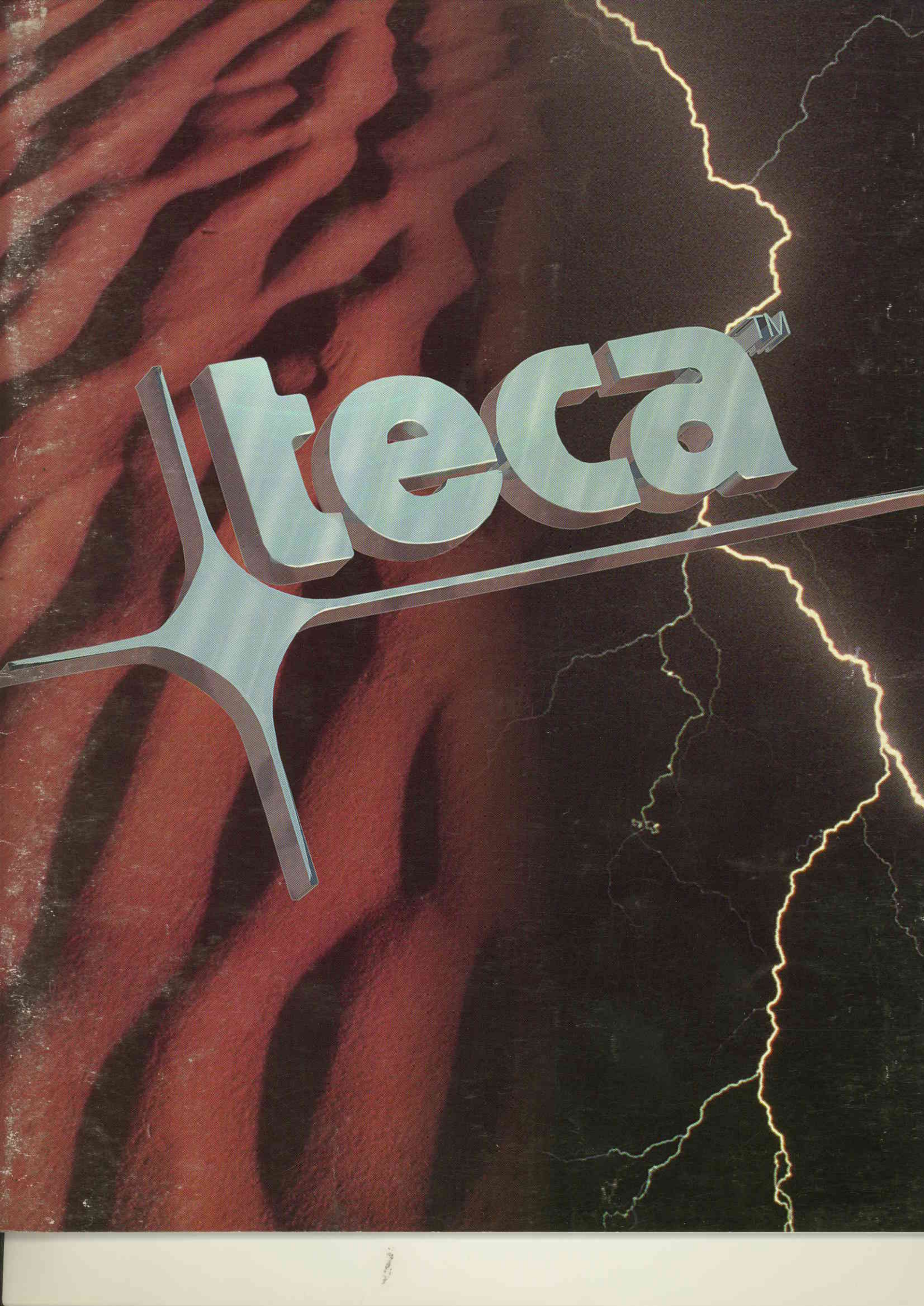

teca™

WORLD CLASS COOLING PRODUCTS CATALOG

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 explosive (Class 1 Division 2) locations. 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.

Reliability

Since the cooling is based on solid-state technology, moving components that clog or wear out are not required. All products we build are environmentally safe, unlike conventional refrigeration methods which employ CFC's (chloroflourocarbons), corrosive liquids and gases.

Total Quality Program

Continuous in-line and final quality assurance inspections are implemented. This insures that all components, throughout the assembly process, provide 100% compliance for trouble free operation.

Whatever your application—we can fulfill all of your cooling requirements. Our engineers may have already developed a similar solution. We are available to work with you to discuss your specifications. Together we will design and build a quality system that sets the standard in thermoelectric cooling. Call us at (773) 342-4900. We'll take it from there!

teca™

TABLE OF CONTENTS

Model Number Code

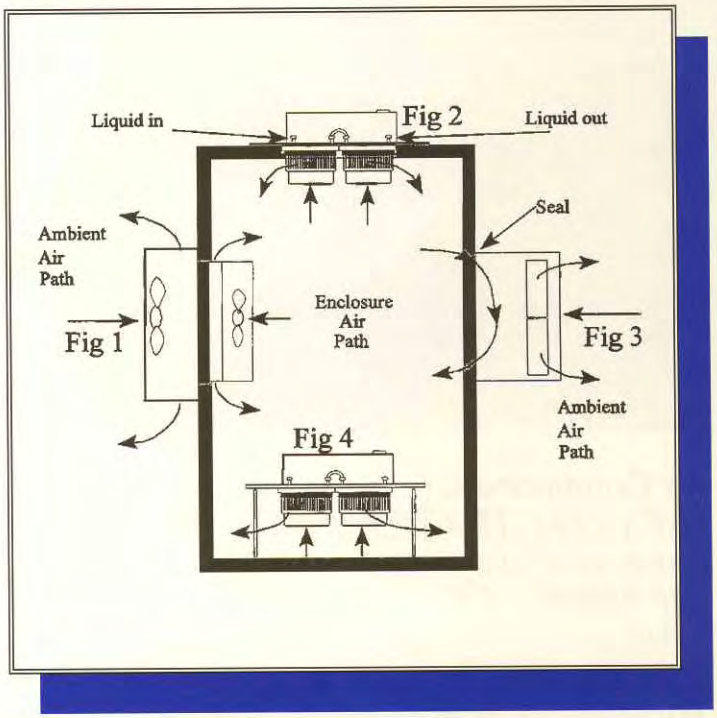
A	H	P	-	1	2	0	0	X	M	H	C

SERIES	MODEL	TYPE
AHP . . . . . Air Cooled, Thru Mount FHP . . . . . Air Cooled, Flush Mount LHP . . . . . Liquid Cooled, Thru Mount ALC . . . . . Air Cooled Liquid Chiller TLC . . . . . Air Cooled Liquid Chiller supplied with pump/reservoir	Refer to table of contents	CP . . . . . Cold Plate FF . . . . . Air Conditioner, cold side fins & fans X . . . . . Nema-4X XM . . . . . Nema-4X + Shock & Vibration XP . . . . . Nema-4X + Explosion Proof HC . . . . . Heating + Cooling

Mounting Styles*

** Since there are no fluorocarbons, units can mount in any orientation.*

Figure 1	AHP-	Thru Mount
Figure 2	LHP-	Thru Mount
Figure 3	FHP-	Flush Mount
Figure 4	LHP-	Internal Mount
	(LHP series is adaptable to explosion proof applications)	



Moisture Removal:

All FHP-Series and AHP-1400 air conditioners contain a built-in condensate removal system. TECA also offers drip pans on other models for enclosures containing high humidity or incomplete cabinet seals.

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

NEMA Type

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.

TECA Products carrying the Nema-4X designation use Mil-Spec fans, o-ring sealed power supplies, no exposed electronic components, stud/gasketed mounting, and Mil-Spec finishes on exterior. They are designed to maintain enclosure rating and perform in the rated environment.

☎ Technical Support Toll Free (888) TECA USA or (888) 832-2872

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 G^2/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

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 accidential 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 ignitible 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 saveguards against ventilation failure are provided.

Groups (A-D)

Atmospheres containing the following: acetylene, hydrogen, fuel and conbustible 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 models AHP- (1200XP, 1200XPHC, 1801XP, 1801XPHC)

UL/CSA Standards

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 models AHP- (1200XP, 1200XPHC, 1801XP, 1801XPHC)

UL-1995
CSA 22.2

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

Applies to models AHP- (1200,1201,1200HC,1201HC,1200X,1200XHC,1801,1801X,1801XHC,1801HC)

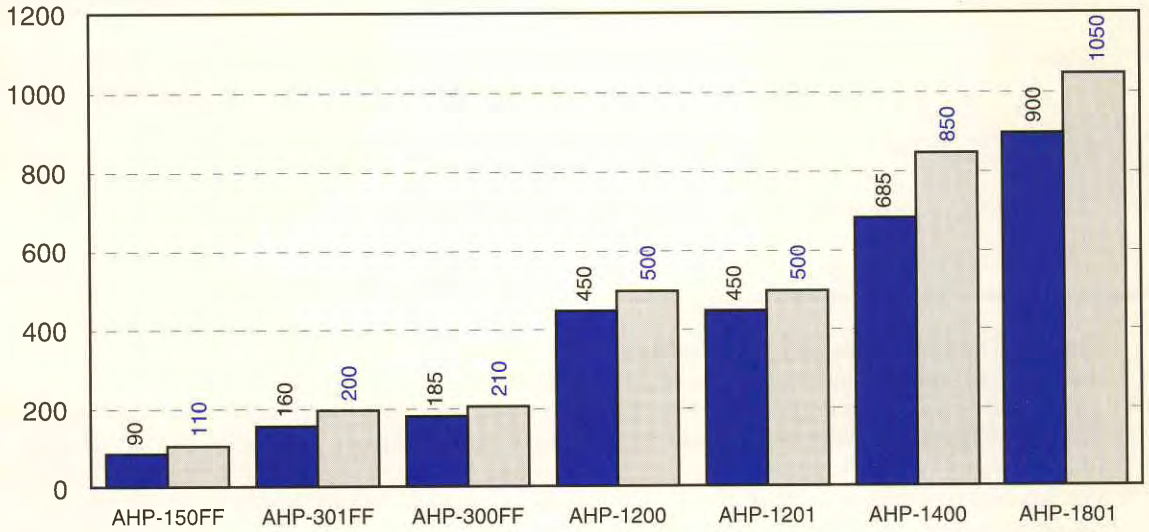
Reliability & Mean Time Between Failure (MTBF)

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 T.E. Modules, MTBF's on the order of 2-300,000 hours at room temperature,100,000 hours at elevated ambients of 80°C, have been calculated.

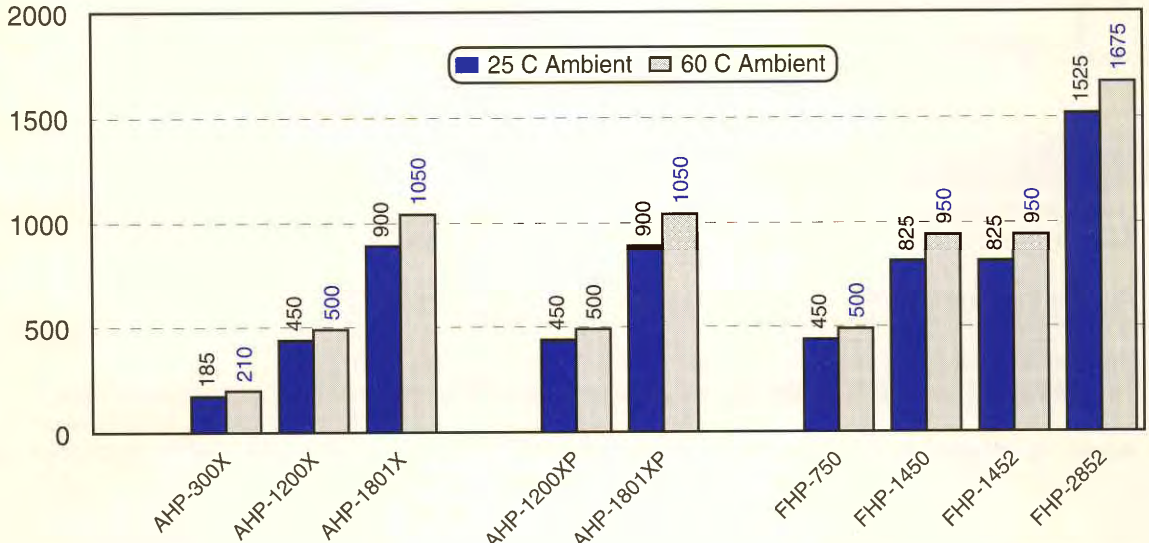
Product Selection Chart

Cooling Capacity (Btu/h)



Nema-12
Thru Mount
AIR CONDITIONERS

Cooling Capacity (Btu/h)



Nema-4X
Thru Mount
AIR CONDITIONERS

Explosion Proof
Class 1 Div 2
AIR CONDITIONERS

Nema-12
Flush Mount
AIR CONDITIONERS

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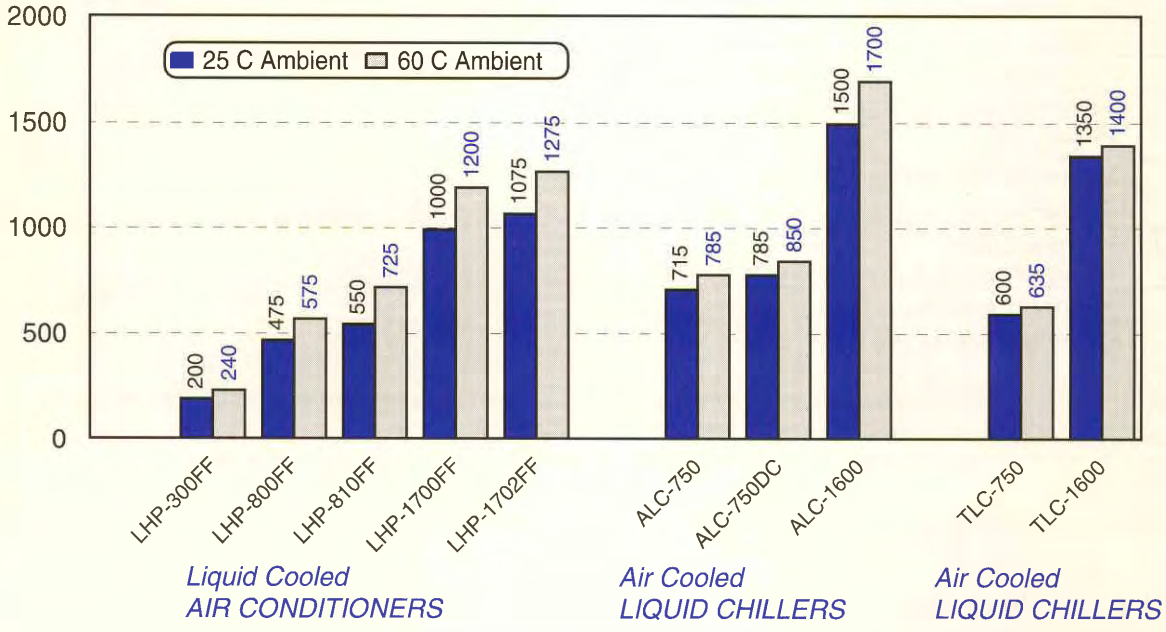

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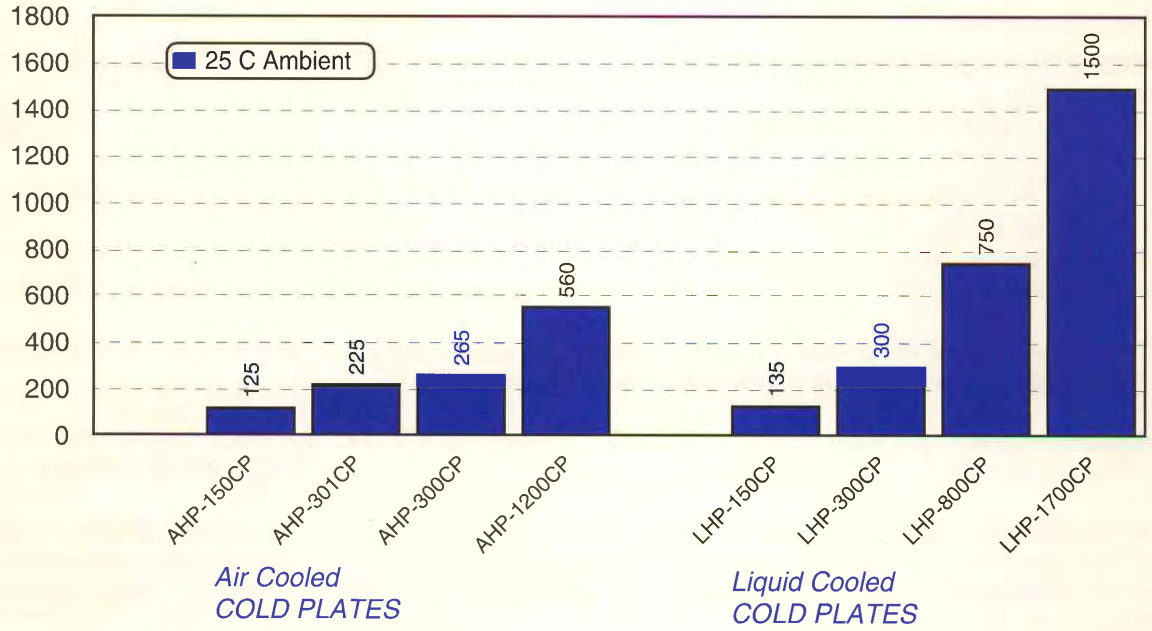


Air Conditioner Sizing:

To size an air conditioner proceed with the following 7 steps.
A free standing enclosure (3' x 3' x 2') with 1" insulation has been provided as an example.

STEP			English	Metric
#1:	(Ta)	Determine the maximum ambient (outside) air temperature ✍ *(9/5 x °C) +32 = °F or 5/9 (°F-32) = °C*	+120° F	+50° C
#2:	(Te)	Determine the maximum allowable enclosure air temperature	+100° F	+38° C
#3:	(▵T)	Determine temperature differential (Step 2- Step 1) ✍ *9/5 x ▵°C = ▵°F or 5/9 x ▵°F = ▵°C*	- 20° F	- 12° C
#4:	(Sa)	Determine exposed surface area = 2(H x W) + 2(H x D)+ 2(W x D) ✍ *(Exclude non exposed surfaces, see fig. 2) 1m² = 10.76ft², or 1ft² = .0929m²*	42 ft²	3.9 m²
#5:	(Qa)	Estimate ambient load *(Example uses 1" insulation, see fig. 3)* *(Positive if cooling below ambient, Negative if cooling above ambient)*	140 Btu/h	41 watts
#6:	(Qe)	Determine enclosure internal load ✍ *(Fill in actual, or use either method 1,2,3)*	341 Btu/h	100 watts
		Method 1: *For resistive loads, measure the electrical power into the enclosure and subtract the electrical power out. This approximates the electrical load generated inside the enclosure.* ✍ *Voltage **(Volts)** x Current **(Amps)** = Power **(Watts)**, & {1 Watt = 3.414 Btu/h}*		
		Method 2: *If power cannot be measured directly, check with the manufacturer of each device and add the load (Watts) from all internal components.*		
		Method 3: *Measure the steady-state temperature rise from ambient to internal with the enclosure completely sealed. See fig. 3 on following page to estimate the internal load.*		
#7:	(Qt)	Total Load (Step 5 + Step 6) ✍ *(Add additional loads at this time, i.e. solar or radiated loads)*	481 Btu/h	141 watts

Using Performance Curves:(See fig. 1)

X- (Horizontal Axis)	Total Load Line	(Qt)	(Watts or Btu/h)
Y- (Vertical Axis)	Temperature Differential Line	(▵T)	(°C or °F)

✍ *(▵T) from ambient to enclosure. Values are (-) for below ambient cooling and (+) for above ambient cooling .*

There is usually a blue shaded region on each performance curve. The upper end is performance at +25° C/+77° F ambient. The lower end is performance at +60° C/+140° F ambient. The shaded region includes performance from 25° C to +60° C.

✍ *Please Note: A thermoelectric cooler is typically more efficient at higher ambients, due to inherent properties in the material. This is the opposite of conventional fluorocarbon systems.*

To use the performance curves, you need to know total load, (Qt from Step #7), and temperature differential, (▵T from Step #3). From the example you know that the total load is 141 Watts. Draw a vertical line to intersect at this load.

Next, place a point within the shaded region and on the vertical line to approximate the actual performance at ambient of 50° C. Since 50° C is close to the lower border, place a point slightly above the border. Then extend a horizontal line thru the point to intersect the y-axis (or ▵T line). For our example, we are at roughly -13° C▵T or -23.4° F▵T, which is greater than the required -12° C/-20° F.

Result: ✓ Adequate cooling capacity with this model.

Line equations are also provided below each performance curve. You can solve for ▵T by substituting the load, or solve for load by substituting ▵T.

☎ Technical Support Toll Free (888) TECA USA or (888) 832-2872

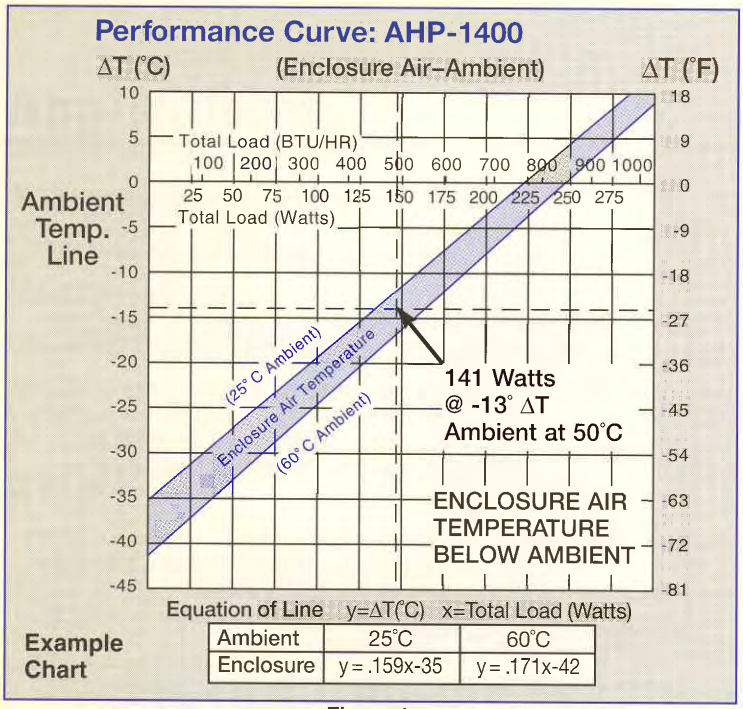


Figure 1

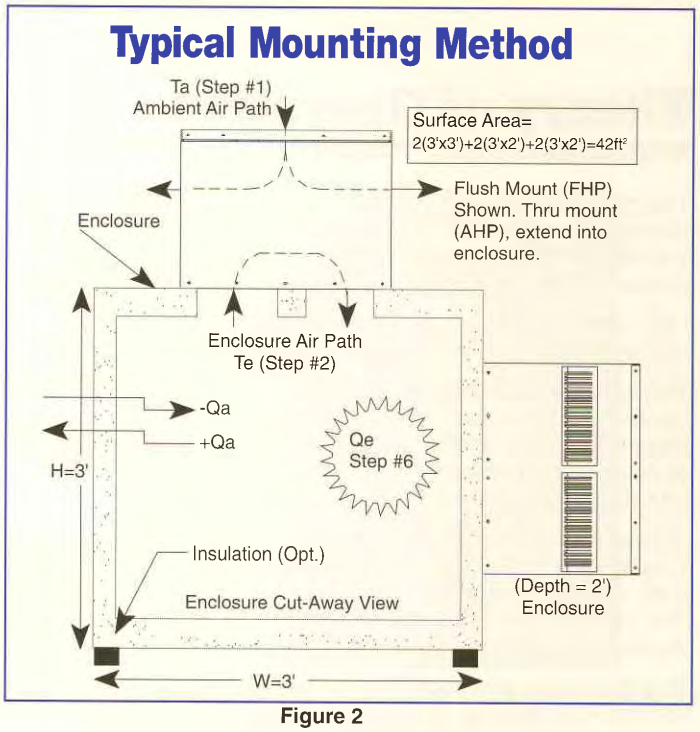


Figure 2

Ambient Load* (Qa), From Step #5

* Calculated using steel enclosure, insulation R Value (1")=4

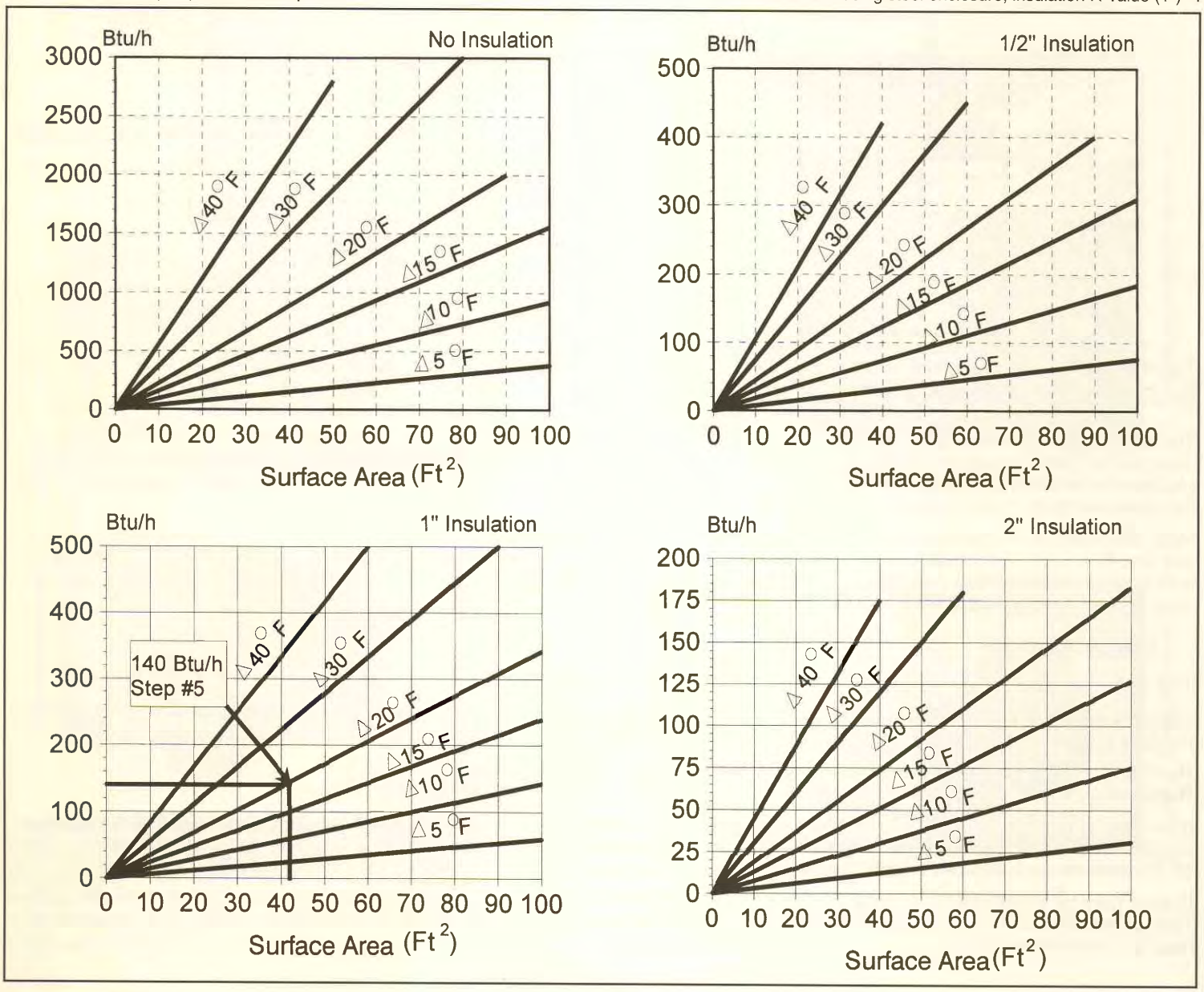


Figure 3

Theory of Operation

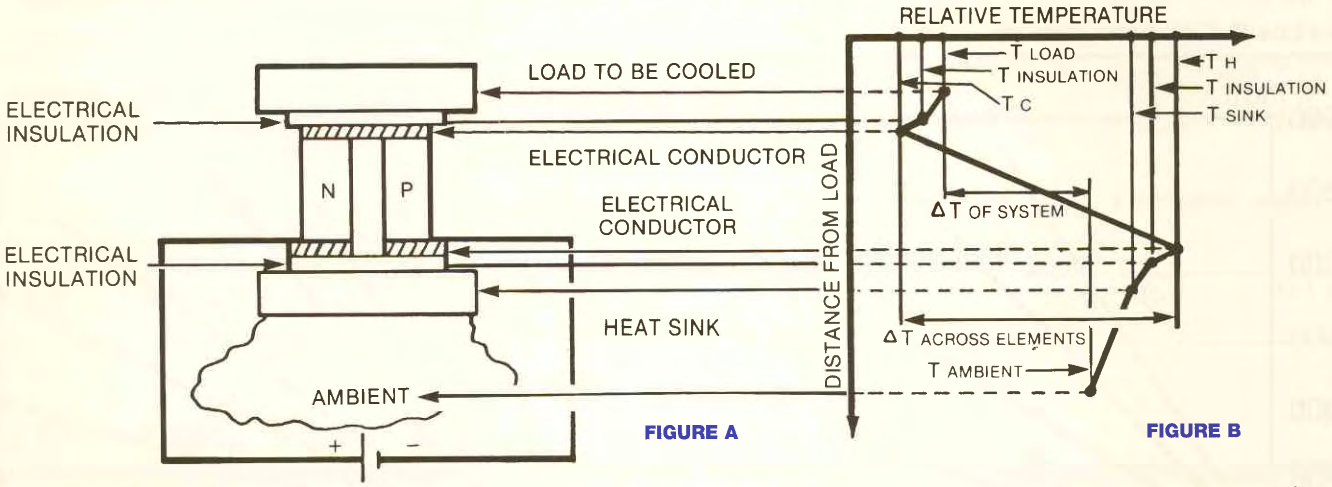
Thermoelectric cooling, or as it is sometimes called, "The Peltier Effect," is a phenomenon discovered by a French watchmaker during the early 19th century. It is described as a solid-state method of heat transfer generated primarily through the use of dissimilar semiconductor materials. To understand 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 the 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.



Thermoelectrics (Def): Semiconductor materials with dissimilar characteristics are connected electrically in series and thermally in parallel, so that two junctions are created (Figure A).

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.

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 semiconductor 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.

Heat Sinks:

The design of the heat exchanger is a very important aspect of a good thermoelectric system.

Figure B illustrates the steady-state temperature profile across a typical thermoelectric device from the load side to the ambient. In figure B, the total steady-state heat which must be rejected by the heat sink to the ambient may be expressed as follows:

$$\text{Heat Rejected } (Q_s) = \text{Heat Absorbed From the Load } (Q_c) + \text{Power Input } (V \cdot I) + \text{Heat Leakage } (Q_1)$$

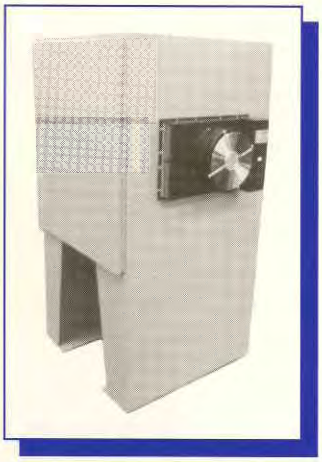
If the heat sink is not capable of rejecting the required Qs from the given system, the temperature of the entire system will rise and the cold junction temperature will increase. If the thermoelectric current is increased to maintain the load temperature, the COP (coefficient of performance) tends to decrease. Thus, a good heat sink contributes to improved COP.

Energy may be transferred to or from the thermoelectric system by three basic modes: conduction, convection, and radiation. The values of Qc and Q1 may easily be estimated; their total along with the power input gives Qs, the energy the hot-junction heat sink must dissipate.

Applications

There are many successful users of thermoelectric cooling systems.

Here are a few examples you may find helpful...

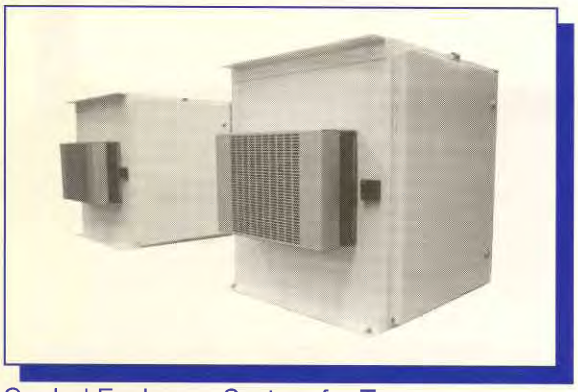


(Photo courtesy of N.A.S.A.-Langley Research Center)

Cooled enclosure system for ADC Camera Power Supply.

(Teca File Photo)

Food Service Refrigerators for Airborne Application



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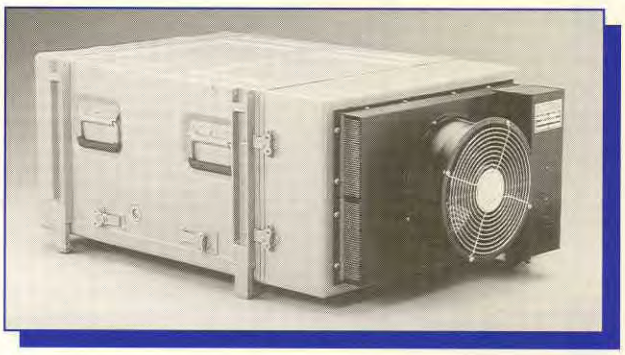

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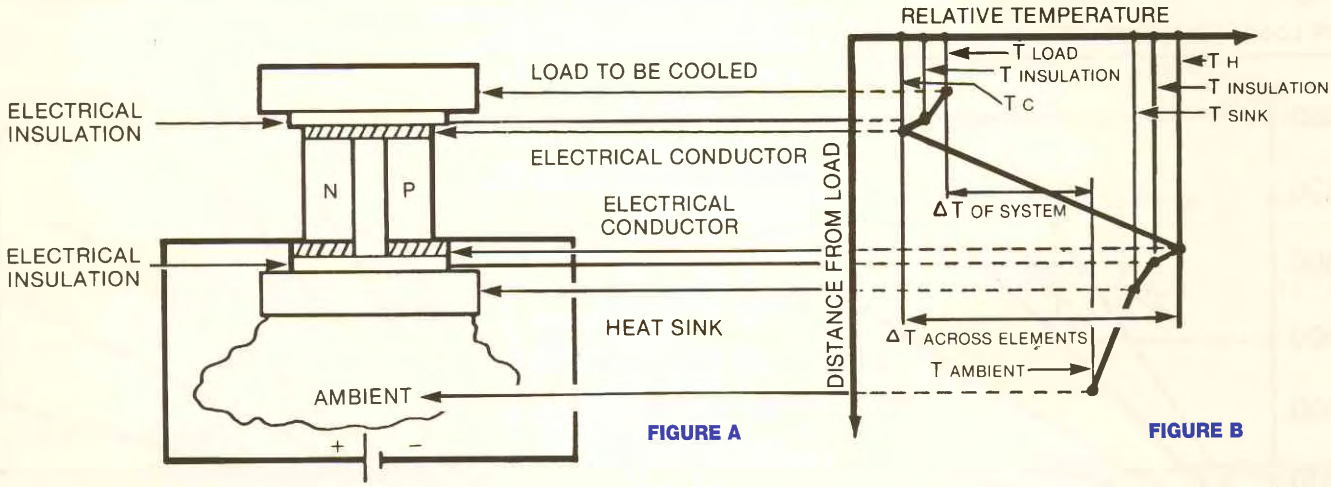

FIGURE A FIGURE B

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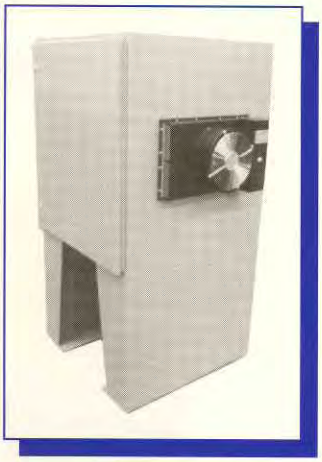
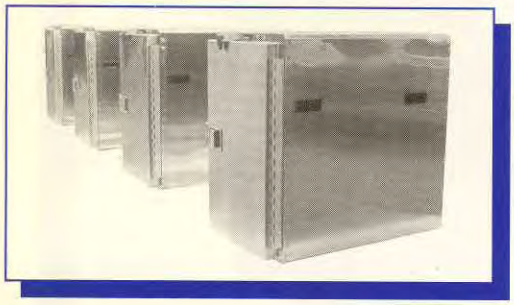


Cooled enclosure system for ADC Camera Power Supply.

(Photo courtesy of N.A.S.A.- Langley Research Center)



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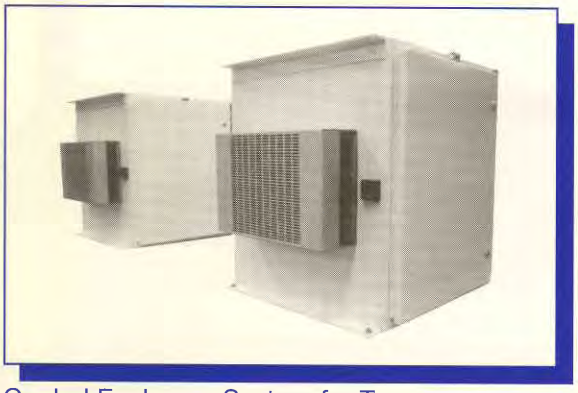

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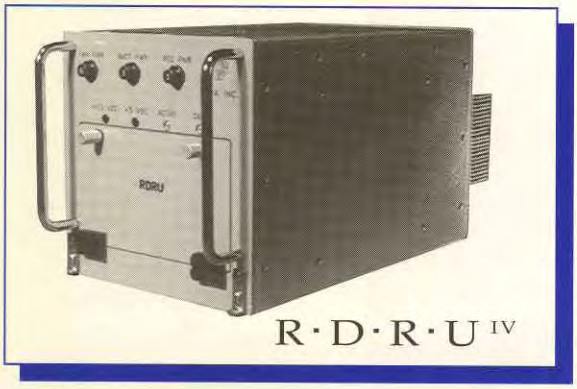

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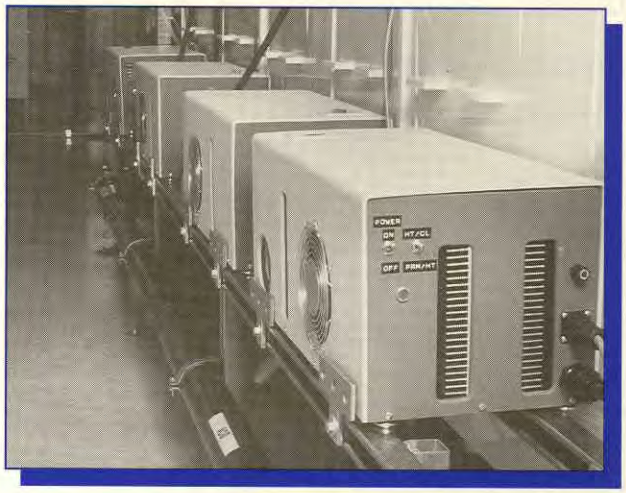

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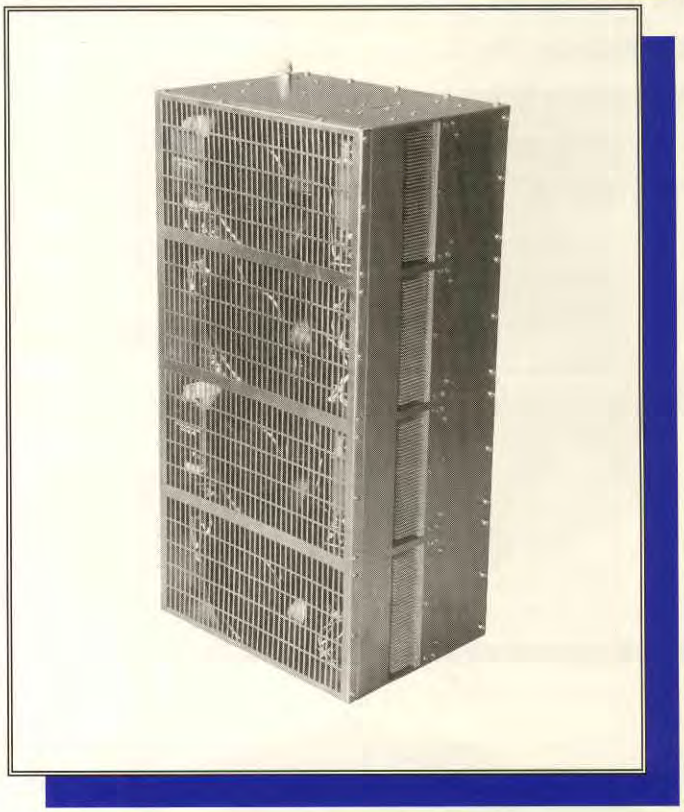
FHP-2852 Solid-State Air Conditioner, Flush Mount

Fin Rating 2200-2400 Btu/Hr
(Ambient to Cold Side Fin)

Air Rating 1500-1700 Btu/Hr
(Ambient to Cold Side Air)

Features:

- Flush (External) Mount
- Compact, only (24" L x 12" W x 9" D)
- Ambient Range, -10°C to +70°C
- No Compressor, Fluorocarbons, or Filters
- Maintenance-Free Operation
- Stainless Steel Exterior Housing
- Nema-12 Rating Maintained
- Mounts in any Orientation



Includes:

- Integral Power Supply (220 VAC Input)
- Condensate Removal System
- TC-6F Thermostat

Cools Equipment Racks, PC's, Drives, Amplifiers, Motor Controls, & Other Electronic Equipment

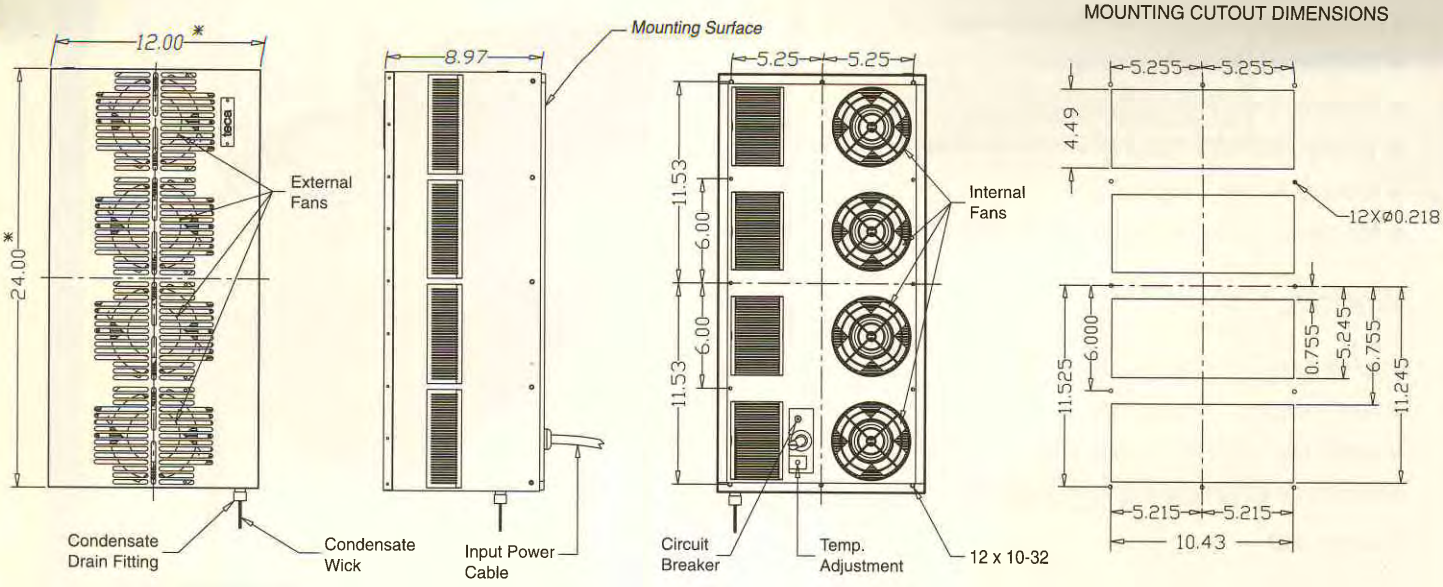
Teca's FHP-Series air conditioners are designed for tightly packaged enclosures. There is no intrusion within the enclosure, allowing for greater design flexibility. Model FHP-2852 packs a powerful punch. It is currently the highest standard capacity thermoelectric system on the market! Ideal for harsh Nema-12 environments such as steel and paper mills, foundries and food processing plants.

SPECIFICATIONS:

Model Number	FHP-2852
• Input Voltage	230 VAC (115 VAC Opt.)
• Input Current	11-12 Amps RMS
• Frequency	50/60 Hz
• Minimum Ambient	-10°C / +14°F
• Maximum Ambient	+70°C / + 158°F
• Enclosure Rating	Nema-12
• Weight	70 lbs. / 32 Kg.
• Temperature Control	TC-6F (Included)

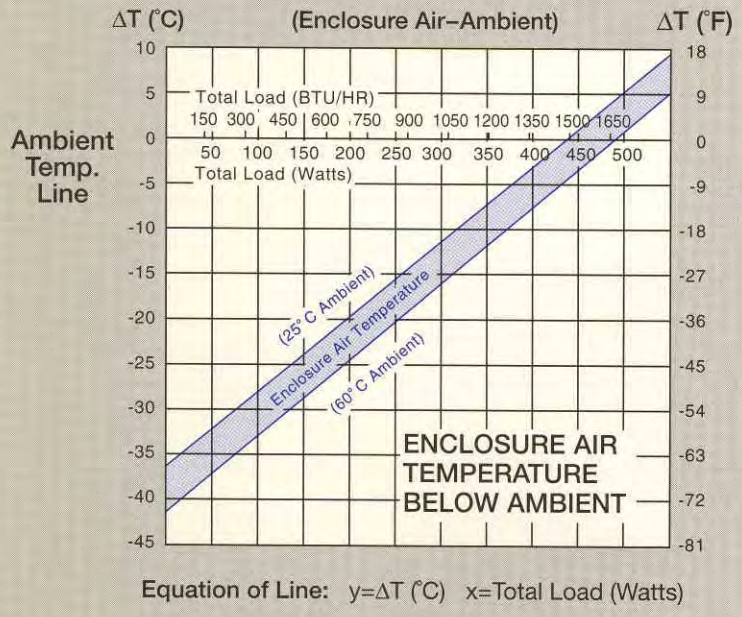
☎ Toll Free (888) TECA USA (832-2872)

Dimensions:



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

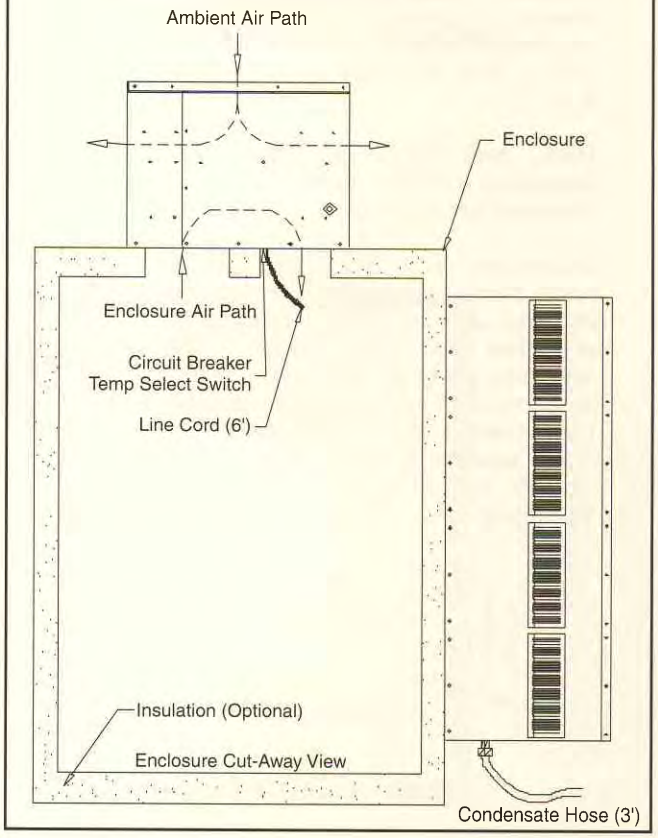
Performance Curve: FHP-2852



Equation of Line: y=ΔT (°C) x=Total Load (Watts)

Ambient	25°C	60°C
Enclosure	y = .0822x-37	y = .0857x-42

Typical Mounting Method



AHP-1801, AHP-1801X, AHP-1801XP Solid-State Air Conditioners, Thru Mount

Explosion Proof (Hazardous Duty) and Nema-4X Models

Fin Rating 1150-1400 Btu/h; Air Rating 900-1050 Btu/h, Heating: 1360 Btu/h (Opt.)

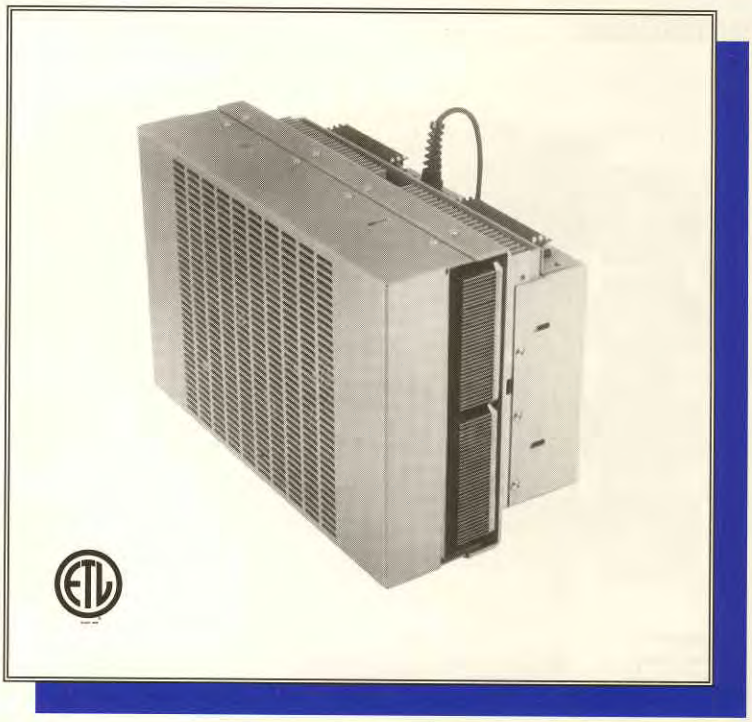
Features:

- Hazardous Duty and Nema-4X Models
- No Compressor, Fluorocarbons, or Filters
- Maintenance Free Operation
- 115 or 230 VAC Input (Field Selectable)
- Mounts in any Orientation
- Mil-Spec. Fans on Nema-4X Models

Models:

- AHP-1801 (Nema-12)
- AHP-1801X (Nema-4X)
- AHP-1801XP (Nema-4X, Explosion Proof)

(Designed for Class I and II, Division 2 and Class III, Division 1 & 2)



Teca's AHP-Series air conditioners are designed to mount with portions on both the inside and outside of the enclosure. There is no air exchange from internal to ambient. A stud/gasketed mounting insures your Nema integrity. Internal fans recirculate cool, clean air only!

Model AHP-1801XP is designed for hazardous locations such as Class I Division 2 (Groups A-D).

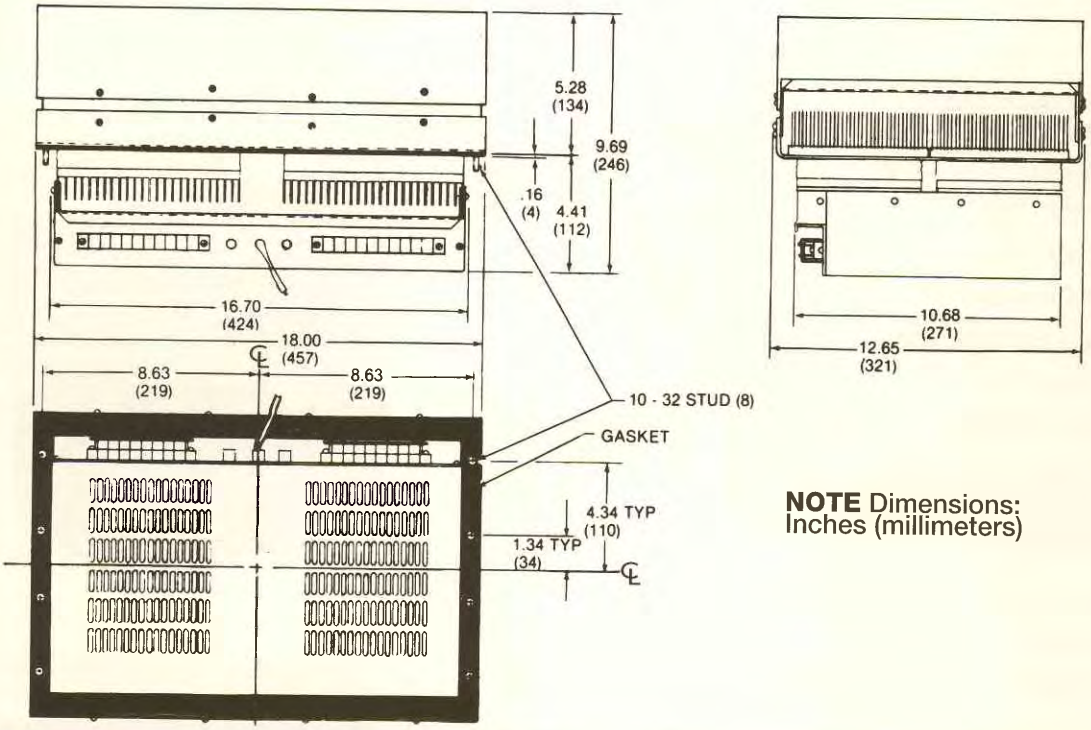
Models AHP-1801X and XP are ideal for harsh Nema-4X environments such as chemical, steel and paper mills, foundries and food processing plants. Can withstand corrosive salt spray, shock, vibration, windblown dust, rain and water hose down in outdoor and indoor use. Cools equipment racks, drives, motor controls and other remote electronic equipment.

SPECIFICATIONS:

Cool Only Models	*AHP-1801*	*AHP-1801X*	*AHP-1801XP*
Input AC Voltage	115/230	115/230	115/230
Current @ 115V	6.8-7.5 Amps	6.8-7.5 Amps	6.8-7.5 Amps
Current @ 230V	4.2-4.9 Amps	4.2-4.9 Amps	4.2-4.9 Amps
Frequency	50/60 Hz	50/60 Hz	50/60 Hz
Minimum Ambient	-28°C / -20°F	-28°C / -20°F	-28°C / -20°F
Maximum Ambient	+70°C / +158°F	+80°C / +176°F	+80°C / +176°F
Nema Rating	12	4X	4X
Weight	46 lbs. / 20.9 Kg.	46 lbs. / 20.9 Kg	46 lbs. / 20.9 Kg
Standard(s) ETL/ETLc Approved Corrosion Resistance	ANSI/UL 1995 CAN/CSA-C22.2 No. 236-M90	ANSI/UL 1995 CAN/CSA-C22.2 No. 236-M90 Mil-Std 810	ANSI/UL 1604 (Hazardous Duty) Mil-Std 810
Thermostat	TC-6F	TC-6F	TC-6F
Cool & Heat Models	*AHP-1801HC*	*AHP-1801XHC*	*AHP-1801XPHC*
Thermostat	TC-3F	TC-3F	TC-3F

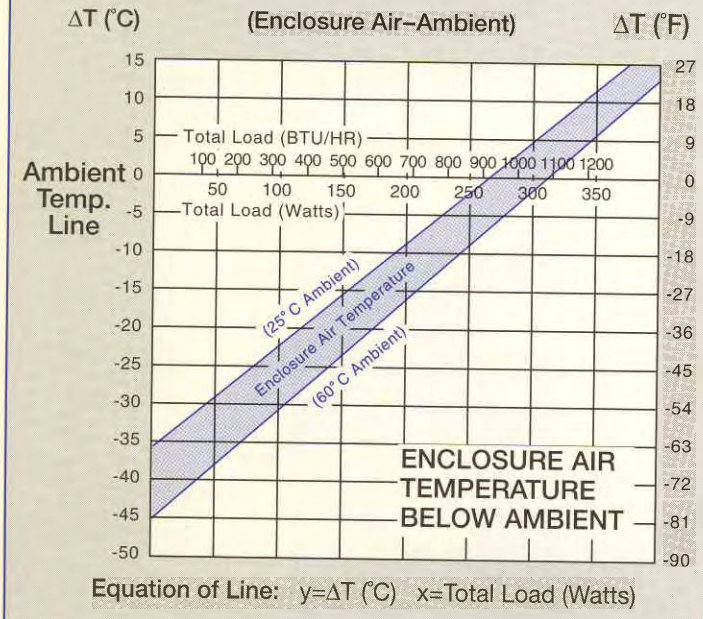
☎ Toll Free (888) TECA USA or (832-2872)

Dimensions:



NOTE Dimensions:
Inches (millimeters)

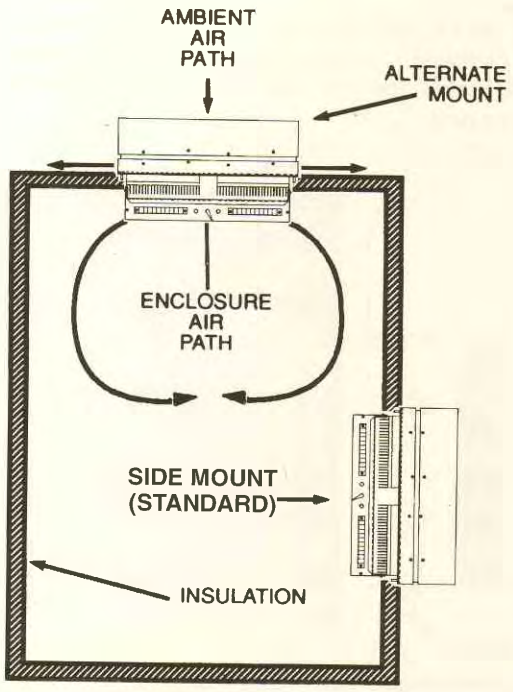
Performance Curve:
AHP-1801/1801X/1801XP



Equation of Line: y=ΔT (°C) x=Total Load (Watts)

	115 VAC		230 VAC	
Ambient	25°C	60°C	25°C	60°C
Enclosure	y = .137x-35.8	y = .143x-41.0	y = .136x-38.1	y = .147x-45.2
Cold Sink	y = .112x-37.4	y = .110x-43.0	y = .104x-38.9	y = .113x-46.1

Typical Mounting Method



FHP-1450, FHP-1452 Solid-State Air Conditioners, Flush Mount

Fin Rating 1200-1350 Btu/Hr *(Ambient to Cold Side Fin)*	Air Rating 850-950 Btu/Hr *(Ambient to Cold Side Air)*

Features:

- Flush (External) Mount
- Compact, only (12" L x 12" W x 9" D)
- Ambient Range, -10°C to +70°C
- No Compressor, Fluorocarbons, or Filters
- Maintenance-Free Operation
- Stainless Steel Exterior Housing
- Nema-12 Rating Maintained
- Mounts in any Orientation

Includes:

- Integral Power Supply (115 VAC Input)
- Condensate Removal System
- TC-6F Thermostat

Cools Equipment Racks, PC's, Drives, Amplifiers, Motor Controls, & Other Electronic Equipment

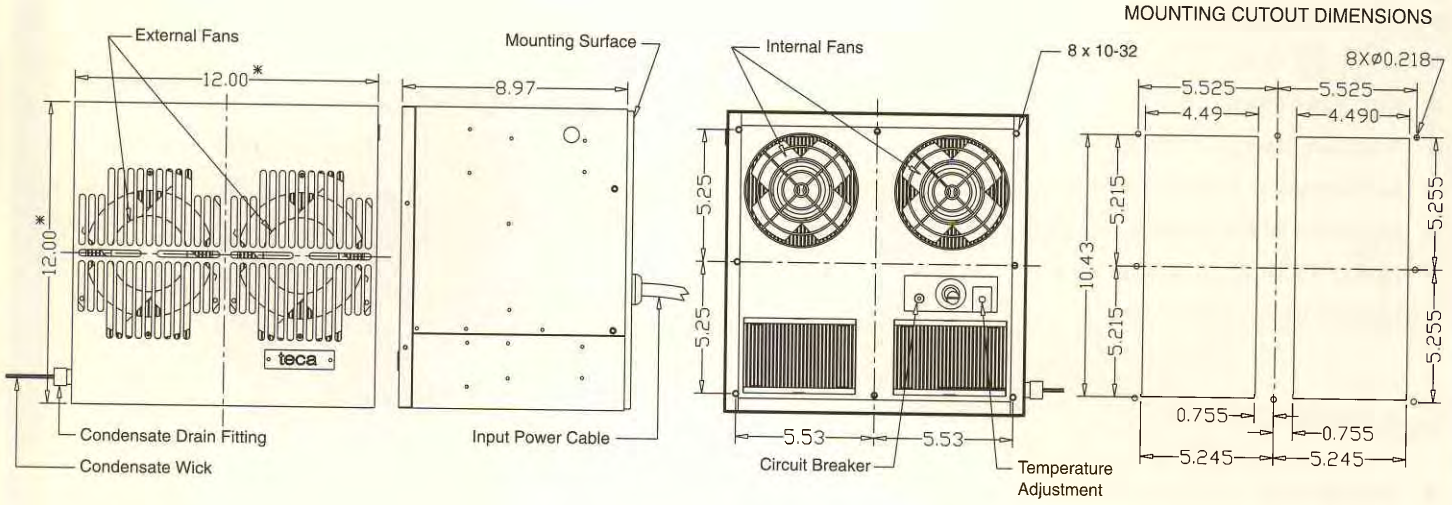
Teca's FHP-Series air conditioners are designed for tightly packaged enclosures. There is no intrusion within the enclosure, allowing for greater design flexibility. Model FHP-1450 is designed for 115 VAC applications, model FHP-1452 is designed for 230 VAC. Ideal for harsh Nema-12 environments such as steel and paper mills, foundries and food processing plants.

SPECIFICATIONS:

Model Number	FHP-1450	FHP-1452
Input Voltage	115 VAC	230 VAC
Input Current (Rms)	10 Amps	6.0 Amps
Frequency	50/60 Hz	50/60 Hz
Minimum Ambient	-10°C / +14°F	-10°C / +14°F
Maximum Ambient	+70°C / + 158°F	+70°C / + 158°F
Enclosure Rating	Nema-12	Nema-12
Weight	32 lbs. / 14.5 Kg.	32 lbs. / 14.5 Kg.
Temperature Control	TC-6F (Included)	TC-6F (Included)

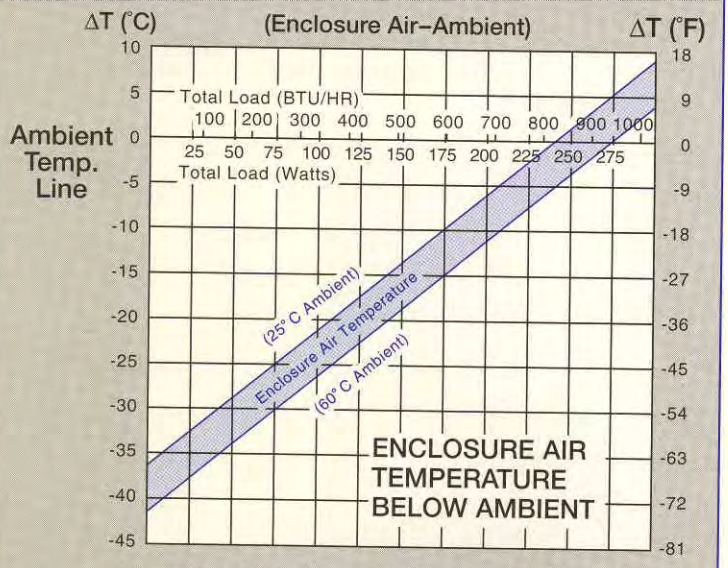
☎ Technical Support Toll Free (888) TECA USA or (888) 832-2872

Dimensions:



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

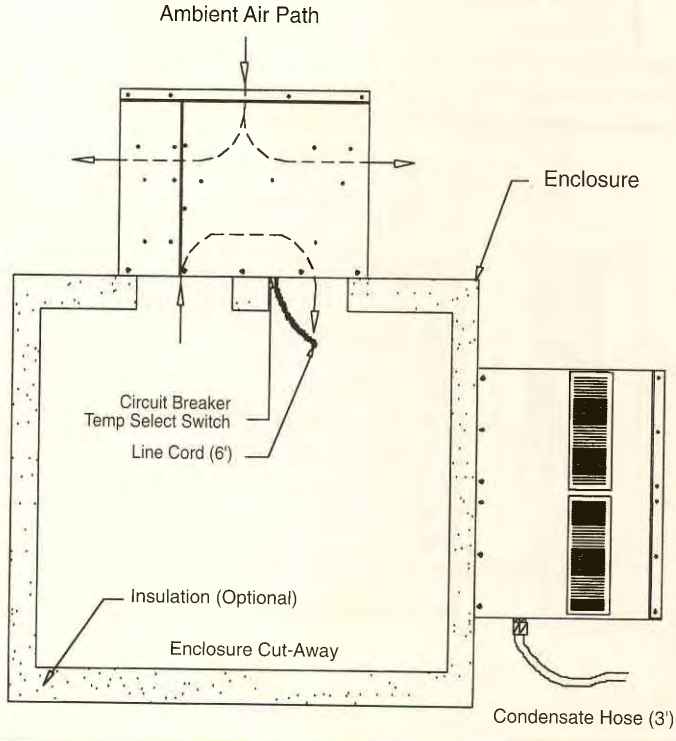
Performance Curve: FHP-1450/1452



Equation of Line: y=ΔT (°C) x=Total Load (Watts)

Ambient	25°C	60°C
Enclosure	y=.154x-37	y=.153x-42

Typical Mounting Method

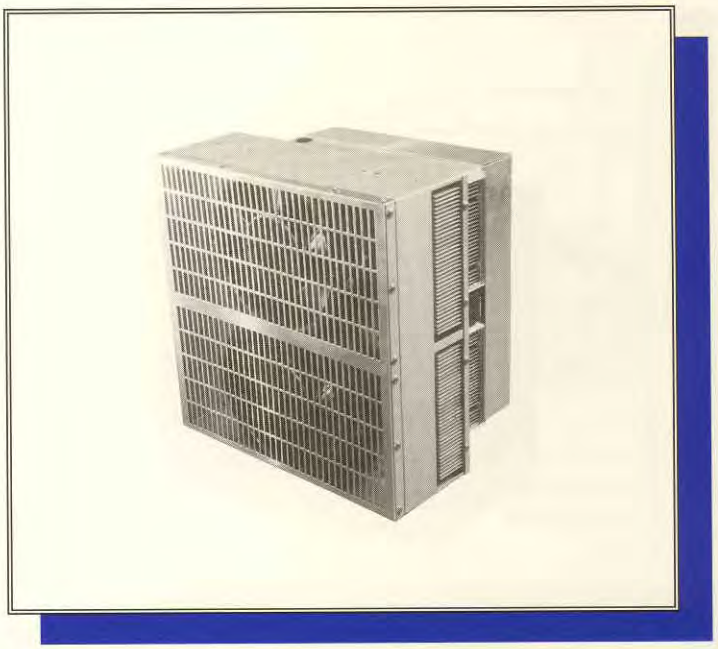


AHP-1400 Solid-State Air Conditioner, Thru Mount

Fin Rating 950-1025 Btu/Hr	Air Rating 685-850 Btu/Hr
(Ambient to Cold Side Fin)	*(Ambient to Cold Side Air)*

Features:

- Solid State Operation
- Compact, only (12" L x 12" W x 9.22" D)
- Ambient Range, -10°C to +70°C
- No Compressor, Fluorocarbons, or Filters
- Maintenance-Free Operation
- Stainless Steel Exterior Housing
- Nema-12 Rating Maintained
- Mounts in any Orientation



Includes:

- Integral Power Supply (115 VAC Input)
- Condensate Removal System
- TC-6F Thermostat

Cools Equipment Racks, PC's, Drives, Amplifiers, Motor Controls, & Other Electronic Equipment

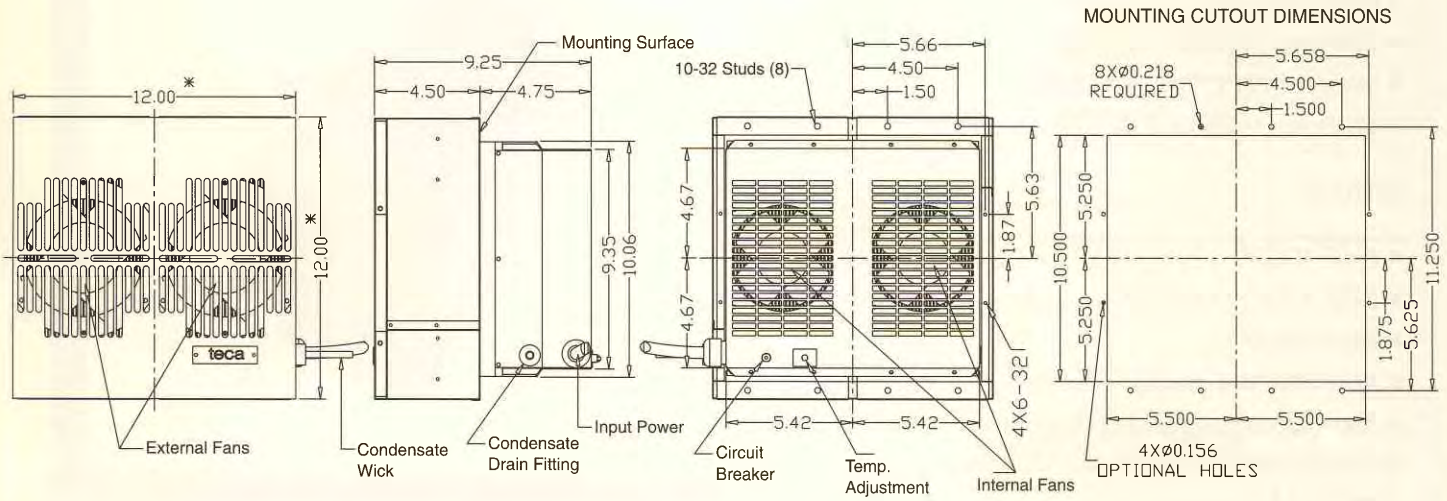
Teca's AHP-Series air conditioners are designed to mount with portions on both the inside and outside of the enclosure. There is no air exchange from internal to ambient. A stud/gasketed mounting insures your Nema integrity. Internal fans recirculate cool, clean air only! Model AHP-1400 replaces our AHP-1700 unit. It is 33% smaller with the same capacity, and also includes the TC-6F thermostat, condensate removal system, and stainless steel housing. Ideal for harsh Nema-12 environments such as steel and paper mills, foundries and food processing plants.

SPECIFICATIONS:

Model Number	AHP-1400
• Input Voltage	115 VAC (Optional 230 VAC, Consult Factory)
• Input Current	7.5-8.9 Amps RMS
• Frequency	50/60 Hz
• Minimum Ambient	-10°C / +14°F
• Maximum Ambient	+70°C / + 158°F
• Enclosure Rating	Nema-12
• Weight	31 lbs. / 14 Kg.
• Temperature Control	TC-6F (Included)

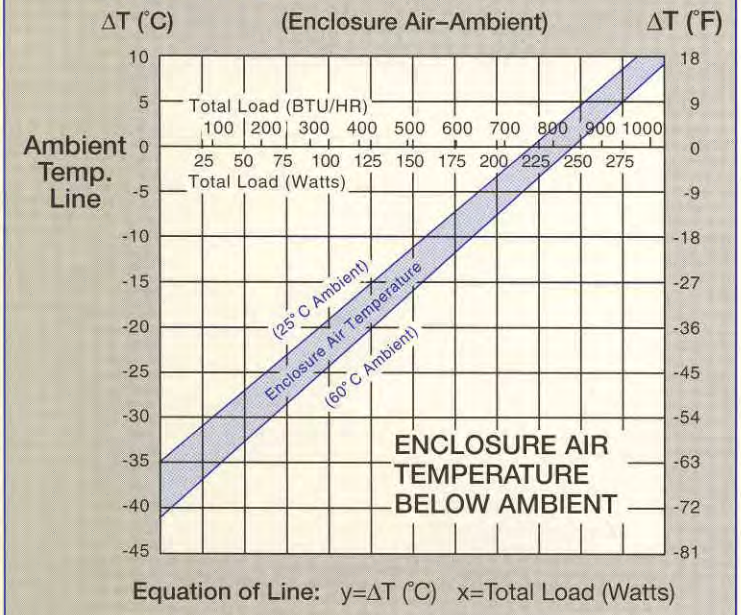
☎ Toll Free (888) TECA USA (832-2872)

Dimensions:



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

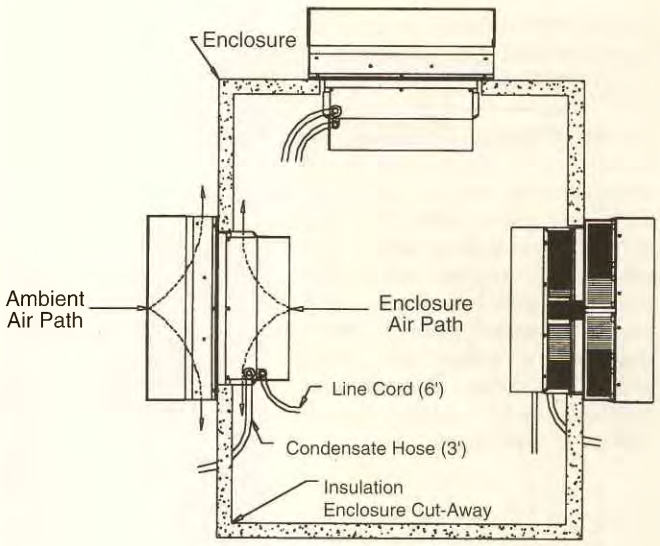
Performance Curve: AHP-1400



Equation of Line: y=ΔT (°C) x=Total Load (Watts)

Ambient	25°C	60°C
Enclosure	y = .159x-35	y = .171x-42

Typical Mounting Method



AHP-1200,(FF,X,XM,XP) & AHP-1201 Solid-State Air Conditioners, Thru Mount

Explosion Proof (Hazardous Duty) and Nema-4X Models

Fin Rating 625-700 Btu/h; Air Rating 450-500 Btu/h, Heating: 680 Btu/h (Opt.)

Features:

- Hazardous Duty and Nema-4X Models
- No Compressor, Fluorocarbons, or Filters
- Maintenance Free Operation
- Mounts in any Orientation
- Mil-Spec. Fans on Nema-4X Models

Models:	Nema:
• AHP-1200FF (115 VAC)	(12)
• AHP-1201 (230 VAC)	(12)
• AHP-1200X	(4X)
• AHP-1200XM (Shock/Vibration)	(4X)
• AHP-1200XP (Explosion Proof)	(4X)

(Designed for Class I and II, Division 2 and Class III,Division 1 & 2

Teca's AHP-Series air conditioners are designed to mount with portions on both the inside and outside of the enclosure. There is no air exchange from internal to ambient. A stud/gasketed mounting insures your Nema integrity. Internal fans recirculate cool, clean air only!

Model AHP-1200XP is designed for hazardous locations such as Class I Division 2 (Groups A-D).

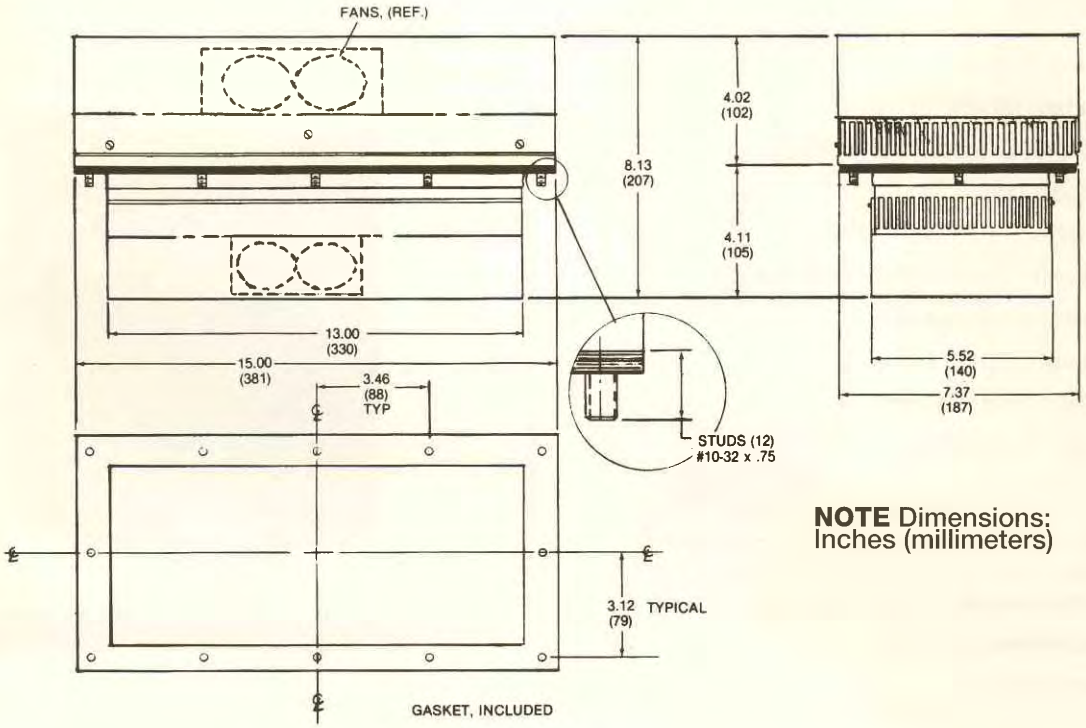
Models AHP-1200X and XP are ideal for harsh Nema-4X environments such as chemical, steel and paper mills, foundries and food processing plants. Can withstand corrosive salt spray, shock, vibration, windblown dust, rain and water hose down in outdoor and indoor use. Cools equipment racks, drives, motor controls and other remote electronic equipment.

SPECIFICATIONS

Cool Only Models	*AHP-1200FF*	*AHP-1201*	*AHP-1200X*	*AHP-1200XM*	*AHP-1200XP*
AC Voltage	115	115/230	115	115	115
Current ,Amps	3.8-4.0	3.8/2.2	3.8-4.0	3.8-4.0	3.8-4.0
Frequency, Hz	50/60	50/60	50/60	50/60	50/60
Min. Ambient (°C/°F)	-28/-20	-28/-20	-28/-20	-28/-20	-28/-20
Max. Ambient (°C/°F)	+70/+158	+70/+158	+80/ +176	+80 / +176	+80 / +176
Nema Rating	12	12	4X	4X	4X
Weight (lb/Kg)	21/9.5	28/12.7	21/9.5	21/9.5	21/9.5
Standard(s) ETL ETLc Corrosion Shock/Vib.	 UL-1995 CSA 22.2	 UL-1995 CSA 22.2	 UL-1995 CSA 22.2 Mil-810	 UL-1995 CSA 22.2 Mil-810 Mil-810	 UL-1604 Mil-810
Thermostat	TC-6F	TC-6F	TC-6F	TC-6F	TC-6F
Cool & Heat Models	*AHP-1200FFHC*	*AHP-1201HC*	*AHP-1200XHC*	*AHP-1200XMHC*	*AHP-1200XPHC*
Thermostat	TC-3F	TC-3F	TC-3F	TC-3F	TC-3F

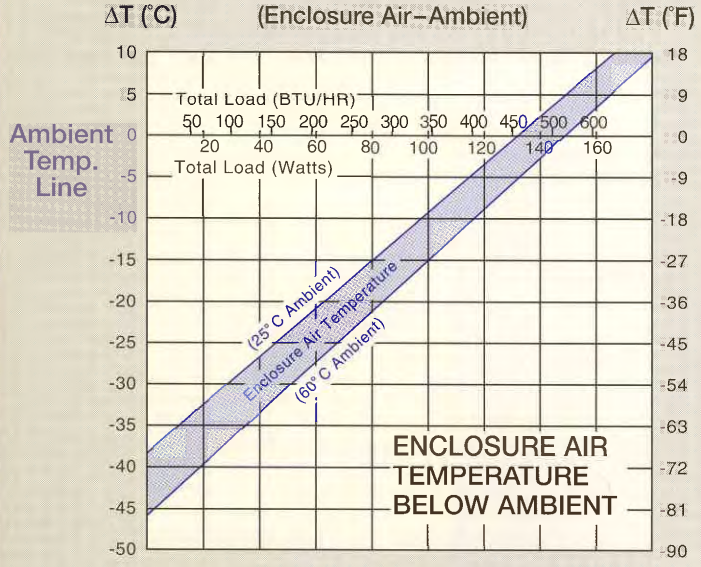
☎ Toll Free (888) TECA USA or (832-2872)

Dimensions:



NOTE Dimensions:
Inches (millimeters)

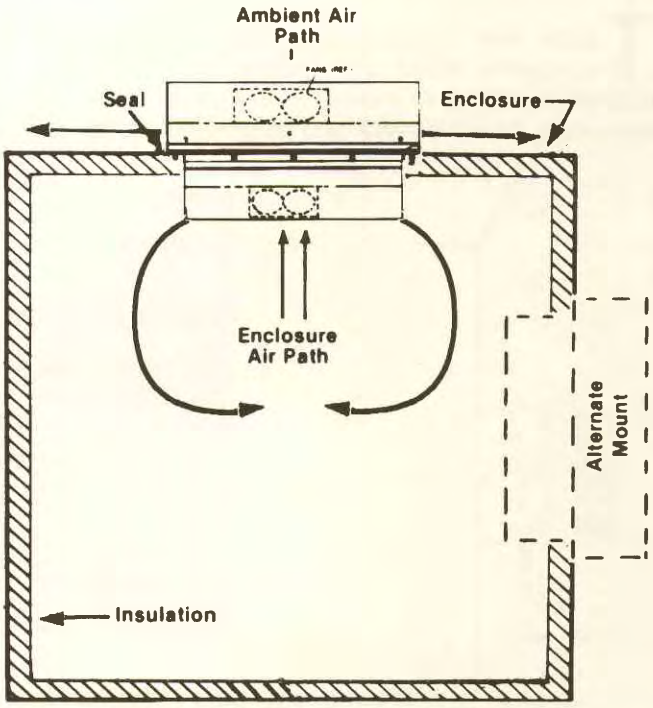
Performance Curve:
AHP-1200FF/1201FF/1200X/1200XP



Equation of Line
y=ΔT (°C)
x=Total Load (Watts)

Ambient Temp.	25°C	60°C
Enclosure	y=.30x-38.9	y=.31x-45.6
Cold Sink	y=.22x-40.3	y=.23x-47.0

Typical Mounting Method



FHP-750 Solid-State Air Conditioner, Flush Mount

Fin Rating 650-725 Btu/Hr
(Ambient to Cold Side Fin)

Air Rating 450-500Btu/Hr
(Ambient to Cold Side Air)

Features:

- Flush (External) Mount
- Compact, only (12" L x 6" W x 9" D)
- Weighs only 16 Lbs.
- Ambient Range, -10°C to +70°C
- No Compressor, Fluorocarbons, or Filters
- Maintenance-Free Operation
- Stainless Steel Exterior Housing
- Nema-12 Rating Maintained
- Mounts in any Orientation

Includes:

- Integral Power Supply (115 VAC Input)
- Condensate Removal System
- TC-6F Thermostat

Cools Equipment Racks, PC's, Drives, Amplifiers, Motor Controls, & Other Electronic Equipment

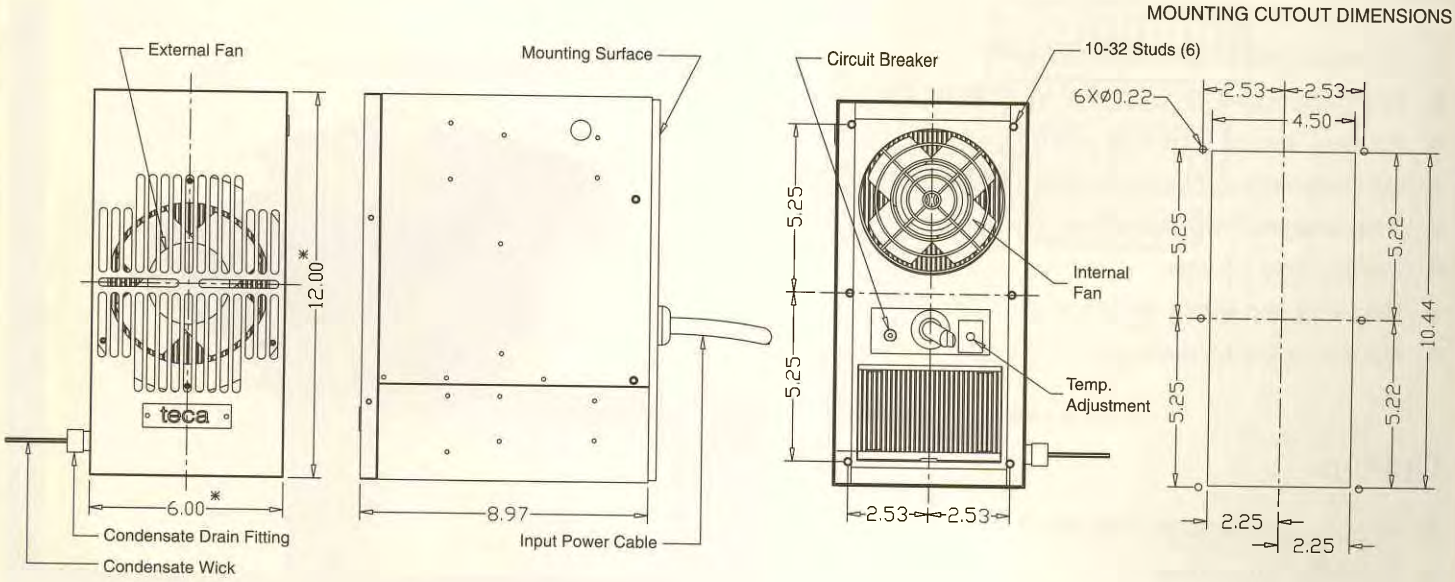
Teca's FHP-Series air conditioners are designed for tightly packaged enclosures. There is no intrusion within the enclosure, allowing for greater design flexibility. Model FHP-750 is the smallest flush mount we offer. An external footprint of only 1/2 ft² makes this unit perfect for small enclosures. Ideal for harsh Nema-12 environments such as steel and paper mills, foundries and food processing plants.

SPECIFICATIONS:

Model Number	FHP-750
Input Voltage	115 VAC
Input Current	4.2-5.0 Amps RMS
Frequency	50/60 Hz
Minimum Ambient	-10°C / +14°F
Maximum Ambient	+70°C / + 158°F
Enclosure Rating	Nema-12
Weight	16 lbs. / 7.25 Kg.
Thermostat	TC-6F (Included)

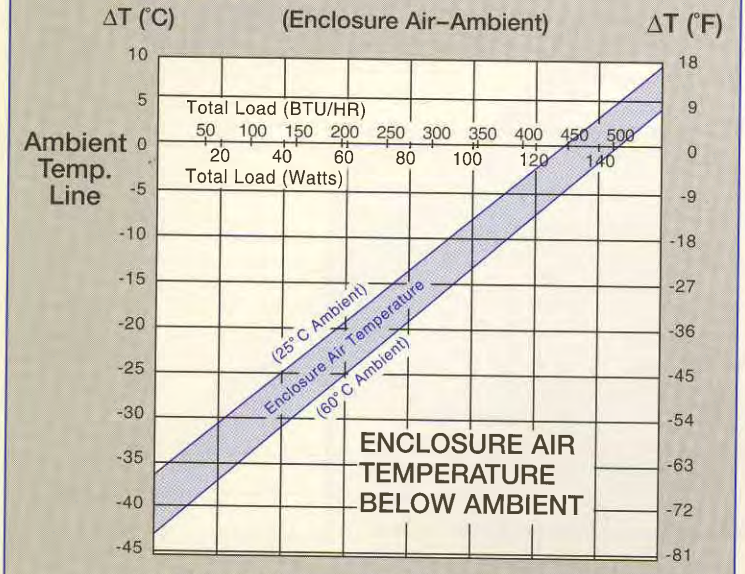
☎ Technical Support Toll Free (888) TECA USA or (888) 832-2872

Dimensions:



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

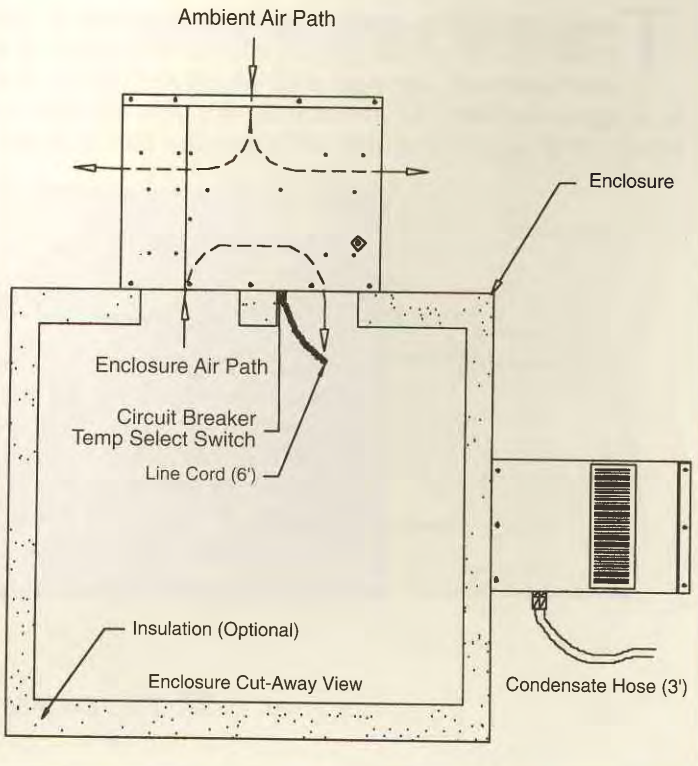
Performance Curve: FHP-750



Equation of Line: y=ΔT (°C) x=Total Load (Watts)

Ambient	25°C	60°C
Enclosure	y = .285x-37	y = .297x-43

Typical Mounting Method



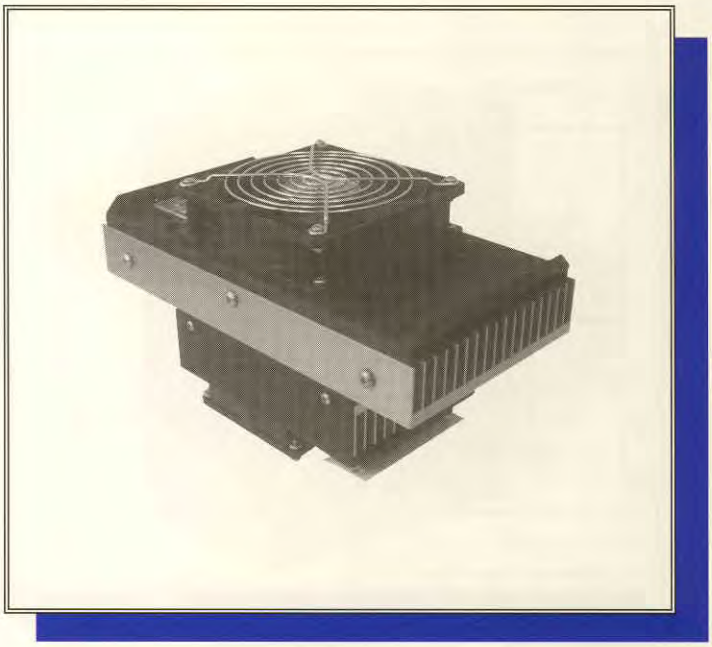
AHP-300FF, AHP-300X — Solid-State Air Conditioner, Thru Mount

Nema-12 and Nema-4X Models

Fin Rating 235-275Btu/Hr	Air Rating 185-210Btu/Hr	Heating: 245 Btu/Hr
(Ambient to Cold Side Fin)	*(Ambient to Cold Side Air)*	*72 Watts (Optional)*

Features:

- DC Input (Field Selectable 12/24/48)
- Compact, only (10" L x 5.75" W x 6.37" D)
- Ambient Range, -10°C to +70°C
- No Compressor, Fluorocarbons, or Filters
- Maintenance-Free Operation
- Weighs only 7.5 Lbs.
- Nema-12 and Nema-4X Models
- Mounts in any Orientation



Options:

- Heating (72 Watts, 24 VDC only)
- TC-6FDC Thermostat

Cools small enclosures containing Computers, Cameras, VCR's & other Sensitive Electronics

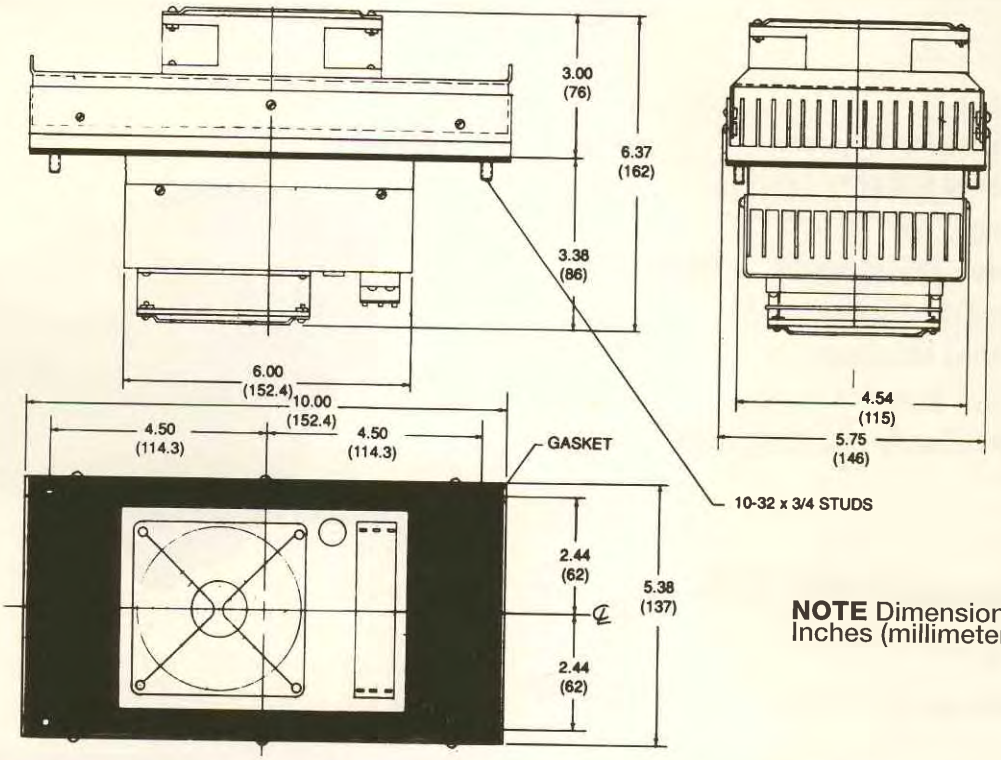
Teca's AHP-Series air conditioners are designed to mount with portions on both the inside and outside of the enclosure. There is no air exchange from internal to ambient. A stud/gasketed mounting insures your Nema integrity. Internal fans recirculate cool, clean air only! Model AHP-300FF is designed for DC input and Nema-12 enclosures. Model AHP-300X is designed for Nema-4X enclosures. We offer a power supply for the AHP-300X if DC is not available, model PS300-24X. Models AHP-300FF and AHP-300X are ideal for harsh and mobile environments.

SPECIFICATIONS:

Model Number	AHP-300FF	AHP-300X
• Input Voltage	12/24/48	12/24/48
• Input Current	12.5/6.3/3.1 Amps	12.5/6.3/3.1 Amps
• Minimum Ambient	-10°C / +14°F	-28°C / -20°F
• Maximum Ambient	+70°C / + 158°F	+80°C / + 176°F
• Enclosure Rating	Nema-12	Nema-4X
• Weight	7.5 lbs. / 3.4 Kg.	7.5 lbs. / 3.4 Kg.
• Thermostat	Optional	Optional

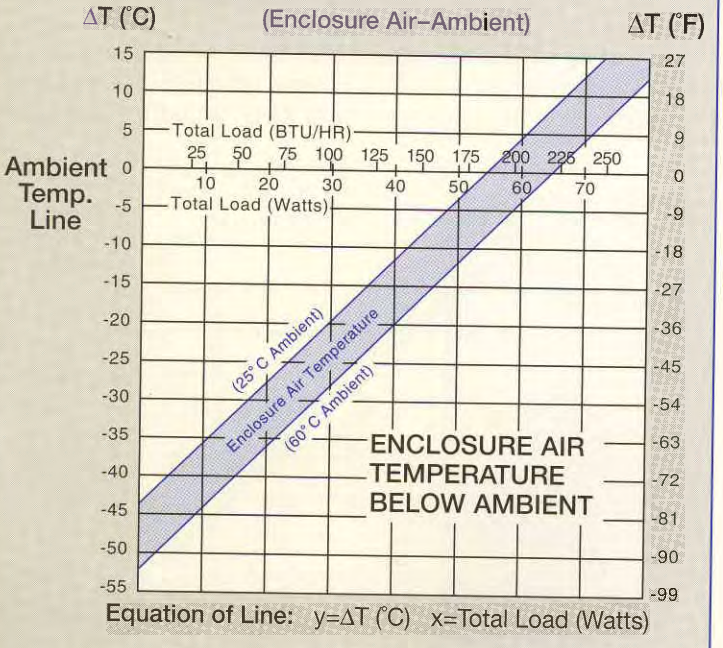
☎ Toll Free (888) TECA USA (832-2872)

Dimensions:



NOTE Dimensions:
Inches (millimeters)

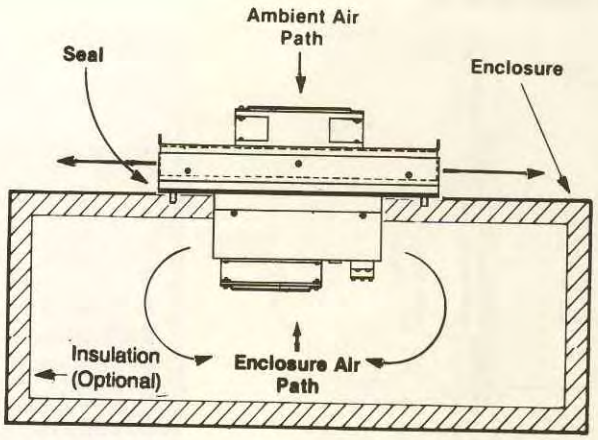
Performance Curve:
AHP-300FF/300X



Equation of Line: y=ΔT (°C) x=Total Load (Watts)

Ambient Temp.	25°C	60°C
Enclosure	y=.82x-44.3	y=.86x-53.3

Typical Mounting Method



AHP-301FF — Solid-State Air Conditioner, Thru Mount

Fin Rating 210-230 Btu/Hr	Air Rating 160-200 Btu/Hr	Heating: 340 Btu/Hr
(Ambient to Cold Side Fin)	*(Ambient to Cold Side Air)*	*100 Watts (Optional)*

Features:

- Our Smallest AC Input System!
  (10" L x 5.75" W x 8.6" D)
- Ambient Range, -28° C to +70° C
- No Compressor, Fluorocarbons, or Filters
- Maintenance-Free Operation
- Nema-12 Rating Maintained
- Mounts in any Orientation
- Integral Power Supply (115 VAC Input)

Options:

- Heat/Cool Model, AHP-301FFHC
  (includes TC-3F Thermostat)
- TC-6F Thermostat (Cool Only)

Cools Equipment Racks, PC's, Drives, Cameras, Motor Controls, & Other Electronic Equipment

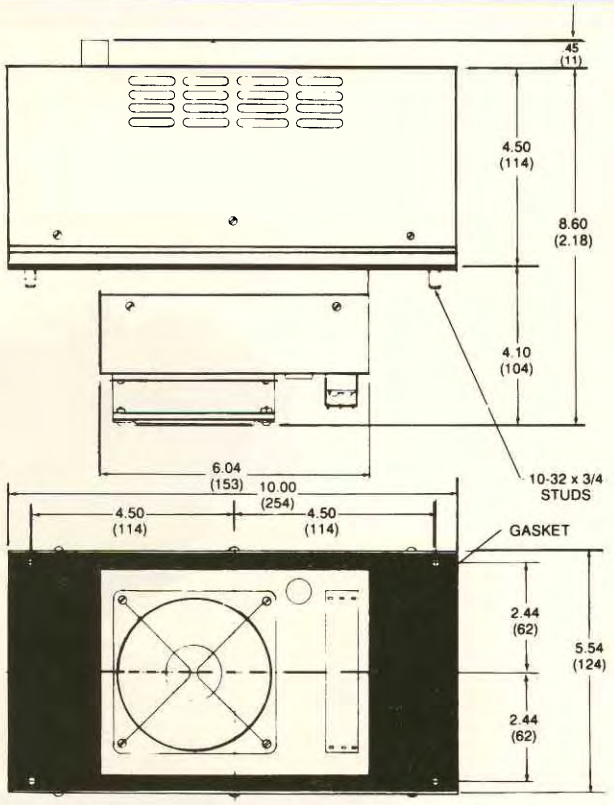
Teca's AHP-Series air conditioners are designed to mount with portions on both the inside and outside of the enclosure. There is no air exchange from internal to ambient. A stud/gasketed mounting insures your Nema integrity. Internal fans recirculate cool, clean air only! Ideal for harsh Nema-12 environments such as steel and paper mills, foundries and food processing plants.

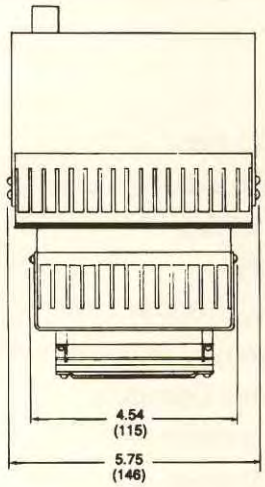
SPECIFICATIONS:

Model Number	AHP-301FF
Input Voltage	115/230 VAC
Input Current	1.2/0.6 Amps
Frequency	50/60 Hz
Minimum Ambient	-28° C / -20° F
Maximum Ambient	+70° C / + 158° F
Enclosure Rating	Nema-12
Weight	12 lbs. / 5.4 Kg.

☎ Toll Free (888) TECA USA (832-2872)

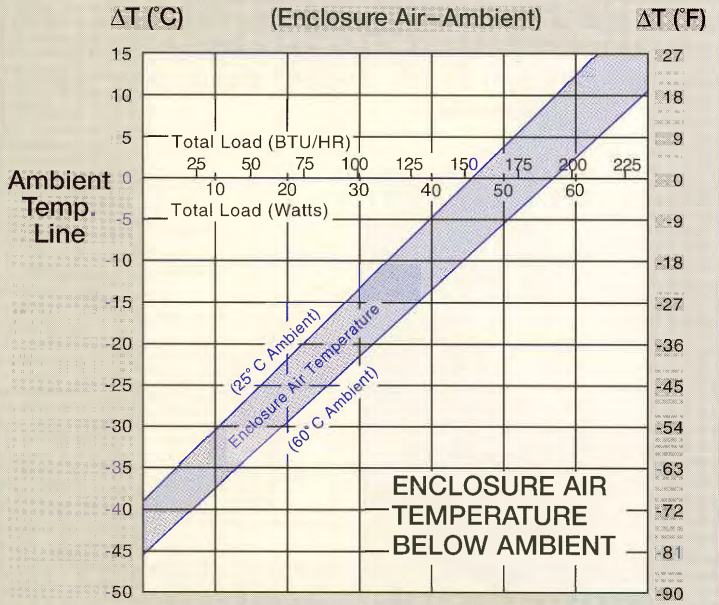
Dimensions:





NOTE Dimensions:
Inches (millimeters)

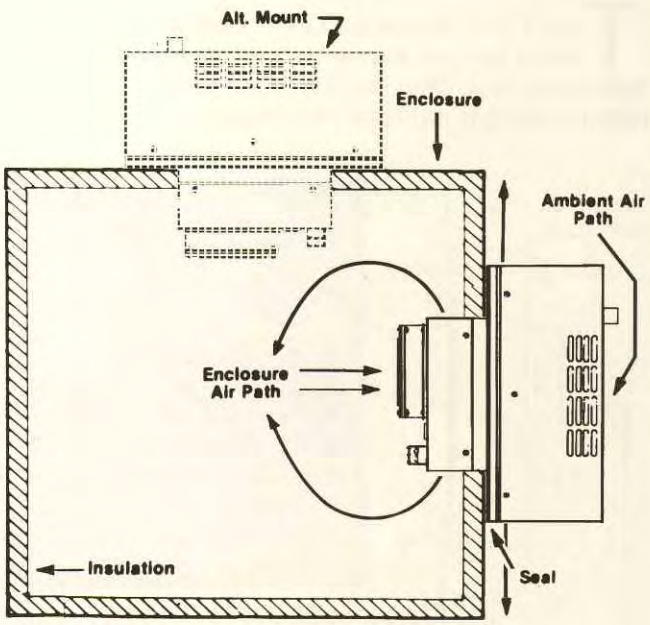
Performance Curve:
AHP-301FF



Equation of Line
y=ΔT (°C)
x=Total Load (Watts)

Ambient Temp.	25°C	60°C
Enclosure	y=.84x-39.7	y=.81x-45.8
Cold Sink	y=.64x-39.4	y=.68x-45.7

Typical Mounting Method

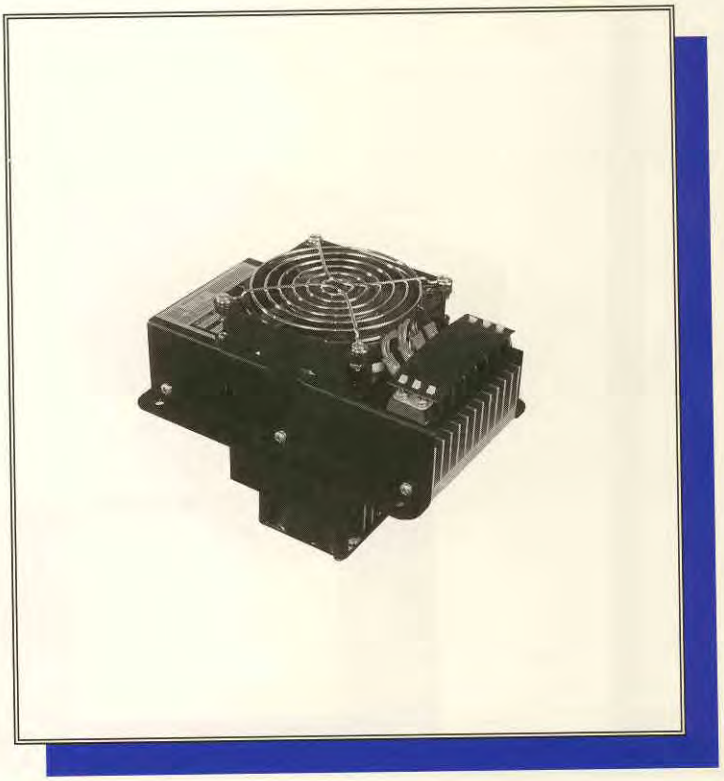


AHP-150FF — Solid-State Air Conditioner, Thru Mount

Fin Rating 110-135 Btu/Hr	Air Rating 90-110 Btu/Hr	Heating: 245Btu/Hr
(Ambient to Cold Side Fin)	*(Ambient to Cold Side Air)*	*72 Watts (Optional)*

Features:

- Our Smallest DC Input System!
  (7" L x 5" W x 6.2" D)
- Weighs only 3.25 Lbs.
- 12 or 24 VDC Input
- Ambient Range, -10°C to +70°C
- No Compressor, Fluorocarbons, or Filters
- Maintenance-Free Operation
- Nema-12 Rating Maintained
- Mounts in any Orientation



Options:

- Heat/Cool Model, AHP-150FFHC (24 VDC)
- DC Power Supply (PS80-12)
- TC-6FDC Thermostat (Cool Only)
- TC-3FDC Thermostat (Heat/Cool)

Cools Video Surveillance Equipment, Cameras, Computers & Other Electronic Equipment

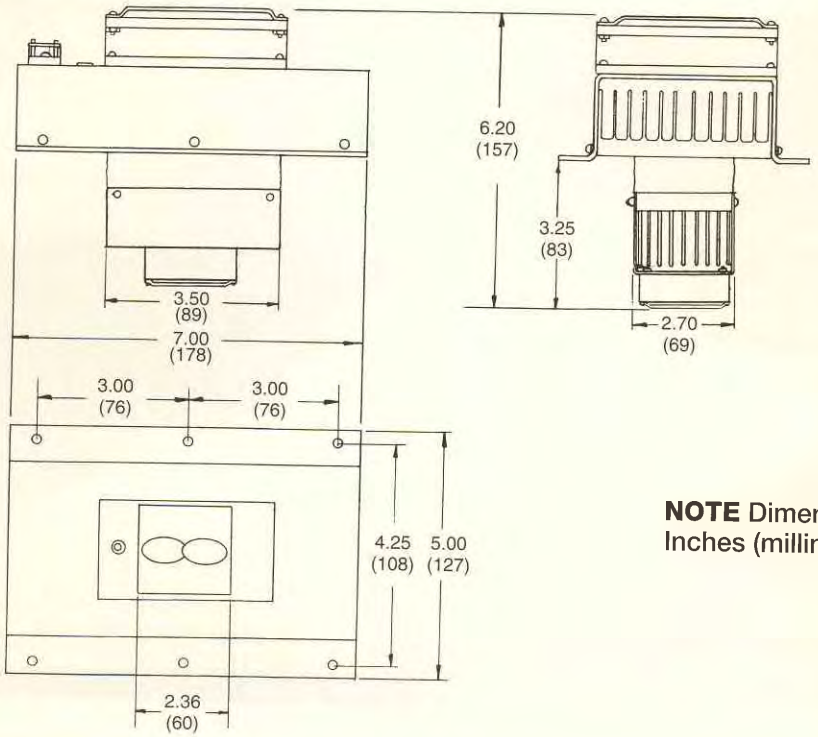
Teca's AHP-Series air conditioners are designed to mount with portions on both the inside and outside of the enclosure. There is no air exchange from internal to ambient. A stud/gasketed mounting insures your Nema integrity. Internal fans recirculate cool, clean air only! Due to space constraints, wiring is terminated from the hot (ambient) side on this model. If internal wiring is required, please consult factory. Ideal for harsh remote environments.

SPECIFICATIONS:

Model Number	AHP-150FF
Input Voltage	12/24 VDC (Factory Wired for 12 VDC)
Input Current	6.25/3.5 Amps
Minimum Ambient	-10°C / +14°F
Maximum Ambient	+70°C / + 158°F
Enclosure Rating	Nema-12
Weight	3.25 lbs. / 1.5 Kg.
Thermostat	Optional

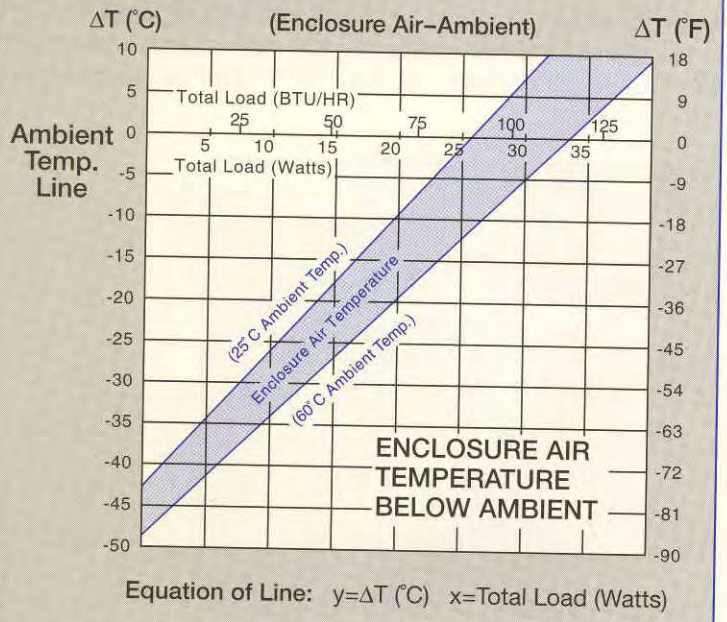
☎ Toll Free (888) TECA USA (832-2872)

Dimensions:



NOTE Dimensions:
Inches (millimeters)

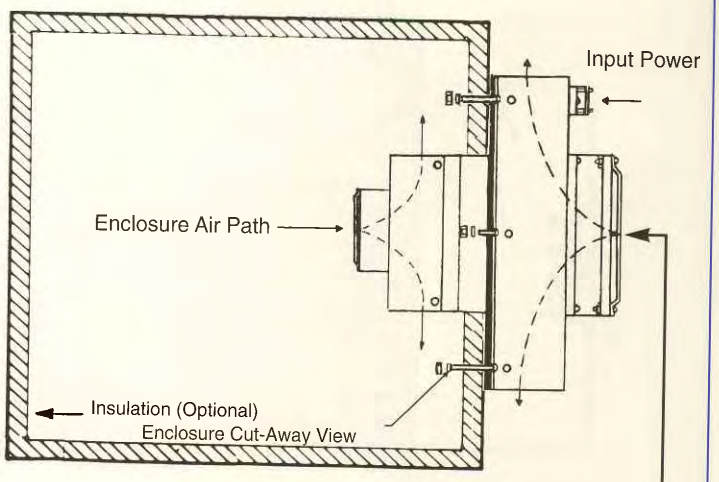
Performance Curve:
AHP-150FF



Equation of Line: y=ΔT (°C) x=Total Load (Watts)

Ambient Enclosure	25°C	60°C
	y = 1.65x-43	y = 1.48x-49

Typical Mounting Method



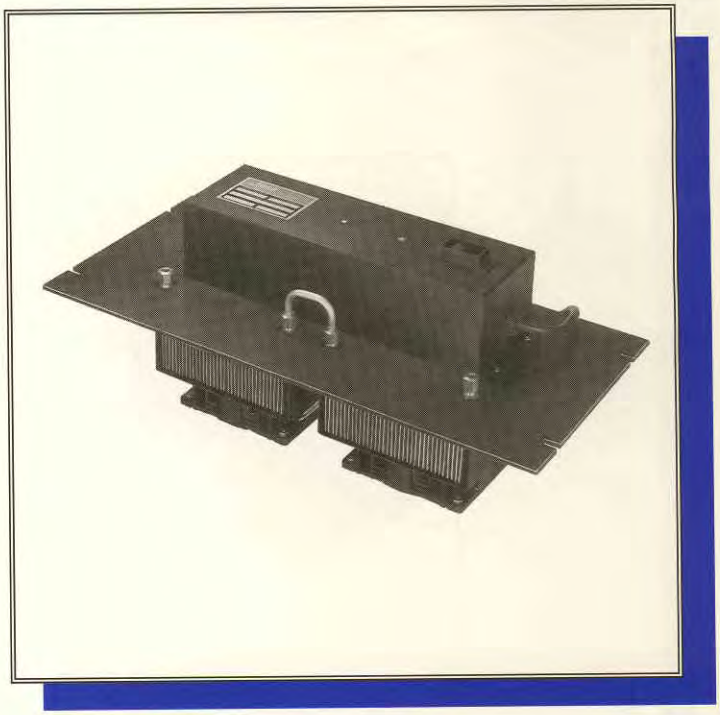
LHP-1700FF, LHP-1702FF Solid-State Air Conditioner, Liquid Cooled

Air Rating (LHP-1702FF) 1050-1300 Btu/Hr
(Liquid Inlet to Cold Side Air)

Air Rating (LHP-1700FF) 900-1000 Btu/Hr
(Liquid Inlet to Cold Side Air)

Features:

- Standard 19" Rack Mount
- Compact, only (19" L x 8.75" W x 8.8" D)
- Ambient Range, -30°C to +80°C
- No Compressor, Fluorocarbons, or Filters
- Maintenance-Free Operation
- Adaptable to Explosion-Proof Applications
- Available in 115 or 230 VAC
- Mounts in any Orientation
- Includes integral power supply



Options:

- Heaters (400 Watts)
  - Model: LHP-1700FFHC (incl. TC-3F)
  - Model: LHP-1702FFHC (incl. TC-3F)
- Temperature Control

Applications in Pulp and Paper Mills, Machine Tools, & Electronics

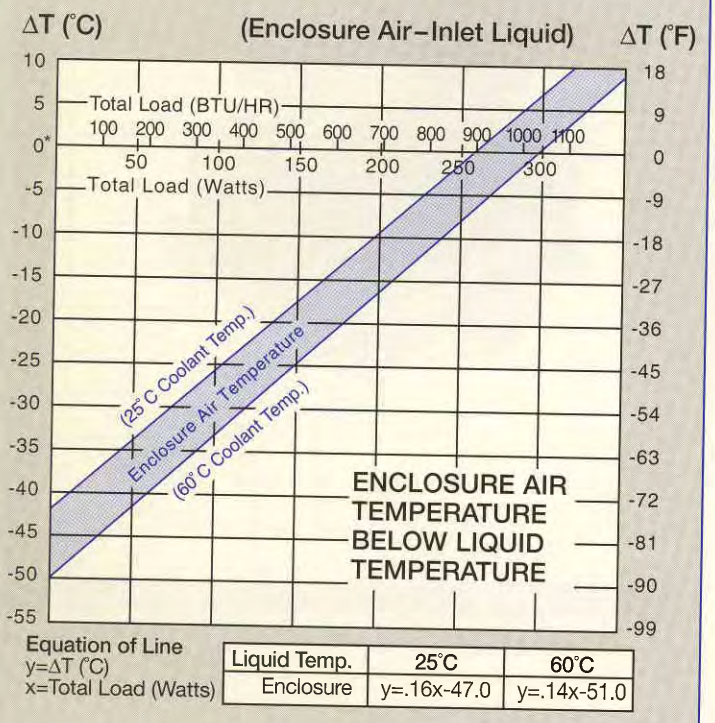
Teca's LHP-Series air conditioners are constructed with anodized aluminum liquid jackets with stainless steel fittings. You provide a constant flow of liquid as a heat removal source. Combining these features with thermoelectric modules make the LHP-series capable of both high capacity and high temperature differentials. Model LHP-1700FF is designed for 115 VAC applications and model LHP-1702FF is designed for 230 VAC input.

SPECIFICATIONS:

Model Number	LHP-1700FF	LHP-1702FF
• Input Voltage	115 VAC	230 VAC
• Input Current	6.3-7.3 Amps RMS	5.9-6.6 Amps RMS
• Frequency	50/60 Hz	50/60 Hz
• Minimum Ambient	-30°C / -21°F	-30°C / -21°F
• Maximum Ambient	+80°C / + 176°F	+80°C / + 176°F
• Minimum Flow Rate	0.5 GPM (2 L/M)	0.5 GPM (2 L/M)
• Enclosure Rating	Nema-12	Nema-12
• Weight	21 lbs. / 9.8 Kg.	21 lbs. / 9.8 Kg.
• Thermostat	Optional	Optional

☎ Technical Support Toll Free (888) TECA USA or (888) 832-2872

Performance Curve: LHP-1700FF

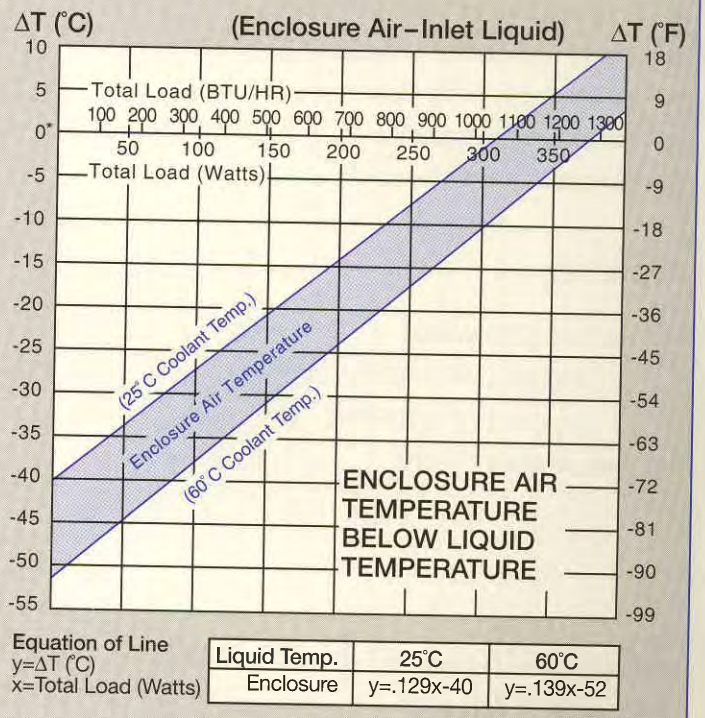


Equation of Line
y=ΔT (°C)
x=Total Load (Watts)

Liquid Temp.	25°C	60°C
Enclosure	y=.16x-47.0	y=.14x-51.0

*Inlet Liquid Temp. Line

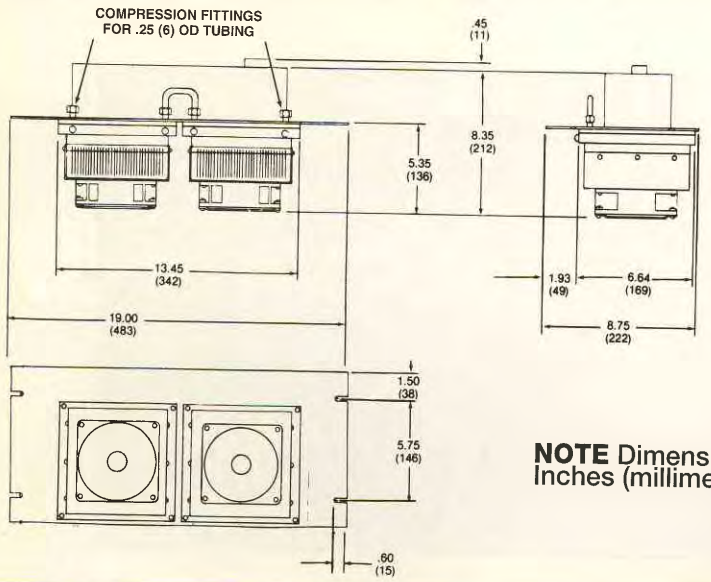
Performance Curve: LHP-1702FF



Equation of Line
y=ΔT (°C)
x=Total Load (Watts)

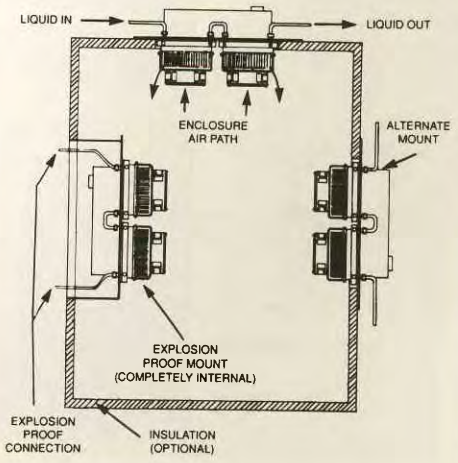
Liquid Temp.	25°C	60°C
Enclosure	y=.129x-40	y=.139x-52

*Inlet Liquid Temp. Line



NOTE Dimensions: Inches (millimeters)

Typical Mounting Method



LHP-800FF, LHP-810FF — Solid-State Air Conditioner, Liquid Cooled

Air Rating (LHP-800FF) 500-575 Btu/Hr *(Liquid Inlet to Cold Side Air)*

Air Rating (LHP-810FF) 550-650Btu/Hr *(Liquid Inlet to Cold Side Air)*

Features:

- Compact, only (8.06" L x 6.62" W x 5.5" D)
- Ambient Range, -30°C to +80°C
- No Compressor, Fluorocarbons, or Filters
- Maintenance-Free Operation
- Adaptable to Explosion-Proof Applications
- Mounts in any Orientation

Options:

- Heaters (200 Watts)
  - Model: LHP-800FFHC
  - Model: LHP-810FFHC
- Temperature Control

Applications in Pulp and Paper Mills, Machine Tools, & Electronics

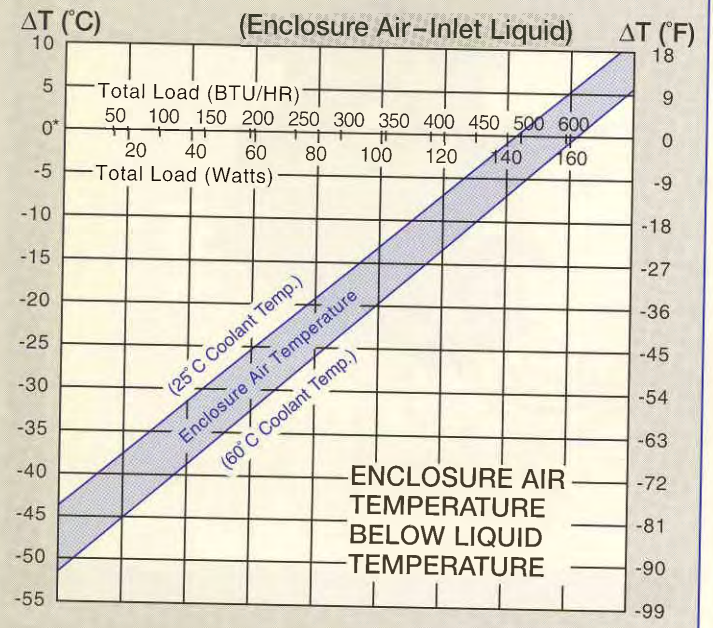
Teca's LHP-Series air conditioners are constructed with anodized aluminum liquid jackets with stainless steel fittings. You provide a constant flow of liquid as a heat removal source. Combining these features with thermoelectric modules make the LHP-series capable of both high capacity and high temperature differentials. Model LHP-800FF is designed for 30 VDC input, while the LHP-810FF is designed for 130 VDC input.

SPECIFICATIONS:

Model Number	LHP-800FF	LHP-810FF
Input Voltage	30 VDC	120 VDC
Input Current	10 Amps	4 Amps
Minimum Ambient	-30°C / -21°F	-30°C / -21°F
Maximum Ambient	+80°C / + 176°F	+80°C / + 176°F
Minimum Flow Rate	0.5 GPM (2 L/M)	0.5 GPM (2 L/M)
Enclosure Rating	Nema-12	Nema-12
Weight	7 lbs. / 3.2 Kg.	7 lbs. / 3.2 Kg.
Thermostat	Optional	Optional
Power Supply (Opt.)	PS400-30	PS-130

☎ Technical Support Toll Free (888) TECA USA or (888) 832-2872

Performance Curve: LHP-800FF

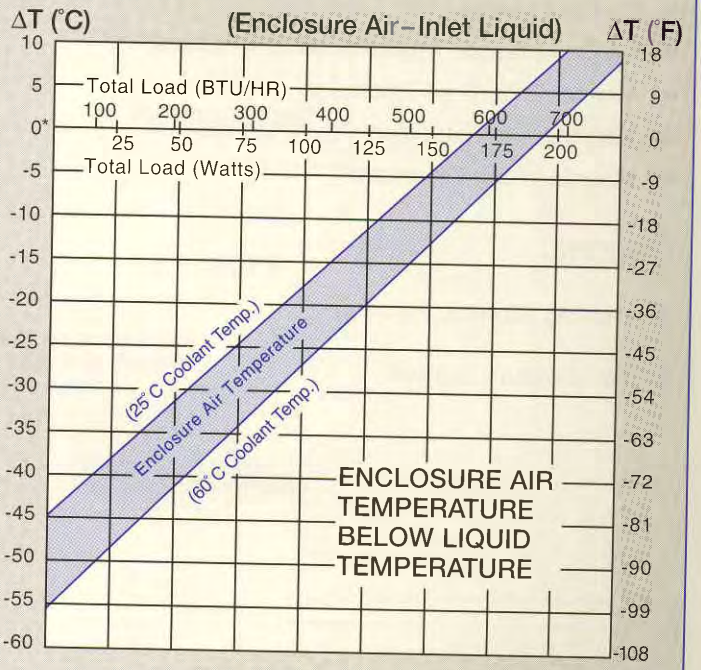


Equation of Line
y=ΔT (°C)
x=Total Load (Watts)

Liquid Temp.	25°C	60°C
Enclosure	y=.32x-44.5	y=.32x-52.0

*Inlet Liquid Temp. Line

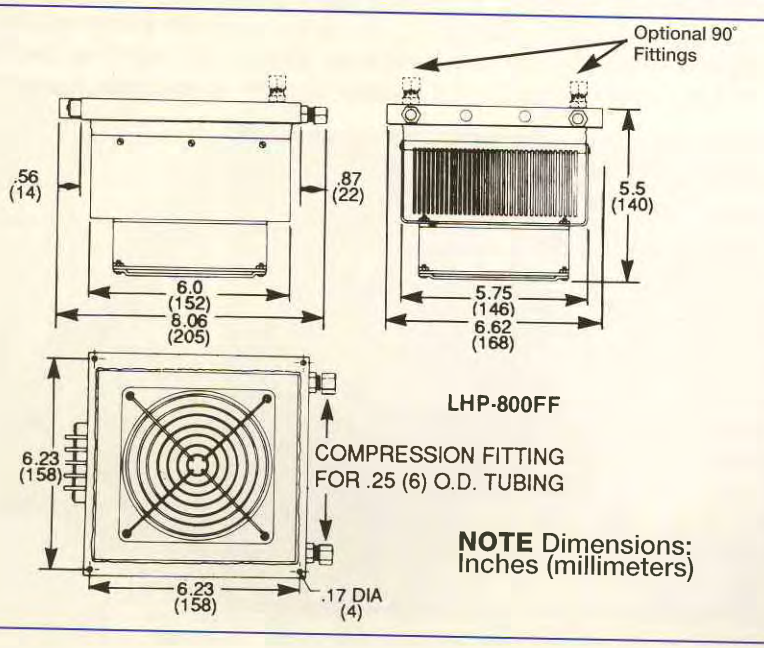
Performance Curve: LHP-810FF



Equation of Line
y=ΔT (°C)
x=Total Load (Watts)

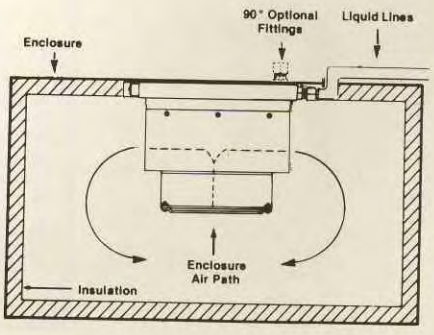
Liquid Temp.	25°C	60°C
Enclosure	y=.28x-45	y=.295x-56

*Inlet Liquid Temp. Line



NOTE Dimensions: Inches (millimeters)

Typical Mounting Method



LHP-300FF

Solid-State Air Conditioner, Liquid Cooled

Air Rating 290-325 Btu/Hr
(Liquid Inlet to Cold Side Air)

Fin Rating 200-240 Btu/Hr
(Liquid Inlet to Cold Side Fin)

Features:

- Compact, only (5.43" L x 4" W x 4.5" D)
- Ambient Range, -30°C to +80°C
- No Compressor, Fluorocarbons, or Filters
- Maintenance-Free Operation
- Adaptable to Explosion-Proof Applications
- Mounts in any Orientation

Options:

- Heating (Consult Factory)
- Temperature Control

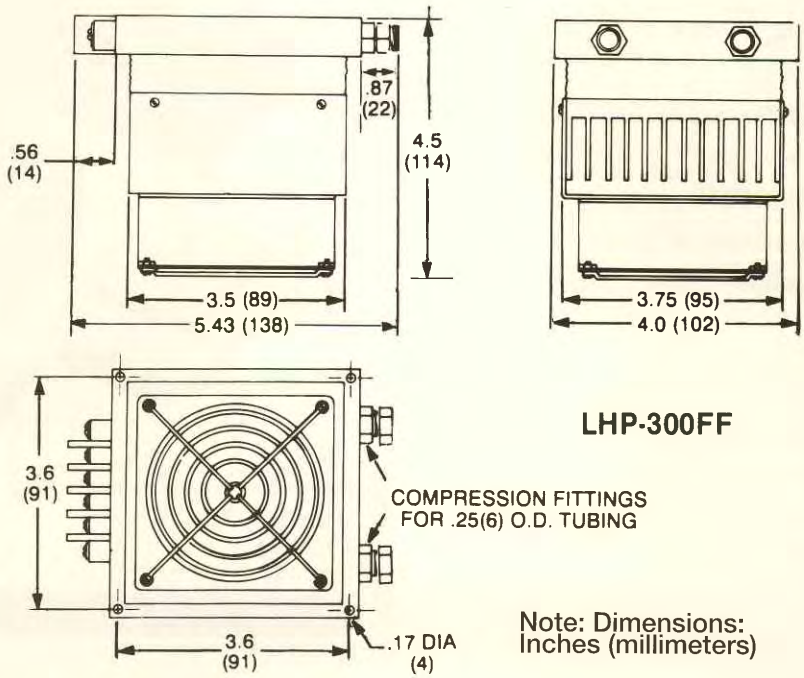
Applications in Pulp and Paper Mills, Machine Tools, & Electronics

Teca's LHP-Series air conditioners are constructed with anodized aluminum liquid jackets with stainless steel fittings. You provide a constant flow of liquid as a heat removal source. Combining these features with thermoelectric modules make the LHP-series capable of both high capacity and high temperature differentials. Model LHP-300FF is designed for 24 VDC input for the Thermoelectric modules and 115 VAC input for the fan. A DC power supply is available, model PS160-24.

SPECIFICATIONS:

Model Number	LHP-300FF
Input Voltage	24 VDC (T.E.), 115 VAC (Fan)
Input Current	4.5 Amps (T.E.)
Minimum Ambient	-30°C / -21°F
Maximum Ambient	+80°C / + 176°F
Minimum Flow Rate	0.1 GPM (.4 L/M)
Enclosure Rating	Nema-12
Weight	2.75 lbs. / 1.25 Kg.
Thermostat	Optional
Power Supply (Opt.)	PS160-24

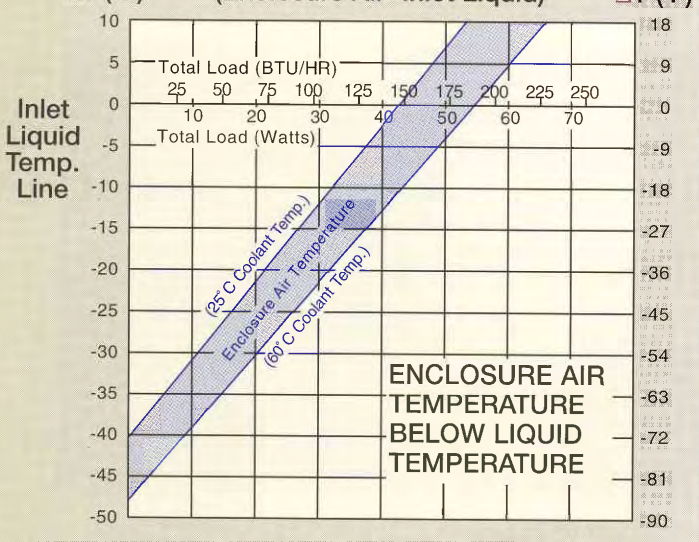
☎ Technical Support Toll Free (888) TECA USA or (888) 832-2872



LHP-300FF

Note: Dimensions:
Inches (millimeters)

Performance Curve: LHP-300FF

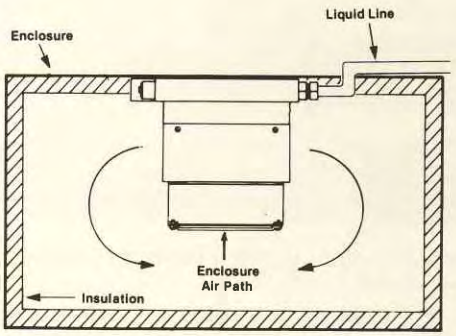


Please Note: Performance curves relative to flow rate of 0.6 L/Min

Equation of Line
y=ΔT (°C)
x=Total Load (Watts)

Liquid Temp.	25°C	60°C
Enclosure	y=.59x-35.5	y=.59x-41.5
Cold Sink	y=.51x-43.0	y=.52x-49.0

Typical Mounting Method



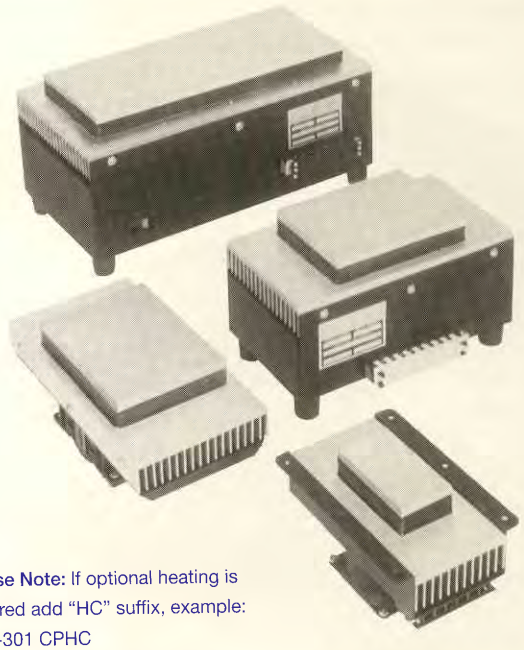
Solid-State Cold Plates, Air Cooled

Features:

- No Load Cooling to -20° C, at room temperature of 25° C
- Bench-top Models available
- AC & DC Input Models
- Ambient Range, -10° C to +70° C
- No Compressor, Fluorocarbons, or Filters
- Maintenance-Free Operation

Options:

- Heat/Cool Models
- DC Power Supplies
- Temperature Control



Please Note: If optional heating is required add "HC" suffix, example: AHP-301 CPHC

Applications in Instrumentation, Laboratory and Component Cooling

Teca's smallest air cooled cold plate, model AHP-150CP, comes with a standard 12 or 24 VDC input. Higher capacity is achieved with the AHP-1200CP, delivering up to 160 Watts of cooling from a standard AC input. Precise temperature control is available with our digital temperature controllers, models 3200 or 965.

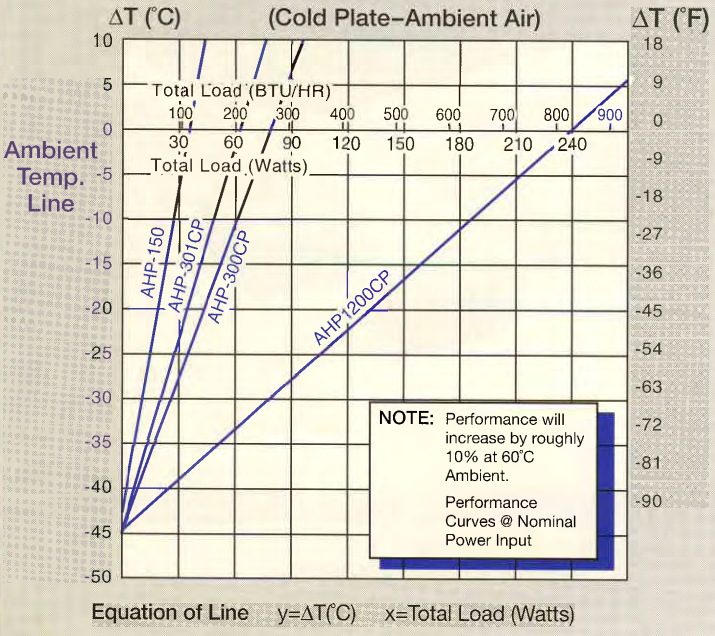
SPECIFICATIONS:

Model Number	Capacity Btu/Hr (Watts)	Input Voltage (Volts)	Input Current (Amps)	Heating (Optional) Btu/Hr (Watts)	Weight Lbs. (Kg)
AHP-150CP	125 (37)	12*/24 VDC	6.25/3.5	245 (72) 24 VDC Input	3.5 (1.6)
AHP-300CP	265 (78)	12/24*/48 VDC	12.5/6.3/3.1	245 (72) 24 VDC Input	6.0 (2.7)
AHP-301CP	225 (66)	115*/230 VAC	1.4/0.7	340 (100)	10.5 (4.8)
AHP-1200CP	560 (164)	115VAC	4	680 (200)	25.7 (11.7)

** Standard Factory Wiring (Terminal jumpers are provided for alternate voltages)*

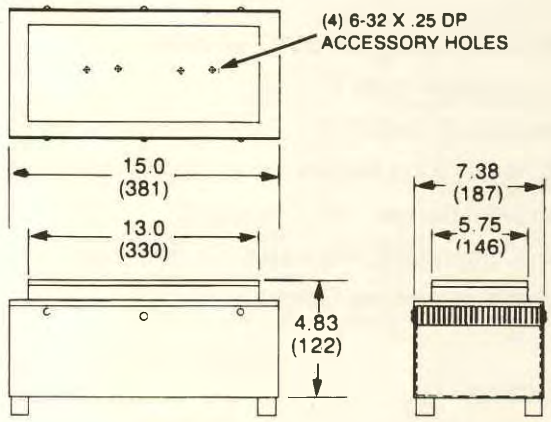
☎ Toll Free (888) TECA USA (832-2872)

Performance Curve: AHP-150/AHP-300CP/ AHP-301CP/AHP-1200CP



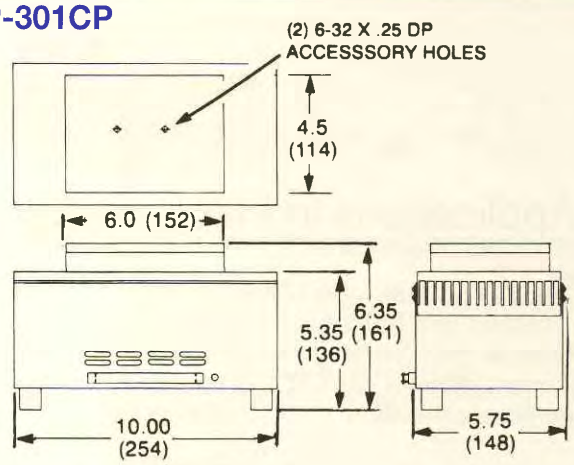
COLD PLATE PERFORMANCE @ 25°C AMBIENT TEMPERATURE				
MODEL	AHP-150	AHP-300CP	AHP-301CP	AHP-1200CP
EQUATION	y=1.2x-44.0	y=.60x-46.4	y=.69x-45.2	y=.19x-45.0

AHP-1200CP



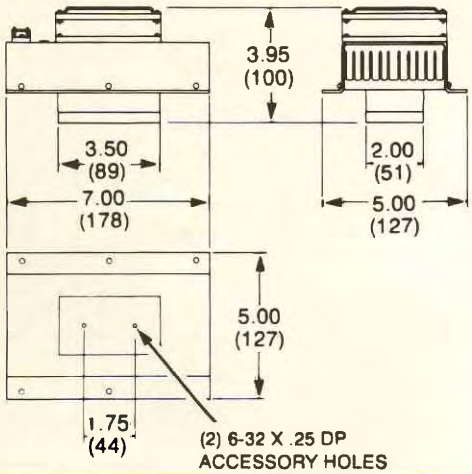
NOTE: 10-32 X 3/4 STUDS AND GASKET NOT SHOWN

AHP-301CP

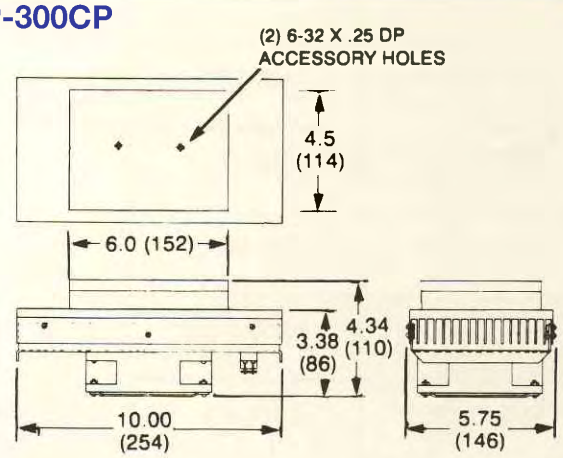


NOTE: 10-32 X 3/4 STUDS AND GASKET NOT SHOWN

AHP-150CP



AHP-300CP



NOTE: 10-32 X 3/4 STUDS AND GASKET NOT SHOWN

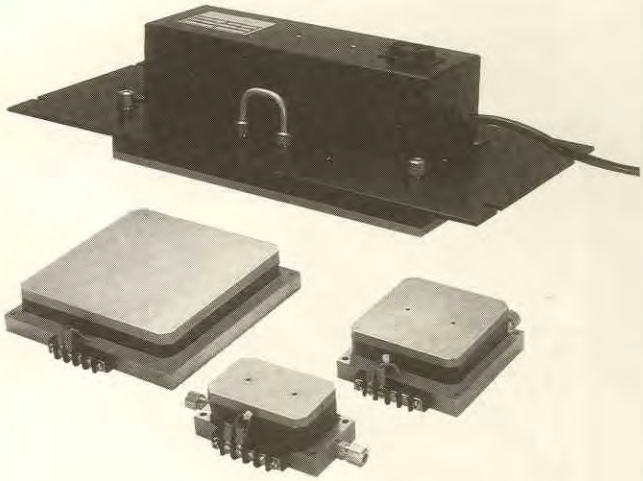
Dimensions: Inches (millimeters)

Features:

- No Load Cooling to -25°C, at room temperature of 25°C
- No Moving Parts
- AC & DC Input Models
- Ambient Range, -30°C to +80°C
- No Compressor, Fluorocarbons, or Filters
- Maintenance-Free Operation

Options:

- Heat/Cool Models
- DC Power Supplies
- Temperature Control



Please Note: If heating is required add "HC" suffix, example: LHP-800CPHC

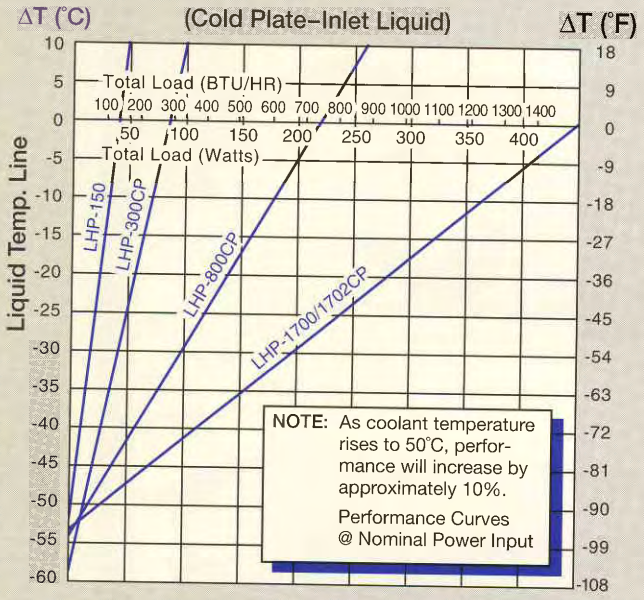
Applications in Instrumentation, Laboratory and Component Cooling

Teca's smallest cold plate, model LHP-150, comes with a standard 12 input. It combines the use of thermoelectric cooling and liquid heat transfer to maximize the performance and efficiency. Greater C.O.P.'s can be achieved by operating at lower power levels. The LHP-1700CP is our largest liquid cooled cold plate designed to operate direct from 115 VAC input, model LHP-1702CP operates from 230 VAC input. Precise temperature control is available with our digital temperature controllers, models 3200 or 965.

SPECIFICATIONS:

Model Number	Capacity Btu/Hr (Watts)	Input	Min. Flow Required	Heating (Optional) Btu/Hr (Watts)	Weight Lbs. (Kg)
LHP-150CP	135 (40)	12 VDC 4.5 Amps	.05 GPM	123 (36) 12 VDC Input	.75 (.34)
LHP-300CP	300 (88)	24 VDC 4.5 Amps	.05 GPM	246 (72) 24 VDC Input	1.75 (.80)
LHP-800CP	750 (220)	30 VDC 10 Amps	0.5 GPM	680 (200) 115 VAC Input	5.2 (2.4)
LHP-1700CP	1500 (450)	115 VAC 6 Amps	0.5 GPM	1360 (400) 115 VAC Input	19.75 (9.0)
LHP-1702CP	1500 (450)	230 VAC 4.5 Amps	0.5 GPM	1360 (400) 230 VAC Input	19.75 (9.0)

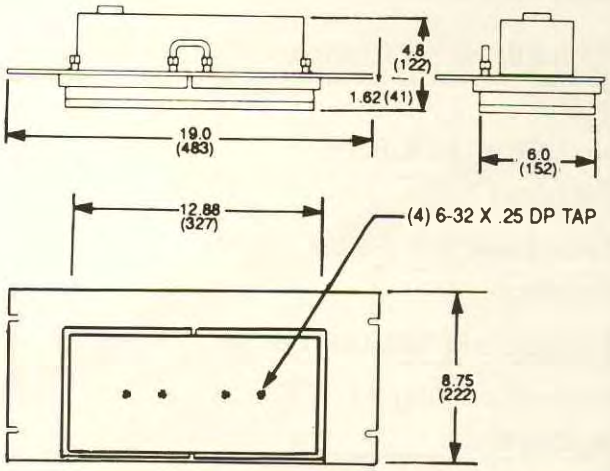
Performance Curves: LHP-150/LHP-300CP/ LHP-800CP/LHP-1700CP/LHP-1702CP



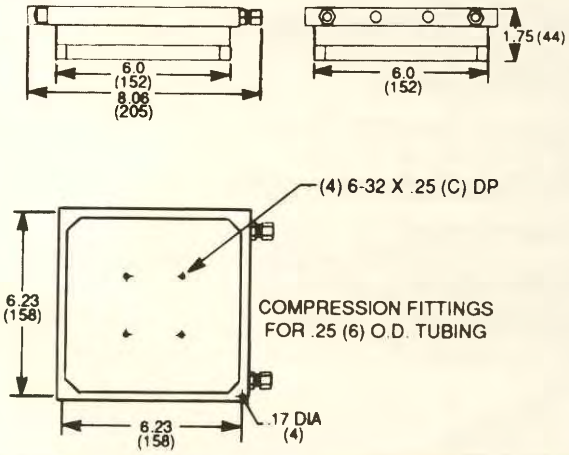
COLD PLATE PERFORMANCE @ 25°C LIQUID TEMPERATURE				
MODEL	LHP-150	LHP-300CP	LHP-800CP	LHP-1700CP/LHP1702CP
EQUATION	y=1.31x-52.0	y=.66x-58.0	y=.25x-54.0	y=.12x-54.0

Equation of Line: y=ΔT (°C), x=Total Load (Watts)

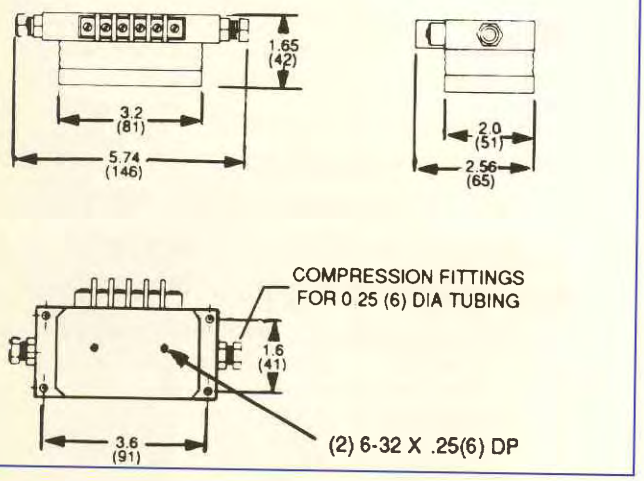
LHP-1700CP/LHP-1702CP



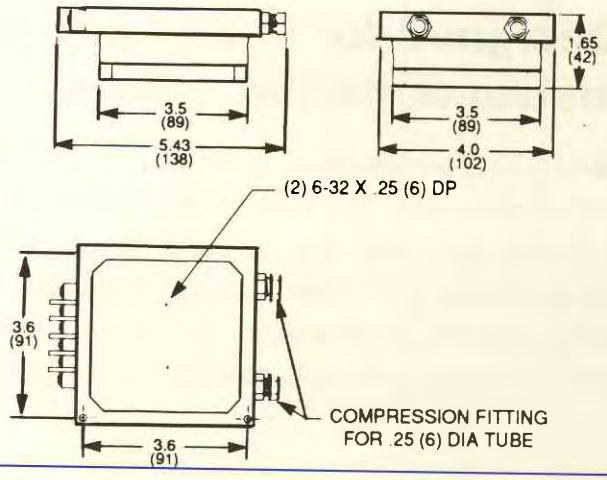
LHP-800CP



LHP-150



LHP-300CP



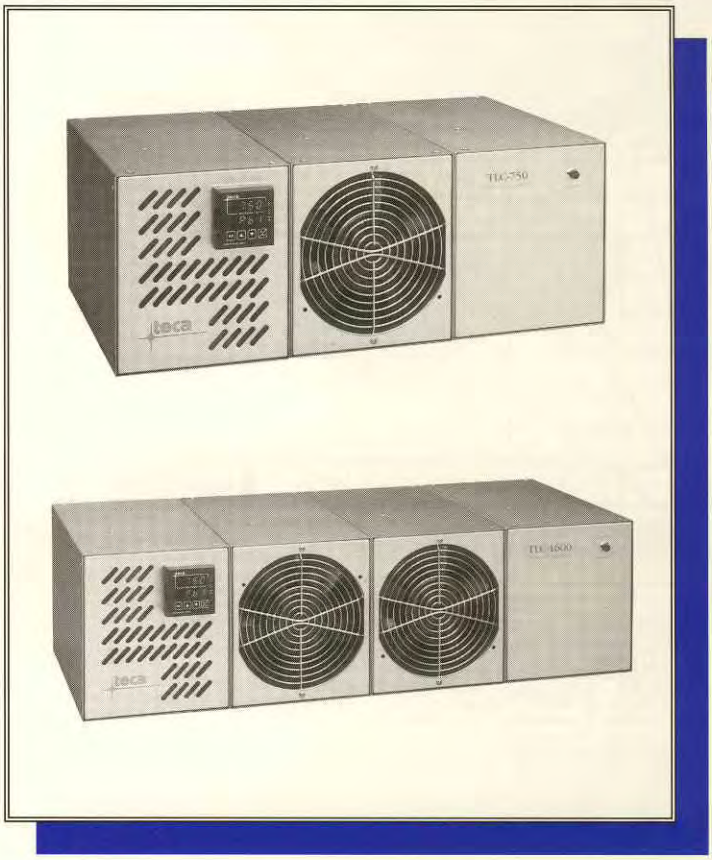
Dimensions: Inches (millimeters)

TLC-750/TLC-1600 Solid State Liquid Chillers

COMPLETE SYSTEM — RATING: 600-1400 BTU/h

Features:

- High Efficiency/ Compact Design
- No CFC's or HCFC's Required
- Thermoelectric (Peltier) Style Cooling
- Durable and Modular Design
- No load cooling 21-37°C from ambient
- TLC-750 (600-675 BTU/h)
- TLC-1600 (1350-1550 BTU/h)
- Optional Low Noise Version
- Optional Heating
- Attractive Anodize Finish
- One Pass Airflow (Front to Back)
- Quick Coupling, Shut Off Valve Fittings



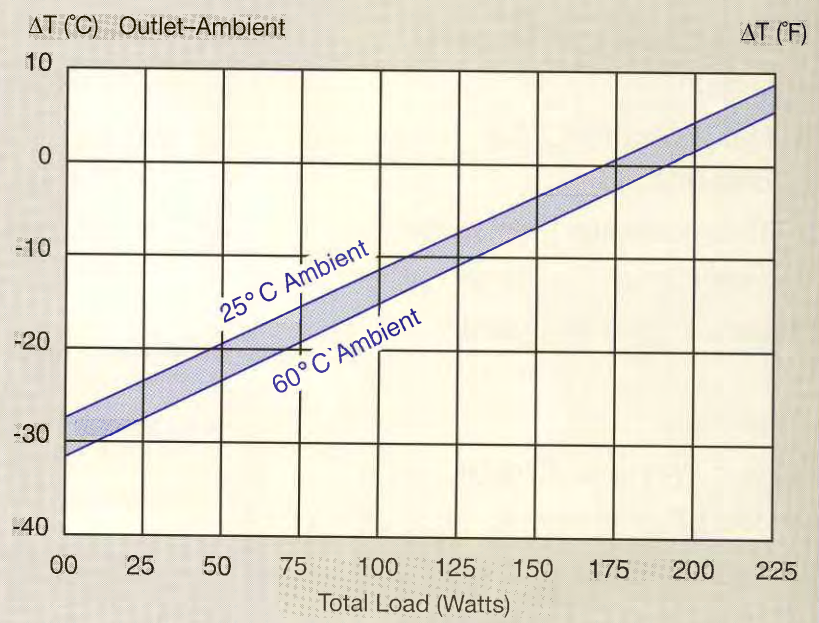
Designed for in-line process cooling, instrumentation, lasers

Teca's TLC-series liquid chillers differ from the ALC-series in that they are designed as complete packaged units. The TLC-series includes a seal-less magnetic drive pump and a 1 liter reservoir with low level indicator. Optional temperature control (Model 965 or 3200), can be offered as an integral package to the TLC-series. With today's growing concerns about the adverse effect that CFC's (chloro-fluorocarbons) have on the environment, thermoelectric cooling technology is an environmentally friendly solution to tomorrow's problems.

Specifications:

MODELS	TLC-750	TLC-1600
CAPACITY		
Cooling (Btu/Hr) (Watts)	600-635 175-200	1350-1400 375-400
Heating (Optional)		
INPUT		
Voltage	115 VAC	115 VAC
Current–RMS (35°C)	3.9 Amps AC	5.3 Amps AC
Current–RMS (50°C)	3.6 Amps AC	5.1 Amps AC
Frequency (Hz)	50/60	50/60
TEMPERATURE CONTROL		
Digital (Opt.)	3200 (Cool only)	
See Pgs. 42,43	965 (Heat/Cool)	
FLUID		
Max Liquid Temp. (°C/°F)	55/130	55/130
Max Ambient Temp. (°C/°F)	70/158	70/158
Liquid Jacket Material: Aluminum Pump Material: Polypropylene, Ceramic, Viton, 316 Stainless Steel		
RESERVOIR		
Capacity (Ltr/Gal.)	1/.45	1/.45
Pressure Relief (PSI)	25	25
FAN		
Number of Fans	1	2
DB (Noise Rating) Single Fan, Not in System	47/49 PSIL	47/49 PSIL
Optional Quiet Fans: Consult Factory		
DIMENSIONS/WEIGHT		
Height in. (cm)	7 (17.8)	7 (17.8)
Width in. (cm)	18.75 (47.63)	25 (63.5)
Depth in. (cm)	10.12 (25.70)	10.12 (25.70)
KG (LBS)	16.8 (37)	23.4 (51.5)

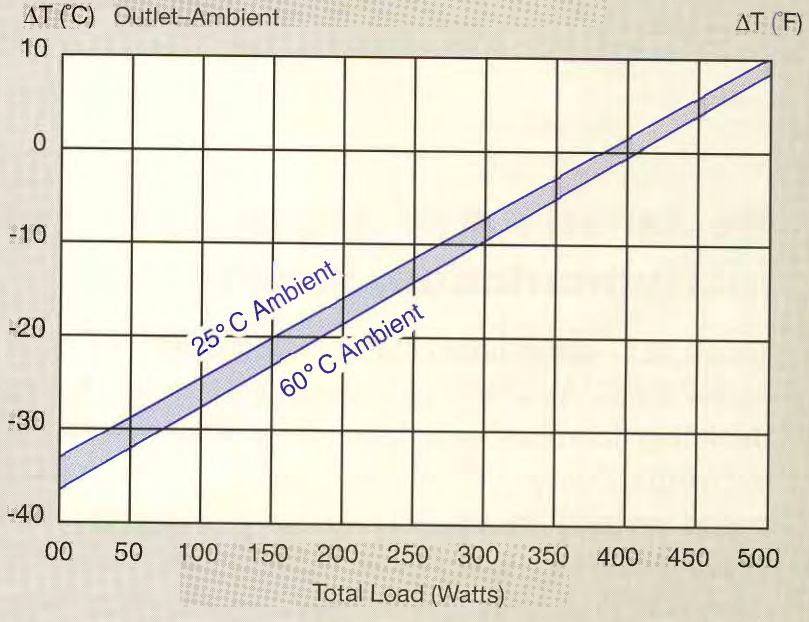
Performance: TLC-750



Equation of Line
y=ΔT (°C)
x=Total Load (Watts)

Ambient Temp.	25°C	60°C
Cooling Performance	y=.166x-28.7	y=.168x-31.3

Performance: TLC-1600



Equation of Line
y=ΔT (°C)
x=Total Load (Watts)

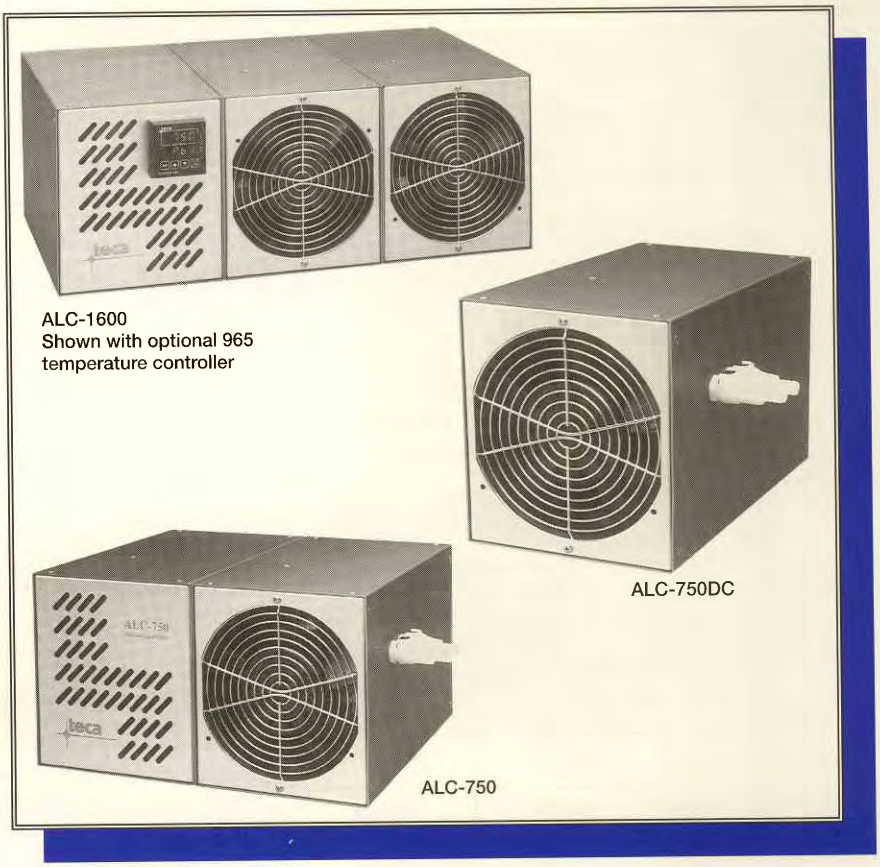
Ambient Temp.	25°C	60°C
Cooling Performance	y=.088x-33.6	y=.092x-37.0

ALC-750
ALC-750DC/ALC-1600 Solid State Liquid Chillers

SUB-SYSTEM — RATING: 600-1700 BTU/h

Features:

- High Efficiency/Compact Design
- No CFC's or HCFC's Required
- Thermoelectric (Peltier) Style Cooling
- Durable and Modular Design
- No load cooling 22-45°C from ambient
- ALC-750 or ALC750DC (600-800 BTU/h)
- ALC-1600 (1500-1700 BTU/h)
- Optional Low Noise Versions
- Optional Heating
- Attractive Anodize Finish



Designed for in-line process cooling, instrumentation, lasers

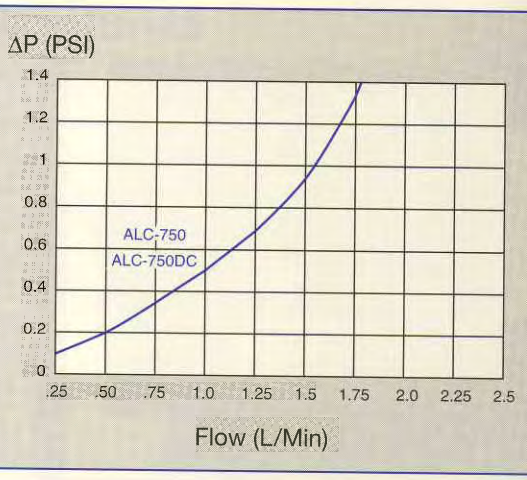
Teca's ALC-series liquid chillers feature high capacity in a compact design. Models (ALC-750, ALC-750DC, ALC-1600) are designed to maximize liquid cooling without the use of ozone depleting fluorocarbons. A combination of thermoelectric cooling modules and an efficient heat exchanger design give the ALC-series chillers the edge in liquid cooling. Traditional conventional based systems are usually expensive to maintain, bulky, hard to control, and inconvienent to operate. With solid-state cooling, temperature control within one degree along with maintenance-free operation are just some of the benefits that will be experienced.

Power supplies are included for models ALC-750 and ALC-1600. Model ALC-750DC is offered with a standard 24 VDC input.

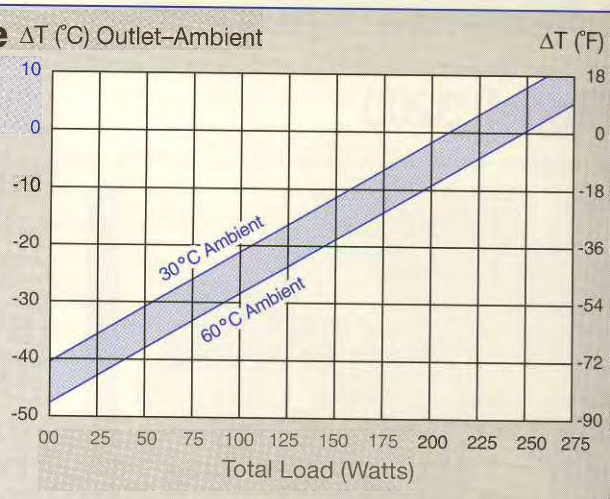
Specifications:

MODELS	ALC-750	ALC-750DC	ALC-1600
CAPACITY			
Cooling (Btu/h)	715-785	785-850	1535-1700
(Watts)	210-230	230-250	450-500
Heating (Consult Factory)			
INPUT			
Voltage	115 VAC	24 VDC	115 VAC
Current–RMS (30°C)	3.5 Amps	17.5 Amps	7.7 Amps
Current–RMS (50°C)	3.2 Amps	16.5 Amps	6.9 Amps
Frequency (Hz)	50/60	n/a	50/60
TEMPERATURE CONTROL			
Digital (Opt.) See Pgs. 42,43	965 3200	965DC 3200DC	965 3200
FLUID			
Max Liquid Temp.	80°C/176°F		
Max Ambient Temp.	70°C/158°F		
Liquid Jacket Material: Aluminum			
FAN			
Number of Fans	1 Fan	1 Fan	2 Fans
DB (Noise Rating) Single Fan, Not in System	47/49 PSIL		
Optional Quiet Fans: Consult Factory			
DIMENSIONS/WEIGHT			
Height in. (cm)	7.03 (17.9)	7.03 (17.9)	7 (17.8)
Width in. (cm)	12.62 (32.1)	6.31 (16.0)	18.75 (47.63)
Depth in. (cm)	10.12 (25.7)	10.12 (25.7)	10.12 (25.70)
KG (LBS)	12.3 (27)	6.6 (14.5)	18.9 (41.5)

Pressure vs. Flow



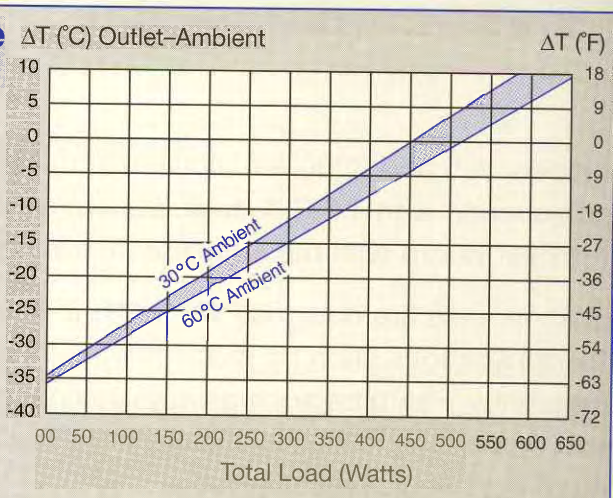
Performance ALC-750/ ALC-750DC



Equation of Line
y=ΔT (°C)
x=Total Load (Watts)

MODEL	30°C Ambient	50°C Ambient
ALC-750	y=.193x-40.4	y=.189x-43.3
ALC-750DC	y=.202x-45.8	y=.195x-48.4

Performance ALC-1600

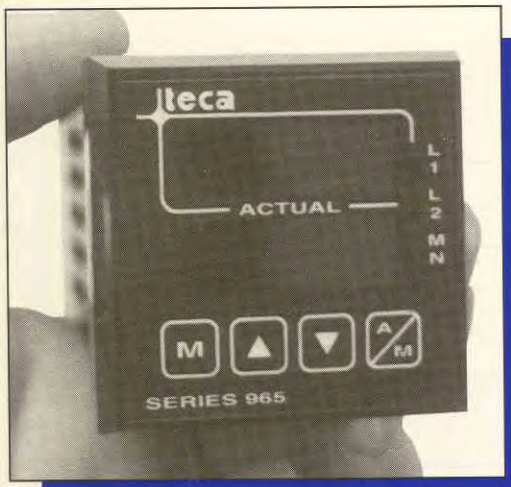


Equation of Line
y=ΔT (°C)
x=Total Load (Watts)

30°C Ambient	50°C Ambient
y=.076x-34.3	y=.072x-36.4

Temperature Controls Models: 965, 3200, TC-6F, TC-3F

Model: 965

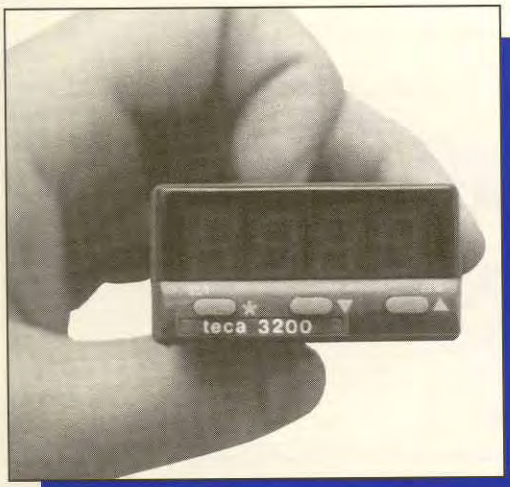


Features:

- 1/16 DIN
- Cool/Heat
- Dual Display
- Single Set Point

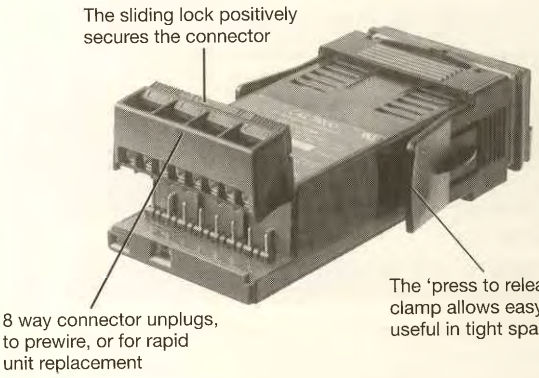
Dimensions: 2.1 (53) x 2.1 (53) x 4.7 (119) in (mm) overall

Model: 3200



Features:

- 1/32 DIN
- Cool Only
- Single Display
- Single Set Point



Dimensions: 1.89 (48) x .95 (24) x 4.29 (109) in (mm) overall

Models 965 and 3200 are digital microprocessor based temperature controllers designed to be used in conjunction with T.E.C.A. heat pumps. When ordered as a complete package, simply plug the unit into the heat pump with the supplied connector.

Both 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 microprocessor based controllers. Each unit comes with factory default programming, but can be user modified through a setup menu.

Temperature Control Specifications

	965	3200
FEATURES/OPTIONS		
FRONT PANEL DISPLAY	DUAL	SINGLE
OPERATOR LOCKOUT	YES, 4 LEVEL	YES, 4 LEVEL
RAMPING TO SET POINT	YES	NO
MICROPROCESSOR BASED	YES	YES
TYPE	P.I.D.	P.I.D.
AUTO TUNING	Yes	Yes
DATA RETENTION	Yes	Yes
OPTIONAL DC INPUT	12/24	12/24
PHYSICAL		
SIZE	1/16 DIN (2.1 " x 2.1 " x 4.7")	1/32 DIN (1 .89" x .95" x 4.29")
WEIGHT	8 oz	3.5 oz
OPERATION		
POWER INPUT	100-240 VAC	90-264 VAC
POWER CONSUMPTION	5VA	2.5 VA
SENSOR PROVIDED	T-type Thermocouple 6'	T-type Thermocouple 6'
OUTPUT 1	COOL	COOL
OUTPUT 2	HEAT or ALARM	
ACCURACY	+/- 0.1% Span +/- 1 LSD	+/- 0.25% Span +/- 1 LSD
AMBIENT RANGE	0-65°C	0-50°C
GENERAL		
NEMA RATING	4X	4X
AGENCY RATING	UL/CSA	UL/CSA/VDE

TC-6F, TC-3F Fixed Point Thermostat Control

Model TC-6F (Cool Only) thermostat is designed using a magnetic reed sensing switch in conjunction with a solid state relay.

3 Adjustable set points are available with the following settings:

Position	Control Temperature	Tolerance	Reset Differential
1	35°C	+/- 5°C	10°C Maximum
2	25°C	+/- 5°C	10°C Maximum
3	Constant Cool		

See controller manual for switch location.

Model TC-3F (Heat/Cool) thermostat is designed with the following technology.

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

Both models are designed for AC input and control. For DC input models, Consult Factory

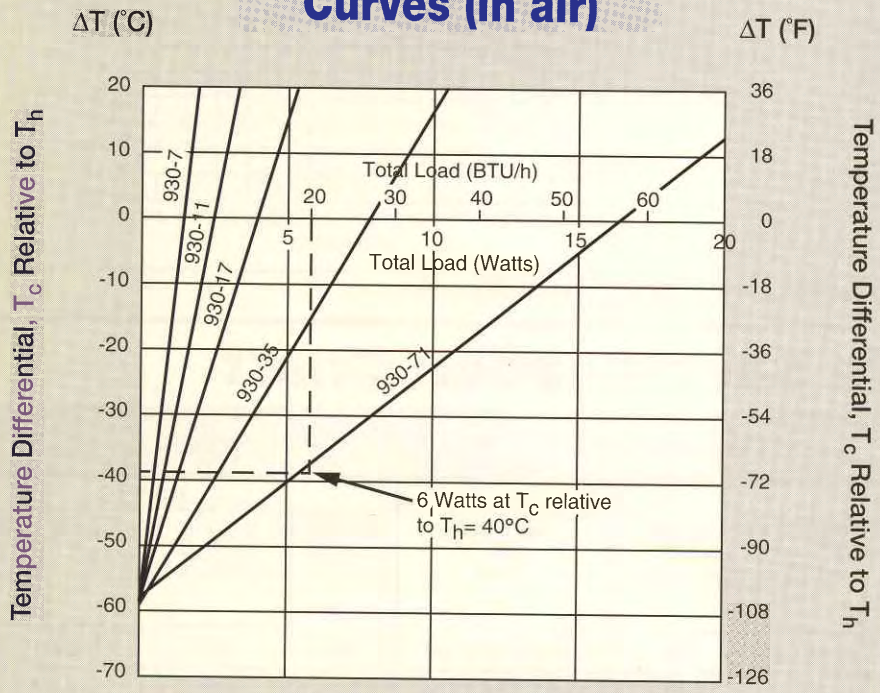
Single Stage ThermoElectric Modules

Features:

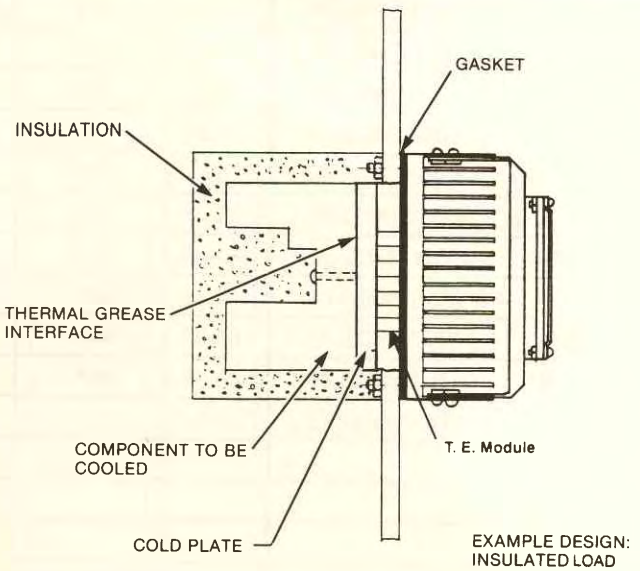
- Operates in -150°C (-238°F) to 80°C (+176°F) Temperature Range
- No vibration, noise
- Operates in any orientation, horizontal, vertical, etc.
- Can operate in cooling or heating mode
- No moving parts, compressor, or piping required.
- No load cooling to -41°C (-42°F) With Hot side at +25°C (+77°F)

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 polarity of the power input.

Series 930 Actual Performance Curves (in air)



Temperature differentials are relative to 27°C (80°F hot side temperature (Th). **Note:** As hot side temperature rises to 50°C (122°F temperature differential and load capacity will improve by approximately 10%. For improved efficiency and smaller heat sink dimensions the performance curves shown have been operated at 75% of the maximum rated current and voltage.



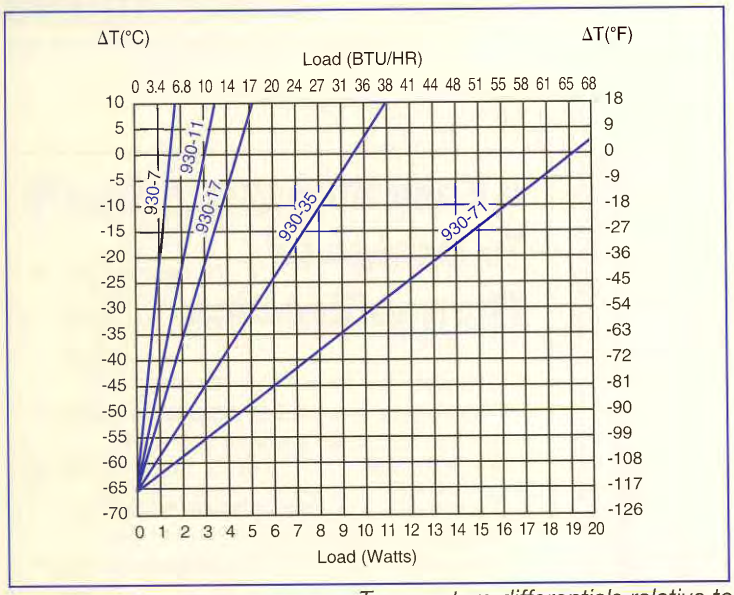
4 Easy Steps To Design Of ThermoElectrics

1. The designer must know three essential values; required cooling temperature of the load, ambient temperature and useful thermal load.
2. Determine actual requirements of TE module. Find the TE module cold side temperature (Tc), hot side temperature (Th), and heat pumped by TE module (Q). Note that a temperature difference (Th-Tc) in excess of 50°C generally requires a multi-stage design.
3. Select a TE module which operates in the current range you are willing to supply and supplies the heat pumping at the required temperature differential. (Single stage module specification chart, pg 46, 47)
4. With the module type, find module voltage and calculate electrical input power and hot side output to determine power supply and heat sink requirements.

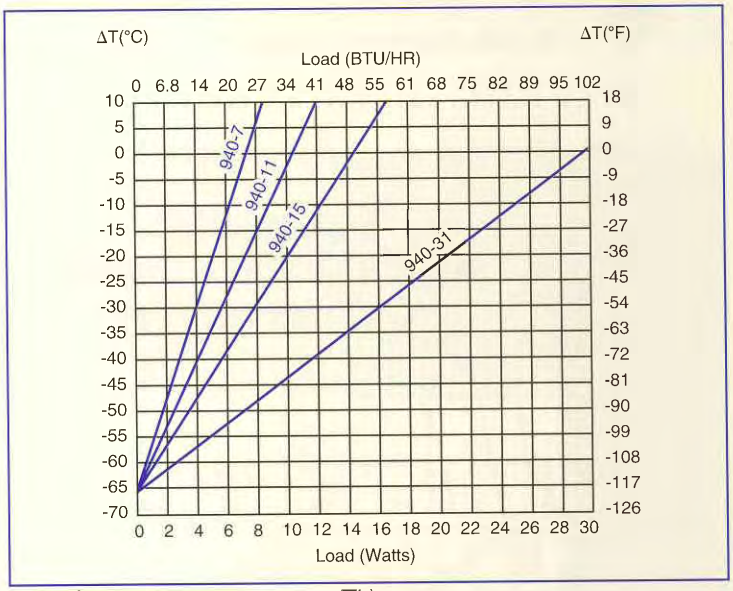
Example

1. Assume the load temperature is +5°C (+41°F) ambient air temperature is +25°C (+77°F) and useful load is 4 watts (14 BTU/h).
2. In this practical case with well designed heat transfer and isolation, expect a 5°C temperature drop on the cold side to the load and a 15°C rise on the hot side to ambient with a forced convection heat exchanger. Leakage losses should not exceed 10% of the load. Thus, you have a 0°C (+32°F) cold side, +40°C (+104°F) hot side and 4.4 watt (15 BTU/h) module load.
3. A single stage 930-35 module operating at Th = 40°C was found to provide 3.5 watts (12 BTU/h) of cooling. This unit is undersized. A 930-71 module operating at Th = 40°C provides 6 watts (20 BTU/h) cooling. This module has amble capacity. (See curve on left.)
4. Module voltage is 6 volts, current is 2.8 amps. The heat load of the hot side heat exchanger is 4.4 watts, +6 volts x 2.8 amps = 21 watts.

930 Series



940 Series

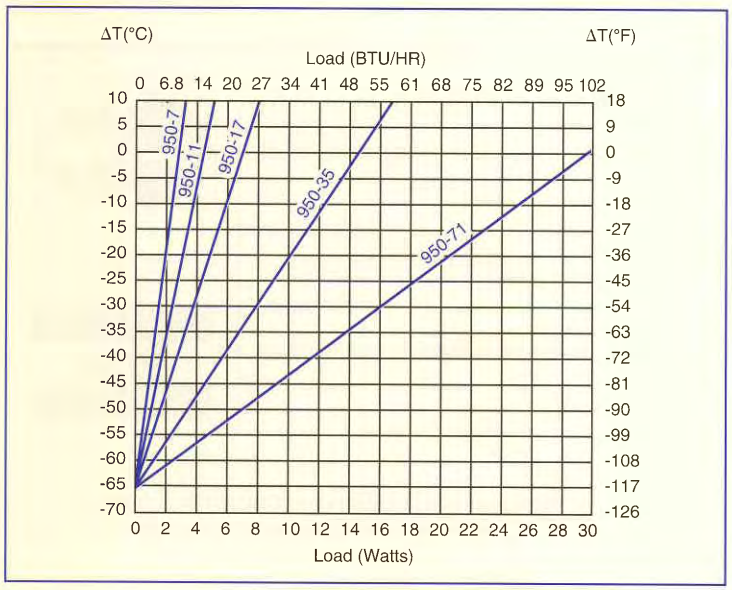


Temperature differentials relative to +27°C (80°F) hot side temperature (Th).

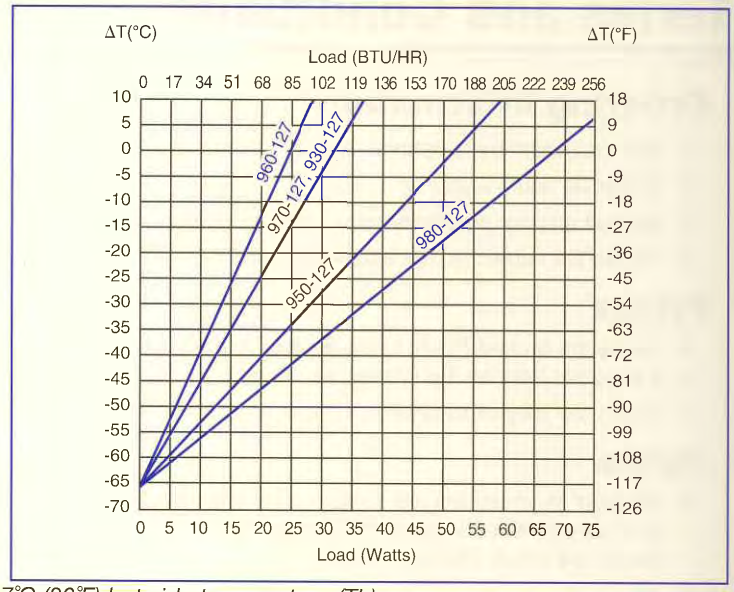
Single Stage Module Specification Chart

Module Series/ Couple	Performance								
	Th=27°C			Th=35°C			Th=50°C		
	MaxΔT @Qc=0 (ΔT°C)	Max Qc @ΔT=0 (Qc watts)	Equation of Line	MaxΔT @Qc=0 (ΔT°C)	Max Qc @ΔT=0 (Qc watts)	Equation of Line	MaxΔT @Qc=0 (ΔT°C)	Max Qc @ΔT=0 (Qc watts)	Equation of Line
930-7	66	1.8	ΔT=36.7Qc-66	73.6	1.9	ΔT=38.7Qc-73.6	78.1	2.0	ΔT=39.1Qc-78
930-11	66	2.9	ΔT=22.76Qc-66	73.6	3.1	ΔT=23.7Qc-73.6	78.1	3.2	ΔT=24.4Qc-78
930-17	66	4.5	ΔT=14.67Qc-66	73.6	4.7	ΔT=15.7Qc-73.6	78.1	5.0	ΔT=15.6Qc-78
930-35	66	9.4	ΔT=7.02Qc-66	73.6	9.9	ΔT=7.43Qc-73.6	78.1	10.4	ΔT=7.51Qc-78
930-71	66	19.0	ΔT=3.7Qc-66	73.6	20.0	ΔT=3.65Qc-73.6	78.1	21.0	ΔT=3.68Qc-78
940-7	66	6.8	ΔT=9.70Qc-66	70.0	7.0	ΔT=10Qc-70	75.4	7.5	ΔT=10.1Qc-75
940-11	66	10.6	ΔT=6.23Qc-66	70.0	11.0	ΔT=6.4Qc-70	75.4	11.7	ΔT=6.4Qc-75
940-15	66	14.5	ΔT=4.55Qc-66	70.0	15.0	ΔT=4.67Qc-70	75.4	16.0	ΔT=4.71Qc-75
940-31	66	30.0	ΔT=2.23Qc-66	70.0	31.0	ΔT=2.25Qc-70	75.4	33.0	ΔT=2.27Qc-75
950-7	66	3.0	ΔT=22Qc-66	70.0	3.1	ΔT=2.2Qc-70	75.0	3.3	ΔT=22.7Qc-7
950-11	66	4.6	ΔT=14.35Qc-66	70.0	4.8	ΔT=14.6Qc-70	75.0	5.1	ΔT=14.7Qc-7
950-17	66	7.2	ΔT=9.17Qc-66	70.0	7.4	ΔT=9.46Qc-70	75.0	7.9	ΔT=9.50Qc-7
950-35	66	14.8	ΔT=4.46Qc-66	70.0	15.3	ΔT=4.58Qc-70	75.0	16.3	ΔT=4.60Qc-7
950-71	66	30.0	ΔT=2.3Qc-66	70.0	31.0	ΔT=2.26Qc-70	75.0	33.0	ΔT=2.23Qc-7
930-127	70	33.4	ΔT=2.1 0Qc-70	75.0	38.1	ΔT=1 .97Qc-75	80.0	38.6	ΔT=2.07Qc-8
950-127	66	51.4	ΔT=1.28Qc-66	71.0	54.4	ΔT=1.30Qc-71	74.4	60.0	ΔT=1.24Qc-7
960-127	66	26.0	ΔT=2.54Qc-66	75.0	29.4	ΔT=2.55Qc-75	80.0	30.0	ΔT=2.67Qc-8
970-127	66	33.4	ΔT=1.98Qc-66	75.0	37.8	ΔT=1.98Qc-75	80.0	38.6	ΔT=2.07Qc-8
980-127	65	68.8	ΔT=.94Qc-65	72.2	83.2	ΔT=.87Qc-72.2	77.2	84.9	ΔT=.91Qc-77

950 Series

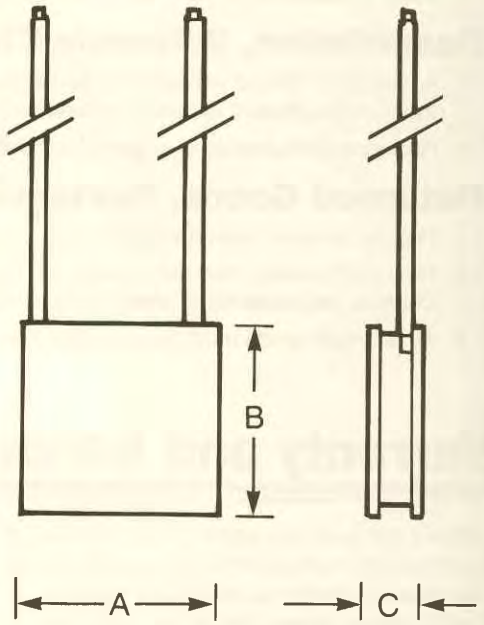


127 Couple Modules

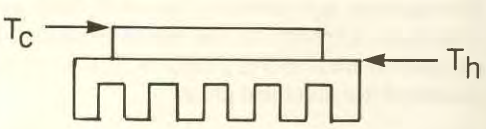


Temperature differentials relative to +27°C (80°F) hot side temperature (Th).

Module Series/ Couple	Electrical			Dimensions		
	Max Current (amps)	Max DC Voltage (volts)	Nominal Resistance (Ω)	A in (cm)	B in (cm)	C in (cm)
930-7	3.7	0.8	0.22	0.38 (.965)	0.38 (.97)	0.19 (.48)
930-11	3.7	1.2	0.32	0.38 (.965)	0.57 (1.46)	0.19 (.48)
930-17	3.7	1.9	0.49	0.57 (1.46)	0.57 (1.46)	0.19 (.48)
930-35	3.7	3.9	0.93	0.57 (1.46)	1.20 (3.05)	0.19 (.48)
930-71	3.7	8.0	2.00	1.2 (3.05)	1.2 (3.05)	0.19 (.48)
940-7	14.0	0.8	0.06	0.57 (1.46)	0.57 (1.46)	0.18 (.45)
940-11	14.0	1.2	0.08	0.57 (1.46)	0.85 (2.16)	0.18 (.46)
940-15	14.0	1.7	0.11	0.57 (1.46)	1.20 (3.05)	0.18 (.46)
940-31	14.0	3.5	0.20	1.2 (3.05)	1.2 (3.05)	0.18 (.46)
950-7	6.0	0.8	0.15	0.38 (.97)	0.38 (.97)	0.15 (.38)
950-11	6.0	1.2	0.18	0.38 (.97)	0.57 (1.46)	0.15 (.38)
950-17	6.0	1.9	0.29	0.57 (1.46)	0.57 (1.46)	0.15 (.38)
950-35	6.0	3.9	0.61	0.57 (1.46)	1.20 (3.05)	0.15 (.38)
950-71	6.0	8.0	1.20	1.2 (3.05)	1.2 (3.05)	0.15 (.38)
930-127	3.9	15.4	3.24	1.57 (3.99)	1.57 (3.99)	0.185 (.47)
950-127	6.0	15.4	2.11	1.57 (3.99)	1.57 (3.99)	0.15 (.38)
960-127	3.0	15.4	4.08	1.18 (3.00)	1.18 (3.00)	0.142 (.38)
970-127	3.9	15.4	3.14	1.18 (3.00)	1.18 (3.00)	0.126 (.32)
980-127	8.5	15.4	1.49	1.57 (3.99)	1.57 (3.99)	0.130 (.33)



NOTE: For improved efficiency and smaller heat sink dimensions, operate T.E. modules at 75% of the maximum rated current and voltage.



For Equations:
Max ΔT = temperature differential (T_c-T_h) (°C)
Max Qc = heat pumped by module (watts)

Terms and Conditions

Ordering Information

- You may order by telephone, during business hours, or
- By fax 24 hours a day, or
- By mail on your purchase order form or company letterhead.
- Orders are subject to acceptance, 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 subject to change without notice.

Terms

- Terms of payment are net 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, C.O.D. or L.O.C. may be required. All published prices unless otherwise stated are F.O.B. Chicago, U.S.A.

Same Day Shipment

- Upon request, we will ship the same day on approved, in stock orders received before noon, Chicago time.

Cancellation, Schedule Changes

- A charge of 15% of net price will be assessed for cancellation of formally acknowledged 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 damage may also be made.
- All returned goods must be sent freight prepaid. A restocking charge of 15% will apply.

Warranty and Service Information

TECA's products are warranted for a period of one (1) year, from date of shipment from the factory, to be free from defects in material and workmanship with correct use, normal operating conditions, and proper application. TECA's obligation under this warranty shall be limited to the repair or exchange (at TECA's option) of any TECA product or part which proves to be defective as provided herein. TECA reserves the right to either inspect the product at buyer's location or require it to be returned to the factory for inspection. Buyer is responsible for freight to the factory on all warranty claims. The above warranty does not extend to goods damaged or subjected to accident, abuse, or misuse after shipment from the factory, nor to goods altered or repaired by anyone other than specifically authorized by TECA. TECA shall not in any way be responsible for the consequences of any alteration, modification, or misuse unless previously approved in writing by an officer of TECA.

TECA makes no express warranties other than those which are described herein. Any description of goods sold hereunder, including any reference to buyer's specifications and any descriptions in catalogs, circulars, and other written material published by TECA, is for the sole purpose of identifying such goods and shall not create an express warranty that the goods shall conform to such description.

This warranty is expressly in lieu of all other warranties, expressed or implied. There are no implied warranties of merchantability of fitness for a particular application. This warranty states TECA's entire and exclusive liability and buyer's exclusive remedy for any claim for damages in connection with TECA's products. TECA will in no event be liable for incidental or consequential damages whatsoever, nor for any sum in excess of the purchase price.

TECA reserves the right to change prices and discontinue catalog items without notice. We reserve the right to make changes in specifications, terms and conditions at any time without notice. Our catalog information and specification are believed to be accurate and reliable. TECA, however, assumes no responsibility or liability for their use, nor for the effect of design or specification changes not yet conceived or made.

Quality Mission Statement

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.

Guiding Values and Principles

Quality is our 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 upon the involvement and individual 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.

the experts in solid-state cooling.