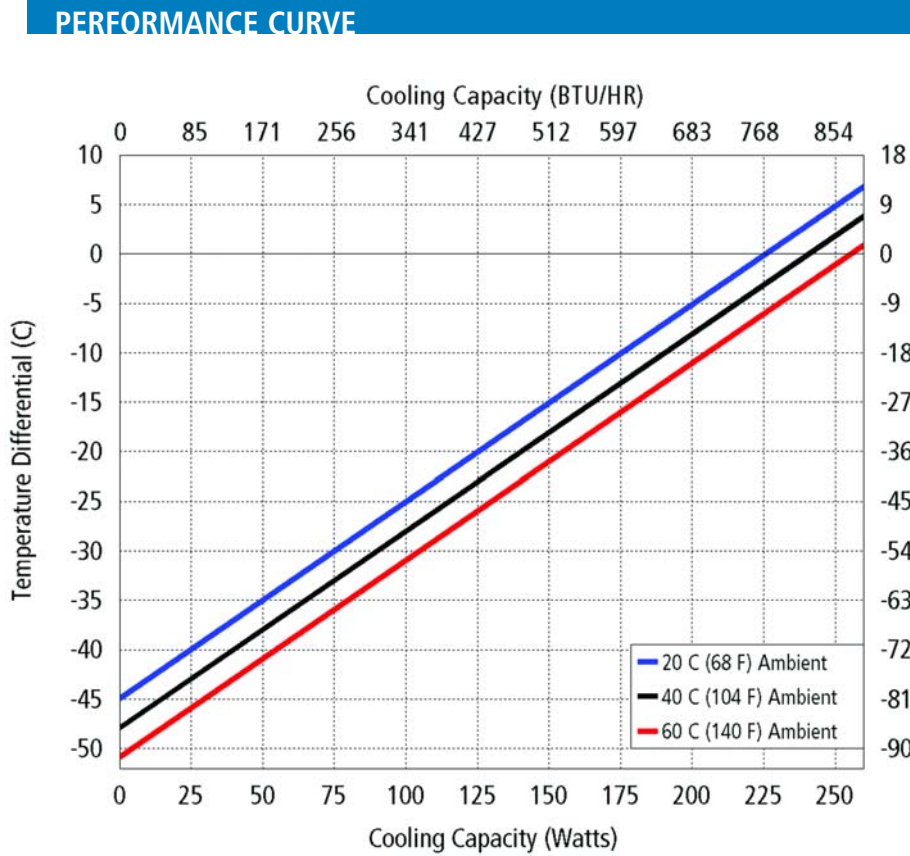


**AHP-1200CP****ENVIRONMENTS**

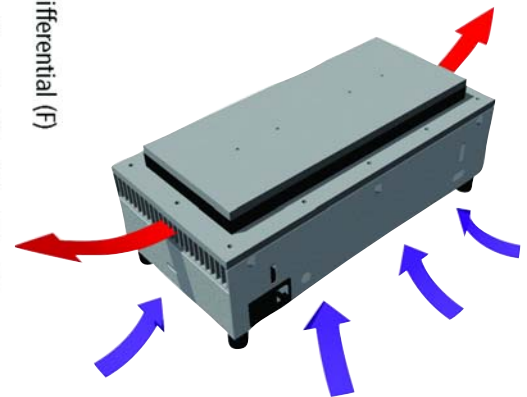
Bench top  
Factory  
Industrial/OEM

**COOLING CAPACITY**

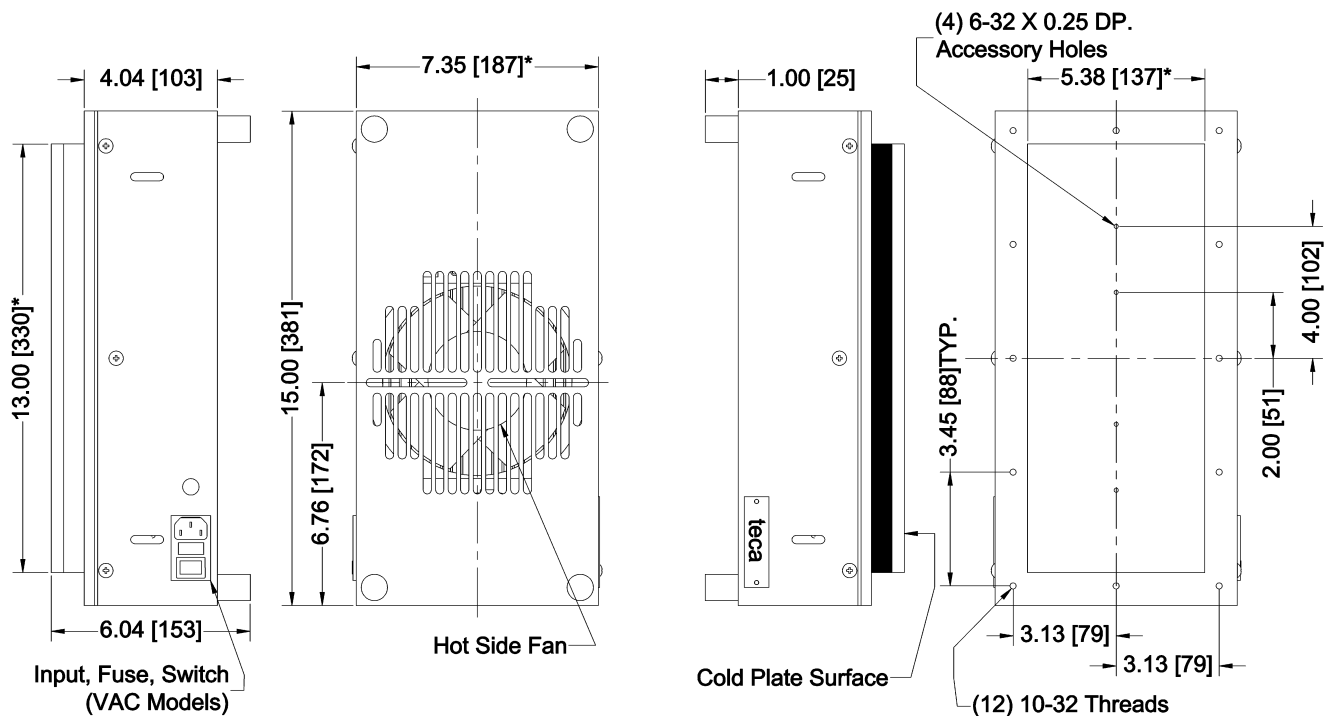
225 Watts @ 0 °C ΔT



Equation of line: $y = \Delta T(^{\circ}\text{C})$ $x = \text{Capacity (Watts)}$			
Ambient Temp	20°C	40°C	60°C
Cold Plate	$y = .199x - 44.9$	$y = .199x - 47.9$	$y = .199x - 50.8$



Ambient Air Path

**DIMENSIONS**

\* Dimension does not include hardware and sealant.  
Dimension: Inches [Millimeters]

# AHP-1200CP Cold Plate

Air Cooled  
Bench Top

General purpose 24 VDC input  
200 Watts

## FEATURES

- Direct contact cooling as much as 46 °C below room temperature
- Weighs only 19 lbs. (8.6 kg)
- Mount thru bench top or enclosure wall
- No compressor, fluorocarbons or filters
- Virtually maintenance-free operation
- Stainless steel exterior housing
- Mounts in any orientation



## INCLUDES

- Cold plate accessory tapped holes
- Cold plate mounting taps
- Rubber feet
- Power input leads

## SPECIFICATIONS

MODEL	PART NUMBER	NOTES	PERFORMANCE RATING	VOLTAGE VDC	CURRENT AMPS.	WEIGHT LBS. (KG)	TEMP. CONTROL *	OPERATING AMBIENT °C
AHP-1200CP	1-3095-0-000	Cool only	830-950	24(16-28)	9.0	18(8.2)	None	-15/+70
AHP-1200CP	1-3055-0-000	Cool only	830-950	24(16-28)	9.0	18(8.2)	EXT *	-15/+70
AHP-1200CPHC	1-3055-1-000	Heat/Cool	830-950	24(16-28)	9.0	19(8.6)	EXT †	-15/+70

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

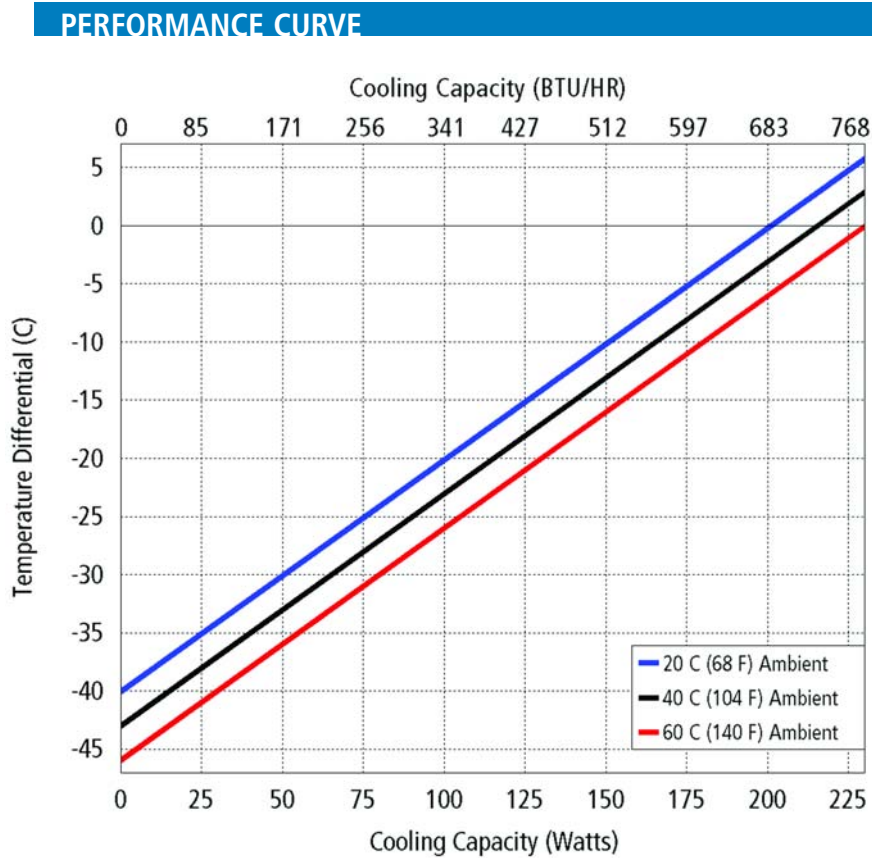
† Unit is set for 5-32 VDC external control signal, H-Bridge relay(s) included

**AHP-1200CP****ENVIRONMENTS**

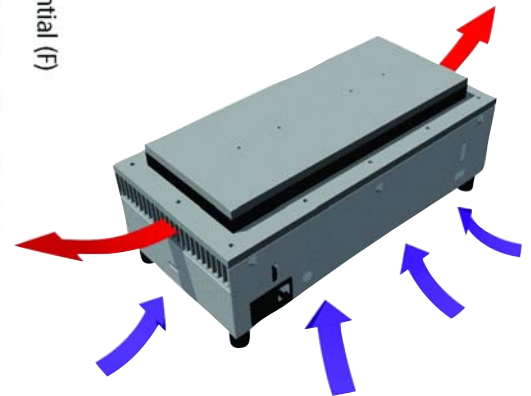
Bench top  
Factory  
Industrial/OEM

**COOLING CAPACITY**

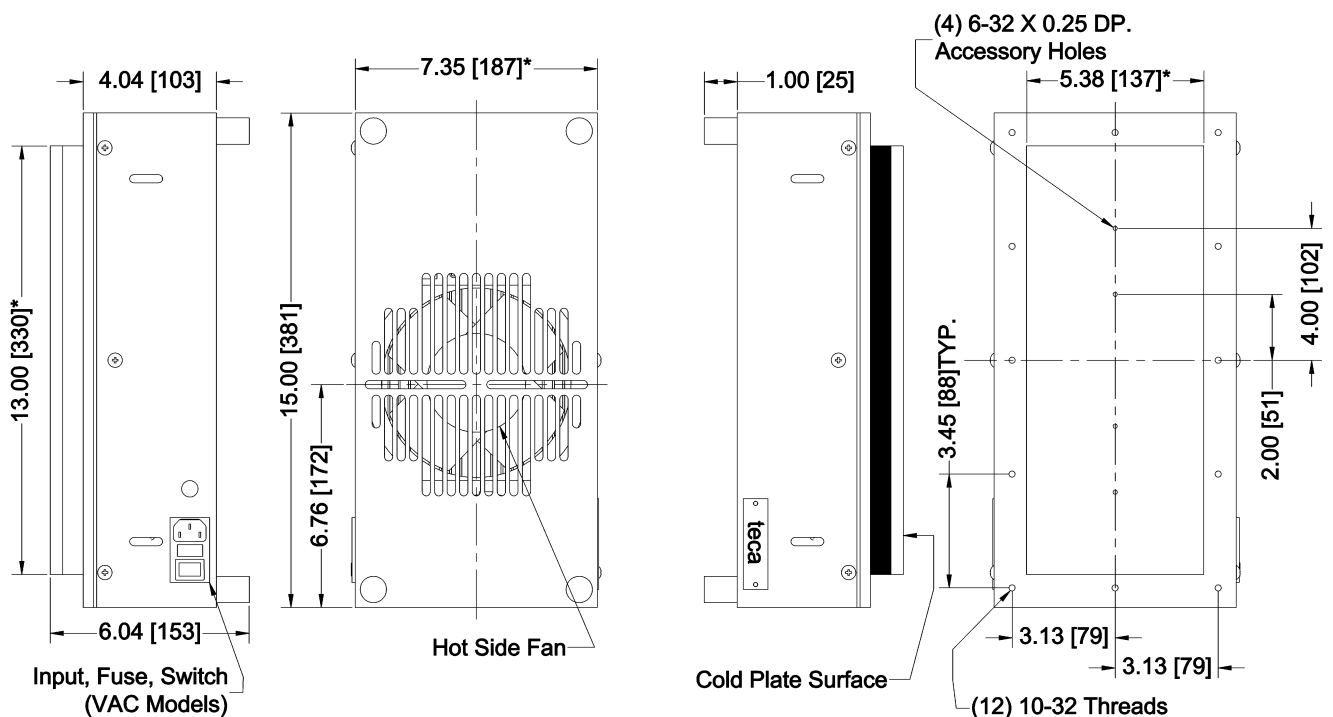
200 Watts @ 0 °C ΔT



Equation of line: $y = \Delta T(^{\circ}\text{C})$ $x = \text{Capacity (Watts)}$			
Ambient Temp	20°C	40°C	60°C
Cold Plate	$y = .199x - 40.0$	$y = .199x - 43.0$	$y = .199x - 46.0$



Ambient Air Path

**DIMENSIONS**

\* Dimension does not include hardware and sealant.  
Dimension: Inches [Millimeters]

# AHP-690CP

# Cold/Hot Plate

Air Cooled

General Purpose 24 VDC  
163 Watts

## FEATURES

- Flat aluminum plate (8" x 4.70") [203 x 119]
- Standard 6-32X.25 UNC threads
- Compact (only 10" x 5.9" x 5.2") [254 x 150 x 132]
- Mounts and operates in any orientation: horizontal, vertical, etc.
- Low vibration and noise
- No moving parts except fan
- Environmentally safe
- No compressor, fluorocarbons or filters
- Cools and heats via reverse polarity
- Virtually maintenance-free operation
- Pivot clean
- Weight 9 LBS. (4 KG)

## INCLUDES

- Mounting gasket
- Mounting hardware
- Power input leads

## OPTIONS

- Custom cold plate threads and/or inserts
- Flat plate without holes or threads
- Stainless steel exterior fan shroud and housing
- Custom fans: Quiet, Speed Control, Waterproof
- Use with TC-3400 and TC-4600 controls



## PERFORMANCE RATINGS

Cooling	163 WATTS
Cooling COP	0.57
Heating	> 288 Watts

## SPECIFICATIONS

MODEL	PART NUMBER	NOTES	PERFORMANCE RATING WATTS	VOLTAGE VDC	CURRENT AMPS.	TEMP. CONTROL	OPERATING AMBIENT °C
AHP-690CPHC	1-M095-1-000	Heat/Cool	163	24	14	None	-10/+60

Heat function via reverse polarity (requires controller with H-Bridge)

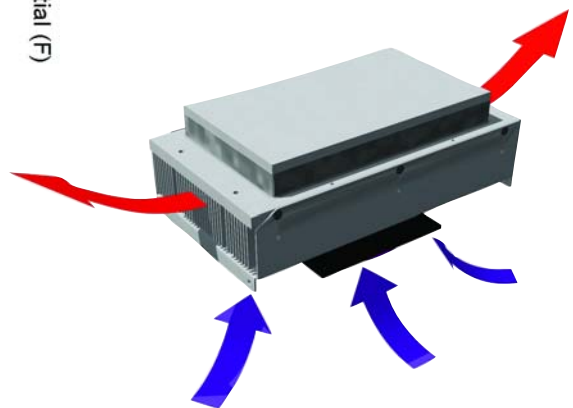
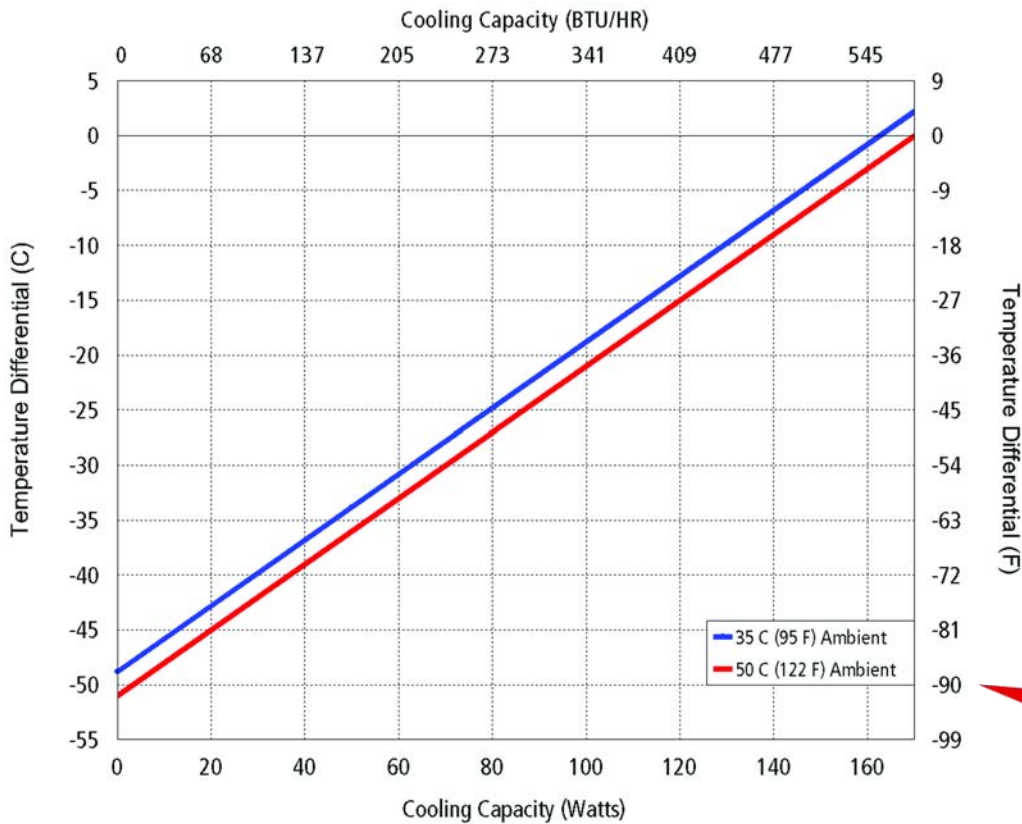


**AHP-690CP****ENVIRONMENTS**

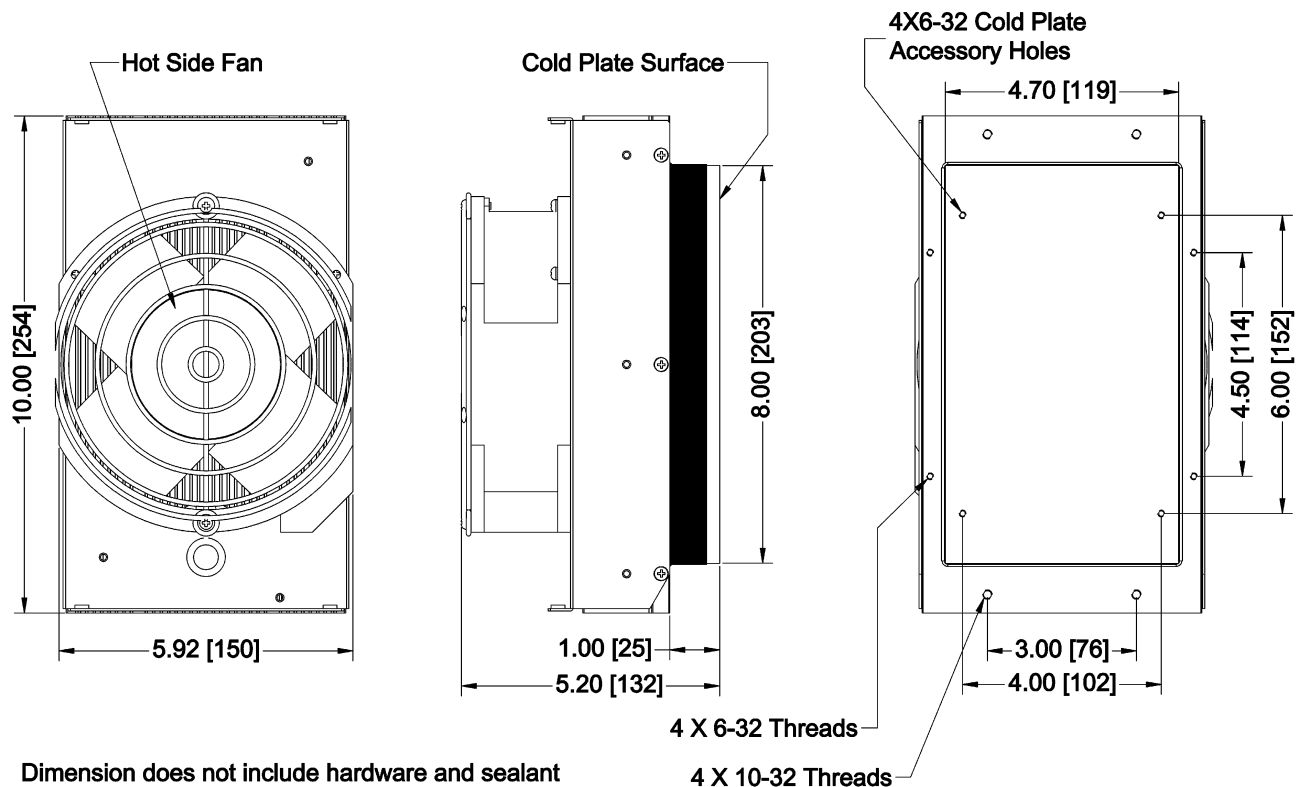
Bench Top, Factory, Industrial, OEM

**COOLING CAPACITY**

163 Watts @ 0 °C ΔT

**PERFORMANCE CURVE**

Air Flow Pattern

**DIMENSIONS**

Dimension does not include hardware and sealant  
 Hardware and gasket included but not shown  
 Dimensions: Inches [Millimeters]



# AHP-590CP

# Cold/Hot Plate

Air Cooled

General Purpose 24 VDC

High Efficiency

145 Watts

## FEATURES

- Flat aluminum plate (8" x 4.70") [203 x 119]
- Standard 6-32X.25 UNC threads
- Compact (only 10" x 5.76" x 4.45") [254 x 146 x 113]
- Mounts and operates in any orientation: horizontal, vertical, etc.
- Low vibration and noise
- No moving parts except fan
- Environmentally safe
- No compressor, fluorocarbons or filters
- Cools and heats via reverse polarity
- Virtually maintenance-free operation
- Pivot clean
- Weight 7 LBS. (3.2 KG)

## INCLUDES

- Mounting gasket
- Mounting hardware
- Power input leads

## OPTIONS

- Custom cold plate threads and/or inserts
- Flat plate without holes or threads
- Stainless steel exterior fan shroud and housing
- Custom fans: Quiet, Speed Control, Waterproof
- Use with TC-3400, TC-3500 and TC-4600 controls



## PERFORMANCE RATINGS

Cooling	145 WATTS
Cooling COP	1
Heating	> 145 Watts

## SPECIFICATIONS

MODEL	PART NUMBER	NOTES	PERFORMANCE RATING WATTS	VOLTAGE VDC	CURRENT AMPS.	TEMP. CONTROL	OPERATING AMBIENT °C
AHP-590CPHC	1-G095-1-001	Heat/Cool	145	24	6	None	-10/+60

Heat function via reverse polarity (requires controller with H-Bridge)

### Cold Plate- Air Cooled

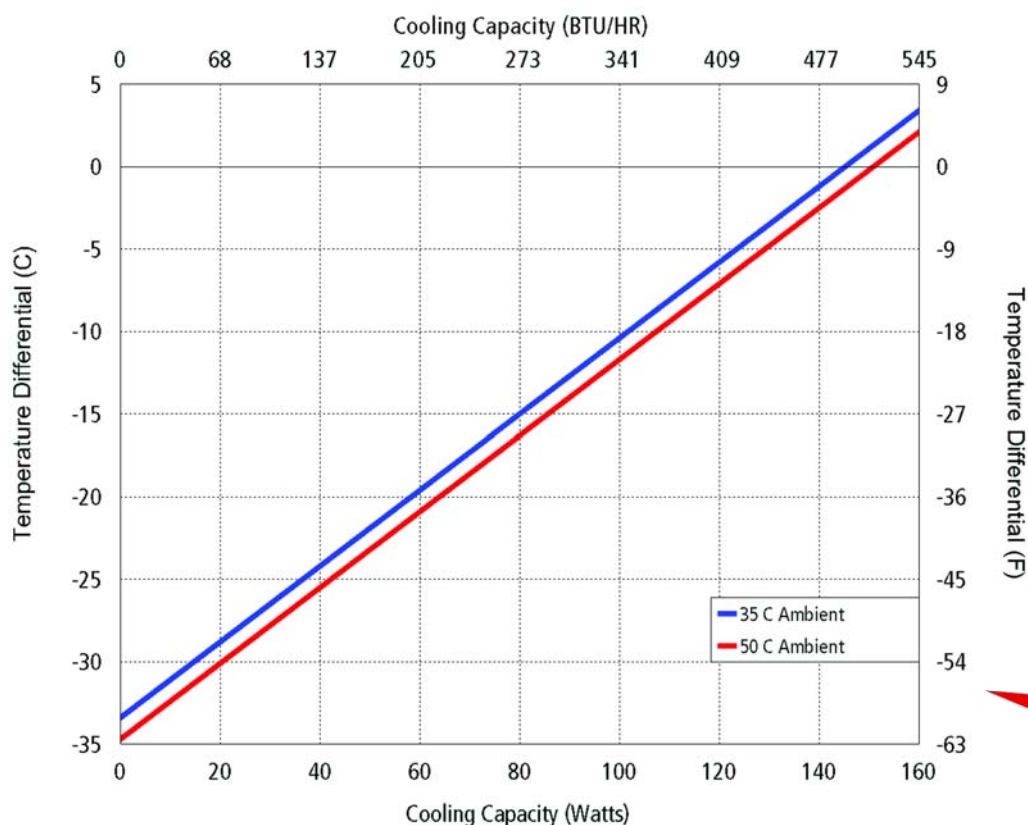
# AHP-590CP

## ENVIRONMENTS

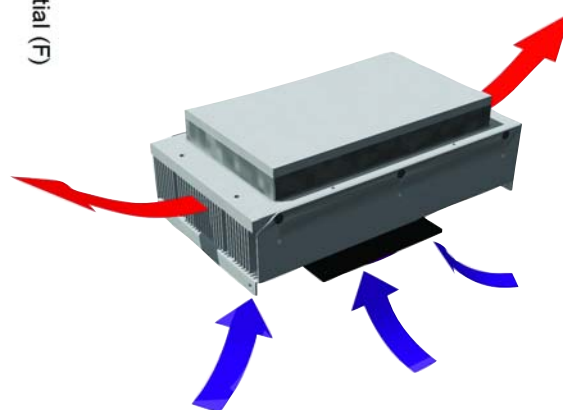
Bench Top, Factory, Industrial, OEM

## COOLING CAPACITY

145 Watts @ 0 °C ΔT

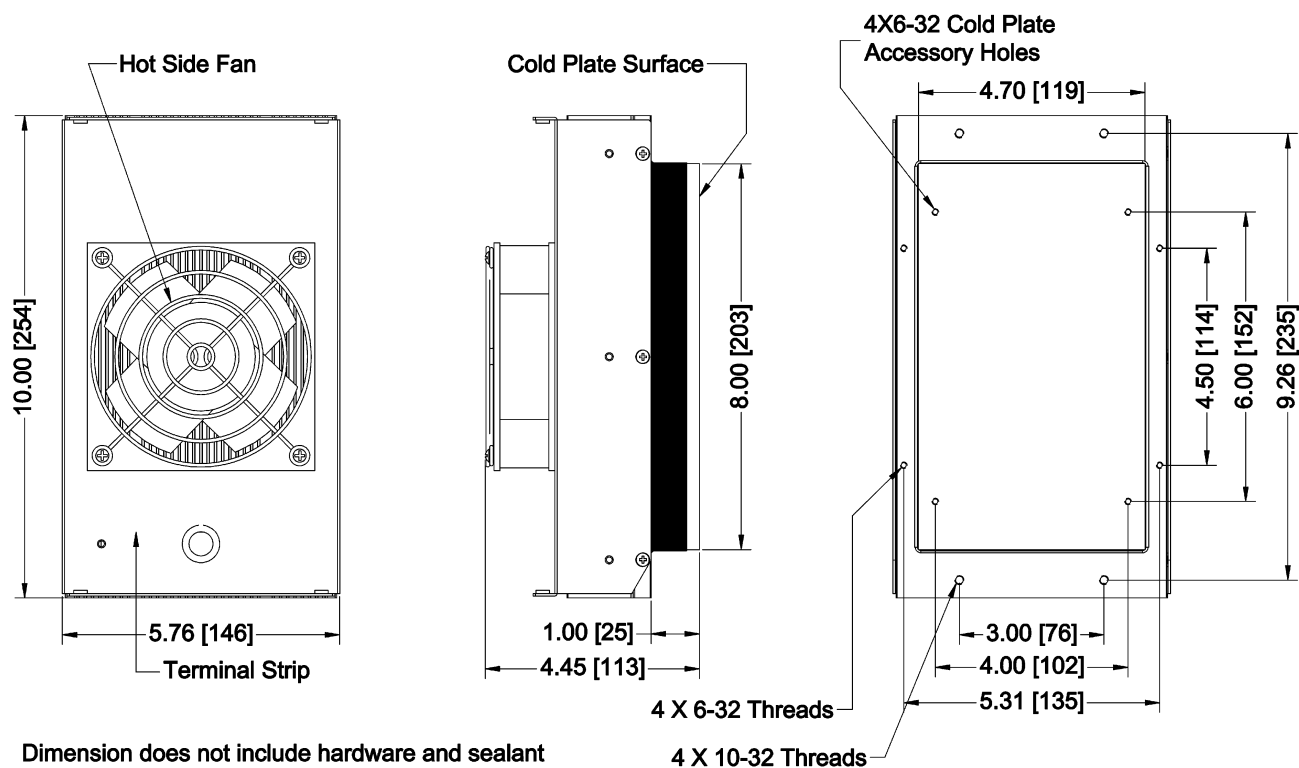


Equation of Line: $y = \Delta T(^{\circ}\text{C})$ $x = \text{Capacity (Watts)}$		
Ambient Temp	35°C	50°C
Cold Plate	$y = 0.23x - 33.4$	$y = 0.23x - 34.7$



### Air Flow Pattern

## DIMENSIONS



Dimension does not include hardware and sealant  
Hardware and gasket included but not shown  
Dimensions: Inches [Millimeters]



# AHP-570CP

# Cold/Hot Plate

Air Cooled

General Purpose 24 VDC  
High Efficiency  
97 Watts

## FEATURES

- Flat aluminum plate (8" x 4.70") [203 x 119]
- Standard 6-32X.25 UNC threads
- Compact (only 10" x 5.76" x 4.45") [254 x 146 x 113]
- Mounts and operates in any orientation: horizontal, vertical, etc.
- Low vibration and noise
- No moving parts except fan
- Environmentally safe
- No compressor, fluorocarbons or filters
- Cools and heats via reverse polarity
- Virtually maintenance-free operation
- Pivot clean
- Weight 7 LBS. (3.2 KG)

## INCLUDES

- Mounting gasket
- Mounting hardware
- Power input leads

## OPTIONS

- Custom cold plate threads and/or inserts
- Flat plate without holes or threads
- Stainless steel exterior fan shroud and housing
- Custom fans: Quiet, Speed Control, Waterproof
- Use with TC-3400, TC-3500 and TC-4600 controls



## PERFORMANCE RATINGS

Cooling	97 WATTS
Cooling COP	1.6
Heating	> 60 Watts

## SPECIFICATIONS

MODEL	PART NUMBER	NOTES	PERFORMANCE RATING WATTS	VOLTAGE VDC	CURRENT AMPS.	TEMP. CONTROL	OPERATING AMBIENT °C
AHP-570CPHC	1-G095-1-000	Heat/Cool	97	24	2.5	None	-10/+60
AHP-570CPHC	1-G094-1-000	Heat/Cool	97	12	5	None	-10/+60

Heat function via reverse polarity (requires controller with H-Bridge)

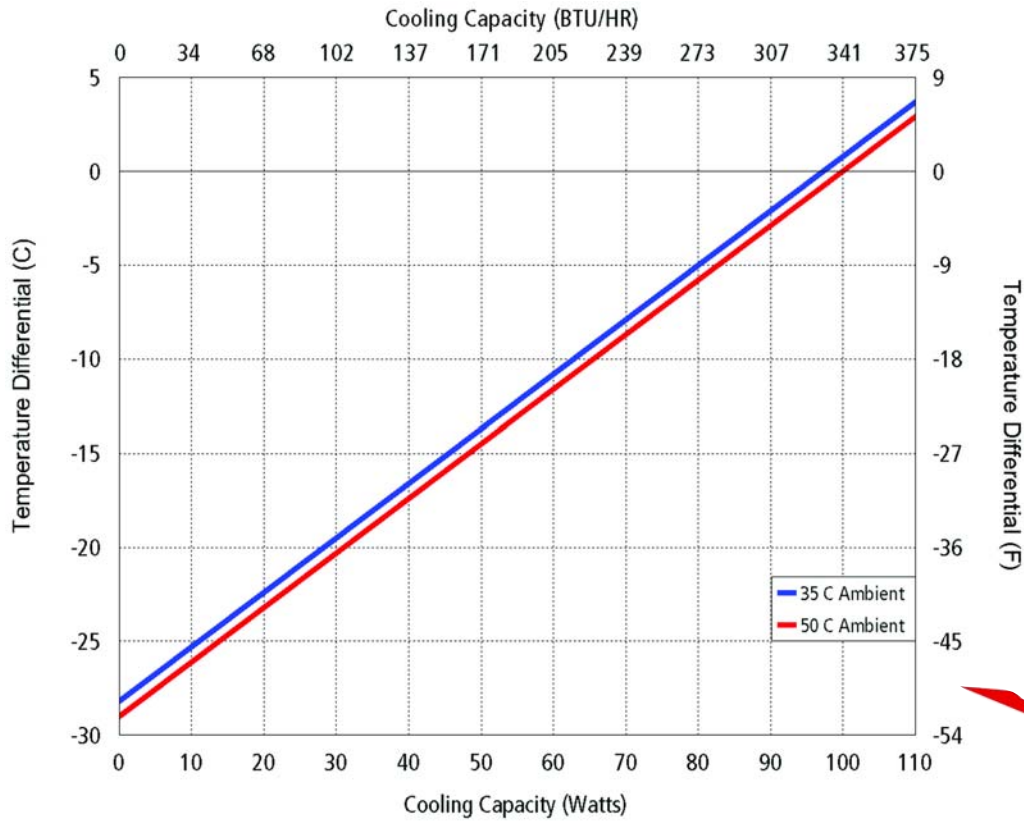


**AHP-570CP****ENVIRONMENTS**

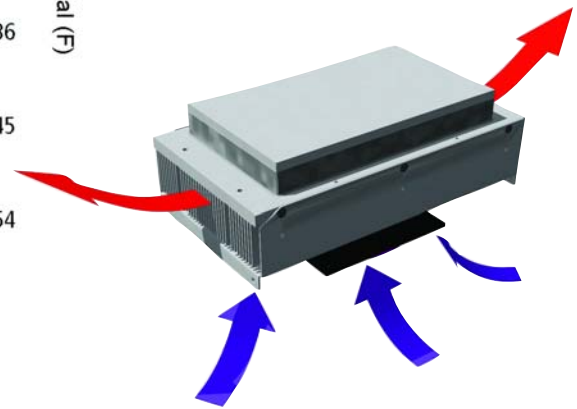
Bench Top, Factory, Industrial, OEM

**COOLING CAPACITY**

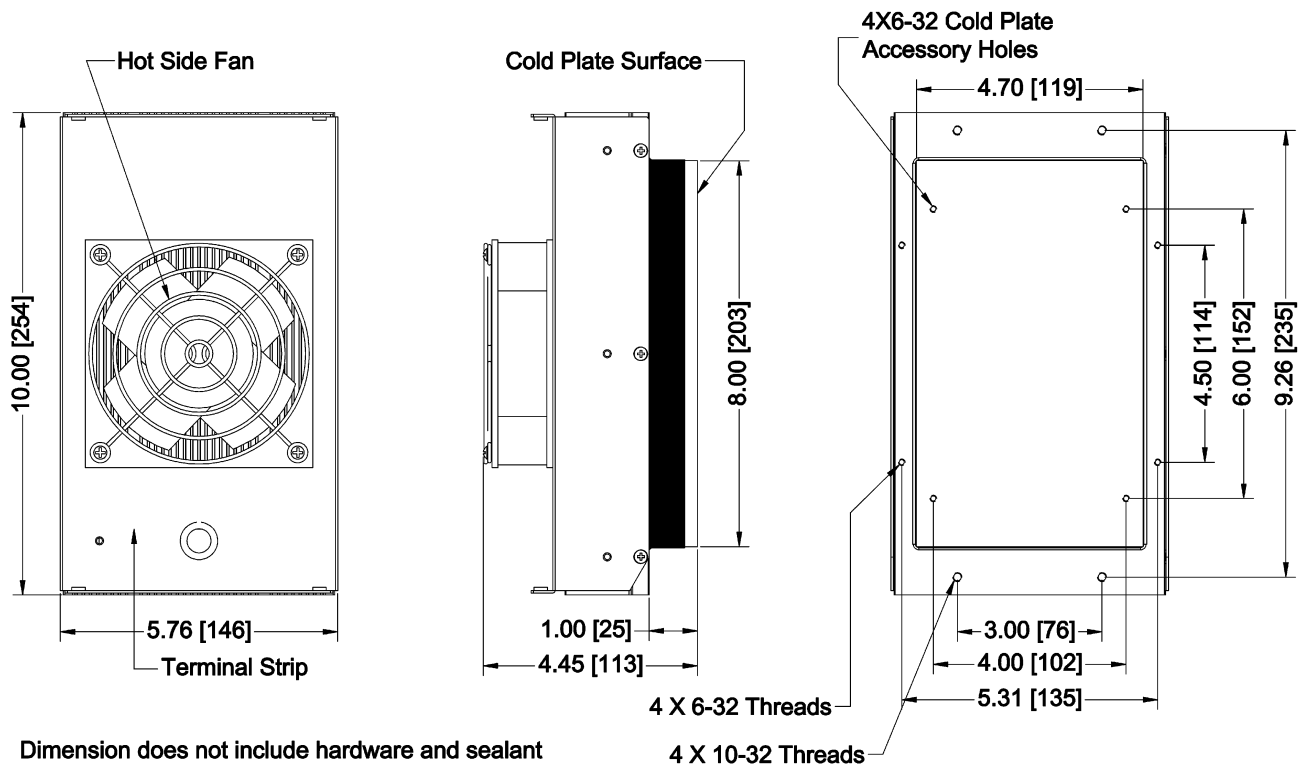
97 Watts @ 0 °C ΔT

**PERFORMANCE CURVE**

Equation of Line: $y = \Delta T(^{\circ}\text{C})$ $x = \text{Capacity (Watts)}$		
Ambient Temp	35°C	50°C
Cold Plate	$y = 0.29x - 28.2$	$y = 0.29x - 29$



Air Flow Pattern

**DIMENSIONS**

Dimension does not include hardware and sealant  
 Hardware and gasket included but not shown  
 Dimensions: Inches [Millimeters]



# AHP-470CP

# Cold/Hot Plate

Air Cooled

General Purpose 24 VDC

High Efficiency

105 Watts

## FEATURES

- Flat aluminum plate (8" x 4.70") [203 x 119]
- Standard 6-32X.25 UNC threads
- Compact (only 10" x 5.76" x 4.45") [254 x 146 x 113]
- Mounts and operates in any orientation: horizontal, vertical, etc.
- Low vibration and noise
- No moving parts except fan
- Environmentally safe
- No compressor, fluorocarbons or filters
- Cools and heats via reverse polarity
- Virtually maintenance-free operation
- Pivot clean
- Weight 7 LBS. (3.2 KG)

## INCLUDES

- Mounting gasket
- Mounting hardware
- Power input leads

## OPTIONS

- Custom cold plate threads and/or inserts
- Flat plate without holes or threads
- Stainless steel exterior fan shroud and housing
- Custom fans: Quiet, Speed Control, Waterproof
- Use with TC-3400, TC-3500 and TC-4600 controls



## PERFORMANCE RATINGS

Cooling	105 WATTS
Cooling COP	0.84
Heating	> 125 Watts

## SPECIFICATIONS

MODEL	PART NUMBER	NOTES	PERFORMANCE RATING WATTS	VOLTAGE VDC	CURRENT AMPS.	TEMP. CONTROL	OPERATING AMBIENT °C
AHP-470CPHC	1-F095-1-001	Heat/Cool	105	24	5.2	None	-10/+60
AHP-470CPHC	1-F094-1-001	Heat/Cool	105	12	10	None	-10/+60

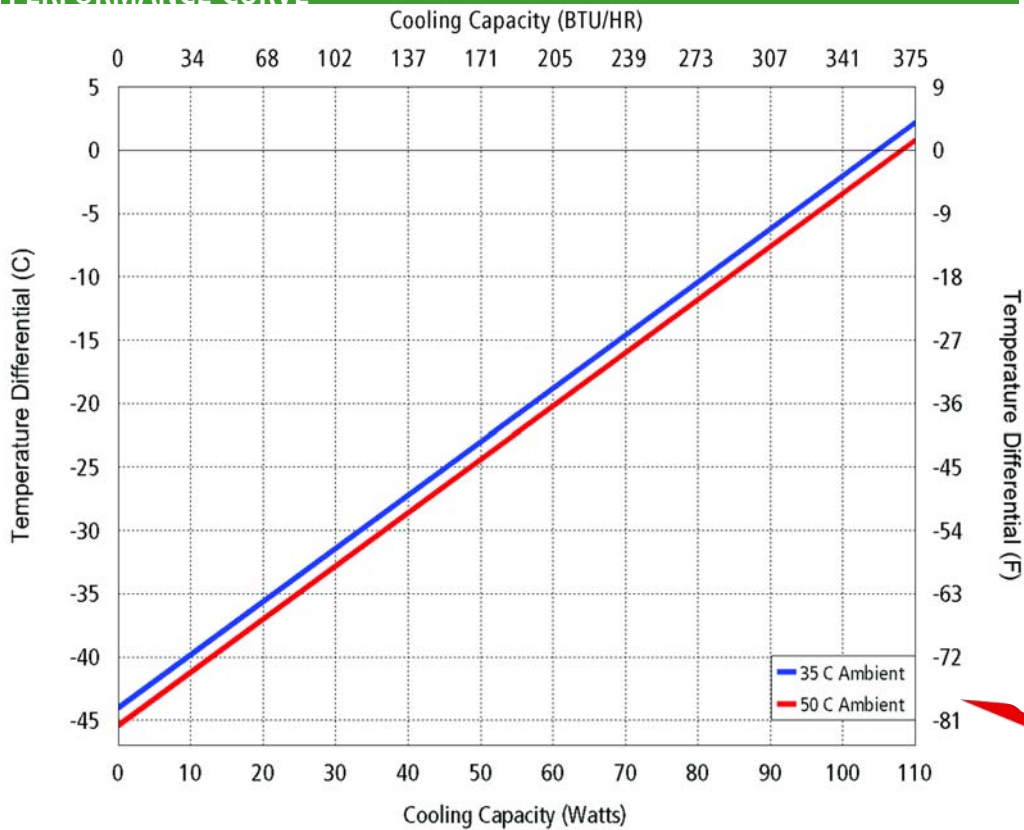
Heat function via reverse polarity (requires controller with H-Bridge)

**AHP-470CP****ENVIRONMENTS**

Bench Top, Factory, Industrial, OEM

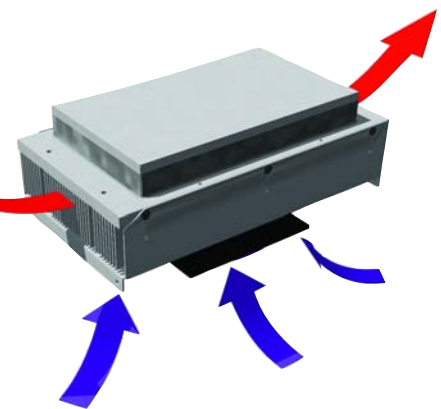
**COOLING CAPACITY**

105 Watts @ 0 °C ΔT

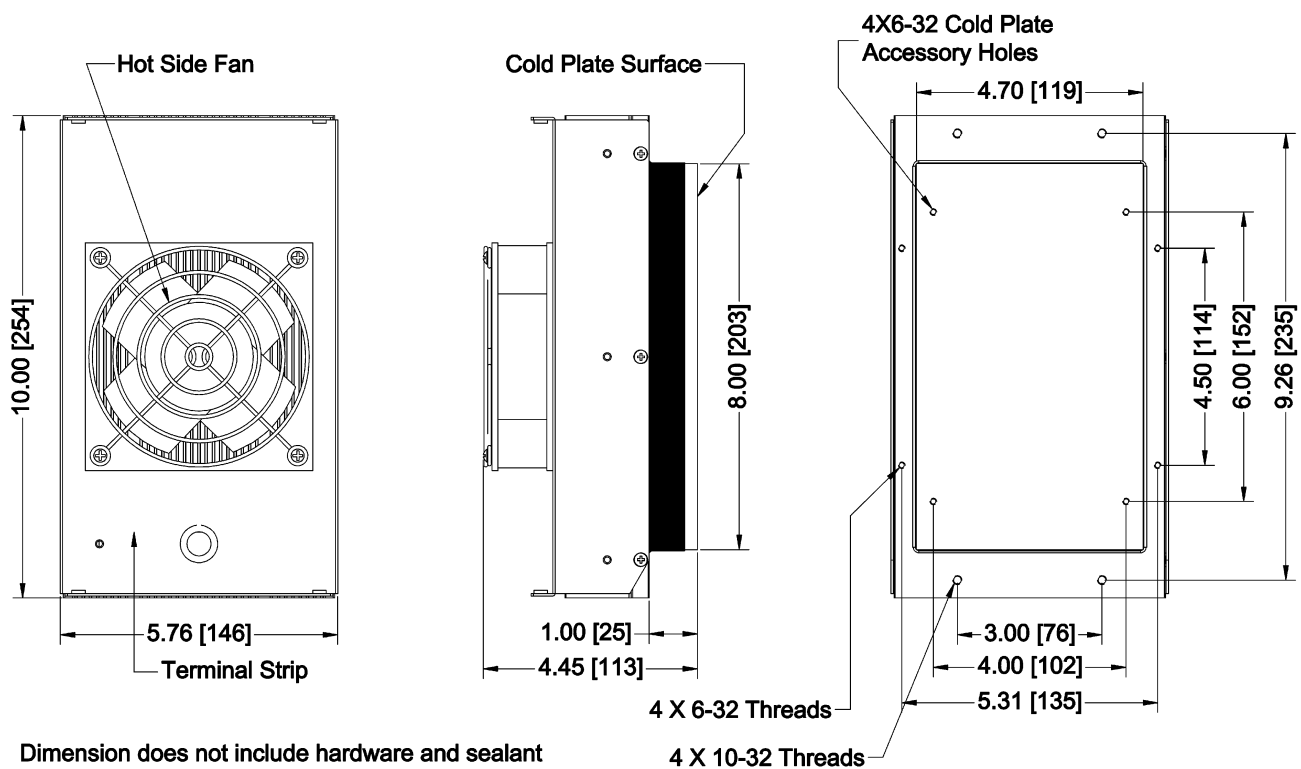
**PERFORMANCE CURVE**

Equation of Line: $y = \Delta T(^{\circ}\text{C})$ $x = \text{Capacity (Watts)}$		
Ambient Temp	35°C	50°C
Cold Plate	$y = 0.42x - 44$	$y = 0.42x - 45.4$

Temperature Differential (F)



Air Flow Pattern

**DIMENSIONS**

Dimension does not include hardware and sealant  
 Hardware and gasket included but not shown  
 Dimensions: Inches [Millimeters]



# AHP-450CP

# Cold/Hot Plate

Air Cooled

General Purpose 24 VDC  
High Efficiency  
68 Watts

## FEATURES

- Flat aluminum plate (8" x 4.70") [203 x 119]
- Standard 6-32X.25 UNC threads
- Compact (only 10" x 5.76" x 4.45") [254 x 146 x 113]
- Mounts and operates in any orientation: horizontal, vertical, etc.
- Low vibration and noise
- No moving parts except fan
- Environmentally safe
- No compressor, fluorocarbons or filters
- Cools and heats via reverse polarity
- Virtually maintenance-free operation
- Pivot clean
- Weight 7 LBS. (3.2 KG)

## INCLUDES

- Mounting gasket
- Mounting hardware
- Power input leads

## OPTIONS

- Custom cold plate threads and/or inserts
- Flat plate without holes or threads
- Stainless steel exterior fan shroud and housing
- Custom fans: Quiet, Speed Control, Waterproof
- Use with TC-3400, TC-3500 and TC-4600 controls



## PERFORMANCE RATINGS

Cooling	68 WATTS
Cooling COP	1.8
Heating	> 36 Watts

## SPECIFICATIONS

MODEL	PART NUMBER	NOTES	PERFORMANCE RATING WATTS	VOLTAGE VDC	CURRENT AMPS.	TEMP. CONTROL	OPERATING AMBIENT °C
AHP-450CPHC	1-F095-1-000	Heat/Cool	68	24	1.5	None	-10/+60
AHP-450CPHC	1-F094-1-000	Heat/Cool	68	12	3	None	-10/+60

Heat function via reverse polarity (requires controller with H-Bridge)



Cold Plate- Air Cooled

## AHP-450CP

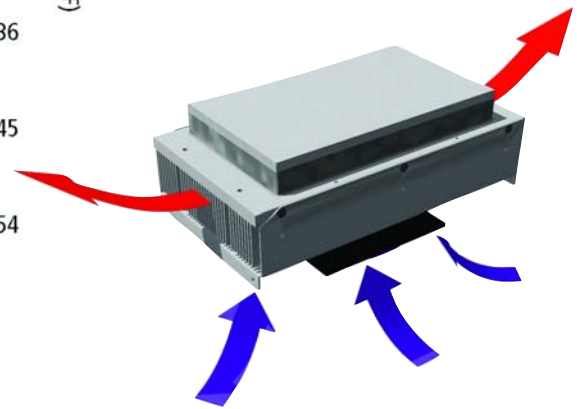
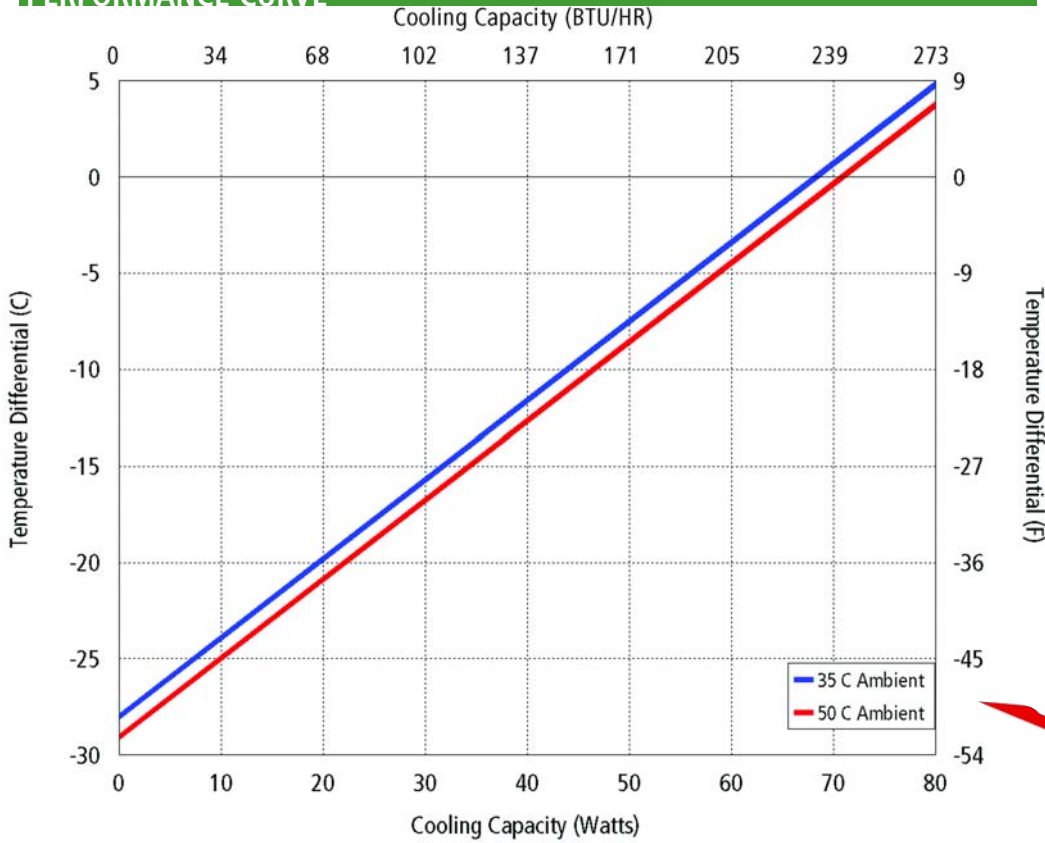
### ENVIRONMENTS

Bench Top, Factory, Industrial, OEM

### COOLING CAPACITY

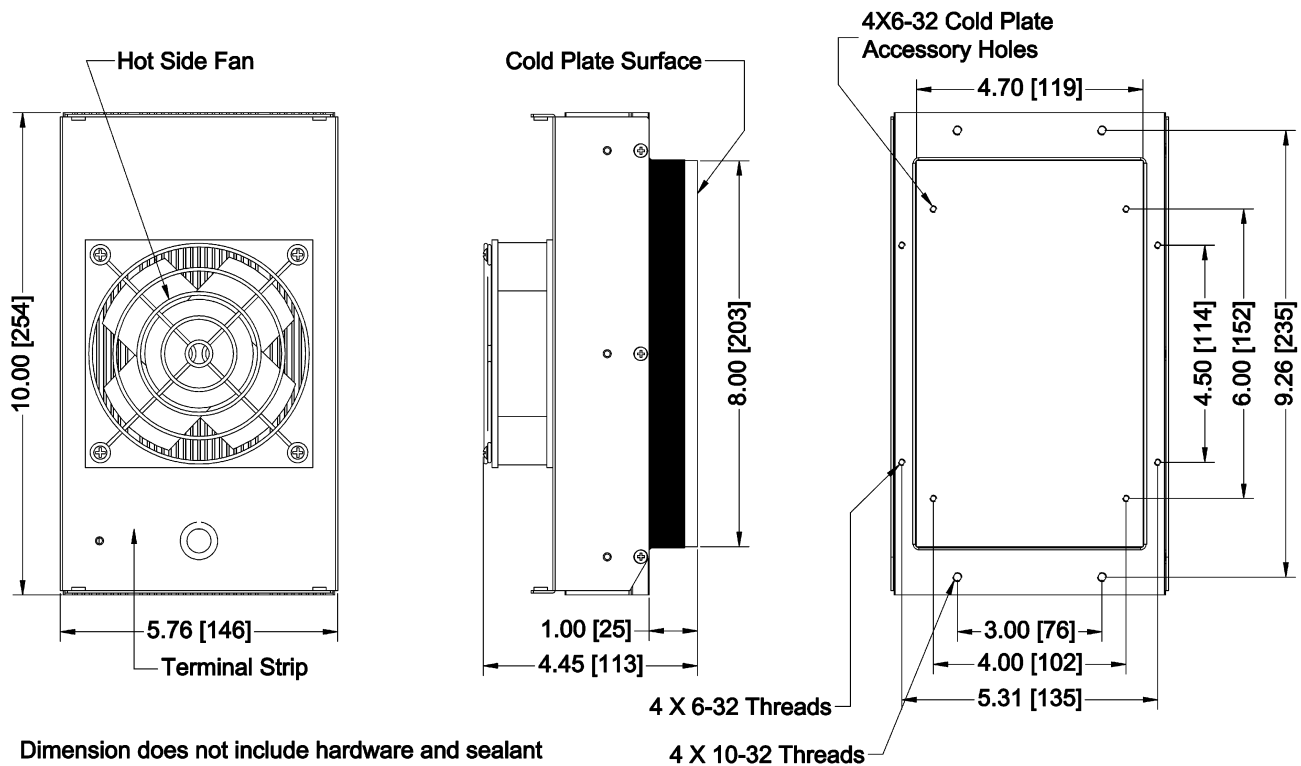
68 Watts @ 0 °C ΔT

### PERFORMANCE CURVE



Air Flow Pattern

### DIMENSIONS



Dimension does not include hardware and sealant  
Hardware and gasket included but not shown  
Dimensions: Inches [Millimeters]



# AHP-451CP

# Cold/Hot Plate

Air Cooled  
Bench Top

General Purpose 120 VAC or 240 VAC  
High Efficiency  
117 Watts

## FEATURES

- Flat aluminum plate (8" x 4.70") [203 x 119]
- Standard 6-32X.25 UNC inserts
- Compact (only 10" x 5.84" x 6.72") [254 x 148 x 170]
- Mounts and operates in any orientation: horizontal, vertical, etc.
- Low vibration and noise
- No moving parts except fan
- Environmentally safe
- No compressor, fluorocarbon or filters
- Heating via embedded resistive heaters
- Virtually maintenance-free operation
- Pivot clean feature
- Weighs less than 12 LBS. (5.5 KG)

## INCLUDES

- Mounting gasket
- Mounting hardware
- Power cord

## OPTIONS

- Custom cold plate threads and/or inserts
- Flat plate without holes or threads
- Quiet fan
- Use with external TC-3400 controller



## PERFORMANCE RATINGS

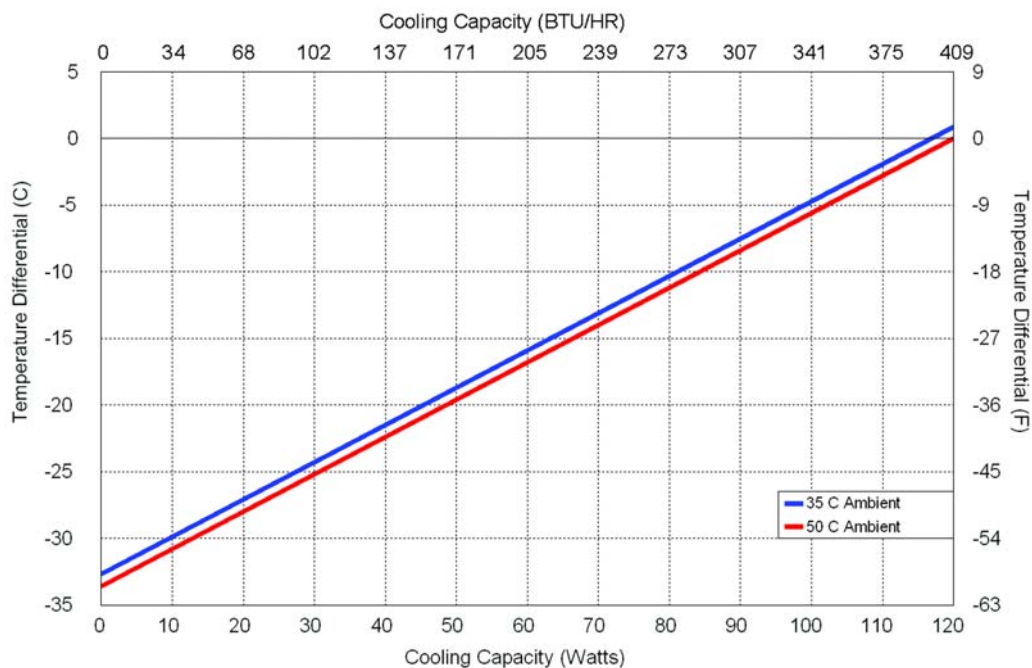
Cooling	117 WATTS
Cooling COP	0.76

## SPECIFICATIONS

MODEL	PART NUMBER	NOTES	PERFORMANCE RATING WATTS	VOLTAGE VAC	CURRENT AMPS.	WEIGHT LBS. (KG)	TEMP. CONTROL *	OPERATING AMBIENT °C
AHP-451CP	1-F090-0-000	Cool only	117	120	1.3	12(5.2)	None	-15/+70
AHP-451CP	1-F050-0-000	Cool only	117	120	1.3	12(5.2)	EXT *	-15/+70
AHP-451CPHC	1-F050-1-000	Heat/Cool	117	120	1.3	12(5.2)	EXT *	-15/+70
AHP-452CP	1-F092-0-000	Cool only	117	240	.6	12(5.2)	None	-15/+70
AHP-452CP	1-F052-0-000	Cool only	117	240	.6	12(5.2)	EXT *	-15/+70
AHP-452CPHC	1-F052-1-000	Heat/Cool	117	240	.6	12(5.2)	EXT *	-15/+70

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

## PERFORMANCE CURVE



Equation of Line: $y = \Delta T(^{\circ}\text{C})$ $x = \text{Capacity (Watts)}$		
Ambient Temp	35°C	50°C
Cold Plate	$y = 0.28x - 32.7$	$y = 0.28x - 33.6$

Cold Plate- Air Cooled

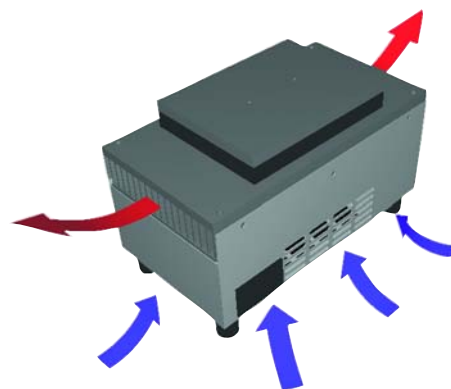
## AHP-451CP

### ENVIRONMENTS

Bench Top, Factory, Industrial, OEM

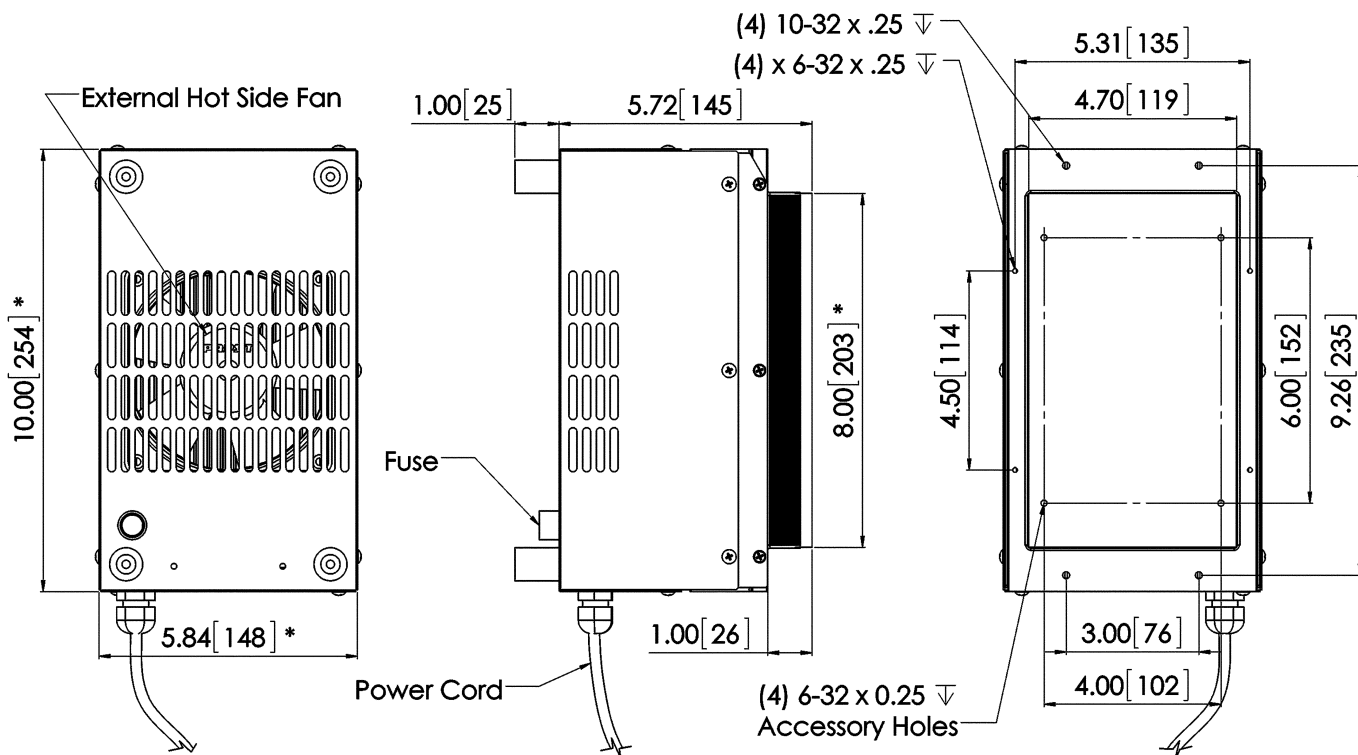
### COOLING CAPACITY

117 Watts @ 0 °C  $\Delta T$



Air Flow Pattern

## DIMENSIONS



\* Dimension does not include hardware and sealant  
Dimensions: Inches [Millimeters]

# AHP-401CP Cold/Hot Plate

Air Cooled  
Bench Top

General Purpose 120 VAC & 240 VAC  
75 Watts

## FEATURES

- Flat aluminum plate (8" x 4.70") [203 x 119]
- Standard 6-32X.25 UNC inserts
- Compact (only 10" x 5.84" x 6.72") [254 x 148 x 170]
- Mounts and operates in any orientation: horizontal, vertical, etc.
- Low vibration and noise
- No moving parts except fan
- Environmentally safe
- No compressor, fluorocarbon or filters
- Heating via embedded resistive heater
- Virtually maintenance-free operation
- Pivot clean feature
- Weighs less than 12 LBS. (5.5 KG)

## INCLUDES

- Mounting gasket
- Mounting hardware
- Power cord

## OPTIONS

- Custom cold plate threads and/or inserts
- Flat plate without holes or threads
- Quiet fan
- Use with external TC-3400 controller



## PERFORMANCE RATINGS

Cooling	75 WATTS
Cooling COP	0.52

## SPECIFICATIONS

MODEL	PART NUMBER	NOTES	PERFORMANCE RATING WATTS	VOLTAGE VAC	CURRENT AMPS.	WEIGHT LBS. (KG)	TEMP. CONTROL *	OPERATING AMBIENT °C
AHP-401CP	1-F090-0-001	Cool only	75	120	1.2	12(5.2)	None	-15/+70
AHP-401CP	1-F050-0-001	Cool only	75	120	1.2	12(5.2)	EXT *	-15/+70
AHP-401CPHC	1-F050-1-001	Heat/Cool	75	120	1.2	12(5.2)	EXT *	-15/+70
AHP-402CP	1-F092-0-001	Cool only	75	240	.6	12(5.2)	None	-15/+70
AHP-402CP	1-F052-0-001	Cool only	75	240	.6	12(5.2)	EXT *	-15/+70
AHP-402CPHC	1-F052-1-001	Heat/Cool	75	240	.6	12(5.2)	EXT *	-15/+70

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

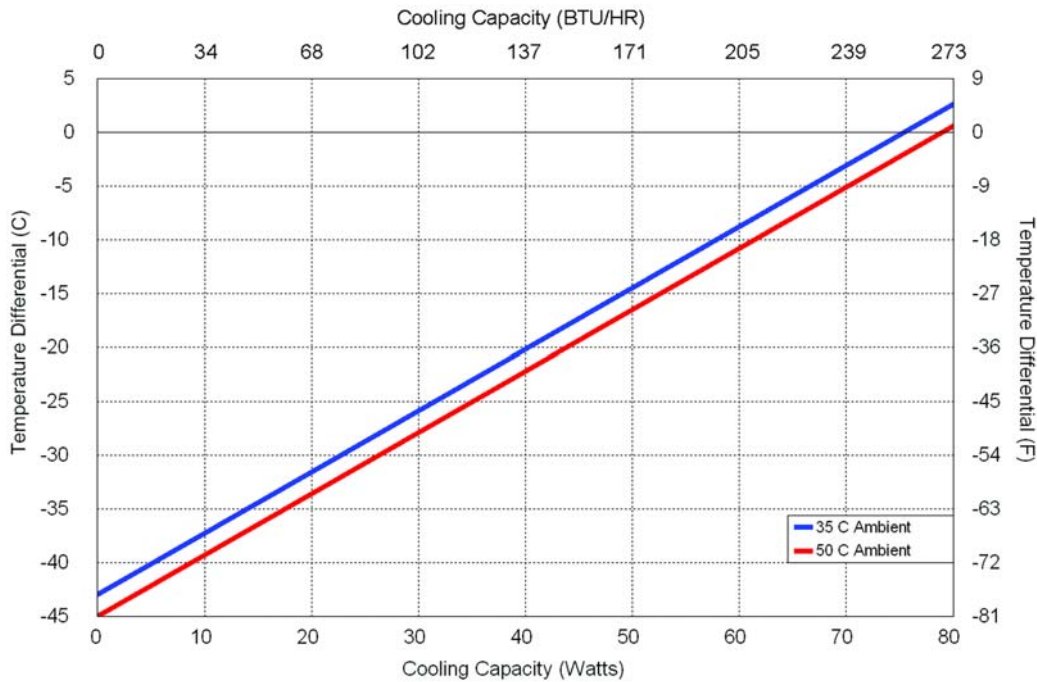


**AHP-401CP****ENVIRONMENTS**

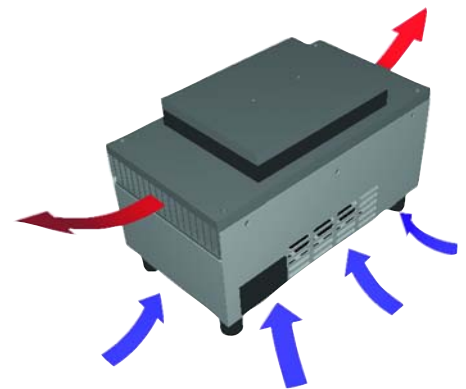
Bench Top, Factory, Industrial, OEM

**COOLING CAPACITY**

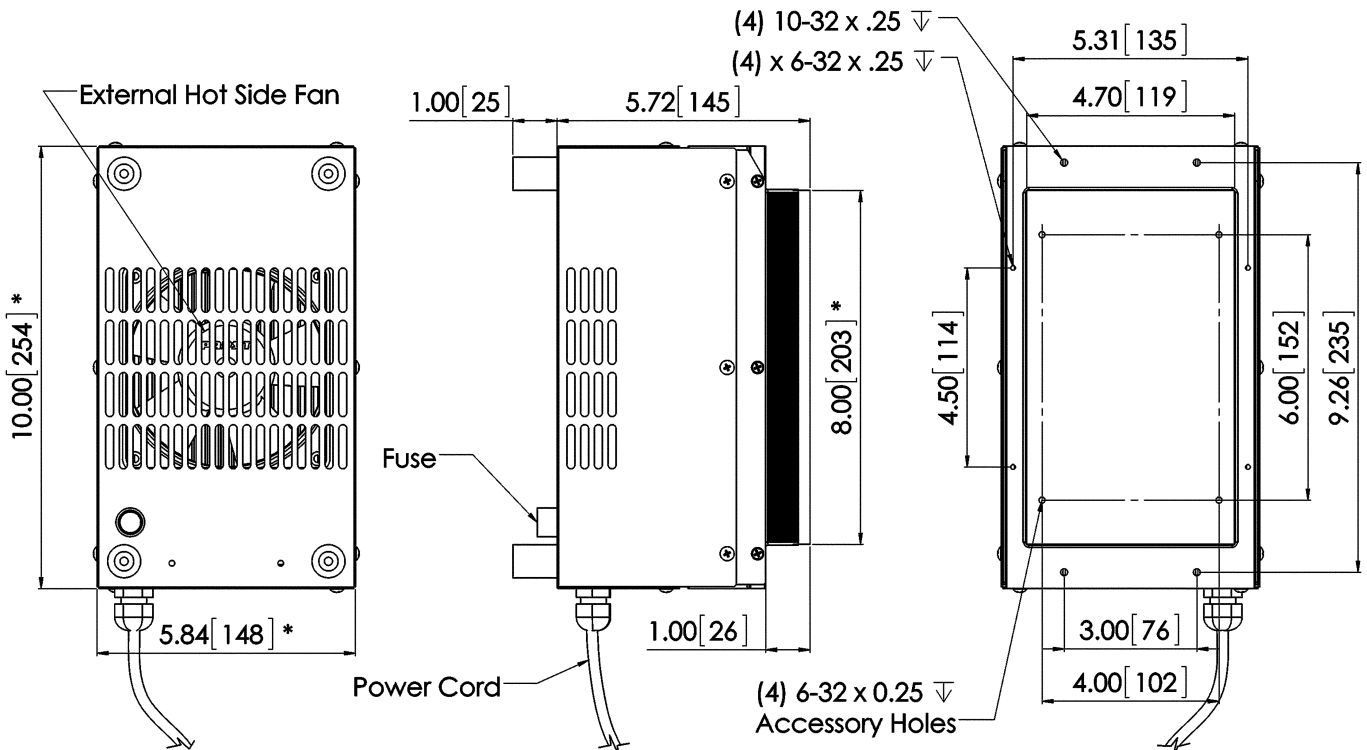
75 Watts @ 0 °C ΔT

**PERFORMANCE CURVE**

Equation of Line: $y = \Delta T(^{\circ}\text{C})$ $x = \text{Capacity (Watts)}$		
Ambient Temp	35°C	50°C
Cold Plate	$y = 0.57x - 43$	$y = 0.57x - 45$



Air Flow Pattern

**DIMENSIONS**

\* Dimension does not include hardware and sealant  
 Dimensions: Inches [Millimeters]

# AHP-301CP Cold Plate

Air Cooled  
Bench Top

General Purpose 120 VAC, 240 VAC Input  
70 Watts

## FEATURES

- Direct contact cooling as much as 52°C below room temperature
- Weighs only 11 lbs. (5.0 kg)
- Mounts through bench top or enclosure wall
- No compressor, fluorocarbons or filters
- Virtually maintenance-free operation
- Stainless steel exterior housing
- Mounts in any orientation

## INCLUDES

- Cold plate accessory tapped holes
- Rubber feet
- Power input cord
- Machined cold plate surface



## SPECIFICATIONS

MODEL	PART NUMBER	NOTES	PERFORMANCE RATING BTU/HR	VOLTAGE VAC 50/60 Hz	CURRENT AMPS.	WEIGHT LBS. (KG)	TEMP. CONTROL *	OPERATING AMBIENT °C
AHP-301CP	1-7090-0-000	Cool only	225-265	120	1.2	11(5)	none	-10/+60
AHP-301CP	1-7050-0-000	Cool only	225-265	120	1.2	11(5)	EXT*	-10/+60
AHP-301CPHC	1-7050-1-000	Heat/Cool	225-265	120	1.2	11(5)	EXT*	-10/+60
AHP-301CP	1-7092-0-000	Cool only	225-265	240	0.6	11(5)	none	-10/+60
AHP-301CP	1-7052-0-000	Cool only	225-265	240	0.6	11(5)	EXT*	-10/+60
AHP-301CPHC	1-7052-1-000	Heat/Cool	225-265	240	0.6	11(5)	EXT*	-10/+60

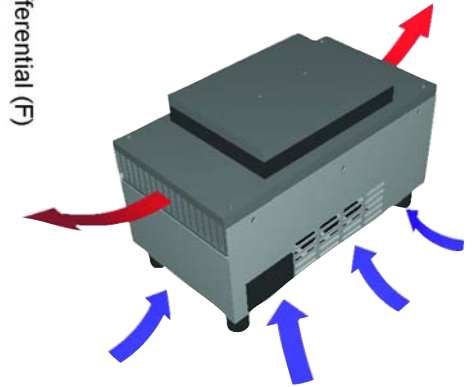
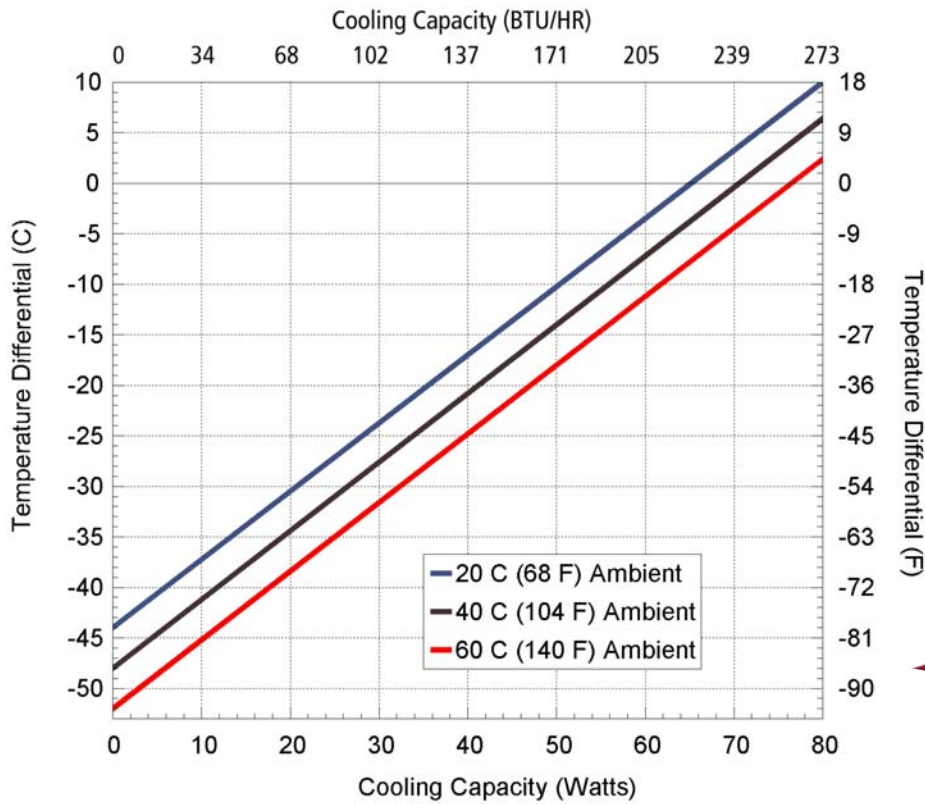
\* Unit is set for 5-32 VDC external signal, relay(s) included

**AHP-301CP****ENVIRONMENTS**

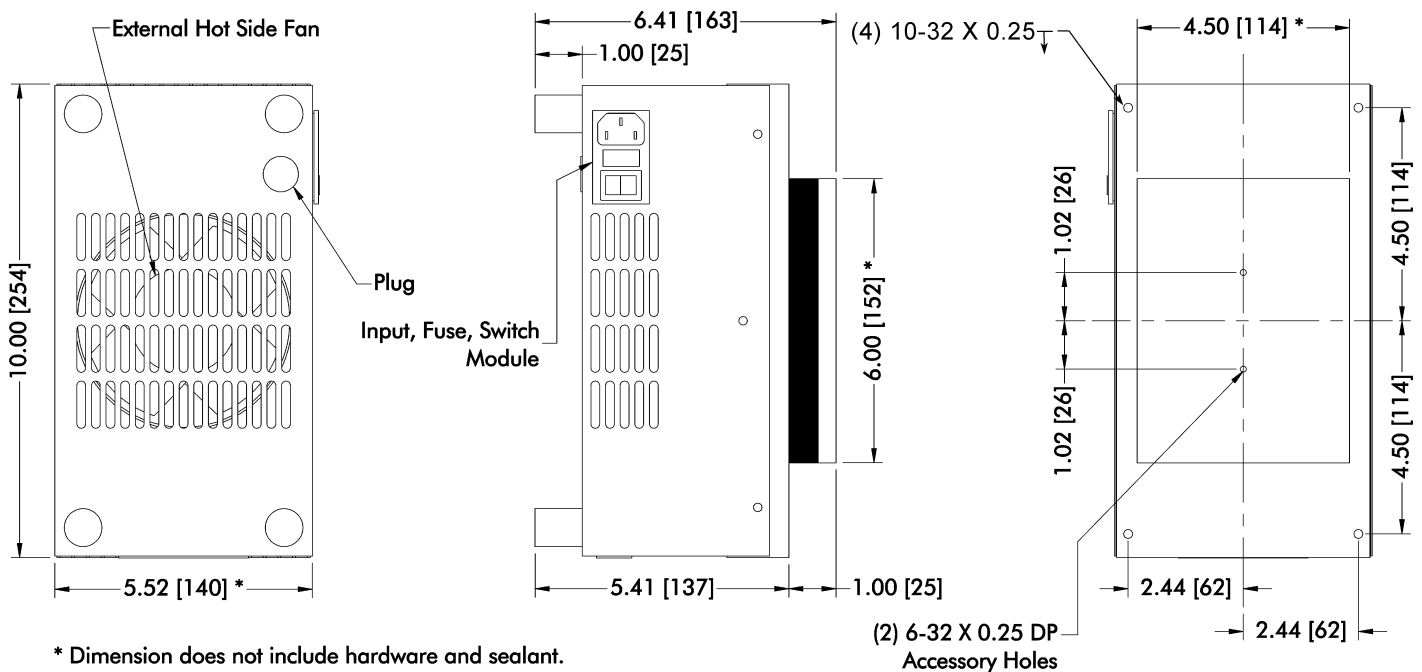
Bench top  
Factory  
Industrial/OEM

**COOLING CAPACITY**

70 Watts @ 0 °C ΔT (40 °C Ambient)



Ambient Air Path

**DIMENSIONS**

# AHP-300CP Cold Plates

Air Cooled

General Purpose VDC Input

85 Watts

## FEATURES

- Direct contact cooling as much as 51 °C below room temperature
- No compressor, fluorocarbons or filters
- Virtually maintenance-free operation
- Mounts in any orientation

## INCLUDES

- Cold plate accessory tapped holes
- Machined surface
- Terminal strip for wire hook up



## SPECIFICATIONS AHP-300CP

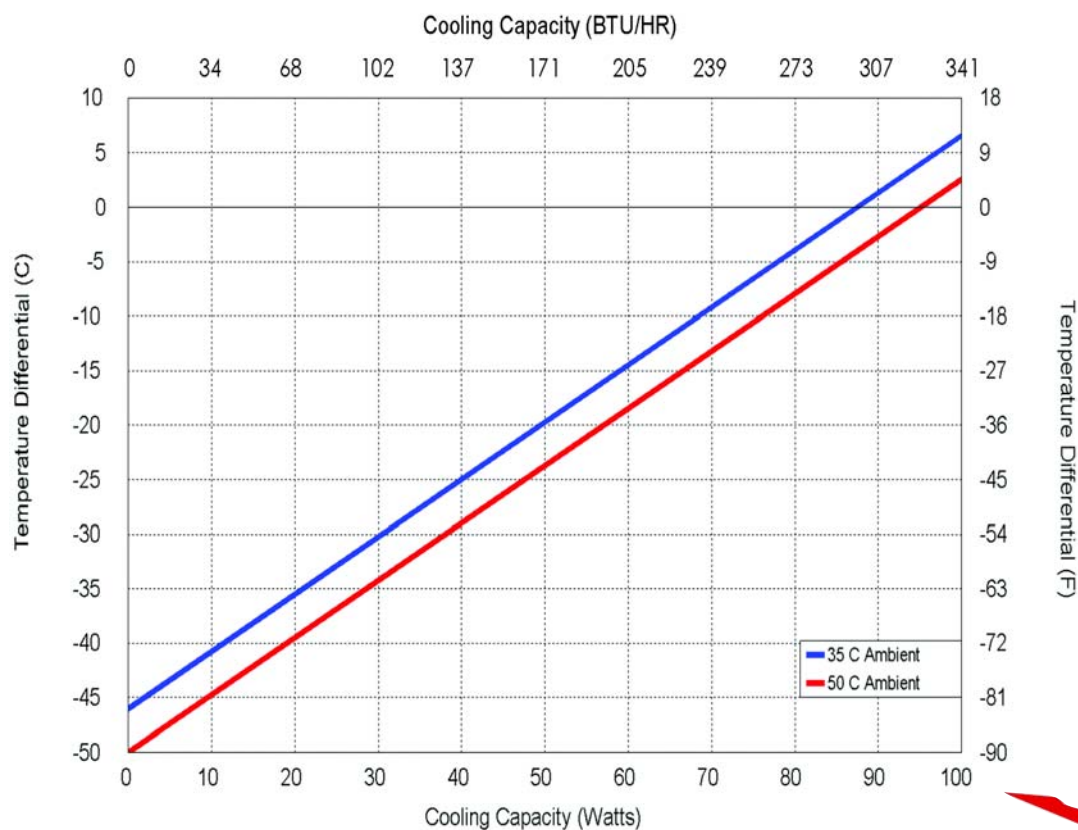
MODEL	PART NUMBER	NOTES	PERFORMANCE RATING BTU/HR	VOLTAGE VDC	CURRENT AMPS.	WEIGHT LBS. (KG)	TEMP. CONTROL	OPERATING AMBIENT °C
AHP-300CP	1-7097-0-000	Cool only	290-330	12/24/48	12/6/3	6(2.7)	None	-10/+60
AHP-300CPHC	1-7094-1-000	Heat/Cool	290-330	12	12	6(2.7)	None	-10/+60
AHP-300CPHC	1-7095-1-000	Heat/Cool	290-330	24	6	6(2.7)	None	-10/+60
AHP-300CPHC	1-7097-1-001	Heat/Cool Rev. Pol.*	290-330	12/24/48	12/6/3	6(2.7)	None*	-10/+60

Note: Options for temperature control, consult factory

\* Heat function via reverse polarity (requires controller with H-Bridge)



## PERFORMANCE CURVE



Equation of line: $y = \Delta T(^{\circ}\text{C})$ $x = \text{Capacity (Watts)}$			
Ambient Temp	20°C	40°C	60°C
300CP Cold Plate	$y = .526x - 45.0$	$y = .526x - 48.0$	$y = .526x - 51.0$

Cold Plate- Air Cooled

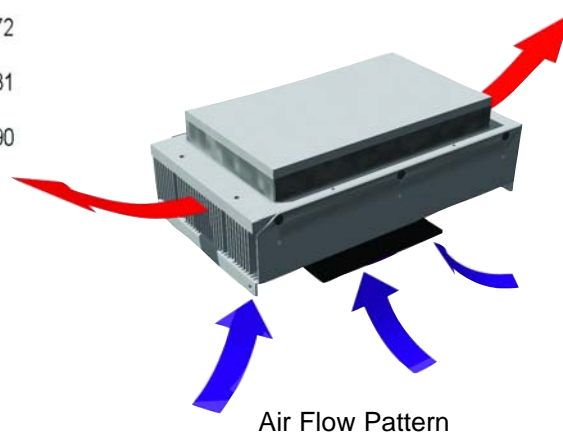
## AHP-300CP

### ENVIRONMENTS

Bench Top, Factory, Industrial, OEM

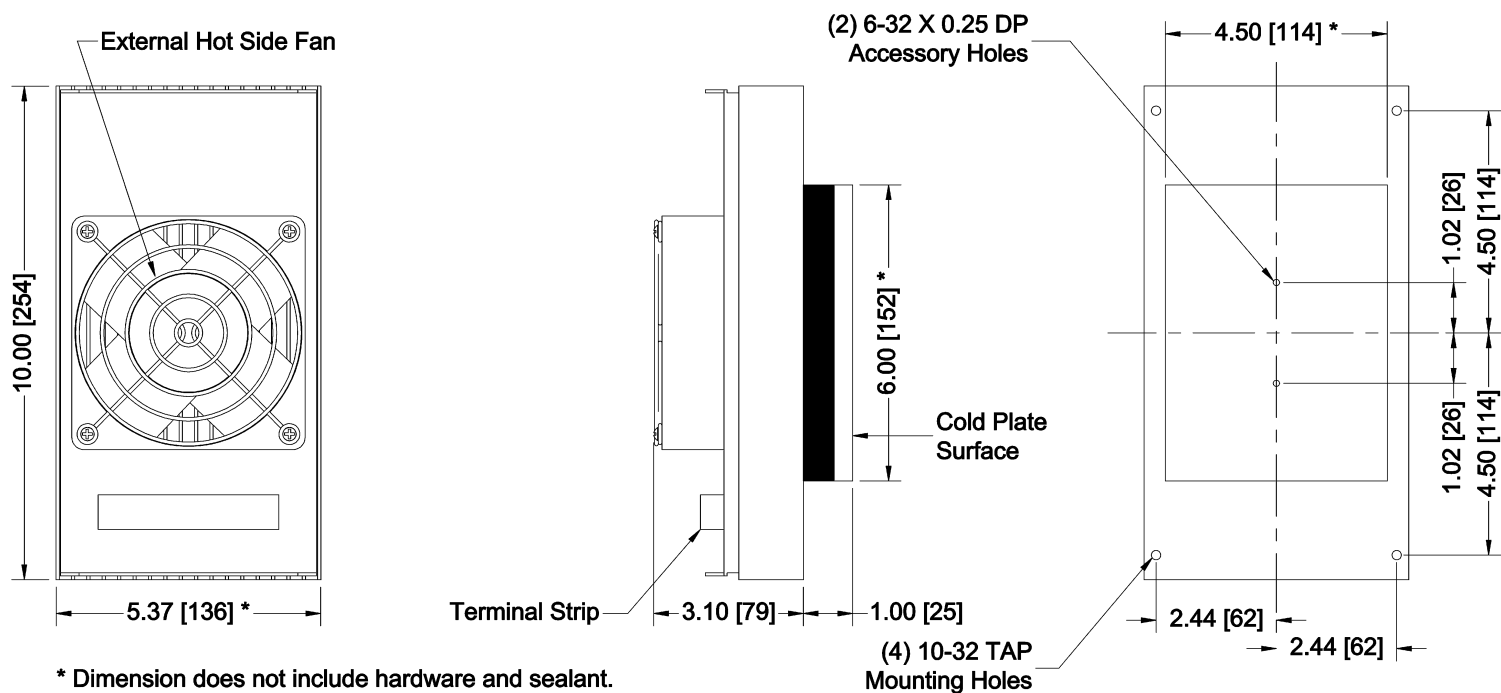
### COOLING CAPACITY

85 Watts @ 0 °C  $\Delta T$



Air Flow Pattern

## DIMENSIONS



\* Dimension does not include hardware and sealant.  
Dimensions: Inches [Millimeters]

# LHP-1200CP Cold Plate

Liquid Cooled

General Purpose 24 VDC Input

## FEATURES

- No moving parts
- Weighs only 20 lbs. (9.1kg)
- Direct contact cooling as much as 48 °C below liquid temperature
- No compressor, fluorocarbons or filters
- Virtually maintenance-free operation
- Mounts in any orientation



## INCLUDES

- Female 1/4-18 NPT fittings
- Power input leads
- Through bench top or wall mount
- Copper fluid path (stainless steel optional)

## SPECIFICATIONS

MODEL	PART NUMBER	NOTES	PERFORMANCE RATING BTU/HR	VOLTAGE VDC	CURRENT AMPS.	WEIGHT LBS. (KG)	MIN FLOW GPM	TEMP. CONTROL	OPERATING AMBIENT °C
LHP-1200CP	3-3095-0-000	Cool only	1360-1630	24	9.0	20(9.1)	0.3	none	0/+70
LHP-1200CP	3-3055-0-000	Cool only	1360-1630	24	9.0	20(9.1)	0.3	EXT *	0/+70
LHP-1200CPHC	3-3055-1-000	Heat/Cool	1360-1630	24	9.0	20(9.1)	0.3	EXT †	0/+70

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

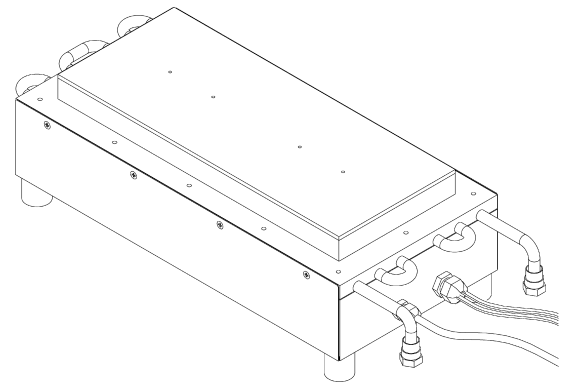
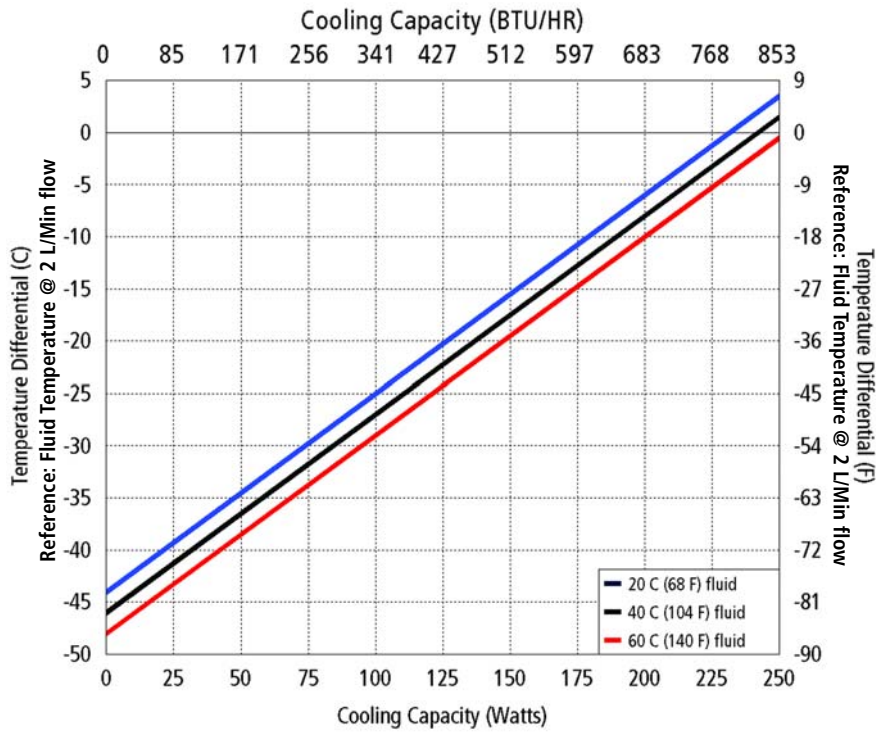
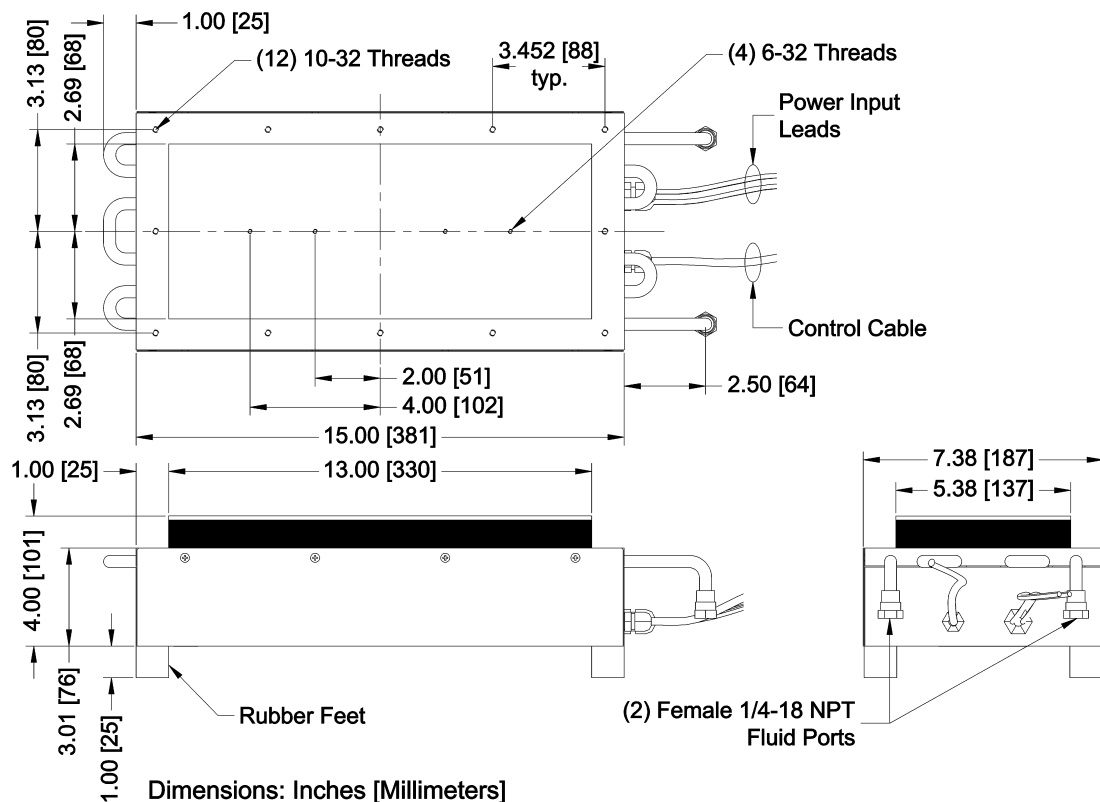
† Unit is set for 5-32 VDC external signal, H-Bridge quad relay(s) included  
For stainless steel fluid path contact TECA

**LHP-1200CP****ENVIRONMENTS**

Bench Top, Factory, Industrial, OEM  
from harsh to benign environments

**COOLING CAPACITY**

260 Watts @ 0 °C ΔT

**DIMENSIONS**

# LHP-800CP LHP-300CP LHP-150CP

Liquid Cooled

## Cold Plates

General Purpose VDC Input

40 Watts, 82 Watts, 205 Watts



LHP-800CP



LHP-300CP



LHP-150CP

### FEATURES

- No moving parts
- Direct contact cooling as much as 61 °C below liquid temperature
- No compressor, fluorocarbons or filters
- Virtually maintenance-free operation
- Mounts in any orientation

### INCLUDES

- Compression fittings
- Auxiliary mounting holes
- Machined cold plate surfaces

### SPECIFICATIONS LHP-800CP

MODEL	PART NUMBER	NOTES	PERFORMANCE RATING BTU/HR	VOLTAGE VDC	CURRENT AMPS.	WEIGHT LBS. (KG)	MIN FLOW GPM	OPERATING AMBIENT °C	HEAT VOLTAGE
LHP-800CP	3-5095-0-000	Heat/Cool *	700-830	24	14	5.2 (2.3)	0.3	0/+70	24 VDC
LHP-800CPHC	3-5095-1-000	Heat/Cool **	700-830	24	14	5.2 (2.3)	0.3	0/+70	24 VDC

\* Heating via reverse polarity to thermoelectrics

\*\* Heating via embedded resistive heaters in the cold plate

### SPECIFICATIONS LHP-300CP

MODEL	PART NUMBER	NOTES	PERFORMANCE RATING BTU/HR	VOLTAGE VDC	CURRENT AMPS.	WEIGHT LBS. (KG)	MIN FLOW GPM	OPERATING AMBIENT °C	HEAT VOLTAGE
LHP-300CP	3-7098-0-000	Heat/Cool *	280-335	12/24	12/6	1.8 (.81)	0.2	0/+70	12/24 VDC
LHP-300CPHC	3-7095-1-000	Heat/Cool **	280-335	24	6	1.8 (.81)	0.2	0/+70	24 VDC

\* Heating via reverse polarity to thermoelectrics

\*\* Heating via embedded resistive heaters in the cold plate

### SPECIFICATIONS LHP-150CP

MODEL	PART NUMBER	NOTES	PERFORMANCE RATING BTU/HR	VOLTAGE VDC	CURRENT AMPS.	WEIGHT LBS. (KG)	MIN FLOW GPM	OPERATING AMBIENT °C	HEAT VOLTAGE
LHP-150CP	3-8094-0-000	Heat/Cool *	130-160	12	4.5	.75(.34)	0.2	0/+70	12 VDC
LHP-150CPHC	3-8094-1-000	Heat/Cool **	130-160	12	4.5	.75(.34)	0.2	0/+70	12 VDC
LHP-150CPHC	3-8099-1-000	Heat/Cool **	130-160	12	4.5	.75(.34)	0.2	0/+70	120 VAC

\* Heating via reverse polarity to thermoelectrics

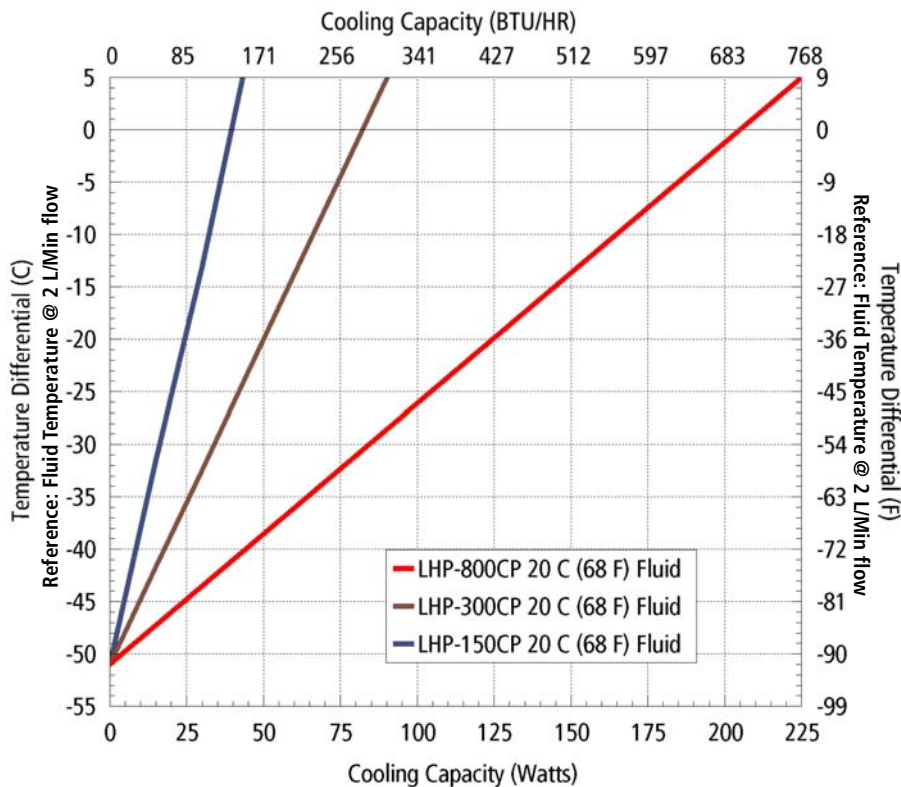
\*\* Heating via embedded resistive heaters in the cold plate

Note: Option for temperature control, consult factory.

See also , "Power Supplies"



## PERFORMANCE CURVE



Cold Plate - Liquid Cooled

## LHP-800CP

COOLING CAPACITY

205 Watts @ 0 °C ΔT

## LHP-300CP

COOLING CAPACITY

82 Watts @ 0 °C ΔT

## LHP-150CP

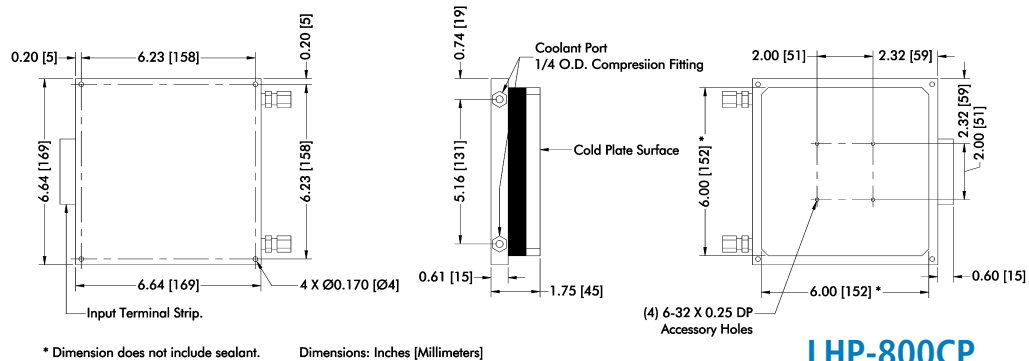
COOLING CAPACITY

40 Watts @ 0 °C ΔT

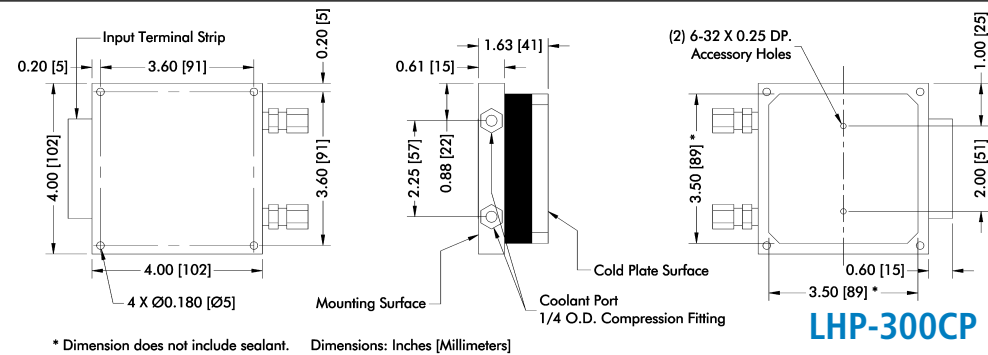
Equation of line:  $y = \Delta T(^{\circ}\text{C})$   $x = \text{Capacity (Watts)}$

Fluid Temp	20°	40°C	60°C
LHP-800CP	$y = .25x - 51.0$	$y = .25x - 56.0$	$y = .25x - 61.0$
LHP-300CP	$y = .62x - 51.0$	$y = .62x - 56.0$	$y = .62x - 61.0$
LHP-150CP	$y = 1.3x - 51.0$	$y = 1.3x - 56.0$	$y = 1.3x - 61.0$

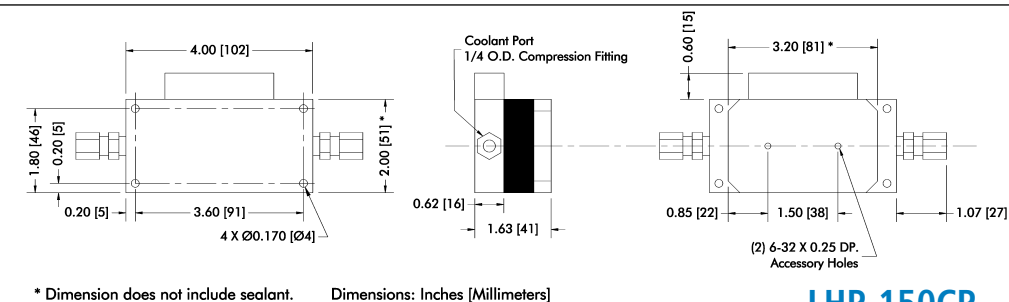
## DIMENSIONS



## LHP-800CP



## LHP-300CP



## LHP-150CP

# 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  $\Omega$  +/- 2% at 25 °C, best for (-20 °C to 30 °C) range
- Thermistor-Z: 10000  $\Omega$  +/- 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:  $\pm 0.2\%$

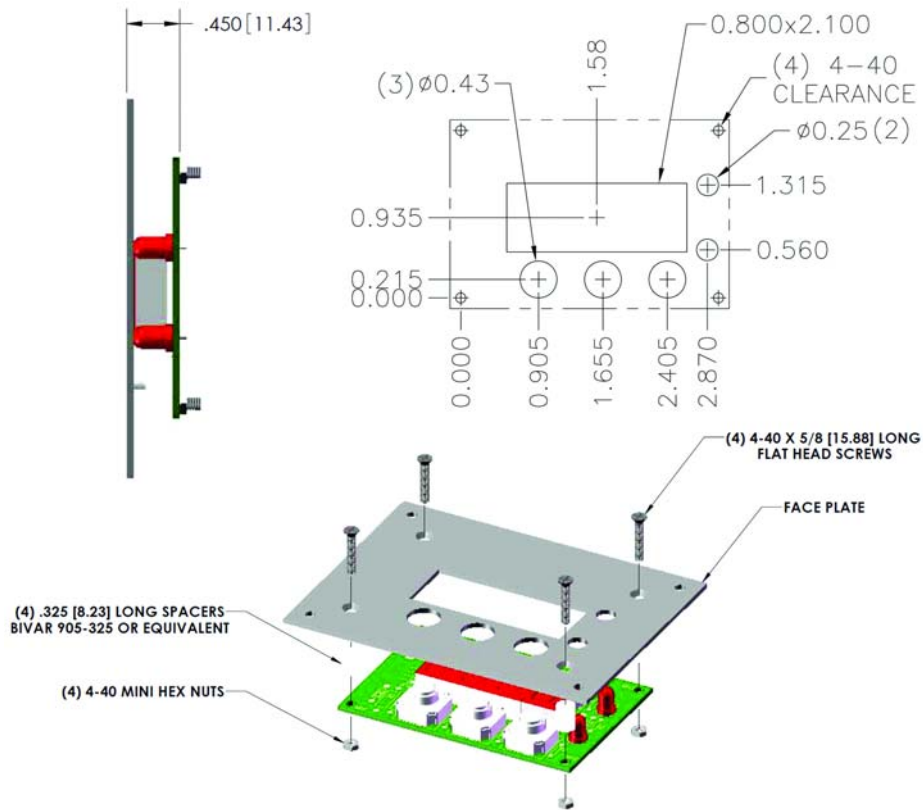
## PART NUMBER AND ORDERING

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

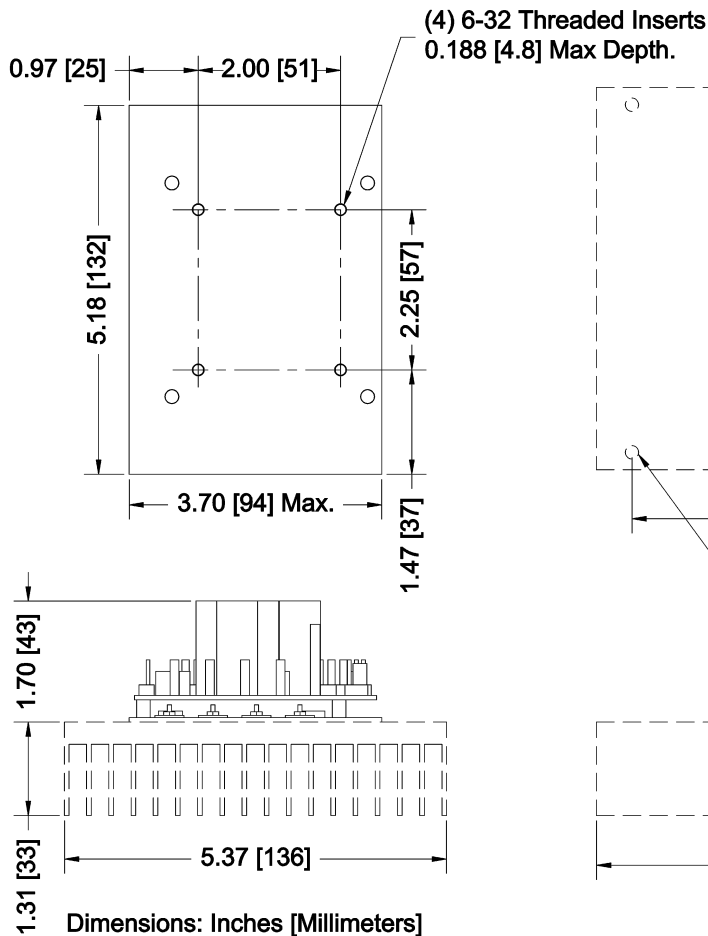
## DISPLAY

## TC-4600

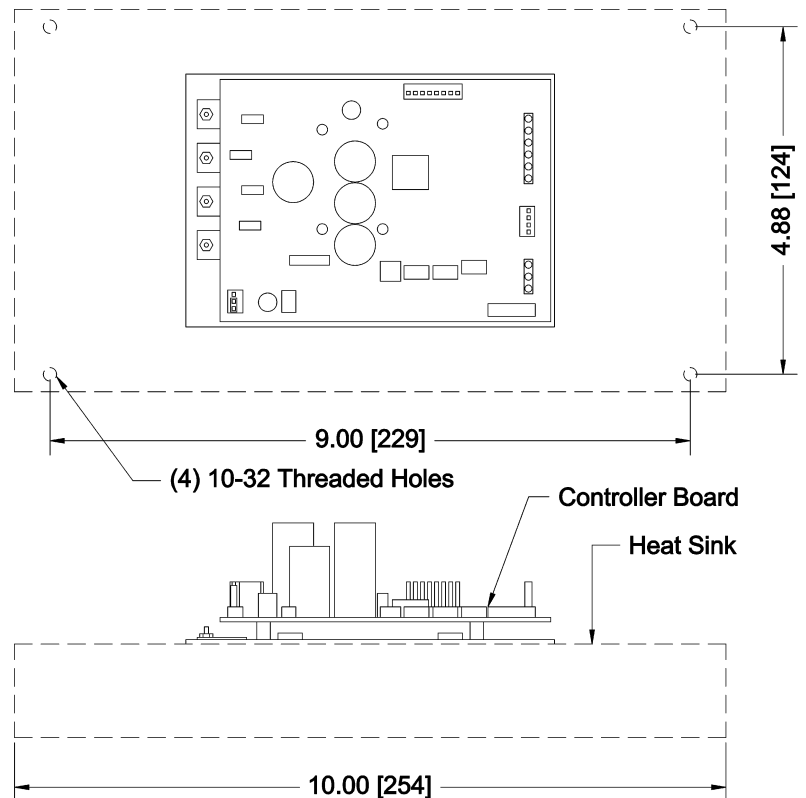


## DIMENSIONS

## 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

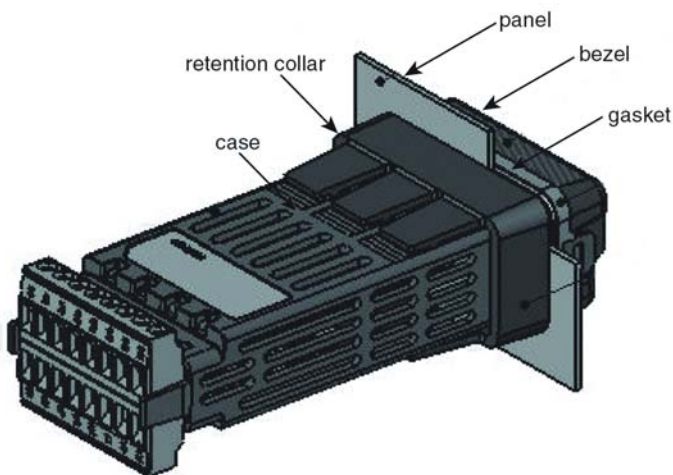
- Reduce service requirement and down time

### 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,  $\pm 5$  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  $\pm 0.1$  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  $-50^\circ\text{C}$ ; 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  $540^\circ\text{C}$  ( $1000^\circ\text{F}$ ) 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  
     $>20\text{M}\Omega$  input impedance  
     $3\mu\text{A}$  open sensor detection  
    Maximum of  $200\Omega$  source resistance
- RTD 2- or 3-wire, platinum,  $100\Omega$  and  $1000\Omega$  @  $0^\circ\text{C}$  calibration to DIN curve ( $0.00385\Omega / \Omega/^\circ\text{C}$ )

### 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
----	---	---	---	---	---	---	---	---	---	---	---

**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**

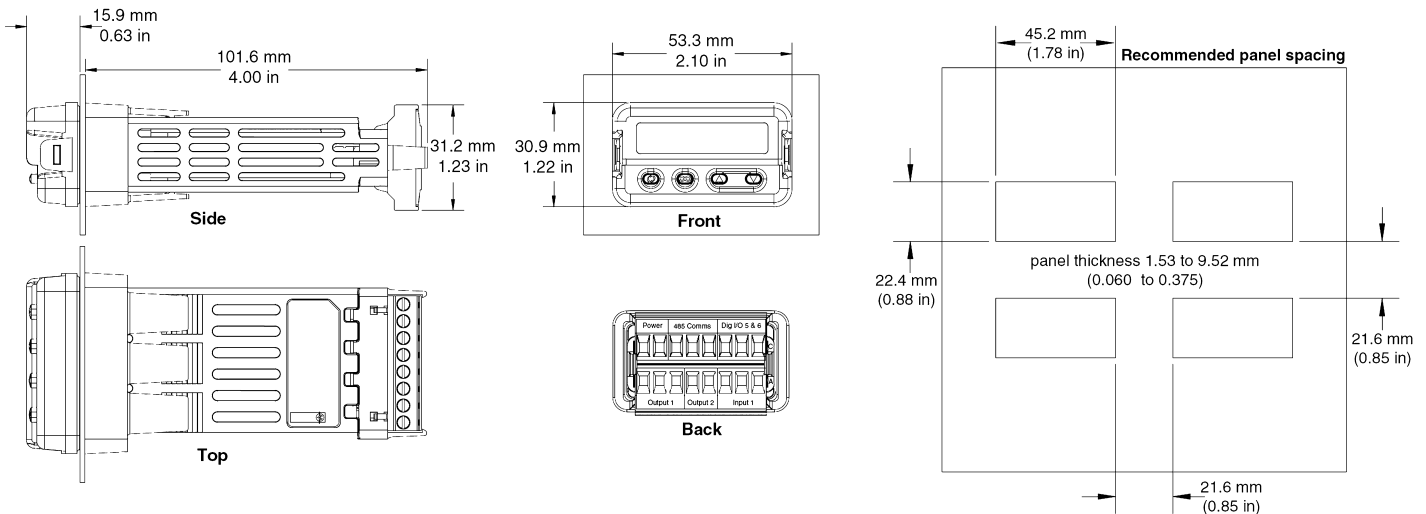
0: None  
 1: 3- Wire RTD - RTD-Probe  
 2: T type thermocouple (ring mount)

**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



# TC-3500 Temperature Controller

PID Temperature Control

## OVERVIEW

The TC-3500 temperature controller series simplifies your temperature control requirements.

This controller reduces system complexity and set up cost. The TC-3500 is a high performance PID temperature controller in space-saving, panel-mount size. RS485 with MODBUS-RTU (JBUS) protocol and IP 65 mounted in panel with gasket suitable for wide range of environments.

For use with reverse polarity AHP-300FFHC, AHP-300XEHC, AHP-300XHC, AHP-150FFHC, AHP-150XEHC.



## SPECIFICATIONS

### Mechanical Data:

- Housing Self-extinguishing plastic, UL 94 V0
- Dimensions 35x78 mm - depth 75,5 mm
- Weight 130 g approx
- Connections 2,5 mm<sup>2</sup> screw terminal block
- Mounting Flush in panel in 29x71 mm hole
- Front panel protection IP 65 mounted in panel with gasket

### Electrical Data:

- Power supply 12...24 VDC +/- 10
- Power consumption 4 VA approx.

### Input Sensor:

- PTC Thermistor (included)

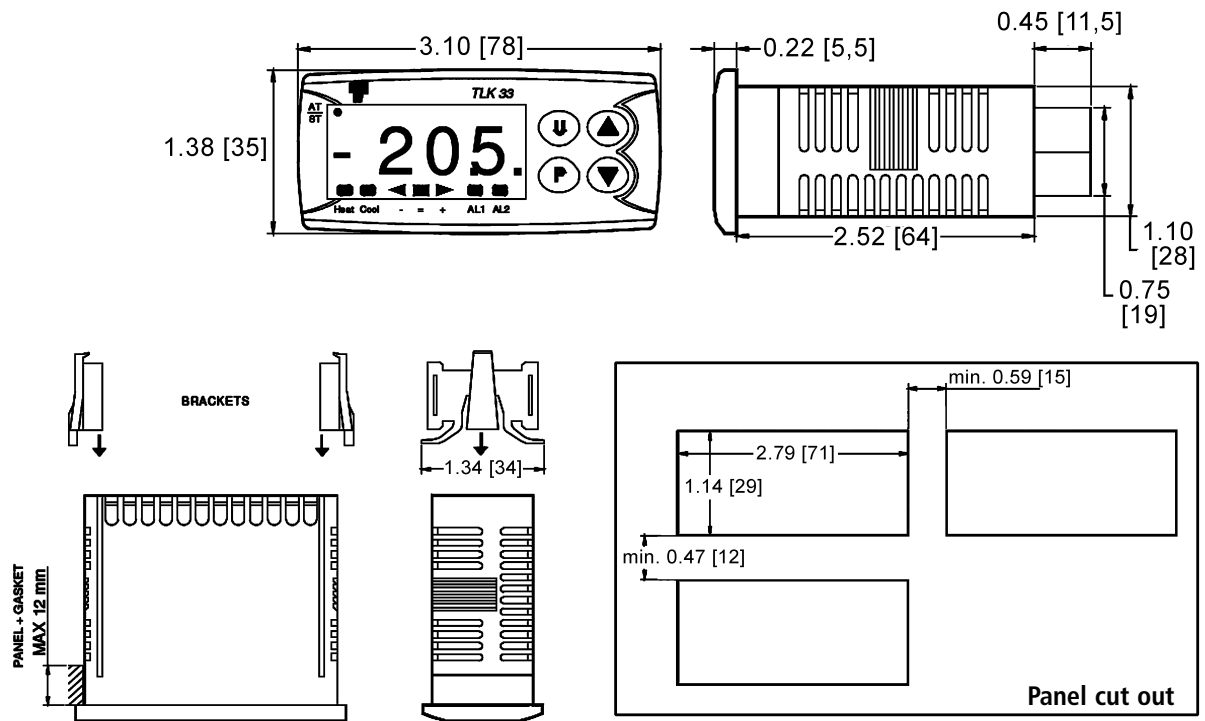
### Functional Data:

- Control PID double action
- PID functions AUTO TUNING FAST, SELF TUNING, FUZZY OVERSHOOT CONTROL

- Multi Set Point Up to 4 programmable Set Points
- Overall accuracy +/-0,5% full scale (TC S : +/- 1% fs)
- Unit of measurement °C / °F, programmable
- Max. cold junction compensation drift 0,1°C/°C with operating temperature 0...50°C after warm-up time of 20 min.
- Sampling rate 8 sample per second
- Serial communication RS485 with MODBUS-RTU (JBUS) protocol
- Communication rate 1200...38400 baud, programmable
- Display 4 red digit h=12 mm
- Parameters access Protected by password
- Operating temperature 0...50°C
- Operating humidity 30...95 RH% without condensation

**PART NUMBER AND ORDERING**

MODEL NUMBER	PART NUMBER	SWITCHING VOLTAGE VDC	SWITCHING CURRENT AMPS (MAX.)	COMMUNICATIONS
TC-3500	35-44S-30-000	12/24	7	None
TC-3500	35-44S-32-000	12/24	7	RS-485

**DIMENSIONS AND CUTOUT**

Dimensions: Inches [Millimeters]

# Power Temperature Controllers

## TC-1F POWER TEMPERATURE SWITCHES

Models TC-1F power temperature controller, with small tolerance and reset differential, are the simplest and most cost effective way to control a cooling or heating device (VAC or VDC) without a need for a relay. For circuits that have higher current draw simply use them in conjunction with a solid state relay.

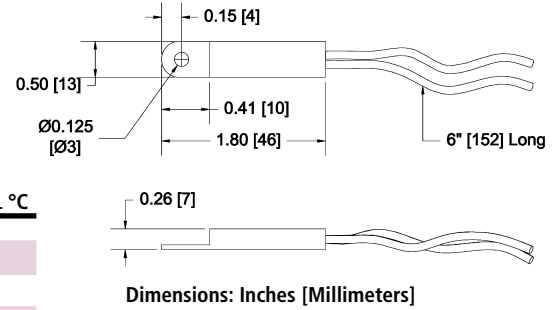
### Part Numbers:

Mode	Part Number	Note
Cool	TC-1C-XX	switch closes on temperature rise
Heat	TC-1H-XX	switch closes on temperature drop

XX: Specify temperatures 20 °C, 25 °C, 30 °C, 35 °C for cool mode and 10°C, 15 °C for heat mode

Example: TC-1C-20 and TC-1H-10

VOLTAGE	CURRENT AMPS	SET POINT TOLERANCE °C	RESET DIFFERENTIAL °C
125 VAC	2	+/- 3	3 - 6
250 VAC	1.3	+/- 3	3 - 6
12 VDC	2	+/- 3	3 - 6
24 VDC	1.3	+/- 3	3 - 6



## TC-4F COOL ONLY WITH ECO-MODE

Model TC-4F is similar to TC-1F plus it has a 2nd power switch for heat exchanger mode (ECO-Mode). The active cool set point for TC-4F is 35 °C and for heat exchanger mode (ECO-Mode) is 25 °C.

MODEL NUMBER	PART NUMBER	NOTES	HX TEMP. °C	COOL TEMP. °C	RESET (MAX) °C	RESET (TYP) °C	OPERATING VOLTAGE	SWITCHING VOLTAGE	ACTIVE MODE SWITCHING CURRENT	ECO-MODE SWITCHING CURRENT
TC-4F-DC	4F-24G-00-000	24 VDC	25 +/- 3	35 +/- 3	6.5	3	24 VDC	24 VDC	.02 - 20 ADC	1.3 ADC

## TC-6F COOL ONLY

Model TC-6F (Cool Only) thermostat is designed using two temperature power switches in conjunction with a solid state relay. A three position switch is provided to adjust temperature settings.

MODEL NUMBER	PART NUMBER	NOTES	TEMP @ T1 °C	TEMP @ T2 °C	T1-T2 (MAX) °C	RESET (TYP) °C	RESET °C	TEMP @ T3	OPERATING VOLTAGE	SWITCHING VOLTAGE	SWITCHING CURRENT
TC-6F	6F-00A-00-000	No Relay	35 +/- 5	25 +/- 5	10 +/- 3	6.5	3	Continuous On	NA	NA	NA
TC-6F-AC	6F-03T-00-000	VAC Version	35 +/- 5	25 +/- 5	10 +/- 3	6.5	3	Continuous On	85-250 VAC	24-280 VAC	10
TC-6F-DC	6F-43D-00-000	12/24 VDC	35 +/- 5	25 +/- 5	10 +/- 3	6.5	3	Continuous On	12/24 VDC	0-100 VDC	.02-20 ADC
TC-6F-DC	6F-33D-00-000	48 VDC	35 +/- 5	25 +/- 5	10 +/- 3	6.5	3	Continuous On	48 VDC	0-100 VDC	.02-20 ADC

## TC-3F HEAT AND COOL

Model TC-3F (Heat/Cool) thermostat incorporates the same technology as the TC-6F. It contains a single setting each for both heating and cooling as referenced below:

MODEL NUMBER	PART NUMBER	NOTES	COOL TEMP. °C	HEAT TEMP. °C	RESET (MAX) °C	RESET (TYP) °C	OPERATING VOLTAGE	SWITCHING VOLTAGE	SWITCHING CURRENT
TC-3F-AC	3F-04R-00-000	VAC Version	35 +/- 5	15 +/- 5	6.5	3	85-280 VAC	24-280 VAC	10 AMPS
TC-3F-DC	3F-44G-00-000	12/24 VDC	35 +/- 5	15 +/- 5	6.5	3	3.5-32 VDC	0-100 VDC	.02 - 20 ADC
TC-3F-DC*	3F-44P-00-000	12/24 VDC	35 +/- 5	15 +/- 5	6.5	3	3.5-32 VDC	0-100 VDC	.02 - 20 ADC

\* H-Bridge relays included

## TC-7F HEAT/COOL WITH ECO-MODE

Model TC-7F (Heat/Cool) thermostat incorporates the same technology as the TC-3F. It contains a single setting each for both heating and cooling and a heat exchanger mode (ECO-Mode).

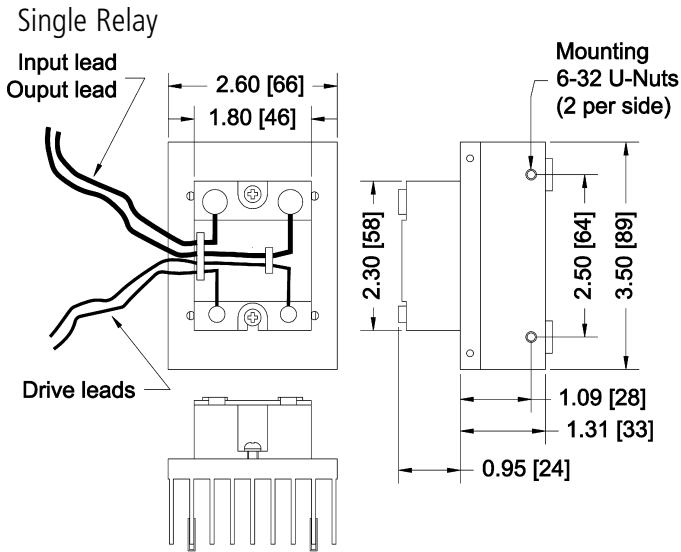
MODEL NUMBER	PART NUMBER	NOTES	COOL TEMP. °C	HX TEMP. °C	HEAT TEMP. °C	RESET (MAX) °C	RESET (TYP) °C	OPERATING VOLTAGE	SWITCHING VOLTAGE	SWITCHING CURRENT
TC-7F-DC	7F-24G-00-000	24 VDC	35 +/- 3	25 +/- 3	10 +/- 3	6.5	3	24 VDC	24 VDC	.02 - 20 ADC

H-Bridge relays included

For custom variations of any of the controls, contact TECA.



## SINGLE RELAY



## RELAYS

Relays

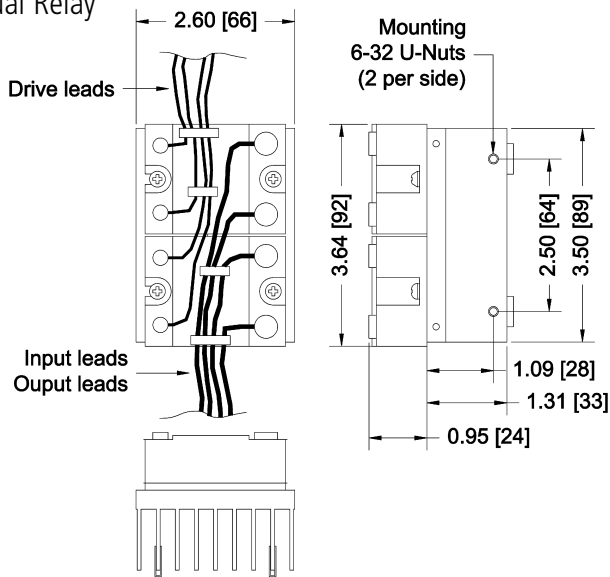
H-Bridges

## 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

## Dual Relay



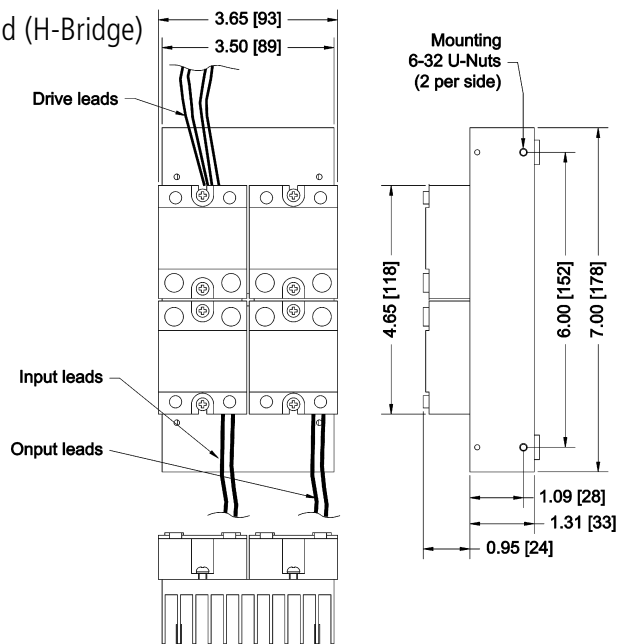
## DESCRIPTION

## (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

## Quad (H-Bridge)



## 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

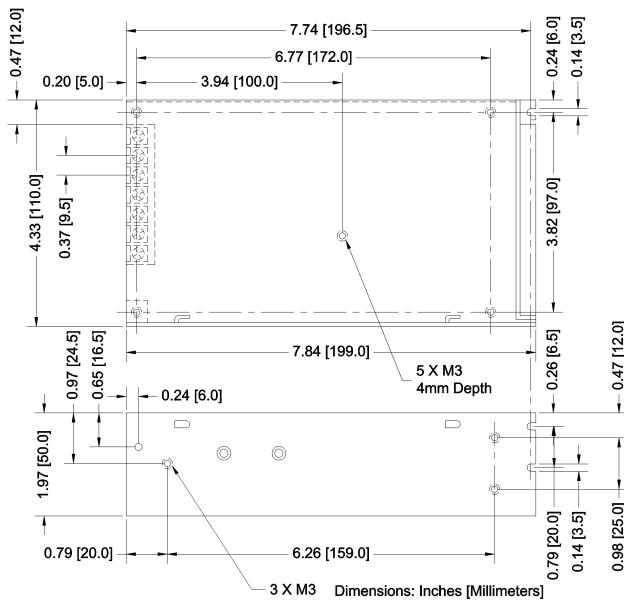
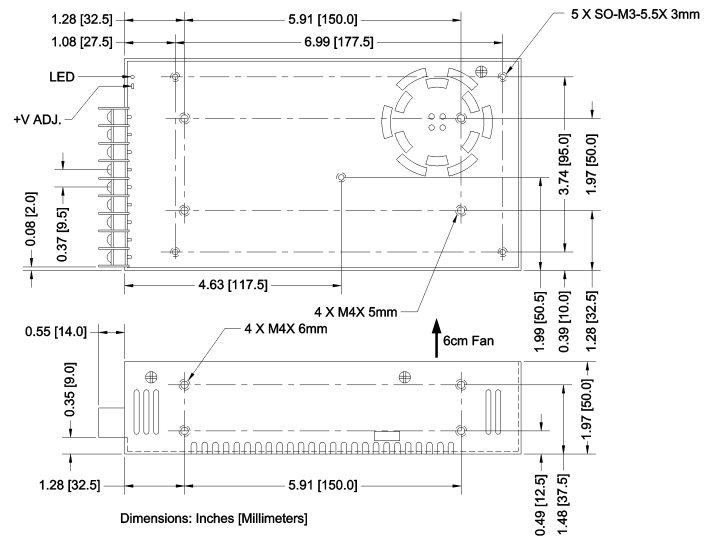
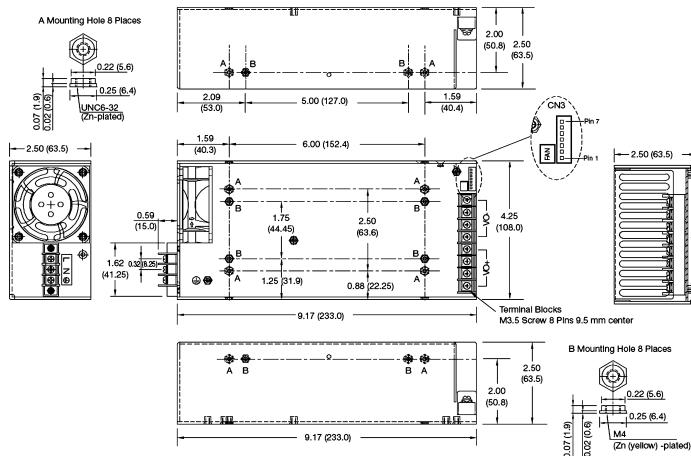
## SENSORS, CABLES, ADAPTERS

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