Specification and Manual

Customer :

Description : Air Conditioner for Equipment

Customer Part No. : Rev.:

Delta Model No. : HEC2010FFA Rev : 07

Sample Date Code:

Sample Issue Date : JUNE.17 2020

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

Approved by :

Date :

DELTA ELECTRONICS, INC.
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Table of content

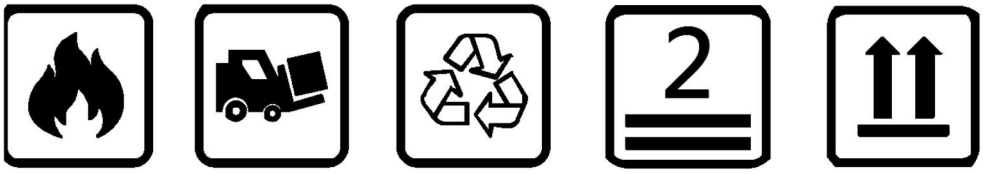
Description

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 upward placed, **"NO"** inverted, flat, excessive tilt and collision. Air conditioner is a precision instrument, it should be handled or transported with care, do not stand on the box, or place heavy objects on it. Please pay attention to the following icons on the package.

If air conditioner is toppled, over slanted or dropped unfortunately, please follow below steps: a. stand for 12 hours to ensure refrigerant pressure stability, b. power on and execute self-test to make sure no alarm happened, c. air conditioner keeps 1 hour operating and make sure there is no abnormal acoustic noise.



Safety Notes

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

Meaning of WARNING and CAUTION notices:

⚠ Warning:

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

⚠ Caution:

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

⚠ Warning:

1. Installation work and electrical wiring must be done by qualified person(s) 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 shocks or fire.
4. Make sure that all wiring is secured, the 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 for installation work.
9. Protective earth connection: The enclosure must be earthed at the protective earth terminal. Use 1.5 mm^2 (16 AWG) wire and use spring washer to avoid loosening.
10. The air conditioner shall be not 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 to be used by expert or trained users in shops, in light industry and on farms, or for commercial use by lay persons”.

⚠ Caution :

1. Install the air conditioner on a wall/ door strong enough to withstand the weight of the unit.
2. Do not block air inlets or exits.
3. Do not install the air conditioner at any place where there is a danger or flammable gas leakage.
4. Arrange the drain to ensure complete drainage.

5. To avoid injury, do not touch the air inlet or aluminum fins of unit.
6. Watch your steps at the time of fin cleaning or air conditioner inspection.
7. Do not topple the air conditioner while moving or storage.
8. The hole in the bottom of the air conditioner should be connected to a sealed container through a drainpipe.
9. The appliance is not to be used by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction.
10. Children being supervised not to play with the appliance.

Part no. :

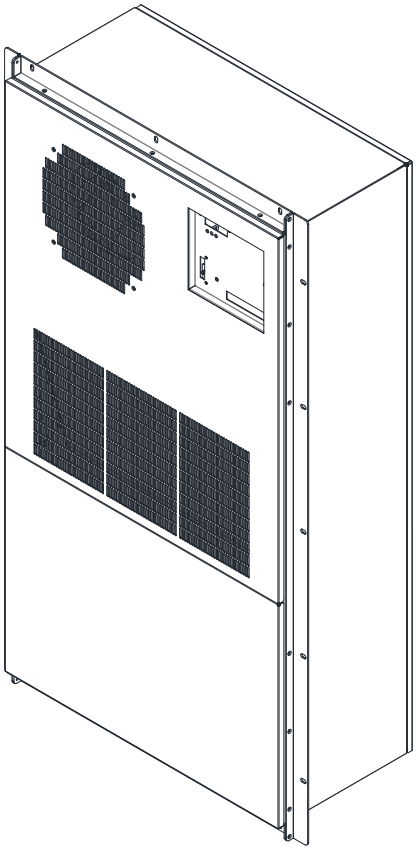
Delta model no. : HEC2010FFA

Specification for Approval

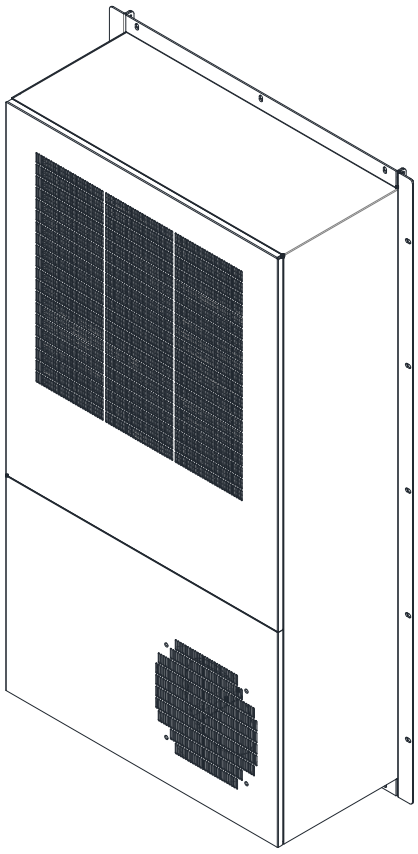
Customer :

Description : Air conditioner for Equipment with 2000 W or 100W/K Rated Cooling Capacity

Customer P/N :	Rev. :
Delta model no. : HEC2010FFA	Rev. : 07
Sample revision. :	Date Code :
Sample issue date :	Quantity :



INTERNAL



EXTERNAL

Part no. :

Delta model no. : HEC2010FFA

1. Product Instruction

1-1. General Description

HEC2010FFA is a hybrid air conditioner with 48VDC & 230 VAC power input, it is designed for IP55 sealed outdoor telecom cabinet to provide stable and optimum internal conditions for equipment and avoid hotspot inside the cabinet.

HEC X1 FF A XXX
(1) (2) (3) (4) (5)

No	Item	Digit	Specification
(1)	Product Message	HEC	Compressor Air Conditioner
(2)	Cooling Capacity	X1	2000W and 100W/K
(3)	Operation Voltage	FF	230VAC & 48VDC for door with heater
(4)	Product Version	A	N/A
(5)	Customer ID	XXX	N/A

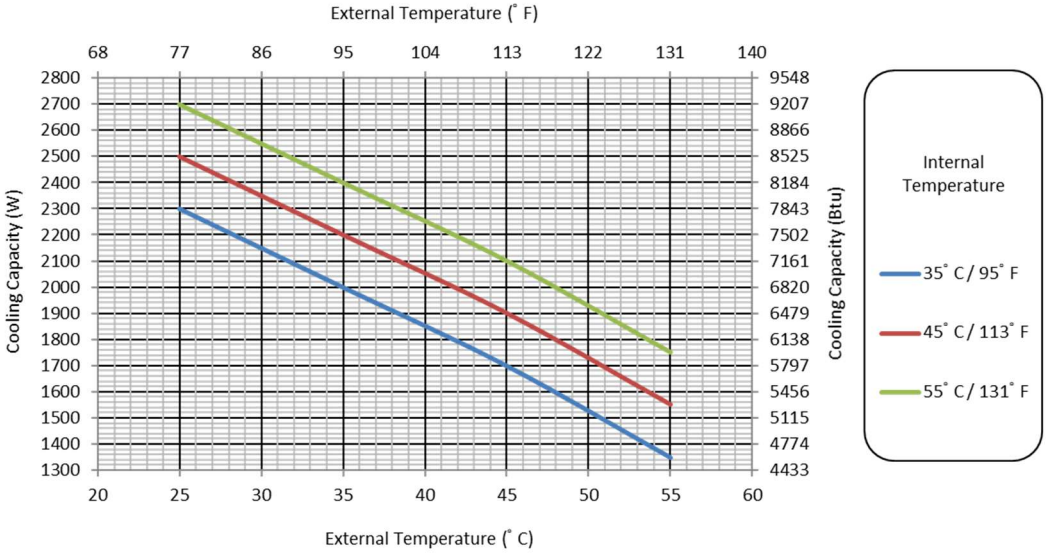
1-2. Main Feature & Model Number

Dimensions, Weight & Mounting method		
Dimension (H x W x D) (without flange)	Mm (inch)	945 x 505 x 250 (37.2 x 19.9 x 9.8)
Application		Outdoor
Weight	Kg (lbs)	40 (88)
Mounting Method		Door/Side
Color (optional)		RAL7035
Environmental Protection & Performance		
Operating Temperature Range	°C (°F)	-40 ~ +55 (-40 ~ +131)
Operating Humidity		External : 0~100% RH Internal: 0~80% RH
Storage Temperature	°C (°F)	-40 ~ +70 (-40 ~ +158)
Storage Relative Humidity	RH	5~95%
Refrigerant		R134a
Protection for Dust ,Wind and Water (External)	IEC 60529 /GR487	IP55 / GR487
Noise (1.5m)	dB-A	65
Operating Status	N/A	LED Indicator / Display Board
Cooling Capacity & Operational Data		
Rated Cooling Capacity at L35/L35	W (Btu/hr)	2000(6824)
Heat Exchange Capacity	W/K	100±10%
Cooling AC Current at L35/L35	A	3.5

Part no. :

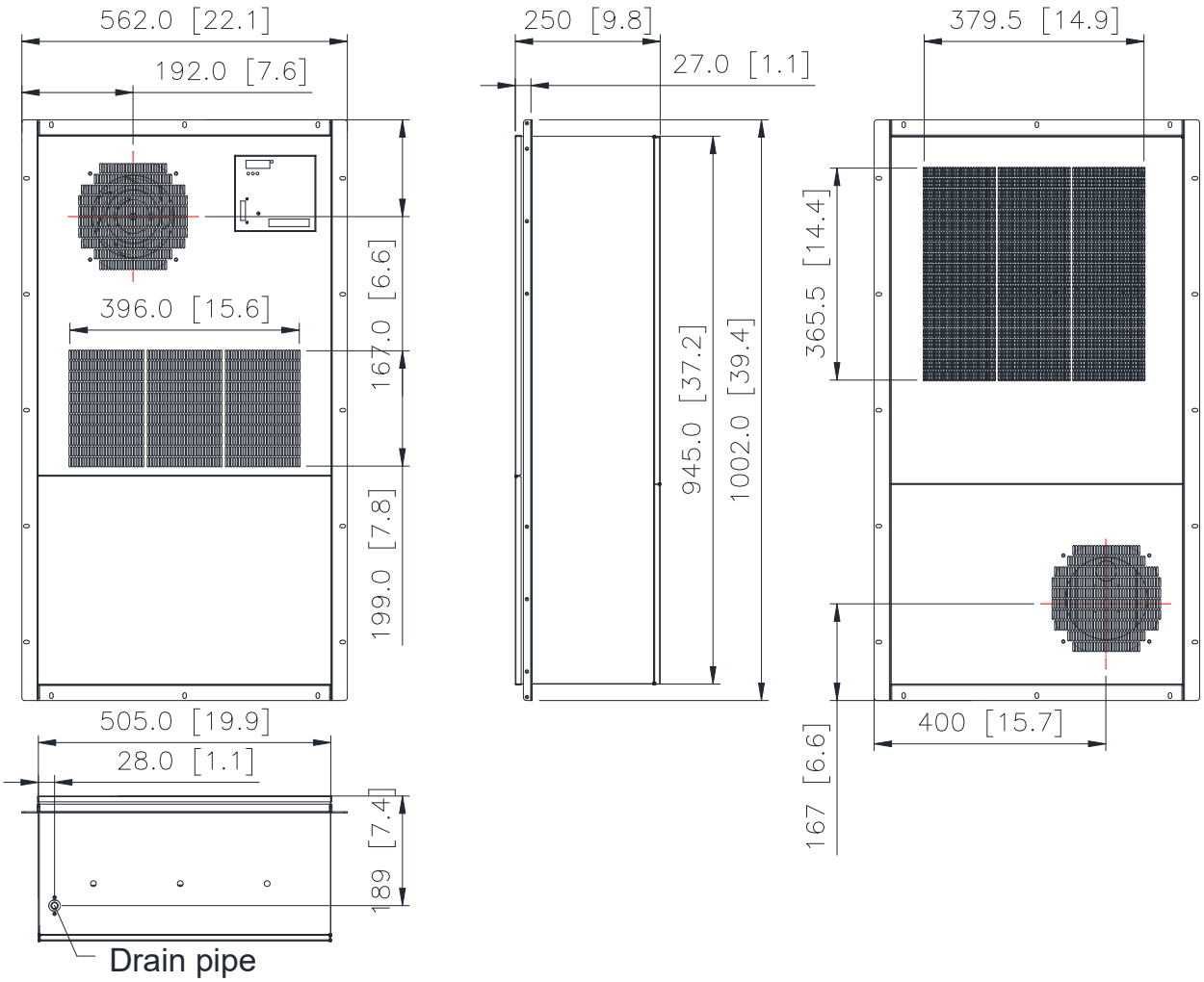
Delta model no. : HEC2010FFA

Cooling DC Current at L35/L35	A	3.3
Rated Internal Airflow (L35/L35)	m^3/h (CFM)	950 (560)
Rated External Airflow (L35/L35)	m^3/h (CFM)	600 (354)
Heating Capacity	W	1000
Power & Range		
Input Voltage (Control and Fan)	VDC	48
Input Voltage (Compressor)	VAC / Phase / frequency	230 / 1 / 50-60
Locked Rotor Current (Compressor)	A	20.2(50Hz)/ 18.9(60Hz)
Alarm	N/A	Dry Contact Output
Key Components		
Controller		Built-in Smart Controller
Fans		Delta High Efficiency Fan
Compressor		Rotary



Cooling Capacity curves

1-3. Dimension



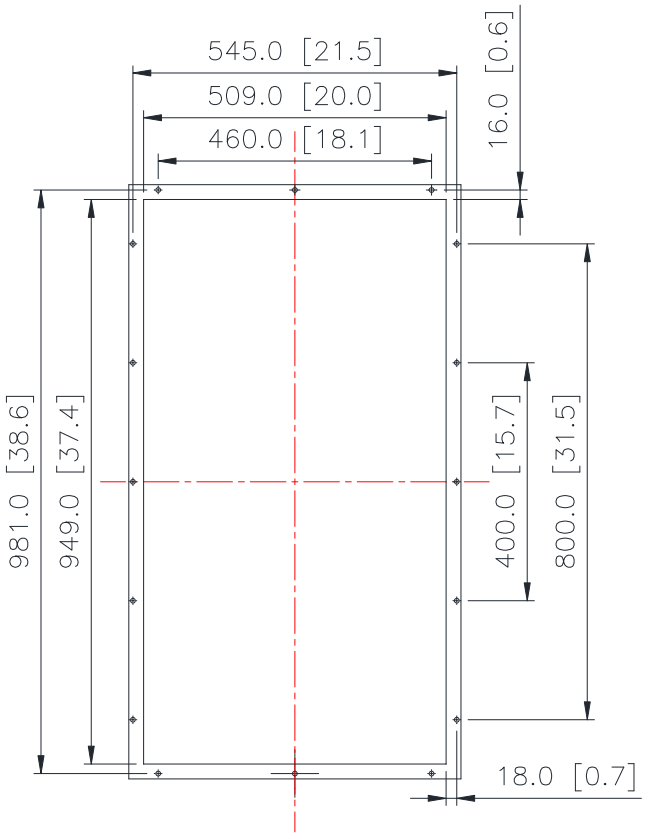
mm(inch)

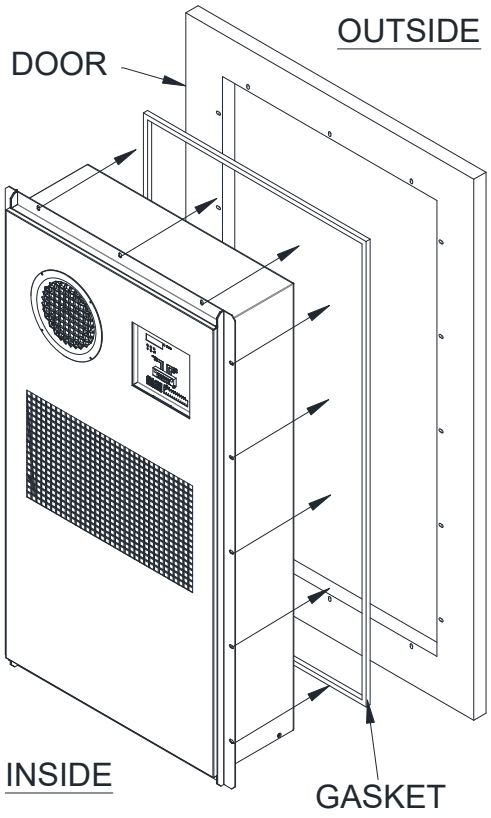
(1) Material: Case SGCC Sheet.

(2) Finish: Powder coating 75~120 uM, Color RAL 7035.

(3) Dimensional Tolerance: ±1 mm.

1-4. Mounting Panel Cutout



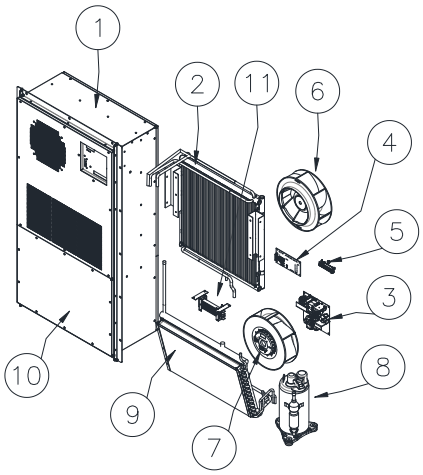


mm[inch]

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	Condenser
3	1	Power Board
4	1	Control Board
5	1	Communication Board
6	1	Internal Fan
7	1	External Fan
8	1	Compressor
9	1	Evaporator
10	1	Case Cover
11	1	Heater

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.

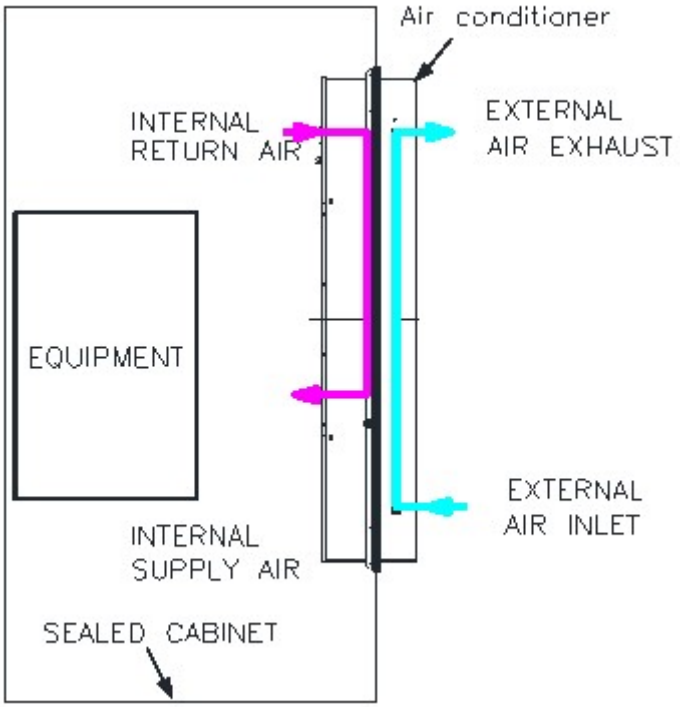
7. The refrigerant is environmental friendly product of R134a. Little refrigerant leakage (< 5 g/ year) is allowed for application. If refrigerant leakage seriously, please turn off the power and wait for at least 2 hours to make sure the refrigerant fully exhaust. Please also contact the services to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

8. The compressor electrical protecting cover is sealed with silicon for IP55 requirement. Please do not dismantle the sealed cover or will lose the quality assurance of the compressor.

1-6. Thermal and Airflow

The internal and external air flow circulation is shown as the figure. Through separated mechanism design, internal and external air flow won't be mixed since the waste heat can be dissipated from the cabinet to the ambience. Internal temperature sensor is placed at return air stream to provide reliable temperature measurement and safety of operation.

The waste heat generated from the internal equipment will be absorbed by the refrigerant through the evaporator and dissipate to the ambience by the condenser of external side.

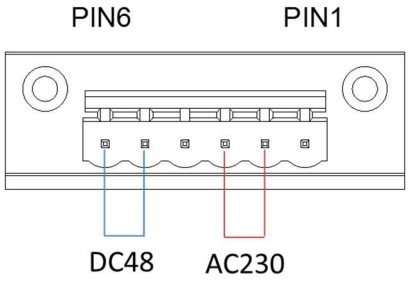


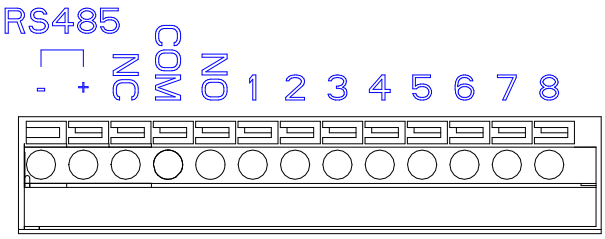
2 Electrical Specification

2-1. Indicator & Connector

2-1-1 Power Supply & Alarm Connector

Pin	Description	Cable wire size
1	PE	(16AWG)
2	N	(18AWG)
3	L	(18AWG)
4	N/A	N/A
5	-48VDC	(18AWG)
6	RTN	(18AWG)

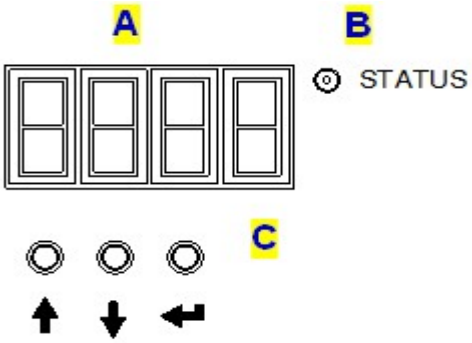




- System Alarm Default Setup
  - Specification: Contact rating: 30 VDC, 1A
  - Normal: NC and COM dry contact output close
  - Any alarms happening: NC and COM dry contact output open

    (Dry Contact will trigger when alarm happen except E2.4,E3.2, E3.3 ,E3.4 and E6.1)

➢ Panel operation



	7-Segment Display
STATUS	Status LED
↑	Up
↓	Down
↵	Parametric Setup

- A: *DisA 7-Segment Display*:

  It will show the temperature inside the cabinet and system parametric setup.

- B: *LED indicator:*

  Power:

  - ❖ 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 or into self-test function

2-2. Parametric Setup

Panel menu	Content	Range
d1.01	Communication address setting	1~128，(Default) 21
d1.02	Communication speed	0 : 9600 1 : 19200 (Default) : 0
d1.03	Cooling start temperature setting temperature	20~50，(Default)40
d1.04	Cooling hysteresis setting	1~10，(Default)5
d1.05	High temperature alarm point setting	20~80，(Default)65
d1.06	System self-test	0: (Not self-test) 1: (self-test) (Default) : 0

d1.07	External fan enable set	0: Disable 1: Enable (Default) : 0
d1.08	Dry contact set	0: normal Open ,abnormal Close 1: normal Close ,abnormal Open (Default) : 1
d1.09	Reset	0: (Not Reset) 1: Reset (Default) : 0
d1.10	Heat start temperature	-5~15，(Default=0)
d1.11	Heat hysteresis setting	5~15，(Default=10)
d1.12	Password setting	(Default): 0001
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	DC input voltage	Display
d2.07	AC input voltage	Display
d2.08	Firmware version	Display

2-3. 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.

2-4. 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
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	E 4.1
	External fan exception alarm	E 4.2
	Emergency fan exception alarm	E 4.3
Voltage exception	AC input over voltage alarm	E 5.1
	AC input under voltage alarm	E5.2
	AC power down alarm	E5.3
	AC communication alarm	E5.4
	DC input over voltage alarm	E5.5

	DC input under voltage alarm	E5.6
System exception	EEPROM abnormal alarm	E 6.1
	Compressor failure alarm	E 6.2
	Heater failure alarm	E 6.3

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	• Power failure or no power • The target temperature is higher than inside temperature • System failure	• Check the power supply and the electric circuit • Re-set the target temperature according to the system requirement • Please contact Delta or authorized Delta service agent.
The air conditioner is running but the cabinet temperature is still high, no obvious cooling effect.	• The air conditioner capacity is not match the load of the system. • The ambient temperature is too high. • Low efficiency of the condenser. • Other system failure	• Check the heating load of the system. • Ensure the air conditioner is operating in correct temperature range. • Clean the condenser. • Please contact Delta or authorized Delta service agent.

The air conditioner stop operating, and there is no alarm signal.	• The inside temperature is lower than the target temperature. • Other system failure.	• Re-set the target temperature according to the system requirement. • Please contact Delta or authorized Delta service agent.

3. Environmental Condition

3-1. Operating Temperature

-40 °C ~ +55 °C (-40 °F ~ 131 °F)

3-2. Storage Temperature

-40 °C ~ +70 °C (-40 °F ~ 158 °F)

3-3. Operation Humidity

External air loop: 0 ~ 100 % RH

Internal air loop: 0 ~ 80 % RH,

3-4. Ingress Protection Rating

IP55 (IEC60529) on external side

GR487 on external side

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 IP55 / GR487
Salt fog test (external side)	IEC 60068-2-11 severity 4 , 6cycles
Package bump	IEC 60068-2-29

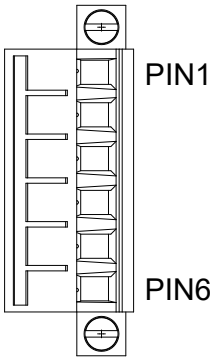
5. Safety Certification

TBD

6. Accessory

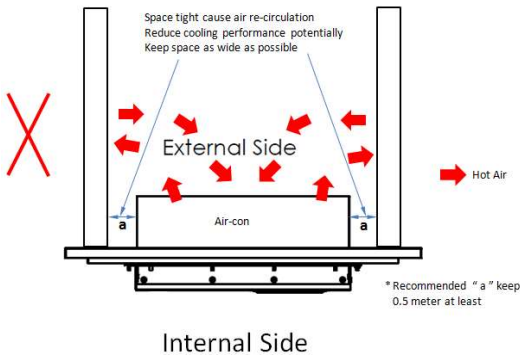
➢ Power Cable

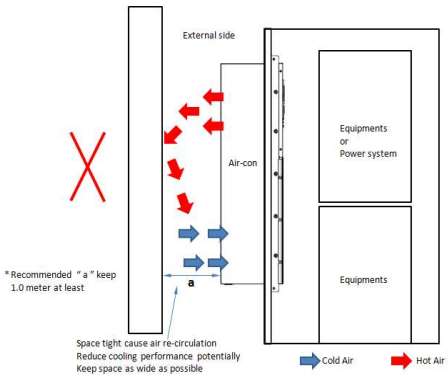
Pin	Description	Cable wire size
1	PE	(16AWG)
2	N	(18AWG)
3	L	(18AWG)
4	N/A	N/A
5	-48VDC	(18AWG)
6	RTN	(18AWG)

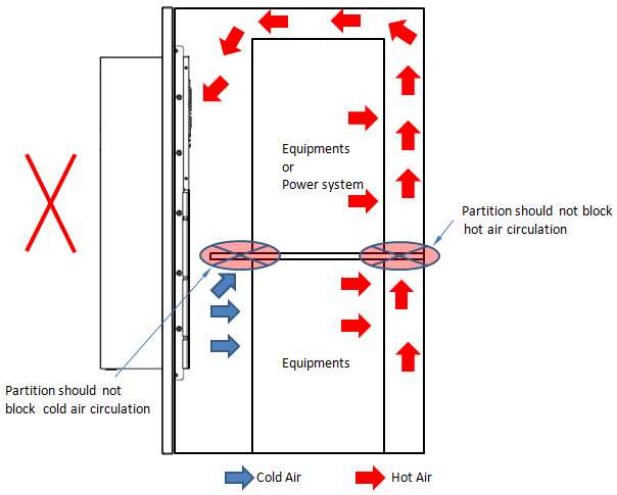


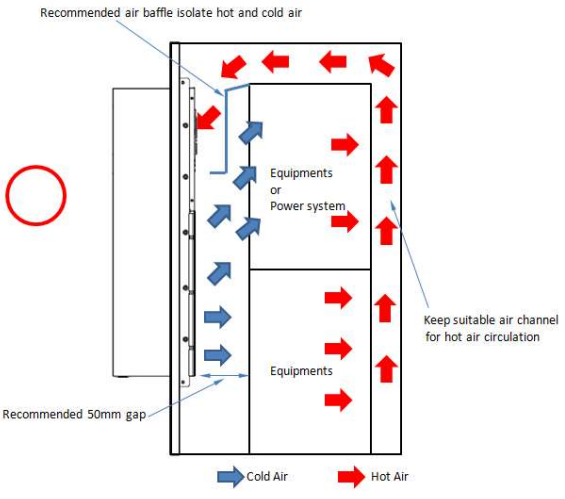
7. Installation Notice

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









8. 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.

9. Versions

REV.	Description	Owner	Date
00	Issue SPEC	VIC	2018.10.23
01	Modify air flow	VIC	2018.11.22
02	Modify SPEC table	VIC	2018.11.29
03	Modify cable dimension	VIC	2018.11.29
04	Issue SPEC	VIC	2018.12.07
05	Issue SPEC	VIC	2018.12.10
06	Modify alarm code	Allen	2018.12.17
07	Delete warranty and safety description	KC	2020.06 17

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