Version 0.97(2016.01.21)

ISO 9001:2008

CONOTEC® Digital Temperature Controller

CONOTEC CO., LTD. www.conotec.co.kr

Operating Manual FOX-2002CC

1 Caution

Read the safety precautions carefully for correct usage.

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

⚠ Danger

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

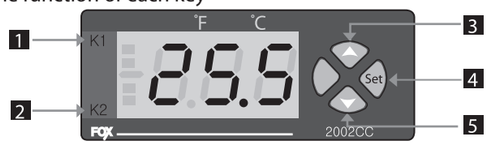
- Electric shock – Do not make contact with the AC terminal during the electric current application for this may result in electrocution.
- When inspecting input power, make sure to cut input power.

2 Composition

Model	Sensor	Output	Temperature Range	Function	
FOX-2002CC	NTC	Relay	℃ : -55.0℃ ~ 99.0℃ °F : -67°F ~ 212°F	Temp.	485 communi ℃,°F
		Relay		Alarm	
FOX-2002CC-RS	NTC	Relay		Temp.	
		SSR (12V DC30mA MAX)		Alarm	
FOX-2002CC-SR	NTC	SSR (12V DC30mA MAX)		Temp.	
		Relay		Alarm	

3 Name of Parts

■ The function of each key



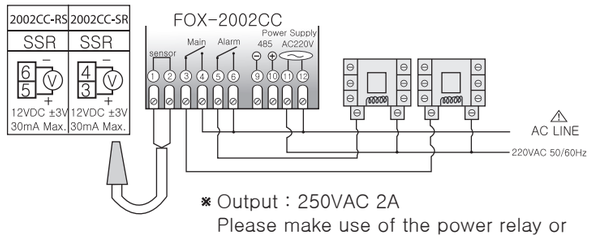
1 Output lamp
2 Alarm lamp
3 Setting up
4 Change function switch
5 Setting down

■ User's mode changing(Temperature setting)

- How to change the setting temp. for Main output
  Set If press it once, the setting value is flickered.
  or the value can be UP & DOWN with this key.

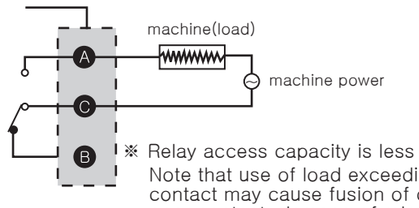
- Mode setting for user
  Set A key to enter to installer mode if press for more than 5 sec. change with these keys. Set

4 Connection



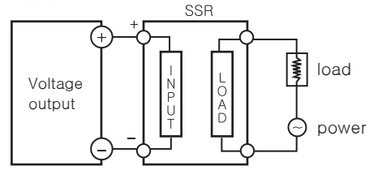
※ Output : 250VAC 2A
Please make use of the power relay or magnet surely.

■ Relay junction



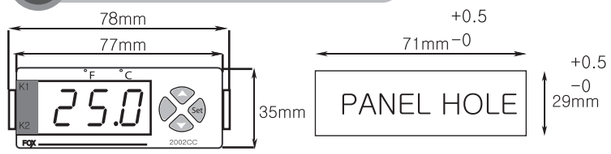
※ Relay access capacity is less than 250VAC 2A. Note that use of load exceeding capacity of contact may cause fusion of contact, poor contact, damage of relay, etc.

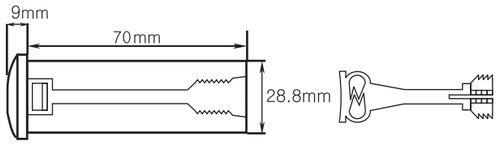
■ SSR junction



※ Please make sure that the SSR's capacity should be used more than load capacity.

5 Size & Dimension





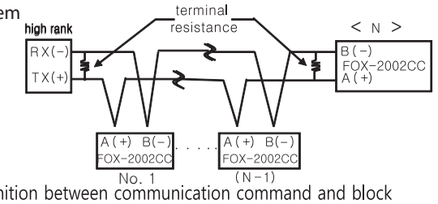
6 Temp. range & Set value when deliver

Display	Function	Celsius range	Fahrenheit range	set value when deliver	Remarks
	Setting Temp.	-55.0 ~ 99.9	-67 ~ 212	10.0	
Unt	Unit of Temp.	°C / °F		°C	°C : Celsius °F : Fahrenheit
HSP	setting for the highest limit of user	LSP ~ 99.9	LSP ~ 212	99.9	It is irrelevant to the relay output
LSP	setting for the lowest limit of user	-55.0 ~ HSP	-67 ~ HSP	-55.0	It is irrelevant to the relay output
tYP	Selection of the function	CoL / HEt		CoL	HEt : heating CoL : cooling
dIS	Selection of the deviation style	P / Pn		P	Pn : deviation ± P : deviation +
dIF	Temperature deviation	0.1 ~ 19.9	1 ~ 35	1.0	
dLt	Delay time	0.00 ~ 9.59		0.00	(min.sec)
Cor	Correction of Temp.	-10.0 ~ 10.0	-18 ~ 18	0.0	correct for a discrepancy between the display temp. and real temp.
Art	Alarm option	t-0 ~ t-3		t-0	
Ars	Alarm operation	S-0 ~ S-6		S-0	
HPr	Alarm high limit temp.	-55.0 ~ 99.9	-67 ~ 212	99.9	
LPr	Alarm low limit temp.	-55.0 ~ 99.9	-67 ~ 212	-55.0	
AdF	Alarm deviation temp.	0.1 ~ 99.9	1 ~ 212	1.0	
AoF		0.1 ~ 99.9	1 ~ 212	1.0	
Adr	Communication channel	01 ~ 99		0.0	
bPS	Communication speed	120 / 240 / 480 / 960 / 19-		120	120 :1200bps 240 :2400bps 480 :4800bps 960 :9600bps 19- :19200bps
LoC	Lock function	on / oFF		oFF	ON : setting for the lock function OFF : removal of the lock function (however,except for the setting temperature value)

7 Communication interface

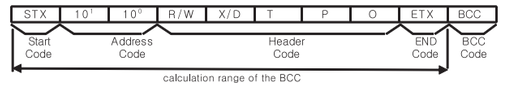
specification	in conformity EIA RS485
max. speed	32 units (but, address setting can be upto 01~99)
method of communication	two wire half-duplex operation
syncronous system	asyncronous system
communication distance	1.2 Km
communication speed	1200/2400/4800/9600/19200bps(selectable)
StartBit	fixed 1bit
StopBit	fixed 1bit
ParityBit	none
DataBit	fixed 8bit
Protocol	BCC

■ System

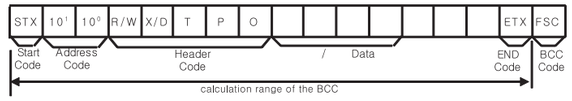


■ Definition between communication command and block

< HOST Query format >



<FOX-2002CC Response format >



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

② ADDRESS CODE
- A high rank system can discriminate the channel code number among FOX-2002CC
  It is available to set between 01 and 99(BCD ASCII)
  (ex-in case of 01, 30H,31H)

③ Header Code
- Show the command name as a 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

Output	Main	Alarm
'0'(0x30)	X	X
'1'(0x31)	O	X
'2'(0x32)	X	O
'3'(0x33)	O	O

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

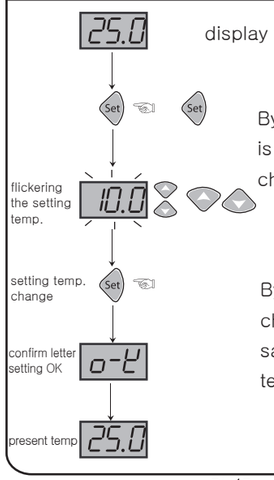
⑨ BCC(Block Check Character)
- Show the XOR arithmetic and logic values from the start(STX) to the ETX

* 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

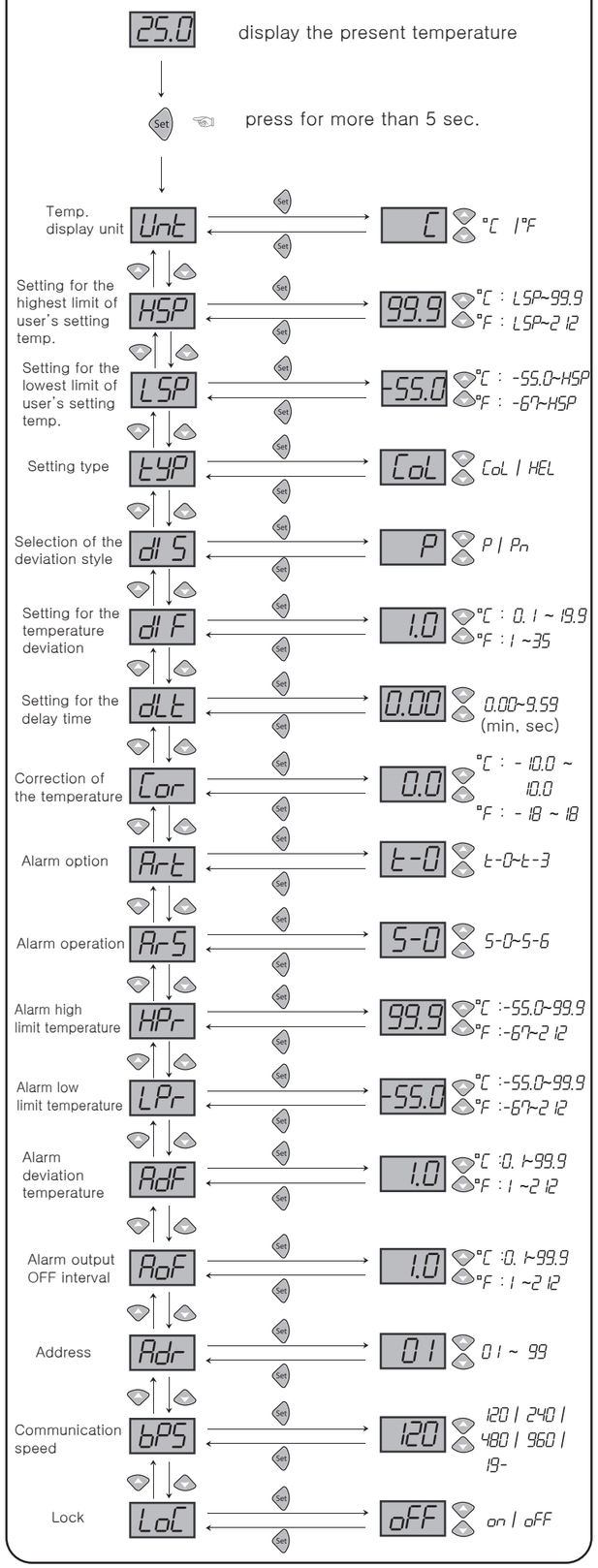
* Treatment – In case of no response of the ACK
  ① Check the cable
  ② Check the communication's condition (set values)
  ③ If the main cause of the status is the noise, try to do communication practicing 3-times until recovering nomally.
  ④ Change the communication speed in case of bring about the communication's error frequently.

8 Programming mode in details

Setting temperature

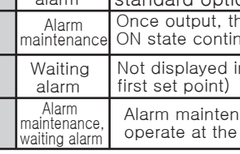


Temperature program setting



■ Alarm chart

PV(Present Value)
SV(Set Value)

S-0	———	No alarm output
S-1	 SV:100℃ ADF:10℃ AOF:3℃	• Deviation high limit alarm ON: PV >= (SV + ADF) OFF: PV <= (SV+ADF)-AOF
S-2	SV:100℃ ADF:10℃ AOF:3℃	• Deviation low limit alarm ON: PV <= (SV - ADF) OFF: PV >= (SV-ADF)+AOF
S-3	SV:100℃ ADF:10℃ AOF:3℃	• Deviation high•low limit alarm ON conditions PV >= (SV + ADF) or PV <= (SV - ADF) OFF conditions PV <= (SV+ADF)-AOF and PV >= (SV-ADF)+AOF
S-4	SV:100℃ ADF:10℃ AOF:3℃	• Deviation high•low limit alarm ON conditions PV >= (SV - ADF) and PV <= (SV + ADF) OFF conditions PV <= (SV-ADF)-AOF or PV >= (SV+ADF)+AOF
S-5	HPR:100℃ AOF:3℃	• Absolute value high limit alarm ON: PV >= HPR OFF: PV <= (HPR-AOF)
S-6	LPR:100℃ AOF:3℃	• Absolute value low limit alarm ON: PV <= LPR OFF: PV >= (LPR+AOF)

■ Alarm option chart

Signal	Details	Functions
t-0	General alarm	General alarm operation that is not added standard option
t-1	Alarm maintenance	Once output, the operation of the alarm output ON state continues to maintain output
t-2	Waiting alarm	Not displayed in early action (when reach to first set point)
t-3	Alarm maintenance, waiting alarm	Alarm maintenance and waiting alarm operate at the same time

9 Detail manual

Unt : Change of the display unit
°C : Celsius
°F : Fahrenheit

Caution : If you change the display unit under operating this controller, please reset all of set values because all of setting values except ADR, BPS should be changed the setting value when delivery.

Celsius : HSP :99.9 LSP :-55.0 TYP :C DIS :P DIF :1.0 DLT :0.00 COR :0.0 ADR :01 BPS :120 LOC :OFF

Fahrenheit : HSP :212 LSP : -67 TYP :C DIS :P DIF :1 DLT :0 COR :0 LOC :OFF

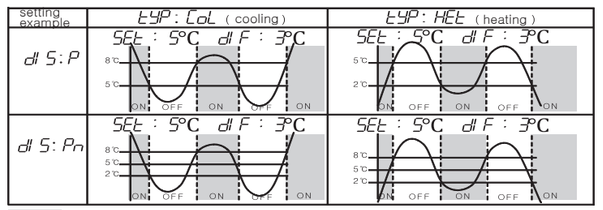
HSP : Setting function of the highest limit of temperature range (maximum set point allowed to the end user)
- Impossible to set up the set value more than HSP set value
ex) HSP = 25.0℃ setting ⇒ impossible to raise the set value more than 25.0℃

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 HSP set value
ex) HSP = 10.0℃ setting ⇒ impossible to lower the set value less than 10.0℃

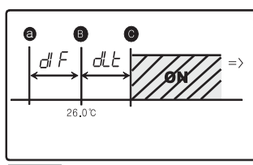
tYP : Selection of Main output function
COL : Cooling
HET : Heating

dIS : Selection of deviation style
P Output : +deviation (be off at setting point)
PN Output : ±deviation(based on the setting point)

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



dLt : Delay time of the output
- in case of operating the ON/OFF control very often
- to protect the operation machinery when re-input of the power supply or momentary stoppage of power supply



ex) Set temp.: 25.0℃, dLt Set value: 1.30, dIF set value : 1.0℃ which point to be output ON?
〉In increasing current temp, if passes 26.0℃ at dLt, after 1 min 30sec as setting time, Relay is to be ON at ⓒ. The reason why applied output delay time not from ⓐ but ⓑ is set to be dIF interval as 1.0℃.

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. (Compare with mercury thermometer or existing thermometer)
ex) real temp: 25.0℃ Cor 0.0 → -3.0
display :28.0℃ screen shown in 25 0°C
if 3℃ differs from the real temp.

Art : Alarm, refer to the alarm chart

ArS : Alarm option, refer the alarm chart

HPr : Alarm high limit temperature setting, refer to the alarm chart

LPr : Alarm low limit temperature setting, refer to the alarm chart

AdF : Alarm deviation temperature setting, refer to the alarm chart

AoF : Alarm output, OFF interval

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

bPS : Communication speed
1200BPS / 2400BPS / 4800BPS / 9600BPS / 19200BPS

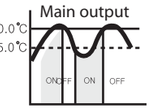
LoC : The lock function
on: setting for the lock function
oFF : setting for the unlock function

■ Model & Output spec

	2001CC	2002CC	2003CC	2001TX	2000TX	2003TX	2000RX
temp. output	○	○	○	○	○	○	—
alarm output	—	○	—	—	○	—	—
defrost output	—	—	○	—	—	○	—
FAN output	—	—	○	—	—	○	—
communication	○	○	○	○	○	○	○

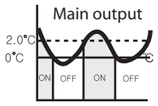
■ Application

ex1)
What is the temp. and program setting value when make the heater turn off at 30.0℃ and operate at 25.0℃ ?



<Temp. setting >
(Refer to the temp.setting mode)
setting : 30.0 C
<Program setting>
(Refer to the program setting mode)
tYP : HEt
dIS : P (one-side deviation, setting point OFF)
dIF :5.0 (Due to on/off interval is 5.0)

ex2)
What is the temp. and program setting value when make the cooler turn off at 0.0℃ and re-operate at 2.0℃?



<Temp. setting >
(Refer to the temp.setting mode)
setting : 0.0 C
<Program setting>
(Refer to the program setting mode)
tYP : C
dIS : P (one-side deviation, setting point OFF)
dIF : 2.0 (Due to on/off interval is 2.0)

10 How to diagnose a breakdown

- Indicating ERROR on using items
- This Eri 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.

※ This device's specification can be changed without any notification to improve its quality

※Regarding the English-language manual, please download it at our homepage.

■ H.Office : CONOTEC B/D 2nd floor, 26, Yunsan-ro, Geumjeong-gu, Busan, 609-821 Rep. of KOREA
Lab : CONOTEC B/D 3rd floor, 26, Yunsan-ro, Geumjeong-gu, Busan, 609-821 Rep. of KOREA
Factory : CONOTEC B/D B1, 26, Yunsan-ro, Geumjeong-gu, Busan, 609-821 Rep. of KOREA
A/S TEL : +82-51-819-0426
E-mail : conotec@conotec.co.kr
Homepage : www.conotec.co.kr