Cabinet Cooler® Systems

Stop electronic control downtime due to heat, dirt, and moisture!

Cabinet Coolers maintain NEMA 4, 4X, and 12 integrity.

All Cabinet Coolers are c UL us LISTED, c UL us CLASSIFIED, and/or CE compliant!

Built to Last 5 yr. WARRANTY
See our Terms & Conditions page for complete details.

What is an EXAIR Cabinet Cooler System?

A low cost, reliable way to cool and purge electronic control panels. EXAIR Cabinet Coolers incorporate a vortex tube to produce cold air from compressed air - with no moving parts. The compact Cabinet Cooler can be installed in minutes through a standard electrical knockout. NEMA 12, 4, and 4X (IP54 and IP66) Cabinet Coolers that match the NEMA rating of the enclosure are available in many cooling capacities for large and small control panels.

Why EXAIR Cabinet Cooler Systems?

The vortex tubes incorporated in the EXAIR Cabinet Coolers are constructed of stainless steel. The wear, corrosion and oxidation resistance of stainless steel assures long life and maintenance free operation. All Cabinet Coolers are UL Listed, UL Classified and/or CE compliant.

Applications

- Programmable controllers
- Line control cabinets
- Motor control centers
- Relay panels
- NC/CNC systems
- Modular control centers
- CCTV cameras
- Computer cabinets
- Laser housings
- Electronic scales
- Food service equipment

Advantages

- Low cost
- Compact
- Cooling capacities to 5,600 Btu/hr. (1,641 Watts)
- Quiet
- Install in minutes
- Maintain NEMA 12, 4 and 4X integrity (IP54 and IP66)
- Stabilize enclosure temperature and humidity
- No CFC's
- No moving parts-maintenance free
- Mount in standard electrical knockout
- Stop nuisance tripping
- Stop heat damage
- Eliminate fans and filters
- Eliminate lost production
- Stop circuit drift
- Stop dirt contamination
- Provide washdown protection

Special Cabinet Coolers

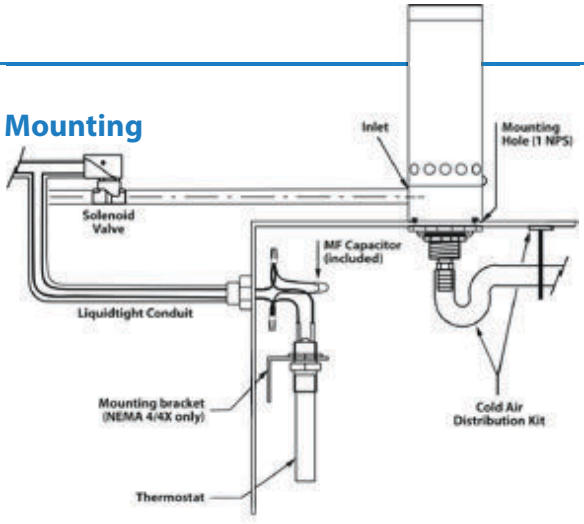
- High temp. models for ambients up to 200°F (93°C) available
- Type 316 stainless steel available
- Purge models for non-hazardous locations available

Cabinet Cooler® Systems

How The Cabinet Cooler Works

Compressed air enters the vortex tube powered Cabinet Cooler and is converted into two streams, one hot and one cold. (For more information on vortex tube operation, see page 200.) Hot air from the vortex tube is muffled and exhausted through the **vortex tube exhaust.** The cold air is discharged into the control cabinet through the cold air distribution kit. The displaced hot air in the cabinet rises and exhausts to atmosphere through the **cabinet air exhaust** at a slight positive pressure. Thus, the control cabinet is both cooled and purged with cool, clean air. **Outside air is never allowed to enter the control panel.**

Mounting



The Cabinet Cooler mounts to the enclosure through a drilled hole or electrical knockout. The NEMA 12 (IP54) Cabinet Coolers may be mounted on the top or side of the panel. NEMA 4 and 4X (IP66) Cabinet Coolers must be mounted on the top of the panel or on the side of the panel using one of our Side Mount Kits (See page 225).

Selecting The Right Model – Know Your System Options

Each different NEMA rated Cabinet Cooler system is available with a thermostat control or as a continuous operation system. Each of these systems will include a water-dirt filter separator to prevent water condensate and dirt from entering your enclosure, and a cold air distribution kit used to direct the air for circulation or on to hot spots. EXAIR also manufactures Cabinet Cooler systems for difficult environments. We have provided additional information on our Cabinet Cooler systems suitable for high temperature environments, Non-Hazardous purge environments, Type 316SS material coolers for highly corrosive environments, Hazardous Location and ATEX environments.

Cabinet Cooler Systems with ETC provide temperature control.

NEMA Rating

The first step to solving your overheating problem is to identify the NEMA integrity your enclosure will require. At right is an explanation to help you determine which NEMA integrity Cabinet Cooler system we should ship to you.

Environmental Considerations

NEMA 12 (IP54) Cabinet Coolers (dust-tight, oil-tight) are ideal for general industrial environments where no liquids or corrosives are present.

NEMA 4 (IP66) Cabinet Coolers (dust-tight, oil-tight, splash resistant, indoor/outdoor service) incorporate a low pressure relief valve for both the vortex tube and cabinet air exhaust. This valve closes and seals when the cooler is not operating **to maintain the integrity of a NEMA 4 enclosure.**

NEMA 4X (IP66) Cabinet Coolers offer the same protection as NEMA 4 but are **constructed of stainless steel for food service and corrosive environments.**

Thermostat Control

The thermostat control systems are the most efficient way to operate a Cabinet Cooler. They save air by activating the cooler only when internal temperatures approach critical levels. Thermostat controlled cooler systems are the best option when experiencing fluctuating heat loads caused by environment or seasonal changes. The standard thermostat control systems include an adjustable thermostat factory set at 95°F (35°C).

Systems with thermostat control include a Cabinet Cooler, thermostat, solenoid valve, cold air distribution kit and filter.

Selecting The Right Model – Know Your System Options (continued)

ETC™ Electronic Temperature Control

EXAIR's digital ETC (Electronic Temperature Control) provides precise temperature control for your electrical enclosure. It can accurately maintain a constant temperature that is slightly under the maximum rating of the electronics, permitting just enough cooling for the electronics without going so cold as to waste compressed air. The LED readout of the ETC displays the internal temperature of the electrical enclosure (°F or °C) that is constantly being monitored by a quick response thermocouple. The control activates the solenoid valve (included) when the temperature setting is exceeded. The polycarbonate plastic enclosure of the ETC is suitable for NEMA 12, 4 and 4X environments. (Cabinet Cooler not included.)

Model	Voltage	Sample Rate	Max Temp	Solenoid Valve	Setting Temp	Supply Current	Sensor
9238	120VAC, 50-60 Hz	1/sec.	158°F (70°C)	¼ NPT	Push Button	250 mA max	Type J Thermocouple
9258	120VAC, 50/60 Hz	1/sec.	158°F (70°C)	½ NPT	Push Button	325 mA max	Type J Thermocouple
9239	240VAC, 50/60 Hz	1/sec.	158°F (70°C)	¼ NPT	Push Button	165 mA max	Type J Thermocouple
9259	240VAC, 50/60 Hz	1/sec.	158°F (70°C)	½ NPT	Push Button	215 mA max	Type J Thermocouple

ETC controls are available within Cabinet Cooler Systems (see pages 222-224) or separately for retrofitting on existing coolers. All ETC enclosures are NEMA 4X (IP66), UL508 and UL94-5V. ETCs are RoHS and CE compliant.

ETC (Electronic Temperature Control) units are available in four different models. See above for details.

Continuous Operation

Also available in any of our NEMA ratings, continuous operation Cabinet Cooler systems are recommended when constant cooling and constant positive purge are desirable.

Systems for continuous operation include a Cabinet Cooler, cold air distribution kit and filter.

Special Cabinet Coolers

EXAIR manufactures special NEMA 12 (IP54), 4 (IP66) and 4X (IP66) Cabinet Coolers suited to specific environmental requirements:

High Temperature Cabinet Coolers *(shown top right)* for ambient temperatures of 125° to 200°F (52° to 93°C) are available. Internal components can withstand high temperatures (like those near furnaces, ovens, etc.).

Non-Hazardous Purge Cabinet Cooler Systems *(shown middle right)* are ideal for dirty areas where contaminants might normally pass through small holes or conduits. Under normal conditions, the NHP Cabinet Cooler Systems provide a slight positive pressure in the enclosure by passing 1 SCFM (28 SLPM) of air through the cooler, when the solenoid valve is in the closed position. When the thermostat detects high temperature, it energizes the solenoid valve to pass full line pressure and volume of compressed air to the Cabinet Cooler, giving it full cooling capability.

Type 316 Stainless Steel NEMA 4X Cabinet Coolers *(shown bottom right)* are suitable for food service, pharmaceutical, harsh and corrosive environments, and other applications where 316SS is preferred. Capacities from 275 to 5,600 Btu/hr. (80 to 1,641 Watts) are available.

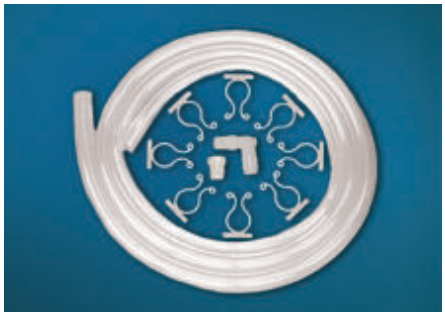
EXAIR High Temperature Cabinet Coolers, Non-Hazardous Purge Cabinet Coolers and Type 316 Cabinet Coolers are now available from stock.

Cabinet Cooler® Systems

Filtration: EXAIR Cabinet Cooler Systems include a 5 micron automatic drain water and dirt filter. This filter is critical for protection of electronics from water and dirt in the compressed air line. If oil is present in the compressed air, a coalescing (oil removal) filter, such as EXAIR Model 9005 is recommended. (See page 231)

Inlet Air Temperature: Cabinet Cooler Systems provide a 50°F (28°C) temperature drop from supply air temperature when the inlet pressure is 80 PSIG (5.5 BAR). Elevated inlet temperature will produce a corresponding rise in cold air temperature and reduction in cooling capacity. Low air pressures will also reduce the cooling capacity.

Humidity: For a continuous operating Cabinet Cooler System, relative humidity inside the enclosure stabilizes at 45%. No moisture condenses inside the enclosure. (The enclosure must be sealed to prevent condensation.)



Cold Air Distribution Kit:
The kit includes a length of flexible vinyl tubing used to direct the cold air for circulation, or to hot spots. Tubing connectors and adhesive backed clips to hold the tubing in place are provided.

Solenoid Valve and Thermostat:
Cabinet Cooler Systems with thermostat control include a solenoid valve and thermostat that limit the flow of compressed air to only cool when needed. The thermostat is factory set at 95°F (35°C). It will normally hold ±2°F (1°C) inside the cabinet. Solenoid valves are available in 120V, 60Hz; 110V, 50Hz; 240V, 50/60Hz and 24VDC. All solenoids are CSA Certified and UL Listed or Recognized.

Heat Can Stop Your Machines

When hot weather causes the electronics inside a control cabinet to fail, there is a panic to get the machinery up and running again. There are several cooling options out there and it's important to know the facts.

A. Heat Exchangers and Heat Pipes

These have serious limitations. On hot summer days when the temperatures of the room and inside of the enclosure are about equal, there's not enough difference for effective heat exchange.

- **They fail when dust and dirt clog the filter**
- **The cooling capacity is limited due to ambient conditions**

B. Refrigerant Panel Air Conditioners

These coolers are prone to failure in dirty, industrial environments when dust and dirt clog the filter.

- **It takes almost a day to install**
- **Vibration from machinery causes refrigerant leaks and component failures**

EXAIR Cabinet Cooler® Systems

EXAIR has a complete line of Cabinet Cooler Systems to dependably cool and purge your electrical enclosures. They convert an ordinary supply of compressed air into clean, cold 20°F (-7°C) air. They mount in minutes through an ordinary electrical knockout and have no moving parts to wear out. The compressed air filtration that is provided keeps water, oil and other contaminants out of the enclosure.

- **There is no room air filter to clog**
- **An accurate electrical thermostat control minimizes compressed air use**
- **All Cabinet Coolers are UL Listed, UL Classified and/or CE Compliant**
- **They are the only compressed air powered coolers that are CE compliant**

For Technical Assistance, Call An EXAIR Application Engineer 1-800-903-9247
Toll Free FAX (866) 329-3924 • E-mail: techelp@exair.com • www.exair.com
@EXAIR

Sizing Guide - Let us do the work

On the following page, EXAIR provides a simple guide to fill in and send to us so we may do the heat load calculations for you and specify a Cabinet Cooler system. You may e-mail the information to techelp@exair.com, call 1-800-903-9247, fill out an online form at exair.com/sizing, use our new calculator at https://exair.co/cccalc_ca or fax the information to 1-866-329-3924.

How To Calculate Heat Load for Your Enclosure

If you would like to determine the correct model for your enclosure without our assistance, it is first necessary to determine the total heat load to which the control panel is subjected. This total heat load is the combination of two factors – heat dissipated within the enclosure and heat transfer from outside the enclosure.

To Calculate Btu/hr.:

1. First, determine the approximate Watts of heat generated within the enclosure. Watts x 3.41 = Btu/hr.
2. Then, calculate outside heat transfer as follows:
   a. Determine the area in square feet exposed to the air, ignoring the top of the cabinet.
   b. Determine the temperature differential between maximum surrounding temperature and desired internal temperature. Then, using the Temperature Conversion Table *(below)*, determine the Btu/hr./ft.^{2} for that differential. Multiplying the cabinet surface area times Btu/hr./ft.^{2} provides external heat transfer in Btu/hr.
3. Add internal and external heat loads for total heat load.

To Calculate Watts:

1. First, determine the approximate Watts of heat generated within the enclosure.
2. Then, calculate outside heat transfer as follows:
   a. Determine the area in square meters exposed to the air, ignoring the top of the cabinet.
   b. Determine the temperature differential between maximum surrounding temperature and desired internal temperature. Then, using the Metric Temperature Conversion Table *(below)*, determine the Watts/m^2 for that differential. Multiplying the cabinet surface area times Watts/m^2 provides external heat transfer in Watts.
3. Add internal and external heat loads for total heat load.

Temperature Conversion Table

Temperature Differential °F	Btu/hr./ft.^{2}
5	1.5
10	3.3
15	5.1
20	7.1
25	9.1
30	11.3
35	13.8
40	16.2

After picking which NEMA integrity you need, choosing your options and calculating your heat load -go to page 222-224 to specify a model number.

See page 226 for HazLoc Cabinet Coolers. See page 228 for ATEX Cabinet Coolers.

OR Contact EXAIR and we'll walk you right through it.

Temperature Conversion Table (METRIC)

Temperature Differential °C	Watts/m^2
3	5.2
6	11.3
9	17.6
12	24.4
15	31.4
18	39.5
21	47.7

Example:
Internal heat dissipation: 471 Watts or 1,606 Btu/hr.
Cabinet area: 40 ft.^{2}
Maximum outside temperature: 110°F
Desired internal temperature: 95°F

The conversion table (above) shows that a 15°F temperature differential inputs 5.1 Btu/hr./ft.^{2}

40 ft.^{2} x 5.1 Btu/hr./ft.^{2} = 204 Btu/hr. external heat load.

Therefore, 204 Btu/hr. external heat load plus 1,606 Btu/hr. internal heat load = 1,810 Btu/hr. total heat load or Btu/hr. refrigeration required to maintain desired temperature.

In this example, the correct choice is a 2,000 Btu/hr. Cabinet Cooler System. Choose a Cabinet Cooler model by determining the NEMA rating of the enclosure (type of environment), and with or without thermostat control.

Example:
Internal heat dissipation: 471 Watts
Cabinet area: 3.7m^2
Maximum outside temperature: 44°C
Desired internal temperature: 35°C

The conversion table (above) shows that a 9°C temperature differential inputs 17.6 Watts/m^2.

3.7m^2 x 17.6 Watts/m^2 = 65.1 Watts external heat load.

Therefore, 65.1 Watts external heat load plus 471 Watts internal heat load = 536.1 Watts total heat load or Watts of refrigeration required to maintain desired temperature.

In this example, the correct choice is a 586 Watt Cabinet Cooler System. Choose a Cabinet Cooler model by determining the NEMA rating of the enclosure (type of environment), and with or without thermostat control.

EXAIR® Cabinet Cooler® System Sizing Guide

Deliver your Data – Receive a Quote

Use this form to gather the information necessary to specify a Cabinet Cooler System and choose a delivery method below.

Submit online
www.exair.com/sizing.htm

Call us at
1-800-903-9247

TO QUICK MOBILE VERSION
https://exair.co/qr-pro-ccsg

Online chat with us at
www.exair.com

Calculate Yourself
https://exair.co/04-CCcalc

Send Us The Facts!

Cabinet Cooler Sizing Guide

To: Application Engineering Department, EXAIR®

From: **Name**_____

Company_____

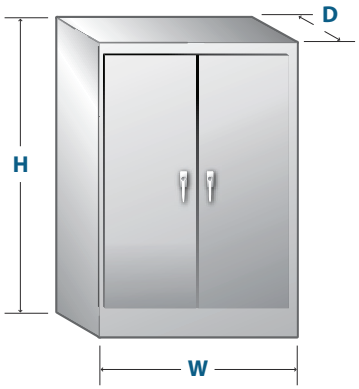
FAX number_____

Phone number_____ **Ext.#**_____

E-mail_____

In a hurry? For help NOW, call our Application Engineering Department at 1-800-903-9247

You can fill this form out online at:
www.exair.com/sizing.htm



1. Height (H)_____ 2. Width (W)_____ 3. Depth (D)_____
4. *External air temperature now?_____°F or °C
5. *Internal air temperature now?_____°F or °C
6. Maximum external air temperature possible?_____°F or °C
7. Maximum internal air temperature desired?_____°F or °C
8. My cabinet rating is: ☐ NEMA 12 ☐ NEMA 4 ☐ NEMA 4X
   ☐ Other (explain) _____
   _____
9. My cabinet is in an area with a hazardous classification: ☐ YES ☐ NO
10. My cabinet is in an explosive environment: ☐ YES ☐ NO
11. My cabinet is (check all that apply):
   ☐ Vented - outside air circulates through the enclosure
   ☐ Not Vented - outside air does not circulate through the enclosure
   ☐ Wall mounted
   ☐ Fan(s)/Vent(s) - Indicate diameter or SCFM _____
   Number of fans/vents _____
12. Available voltage for thermostat control: ☐ 24 VDC ☐ 110 VAC ☐ 240 VAC

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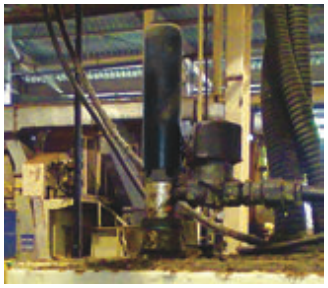
*Using a "Temperature Gun" or infrared thermometer will result in measuring surface temperatures.
Air temperatures are needed for the cabinet cooling calculations. Please use a standard thermometer or thermocouple to measure the air temperature.

Cabinet Coolers Keep Working at Full Capacity After Seven Years of Near Constant Operation

The Problem: A manufacturer of automotive radiators had a problem relating to an overheated motor drive which caused one of their two production lines to come to a stop. They used a refrigerant based air conditioner set on the panel, but the air conditioner began leaking water into the panel. The water got into the motor drive, shorted it out and caused the production line to go down. Not only was production down for 1 month, but the motor drive cost them $20,000 to replace by the time they purchased, had it shipped and got it installed.

The Solution: The manufacturer was unsure of what they were going to use for an air conditioning unit because the motor drives had to stay cool. They purchased EXAIR's Model 4330 NEMA 12 2,000 Btu/hr. (586 Watts) Cabinet Cooler System with thermostat control for the panel. The Cabinet Cooler System worked perfectly at solving the cooling problem.

Seven years later, this manufacturer contacted EXAIR for another application. They mentioned the old EXAIR Cabinet Cooler system still on the motor drive panel, cranking out cold air. No maintenance had been performed on the Cabinet Cooler System in that time (as none was necessary) even though the environment was quite dirty. It was still working perfectly!



Comment: When we talk to customers about the EXAIR Cabinet Cooler Systems, one of their initial concerns is how long they last. With a source of clean/dry compressed air, the life span of a Cabinet Cooler can easily be in the range of 20 years or more, since there are no moving parts to wear out. In that time frame, you could have to purchase four refrigerant based units, pay to have them changed out and pay for them to be maintained 2 - 4 times per year, changing filters, replacing compressors, and re-charging refrigerant. Not only does the Cabinet Cooler last a long time, but when it is operating, it produces a positive pressure inside the panel which keeps dust and debris from getting inside your cabinet over time.

Cooling in a Hostile Environment

The Problem: A traditional refrigerant based air conditioner was installed on wastewater clarifier controls but could not withstand the harsh chemical environment of the wastewater industry. Controls on a wastewater clarifier process were mounted outdoors and experienced weather related overheating problems in the hotter months of the year. Not only did higher temperatures compromise the performance of the traditional refrigerant based air conditioner, the corrosive environment from the many different wastewater chemicals, acids and bases prematurely wore the critical moving parts of the air conditioner.

The Solution: A Model 4850SS-316 Cabinet Cooler System provided 3,400 Btu/hr. (997 Watts) of cooling for the clarifier controls and kept them running efficiently. The Cabinet Cooler is resistant to seasonal temperature fluctuations because it operates from a source of compressed air and not ambient air. The 316SS construction also provided high corrosion resistance to the chemical environment. Since EXAIR Cabinet Coolers have no moving parts, another maintenance concern was eliminated.

Comment: The inherent reliability of the vortex tube operated Cabinet Cooler System is another important advantage in this application. Because they have no moving parts, EXAIR Cabinet Coolers are virtually impervious to hostile environments. Wastewater treatment, chemical processing, paper manufacturing, steel mills and power generation are just a few of the facilities benefitting from this simple, yet effective technology.