CONOTEC

CONOTEC CO., LTD.
DIGITAL TEMPERATURE CONTROLLER

ISO 9001:2008

| EZIN-PRO | INSTRUCTION MANUAL |

◆ Controls 5 outputs: Compressor, Defrost, Fan, Solenoid Valve, Alarm
◆ 4 inputs for protection and alarms: DP, HTC, LTC, OCR
◆ Choose temperature unit: Celsius or Fahrenheit
◆ Supports 485 Modbus communication
◆ Easy-to-use design for convenience
◆ 3-color LED changes with temperature

- This product has a detailed manual available on our website.
- For technical explanations and communication manuals, Please visit our website or scan the QR code.

01 Safety precautions

Please read the safety precautions carefully for correct operation of the product.

※ The specifications and dimensions specified in this instruction manual may be changed without any notice for performance enhancement.

⚠ Warning

1. This product was not made as a safe device. Therefore, this product should be attached with dual safety devices if it is used for the control purposes (e.g. a device vulnerable to accident and property damage, etc.).
2. Do not wire, inspect or service this product while the power is being supplied.
3. You must attach this product to a panel. Otherwise, it may cause an electric shock.
4. When connecting the power, you must check the terminal number.
5. Do not ever disassemble, process, modify or repair this product.

⚠ Caution

1. Please make yourself familiar with all the operation instructions, safety precautions and warnings before using this product. Comply with related specifications and capacity requirements
2. Do not wire or install this product to any unit with high inductive load (e.g. motor, solenoid, etc.).
3. Use a shielded cable with a proper length when extending a sensor.
4. Do not use any part that generates an arc when used in the same power or directly switched in close proximity.
5. Keep the power cable away from a high-voltage cable and do not install this product in any place that is full of water, oil and dust.
6. Do not install this product in any place that is exposed to direct sunlight or rain.
7. Do not install this product in any place that is subject to strong magnetic power, noise, vibration or shock.

8. Keep this product away from any place that generates strong alkaline or acid substances. Use a separate pipe.
9. Do not sprinkle water onto this product for cleaning when installing it in the kitchen.
10. Do not install this product in any place where the temperature/humidity ratings are exceeded
11. The sensor cable should not be cut or cracked..
12. Keep the sensor cable away from a signal cable, a power cable or a load cable. Use a separate pipe.
13. Keep in mind that the follow-up service will not be available if this product has been arbitrarily disassembled and modified
14. ⚠ symbol on the terminal wiring diagram indicates a safety statement that alerts a warning or caution.
15. Do not use this product near any device generating strong high-frequency noise (e.g. high-frequency welding machine high-frequency sewing machine, high-frequency radio, large-capacity SCR controller, etc.).
16. Using this product in any method other than those specified by by the manufacturer may lead an injury or a property damage
17. The product is not a toy. Keep it away from children.
18. The product should be installed only by an expert or a qualified person.
19. The company will not be liable for any damage caused by the violation of the above warnings and cautions or by a consumer's fault

⚠ Danger

Caution: Risk of electric shock
- Electric shock – Do not touch the AC terminal while the current is flowing. It may cause an electric shock.
- You must disconnect the input power when servicing it.

02 Model Types

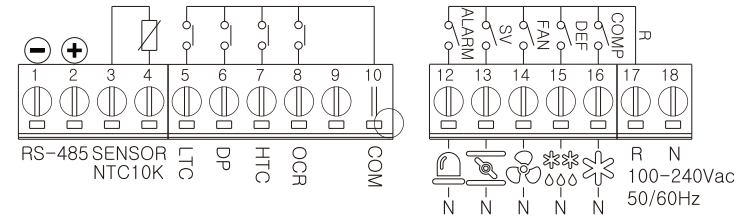| Model	Sensor	Control method	Temp. Range	Power	Function
EZIN-PRO	NTC 10K	Relay Output (220Vac 2A) (5EA) External Contact (4EA)	Celsius : −55.0℃ ~99.9℃ Fahrenheit : −67°F ~212°F	100~240 Vac 50/60Hz	OUTPUT : Comp, Defrosting, Fan, Solenoid Valve, Alarm INPUT : DP,HTC,LTC,OCR RS-485 Commnuication MODBUS

03 Components
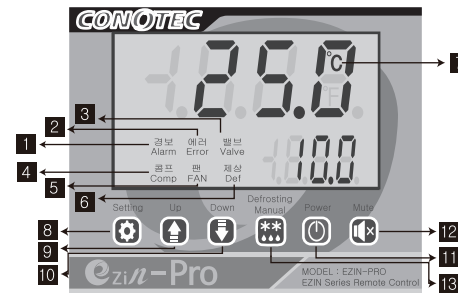
1 Alarm 2 Error indication (inspection request) 3 Electromagnetic valve output
4 Comp output 5 Fan output 6 Defrosting output 7 Display temperature units
8 Setting 9 Up Key 10 Down key 11 Power Key
12 Mute Key 13 Defrosting Manual Key

■ Functionality of Operation Key
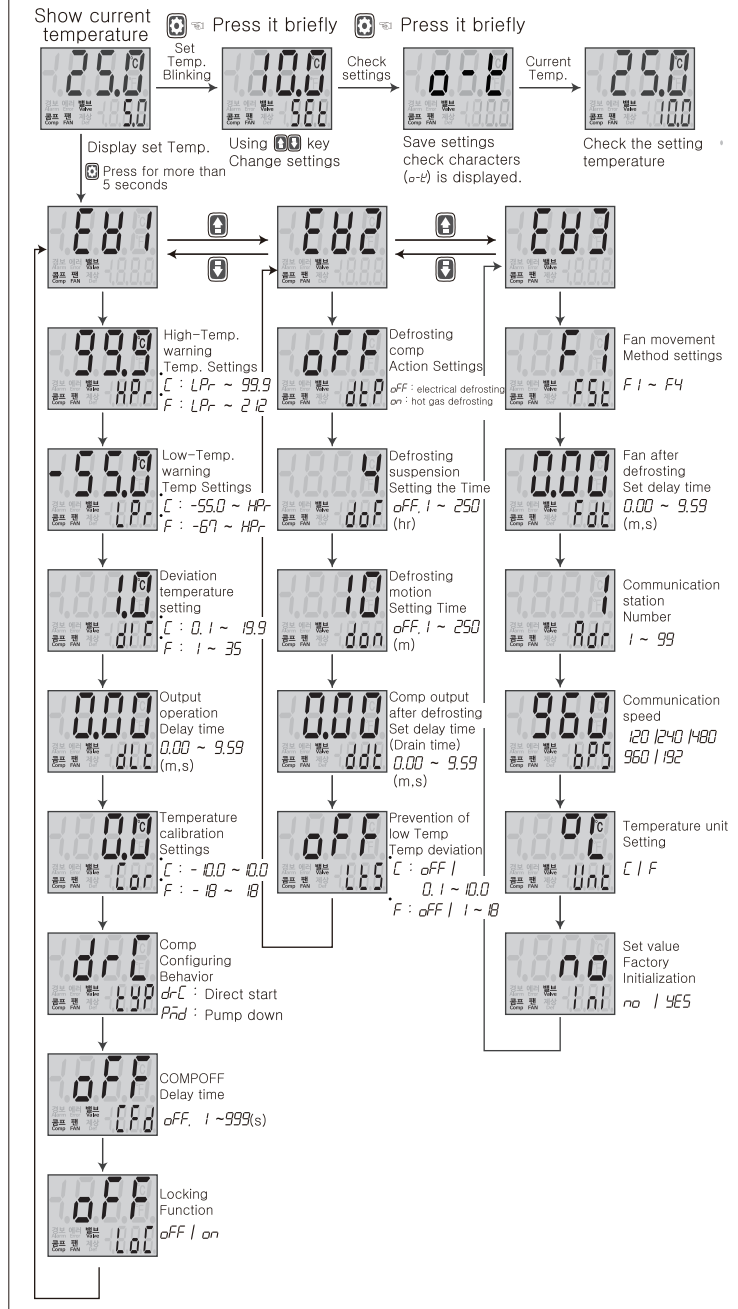· Change the setting temperature of the main output
On the Temperature Output screen, press [▲][▼] key to change the instrument's setting temperature.
Press [⚙] key briefly on the temperature output screen to enter the set temperature on the screen
Press [▲][▼] key to change the instrument's setting temperature.
· Changing Device Details
Change the corresponding setting for each mode and press [⚙] key to move on the next mode change.
Press the key for more than 5 seconds to enter the device's detailed setting mode, and press [▲][▼] key to change it.
· Instrument operation ON/OFF
Press [⚙] key for more than 3 seconds to turn the instrument on/off.
· Manual defrosting method
Press [❄] key for more than 3 seconds to turn on/off the manual defrosting function.
· Mute Method
When an alarm is raised, a buzzer is heard with an alarm and [🔇] key is pressed for two seconds. The buzzer turns on/off.

04 Terminal wiring diagram

RS-485 | SENSOR NTC10K | LTC | DP | HTC | OCR | COM
| ALARM | SV | FAN | DEF | COMP | R N 100-240Vac 50/60Hz

05 Setting process

Program setting (The value of each item is the factory setting.)

Show current temperature — Set Temp. Blinking — Press it briefly — Check settings — Press it briefly — Current Temp.

Display set Temp. → Press for more than 5 seconds → Using [▲][▼] key Change settings → Save settings check characters (o-t) is displayed. → Check the setting temperature

| E 1 | E 2 | E 3 |

| 99.9 HPr | High-Temp. warning Temp. Settings C : LPr~ 99.9 F : LPr~ 212 | oFF dtP | Defrosting comp Action Settings oFF : electrical defrosting on : hot gas defrosting | F 1 FSt | Fan movement Method settings F 1 ~ F 4 |

| -55.0 LPr | Low-Temp. warning Temp Settings C : -55.0 ~ HPr F : -67 ~ HPr | 4 doF | Defrosting suspension Setting the Time oFF, 1 ~ 250 (hr) | 0.00 Fdt | Fan after defrosting Set delay time 0.00 ~ 9.59 (m,s) |

| 1.0 diF | Deviation temperature setting C : 0.1 ~ 19.9 F : 1 ~ 35 | 10 don | Defrosting motion Setting Time oFF, 1 ~ 250 (m) | 1 Adr | Communication station Number 1 ~ 99 |

| 0.00 dLt | Output operation Delay time 0.00 ~ 9.59 (m,s) | 0.00 ddt | Comp output after defrosting Set delay time (Drain time) 0.00 ~ 9.59 (m,s) | 960 bPS | Communication speed 120 240 480 960 192 |

| 0.00 Cor | Temperature calibration Settings C : -10.0 ~ 10.0 F : -18 ~ 18 | oFF LtS | Prevention of low Temp Temp deviation C : oFF 1 0.1 ~ 10.0 F : oFF 1 ~ 18 | C Unt | Temperature unit Setting C I F |

| drC tYP | Comp Configuring Behavior drC : Direct start Pnd : Pump down | | | no Ini | Set value Factory Initialization no 1 YES |

| oFF CFd | COMPOFF Delay time oFF, 1 ~999(s) | | | | |

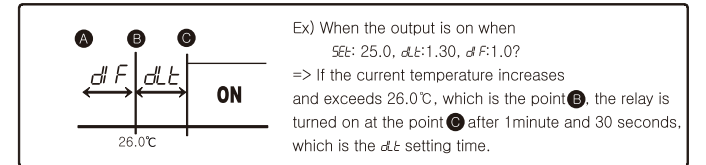| oFF LoC | Locking Function oFF 1 ON | | | | |

06 Function details

HPr : High-Temp alarm temp setting (-LPr to 99.9℃), 10 minutes after defrosting

LPr : Low-Temp alarm temp settings (−55.0 ~ HPr)

LoC : The lock function of setting data.
– A safety device that prevents the user from changing various setting values
When on, the detailed setting value is not changed and the message output is LoC

diF : Setting fot temperature deviation
– In the ON/OFF control, it needs at regular interval between ON and OFF.
– By operating the ON/OFF control frequently, the realy or its output contact can be damaged quickly and it also occurs the hunting (oscillating,chattering) by virtue of external noise.
– You can make use of the temperature deviation in order to protect its realy or contact and so on.

dLt : Output Delay Time
– It is widely used as the followings in case of operating the ON/OFF control very often, (Cooler,Compressor and so on)
– To protect the operation machinery when re-input of the power supply or momentary stoppage of power supply.

Ex) When the output is on when 5Et: 25.0, dLt:1.30, diF:1.0?
=> If the current temperature increases and exceeds 26.0℃, which is the point ⓑ, the relay is turned on at the point ⓒ after 1minute and 30 seconds, which is the dLt setting time.

Cor : Current temperature calibration function
– While there is no problem in the product, a function to calibrate when temperature is different error and reference standard that occur in the input sensor (e.g. Mercury thermometer or thermomete currently use, a temperature controller)
– Ex) Actual temperature : 10.0℃ → Cor Modification of 0.0 to −2.0
    Display window : 12.0℃ → Displayed as 10.0 (corrected current temperature)

tYP : COMP operation type setting (direct start/pump down method)
– Selection of COMP operation method by dP input signal
drC : Direct start – Depending on the temperature, turn off the comp in case of abnormal dP signal for simultaneous operation of the solenoid valve and indicate the dP
Pnd : Pump down – Depending on the temperature, the solenoid valve is switched on/off, the compress is operated when the valve is turned on and the dP signal is input, and the 5d is turned on when the dP signal is abnormal and lasts for more than 5 minutes after detection of the abnormal signal for 5 minutes

CFd : COMP OFF delay time
– For comp protection and pump down
After a certain period of time after the solenoid valve is turned off. Ability to turn OFF COMP
(Does not delay when oFF)
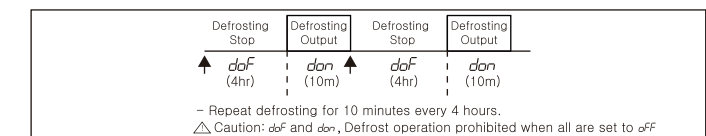
EX) CFd : 10s
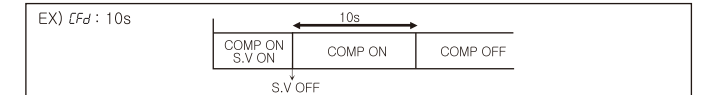
dtP : Select COMP behavior during defrosting
oFF : Electrical defrosting → COMP OFF defrosting
on : Hot gas defrosting → COMP ON defrosting

doF : Defrost stop time setting
– Defrosting proceeds if the time has elapsed for the set time.

don : Defrosting Operation Time Setting
– When the defrosting cycle comes, defrost it.

– Repeat defrosting for 10 minutes every 4 hours.
⚠ Caution: doF and don, Defrost operation prohibited when all are set to oFF

ddt : Set the COMP delay time after thawing (drain time)
– Set range 0.00 ~ 9.59 (m,s)
After defrosting is finished, all outputs are turned OFF for the set time, and the outputs are turned ON
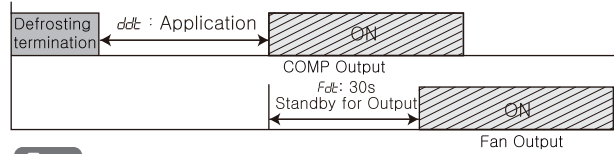
EX) In the case of ddt : LOO (1m)

Left column
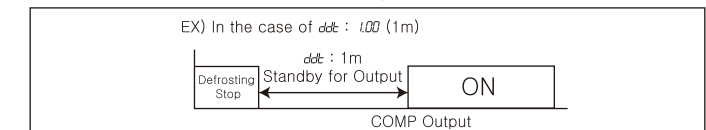
LtS : Set low temperature deviation temperature deviation (oFF, 0.1 ~ 10.0 ℃)
- Current Temperature ≤ (Set Temperature - LtS)
  → Defrosting, fan ON
  (Defrosting and fan output immediately in LtS operation regardless of fan setting chart)

FSt : Fan Action Settings(F1 ~ F4)

Fan Settings		When Comp ON	When Comp OFF	When defrosting is ON
	F1	Fan ON	Fan OFF	
	F2	Fan ON		
	F3	Fan ON	Fan OFF	Fan ON
	F4	Fan ON		Fan OFF

FdT : Set fan output delay time after defrosting
- Set range 0.00~9.59 (m,s)
  EX)Fdt : 0.30 (30s)

Defrosting termination — ddt : Application — COMP Output — Fdt : 30s — Standby for Output — Fan Output ON

Adr : Set communication dialing code
- When using RS485 communication, you must specify the country number from 1 to 99.

bPS : Set communication speed
- 1200BPS / 2400BPS / 4800BPS / 9600BPS / 19200BPS

Unt : Temp display unit
C : Displayed in Celsius
F : Displayed in Fahrenheit
※ Caution : If you change the unit during operation, all settings except Unit and the Communication menu will change to the factory settings, so reset all settings.

Sor : Select Sensor
- In Uses the sensor connected to PRO to control the device.
- out Controls the device using the sensor connected to REMOTE

Ini : Initialize settings
- Select YES and press [icon] to reset the settings and start again

■ How to Set External Input
Install the OCR, DP, HTC, or LTC externally when there are no abnormal signals from the device.
※ Only Normal Close contact type can be used.

If there is a fault with the OCR and the contact is broken, it will be considered an abnormal signal and trigger an alarm.

If the DP contact is broken, the compressor will stop, and DP will show on the screen.
(In pump-down mode, SV will turn ON, and after 5 minutes, an alarm will appear.)

If the LTC contact is broken, it will stop all device operations, display LTC on the screen, and show an alarm
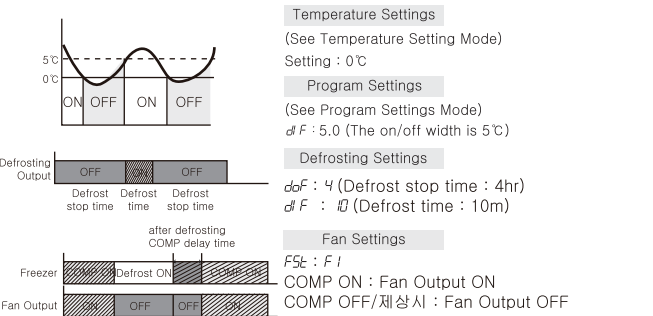
If the HTC contact is broken, it will stop the heater output during defrost or LTS operation and blink the defrost heater display on the screen.
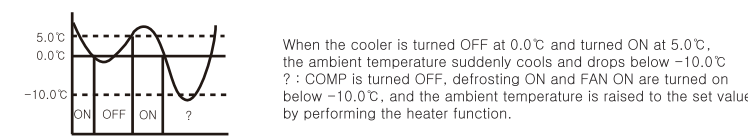
[Color display according to temperature]
• Current temp ≥ (set temp + deviation temp)
  →Current temp output in RED color
• Current temp <(set temp + deviation temp), Current temp ≥ set temp
  →Current temp output in GREEN color
• Current temp < set temp
  →Current temp output in YELLOW color

Second column

[How to apply deviation in ON/OFF control]
• Current temp ≥ (set temp + deviation temp)
  →solenoid valve, compress output ON
• Current temp <Set temp
  →solenoid valve, compress output off

(diagram: -20.0℃, -25.0℃, ON OFF ON OFF; setting = -25.0℃ d F = 5.0 d.t = 0.0)

■ xample of using a thermostat
The cooler is turned off at 0℃ and restarted at 5℃, and defrosting power is produced every 4 hours for 10 minutes, Fan is turned on when the COMP is output.
What are the set values when COMP OFF and defrosted OFF?

Temperature Settings (See Temperature Setting Mode) Setting : 0℃
Program Settings (See Program Settings Mode) d F : 5.0 (The on/off width is 5℃)
Defrosting Settings doF : 4 (Defrost stop time : 4hr) d F : 10 (Defrost stop time : 10m)
Fan Settings FSt : F1 COMP ON : Fan Output ON COMP OFF/제상시 : Fan Output OFF

Defrosting Output: OFF ON OFF — Defrost stop time / Defrost time / Defrost stop time — after defrosting COMP delay time
Freezer: Defrost ON
Fan Output: ON OFF OFF

■ xample of using subcooled compensation (EX:When the value of LtS is set to 10.0℃)

(diagram: 5.0℃ 0.0℃ -10.0℃ ON OFF ON ?)

When the cooler is turned OFF at 0.0℃ and turned ON at 5.0℃, the ambient temperature suddenly cools and drops below -10.0℃ ? : COMP is turned OFF, defrosting ON and FAN ON are turned on below -10.0℃, and the ambient temperature is raised to the set value by performing the heater function.

07 Communication Specifications

* It has built-in RS485 MODBUS RTU protocol.
* Asynchronous two-wire half-duplex communication system
* Communication distance: Within 1.2km
* Communication Speed: 1200/2400/4800/9600/19200BPS
* Start bits: 1 bit, Stop bits: 1 bit, Parity bits: None, Data bits: 8 bits

[Func 0x02 : Read Discrete Input]
- You can receive sensor status and simple information in bit form.

[Request]

Address	Command	Starting address		Number of data		CRC16	
		Upper Byte	Lower Byte	Upper Byte	Lower Byte	Lower Byte	Upper Byte
1BYTE	0x02	1BYTE	1BYTE	1BYTE	1BYTE	1BYTE	1BYTE

[Response]

Address	Command	Number of data	Data	CRC16	
				Upper Byte	Lower Byte
1BYTE	0x02	N x 1BYTE	1BYTE	1BYTE	1BYTE

[MAP N = If the number of data is 8 or less, it is more than 1, 8, if it is 16 or less, it is 2 or more, and if it is 16 or more, it is 3]

NO	Address	Description	Range		Unit	Shipping value
10001	0000	System operation	bit0	0:ON, 1:OFF		
10002	0001	Comp output	bit1	0:OFF, 1:ON		
10003	0002	Fan output	bit2	0:OFF, 1:ON		
10004	0003	Defrosting output	bit3	0:OFF, 1:ON		
10005	0004	Electromagnetic valve output	bit4	0:OFF, 1:ON		
10006	0005	Output operation delay	bit5	0:OFF, 1:ON		
10007	0006	COMP OFF delay	bit6	0:OFF, 1:ON		
10008	0007	Comp output delay after defrosting	bit7	0:OFF, 1:ON		
10009	0008	Fan delay after defrosting	bit8	0:OFF, 1:ON		
10010	0009	Temp sensor open error	bit9	0:OFF, 1:ON		
10011	000A	Temp sensor short error	bit10	0:OFF, 1:ON		
10012	000B	dP Contact Error	bit11	0:OFF, 1:ON		
10013	000C	HtC Contact Error	bit12	0:OFF, 1:ON		
10014	000D	LtC Contact Error	bit13	0:OFF, 1:ON		
10015	000E	HPr- High-Temp warning	bit14	0:OFF, 1:ON		
10016	000F	LPr- Low-Temp warning	bit15	0:OFF, 1:ON		

[Func 0x04 : Read Input Registers]
- You can receive simple information such as current temperature, temperature unit, and output status.

[Request] → Number of bytes = Number of data*2

Address	Command	Starting address		Number of data		CRC16	
		Upper Byte	Lower Byte	Upper Byte	Lower Byte	Lower Byte	Upper Byte
1BYTE	0x04	1BYTE	1BYTE	1BYTE	1BYTE	1BYTE	1BYTE

[Response]

Address	Command	Number of Byte	Data1		...	Datan		CRC16	
			Upper Byte	Lower Byte		Upper Byte	Lower Byte	Lower Byte	Upper Byte
1BYTE	0x04	1BYTE	1BYTE	1BYTE	...	1BYTE	1BYTE	1BYTE	1BYTE

→ Total 12 data and 24 bytes received if data count = 12

Third column

[MAP]

NO	Address	Description	Range	Unit	Shipping value
30001	0000	Product Model Name	"EZ"		ASCII
30002	0001	Product Model Name	"IN"		ASCII
30003	0002	Product Model Name	"-2"		ASCII
30004	0003	Product Model Name	"3"		ASCII
30005	0004	Product Model Name	blank		
30006	0005	Product Model Name	blank		
30007	0006	Product Model Name	blank		
30008	0007	Product Model Name	blank		
30009	0008	Product Model Name	blank		
30010	0009	Product Model Name	blank		
30011	000A	Firmware version	the front decimal place		
30012	000B	Firmware version	the last decimal place		
30101	0064	Current Temp	Sensor Error: -9999	℃ / °F	
30102	0065	Temp Settings	-55.0 ~ 99.9 / -67 ~ 212	℃ / °F	
30103	0066	Temp unit	0:Celsius, 1:Fahrenheit	℃ / °F	
30104	0067	System operation	bit0	0:ON, 1:OFF	
		Comp output	bit1	0:OFF, 1:ON	
		Fan output	bit2	0:OFF, 1:ON	
		Defrosting output	bit3	0:OFF, 1:ON	
		Electromagnetic valve output	bit4	0:OFF, 1:ON	
		Output operation delay	bit5	0:OFF, 1:ON	
		COMP OFF delay	bit6	0:OFF, 1:ON	
		Comp output delay after defrosting	bit7	0:OFF, 1:ON	
		Fan delay after defrosting	bit8	0:OFF, 1:ON	
30105	0068	Temp sensor open error	bit0	0:No error, 1:Open error	
		Temp sensor short error	bit1	0:No error, 1:Short error	
		dP Contact Error	bit2	0:No error, 1:dP error	
		HtC Contact Error	bit3	0:No error, 1:HtC error	
		LtC Contact Error	bit4	0:No error, 1:LtC error	
		HPr- High-temp warning	bit5	0:OFF, 1:High-temp warning	
		LPr- Low-temp warning	bit6	0:OFF, 1:Low-temp warning	

[Func 0x03 : Read Holding Registers]- You can read the setting values.

[Request] → Number of bytes = Number of data*2

Address	Command	Starting address		Number of data		CRC16	
		Upper Byte	Lower Byte	Upper Byte	Lower Byte	Lower Byte	Upper Byte
1BYTE	0x03	1BYTE	1BYTE	1BYTE	1BYTE	1BYTE	1BYTE

[Response]

Address	Command	Number of Byte	Data1		...	Datan		CRC16	
			Upper Byte	Lower Byte		Upper Byte	Lower Byte	Lower Byte	Upper Byte
1BYTE	0x03	1BYTE	1BYTE	1BYTE	...	1BYTE	1BYTE	1BYTE	1BYTE

→ If data count = 23, total 23 data, 46 bytes received

[Func 0x06 : Write Single Register]
- You can change one setting value item at a time.
- If written normally, the contents of Request and Response are the same.

[Request / Response]

Address	Command	Write address		Data		CRC16	
		Upper Byte	Lower Byte	Upper Byte	Lower Byte	Lower Byte	Upper Byte
1BYTE	0x06	1BYTE	1BYTE	1BYTE	1BYTE	1BYTE	1BYTE

[Func 0x10 : Write Multiple Registers]
- You can change the setting value multiple items at once.
- When you write multiple registers, if there is an error in the data, it will not be written all over.

[Request]

Address	Command	Starting address		Number of data		Number of Byte	Data1		...	Datan		CRC16	
		Upper Byte	Lower Byte	Upper Byte	Lower Byte		Upper Byte	Lower Byte		Upper Byte	Lower Byte	Lower Byte	Upper Byte
1BYTE	0x10	1BYTE	1BYTE	1BYTE	1BYTE	1BYTE	1BYTE	1BYTE	...	1BYTE	1BYTE	1BYTE	1BYTE

[Response]

Address	Command	Starting address		Number of Byte		CRC16	
		Upper Byte	Lower Byte	Upper Byte	Lower Byte	Lower Byte	Upper Byte
1BYTE	0x10	1BYTE	1BYTE	1BYTE	1BYTE	1BYTE	1BYTE

[Exception Response]
Returns error information when you send a command that is not supported by this product or when there are other errors.

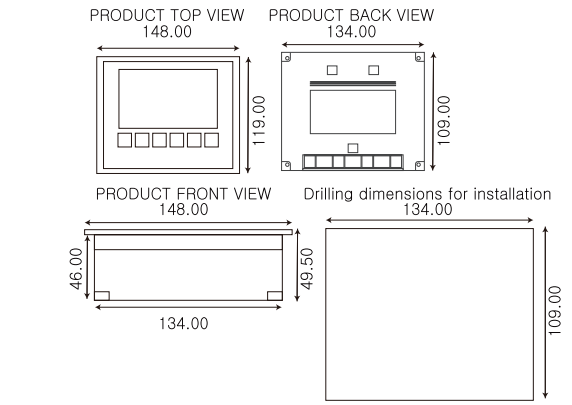| Address	Command	Error Code	CRC16	
			Lower Byte	Upper Byte
1BYTE	incoming command+0x80	1BYTE	1BYTE	1BYTE

0x01: Unsupported Commands
0x02: Starting address error
0x03: Data count error
0x04: Requested Commands abnormal treatment

Fourth column

[MAP]

NO	Addr	Menu Name	Description	Celsius range	Fahrenheit range	Unit	Shipping value
40001	0000	SEt	Temp Settings	-55.0 ~ 99.9	-67 ~ 212	℃/°F	0.0
40002	0001	HPr	High-Temp alarm temp setting	LPr ~ 99.9	LPr ~ 212	℃/°F	99.9
40003	0002	LPr	Low-Temp alarm temp setting	-55.0 ~ HPr	-67 ~ HPr	℃/°F	-55.0
40004	0003	dF	Deviation temp setting	0.1 ~ 19.9	1 ~ 35	℃/°F	1.0
40005	0004	oLt	Setting output delay time	0.00 ~ 9.59		m s	0.00
40006	0005						
40007	0006	Cor	Temp calibration settings	-10.0 ~ 10.0	-18 ~ 18	℃/°F	0.0
40008	0007	tYP	Comp operation setting	d-C	Pnd		d-C
40009	0008	CFd	Comp OFF delay time	oFF, 1 ~ 999		s	oFF
40010	0009	LoC	Locking Settings	OFF / on			on
40011	000A	dtP	Defrosting Comp Action Settings	OFF / on			on
40012	000B	doF	Defrost stop time setting	oFF, 1 ~ 250		hr	4
40013	000C	don	Defrost operation time setting	oFF, 1 ~ 250		m	10
40014	000D	ddt	Comp output delay after defrosting	0.00 ~ 9.59		m s	0.00
40015	000E						
40016	000F	LtS	Low-temp prevention temp deviation	oFF, 0.1 ~ 10.0	oFF / 1 ~ 18	℃/°F	oFF
40017	0010	FSt	Setting the fan operation method	F1 ~ F4			F1
40018	0011	Fdt	Setting fan latency after defrost	0.00 ~ 9.59		m s	0.00
40019	0012						
40020	0013	Adr	Communication station number	1 ~ 99			1
40021	0014	bPS	Communication speed	120/240/480/960/192		bPS	960
40022	0015	Unt	Temp display unit	C	F	℃/°F	C
40023	0016	Ini	Set value initialization	no / YES			no
40024	0017	—	Operation status	0: Operation / 1: Stop			

※ Only Func 0x06 is available for operation state control through communication.

08 Dimension and panel hole sizes

PRODUCT TOP VIEW 148.00
PRODUCT BACK VIEW 134.00
119.00 / 109.00
PRODUCT FRONT VIEW 148.00
Drilling dimensions for installation 134.00
46.00 / 49.50 / 109.00
134.00

09 Easy error diagnosis instructions

※ If an error is displayed while the product is running
• **Er1** : It is case where the product was subject to a strong external noise and internal data memories have been damaged.
• In this case, contact us for product service.
• Although this controller was designed to withstand a certain level of external noise, it is not supposed to withstand all levels of noise.
• If the product is subject to a noise greater than 2KV, it could be internally damaged.
• If o-E (open error) or S-E (short error) is displayed, there is something wrong with a sensor. Please check the sensor.