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The most current version of this manual can be found at www.acice.com.
How To Use This Manual
This manual is intended to be a guide to Industrial Climate Engineering’s line of Heat Exchanger (EX Series) Cabinet Climate Control Units. It contains installation, troubleshooting, maintenance, warranty, and application information. The information contained in this manual is to be used by the installer as a guide only. This manual does not supersede or circumvent any applicable national or local codes.

If you are installing the air conditioner first read Chapter 1 and scan the entire manual before beginning the installation as described in Chapter 2. Chapter 1 contains general, descriptive information and provides an overview, which can speed up the installation process and simplify troubleshooting.

If a malfunction occurs, follow this troubleshooting sequence:

1. Make sure you understand how the heat exchanger works (Chapters 1 & 3).
2. Identify and correct installation errors (Chapter 2).
3. Refer to the troubleshooting information (Chapter 4).

If you are still unable to correct the problem, contact the Factory at 1-229-273-9558 for additional assistance.

Please read the following “Important Safety Precautions” before beginning any work.

Important Safety Precautions

1. USE CARE when LIFTING or TRANSPORTING equipment.

2. TRANSPORT the UNIT UPRIGHT. Laying it down on its side may cause the fan to shift in its mounting or damage to other components.

3. TURN ELECTRICAL POWER OFF AT THE breaker or fuse box BEFORE installing or working on the equipment. LINE VOLTAGES ARE HAZARDOUS or LETHAL.

4. OBSERVE and COMPLY with ALL applicable PLUMBING, ELECTRICAL, and BUILDING CODES and ordinances.

5. SERVICE may be performed ONLY by QUALIFIED and EXPERIENCED PERSONS.
   * Wear safety goggles when servicing the refrigeration circuit
   * Beware of hot surfaces on refrigerant circuit components
   * Beware of sharp edges on sheet metal components
   * Use care when recovering or adding refrigerant

6. Use COMMON SENSE - BE SAFETY-CONSCIOUS

This is the safety alert symbol ¡ !. When you see this symbol on the air conditioning unit and in the instruction manuals be alert to the potential for personal injury. Understand the signal word DANGER, WARNING and CAUTION. These words are used to identify levels of the seriousness of the hazard.

<table>
<thead>
<tr>
<th>DANGER</th>
<th>Failure to comply will result in death or severe personal injury and/or property damage.</th>
</tr>
</thead>
<tbody>
<tr>
<td>WARNING</td>
<td>Failure to comply could result in death or severe personal injury and/or property damage.</td>
</tr>
<tr>
<td>CAUTION</td>
<td>Failure to comply could result in minor personal injury and/or property damage.</td>
</tr>
<tr>
<td>IMPORTANT</td>
<td>Used to point out helpful suggestions that will result in improved installation, reliability or operation.</td>
</tr>
</tbody>
</table>
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Chapter 1: Description & Specifications

1.1 Foreword

Note: All operation of this unit shall be performed by qualified persons such as engineers and technicians.

This manual shall only be used as the guide for the installation and operation of the ICE EX Series Cabinet Climate Control Units. It introduces the installation, operation and regular maintenance of the unit.

1.2 General Description

The EX Series heat exchanger is designed for outdoor telecommunication or control cabinets. It is designed for easy installation and reliable operation. The heat exchanger can be operated immediately after installation. And the output can be automatically adjusted when internal heat load changes, any fault can be read remotely through the RS485 interface monitoring system.

The EX Series heat exchanger works as shown in Figure 1, the unit’s internal loop draws heated air from upper opening, the heat dissipated to the outside air in the heat exchanger. The external loop draws cold air from lower end and discharges the hot air from the upper opening.

![Figure 1. Functional Diagram](image)

**IMPORTANT**

The air conditioner shall be kept vertically strictly in accordance with the instructions on the package during transportation, storage and use.

**Power Input**

DC input power: The normal operating voltage is -40 ~ -58V, The unit can be safely operated between -38 ~ -60V.

AC input power: The normal operating voltage is 187~242V (50/60Hz), The unit can be safely operated between 154~286V (50/60Hz).

**Note:** Please refer to the unit data label for the power input.

**Application limitation**

Ambient temperature: -40°F~158°F (-40°C~70°C)
1.3 Features

- High reliability
- Intelligent control
- Frequency regulated and energy-saving.
- Dry contact and RS485 intelligent communication interface

1.4 Standards

<table>
<thead>
<tr>
<th>Standard</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEC61000-4</td>
<td>Electromagnetic Compatibility</td>
</tr>
<tr>
<td>IEC335-1</td>
<td>Safety of household appliances or similar electric appliance</td>
</tr>
<tr>
<td>GB4798.1</td>
<td>Environmental conditions existing in the application of electric and electronic product – Storage</td>
</tr>
<tr>
<td>GB4798.2</td>
<td>Environmental conditions existing in the application of electric and electronic product – Transportation</td>
</tr>
<tr>
<td>GB4798.3</td>
<td>Environmental conditions existing in the application of electric and electronic product – Use</td>
</tr>
<tr>
<td>CE</td>
<td>Third-party certification</td>
</tr>
</tbody>
</table>

Table 1. Applicable standards of products

Chapter 2: Installation & Operation

2.1 Unpacking and Inspection

All of the EX series heat exchangers are carefully packaged for shipping and storage. Unpack the carton and remove the unit from the shipping materials. Check the packing list to ensure all parts and components are present.

Note:

1. Please check for any damage to the packaging and units; if any is present, make a note and inform Industrial Climate Engineering together with the bar code number on the package within 7 days.
2. If the product will not be immediately installed or is to be forwarded to its final destination, re-pack the unit and store it in a safe place.
3. As an environment concern, we recommend that all shipping cartons be recycled.

2.2 Preparation Before Installing

The cabinet should have filters for the external loop to prevent the dust from entering the heat exchanger.

The external loop’s suction and discharging opening should be isolated. If the suction and discharging air is short circuited, heat dissipation capability will reduced significantly.

The opening area of the cabinet should be at least 1.5 times of the heat exchanger’s inlet and outlet opening area and directed toward the heat exchanger’s opening.

During normal operation, the heat exchanger’s external loop will draw in small amounts of water. This water can be discharged from the heat exchanger by a drainage pipe. If the heat exchanger is mounted inside the cabinet, the drainage pipe should be designed carefully, and the pipe should not be twisted. And when the pipe is exposed to ambient lower than 32°F (0°C), care should be taken to prevent the pipe from freezing.
2.3 Mechanical Installation of the Heat Exchanger

Do not press on the heat exchanger cooling fins during installation - this will damage them. If the heat exchanger fins are damaged, repair them before moving it. The mounting flange is factory installed. Ensure the waterproofing seal is in place before installing the unit.

2.4 Electrical Installation

The electrical installation of the air conditioner includes:

- Connecting the power cables
- Connecting the communication & alarm output cables

<table>
<thead>
<tr>
<th>IMPORTANT</th>
</tr>
</thead>
<tbody>
<tr>
<td>All the electrical connections should comply with the standards of the national and local electrical codes. Please disconnect all the power supplies for the air conditioner before the installation.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WARNING FIRE HAZARD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improper adjustment, alteration, service, maintenance or installation could cause serious injury, death and/or property damage.</td>
</tr>
<tr>
<td>Installation or repairs made by unqualified persons could result in hazards to you and others. Installation MUST conform with local codes or, in the absence of local codes, with codes of all governmental authorities have jurisdiction.</td>
</tr>
<tr>
<td>The information contained in this manual is intended for use by a qualified service agency that is experienced in such work, is familiar with all precautions and safety procedures required in such work, and is equipped with the proper tools and test instruments.</td>
</tr>
</tbody>
</table>

The power connection should match the marking on the wiring. It is recommended that the input circuit breaker be at least 16A. Some models’ temperature sensor is externally located. Check to be sure the wiring input is correct and securely connected.

2.5 Power Input Cables

<table>
<thead>
<tr>
<th>IMPORTANT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Please refer to the specific wiring definition mark on the unit.</td>
</tr>
</tbody>
</table>

**AC Power Input:**

If the unit needs AC input, will be an external AC input L, N, PE terminals access to the corresponding position, as shown in Figure 2.1, please be sure to connect power supply in accordance with instructions.

Figure 2. AC Power Input Wiring Diagram
**DC Power input:**
If the unit using -48V DC power input, the connection diagram is shown in Figure 2.2. Please be sure to connect power supply in accordance with instructions.

![Figure 3. DC Power Input Wiring Diagram](image)

### 2.6 Monitoring

**IMPORTANT**

Please refer to the specific wiring definition mark on the unit.

The heat exchanger provides normally open or normally closed alarm output dry contacts, when the high temperature alarm, low temperature alarm, sensor failure alarm, fan failure alarm and other faults are triggered, the output’s status changes.

For detailed information please check the table 2.1 9PIN terminal definitions.

**Monitoring Output:**
The RS485 monitoring connector definition is following

<table>
<thead>
<tr>
<th>Pin</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>RS485+</td>
<td>RS485 communication ports (+) (upstream equipment monitoring interface)</td>
</tr>
<tr>
<td>RS485-</td>
<td>RS485 communication ports (-) (upstream equipment monitoring interface)</td>
</tr>
<tr>
<td>4</td>
<td>GND</td>
</tr>
<tr>
<td>3</td>
<td>Door open alarm (Optional)/Hydrogen discharging/emergency fan contact input (Optional)</td>
</tr>
<tr>
<td>2</td>
<td>Hydrogen discharging/emergency fan alarm dry contact NC (Optional)</td>
</tr>
<tr>
<td>1</td>
<td>Hydrogen discharging/emergency fan alarm dry contact COM (Optional)</td>
</tr>
<tr>
<td>NC</td>
<td>Public alarm dry nod (NC)</td>
</tr>
<tr>
<td>COM</td>
<td>Public alarm dry nod (COM)</td>
</tr>
<tr>
<td>NO</td>
<td>Public alarm dry nod (NO)</td>
</tr>
</tbody>
</table>

**Table 2**

9PIN Connection Interface

![Figure 4. 9PIN Connection Interface](image)

### 2.7 Hydrogen Discharge/Emergency Fan Connection (optional)
**Notice:** Contact capacity: max load 2A@48VDC.

Hydrogen discharge / emergency fan (DC input) connection interface diagram;
2.8 Installation Checklist

Use the following checklist when the electrical connections and the heat exchanger installation are completed.

1. Check the packing list to ensure no parts are missing.
2. No apparent obstacles near the interior and exterior air flow passages.
3. The heat exchanger is vertically mounted and all the mounting bolts are tightened.
4. Drainpipe is clear of obstructions.
5. Power input is reliable and correctly connected.
6. Alarm output is securely connected.
7. The input voltage is within the acceptable range.
8. Fan runs freely, with no abnormal noise.

2.9 Startup

After completing the Installation Checklist, the heat exchanger is ready for operation. Close the circuit breaker and the unit will automatically begin operating. When the temperature inside the cabinet rises above the preset value, the external fan will increase to maximum speed.

Chapter 3: Operation

3.1 Function

The heat exchanger factory settings may be different from the default setting; the heat exchanger is automatically controlled by interior temperature of the cabinet, the controller measures the interior return temperature, compares it with the setting value, then adjust the inner loop or outer loop fan speed to achieve the most reasonable energy-efficient state of operation.

3.2 Operating control mode

3.2.1 Cooling Control

After power is applied, the inner fan will delay start. When inner temperature is above 77°F (25°C) and the internal temperature is higher than outside temperature it stops when the internal temperature is below 75°F (24°C).

Note: The inner temperature is the temperature of return air heat exchanger cabinet.
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Default Value</th>
<th>Setting Range</th>
<th>Units</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refrigeration Point</td>
<td>25</td>
<td>[15 ~ 50]</td>
<td>ºC</td>
<td>External fan stop point</td>
</tr>
<tr>
<td>CoolΔT</td>
<td>10</td>
<td>[6 ~ 30]</td>
<td>ºC</td>
<td>External fan setting range</td>
</tr>
</tbody>
</table>

Table 3. Cooling Set Point Parameters

3.2.2 Heating Control
Heating startup point = Heating on point - Heating sensitivity. In order to protect the internal equipment, when the internal temperature below the heating on setting point, the unit begins heating, when the cabinet temperature is higher than heating off point, heater stops operating.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Default Value</th>
<th>Setting Range</th>
<th>Units</th>
<th>Set Point Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heating On Point</td>
<td>15</td>
<td>[10 ~ 20]</td>
<td>ºC</td>
<td>The temperature point of the heating stop.</td>
</tr>
</tbody>
</table>

Table 4. Heating Set Point Parameters

3.3 Alarms
The Heat exchanger provides the following alarm information; monitoring software can see the detailed alarm information, some models are equipped with warning lights outside the unit.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Default Value</th>
<th>Setting Range</th>
<th>Units</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Temperature Alarm</td>
<td>0</td>
<td>[-25 ~ 15]</td>
<td>ºC</td>
<td>The temperature point of the Low Temperature alarm.</td>
</tr>
</tbody>
</table>

Table 5. Alarm Parameter Settings

3.4 Hydrogen Discharging/Emergency Fan (Optional)
The hydrogen discharging/emergency fan will provide automatic-cycle hydrogen discharging according to the requirements of the environment inside the cabinet. The interval between each automatic cycle hydrogen discharging is 24 hours (adjustable) and the discharging time is 5 minutes (adjustable).

When the cabinet is over-temperature, a system failure occurs, or the external temperature is low, the hydrogen discharging/emergency fan will be started to provide forced ventilation.

3.5 Monitoring
The Heat exchanger is supplied with a RS485 control interface offers a variety of information output. For detailed information, please refer to the protocol list.

If you need to adjust the set point, you can connect heat exchanger and computer with RS485 ports, through the background monitoring software or handheld monitor to make changes.

Note: To prevent unauthorized setting changes, make sure only qualified people are permitted access.
3.6 Self-Test

The unit provides the self testing function for the onsite test. The self testing procedures are as follows:

1. The indoor fan speed 50% run 30 seconds.
2. The indoor fan speed 100% run 30 seconds.
3. The external fan speed 50% run 30 seconds.
4. The external fan speed 100% run 30 seconds.
5. The external fan stops, if the optional electric heating, electric heating operates for 2 minutes.
6. Electric heating stops for 10 seconds, if the unit is equipped with the optional emergency fan, the fan will run for 1 minute.
7. The unit then returns to normal operation.

3.7 Operational Menu Structure

The unit controller utilizes a 96x32 LCD, which contains 7 buttons for adjusting the settings. The operation interface is as shown in the following figure.

![Figure 6. Control Interface](image_url)

**ON/OFF:** **ON/OFF** Button, (long press this button, about 4s) this can be used to turn on/off the unit.

- **Up** Button, which is used to select the previous record/menu or increase the setting value (password only).
- **Down** button, which is used to select the next record/menu or decrease the setting value (password only).
- **Left** button, which is used to increase the setting value during the parameter setting or select the previous bit of the data during the password setting.
- **Right** button, which is used to decrease the setting value during the parameter setting or select the next bit of the data during the password setting.

**ENTER:** **ENTER** button, which is used to confirm the entry.

**ESC:** Quit button, which is used to return to the previous page menu.

If there is no keyboard operation for a continuous 60 seconds, it will automatically return to the normal display interface.

When any button is pressed after the system is powered up, the backlight will turn on. If there is no keyboard operation for a continuous 60 seconds, the backlight will turn off.
The factory default operation password of the unit is “0001”. To change it, press ENTER on the normal display interface to enter the password input interface, press the LEFT button or RIGHT button to select the digits to change, and press the UP/DOWN button to change the relevant digits, and finally press ENTER button to confirm the change.

If the password is incorrect, the interface will display an error message, and the unit setting cannot be changed. If the password is correct, you can enter the main menu and edit the unit setting.

**Note:** The above diagram is unit menu structure, not the factory setting.

### Chapter 4: Maintenance

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**WARNING**

All maintenance shall be performed by qualified persons. Always disconnect the power, communication and alarm output cables from the heat exchanger before any maintenance and do not reconnect them until the maintenance is completed.

To maintain full performance of a heat exchanger operating in a harsh environment, preventative maintenance should performed every six months.

**Note:** Make sure all the power input is shutoff before any maintenance work is done.

**Tool lists:**

1. Air compressor or a dedicated clean water gun
2. Brush
3. Cleaning towels
4. Screw driver

#### 4.1 Filter

This heat exchanger has no filters; the cabinet provides air filtration. Any debris blocking the openings will reduce air into the heat exchanger, thereby reducing its performance.
4.2 Fan

If a fan fails, the fan can be replaced after dismounting the service panel. Using only Industrial Climate Engineering spare parts to prevent any incompatibilities. Check the weather seals after replacing the fan.

Service procedure:
1. Make sure all the power have been disconnected;
2. Dismantle the connector panel;
3. Dismantle the inner fan service panel;
4. Disconnect the connector of the fan; dismantle the fan with the frame;
5. Reverse the 2 and 3 steps to mount the new fan.

4.3 Controller

If the controller fails, ask for Industrial Climate Engineering’s standard spare parts, after dismantling the service panel, the control board can be reached. Check the weather seals after replacing the controller.

Service procedure:
1. Make sure all the power have been disconnected
2. Dismantle the inner fan
3. Disconnect the wiring of the controller
4. Dismantle the controller
5. Reverse the steps 2, 3,4 to mount the new controller

4.4 Heater (Optional)

If the heater fails, please contact Industrial Climate Engineering to order replacement parts. Remove the installation of panels and fans; you can easily remove the fault heater. Check the weather seals after replacing the heater.

In accordance with the following steps to replace the heater:
1. Be sure to close all of the circuit breakers
2. In accordance with instructions in section 4.2, remove the fan components
3. Remove heater wiring
4. Removal of the fixed heater screw
5. Follow the steps to the opposite of 2, 3, 4 steps to install a new heater and reinstall the interior fan.

4.5 Heat Exchanger

If the heat exchanger is exposed to dirty ambient air, Use compressed air or clean water to clean the heat exchanger, Note that before cleaning you must confirm that heater power has been disconnected.
4.6 Maintenance Checklist

Date: __________________________ Maintenance Technician: ________________________

Equipment Type: _______________ Equipment Serial Number: _______________________

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
<th>Result</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Input voltage is normal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Sensor location is reasonable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Filter is not dirty</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>heat exchanger is not dirty</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Check whether there are loose all the lines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Unit have no abnormal noise</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Fan have no unusual noise</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Drainpipe is not dirty block</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 6. Maintenance Checklist

4.7 Disposal

DISPOSAL: Properly dispose of this product.

Chapter 5: Troubleshooting

5.1 Troubleshooting Guide

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Possible Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit Doesn’t Start</td>
<td>Power supply failure</td>
<td>Check the external input power supply</td>
</tr>
<tr>
<td></td>
<td>Terminal is loose</td>
<td>Check whether the connecting terminal is loose.</td>
</tr>
<tr>
<td></td>
<td>Power failure</td>
<td>Check the DC input power voltage.</td>
</tr>
<tr>
<td>Fan Abnormalities</td>
<td>Power failure</td>
<td>Check for loose wiring</td>
</tr>
<tr>
<td></td>
<td>Incorrect DC wiring</td>
<td>Check the power input</td>
</tr>
<tr>
<td></td>
<td>High voltage</td>
<td>Check the voltage</td>
</tr>
<tr>
<td></td>
<td>Bearing</td>
<td>Replace the fan</td>
</tr>
<tr>
<td>Not Heating</td>
<td>Fuse triggered</td>
<td>Check the fuse</td>
</tr>
<tr>
<td></td>
<td>No power</td>
<td>Check input power</td>
</tr>
<tr>
<td></td>
<td>Heater failure</td>
<td>Replace heater</td>
</tr>
</tbody>
</table>

Table 7. Troubleshooting Guide
Chapter 6: Technical Parameters

6.1 EX04CDHC1A Dimensional Drawings

FRONT VIEW

ISOMETRIC VIEW

TOP VIEW

REAR VIEW

SIDE VIEW
6.2 EX08CDHC1C Dimensional Drawings

TOP VIEW

ISOMETRIC VIEW

FRONT VIEW

SIDE VIEW

REAR VIEW

Mounting screws M5x12
Heat Exchanger

Adhesive gasket
DOOR

RETURN

AIR

SUPPLY

AIR
6.3 EX12CDHC1B Dimensional Drawings

**TOP VIEW**

**ISOMETRIC VIEW**

**FRONT VIEW**

**SIDE VIEW**

**REAR VIEW**

- Mounting screws M5X12
- Heat Exchanger
- Adhesive gasket
- Door

**Dimensions:**
- 4 1/8" (105)
- 7 5/8" (194)
- 14 15/16" (380)
- 18 13/32" (468)
- 2 15/32" (75)
- 11 23/32" (298)
- 7 5/16" (440)
- 24 7/8" (632)
- 7 7/8" (200)
- 1 3/8" (35)
- 30 13/16" (783)
- 15 1/32" (382)
- 19" (483)
- 11 23/32" (298)
- 2 5/16" (55)
- 4 25/32" (122)
- 4 3/4" (121)
- 29 3/8" (746)
- 9 9/32" (236)
- 2 1/32" (52)
- 3 23/32" (95)
- 123x379
- 24 - 7/32" x 3/8" (5x10)

**Notes:**
- FRONT VIEW, TOP VIEW, ISOMETRIC VIEW, SIDE VIEW, REAR VIEW
- Mounting screws M5X12
- Heat Exchanger
- Adhesive gasket
- Door
6.4 EX18CDHC1A Dimensional Drawings