

***Pelmar Engineering Ltd.***

***Compact Cabinet  
Coolers***

***C a t a l o g***

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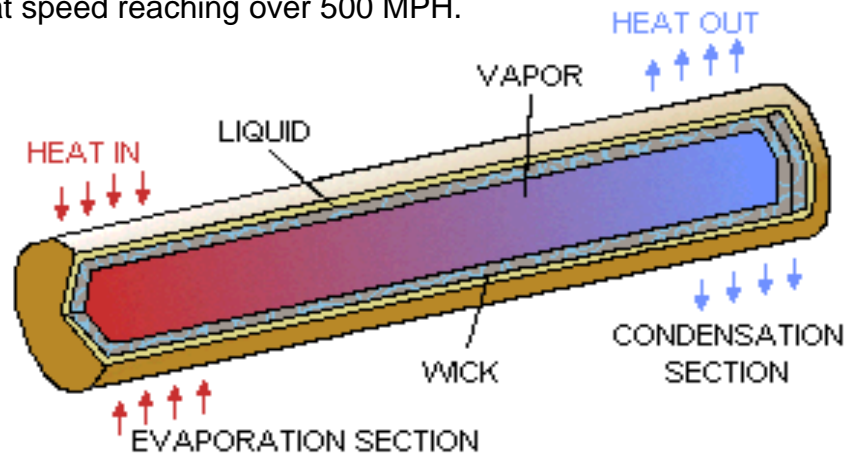
## INTRODUCTION

Pelmar/Noren produces a broad range of heat transfer devices incorporating heat pipes. Several of the company's products are widely recognized by their brand names. They include Compact Cabinet Coolers, Thermal Pins, and Megafats.

The first Noren Heat Pipes were manufactured over 30 years ago. During this time, Noren Products has successfully solved thermal management problems in the military, machine tool, instrument, robotics, food and power industries, to name a few. The heat pipe is the basic rapid heat transfer device in all of Noren's cooling products.

### What is a real Heat Pipe?

A heat pipe consists of a sealed aluminum or copper container whose inner surfaces have a capillary wicking material. Inside the container is a liquid (usually alcohol) under its own pressure, that enters the pores of the capillary material, wetting all internal surfaces. Applying heat at any point along the surface of the heat pipe causes the liquid at that point to boil and enter a vapor state. When that happens, the gas picks up the latent heat of vaporization. The gas, which then has a higher pressure, moves inside the sealed container to a colder location where it condenses. Thus, the gas gives up the latent heat of vaporization and moves heat from the input to the output end of the heat pipe. This process takes place at great speed reaching over 500 MPH.



One thousand times more conductive than copper of the same weight, heat pipes conduct large volumes of thermal energy away from the heat source. The heat pipe design is so simple and efficient that its cooling is advantageous for maintenance retrofit as well as the OEM production application.

### **The Reliable, Cost Effective Alternative To Cool Sealed Enclosures**

Modern day electronics continue to be placed in denser packaging and smaller enclosures. Consequently, electronics are being designed to handle higher temperatures. For example, many industrial logic controllers in today's market have thermal ratings of at least 140° F.

Moisture and airborne dust, oil, dirt, and other contaminants can damage sensitive electronic equipment. Sealed enclosures protect the electronics but can lead to overheating, which causes reliability problems and unnecessary downtime.

The Compact Cabinet Cooler is an air-to-air heat exchanger that solves these problems by cooling and recirculating the clean air inside the cabinet. At the same time, it maintains the enclosure's protective seal against contaminants.

Air conditioners and other below ambient type coolers are not necessary for most enclosure cooling applications. Compact Cabinet Coolers, built around the heat pipe principle, allow the use of slightly above-ambient cooling. Cabinet Coolers provide enough cooling even when summertime temperatures reach 120° F.

### **GREATER COOLING POWER FOR SEALED ELECTRONIC ENCLOSURES**

The Cabinet cooler customer receives many benefits over standard A/C; i.e., smaller size and weight, one-tenth the power draw, longer life and the fact that no condensation is created inside the cabinet. Also, one hour installation, wiring into the control circuit and easy maintenance allow the customer to walk away from the Cabinet Cooler after it is installed - worry free. Just change fans every four or five years.

The Cabinet Cooler's closed loop design cools and recirculates clean air while isolating sensitive components from the hostile environment. Kept in inventory at the manufacturer, standard Cabinet Coolers are designed for NEMA 12 type applications.

NEMA 4 and NEMA 4X models are available for operation outdoors or in corrosive environments, when weather protection or external protective coatings are required. Ask our applications engineers for these special protections.

### Benefits

- Minimizes down time
- Cost savings
- Easy to design into existing applications
- Easy to retrofit
- Worry free operation

### Features

- Cools electronics down to slightly above outside ambient air temperature.
- Maintains NEMA 12 seal. With added protection, units may be made splash proof (P unit).
- Air is circulated inside cabinet to keep hot spots from forming.
- Maintenance free cooling. Fans need changing only once in every four years.
- Flange and neoprene gasket keep contaminants out.
- Easy to install on top, door, sides, or back of cabinet.  
One person can cut a hole in the cabinet and bolt unit on in less than one hour.
- Compact and lightweight. One person can easily carry two units under his arm.
- Low power draw. 32 watts per fan results in low operating costs. No new electrical line required.
- Causes no condensation like air conditioners.
- Corrosion resistant. Anodized aluminum housing (standard). Additional salt water and chemical protection available (please inquire).
- Allowable ambient temperature. -40°F to 160°F.
- Explosion proof model available.
- Oil cooling models available.
- 115v 50/60 Hz or 220v 50/60 Hz fans. DC fans also available

Pelmar/Noren Cabinet Coolers as compared to Air Conditioners are:

- 1/6 the SIZE
  - 1/7 the WEIGHT
  - 1/10 the ENERGY
- and
- 1/5 the **COST**
  - **FREON FREE**
- and work 13X longer



### I. Determine Heat Load

#### ■ Existing Cabinets

To find heat load in the cabinet, first determine temperature rise inside the enclosure above outside ambient. Then calculate cabinet surface area available for cooling.

#### ■ Measurement and Calculation

1. Seal cabinet.
2. Measure T1 inside cabinet air temperature in °F. Measure T2 outside ambient air temperature approximately 6" from cabinet.
3. Calculate surface of cabinet available for free air convection, any surface 3" away from wall. Express surface area in ft<sup>2</sup>.
4. Using (2) and (3) above, heat load in metal cabinet will be:

$$P \text{ (watts)} = \frac{9 \times \text{AREA} \times (T1 - T2)}{36}$$

(Use 2.2 instead of 9 for plastic cabinets.)

#### ■ New Cabinets

Several methods are available to the engineer to estimate waste heat load in a newly developed cabinet. Some of the important methods are:

- A. Component efficiency.
- B. Incoming vs, outgoing power from a bread board unit.
- C. Temperature rise and volume of air passing over equipment.
- D. Manufacturer's rating.
- E. Simple test of each component.
- F. Test in foam or wooden box.

For Computer aided applications assistance, call 888-754-6329 or fax, and we will help you size your enclosure for cooling within two minutes over the phone.

## II. Select Correct Model Cabinet Cooler for Individual Applications

Know:

P = heat load (watts) from Step I

A = surface area of cabinet (ft<sup>2</sup>)

ΔT = allowable rise in temperature above ambient after Cabinet Cooler is installed (°F)

C = Cabinet cooler rating (found in table)

For metal cabinet:  $C = \frac{36P}{\Delta T} - 9A$

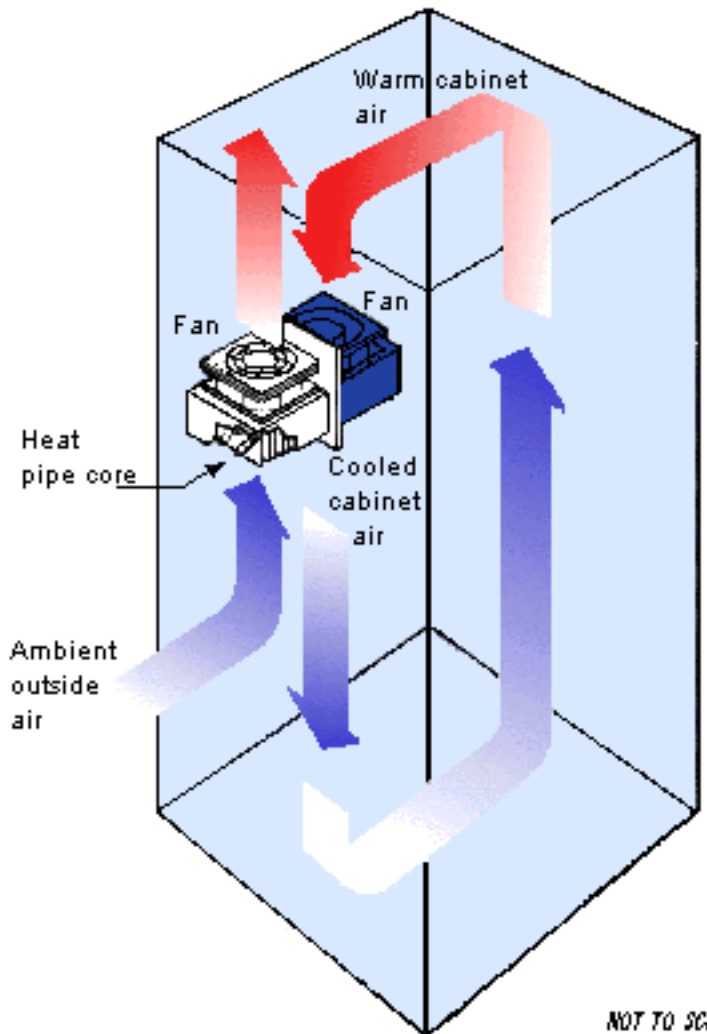
Then look in table to find the Cabinet Cooler with at least that capacity (C).

For heat loads requiring more than one Cabinet Cooler to attain desired ΔT, add another

$$C + C = \frac{36P}{\Delta T} - 9A$$

Compact Cabinet Cooler * Rating Table Watts/20°CΔT(36°FΔT)	
Installed Unit	C
CC200	330
CC500	700
CC800	1100
CC1200	1500
CC1400	1500
CC2000	2200
CC250F	322
CC400F	408
CC600F	988
CC900F	1320
CC1300F	1500
CC2500F	2080

\* Ratings are net values not including heat loss through cabinet walls.





- **How does the Compact Cabinet Cooler work?**

The Compact Cabinet Cooler continuously removes heat from the enclosure's interior in order to cool sensitive electronic components without exposing them to harsh environments. Referring to the illustration above, the interior fan draws air, which has been heated by the electronics, over the inside half of the Compact Cabinet Cooler core. The heat pipe core absorbs the heat and transfers it to the outside fins.

The heat is removed by the cooler ambient air circulated by the exterior fan. The inside fan blows the cooled air toward the electronic components to cool them. This kind of system is known as an air-to-air heat exchanger.

The heat pipe core of the Compact Cabinet Cooler transfers heat very efficiently. As the core absorbs heat inside the enclosure, the working fluid inside the heat pipes vaporizes and travels to the cooler end of the core, where it gives up its latent heat of vaporization. The exterior fan draws ambient air over the core and blows the heat away.

The now-cooled fluid condenses and flows back to the hotter end. Notice that the two air streams are kept completely separate. You cool electronic components effectively while protecting them from environmental contamination.

- **Example Applications**

In example A, we want to cool a NEMA 12, 72" X 36" X 24" uninsulated, floor mounted, sheet metal enclosure. We measured inside cabinet temperature and found it to be 126°F. Outside the cabinet was 90°F. Then, from Step 4 on page 3, we calculated heat load (P) to be 600 watts. In this application, allowable temperature rise above ambient ( $\Delta T'$ ) is 20°F. Using  $C=36P/\Delta T'-9A$ , we find  $C=486$  watts. We select a Cabinet Cooler from the table with a rating of at least 486 watts. Therefore, we choose the CC500, because it is closest in performance above 486 watts.

In example B, with the same enclosure, if we decrease the allowable rise in temperature to only 10°F, then using  $C=36P/\Delta T'-9A$  again, the Cabinet Cooler rating must exceed 1566 watts. The CC2500F will meet the requirement.

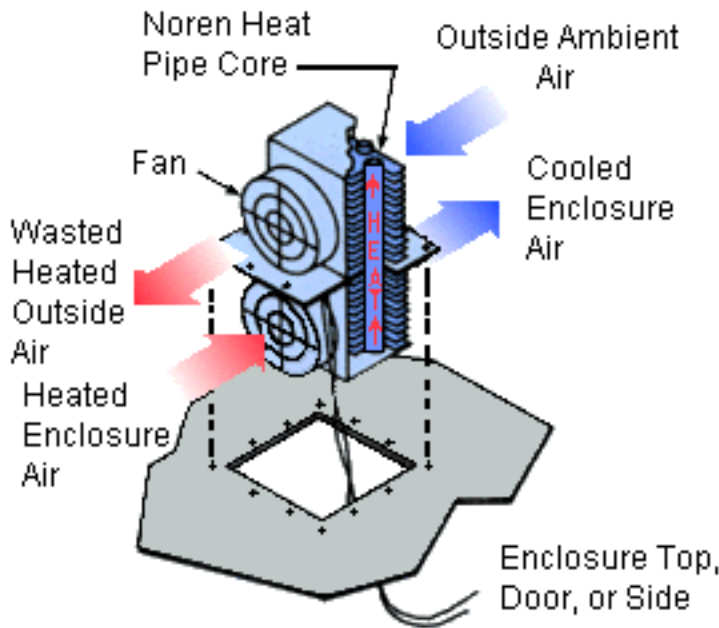
Choose the first Cabinet Cooler with the rating exceeding that of your heat load. Both standard Drop-in and Flush Mount models are available to accommodate individual enclosure dimensions.

Pelmar's computer aided application engineers can size your cabinet for cooling in minutes. Provide dimensions of the enclosure, inside temperature and outside ambient temperatures (or waste heat load in watts) for an on-the-spot quotation. Phone **888-754-6329** for information.

- **SIMPLE**
- **SMALL**
- **POWERFUL**
- **LONG LIFE**



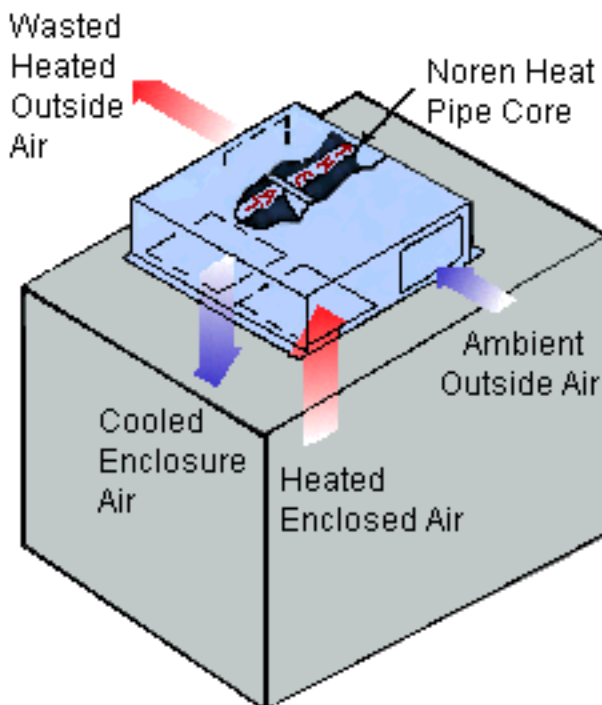
## Compact Drop-In Models



### Features

- Most compact but powerful cooling
- 1100 - 7500 BTU's/hr
- Energy Efficient. Light Weight.
- Fans of 100 - 215 CFM each.
- Extends 5 3/4" - 15" respectively into cabinet.
- Maintenance Free - Just change fans every four years.
- Quiet - Low dBA

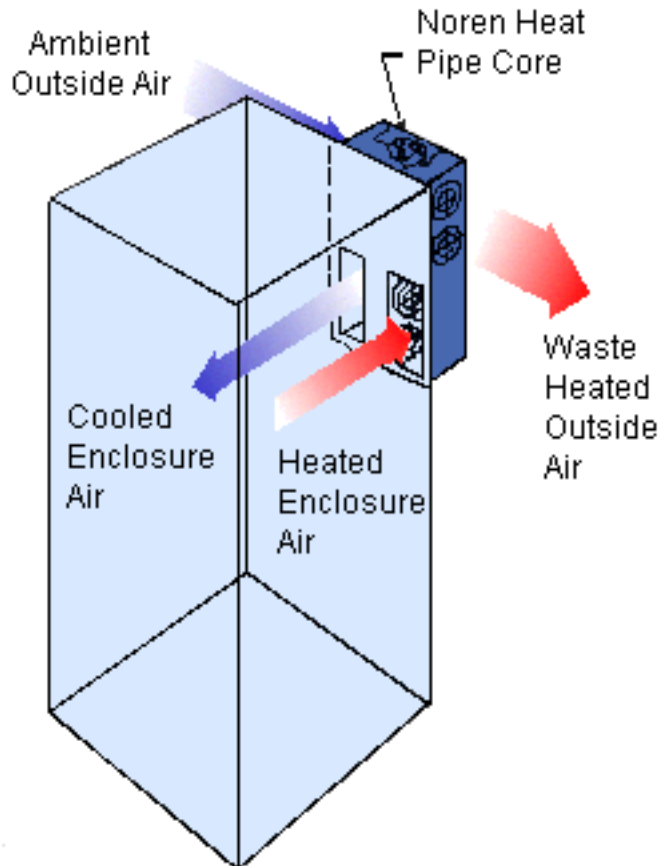
## Thin Flush Mount Models



### Features

- Thin Flush Models
- 1100 - 3300 BTU's/hr
- Energy Efficient. Light Weight
- Fans of 100 - 215 CFM each.
- Mounts outside, flush to enclosure
- Maintenance Free - Just change fans every four years.
- Quiet - Low dBA

## High Power Flush Mount Models



### Features

Most powerful Flush Models.

4500 - 7100 BTU's/hr.

Energy Efficient. Light Weight.

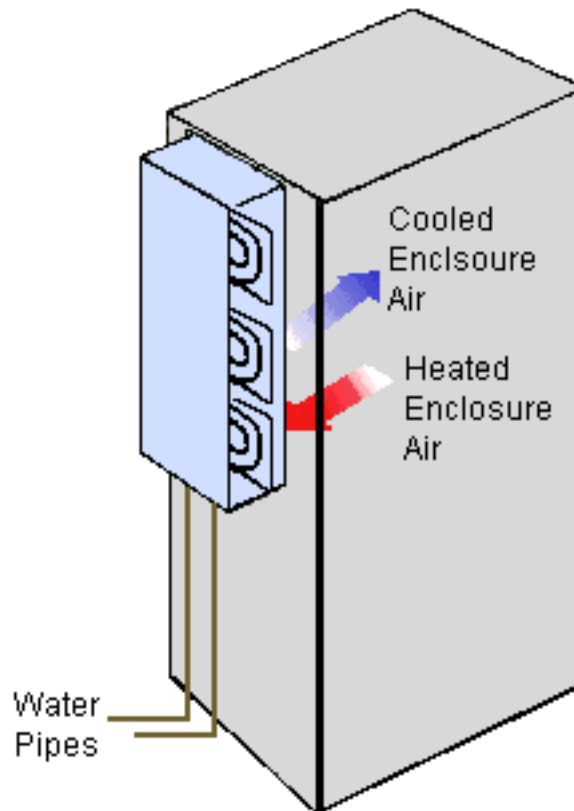
Mounts outside, flush to enclosure.

Maintenance free - just change fans every four years.

Quiet - Low dBA.

## Air-to-Water Compact Cabinet Coolers

### Below Ambient Cooling System



### Features of Pelmar/Noren Water Units

Cools below ambient

3,351, 8,557, 9,300 and 21,800 BTU's/hr respectively

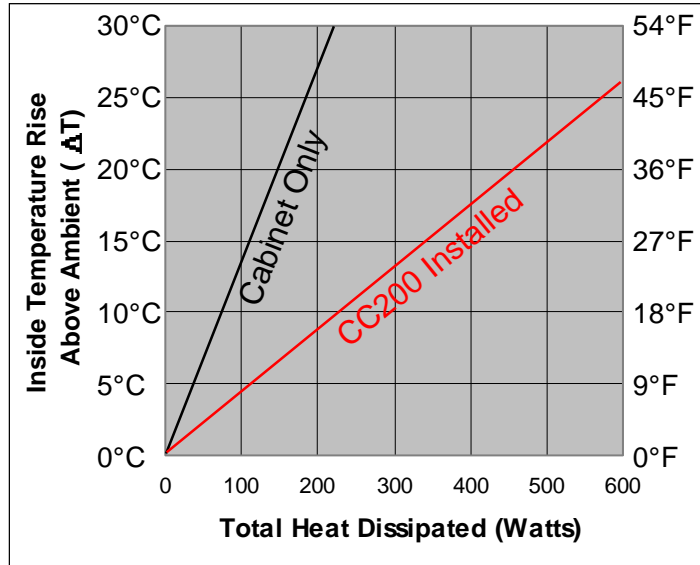
Maintenance free

No filters to clog. No external fans.

Energy efficient - 13, 35 and 100 Watts respectively.

Mounts on the outside, flush mount

## CC200



Compact Cabinet Coolers

### Specifications

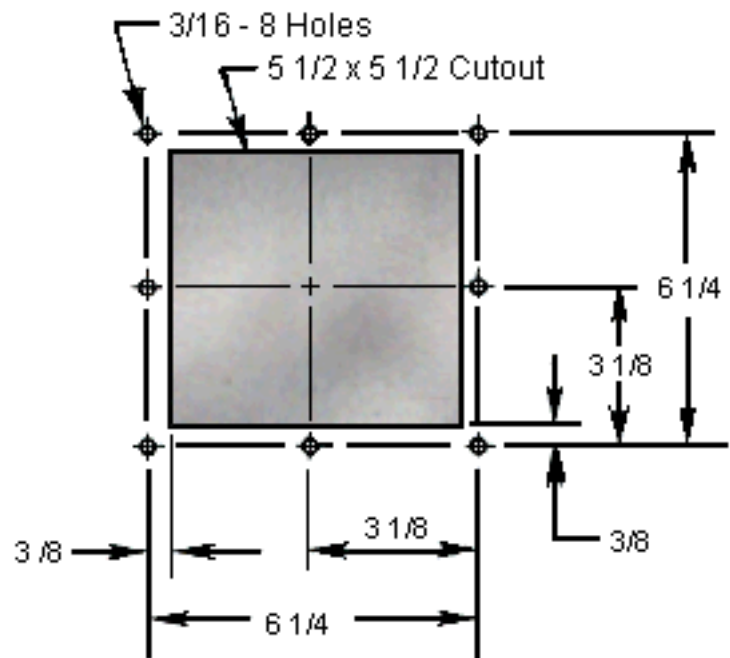
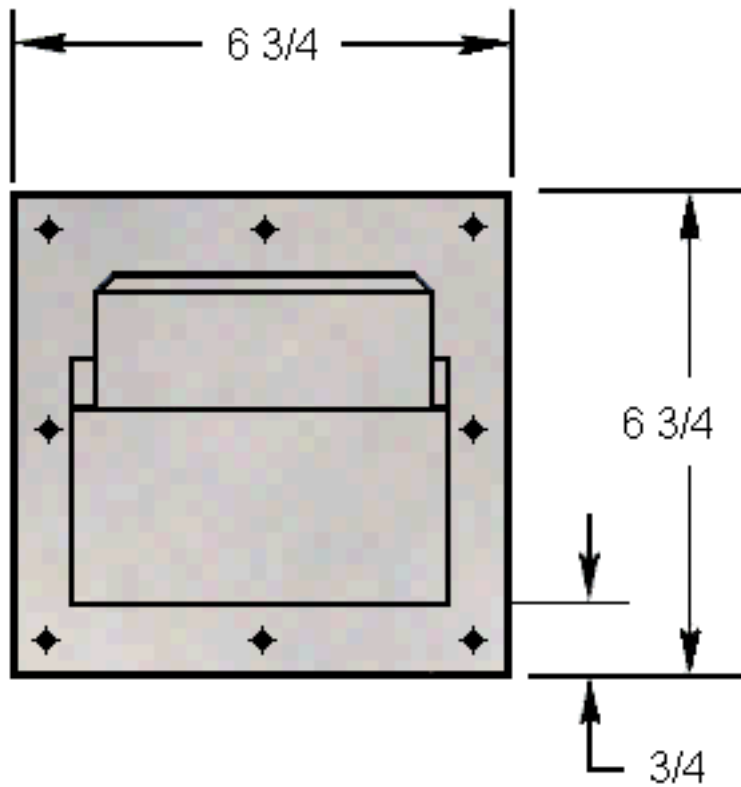
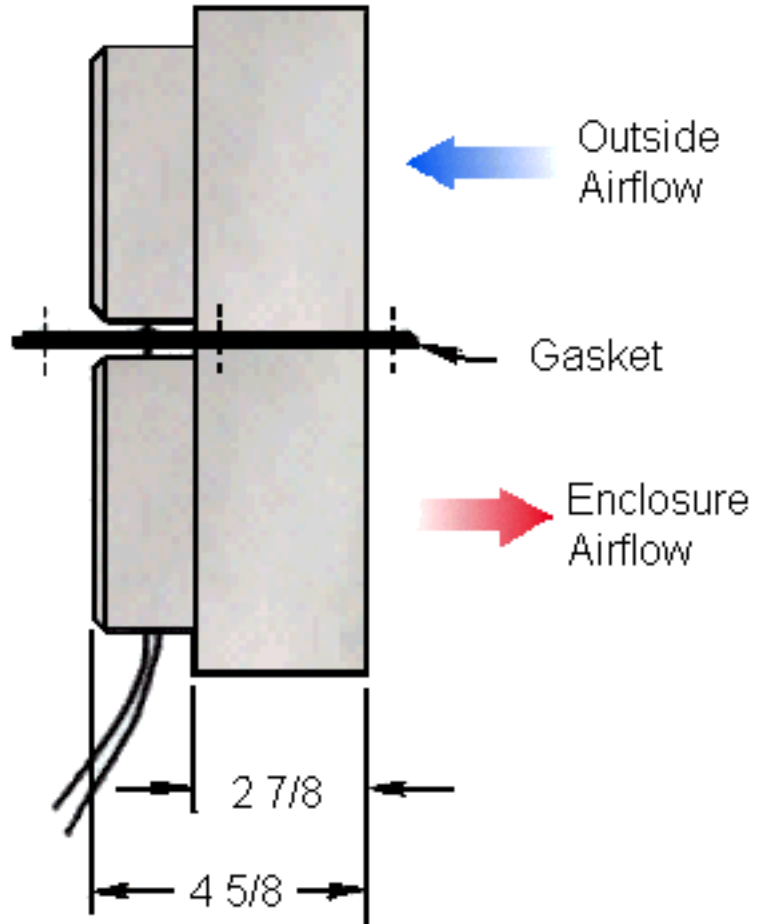
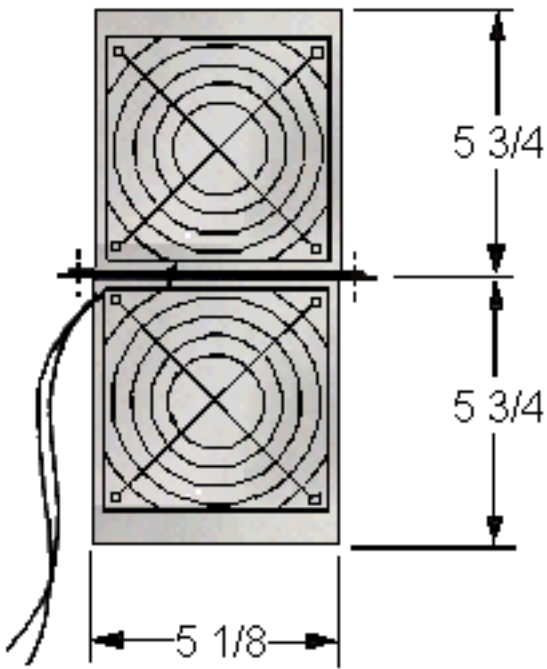
Model	Efficiency Watts/°C	BTU/Hr @20°CΔT	Voltage *	Hz *	Amps	No. of Fans & Size	Noise Level dB(A) @ 3 ft.
CC200	16.5	1100	115	50/60	0.4	2 (4")	50/53

\*230 VAC and 12,24 and 48 VDC Fans also available.

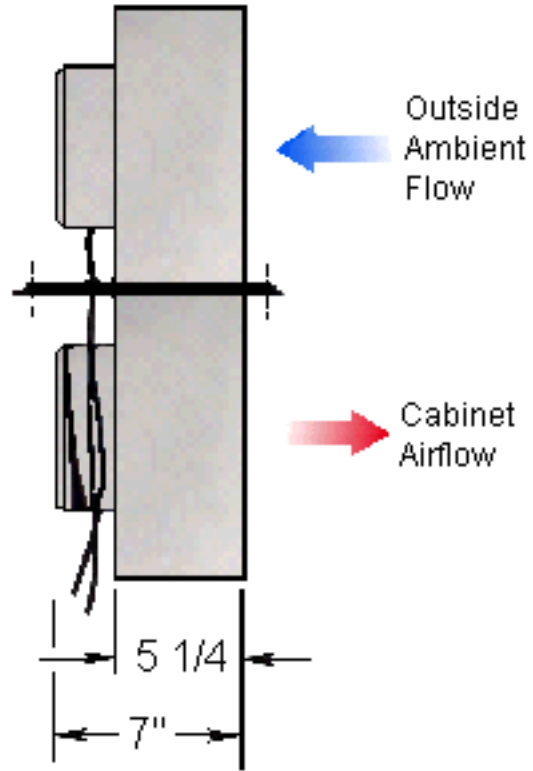
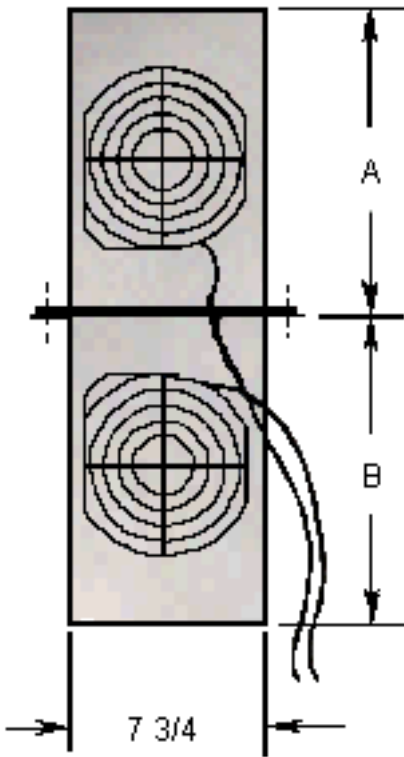
### Filters for the dirtiest environments

Washables	Disposable	Filter Housing
F20-A	F20-P	FH-20

Dimensions

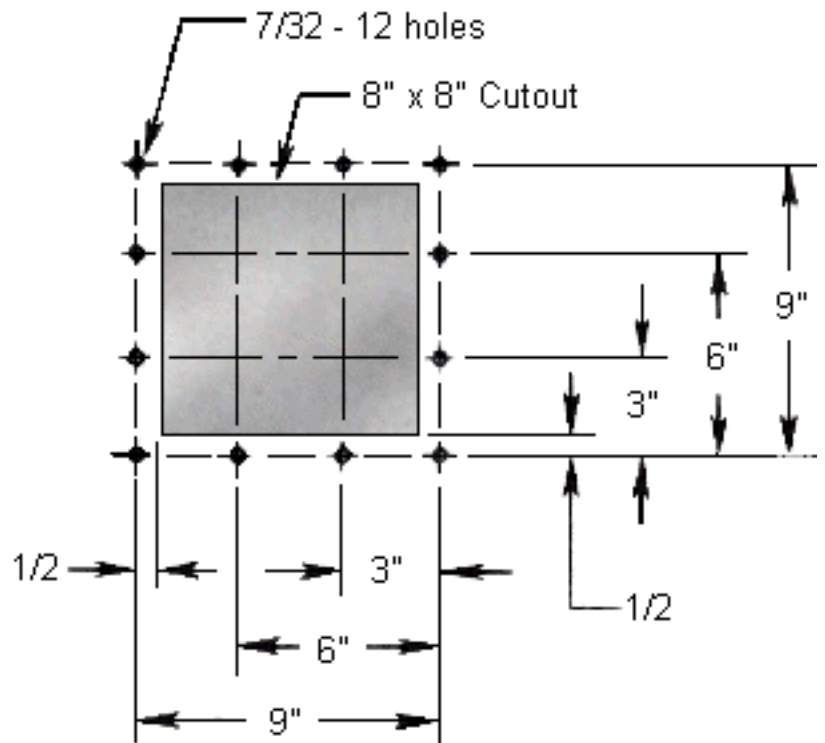
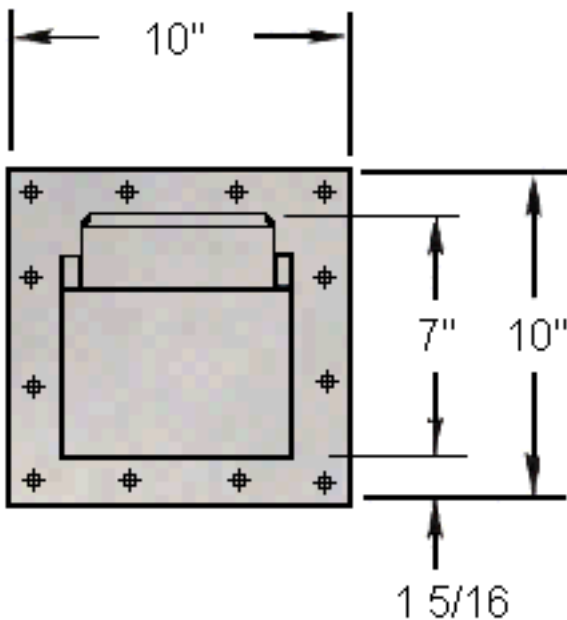


# Dimensions

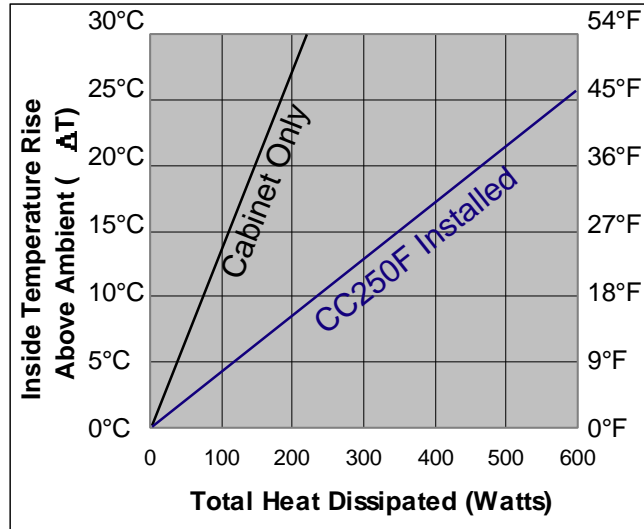


Dimensions in inches

Model	A	B
CC500	7 1/2	7 1/2
CC800	7 1/2	7 1/2
CC1200	11	11
CC1400	15	7 1/2
CC2000	15	15



## CC250F



### Specifications

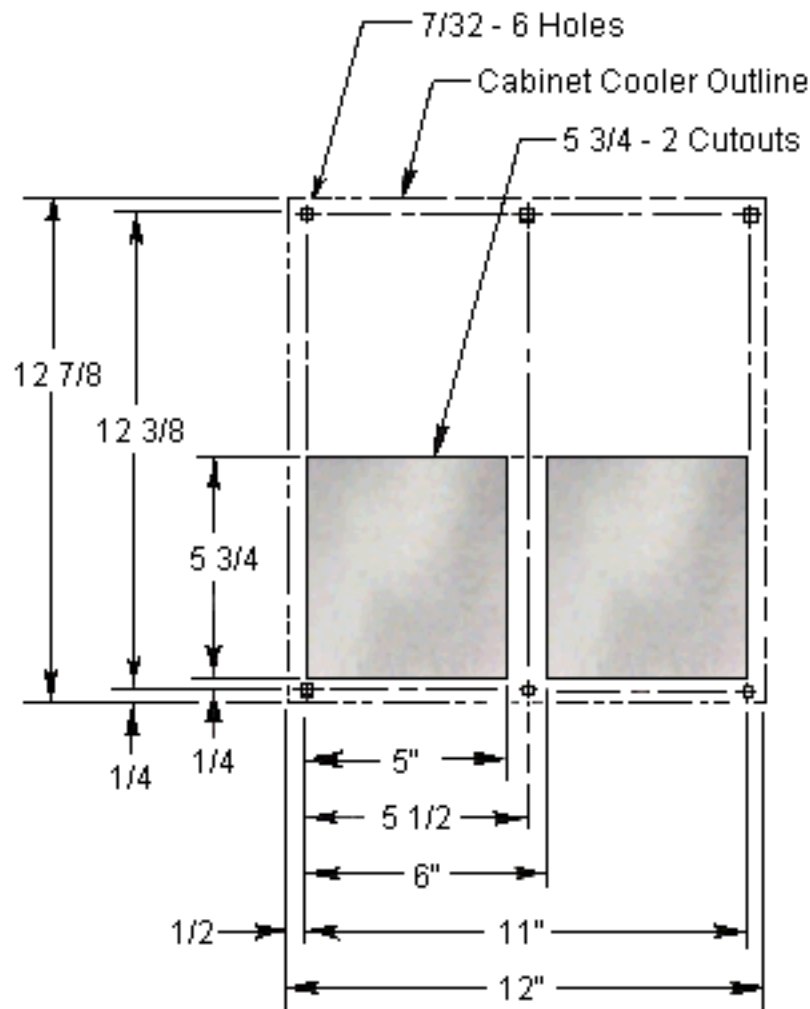
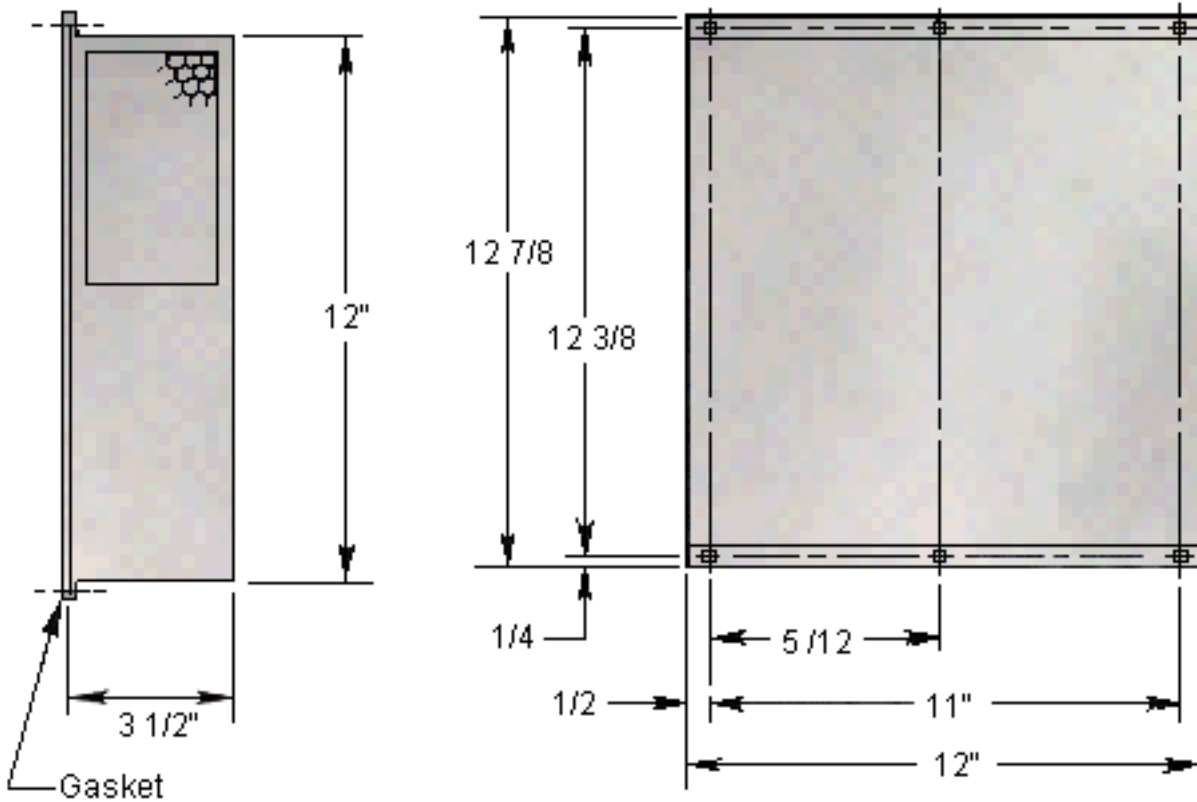
Model	Efficiency Watts/°C	BTU/Hr @20°CΔT	Voltage *	Hz *	Amps	No. of Fans & Size	Noise dB(A) @ 3 ft.
CC250F	16.1	1100	115	50/60	0.4	2 (4")	50/53

\*230 VAC and 12,24 and 48 VDC Fans also available.

### Filters for dirtiest environments

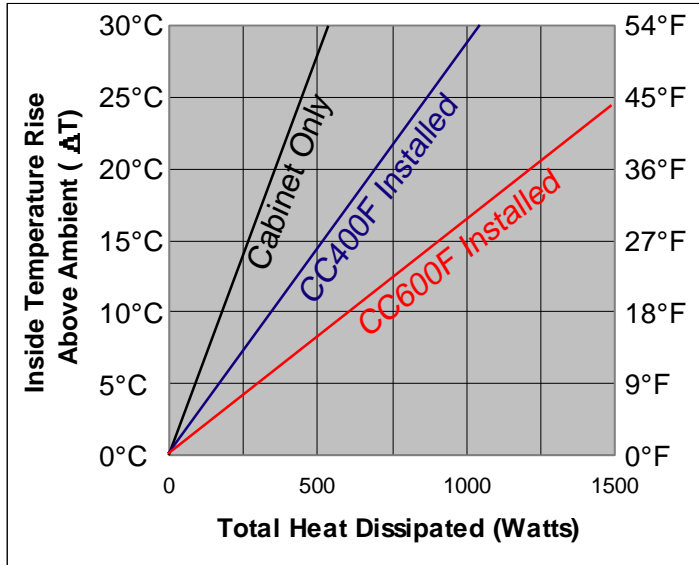
Washable	Disposable	Filter Housings
F25-A	F25-P	N/A

# Dimensiones





## CC400F and CC600F



Compact Cabinet Coolers

### Especificaciones

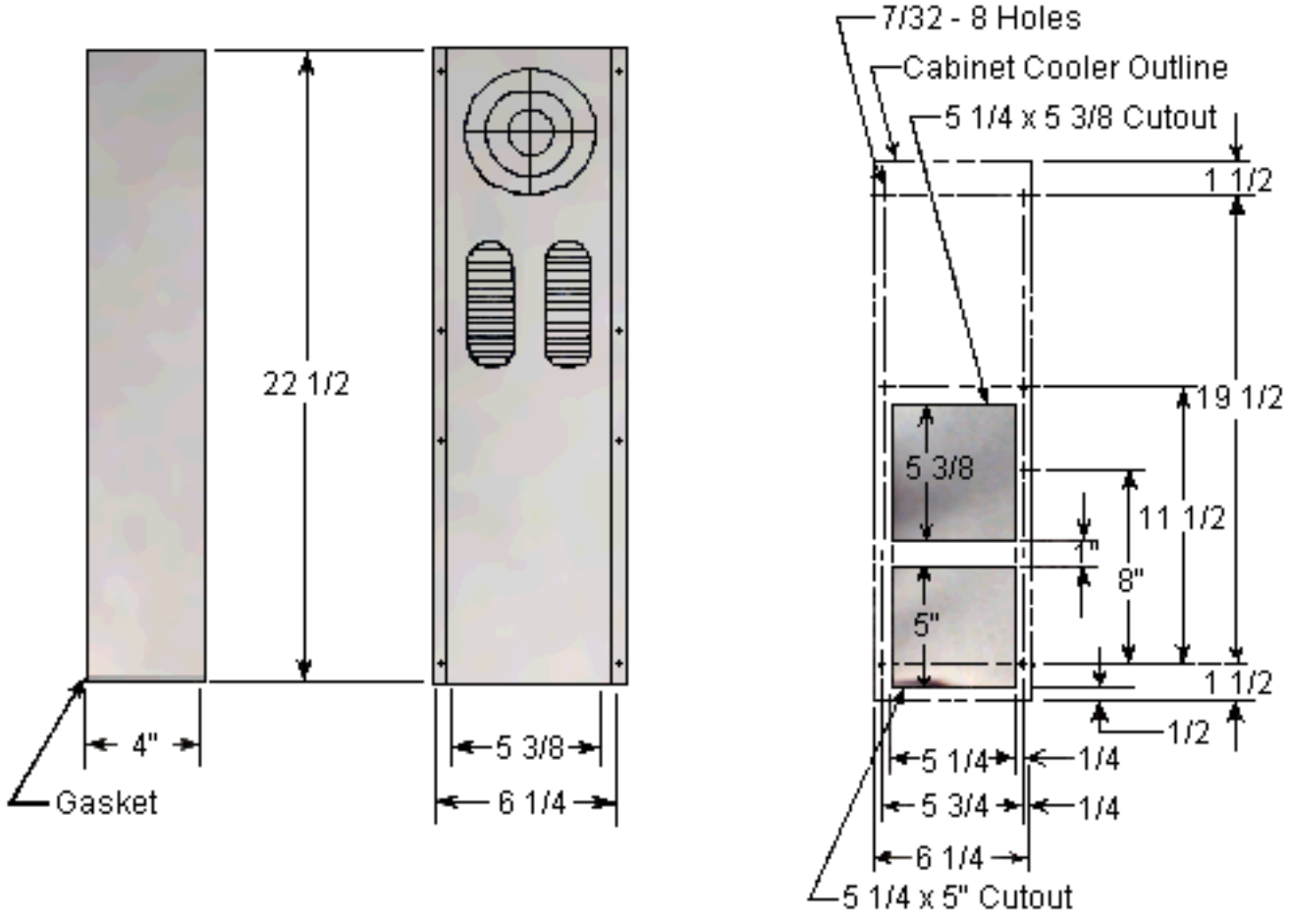
Model	Efficiency Watts/°C	BTU/Hr @20°CΔT	Voltage *	Hz *	Amps	No. of Fans & Size	Noise Level dB(A) @ 3 ft.
CC400F	20.4	1400	115	50/60	0.4	2 (4")	50/53
CC600F	49.2	3300	115	50/60	0.6	2 (6")	52/56

\*230 VAC and 12,24 and 48 VDC Fans also available.

### Filters for the dirtiest environments

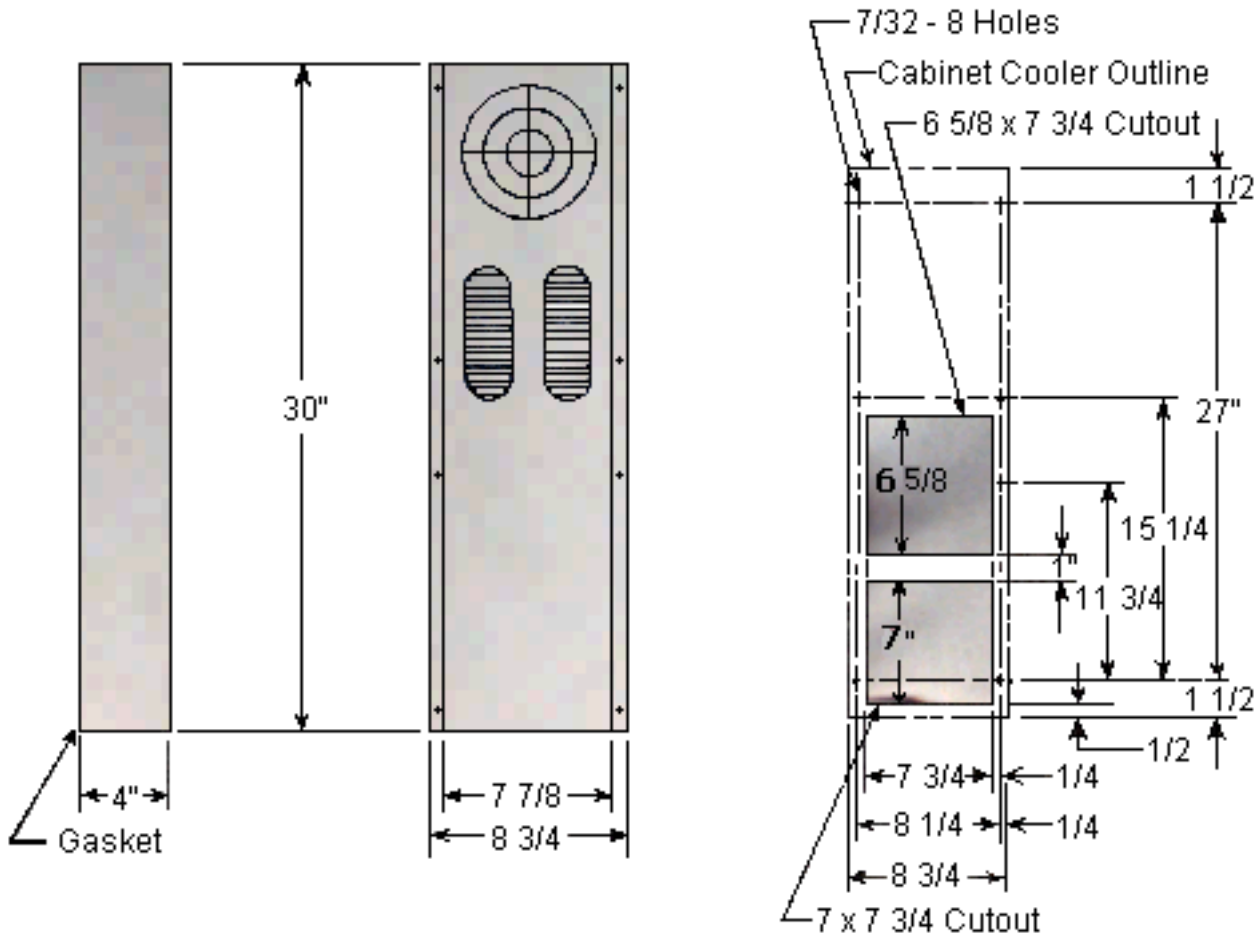
Model	Washables	Disposables	Filter Housing
CC400F	F40-A	F40-P	FH-40
CC600F	F60-A	F60-P	FH-60

CC400F Dimensions

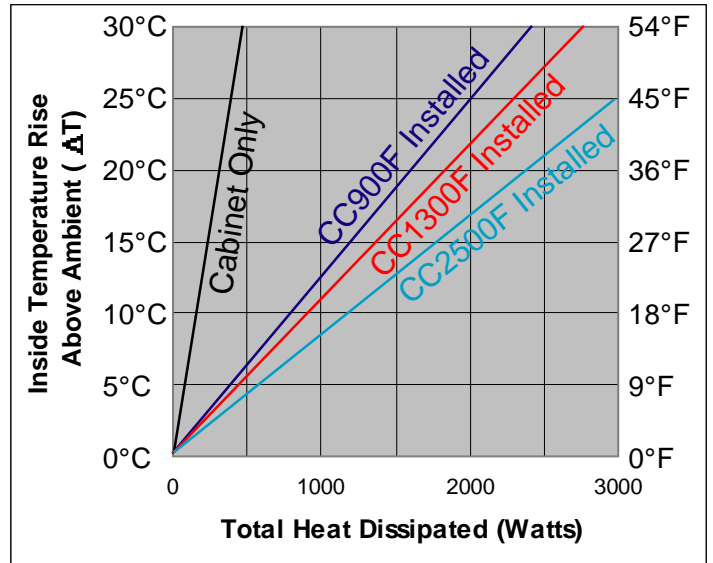


## CC600F Dimensions

Compact Cabinet Coolers



## CC900F, 1300F & 2500F



### Specifications

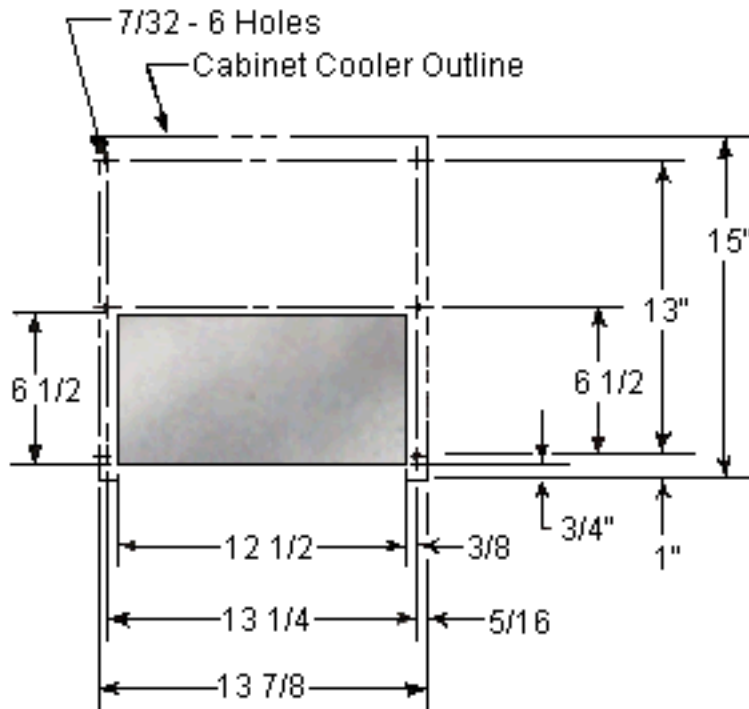
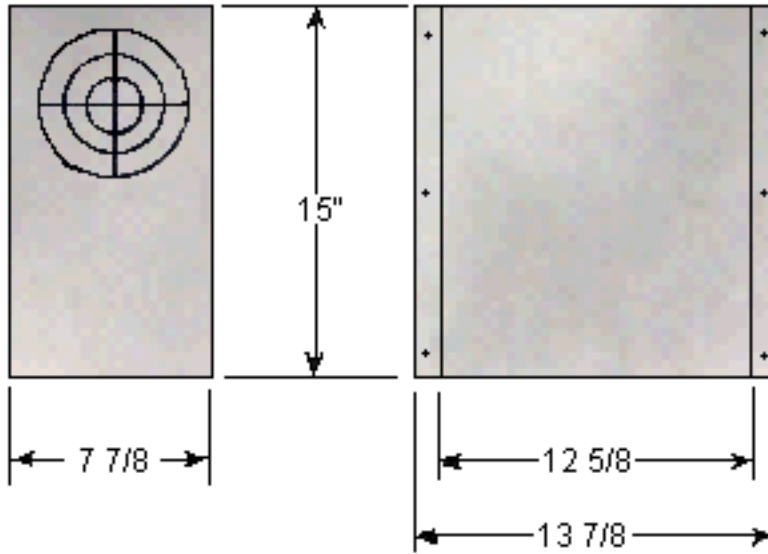
Model	Efficiency Watts/°C	BTU/Hr @20°CΔT	Voltage *	Hz *	Amps	No. of Fans & Size	Noise Level dB(A) @ 3 ft.
CC900F	66	4500	115	50/60	0.6	2 (6")	52/56
CC1300F	75	5100	115	50/60	0.6	2 (6")	52/56
CC2500F	104	7500	115	50/60	1.2	4 (6")	58/62

\*230 VAC and 12,24 and 48 VDC Fans also available.

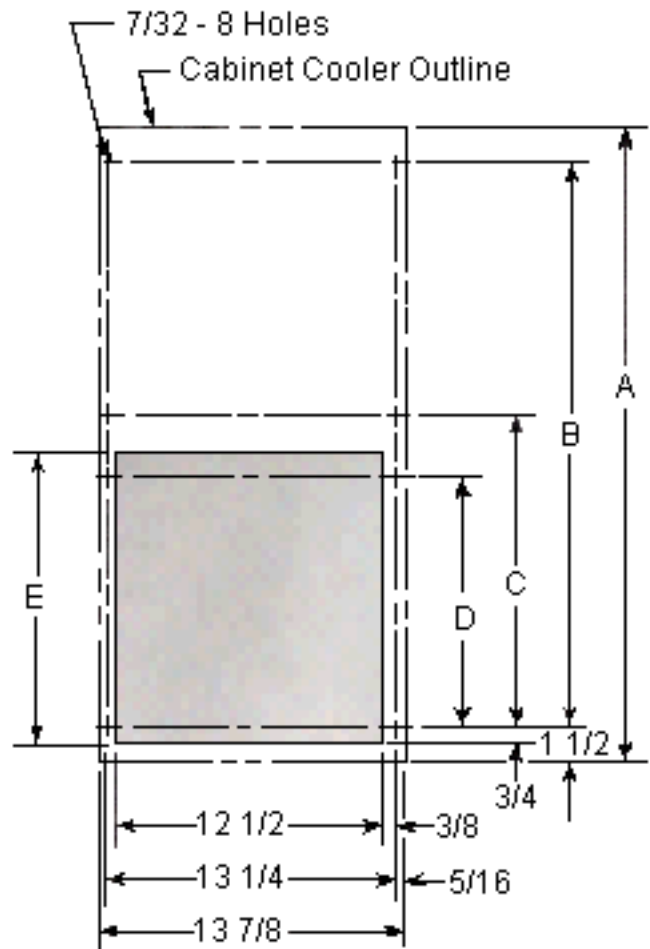
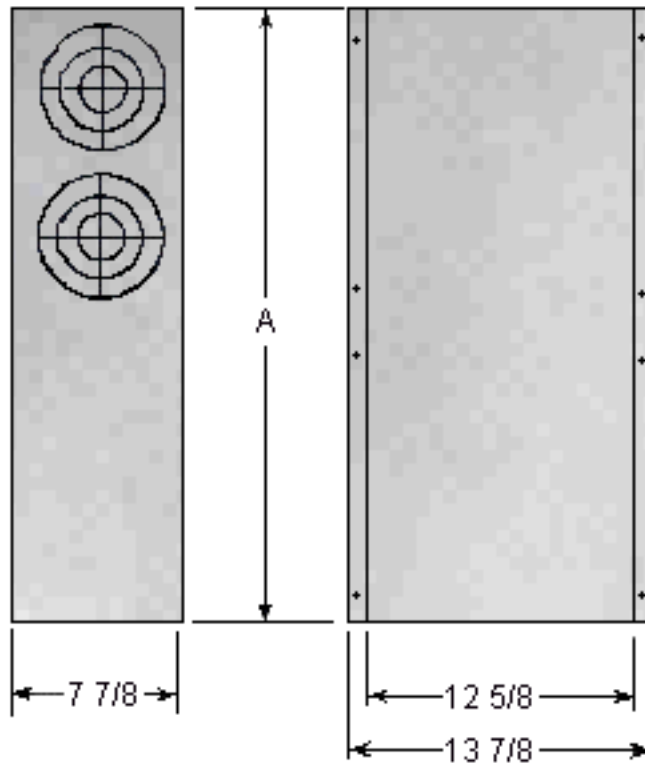
### Filters for the dirtiest environments

Model	Washables	Disposables	Filter Housing
CC900F	F90-A	F90-P	FH-250
CC1300F	F130-A	F130-P	FH-250
CC2500F	F250-A	F250-P	FH-250

## CC900F Dimensions



# CC1300F and CC2500F Dimensions



**Dimensions (in inches)**

Model	A	B	C	D	E
CC1300F	22	19	11	8	10
CC2500F	29	26	14.5	11.5	13.5

### Below Ambient Coolers

#### Features of Noren Water Units

- Cools below ambient
- 3,351, 8,557, 9,300 and 21800 BTU's respectively
- Maintenance free
- No filters to clog
- No external fans
- Energy efficient - 13, 35 and 100 Watts respectively
- Mounts on outside, flush mount enclosure

#### Requirements

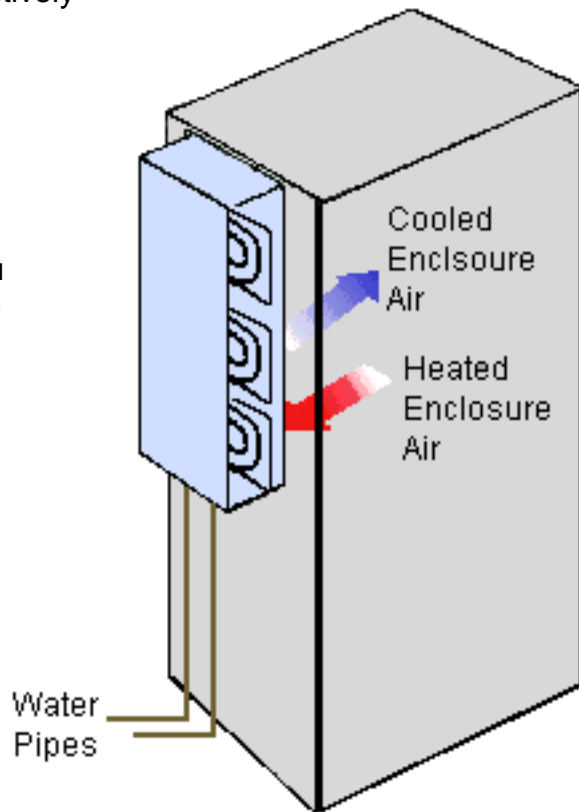
One gallon per minute of circulating water is required, from virtually any source. If you have an already low pressure supply, we can help you work out a simple way to give our cooler the one GPM it requires without reducing the flow of other applications.

#### Condensation

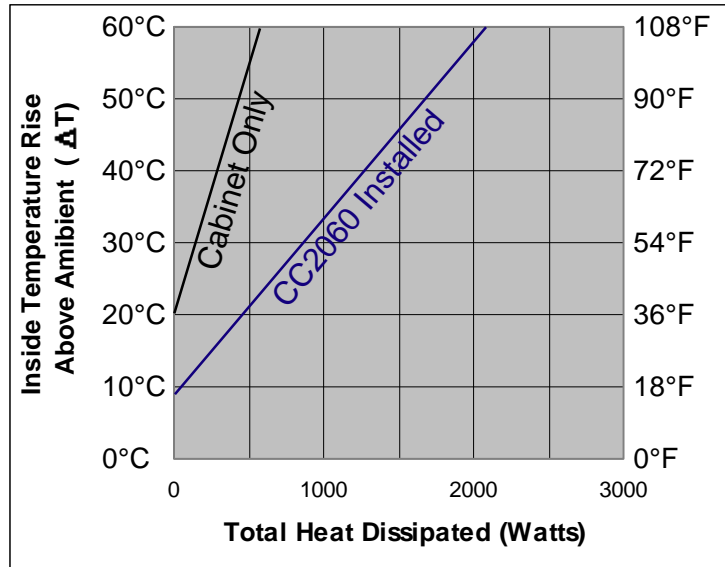
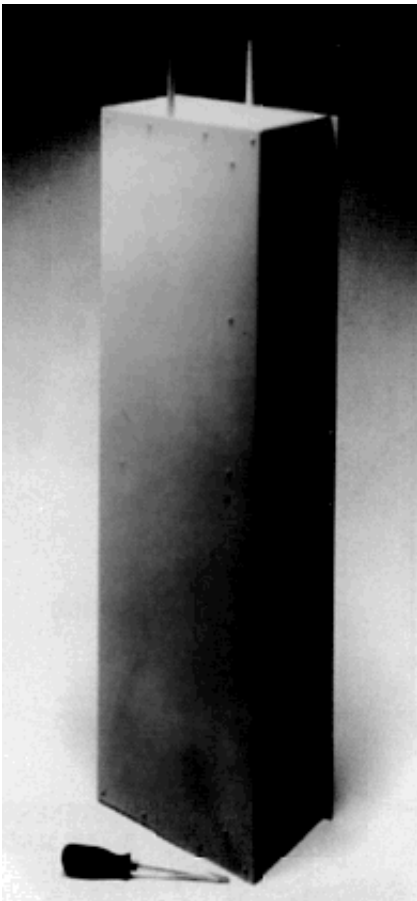
Unlike A/C solutions that create condensation, our water units do not use any refrigerants. Because our units use water, the condensation concerns are greatly reduced and often completely eliminated.

#### Safety Factor

Pelmar/Noren air-to-water units are safe. We also manufacture DRY Water solutions. Ask our applications engineer for more information.



## Air-to-Water Unit Model CC2060



Typical performance with 1 GPM of cooling water at 20°C and ambient air at 40°C when mounted to an uninsulated 72"X36"X24" cabinet.

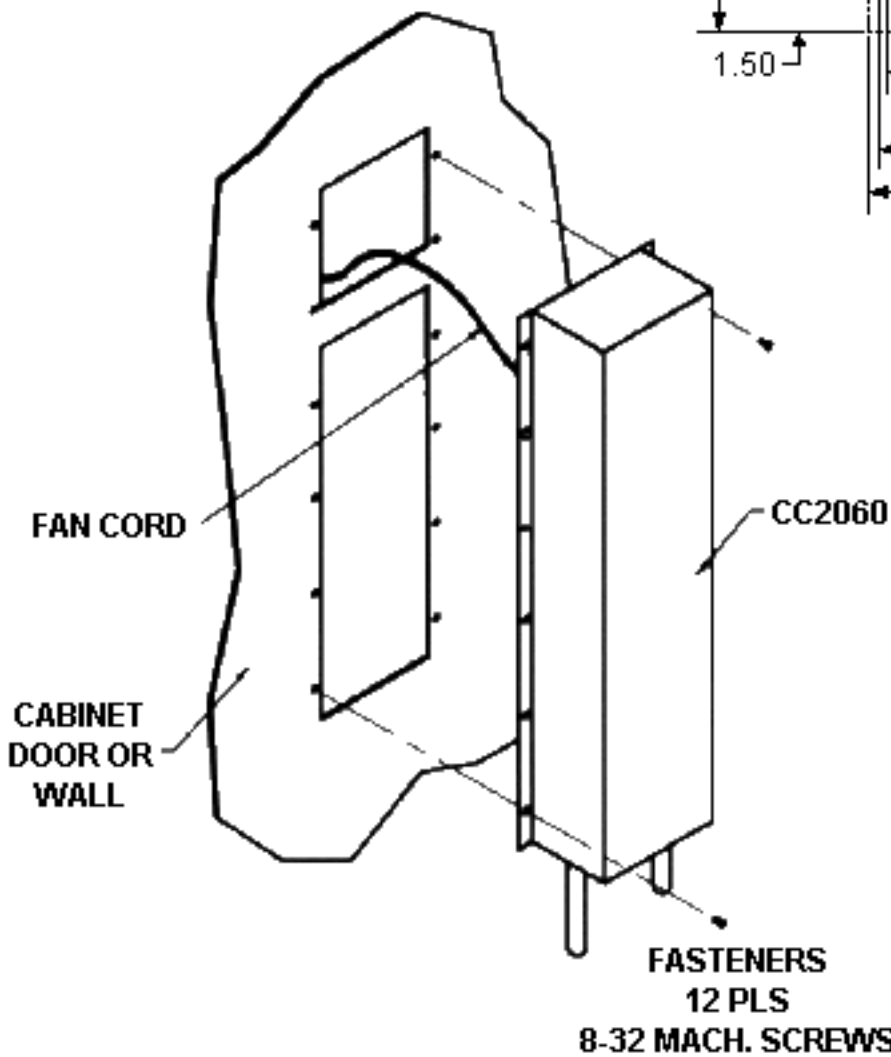
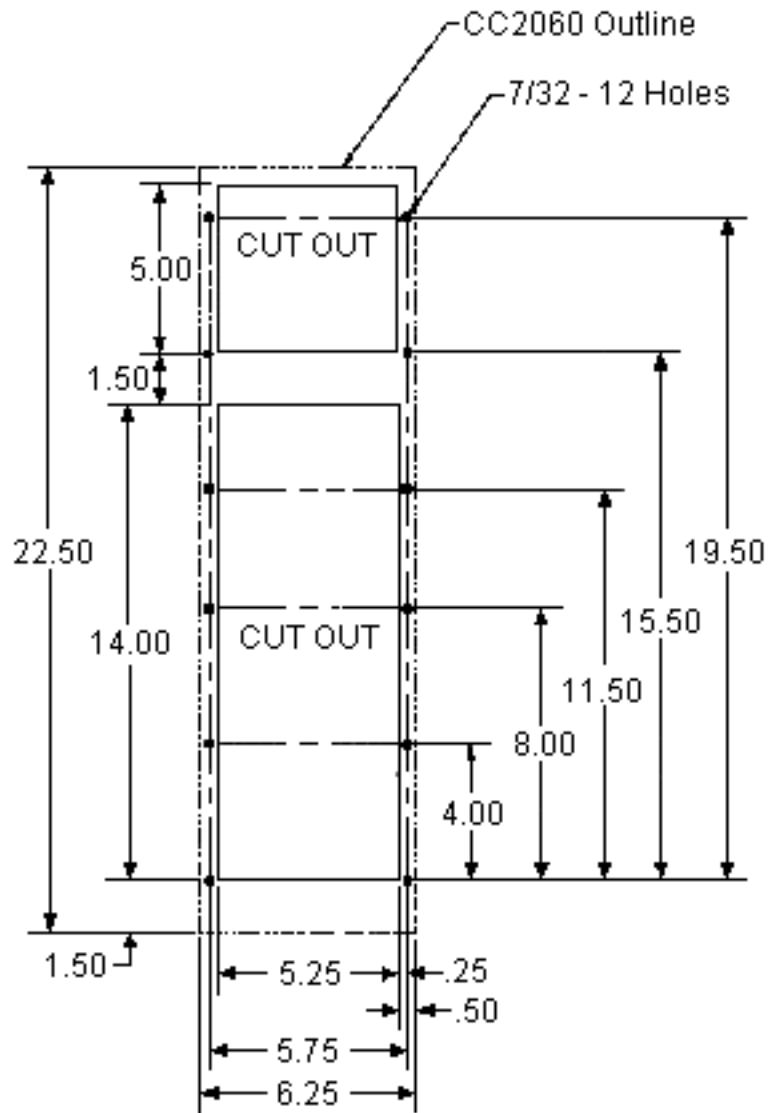
### Specifications

Model	Efficiency Watts/°C	BTU/Hr @40°CΔT	Voltage *	Hz *	Amps	No. of Fans & Size	Noise Level dB(A) @ 3 ft.
CC2060	24.5	3,351	115	50/60	0.2	1 (4")	Less than 50

\*230 VAC and 12,24 and 48 VDC Fans also available.

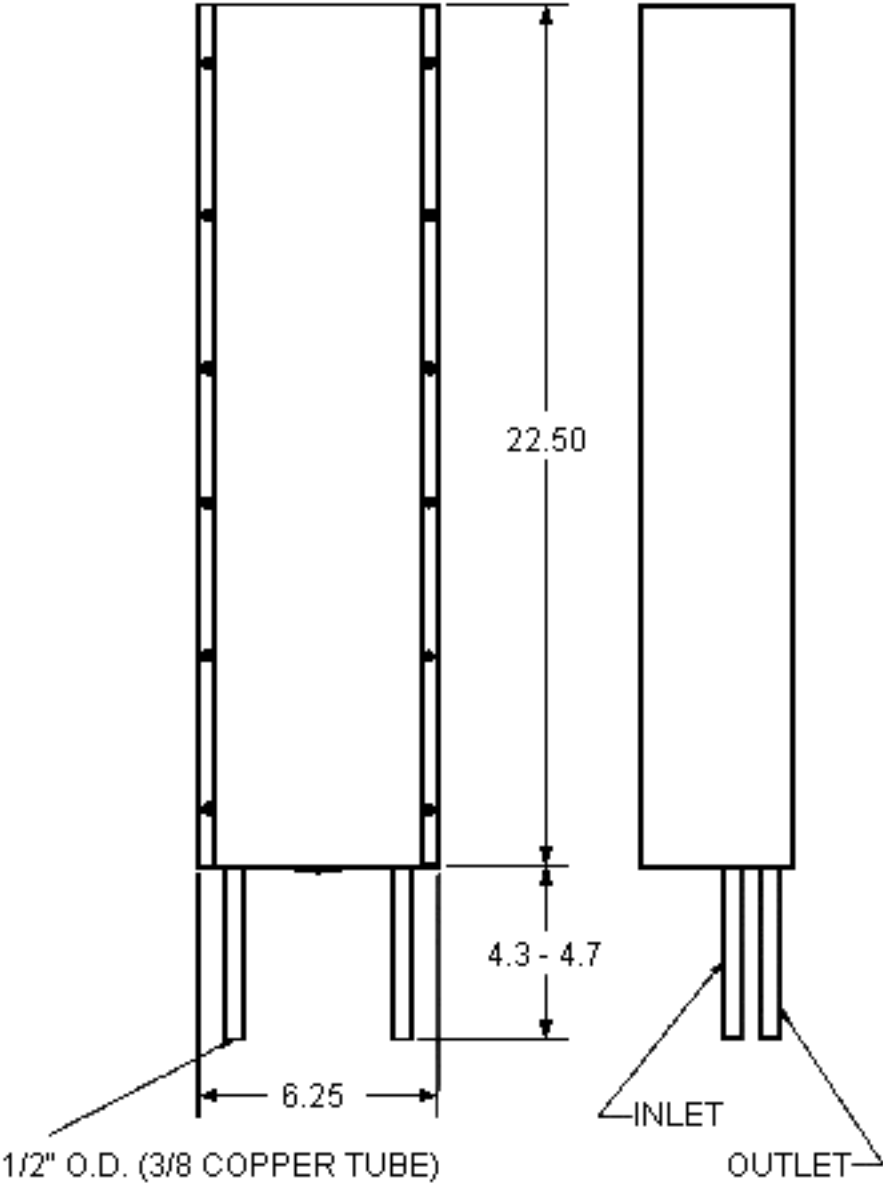


# CC2060 Dimensions



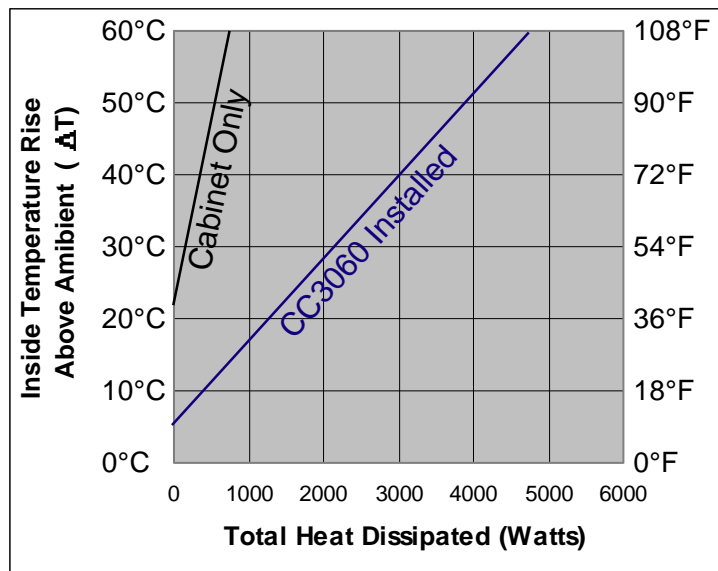
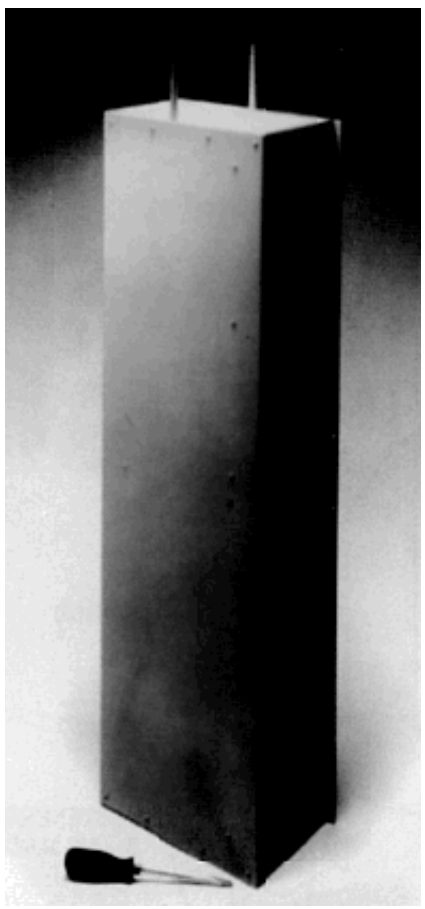
Compact Cabinet Coolers

CC2060 Dimensions



## Air-to-Water Unit Model Cc3060

Compact Cabinet Coolers

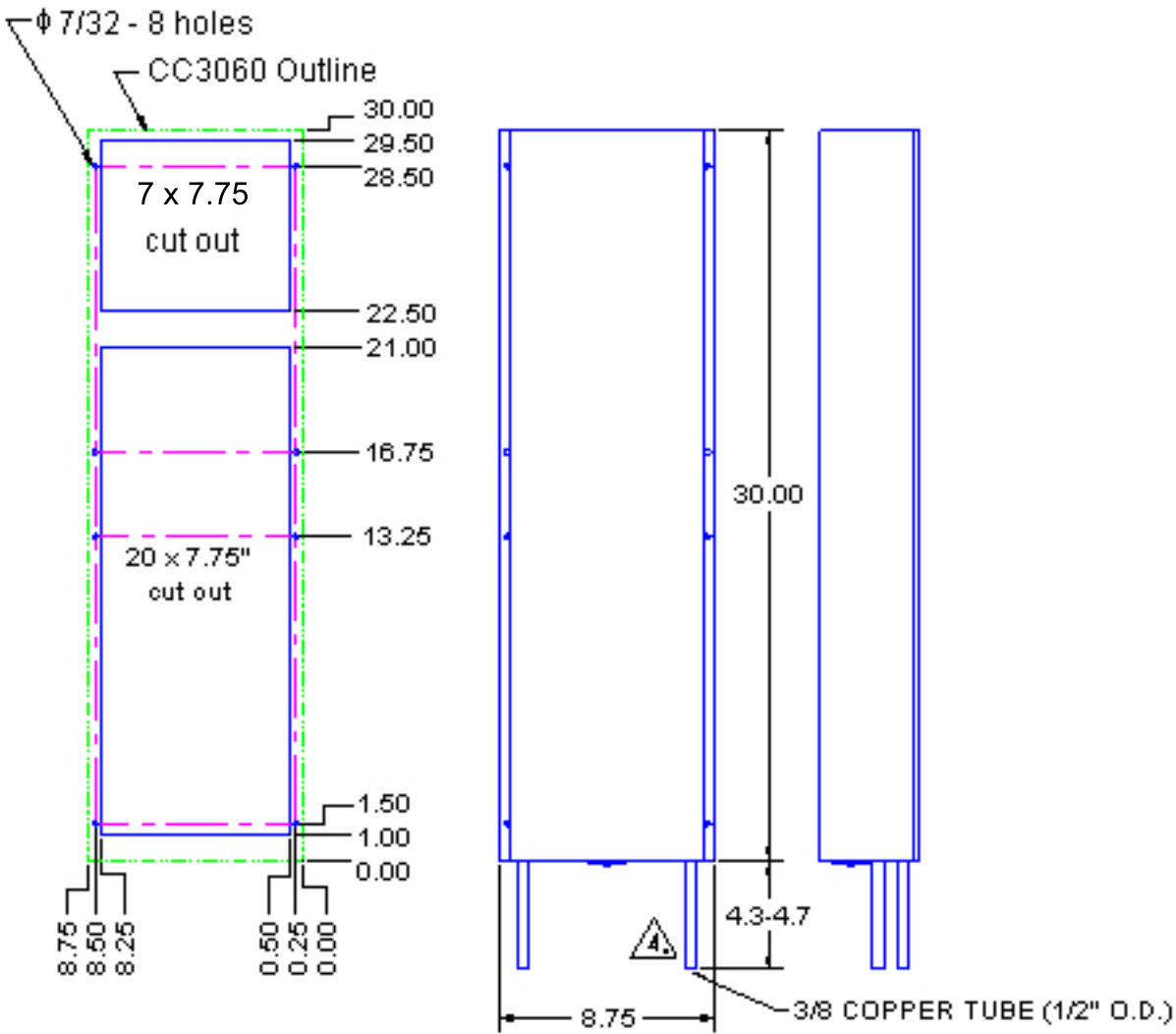


Typical performance with 1 GPM of cooling water at 20°C and ambient air at 40°C when mounted to an uninsulated 72"X36"X24" cabinet.

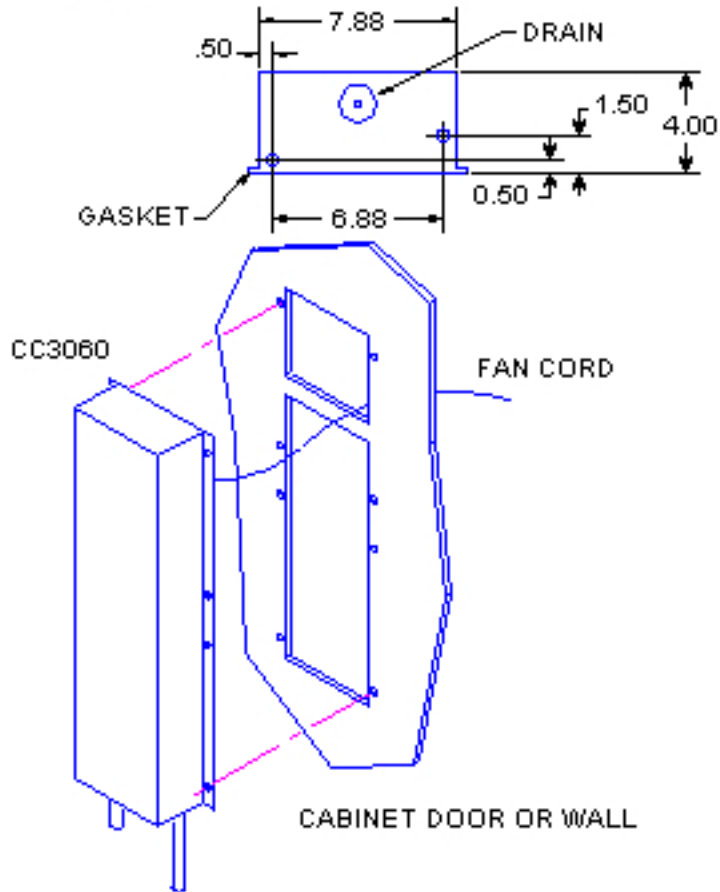
### Especificaciones

Model	Efficiency Watts/°C	BTU/Hr @40°CΔT	Voltage *	Hz *	Amps	No. of Fans & Size	Noise Level dB(A) @ 3 ft.
CC3060	68.8	9,300	115	50/60	0.3	1 (6")	Less than 50

\*230 VAC and 12,24 and 48 VDC Fans also available.

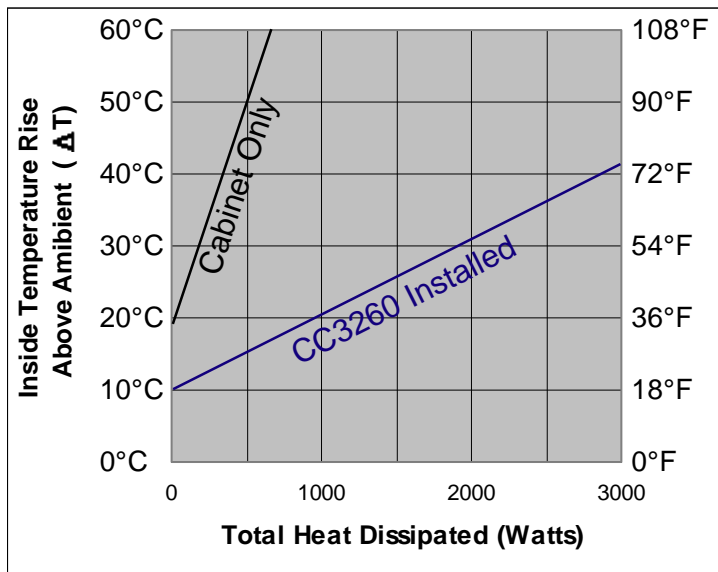
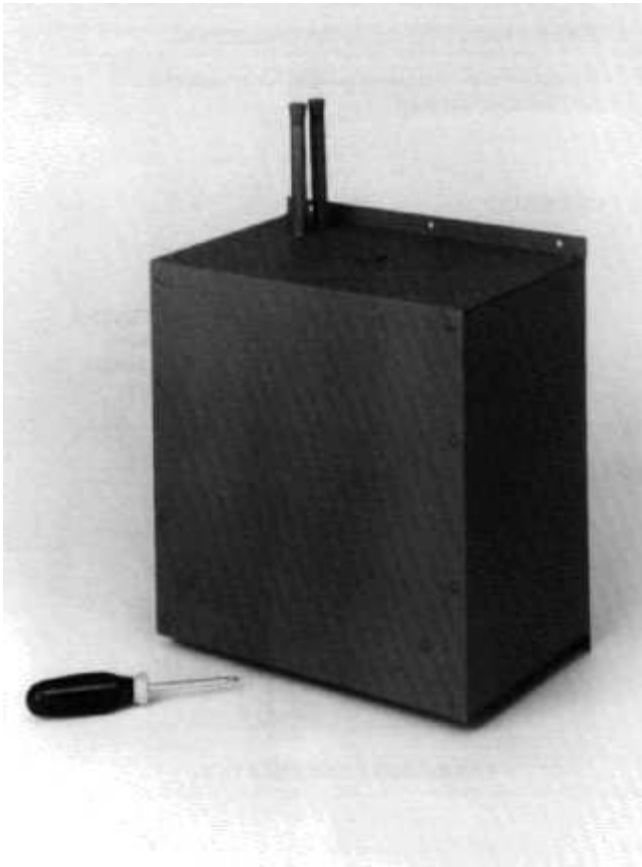


CABINET HOLE PATTERN



## Air-to-Water Unit Model CC3260

Compact Cabinet Coolers



Typical performance with 1 GPM of cooling water at 20°C and ambient air at 40°C when mounted to an uninsulated 72"X36"X24" cabinet.

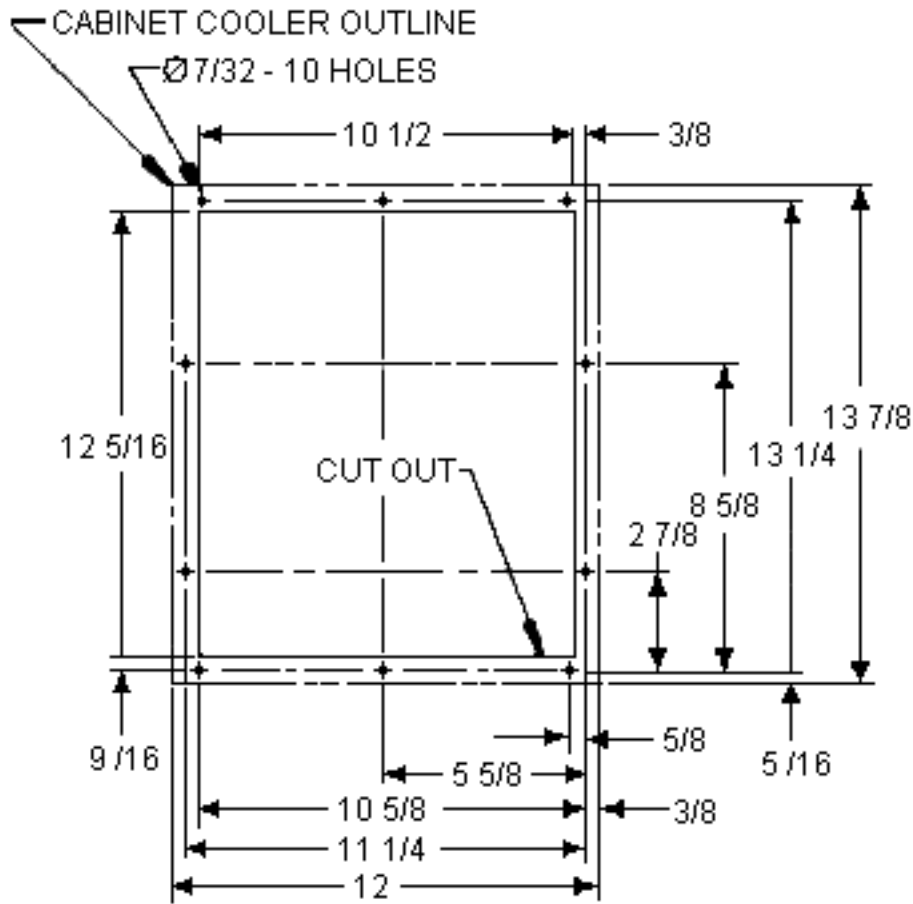
### Specifications

Model	Efficiency Watts/°C	BTU/Hr @40°CΔT	Voltage *	Hz *	Amps	No. of Fans & Size	Noise Level dB(A) @ 3 ft.
CC3260	62.7	8,557	115	50/60	0.3	1 (6")	Less than 50

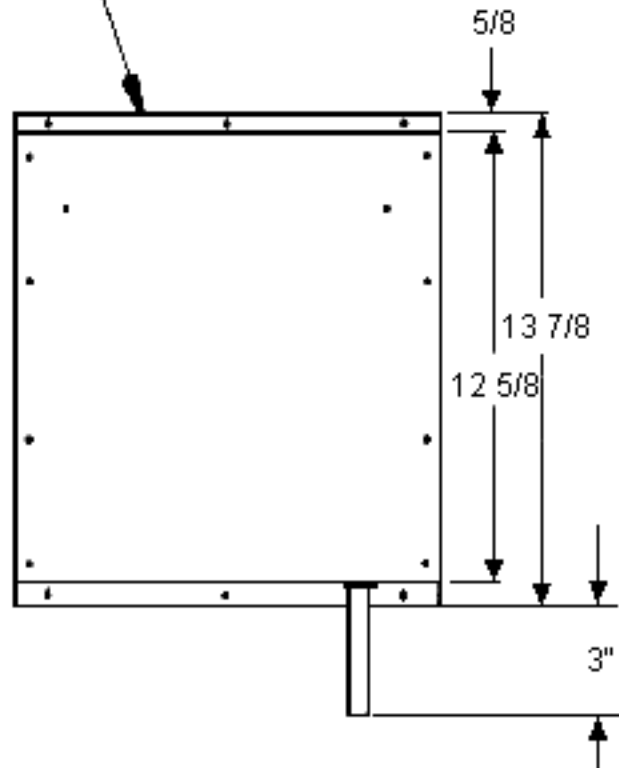
\*230 VAC and 12,24 and 48 VDC Fans also available.

# CC3260 Dimensions

31

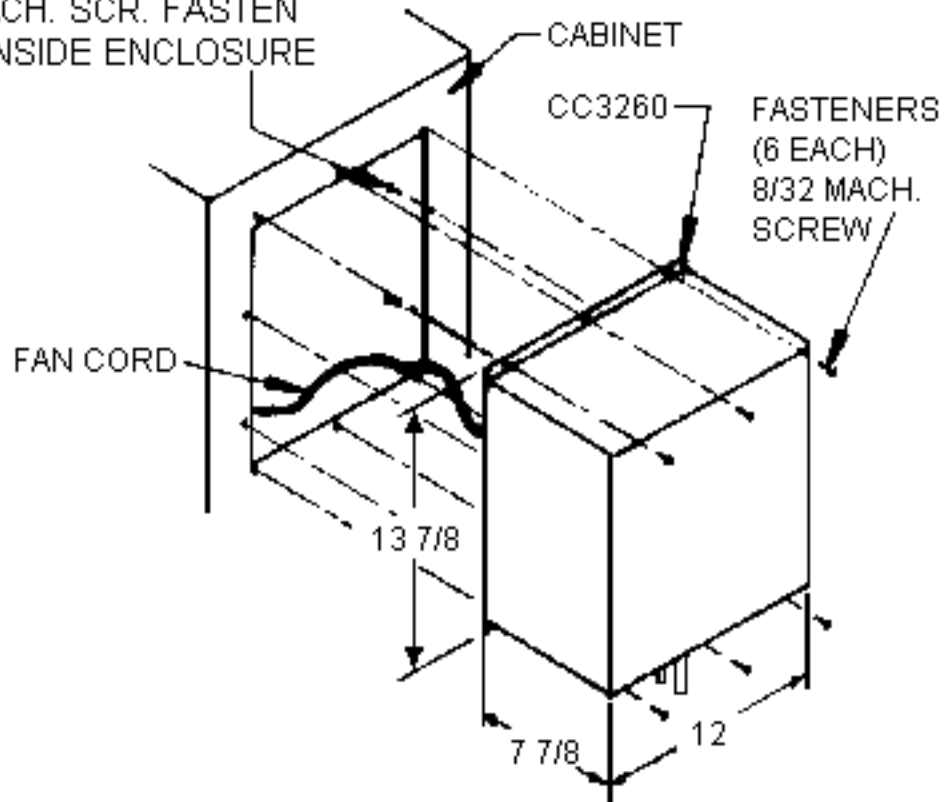


ENCLOSURE CUT OUT  
CC3260 CABINET COOLER

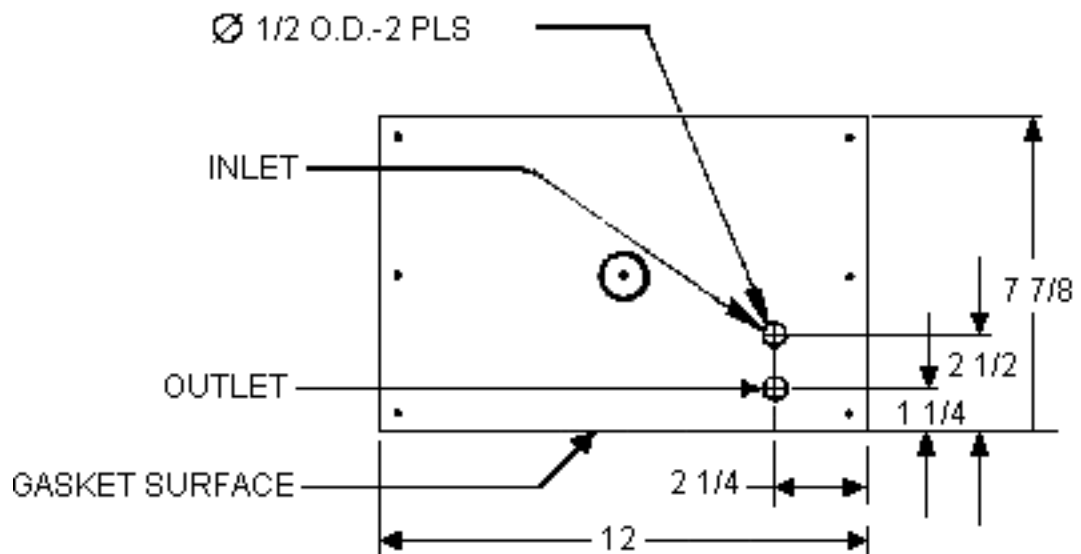


# CC3260 Dimensions

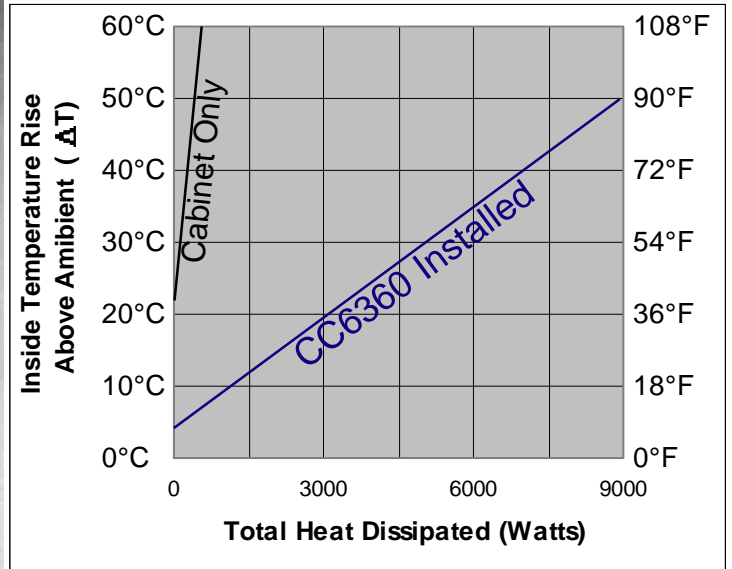
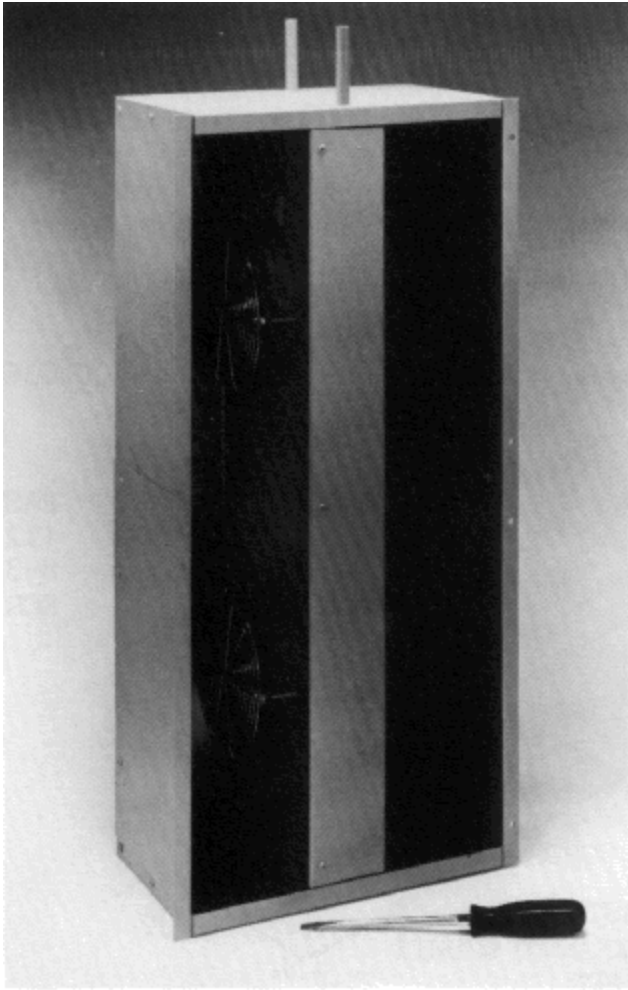
INTERNAL FASTENERS  
(4 EACH) INCLUDED W/UNIT  
8/32 MACH. SCR. FASTEN  
FROM INSIDE ENCLOSURE



## MOUNTING & ORIENTATION



## Air-to-Water Unit Model CC6360



Typical performance with 1 GPM of cooling water at 20°C and ambient air at 40°C when mounted to an uninsulated 72"X36"X24" cabinet.

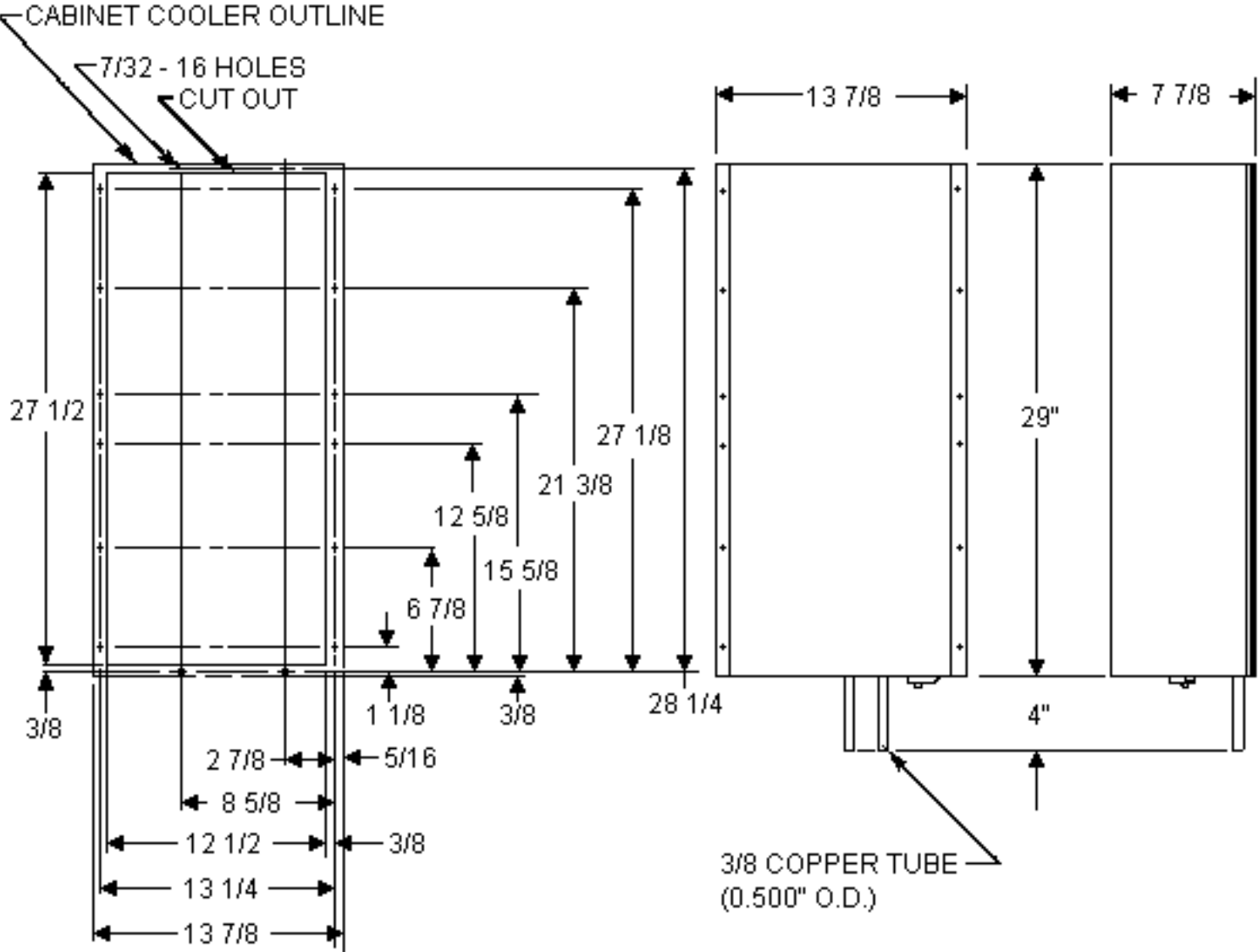
### Specifications

Model	Efficiency Watts/°C	BTU/Hr @40°CΔT	Voltage *	Hz *	Amps	No. of Fans & Size	Noise Level dB(A) @ 3 ft.
CC6360	159.7	21,800	115	50/60	0.9	3 (6")	Less than 50

\*230 VAC and 12,24 and 48 VDC Fans also available.

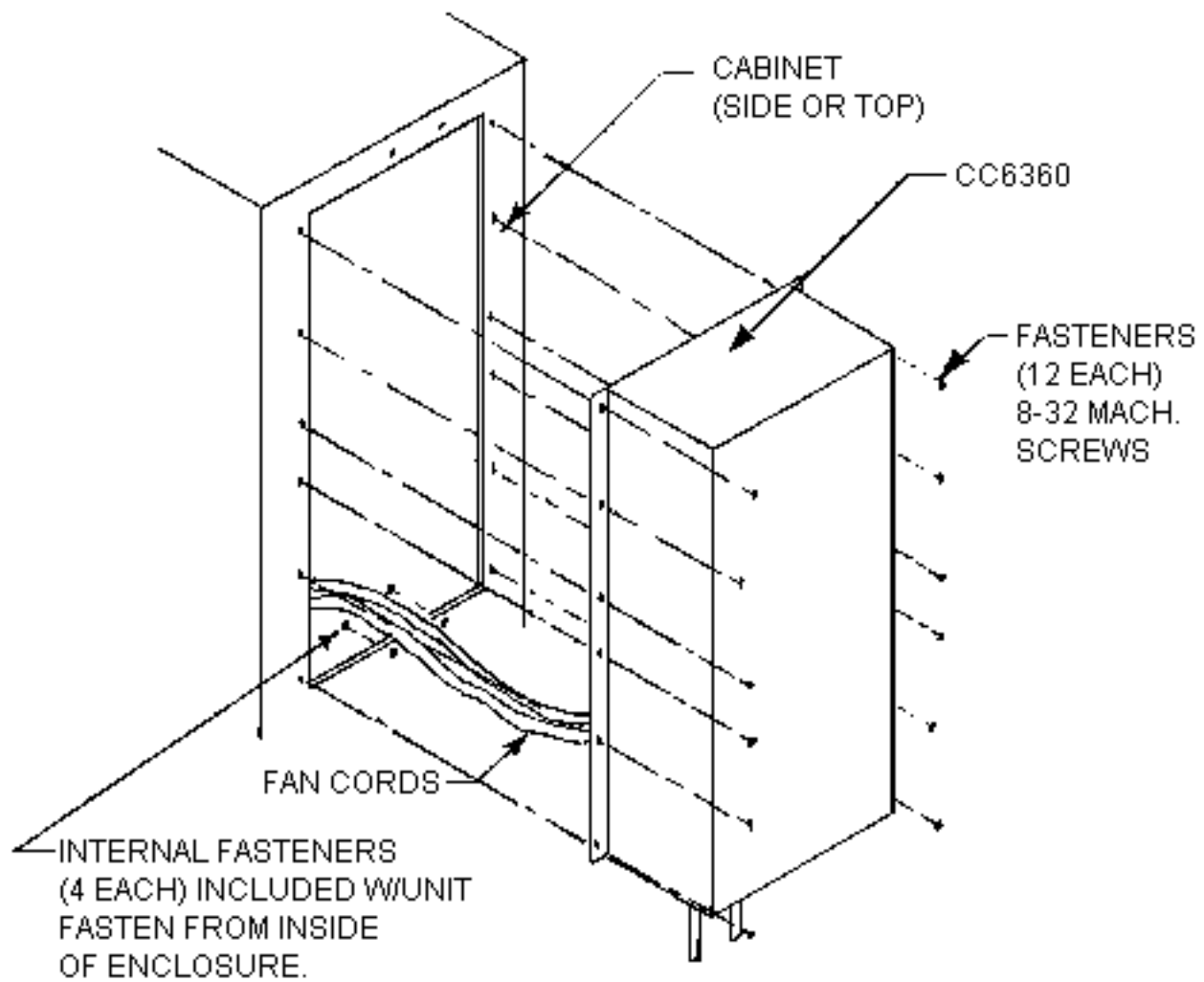
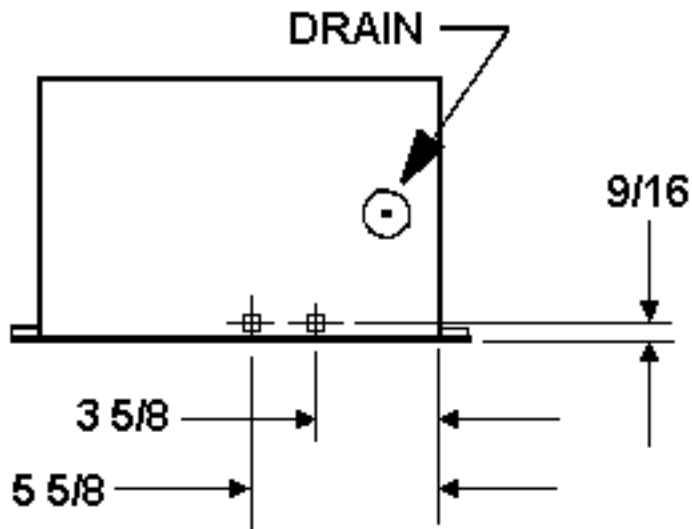


# CC6360 Dimensions



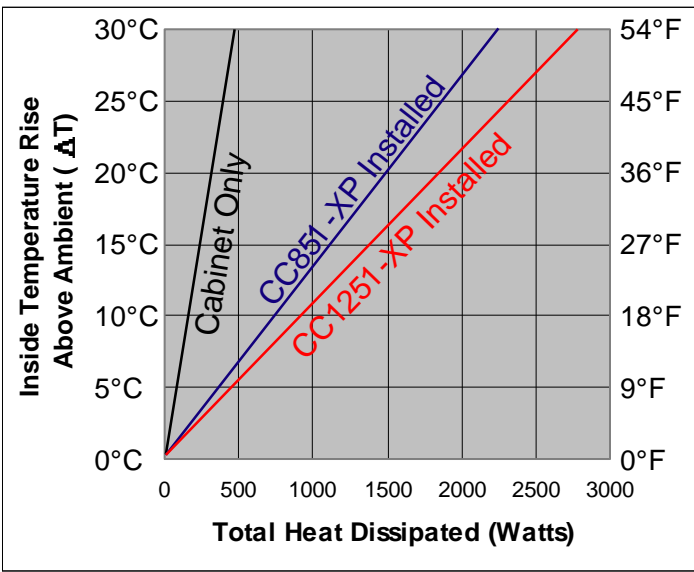
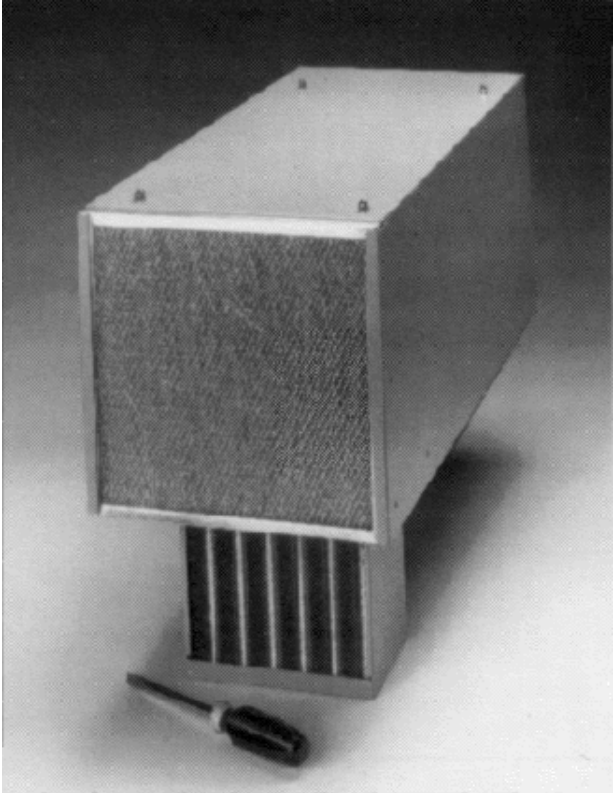
CABINET HOLE PATTERN

# CC6360 Dimensions



## Models CC851XP and CC1251-XP Explosion Proof Units

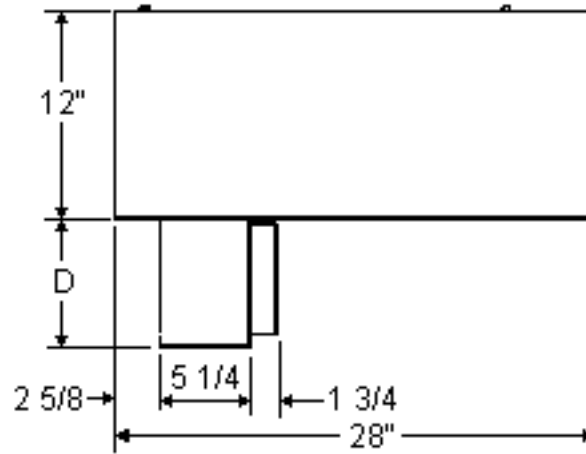
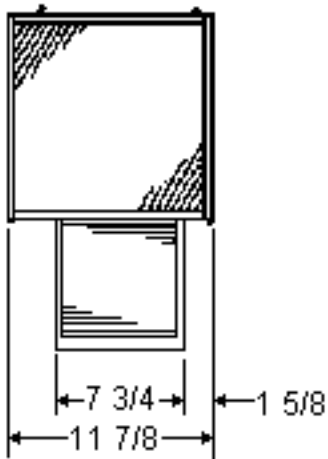
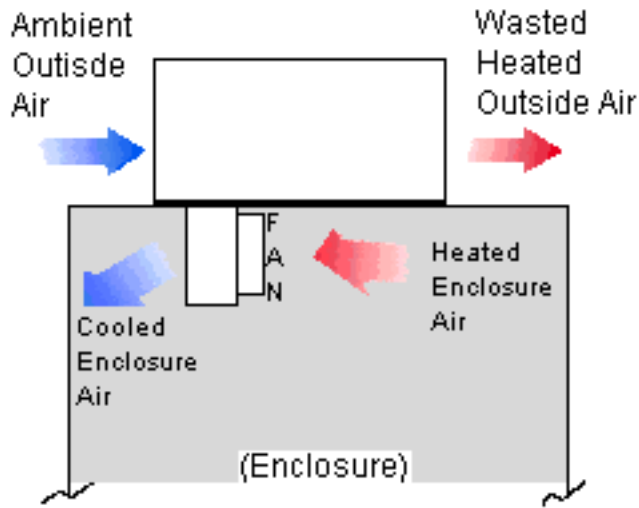
Compact Cabinet Coolers



### Especificaciones

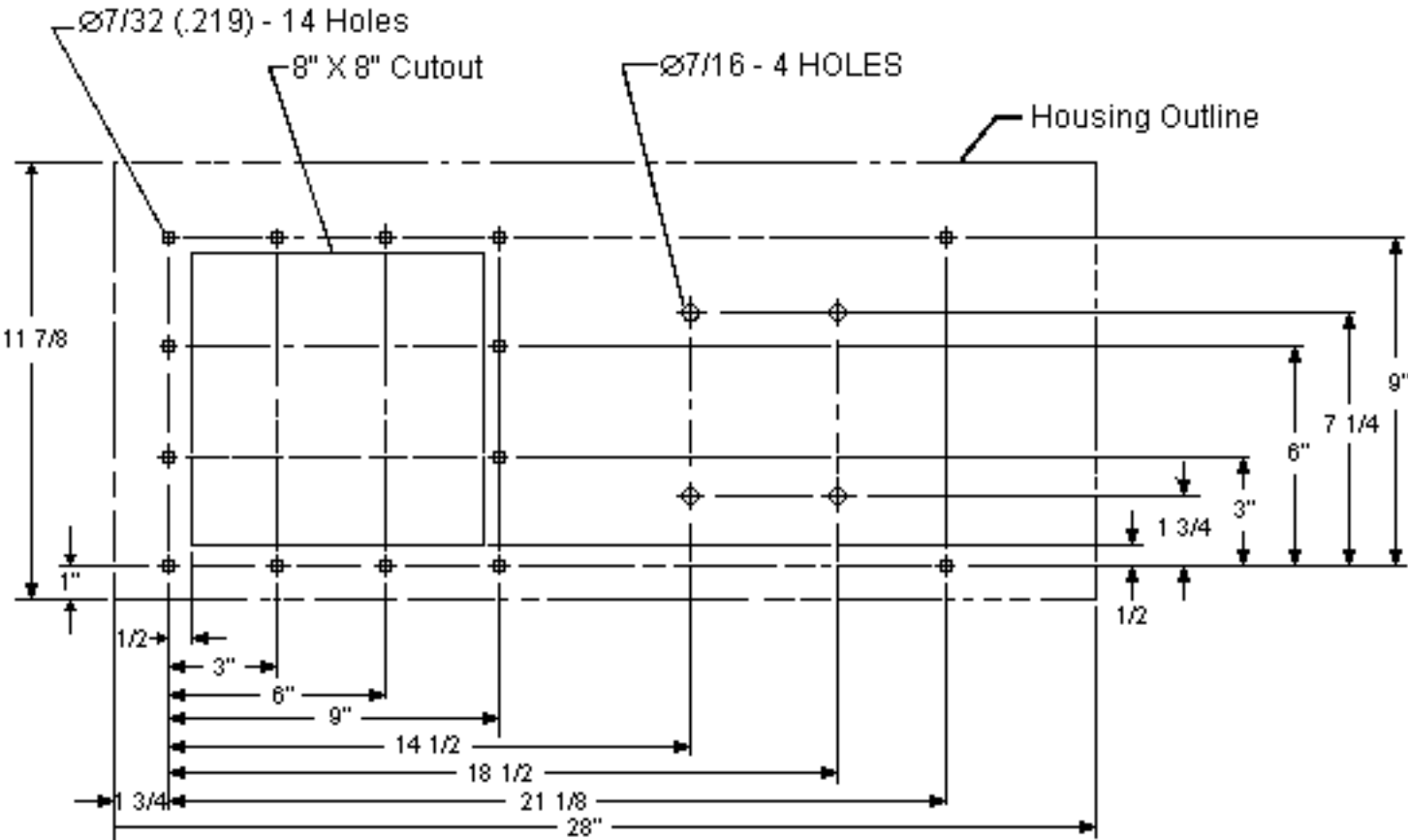
Model	Efficiency Watts/°C	BTU/Hr @20°CΔT	Voltage *	Hz *	Amps	Weight	Dimensions extending into cabinet
CC850-XP	60	3700	115	50/60	5	50 lbs.	7 1/2
CC1250-XP	80	5000	115	50/60	5	51 lbs.	11

## CC850 and CC1250-XP Dimensions



D= 7 1/2"  
or  
D= 11"

# CC851 and CC1251-XP Dimensions



## New Models

### Largest Standard Compact Cabinet Cooler

Customer demand drives the Noren engineering to develop the CC4000. Still a compact model, it removes twice the heat as the CC2500F. Larger model are in development.

#### Specifications

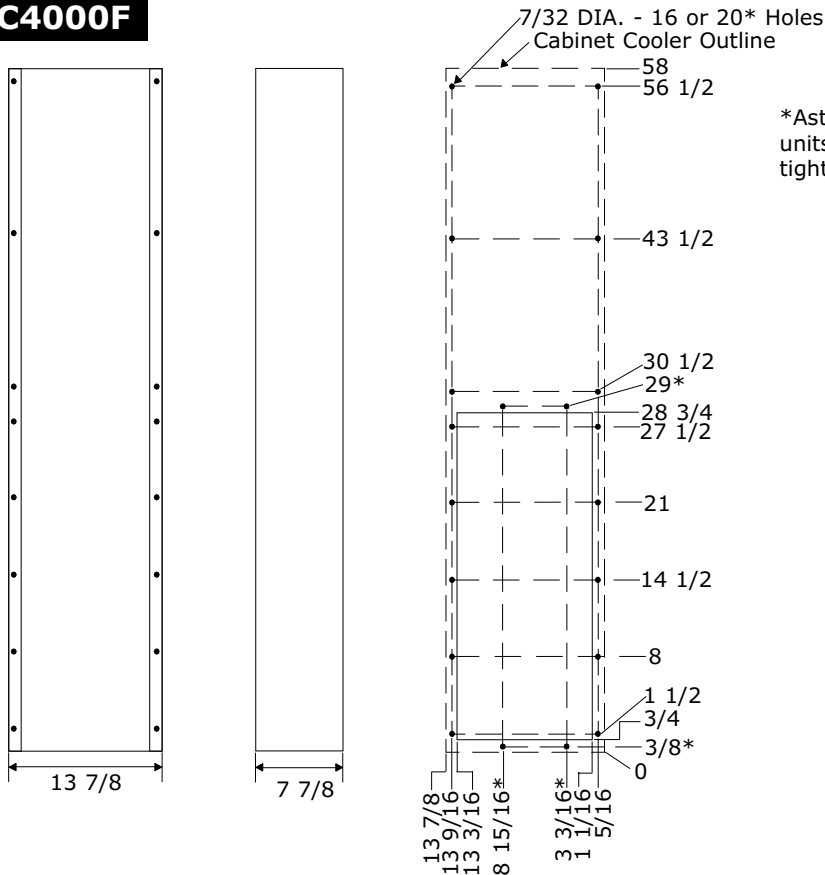
Model	Efficiency Watts/°C	BTU/hr @20°CΔT	Voltage *	Hz *	Amps *	No. Fans & Size	Noise Level dB(A)@3ft	Weight
CC4000F	200.0	13,000	115	50/60	1.6	3 (6")	58/62	43 lbs.

\* 230 VAC and 12, 24 and 48 VDC Fans also available

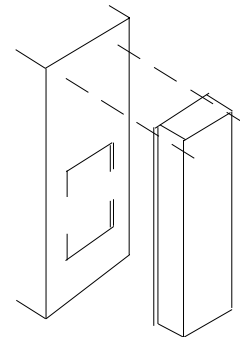
#### Filters for the dirtiest environments

Model	Washable	Disposable	Filter Housing
CC4000F		Special Order	

#### CC4000F



\*Asterisk indicates extra mounting holes for "P" units which is pressure tested to insure liquid tight seal.



## Remote Surface Mount

This special model was developed for a customer that is not able to mount a cabinet cooler on the enclosure. Especially thin cabinets or small cabinets are perfect candidates for the CC450R.

### Specifications

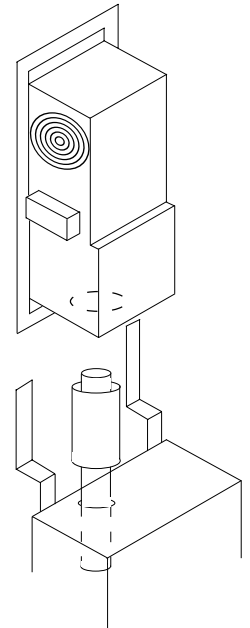
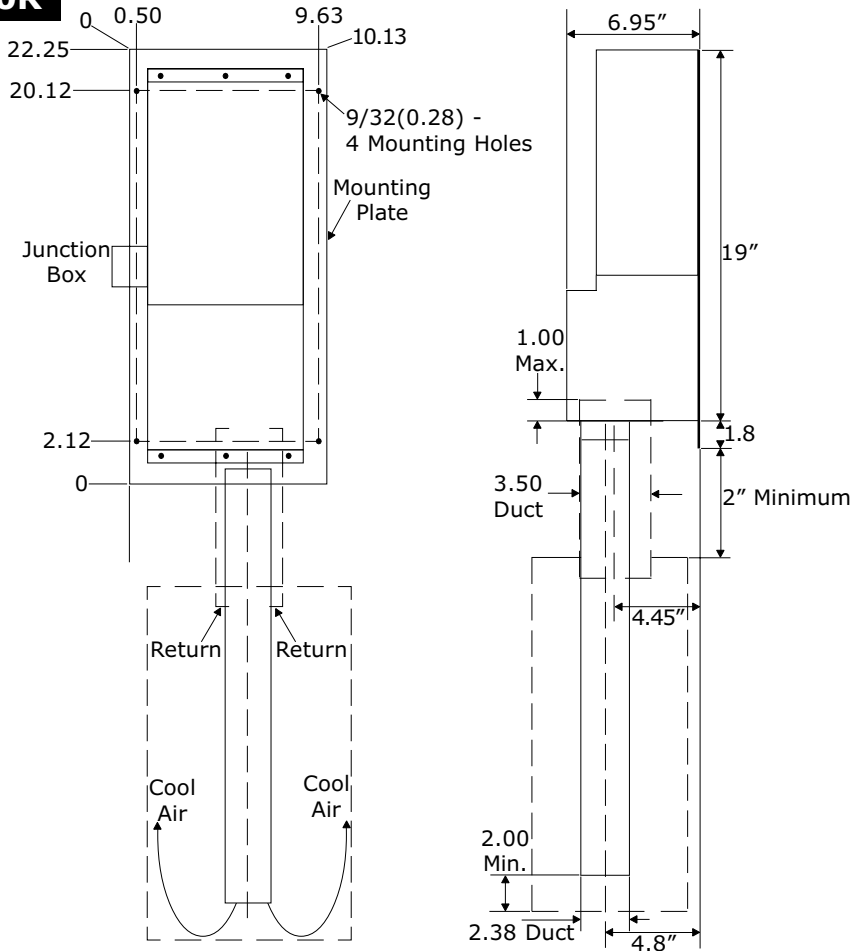
Model	Efficiency Watts/°C	BTU/hr @20°CΔT	Voltage *	Hz *	Amps *	No. Fans & Size	Noise Level dB(A)@3ft	Weight
CC450R	20.0	1400	115	50/60	.4	1 (6")	50/53	15 lbs.

\* 230 VAC and 12, 24 and 48 VDC Fans also available

### Filters for the dirtiest environments

Model	Washable	Disposable	Filter Housing
CC450R	F45	F45A	F45P

### CC450R





## CALL, FAX OR EMAIL US TO COOL YOUR SEALED ELECTRONIC ENCLOSURES

THESE ARE SOME OF THE AVAILABLE FEATURES:

- NEMA 4, NEMA 4X, NEMA 12
- Explosion Proof
- UL Recognized units are Available in Nema 12
- Stainless Steel
- Interior Mount

**!!!OBTAIN A FAST COOLING SOLUTION FOR YOUR CABINET!!!**  
**WE MANUFACTURE SPECIAL UNITS TO SOLVE CUSTOM APPLICATIONS**

Call, Email or send us a fax. We will help you size your enclosure for cooling within two minutes over the phone.

DATE: \_\_\_\_\_  
NAME: \_\_\_\_\_  
COMPANY: \_\_\_\_\_  
ADDRESS: \_\_\_\_\_  
CITY: \_\_\_\_\_ STATE: \_\_\_\_\_  
ZIP CODE \_\_\_\_\_  
PHONE NUMBER: \_\_\_\_\_  
FAX NUMBER \_\_\_\_\_  
EMAIL ADDRESS \_\_\_\_\_

SIZE OF CABINET:

HEIGHT: \_\_\_\_\_ WIDTH \_\_\_\_\_ LENGTH \_\_\_\_\_

\*INTERIOR TEMPERATURE INTERIOR OF CABINET \_\_\_\_\_ ° F

HEAT LOAD \_\_\_\_\_ BTU/HR.

\*AMBIENT TEMPERATURE OUTSIDE OF CABINET \_\_\_\_\_ ° F

OR \_\_\_\_\_ WATTS

(\* Taken simultaneously)

For Air-to-Water Applications: Water Temperature \_\_\_\_\_ °F

Email us at: [sales@pelmareng.com](mailto:sales@pelmareng.com)