Refrigerated cabinet controller Instructions

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SANHUA

Zhejiang Sanhua Commercial Refrigeration Controls Co.,Ltd
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SANHUA official website

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Instructions

SAFETY ATTENTION

1. Although the internal electronic circuit of this product has been protected to some extent, the components will still be damaged if it operates in a humid environment for a long time. Therefore, please avoid installing and operating in rain, moisture and other liquids.
2. This product is installed in an electric box with DIN 35 rail.
3. This product can be used under the following environmental conditions:
   a. indoor; b. In an environment with pollution level 2; c. Altitude 2000m or below.
4. The power input must be within the range specified in the manual
5. To turn on or off the power supply of this product, please use a circuit breaker or switch meeting IEC 60947-1 or IEC 60947-3 standards and install it in a position close to and convenient for customer operation.
6. Wire used for this product must meet the flammability grade Fv1 (V-1 or above), The thickness of the wire should be 0.34 mm² (AWG24) or above.
7. To prevent induced noise, please keep power wires away from high-voltage wires.
8. Please avoid installing the product in a position with strong magnetic field, noise, violent vibration and impact.
9. When extending the length of the sensor wire, please use the shielded wire. Do not extend it unless necessary to avoid affecting the accuracy of the sensor.
10. Sensor wires and signal wires shall be away from power and load wires and installed separately
11. Avoid using this product near the equipment generating strong high-frequency noise (such as high-frequency welding machine, high-frequency sewing machine, high-frequency wireless telegraph, high-capacity SCR controller, etc.)

Scrap disposal: This product is composed of metal parts and plastic parts.
All parts must be disposed of separately in accordance with local regulations on scrap disposal.

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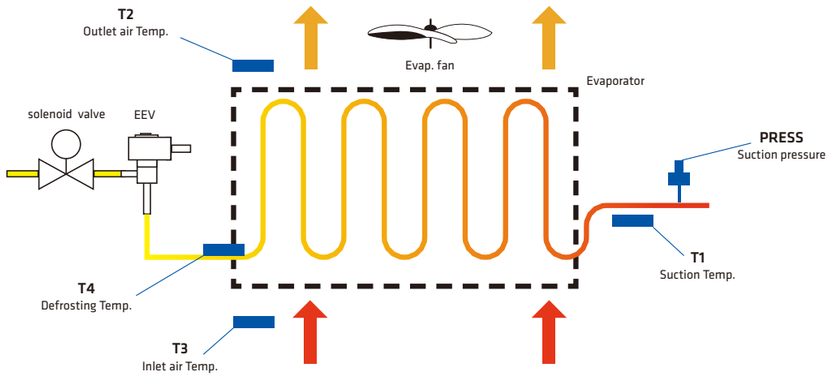
1 Product description

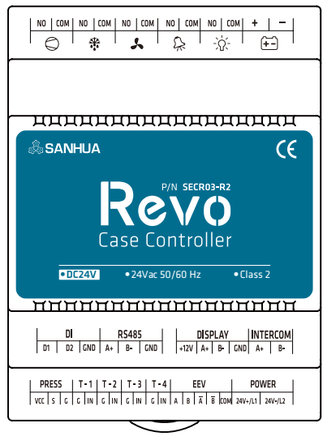
SECR03-R2 is designed for refrigeration system management of self-contained or remote cabinets. Multiple functions are integrated such as EEV control, cabinet temperature control, intelligent defrosting control, evaporating fan control, lighting control. The adaption of electronic expansion valve makes the refrigeration system more efficient and intelligent, and the superheat is controlled by PID algorithm which ensures the stable and efficient operation of the system.

Storage and operating Temperature: -30~55 ℃ Relative Humidity≤95%RH

1.1 Schematic diagram of cabinet input signal



1.2 Basic information of controller SECR03-R2



Items	Description
Dimension have (WxHxD)	80(W)mm x 106(H)mm x 54(D)mm
Power supply	24Vac+10%/-15%, 50/60Hz; 24Vdc+10%/-15%, class 2
Power consumption	Maximum power 10W (24Vdc) or 25VA (24Vac)
Connection	Pluggable terminal (M3) Torque 0.5N.m, Current ≤3A(220V), Min/max wire diameter 0.34~2.5mm2 XHP terminal (EEV and sensor)
Communication	Modbus RTU, Intercom

2 Product configuration

2.1 Product list

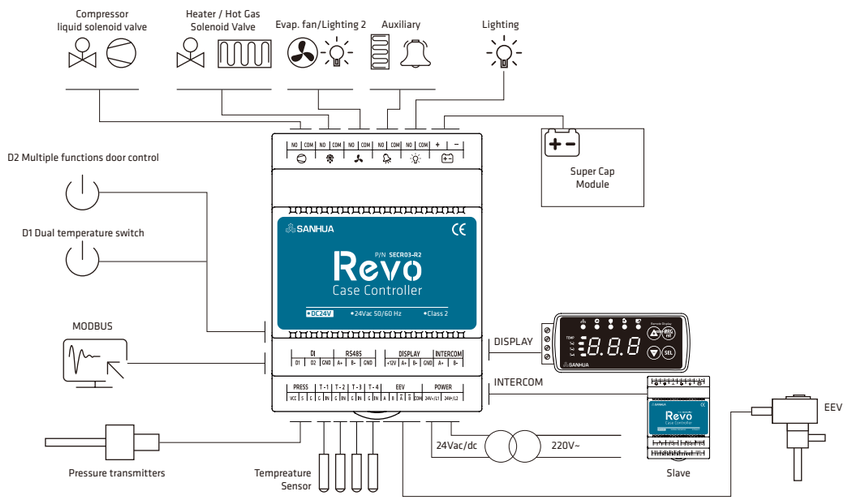
NO.	Name	Model	Details	Part Number (U11)
1	Revo Controller	SECR03-R2	Main controller	10680004902
2	Voltage Pressure Transmitter (Output signal: 0.5~3.5V)	YCQB02H01-1 0-20 bar	1/4" soldering 2m cable	10185001502
		YCQB02H18-1 0-20 bar	1/4" soldering 4.9m cable	10185015402
		YCQB02L12-1 0-20 bar	Thread: SAE-1/4" 7/16-20UNF-2B 2m cable	10185015502
		YCQB02L28-1 0-20 bar	Thread: SAE-1/4" 7/16-20UNF-2B 4.9m cable	10185015602
3	Temperature Sensor (NTC 5 K)	NTC2A1	With 2m cable length	10665000102
		NTC5A1	With 5m cable length	10665000202
		NTC9A1	With 9m cable length	10665000402
4	Remote Display	MD01-01	Display values and parameters setting	10680002002
5	Super Capacitor (Optional)	SP01	Backup power supply in case of unexpected power failure	10680001702
		SP02		10680004702

2.2 Sensor information

Items		Description
Temperature sensor	Sensor type	NTC 5KΩ β value: 3970K
	Cable specification	2/5/9 m×0.5mm^2
	Enclosure	IP 67
	Accuracy	±1°C(-40°C)
	Operating temperature range	-40°C~ 105°C
Pressure Transmitter	Power Supply	YCQB: (5±0.25) VDC
	Output signal	YCQB: (0.5~3.5) VDC
	Pressure range & Accuracy	±0.8% F.S. (-40°C/+40°C)
	Enclosure	IP 67

★ **Note:** Above pressure transmitters are standard models recommended by Sanhua.
If you select other models, please refer to the Sanhua catalogue. The output signal for pressure transmitters purchased separately, must have the output of 0.5~3.5V.

2.3 Controller function & wiring diagram



Screen printing	Port name	Pin	Function description	Remarks
POWER	Power supply	24V+	24VDC/AC	See 2.4 connecting power supply for details
		24V-		
	Super-capacitor	+	Super-capacitor SP01 /SP02 connection	
		-		
DISPLAY	Remote display	12V+	Connect remote display	See 2.5 connecting the remote display MD01-01 for details
		A+		
		B -		
		GND		
RS485	RS485 communication	A+	Connect to upper level computer, main controller or monitoring system	MODBUS RTU
		B -		
		GND		
INTERCOM	Cascade communication	A+	Share signals and synchronize defrosting or cooling	See 2.7 intercom communication for details
		B -		
T-1	Temp. sensor	G	Suction Temp. sensor	XHP terminal
		IN		
T-2	Temp. sensor	G	Outlet air Temp. sensor	XHP terminal
		IN		
T-3	Temp. sensor	G	Inlet air Temp. sensor (by default) or program as Condensing Temp. sensor	XHP terminal
		IN		
T-4	Temp. sensor	G	Defrosting Temp sensor	XHP terminal
		IN		
PRESS	Pressure sensor	G	Wire 3：Black	XHP terminal
		S	Wire 2：White	
		VCC	Wire 1：Red	
EEV	EEV	A	5-pin coil of Electronic expansion valve	Sanhua LPF or DPF XHP terminal
		B		
		— A		
		— B		
		COM		
	Relay output 1	NO	Liquid line solenoid valve or Compressor (in case of plug-in cabinet)	(Resistive load 8A 250Vac/30Vdc) Normally open contact
		COM		
	Relay output 2	NO	Control electric heater or hot gas bypass solenoid valve	(Resistive load 8A 250Vac/30Vdc) Normally open contact
		COM		
	Relay output 3	NO	Control evaporating fans (by default) or lighting2	(Resistive load 5A 250Vac/30Vdc) Normally open contact
		COM		
	Relay output 4	NO	Alarm (by default) / anti-condensation(always ON) / anti-condensation(ON/OFF)	(Resistive load 5A 250Vac/30Vdc) Normally open contact
		COM		
	Relay output 5	NO	Control lighting	(Resistive load 5A 250Vac/30Vdc) Normally open contact
		COM		
DI	Digital Input [Door control]	D1	switch two groups of parameters with an external switch	See 2.8 Dual Temp. control of one unit for details
		D2	Multiple functions	See 2.8 door control 2 for details
		GND		

2.4 Super-capacitor connection diagram

In case of unexpected power failure, the following two methods can be used to cut off the liquid line:

1. With a liquid line solenoid valve, if power is accidentally OFF, the solenoid valve will automatically close and there's no need of super-capacitor.

2. Use low internal leakage EEV (eg. Sanhua LPF), we recommend to install a super-capacitor to close the EEV when the system lose power unexpectedly.

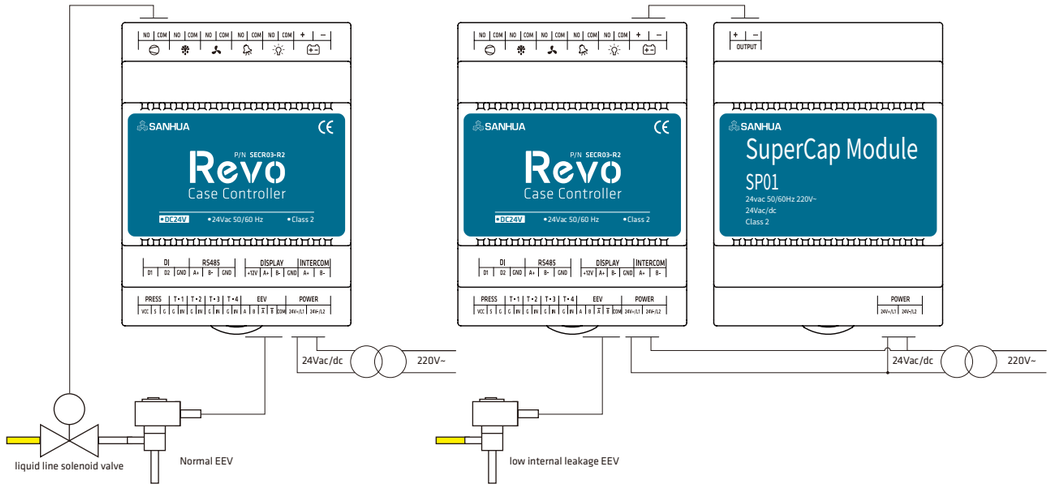
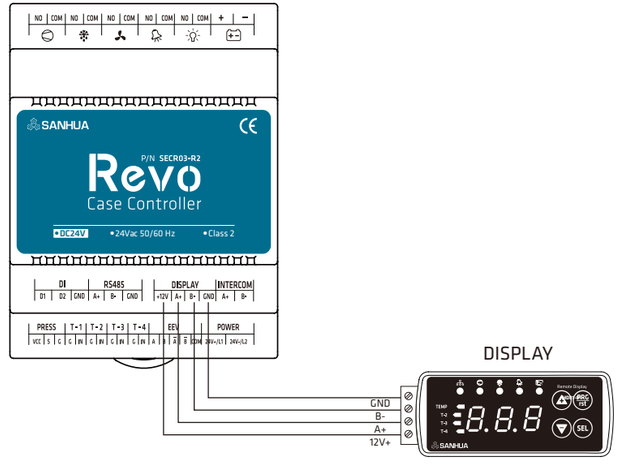


Figure 3: Super capacitor connection diagram

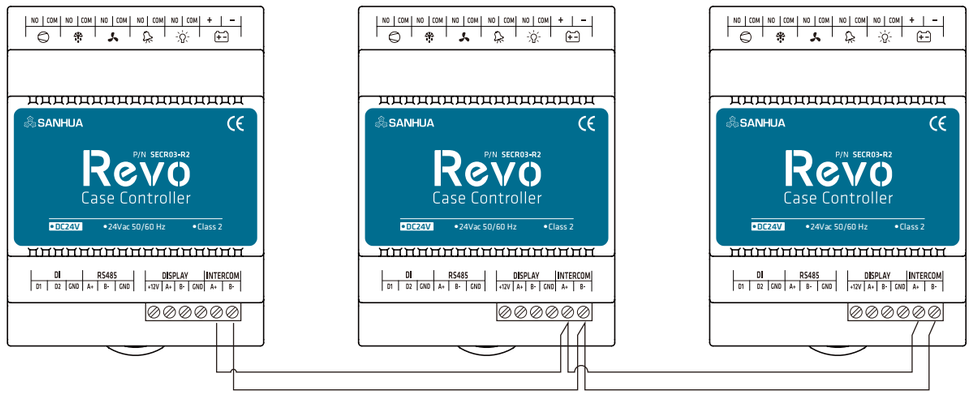
2.5 Remote display connection

For easier operation, a remote display can be connected to the blind controller, and you could operate the controller via a remote display:



2.6 INTERCOM cascade communication

When several controllers are used in parallel, the INTERCOM communication can be used. The analog signal for master controller (eg. Suction pressure , case temperature) can be shared with slave controllers, and can also achieve synchronous defrosting or cooling.



Intercom cascade communication parameter setting [*3.Pr*]

Description	code	unit	interval	Min.	Max.	Default	Notes
★ Communication ID setting	*c 16*	/	1	1	250	2	
Number of slave controllers	*c 18*	/	1	0	10	0	
★ Controller master/slave mode	*c 19*	0: Slave 1: Master				0	

★ The controller is by defaults in slave mode and do not need any setting during independent working; When multiple controllers work in parallel, if the [c19] is set to 1, it means that the controller is the Master, and if it is set to 0, it means that the controller is the Slave.

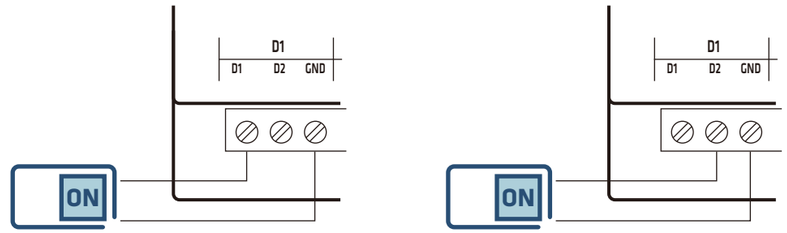
★ If the cascade communication speed is modified,the controller will restart automatically.

★ Set the master/slave controller communication ID as follows:

Master controller communication ID m*10+1, m ∈ [0,24]	Slave controller communication ID m*10+n, n ∈ [2,10]
1	2, 3, ..., 9, 10
11	12, 13, ..., 19, 20
.	.
.	.
.	.
231	232, 233, ..., 239, 240
241	242, 243, ..., 249, 250

The default is working in independent mode. If you want to work in slave mode, you need to set the master slave mode to 0, and the number of slave controllers is greater than 0.

2.7 Dual Temp mode setting and door control function



1. An external switch is connected between terminal D1 and GND for dual Temp mode. When the external switch is switched to different positions, two different sets of operating parameters (MT temperature and LT temperature) can be set. The default two sets of parameters are identical.
2. When switching from one group of parameter to the other, the controller will automatically restart.

Description	Code	Unit	Interval	Min.	Max.	Default	Notes
Door Control 2 Function selection	*d08*	0: No function 1: Run/Stop Signal 2: Cooling/Defrosting Switch 3: Door Open Alarm (w/ delay setting) 4: Lighting ON/OFF 5: Day/Night Switching 6: Alarm when contact is closed 7: Alarm when contact is open				0	
Door Open Alarm delay	*H 17*	min	1	0	240	30	
DI2 Alarm delay	*H 18*	min	1	0	240	30	

[Run/stop Signal] : The cooling control will start once the contact is closed.

[Cooling/Defrosting Switch] : Every time the contact status is changed, the control status will switch from cooling to defrosting or from defrosting to cooling.

[Door Open Alarm] : If the door is keep opened (the contact is closed) for the time > [Door Open Alarm delay], the alarm will be activated.

[Lighting ON/OFF] : In case the Lighting is set to be controlled by the door control, then once the contact is closed, the light will be turned on.

[Day/Night Switching]: Every time the contact status is changed, the control status will switch from day time mode to night time mode or vice versa.

[Alarm when contact is closed]: if the contact is closed for more than [DI2 Alarm delay], alarm will will be activated. The similar logic for [Alarm when contact is open]

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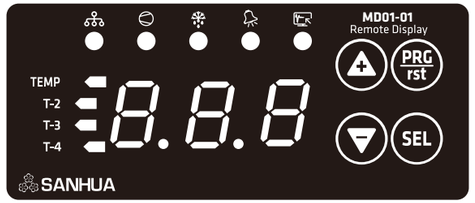
3 Operating instructions

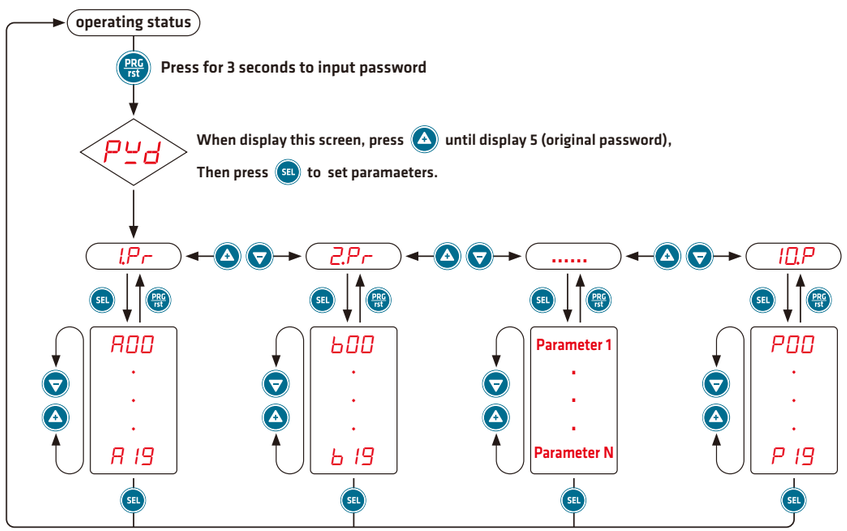
3.1 Remote display



Item		Description
LED		Set as a master controller, LED is ON, Set as a slave controller, LED is OFF
		When compressor or Liquid line solenoid valve is working, the LED is ON
		When heater or defrosting solenoid valve is working, the LED is ON
		When the alarm/ Non-condensation heater is working, the LED is on
		When communicate with upper computer/supervision, LED light is ON
	°C/bar	Units of temperature and pressure
	★ TEMP	Cabinet temperature
	T-2	Outlet air Temp.
	T-3	Inlet air Temp.(by default)/Condensing Temp.
	T-4	Defrosting Temp.
	TEMP + T-2	Suction pressure
	T-2 + T-3	Superheat
	T-3 + T-4	EEV opening degree

★ Cabinet temperature is displayed by default; press the SEL key to switch the display content, check other parameters such as T-2 Temp, T-3 Temp, etc., and automatically return to the current Cabinet Temp. display in case no operation after 1 minute.

3.2 Parameter setting steps



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① Long press PRG rst key for 3 seconds, and enter the password through the ▲ ▼ button, press the SEL key to confirm, and enter the parameter setting mode(When the password is correct, the value flashes and can be modified. When input wrong password, users can check the parameter but cannot modify the parameter. Default password = 5);

② Input password to enter page Menu (1.Pr, 2.Pr, 3.Pr, 4.Pr, 5.Pr, 6.Pr, 7.Pr, 8.Pr, 9Pr, 10P), Press ▲ ▼ to choose the page menu and press SEL to enter the target page.

③ Press SEL to select the parameter needed to be revised and press ▲ and ▼ to revise the value. Press SEL to access to next parameter and press PRG rst to return to page menu.

④ Press SEL for 3 seconds to save the parameter setting and exit parameter setting mode. Without operation after 1 minute, the controller automatically exit the parameter setting.。

Description	Code	Unit	Interval	Min.	Max.	Defaults	Notes
password	A00	/	1	1	999	5	

3.3 Button Functions

① Cabinet temperature is displayed by default; press the SEL key to switch the display content, view other parameters such as outlet air temperature (T-2 Temp), inlet air temperature (T-3 Temp) Temp, etc., and automatically return to the current Cabinet Temp display after 1 minute of inactivity.

② Press SEL for 3s to start control function and digit screen displays "ON". Press SEL for 3s again to close control function and digit screen displays "OFF", then screen will be off. Under "OFF" mode, the timer will keep running while other controls of cooling, defrosting and evaporating fan are OFF.

③ press ▲ or ▼ for 3 seconds to enter the target cabinet temperature setting, flashing to display the current daytime target cabinet temperature setting value. Press ▲ or ▼ to modify the setting value, press SEL to confirm and complete the setting. After the setting is completed, the daytime target cabinet temperature is changed to the set value, and the nighttime target cabinet temperature follows the same difference as it was.

④ During defrosting mode, press both ▲ or ▼ for 3 seconds to compulsively quit defrosting mode and start the cooling mode. During cooling mode, press both ▲ or ▼ for 3 seconds to compulsively end the cooling mode and start defrosting mode.

⑤ Press both PRG rst and SEL button for 3 seconds to enter or exit the fault/alarm display. When displaying faults, switch between the value and the current fault code, switching once every 1 second。

⑥ Press both PRG rst and ▲ button for more than 5 seconds to reset the alarm (in case of manually reset alarm).

⑦ Press both PRG rst and ▼ button for 3 seconds to switch between day and night: switch the current time period between day and night. For example: The set time from 7:00 to 20:00 is daytime, and the current time is 8:00, which is daytime. If switching between day and night, 8:00 to 20:00 will switch from daytime to nighttime. The state after 20: 00 remains night time.

3.4 Parameter setting

3.4.1 Refrigerant and EEV setting

Refrigerant and EEV parameter setting [1.Pr]

Description	Code	Unit	Interval	Min.	Max.	MT. default	LT. default
Refrigerant	A01	0=R22 1=R404A 2=R410A 3=R134a 4=R407C 5=R507 6=R1234ze 7=R1234yf 8=R290 9=R450A 10=R513A 11=R448A 12=R449A 13=R452A 14=R744(CO_2) 15=R744a(N_2O) 16=R32 17=R245fa 18=R23 19=R407A 20=R407F 21=R124 22=R717 23=R407H 24=R454C 25=R455A 26=R454B 27=R452B 28=R600A 29=R600 30=R454A				1	
Superheat setting	A02	K	0.1	0.5	30	6	6
Initial opening setting	A04	%	1	0	100	70	70
Initial opening duration time	A05	Sec	1	0	600	20	20
Proportional	A06	%	0.1	0.1	99.9	30	30
Integration	A07	Sec	1	0	999	20	20
Differential	A08	Sec	1	0	999	4	4
★ Forced valve opening ratio	A09	%	0.1	0	100	OFF(-1)	OFF(-1)
Maximum opening	A13	%	1	0	100	100	100
Minimum opening	A14	%	1	0	100	0	0

★ **Note:** When [A09] forced valve opening ratio setting value is not -1, the EEVe will be forced to open to the A09 [force valve opening ratio] setting value and remain unchanged after the initial opening duration ends.

EEV Opening at Cooling OFF [2.Pr]

Description	Code	Unit	Interval	Min.	Max.	MT. default	LT. default
EEV at Cooling OFF	b0b	0: fully closed 1: Keep at previous opening 3: to pre-defined opening				0	0
EEV opening at Cooling OFF mode	b07	%	1	0	100	0	0

EEV Opening at defrosting [2.Pr]

Description	Code	Unit	Interval	Min.	Max.	MT. default	LT. default
EEV at defrosting	b 15	0: fully closed 1: Keep at previous opening 2: to pre-defined opening				0	0
EEV opening at defrosting mode	b 16	%	1	0	100	0	0

EEV Closing Delay [3.Pr]

Description	Code	Unit	Interval	Min.	Max.	MT. default	LT. default
EEV Closing Delay	c03	Sec	1	0	100	0	0

3.4.2 Sensor parameter setting [4.Pr]

Description	Code	Unit	Interval	Min.	Max.	MT. default	LT. default
Pressure transmitter type	d00	0: Voltage type; 1: N/A; 2: Shared pressure from Master				0	0
Transmitter input filter coefficient	d0 1	/	1	1	100	10	10
Pressure sensor maximum	d02	bar	1	-1	99	20	20
Pressure sensor minimum	d03	bar	1	-1	99	0	0
Pressure transmitter offset correction	d04	bar	0.1	-9.9	9.9	0	0
T-1 Sensor offset correction	d08	℃	0.1	-9.9	9.9	0	0
T-2 Sensor offset correction	d09	℃	0.1	-9.9	9.9	0	0
T-3 Sensor offset correction	d 10	℃	0.1	-9.9	9.9	0	0
T-4 Sensor offset correction	d 11	℃	0.1	-9.9	9.9	0	0

3.4.3 Cabinet temperature parameter setting

Cabinet temperature display setting [4.Pr]

Description	Code	Unit	Interval	Min.	Max.	MT. default	LT. default
★ Cabinet Temp sensor logic selection	d07	0: Weighted Temp. (T2 & T3); 1: Only T-2 air outlet Temp.				1	1
Cabinet Temp weighting factor	d 12	/	1	0	100	50	50
Cabinet Temp display upper limit	d 13	℃	0.1	-40	40	25	25
Cabinet Temp display lower limit	d 14	℃	0.1	-40	40	-10	-10
★ Cabinet Temp display during defrosting	d 15	0: Stability display; 1: Real Temp display; 2: DEF display				2	2
Cabinet Temp stabilization display coefficient	d 16	/	1	1	10	1	1
Delay time for temperature display after defrosting	d 18	min	1	0	250	45	45

★ Cabinet Temp weighted Temp=[T-2 outlet Temp]×[d12 cabinet Temp weighting coefficient]+[T-3 inlet air Temp]×(1-[d12 cabinet Temp weighting coefficient]);

★ You can select to display real time Temp. during defrosting, or the stabilized Temp. as the real temperature inside the food is not changing that fast. The larger the stabilization display coefficient, the slower the Temp. changes from display.

Cabinet temperature target value setting [2.Pr]

Description	Code	Unit	Interval	Min.	Max.	MT. default	LT. default
★ Cabinet Temp. sensor failure operation period	b00	min	1	1	20	10	10
★ Cabinet Temp failure shutdown interval	b0 1	min	1	1	20	5	5
★ Daytime cabinet Temp target value	b04	℃	0.1	d05	d06	4	4
★ Daytime cabinet temperature offset	b05	℃	0.1	1	100	3	3

Cabinet temperature target value setting [4.Pr]

Description	Code	Unit	Interval	Min.	Max.	MT. default	LT. default
Cabinet Temp setting upper limit	d05	℃	0.1	d06	20	20	20
Cabinet Temp setting lower limit	d06	℃	0.1	-50	d05	-50	-50

Cabinet temperature target value setting [7.Pr]

Description	Code	Unit	Interval	Min.	Max.	MT. default	LT. default
★ Nighttime cabinet Temp target value	J 10	℃	0.1	d05	d06	4	4
★ Nighttime cabinet temperature offset	J 11	℃	0.1	1	100	3	3

Compressor protection parameter setting [2.Pr]

Description	Code	Unit	Interval	Min.	Max.	MT. default	LT. default
Power on delay time	b02	min	1	0	600	2	2
Min. interval between 2 starts	b03	min	1	1	600	2	2

Compressor protection parameter setting [7.Pr]

Description	Code	Unit	Interval	Min.	Max.	MT. default	LT. default
Minimum shutdown time of compressor	J 16	min	1	0	15	0	0
Minimum single operation time of the compressor	J 17	min	1	0	15	0	0
Maximum single operation time of the compressor	J 18	min	1	0	199	45	45

[Cabinet Temp setting upper limit]and[Cabinet Temp setting lower limit]limit[the daily cabinet temperature target value], as well as[the nighttime cabinet temperature target value]to the range of this maximum set point and minimum set point. If it exceeds the set range, the setting is invalid.

★ During daytime, when the cabinet temperature is higher than the [Daytime cabinet Temp target value]+[Daytime cabinet temperature offset], start refrigeration, and stop refrigeration when the cabinet temperature is lower than the [Daytime cabinet Temp target value];

At night, when the cabinet temperature is higher than the [Nighttime cabinet Temp target value]+[Nighttime cabinet temperature offset], start refrigeration, and stop refrigeration when the cabinet temperature is lower than the[Nighttime cabinet Temp target value];

[Minimum shutdown time of compressor]set the minimum time (in minutes) for the compressor to remain off. Since the last shutdown, the compressor must not be restarted before the selected minimum time has passed.

[Minimum single operation time of the compressor] set the minimum operating time of the compressor. The compressor must be turned off for the minimum time selected after being turned on.

[Maximum single operation time of the compressor]set the maximum single operation time of the compressor. After reaching the time, the compressor will be shut down.

★ When an open or short circuit is detected in the cabinet temperature sensor, the controller will force interval cooling until the sensor returns to normal.

Clock setting and night mode cabinet Temp setting [7.Pr]

Description	Code	Unit	Interval	Min.	Max.	MT. default	LT. default
Night mode start o'clock	J00	Hour	1	0	23	22	22
Night mode start minute	J0 1	Min	1	0	59	30	30
Night mode end o'clock	J02	Hour	1	0	23	7	7
Night mode end minute	J03	Min	1	0	59	30	30
Day and night switching interval time	n07	Min	1	1	99	2	2

When the controller time reaches the night mode start time, it switches to night mode operation, and when it reaches the night end time, it switches to daytime mode.

You can manually switch the day and night modes and return to normal at the next switching time, there is a minimum interval between the two switches to prevent too frequent switching.

3.4.4 Defrosting parameter setting

Defrosting according to the schedule [8.Pr]

Description	Code	Unit	Interval	Min.	Max.	MT. default	LT. default
Defrosting start mode	L16	0: Pre-defined time; 1: Operation time 2: Defrosting interval; 3: Disable defrosting function				0	0
★ 1# Defrosting o'clock	L00	Hour	1	OFF (-1)	23	8	8
1# Defrosting minute	L01	min	1	OFF (-1)	59	0	0
★ 2# Defrosting o'clock	L02	Hour	1	OFF (-1)	23	14	14
2# Defrosting minute	L03	min	1	OFF (-1)	59	0	0
★ 3# Defrosting o'clock	L04	Hour	1	OFF (-1)	23	20	20
3# Defrosting minute	L05	min	1	OFF (-1)	59	0	0
★ 4# Defrosting o'clock	L06	Hour	1	OFF (-1)	23	2	2
4# Defrosting minute	L07	min	1	OFF (-1)	59	0	0
★ 5# Defrosting o'clock	L08	Hour	1	OFF (-1)	23	OFF (-1)	OFF (-1)
5# Defrosting minute	L09	min	1	OFF (-1)	59	0	0
★ 6# Defrosting o'clock	L10	Hour	1	OFF (-1)	23	OFF (-1)	OFF (-1)
6# Defrosting minute	L11	min	1	OFF (-1)	59	0	0
★ 7# Defrosting o'clock	L12	Hour	1	OFF (-1)	23	OFF (-1)	OFF (-1)
7# Defrosting minute	L13	min	1	OFF (-1)	59	0	0
★ 8# Defrosting o'clock	L14	Hour	1	OFF (-1)	23	OFF (-1)	OFF (-1)
8# Defrosting minute	L15	min	1	OFF (-1)	59	0	0

★ when o'clock setting is -1, this group o'clock/minute setting is disabled

Parameter setting of defrosting according to the time schedule [9.Pr]

Description	Code	Unit	Interval	Min.	Max.	MT. default	LT. default
Monday defrosting	n09	0：OFF； 1：ON				ON (-1)	ON (-1)
Tuesday defrosting	n10	0：OFF； 1：ON				ON (-1)	ON (-1)
Wednesday defrosting	n11	0：OFF； 1：ON				ON (-1)	ON (-1)
Thursday defrosting	n12	0：OFF； 1：ON				ON (-1)	ON (-1)
Friday defrosting	n13	0：OFF； 1：ON				ON (-1)	ON (-1)
Saturday defrosting	n14	0：OFF； 1：ON				ON (-1)	ON (-1)
Sunday defrosting	n15	0：OFF； 1：ON				ON (-1)	ON (-1)

In the Pre-defined time mode, each week you can select the date you need to switch on the defrosting, if it is ON the defrosting function is activated when the defrosting moment arrives, otherwise it is not activated.

Exception to pre-defined time defrosting [2.Pr]

Description	Code	Unit	Interval	Min.	Max.	MT. default	LT. default
Continuous refrigeration time before defrosting	b09	Hour	0.1	0	99.9	6	6

If L16 [Defrosting start mode] is set to 1 (defrosting according to the operation time), then b09 [continuous refrigerating time before defrosting] is the refrigeration operation time of the compressor (compressor OFF time not counted).

If L16 [Defrosting start mode]is set to 2 (defrosting according to the defrosting interval), then b09 [continuous refrigerating time before defrosting] is the defrosting interval time.

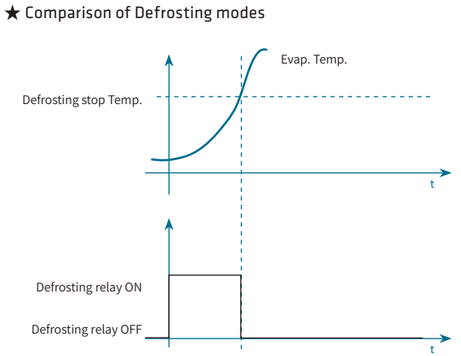
Parameter setting of defrosting process [2.Pr]

Description	Code	Unit	Interval	Min.	Max.	MT. default	LT. default
Compressor mode during defrosting	b08	0: compressor off; 1: compressor on				0	0
★ Ending of defrosting	b10	0: According to defrosting time; 1: According to defrosting temp. 2: According to time + temp.				1	1
Defrosting end Temp	b11	℃	0.1	-50	50	12	12
Defrosting time	b12	min	1	0	100	30	30
Drop water time	b13	min	1	0	100	5	5
★ Pre-cooling time	b14	min	1	0	100	3	3
Expansion valve mode during defrosting	b15	0: fully closed; 1: Keep at previous opening 2: to pre-defined opening				0	0
Expansion valve opening during defrosting	b16	%	1	0	100	0	0
Fan control during defrosting	b17	0: Always off; 1: same fan mode as in cooling				1	1
Defrosting method	b19	0:heating defrosting; 1: Air defrosting				0	0
Air defrosting output time	d19	min	1	0	100	10	10

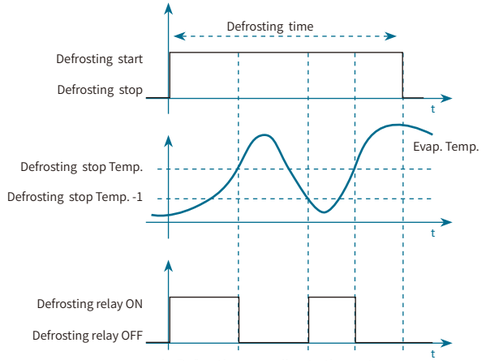
Parameter setting of dropping water process [10.Pr]

Description	Code	Unit	Interval	Min.	Max.	MT. default	LT. default
Compressor off when dripping	P17	0: off; 1: on				0	0
Expansion valve mode when dripping	P18	0: fully closed; 1: Keep at previous opening 2: to pre-defined opening				0	0
Expansion valve opening when dripping	P19	%	1	0	100	0	0
Fan control when dripping	b18	0: Always off; 1: same fan mode as in cooling 2: Always on				0	0

★ Comparison of Defrosting modes



a. Defrosting according to defrostinging temp.



b. Defrosting according to time + temp.

The difference between the above two defrosting modes

1.According to the defrosting temperature, If T4 (Defrosting sensor) > b11 [Defrosting end Temp], it will end the defrosting process;

2.According to the defrosting time + temp, the system may start and stop the defrosting multiple times within the set time.

Defrosting method

1.When b19 [Defrosting method] is 0, defrosting relay turn on when defrosting start and defrosting relay turn off once defrosting end.

2.When b19 [Defrosting method] is 1, defrosting relay keep on during d19[Air defrosting output time] when defrosting end it turns off.

Synchronous defrosting parameter setting [3.Pr]

★ In the master-slave control mode, if synchronous defrosting is turned on, when all the controllers reach the defrosting conditions, the master controller will issue a defrosting command, and all the controllers will enter the defrosting together.

All controllers enter the water dropping phase after they complete defrosting; after all the controllers finishing water dropping, the master

Description	Code	Unit	Interval	Min.	Max.	MT. default	LT. default
★ Synchronous defrostinging mode	c0b	On(1): Turn on; OFF(0): Turn off				0	0

issues a command and all the controllers enter the cooling (or pre-cooling) phase together.

If synchronous defrosting is turned off, all controllers will perform independent defrosting according to their respective set conditions.

★ pre-cooling mode

When the defrosting and water drop time is over, the system enters the cooling mode again. To prevent the fan from blowing hot air into the cabinet, pre-cooling mode can be selected; during the pre-cooling time, the evaporator fan is off.

3.4.5 Time setting

Time setting [9.Pr]

Description	code	unit	Interval	Min.	Max.	Defaults	Remark
Current year	n00	Year	1	0	99	23	
Current month	n01	Month	1	1	12	1	
Current day	n02	Day	1	1	31	20	
Current week	n03	Week	1	1	7	5	
Current hour	J04	Hour	1	0	23	0	
Current minute	J05	Min	1	0	59	0	

Attention: The time can be saved for 96 hours after power off. If the time exceeds this time, it needs to be reset. The time deviation is less than 2 seconds per day. The time can be calibrated every month according to the requirements for time accuracy.

3.4.6 Evaporator fan / lighting 2 control

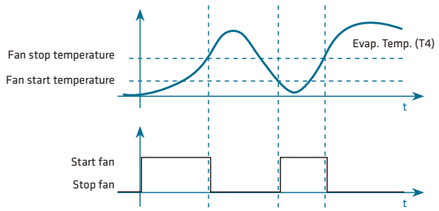
Evaporator fan control during cooling [3.Pr]

Description	Code	Unit	Interval	Min.	Max.	MT. default	LT. default
Evap.fan/Lighting 2 mode	c00	0: Always on; 1: Synchronize with compressor/liquid line solenoid valve; 2: According to the defrosting Temp sensor 3: as lighting 2 function				0	0
★ Fan start Temp	c01	℃	0.1	-50	50	4	4
★ Fan stop Temp	c02	℃	0.1	-50	50	7	7

★ Judging according to the Temp of the defrosting Temp sensor:

If the Temp of T4 [defrosting Temp sensor] < c01 [start Temp]of the fan, the evaporating fan will be turned on;

If the Temp of T4 [defrosting Temp sensor] > c02 [fan stop Temp], the evaporation fan will stop.



Evaporator fan control during defrosting and water dropping [2.Pr]

Description	Code	Unit	Interval	Min.	Max.	MT. default	LT. default
Fan control during defrosting	b17	0: Always off; 1: Same as c00 [Evaporator fan control during cooling]				1	1
Fan control during water dropping	b18	0: Always off; 1:Same as c00 [Evaporator fan control during cooling] 2: Always on				1	1

Lighting 2 control [9.Pr]

Description	Code	Unit	Interval	Min.	Max.	MT. default	LT. default
Lighting 2 ON hour	n16	hour	1	0	23	5	5
Lighting 2 ON minute	n17	min	1	0	59	0	0
Lighting 2 OFF hour	n18	hour	1	0	23	10	10
Lighting 2 OFF minute	n19	min	1	0	59	0	0

Use the evaporator fan control relay as the lighting 2 control relay; Then the control port will only switch according to the set time of n16-n18 lighting 2.

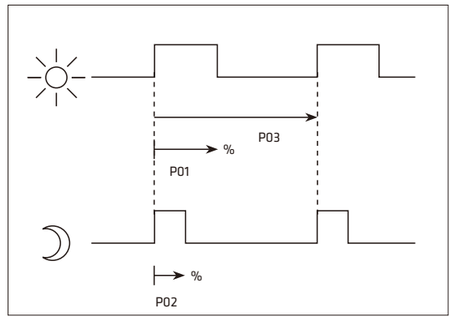
3.4.7 Non-condensation/alarm and light function [3.Pr]

Description	Code	Unit	Interval	Min.	Max.	MT. default	LT. default
Non-condensation /alarm function	c04	0: OFF; 1: Non-condensing(always ON) 2: Alarm; 3: Non-condensation (ON/OFF)				10	10
Lighting function	c05	0: Turn off; 1: turn on; 2: According night mode 3: According door control signal				0	0

When the lighting function is selected based on 3: According to door control signal and the lighting control is selected for door control 2 (DI) as well, the lighting is turned on or off as the door control is turned on or off.

3.4.8 Non-condensation (ON/OFF) function [10.Pr]

Description	Code	Unit	Interval	Min.	Max.	MT. default	LT. default
Non-condensation function	P00	OFF(0): off On(0): on				OFF(0)	OFF(0)
Non-condensation Daytime duty cycle	P01	%	1	0	100	100	100
Non-condensation Nighttime duty cycle	P02	%	1	0	100	100	100
Non-condensation cycle (heating time+OFF time)	P03	Min	1	1	60	5	5
Non-condensation at Defrosting time	P04	OFF(0): off On(0): on				OFF(0)	OFF(0)



Pulse control can be applied to the power supply for heating the slide rail to achieve energy-saving. Pulse control can be controlled based on daytime/nighttime load.

Different heating periods can be set for daytime and nighttime operation based on pulse control during daytime and nighttime: Set the cycle time and the percentage of duty cycle when the slide rail is heated on.

During defrosting, you can choose to turn off or turn on the Non-condensation heater.

When using this function, the 40085 [Demist Output] needs to be configured as an anti No-condensation relay.

EN

3.4.9 Condensing temperature control mode [4.Pr]

Description	Code	Unit	Interval	Min.	Max.	MT. default	LT. default
T-3 Temp sensor mode	d17	0: Inlet air Temp 1: Condensing Temp				1	1

3.4.10 Alarm mode [5.Pr]

Description	Code	Unit	Interval	Min.	Max.	MT. default	LT. default
MOP Alarm mode	F00	OFF(0): off On(1): on				On(1)	On(1)
MOP Alarm value	F01	bar	0.1	-1	50	9	9
MOP Alarm delay	F02	Min	1	1	999	1	1
MOP alarm reset	F03	bar	0.1	-1	50	8	8
Low pressure alarm mode	F04	OFF(0): off On(1): on				On(1)	On(1)
Low pressure alarm value	F05	bar	0.1	-1	50	-0.1	-0.1
Low pressure alarm delay	F06	Min	1	1	999	15	15
Low pressure alarm reset	F07	bar	0.1	-1	50	0.2	0.2
Low SH alarm mode	F08	OFF(0): off On(1): on				On(1)	On(1)
Low SH alarm value	F09	K	0.1	0.5	30	0.5	0.5
Low SH alarm delay	F10	Min	1	1	300	15	15
Low SH alarm reset	F11	K	0.1	1	30.5	3	3
High SH alarm mode	F12	OFF(0): off On(1): on				OFF(0)	OFF(0)
High SH alarm value	F13	K	1	10	40	30	30
High SH alarm delay	F14	Min	1	1	600	10	10
High SH alarm reset	F15	K	1	7	37	27	27
EEV opening with abnormal pressure or Temp.	F16	/	0.1	0	100.0	50.0	50.0
Exit time with abnormal defrosting Temp.	F17	Min	1	0	180	10	10
Compressor mode with abnormal condensing Temp.	F18	0: no-stop 1: stop				0	0
MOP valve closing integral time	F19	/	1	0	800	200	200

1.When the pressure transmitter fails or T1 suction temperature fails, EEV keep a fixed opening set by F16 [EEV opening with abnormal pressure or Temp.].

2.When the defrosting temperature sensor fails, if the method of exiting defrosting is temperature related, set the time by F17 [Exit time with abnormal defrosting Temp.] to exit the defrosting.

3.When T3 is used as a condensing temperature sensor, if the T3 temperature sensor fails, according F18 [Compressor mode with abnormal condensing Temp.]to choose stop or not stop compressor.

4.MOP function:

When F00 [MOP alarm mode] is set to 0, there is no MOP function;

When F00 [MOP alarm mode] is set to 1, if F19 [MOP valve closing integral time] is 0, it will only alarm and the valve has no protection action;

If F19 [MOP valve closing integral time]> 0, the valve will be closed according to the difference between the current pressure and F01 [MOP alarm value]with the speed due to F19 [MOP valve closing integral time].

Alarm mode [b.Pr]

Description	Code	Unit	Interval	Min.	Max.	MT. default	LT. default
Condensing Temp control mode	H00	0: OFF; 1: ON+ automatic reset; 2: ON+ Manual reset				0	0
High condensing Temp alarm	H01	℃	0.1	-40	70	45	45
High condensing Temp alarm delay	H02	Min	1	1	600	10	10
High condensing Temp alarm reset	H03	℃	0.1	-40	70	40	40
High Condensing Temp protection value	H04	℃	0.1	-40	70	55	55
High condensing Temp protection delay	H05	Min	1	1	600	10	10
High condensing Temp protection reset	H06	℃	0.1	-40	70	50	50
High cabinet Temp alarm mode	H07	OFF(0): off On(1): on				1	1
High cabinet Temp alarm value	H08	℃	0.1	-40	40	10	10
High cabinet Temp alarm delay	H09	Min	1	1	600	60	60
High cabinet Temp alarm reset	H10	℃	0.1	-40	40	9	9
Low cabinet Temp alarm mode	H11	OFF(0): off On(1): on				0	0
Low cabinet Temp alarm value	H12	℃	0.1	-40	40	-2	-2
Low cabinet Temp alarm delay	H13	Min	1	1	600	10	10
Low cabinet Temp alarm reset	H14	℃	0.1	-40	40	0	0
★ Overtime refrigeration mode	H15	OFF(0): off On(1): on				0	0
★ Refrigeration overtime alarm	H16	Min	1	1	999	60	60
★ Anti-freezing protection mode	J12	0: OFF; 1: ON+ automatic reset; 2: ON+ Manual reset				0	0
★ Anti-freezing protection value	J13	℃	0.1	-50	200	-20	-20
★ Anti-freezing protection delay	J14	Min	1	0	15	3	3
★ Anti-freezing protection reset	J15	℃	0.1	-50	200	-20	-10

When H00 [Condensing temperature control mode] is set to 1 or 2, and T3 is set as the condensing temperature probe.

If T3 temperature>H01 [High condensing temperature alarm] and duration time>H02 [High condensing temperature alarm delay], the high condensing temperature alarm is triggered, and the alarm relay is output, and [cHt] will be displayed in fault alarm mode;

If T3 temperature>H04 [high condensing temperature protection value]and the duration >H05 [High condensing Temp protection delay], the condensing temperature protection is triggered, compressor shutdown for protection, alarm relay output and [CHt] will be displayed in fault alarm mode;

★ After Overtime refrigeation mode is ON, if the system can not reach the target value of the cabinet Temp within the set time, controller outputs an alarm.

★ Anti-freezing protection mode: if the anti-freezing Protection mode is turned on and T4 (defrosting temperature) is lower than J13 [anti-freezing protection value] and maintained for more than J14 [anti-freezing protection delay] time, the anti-freezing protection alarm will be triggered, and the alarm relay will close the digital output . FrE will be displayed under the fault alarm mode and compressor shutdown for protection.

If the H07 [High cabinet Temp alarm mode] is activated, the non-condensation outputs will be turned off when the high cabinet temperature high alarm is triggered, reducing the heat source until the alarm is reset.

3.4.11 Fault Codes and Fault Determination

The fault display is on by default. Once fault code is displayed, the fault code and numerical value display alternate once every second. Turn off the fault display by pressing the buttons.

Alarm code	Alarm determination	Alarm code	Alarm determination
PoP	Pressure transmitter open circuit	noP	High suction pressure alarm
PSt	Pressure transmitter short circuit	LoP	Low suction pressure alarm
t1o	Suction temperature sensor open circuit	HSH	High SH alarm
t1S	Suction temperature sensor short circuit	LSH	Low SH alarm
t2o	Outlet air temperature sensor open circuit	HCt	High cabinet temperature alarm
t2S	Outlet air temp. sensor short circuit	LCt	Low cabinet temperature alarm
t3o	Inlet air/condensing Temp sensor open circuit	cHt	High condensing temp. alarm
t3S	Inlet air/condensing Temp sensor short circuit	CHt	High condensing temp. protection
t4o	Defrosting Temp sensor open circuit	EL	Refrigeration overtime alarm
t4S	Defrosting Temp sensor short circuit	FrE	Anti-freeze protection alarm
con	Remote display data transmission interruption		

4 Communication protocol

The SECR03 controller supports RS485 communication, MODBUS communication protocol, and the host computer or the main controller supporting the MODBUS protocol based on RS485 communication can communicate with the controller.

4.1 Communication protocol description

Item	Description
Transmission line connection	Multi-line transmission
communication method	RS485 (2-wire, half-duplex)
Baud rate	Default 9600,settable
Parity, data, stop bit	None, 8 data, 1 stop bit (cannot be modified)
Protocol type	Modbus RTUMode
function code	Read holding register (0x03)/preset single register (0x06)
Max. number of words read	32
Cable type	Belden 9841/9842, LG LIREV-AMESB
Polling interval	≧ 500ms
Machine ID	See communication data list

Note