Cabinet Coolers™

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

Cabinet Coolers maintain NEMA 4, 4X and NEMA 12 integrity and are c UL us LISTED

EXAIR's new Side Mount Kit for NEMA 4/4X Cabinet Coolers offers convenient mounting to the side of an electrical enclosure.

What Are EXAIR Cabinet Coolers?

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 4, 4X and 12 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 Coolers?

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 and ULC Listed.**

See page 2 for complete details.

A Model 4830 NEMA 4 Cabinet Cooler cools a panel with 20°F air while keeping the inside dry.

Applications

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

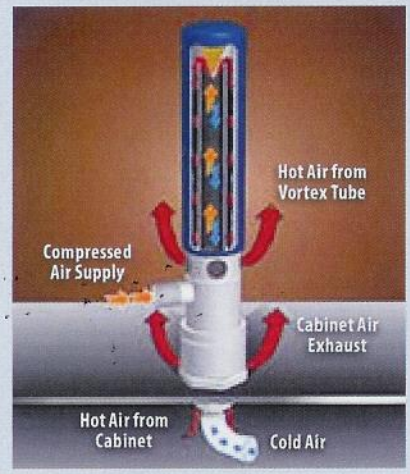
Advantages

- Low cost
- Compact
- Quiet - less than 75 dBA
- Install in minutes
- Maintain NEMA 4, 4X and 12 integrity (IP52 and 56)
- 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

How Cabinet Coolers Work



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 100.) 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.**

A dangerous shock hazard exists when the panel door is opened to let a fan blow hot, dirty shop air at the electronics.

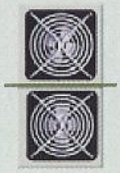
Selecting The Right Model

EXAIR Cabinet Coolers are available with or without thermostat control. The continuous coolers (Model 4200 and 4700 series) are recommended when constant cooling and a constant positive purge are desirable. The thermostatically controlled systems (Model 4300 and 4800 series) save air by activating the cooler only when internal temperatures approach critical levels. The adjustable thermostat is factory set at 95°F (35°C). Thermostatic systems are recommended where heat load fluctuates and continual purge is not required.

All EXAIR Cabinet Cooler Systems contain a 5 micron, **Automatic Drain Filter** for the compressed air supply and a **Cold Air Distribution Kit** to circulate the cold air throughout the enclosure. See page 120 for details.

Heat Can Stop Your Machines

It happens when you least expect it. High temperatures can cook the electronics that control your machines, resulting in erroneous readings, trip-outs or fried circuit boards. Cooling the electrical cabinet can eliminate these problems, but how will you do it?



Heat Exchangers and Heat Pipes

These have serious limitations when it comes to summer time heat. In many cases, the temperature of the hot plant on a summer day is close to that inside the enclosure. There is not enough difference in temperature for a decent heat exchange.

Refrigerant Panel Air Conditioners

These coolers are expensive, take almost a day to install, and are prone to failure when dust and dirt clogs the filter. Vibration from machinery contributes to component failures and loss of freon. Life expectancy for most compressors is rated at 2.5 years of continuous operation. Average replacement cost for a bad compressor is $750 plus installation. Often, a floor drain is not readily available for the condensation tube.

EXAIR Cabinet Coolers™

Our compressed air operated Cabinet Coolers are the low cost solution. NEMA 12, 4 and 4X models are available that are very compact and mount in just minutes through an ordinary electrical knockout. Thermostat control limits compressed air use by operating the Cabinet Cooler only when the temperature inside the enclosure reaches critical levels.

Heat exchangers, heat pipes and refrigerant coolers all have filters that can clog. Left unattended, mechanical failure of the cooler is likely. And, the expensive equipment in the electrical enclosure can malfunction, overheat and shut down the entire machine or process. EXAIR Cabinet Coolers have no moving parts to wear out and do not require constant monitoring. All models are UL Listed and available in a large number of styles and cooling capacities.

Environmental Considerations

NEMA 12 (IP52) Cabinet Coolers (dust-tight, oil-tight) are ideal for general industrial environments where no liquids or corrosives are present.

NEMA 4 (IP56) 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 (IP56) Cabinet Coolers offer the same protection as NEMA 4 but are **constructed of stainless steel for food service and corrosive environments.**

See page 122 for a complete description of each Cabinet Cooler and Cabinet Cooler System.

Cabinet Cooler Specifications

	Model #	Capacity Btu/hr.	Capacity Kcal/hr.	Thermostat Control	Sound Level dBA
NEMA 12 IP52 (Dust, Oil resistant)	4208	550	139	No	56
	4215	1000	252	No	66
	4225	1700	428	No	69
	4230	2000	504	No	69
	4240	2800	706	No	69
	4308	550	139	Yes	56
	4315	1000	252	Yes	66
	4325	1700	428	Yes	69
	4330	2000	504	Yes	69
	4340	2800	706	Yes	69
NEMA 4 IP56 (Splash resistant)	4708	550	139	No	65
	4715	1000	252	No	79
	4725	1700	428	No	85
	4730	2000	504	No	85
	4740	2800	706	No	85
	4808	550	139	Yes	65
	4815	1000	252	Yes	79
	4825	1700	428	Yes	85
	4830	2000	504	Yes	85
	4840	2800	706	Yes	85
NEMA 4X IP56 (Corrosion resistant)	4708SS	550	139	No	65
	4715SS	1000	252	No	79
	4725SS	1700	428	No	85
	4730SS	2000	504	No	85
	4740SS	2800	706	No	85
	4808SS	550	139	Yes	65
	4815SS	1000	252	Yes	79
	4825SS	1700	428	Yes	85
	4830SS	2000	504	Yes	85
	4840SS	2800	706	Yes	85

Sizing Guide - How To Calculate Heat Load For Your Enclosure

To determine the correct model for your application, 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 into 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.

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

Example:

Internal heat dissipation: 471 Watts or 1606 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 sq. ft. x 5.1 Btu/hr./ft.^{2} = 204 Btu/hr. external heat load.

Therefore, 204 Btu/hr. external heat load plus 1606 Btu/hr. internal heat load = 1810 Btu/hr. total heat load or Btu/hr. refrigeration required to maintain desired temperature.

In this example, the correct choice is a 2000 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.

Need Help Sizing EXAIR Cabinet Coolers?

1. Fill out and fax us the "Cabinet Cooler Sizing Guide" on page 119.
2. For answers NOW, call our Application Engineering Department

To Calculate Kcal/hr.:

1. First, determine the approximate watts of heat generated within the enclosure. Watts x .86 = Kcal/hr.
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 Kcal/hr./m^2 for that differential. Multiplying the cabinet surface area times Kcal/hr./m^2 provides external heat transfer in Kcal/hr.
3. Add internal and external heat loads for total heat load.

Temperature Conversion Table (METRIC)	
Temperature Differential °C	Kcal/hr./m^2
3	4.5
6	9.7
9	15.1
12	21.0
15	27.0
18	34.0
21	41.0

Example:

Internal heat dissipation: 471 Watts or 405 Kcal/hr.

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 15.1 Kcal/hr./m^2.

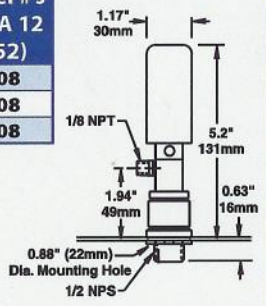
3.7m^2 x 15.1 Kcal/hr./m^2 = 56 Kcal/hr. external heat load.

Therefore, 56 Kcal/hr. external heat load plus 405 Kcal/hr. internal heat load = 461 Kcal/hr. total heat load or Kcal/hr. refrigeration required to maintain desired temperature.

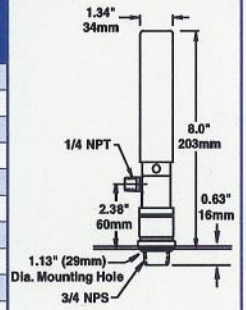
In this example, the correct choice is a 504 Kcal/hr. Cabinet Cooler System. Choose a Cabinet Cooler model by determining the NEMA rating of the enclosure (type of environment), and with or without thermostat control.

Dimensions

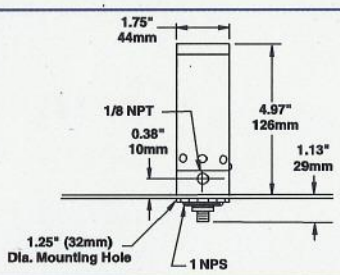
Model #'s NEMA 12 (IP52)
4008
4208
4308



Model #'s NEMA 12 (IP52)
4015
4025
4030
4040
4215
4225
4230
4240
4315
4325
4330
4340

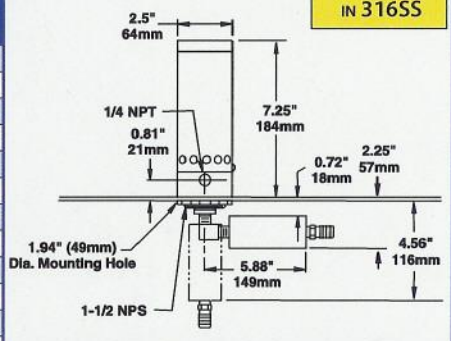


Model #'s NEMA 4 (IP56)	Model #'s NEMA 4X (IP56)
4608	4608SS
4708	4708SS
4808	4808SS



Model #'s NEMA 4 (IP56)	Model #'s NEMA 4X (IP56)
4615	4615SS
4625	4625SS
4630	4630SS
4640	4640SS
4715	4715SS
4725	4725SS
4730	4730SS
4740	4740SS
4815	4815SS
4825	4825SS
4830	4830SS
4840	4840SS

AVAILABLE IN 316SS



NEMA 12, 4, and 4X Cabinet Coolers are available in many cooling capacities for large and small control panels.

Special Cabinet Coolers

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

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

The **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 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 650 to 2800 Btu/hr. (164 to 706 Kcal/hr.) are available.

Fax Us The Facts!

Cabinet Cooler Sizing Guide

Use this form to fax us information about your control panel cooling problem. **We'll fax back our recommended solution within 24 hours.**

To: Application Engineering Department, EXAIR Corporation

From: **Name**_____

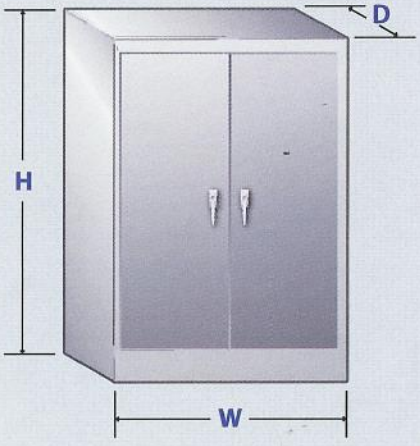
Company_____

FAX number_____

Phone number_____ **Ext.#**_____

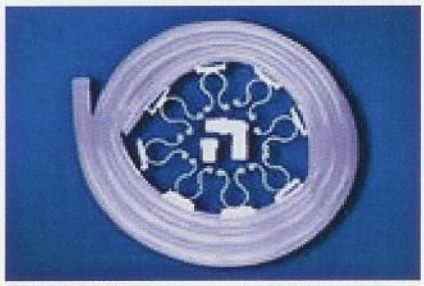
E-mail_____

☐ I have completed the information below. I want to know which EXAIR Cabinet Cooler is the best choice for my control panel.



1. Height_____ 2. Width_____ 3. Depth_____
4. External temperature now?_____ °F or °C
5. Internal temperature now?_____ °F or °C
6. Maximum external temperature possible?_____ °F or °C
7. Maximum internal temperature desired?_____ °F or °C
8. My cabinet rating is:
   - ☐ NEMA 12 ☐ NEMA 4 ☐ NEMA 4X
   - ☐ Other (explain)_____
9. My cabinet is (check all that apply):
   - ☐ Vented - outside air circulates through the enclosure
   - ☐ Not vented - outside air does not circulate through the enclosure
   - ☐ Free standing
   - ☐ Wall mounted
   - ☐ Fan(s)
     - Indicate diameter or SCFM_____
     - Number of fans_____

For Assistance Contact us at 925-706-7433
Fax Return Form to: 925-706-2583



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.

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

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 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.

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

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

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.

Mounting: The Cabinet Cooler mounts to the enclosure through a drilled hole or electrical knockout. The NEMA 12 Cabinet Coolers may be mounted on the top or side of the panel. NEMA 4 and 4X Cabinet Coolers must be mounted on the top of the panel, or on the side of the panel using our new side mount kits.

Solenoid Valve and Thermostat.

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 when cooling is needed. The solenoid valve is rated 120V, 60 Hz or 110V, 50 Hz. It is UL Listed, CSA Certified.

The thermostat is factory set at 95°F (35°C). It will normally hold ±2°F (1°C) inside the cabinet. It is rated 120V, 50/60 Hz and is UL Recognized, CSA Certified.

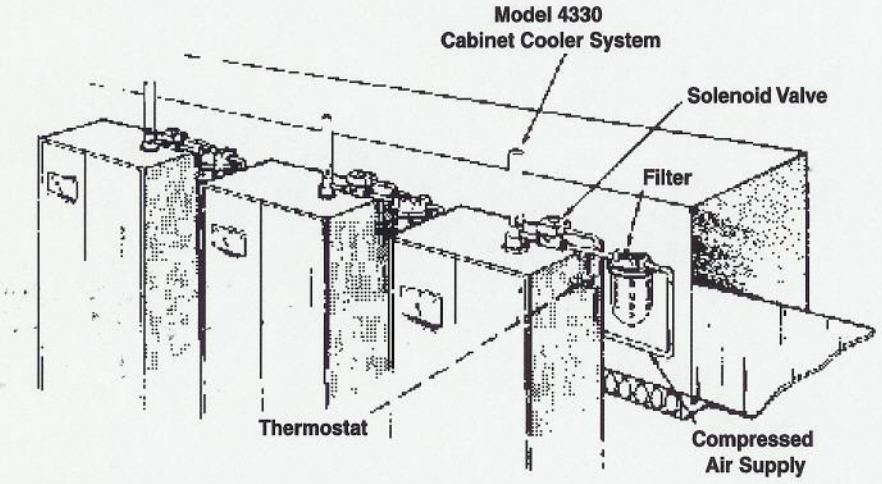
Electronic Temperature Control™

Model 9038 - 120VAC, 50/60 Hz
Model 9039 - 240VAC, 50/60 Hz

Temperature settings: 80 -120°F (27 - 49°C)
Power supply current: 2mA
Sensor: 1K ohm platinum RTD
Sample rate: 2.5 readings/second
ETC enclosure: UL508-4X
NEMA 4X, IP56
ABS/PC plastic
Max ambient temperature: 160°F (71°C)
Polycarbonate door: U94-V-0
Solenoid Valve: 1/4 NPT

EXAIR's **ETC** (Electronic Temperature Control) delivers precise temperature control for your enclosure. Temperature is maintained with an accuracy of ±1°F of the dial setting. The digital readout monitors the internal temperature of the electrical enclosure and activates the solenoid valve (included) only when the temperature setting is exceeded. The ABS/PC plastic enclosure of the **ETC** is suitable for NEMA 12, 4 and 4X environments. *(Cabinet Cooler not included.)*

Cooling Control Panels In A Glass Plant

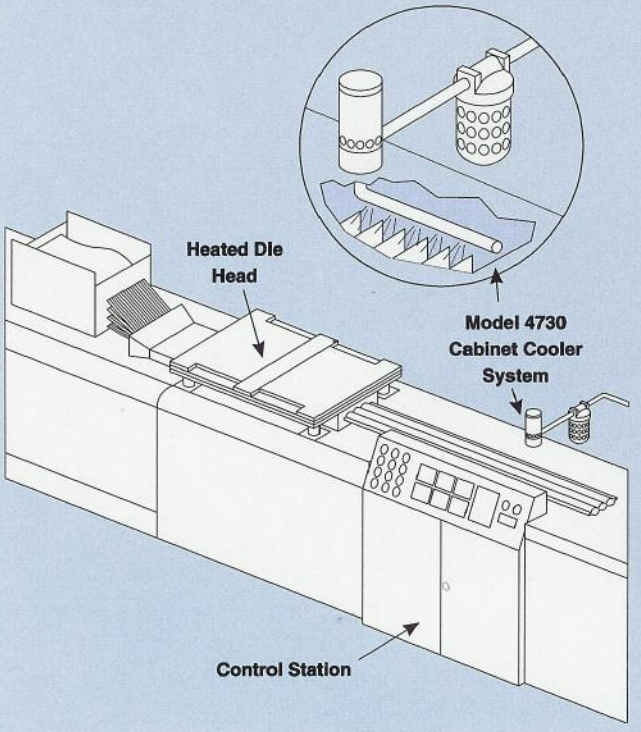


The Problem: Few companies contend with more heat-related problems than do glass manufacturers. Control panels in close proximity to molten glass are particularly susceptible. High ambient temperatures caused constant "nuisance tripping" of the circuit breakers. The "quick fix" solution — opening the panel doors — allowed dirt to enter the panels and created a potential safety hazard.

The Solution: EXAIR **Model 4330 Cabinet Coolers** were installed on each control panel. Cold air was directed through the Cold Air Distribution Kit over the circuit breakers. Thermostat control assured that the **Cabinet Coolers would activate only when internal temperatures approached critical levels.** The panel doors were closed to prevent dirt infiltration and shock hazard. Downtime was eliminated.

Comment: The inherent reliability of the vortex tube operated Cabinet Cooler was the important advantage in this application. Because they have no moving parts, **EXAIR Cabinet Coolers are virtually impervious to hostile environments.** Glass plants, steel mills, foundries, and casting plants are just a few of the facilities benefiting from this simple, yet effective technology.

Cooling And Purging A Pultrusion Control



The Problem: In the pultrusion process, resin coated fibers are assembled by a forming guide, then drawn through a heated die. Residual heat from the die caused electronic malfunctions at the control station located immediately downstream.

The Solution: In minutes, a **Model 4730 NEMA 4 Cabinet Cooler System** was installed on the control module. **Its 2,000 Btu/hr. (504 Kcal/hr.) cooling capacity more than offset the additional heat load produced by the die.** Heat related malfunction and downtime were eliminated.

Comment: The ability of EXAIR's Cabinet Cooler to maintain a slight positive pressure within the enclosure was an important additional benefit in this application. **This purging feature assured that dust from the surroundings would not infiltrate the enclosure and compromise the sensitive electronic componentry.** The Cabinet Cooler also maintained the NEMA 4 integrity of the enclosure which was necessary for the occasional washdown of the die and surrounding surfaces.