

CONOTEC

CONOTEC CO., LTD.
DIGITAL TEMPERATURE CONTROLLER



FOX-2000TR

Instruction Manual



- ◆ Control by temp. & time
 - Open/close relay control
 - 1 stage/2 stage control
- ◆ Alarm output : 1 Relay
 - High & low limit / Alarm
- ◆ Door open & close for a greenhouse
- ◆ RS485

- 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 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-2000TR	FS-200N (NTC 10K)	Relay Contact MAX : 250Vac 2A	Celsius: -55.0 °C ~ 99.9 °C	– Control by temp. and time – Alarm – RS-485 communication

03 Components



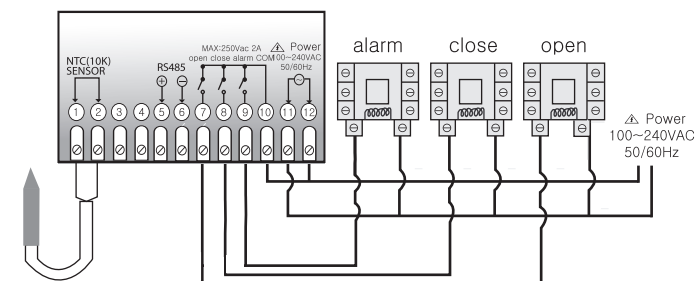
- 1 Second display 2 Open display 3 Close display 4 Relay output
- 5 Alarm display 6 Alarm display 7 Time setting switch
- 8 Increasing switch 9 Temp. setting switch 10 Decreasing switch

■ Function of Operating Key

1. : KEY for temperature setting & program change
2. : KEY for time setting change
3. : KEY for Data change per each setting value

04 Terminal wiring diagram

[FOX - 2000TR]

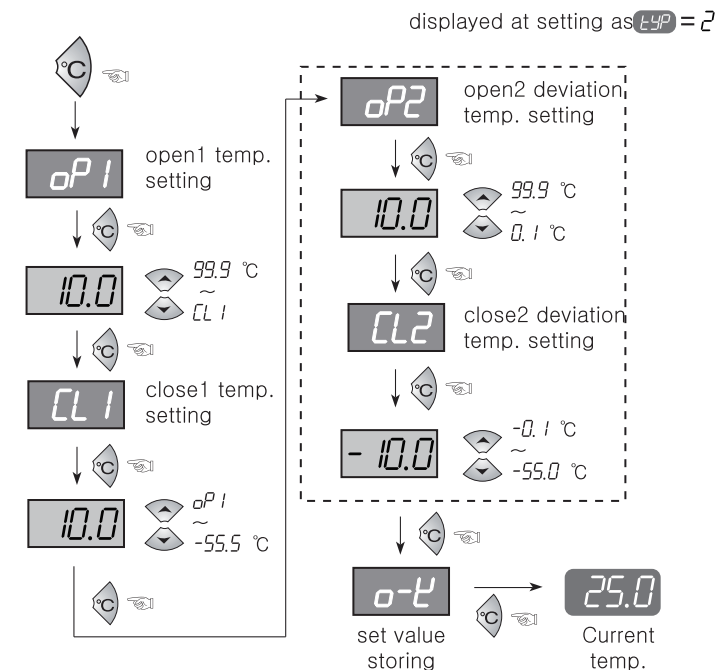


- ✱ Relay contact capacity is less than 250VAC 2A.

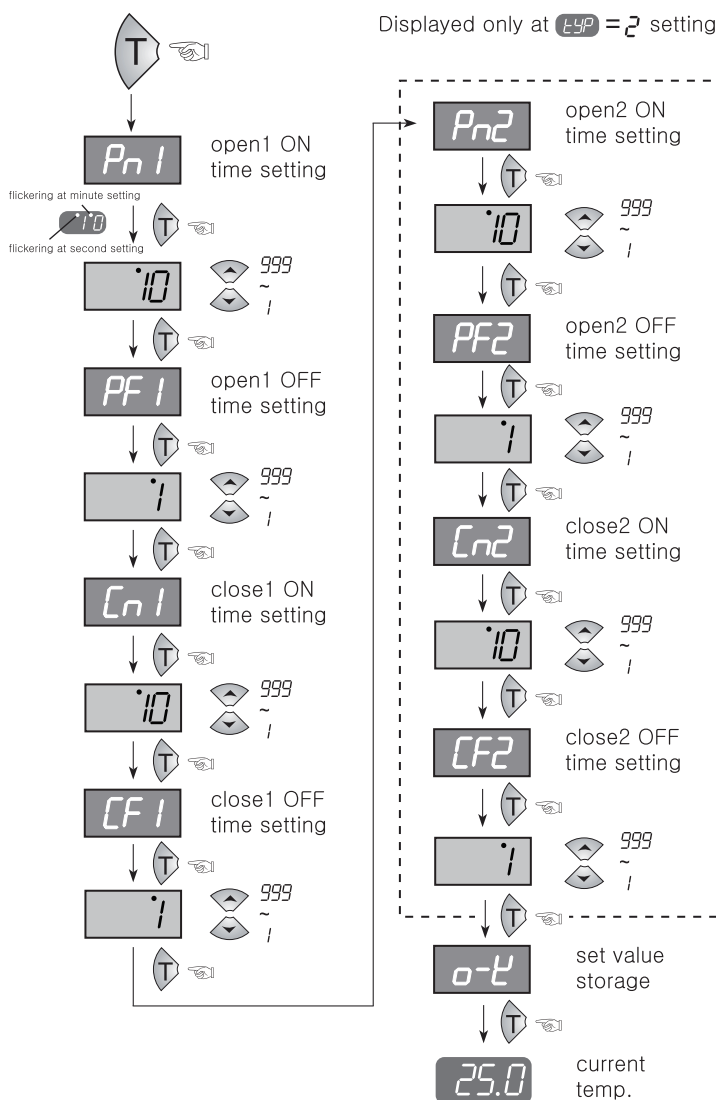
If using the load to exceed contact capacity, be cautious on those can be caused by contact deposited, contact failure, relay damaged, etc.

05 Setting process

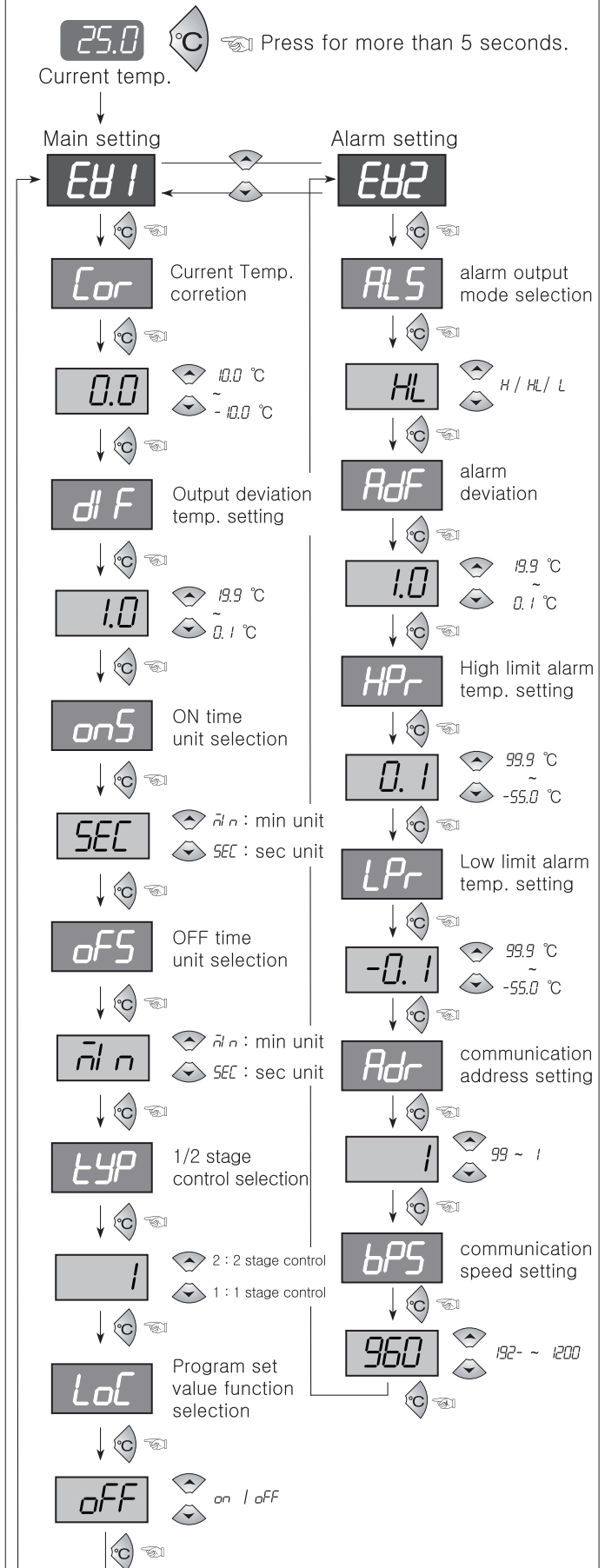
Setting temperature



Setting time



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

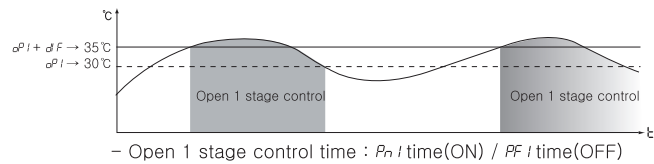


06 Function details

oP1 : Open 1 temp. setting

- Operates at the current temp. higher than setting value(**oP1**)

ex) **oP1** = 30.0℃, **dF** = 5.0℃, **tYP** = 1

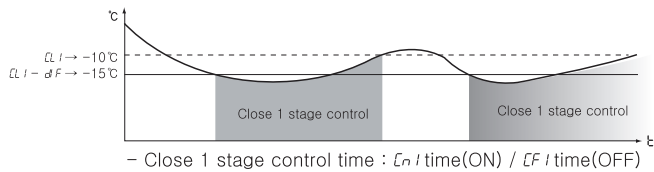


– Open 1 stage control time : P_{n1} time(ON) / $PF1$ time(OFF)

CL1 : Close 1 temp. setting

- Operates at the current temp. lower than setting value(**CL1**)

ex) **CL1** = -10.0℃, **dF** = 5.0℃, **tYP** = 1



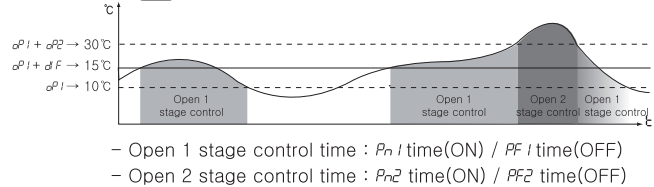
– Close 1 stage control time : C_{n1} time(ON) / $CF1$ time(OFF)

oP2 : Open 2 deviation temp. setting

- Operates at the current temp. is higher than the set value (**oP1** + **oP2**)

ex) Set at **oP1** = 10.0℃, **dF** = 5.0℃
If setting **oP2** as 20.0℃, the set value will be (**oP1** + 20.0℃)

tYP : Displays only at setting 2



– Open 1 stage control time : P_{n1} time(ON) / $PF1$ time(OFF)

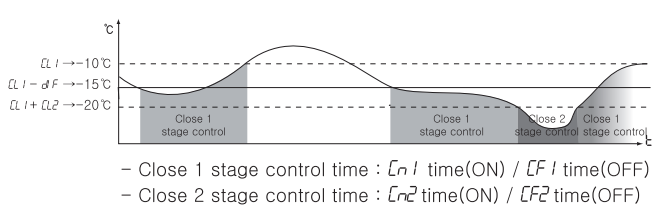
– Open 2 stage control time : P_{n2} time(ON) / $PF2$ time(OFF)

CL2 : Close 2 deviation temp. setting

- Operates at the current temp. is lower than the set value (**CL1** + **CL2**)

ex) Set at **CL1** = -10.0℃, **dF** = 5.0℃
If setting **CL2** as -10.0℃, the set value will be (**CL1** + -10.0℃)

tYP : Displays only at setting 2



– Close 1 stage control time : C_{n1} time(ON) / $CF1$ time(OFF)

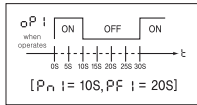
– Close 2 stage control time : C_{n2} time(ON) / $CF2$ time(OFF)

Pn1 : Open 1 operation ON time setting

- Output ON time when it is satisfied with the terms of No.1 **oP1**

PF1 : Open 1 operation OFF time setting

- Output OFF time after time elapsed of No. 5 **Pn1**

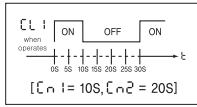


Cn1 : Close 1 operation ON time setting

- Output ON time when it is satisfied with the terms of No.2 **CL1**

CF1 : Close 1 operation OFF time setting

- Output OFF time after time elapsed of No. 7 **Pn1**

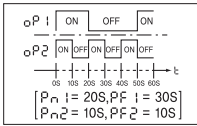


Pn2 : Open 2 operation ON time setting

- Output ON time when it is satisfied with the terms of No.3 **oP2**

PF2 : Open 2 operation OFF time setting

- Output OFF time after time elapsed of No. 9 **Pn2**



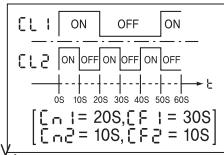
When the current temp. is more than the value 1 stage and 2 stage, 2 stage control takes priority.

CL2 : Close 2 operation ON time setting

- Output ON time when it is satisfied with the terms of No.4 **CL2**

CF2 : Close 2 operation OFF time setting

- Output OFF time after time elapsed of No. 11 **Cn2**



When the current temp. is more than the value 1 stage and 2 stage, 2 stage control takes priority.

dF : Output deviation temperature setting

- By operating the ON/OFF frequently, the relay or its output contact can be damaged quickly. So it needs a deviation temperature setting to protect hunting from the external noise, etc.,

Cor : Current temperature correction

- Correction errors in the sensor put in from the outside and different with the base temperature.

EX) Actual temperature: 10.0℃ → **Cor** 0.0 to -2.0 Correction

Display window: 12.0℃ → Displayed as 10.0℃

onS : Output ON time unit selection

- SEC** : second unit, **min** : minute unit

ofS : Output OFF time unit selection

- SEC** : second unit, **min** : minute unit

tYP : Control method selection

- 1 : 1 stage setting&1 stage control only
 - 2 : 1 stage setting/2 stage setting&1 stage control/2 stage control
- When the current temp. is higher than 1 and 2 stage set values, 2 stage control takes priority.

LoC : Program set value lock function

- As a safety menu, in order not to change the set values except for the main user.

RLS : Alarm output selection

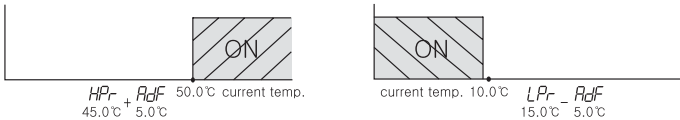
- Menu for selection the high, low limit output mode when using an alarm

H : High limit alarm
(in case of selection this mode, low limit alarm is not applied)

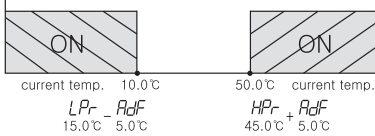
HL : High / low limit alarm output
(High or low limit alarm both applicable)

L : Low limit alarm output
(If selects this mode, high limit alarm is not applied)

– **RLS** : **H**, **HP** : 45.0℃, **RdF** : in case of 5.0℃ **RLS** : **L**, **LP** : 15.0℃, **RdF** : in case of 5.0℃



– **RLS** : **HL**, **HP** : 45.0℃, **LP** : 15.0℃, **RdF** : in case of 5.0℃



RdF : Alarm deviation setting

- Menu for protection the devices' contact and etc., through the regular interval ON/OFF of an alarm relay like deviation temperature setting.

HP : High limit alarm temp. setting

- Menu for setting the high limit alarm

LP : Low limit alarm temp. setting

- Menu for setting the low limit alarm

Rd : Communication code setting

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

bPS : Communication speed setting

- Menu for setting the communication speed (1200, 2400, 4800, 9600, 19200 optional)

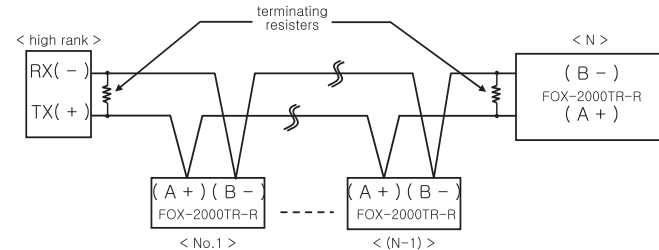
07 Comm. interface

Interface

Applicable standard	EIA RS485
Maximum units accessed	32 units (however, 1 ~ 99 available for address setting)
Communications method	2-line half-duplex; Asynchronous
Baudrate setting	1200/2400/4800/9600/19200bps(5 options)
Communications range	Within 1.2 km
Communications protocol	BCC
Start bit, Stop bit	1 bit (fixed)
Parity bit, Data bit	Parity bit: None, Data bit: 8 bit (fixed)

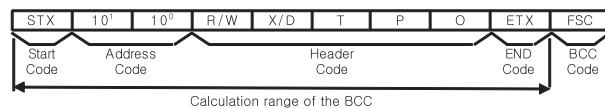
※ Please see the user manual on our website for more details about the communications specifications.

System Configuration

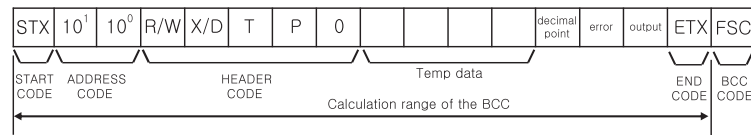


Definition between communication command and block

[Show the format of Command]



[Show the format of Command]



- START CODE
Show the lead(head) of the Block
STX -> [02H], ACK will be added in case of Response.
- ADDRESS CODE
Channel Code for high rank to identify 2000TR,1~99 (BCD ASCII) Setting available within the range
- HEADER CODE: Displays the name of Command as a character
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 measured value) -> T[54H], P[50H], O[30H]

④ Configuration of data: data is displayed as "hexadecimal"

ASCII character string receives '0' '4' 'D' '2'
→ Convert to 10 decimal number from 0x04D2 : 1234
ASCII character string receives 'F' 'B' '2' 'B'
→ Convert to 10 decimal number from 0xFB2B : -1234
(Negative number : calculation of complement on 2)

⑤ Decimal point -0[0X30] There's No decimal point
1[0X31] There's a decimal point

⑥ Error : 0[30H] : no error // 1[31H] : sensor open error // 2[32H] : sensor short error

⑦ Output : 0[30H]: Output OFF//1[31H]: Output ON

	OP	CL	OUT	AL
0[30H]	X	X	X	X
1[31H]	X	X	X	O
2[34H]	X	O	X	X
3[35H]	X	O	X	O
4[36H]	X	O	O	X
5[37H]	X	O	O	O
6[38H]	O	X	X	X
7[39H]	O	X	X	O
8[3AH]	O	X	O	X
9[3BH]	O	X	O	O

⑧ END CODE : show the end (close) of the block | ETX -> [0X03]

⑨ BCC : (Black Check Character)

Show the XOR arithmetic and logic values from the start(STX) to the ETX

※ Others

■ the others As of no response of the ACK

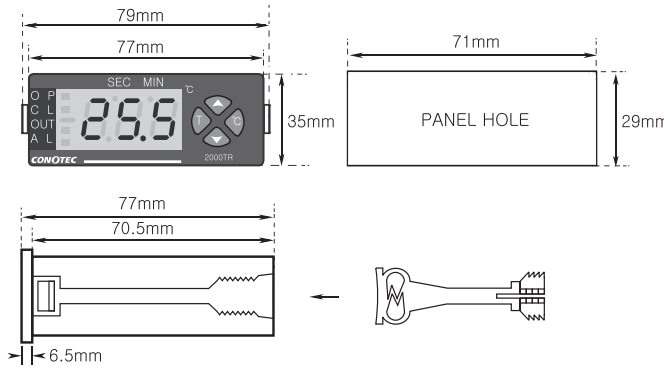
- in case of not equivalent to the channel after receiving STX
- in case of generating the receive buffer overflow
- in case of not equivalent to the communication' s set values or baud rate

■ treatment in case of no response of the ACK

- check the cable
- check the communication's condition (set values)
- if the main cause of the status is the noise, try to do communication practicing 3times until recovering nomally
- change the communication speed in case of bring about the communication's error frequently

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

- E-1** : 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 **5-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

※ This manual was prepared in the Naver Nanum fonts.