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CONOTEC

CONOTEC CO., LTD.

DIGITAL TEMPERATURE CONTROLLER

ISO 9001:2008

FOX-2001FR **Instruction Manual**

FOX-2001FR

- A user manual for this product is posted on the company website.
- Please download the technical document and communications manual on the company website

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	Function
FOX-2001FR	NTC	Relay Contact (4EA)	-55.0℃ ~ +99.9℃	Temp. control RS485 Comm

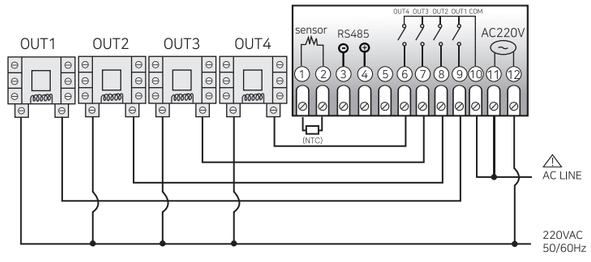
03 Components

1 OUT1 output display 2 OUT2 output display 3 OUT3 output display
4 OUT4 output display 5 Increasing Switch 6 Function change switch
7 Decreasing Switch

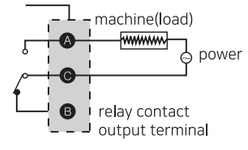
· Functionality of Operation Key

1. Set : Key for temperature setting and program change
2. ▲ ▼ : Key to change temperature and program settings

04 Terminal wiring diagram



■ Example of a Relay Access



※ Relay contact capacity is less than 250VAC 2A.

If using the load to exceed contact capacity, be cautious on those can be caused by contact deposited, contact failure, relay damaged, etc.

05 Communication Description

* RS485 MODBUS RTU protocol is built-in.
* Asynchronous 2-wire half-duplex communication method / Communication distance: within 1.2 km
* Communication speed: 1200 / 2400 / 4800 / 9600 / 19200 Bps
* Start bit: 1 bit, Stop bit: 1 bit, Parity bit: None, Data bit: 8 bits

Modbus Mapping Table

[Func 0x02 : Read Discrete Inputs] - You can receive a brief information in the for of bits, such as a sensor status and a decimal.

[Request]

Sub products address	command	start address		number of data		CRC16	
		high byte	low byte	high byte	low byte	low byte	high byte
1BYTE	0x02	1BYTE	1BYTE	1BYTE	1BYTE	1BYTE	1BYTE

[Response]

Sub products address	command	Number of data	Data	CRC16	
				low byte	high byte
1BYTE	0x02	1BYTE	1BYTE	1BYTE	1BYTE

Request 01 02 00 01 00 06 A9 C8

Response 01 02 01 21 61 90

00100001

10 0001
(10)
Sensor Short Error

[MAP]

NO	Address	Description	Range		Unit
10001	0000	Not Allowed			
10002	0001	OUT1	bit0	1:ON, 0:OFF	
10003	0002	OUT2	bit1	1:ON, 0:OFF	
10004	0003	OUT3	bit2	1:ON, 0:OFF	
10005	0004	OUT4	bit3	1:ON, 0:OFF	
10006	0005	Temp. Sensor Open Error	bit4	1:0-E, 0:Normal	
10007	0006	Temp. Sensor Short Error	bit5	1:S-E, 0:Normal	

[Func 0x04 : Read Input Registers] - You can receive basic information such as room temperature and output status.

[Request]

Sub products address	command	start address		number of data		CRC16	
		high byte	low byte	high byte	low byte	low byte	high byte
1BYTE	0x04	1BYTE	1BYTE	1BYTE	1BYTE	1BYTE	1BYTE

byte numbers = data numbers * 2

data numbers = if 5 total 5 numbers data, 10 numbers byte receiving

[Response]

Sub products address	command	Byte numbers	DATA1		...	DATA n		CRC16	
			high byte	low byte		high byte	low byte	low byte	high byte
1BYTE	0x04	1BYTE	1BYTE	1BYTE	...	1BYTE	1BYTE	1BYTE	1BYTE

[MAP]

NO	Address	Description	Range		Unit
30001	0000	room temperature	at a sensor error : -9999		
30002	0001	OUT1	bit1	1:ON, 0:OFF	
		OUT2	bit2	1:ON, 0:OFF	
		OUT3	bit3	1:ON, 0:OFF	
		OUT4	bit4	1:ON, 0:OFF	
		Temp. Sensor Open Error	bit5	1:ON, 0:OFF	
		Temp. Sensor Short Error	bit6	1:ON, 0:OFF	

[Func 0x03 : Read Input Registers] - Able to read the set value

[Request]

Sub products address	command	start address		number of data		CRC16	
		high byte	low byte	high byte	low byte	low byte	high byte
1BYTE	0x03	1BYTE	1BYTE	1BYTE	1BYTE	1BYTE	1BYTE

byte numbers = data numbers * 2

data numbers = if 23 total 23 of data, 46 bytes receiving

[Response]

Sub products address	command	Byte numbers	DATA1		...	DATA n		CRC16	
			high byte	low byte		high byte	low byte	low byte	high byte
1BYTE	0x03	1BYTE	1BYTE	1BYTE	...	1BYTE	1BYTE	1BYTE	1BYTE

[Func 0x06 : Write Single Register] - You can change the setting one by one.

[Request]

Sub products address	command	writing address		data		CRC16	
		high byte	low byte	high byte	low byte	low byte	high byte
1BYTE	0x06	1BYTE	1BYTE	1BYTE	1BYTE	1BYTE	1BYTE

Func.06 Write Single Register is written correctly, the contents of Repuest and Response is same.

[Response]

Sub products address	command	writing address		data		CRC16	
		high byte	low byte	high byte	low byte	low byte	high byte
1BYTE	0x06	1BYTE	1BYTE	1BYTE	1BYTE	1BYTE	1BYTE

[Func 0x10 : Write Multiple Registers]

Several items of the setting values can be changed at a time.

When writing multiple registers, if any of the data has errors, all of them will not be written.

[Request]

Sub products address	command	start address		number of data		Byte numbers	DATA1		...	DATA n		CRC16	
		high byte	low byte	high byte	low byte		low byte	high byte		high byte	low byte	low byte	high byte
1BYTE	0x10	1BYTE	1BYTE	1BYTE	1BYTE	1BYTE	1BYTE	1BYTE	...	1BYTE	1BYTE	1BYTE	1BYTE

[Response]

Sub products address	command	start address		number of data		Byte numbers	DATA1	
		high byte	low byte	high byte	low byte		low byte	high byte
1BYTE	0x10	1BYTE	1BYTE	1BYTE	1BYTE	1BYTE	1BYTE	1BYTE

data numbers = byte number * 2

[MAP] Func 0x03, 0x06, 0x10

NO	Address	Description	Range	Unit
40001	0000	Stage 1 temp setting	-55.0 ~ 99.9℃	℃
40002	0001	Stage 2 temp setting	-55.0 ~ 99.9℃	℃
40003	0002	Stage 3 temp setting	-55.0 ~ 99.9℃	℃
40004	0003	Stage 4 temp setting	-55.0 ~ 99.9℃	℃
40005	0004	Temp calibration	-10.0 ~ 10.0℃	
40006	0005	Comm address setting	1 ~ 256	
40007	0006	Comm speed setting	1200/2400/4800/9600/19200	
40008	0007	Temp 1 function selection	0=C, 1=H	
40009	0008	Temp 1 output delay time setting	0.00 ~ 9.59(m,s)	
40010	0009	Temp 1 differential (hysteresis) setting	0.1 ~ 19.9	℃
40011	000A	Temp 2 function selection	0=C, 1=H	
40012	000B	Temp 2 output delay time setting	0.00 ~ 9.59(m,s)	
40013	000C	Temp 2 differential (hysteresis) setting	0.1 ~ 19.9	℃
40014	000D	Temp 3 function selection	0=C, 1=H	
40015	000F	Temp 3 output delay time setting	0.00 ~ 9.59(m,s)	
40016	0010	Temp 3 differential (hysteresis) setting	0.1 ~ 19.9	℃
40017	0011	Temp 4 function selection	0=C, 1=H	
40018	0012	Temp 4 output delay time setting	0.00 ~ 9.59(m,s)	
40019	0013	Temp 4 differential (hysteresis) setting	0.1 ~ 19.9	℃

06 Setting process

Temp Setting

25.0 — Displays the current temperature.

Set — Set TEMP 1 change

St 1 — Press key Set and St 1 appears

Set

10.0 — HSP / LSP — Use the key to change the set value.

Set — Set TEMP 2 change

St2 — Press key Set and St2 appears

Set

10.0 — HSP / LSP — Use the key to change the set value.

Set — Set TEMP 3 change

St3 — Press key Set and St3 appears

Set

10.0 — HSP / LSP — Use the key to change the set value.

Set — Set TEMP 4 change

St4 — Press key Set and St4 appears

Set

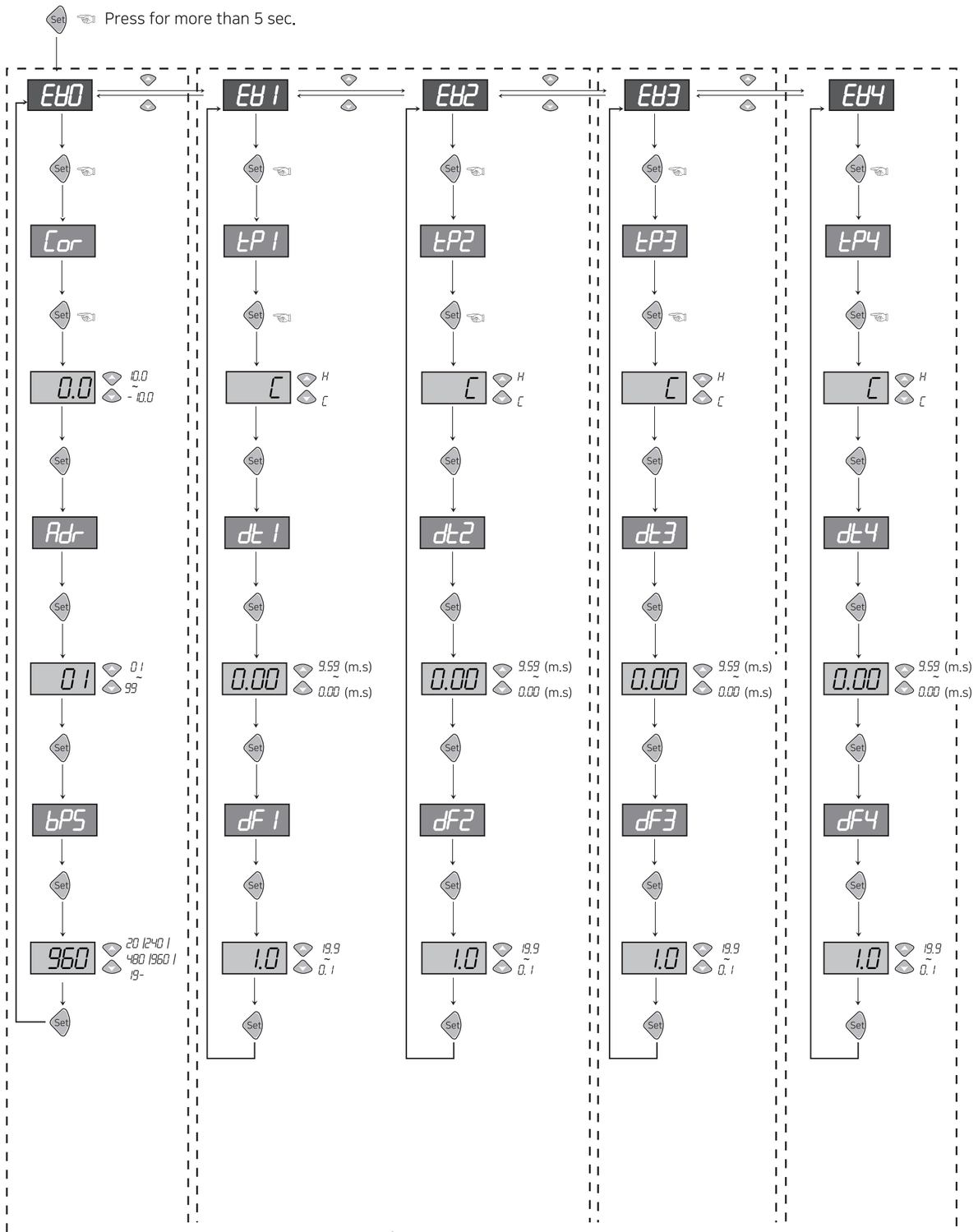
10.0 — HSP / LSP — Use the key to change the set value.

Set — After changing the setting value, press the Set key.

o-t — A Save Settings confirmation character (o-t) is displayed, The current temperature appears.

25.0

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



※ In the current temperature display state, press the Set key for 5 seconds to change to program setting mode.

※ All programs are terminated after checking the OK text by continuously pressing the Set key for 2 seconds after setting up, or automatically return to the current temperature 30 seconds later.

07 Function details

St1 : Stage-1 Temp Setting

St2 : Stage-2 Temp Setting

St3 : Stage-3 Temp Setting

St4 : Stage-4 Temp Setting

Cor : Correction of the current temperature

- This function corrects discrepancies between the actual product's temperature and the sensor input or reference temperature (e.g., a water thermometer or previously used temperature controller), even when the product itself has no issues.

EX) real temp 25.0℃ → Cor Modification of 0.0 to -3.0
Display : 28.0℃ → Displayed as 25.0℃
When the actual temp differs by 3℃

Adr : Communication code setting

- Menu for setting the communication code (1~99)

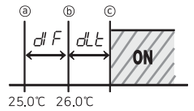
bPS : Communication speed setting

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

tP1 : Temp 1 Cooling (CoL) & Heating (HEt) selection

dt1 : Temp 1 Delay time of the output

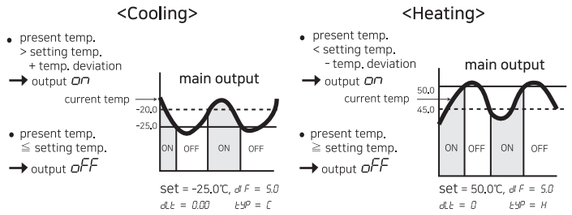
- It is widely used as the followings in case of operating the ON/OFF control very often, (Cooler,Compressor and so on)
- To protect the operation machinery when re-input of the power supply or momentary stoppage of power supply.



EX) Set temperature: 25.0℃, dLt setting value: 1.30, dIF setting value: 1.0℃, When does the output turn ON?
=> When the current temperature rises and exceeds point ⓑ at 26.0℃, the relay turns ON at point ⓒ after the dLt delay time of 1 minute 30 seconds. The output delay time starts from point ⓑ, not point ⓐ, because the dIF (hysteresis) interval is set to 1.0℃.

dF1 : Setting for Temp1 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.



tP2 : Temp 2 Cooling (CoL) & Heating (HEt) selection

dt2 : Temp 2 Delay time of the output

dF2 : Setting for Temp 2 deviation

tP3 : Temp 3 Cooling (CoL) & Heating (HEt) selection

dt3 : Temp 3 Delay time of the output

dF3 : Setting for Temp 3 deviation

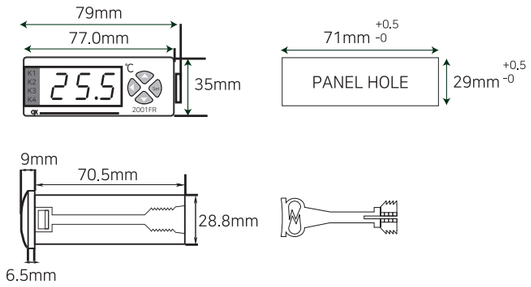
tP4 : Temp 4 Cooling (CoL) & Heating (HEt) selection

dt4 : Temp 4 Delay time of the output

dF4 : Setting for Temp 4 deviation

08 Diemension and panel hole sizes

(Unit : mm / error : ±0.5)



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.

※ The above specifications may be changed without any notice for performance enhancement. Please make yourself fully familiar with and follow the above precautions.

■ Warranty period: One year from the date of purchase

■ Address : (Street address) 56, Ballyongsandan 1-rp, Jangan-eup, Gijang-gun, Busan, ROK
(Land-lot address) 901-1, Ballyong-ri, Jangan-eup, Gijang-gun, Busan, ROK (46034)

- Product service : 070-7815-8289
- Customer service : 051-819-0425 ~ 0427
- FAX : 051-819-4562
- Email : overseas-sales@conotec.co.kr
- SNS : Facebook, Instagram, Twitter, YouTube ▶ 'Search for '**Conotec**'
- Website : www.conotec.co.kr

◈ Installation precautions

■ This device sholuld be connected to a protective earth terminal and a power supply in order to prevent an electric shock.

■ Do not block the air outlet.

◈ Operation precautions

※ An operating environment of this device is as follows.

■ Ambient temperature : 0 ~ 60℃ ■ Ambient humidity : 80%RH or less

■ Indoor uses only ■ Pollution class 2

■ Altitude under 2000m ■ Installation category : II

■ This device should be laid out in a way that its power cord is easy to handle.

■ Using this product in any method other than those specified by the manufacturer may damage its protection function

■ Major products and development

- Temperature/humidity controller
- Counter and timer controller
- Current and voltage panel meter
- Temperature/humidity indicator
- Oven controller
- CO2 controller
- PID controller
- Unit cooler controller
- Heat pump controller
- Chiller controller
- Thermo-hygrostat controller
- Short message alarm
- Temperature/ humidity transmitter
- Smartphone app and monitoring system

※ This manual was prepared in the Naver Nanum fonts.