

## Plastic case electric control box ECB-4000 Series Manual



**Notice for users**

- ◆ Dangerous
  - Make sure that the cabinet housing is properly grounded!
  - The power of the electric control box shall not exceed the maximum allowable load!
- ◆ Warning
  - This product must be debugged and installed by professionals;
  - General rules for installation of electromechanical equipment must be observed; the chassis can be fixed with expansion bolts;
  - Connect relevant circuits strictly according to the terminal diagram;
  - In case of emergency fault, quickly disconnect the circuit breaker on the electric cabinet!
- ◆ Note
  - Equipment should be placed in a ventilated, dry, direct sunlight environment;
  - Equipment should be kept at an appropriate distance from condensers and other heat sources;
  - Try to avoid strong magnetic fields or other interference sources;
  - Sensors shall be wired separately and as far away as possible from other strong current control lines;
  - The electronic control box does not support pressure start stop function

**Warranty and Disclaimer**

- ◆ Warranty period: One year warranty for controller and three months warranty for other original parts from the date of purchase.
- ◆ Warranty failure: The warranty will be invalid in one of the following cases:
  - A: The use conditions exceed the provisions of this product;
  - B: Incorrect maintenance;
  - C: Unauthorized change, misuse or artificial damage;
  - D: No proof of purchase and sale of this product.
- ◆ This product is the control device of the unit, not the protection device. If the system, equipment and device you use have higher safety requirements, please add protection device additionally.
- ◆ When users use our products for occasions closely related to personal and property safety, special redundancy design shall be adopted to ensure safety.
- ◆ The Company shall not be liable for special losses, indirect losses and other related losses caused by the Company's products.

**Main Function**

ECB-4000series plastic case electric control box is our company designed for small and medium cold storage development of electrical control box. With temperature measurement, display, control; refrigeration, defrosting, fan, alarm output function, clock display function. Through WIFI, pipeline module, Bluetooth module can be connected to our company APP, platform.

Power supply	Three - phase five - wire (or three - phase four - wire) 380 V A C±10 % / 50 Hz
Measurement temperature range	- 49°C -119 °C/ - 56-212 °F
Temperature measurement accuracy	- 2.0°C- 50 °C± 1°C/ ± 2°F, others± 1.5°C/± 3 °F
Temperature control range	-49°C-119 °C/ - 56-212 °F
Temperature resolution	0.1°C/1 °C or 1F
Current measurement range	0- 40A
Current display resolution	0.1A
Current detection ac curacy	0- 30A±2A, others ±5%
Relay contact output capacity	5A/240VAC
Maximum allowable continuous output current of compressor circuit	10A 22A 30A

Maximum allowable continuous output current of defrosting circuit	10A 22A 30A
Maximum allowable continuous output current of fan circuit	7A
Working environment	-10℃~50℃/14~122 ℉
Sensor type	NTC (10KΩ/25 ℃, B value 3435K)
Sensor Cable Length	2m/ 5m (including probe length) 3 sensors
Box size	Width 250mm* Height 350mm* Depth 125mm



**Operation and Display panel**



WiFi indicator	Defrost indicator	Refrigeration indicator
Fan indicator	Unlock indicator	Bluetooth indicator
Communication indicator	Alarm indicator	Light indicator
AUX Auxiliary indicator	°F Fahrenheit symbol	°C Celsius symbol
Exit key up key/Force defrost key		Down key /Light key
Unlock key Set key		Pause key


**Job Indicator Status Description**

Indicator	State	Signification
WiFi	Off	No Wi-Fi Connection
	On	Wi-Fi is Connected
Bluetooth	Off	No Bluetooth Connection
	On	Bluetooth Connected

AUX Auxiliary	Off	Auxiliary Function Off
	On	Accessibility On
 Refrigeration	Off	Refrigeration Stop
	Scintillation	Cooling Delay
	On	Refrigeration Working
 Light	Off	Lights Off.
	On	Lights On.
 Defrost	Off	Defrost Stop
	Scintillation	Defrosting Work
	On	Defrost Drip
 Alarm	Off	No Alarm
	On	Fault Alarm
 Fan	Off	Fan Stop
	On	Fan Operation
	Scintillation	Fan Delay
 Lock	Off	Key Unlocked
	On	Key Lock
 Communication	Off	No Communication
	On	Data Communication Ongoing
°C	Off	No
	On	Celsius Display
°F	Off	No
	On	Fahrenheit Display

## Operation Instructions

### Key Unlock

In the normal operation interface, if there is no key operation, the key is locked after 10 seconds, and the key lock symbol light is on, and relevant operations cannot be performed; in the case that the key lock light is on, press the setting key for more than 2 seconds, and the key lock symbol  is off, indicating that the key is unlocked, and relevant operations can be performed.

### User set menu

#### Domestic Trade Products:

In the running state, if the key is not locked, press the "Set" key and immediately release it, and the "Startup Temperature" indicator light will light up, it indicates that the user setting menu will be entered. After that, every time the "Set" key is pressed and immediately released once, the next parameter setting will be entered (cyclic operation is possible). At the same time, the corresponding parameter indicator light will light up, and press the "▲" or "▼" key to modify the corresponding user setting parameters. Press the exit key to save the parameters or press the key to save the parameters automatically after 10s.

## User menu

Parameter Indicator	Shutdown temperature display window	Setting range	Factory setting	Annotation
Turn-on temperature symbol	Turn-on temperature	Shutdown temperature +0.1~+100.0°C/180°F	10.0°C/50°F	Press on when set point is reached
Shutdown temperature symbol	Shutdown temperature	-- 49.0°C-- startup temperature -0.1 -56.2°F--startup temperature -0.1°F	-10.0°C/14°F	Press stops when set point is reached
Compressor delay symbol	Compressor delay	1 to 120 minutes	3 minutes	Minimum time interval between compressor shutdown and restart
Defrost cycle	Defrost cycle	0-120 hours	6 hours	Time between defrosting
Defrost Time Talisman	Defrosting time	0 to 120 minutes	30 minutes	Duration of defrosting
Defrost stop temperature lamp	Defrost stop temperature	-49.0°C~+50.0°C/ -56.2°F-122°F	10.0°C/50°F	Defrost is not allowed when the defrost sensor temperature is higher than this

Note: The automatic exit logic exits level by level in the menu hierarchy until the exit setting. The same applies to the following system settings.

### System settings menu

In the running state, if the key is not locked, press and hold the "Settings"+"▼" key for more than 5 seconds at the same time. When the F33 parameter setting password is 0, the display window displays "F01", indicating that the system setting menu is entered. If F33 parameter setting password is not equal to 0, enter system password input interface, PAS is displayed on display screen, press setting key to enter password input, use up and down keys to adjust password value, press setting key to confirm password after adjusting password value, enter system setting menu if password is correct, display window displays "F01", if password is wrong, exit password input interface and go to normal display interface. After entering the system settings menu, press and immediately release the "Settings" key once to enter the next parameter setting (cyclic operation). After entering the system setting menu, press the "▲" or "▼" key to modify the corresponding setting parameters, press the exit key to exit and save the parameters, or 10S to automatically exit without key operation.

### Operation Instructions

Parameters	Description of parameter settings	Range	Default value	Remarks
F01	Calibration of main reservoir temperature sensor	(-10.0... 10.0 )°C / (-18.0... 18.0 )°F	0.0	
F02	Compressor power - on initial startup delay	(0 ... 30) min	2	
F03	Over - limit alarm	0-50.0°C/0-90.0°F	10.0°C/18°F	
F04	Over temperature alarm delay	(0 ... 120) min	30	
F05	Delay of first high temperature alarm after power-on or defrosting	(0 ... 120) min	20	

<b>F06</b>	Defrost type	Defrost type(0:shutdown defrost; 1: Electrochemical Frost, 2: Hot Air Defrost)	1	
<b>F07</b>	Defrost cycle timing mode	0:controller operating time;1:compressor cumulative time;2: real-time clock	0	If you select 2, press the SET key to enter the clock defrost parameter d menu.
<b>F08</b>	Defrosting drip time	(0 ... 20)min	3	
<b>F09</b>	Defrost sensor calibration	(-10.0... 10.0 ) °C/ (-18.0... 18.0 ) °F	0.0	
<b>F10</b>	Defrost sensor selection	(0: disable, 1: enable )	1	
<b>F11</b>	Display mode when defrosting	0-3;0=Display actual warehouse temperature sensor measurement; 1:Display warehouse temperature sensor measurement at defrost cycle start time ; 2: Display "deF". 3: Display Settings temperature	2	
<b>F12</b>	Power -on first defrost delay	(0 ... 99)min	0	
<b>F13</b>	Alarm buzzer switch (1: On, 2: off)	(1 ... 2)	1	
<b>F14</b>	Fan start mode	(-30 ... 30.. c)	0	(C: Fan continuous operation; 0-30: Fan lag compressor 0-30 min start; -30--1 Fan advance compressor)
<b>F15</b>	Fan stop mode	(0 ... 30.. c)	0	(C: Fan continuous operation; 0-30: Fan lag compressor 0-30 min start; -30--1 Fan advance compressor)
<b>F16</b>	Fan operation mode during defrosting process	(1 ... 2)	1	(1: Stop, 2: Run)
<b>F17</b>	Spare sensor selection	0-1	1	(0:disable,1:enable)If enabled,press the "SET" key to enter the spare sensor parameters b.
<b>F18</b>	Numeric quantity 1 Functional definition	0-5	4	0:Shield;1:Defined as defrost; 2:Auxiliary input;3:External alarm;4:Pressure switch;5:People in the cold storage alarm
<b>F19</b>	Numeric quantity 2 Functional definition	0-6	5	0:Shield;1:Defined as defrost; 2:Auxiliary input;3:External alarm;4:Pressure switch;5:People in the cold storage alarm
<b>F20</b>	Digital quantity 1 Type input selection	0-1	1	(0: normally closed effective, 1: normally open effective)
<b>F21</b>	Digital quantity 2 Type input selection	0-1	1	(0: normally closed effective, 1: normally open effective)
<b>F22</b>	Auxiliary output relay function	0-4	1	0: shielding; 1: a alarm output; 2: Auxiliary output;3: Light relay;4: Condensate pump output out

<b>F23</b>	When the door switch is open, the equipment is in operation state.	0-4	2	0: compressor and evaporator1 : Evaporation wind mechanism is closed; 2: The library light is on;3: The compressor evaporator fan is off, and the library light is on;4:The evaporator fan is off.And the library lights are on;
<b>F24</b>	Door switch alarm delay	(0 ... 120)min	30	
<b>F25</b>	Pump priming time	(3-255)s ec	3	Auxiliary relay as water pump work
<b>F26</b>	Water pump shutdown delay	(3-255)s ec	5	Auxiliary relay as water pump work
<b>F27</b>	Pressure switch alarm allowable times (within 15 minutes)	1-5	3	If the number of alerts exceeds this value,even if the switch is reset, the compressor cannot be turned on,need to shut down and restarted.
<b>F28</b>	Pause time setting	(1-120)min	30	The time at which the system stops working when the pause button is pressed
<b>F29</b>	Fractional integer display mode	1-2	1	(1: decimal, 2: integer)
<b>F30</b>	Celsius Fahrenheit display	1-2	1	(1: Celsius, 2: Fahrenheit)
<b>F31</b>	Reserved	(0 ... 1)	30	(This parameter is not used and does not need to be tested )
<b>F32</b>	Current protection function	0-1	1	0: Disable; 1:enable; if enabled, press the set key and the system enters current protection Parameter Settings U Menu
<b>F33</b>	Parameter Settings Password	0-999	0	
<b>F34</b>	Compressor unit maintenance time	0-999 days	0	0: Disable
<b>F35</b>	Phase sequence protection function	0-1	1	0: Off; 1: On
<b>F36</b>	Night energy saving mode	1-2	2	(1: ON, 2: OFF ) If setting 1, press the setting key to enter C parameters.
<b>F37</b>	RS485 mailing address	1-127	1	

Clock defrost parameter (F07=2, press the setting key to enter this menu operation)

Parameters	Refer to setup instructions	Range	Default value	Remarks
<b>d01</b>	1st defrost start hour	(0 ... 23)hour	0	
<b>d02</b>	1st defrost start min	(0 ... 59)min	0	
<b>d03</b>	2nd defrost start hour	(0 ... 23)hour	0	
<b>d04</b>	2nd defrost start min	(0 ... 59)min	0	
<b>d05</b>	3rd defrost start hour	(0 ... 23)hour	0	
<b>d06</b>	3rd defrost start min	(0 ... 59)min	0	
<b>d07</b>	4th defrost start hour	(0 ... 23)hour	0	
<b>d08</b>	4th defrost start minutes	(0 ... 59)min	0	
<b>d09</b>	5th defrost start hour	(0 ... 23)hour	0	
<b>d10</b>	5th defrost start minutes	(0 ... 59)min	0	
<b>d11</b>	6th defrost start hour	(0 ... 23)hour	0	
<b>d12</b>	6th defrost start min.	(0 ... 59)min	0	
<b>d13</b>	7th defrost start hour	(0 ... 23)hour	0	
<b>d14</b>	7th defrost start min.	(0 ... 59)min	0	
<b>d15</b>	Maximum defrost times per day under clock defrost	0-7	0	

Night energy saving mode parameters (when F36=1, enter F36, press the setting key to enter)

Parameters	Description of parameter settings	Range	Default value	Remarks
<b>C01</b>	Night Energy Saving Mode Start Hour	(0 ... 23)hour	22	
<b>C02</b>	Night Energy Saving Mode Start Minutes	(0 ... 59)min	0	
<b>C03</b>	Night Energy Saving Mode End Hour	(0 ... 23)hour	8	
<b>C04</b>	Night Energy Saving Mode End Minutes	(0 ... 59)min	0	
<b>C05</b>	Night Energy Saving Mode Set point Change Value	(-10.0 ... 10.0) °C/ (-18.0 ... 18.0) °F	2.0°C/3.6 °F	

Standby sensor related parameters (F17=1)

Parameters	Description of parameter settings	Range	Default value	Remarks
<b>b01</b>	Function setting of channel 3 sensor; 1:Automatic use of this sensor to control temperature after failure of temperature sensor;2: Use as internal temperature sensor of food, only for measurement, not for control;3:Storage temperature sensor common use, average temperature control compressor start Stop;	1-3	1	
<b>b02</b>	Standby sensor temperature correction	(-12.0...12.0 ) °C/ (-21.6... 21.6 ) °F	0	
<b>b03</b>	Standby sensor high temperature alarm value	(B04+0.1 -120)°C/ (B04+0.1 -248)°F	50°C/122 °F	
<b>b04</b>	Standby Sensor Low temperature Alarm value	(-50-b03)°C/ (-58-b03-0.1)°F	-20°C/ -4°F	
<b>b05</b>	Standby Sensor Over temperature Alarm Delay	0-120min	30	

Current protection function menu (F32=1)

Parameters	Description of parameter settings	Range	Default value	Remarks
<b>u01</b>	Overload current setting	2-80	20A	
<b>u02</b>	Overload protection inverse time function : 0= disable; 1= enable	0-1	1	
<b>u03</b>	Automatic reset times after overload protection	0-3	0	
<b>u04</b>	Three -phase unbalanced protection current setting	0-90 A	10	
<b>u05</b>	Unbalanced protection delay	1-99 S	60	
<b>u06</b>	Over current protection delay start -up time	1-99 S	3	
<b>u07</b>	Delay start time of current protection function after power-on	0-9 min	1	
<b>u08</b>	Delay start -up time of phase -loss protection	1-10 S	3	
<b>u09</b>	After current detection, current protection function delay start time	1-10S	3	
<b>u10</b>	Average current selection : 0= A phase; 1= A,B phase 2= A, B,C phase	0-2	2	
<b>u11</b>	Overload protection function 0= disable; 1= enable	0-1	1	
<b>u12</b>	0= disable; 1= enable	0-1	1	
<b>u13</b>	Current transformer turns ratio 0=1000:1;1=2000:1	0-1	0	

**Remarks:** When the function is enabled and the specific parameter value of the function is displayed, press the setting key to enter the sub menu, switch the sub menu code display by pressing the up and down keys, press the setting key again to enter the sub menu parameter value modification, after modification, press the exit key for a short time to return to the sub menu display interface, press the exit key again for a short time to return to the main menu, that is, the F menu code display interface, and save the modified parameter value at the same time. Relevant operations on the F menu page can be carried out by corresponding key operation.

### Foreign Trade Menu (Foreign Trade Products)

Parameters and menu modes are the same as those of domestic trade, except that after entering user settings, the displayed characters are English characters; others are the same as domestic trade.

#### Forced defrosting

In case of no key locking, if there is no defrosting, press and hold the forced defrosting key for 5 seconds, and the system will enter the forced defrosting state (defrosting temperature is less than defrosting termination temperature) if the defrosting conditions are met; in the defrosting state, press and hold the forced defrosting key, and the defrosting state will exit and the defrosting dripping will enter; remote forced defrosting can also be set through the platform;

#### Startup & Shutdown

During normal operation, press and hold the pause button for more than 5 seconds, the display screen displays PAC, and the system is in suspended working state. The suspended working time is 30min, and after more than 30min, the system turns into normal operation state; when the system is in suspended state, press and hold the pause button for 5 seconds again, and OFF is displayed, and the system is in shutdown state; when the system is shutdown, the controller is shutdown, and all outputs are closed, press and hold the shutdown button again. After 5 seconds, the system goes into normal operation mode. Remote switch can also be set through the platform.

#### Other sensors Temperature Viewing

In the normal operation interface, when the key is not locked, press the down key for a short time and release the key, the interface displays P1 to enter the temperature viewing interface, switch P1, P2, P4, P5, P6, P7, P8, P9 and P10 by the up and down keys (this item is displayed when FAC is 2), when P code is displayed, press the setting key to enter the corresponding temperature viewing, press the setting key or exit key again to return to P code interface, and in P code interface, press the exit key for a short time to launch the temperature viewing interface: P1: main reservoir temperature; P2: defrost probe; P3: standby sensor; P4: A phase current; P5: B phase current; P6: C phase current; P7: average current; P8: box temperature; P9: humidity; P10: accumulated trial time of compressor (this item is displayed when FAC is 2);

#### Standby sensor and compressor operation

In normal operation, if that standby sensor is enable, if the main reservoir temperature sensor fails, the standby sensor is use for temperature control; if the standby sensor also fails, the compressor is started and stopped proportionally in the mode of 15 minutes on and 30 minutes off; if the standby sensor is not enabled, the compressor is started and stopped  
Proportional on-off in a 15-minute, 30-minute stop-off pattern.

#### Door switch function

If the door switch function is enabled, after the product is powered on, the current door switch times, the current door switch state, and the current door switch opening time can be uploaded to the cloud platform through the pipeline communication module. No data storage is performed locally. After the product is powered on again, the above data are re-counted.

#### Control output

##### 1. Compressor

Compressor start-up conditions (simultaneously meet the following conditions):

#### Normal Mode:

##### a, first start

- 1) If the startup is started for the first time, it must delay the "power-on startup delay time";
- 2) Non-manual shutdown, non-defrosting, non-defrosting dripping state of the temperature  $\geq$  the set start-up temperature; or hot air defrosting start;
- 3) No voltage control alarm

##### b, not the first start

- 1) Non-manual shutdown, non-defrosting, non-defrosting dripping state temperature  $\geq$  set startup temperature;
- 2) The time between the last stop and this start  $\geq$  compressor delay time.
- 3) No voltage control alarm;

## Night Energy-saving mode

### a, first start

- 1) If the startup is started for the first time, it must delay the "power-on startup delay time";
- 2) Non-manual shutdown, non-defrosting, non-defrosting drips under the state of temperature  $\geq$  set startup + C05; or hot air defrosting start;

### b, not the first start

- 1) Non-manual shutdown, non-defrosting, non-defrosting dripping state temperature  $\geq$  set startup temperature +C05;
- 2) The time between the last shutdown and this startup  $\geq$  the compression machine delay time.  
In case of sensor failure (one of which is satisfied)

1) First startup after failure: if the spare sensor is not started, the compressor starts immediately; if the spare sensor is enabled, the temperature of the spare sensor is controlled; if the spare sensor also fails, the compressor works according to the mode of opening for 15 minutes and stopping for 30 minutes;

### Compressor stop conditions: meet any of the following conditions:

- 1) Manual shutdown;
- 2) Electric defrosting starts;
- 3) Night mode is not enabled: reservoir temperature  $\leq$  set shutdown temperature;

**When night energy-saving mode is enabled: the temperature of the reservoir  $\leq$  the set shutdown temperature + C05;**

- 4) At the end of hot air defrosting;
- 5) 15 minutes of operation under proportional on-off condition;
- 6) Shutdown defrosting begins.

**Note:** The temperature of the reservoir mentioned above is the temperature collected by the main sensor when the standby sensor is not enabled, i.e. when F17=0; if F17=1, b01 =1, the temperature of the reservoir is the temperature collected by the main sensor when the main sensor is not in fault, and the temperature of the reservoir is the temperature of the standby sensor when the main sensor is in fault; If F17=1, b01 =3, the average temperature of the main sensor + standby sensor, there is a fault in both, the temperature of the reservoir is the temperature value of no fault sensor; if F17=1, b01 =2, the temperature of the reservoir is the temperature collected by the main sensor.

### Defrosting control

#### Defrost start condition:

##### a. Periodic defrosting

F07=0, controller startup time  $\geq$  defrost cycle; F07=1, compressor cumulative working time  $\geq$  defrost cycle;

##### b, clock defrost

Clock time control, the maximum number of defrosting times per day can not exceed d15;

**c. Press the forced defrosting button:** Press the forced defrosting button for 5 seconds to meet the defrosting temperature and defrosting termination temperature;

Stop conditions (meet one of them):

- a. Press the forced defrosting button;
- b. Defrosting time  $\geq$  defrosting time;
- c. defrosting temperature  $\geq$  defrosting termination temperature;

### Fan control

#### a. Fan startup mode(F14)

Under non-defrosting condition, C: fan continuously running; 0-30: fan lagging compressor starts 0-30 minutes. - 1 - 30, the fan compressor starts 1-30 minutes ahead of time; in the defrosting state, when F16=1, the fan stops, when F16=2, the fan runs.

#### b. Fan stop mode(F15)

Under non-defrosting condition, C: fan continuously operates, and stops during defrosting; 0-30: fan lags press stops for 0-30 minutes; during defrosting: set according to the working mode set by fan during defrosting;

### Water pump control (F22=4)

Start the water pump first when cooling, and then start the compressor after the water pump runs out of

the preset pre-charging time. After the compressor stops, the water pump will stop after running the set water pump stop delay time.

### Light(F22=3)

When the door switch is not enabled, press the light button for more than 1 second when the key is unlocked, the light is turned on, press the light button again for a long time, and the light is turned off; when the door switch is enabled, the light relay is turned on when the door switch is opened, and the light relay is controlled by the light button after the door is closed.

### Alarm output

In the operating state, when the following conditions occur, the buzzer sounds and the alarm relay is activated at the same time (F22=1). Press and release the key to eliminate this buzzer alarm sound.

- 1) When the temperature probe is open circuit, the fault code E2 is displayed in the measuring temperature display window;
  - 2) When the temperature probe is short-circuited, the fault code E1 is displayed in the temperature measuring display window;
  - 3) When the defrosting probe is open circuit, the measuring temperature display window alternately displays fault code E4 and current temperature;
  - 4) When the defrosting probe is short-circuited, the measuring temperature display window alternately displays fault code E3 and current temperature;
  - 5) The two probes fail at the same time, and the fault code is alternately displayed in the measurement temperature display window;
  - 6) High temperature alarm, when the temperature  $\geq$  boot temperature + over-limit alarm, if it is the first high temperature alarm after power on or the first alarm after defrosting, the alarm time exceeds F05, and the high temperature alarm is generated; if it is not the first high temperature alarm and the duration  $\geq$  F04, the high temperature alarm is generated, and the temperature display window alternately displays Barrier code E5 and current temperature. When the temperature is less than or equal to the startup temperature, the alarm is eliminated.
  - 7) Low temperature alarm, when the temperature of the storage shutdown  $<$  over-limit alarm, if it is the first alarm after power on, the low temperature alarm will be generated when the alarm time exceeds F05, if it is not the first alarm and the alarm time  $\geq$  F04, the low temperature alarm will be generated, and the temperature display window will alternately display the fault code E6 and the current storage temperature. When the temperature is greater than or equal to the shutdown temperature, the alarm is eliminated.
- Note: no high or low temperature alarm will be generated when defrosting and door switch are open.

### Current protection (current protection enabled)

Except for phase sequence protection, other current protection functions occur after following time. After the protector is energized, no current protection action occurs within U07. When the load is started, no current protection action occurs within U09 time. The U10 parameter determines the selection of the average current.

#### 1. Phase loss protection

Under the condition of compressor output, when U12=1, under the condition of average current exceeding 2A, if any phase current drops to 0 and the duration is greater than or equal to U08, if the current is still 0, phase-missing protection will be generated, E16 will be displayed, and the system will cut off the output;

#### 2. Overload protection

When U11=1, when the average current  $\geq$  U01 (overload current setting) current value, the protection action time U02 (overload protection inverse time function) and U06 (overload current protection delay start time) influence. When U02 = 0, inverse time function is not enabled. When protection time = U06; U02 = 1, inverse time function is enabled. Protection time =  $U06 / [(average\ current - U01) / 2]$ ; the larger the average current exceeds the set protection current, the faster the protection actuation time; unbalanced protection; overload protection alarm code E13.

After overload protection occurs, the protector resets automatically after 5 minutes, and the fault code of the protector disappears after resetting.

If the number of consecutive resets within half an hour is greater than U03 (automatic reset times after

overload protection) times, the protector will not reset automatically, and the protector must be powered off and restarted before resetting.

### 3. Unbalanced protection

When U04 is not equal to 0, among the three-phase currents, the maximum current phase minus the minimum current phase is greater than or equal to U04 (three-phase unbalanced protection current setting) current value, and the duration exceeds U05 (unbalanced protection delay) time. Three-phase unbalance protection action, the screen alternately displays E15 fault code, buzzer sounds. If this protection occurs, the protector needs to be powered off to reset the protection function.

#### Restore factory settings and self-test settings

It is allowed to enter the factory reset and self-test settings within 5min after power-on, and it is impossible to enter more than 5 min after power-on .

If the key is not locked, press and hold the exit key for more than 10 seconds to display FAC, press the setting key to enter, select 1, press OK, the display screen displays YES, the system parameters are restored to factory settings, after displaying Y ES for3seconds, the system will turn to normal operation; if 2 is selected, it will be parameters with WIFI module. Select 3 to enter Chinese and English selection interface, press up and down key to switch, CN is Chinese, EN is English.

When FAC is displayed, switch to TST by using the up and down keys, press the setting key to confirm entering self-test setting, and the digital tube follows the A segment of the digital tube. Paragraph AB.. Full light, in turn, relays according to compressor, defrosting, fan, auxiliary in turn on, and then all disconnected, cycle 3 times, cycle end, digital tube display S00, short press exit key display S01, up key display S03, set key display S02, down key display S04, on key display S05. After factory reset or self-test, power off and restart.

When FAC is displayed, switch to Lan by up and down keys, press the setting key to confirm entering language selection, press up and down keys to adjust language items, CN is Chinese, EN is English, press the setting key to confirm and exit.

When FAC is displayed, Int is reserved for recorder initialization function and is not used when selecting by using up and down keys.

#### WIFI related settings and status

WIFI Reset and View: After replacing the network, clear the relevant network settings in the module before reconfiguring the network. Setting method: in the case that the key is not locked, press and release the key for a short time to display P01, adjust to P10, press the setting key for a short time to enter. When the number is displayed, press and unlock the key for more than 5 seconds, and the digital tube displays rST. At this time, the module enters the network clearing state, and 2 seconds turns into the normal operation state. At this time, the relevant network configuration can be entered. If there is no P10,you need to enter the factory reset, select 2;

After the WI F I connection is successful, the WI F I symbol is always bright. If the WI F I symbol is flashing rapidly, it means that the router is connected but the Internet cannot be accessed. If the WI F I status symbol flashes slowly, it means that the router is not connected. If the WI F I symbol is off, it means that the WI F I module is not configured.

#### Clock setting

Normal operation, no key lock state, if there is a large error between the clock and the actual time, you can adjust the time by setting. The adjustment method is as follows: Under normal operation and no key locking state, press the exit key for a short time, and the year number flashes to indicate entering the clock adjustment state, press "▲" or "▼" .Press "Set" key to save year, month flashes, press "▲" or "▼" key to add or subtract month, press "Set" key to save month, day flashes, press "▲" or "▼" key to add or subtract day, press "Set" key to save day, hour flashes, press "▲" or "▼" key to add or subtract hour, press "Set" key to save hour, minute flashes, press "▲" or "▼" key to add or subtract minute, press "Set" key to save minute, and exit clock setting at the same time. If after entering the time setting, the system automatically exits the time setting after 10 seconds without key operation.

#### Modbus communication

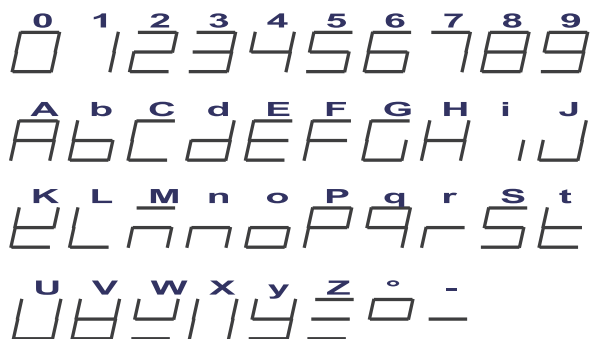
This system adopts MODBUS-RTU communication slave mode, baud rate9600, no parity check,8bits data bit,1bit stop bit, supporting MODBUS-RTUcommand03(read hold register),06(write single register)

### Trial Time Settings

In the system setting state, press the defrost key for more than 10 seconds, F38 appears, press the setting key to enter the parameter value modification, you can use the up and down keys to adjust the parameter value of F38, the default is 0 (do not enable the function), the parameter range is 0-999 days, adjust to 1day trial time (24 hours), after the trial time, the compressor of the controller outputs for 15 minutes and stops for 30 minutes. The fan outputs continuously. After the trial time function of the controller is enabled, it is recorded according to 1 hour. Once, 24 hours a day.

After the display board is fully displayed, the software version number of the display board is displayed in the upper window, and the software version number of the motherboard is displayed in the lower window.

### Appendix: Character sets

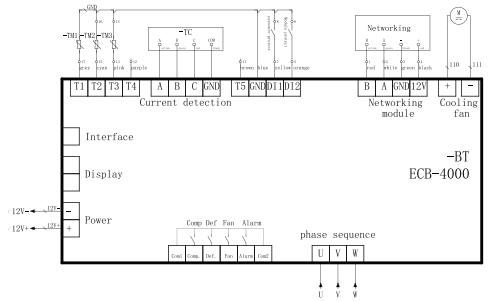
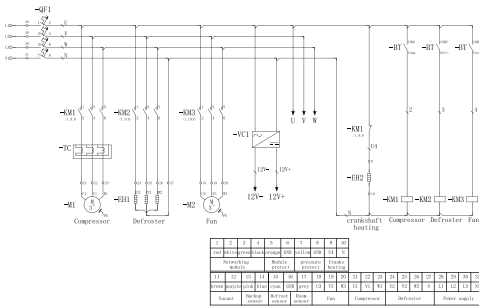


### Alarm codes

Code	Meaning
E1	Room temperature probe short circuit
E2	Room temperature probe short circuit
E3	Defrost probe short circuit
E4	Defrost probe short circuit
E5	High temperature alarm
E6	Low temperature alarm
E7	Door switch alarm
E8	Alarm when people are in the cold storage
E9	External alarm
E10	Pressure protection alarm
E11	Backup sensor failure
E12	Unit maintenance
E13	Current overload
E14	Phase - sequence alarm
E15	Unbalance protection

E16	Open-phase protection
Err	Motherboard and display board communication failure
E17	Parameter Storage Error Alarm
E19	Standby Sensor High Temperature Alarm
E20	Standby Sensor Low Temperature Alarm
E21	Trial time alarm
E22	Radiating fan sensor fault

### Appendix: Character sets



National high-tech enterprise  
Cold Chain IoT Product R & D and Production Base  
Jiangsu Province Refrigeration HVAC Energy-saving Control Engineering Technology Research Center  
National Calibration Regulation for Temperature Indicator Controller  
Standard drafting unit of Temperature Measurement of Perishable Food Cold Chain

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