# Specification and Manual

Customer: _____

Description:   Air Conditioner for Equipment

Customer Part No.: _____    Rev.: _____

Delta Model No.:     HEC1000AFR           Rev.:    X00

Sample Date Code: _____

Sample Issue Date: _____

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Please send one copy of this specification back after you signed approval for production pre-arrangement

Approved by: _____

Date: _____

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DELTA ELECTRONICS, INC.

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Part no.:
Delta model no.: HEC1000AFR

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Part no.:

Delta model no.: HEC1000AFR

## Description

This document is an installation and the characteristics of Delta HEC series. Before installing the unit, please read this manual thoroughly, and following the instructions contained in it. The document is the exclusive property of Delta Electronics, Inc. it should not be distributed, reproduced, or any other format without prior permission of Delta. Specifications are subject to change without notice.

## Packing & Shipping

During handling or transport, air conditioner must be kept in upward position, "**NOT**" inverted, flat, or subject to excessive tilt and collision. The air conditioner is a precision instrument; it should be handled and transported with care.   Do not stand on the box, or place heavy objects on top of the box. Pay attention to the below icons on the package.

If air conditioner is toppled, slanted or dropped, follow these steps: a. stand unit up for 12 hours to ensure refrigerant pressure stability, b. power on the unit and execute self-test to make sure no alarm condition, c. keep the air conditioner running for 1 hour to make sure there is no abnormal acoustic noise.

## Safety Notes

Please read the safety notes carefully before installing the air conditioner, and be sure to install it correctly. After completing installation, check that the unit operates properly during start-up operation.

Meaning of WARNING and CAUTION notices:

⚠ **Warning**:

Failure to follow these instructions properly may result in personal injury or loss of life.

⚠ **Caution**:

Failure to observe these instructions properly may result in property damage or personal injury, which may be serious depending on the circumstance.

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⚠ **Warning**:

1.    Installation work and electrical wiring should be done only by qualified personnel in accordance with all applicable codes, standards and national wiring regulations.

2.    Use this unit only in the manner intended by the manufacturer. If you have questions, please contact the manufacturer.

3.    Install the air conditioner in accordance with the instructions in this installation manual. Improper installation may result in water leakage, electric shock or fire.

4.    Make sure that all wiring is secured, that specified wires are used, and there is no strain on the terminal connections or wires.

5.    If refrigerant gas leaks during installation, ventilate the area immediately. Do not directly touch refrigerant that has leaked from refrigerant pipes or other areas, as there is a danger of frostbite.

6.    Before serving or cleaning unit, switch power off and disconnect power supply.

7.    When cutting or drilling into wall or ceiling, do not damage electrical wiring or hidden utilities.

8.    Be sure to use only the specified accessories and parts to complete installation.

9.    Protective grounding connection: The enclosure must be grounded at the protective ground terminal. Use 1.5 mm$^2$ (18AWG) wire and use spring washer to avoid loosening.

10.   The air conditioner should not be accessible to the general public.

11.   The installation must contain a device to disconnect all poles of the air conditioner from the power supply. The contact distance in all poles must be 3 mm minimum.

12.   To reduce the risk of electrical shock: Means for disconnection must be incorporated in the fixed wiring in accordance with the wiring rules.

13.   This appliance is intended for use only by qualified personnel.

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## ⚠ **Caution** :

1. Install the air conditioner on a wall or door strong enough to withstand the weight of the unit.

2. Do not allow a child to mount onto the outdoor unit. Avoid placing any object on it.

3. Do not block the air inlets or exits.

4. Do not install the air conditioner at any place where there is a danger or flammable gas leakage.

5. Arrange the drain to ensure complete drainage.

6. To avoid injury, do not touch the air inlet or aluminum fins of the unit.

7. Watch your step at the time of fin cleaning or air conditioner inspection.

8. Do not topple the air conditioner while moving or in storage.

9. The hole in the bottom of the air conditioner should be connected to a sealed container through a drain pipe.

10. This appliance is not to be used by any persons with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given proper supervision or instruction.

11. Children should be prevented from playing with the appliance.

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## Specification for Approval

Customer :

Description : Air conditioner for Equipment with 1000 W Rated Cooling Capacity

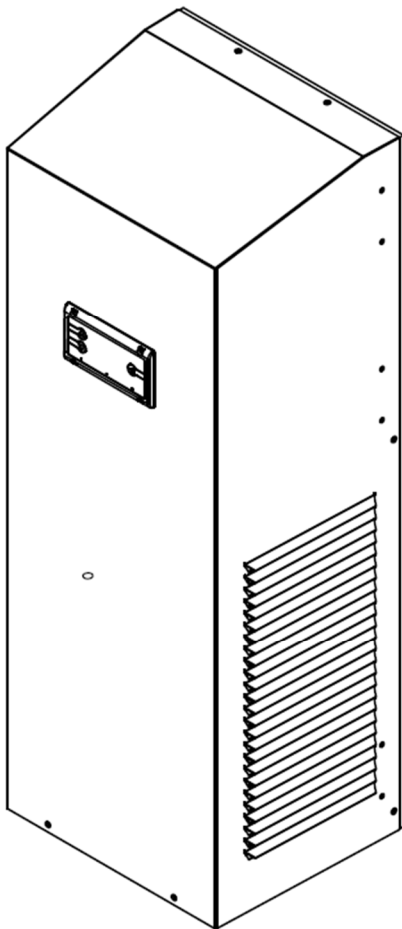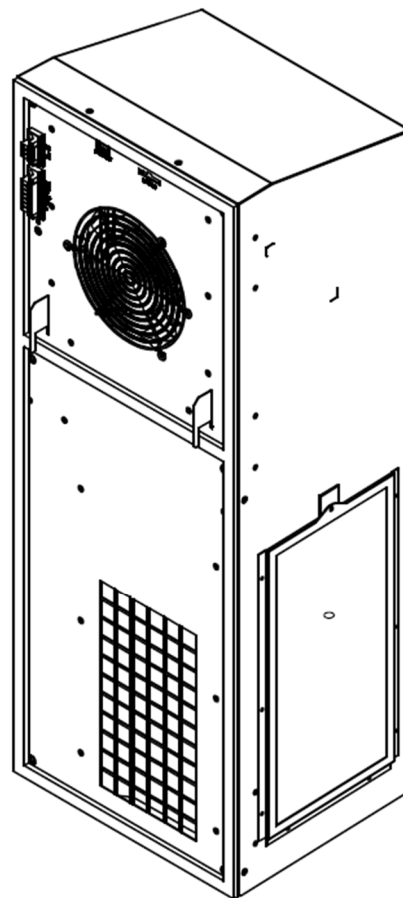| Customer P/N : | Rev. : |
| --- | --- |
| Delta model no. : HEC1000AFR | Rev. : 00 |
| Sample revision. : | Date Code : |
| Sample issue date : | Quantity :1 pc |

EXTERNAL                    INTERNAL

Part no.:

Delta model no.: HEC1000AFR

# 1. Product Instruction

## 1-1. General Description

HEC1000AFR is a AC air conditioner with 115VAC power input, it is designed for NEMA4X sealed outdoor telecom cabinet to provide stable and optimum internal conditions for equipment and avoid hotspot inside the cabinet.

HEC X1 A F R
(1) (2) (3) (4) (5)

| No | Item | Digit | Specification |
|---|---|---|---|
| (1) | Product Message | HEC | Compressor Air Conditioner |
| (2) | Cooling Capacity | X1 | X1=1000 |
| (3) | Operation Voltage | A | AC 115V for door |
| (4) | Air condition type | F | F= Fix speed |
| (5) | Product Version | R | N/A |

## 1-2. Main Feature & Model Number

| Dimensions, Weight & Mounting method | | |
|---|---|---|
| Dimension (H x W x D) (Body only) | mm (inch) | 810 x 299 x 240 (32" x 11.8" x 9.5") |
| Application | | Indoor / Outdoor |
| Weight | Kg (lbs) | 27.0(50.7) |
| Mounting Method | | Side mount |
| Color (optional) | | NA |
| Environmental Protection & Performance | | |
| Operating Temperature Range | °C (°F) | -10 to +55 ( 14 to +131) |
| Operating Humidity | | External: 0~100% RH Internal: 0~80% RH |
| Storage Temperature | °C (°F) | -40 to +70 (-40 to +158) |
| Storage Relative Humidity | RH | 5~95% |
| Refrigerant | | R134a, 280±10 g |
| Protection for Dust ,Wind and Water (External) | IEC 60529 /NEMA | UL 50E TYPE4X |
| Noise (1.0m) | dB-A | 65 |
| Operating Status | N/A | LED Indicator / Display Board |
| Cooling Capacity & Operational Data | | |
| Cooling Capacity at L35/L35 (50/60HZ) | W (Btu/hr) | 850(2672)/1000(3143) |
| Cooling Current at L35/L35(50/60Hz)* | A | 5.1/ 4.2 |
| Power & Range | | |
| Input Voltage | VAC/Phase/Frequency | 110/50/1,115/60/1 |

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| Input Voltage Range | VAC | 103~121/50Hz,105~127/60Hz |
|---|---|---|
| Locked Rotor Current (60Hz) | A | 15.9 |
| Rated Current | A | 6.4 |
| Minimum circuit ampacity (MCA) | A | 7.0 |
| Maximum rating of overcurrent protective device (MOP) | A | 11.7 |
| Alarm | N/A | Dry Contact Output |
| Key Components | | |
| Controller | | Built-in Smart Controller |
| Fans | | Delta High Efficiency Fans |
| Compressor | | Rotary |

*Followed thermal balancing test of DIN3168
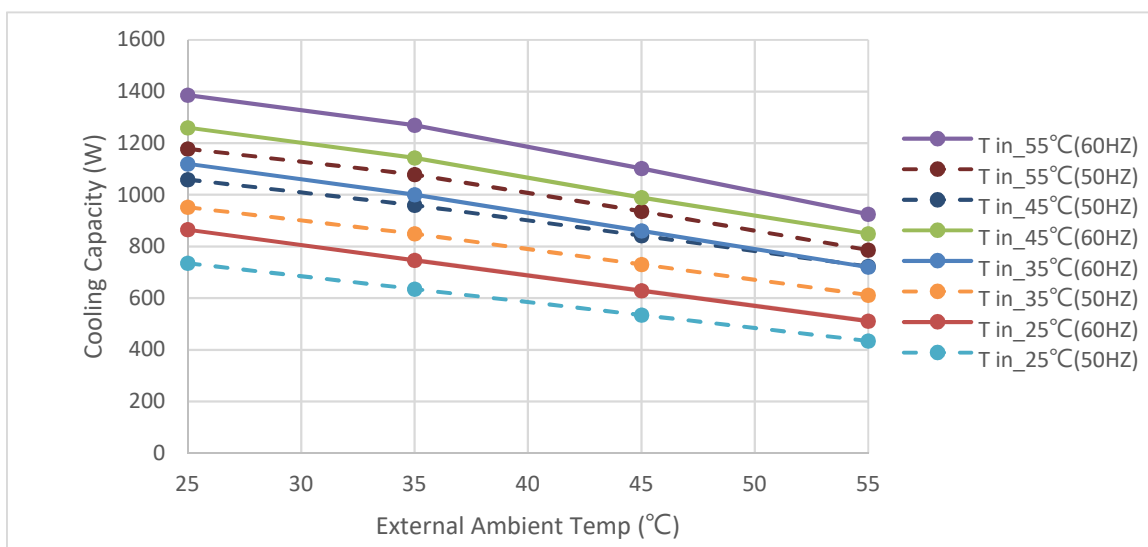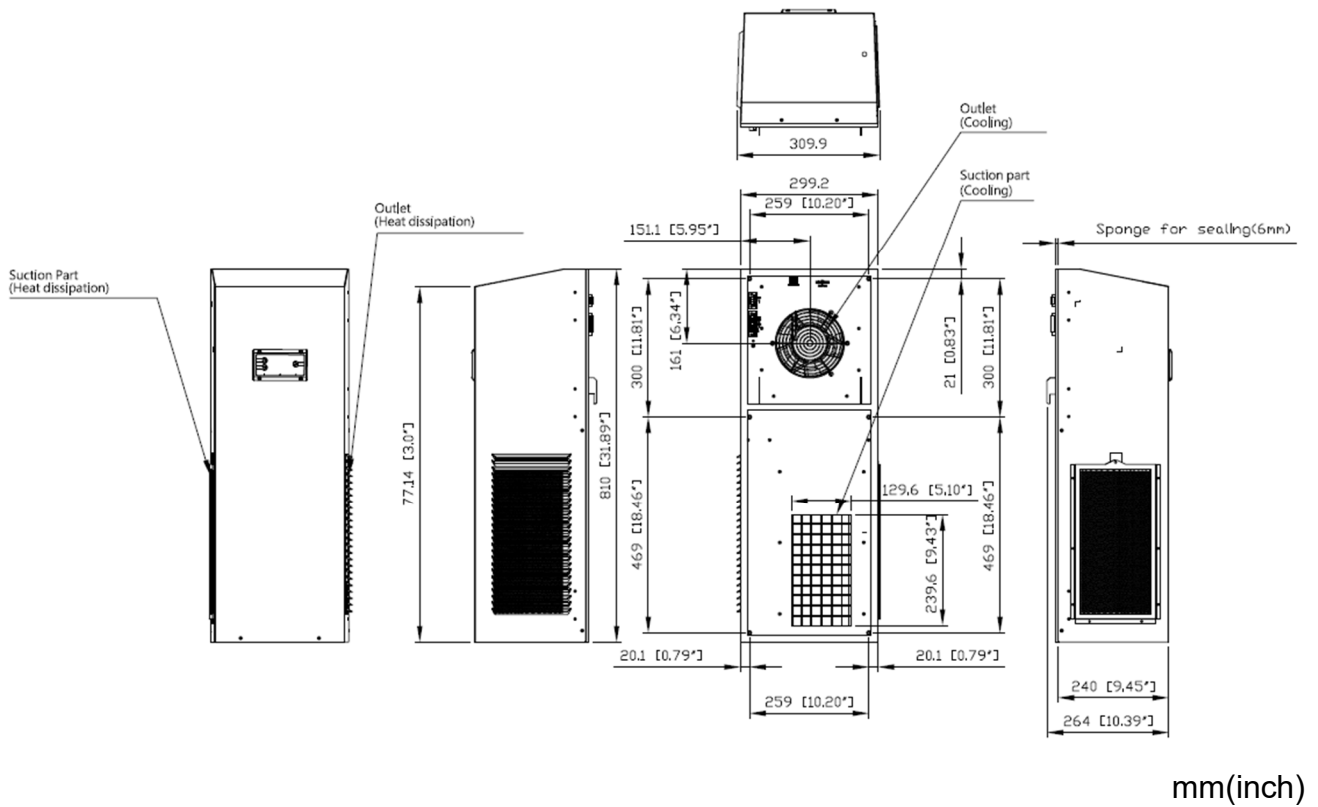


**Cooling Capacity with Varied Temperature**
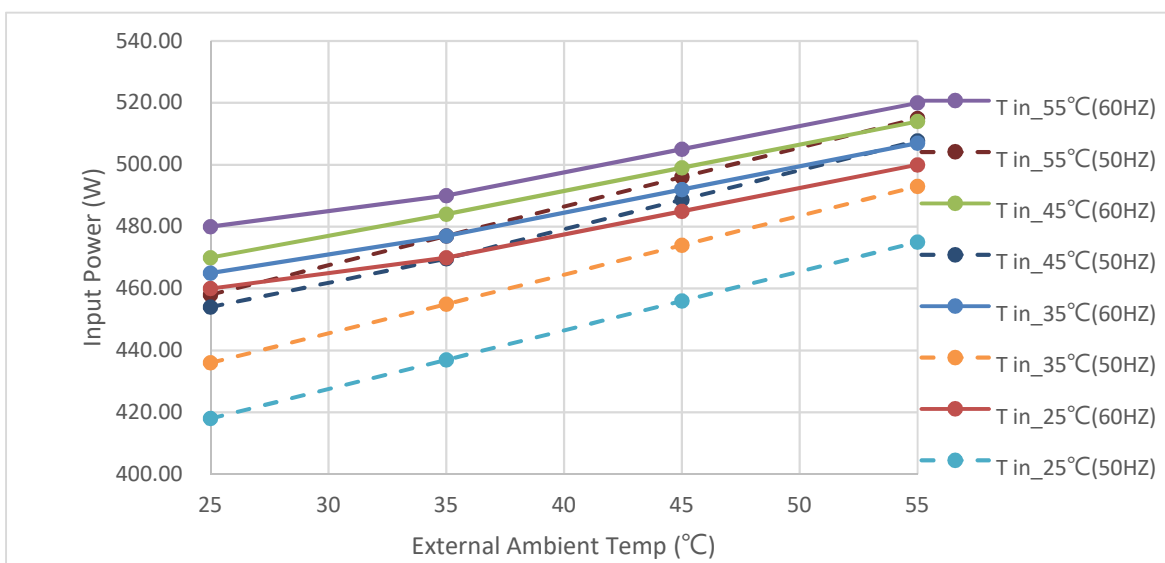


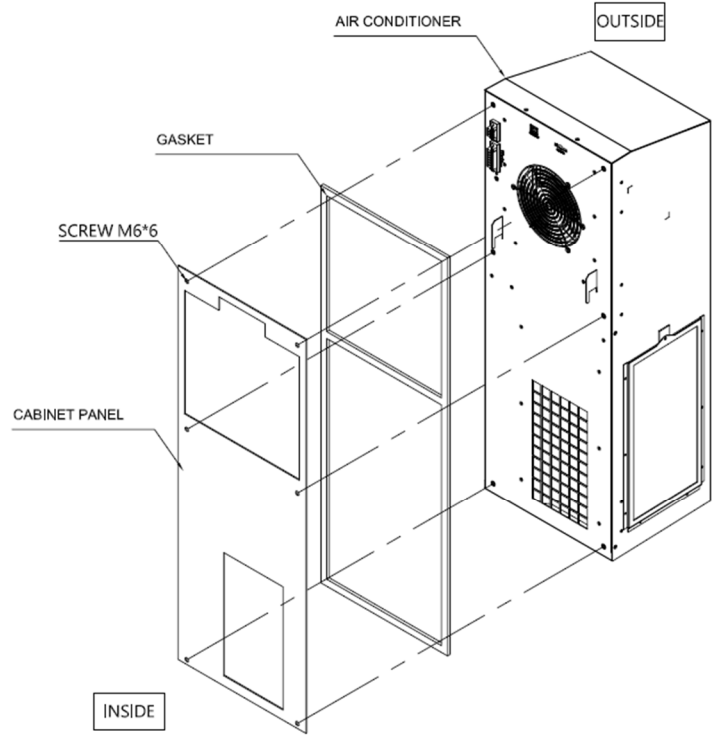**Power Consumption with Varied Temperature**

## 1-3. Dimension



mm(inch)
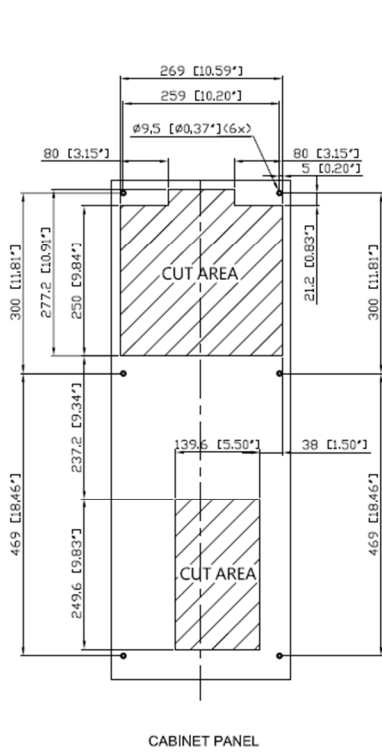
   (1) Material: SUS 304

   (2) Finish: N/A

   (3) Color: N/A

   (4) Dimension tolerance: ± 1.0mm

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## 1-4. Mounting plane Cutout



CABINET PANEL

mm (inch)

## 1-5. Configuration & Maintenance

Make sure the air conditioner surface sealed with mounting flange to avoid water penetrates into shelter through mounting interface. It is suggested to use gaskets sticking on the mounting flange and seal the gap between flange and cabinet with silicone gel during installation. There should be **NO** any gap surround gaskets to avoid water penetrates into enclosure.

The air conditioner is composed as the following key components: they are chassis, cover, controller, heat exchanger, blowers and compressor etc. It is "**not**" recommended that the user replace the compressor, evaporator, and the condenser by themselves; it may damage the system and getting injured.
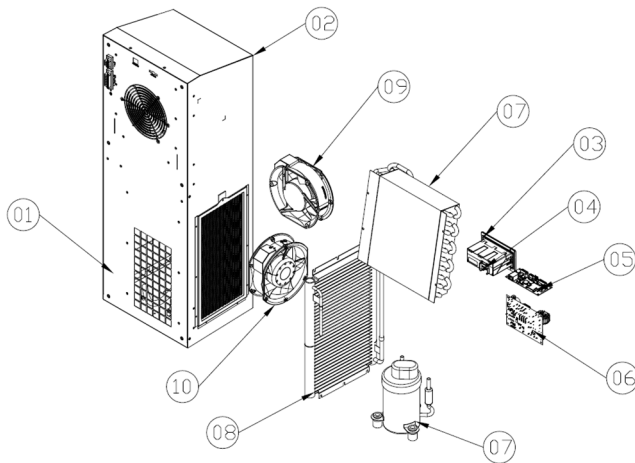


| NO. | Q'TY | DESCRIPTION |
|-----|------|-------------|
| 1 | 1 | Case Chassis |
| 2 | 1 | Case Cover |
| 3 | 1 | Display Board |
| 4 | 1 | Driver Board |
| 5 | 1 | Remote Control Board |
| 6 | 1 | Compressor |
| 7 | 1 | Condenser |
| 8 | 1 | Evaporator |
| 9 | 1 | External Fan |
| 10 | 1 | Internal Fan |

In order to assure the air conditioner running at optimal condition, the condenser should be cleaned once annually at least; user can clean the condenser with water directly. The external side fan blade can also be cleaned with normal pressure water if there is dust accumulation. Please do not use strong water jet to impact the center of fan and the surface of condenser.

The bottom hole of the air conditioner should be connected to a sealed container through a drainpipe, please clear drain holes when the maintenance. Please also notice that:

1. Check wires are connected correctly, and the insulation is not cracking or broken.

2. Use Self-test to check the unit running correctly or not. And the supplied air of internal side should be as cooled air.

3. Do not wipe the product with organic solvent, volatile substances like toluene or gasoline, it will destroy the powder-coated surface.

4. Turn off the power before maintaining.

5. Please turn off power and remove dry contact connector while non-operating for a long time.

6. If any abnormal acoustic noise from air conditioner happened, please turn off the product and contact with customer services.

7. The refrigerant is environmental friendly product of R134a. Little refrigerant leakage (< 5 g/ year) is allowed for application. If refrigerant leakage seriously, please turn off the power and wait for at least 2 hours to make sure the refrigerant fully exhaust. Please also contact the services to replace spare parts.

8. The compressor electrical protecting cover is sealed with silicon for IP54 requirement. Please do not dismantle the sealed cover or will lose the quality assurance of the compressor.

## 1-6. Thermal and Airflow

Internal and external air flow circulation is shown in below diagram. Counter flow design prevents mixing of internal and external air flows, but waste heat can still be dissipated from cabinet to the ambient outside air. An internal temperature sensor has been placed in the return air stream to provide reliable temperature measurement, and for safe operation.

The heated air inside the cabinet will be cooled by the evaporator. Waste heat absorbed by the refrigerant will be dissipated through the condenser at the external side.
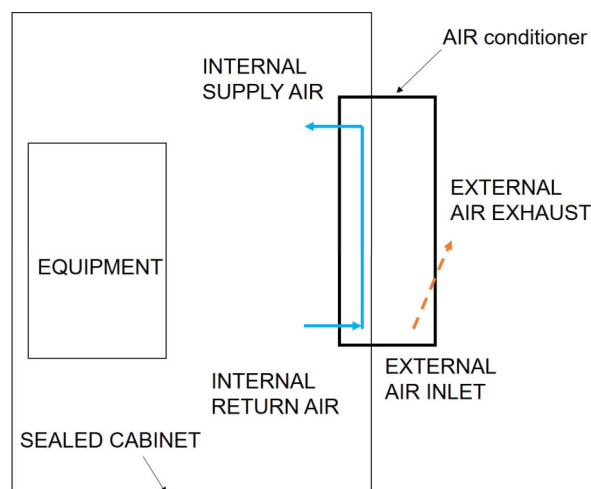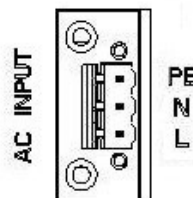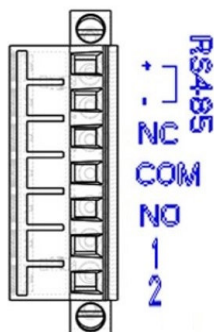
## 2. Electrical Specification

➢ **Power Supply & Alarm Connector & Indicator**

(1) AC Power Connect：

| Pin | Description | Cable wire size |
|-----|-------------|-----------------|
| 1 | PE | 16 AWG |
| 2 | N | 16 AWG |
| 3 | L | 16 AWG |

(2) RS485 and J1 Connect：

| J1 Pin Name | Description |
|-------------|-------------|
| RS485 + | RS485 Communication |
| RS485 - | RS485 Communication |
| NC | Dry Output NC |
| COM | Dry Output COM |
| NO | Dry Output NO |
| 1 | Door open alarm input |
| 2 | Door open alarm input |

➢ System Alarm Default Setup
  • Specification: Contact rating: 2A@30 VDC / 2A@250 VAC

- Normal: NC and COM dry contact output close

- Alarms happening: NC and COM dry contact output open

(Dry Contact will trigger when alarm happen except E2.6 and E5.1)

(3) Panel operation：

- A: Display:

| | |
|---|---|
| [7-seg] | 7-Segment Display |
| ⊙ STATUS | Status LED |
| ↑ | Up |
| ↓ | Down |
| ↵ | Parametric Setup |
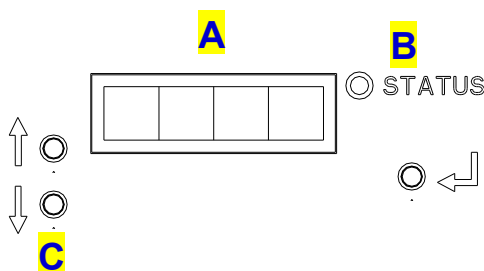
It will show the temperature inside the cabinet and system parametric setup.

- B: LED indicator:

❖ When the system power on and the LED will light in green.

❖ If any alarm happens, according to flashing times of red led to check the root cause.

❖ If the system gets into self-test mode and the LED will flash in green.

- C: Press Buttons:

❖ ↑: UP or increase

❖ ↓: DOWN or decrease

❖ SET: Parametric setup

(4) Panel Operation Flowchart :



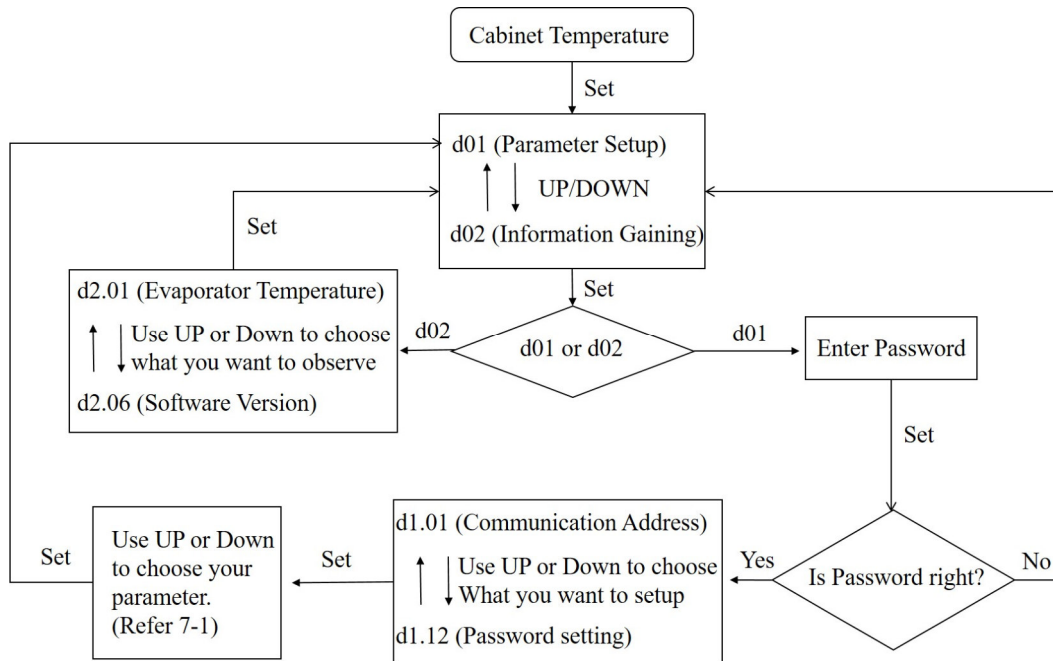※ If no button is pressed, after 20 seconds, the panel will return to the Cabinet Temperature screen.

※ The default value of Password is 0001.

➢ **SD card & Ethernet (Optional function):**
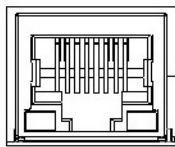


ETHERNET    SD CARD

The controller used communication technology to remotely control, monitor, SD card 8 GB for logging data and alarm the cooling function of the ACU. This can be done using a RJ45 or RS485 connected to an industrial network or a personal computer (PC) connected to an Internal local area network.

# 3.  Environmental Condition

➢ **Operating Temperature**
-10°C ~ +55 °C (14 °F ~ +131 °F)

➢ **Storage Temperature**
-40 °C ~ +70 °C (-40 °F ~ 158 °F)

➢ **Operation Humidity**
External air loop: 0 ~ 100 % RH
Internal air loop: 0 ~ 80 % RH, non-condensing

➢ **Ingress Protection Rating**
NEMA 4X

# 4. Reliability Table

| Test item | Condition |
|---|---|
| High temperature | IEC 60068-2-2 |
| Low temperature | IEC 60068-2-1 |
| High temp. / High humidity | IEC 60068-2-3 |
| Temperature cycle | IEC 60068-2-14 test Nb |
| Vibration | ETSI 300 019-1-4 CLASS 4.1 |
| Ingress protection (external side) | IEC 60529 IP54   / NEMA 4X |
| Salt fog test (external side) | IEC 60068-2-52, 6cycles |
| Package bump | IEC 60068-2-29 |

# 5. Safety Certification

TBD

# 6. Accessory

Power and Alarm Cable：

| Pin | Description | Cable wire size |
|---|---|---|
| 1 | L | 16AWG |
| 2 | N | 16AWG |
| 3 | PE | 16AWG |
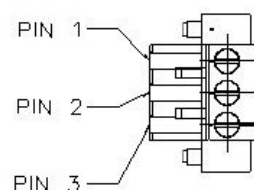
# 7. Parameters

## 7-1 Parametric Setup

| Display | Description | Range |
|---|---|---|
| **d01** | | |
| d1.01 | Communication Address | 1~128, (Default=21) |
| d1.02 | Communication speed (Baud rate) | 0 : 9600<br>1 : 19200<br>(Default=0) |
| d1.03 | Compressor turn on temperature setting | 20~50, (Default=40) |
| d1.04 | Compressor hysteresis set point setting | 1~10, (Default=5) |
| d1.05 | Cabinet over temperature point setting | 20~80,(Default=65) |
| d1.06 | System self-test | 0: off<br>1: on<br>(Default=0) |
| d1.07 | Door open alarm function | 0: Disable<br>1: Enable<br>(Default=0) |
| d1.08 | Dry contact setting | 0: normal Open<br>1: normal Closed<br>(Default=1) |
| d1.09 | System parameters recovery | 0: off<br>1: on<br>(Default=0) |
| d1.10 | Heater turn on temperature setting | N/A |
| d1.11 | Heater hysteresis set point setting | N/A |
| d1.12 | Password setting | Default= 0001 |
| **d02** | | |
| d2.01 | Evaporator temperature | Display |
| d2.02 | Condenser temperature | Display |

| d2.03 | Ambient temperature | Display |
|---|---|---|
| d2.04 | Internal fan speed | Display |
| d2.05 | External fan speed | Display |
| d2.06 | Firmware version | Display |

※ d1.10 and d1.11 are option functions. Default is closed.

※ d2 layer is for system status information read only.

## 7.2 Self-Test

1. Press the SET button into parametric setup mode.
2. Press UP button to choose d1.06 and then press SET button to choose "1"executing auto self-test.
3. If the system gets into self-test mode and LED will flash in green.
4. Auto self-test running period about eighty seconds exclude compressors three minutes protection.
5. The test process including EEPROM, NTC sensor, inner-fan, outer-fan, compressor heater, emergency fan running correctly.
6. Recognizing that the implementation process without generating alarm or fault. If any alarm happens, according to alarm code to check the root cause.

## 7.3 Alarm Logs & Fault Processing

| Alarm Items | Type of alarm | Alarm code |
|---|---|---|
| Temperature protection alarm | Evaporator low temperature alarm | E 2.1 |
| | Cabinet high temperature alarm | E 2.2 |
| | System high pressure alarm | E 2.4 |
| | System high pressure frequent alarm | E 2.5 |
| | Cabinet low temperature alarm | E 2.6 |
| Temperature sensor abnormality | Cabinet temperature sensor fault alarm | E 3.1 |

| | Evaporator temperature sensor fault alarm | E 3.2 |
|---|---|---|
| | Condenser temperature sensor fault alarm | E 3.3 |
| | Ambient temperature sensor fault alarm | E 3.4 |
| Fan exception | Internal fan exception alarm(Only For DC Fan Project) | N/A |
| | External fan exception alarm(Only For DC Fan Project) | N/A |
| Control board exception | EEPROM abnormal alarm | E 5.1 |
| System exception | Power board abnormal alarm(Only For DC Fan Project) | N/A |
| | Compressor failure alarm | E 6.2 |
| | Door Open Alarm | E 6.3 |

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Fault Analysis and Processing

| Fault State | Analysis of the Reasons | Solutions |
|---|---|---|
| Power on, and the cabinet temperature is too high but the air conditioner is not working | 1. Power failure or no power.<br>2. The target temperature is higher than inside temperature.<br>3. System failure. | 1. Check the power supply and the electric circuit.<br>2. Re-set the target temperature according to the system requirement.<br>3. Please contact the service department. |
| The air conditioner is running but the cabinet temperature is still high, no obvious cooling effect. | 1. The air conditioner capacity is not match the load of the system.<br>2. The ambient temperature is too high.<br>3. Low efficiency of the condenser.<br>4. Other system failure | 1. Check the heating load of the system.<br>2. Ensure the air conditioner operates in correct temperature range.<br>3. Clean the condenser.<br>4. Please contact the service department. |
| The air conditioner stop operating, and there is no alarm signal. | 1. The inside temperature is lower than the target temperature.<br>2. Other system failure. | 1. Re-set the target temperature according to the system requirement.<br>2. Please contact the service department. |

# 8. Installation Notice

Check the surrounding obstacles to make sure the product get enough space for air circulate.
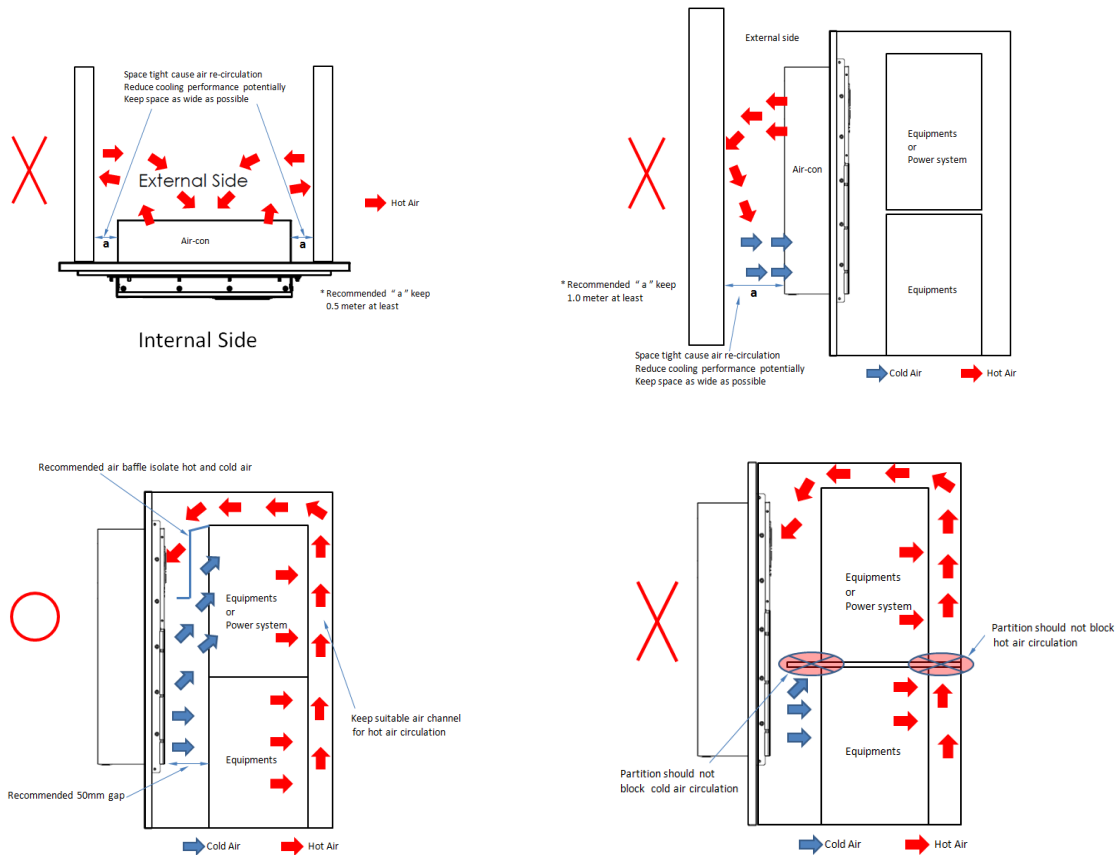


# 9. Warranty

**Delta Electronics, Inc. Warranty for Cabinet Thermal Solutions Products**

Delta Electronics, Inc warrants that Air Conditioners and accessories within its Cabinet Thermal Solutions product family and manufactured by Delta Electronics, Inc., herein referred to as ("products"), will be free from defects in material and workmanship for a period of one (1) year from the date of shipment by Delta Electronics, Inc.  This warranty covers repair or replacement of product at the sole discretion of Delta Electronics, Inc. and is subject to the following Conditions and Exclusions:

**A. Conditions.**

- All products must be installed and operated according to Delta product Specification(s) and product Instruction/User Manual(s):
- Maximum voltage variation is no greater than normal operation and instruction in Delta product Specification(s) and product Instruction/User Manual(s), with avoidance to power line disturbances of any kind.

- Application is not to exceed minimum and maximum stated operation temperatures and humidity range as indicated in the Delta product Specification(s) and product Instruction/User Manual(s).

- Filters (if applicable) must be cleaned regularly.

- Products and any parts thereof must not be modified, unless prior written authorization is received from Delta Electronics, Inc.

- All products must be installed and grounded in accordance with all relevant electrical and safety codes, as well as the National Electric Code and OSHA rules and regulations.

- All products must be installed in a stationery application, free of vibration and shock.

- A violation of any one of these conditions shall render the warranty hereunder void and of no effect.

**B. Exclusions.**

This warranty does not cover the following:

- Applications where products are being misapplied.   This includes inappropriate selection of products for the environment and conditions in which it is to be used.

- Damages caused by shipping carrier or any other accident after products have left Delta Electronics, Inc. manufacturing facility.   Shipping claims are the responsibility of the customer and are to be completed in a timely manner.

- Reimbursement of labor for installation or removal of any warrantied products, or for parts and labor resulting from repairs performed by any other source besides Delta Electronics, Inc.

This is the complete warranty and is in lieu of any other warranty expressed or implied, including but not limited to any implied warranty of merchantability or fitness for a particular purpose.   Delta Electronics, Inc. will in no way be liable for incidental or consequential damage whatsoever or for any other claims by the customer for damages in connection with Delta Electronics Inc. products, even if advised in advance of the possibility of such damage.

**Return Procedure**

All returns require a Return Material Authorization number (RMA #), regardless of reason for return, whether it be for warranty or out of warranty repair.   Returns without an RMA # will be refused by Delta Electronics, Inc. Approval for return requests are at the sole discretion of Delta Electronics, Inc.

Buyer should provide the following information at the time of RMA request:

1. Complete Model Number, Serial Number and description of damaged unit requested to be returned.

2.  Original Buyer Purchase Order number and date product was received by Buyer.

3.  Quantity to be returned and a brief description of failure for each unit, if different.

All returns to Delta Electronics, Inc must be securely packed, using original cartons if possible.   All returns must have the RMA number visible on the outside of the carton. Delta Electronics, Inc. is not responsible for material damaged in transit.

Shipping cost for all non-warranty repairs is the responsibility of the sender and must be shipped prepaid. Shipping costs for all warranty related repairs will be covered by Delta Electronics, Inc. provided the products are returned using a Delta Electronics, Inc approved carrier.   If after diagnosis, products determined by Delta Electronics, Inc. are not covered under warranty, Buyer will be responsible for all shipping charges and will be billed accordingly.

**LIMITATION OF LIABILITY**

DELTA ELECTRONICS, INC. WILL NOT BE LIABLE UNDER ANY CIRCUMSTANCES FOR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES, INCLUDING WITHOUT LIMITATION ANY LOST PROFITS OR LABOR COSTS, ARISING FROM THE SALE, USE OR INSTALLATION OF THE GOODS, FROM THE PRODUCTS BEING INCORPORATED INTO OR BECOMING A COMPONENT OF ANOTHER PRODUCT, FROM ANY BREACH OF THIS AGREEMENT OR FROM ANY OTHER CAUSE WHATSOEVER, WHETHER BASED ON WARRANTY (EXPRESSED OR IMPLIED) OR OTHERWISE BASED ON CONTRACT, OR ON TORT OR OTHER THEORY OF LIABILITY, AND REGARDLESS OF ANY ADVICE OR REPRESENTATIONS THAT MAY HAVE BEEN RENDERED BY DELTA ELECTRONICS, INC. CONCERNING THE SALE, USE OR INSTALLATION OF THE PRODUCTS.

# 10. Reclaim 

At the end of the unit working life, the produce must not be disposed of as urban waste. It must be taken to a special local authority differentiated waste collection center or to a dealer providing this service.

# 11. Versions

| REV. | DESCRIPTION | DRAWN | CHECKED | | | APPROVED | ISSUE |
| | | | ME | EE | CE | | DATE |
|---|---|---|---|---|---|---|---|
| 00 | ISSUE SPEC | Rex Lyu 01/30'20 | Rex Lyu 01/30'20 | Allen.Huang 01/30'20 | ------ | TEDTU / CW.CHEN 01/30'20 | 01/30'20 |