



**SPRING 2000 EDITION
SOLID STATE COOLING**

Leadership

Teca pioneered the market of solid-state air conditioners for electronic enclosures. Products are available for harsh environments such as NEMA-4X as well as hazardous locations such as (Class 1, Division 2). We offer a full line of cooling products, from liquid cooled air conditioners, to cold plates and liquid chillers.

Design Solutions

We have met the needs of the Original Equipment Market by offering complete engineering services, prototype development and custom built cooling equipment through an exclusive and confidential basis.



Quality Mission

The fundamental purpose of TECA is to provide world-class products of superior quality. It is our goal to continually monitor and improve our operations to meet and exceed our customer needs. Quality is top priority- Suppliers are a direct link and partner in the total quality team. Their contribution will be measured and controlled to ensure on time deliveries and first time acceptance. We are "TEAM TECA." We recognize that our success depends on the involvement, commitment, and performance of each team member. 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 and the environment we live in.

Whatever your application—we can fulfill all of your cooling requirements. Our engineers may have already developed a similar solution.

Together, we will design and build a quality system that sets the standard in thermoelectric cooling. Call us at 888-TECA-USA and we'll take it from there!

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Call us toll free at 888-TECA-USA (832-2872)

ThermoElectric Cooling America Corporation • 4048 W. Schubert Ave. • Chicago IL (USA) 60639
Phone: 773-342-4900 Fax: 773-342-0191 • www.thermoelectric.com • teca@thermoelectric.com

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SOLID STATE AIR CONDITIONERS

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(Thru Mount Air Conditioners for Nema-4X, Indoor/Outdoor Enclosures)	
XP Series	23-25
(Thru Mount Air Conditioners for Class 1, Div 2 Hazardous Duty)	
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(Liquid Cooled Air Conditioners for Nema-12, Indoor Enclosures)	

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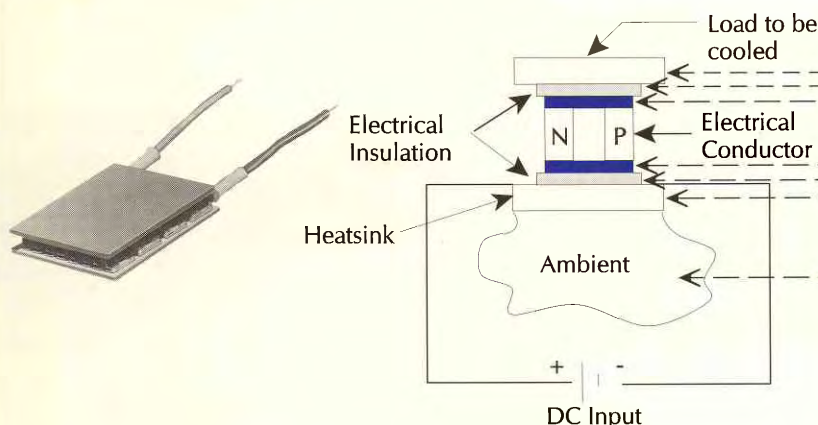
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Sizing Software Available



Theory of Operation

Thermoelectric cooling, or as it is sometimes called, "The Peltier Effect," is a phenomenon discovered by a French watchmaker during the early 19th century. It is described as a solid-state method of heat transfer generated primarily through the use of dissimilar semiconductor materials. To understand the cooling method, it is first necessary to know how thermoelectric cooling systems differ from their conventional refrigeration counterparts. Like conventional refrigeration, thermoelectrics obey the basic laws of thermodynamics. Both in result and principle, then, thermoelectric cooling has much in common with conventional refrigeration methods - only the actual system for cooling is different.

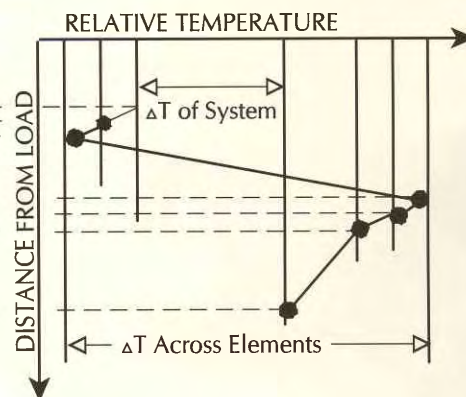


Perhaps the best way to show the differences in the two refrigeration methods is to describe the systems themselves. In a conventional refrigeration system, the main working parts are the evaporator, condenser, and compressor. The evaporator surface is where liquid refrigerant boils, changes to vapor and absorbs heat energy. The compressor circulates the refrigerant and applies enough pressure to increase the temperature above ambient level. The condenser helps discharge the absorbed heat into the ambient air.

In thermoelectric refrigeration, essentially nothing has changed. The refrigerant in both liquid and vapor form is replaced by two dissimilar conductors. The cold junction (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 compressor is replaced by a DC power source which pumps the electrons from one semiconductor to another.

A heat sink replaces the conventional condenser fins, discharging the accumulated heat energy from the system.

The difference between the two refrigeration methods, then, is that a thermoelectric cooling system refrigerates without use of mechanical devices, except perhaps in the auxiliary sense, and without refrigerant. The semiconductor materials are N and P type, and are so named because either they have more electrons than necessary to complete a perfect molecular lattice structure



(N-type) or not enough electrons to complete a lattice structure (P-type). The extra electrons in the N-type material and the holes left in the P-type material are called "carriers" and they are the agents that move the heat energy from the cold to the hot junction.

Thermoelectrics:

Semiconductor materials with dissimilar characteristics are connected electrically in series and thermally in parallel, so that two junctions are created.

Heat absorbed at the cold junction is pumped to the hot junction at a rate proportional to carrier current passing through the circuit and the number of couples. Good thermoelectric materials such as bismuth telluride greatly impede conventional heat conduction from hot to cold areas, yet provide an easy flow for the carriers. In addition, these materials have carriers with a capacity for carrying more heat.

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CONDENSATION

Condensation may form on the cold side fins when the surface temperature goes below the dew point temperature. To reduce or transfer condensate to the outside of the enclosure consider the following:

- Match the cooling capacity with the internal load to avoid the condition
- Keep enclosure closed and sealed from outside humidity
- Employ condensate removal system or drip pans
- Regulate the fin temperature above the dew point
- Use desiccant (moisture absorbing granules)

All FHP-Series and AHP-1400 Series Air Conditioners contain a condensate removal system. The system consists of an antifungal sponge with a condensate wick. PVC tubing is also provided for drainage. The wick should extend below the cooling assembly to allow for a gravity feed.

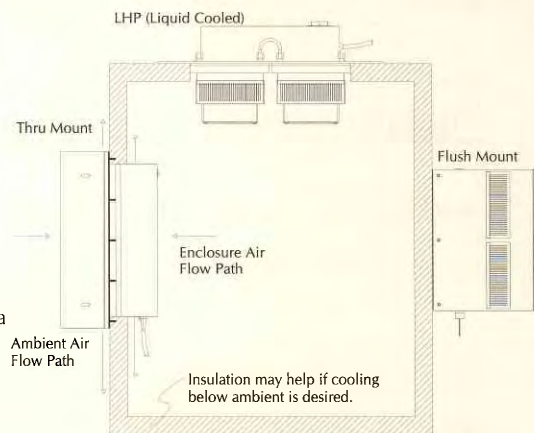
MOUNTING CONSIDERATIONS

VERTICAL (Side, Front, Back) Mounting:

This mounting orientation is recommended for applications with high humidity or incomplete cabinet seals. Condensation can be removed from moisture collection systems (standard on FHP-units and AHP-1400) or a drip pan positioned below the cold side fins. Drip pans may be available for selected thru mount units.

HORIZONTAL (Top) Mounting:

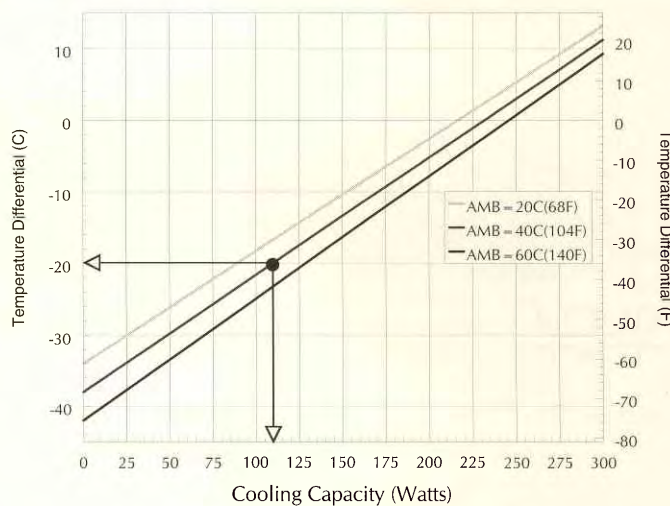
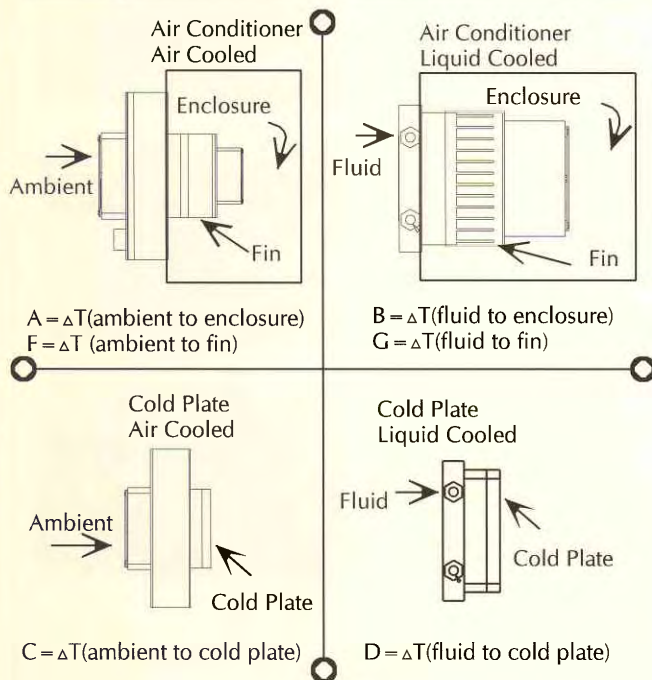
It is difficult to collect condensation in this orientation due to the fin orientation and gravity. If a drip pan is employed by the end user, use caution to place the pan far enough away from the internal fan to minimize the restriction of air flow. The pan should cover the fin ends as well as the fan area. When there is a choice, side orientation is preferred by most users in high humidity environments.



Example: Air Cooled Air Conditioner

USING PERFORMANCE CURVES

STEP	DETERMINE	EXAMPLE:
1	Choose the curve that best approximates your maximum ambient (external) air temperature	+40°C Center Curve
2	Determine ΔT (temperature differential): Max. allowable internal temperature- Max. ambient temperature	$\Delta T = -20^\circ\text{C}$
3	Capacity at required ΔT : Please Note (1 Watt = 3.414 Btu/Hr)	110 Watts



	Amb = 20°C	Amb = 40°C	Amb = 60°C
Air Equation	$A = .158x - 34$	$A = .165x - 38$	$A = .171x - 42$
Fin Equation	$F = .134x - 34$	$F = .141x - 38$	$F = .146x - 42$

$$A = \Delta T(^{\circ}\text{C}) \text{ Enc-Amb}, \quad x = \text{Capacity (Watts)}, \quad F = \Delta T(^{\circ}\text{C}) \text{ Fin-Amb}$$

RELIABILITY/M.T.B.F.

The life expectancy of a thermoelectric device is exceptionally high due to its solid state construction. Service life is typically in excess of five (5) years under normal conditions.

For individual T.E. Modules MTBF's on the order of 200,000 to 300,000 hours at room temperatures and 100,000 hours at elevated ambients of 80°C have been calculated.

DESIGN ENVIRONMENTS: (NEMA, Mil-Std, NEC, UL/CSA)

NEMA Type (National Enclosure Manufacturing Association)

Source: NEMA Publication No. 250, Part 1, Page 1

- Nema-12 Type 12 enclosures are intended for indoor use primarily to provide a degree of protection against dust, falling dirt, and dripping noncorrosive liquids.
- Nema-4X Type 4X enclosures are intended for indoor and outdoor use primarily to provide a degree of protection against corrosion, windblown dust and rain, splashing water, and hose-directed water.

Military Standards

- Mil-Std 810
- Corrosion:** (Salt Fog Testing) Method 509.2, 168 Hours, *Employed for all Nema-4X units*
- Vibration:** Method 514.3, 2 hours, x,y,z axis 8.9 G's, 10-2000 Hz with a magnitude of 0.04 G²/Hz, *Employed for all XM- Versions, Standard models are designed to withstand 2.2 G's.*
- Shock:** Method 516.2, with 30 G's peak amplitude, 11ms pulse duration, half-sine waveform, and three (3) shocks in each direction along three (3) mutually orthogonal axes, *Employed for all XM- Versions*

NEC (National Electrical Code)

Source NEC 1993, Article 500, 70-466 to 70-471

- CID2 Class 1, Division 2 (**Hazardous Environments**) A Class I, Division 2 location is a location (1) in which volatile flammable liquids or flammable gases are handled, processed, or used, but in which the liquids, vapors, or gases will normally be confined within closed containers or closed systems from which they can escape only in case of accidental rupture or breakdown of such containers or systems, or in case of abnormal operation of equipment; or (2) in which ignitable concentrations of gases or vapors are normally prevented by positive mechanical ventilation, and which might become hazardous through failure or abnormal operation of the ventilating equipment; or (3) that is adjacent to a Class I, Division 1 location, and to which ignitable concentrations of gases or vapors might occasionally be communicated unless such communication is prevented by adequate positive-pressure ventilation from a source of clean air, and effective safeguards against ventilation failure are provided.

- Groups (A-D) Atmospheres containing the following: acetylene, hydrogen, fuel and combustible process gases containing more than 30% hydrogen by volume, or gases or vapors of equivalent hazard such as butadiene, ethylene oxide, propylene oxide, acrolein, ethyl ether, ethylene, or gases or vapors of equivalent hazard, acetone, ammonia, benzene, butane cyclopropane, ethanol, gasoline, hexane, methanol, methane, natural gas, naphtha, propane, or gases or vapors of equivalent hazard.

Applies to XP Series Models

UL/CSA (Underwriters Laboratory/ Canadian Standards Association)

- UL-1604 Hazardous duty operation, Class I and II Division 2, Class III Div 1 and 2, Tested thru ETL and ETLc Testing Laboratories, Report # 532015

Applies to XP Series Models

- UL-1995/CSA 22.2 Heating & Cooling Equipment, Categories 169 & 294, No. 236-M90 Tested thru ETL and ETLc Testing Laboratories, Report # 532015

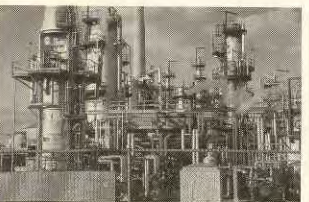
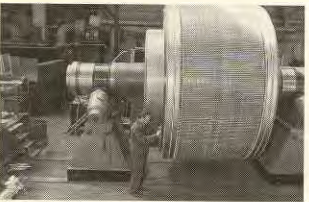
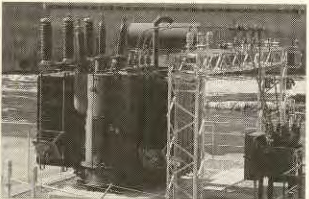
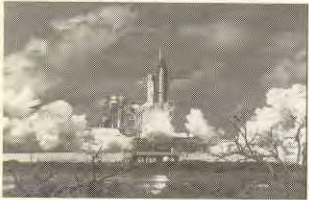
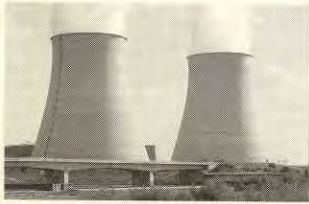
Refer to individual data sheets for applicable models

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Where are thermoelectric coolers used?



Thermoelectric coolers can be used in a wide variety of applications. They can be custom configured to meet a number of design requirements including:

- Input (Voltage/Frequency)
- Size and Packaging Constraints
- Finish
- Capacity & Temperature Regulation

Here is a short list of applications of thermoelectric units.

Medical/Laboratory:

Blood Coagulators
Blood Analyzers
Bottle/Sample Coolers
Cold Probes
Microscope Cold Plates
Micro well Cold Plates
Mobile Drug Coolers
Patient body Liquid Chillers
Recirculating Liquid Chillers
Surgical Instrument Coolers
Temperature Baths
Test Tube Coolers

Temperature Control:

Airborne Temperature Chamber
Air Purification Equipment
Calibration Test Jig
Climate Control for Display Cases
Cooling Air Stream
Constant Temperature Chamber
Disc Drive Testing
Environmental Chamber
Fiber Optic Thermometer
Heat/Cool Protein Samples
Hydroponic Greenhouse
Integrated Circuit Test Chamber
Low Volume Adhesive
Ozone Generator
Perma Frost Display
Temperature Baths
Thermal Diffusion Chamber

Refrigeration/Consumer:

Aircraft Refrigerators
Aircraft Water Coolers
Aquarium Coolers
Cream Coolers
Dispenser
Display Cabinets
Ice Cube Makers
Mobile Refrigerators
Photo developing solution coolers
Picnic Coolers
Restaurant service-stand coolers
Water Coolers

Electronic Components:

Air-Conditioning
AC/DC Drives
Accelerometer
Airport LCD Display
Amplifiers
Bar Code Scanners
Battery Chargers
Bridge Cranes
Calorimeter
Camera Housing
Charged Coupling
Cold Traps for vacuum chambers
Crystals
Discrete silicon components
CNC Equipment
Control Equipment
Crane, radio control inverter
CRT
Deep Sea Fiber Optics
Digital Timer
Digitizing Scope
Electronic Enclosure
Electronic Scale
Electronic Boards
Elevator Equipment
Etch Baths
Flight Simulators
Food Processing Equipment
Gas Sample Analyzer
Heat Exchanger Evaporator
IC's
Inertial Guidance Systems
Infrared Detectors
Laser Diode
Lasers
Lottery Ticket Electronic System
Machine Tools
Mobile Transport Housing
Monitors
Motor Starters
Motor Controls
Motor Drives
Natural Gas Line SAT Terminal
Nuclear Radiation Detectors
Optical Tape Recorder
Optical Lasers
Overhead Crane
Parametric Amplifiers
Personal Computers
Pressure Transducers
Programmable Controllers
Radar Transmitters
Robotic Welding
Robotics
Rocket Transmitters
Satellite Electronics
Shipboard Electronic Equipment
Sub station Modem
Telecommunications Equipment
Telephone Racks
Telescope
U.P.S. (Uninterruptable Power Supply)
Thermal Printers
Touch Screen Displays

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APPLICATIONS

There are many successful users of thermoelectric cooling systems ranging from industrial, food service, hi-tech, military, aerospace to medical, pharmaceutical, and laboratory applications . Here are a few examples you may find helpful...

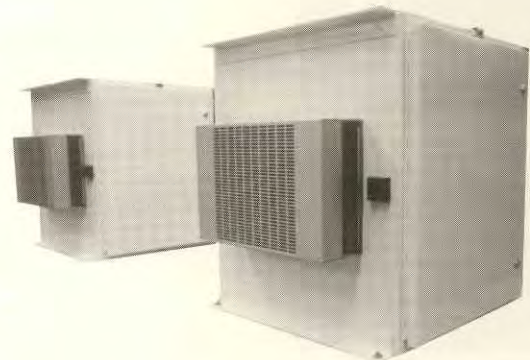
A leading food service equipment manufacturer uses a solid state cooling system to ensure food safety by maintaining proper holding temperature prior to dispensing portion-controlled product servings. *(Photo courtesy of Frymaster)*



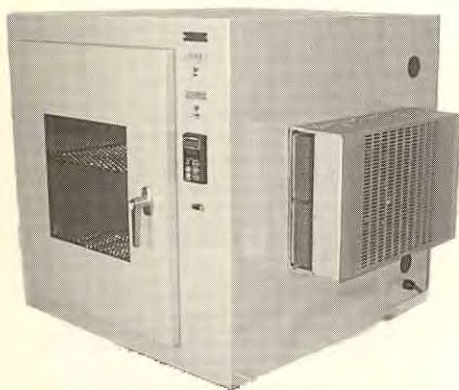
Food Service Galley Refrigerators used in C130 and C141 Military Cargo Planes. *(TECA file photo)*



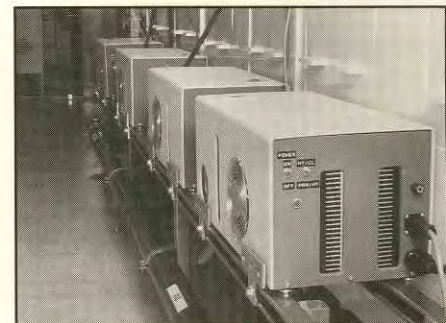
Compact thermoelectric assembly used to cool data recording equipment in a military fighter aircraft. *(Photo rendering courtesy of Metrum-Datatape Inc)*



Outdoor electronics equipment protected with TECA's AHP-1801X (Nema-4X) Assembly and 965 Temperature Controller *(Photo courtesy of Scientific Atlanta/Jet Propulsion Labs)*



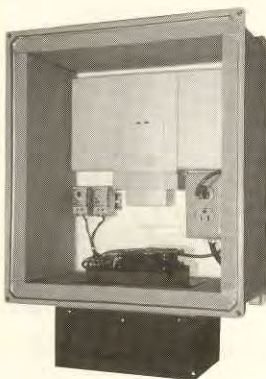
Laboratory heater/cooler assembly used for the determination of the ambient-temperature coefficient of high-accuracy pressure calibration standards. Unit features ramping and soaking control with external communications. *(TECA File Photo)*



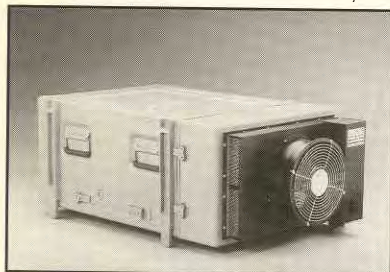
A manufacturer in the semiconductor industry uses a solid state liquid chiller to precisely control fluid temperatures for water jacketed columns and etch baths. *(Photo courtesy of Noah Precision)*



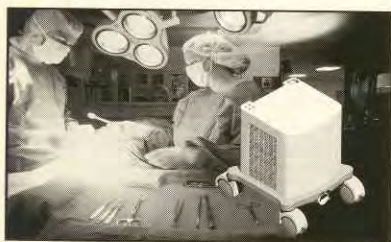
One of the world's leading centers for dairy research uses thermoelectric cold plates with temperature control for tempering fat samples prior to pulsed NMR measurement of solid fat content. *(Photo courtesy of New Zealand Dairy Research Center)*



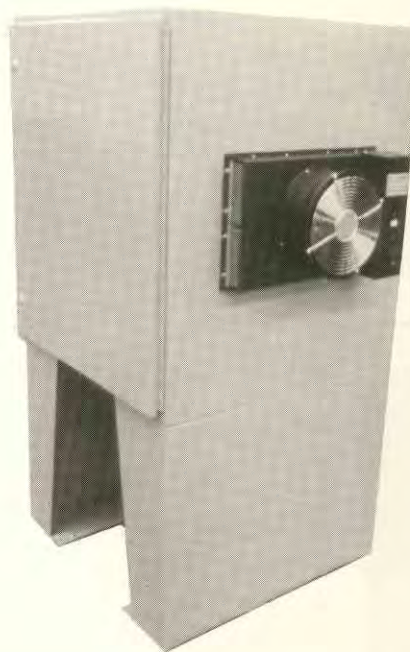
Wireless Base Station Environmental Enclosure features Nortel Companion™ cellular equipment. Designed to protect electronics for outdoor use in environments from -40°F to +120°F. *(Photo courtesy of Northern Touch)*



A manufacturing specialist of transport equipment uses a solid state cooling system to protect electronic equipment from harsh, high stress conditions. *(Photo courtesy of EDAK)*



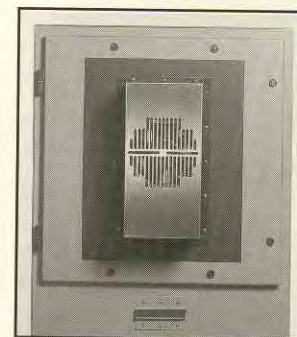
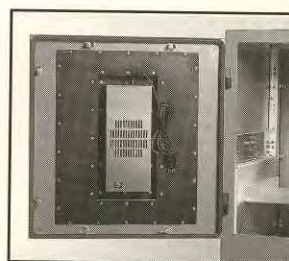
A leading manufacturer in the hospital supply industry uses a solid state liquid chiller for patient body temperature control during surgery. *(TECA File Rendering)*



Cooled enclosure system for ADC Camera Power Supply *(Photo courtesy of N.A.S.A., Langley Research Center)*



R.D.R.U. (Ruggedized Digital Recording Unit), utilizes a thermoelectric heat/cool system for reconnaissance data collection, flight test and evaluation, and automotive test and instrumentation. *(Photo courtesy of VEDA Corporation)*



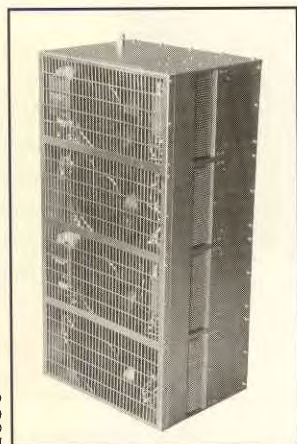
Industrial PC Workstation features thermoelectric cooling for use in automotive, breweries and other harsh industries. *(Photo courtesy of Pro-Tech)*

FHP-Series

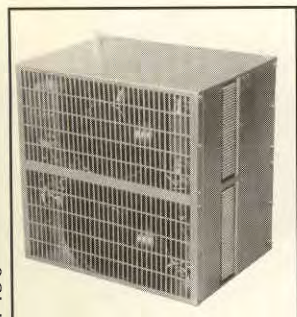
Flush Mount (Nema-12)

RATING: 500-2000 BTU/HR

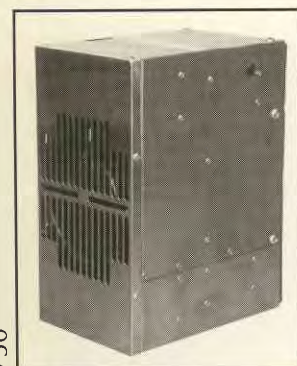
Solid State Air Conditioners



2850



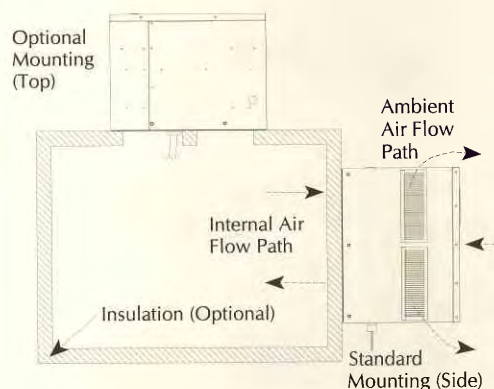
1450



750

- ◆ Flush Mount Design
- ◆ No Filters
- ◆ No Compressor
- ◆ No Piping
- ◆ Low Maintenance
- ◆ High Ambient Operation
- ◆ Compact
- ◆ Lightweight
- ◆ Durable
- ◆ Reliable
- ◆ Easy Installation

Typical Mounting Method



TECA's FHP-series thermoelectric air conditioners are designed to mount on the outside of the enclosure. There is no intrusion within the enclosure allowing for greater design flexibility. A mounting plate is provided for easy installation. Internal fans are supplied to recirculate cool, clean air. An attractive Stainless Steel housing is standard with all FHP-Series units. Thermostatic control and an integral condensate removal system are also included.

The FHP-series is suited for harsh industrial locations such as steel and paper mills, foundry, refinery and other rugged environments.

Typical applications include, machine controls, plc's, drives, motor controls, computers and other sensitive electronic equipment.

Nema-12, ...are intended for indoor use primarily to provide a degree of protection against dust, falling dirt, and dripping non corrosive liquids. (NEMA Pub# 250, Part 1, Page 1)

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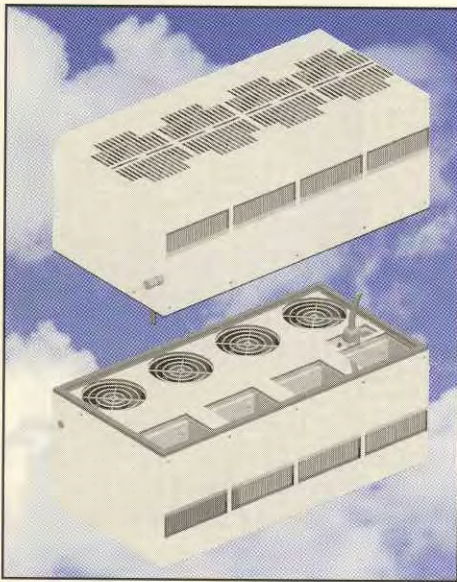
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FHP-2850

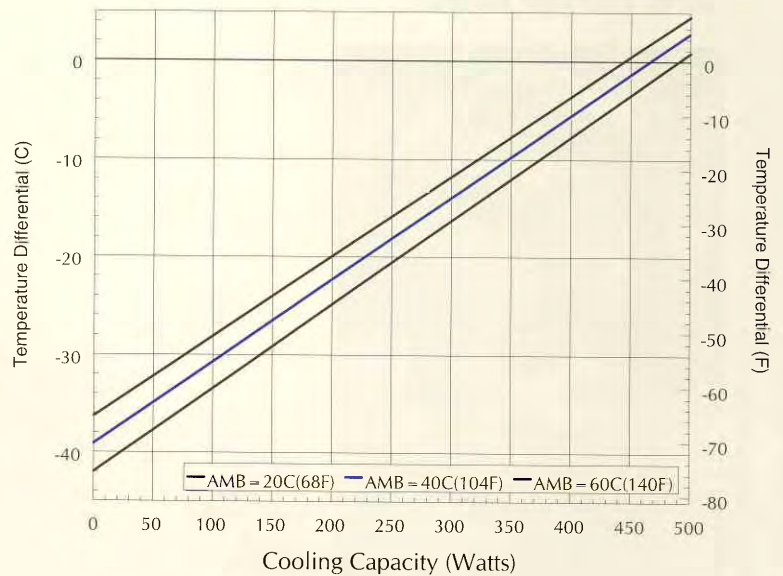
Air Rating: 1500-1700 Btu/Hr
Nema-12 (Flush Mount)

All Products • Made in U.S.A.



Performance:

Curves & Equations
Refer to page 3, for how to use

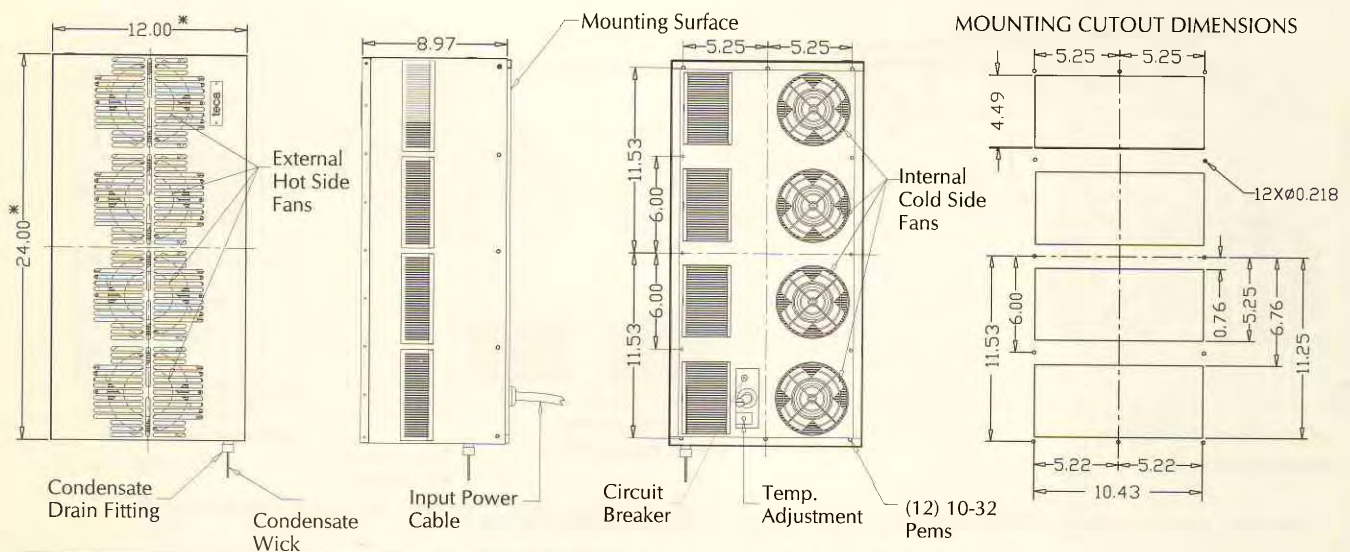


	Amb = 20°C	Amb = 40°C	Amb = 60°C
Air Equation	$A = .081x - 36$	$A = .083x - 39$	$A = .086x - 42$
Fin Equation	$F = .051x - 36$	$F = .052x - 39$	$F = .054x - 42$

$A = \Delta T(^{\circ}\text{C}) \text{ Enc-Amb}$, $x = \text{Capacity (Watts)}$, $F = \Delta T(^{\circ}\text{C}) \text{ Fin-Amb}$

Specifications

Model	FIN RATING 0°ΔT Ambient to Fin (Btu/Hr)	AIR RATING 0°ΔT (Ambient to Air (Btu/Hr)	Voltage (Volts) AC	Current (Amps)	Frequency (Hz)	Weight Lbs (Kg)	Temperature Control Included	Moisture Removal System	Operating Range (°C)
FHP-2852	2400-2650	1500-1700	230	7-8	50/60	70(32)	TC-6F	Included	-10/+70
FHP-2850	2400-2650	1500-1700	115	12.5-13.5	50/60	70(32)	TC-6F	Included	-10/+70



* Dimension does not include hardware. Dimensions: inches, Mounting hardware and gasket not shown

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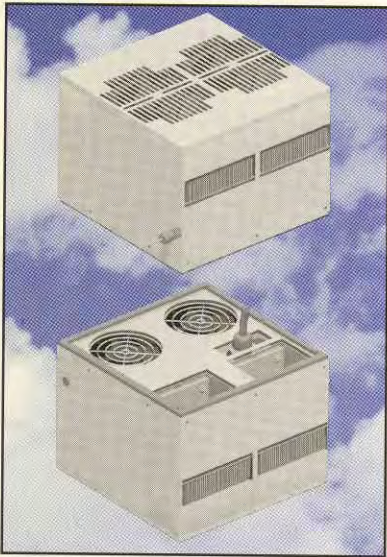
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FHP-1450

Air Rating: 685-850 Btu/Hr
Nema 12 (Flush Mount)

All Products • Made in U.S.A.



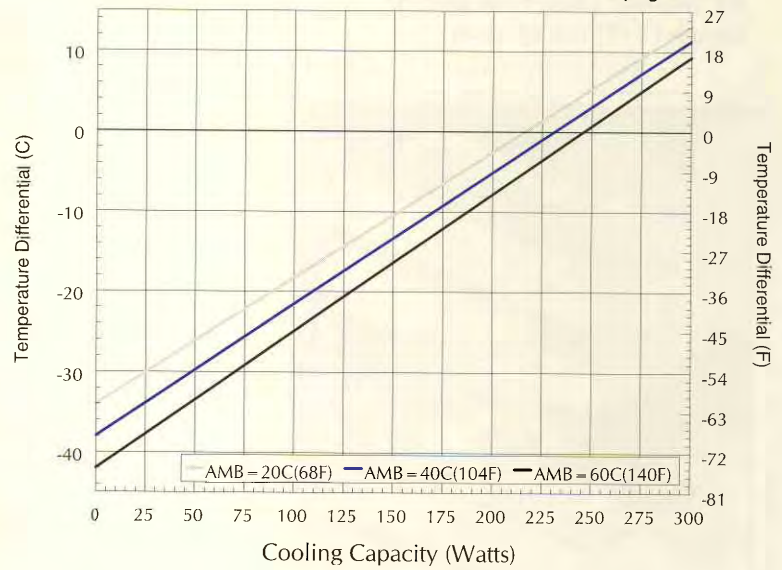
Performance Curves and Equations are available for FHP-1452 Consult Factory.

Performance:

≈10% increase for FHP-1452

FHP-1450 Shown

How to use, refer to page 3



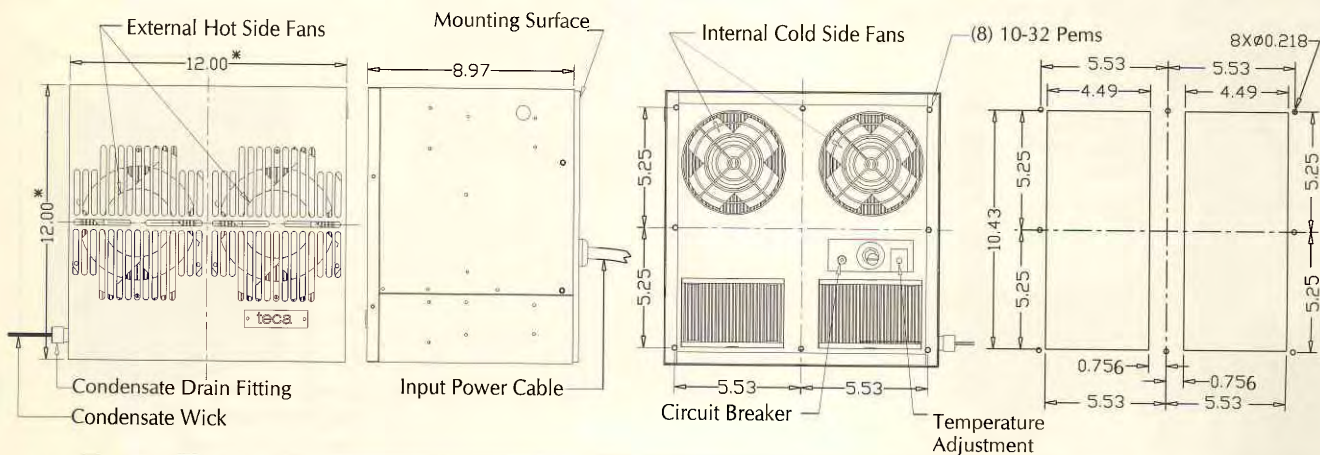
	Amb = 20°C	Amb = 40°C	Amb = 60°C
Air Equation	A = .158x-34	A = .164x-38	A = .170x-42
Fin Equation	F = .099x-34	F = .103x-38	F = .107x-42

A = $\Delta T(^{\circ}\text{C})$ Enc-Amb, x = Capacity (Watts), F = $\Delta T(^{\circ}\text{C})$ Fin-Amb

Specifications

Model	FIN RATING 0°ΔT Ambient to Fin (Btu/Hr)	AIR RATING 0°ΔT Ambient to Air (Btu/Hr)	Voltage (Volts)	Current (Amps)	Frequency (Hz)	Weight Lbs (Kg)	Temperature Control Included	Moisture Removal System	Operating Range (°C)
FHP-1452	1200-1350	850-950	230 AC	6	50/60	36(16)	TC-6F	Included	-10/+70
FHP-1450	950-1025	685-850	115 AC	7.5-9	50/60	36(16)	TC-6F	Included	-10/+70

MOUNTING CUTOUT DIMENSIONS



* Dimension does not include hardware Dimensions: Inches ,Mounting hardware and gasket not shown

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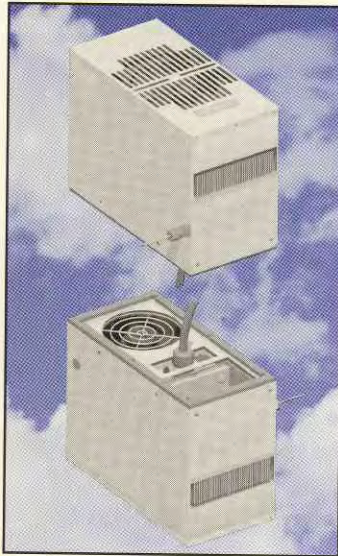
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FHP-750

Air Rating: 450-500 Btu/Hr
Nema-12 (Flush Mount)

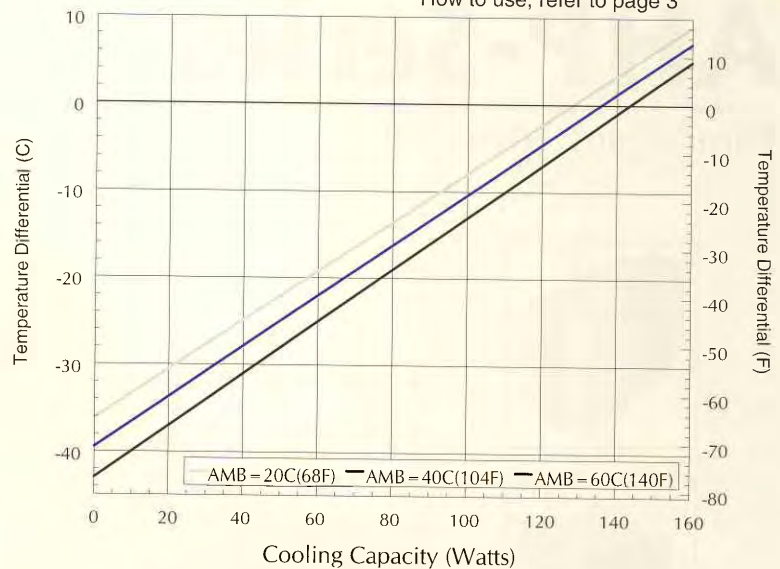
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Performance:

Curves & Equations

How to use, refer to page 3



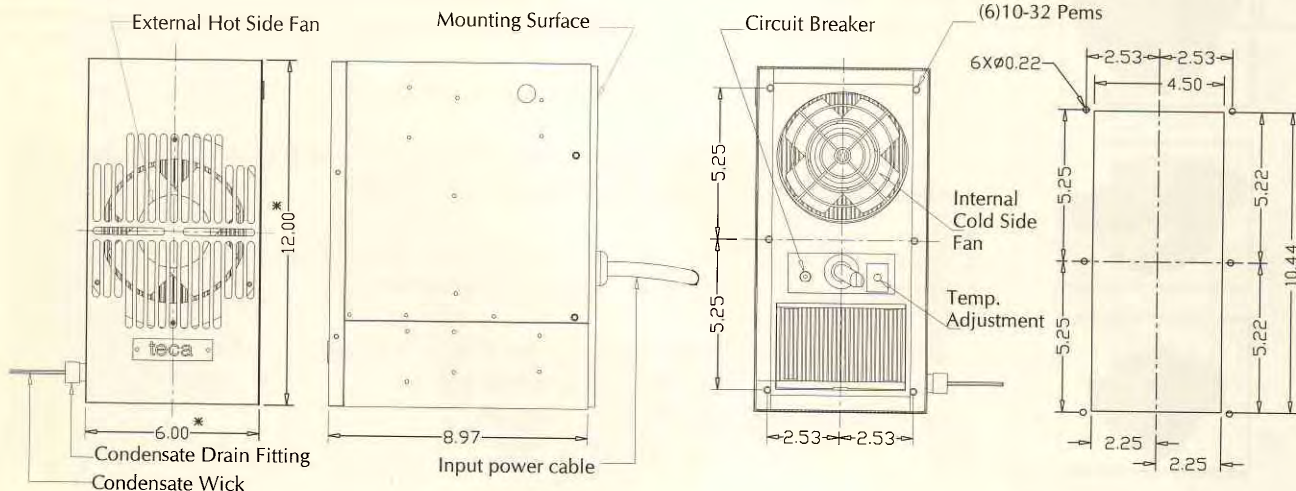
	Amb = 20°C	Amb = 40°C	Amb = 60°C
Air Equation	$A = .277x - 36$	$A = .288x - 39$	$A = .293x - 42$
Fin Equation	$F = .174x - 36$	$F = .181x - 39$	$F = .184x - 42$

$A = \Delta T(^{\circ}\text{C}) \text{ Enc-Amb}$, $x = \text{Capacity (Watts)}$, $F = \Delta T(^{\circ}\text{C}) \text{ Fin-Amb}$

Specifications

Model	FIN RATING $0^{\circ}\Delta T$ Ambient to Fin (Btu/Hr)	AIR RATING $0^{\circ}\Delta T$ Ambient to Air (Btu/Hr)	Voltage (Volts)	Current (Amps)	Frequency (Hz)	Weight Lbs (Kg)	Temperature Control Included	Moisture Removal System	Operating Range ($^{\circ}\text{C}$)
FHP-750	700-785	450-500	115 AC	4.2-5	50/60	16(7.25)	TC-6F	Included	-10/+70

MOUNTING CUTOUT DIMENSIONS



*Dimension does not include hardware. Dimensions: Inches, Mounting hardware and gasket not shown.

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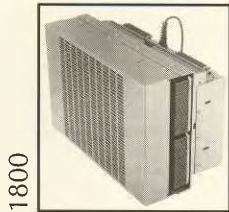
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AHP-Series

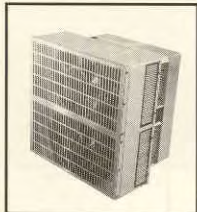
Thru Mount (Nema-12)

RATING: 100-1175 BTU/HR

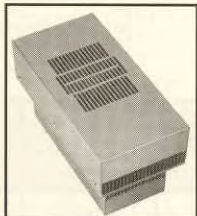
Solid State Air Conditioners
For Indoor Use



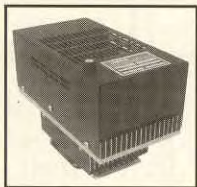
1800



1400



1200



301



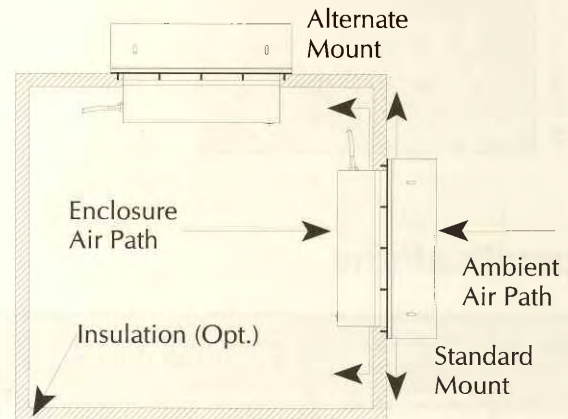
300



150

- ◆ Solid State Design
- ◆ No Filters
- ◆ No Compressor
- ◆ No Piping
- ◆ Low Maintenance
- ◆ High Ambient Operation
- ◆ Compact
- ◆ Lightweight
- ◆ Durable
- ◆ Reliable
- ◆ Easy Installation

Typical Mounting Method



TECA's AHP-series thermoelectric air conditioners are designed to mount with portions on both the inside and the outside of the enclosure. There is no air exchange from internal to ambient. A stud/flange and gasketed mount ensure your Nema integrity. Internal fans are provided to recirculate cool, clean air.

The AHP- series is suited for harsh industrial locations such as steel and paper mills, foundry, refinery and other rugged environments.

Typical applications include, machine controls, plc's, drives, motor controls, computers and other sensitive electronic equipment.

Nema-12, ...are intended for indoor use primarily to provide a degree of protection against dust, falling dirt, and dripping noncorrosive liquids. (Nema Publication No 250, Part 1, Page1)

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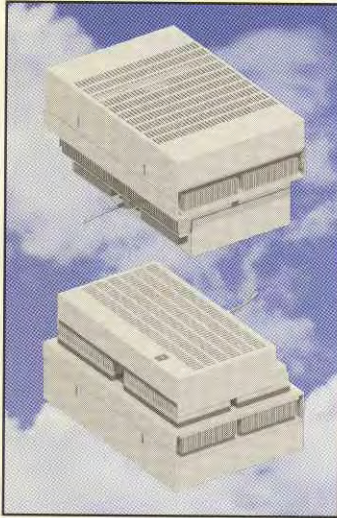
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AHP-1800

Air Rating: 1025-1175 Btu/Hr
Nema-12 (Thru Mount)

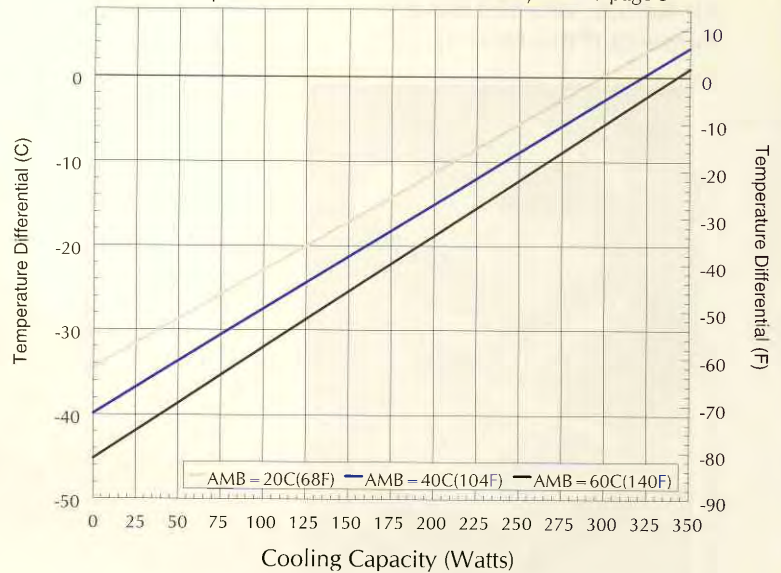
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Performance:

Curves & Equations

How to use, refer to page 3



	Amb = 20°C	Amb = 40°C	Amb = 60°C
Air Equation	$A = .113x - 34$	$A = .124x - 40$	$A = .130x - 45$
Fin Equation	$F = .083x - 34$	$F = .091x - 40$	$F = .095x - 45$

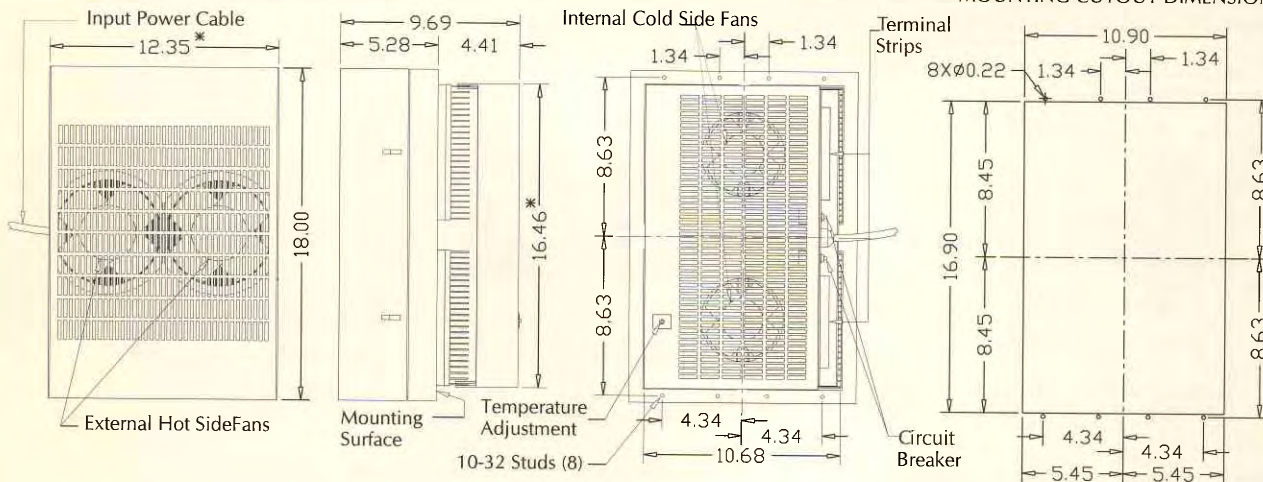
$A = \Delta T(^{\circ}\text{C})$ Enc-Amb, $x = \text{Capacity (Watts)}$, $F = \Delta T(^{\circ}\text{C})$ Fin-Amb

Specifications

Model	FIN RATING 0°ΔT Ambient to Fin (Btu/Hr)	AIR RATING 0°ΔT Ambient to Air (Btu/Hr)	Voltage (Volts)	Current (Amps)	Frequency (Hz)	Heat Installed (Watts)	Temperature Control Included	Approval UL1995 *Pending	Weight Lbs (Kg)	Operating Range (°C)
AHP-1800	1400-1600	1025-1175	115 AC	7.5	50/60		TC-6F	ETL/ETLc	46(21)	-10/+70
AHP-1800HC	1400-1600	1025-1175	115 AC	7.5	50/60	400	TC-3F	ETL/ETLc	46(21)	-10/+70
AHP-1802	1400-1600	1025-1175	230 AC	5	50/60		TC-6F	ETL/ETLc*	46(21)	-10/+70
AHP-1802HC	1400-1600	1025-1175	230 AC	5	50/60	400	TC-3F	ETL/ETLc*	46(21)	-10/+70

Consult Factory for 115/230 VAC AHP-1801

MOUNTING CUTOUT DIMENSIONS



*Dimension does not include hardware, insulation

Dimensions, Inches

Mounting hardware and gasket not shown

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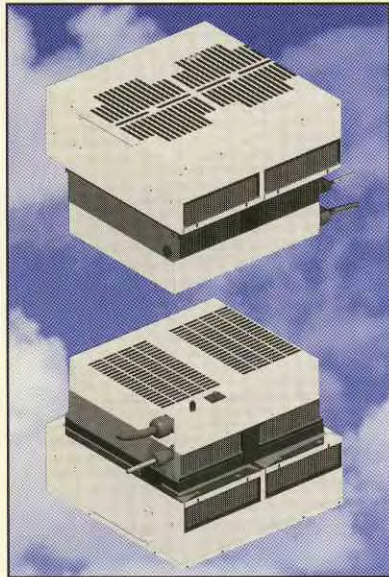
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AHP-1400

Air Rating: 685-850 Btu/Hr
Nema-12 (Thru Mount)

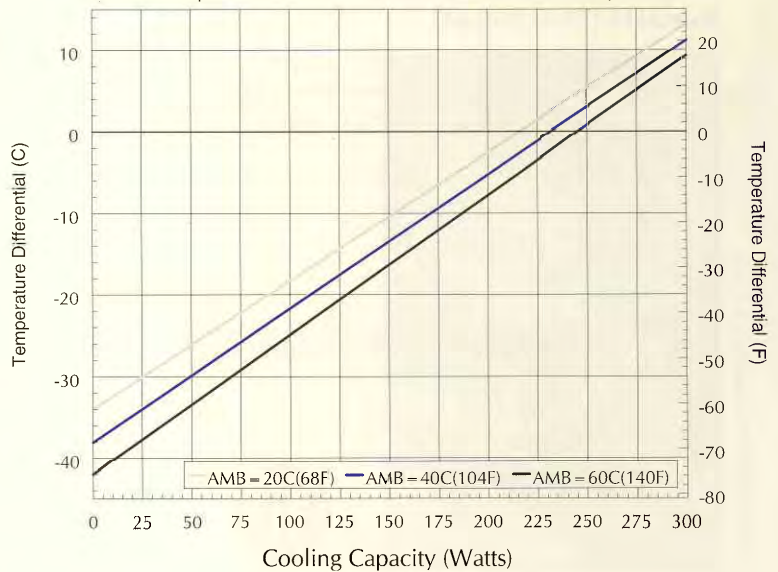
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Performance:

Curves & Equations

How to use, refer to page 3



	Amb = 20°C	Amb = 40°C	Amb = 60°C
Air Equation	$A = .158x - 34$	$A = .165x - 38$	$A = .171x - 42$
Fin Equation	$F = .134x - 34$	$F = .141x - 38$	$F = .146x - 42$

$A = \Delta T(^{\circ}\text{C}) \text{ Enc-Amb}$, $x = \text{Capacity (Watts)}$, $F = \Delta T(^{\circ}\text{C}) \text{ Fin-Amb}$

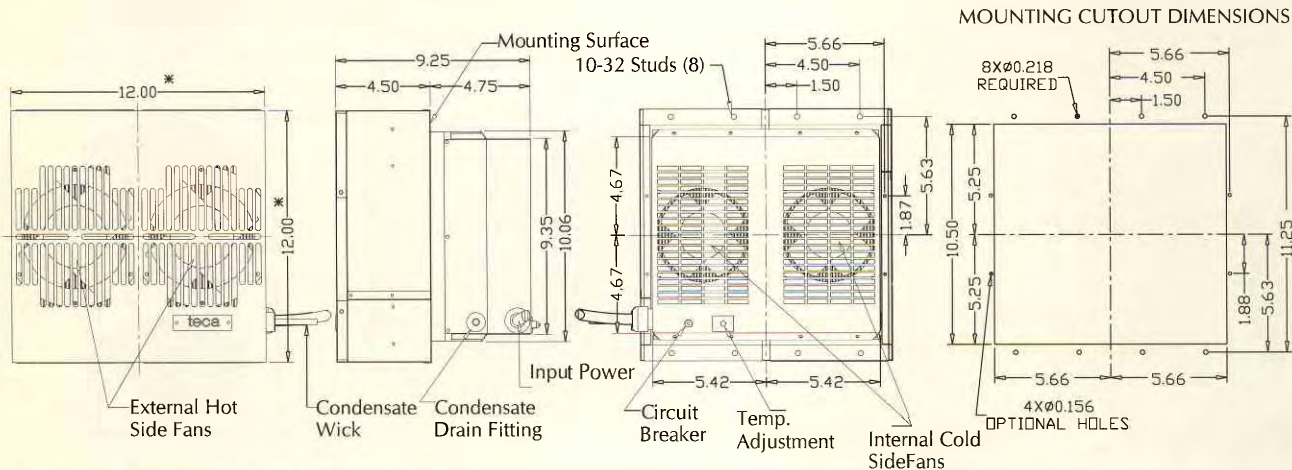
Specifications

Optional 230 VAC Unit (Consult Factory) $\approx 10\%$ Higher Capacity, Performance Curves and equations available.

Model	FIN RATING 0°ΔT Ambient to Fin (Btu/Hr)	AIR RATING 0°ΔT Ambient to Air (Btu/Hr)	Voltage (Volts)	Current (Amps)	Frequency (Hz)	Temperature Control Included	Moisture Removal System	Weight Lbs (Kg)	Operating Range (°C)
AHP-1400	875-1000	685-850	115 AC	7.5-9	50/60	TC-6F	Included	31(14)	-10/+70

* FOR HIGH HUMIDITY ENVIRONMENTS:

This model contains a condensate (anti-fungal) sponge and a moisture wick. Vertical mounting orientation is recommended for best collection. Tubing can be placed over the wick for draining. User can add a drip pan below the internal heat sink if additional collection is required.



*Dimension does not include hardware, insulation Dimensions: Inches, Mounting hardware and gasket not shown

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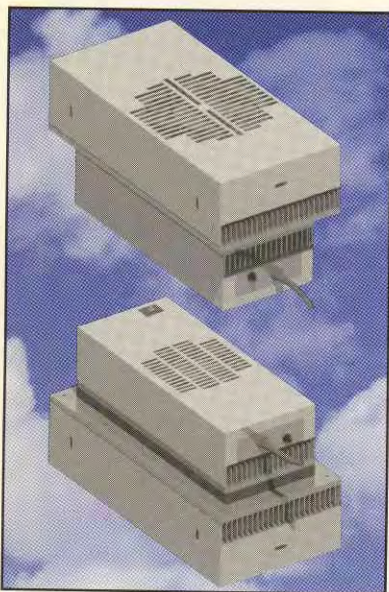
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AHP-1200

Air Rating: 550-615 Btu/Hr
Nema-12 (Thru Mount)

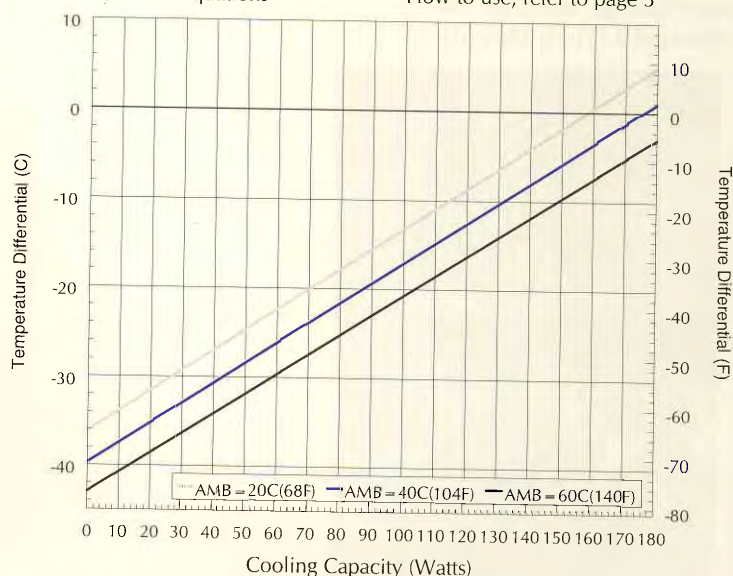
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Performance:

Curves & Equations

How to use, refer to page 3

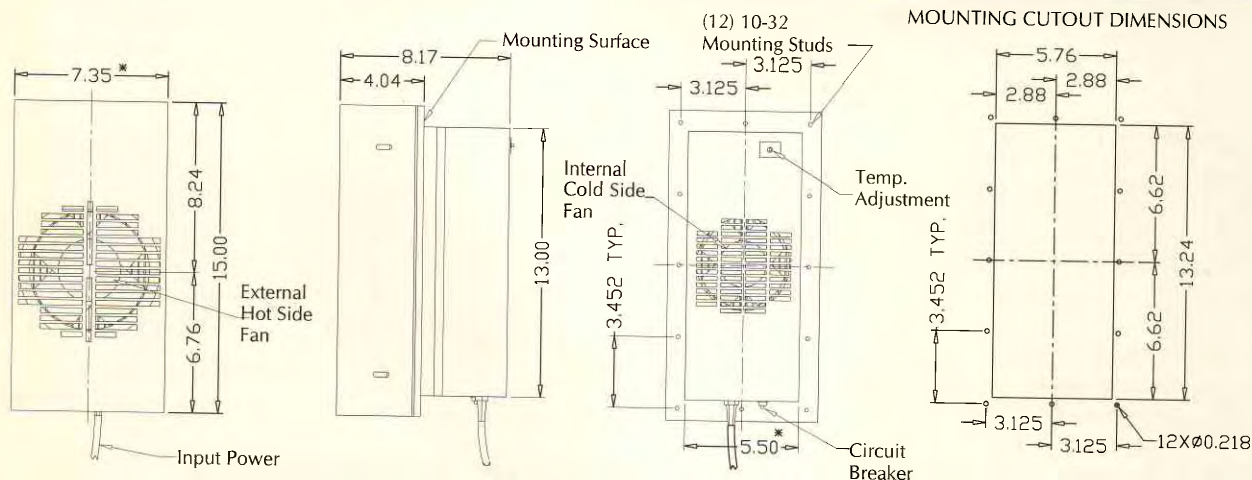


	Amb = 20°C	Amb = 40°C	Amb = 60°C
Air Equation	$A = .228x - 36$	$A = .224x - 39$	$A = .219x - 42$
Fin Equation	$F = .176x - 36$	$F = .173x - 39$	$F = .170x - 42$

$A = \Delta T(^{\circ}\text{C}) \text{ Enc-Amb}$, $x = \text{Capacity (Watts)}$, $F = \Delta T(^{\circ}\text{C}) \text{ Fin-Amb}$

Specifications

Model	FIN RATING 0° Δ Ambient to Fin (Btu/Hr)	AIR RATING 0° Δ Ambient to Air (Btu/Hr)	Voltage (Volts)	Current (Amps)	Frequency (Hz)	Heat Installed (Watts)	Weight LBS (Kg)	Temp. Control Included	Approval UL-1995 *Pending	Operating Range (°C)
AHP-1200FF	700-850	550-615	115 AC	5	50/60		21(9.5)	TC-6F	ETL/ETLc	-10/+70
AHP-1200FFHC	700-850	550-615	115 AC	5	50/60	200	21(9.5)	TC-3F	ETL/ETLc	-10/+70
AHP-1201FF	700-850	550-615	115/230 AC	5/2.5	50/60		28(13)	TC-6F	ETL/ETLc*	-10/+70
AHP-1201FFHC	700-850	550-615	115/230 AC	5/2.5	50/60	200	28(13)	TC-3F	ETL/ETLc*	-10/+70



* Dimension does not include hardware, insulation. Dimensions, Inches Mounting hardware and gasket not shown.

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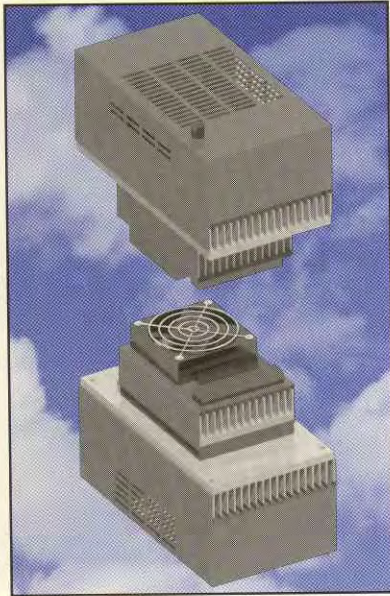
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AHP-301FF

Air Rating: 160-200 Btu/Hr
Nema-12 (Thru Mount)

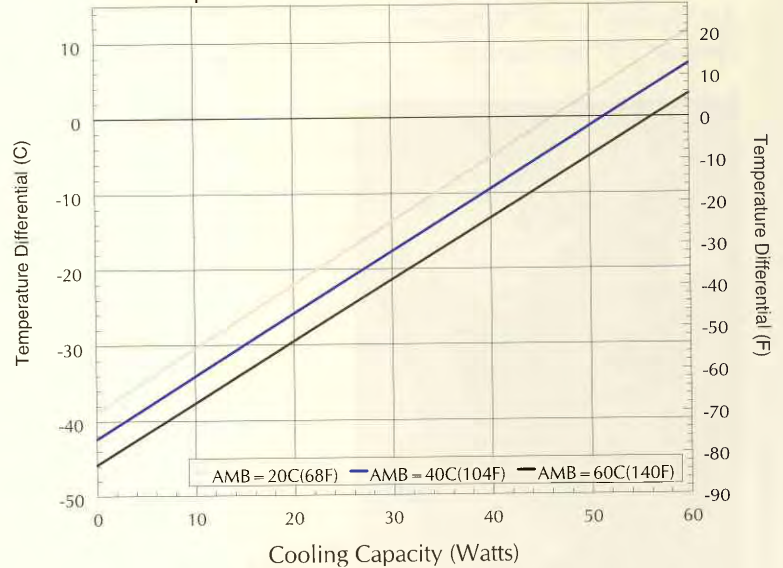
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Performance:

Curves & Equations

How to use, refer to page 3



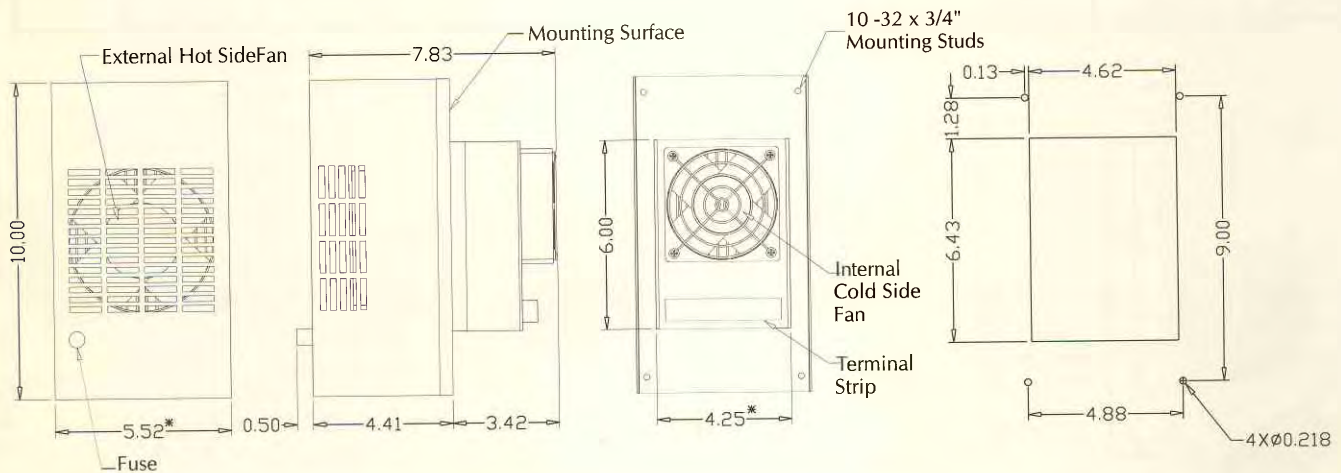
	Amb = 20°C	Amb = 40°C	Amb = 60°C
Air Equation	$A = .809x - 38$	$A = .824x - 42$	$A = .807x - 46$
Fin Equation	$F = .623x - 38$	$F = .636x - 42$	$F = .621x - 46$

$A = \Delta T(^{\circ}C) \text{ Enc-Amb}$, $x = \text{Capacity (Watts)}$, $F = \Delta T(^{\circ}C) \text{ Fin-Amb}$

Specifications

Model Number	FIN RATING $0^{\circ}\Delta T$ Ambient to Fin (Btu/Hr)	AIR RATING $0^{\circ}\Delta T$ Ambient to Air (Btu/Hr)	Voltage (Volts) AC	Current (Amps)	Frequency (Hz)	Temperature Control	Heat Installed (Watts)	Weight Lbs (KG)	Operating Range ($^{\circ}C$)
AHP-301FF	210-250	160-200	115/230	1.2/0.6	50/60	Optional		12(5.4)	-28/+70
AHP-301FFHC	210-250	160-200	115/230	1.2/0.6	50/60	TC-3F	100	12(5.4)	-28/+70

MOUNTING CUTOUT DIMENSIONS



* Dimension does not include hardware, insulation. Dimensions, inches Mounting Hardware and gasket not shown.

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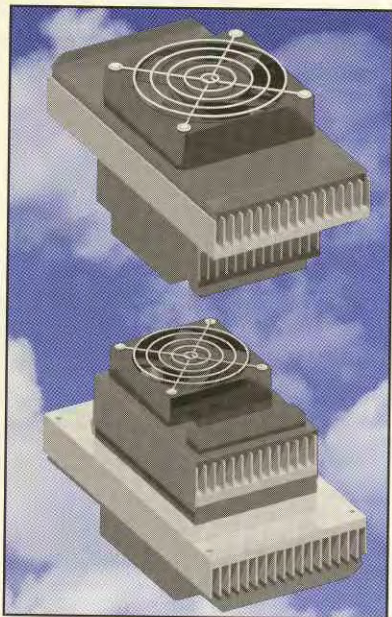
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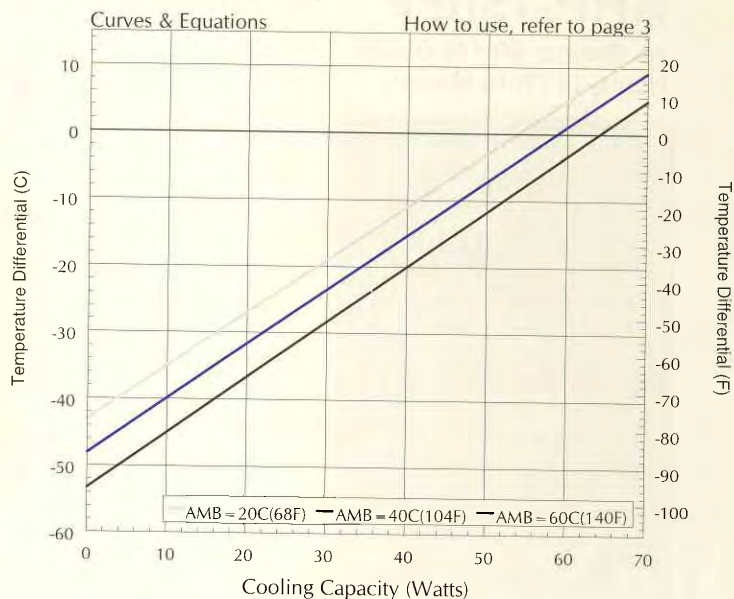
AHP-300FF

Air Rating: 185-210 Btu/Hr
Nema-12 (Thru Mount)

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Performance:

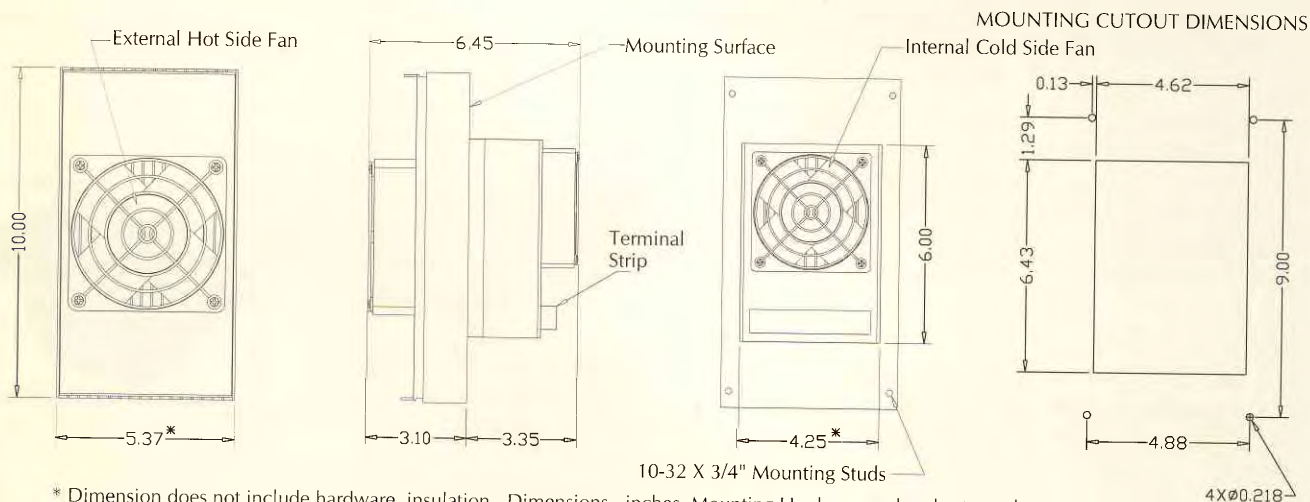


	Amb = 20°C	Amb = 40°C	Amb = 60°C
Air Equation	$A = .782x - 43$	$A = .813x - 48$	$A = .828x - 53$
Fin Equation	$F = .614x - 43$	$F = .640x - 48$	$F = .654x - 53$

$A = \Delta T(^{\circ}\text{C})$ Enc-Amb, $x = \text{Capacity (Watts)}$, $F = \Delta T(^{\circ}\text{C})$ Fin-Amb

Specifications

Model	FIN RATING 0°ΔT Ambient to Fin (Btu/Hr)	AIR RATING 0°ΔT Ambient to Air (Btu/Hr)	Voltage (Volts) DC	Current (Amps)	Weight Lbs (KG)	Power Supply (Optional)	Temperature Control	Heat Installed (Watts)	Operating Range (°C)
AHP-300FF	235-275	185-210	12/24/48	12.5/6.3/3.1	7.5(3.4)	AS150F-24	Optional		-10/+70
AHP-300FFHC	235-275	185-210	24	6.3	7.5(3.4)	AS150F-24	Optional	72	-10/+70



* Dimension does not include hardware, insulation. Dimensions , inches. Mounting Hardware and gaske t not shown.

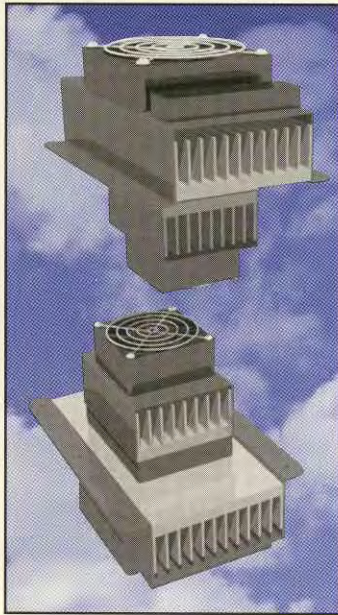
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AHP-150FF

Air Rating: 90-110 Btu/Hr
Nema-12 (Thru Mount)

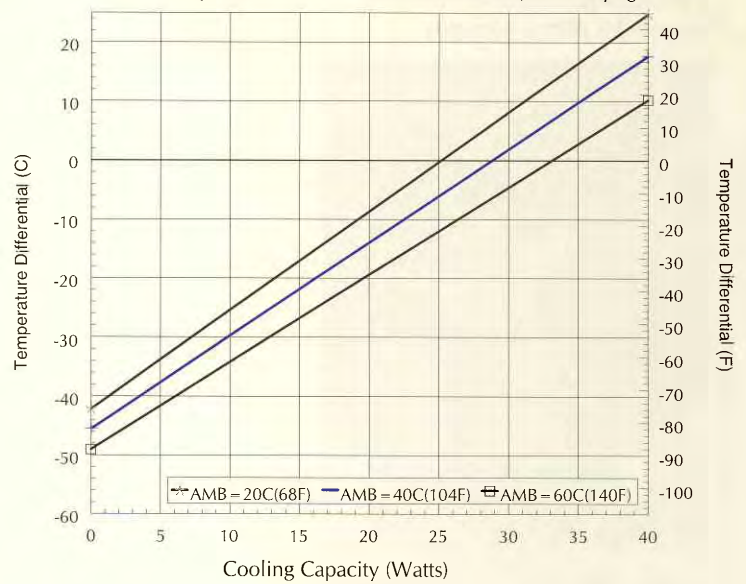


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Performance:

Curves & Equations

How to use, refer to page 3

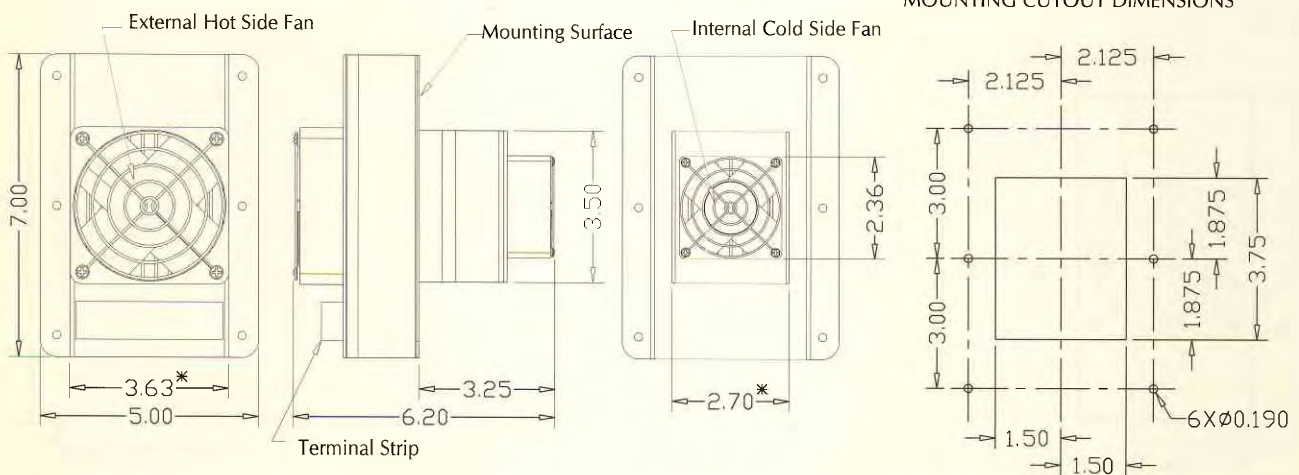


	Amb = 20°C	Amb = 40°C	Amb = 60°C
Air Equation	$A = 1.68x - 42$	$A = 1.59x - 46$	$A = 1.48x - 49$
Fin Equation	$F = 1.31x - 42$	$F = 1.24x - 46$	$F = 1.17x - 49$

$A = \Delta T(^{\circ}\text{C})$ Enc-Amb, $x = \text{Capacity (Watts)}$, $F = \Delta T(^{\circ}\text{C})$ Fin-Amb

Specifications

Model	FIN RATING 0°ΔT Ambient to Fin (Btu/Hr)	AIR RATING 0°ΔT Ambient to Air (Btu/Hr)	Voltage (Volts) DC	Current (Amps)	Weight Lbs (KG)	Temperature Control	Power Supply (Optional)	Heat Installed (Watts)	Operating Range (°C)
AHP-150FF	110-145	90-110	12/24	5/2.5	3.25(1.5)	Optional	AS60-12		-10/+70
AHP-150FFHC	110-145	90-110	24	2.5	3.25(1.5)	Optional	AS60-12	36	-10/+70



* Dimension does not include hardware, insulation. Dimensions, Inches. Mounting Hardware and gasket not shown.

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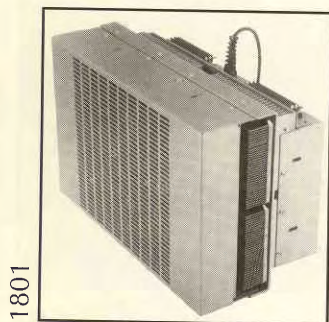
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X/XE-Series

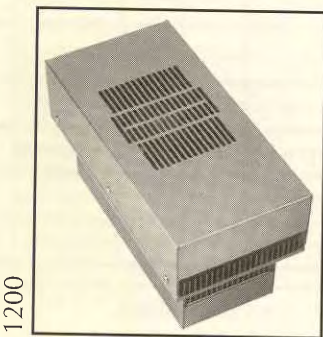
RATING: 200-1175 BTU/HR

Thru Mount (Nema-4X)

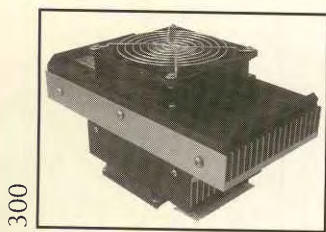
Solid State Air Conditioners
For Indoor or Outdoor Environments



1801



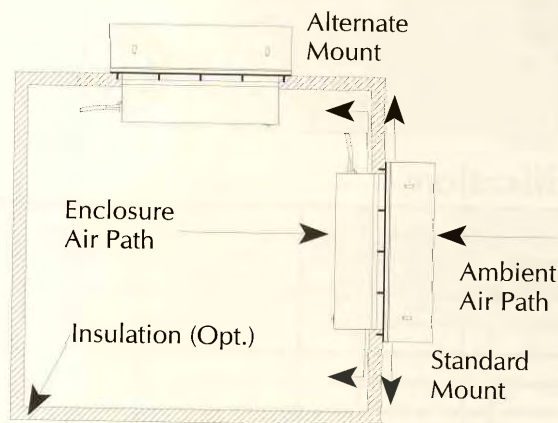
1200



300

- ◆ Outdoor Use
- ◆ Wash down/Corrosive
- ◆ Solid State Design
- ◆ No Filters
- ◆ No Compressor
- ◆ No Piping
- ◆ Low Maintenance
- ◆ High Ambient Operation
- ◆ Compact
- ◆ Lightweight
- ◆ Durable
- ◆ Reliable
- ◆ Easy Installation

Typical Mounting Method



TECA's X & XE-series thermoelectric air conditioners are designed for rugged Nema-4X Locations. The X series unit contain military grade fans on the exterior. XE series units contain industrially grade sealed fans. The X & XE series can withstand corrosive salt spray, windblown dust, rain and water hose down from any angle in outdoor or indoor locations. A stud and gasket style mount is provided to maintain your NEMA integrity. Ideally suited for harsh industrial locations such as steel and paper mills, chemical and oil refinery, foundry, ship board and other rugged environments. Typical applications include, machine controls, plc's, drives, motor controls, computers and other sensitive electronic equipment.

Nema-4X, ...are intended for indoor and outdoor use primarily to provide a degree of protection against corrosion, windblown dust and rain, splashing water, and hose-directed water. (Nema Publication No. 250, Part 1, Page 1)

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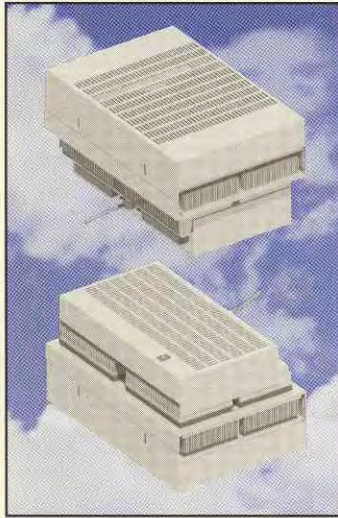
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AHP-1800XE

Air Rating: 1025-1175 Btu/Hr
Nema-4X (Thru Mount)

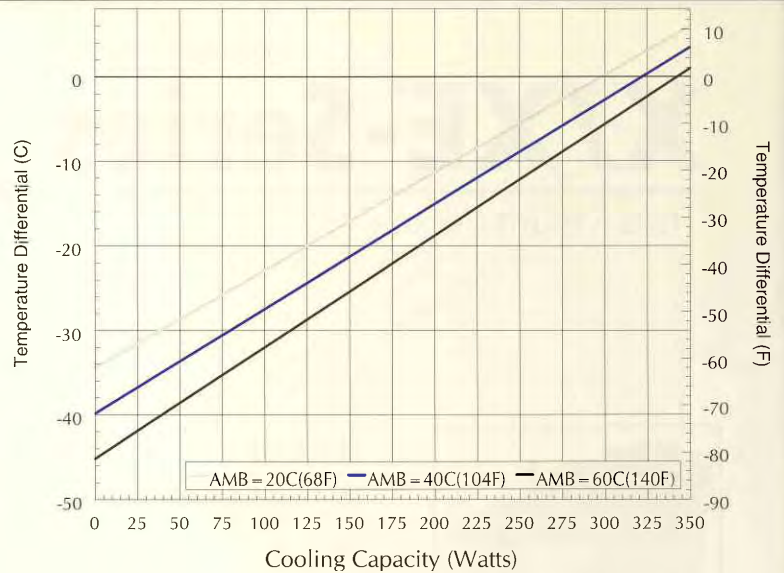
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Performance:

Curves & Equations
How to use, refer to page 3

AHP-1800XEHC
AHP-1802XE
AHP-1802XEHC
AHP-1801X
AHP-1801XHC

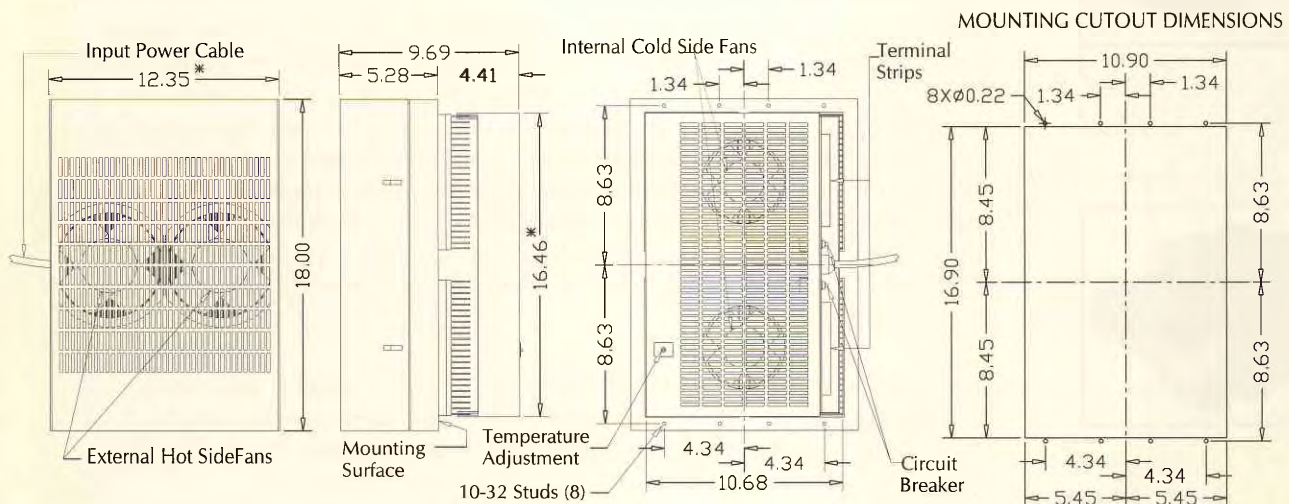


	Amb = 20°C	Amb = 40°C	Amb = 60°C
Air Equation	$A = .113x - 34$	$A = .124x - 40$	$A = .130x - 45$
Fin Equation	$F = .083x - 34$	$F = .091x - 40$	$F = .095x - 45$

$A = \Delta T(^{\circ}\text{C})$ Enc-Amb, x = Capacity (Watts), $F = \Delta T(^{\circ}\text{C})$ Fin-Amb

Specifications

Model	FIN RATING 0°Δ Ambient to Fin (Btu/Hr)	AIR RATING 0°ΔT Ambient to Air (Btu/Hr)	Voltage (Volts) AC	Current (Amps)	Frequency (Hz)	Weight lbs (KG)	Heat Installed (Watts)	Temp. Control Included	Approvals UL1995 *Pending	Operating Range (°C)
AHP-1800XE	1400-1550	1025-1175	115	7.5	50/60	46(21)		TC-6F	ETL/ETLc	-40/+70
AHP-1800XEHC	1400-1550	1025-1175	115	7.5	50/60	46(21)	400	TC-3F	ETL/ETLc	-40/+70
AHP-1802XE	1400-1550	1025-1175	230	5	50/60	46(21)		TC-6F	ETL/ETLc*	-40/+70
AHP-1802XEHC	1400-1550	1025-1175	230	5	50/60	46(21)	400	TC-3F	ETL/ETLc*	-40/+70
AHP-1801X	1400-1550	1025-1175	115/230	7.5/5	50/60	46(21)		TC-6F	ETL/ETLc	-10/+80
AHP-1801XHC	1400-1550	1025-1175	115/230	7.5/5	50/60	46(21)	400	TC-3F	ETL/ETLc	-10/+80



*Dimension does not include hardware, insulation Dimensions, Inches Mounting hardware and gasket not shown

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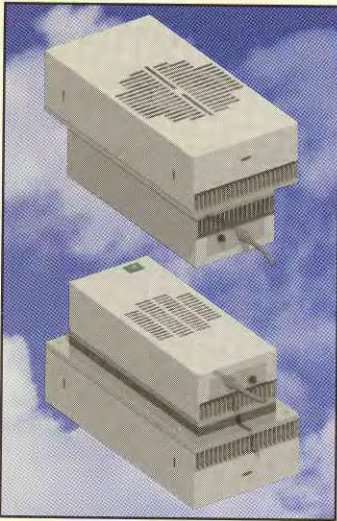
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AHP-1200XE

Air Rating: 550-615 Btu/Hr
Nema-4X (Thru Mount)

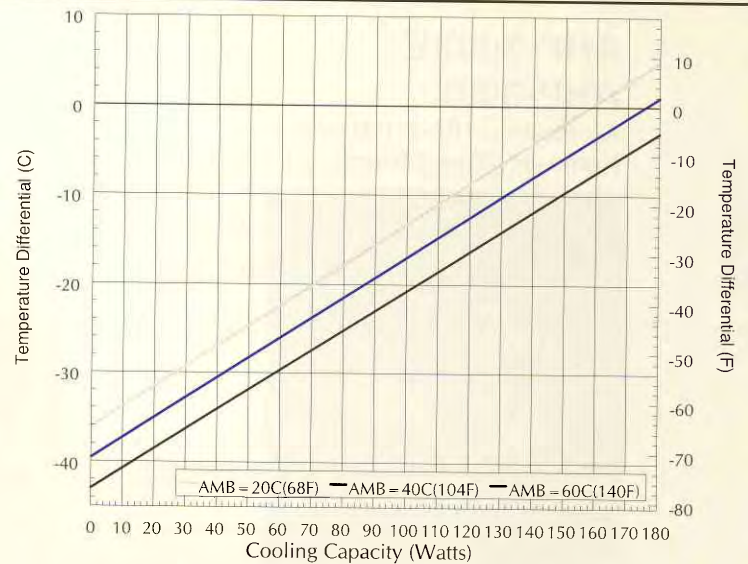
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Performance:

Curves & Equations
How to use, refer to page 3

AHP-1200XEHC
AHP-1202XE
AHP-1202XEHC
AHP-1200X
AHP-1200XHC

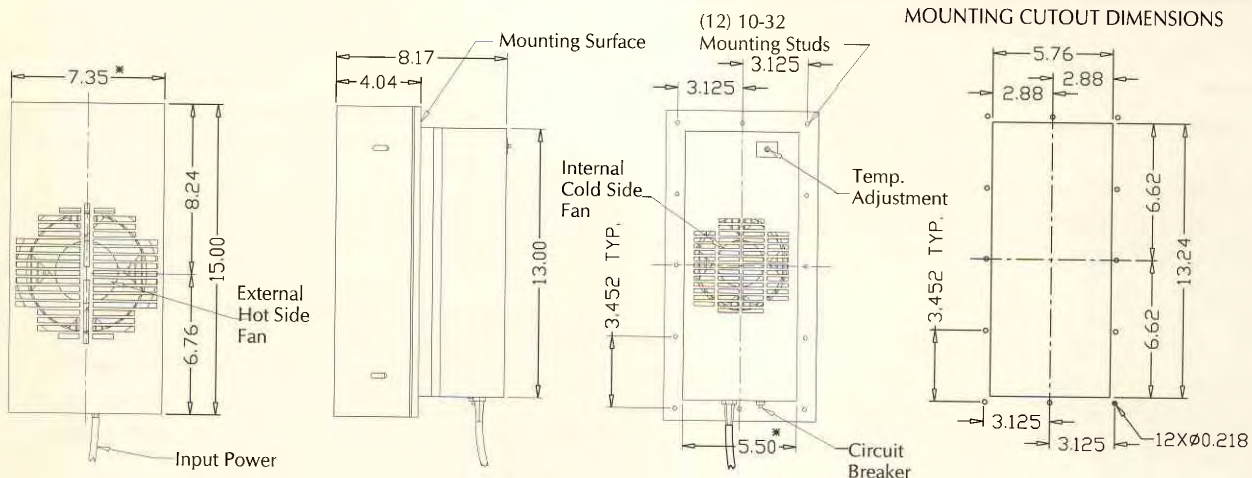


	Amb = 20°C	Amb = 40°C	Amb = 60°C
Air Equation	$A = .228x - 36$	$A = .224x - 39$	$A = .219x - 42$
Fin Equation	$F = .176x - 36$	$F = .173x - 39$	$F = .170x - 42$

$A = \Delta T(^{\circ}\text{C})$ Enc-Amb, x = Capacity (Watts), $F = \Delta T(^{\circ}\text{C})$ Fin-Amb

Mil Shock/Vibration models: AHP-1200XM/AHP-1200XMH (Consult Factory)

Model	FIN RATING 0°ΔT Ambient to Fin (Btu/Hr)	AIR RATING 0°ΔT Ambient to Air (Btu/Hr)	Voltage (Volts) AC	Current (Amps)	Frequency (Hz)	Heat Installed (Watts)	Weight lbs (KG)	Temp. Control Included	Approval UL-1995 Pending*	Operating Range (°C)
AHP-1200XE	725-800	550-615	115	5	50/60		21	TC-6F	ETL/ETLc	-40/+70
AHP-1200XEHC	725-800	550-615	115	5	50/60	200	21	TC-3F	ETL/ETLc	-40/+70
AHP-1202XE	725-800	550-615	230	2.5	50/60		28	TC-6F	ETL/ETLc*	-40/+70
AHP-1202XEHC	725-800	550-615	230	2.5	50/60	200	28	TC-3F	ETL/ETLc*	-40/+70
AHP-1200X	725-800	550-615	115	5	50/60		21	TC-6F	ETL/ETLc	-10/+80
AHP-1200XHC	725-800	550-615	115	5	50/60	200	21	TC-3F	ETL/ETLc	-10/+80



* Dimension does not include hardware, insulation. Dimensions, Inches Mounting hardware and gasket not shown.

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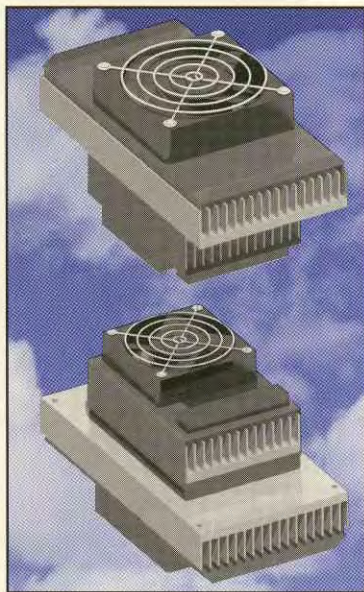
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AHP-300XE

AHP-300X

Air Rating: 185-210 Btu/Hr
Nema-4X (Thru Mount)



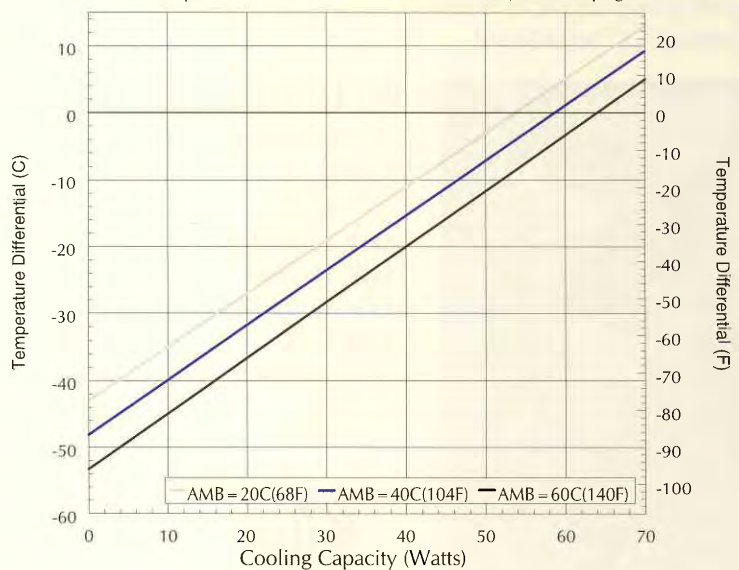
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Specifications

Performance:

Curves & Equations

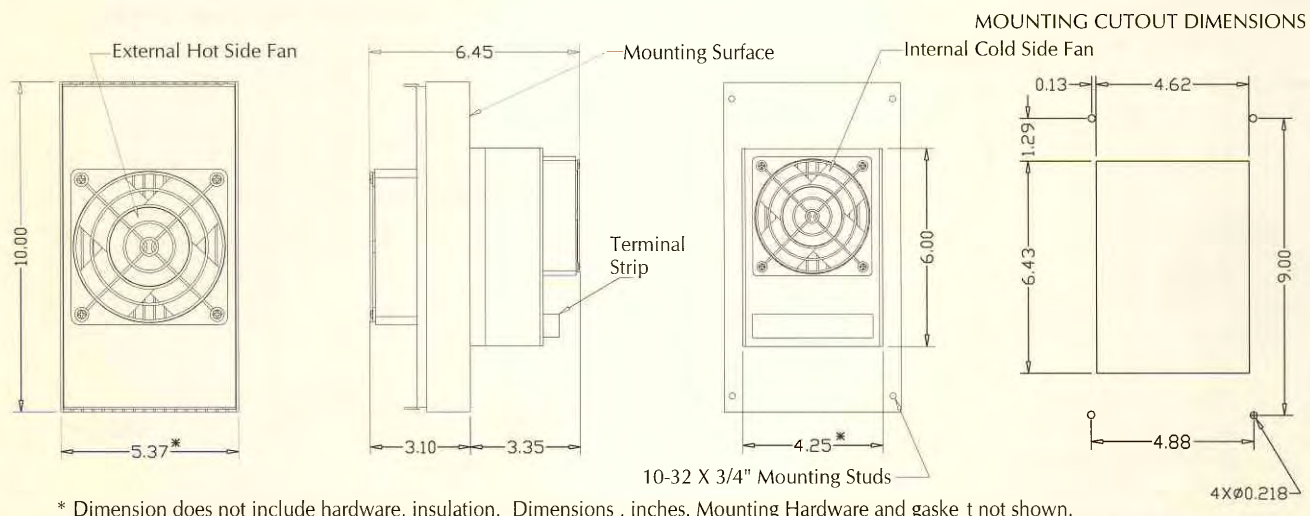
How to use, refer to page 3



	Amb = 20°C	Amb = 40°C	Amb = 60°C
Air Equation	$A = .782x - 43$	$A = .813x - 48$	$A = .828x - 53$
Fin Equation	$F = .614x - 43$	$F = .640x - 48$	$F = .654x - 53$

$A = \Delta T(^{\circ}\text{C}) \text{ Enc-Amb}$, $x = \text{Capacity (Watts)}$, $F = \Delta T(^{\circ}\text{C}) \text{ Fin-Amb}$

Model Number	FIN RATING 0°Δ Ambient to Fin (Btu/Hr)	AIR RATING 0°ΔT Ambient to Air (Btu/Hr)	Voltage (Volts)	Current (Amps)	Weight Lbs (KG)	Temperature Control (Optional)	Heat Installed (Watts)	Operating Range (°C)
AHP-300XE	235-275	185-210	12/24/48 DC	12.5/6.3/3.1	7.5(3.4)	TC-6FDC		-10/+70
AHP-300XEH	235-275	185-210	24 DC	6.3	7.5(3.4)	TC-3FDC	72	-10/+70
AHP-300X	235-275	185-210	12/24/48 DC	12.5/6.3/3.1	7.5(3.4)	TC-6FDC		-30/+80
AHP-300XHC	235-275	185-210	24 DC	6.3	7.5(3.4)	TC-3FDC	72	-30/+80



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XP-Series

Thru Mount (Nema-4X)
Class 1, Division 2, Groups A-D

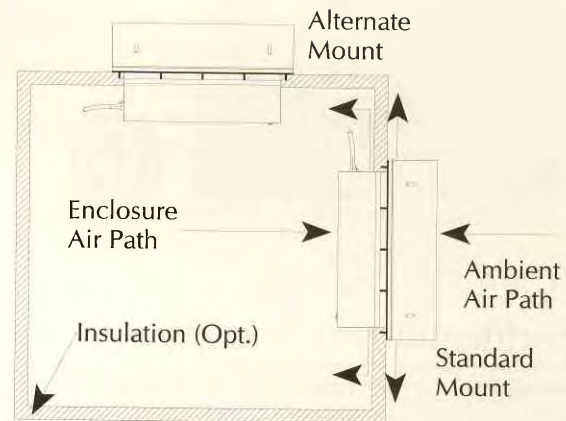
RATING: 550-1175 BTU/HR

Solid State Air Conditioners
Indoor/Outdoor/Hazardous Duty

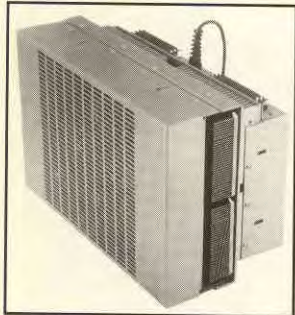


- ◆ Outdoor Use
- ◆ Wash down/Corrosive
- ◆ Solid State Design
- ◆ No Filters
- ◆ No Compressor
- ◆ No Piping
- ◆ Low Maintenance
- ◆ High Ambient Operation
- ◆ Compact
- ◆ Lightweight
- ◆ Durable
- ◆ Reliable
- ◆ Easy Installation

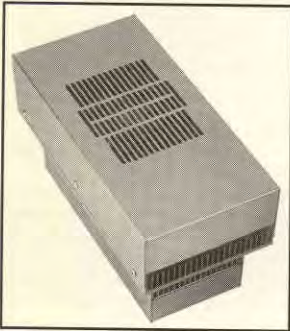
Typical Mounting Method



1801



1200



TECA's XP-Series thermoelectric air conditioners are designed for rugged Nema-4X locations as well as hazardous duty installations including Class I and II, Division 2 and Class III, Division 1 & 2, all groups. They can withstand corrosive salt spray, windblown dust, rain and water hose down from any angle in outdoor or indoor locations. A stud and gasket style mount is provided to maintain your enclosures integrity. Military fans are employed on the exterior for long life and durability.

Suitable for harsh and hazardous locations such as oil refineries, foundries, chemical, steel and paper mills, ship board and other rugged environments.

Type 4X enclosures are intended for indoor and outdoor use primarily to provide a degree of protection against corrosion, windblown dust and rain, splashing water, and hose-directed water. (Nema Publication No. 250, Part 1, Page 1)

Class 1, Division 2 (Hazardous Environments) A Class I, Division 2 location is a location (1) in which volatile flammable liquids or flammable gases are handled, processed, or used, but in which the liquids, vapors, or gases will normally be confined within closed containers or closed systems from which they can escape only in case of accidental rupture or breakdown of such containers or systems. (NEC, Article 500, 70-466 to 70-471)

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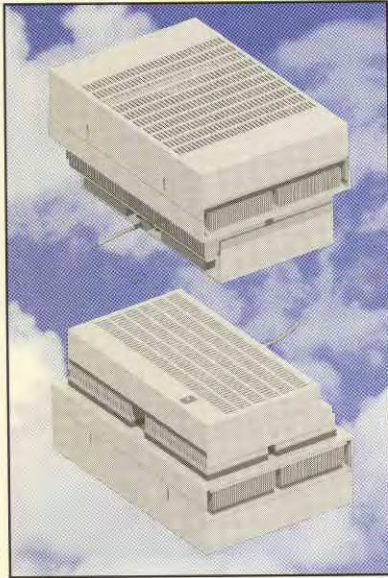
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AHP-1800XP

Rating: 1025-1175 Btu/Hr

Class 1, Div 2, Nema-4X, Thru Mount

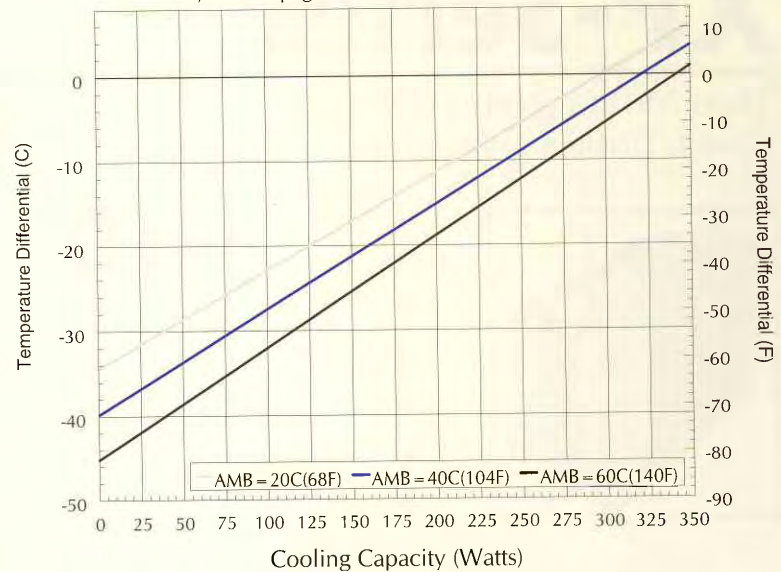
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Performance:

Curves & Equations

How to use, refer to page 3



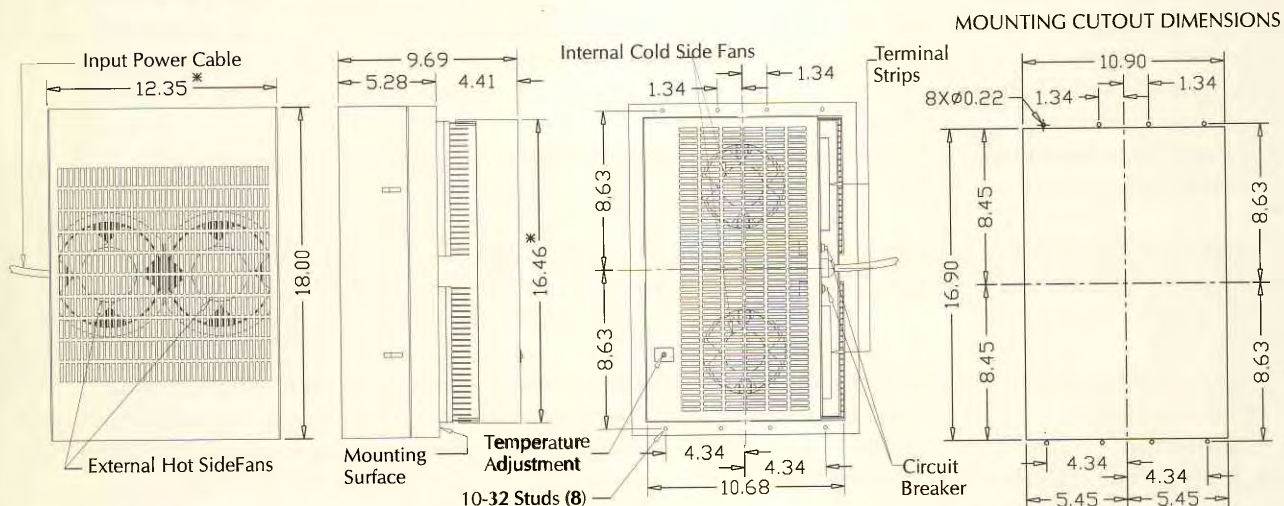
	Amb = 20°C	Amb = 40°C	Amb = 60°C
Air Equation	$A = .113x - 34$	$A = .124x - 40$	$A = .130x - 45$
Fin Equation	$F = .083x - 34$	$F = .091x - 40$	$F = .095x - 45$

$A = \Delta T(^{\circ}\text{C})$ Enc-Amb, $x = \text{Capacity (Watts)}$, $F = \Delta T(^{\circ}\text{C})$ Fin-Amb

Specifications

Consult Factory for 115/230 VAC Dual Primary AHP-1801XP/AHP-1801XPHC

Model	FIN RATING 0°ΔT Ambient to Fin (Btu/Hr)	AIR RATING 0°ΔT Ambient to Air (Btu/Hr)	Voltage (Volts) AC	Current (Amps)	Frequency (Hz)	Weight lbs (KG)	Heat Installed (Watts)	Temp. Control Included	Approvals UL1604	Operating Range (°C)
AHP-1800XP	1400-1550	1025-1175	115	7.5	50/60	46(21)		TC-6F	ETL/ETLc	-30/+80
AHP-1800XPHC	1400-1550	1025-1175	115	7.5	50/60	46(21)	400	TC-3F	ETL/ETLc	-30/+80



*Dimension does not include hardware, insulation

Dimensions, Inches

Mounting hardware and gasket not shown

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AHP-1200XP

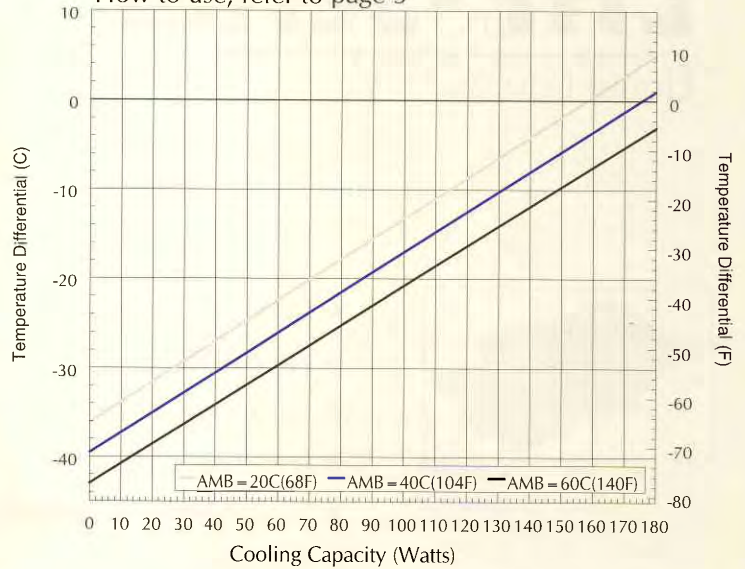
Rating: 550-615 Btu/Hr

Class 1, Division 2, Nema-4X, Thru Mount

Performance:

Curves & Equations

How to use, refer to page 3

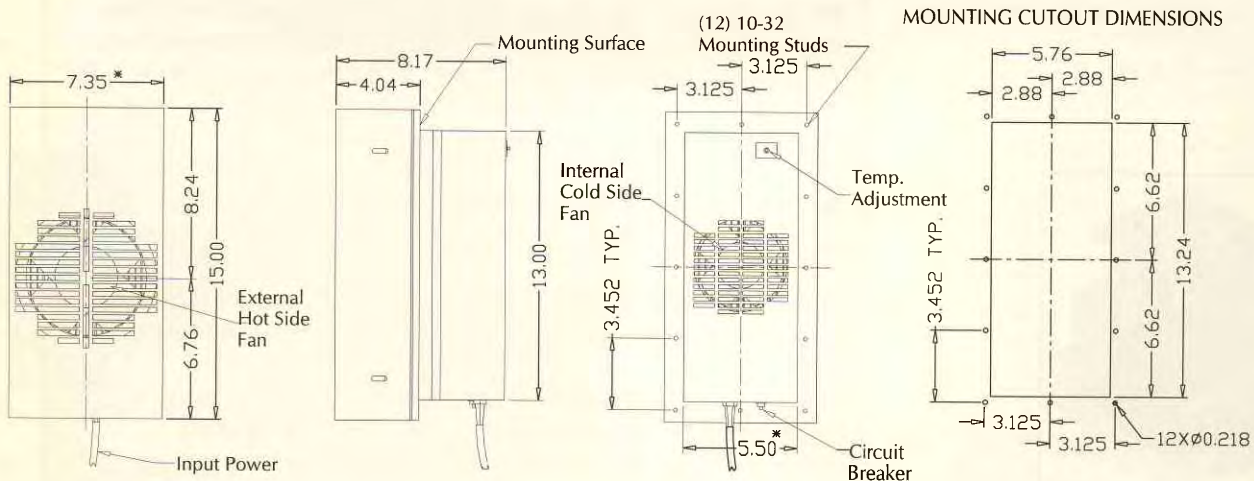


	Amb = 20°C	Amb = 40°C	Amb = 60°C
Air Equation	$A = .228x - 36$	$A = .224x - 39$	$A = .219x - 42$
Fin Equation	$F = .176x - 36$	$F = .173x - 39$	$F = .170x - 42$

$A = \Delta T(^{\circ}\text{C}) \text{ Enc-Amb}$, $x = \text{Capacity (Watts)}$, $F = \Delta T(^{\circ}\text{C}) \text{ Fin-Amb}$

Specifications

Model	FIN RATING 0°ΔT Ambient to Fin (Btu/Hr)	AIR RATING 0°ΔT Ambient to Air (Btu/Hr)	Voltage (Volts) AC	Current (Amps)	Frequency (Hz)	Heat Installed (Watts)	Weight LBS (Kg)	Temperature Control Included	Approval UL-1604	Operating Range (°C)
AHP-1200XP	725-800	550-615	115	5	50/60		21(9.5)	TC-6F	ETL/ETLc	-30/+71
AHP-1200XPHC	725-800	550-615	115	5	50/60	200	21(9.5)	TC-3F	ETL/ETLc	-30/+71



* Dimension does not include hardware, insulation. Dimensions, Inches Mounting hardware and gasket not shown.

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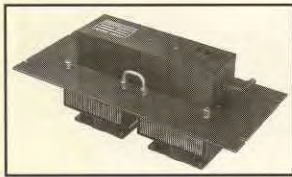
LHP-Series

Liquid Cooled

RATING: 200-1300 BTU/HR

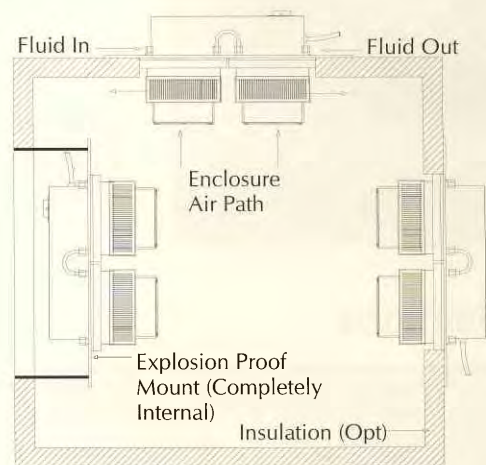
Solid State Air Conditioners

1700

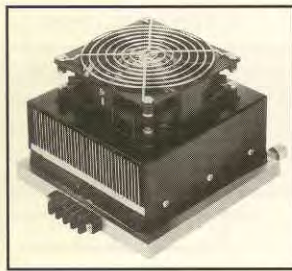


- ◆ Solid State Design
- ◆ No Filters
- ◆ No Compressor
- ◆ Low Maintenance
- ◆ High Ambient Operation
- ◆ Compact
- ◆ Lightweight
- ◆ Durable
- ◆ Reliable
- ◆ Easy Installation

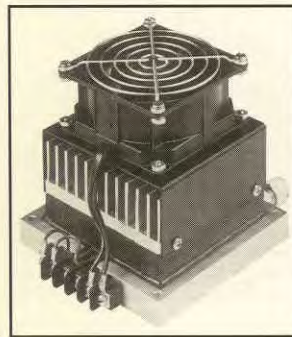
Typical Mounting Method



800/810



300



TECA's LHP-series thermoelectric air conditioners are constructed with anodized aluminum liquid jackets with stainless steel fittings. You provide a constant flow of liquid as the heat removal source. They offer an advantage over our air cooled models in that they have a higher capacity in a smaller package size.

The LHP- series is suited for harsh industrial locations such as pulp and paper mills, foundry, refinery and other rugged environments.

Typical applications include, machine controls, plc's, drives, motor controls, computers and other sensitive electronic equipment.

Nema-12, ...are intended for indoor use primarily to provide a degree of protection against dust, falling dirt, and dripping noncorrosive liquids. (Nema Publication No. 250, Part 1, Page 1)

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LHP-1700FF

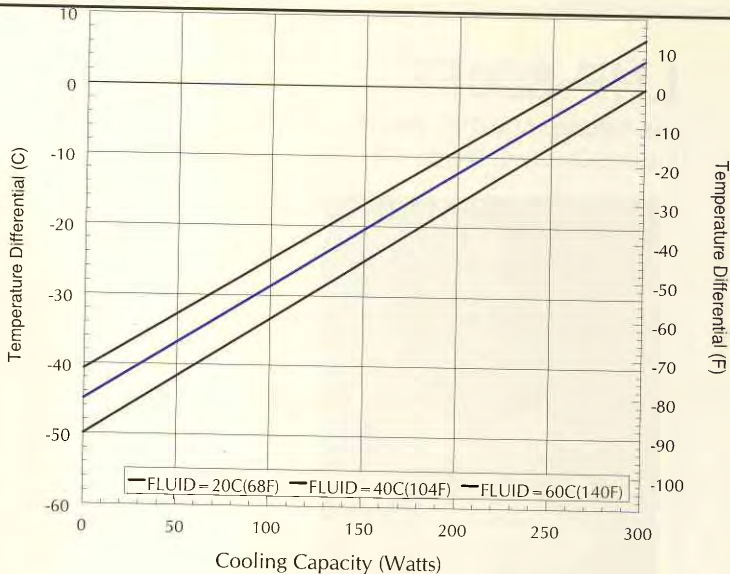
Air Rating: 900-1275 Btu/Hr
Liquid Cooled, Nema-12

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Performance:

Curve & Equations
How to use, refer to page 3



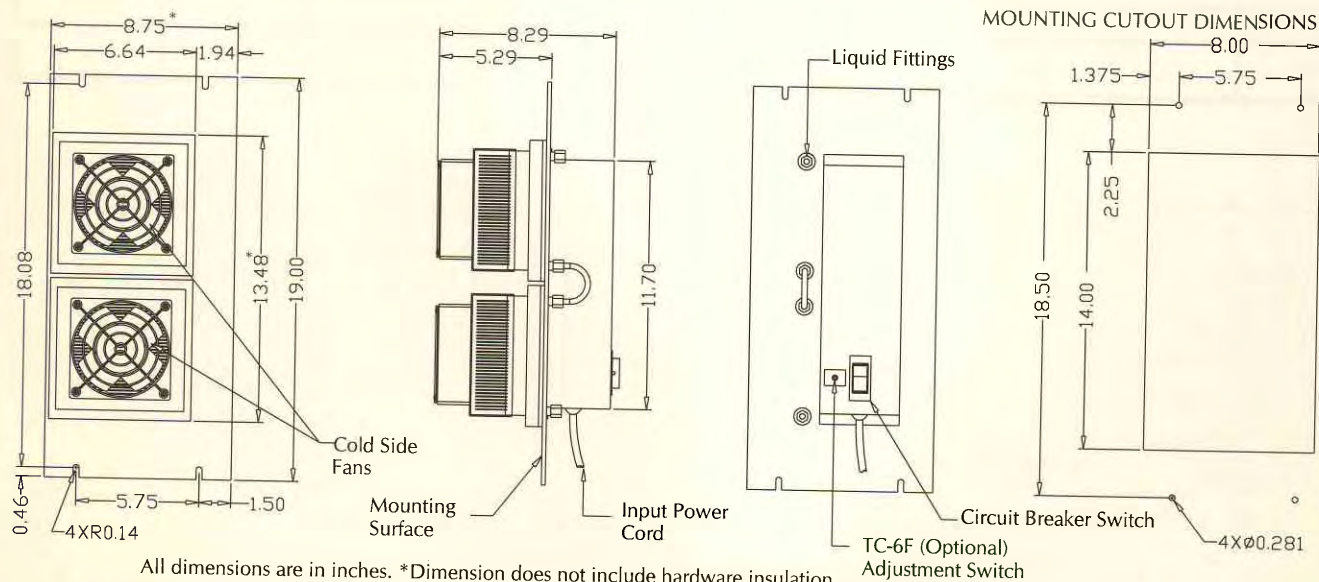
	Amb = 20°C	Amb = 40°C	Amb = 60°C
Air Equation	$B = .160x - 41$	$B = .164x - 45$	$B = .167x - 50$
Fin Equation	$G = .095x - 41$	$G = .096x - 45$	$G = .102x - 50$

$B = \Delta T(^{\circ}\text{C})$ Enc-Fluid, $x = \text{Capacity (Watts)}$ $G = \Delta T(^{\circ}\text{C})$ Fin-Fluid

Specifications

LHP-1700 curve shown, LHP-1702 approximately 15% higher capacity.

Model Number	AIR RATING $0^{\circ}\Delta T$ Fluid to Air (Btu/Hr)	Minimum Flow (GPM)	Voltage (Volts) AC	Current (Amps)	Frequency (Hz)	Weight Lbs (Kg)	Temperature Control Included	Heat Installed (Watts)	Operating Range ($^{\circ}\text{C}$)
LHP-1700FF	900-1050	0.5	115	8.5	50/60	21(10)	Optional		-10/+70
LHP-1700FFHC	900-1050	0.5	115	8.5	50/60	21(10)	TC-3F	400	-10/+70
LHP-1702FF	1000-1275	0.5	230	6.5-7	50/60	21(10)	Optional		-10/+70
LHP-1702FFHC	1000-1275	0.5	230	6.5-7	50/60	21(10)	TC-3F	400	-10/+70



All dimensions are in inches. *Dimension does not include hardware, insulation.

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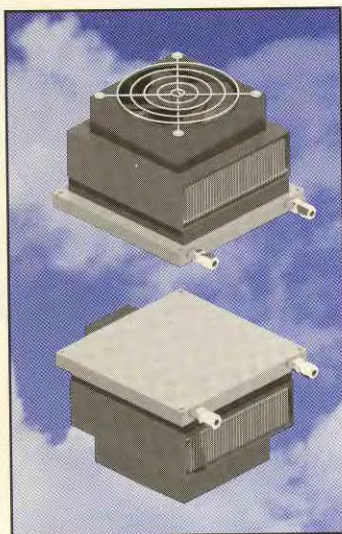
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LHP-800FF

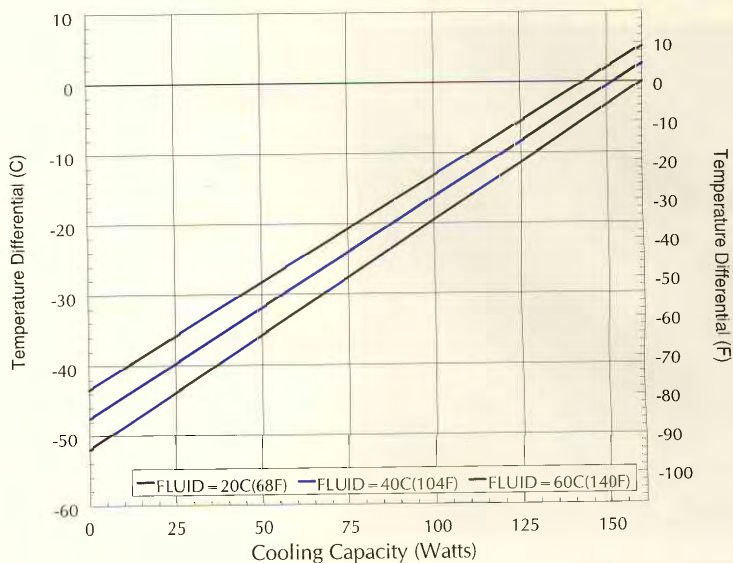
Air Rating: 500-700 Btu/Hr
Liquid Cooled, Nema-12

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Performance:

Curve & Equations
How to use, refer to page 3



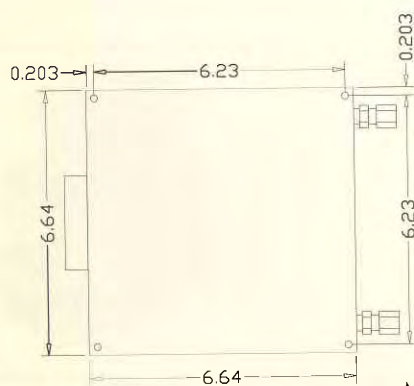
	Amb = 20°C	Amb = 40°C	Amb = 60°C
Air Equation	$B = .303x - 43$	$B = .318x - 48$	$B = .325x - 52$
Fin Equation	$G = .184x - 43$	$G = .194x - 48$	$G = .198x - 52$

$B = \Delta T(^{\circ}\text{C})$ Enc-Fluid, $x = \text{Capacity (Watts)}$ $G = \Delta T(^{\circ}\text{C})$ Fin-Fluid

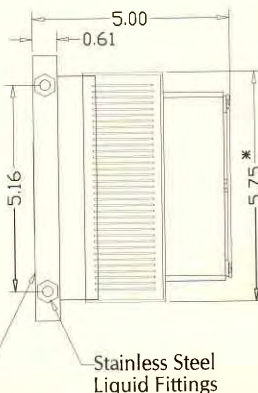
Specifications

LHP-800 curve shown, LHP-810 approximately 15% higher capacity

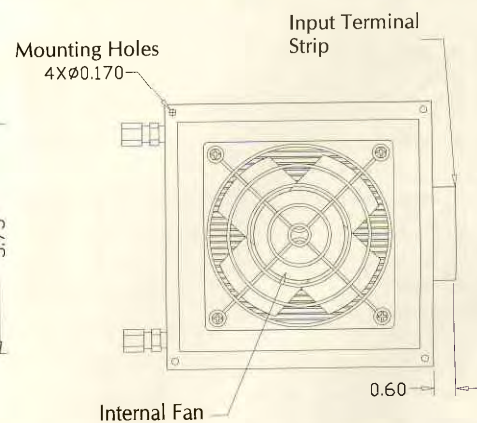
Model Number	AIR RATING $0^{\circ}\Delta T$ Fluid to Air (Btu/Hr)	Minimum Flow (GPM)	Voltage Cooling VDC	Current (Amps)	Voltage Fan VAC	Weight Lbs (Kg)	Heat Installed (Watts)	Operating Range ($^{\circ}\text{C}$)
LHP-800FF	500-600	0.5	30	10	115	7(3.2)		-30/+80
LHP-810FF	600-700	0.5	130	4	115	7(3.2)		-30/+80
LHP-800FFHC	500-600	0.5	30	10	115	7(3.2)	200	-30/+80



Mounting Surface



Stainless Steel
Liquid Fittings



* Dimension does not include hardware. Dimension (Inches)

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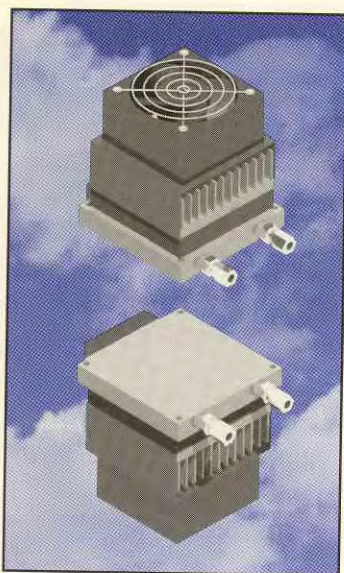
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LHP-300FF

Air Rating: 300-325 Btu/Hr

Liquid Cooled, Nema-12

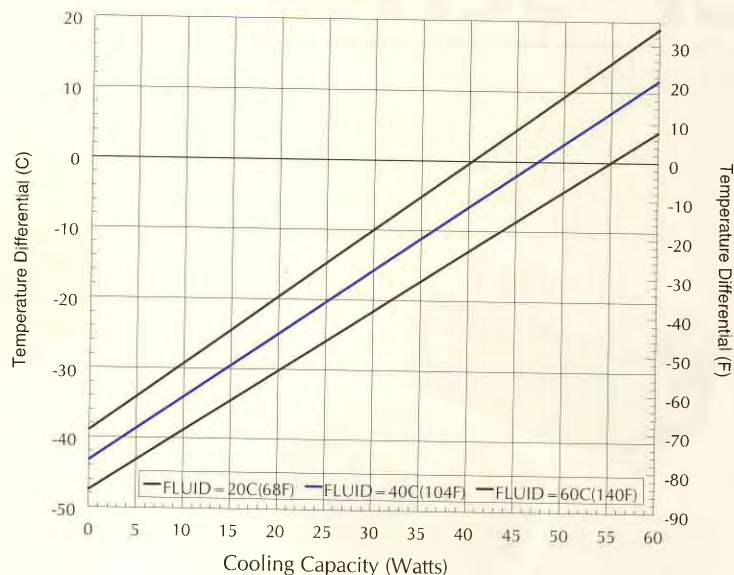
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Performance:

Curve & Equations

How to use, refer to page 3

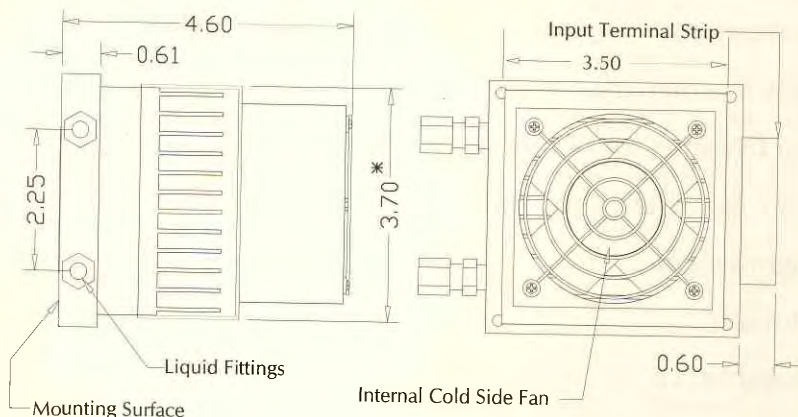
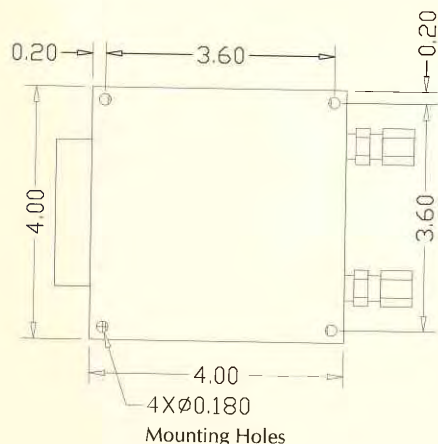


Specifications

	Amb = 20°C	Amb = 40°C	Amb = 60°C
Air Equation	$B = .963x - 38$	$B = .885x - 42$	$B = .836x - 46$
Fin Equation	$G = .562x - 38$	$G = .517x - 42$	$G = .488x - 46$

$B = \Delta T(^{\circ}\text{C})$ Enc-Fluid, $x = \text{Capacity (Watts)}$ $G = \Delta T(^{\circ}\text{C})$ Fin-Fluid

Model Number	AIR RATING $0^{\circ}\Delta T$ Fluid to Air (Btu/Hr)	Minimum Flow (GPM)	Voltage Cooling (VDC)	Current (Amps)	Voltage Fan VAC	Power Supply (Optional)	Voltage Heater VAC	Weight Lbs (Kg)	Heat Installed (Watts)	Operating Range ($^{\circ}\text{C}$)
LHP-300FF	300-325	0.2	24	4.5	115	AS60-24		2.75(1.25)		-30/+80
LHP-300FFHC	300-325	0.2	24	4.5	115	AS60-24	115	2.75(1.25)	50	-30/+80



* Dimension does not include hardware, Insulation. Dimensions are in inches.

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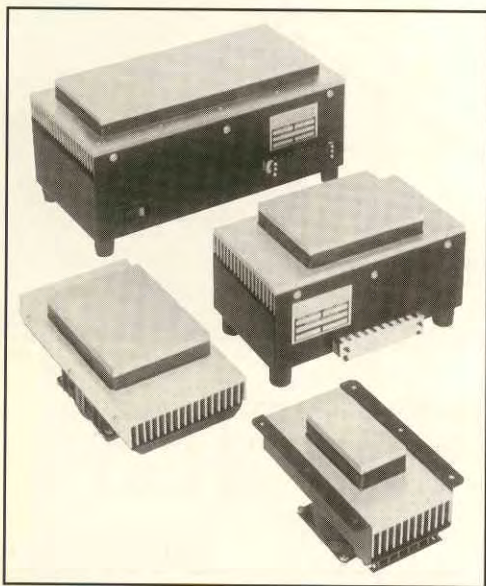
CP-Series

Air Cooled

RATING: 100-800 BTU/HR

Solid State Cold Plates

All Products • Made in U.S.A.



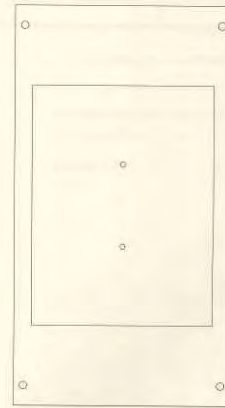
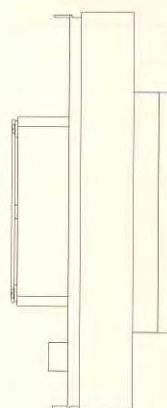
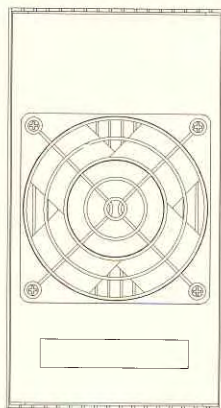
Shown from top: 1200/301/300/150

TECA's CP-series thermoelectric cold plates are designed for either bench top or enclosure mounted applications requiring direct contact cooling. Models are available with either a DC or AC input. Our AHP type cold plates include a fan for heat removal from the hot side heat exchanger.

The CP-Series is ideal for laboratory, medical instrumentation and component cooling such as thermal cycling, stress testing, microwell cooling, blood analyzers and electronic components.

Precise temperature control is available with our digital temperature controllers, model 3300.

- ◆ -20°C (No load, 25°C Amb)
- ◆ Optional Heating
- ◆ Temperature Control
- ◆ Low Maintenance
- ◆ No Compressor or Filters
- ◆ Compact (Bench top units)
- ◆ Lightweight
- ◆ Durable
- ◆ Reliable



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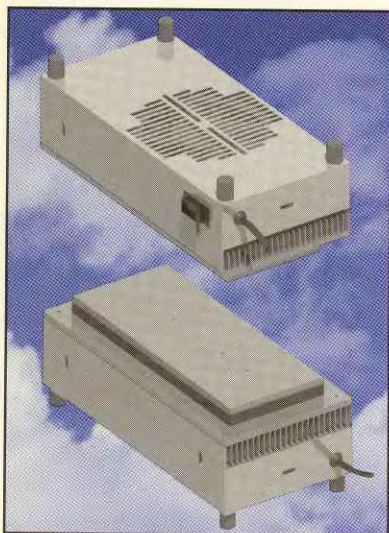
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AHP-1200CP

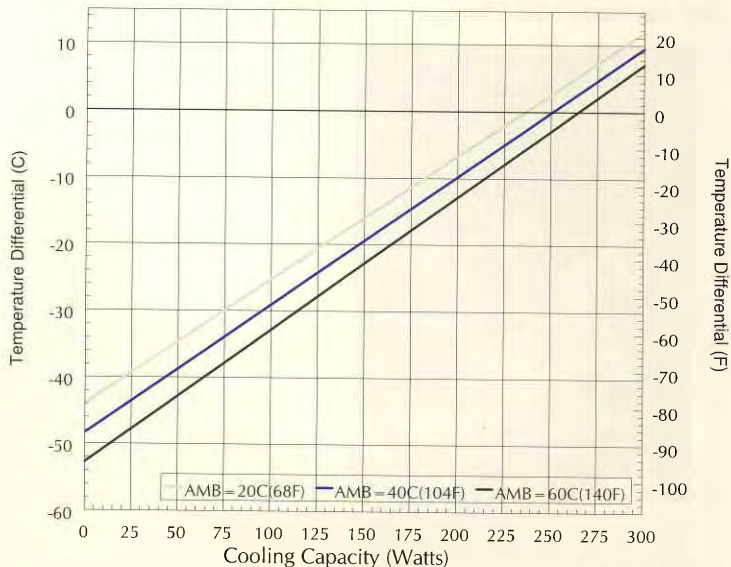
Capacity: 800-900 Btu/Hr
Air Cooled Cold Plate

All Products • Made in U.S.A.



Performance:

Curves & Equations
How to use, refer to page 3

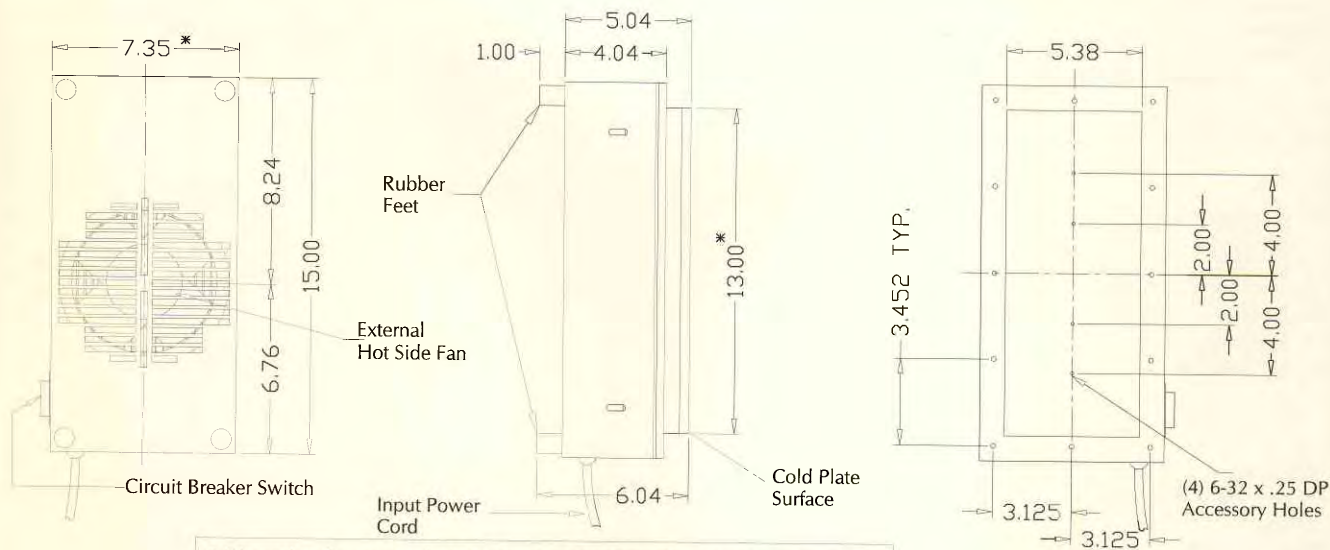


	Amb = 20°C	Amb = 40°C	Amb = 60°C
Equation	$C = .187x - 44$	$C = .192x - 48$	$C = .200x - 53$

$C = \Delta T(^{\circ}C)$ Cold Plate-Ambient Air x = Capacity (Watts)

Specifications

Model	CAPACITY $0^{\circ}\Delta T$ Ambient to Cold Plate (Btu/Hr)	Voltage (Volts)	Current (Amps)	Frequency (Hz)	Heat Installed (Watts)	Temperature Control Interface	Weight (Lbs)	Operating Range ($^{\circ}C$)
AHP-1200CP	800-900	115 AC	4	50/60		Optional	26	-10/+70
AHP-1200CPHC	800-900	115 AC	4	50/60	200	Included	26	-10/+70



* Dimension does not include hardware, insulation. Dimensions are in inches.

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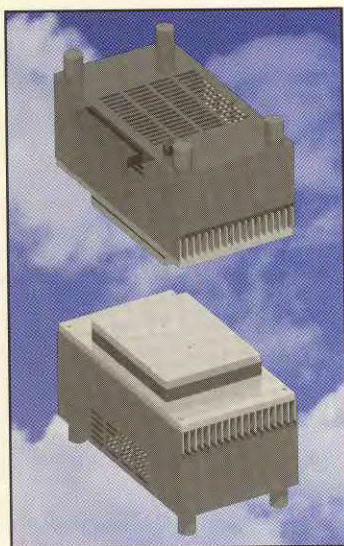
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AHP-301CP

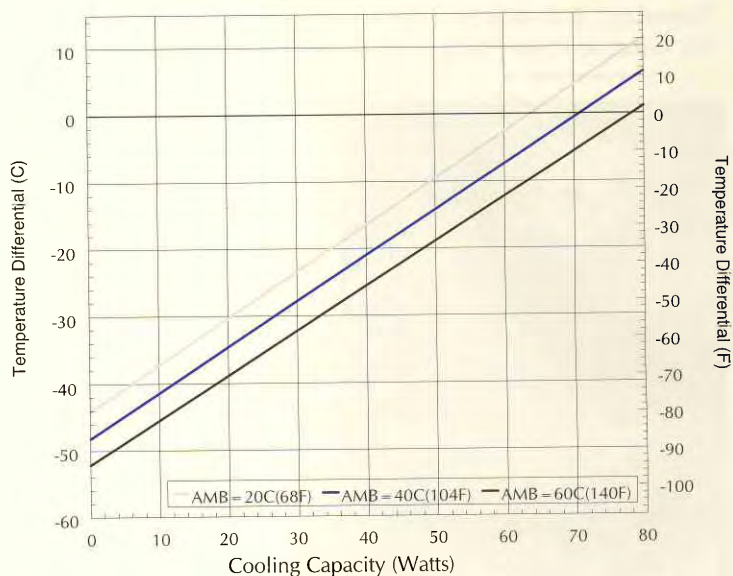
Capacity: 225-265 Btu/Hr
Air Cooled Cold Plate

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Performance:

Curves & Equations
How to use, refer to page 3

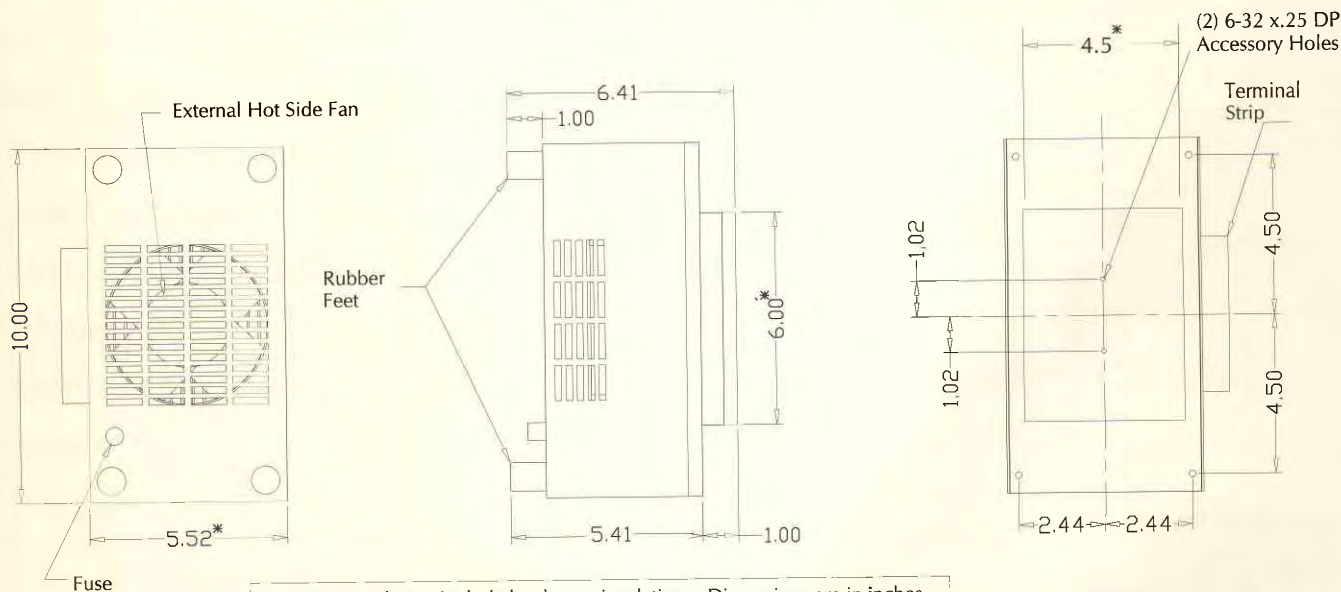


	Amb = 20°C	Amb = 40°C	Amb = 60°C
Equation	C = .698x - 44	C = .680x - 48	C = .677x - 52

C = $\Delta T(^{\circ}\text{C})$ Cold Plate-Ambient Air x = Capacity (Watts)

Specifications

Model	CAPACITY $0^{\circ}\Delta T$ Ambient to Cold Plate (Btu/Hr)	Voltage (Volts)	Current (Amps)	Frequency (Hz)	Heat Installed (Watts)	Temperature Control Interface	Weight Lbs (Kg)	Operating Range ($^{\circ}\text{C}$)
AHP-301CP	225-265	115/230 AC	1.4/0.7	50/60		Optional	11(5)	-10/+70
AHP-301CPHC	225-265	115/230 AC	1.4/0.7	50/60	100	Included	11(5)	-10/+70



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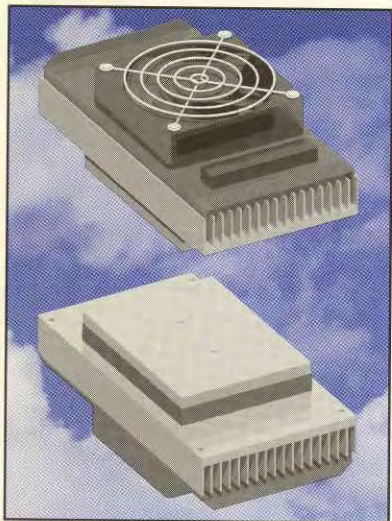
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AHP-300CP

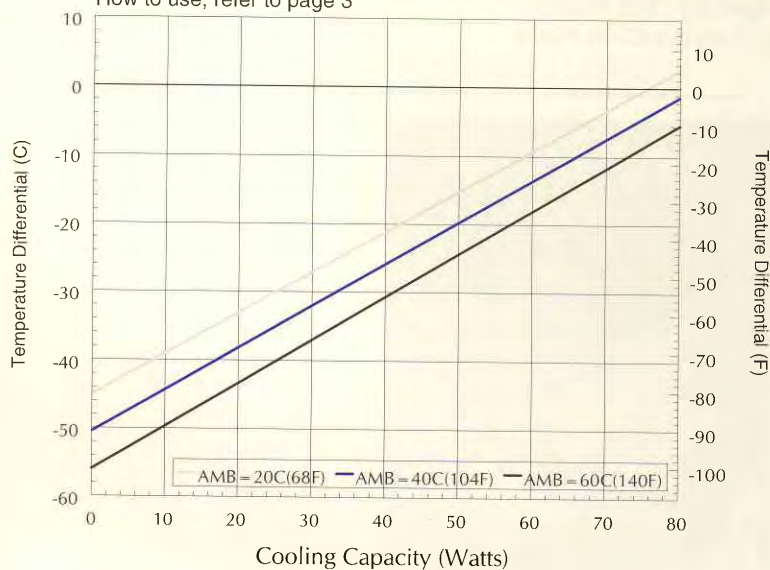
Capacity: 265 Btu/Hr
Air Cooled Cold Plate

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Performance:

Curves & Equations
How to use, refer to page 3



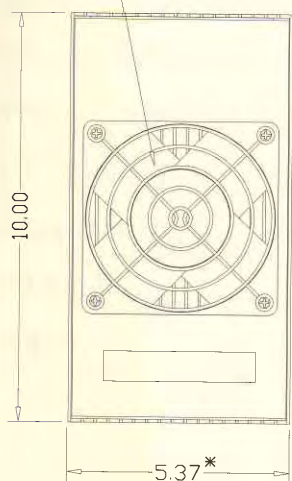
	Amb = 20°C	Amb = 40°C	Amb = 60°C
Equation	$C = .592x - 45$	$C = .602x - 50$	$C = .622x - 56$

$C = \Delta T(^{\circ}\text{C})$ Cold Plate-Ambient Air x = Capacity (Watts)

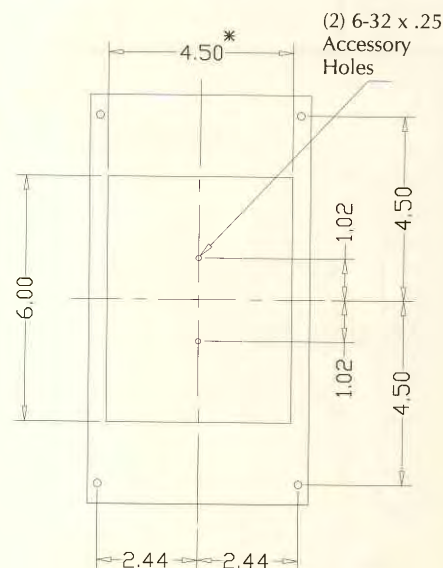
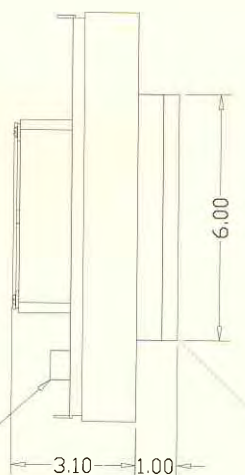
Specifications

Model	CAPACITY $0^{\circ}\Delta T$ Ambient to Cold Plate (Btu/Hr)	Voltage (Volts) * Factory Wired	Current (Amps)	Power Supply (Optional)	Temperature Control	Heat Installed (Watts)	Weight Lbs (Kg)	Operating Range ($^{\circ}\text{C}$)
AHP-300CP	265	12/24*/48 VDC	12.5/6.3/3.1	AS150F-24	Optional		6(2.7)	-10/+70
AHP-300CPHC	265	24 VDC (12 VDC Optional)	6.3	AS150F-24	Optional	72	6(2.7)	-10/+70

External Hot Side Fan



Input Terminal
Strip



*Dimensions do not include hardware, insulation. Dimensions are in inches.

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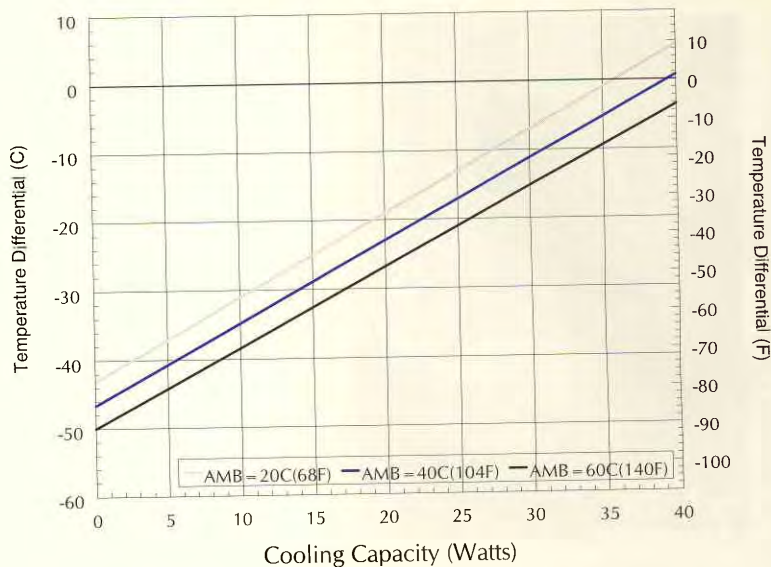
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AHP-150CP

Capacity: 125 Btu/Hr
Air Cooled Cold Plate

Performance:

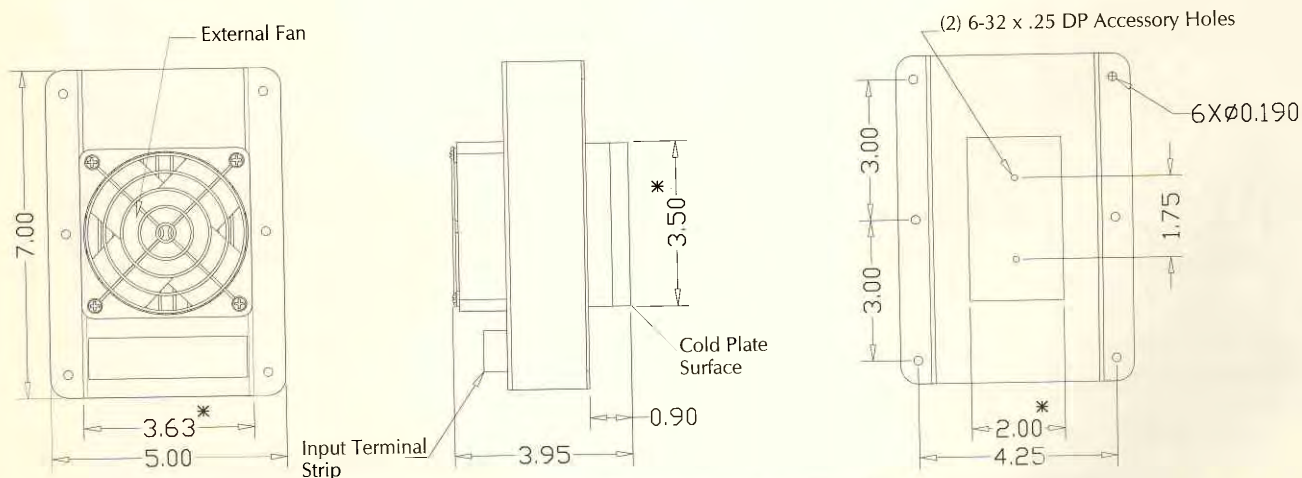
Curves & Equations
How to use, refer to page 3



	Amb = 20°C	Amb = 40°C	Amb = 60°C
Equation	$C = 1.19x - 43$	$C = 1.17x - 46$	$C = 1.16x - 50$
$C = \Delta T(^{\circ}C)$ Cold Plate-Ambient Air x = Capacity (Watts)			

Specifications

Model	CAPACITY Ambient to Cold Plate (Btu/Hr)	Voltage (Volts) *Factory Wired	Current (Amps)	Power Supply (Optional)	Temperature Control	Heat Installed (Watts)	Weight (Lbs)	Operating Range (°C)
AHP-150CP	125	12*/24 DC	6.25/3.5	AS100F-12	Optional		3.5	-10/+70
AHP-150CPHC	125	24 DC 12 VDC Optional	3.5	AS100F-24	Optional	36	3.5	-10/+70



* Dimensions do not include hardware, insulation. Dimensions are in inches.

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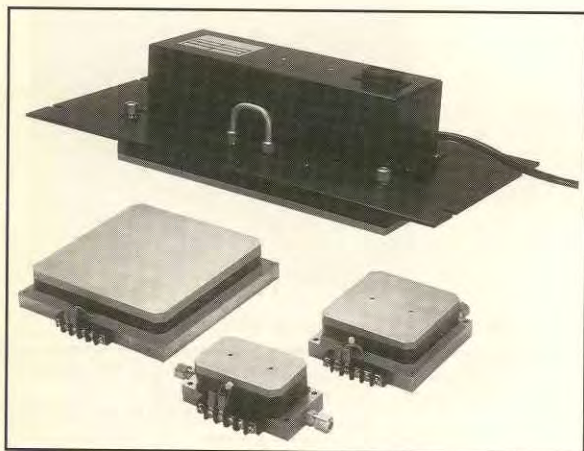
CP-Series

Liquid Cooled

RATING: 135-1500 BTU/HR

Solid State Cold Plates

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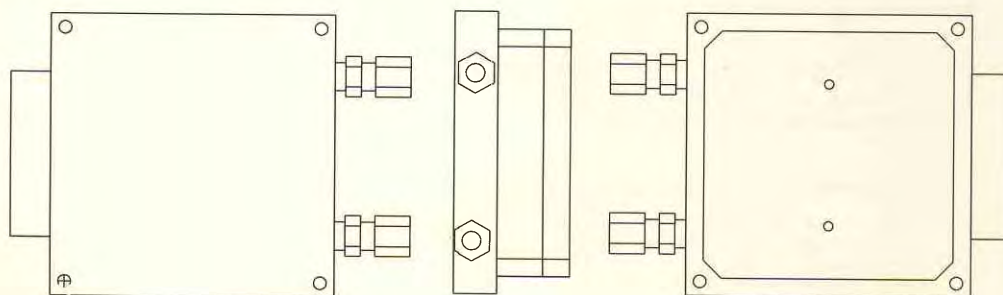
Shown from Top: 1700/800/300/150

TECA's CP-series thermoelectric cold plates are designed for applications requiring direct contact cooling. Models are available with either a DC or AC input. Our LHP type cold plates require a constant source of fluid for heat removal from the hot side heat exchanger.

The CP-Series is ideal for laboratory, medical instrumentation and component cooling such as thermal cycling, stress testing, microwell cooling, blood analyzers and electronic components.

Precise temperature control is available with our digital temperature controller model 3300.

- ◆ -20°C (No load, 25°C Amb)
- ◆ Optional Heating
- ◆ Temperature Control
- ◆ Low Maintenance
- ◆ No Compressor or Filters
- ◆ Compact
- ◆ Lightweight
- ◆ Durable
- ◆ Reliable



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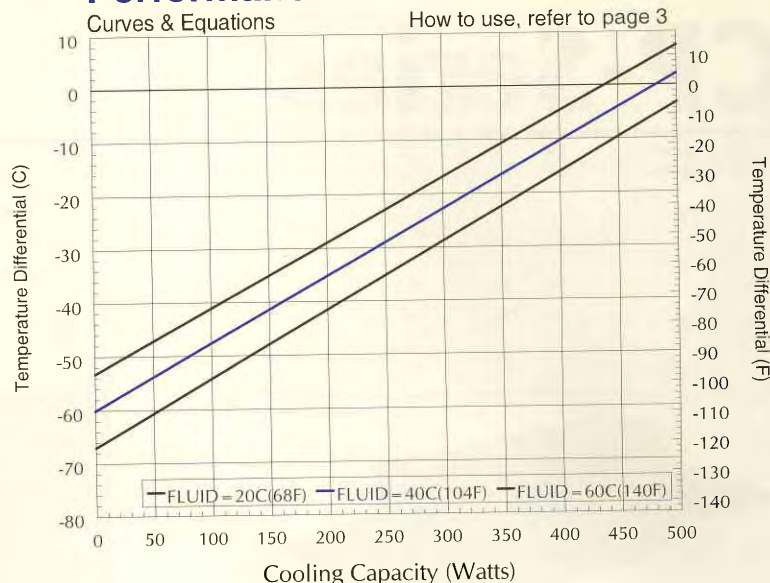
LHP-1700CP

Capacity: 1500 Btu/Hr
Liquid Cooled Cold Plate



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Performance:

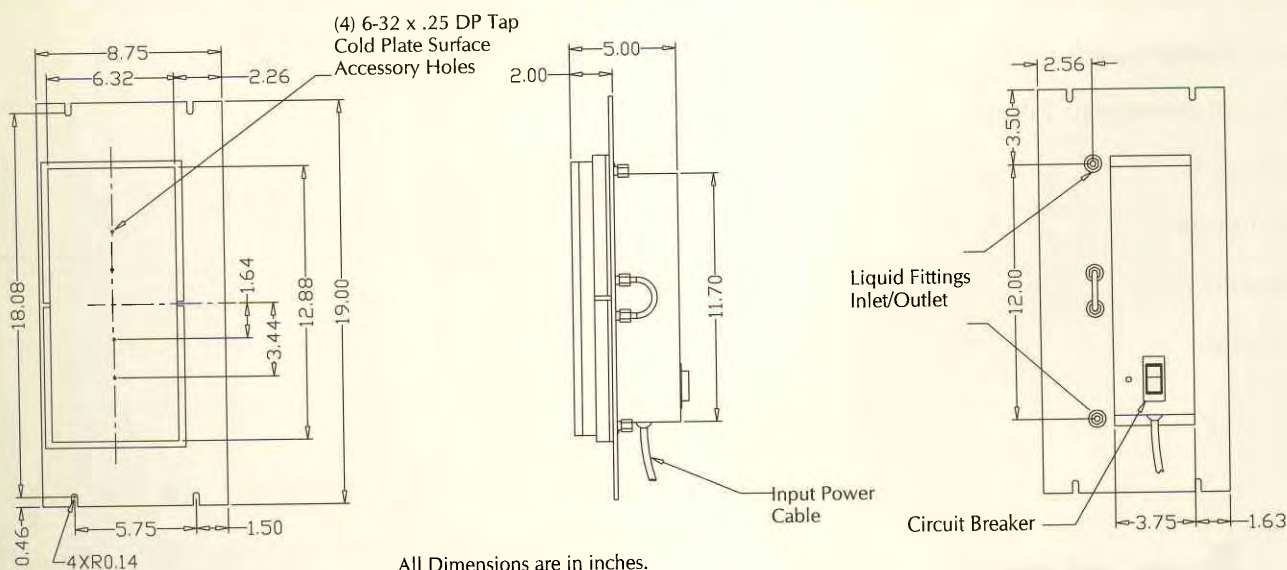


Specifications

	Amb = 20°C	Amb = 40°C	Amb = 60°C
Equation	D = .120x-53	D = .125x-60	D = .127x-66

D = ΔT (°C) Cold Plate- Inlet Fluid x = Capacity (Watts)

Model Number	RATING 0° ΔT Fluid to Cold Plate (Btu/Hr)	Minimum Flow (GPM)	Voltage (Volts)	Current (Amps)	Frequency (Hz)	Temperature Control	Weight Lbs	Heat Installed (Watts)	Operating Range (°C)
LHP-1700CP	1500	0.5	115 AC	8	50/60	Optional	20		-30/ +80
LHP-1702CP	1500	0.5	230 AC	4.5	50/60	Optional	20		-30/ +80
LHP-1700CPHC	1500	0.5	115 AC	8	50/60	Optional	20	400	-30/ +80
LHP-1702CPHC	1500	0.5	230 AC	4.5	50/60	Optional	20	400	-30/ +80



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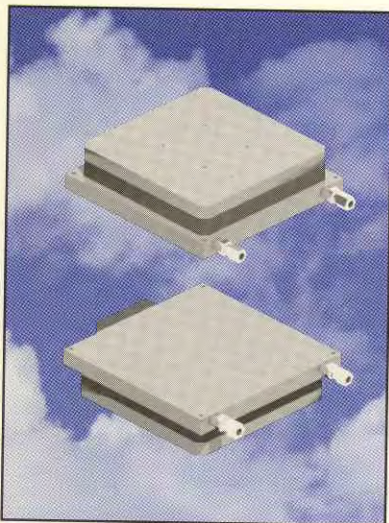
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LHP-800CP

Capacity: 750 Btu/Hr
Liquid Cooled Cold Plate

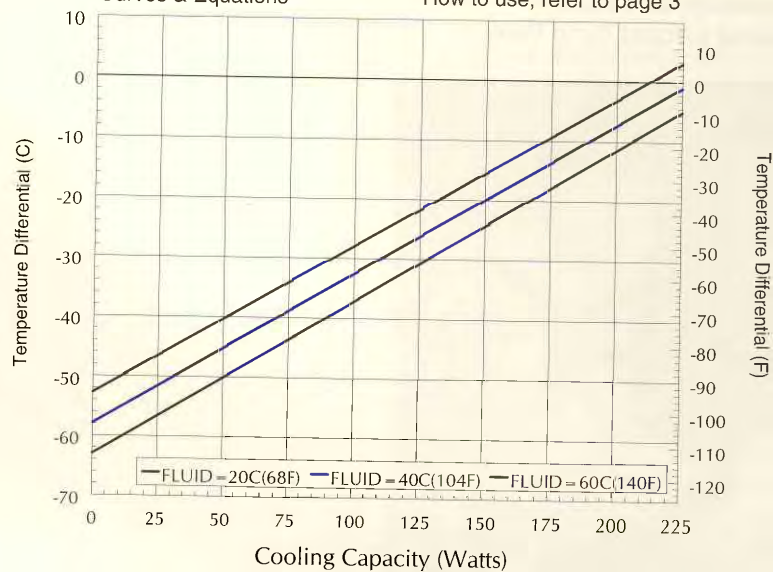
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Performance:

Curves & Equations

How to use, refer to page 3

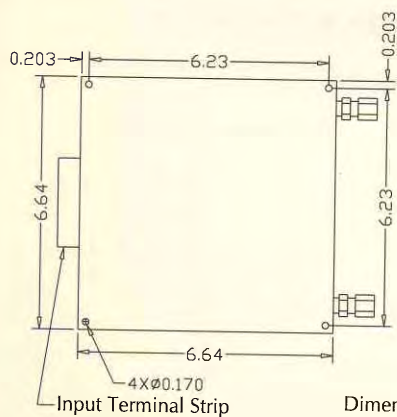


	Amb = 20°C	Amb = 40°C	Amb = 60°C
Equation	$D = .242x - 52$	$D = .252x - 58$	$D = .257x - 63$

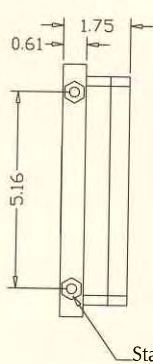
$D = \Delta T(^{\circ}\text{C})$ Cold Plate- Inlet Fluid x = Capacity (Watts)

Specifications

Model	RATING $0^{\circ}\Delta T$ Fluid to Cold Plate (Btu/Hr)	Minimum Flow (GPM)	Voltage (Volts)	Current (Amps)	Weight (Lbs)	Power Supply Option	Heater Voltage	Heat Installed (Watts)	Operating Range (°C)
LHP-800CP	750	0.5	30 DC	10	5.2				-30/+80
LHP-810CP	750	0.5	130 DC	4	5.2	PS-130			-30/+80
LHP-800CPHC	750	0.5	30 DC	10	5.2		115 AC	200	-30/+80
LHP-810CPHC	750	0.5	130 DC	4	5.2	PS-130HC	115 AC	200	-30/+80

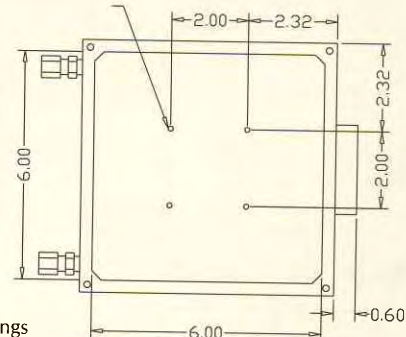


Dimensions are in inches.



Stainless Steel Liquid Fittings

(4) 6-32 x .25 DP Accessory Holes



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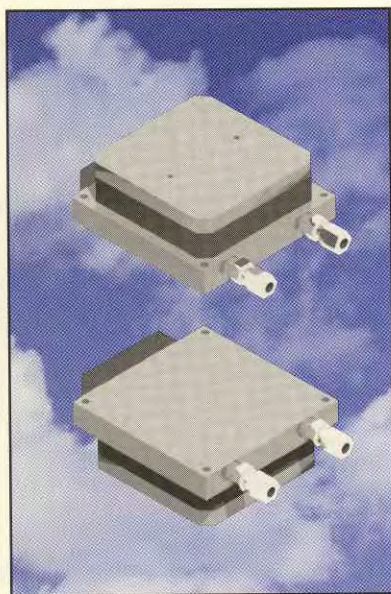
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LHP-300CP

Capacity: 300 Btu/Hr
Liquid Cooled Cold Plate

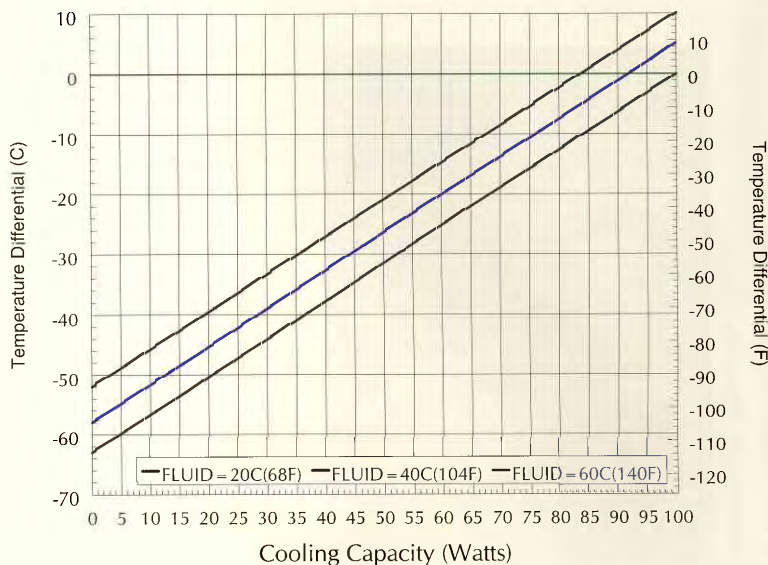
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Performance:

Curves & Equations

How to use, refer to page 3

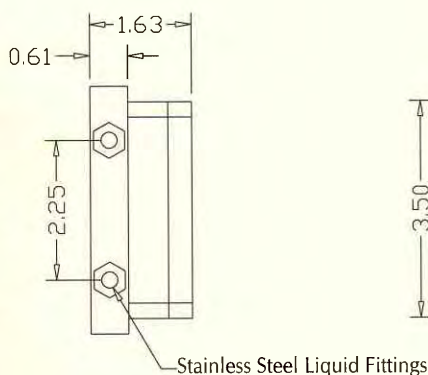
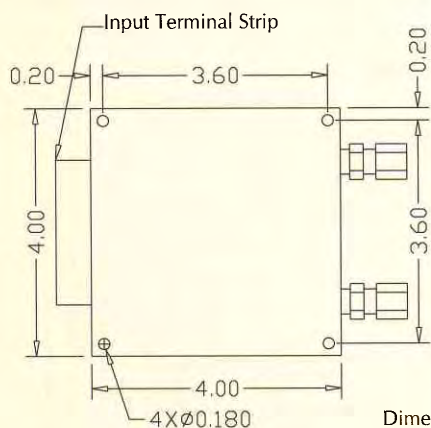


	Amb = 20°C	Amb = 40°C	Amb = 60°C
Equation	D = .620x-52	D = .630x-58	D = .630x-63

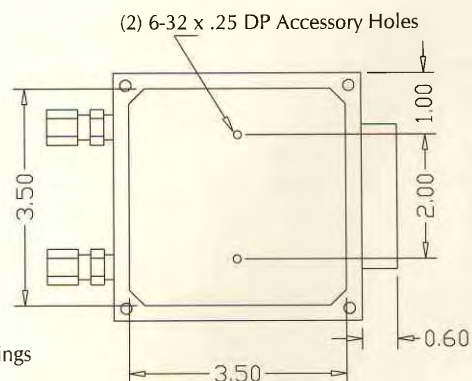
D = $\Delta T(^{\circ}\text{C})$ Cold Plate- Inlet Fluid x = Capacity (Watts)

Specifications

Model	RATING $0^{\circ}\Delta T$ Fluid to Cold Plate (Btu/Hr)	Minimum Flow (GPM)	Voltage (Volts)	Current (Amps)	Weight (Lbs)	Power Supply Option	Heater Voltage	Heat Installed (Watts)	Operating Range ($^{\circ}\text{C}$)
LHP-300CP	300	0.1	24 DC	4.5	1.8	AS100F-24			-30/+80
LHP-300CPHC	300	0.1	24 DC	4.5	1.8	AS100F-24	24 VDC	72	-30/+80



Dimension are in inches.



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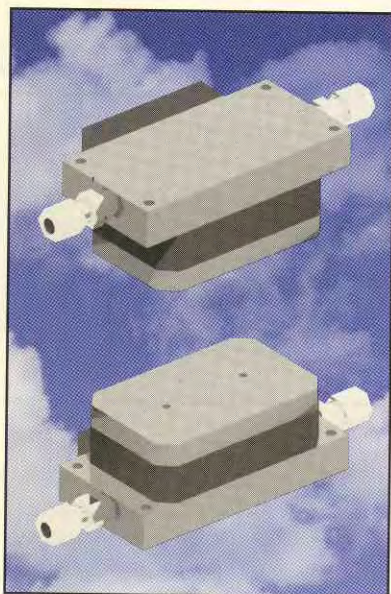
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LHP-150CP

Capacity: 135 Btu/Hr
Liquid Cooled Cold Plate

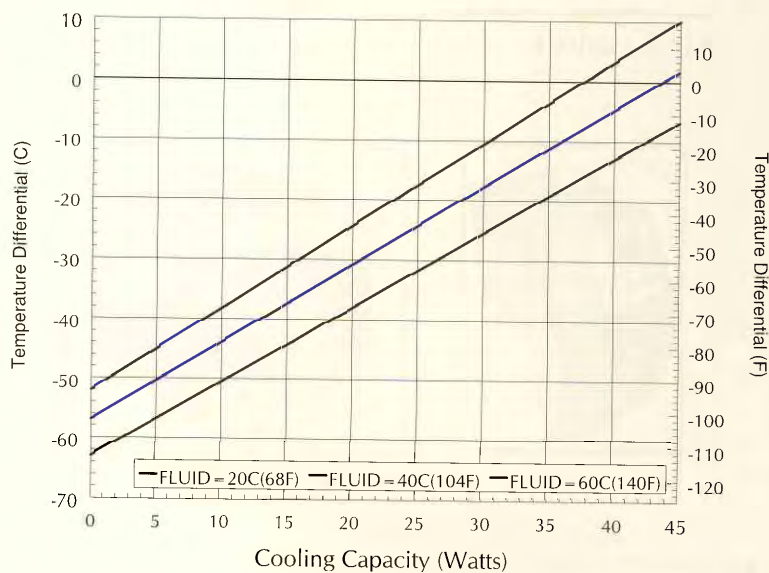
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Performance:

Curves & Equations

How to use, refer to page 3

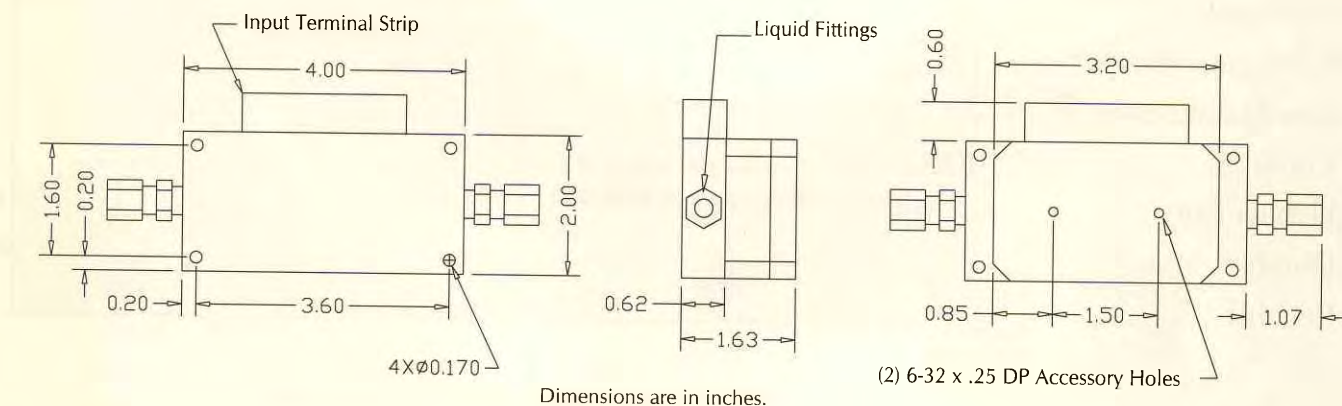


	Amb = 20°C	Amb = 40°C	Amb = 60°C
Equation	D = 1.40x-52	D = 1.29x-57	D = 1.26x-63

D = $\Delta T(^{\circ}\text{C})$ Cold Plate- Inlet Fluid x = Capacity (Watts)

Specifications

Model	RATING $0^{\circ}\Delta T$ Fluid to Cold Plate (Btu/Hr)	Minimum Flow (GPM)	Voltage (Volts)	Current (Amps)	Weight Lbs	Power Supply Option	Heater Voltage	Heat Installed (Watts)	Operating Range ($^{\circ}\text{C}$)
LHP-150CP	135	0.1	12 DC	4.5	.75	AS60-12			-30/+80
LHP-150CPHC	135	0.1	12 DC	4.5	.75	AS60-12	24 VDC	72	-30/+80



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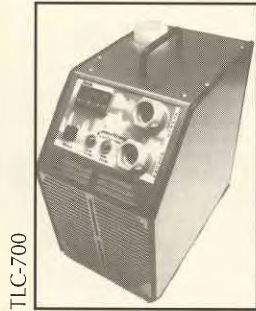
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ameritempTM series

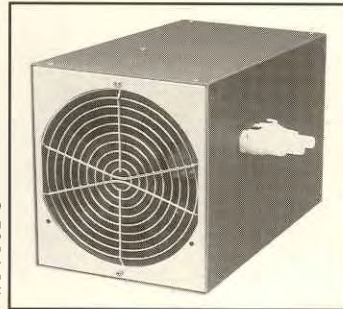
Air Cooled

RATING: 200-400 Watts

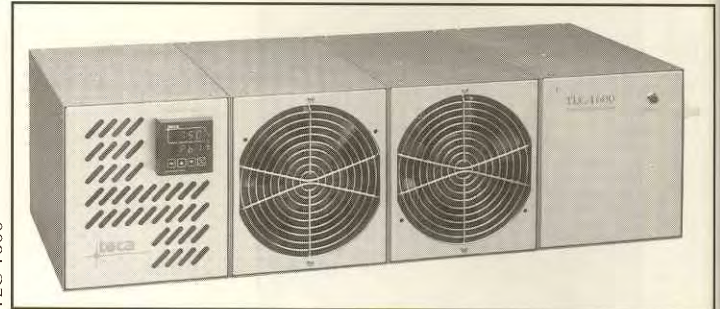
Solid State Chillers



TLC-700

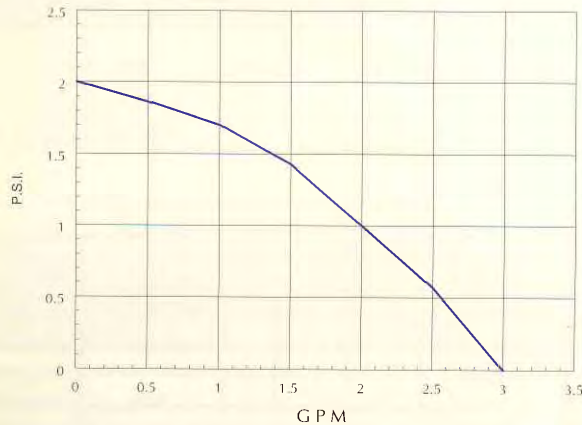


ALC-750DC

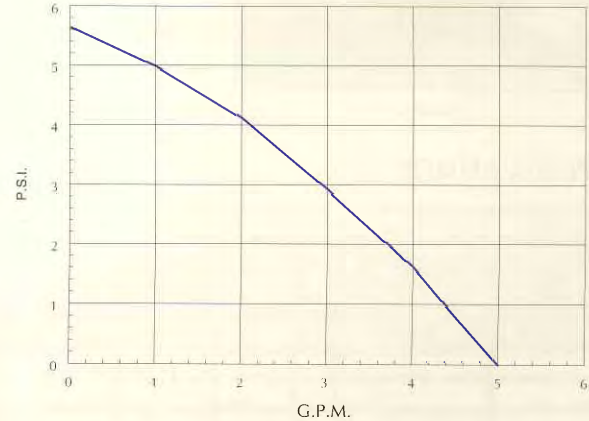


TLC-1600

Pump Curve: TLC-700



Pump Curve: TLC-1600



- ◆ Solid State Design
- ◆ No Filters
- ◆ No Compressor
- ◆ Low Maintenance
- ◆ Compact
- ◆ Lightweight
- ◆ Durable
- ◆ Reliable

Teca's AmeritempTM Series liquid chillers are designed to cool fluid in either a recirculating flow with our TLC units or you supply the fluid flow with our ALC types. A pump and reservoir are included with all TLC models. Our TLC-700 compact design chiller is our newest addition. This model contains a temperature controller, reservoir, low level and fluid alarms, along with external insulated plumbing lines. The ALC chiller does not contain a pump and reservoir to allow for flexibility in pumping requirements. This DC model is available in other voltages such as 12 or 48 VDC.

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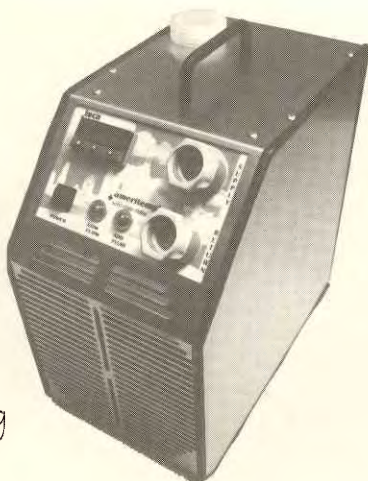
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new TLC-700

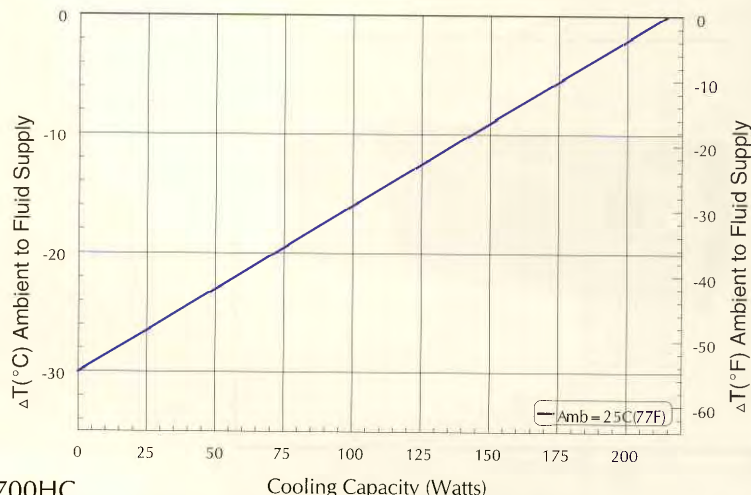
Standard Features:

- ✧ 215 Watt Capacity
- ✧ PID Temperature Control
- ✧ Low Fluid/Flow Warning
- ✧ Fluid Quick Connects
- ✧ External Plumbing

✧ ✧ stainless steel housing



Performance:

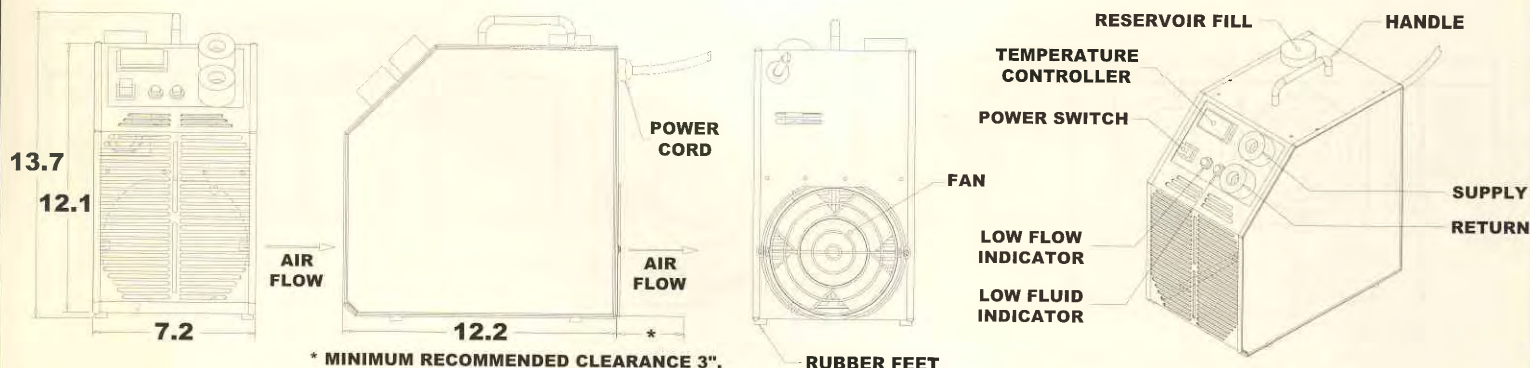


Specifications

Optional Heating: Specify TLC-700HC

Model Number	Capacity Btu/Hr(Watts)	Voltage (Volts)	Current (Amps)	Frequency (Hz)	Weight Kg(Lbs)	Maximum Ambient	Heating (Optional)
TLC-700	735(215)	115 VAC	4.2	50/60	13.6(30)	50°C(+122°F)	200 Watt
Control Stability	Control	Housing	Liquid Jacket	Reservoir Capacity	Pump Flow Max Pressure	External Plumbing Provided with Shipment	Size (Inches)
< +/- 0.5°C	Digital Display 0.1°C Indication	Stainless Steel Type 304	Aluminum Type 6063	500 mL 0.13 Gal	2 ½ LPM (.66 GPM) Open Flow 2 PSI, 4.6 Head in Feet	6 Foot Supply & Return Reinforced 3/8" ID PVC Tubing with Insulation	13.69 x 7.2 x 12.2

TECA's AmeritempTM Series Chillers are a compact and reliable alternative to conventional recirculating coolers. A complete integrated package is now offered in a standard configuration. Precise temperature control and external plumbing lines with quick connectors are included with our base model. Options such as heating, temperature alarm (cool only), RS-232 & Computer Communications software are offered as well. WindowsTM based software includes logging, charting, remote configuration and set point adjustment. The AmeritempTM is ideal for bench-top or portable applications such as laboratory, laser, x-ray, out-patient and medical therapy as well as many others.



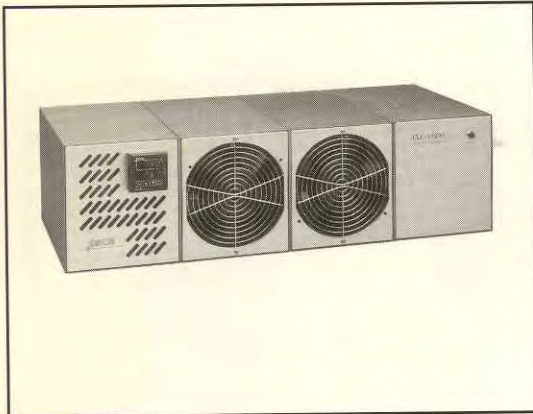
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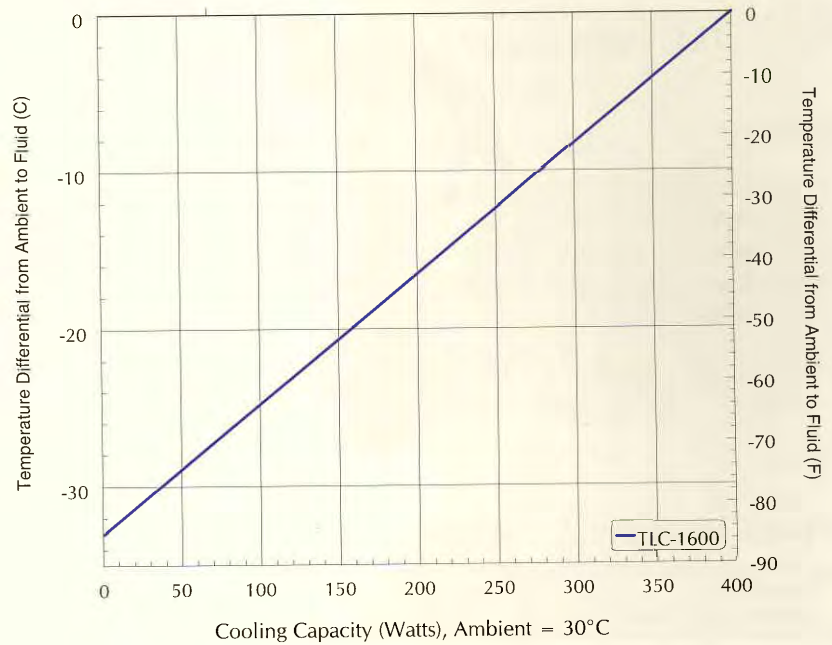
TLC-1600

Rating: 400 Watts, 1365 Btu/Hr
Solid State Liquid Chiller



Shown with optional controller

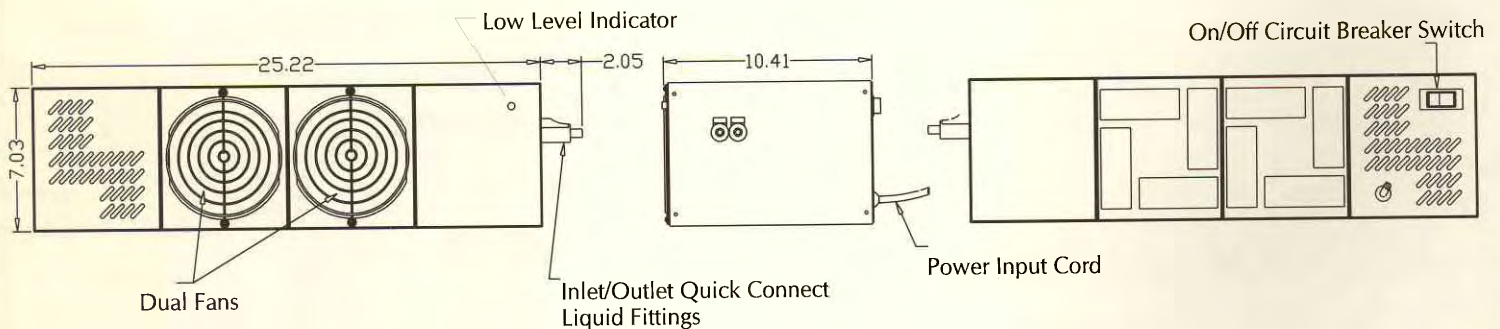
Performance:



Specifications

Model Number	RATING Ambient to Fluid (Btu/Hr)	Voltage (Volts)	Current (Amps)	Fan DB Noise Rating	Temp Control	Weight Kg(Lbs)	Materials in contact with fluid	Max Fluid Temp. (°C)
TLC-1600	1365	115 VAC	6	49/53 Opt. 30 DB Low Noise	Optional 3300 Integral	23.4(51.5)	Aluminum, PVC, Delrin®, Brass, Polypropyent, Ceramic, Viton®, 316 Stainless	55

Dimensions (inches)



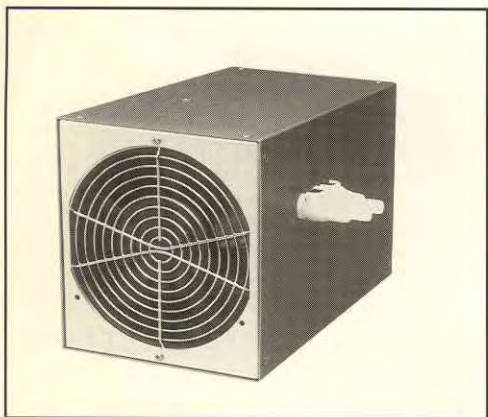
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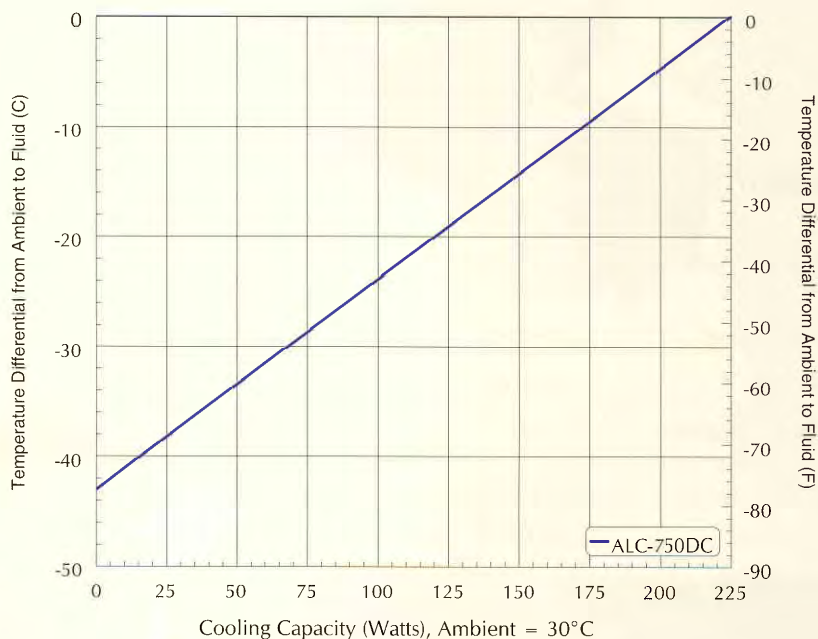
ALC-750DC*

Rating: 250 Watts, 850 Btu/Hr
Solid State Liquid Chiller



*Requires External Pump

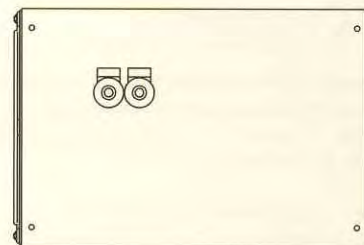
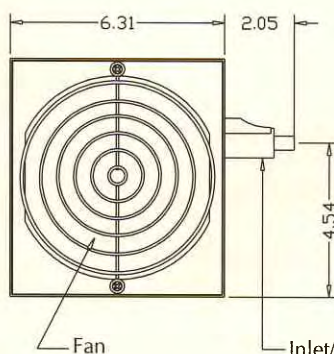
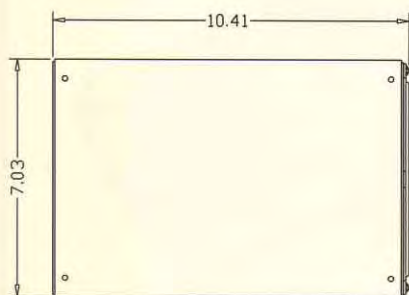
Performance



Specifications

Model Number	RATING Ambient to Fluid (Btu/Hr)	Voltage (Volts)	Current (Amps)	Fan DB Noise Rating	Weight Kg(Lbs)	Power Supply (Optional)	Materials in contact with fluid	Operating Range (°C)
ALC-750DC	850	24 VDC	16.5-17.5	53	6.6(14.5)	SP-500	Aluminum, PVC, Delrin®, Brass	-10/+ 70

Dimensions (inches)



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Temperature Controllers



Featuring

Front panel display	000.0 Digital High Brightness Display
Operator lockout	Included
Ramp/Soak	Included
Type	P.I.D.
Auto tuning	Included
Data retention	Included
Size (1/32 DIN)	2" w x 1.2" h x 4.57" d
Weight	3.9 oz
Power Input	AC & DC Models
Sensor (Provided)	T-Type (6' Length cable)
Calibration Accuracy	+/- 0.25% of span +/- 1 LSD
Control Stability	Application Dependant Typically < +/- 1°C
Ambient Range	0-50°C (32-130°F)
Approvals (pending)	UL873, EN 61010, CSA 22.2 No. 1010.1-92
EMC Emission:	EN50081-1 FCC Rules 15 subpart J Class A
EMC Immunity:	EN50082-2
Sensor Range (T-Type)	-200°C to +250°C

PC Compatible

Communications and communications software are available for PC supervision, offering remote adjustment, instrument configuration, cloning, saving and retrieving instrument settings to files together with logging and charting in real time.

To gain the full benefit of the COMMS software, it is recommended that the PC is fitted with a Pentium® Processor and is running Windows™ 95/98 Windows™ NT programs. A minimum of 16 Mb Ram is recommended, together with 20 Mb of hard disc space, to allow ample space for logging files.

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Model 3300 is a digital, microprocessor based temperature controller designed to be used in conjunction with TECA heat pumps. When ordering a complete package, simply plug in the control cable and with factory preset tuning already provided, you are ready to go!

All models are designed with a Nema-4X front panel for corrosion and water resistance. This is ideal for applications such as food processing and food packaging, where equipment needs to be cleaned frequently. Features such as auto-tuning, dual output, and single input are available from these controllers. Each unit comes with factory default programming, but can be user modified through a setup menu.

Part Number

3	3	0	0	-	▲	-	○	●	□
---	---	---	---	---	---	---	---	---	---

⊙ (Standard)

▲ OUTPUT

0	Single Output (Cool Only)	⊙
1	Dual Output (Cool/Heat)	

○ INPUT

0	AC Input 100-240 VAC	⊙
1	DC Input 12-24 VDC	

● SOLID STATE RELAY

0	Internal Relay(s) *Choose this option if ordering with AC input TECA units. Relay(s) are contained within the power supply.	⊙
1	External Relay(s) AC load (10 amp)	
2	External Relay(s) DC load (20 amp)	

□ COMMUNICATIONS

0	No Communications	⊙
1	RS-232	
2	RS-485	

SOFTWARE (ORDER SEPARATELY)
Windows™ Based, Includes Software Manual

Part Number: 100-1GB-300

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Reed Switch Thermostats

TC-6F

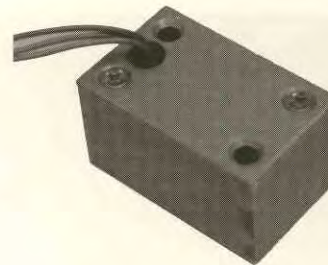


Relay/Switch Not Shown

Model TC-6F (Cool Only) thermostat is designed using two magnetic reed sensing switches in conjunction with a solid state relay. A three position switch is provided to adjust between the following settings:

Position	Control Temp.	Tolerance	Reset Differential
1	35°C	+/-5°C	10°C Maximum
2	25°C	+/-5°C	10°C Maximum
3	Continuous		

TC-3F

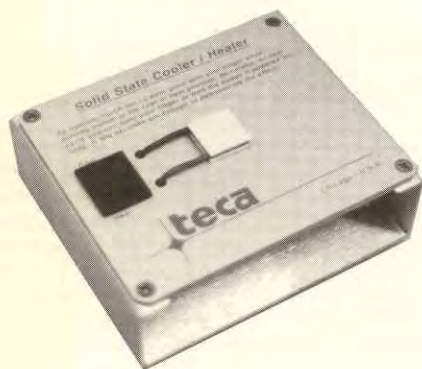


Relays Not Shown

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

Mode	Control Temp.	Tolerance	Reset Differential
Cooling	35°C	+/-5°C	10°C Maximum
Heating	10°C	+/-5°C	10°C Maximum

TE-100 Demonstration Device



The TE-100 is a demonstration device for the concept of thermoelectric cooling. A thermoelectric module is bonded to an aluminum plate. To demonstrate the concept, simply place your finger on the top of the ceramic plate. Adjust the toggle switch to either cool or heat.

4 AA batteries are included.



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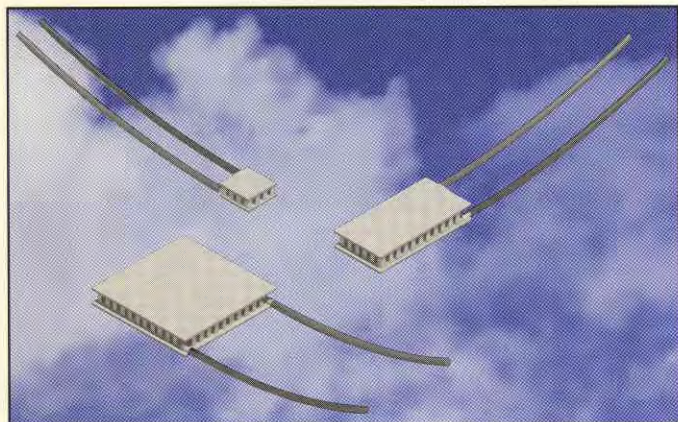
T.E. Modules

RATING: 6-235 BTU/HR

Single Stage

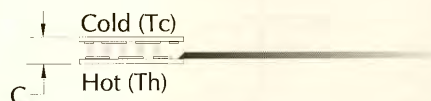
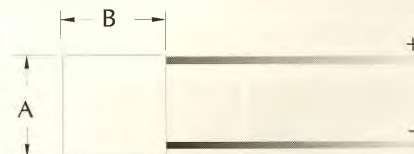
Thermoelectric Cooling Modules

All Products • Made in U.S.A.

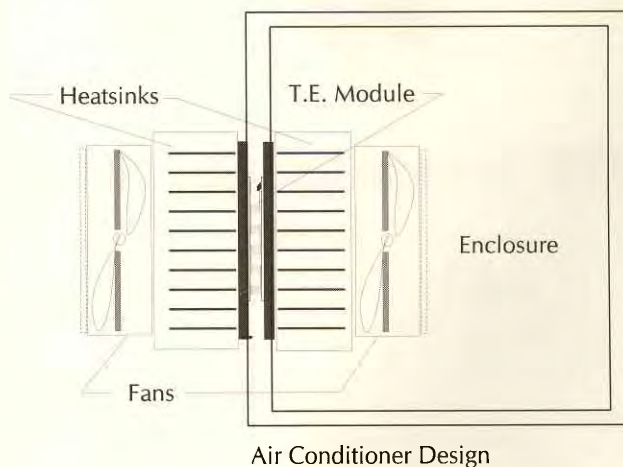
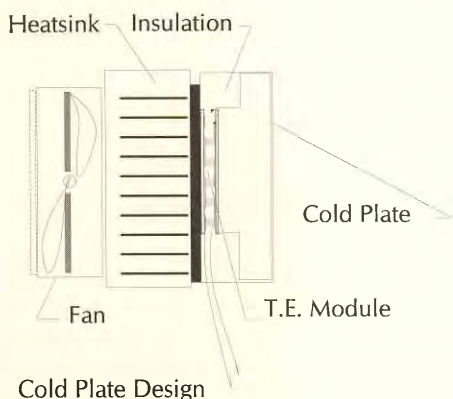


Solid state thermoelectric modules are a silent, compact, and reliable method of heat removal. Applications ranging from missile guidance systems to portable refrigerators are only limited by the imagination of the designer. System simplicity assures ease of adapting to thermoelectric heat pumping. Thermoelectrics have no compressor or piping, eliminating compressor maintenance and coolant leakage. Modules can be converted from cooling to heating by a reversal of the power input.

- ◆ Operates from -150°C to $+80^{\circ}\text{C}$
- ◆ No vibration, noise
- ◆ Operates in any orientation
- ◆ Can operate in cooling or heating mode
- ◆ No moving parts
- ◆ No compressor, or piping required
- ◆ Lightweight
- ◆ Reliable



Example Designs



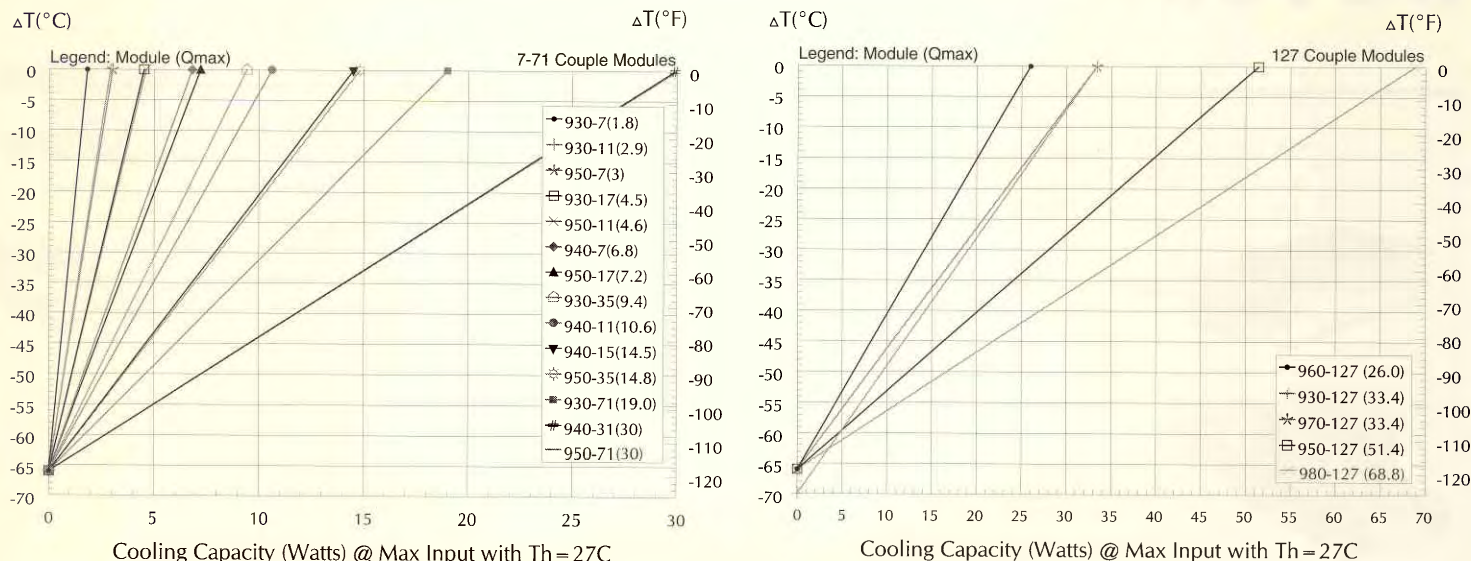
Note: For improved efficiency and smaller heat sink dimensions, operate t.e. modules @ 75% of maximum rated voltage and current.

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Performance Curves



Specification Chart

Module Number	I Max Current Amps	Q Max Cooling Watts	V Max Voltage Volts (DC)	Nominal Resistance Ω @ 25°C	ΔT Max T_h/T_c $^{\circ}\text{C}$	Dimension A in (cm) $\pm .042(.11)$	Dimension B in (cm) $\pm .042(.11)$	Dimension C in (cm) $\pm .008(.02)$	Wire Gauge (Awg)	Wire Length (Inches)
930-7DL	3.7	1.8	0.8	$0.20 \pm .02$	66	0.38 (.965)	0.38 (.97)	0.185 (.47)	20	6
930-11DL	3.7	2.9	1.2	$0.32 \pm .05$	66	0.38 (.965)	0.57 (1.46)	0.185 (.47)	20	6
930-17DL	3.7	4.5	1.9	$0.49 \pm .04$	66	0.57 (1.46)	0.57 (1.46)	0.185 (.47)	20	6
930-35DL	3.7	9.4	3.9	$1.00 \pm .07$	66	0.57 (1.46)	1.18 (3.00)	0.185 (.47)	20	6
930-71DL	3.7	19.0	8.0	$2.03 \pm .15$	66	1.18 (3.00)	1.18 (3.00)	0.185 (.47)	18	4.5
940-7DL	14.0	6.8	0.8	$0.06 \pm .01$	66	0.57 (1.46)	0.57 (1.46)	0.18 (.46)	18	6
940-11DL	14.0	10.6	1.2	$0.08 \pm .01$	66	0.57 (1.46)	0.85 (2.16)	0.18 (.46)	18	6
940-15DL	14.0	14.5	1.7	$0.12 \pm .01$	66	0.57 (1.46)	1.18 (3.00)	0.18 (.46)	18	6
940-31DL	14.0	30.0	3.5	$0.24 \pm .02$	66	1.18 (3.00)	1.18 (3.00)	0.18 (.46)	18	4.5
950-7DL	6.0	3.0	0.8	$0.13 \pm .01$	66	0.38 (.965)	0.38 (.965)	0.15 (.38)	20	6
950-11DL	6.0	4.6	1.2	$0.18 \pm .02$	66	0.38 (.965)	0.57 (1.46)	0.15 (.38)	20	6
950-17DL	6.0	7.2	1.9	$0.32 \pm .03$	66	0.57 (1.46)	0.57 (1.46)	0.15 (.38)	20	6
950-35DL	6.0	14.8	3.9	$0.65 \pm .05$	66	0.55 (1.40)	1.18 (3.00)	0.15 (.38)	20	6
950-71DL	6.0	30.0	8.0	$1.32 \pm .10$	66	1.18 (3.00)	1.18 (3.00)	0.15 (.38)	18	4.5
930-127DL	3.9	33.4	15.4	$3.62 \pm .26$	70	1.57 (3.99)	1.57 (3.99)	0.185 (.47)	18	4.5
950-127DL	6.0	51.4	15.4	$2.36 \pm .17$	66	1.57 (3.99)	1.57 (3.99)	0.15 (.38)	18	4.5
960-127DL	3.0	26.0	15.4	$4.22 \pm .30$	66	1.18 (3.00)	1.18 (3.00)	0.142 (.38)	24	4.5
970-127DL	3.9	33.4	15.4	$3.51 \pm .25$	66	1.18 (3.00)	1.18 (3.00)	0.126 (.32)	24	4.5
980-127DL	8.5	68.8	15.4	$1.63 \pm .12$	66	1.57 (3.99)	1.57 (3.99)	0.130 (.33)	18	4.5

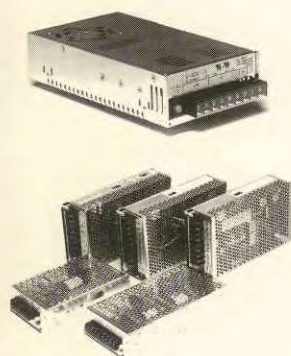
Flatness and parallelism .0015" for all modules except 127 series which is .0020"

Optional versions (suffix -1, adds $\pm .001$ " tolerance, suffix -2, adds $\pm .0005$ " tolerance)

Temperature Range -150°C to $+80^{\circ}\text{C}$

Both hot and cold side surfaces lapped flat, Type DL

DC Power Supplies



FEATURING:

- ✧ 60-300 Watts
- ✧ 12/24 VDC Models
- ✧ 115/230 VAC Input
- ✧ High Efficiency
- ✧ 47-440 Hz Input

OUTPUT POWER	300 WATTS	150 WATTS	100 WATTS	60 WATTS
MODEL NUMBER	SP300-12 SP300-24	AS150F-12 AS150F-24	AS100F-12 AS100F-24	AS60-12 AS60-24
DC Output Voltage, VDC	-12 = 12 VDC -24 = 24 VDC	-12 = 12 VDC -24 = 24 VDC	-12 = 12 VDC -24 = 24 VDC	-12 = 12 VDC -24 = 24 VDC
Output Tolerance, %	+/-1	+/-1	+/-1	+/-1
Output Rated Current, A	24/12.5	12.5/6.5	8.5/4.5	5/2.5
Ripple/Noise, mV Pk-Pk	120/150	120/150	125/150	100/100
Line Regulation, %	+/- .3, +/- .2	+/- .3, +/- .2	+/- .3, +/- .2	+/- .3, +/- .2
DC Output Power, Watts	300	150	100	60
Efficiency, %	82/86	82/85	70/83	77/81
DC Voltage Adjust, % Vout	+/-10	+/- 10	+/- 10	+/- 10
Input Voltage Range, VAC	85-264 Universal	88-132 or 170- 264 switch selected	88-132 VAC, 176-264 VAC Jumper Selected	85-264 Universal
Frequency, Hz	47-440	47-440	47-440	47-440
AC Current,	6A @ 115 3A @ 230	3.2@ 115 1.6@ 230	2A @ 115 1A @ 230	2A @ 115 1A @ 230
Inrush Current, A (115/230)	15/30	30	20/40	25/50
Overload Protection	105-135%, Type Foldback, Reset: Auto	105-150%, Type Foldback, Reset: Re power on	105-150%, Type Foldback, Reset: Auto	105-150%, Type Foldback, Reset: Auto
Over Voltage Protection	115-145% of Vout, Nominal	115-135% of Vout, Nominal	115-135% of Vout, Nominal	115-135% of Vout, Nominal
Over Temperature Protection	n/a	n/a	n/a	n/a
Working Temperature/Humidity	0-40°C 20-90% RH	-10 to +60°C, 20-90%RH	-10 to +60°C, 20-90%RH	-10 to +60°C, 20-90%RH
Storage Temperature/Humidity	-20 to +85°C 10-90% RH	-20 to +85°C, 10-95%RH	-20 to +85°C, 10-95%RH	-20 to +85°C, 10-95%RH
Dimensions	9" x 4.5" x 1.9"	7.8" x4.3" x 1.9"	7.8" x4.3" x 1.9"	6.25" x 3.8"x1.5"
Weight	2.6 lb	1.76 lb	1.4 lb	1.2 lb
Safety Specification	UL1012, TUV EN60950 (IEC 950, UL 1950)	UL1012, TUV EN60950 (IEC 950, UL 1950)	UL1012, TUV EN60950 (IEC 950, UL 1950)	UL1012, TUV EN60950 (IEC 950, UL 1950)
EMC Specification	CISPR22(EN5502 2) Class B	CISPR22(EN5502 2) Class B, IEC801-1,2,3,4, IEC555-2 Verification	CISPR22(EN5502 2) Class B, IEC801-1,2,3,4, IEC555-2 Pending	CISPR22(EN5502 2) Class B, IEC801-1,2,3,4, IEC555-2 Verification

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Ordering information:

- ◆ You may order by telephone during business hours or
- ◆ By fax or e-mail 24 hours a day or
- ◆ By mail on your purchase order form or company letterhead.

All orders are always 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 any sales or other taxes. Applicable taxes will be shown as a separate item on the invoice, as will charges for freight.
- ◆ Prices are in USD 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, L.O.C. or C.O.D. may be requested.

Cancellation, Schedule Changes

- ◆ A charge of 15% of net price will be assessed for cancellation of formally accepted orders. On special equipment and custom modified equipment orders, additional incremental cancellation charges may be made.
- ◆ 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 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: (a) TECA is notified of the defect in writing by certified mail within 14 days of the date of discovery; (b) TECA may then either, at its sole discretion, inspect the product at Buyer's location, or require that the product be made available at Buyer's expense at TECA's premises for TECA's inspection within 14 days of the date of notification; and (c) 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, or credit to buyer the 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 UPON BREACH OF EXPRESS OR IMPLIED WARRANTY OR ANY OTHER DAMAGES WHETHER SPECIAL, INDIRECT, INCIDENTAL, CONSEQUENTIAL, LOST PROFITS, BUSINESS INTERRUPTION, OR LOSS OF BUSINESS OR CUSTOMER RELATIONSHIPS.**

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