

USER MANUAL FOX-2005S/FOX-2005S-R



- 2 sensors
 - Indoor temperature, defrost temperature sensor
- Over cooling compensation
- COMP, defrost, FAN output
- Applied the type of defrost by deviation
 - electricity savings
- Manual defrosting
- Cooling only
- RS485(FOX-2005S-R)

1 Cautions for Safety

Please read the cautions carefully before using the product and use it correctly.

※ The specifications, sizes and etc. described in this user manual are subject to change without advanced notice to improve the performance.

Warning

1. As this product is not manufactured as safety equipment, make sure to use this product after mounting double safety device when using it for the purpose of controlling a device having risk of personal injury, equipment damage or huge property loss.
2. Do not cut the wire or make check-up or maintenance when the power supply is connected.
3. Make sure to check the socket number before connecting the power.
4. Never disassemble process, improve or repair this equipment.

Cautions

- Be well acquainted with way of operation, safety regulations and warnings and make sure to use the product in accordance with the defined specification and within the related capacity.
- Do not connect wiring or make installation with the motors or solenoids having big inductive load.
- In extending the sensor, use the same wire, and do not make it long unnecessarily.
- Do not use the parts to generate arc in opening and closing at the same or nearby power supply.
- Power cable should be kept away from high-voltage cable, and should not be installed in the place of much water, oil or dust.
- Do not install in the place exposed to direct sunlight or rain.
- Do not install in the place exposed to strong magnetism, noise, vibration and impact.
- Keep away from the place where strong alkali or strong acid material is directly discharged.
- Do not spray water directly for cleaning when installing in the kitchen.
- Do not install in the place where the temperature and humidity exceed rated range.
- Use the product not to cut the sensor line or to get flaw on it.
- Sensor line should be kept away from the signal line, power supply, driving power and load line, and independent piping should be used for it.
- This product may not be serviced when disassembled and modified as you like.
- The mark ⚠ on the wiring diagram is the safety wording for warning or caution.
- Do not use near the devices which emit strong high frequency noise (High frequency welder, High frequency sewing machine, High frequency two-way radio, High capacity SCR controller).
- If the product is used by the way other than defined by the manufacturer, it may cause personal injury or property loss.
- As it is not a toy, keep out of the reach of the children.
- The installation should be done by an expert or a qualified person.
- Our company does not assume any responsibility for the damage and loss caused by non-complying with the above warnings and cautions or through the mistakes of the consumers.

Danger

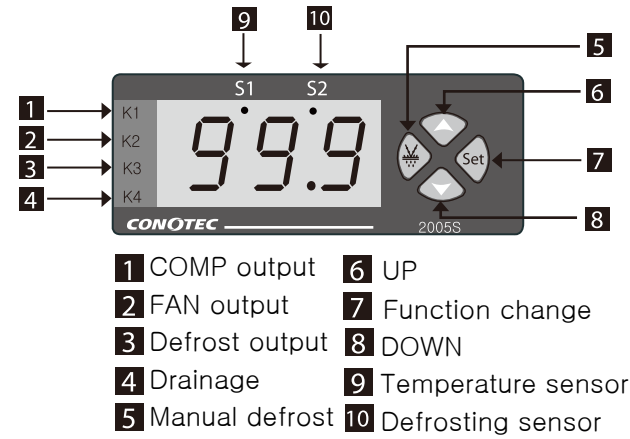
- Cautions, Danger of electric shock
 - Electric shock – Do not touch AC socket while the power is connected. You may get electric shock.
 - Make sure to block the input power when you check the power input.

2 Models

Model	Sensor	Output	Range	Function
FOX-2005S /FOX-2005S-R (Cooling only)	NTC (2EA)	Relay contact (3EA) MAX:220VAC 2A	-55.0℃ ~+99.9℃	COMP control Defrost control FAN control RS485 FOX-2005S-R

3 Name of each parts

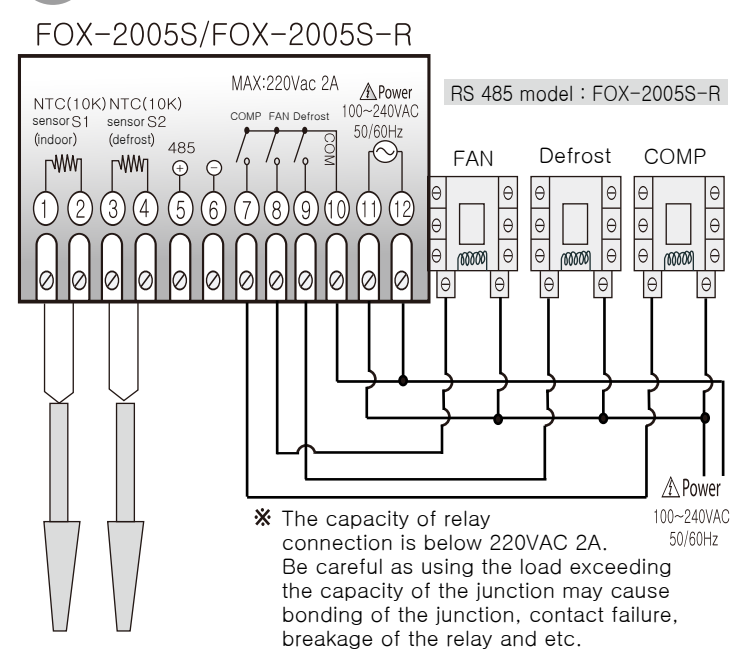
Part names



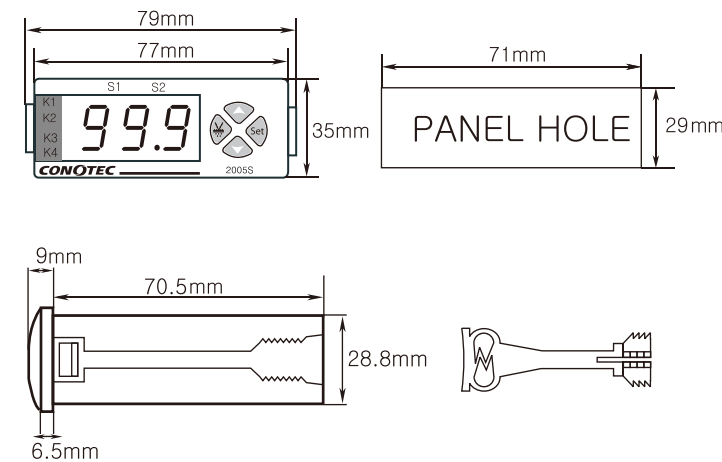
Function for key

- ⏸ Press this key for more than 2 sec to record the configured value and if you do not press any key, return at present value & be recorded automatically after 1 min.
- ⏸ Press this key for more than 4 sec, manual defrost function is operated.(details : refer to the next page)
- ⏸ To change of each SV or conversion into the S2 temperature display mode(after indicating S2, the S1 displayed automatically after 5 sec)

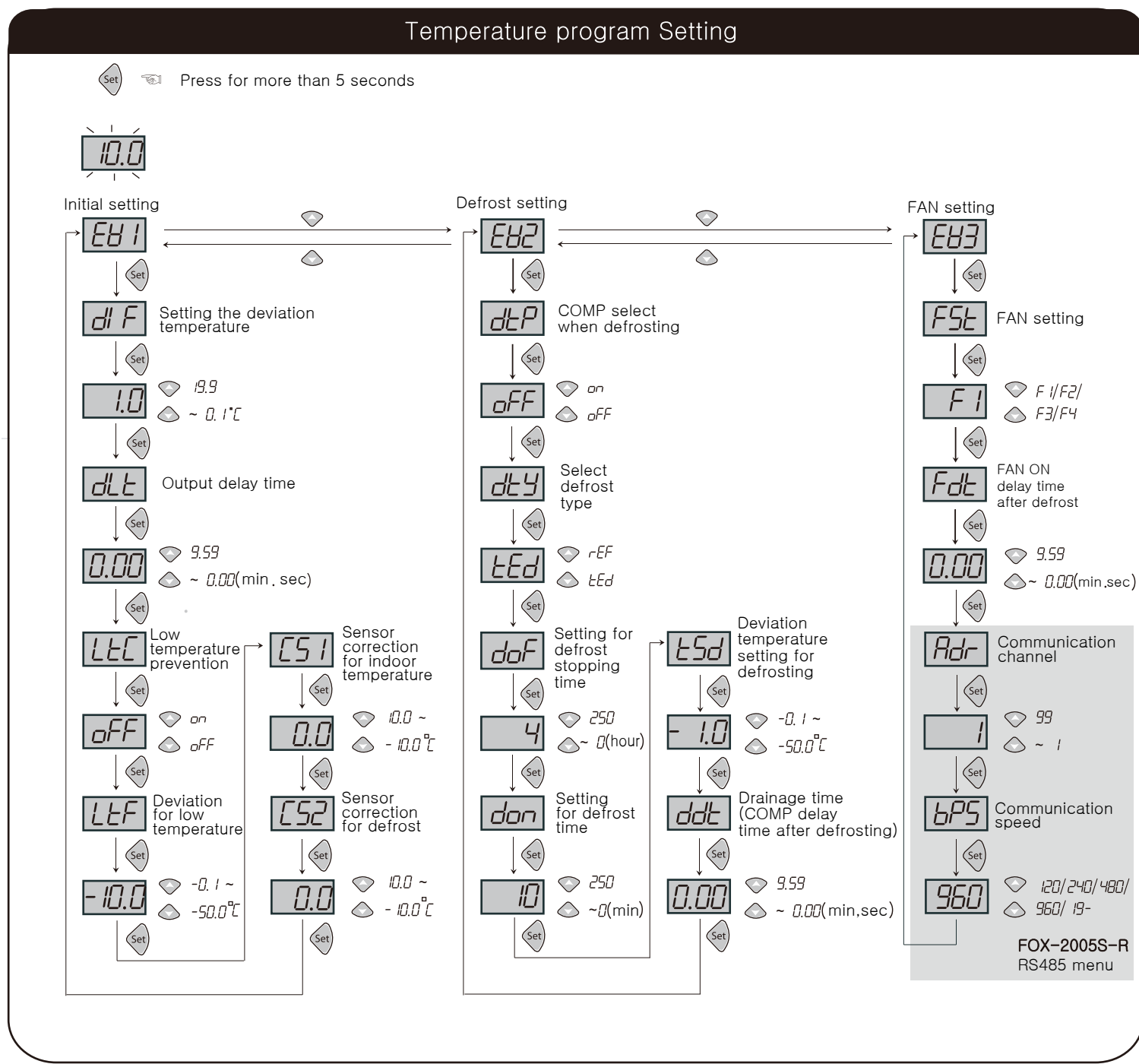
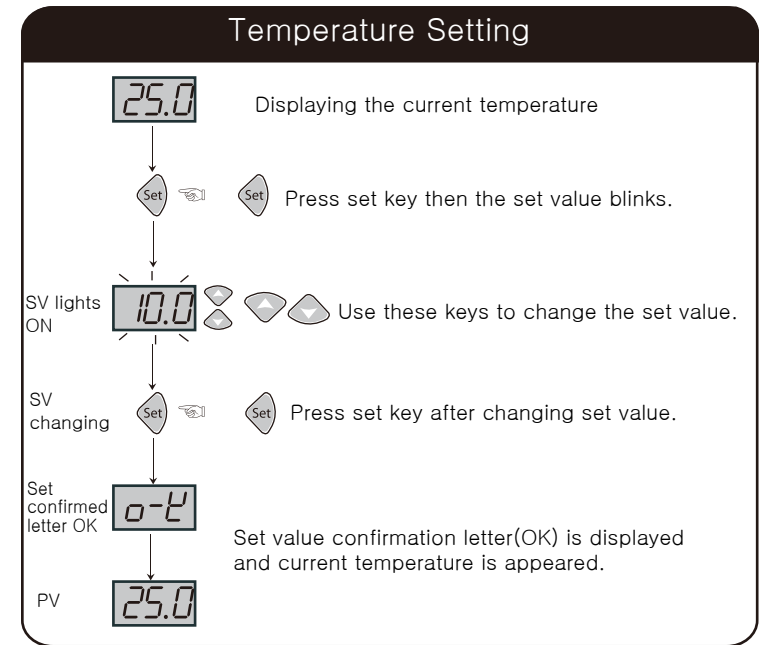
4 Wiring diagram



5 Dimension



6 How to change set value



7 Detailed description of the functions

dF : Setting deviation temperature

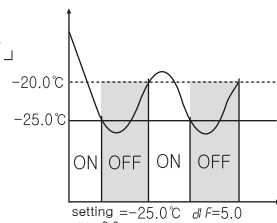
In ON/OFF control, constant gap between ON and OFF is needed (Setting ON/OFF width)

In case ON and OFF act too often, the relay and other output contact points can be damaged fast or hunting (oscillation, chattering) can be caused by external noise.

It is the function to prevent the contact point of the machine and others by setting deviation temperature.

「How to apply deviation when control ON/OFF」

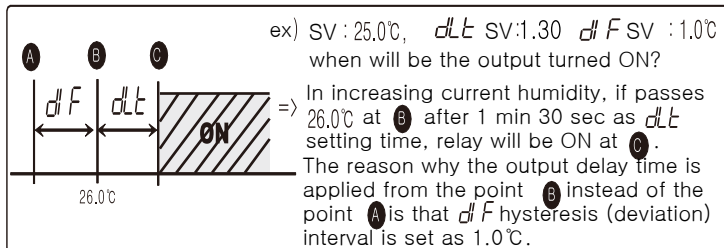
- PV (S1) > SV + deviation value
→ COMP output ON
- PV (S1) ≤ SV
→ COMP output OFF



dLt : Output delay time

It is used when there is trouble in the object to be controlled by frequent ON/OFF action (freezer, compressor and etc.)

Protecting the machines in operation in case of momentary blackout or power restoration.



$LtEC$: Low temperature prevention

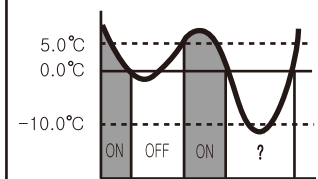
aFF : Stop the system to prevent of low temperature

an : Operate the system to prevent of low temperature

(Defrost output ON, FAN output ON if it operates at low temperature)

Application using for supercooling compensation

Setting : $LtEC \rightarrow an$ $LtF \rightarrow -10.0^\circ C$ $dF \rightarrow 5.0^\circ C$



If it begins normal operation ON at 5.0°C suddenly it turned cold as the ambient temperature falls below minus 10.0°C.
? : COMP will be turned OFF and defrost ON & FAN ON in minus 10.0°C to make the heater's ambient temperature turning till the set value.

$CS1$: temperature correction for the sensor using indoor(S1)

$CS2$: temperature correction for the sensor in defrosting(S2)

In case that the actual temperature and the temperature indicated on the display window of the unit is different while the product itself has not a problem, it is the function to make the present temperature same as the actual temperature by calibration.(Comparing with a water temperature thermometer or an existing thermometer)

ex) actual value : 25.0°C if $CS1$ or $CS2$ corrected as 0.0 → -3.0
displayed value : 28.0°C and then 25.0°C is indicated on the display window.
if the differs value 3°C from an actual

dLP : Select COMP when defrosting

aFF : electrical defrosting → COMP OFF

an : Hot gas defrosting → COMP ON

when defrosting

dLY : Select the type of defrosting

rEF : defrosting cycle

defrosting OFF during doF setting time

→ defrosting ON during don setting time

tEd : Defrosting by the temperature of defrosting sensor

doF : Defrosting OFF time

Setting range is 0 ~ 250 hour

Defrosting starts at the cycle of defrost

don : Defrosting ON time

Setting range is 0 ~ 250 min

Defrosting starts at the cycle of defrost



tSd : Setting defrosting deviation value

* Present value(S2) < Set value + defrost deviation value

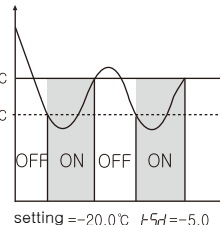
→ defrosting output ON

* Present value(S2) ≥ Set value

→ defrosting output OFF

* 「Through defrosting system by the deviation it gets the electricity savings..」

* By attaching the sensor (S2) around the evaporator coil or outlet it has the most effective.

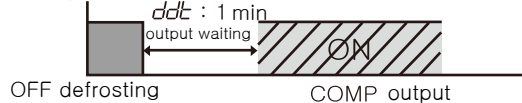


ddt : Draining time(COMP delay time after defrosting)

Setting range 0.00 ~ 9.99 (min,sec)

COMP output turns ON after all output turns OFF as long as setting time since defrosting finishes.

e.g) ddt : in case of 1.00(1min)



FSt : Refer to the program setting for a FAN (1 ~ 4)

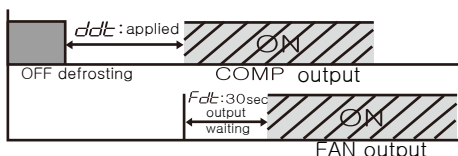
Chart

	COMP ON	COMP OFF	Defrost
F1	ON	OFF	OFF
F2	ON	ON	ON
F3	ON	OFF	ON
F4	ON	ON	OFF

Fdt : FAN ON delay time after defrosting

Setting range : 0.00 ~ 9.99(min,sec)

e.g) Fdt : 0.30(30 sec)



Adr : Communication address setting

To designate the channel 1~99 while RS 485 communication.

bPS : Communication speed setting

1200BPS / 2400BPS / 4800BPS / 9600BPS / 19200BPS

How to set the manual defrost

1. Manual defrost ON : If press key for 4 seconds, K3 LED turns ON and starts to defrost manually.

2. Manual defrost OFF : If press key for 4 seconds in the state of manual defrosting ON, defrosting turns OFF.

* Ending time according to the setting for defrost type selection (dLY)

– When defrost setting by temperature (tEd) : Defrosting ends at the set value

– When setting the cyclic defrost (rEF) : Defrosting ends after don time

8 Setting range & set values at shipment

	Function	Range	Value at shipment	Remark
	Temperature setting	-55.0 ~ 99.9	10.0	
dF	Deviation value setting	0.1 ~ 19.9	1.0	
dLt	Output delay time setting	0.00 ~ 9.99	0	min, sec
$LtEC$	Anti low temperature	aFF / an	aFF	an : Anti-low temp. operation ON aFF : Anti-low temp. operation OFF
LtF	Anti low deviation setting	-50.0 ~ -0.1	-10.0	
$CS1$	Correct indoor value	-10.0 ~ 10.0	0.0	Correct different indoor value between displayed and real
$CS2$	Correct defrost value	-10.0 ~ 10.0	0.0	Correct different defrost value between displayed and real
dLP	COMP select at defosting	aFF / an	aFF	an : COMP output ON aFF : COMP output OFF
dLY	Select type of defrost	rEF / tEd	tEd	rEF : Defrosting cycle tEd : Defrosting by temp.
doF	Defrosting OFF time	0 ~ 250	4	hour
don	Defrosting ON time	0 ~ 250	10	minute
tSd	Defrosting deviation value setting	-50.0 ~ -0.1	-1.0	
ddt	Draining time (COMP delay time after defrost)	0.00 ~ 9.99	0	minute, second
FSt	FAN setting	F1 ~ F4	F1	refer to the chart
Fdt	FAN ON delay time after defrost	0.00 ~ 9.99	0	minute, second
Adr	Communication station settings	1 ~ 99	1	
bPS	Communication speed setting	120/240/480/960/1920	960	120 : 1200BPS 240 : 2400BPS 480 : 4800BPS 960 : 9600BPS 1920 : 19200BPS FOX-2005S-R only

9 Tips for diagnosis of simple troubles

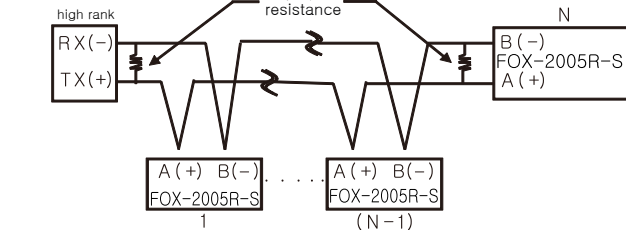
In the event that ERROR is indicated during the use of a product

- In case of Er1, the memory elements of the various internal data are damaged due to the strong noise from outside.
- In this case, request the after-sale service to our company.
- As for this regulator, the supplementation measures are established against the above noise, however, it cannot endure noise unlimitedly.
- If $aE1$, $aE2$ (open error) or $SE1$, $SE2$ (short error) appears, it is the case of the error of the sensor. Please check the sensor.

10 Communication

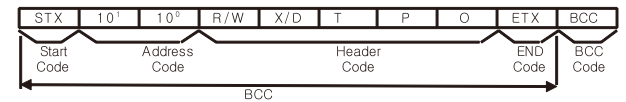
Specification	In conformity EIA RS485
The maximum number of connections	32 units(but, address setting can be upto 01~99)
Method of communication	Two wire half-duplex operation
Synchronous system	Asynchronous system
Communication distance	Within 1.2 km
Communication speed	1200/2400/4800/9600/19200bps (selectable)
Start Bit	Fixed 1 bit
Stop Bit	Fixed 1 bit
Parity Bit	None
Data Bit	Fixed 8 bit
Protocol	BCC

System Composition

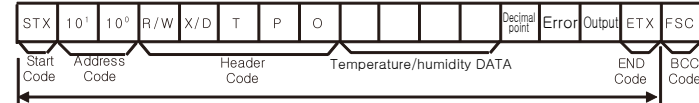


Definition of communication Command and Block

< Format of Host Query >



< FOX-2005S-R Response format >



- Start Code
show the lead(head) of the BLOCK
STX → [02H]
- ADDRESS CODE
– A high rank system can discriminate the channel code number among FOX-2005SR. It is available to set between 01 and 99 (BCD ASCII) (ex-in case of 01, 30H, 31H)
- Header Code
– Show the command name as an alphabetic letter.
RX(reading demand) → R[52H], X[58H]
RD(reading response) → R[52H], D[44H]
WX(writing demand) → W[57H], X[58H]
WD(writing response) → W[57H], D[44H]
TPO(indoor value) → W[54H], P[50], O[30H]
TPO(defrost value) → T[54H], P[50H], 1[31H]
– Data is displayed as “Hexadecimal”
– Data is displayed as “Hexadecimal”
– Data is displayed as “Hexadecimal”
– Data is displayed as “Hexadecimal”
- Composition of data
– Data is displayed as “Hexadecimal”
– Data is displayed as “Hexadecimal”
– Data is displayed as “Hexadecimal”
– Data is displayed as “Hexadecimal”
- Decimal point → 0[30H] no “decimal point” 1[31H] “decimal point”
- Error → 0[30H] there is no “error” 1[31H] interrupted of the sensor's cable 2[32H] short-circuited error of the sensor

	COMP	DEFROST	FAN
0(30H)	X	X	X
1(31H)	O	X	X
2(32H)	X	X	O
3(33H)	O	X	O
4(34H)	X	O	X
5(35H)	O	O	X
6(36H)	X	O	O
7(37H)	O	O	O

- END CODE
– Shows the end (close) of the Block ETX → [03H]

- BCC(Block Check Character)
– Show the XOR arithmetic and logic values from the start(STX) to the ETX
* The others : As of not response of the ACK
① In case of not equivalent to the channel after receiving STX
② In case of generating the receive buffer overflow
③ In case of not equivalent to the communication's set values or baud rate
* Treatment – in case of no response of the ACK
① Check the cable
② Check the communication's condition (set values)
③ If the main cause of the status is the noise, try to do communication practicing 3-times until recovering normally.
④ Change the communication speed in case of bring about the communication's error frequently.

* The specifications of the above product are subject to change without a prior notice to improve the performance of the product. Please comprehend the contents specified in the above precautions, and observe them without fail.

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* This device works proper operation with :
Ambient Temp : 0 ~ 60°C
Ambient Humi. : below 80%RH
Regular power : 220VAC ±10% 50/60Hz

* Main product and development
– Digital temp./humi. controller
– Digital timer, Current/Voltage meter
– Development of other products.