Version 1.2(2014.12. 29)

ISO 9001:2008

CONOTEC®

Digital Temperature Controller

CONOTEC CO., LTD.

www.conotec.co.kr

FOX-7ND

Operating Manual

Thank you for puchasing CONOTEC's product.

1 Caution

Read the safety precautions carefully for correct usage.

※ The specifications, appearance, and measurements may change without advance notice for improvement of performance.

⚠ WARNINGS

1. This product is not made as a safety device, so when it is used for a control of devices feared to cause casualties, damages to the peripheral devices or huge property loss, the double safety devices should be arranged before use.
2. Avoid connecting lines, checking and repairing the products while power is supplied.
3. Connect power after making sure the terminal number.
4. Never disassemble modify, improve or repair the product.

⚠ CAUTIONS

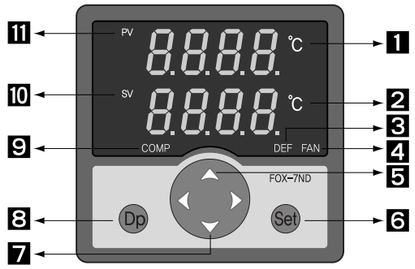
- Be well-informed of how to use, safety regulations, warnings, etc before installation of this device and apply it to the extent of the defined specifications and relevant capacity without fail.
- Avoid wiring or installation to a motor or solenoid with a large inductive load.
- Use a shiled cable for extention of the sensor and ensure not to make it longer than the necessity.
- Ensure not to use the parts generating arc when switching at the same power source or near to it.
- Keep the power cable away from a high-tention power line and ensure not to install it at a place with serious oil and dirt.
- Avoid strong magnetic field or serious noise, vibration or impact.
- Keep away from the place where strong alkaline or acid material is directly released and use an independent pipe line.
- When it is installed at kitchen, ensure not to pour water directly over the product for cleaning.
- Keep the sensor cable away from signal line, power source, power line or loaded line and use an independent pipe line.
- Note that the mark of ⚠ in terminal connection diagram is the safety expression for warnings or cautions.
- Avoid using the product close to the device generating noises(high frequency welder, high frequency sewing machine, high frequency radio, large capacity SCR Controller, etc).
- The use in any way other than what is instructed by the manufacturer may cause injury or property loss.
- It is not a toy and keep it out of reach of children's hand.
- The installation of the device should be performed by an expert or a qualified personnel without fail.
- We shall not take any responsibility for the damage caused by non-compliance with the above-mentioned warnings or cautions or by any consumer's mistake.

⚠ **Danger**

■ Danger from electrocution

- Electric shock - Do not make contact with the AC terminal during the electric current application for this may result in electrocution.
- When inspecting input power, make sure to cut input power.

2 Part names

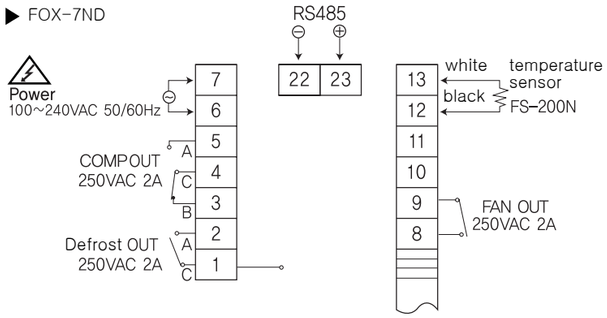


1 : Display of the present temperature
2 : Display of the temperature set values
3 : A lamp to display of the defrost output
4 : A lamp to display of the FAN output
5 : Setting button , "Upward"
6 : A button to change of the set values
7 : Setting button, "Downward"
8 : A button for the manual defrost
9 : A lamp to display of the COMP output
10 : Display lamp of the set values
11 : Display lamp of the present temperature

3 Connection

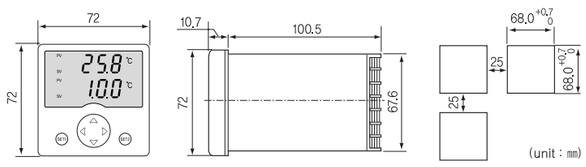
※ Output : 250VAC 2A
Please make use of the power relay or magnet surely.

▶ FOX-7ND



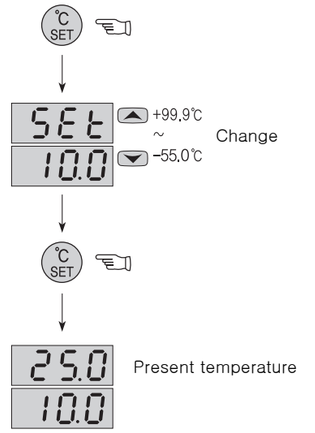
4 Size & Dimension

▶FOX-7ND(72x72x110mm)



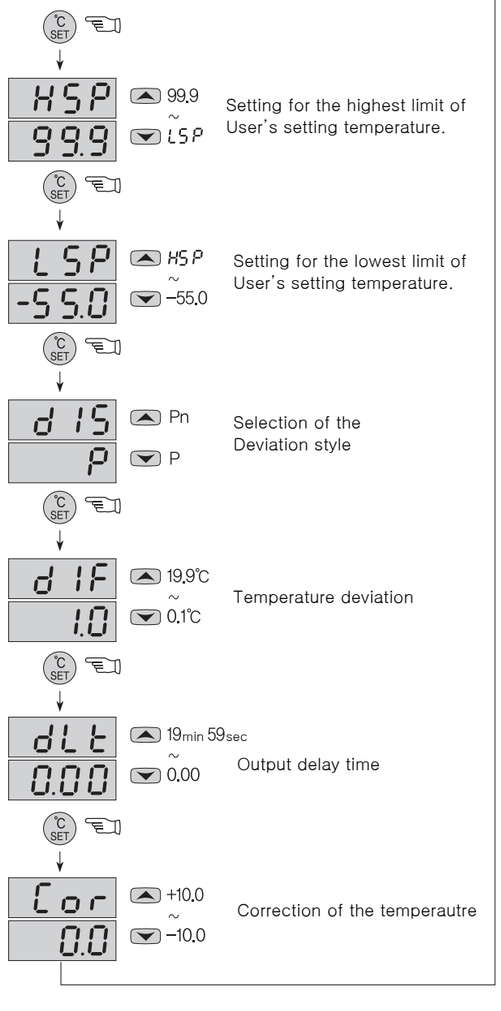
5 How to set program

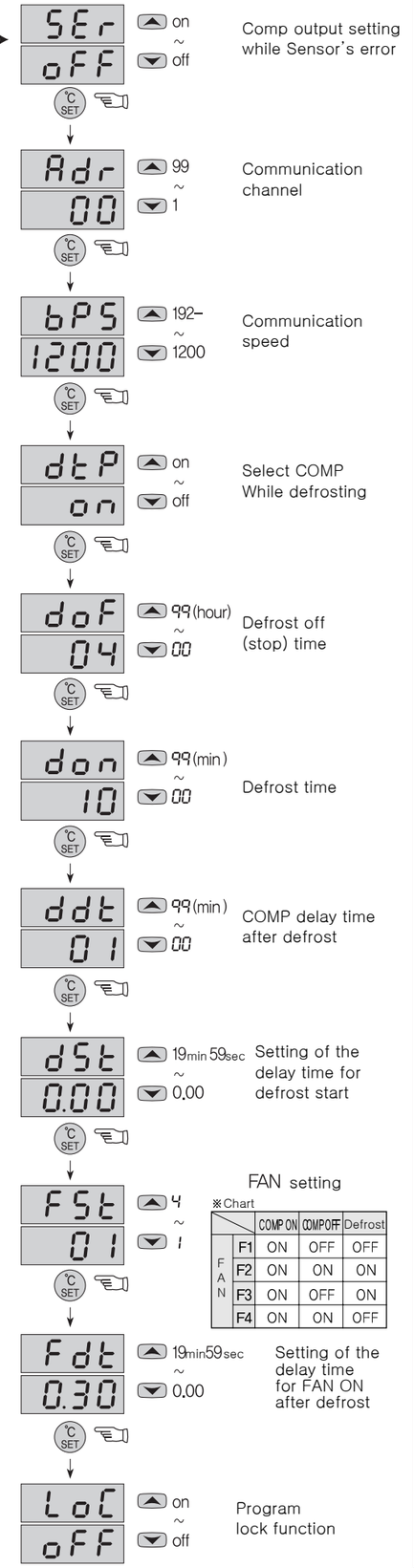
Temperature setting



Temperature program setting

Press for more than 5 seconds





6 Description of Function

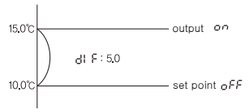
1. HSP : Setting function of the highest limit of temperature range (maximum set point allowed to the end user)
   - Impossible to set up the set value more than HSP set value
   ex) HSP = 25.0℃ setting ⇒ impossible to raise the set value more than 25.0℃

2. LSP : Setting function of the lowest limit of temperature range (Minimum set point allowed to the end user)
   - Impossible to set up the set value less than LSP set value
   ex) LSP = 10.0℃ setting ⇒ impossible to lower the set value less than 10.0℃

3. dIS : Selection of deviation style

   P Output : +deviation (be off at setting point)

   ex) setting = 10.0℃, dIF : 5.0

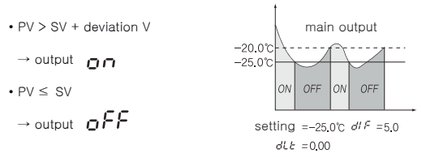


   Pn Output : ±deviation(based on the setting point)

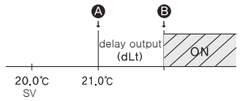
   ex) setting = 10.0℃, Pn : 5.0

4. dIF : Setting for temperature deviation
   - In the ON/OFF control, it needs at regular intervals between ON and OFF.
   - If ON/OFF operation is activated frequently, the relay or output contact can be damaging quickly and it occurs the hunting(oscillating, chattering) by virtue of external noise, and so on.
     To prevent these happenings, you can set up temperature deviation in order to protect its relay or contact and so on.

「How to apply the deviation when ON/OFF controls」



5. dLt : Delay time of the output
   - in case of operating the ON/OFF control very often (cooler, compressor, etc.,)
   - to protect the operation machinery when re-input of the power supply or momentary stoppage of power supply



   ex) When the set value is 1.30, the time from Ⓐ point to Ⓑ point is dLt set time (1 min 30 sec), after which relay becomes ON at Ⓑ point.
   (OUT display lamp blinks during dLt time.)

6 Cor : Correction of the present temp.
   - The product itself has no problem, but the correction functioned for that if temp.differs between an error occurs in the input sensor from outside and basic temp.

   ex) real temp. : 10.0℃
   display : 12.0℃ → Cor :0.0 ⇒correct to –2.0
   → display 10.0℃ (corrected PV)

7. SEr : Sensor error (o-E, S-E)
   COMP output setting : ON : continuously ON
   OFF : continuously OFF

8. Adr : Communication channel setting
   Should designate the channel 1~99 while RS485 communication.

9. bPS : Communication speed
   - 120, 1200 : 1200bps
   - 240, 2400 : 2400bps
   - 480, 4800 : 4800bps
   - 960, 9600 : 9600bps
   - 19-, 192- : 19200bps
   (Start bit 1, Stop bit 1, Non parity)

10. dtP : COMP select when defrost — on : when defrost COMP ON; oFF : when defrost COMP OFF

11. doF : Defrost stoppage time
   - Setting range 0 ~ 99 (hour)
   - Start to defrost at the defrost cycle.

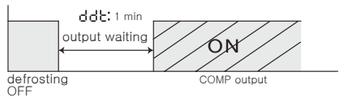
12. don : Defrosting time
   - Setting range 0 ~ 99 (min)
   - Start to defrost during the defrost cycle.

   ex) doF : 04(hour), don : 10(minutes)

※ It repeats the defrost operation for 10 minutes every 4 hours.

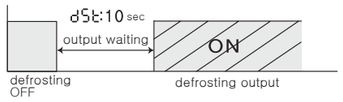
13. ddt : COMP delay time after defrost
   - Setting range 0 ~ 99 (min)
   - COMP output is ON after delay as much as setting time after defrost OFF

   ddt : 01 (1 min)



14. dSt : Delay time after start to defrost
   - Setting range 0.00 ~ 19.59 (min,sec)
   - Defrosting output is on after delay as much as setting before defrosting on

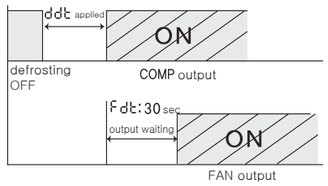
   ex) dSt : when setting at 0.10



15. FSt : FAN setting (F1 ~ F4) refer to the program setting chart

16. Fdt : FAN ON delay time after defrosting
   - Setting range 0.00 ~ 19.59 (min,sec)

   ex) Fdt : 0.30(30 sec)



17. LoC : Lock function for the set DATA
   As a safety way, it is usually used in order not to change the set value except for a main user.

   when setting ON – Lock function for all set values except for set temperature value
   when setting OFF– Unlock function for all set values except for set temperature value

7 Setting range & set value at factory

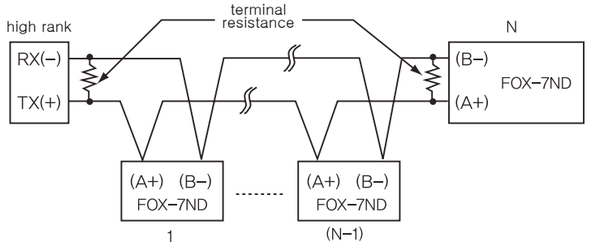
	Function	Display	Range	Value at factory	Remark
Set value	Temp.setting		-55.0 ~ 99.9	10.0	
Program setting	Highest limit of user	HSP	LSP~ 99.9	99.9	unrelevant to relay output
	Lowest limit of user	LSP	-55.0 ~HSP	-55.0	unrelevant to relay output
	Selection of the deviation style	dIS	P / Pn	P	Pn - deviation ± ; P - deviation +
	Deviation	dIF	0.1 ~ 19.9	1.0	
	Delay time	dLt	0 1	0.00	(min.sec)
	Correction of temp.	Cor	- 10.0 ~10.0	0.0	correct for a discrepancy between displayed, and real
	Sensor error	SEr	on /oFF	oFF	on - COMP OUTPUT ; oFF - COMP OUTPUT
	Communication channel	Adr	01 ~ 99	0	RS485
	Communication speed	bPS	1200/2400 /4800/9600 /192-	1200	RS485
	Comp. select when defrosting	dtP	on /oFF	oFF	on - COMP OUTPUT ; oF - COMP OUTPUT
	Defrost OFF time	doF	00 ~ 99	04	hour, set up unit
	Defrost ON time	don	00 ~ 99	10	minute, set up unit
	COMP delay time setting after defrost	ddt	00 ~ 99	01	minute, set up unit
	Start to defrost delay time setting	dSt	00.0 ~ 19.59	0.00	(min.sec)
	FAN setting	FSt	1 ~ 4	1	※ refer to the chart
	FAN delay time after defrost	Fdt	0.00 ~ 19.59	0.30	(min.sec) ※Comp delay time applied after defrost
	Program lock function	LoC	on /oFF	oFF	on setting for the lock function ; oFF setting for the unlock function(however, except for the setting temperature value)

8 Communication output

■ Interface

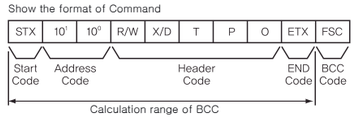
Applied standard	EIA RS485
Max.number of occupations	32 units(but, Address setting : 01~99)
Communication method	2-wire half duplex
Synchronized system	Asynchronous system
Communication distance	Within 1.2 Km
Communication speed	1200/2400/4800/9600/19200bps(selectable)
Start bit	Fixed 1 bit
Stop bit	Fixed 1 bit
Parity bit	None
Data bit	Fixed 8 bit
Protocol	BCC

■ System Composition

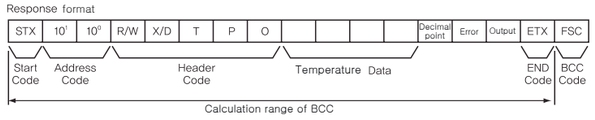


■ Definition of communication Command and Block

Show the format of Command



Response format



① Start Code
   - show the lead(head) of the block
   ACK will be added in case of Response STX → [02H]

② Address Code
   - A high rank system can discriminate the channel code number among FOX-7ND.
   It is available to set between 01 and 99(BCD ASCII)

③ 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(temperature measuring value) → W[54H], P[50], O[30H]

④ Composition of data
   - Data is displayed as "Hexadecimal"

⑤ Decimal point → 0[30H] there is no "decimal point"
   1[31H] there is "decimal point"

⑥ Error → 0[30H] there is no "error"
   1[31H] interrupted of the sensor's cable
   2[32H] short-circuited error of the sensor

⑦ Output → 0 [30H] COMP OFF, DEF OFF, FAN OFF
   1 [31H] COMP ON, DEF OFF, FAN OFF
   2 [32H] COMP OFF, DEF ON, FAN OFF
   3 [33H] COMP ON, DEF ON, FAN OFF
   4 [34H] COMP OFF, DEF OFF, FAN ON
   5 [35H] COMP ON, DEF OFF, FAN ON
   6 [36H] COMP OFF, DEF ON, FAN ON
   7 [37H] COMP ON, DEF ON, FAN ON

⑧ END Code
   - Show the end (close) of the Block ETX → [03H]

⑨ 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 nomally.
   ④ Change the communication speed in case of bring about the communication's error frequently.

9 How to diagnose a breakdown

■ Indicating ERROR on using items
- This Er1 is the damage of memory data for various of inner-DATA due to be got nosied strongly from outside while using this items.
- Please request us A/S by return.
- Although our controller is designed as the complementary measures regarding these noise from outside, it is not endurable against these noise with endlessly.
- If noise(2KV) disordering become an inflow, the inner-part will be damaged.
- When shows these letter o-E(open error), S-E(short error) it indicates that sensor has a problem.
- Please check the sensor.

※The product specifications are subject to change without notice to improve the performance of the product.

Please read carefully the NOTICE before handling the product and abide by it.

※Regarding the manual in English, please download it at our website.

■H.Office : CONOTEC B/D 2nd floor, 26, Yunsan-ro, Geumjeong-gu, Busan, 46269 Rep. of KOREA
Lab : CONOTEC B/D 3rd floor, 26, Yunsan-ro, Geumjeong-gu, Busan, 46269 Rep. of KOREA
Factory : CONOTEC B/D B1, 26, Yunsan-ro, Geumjeong-gu, Busan, 46269 Rep. of KOREA
A/S TEL : +82-51-819-0426
E-mail : conotec@conotec.co.kr
Homepage : www.conotec.co.kr

■This device is suitable for following environment.
Ambient temperature: 0°C~ 60°C
Surrounding humidity: Below 80%Rh
Rated power source: AC230V 50/60Hz

■ Main Products & Development
- Digital Temperature /Humidity Controller
- Digital Timer, Current/Voltage Meter
- Other Products Development