



Your Enclosure Source®

Universal

Air to Air Heat Exchangers

www.saginawcontrol.com



Topic Overview

1. Why do we use air to air heat exchangers to cool cabinets?
2. Air to air heat exchangers
Universal line
3. Verifying that the selected Heat Exchanger has the appropriate cooling performance
4. Controller functions
5. Wiring and mounting units
6. Safety
7. Troubleshooting & Debugging



Why do we use air to air heat exchangers to cool cabinets?

Why do we use cabinet close loop temperature control

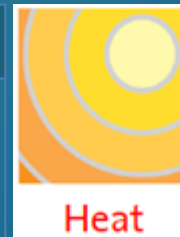
Protection from:

- Dust
- Humidity
- Heat
- Water
- Wide temperature changes



Which effect an AC has inside the cabinet?

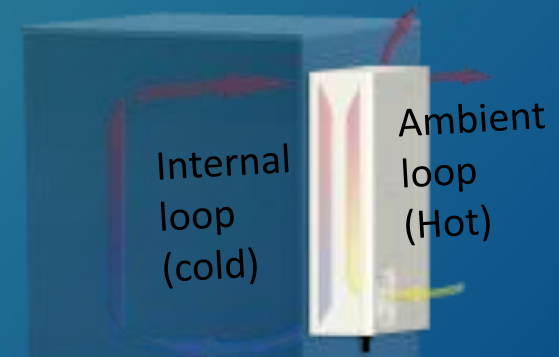
- Heat dissipation from components
- Temperature control



Air to Air Heat Exchanger cabinet cooling

For a cabinet heat exchanger to function at optimum cooling capacity:

- Ambient air temperature has to be 18 deg F lower then the required cabinet temperature
- Don't obstruct internal & external Airflow
- Keep cabinet closed tight and free of air infiltration



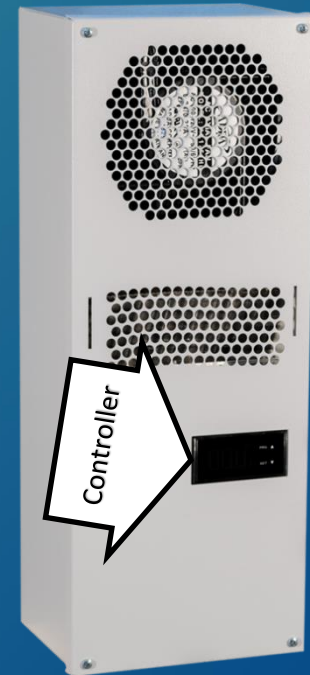
Ambient air has to be always cooler then cabinet air for the heat exchanger to cool

Universal units NEMA 12, 3R rating

- Universal heat exchangers are all UL type 12 and 3R rated
- Powder coated steel RAL7035
- 4, 8, 18 and 24 W/°F cooling capacity available
- Internal sheet metal parts coated in Alu-zinc
- Corrosion proof coated core
- Controller (digital display) mounted outside the unit
- Filterless design with wide gap maintenance free core
- Available in 120 V
- Industry standard footprint
- 2 year warranty

Controller functions

- Adjustable temperature set point
- Adjustable high temp alarm
- High temp alarm relay is delivered as normally closed, this can be changed through the digital display

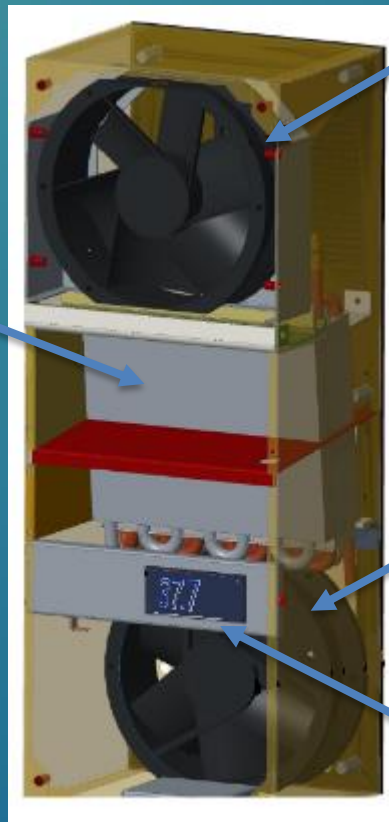


Air to Air heat exchanger operation

Heat pipe technology is used on the 4W/F heat exchanger for a compact construction



Heat pipe



Ambient fan

Ambient air Inlet

Ambient air outlet

Internal fan

Adjustable Digital controller



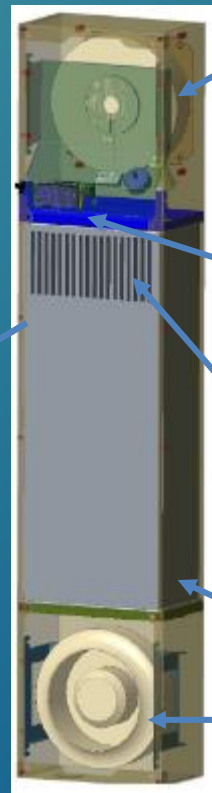
SCE-HE04W120V

Air to Air heat exchanger operation

Counter-flow air to air heat exchanger cores are used on the 8, 18, 24 W/F units for simplicity and best performance



Counter-flow heat exchanger



Internal fan

Adjustable digital controller

Ambient air outlet

Internal fan

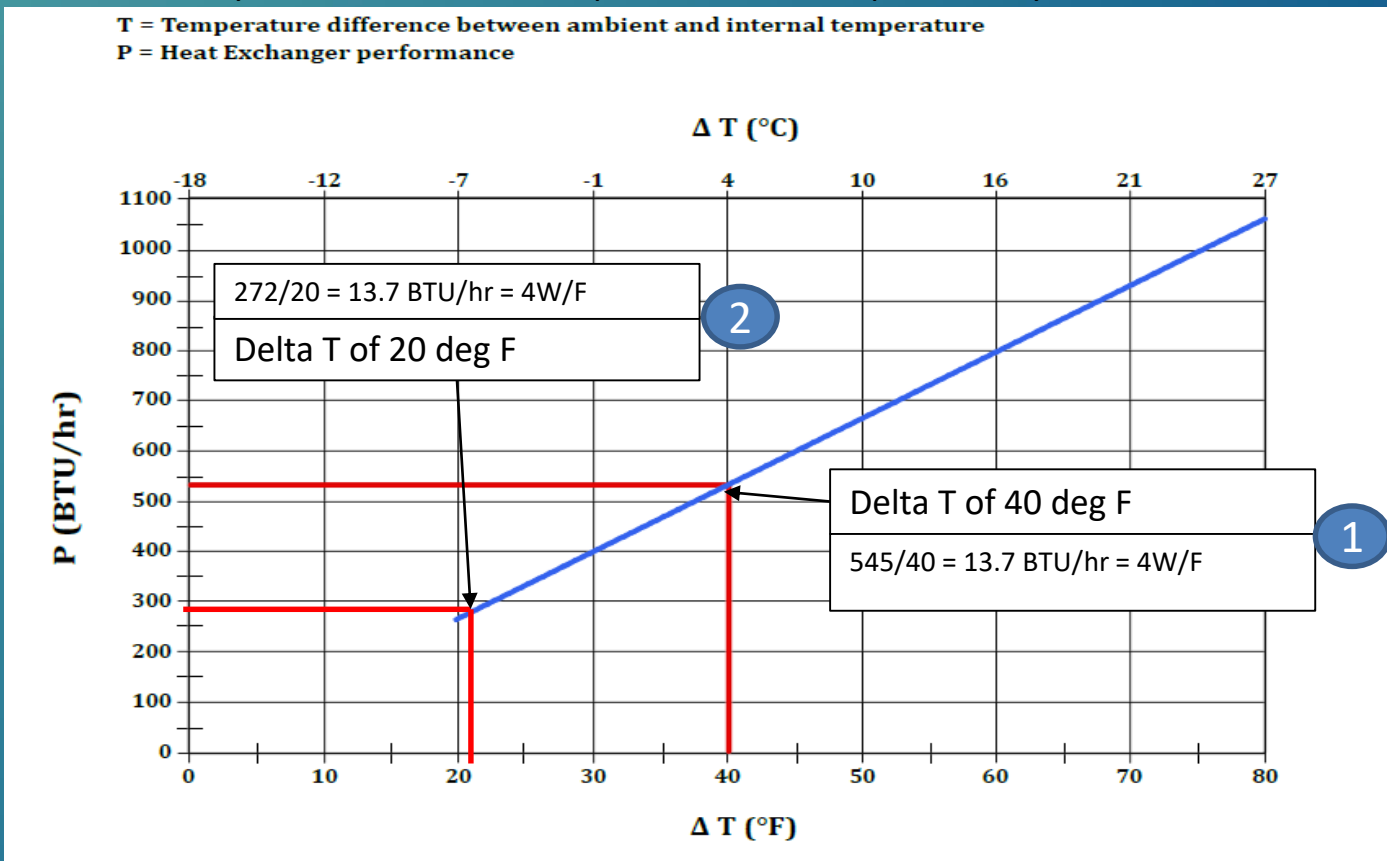
Ambient air inlet



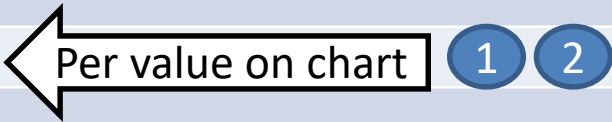
SCE-HE24W120V

How to choose?

You can use performance curves on the air to air heat exchanger to determine its cooling capacity. The chart below shows one examples: the unit in question can cool a load of 525 BTU/hr at a delta T of 40 deg F (the delta T is measured between the ambient temperature and the internal return air temperature). The same unit operating with a hotter ambient temperature but having to maintain the same internal temperature bringing the delta T to 20 deg F the cooling performance would be reduced to 260 BTU/hr. Note that for a air to air heat exchangers to be able to cool the temperature inside a cabinet the ambient temperature has to always be lower then the required cabinet temperature by at least 18 °F.



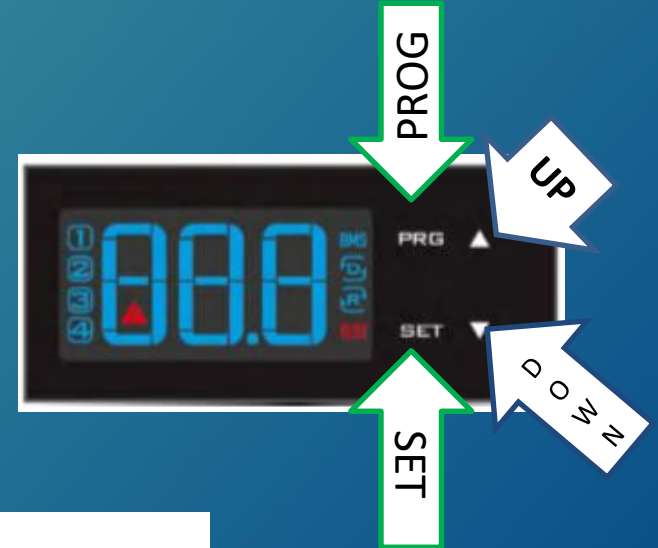
How to choose?

Technical Data	
Part Number	SCE-HE04W120V
Specific Performance	4 W/F (13.7 BTU/F) 
Operating Temperature Range	23°F - 131°F
Mounting	External
Housing Material	Mild Steel, Powder Coated
Dimensions (H x W x D)	20.00 x 7.50 x 5.95 inch
Weight	14 lbs
Rated Operating Voltage / Frequency	120 V - 50/60 Hz
Rated Current	0.48 A
Starting Current	0.70 A
Power Consumption	55 W
Fuse Rating	1.6 A (T)
Connection	70 inch Connection Cable
NEMA Protection Class	NEMA 3R & 12
Approvals	CE / cURus
Industry Standards	IS22

Controller function on the Universal Heat Exchanger

Modifying controller parameters

The display shows the temperature in the range of -50°C to +150°C (-58°F to +302°F). The temperature is displayed with resolution of tenths between -19.9°C and +99.9°C (-3.8°F to +211.8°F). During programming, it shows the codes and values of the parameters. The display also shows icons according to occurring events.



Display icons

Icon	Function	Description
1	Cooling relay active	Flashes when activation is delayed or inhibited by protection times, external disabling or other procedures
2	Alarms relay active	
3	Heating relay active	
4	Ambient blower relay active in progress	
⚠	Alarm	Flashes when alarms are active
↑R↓	Heating mode	Signals operation of unit in heating mode
↓D↑	Cooling mode	Signals operation of unit in cooling mode
TEST	Test mode in progress	Activated only by manual procedure

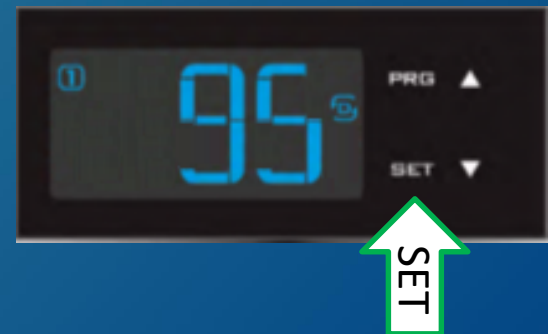
Controller function on the Universal Heat Exchanger

Programming

The operating parameters can be modified using the front keypad. Access differs depending on the type of parameter. Access to configuration parameters is protected by a password that prevents unwanted modifications or access by unauthorized persons.

Setting cooling set point, St1:

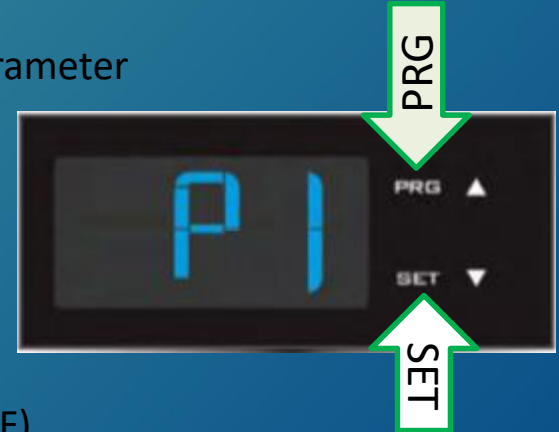
1. Press “SET” and display should show St1 and then the pre-set value of St1. (default: +35°C / +95°F)
2. Reach the desired value by using ▲ or ▼.
3. Press “SET” again to save the new value of St1.



Controller function on the Universal Heat Exchanger

Setting temperature unit, low temperature alarm and high temperature alarm:

1. Press “PRG” button for 5 seconds to reach the modifiable parameter list.
2. Use ▲ or ▼ to reach the desired parameter:
 - C18 for temperature unit of measure
 - °C = 0
 - °F = 1
 - P25 for low temperature alarm threshold (default -10°C /+14°F)
 - P26 for high temperature alarm threshold (default +55°C /+131°F)
3. Press “SET” on the desired parameter to display the current value.
4. Use ▲ or ▼ to reach the desired value.
5. Pressing “SET” temporarily saves the new value and returns to the parameters list.
6. Repeat steps 2-5 to set other parameters.
7. Press “PRG” for 5 seconds to permanently save the new values.



Controller function on the Universal Heat Exchanger

Test function

Different test functions can be used depending on the combination of keys pressed. Such tests run for the duration of 4 minutes.

- “SET+ ▲” tests cooling relays.
- “SET+ ▼” tests Alarms and Heater relays

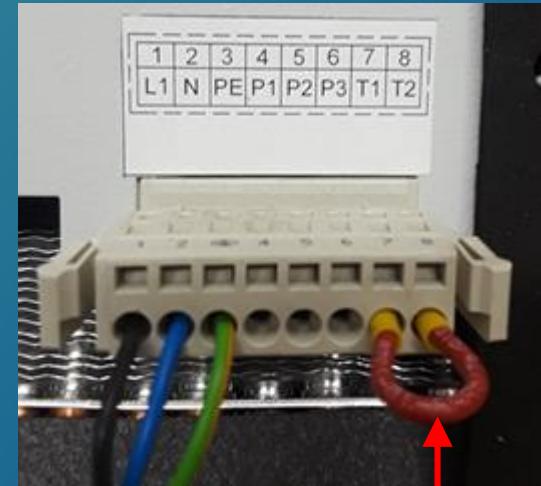
Important Notes

- Whilst programming, if no button is pressed for 10 seconds, the display starts flashing, and after 1 minute returns to the main display without saving changes.
- To increase scrolling speed, press and hold the ▲ or ▼ button for at least 5 seconds.
- When pressing “PRG” for 3 seconds, the firmware revision code is displayed for 2 seconds.
- When cleaning the controller panel, do not use ethanol, hydrocarbons, ammonia or their by-products. Use neutral detergents and water.

Controller function on the Universal Heat Exchanger

Door Switch

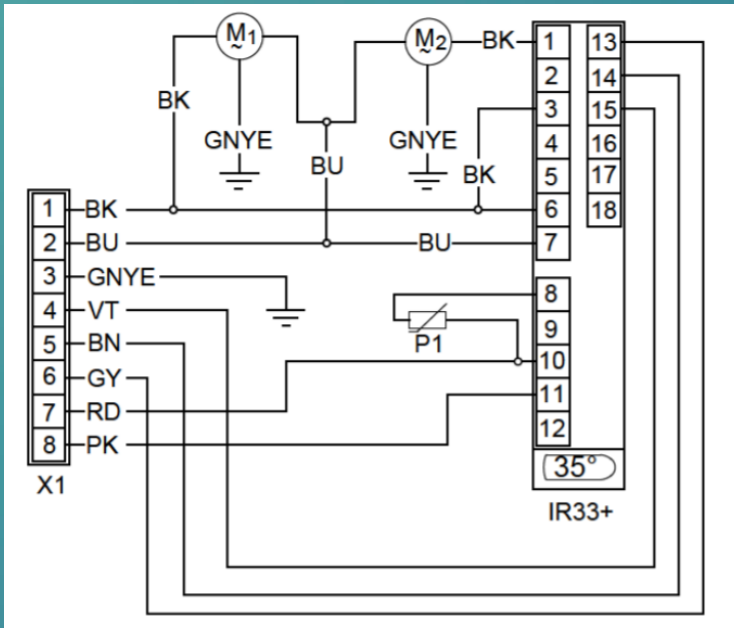
The unit can be turned on and off via a door contact switch. When a new unit is delivered the door contact terminals are bridged on the female connector. In order to connect the door contact switch remove the bridge and connect the door contact switch. The contact must be closed when the cabinet door is closed.



Door contact bridge

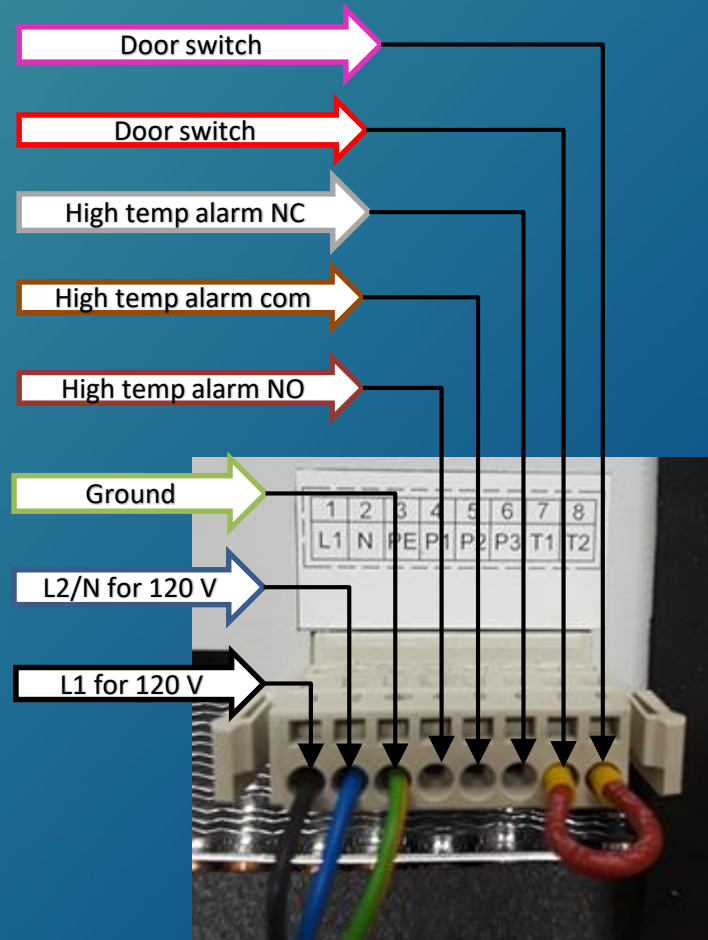
Controller function on the Universal Heat Exchanger

4 W/F and 8 W/F units wire diagram



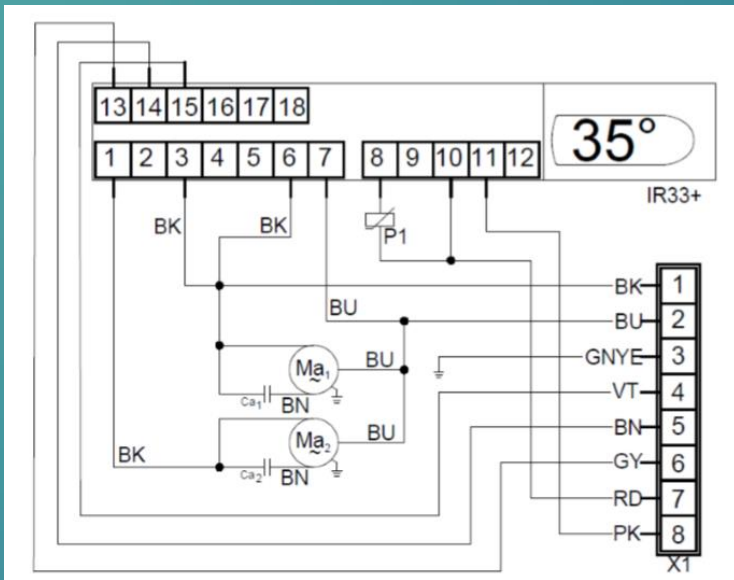
Part List:

- X1 - 8-Pole connector
- P1 - Temperature sensor probe
- M1 - Internal blower
- M2 - Ambient blower



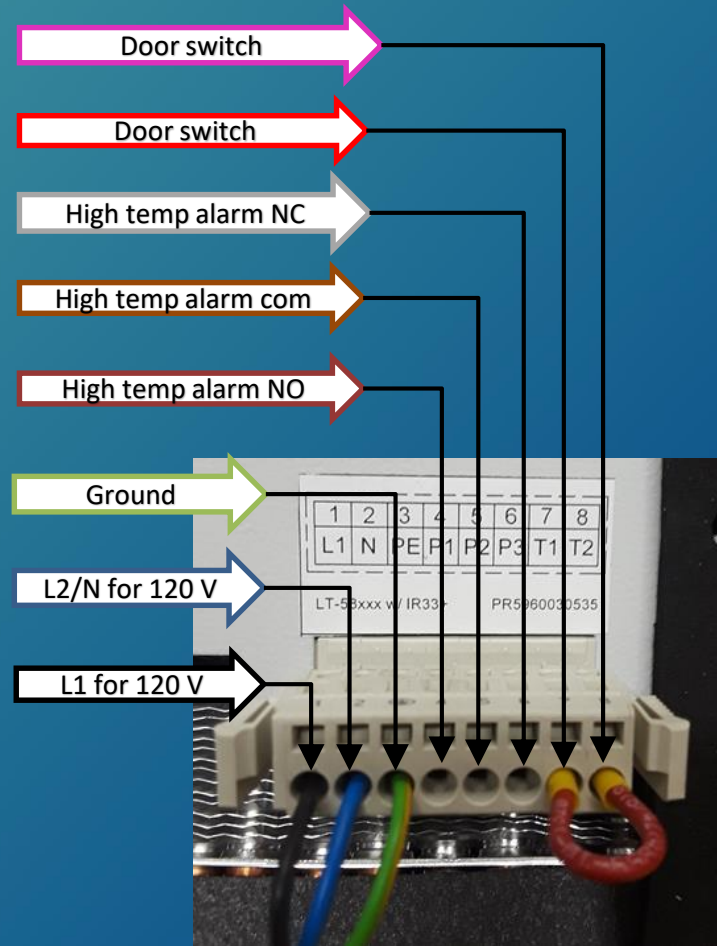
Controller function on the Universal Heat Exchanger

18 W/F and 24 W/F units wire diagram



Part List:

- X1 - 8-Pole Connector
- P1 - Temperature sensor probe
- Ca1 - Capacitor for internal blower
- Ma1 - 8-Pole Connector
- Ma2 - Temperature sensor probe
- Ca2 - Capacitor for ambient blower



Safety

Take care!



General danger

Indicates compulsory safety regulations which are not covered by a specific pictogram such as one of the following.



High electric voltage

Indicates electric shock danger.



Important safety instruction

Indicates instructions for safe maintenance and operation of the unit.



Attention

Indicates possible burns from hot components.



Attention

Indicates possible damage to the unit.



Instruction

Indicates possible danger to the environment.



Transportation
&
Installation

What to do If Heat Exchanger Does not cool

Condition	Cause	Solution
Internal fan does not work	Power not connected.	Verify power supply
Internal fan works, external fan does not work	Enclosure temperature is below setting temperature (St)	Verify values of parameter "St"
	Door switch contact is open	Verify door switch
	Controller does not work	Replace controller
Internal fan works, external fan does not work. Display shows alternating "OFF" and temperature	The sequence of the phases inside the power supply connector is incorrect	Change phases inside power supply connector
External fan does not work	External fan needs to be replaced	Replace external fan

What to do If Heat Exchanger Does not cool

Condition	Cause	Solution
Fans (external and internal) work all the time	Unit cooling undersized	Enclosure needs a bigger cooling unit

Excessive Condensate

Condition	Cause	Solution
Door enclosure open	Ambient air gets into the enclosure	Ensure door is closed, add a door switch and connect it to controller
Door enclosure closed	Enclosure IP degree minimum IP54	Seal openings on enclosure
	Damaged/misplaced sealing strip	Repair strip accordingly

Glossary

AMBIENT The environment surrounding the product. The word Ambient is typically used to describe the temperature, humidity, air cleanliness or quality including dust and possibly any other harsh weather condition.

BLOWER An air moving device typically used to move air against medium to high static pressure systems. Blowers are designed to operate against higher static pressures than fans.

BTU/H British Thermal Unit per Hour is a unit of measure for heat. Heat is also commonly measured in watts: (1 BTU/H = .29 watts)

CLOSED LOOP COOLING is an industry term used to describe a cooling process that reconditions (reuses) the air inside a chamber. The purpose of this system is to prevent contamination from entering the chamber.

CONDENSATION is the process in nature that causes water (condensate) to be removed from the air, and form on a cold surface. This is commonly seen on the outside of a glass of ice water, or dew on grass in the morning.

CORROSIVE ATMOSPHERES Corrosive environments, such as those found in chemical plants and in industries where processes result in harsh chemical by-products, usually preclude the use of filtered ambient air for forced convection cooling.

FILTERS

Filters used with typical electronic equipment cooling devices are usually the viscous-impingement type. They utilize fibers that have been coated with a nondrying, tacky substance which traps particulates as air is drawn through. Usually constructed of aluminum foil, the filters can be cleaned, recoated and re-used indefinitely.

HEAT EXCHANGER is a device designed to transfer heat from one fluid to another

HEAT PIPE is a heat-transfer device that combines the principles of both thermal conductivity and phase transition to efficiently manage the transfer of heat between two solid interfaces.

WATT A unit of measure for electrical power. Watts are also used to quantify the amount of heat in a system, because 1 watt will convert to 3.413 BTU's.