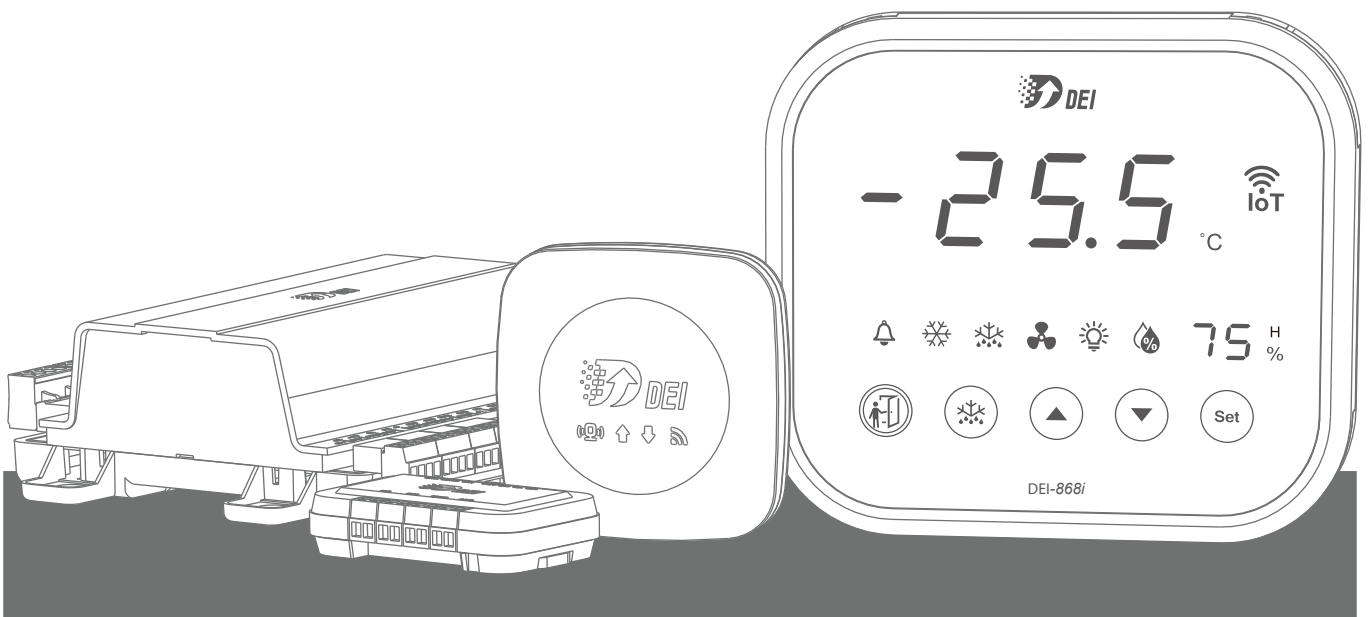




# DEI-868i

## Cold Room Control System Operation Manual



# Directory

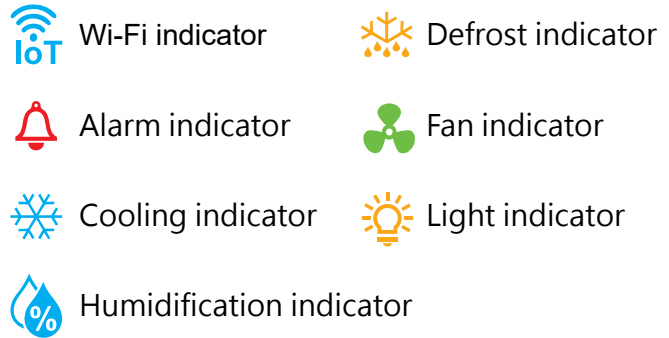
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## Cautions

1. Please read the instruction carefully to avoid incorrect wiring. Any damage caused resulted from improper wiring/ installation is beyond our warranty.
2. Do not install it in a humid ambience to avoid errors resulted from too much humidity.
3. Please use the communication wire with UL2464 or 26AWG 3C including Mesh isolated wire.

## Dimensions

### Front panel exterior



Panel dimension: 160mm(L) x 140mm(W) x 25mm(T) ±1mm

### Driver board exterior



Driver board dimension: 179.5mm(L) x 116mm(W) x 50mm(H) ±1mm

### Sensor extended wire module



Sensor extended wire module dimension: 70mm(L) x 50mm(W) x 18mm(H) ±1mm

## Wi-Fi sender and receiver module exterior



Wi-Fi sender and receiver module dimension: 80mm(L) x 80mm(W) x 18mm(H) ±1mm

### Specification & Output / Input

#### • Specification :

1. Power supply: AC100V~240V, single phase 50 / 60Hz, Fuse 1A.
2. Power consumption: Within 10 W (Controller Only).
3. Operation Environment
  - a. Operating Temp.: 0°C~55°C, <90%(non-condensing)
  - b. Storage Temp.: -10°C~65°C, <90%(non-condensing)
4. Temp. Sensing Range: -45.0°C~105.0°C, Accuracy 0.1°C,  
 tolerance ± 1°C @-40~50°C / others ± 3°C  
 -49.0°F ~ 221°F, Accuracy 0.1°F  
 tolerance ± 2°F@ -40 ~ 122°F / others ± 5°F
5. Humidity Sensing Range: 0~99%RH, Accuracy 1%,  
 tolerance range(25°C): ± 3% @ 20 ~ 70% / others ± 5%

#### • Input :

1. Control panel: Capacitive buttons x 5 - Door / Defrost / SET / ▲ / ▼
2. Power box:
  - a. Temp. Sensor (NTC / B3435) x3: (Optional , Length 1.5 、 3 、 5 、 9 M)
    - ① Room temp. Sensor: 4.3φx40mm, stainless steel probe,L=5m.
    - ② Evaporator temp. Sensor: 6φx60mm, stainless steel probe, L=5m
    - ③ Evaporator temp. 2 Sensor: 6φx60mm, stainless steel probe (for optional)
  - b. Wi-Fi Module x1
  - c. Hi-Low Pressure Switch (PA) input x1
  - d. System Failure Alarm (HA) input x1
  - e. Door status (DOR) Input x1
  - f. Humidity Sensor: AM2305 Humidity Sensor 5 M x 1(optional)
3. Sensor extended wire module: (The maximum length is 100 M long)
  - a. Sensor (NTC / B3435) x4: (Optional, Length 1.5, 3, 5, 9 M)
    - ① Condenser Sensor (Big Data): 4.3φx40mm Stainless Steel (Stepped probe) (Yellow Tape), Length 1.5 M

- ② Discharge temp. Sensor (Big Data): 4.3φx40mm Stainless Steel (Stepped probe) (Red Tape), Length 1.5 M
- ③ Suction temp. Sensor(Big Data): 4.3φx40mm Stainless Steel (Stepped probe) (Green Tape), Length 1.5 M
- ④ Ambient temp. Sensor(Big Data): 4.3φx40mm Stainless Steel (Stepped probe) (Blue Tape), Length 1.5 M

• **Output :**

1. Operation display panel:

- a. Temperature display / Parameter display: white 1" Seven-segment displayx3.
- b. Humidity / time display: white 0.4" Double eight display x1.
- c. Indicator x11:
  - ① IoT(Wi-Fi) Indicator (blue).
  - ② °C Indicator (white).
  - ③ °F Indicator (white).
  - ④ Time/min indicator (white).
  - ⑤ H % Humidity indicator (white).
  - ⑥ Alarm indicator (red).
  - ⑦ Refrigeration indicator (blue).
  - ⑧ Defrost indicator (yellow).
  - ⑨ Fan indicator (green).
  - ⑩ Lighting indicator (yellow).
  - ⑪ Humidification indicator (blue).
- d. Modbus-RTU (Master) Communication contact x 1.

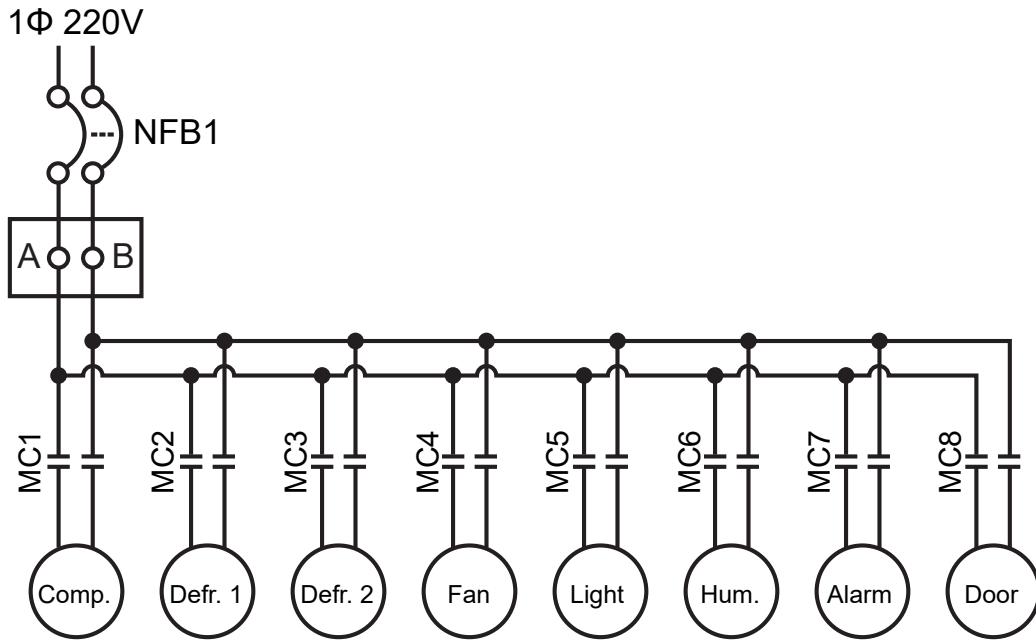
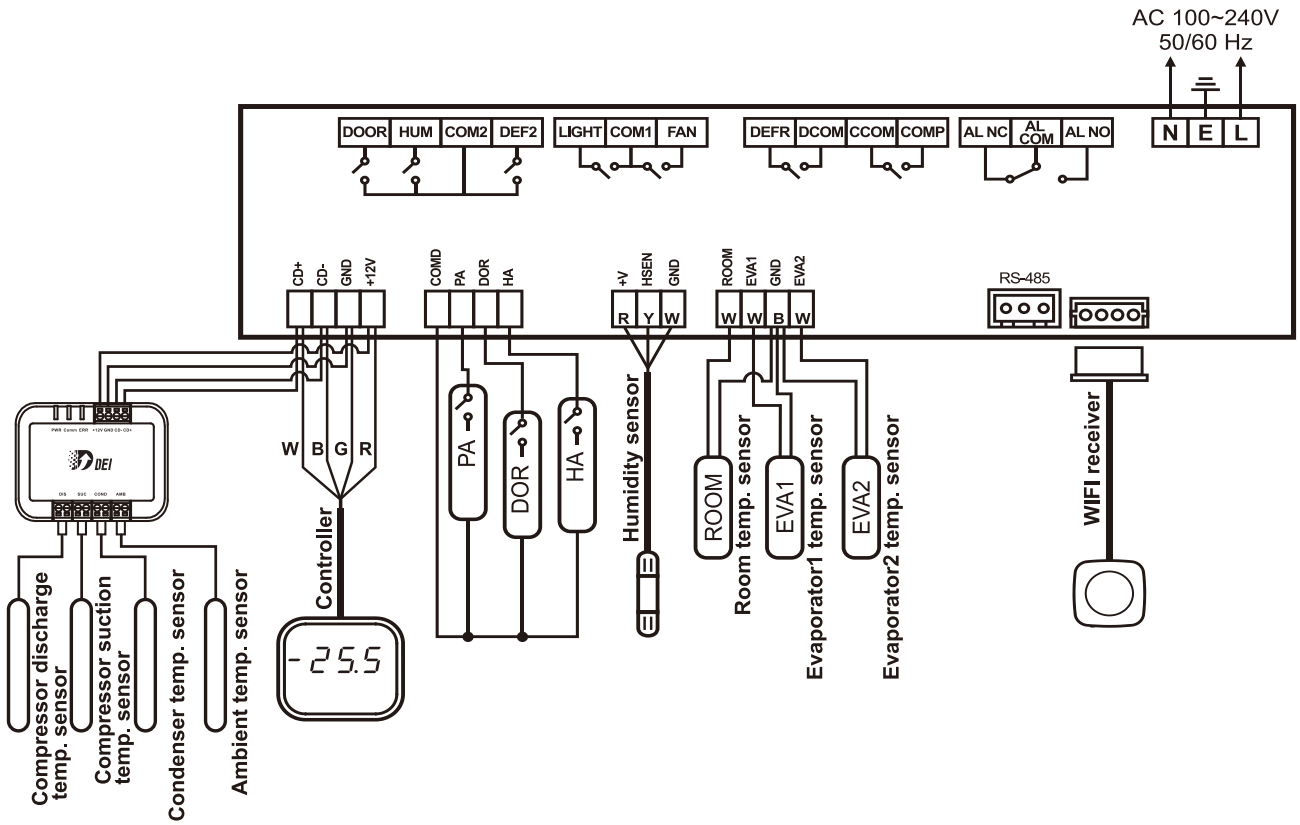
2. Driver board:

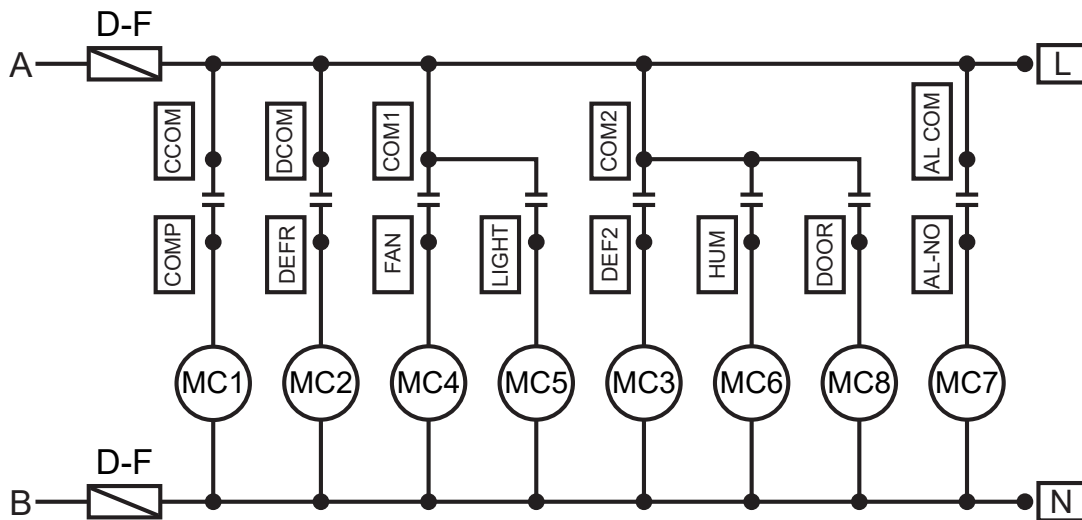
- a. Compressor control contact: 1A / 220VAC x 1.
- b. Room fan control contact: 1A / 220VAC x 1.
- c. Defrost electric heating 1 control contact: 1A / 220VAC x 1.
- d. Defrost electric heating 2 control contact: 1A / 220VAC x 1.
- e. Lighting control contact: 1A / 220VAC x 1.
- f. Humidification control contact: 1A / 220VAC x 1.
- g. Alarm contact: 1A / 220VAC (NC, NO, COM).
- h. Door anode lock contact: 1A / 220VAC x 1.
- i. Power / communication indicator (red) x 1.
- j. Modbus(Wi-Fi) communication indicator (green) x 1.
- k. Alarm indicator (yellow) x 1.
- l. RS-485 Communication contact x 2:
  - ① Modbus-RTU (Slave) Wi-Fi module contact x 1.
  - ② Modbus-RTU (Slave) Control panel / Sensor extended wire communication contact x 1.

3. Sensor extended wire module:

- a. Power indicator (green) x 1.
- b. Communication indicator (blue) x 1.
- c. Alarm indicator (red) x 1
- d. Modbus-RTU (Slave) Communication contact x 1.

Circuit diagram





## Parameter setting and Description

1. Quick setpoint mode:
  - a. Except Eb & EE, press ▼ for 2 seconds to enter quick setpoint mode, temp. setpoint shown.
  - b. Press ▲ or ▼ to adjust setpoint (tS).
  - c. Set the desired temperature, then press SET button to confirm or wait for 5 seconds, it will take effect automatically and return to normal display.
2. Setup mode:
  - a. In normal status except Eb & EE, press "SET" for 3 seconds to enter PL1 setup mode. If no password is needed, display shows "tS"; in contrast, please enter correct password for adjusting parameters value.
  - b. Press ▲ or ▼ to choose correct password and then press "set" for enter setup mode.
  - c. Press ▲ or ▼ to choose the parameter code. (Parameter code will be listed in following pages in order.)
  - d. Choose the parameter code you'd like to adjust, press "Set" to review the value and press ▲ or ▼ to adjust the value.
  - e. To set up advanced parameter value, please choose "Fn2" with password input to enter PL2 setup mode. If password for PL2 is entered in PL1 password verification, no need to enter password again.
  - f. Display's showing "LC" means parameters cannot be adjusted. Please re-check if the password is correct.
  - g. All adjusted parameter values will be saved automatically and return to normal display while nothing gets operated within 15 seconds.
3. Parameter lock-up:
  - a. Parameter for setting temperature won't be locked.
  - b. Users still can get into parameter setup mode while entering wrong password; however, the function will be limited to parameter checking instead of adjusting.
4. Parameter memory:
 

All parameter values are saved in internal memory (ROM), which won't be affected during power outage. All function will be as same as the status before power outage
5. Factory default:
 

Enter "setup mode", choose "LdF" and press "set". All parameter value will be set as default value after 10 seconds with "rS" shown on the panel.
6. °C/°F switch:
 

Enter "Ut", choosing °C/°F and press "set".

## Parameter List

Code	Function	Range		Default	Unit	Description	Level
		Max.	Min.				
tS	Setpoint	LS	HS	-18	°C	Set the cut-out temperature	Fn1
				0	°F		
td	Temp. Differential	1	10	4	°C	Cut-in temperature= tS + td	Fn1
		2	20	7	°F		
dF	Defrost Cycle	0	99	6	hr	Set the interval between defrost cycles. (dF = 0, defrost doesn't work automatically, but manually.)	Fn1
dt	Defrost Period	1	55	30	min	To set the duration of defrost time. Defrost is terminated when defrost time is up.	Fn1
dS	Defrost Stop Temp.	0	70	20	°C	When evaporator temp. $\geq$ dS, defrost is enforced to stop in order not to cause damage to the storage during defrost. (only Pb2=y)	Fn1
		32	158	68	°F		
dL	Defrost Temp. Lockup	0	99	0	min	0: room temp. Shows normally during defrost period; 1~99: room temp. is locked and fixed after defrost period.	Fn1
dd	Temp. locked while defrosting	n	y	n	-	n:display shows dEF y:display shows the room temp. before defrosting.	Fn1
dr	Dripping Period	0	99	5	min	The dripping period when defrost ends. (Compressor is off during this period.)	Fn1
odS	power-on temperature control delay	0	255	1	min	Compressor does not operate until time is up.	Fn1
CP	Compressor protection delay	0	30	1	min	In case compressor's frequent start and stop causes damage to compressor or other units.	Fn1
ot	Temperature calibration	-12.0	12.0	0	°C	Offset adjustment of room temp.	Fn1
					°F		
FS	Fan Motor Stop Temp.	-25	25	10	°C	When evaporator temp. $\geq$ FS, fan stops. (To keep out hot air blowing into freezer)(Freezer only)	Fn1
		-13	77	50	°F		
FnC	Fan Choose	o-n	c-y	o-n	-	o-n: Keep operating, fan not operate during defrosting (Freezer only) c-n: Fan operates / stops in consistent with compressor, fan not operate during defrosting (Freezer only) o-y: Keep operating, fan operates during defrosting c-y: Fan operates / stops in consistent with compressor, fan operates during defrosting	Fn1
Fon	Fan On	0	255	0	min	When FnC=c-y/c-n and compressor is off, fan operates as Fon setting. Fon=0, fan stops.	Fn1
FoF	Fan Off	0	255	3	min	When FnC=c-y/c-n and compressor is off, fan stops as FoF setting. Fon=0, fan stops.	Fn1
Fnd	Fan operation delay	0	255	10	min	When FnC=o-n/c-n, after defrost is off. Fan doesn't operate until Fnd is up. (Freezing only )	Fn1



dAo	Alarm delay	0	99	60	min	dAo starts to be counted after power on. Alarm is activated until dAo time is up. When power is off , dAo time is reset.	Fn1
AU	Max. temp. alarm	AL+1	70	70	°C	When temp is higher or reaches the AU, UA alarm is activated.	Fn1
			158	158	°F		
AL	Min. temp. alarm	-45	AU-1	-45	°C	When temp is lower or reaches the AL, LA alarm is activated.	Fn1
				-49	°F		
Ad	Alarm delay	0	255	15	min	When temp reaches the set point, alarm is activated after Ad time is up.	Fn1
Cr	Compressor running period under any failure	0	255	15	min	When EE.E1.E2 happen, the enforced operation time for compressor.	Fn1
CS	Compressor Stop period under any failure	0	255	15	min	When EE.E1.E2 happen, the remaining cease time for compressor.	Fn1
HS	Max. temp. setpoint	tS	60	25	°C	The limitation of max temp. set point	Fn1
			138	77	°F		
LS	Min. temp. setpoint	-45	tS	-25	°C	The limitation of min temp. set point	Fn1
				-49	°F		
CLd	Cleaning duration	0	365	0	day	CLd is displayed as accumulated power transmission days reach the set value. 0 days means to skip cleaning.	Fn1
Ut	Temp. Unit	°C	°F	°C	-	Set temperature value in °C or °F. Default temp value is rebooted while changing Ut.	Fn1
rES	Resolution	1	0.1	0.1	-	The display shows the temperature resolution 1 or 0.1	Fn1
id	Modbus ID	1	99	1	-	Modbus communication equipment Identification	Fn1
LdF	Restore factory value	n	y	n	-	Choose Y and confirm by pressing "set" button, all the parameter value will be restored automatically as factory default.	Fn1
Fn2	Administrator Parameter	000	999	-	-	Input the password of PL2 to get admission for advanced parameter setup. If the password is incorrect, the parameter cannot be changed.	
Hud	Humidity detection	n	y	n	-	n: not use y: use AM2305 humidity sensor	Fn2
HuP	Humidity setup	50	99	80	%	The humidifier stops while RH% reaches HuP setting.	Fn2
HuC	Humidity output cycle	1	255	1	min	Humidity control output cycle	Fn2
Hut	Humidity output time	0	255	0	sec	The running time per cycle for humiditor (0: the humiditor is on always when the humidity is lower the setpoint)	Fn2
HAu	Max. humidity alarm	HAL+1	95	90	%	When humidity is higher than set HAU, the humidity alarm is activated after HAd time is up.	Fn2








HAL	Min. humidity alarm	20	HAu-1	50	%	When humidity is lower than HAL, the humidity alarm is activated after Had time is up.	Fn2
HAd	Humidity alarm delay	0	255	15	min	Humidity alarm isn't activated until HAd time is up.	Fn2
PSi	Polarity of Pressure Switch	nA	oP	nA	-	nA: Not use cL: When abnormal pressure, the Di is short-circuited. oP: When abnormal pressure, the Di is open-circuited.	Fn2
PSn	Pressure Switch trip numbers	1	15	5	times	The add-up numbers for pressure switch trips in a given time period.	Fn2
PSt	Pressure switch reset duration	0	255	60	min	PSn reset cycle, PSA alarm is activated when PSn is reached within this duration. 0=no pressure alarm	Fn2
doi	Door open polarity setup	nA	oP	nA	-	nA: Not use cL: When door is open, the Di is short-circuited. oP: When door is open, the Di is open-circuited.	Fn2
dot	Door alarm delay	0	255	15	min	Once room door open status is detected during this duration, the alarm is activated.	Fn2
doo	Door operation	nA	F-C	nA	-	nA: Not use FAn: When door is open, the fan stops CPr: When door is open, the compressor stops F-C: When door is open, both compressor and fan stop at the same time.	Fn2
dor	Door close remind	0	255	15	sec	After press the door close button, the illumination delays to turn off and the alarm connection is activated.	Fn2
oAt	Operation alarm setup	0	255	30	min	0 : After pressing the open door button, operation time starts to count and the light is on. When the operation time is up, oA alarm is given.	Fn2
Chi	The polarity of parallel rack system	nA	oP	nA	-	nA: Not use cL: When parallel rack system is abnormal, the Di is short-circuited oP: When parallel rack system is abnormal, the Di is open-circuited	Fn2
Cht	parallel rack system delay	0	255	15	min	When abnormality is detected in parallel rack system in this duration, the ChA alarm is activated.	Fn2
Cho	parallel rack system operation	nA	F-C	nA	-	nA: Not use Fan: The fan stops when parallel rack system abnormality signal is activated. CPr: The compressor stops when parallel rack system abnormality signal is activated. F-C: Both compressor and fan stop when parallel rack system abnormal signal is activated.	Fn2
Pb2	Evaporator 1 temp. detection.	n	y	y	-	n: not use y: use Evaporator 1 temp.sensor	Fn2
ot2	Evaporator 1 temp. calibration	-12.0	12.0	0	°C °F	Offset adjustment of the evaporator 1 temp displayed.	Fn2

Pb3	Evaporator 2 temp. detection.	n	y	n	-	n: not use y: use Evaporator 2 sensor (when Pb2=n , this parameter is unable to be set up)	Fn2
ot3	Evaporator 2 temp. calibration	-12.0	12.0	0	°C °F	Offset adjustment of the evaporator 2 temp displayed.	Fn2
t-3	Evaporator 2 temp. unit	-	-	-	°C/°F	Display Evaporator 2 temp.	Fn2
Pb4	Condenser temp. detection.	n	y	y	-	n: not use y: use condenser sensor	Fn2
ot4	Condenser temp. Calibration	-12.0	12.0	0	°C °F	Offset adjustment of the condenser temp displayed.	Fn2
t-4	Condenser temp.	-	-	-	°C/°F	Show condenser temp.	Fn2
CAu	Max. condenser temp. alarm	0 32	70 158	50 122	°C °F	When condenser temp. is higher CAu, CAd starts to be counted.	Fn2
CAd	Min condenser temp. alarm	0	255	15	min	When CAd time is up, CdA alarm is activated.	Fn2
Pb5	Compressor suction temp. detection.	n	y	y	-	n: not use y: use compressor suction temp. sensor.	Fn2
ot5	Compressor suction temp. calibration.	-12.0	12.0	0	°C °F	Offset adjustment of the compressor suction temp displayed.	Fn2
t-5	Compressor suction temp.	-	-	-	°C/°F	Show compressor suction temp.	Fn2
Pb6	Compressor discharge temp. probe presence	n	y	y	-	n: not use y: use compressor discharge temp. sensor	Fn2
ot6	Compressor discharge temperature calibration	-12.0	12.0	0	°C °F	Offset adjustment of the compressor discharge temp shown on panel.	Fn2
t-6	Compressor discharge temp.	-	-	-	°C/°F	Show compressor discharge temp.	Fn2
PAu	Compressor discharge max. temp. alarm	0 32	105 221	105 221	°C °F	When compressor discharge temp. is higher than PAu, PAd starts to be counted.	Fn2
PAd	Compressor discharge temp. alarm delay	0	255	15	min	When PAd time is up, PoA alarm is activated.	Fn2
Pb7	Ambient temp. probe presence	n	y	y	-	n: not use y: use ambient temp. sensor	Fn2

ot7	Ambient temp. calibration	-12.0	12.0	0	°C/°F	Offset adjustment of the ambient temp displayed.	Fn2
t-7	Ambient temp.	-	-	-	°C/°F	Ambient temp. display	Fn2
t-8	Driver board temp.	-	-	-	°C/°F	Driver board temp. display	Fn2
PL1	User password	001	999	000	-	000: not locked. (Enter setup mode without being asked for password ) 001~999: Enter password to unlock and adjust Fn1 parameters value.	Fn2
PL2	Administrator password	001	999	000	-	000: not locked. Enter Fn2 settings without asking password 001~999: Insert password to enter Fn2 setup mode and adjust Fn2 parameter values.	Fn2
run	Operating status	n	y	y	-	n= stop y= operate	Fn2

### Malfunction / alarm / status code / indicator

1. EC Communication error: Check that if the communication line is disconnected or shorted.
2. E1 Room temp. sensor malfunction: Check that if the sensor is disconnected, shorted or sensors replace needed.
3. E2 Evaporator 1 sensor malfunction: Check that if the sensor is disconnected, shorted or sensors replace needed.
4. E3 Evaporator 2 sensor malfunction: Check that if the sensor is disconnected, shorted or sensors replace needed.
5. E4 Condenser sensor malfunction: Check that if the sensor is disconnected, shorted or sensors replace needed.
6. E5 Compressor suction sensor malfunction: Check that if the sensor is disconnected, shorted or sensors replace needed.
7. E6 Compressor discharge sensor malfunction: Check that if the sensor is disconnected, shorted or sensors replace needed.
8. E7 Ambient sensor malfunction: Check that if the sensor is disconnected, shorted or sensors replace needed.
9. Eb PCB board sensor malfunction: please return it back to the factory for repair
10. EE Parameter memory malfunction: If the problem could not be solved after power-on, please return it back to the factory for repair.
11. EH Humidity detection malfunction (humidity position): Check if the wiring is disconnected, shorted, or humidity sensor replace needed.
12. tA PCB board high temperature alarm: Check if the installation environment and PCB board are at high temperature.
13. UA room high temperature alarm: Check the installation position of the temperature sensor or the compressor operation status (the compressor not working).
14. LA the low temperature alarm in the library: Check the installation position of the temperature sensor or the compressor operation status (the compressor non stop).
15. UA room high humidity alarm (humidity position): Check the humidity sensor position, condensation, or humidifier working status.

16. Low humidity alarm (humidity position) in LA room: Check humidifier working status.
17. PSA pressure abnormality alarm: Check the cooling system temperature and refrigerant pressure.
18. PoA discharge tube high temperature alarm: Check the cooling system temperature and refrigerant pressure.
19. doA room door open alarm: Check if the door is closed, or the door detected status.
20. OA job alarm (humidity position): Check if someone still works in the room.
21. ChA Host Abnormal Alarm: Check the host machine status and host machine abnormal input status.
22. CdA condenser high temperature alarm: Check if the condenser is dirty / blocking to affect the heat dissipation.
23. FF fast freezing
24. dEF Defrost temperature locked
25.  Wi-Fi indicator: The indicator is ON when connecting Wi-Fi module or Modbus.
26.  Alarm indicator: The indicator is ON when alarm contact is activated.
27.  Cooling indicator : The indicator is ON when the compressor contact is activated, flashing when the compressor is protected.
28.  Defrost indicator: The indicator is ON when defrosting contact is activated, and flashing when the defrosting contact is OFF during defrosting period.
29.  Fan indicator : The indicator is ON when Fan contact is activated, and flashing when the Fan is OFF during cooling period.
30.  Light indicator: The indicator is ON when Light(door) is activated, and flashing when door closed reminder.
31.  Humidification indicator: The indicator is ON when humidifying contact is activated.

## Function and control instructions

1. On / Off door key: triggers the opening of the anode lock and turns on the light.
2. Manual defrost button: Manually enter / leave the defrost program.
3. ▲ Increment button: The temperature / parameter adjustment is increased.
4. ▼ Decrement button: The temperature / parameter adjustment is decreased.
5. Set button: Enter the parameter setup mode.

### • Compressor operation:

1. When E1.E2.EE occurs, the compressor operates according to the operation time while malfunction (Cr), and terminates according to the termination time while malfunction (CS), in automatically running cycle. When Cr=0 or Cr/CS is set to be 0 simultaneously, the compressor does not operate; when CS = 0, the compressor keep operating.
2. When the pressure is abnormal (Di action) or the high temperature alarm (CdA) is activated, the compressor is Off.
3. When the room door open linkage doo=cPr or F-C, and the room door detects the Di action for 5 seconds (including above), the compressor is Off.
4. When the condensing unit abnormality linkage Cho=cPr or F-C, and the condensing unit abnormality Di action lasts for 5 seconds (including above), the compressor is Off.
5. During defrost, dripping, power-on temperature control delay (odS), compressor protection delay (CP), compressor is off.
6. In the cooling/freezing mode, when the temperature is  $\leq tS$ , the compressor is off.
7. In the cooling/freezing mode, when the temperature is  $\geq (tS + td)$ , the compressor is On.
8. When the compressor is On→Off or power is on, the CP time starts to be calculated. If the CP is set to 0 when power is supplied, the compressor is forced to delay 60 seconds before operating.

### • Quick freezing:

1. Except being at malfunction/ powering-off/defrosting state, press and hold the “set” button for 6 seconds (keep pressing and holding while entering the parameter setting) to enter/leave the fast freezing state.
2. In the fast freezing state, the temperature and FF is alternately displayed.
3. When room temp  $\leq tS$ , the quick freezing returns to normal cooling state.
4. Under rapid freezing, do not enter the defrosting state.

### • Defrost cycle / time calculation:

1. After power transmission, load the defrost cycle dF and start timing; when dF is changed, the dF time is recalculated.
2. When the dF time arrives, the dF time is re-timed, and the defrosting state (automatic defrosting) is entered at the same time, and the defrosting time dt is started.
3. A fault or alarm's occurring does not affect the dF cycle calculation.
4. In the quick freezing mode or malfunction, neither defrosting nor immediate defrosting is available.
5. When the dt time is changed during defrosting, the set value will take effect at the next defrosting.
6. After the dt timing is over, the defrost state ends.

## • Defrost control:

1. Defrost (freezing):
  - a. Evaporation 1 temperature ( $Pb2 = y$ )  $\geq$  Defrost protection  $dS$ , the defrost heater 1 Off, loading 60 seconds delay.
  - b. Evaporation 1 temperature ( $Pb2 = y$ )  $<$   $dS$ , and at the end of the delay time, the defrosting heater 1 On.
  - c. Evaporation 2 temperature ( $Pb3 = y$ )  $\geq$  Defrost protection  $dS$ , defrost heater 2 Off, loading 60 seconds delay.
  - d. Evaporation 2 temperature ( $Pb3 = y$ )  $<$   $dS$ , and at the end of the delay time, the defrosting heater 2 On.
  - e. ( $Pb3=y$ ) When E3 occurs, the heater 2 won't be activated during defrost until the defrost ends.
2. Defrost (refrigeration): ( $Pb2=n$ ) stop defrosting, defrost heater Off.
3. When Evaporation 2 detects  $Pb3=n$  or non-defrosting period, Defrost 2 Electric Heater Off.
4. Defrost temperature lock (dL):
  - a. When  $dL=0$ , the actual temperature is displayed during defrosting.
  - b. When  $dL \neq 0$  and start defrosting, the temperature display is locked (dEF is displayed when  $dd=n$ , and the temperature before defrosting is displayed when  $dd=y$ ). Defrost temperature lock time is activated after defrost ends, and the display is continuously displayed till DI time is up, then room temp. restored.
5. During the defrost period, when E1.E2 occurs, defrost is immediately ended and the operation while malfunction (Cr) is activated, and the defrost heater is off.
6. Defrost while freezing ends: ( $Pb2=y$ )  
When the dt time is over or the defrosting is manually ended with defrost contact being Off. It starts to calculate the drip time (dr) , fan starts to delay (Fnd), and returns to the cooling mode.
7. Defrost while refrigeration ends: ( $Pb2=n$ )  
When the dt time is up or the defrost is manually ended, it immediately returns to the cooling mode.
8. Manual defrosting:  
During normal operation, press and hold the defrost button for 3 seconds to manually enter/leave the defrost state; dF cycle won't be affected by manual defrost.
9. Defrost contact protection:  
In case of improper operation while manual defrost or evaporation temperature being located at  $dS$  critical point, causing frequent contact switching; thus, when the defrost contact On->Off, 60 seconds delay time is loaded, during which the defrost contact is Off.

## • Fan control:

1. When E1.E2.EE occurs, the fan is On.
2. In the quick freezing mode (FF), the fan is On.
3. When the room door alarm linkage  $doo=FA$ n or F-C, and the state of the room door continues for 5 seconds (including above), the fan is Off.
4. When the condenser unit alarm linkage  $Cho=FA$ n or F-C, and the condenser unit abnormal action lasts for 5 seconds (including above), the fan is Off.

## 5. Freeze mode (Pb2=y):

a. Fan selection Fnc = o-n: (Continuous operation, stop operating during defrost)

- ① During defrost and fan-starting delay (Fnd), fan is Off.
- ② When Fnd time is up and it's still during the dripping time (dr), fan is On.
- ③ When cooling and evaporation 1 temperature  $\geq$  Fan stop temperature FS, fan is Off.
- ④ When cooling and evaporation 1 temperature is  $<$ FS, fan is On.

b. Fnc = c-n: (Synchronous operation with compressor, stop operating during defrost)

- ① During the defrosting and fan-starting delay (Fnd), fan is Off.
- ② Fnd time is up and still during dr time, fan is On.
- ③ When cooling and evaporating 1 temperature  $\geq$ FS, fan is Off.
- ④ When the refrigeration compressor is on and the evaporation temperature is  $<$ FS, fan is On.
- ⑤ When the compressor is Off, the fan starts and stops according to the Fon / FoF cycle.

c. Fnc = o-y: (Continuous operation, stop operating during defrost)

- ① Fan On when defrosting.
- ② When cooling and evaporating 1 temperature  $\geq$ FS, the fan is Off.
- ③ When cooling and evaporation 1 temperature is  $<$ FS, the fan is On.

d. Fnc = c-y: (Synchronous operation with compressor, stop operating during defrost)

- ① Fan On when defrosting.
- ② When cooling and evaporating 1 temperature  $\geq$ FS, the fan is off.
- ③ When the refrigeration compressor is on and the evaporation temperature is  $<$ FS, fan is On.
- ④ When the refrigeration compressor is Off, the fan starts and stops according to the Fon / FoF cycle.

## 6. Refrigeration mode (Pb2 = n):

a. Fnc = o-y: Continuous operation after power transmission.

b. Fnc = c-y:

- ① Fan On when defrosting.
- ② When the refrigeration compressor is On, fan is On.
- ③ When the refrigeration compressor is Off, the fan starts and stops according to the Fon / FoF cycle.

7. Select Fnc=c-n or c-y. When compressor is stopping and not in malfunction and defrost status, fan is Off once either Fon or FoF is set to be 0.

## • Lighting, room door and operation alarm control:

### 1. Lights Off state (door closing):

- a. When Wi-Fi is connected, press door switch button to open the room door. You need to enter the administrator password to open the door.
- b. Press and hold the door switch button for 1 second or use the mobile APP to open the door. The anode lock contact is activated for 1 second (open the door), the lighting contact is On, and the operation alarm time (oAt) starts to be counted.



2. Lights On state (door opening):
  - a. Once the room door is opened via mobile APP, or received door open instruction from mobile APP again, oAt is re-counted.
  - b. When the replenishment job is done, press and hold the switch button on panel for 1 second or use the mobile APP to close the door, oAt will be terminated and door close reminder (dor) turns to be activated; if a room door detector is equipped (the room door input polarity doi=oP or cL), and the room door is open, the doA room door alarm is activated immediately until the room door is closed.
  - c. When the door is opened via mobile APP/ door switch button, the job alarm time (Time/min) is displayed on the humidity window. When the countdown time is greater than 99 minutes, the display continues for 99 minutes, and the last minute shows 01 flashes. After the countdown ends, the job alarm OA is generated, and the alarm continues until the countdown is completed. The operation ends till door switch button gets pressed and alarm is terminated.
  - d. During the door closing reminder, the lighting continues to be ON, the light indicator flashes, the alarm contact and the buzzer are ON, until the timing is over, the light, buzzer and alarm contact are turned off; if the door button is pressed again during this period, Release the door closing reminder, turn off the alarm, keep the lighting ON, and re-time the job alarm oAt.
3. Room door detection:
  - a. Room door input polarity (doi):
    - ① nA indicates that the room door status is not detected.
    - ② cL indicates that the room door switch contact is short-circuited (closed) when the room door is open.
    - ③ oP indicates that the room door switch contact is open-circuited (open) when the room door is open.
  - b. Room door linkage doo:
    - ① nA indicates that the room door does not interlock with the refrigeration system but with illumination status.
    - ② FAn indicates that the room fan is forcibly terminated when door is opened for more than 5 seconds or light is on.
    - ③ CPr indicates that the compressor is forcibly terminated when the door is opened for more than 5 seconds or light is on.
    - ④ F-C indicates that the room fan and compressor are forcibly terminated when the door is opened for more than 5 seconds or light is on.

• **Humidification control:**

1. Humidity detection (Hud) must be set as " y" and the humidity sensor should be installed to activate the humidity control function.
2. When EH happened, the humidification contact is OFF.
3. When detecting humidity < HuP, the ON/OFF of humidification contact is controlled by HuC/Hut (Example: HuC=2, Hut=15, then humidify for 15 seconds every 2 minutes), if Hut=0, continue to humidify.
4. When detecting humidity  $\geq$  humidity setting, humidification contact OFF.
5. When detecting humidity  $\geq$  high humidity alarm (HAu), humidity alarm delay (HAd) starts to be counted, and high humidity alarm (UA) is activated after time is up.

6. When detecting humidity  $\leq$  low humidity alarm HAL starts, humidity alarm delay (HAd) starts to be counted, and low humidity alarm (LA) is activated after time is up.

- **Protection of temperature setting**

The range of temp. setting is restricted via Max temp. setpoint (HS) and Min temp. setpoint (LS) to avoid manual setting error making compressor overload or overheat in room, resulting in damaged caused.

- **Cleaning reminder:**

Accumulating time of power transmission.(reset when power off) When time accumulated reaches cleaning period (CLd)(day), cleaning reminder (CLn) / room temp. shows alternately. Alert and accumulating time clear when power off.

- **Alarm features:**

1. Temperature Alarm

- Alarm delay (dAo) starts to be counted after power transmission. Room temp. alarm detection won't be turned on until time is up.
- Room Max Temp. Alarm (UA): Except power-off/malfunction, once room temp. is higher than AU, Ad starts to be counted, UA and room temp. are displayed alternately on the panel when time is up. Alarm contact is activated.
- Room Min Temp. Alarm (LA): Except power-off/malfunction, once room temp. is lower than AL, Ad starts to be counted, LA and room temp. are displayed alternately on the panel when time is up. Alarm contact is activated.
- PCB Max temp Alarm (tA): once PCB temp. is higher than 70°C, tA/ room temp are displayed alternately on the panel with all output contact shut down.
- Condenser temp alarm (CdA): Except power-off/malfunction, once condenser temp. is higher than CAu, CAd starts to be counted, CdA/ room temp. are displayed alternately on the panel after time is up. Alarm contact is activated.
- Compressor Discharge temp. alarm (PoA): Except power-off/malfunction, once compressor discharge temp. is higher than PAu, PAd starts to be counted, PoA/ room temp. are displayed alternately on the panel when time is up. Alarm contact is activated.
- Temp. alarm is terminated once temp. turns back to normality.

2. Humidity alarm(Humidity window)

- Room Max humidity alarm (UA): Except being power-off/malfunction, once humidity is higher than HAu, HAd starts to be counted, UA/ humidity are displayed alternately on the panel when time is up. Alarm contact is activated.
- Except being power-off/malfunction, once humidity is lower than HAL, HAd starts to be counted, LA/ humidity are displayed alternately on the panel when time is up. Alarm contact is activated.
- Humidity alarm is terminated once humidity. turns back to normality.

3. Pressure alarm: (Detected when compressor activated. )

- When pressure switch polarity Psi: (DI connect H / L pressure switch of compressor.)
  - nA indicates pressure detection function is not used.
  - cL indicates the contact is short-circuited once pressure abnormality is detected.

- ③ oP indicated the contact is open-circuited once pressure abnormality is detected.
- b. Pressure switch accumulation: The accumulation of pressure abnormality occurring during PSt when pressure is abnormal.
- c. Counts accumulated reset cycle: Pst starts to be counted once pressure is abnormal. During the timing, if pressure abnormality doesn't reach PSn setting, counts accumulated are reset, re-counted till next PSt timing/accumulating.
- d. Pressure Switch numbers (PSn): When accumulated pressure abnormality = Pressure Switch numbers (PSn), pressure abnormal alarm (PSA) is given. Alarm contact activated.
- e. When pressure alarm (PSA) is activated, power re-transmission, shutting-sown or PSi = nA or PSt= 0 is needed to terminate the alarm.
- 4. Door alarm delay (doA): dot starts to be counted once door open status is detected. After time is up, doA is given and alarm contact is activated. doA will be terminated once room door is closed. Door alarm won't be determined when illumination is on.
- 5. Operation alarm (OA): When operation alarm occurs, alarm contact is activated, press door button to terminate alarm.
- 6. Parallel rack system alarm (ChA):
  - a. Parallel rack system abnormal switch polarity (Chi): (DI connect host abnormal switch)
    - ① nA indicates function for detecting parallel rack system normality is not used.
    - ② cL indicates the contact is short-circuited while parallel rack system is abnormal.
    - ③ oP indicates the contact is open-circuited while parallel rack system is abnormal.
  - b. Abnormal link of parallel rack system (Cho)
    - ① nA indicates parallel rack system abnormality doesn't interlock with refrigeration system.
    - ② FAn indicates that the fan in the room is forcibly stopped when the parallel rack system abnormality lasts for more than 5 seconds.
    - ③ CPr indicates that the compressor is forcibly stopped when the parallel rack system abnormality lasts for more than 5 seconds.
    - ④ F-C indicates that both the fan in the room and compressor are forcibly stopped when the parallel rack system abnormality lasts for more than 5 seconds.
  - c. parallel rack system Alarm Delay (Cht):
 

Once abnormality is detected in parallel rack system, Cht start to be counts; afterwards, ChA is given after time is up. Alarm contact is activated. ChA will be terminated once parallel rack system turns back to normality.

- **Evaporation 1 temperature display/ turning on& off via one button:**

1. Under normal conditions (not power-off/ malfunction), press and hold the up button for 2 seconds to switch to display the evaporation 1 temperature, and automatically restore the room temperature display after 5 seconds.
2. Under normal conditions (not power-off/ malfunction), press and hold the up button for 5 seconds to turn on/ off.

- **Turn off alarm:**

1. When a fault/alarm occurs, the alarm contact is activated, and the buzzer sounds an alarm. At this time, press the down button to temporarily turn off or resume the buzzer alarm; if it is off, the fault alarm status is terminated, and the alarm is automatically restored. Buzzer alarm function.
2. When the door is closed, the alarm cannot be turned off.



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