

ECB

Plastic Electric Control Box



User Manual

Note: When the start time of business hour mode is set to ----, the corresponding setting items of business hour stop mode neither be displayed nor set; the set-point is ----. Only when the start time of business hour mode is not set to ----, the corresponding setting items of business hour stop mode can be displayed and set, and the set-point cannot be ----. If the start time of business hour mode is set and the stop time is set to ----, the corresponding stop time will be automatically set to 23:59 when exiting system settings.

3.5 Current protection menu

Menu	Function	Setting range	Default	Unit	Remarks	Register address
V1	Set compressor overload current	2~80A	20	A	The set-point of maximum overload current is forbidden to exceed the nominal value of mutual inductor	0x0462
V2	Enable inverse time lag	0: Disable 1: Enable	1	-		0x0463
V3	Compressor overload protection delay	0.5~99	3	s	Step 0.5s	0x0464
V4	Auto reset times of overload	0~5	2	-	Reset in half an hour	0x0465
V5	Unbalanced current differential	0~40	30	A	0: Cancel	0x0467
V6	Unbalanced current differential protection delay	1~99	60	s		0x0468
V7	Power-on delay protection	0~9	1	min		0x0469
V8	Open phase protection delay	0.5~3	2	s	Step 0.5s	0x046a

3.6 User menu settings

Parameter	Range	Default	Description	Register address
On Temp	Off Temp~85 C	10.0 C		0x0400
Off Temp	-40.0 C~On Temp	-10.0 C		0x0401
Defrost time	0~120 min	30 min	The time of duration in defrost	0x0404
Defrost cycle	0~120 hr	6 hr	The interval between two defrosts	0x0405

3.7 Alarm

Alarm code	Description	Alarm code	Description
E1	Short circuit in cold storage sensor	E7	Door switch alarm
E2	Open circuit in cold storage sensor	E8	External alarm
E3	Open circuit in defrost sensor	E9	Emergent external alarm
E4	Short circuit in defrost sensor	E10	Pressure protection alarm
E5	High cold storage temperature alarm	E11	HACCP alarm
E6	Low cold storage temperature alarm		

Over-temperature alarm:

Over high cold storage temperature alarm occurs when cold storage temperature \geq "On Temp set-point" + "Over limit alarm set-point" and duration \geq "temperature alarm delay". The alarm cancels when cold storage temperature $<$ "On Temp set-point". Over low cold storage alarm occurs when cold storage temperature \leq "Off Temp set-point" - "Over limit alarm set-point" and duration \geq "temperature alarm delay". The alarm cancels when cold storage temperature $>$ "Off Temp set-point".

4. Comprehensive Protection of Compressor

4.1 Over-load protection:

In the process of compressor running, when the average current of the three phases \geq V1 and duration \geq V3, the ECB stops all the output, overload indicator lights and buzzer beeps.

4.2 Phase order protection:

Power on the ECB after wiring according the wiring diagram, the compressor identifies phase sequence. If the phase sequence is wrong due to maintenance or change of power lines, or any phase of the three phases is open, the ECB stops all the output, overload indicator lights and buzzer beeps.

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1. Product Instruction

1.1 Overview

ECB-2000 series are electric control boxes with plastic case, specially designed for small to medium size cold storage of medium and low temperature. The case adopts ABS flame retardant material. It is touch control by a big panel and displays temperature, current and clock at the same time. Thanks to its modular design it is expandable with multiple functions, safe and reliable properties.

ECB-2010N: input: single sensor; output: refrigeration, light and alarm, buzzer alarm, RS485 communication
 ECB-2020N: input: double sensors; output: refrigeration, defrost, light and alarm, buzzer alarm, RS485 communication
 ECB-2030N: input: double sensors; output: refrigeration, defrost, fan, light and alarm, buzzer alarm, RS485 Communication

Directly drive units with power of 380V/10HP at maximum.
 Realize centralized management and control of cold storage.
 Innovative design, modular structure, allows free expansion.
 Display temperature, current and time.
 Hazard analysis and critical control point system (HACCP).
 Two modes: business hour mode and non-business hour mode.
 High/low temperature alarm, sensor failure alarm.
 Much safer, more stable and reliable.

1.2 Technical parameters

Power supply: three-phase-four-wire 380VAC±10%/50Hz
 Temperature measuring range: -45 °C~100 °C
 Temperature accuracy: ±1 °C
 Temperature control range: -40 °C~85 °C
 Temperature resolution: 0.1 °C
 Current measuring range: 0~80A
 Current measuring accuracy: ±2A (0~30A), ±3% (within the nominal range of mutual inductor)
 Current display resolution: 0.1A
 The maximum continuous output current of compressor loop: 10A (5HP), 14A(7.5HP), 21A(10HP)
 The maximum continuous output current of defrosting loop: 10A (5HP), 14A(7.5HP), 21A(10HP)
 The maximum continuous output current of fan loop: 5A
 The maximum continuous output current of cold storage light loop: 5A/220VAC (inductive load)
 Ambient temperature: 0 °C~40 °C
 Sensor: NTC (thermistor) (10KΩ/25 °C, B value 3435K)
 Communication interface: RS485

1.3 Dimension



ECB-2010W/2020W

ECB-2030W

Parameter items	Range	Default	Unit	Meaning	Register address
SHH	SLH...99.0	30	°C/°F	HACCP high temperature alarm parameter: when the cold storage temperature goes above the temperature set in SHH, and the time exceeds drA set-point, HACCP high temperature alarm will occur. The accuracy of this parameter is 0.1 °C. The display of the alarm lies on H50	0x044b
SLH	-50.0...SHH	-30	°C/°F	HACCP low temperature alarm parameter: when the cold storage temperature goes below the temperature set in SLH, and the time exceeds drA set-point, HACCP low temperature alarm will occur. The accuracy of this parameter is 0.1 °C. The display of the alarm lies on H50	0x044c
drA	0...99	10	min	HACCP alarm delays	0x044d
drH	0...255	0	hr	Set HACCP alarm reset time: when the time set in this parameter elapses after the ECB is power on, HACCP will automatically reset. If the time is set to 0, HACCP alarm record will be saved.	0x044e
H50	0...2	0	number	H50=0, HACCP is disabled; H50=1, HACCP is activated with no alarm relay output; H50=2, HACCP is activated with alarm relay output.	0x044f
H52	-	-	-	Reserved	0x0450

3.4 Menus of business hour mode/Non-business hour mode

Parameters	Description	Default	Range	Register address	Parameters	Description	Default	Range	Register address
H20	Temperature setting in non-business hour mode	3°C	-35°C~35°C			When business hour mode is shifted to non-business hour mode, On Temp and Off Temp equals to their corresponding set-points in business hour mode plus H20 set-point.			0x0451
H21	The time when the first business hour mode starts	--	00-23hr. 00-59 min	0x0452	H31	The time when the first business hour mode stops	--	00-23hr. 00-59 min	0x045a
H22	The time when the second business hour mode starts	--	00-23hr. 00-59 min	0x0453	H32	The time when the second business hour mode stops	--	00-23hr. 00-59 min	0x045b
H23	The time when the third business hour mode starts	--	00-23hr. 00-59 min	0x0454	H33	The time when the third business hour mode stops	--	00-23hr. 00-59 min	0x045c
H24	The time when the fourth business hour mode starts	--	00-23hr. 00-59 min	0x0455	H34	The time when the fourth business hour mode stops	--	00-23hr. 00-59 min	0x045d
H25	The time when the fifth business hour mode starts	--	00-23hr. 00-59 min	0x0456	H35	The time when the fifth business hour mode stops	--	00-23hr. 00-59 min	0x045e
H26	The time when the sixth business hour mode starts	--	00-23hr. 00-59 min	0x0457	H36	The time when the sixth business hour mode stops	--	00-23hr. 00-59 min	0x045f
H27	The time when the seventh business hour mode starts	--	00-23hr. 00-59 min	0x0458	H37	The time when the seventh business hour mode stops	--	00-23hr. 00-59 min	0x0460
H28	The time when the eighth business hour mode starts	--	00-23hr. 00-59 min	0x0459	H38	The time when the eighth business hour mode stops	--	00-23hr. 00-59 min	0x0461

Parameters	Description	Setting range	Default	Note	Register address
F25	Definition of auxiliary output 1	0~6	4	F25=0, output 1: disabled; F25=1, output 1: alarm; F25=2, output 1: auxiliary function F25=3, output 1: standby mode F25=4, output 1: light relay; F25=5, output 1: buzzer alarm; F25=6, output 1: condensate water pump	0x043e
F26	Type of auxiliary input 1	0~1	1	1: Normally closed 0: Normally open	0x043f
F27	Type of auxiliary input 2	0~1	0	0: Normally closed 1: Normally open	0x0440
F28	RS485 communication address	1~247	1		0x0421
F29	Current protection	0~1	1	0: Disabled 1: Enabled	0x0042
F30	Three-phase voltage selection	0~1	0	0: 380V 1: 220V	0x046a
F31	Enable phase sequence protection	0~1	0	0: Enabled 1: Disabled	0x046b

3.2 Real-time defrost submenu

Parameters	Description	Setting range	Default	Register address
H0	The time when the first defrost starts	00-23 hr./00-59 min	----	0x0441
H1	The time when the second defrosting starts	00-23 hr./00-59 min	----	0x0442
H2	The time when the third defrosting starts	00-23 hr./00-59 min	----	0x0443
H3	The time when the fourth defrosting starts	00-23 hr./00-59 min	----	0x0444
H4	The time when the fifth defrosting starts	00-23 hr./00-59 min	----	0x0445
H5	The time when the sixth defrosting starts	00-23 hr./00-59 min	----	0x0446
H6	The time when the seventh defrosting starts	00-23 hr./00-59 min	----	0x0447
H7	The time when the eighth defrosting starts	00-23hr./00-59 min	----	0x0448

- Note:
1. Real-time defrost mode is still controlled by defrost stop temperature. When defrost probe temperature goes above defrost stop temperature within defrost start time, the controller will cancel defrost, and the corresponding effect on fan, etc. The controller will judge whether to defrost until next defrost time approaches.
 2. When the ECB is power on and in any defrost duration, it defrosts in defrost mode and lasts based on defrost stop temperature.
 3. When the defrost lasts until next defrost starts, defrost will not stop but elapse next defrost duration.

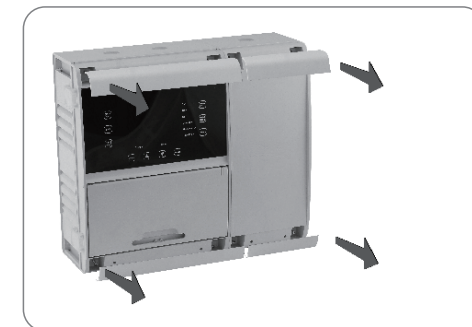
3.3 HACCP submenu

Parameter items	Range	Default	Unit	Meaning	Register address
SHi	SHH...99.0	35	°C/°F	Emergent high temperature alarm output parameter: when the cold storage temperature goes above the temperature set in SHi, the ECB will start emergent high temperature HACCP alarm without delay. The accuracy of this parameter is 0.1 °C. The display of the alarm lies on H50	0x0449
SLi	-50.0...SLH	-35	°C/°F	Emergent low temperature alarm output parameter: when the cold storage temperature goes below the temperature set in SLi, the ECB will start emergent low temperature HACCP alarm without delay. The accuracy of this parameter is 0.1 °C. The display of the alarm lies on H50.	0x044a

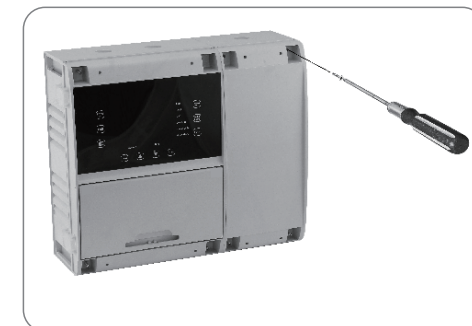
2. Installation and Usage

2.1 Installing diagrams

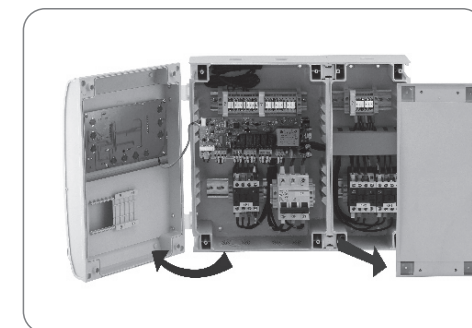
Step 1. Remove the frame of the ECB.



Step 2. Remove the retaining screw with a screw driver.



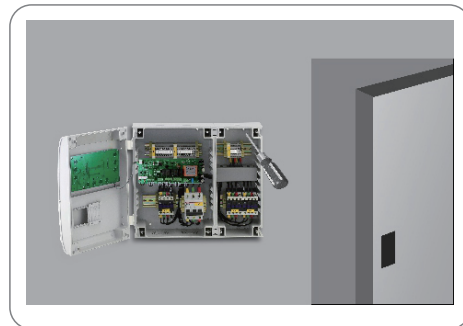
Step 3. Open the cover.



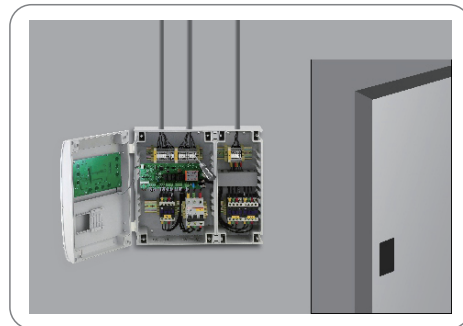
Step 4. Drill holes according to the borehole layout we provide.



Step 5. Put waterproof rubber mats on the screws and fix the ECB from inside.



Step 6. Connect the ECB with your units and debug it. Install the cover after debugging.



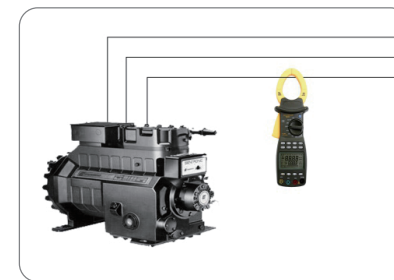
Parameters	Description	Setting range	Default	Note	Register address
F17	Whether to enable door switch light	0: Disable 1: Enable	1		0x0436
F18	Light delay when door is closed	0~99 min	0		0x0437
F19	Business/Non-business hour mode	0: Disable 1: Enable	0		0x0438
F20	Set HACCP	SHI~H52	--	Refer to the HACCP submenu.	0x0439
F21	Set password	000~999	18	When the password is set to 000, there is no need to input it when entering administration menu.	0x043a
F22	Definition of auxiliary input 1	0~12	11	F22=0, input 1: disabled; F22=1, input 1: defrost; F22=2, input 1: non-business hour mode; F22=3, input 1: auxiliary function; F22=4, input 1: door switch; F22=5, input 1: external alarm; F22=6, input 1: standby mode; F22=7, input 1: maintenance call; F22=8, input 1: low pressure switch input; F22=9, input 1: high pressure switch input; F22=10, input 1: light switch input; F22=11, input 1: emergency alarm; F22=12, input 1: HACCP reset.	0x041f
F23	Definition of auxiliary input 2	0~12	4	F23=0, input 1: disabled; F23=1, input 1: defrost; F23=2, input 2: non-business hour mode; F23=3, input 2: auxiliary function; F23=4, input 2: door switch; F23=5, input 2: external alarm; F23=6, input 2: standby mode; F23=7, input 2: maintenance call; F23=8, input 2: low pressure switch input; F23=9, input 2: high pressure switch input; F23=10, input 2: light switch input; F23=11, input 2: emergency alarm; F23=12, input 2: HACCP reset.	0x0420
F24	Definition of auxiliary output 1	0~6	1	F24=0, output 1: disabled; F24=1, output 1: alarm; F24=2, output 1: auxiliary function F24=3, output 1: standby mode F24=4, output 1: light relay; F24=5, output 1: buzzer alarm; F24=6, output 1: condensate water pump.	0~6

3. Parameter Codes

3.1 Parameter list

Parameters	Description	Setting range	Default	Note	Register address
F01	Temperature calibration	-10.0 C~10.0 C	0 C	Calibrate the temperature by adjusting "temperature calibration" set-point when error occurs to cold storage temperature displayed	0x0410
F02	Over temperature alarm deviation	0~50.0 C	5.0 C	If cold storage temperature goes above "On Temp set-point + Over-temperature alarm deviation set-point" or below "Off Temp set-point - Over-temperature alarm deviation set-point", it will alarm	0x040e
F03	Defrost stop temperature	-40~50.0 C	10 C		0x0409
F04	Defrost mode	0: Electric defrost 1: Natural defrost 2: Hot gas defrost	1		0x0408
F05	Defrost timing mode	0: in cycle 1: in real time	0		0x0430
F06	Defrost cycle calculation	0: Cumulative running time of the controller after power on 1: Cumulative running time of the compressor after power on	1	Set it according to the sub menu items	0x0406
F07	Dripping time after defrost	0 ~ 120 min	3 min	Delay time after each defrost ends	0x0407
F08	Whether to enable defrost sensor	0: Disable 1:Enable	-	ECB-2010N: default 0 ECB-2020N and ECB-2030N: default 1	0x0431
F09	Max defrost times	0~8	0	The maximum defrost time per day in real-time defrost mode	0x0432
F10	Compressor delay time	0~10 min	3	Compressor delay protection time	0x040c
F11	Water-prefilling time of water pump	3~255 sec	5 sec	Start the water pump first in refrigeration. The compressor starts after the set water prefilling time elapses	0x0433
F12	Water pump stop delay	3~255 sec	10 sec	After compressor stops, water pump stops until the set "water pump stop delay" elapses.	0x0434
F13	Fan start mode	-1: Fan runs continuously. 0~30: Fan starts 1 to 30 min later than compressor	0	Fan stops during defrosting	0x040a
F14	Fan stop mode	-1: Fan runs continuously. 0~30: Fan stops 1 to 30 minutes later than compressor.	0		0x0435
F15	Over-temperature alarm delay	0~120 min	30 min	Alarm won't occur until over-temperature duration is longer than the time set by this parameter.	0x040f
F16	The initial over-temperature alarm delay after power on	0~120 hr	2 hr	After power on, there is no over-temperature alarm signal within this time range	0x040d

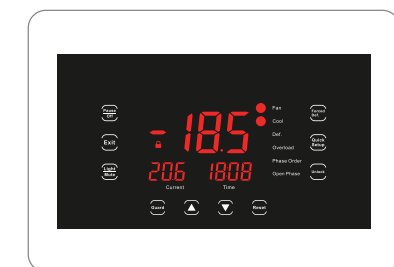
Step 7. Detect the current of compressor.



Step 8. Set parameters.



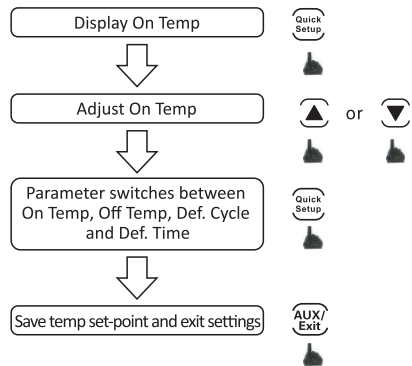
2.2 Operation interface



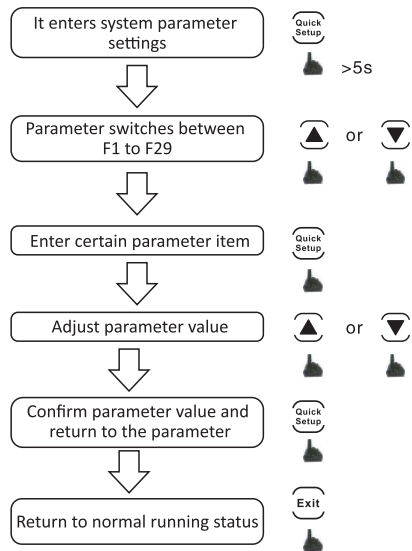
Indicators	Status	Meaning
Cooling indicator	Off	Refrigeration stops.
	Flash	Refrigeration delays.
	On	Refrigeration is on.
Defrost indicator	Off	Defrosting stops.
	On	Defrosting is on.
Fan indicator	Off	Fan stops.
	On	Fan runs.
Overload indicator	Off	----
	On	Compressor overload
Phase order indicator	Off	----
	On	Phase sequence error or open circuit of any
Open phase/imbalance indicator	Off	----
	On	Open phase/ imbalance of three phase current

2.3 Operation instruction

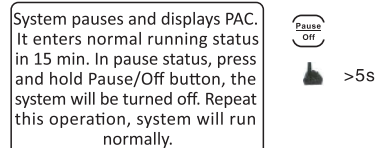
General settings (No password)



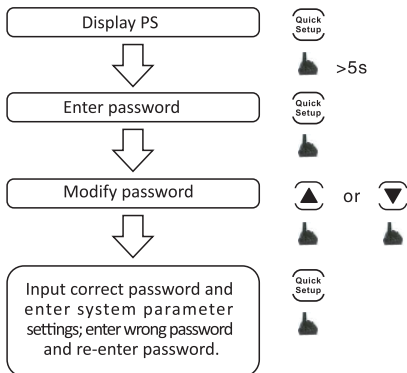
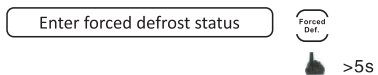
Set system parameters (When buttons are unlocked.)
If F21=0,



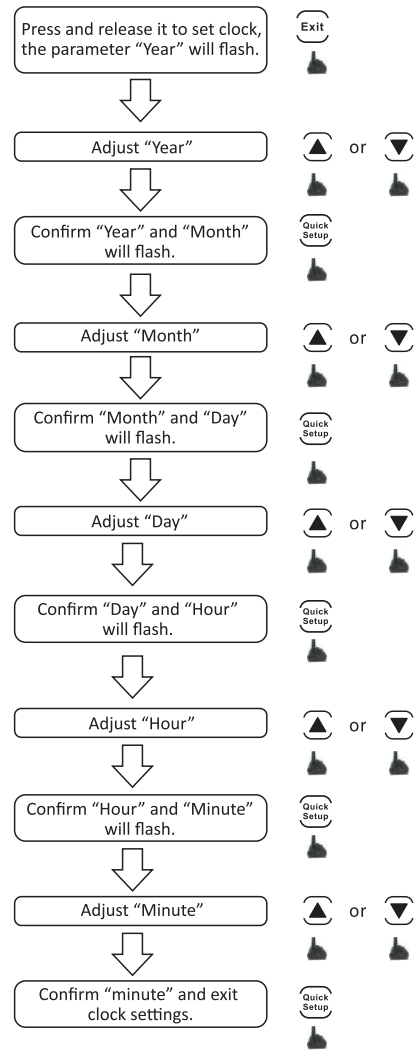
Pause/On/Off (When buttons are unlocked.)



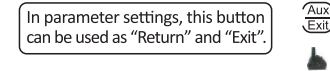
Forced defrost (When buttons are unlocked.)



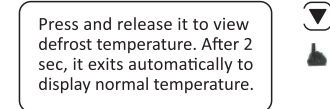
Set time: (No password)



Others:



View defrost temperature:



Set current protection (When buttons are unlocked.)
If F29=1,

