Version 1.0(2016.11.18)

ISO 9001:2008

CONOTEC

Digital Temperature Controller

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

User Manual CNT-P700

- PID Temperature controller
- 2 relay outputs
- 2 outputs enabling the use of current and SSR (cycle, phase control, general on and off)
- Users can select the Alarm Output, Current Transmission and Control Output functions.
- Various sensor inputs including thermal resistor, thermocouple, NTC sensor, voltage (mV, Volt), current (4-20mA) among others.
- RS485communication (MODBUS - RTU) supported

※ Thank you for purchasing this Product of Conotec.
This Manual contains useful information for your proper use of the Product and for prevention of damage and breakdown of the Product which may be experienced by users' carelessness. Please keep this Manual handy for future reference during the service life of the Product.

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

1 Safety Precaution

Please read all precautionary information before use, to ensure proper usage.

※ The specification and external dimensions etc of the Product contained in this Manual can be changed without prior notice for further improvement in the product performance.

⚠ Warning

1. This Product is not designed to be used as a safety device. Please add a secondary safety device if this Product is used as a controller for a device that has the potential of causing personal injury, damage to the surrounding machine or damage to other properties.
2. Do not perform any wiring, maintenance or repair work while the Product is connected to power.
3. Check the terminal number before connecting to power.
4. Do not disassemble, process, improve or repair the Product.

⚠ Caution

1. Please read and observe safety warnings and cautions as well as the method of operation before installation, and use the Product within the scope of specified and permitted usage.
2. Do not wire or install the Product on a motor or a solenoid having a high level of inductive load.
3. If the sensor of the Product needs to be extended, make sure to use the same cable as the original. The length of cable should be kept at a minimum.
4. Do not use a part that may generate arc when it is open or closed near or on the same power supply.
5. Keep the power cable away from a high voltage wire. Install the Product away from water, oil and excessive dust.
6. Install the Product away from direct sunlight and rain.
7. Install the Product away from strong magnetic force, noise, vibration and impact.
8. Keep the Product away from a place exposed to strong alkaline or acid materials.
9. Do not splash water directly onto the Product to clean in case the Product is installed in the kitchen.
10. Do not install the Product in a place exposed to high temperature/humidity.
11. Use the sensor cable with care not to allow cut or scratch.
12. Keep the sensor cable away from a signal cable, power cable, power and load cable. Use a separate cable pipe.
13. Please note that no after-sales service will be available if the Product is disassembled or altered without permission.
14. Please observe the hazard and precautionary statements shown on the terminal wiring diagram.
15. Do not use the Product near a device generating a significant level of high frequency (such as high frequency welding machine, high frequency sewing machine, high frequency radio, high capacity SCR controller etc).
16. Use of the Product in violation of the manufacturer's instructions may cause personal injury or physical damage.
17. Keep the Product away from the reach of children as this is not a toy.
18. The Product must be installed by a qualified technician only.
19. The Company will not be held responsible for any damage caused by non observance of the above instructions or the user's negligence.

⚠ Hazard

■ Hazard related to electric shock
1. Electric shock - Do not touch the AC terminal while current is flowing. It may cause electric shock.
2. Disconnect the input power before checking the input power.

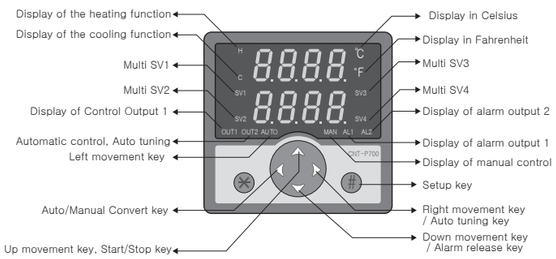
2 Product Specification

Input Power	100~240VAC 50/60Hz		Viscosity Display	±1% rdg ±1digit	
Display Method	7segment 0.51Inch 4Digit 2Line				
Output Specification	OUT1 : Current output and transmission / SSR output (general,cycle, phase control) - Current: within 500ohm of resistance load, SSR: within 11VDC ±2V 20mA OUT2 : Current output and transmission / SSR output (general, cycle, phase control) - Current: within 500ohm of resistance load, SSR: within 11VDC ±2V 20mA AL1 or OUT3 : 1c 250VAC 2A relay AL2 or OUT4 : 1a 250VAC 2A relay				
Sensor Specification Be sure to recheck all menus because there are many menus that are reset when the sensor is changed.	Type	Sensor	Range	Type	Sensor	Range
	Thermo resistor (RTD)	DPT100 Ω	-199.9 ~ 400.0℃	Ther -mistor	NTC10K(Low)	-55.0 ~ 99.9℃
		JPT100	-199.9 ~ 400.0℃		NTC10K(High)	-20.0 ~ 250.0℃
	Thermo -couple (TC)	K	-50 ~ 1200℃	Voltage	mV	0.0 ~ 100.0mV
		N	-50 ~ 1200℃		0~5V	0.00 ~ 5.00V
		T	-50 ~ 400℃		1~5V	1.00 ~ 5.00V
		J	-50 ~ 1200℃		0~10V	0.00 ~ 10.00V
		E	-50 ~ 1000℃	Current	0~20mA	0.00 ~ 20.00mA
					4~20mA	4.00 ~ 20.00mA
Communication	RS485, MODBUS RTU, Data 8 bit, Parity None, Stop bit 1					
Ambient	0~55℃, 35~80%Rh(to be free of freezing or condensation)					
Permitted voltage	90~110% of the supply voltage					
Output Selection Selectable to use relay, current module or SSR for each function	Particular	Selectable Hardware	Selectable Output Format			
	Control output 1 (heating control)	OUT1, OUT2	SSR on/off, SSR general PID, SSR cycle PID, SSR satellite PID, current PID			
		OUT3, OUT4	Relay on/off, relay PID			
	Control output 2 (cooling control)	OUT1, OUT2	SSR on/off, SSR general PID, SSR cycle PID, SSR satellite PID, current PID			
		OUT3, OUT4	Relay on/off, relay PID			
	Alarm output 1	OUT3, OUT4	High temperature alarm, low temperature alarm, High/low temperature alarm, sensor error, loop error (output error)			
	Alarm output 2	OUT3, OUT4	High temperature alarm, low temperature alarm, High/low temperature alarm, sensor error, loop error (output error)			
	Transmission output 1	OUT1, OUT2	Transmission of current temperature, set temperature and control volume			
	Transmission output 2	OUT1, OUT2	Transmission of current temperature, set temperature and control volume			
Digital Input	Input 1, 2, 3		Start/Stop, Alarm release, Auto/manual auto tuning, Multi SV			
Power Failure Compensation	Approx. 10 years (non-volatile semi-conductor memory type)					

⚠ Caution

*To enable the cycle PID control and phase PID control with SSR, SSR must be of the Non zero-crossing type and its reaction speed must be within 1ms.

3 Front Operation & Display



Display of Special Function

OUT1, OUT2 (display of control output): Flickers depending on the size of controlled variable for PID control.

AUTO (Auto Control/ Auto Tuning): Illuminates in the Auto Control mode; Flickers if the Auto Tuning is in progress.

SV1, SV2, SV3, SV4 (Multi SV): Displayed depending on the set temperature selected by the external digital input key.

Initialize ⊛ + # Press and hold the left and the right keys for 3 seconds to initialize all setup values.

Auto/Manual ◀ Switched to the Auto or the Manual mode when pressed on the Operation Screen. AUTO for the automatic mode; MAN for the manual mode.

Start/Stop ▲ Switched to the Start or the Stop mode when pressed on the Operation Screen. StoP indicating the stop mode

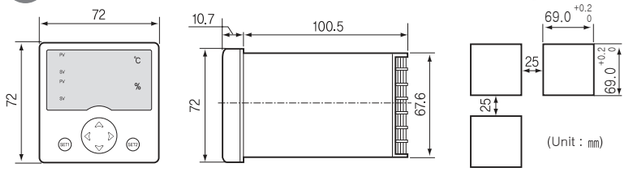
Release Alarm ▼ The alarm output is released during an alarm event when pressed on the operation screen.

Auto Tuning ▶ The automatic tuning starts or stops when pressed on the operation screen.

⚠ Caution:

The Select Auto/Man, Start/Stop, Release Alarm and Auto Tuning functions etc can be operated by the external digital input function. Once they are set to be enabled by an external input, the keys on the controller are disabled.

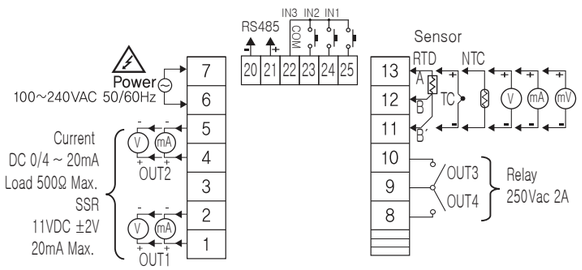
4 External Dimensions and Panel Processing Size



5 Terminal Wiring Diagram

Method of Switch Use depending on the Digital Switch Function Setup

If set to the Start/Stop function	Use the Select switch
If set to the Release Alarm function	Use the Push switch
If set to Select Auto/Manual Mode function	Use the Select switch
If set to the Auto Tuning function	Use the Push switch
If set to the Multi SV function	Use the Select switch



⚠ Warning:

* Turn power OFF before wiring or replacement.
* The relay connection capacity is 250VAC 2A at a maximum. Use of the load in excess of the relay capacity may cause fusion of the relay contract, poor connection and damage to the relay.

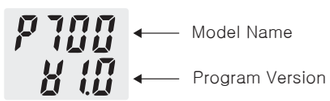
⚠ Caution:

To enable the cycle PID control and phase PID control with SSR, SSR must be of the non zero-crossing type and its reaction speed must be within 1ms.

⚠ Caution:

Be sure to recheck all menus' values because there are many menus that are reset when the sensor is changed.

6 Logo shown upon Power-on



⚠ Caution

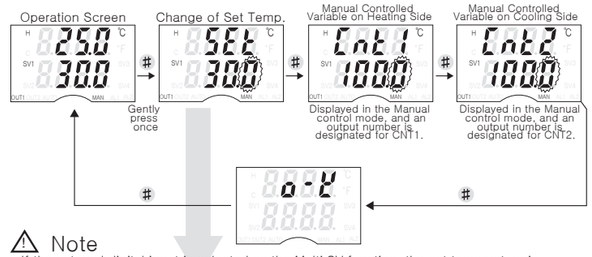
If the logo is displayed repeatedly upon power-on, it is probable that the input power is incorrect. If not, please contact the Company.

⚠ Warning

Unstable power supply may cause damage to the internal memory.

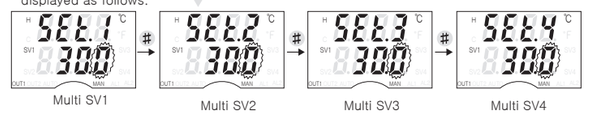
7 Program Setup

Change of Set Temp. and Manual Controlled Variable



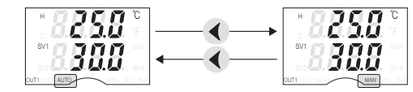
⚠ Note

* If the external digital input is selected as the Multi SV function, the set temperature is displayed as follows.



* If the Multi SV function is not selected, only the SV1 setup is displayed as same as the screen under "Change of Set Temp." as above.

Change of Auto or Manual Control



AUTO indication lamp illuminated

Both the heating and the cooling sides are automatically controlled by the controlled variable calculated with the proportional band (Pb), integral time (TI) and differential time (Td).

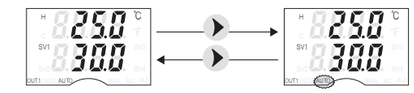
MAN indication lamp illuminated

Both the heating and the cooling sides are controlled by the Manual Controlled variable as described as above, regardless of the controlled variable calculated by the proportional band (Pb), integral time (TI) and differential time (Td).

⚠ Note

* If the external digital input function is set to "AUTO/MANUAL control", the front key operation will be disabled.

Start and Stop of Auto Tuning



AUTO indication lamp illuminated

Both the heating and the cooling sides are automatically controlled by the controlled variable calculated with the proportional band (Pb), integral time (TI) and differential time (Td).

Flickering of AUTO indication lamp

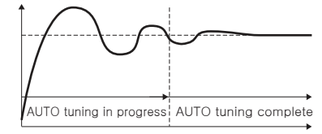
The automatic tuning progresses by which the optimum proportional band (Pb), integral time (TI) and differential time (Td) are identified through a series of on/off operations.

⚠ Caution

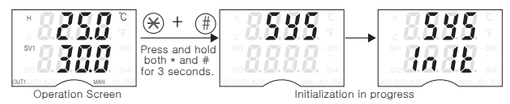
* If the external digital input function is set to "Start/Stop Auto Tuning" the front key operation will be disabled.
* Some menus cannot be changed during auto turning. The word tUnE will be displayed for a short period of time to indicate that tuning is in progress.

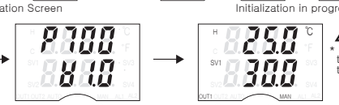
AUTO Tuning

This is a procedure to search for an optimum control coefficient. The on/off operation will be repeated for 2~3 times near the set temperature before ending the tuning function.
The Auto Tuning function will not start in the event of sensor error. If the sensor becomes erroneous during tuning, the Auto Tuning function will stop.



Initialization

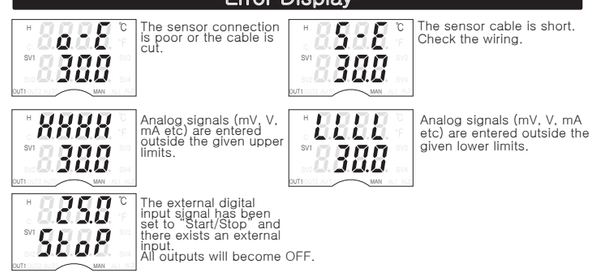




⚠ Caution

* Please be cautious to initialize as all the setting values will be changed to the factory default values.

Error Display



Program Setup in Detail

Press the key (#) for longer than 5 seconds on the operation screen to enter into the detailed setup mode. Press the key (#) for longer than 3 seconds to save and return to the operation screen upon adjustment of all setup values. (#) Enter and shift to the set menu. (▼▲) Change the set value. (◀▶) To shift the set position. **The shaded menus are displayed upon selected function only.**

EU1 Cnt1 — Setup – Heating Side (Control Output 1)

- oUt.n / oUt1 — Selection of Output Hardware for Heating Side (Control Output 1)
  - oUt1 Current or SSR output
  - oUt2 Current or SSR output
  - oUt3 Relay
  - oUt4 Relay
  - no No selection
- C.SEL / SnPd — Selection of Control Method for Heating Side (Control Output 1)
  - Sr.nF SSR ON/OFF Control Enabled when OUT1, OUT2 are selected
  - SnPd SSR PID Control Enabled when OUT1, OUT2 are selected
  - SCPd SSR Cycle by PID Control Enabled when OUT1, OUT2 are selected
  - SPPd SSR Phase by PID Control Enabled when OUT1, OUT2 are selected
  - APd Current by PID Control Enabled when OUT1, OUT2 are selected
  - rLnF Relay ON/OFF Control Enabled when OUT3, OUT4 are selected
  - rLPd Relay ON/OFF by PID Control Enabled when OUT3, OUT4 are selected
- dIF 1.0 — ON/OFF deviation setup control for heating side (control output 1). Displayed only when the method of Sr.nF rLnF
- dLt 0 — Output delay setup control for heating side (control output 1). Displayed only when the method of Sr.nF rLnF
- CPt 20 — Setting the PID control cycle for heating side (control output 1). Displayed only when the method of SnPd rLPd
- Pb 10.0 — Displayed only when the method of PID Pb setup control for heating side (control output 1) is SnPd SCPd SPPd APdrLPd
- tI 0 — Displayed only when the method of PID Ti setup control for heating side (control output 1) is SnPd SCPd SPPd APdrLPd
- td 0 — Displayed only when the method of PID Td setup control for heating side (control output 1) is SnPd SCPd SPPd APdrLPd
- rSt 0.0 — Displayed only when the method of steady-state error correction control for heating side (control output 1) is SnPd SCPd SPPd APdrLPd
- AHI 20.0 — Maximum current output setup control for heating side (control output 1). Displayed only when the method is APd
- ALo 4.0 — Minimum current output setup control for heating side (control output 1). Displayed only when the method is APd

EU2 Cnt2 — Setup – Cooling Side (Control Output 2)

- oUt.n / oUt2 — Selection of Output Hardware for Cooling Side (Control Output 2)
  - oUt1 Current or SSR output
  - oUt2 Current or SSR output
  - oUt3 Relay
  - oUt4 Relay
  - no No selection
- C.SEL / Sr.nF — Selection of Control Method for Cooling Side (Control Output 2)
  - Sr.nF SSR ON/OFF Control Enabled when OUT1, OUT2 are selected
  - SnPd SSR PID Control Enabled when OUT1, OUT2 are selected
  - SCPd SSR Cycle by PID Control Enabled when OUT1, OUT2 are selected
  - SPPd SSR Phase by PID Control Enabled when OUT1, OUT2 are selected
  - APd Current by PID Control Enabled when OUT1, OUT2 are selected
  - rLnF Relay ON/OFF Control Enabled when OUT3, OUT4 are selected
  - rLPd Relay ON/OFF by PID Control Enabled when OUT3, OUT4 are selected
- dIF 1.0 — ON/OFF deviation setup control for cooling side (control output 2). Displayed only when the method of Sr.nF rLnF
- dLt 0 — Output delay setup control for cooling side (control output 2). Displayed only when the method of Sr.nF rLnF
- CPt 20 — Setting the PID control cycle for cooling side (control output 2). Displayed only when the method of SnPd rLPd
- Pb 10.0 — Displayed only when the method of PID Pb setup control for cooling side (control output 2) is SnPd SCPd SPPd APdrLPd
- tI 0 — Displayed only when the method of PID Ti setup control for cooling side (control output 2) is SnPd SCPd SPPd APdrLPd
- td 0 — Displayed only when the method of PID Td setup control for cooling side (control output 2) is SnPd SCPd SPPd APdrLPd
- rSt 0.0 — Displayed only when the method of steady-state error correction control for cooling side (control output 2) is SnPd SCPd SPPd APdrLPd
- AHI 20.0 — Maximum current output setup control for cooling side (control output 2). Displayed only when the method is APd
- ALo 4.0 — Minimum current output setup control for cooling side (control output 2). Displayed only when the method is APd

EU3 AL.1 — Alarm Output 1 Setup

- oUt.n / oUt3 — Selection of output hardware for Alarm Output 1
  - no No selection
  - oUt3 Relay
  - oUt4 Relay
- AtYP / ALH — Selection of Alarm Type for Alarm Output 1
  - ALH Upper limit alarm
  - ALL Lower limit alarm
  - ALHL Upper/Lower limit alarm
  - SEnS Sensor error
  - FALt Loop error (output error)
- AHLd / no — Selection of Alarm Hold for Alarm Output 1
  - YES Using the hold
  - no Not using the hold
- PASS / no — Selection of Initial Alarm Pass for Alarm Output 1
  - YES Using the pass
  - no Not using the pass
- HPr 40.00 — Upper alarm temperature limit setup for Alarm Output 1. Displayed only when the alarm type is ALH ALHL
- LPr -19.99 — Lower alarm temperature limit setup for Alarm Output 1. Displayed only when the alarm type is ALL ALHL
- AdF 0.0 — The temperature variance for alarm release setup for Alarm Output 1. Displayed only when an alarm type is ALHL ALH ALL
- noAC / no — Setting the output direction for Alarm Output 1
  - nC NormalClose output
  - no NormalOpen output

EU4 AL.2 — Alarm Output 2 Setup

- oUt.n / oUt4 — Selection of output hardware for Alarm Output 2
  - no No selection
  - oUt3 Relay
  - oUt4 Relay
- AtYP / ALH — Selection of Alarm Type for Alarm Output 2
  - ALH Upper limit alarm
  - ALL Lower limit alarm
  - ALHL Upper/Lower limit alarm
  - SEnS Sensor error
  - FALt Loop error (output error)
- AHLd / no — Selection of Alarm Hold for Alarm Output 2
  - YES Using the hold
  - no Not using the hold
- PASS / no — Selection of Initial Alarm Pass for Alarm Output 2
  - YES Using the pass
  - no Not using the pass
- HPr 40.00 — Upper alarm temperature limit setup for Alarm Output 2. Displayed only when the alarm type is ALH ALHL
- LPr -19.99 — Lower alarm temperature limit setup for Alarm Output 2. Displayed only when the alarm type is ALL ALHL
- AdF 0.0 — The temperature variance for alarm release setup for Alarm Output 2. Displayed only when an alarm type is ALHL ALH ALL
- noAC / no — Setting the output direction for Alarm Output 2
  - nC NormalClose output
  - no NormalOpen output

EU5 AnP1 — Current Output 1 Setup

- oUt.n / oUt — Selection of output hardware for Current Output 1
  - no No selection
  - oUt1 Current output
  - oUt2 Current output
- AtrS / PVt — Selection of current output type for Current Output 1
  - PVt Current temperature
  - SVt Setting temperature
  - Cntt Controlled variable
- t.20 / 10.00 — The temperature at current output of 1.20mA
- t.4 / 0.0 — The temperature at current output of 1.4mA

EU6 AnP2 — Current Output 2 Setup

- oUt.n / oUt — Selection of output hardware for Current Output 2
  - no No selection
  - oUt1 Current output
  - oUt2 Current output
- AtrS / PVt — Selection of current output type for Current Output 2
  - PVt Current temperature
  - SVt Setting temperature
  - Cntt Controlled variable
- t.20 / 10.00 — The temperature at current output of 2.20mA
- t.4 / 0.0 — The temperature at current output of 2.4mA

Table of Letters for Text Display

0 1 2 3 4 5 6 7 8 9 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

EU7 SYS — System Setup

- In / dPt1 — Input and Selection of Sensor Type
  - dPt1 German Industrial Std. PT100
  - JPt1 Japanese Industrial Std PT100
  - tCA K type thermocouple
  - tCn N type thermocouple
  - tCt T type thermocouple
  - tCJ J type thermocouple
  - tCE E type thermocouple
  - ntC1 NTC 10K low temp
  - ntC2 NTC10K high temp
  - 100n 0 ~100 mV voltage
  - 0-5V 0 ~ 5V voltage
  - 1-5V 1 ~ 5V voltage
  - 0-10V 0 ~ 10V voltage
  - 0-20mA 0 ~20mA current
  - 4-20mA 4 ~ 20mA current

* Please be cautious to check once as all the setting values will be initialized to the factory default values when the sensor is replaced.

- PI.dt / StAn — PID Operation Type
  - FASt High-speed operation
  - StAn Standard operation
- noSF 10.0 — NO over shoot tuning deviation temperature setting
- Addr 1 — RS 485 communication address
- bPS 9600 — RS 485 communication speed
- Cor 0.0 — Setting the sensor compensation
- diG.1 / no — Function Setup for Digital Input 1
  - no Not using
  - rnSt Start/Stop function
  - rELA Release Alarm function
  - AUto Auto Tuning function
  - AtnA Auto/Man function
  - nULA Multi SV Input 1
- diG.2 / no — Function Setup for Digital Input 2
  - no Not using
  - rnSt Start/Stop function
  - rELA Release Alarm function
  - AUto Auto Tuning function
  - AtnA Auto/Man function
  - nULb Multi SV Input 2

To be continued on the right

Continued from the left

- diG.3 / no — Function Setup for Digital Input 3
  - no No use
  - rnSt Start/Stop
  - rELA Alarm/Release
  - AUto Auto tuning
  - ALnA Auto/Manual
- itP.1 / no — Input Type Setup for Digital Input 1
  - no NormalOpen
  - nC NormalClose
- itP.2 / no — Input Type Setup for Digital Input 2
  - no NormalOpen
  - nC NormalClose
- itP.3 / no — Input Type Setup for Digital Input 3
  - no NormalOpen
  - nC NormalClose
- Unit / °C — Unit of Temperature Display
  - no No unit display
  - °C Display in Celsius
  - °F Display in Fahrenheit
- SCLE / no — Use/Unuse of the analog scale function
- AI.nX 4000 — Upper limit of analog signal input
- AI.nL 0.0 — Lower limit of analog signal input
- X.SCL 4000 — Upper limit of analog signal scale
- L.SCL 0.0 — Lower limit of analog signal scale
- dot 0.000 — Decimal point position of analog signal scale
- bAnd 0.0 — Setting the band
- rnPr 0.0 — Setting the lamp change temp.
- rnPt no — Setting the lamp change time
- rPEr 0.0 — Setting the loop error detection temp.
- rPEt no — Setting the loop error detection time

Caution:

You are recommended to set the following menus first as there are menus that initialize other menu values depending on the setup values. Upon change of the following menus, please check again other menu values that were previously set.

- oUt.n / oUt1 — * This is the menu to select one from OUT1, OUT2, OUT3 and OUT4 for the output hardware. You can initialize the method of control C.SEL for the heating/cooling output. Tuning stops if Auto Tuning is selected.
- C.SEL / SnPd — * This is the menu to change the method of control for the heating/cooling output. The hardware setup is changed in accordance with the selected control method. Tuning stops if Auto Tuning is selected.
- In / dPt1 — * This is the menu to change the input sensor. The following menus will be initialized.

SEt.1	SCLE	AI.nX	AI.nL	X.SCL	L.SCL	dot	dIF
Set temp.	Scale	Upper limit for scale input	Lower limit for scale input	Upper limit for scale display	Lower limit for scale display	Scale decimal point	ON/OFF output deviation

Pb	rSt	AdF	Cor	bAnd	rnPr	rPEr	noSF
Proportional Band Width	Steady-state error correction	Alarm output deviation	Temp.sensor correction	Band setting	Lamp change temperature	Loop error detective temp.	No over shoot tuning deviation

8 Description of Control Output (Heating Output, Cooling Output)

For output of Product, hardware is selected by each function. Please select one from OUT1, OUT2, OUT3 and OUT4 for the control output.

		OUT1	OUT2	OUT3	OUT4
Heating Side (Control Output 1) ON/OFF control PID control	EU1 Cnt1	Current output and SSR enabled	Current output and SSR enabled	Relay	Relay
Cooling Side (Control Output 1) ON/OFF control PID control	EU2 Cnt2	Current output and SSR enabled	Current output and SSR enabled	Relay	Relay

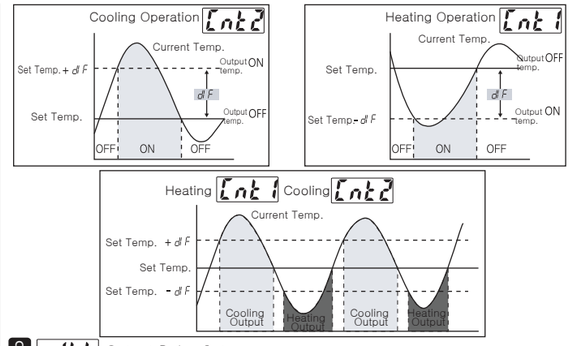
ON/OFF Control

If OUT1, OUT2 are selected for hardware for the heating output and the cooling output to enable the ON/OFF control, the ON/OFF control is enabled by using SSR. If OUT3, OUT4 are selected, the ON/OFF control is enabled by using the relay.

The menu to select a control method C.SEL shall be Sr.nF if OUT1, OUT2 are selected, or rLnF if OUT3, OUT4 are selected.

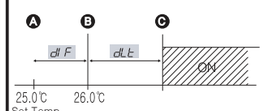
dIF ON/OFF Deviation Temperature Setup

Frequent ON/OFF operation for relay output will cause early deterioration of the output contact, or hunting (vibration, chattering) owing to external noise etc. To prevent such phenomenon, this function enables the setting of a specific gap between the ON and OFF output operations to protect the contact.



2 dLt Output Delay Setup

To be used if problems are foreseeable for the controlled object owing to frequent ON/OFF operation (such as freezer, compressor etc).
Protecting the equipment during sudden power failure or re-connection to power.



- When is the output ON if the set temp. is : 25.0℃, dLt : 1.30, tYP : CoL, dIF: 1.0 ?

When the current temperature rises and passes the point 'B' (i.e. 26.0℃), the relay is ON at the point 'C' at the dLt set time (i.e. 1m 30s).

⚠ Caution

In case of ON/OFF control by SSR, use zero Crossing SSR to reduce noise generation.

ON/OFF by PID Control

The ON/OFF by PID control is similar to the general ON/OFF control methods.
The outstanding difference is in that the ON time and the OFF time are adjusted in accordance with the controlled variable to facilitate the PID control.

If OUT1, OUT2 are selected for hardware for the heating output and the cooling output the ON/OFF PID control is enabled by using SSR. If OUT3, OUT4 are selected, the PID control is enabled by using the relay.

The menu to select a control method C.SEL shall be SnPd if OUT1, OUT2 are selected, or it shall be rLPd if OUT3, OUT4 are selected.

The minimum ON/OFF time varies depending on the control cycle (CPT) in case of PID control by relay.
- If CPT control cycle is less than 5s:0.3s; less than 10s:0.5s; 10s or above: 1s
- The minimum ON/OFF time for PID control by SSR is 0.05s in all cases.

⚠ Caution

If the control cycle is too short for PID control by relay, frequent ON/OFF operations may shorten the relay contact life.

⚠ Caution

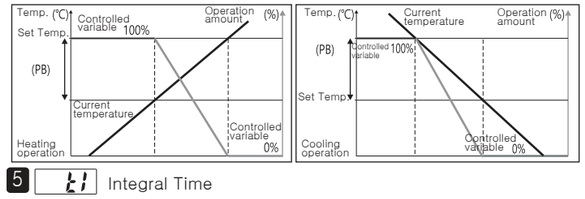
In case of ON/OFF PID control by SSR, use zero Crossing SSR to reduce noise generation.

3 CPt Control Cycle Setup

The ON and OFF operations are repeated for a set period of time within the set time cycle when performing the PID control using the relay or the SSR output. The said set time cycle is known as the control cycle.

4 Pb Proportional Band Width

The P controlled variable changes when the current temperature is within the proportional band width (PB).



5 tI Integral Time

The differential time (TD) refers to the time when the operating amount as same as the proportional operation is obtained only by the differential operation during the uniform change in deviation. The differential operation monitors sudden deviations in disturbance, and adds the operating amount in case of large difference to the previous deviation to facilitate quick response to disturbance.

* TI too low: Vibration on a regular basis may occur.
* TI too high: The target temperature cannot be reached easily, or it may take too long to reach.
* TI = 0: The integral operation is disabled.

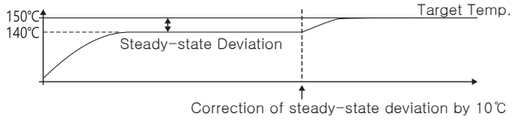
6 td Differential Time (TD)

The differential time (TD) refers to the time when the operating amount as same as the proportional operation is obtained only by the differential operation during the uniform change in deviation.
The differential operation monitors sudden deviations in disturbance, and adds the operating amount in case of large difference to the previous deviation to facilitate quick response to disturbance.

* TD too low: Slow response to disturbance
* TD too high: Vibration on a regular basis may occur..
* TD = 0: The differential operation is disabled.

7 rSt Steady-state Error Correction

This is applicable when the proportional operation is used only. With the proportional operation only, the target temperature cannot be reached and there exists a steady-state error.
The deviation can be corrected using this menu.



PID SSR Cycle Control

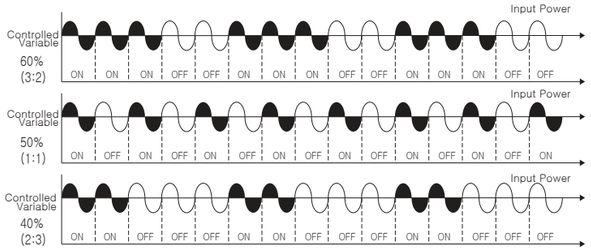
The PID SSR cycle control uses a Non Zero Crossing type SSR, making outputs by adjusting the number of ON/OFF operations in unit of one cycle of AC power according to the controlled variable. This method can lower the open/close noise compared to the zero crossing AC power control for the phase control, and facilitate more accurate control as the control cycle is variable to the optimum ratio instead of it being fixed.

Select OUT1, OUT2 for the heating and cooling output hardware for the cycle control.

To enable the cycle PID control with SSR, SSR must be of the Non Zero -Crossing type and its reaction speed must be within 1ms.

⚠ Caution

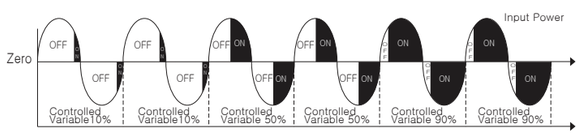
In order to detect the zero pass of the load power in the product, when applying NonZero Crossing type SSR, product operation power and load must be common power.



PID SSR Phase Control

The PID SSR phase control uses a Non Zero Crossing type SSR, controls the phase within a half cycle of AC power in accordance with the controlled variable, and facilitates the continuous control of the load power.
In general, a power regulator may be used for phase control, but it is expensive and bulky. SSR is an economic and efficient substitute.

Select OUT1, OUT2 for the heating and cooling output hardware for the phase control.
In the control method selection menu CSEL , select SPPd .

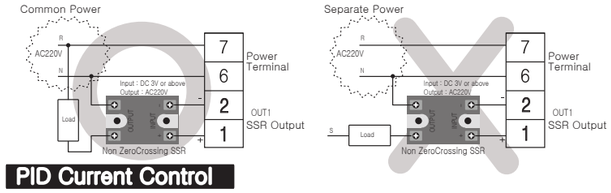


⚠ Caution

To enable the PID control with SSR, SSR must be of the non zero-crossing type and its reaction speed must be within 1ms.

⚠ Caution

The Product's operation power and the load must be the same as the zero pass of load power must be detected within the Product.



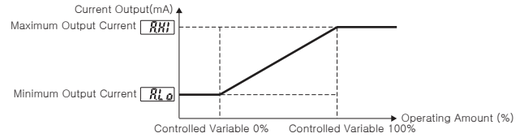
PID Current Control

The PID current control efficiently stabilizes the current temperature to the target temperature by adjusting the current output (4-20mA) in accordance with the controlled variable. The output current is controlled by the continuous analog output. Select OUT1, OUT2 for the heating and cooling output hardware for the PID current control.

In the control method selection menu CSEL, select RPd.

⚠ Caution

The load resistance during the use of current output shall be 500 ohm or below.



8 RHI Maximum Current Output Setup

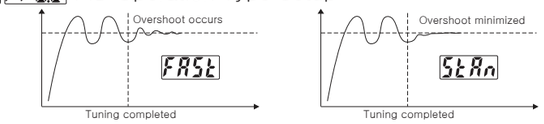
This refers to the current output during the PID current control at 100% operating amount.
Example) If A.HI is 15.0mA, the current output is 15.0mA at 100% operating amount.

RLo Minimum Current Output Setup

This refers to the current output during the PID current control at 0% operating amount.
Example) If A.LO is 5.0mA, the current output is 5.0mA at 0% operating amount.

PID Operation Type

9 PIdt PID Operation Type Setup

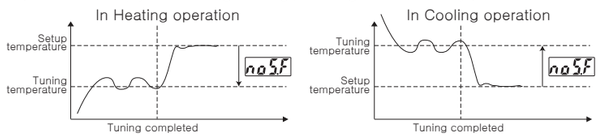


In FAST mode, the target temperature is reached faster, even if there is some overshoot. In STANDARD mode, the target temperature is reached while minimizing overshoot

PID tuning temperature setup

10 noSF No over shoot tuning deviation temperature setup

In auto tuning operation, tuning is performed at a distance of NO overshoot tuning deviation temperature from the set temperature to reach the set temperature so that the current temperature does not exceed the set temperature.
(It does not apply when using heating / cooling simultaneously.)

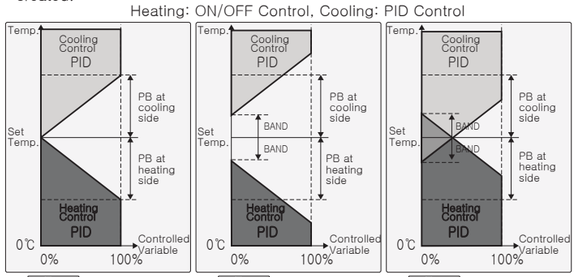


Band Function

11 bAnd Band Function Setup

You can designate a zone between the heating control and the cooling control when both the heating and cooling outputs are used. This does not apply if the set value is 0. If the set value is "+" a zone having 0% of the controlled variable for both the heating and the cooling sides will be created. If the set value is "−" a zone where the control for the heating and the cooling sides are overlapped is created.

Heating: ON/OFF Control, Cooling: PID Control

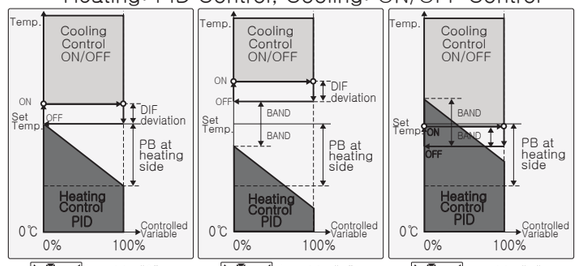


bAnd is set to "0"

bAnd is set to "+"
Based on the set temperature, a zone having the controlled variable of 0 is created.

bAnd is set to "−"
Based on the set temperature, a zone with the heating and cooling controls overlapped is created

Heating: PID Control, Cooling: ON/OFF Control

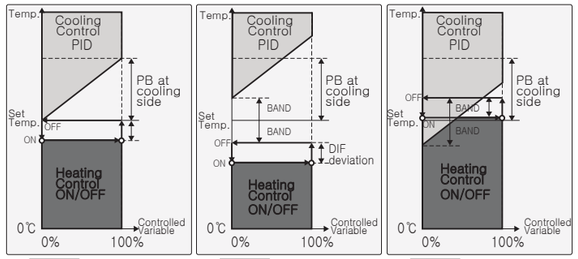


bAnd is set to "0"

bAnd is set to "+"
Based on the set temperature, a zone having the controlled variable of 0 is created.

bAnd is set to "−"
Based on the set temperature, a zone with the heating and cooling controls overlapped is created.

Heating: ON/OFF Control, Cooling: PID Control

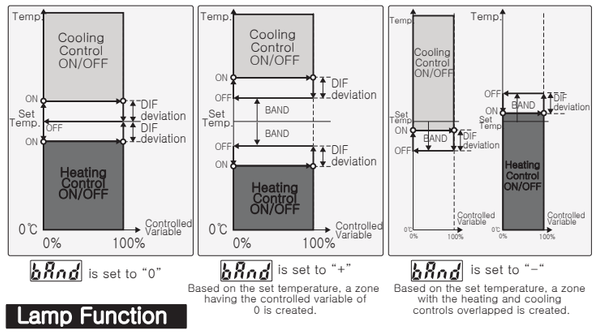


bAnd is set to "0"

bAnd is set to "+"
Based on the set temperature, a zone having the controlled variable of 0 is created.

bAnd is set to "−"
Based on the set temperature, a zone with the heating and cooling controls overlapped is created.

Heating: ON/OFF Control, Cooling: ON/OFF Control



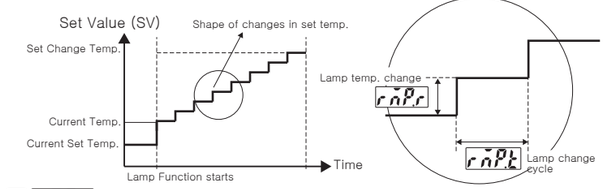
bAnd is set to "0"

bAnd is set to "+"
Based on the set temperature, a zone having the controlled variable of 0 is created.

bAnd is set to "−"
Based on the set temperature, a zone with the heating and cooling controls overlapped is created.

Lamp Function

The lamp function is used to prevent sudden temperature changes when the setting values are changed, typically at sites where such changes cause concerns with respect to the controlled object.



12 rnPr Lamp Temperature Change

This is the temperature value used to be added to or subtracted from the set temperature at each time of lamp change when the lamp function is started.

Example:
Lamp temperature change: 5℃, Current set temp.: 10℃, Set target temp.: 50℃
Lamp changing time: 1min.
The set temperature is increased by 5℃ every minute and the lamp stops when the temperature reaches to 50℃.

13 rnPt Lamp Change Time

This menu is used to change the lamp temperature at every set time when the lamp function is started. The lamp function is disabled if the set value is "0".

9 Alarm Output (Alarm Output 1, Alarm Output 2)

For output of Product, hardware is selected by each function. Please select one from OUT1, OUT2, OUT3 and OUT4 for the alarm output.

Upper Limit Alarm

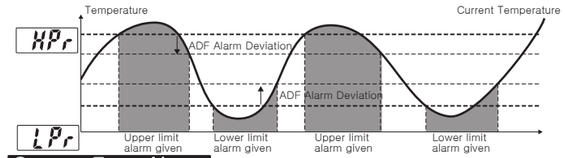
14 ALH shall be selected for the AtYP menu to use this function.
An alarm is given when the current temperature rises above the set upper limit alarm temperature. The temperature must drop by the set ADF value to release the alarm.
The upper limit alarm temperature shall be set in the HPr menu.

Lower Limit Alarm

15 AtYP shall be selected for the ALL menu to use this function.
An alarm is given when the current temperature drops below the set lower limit alarm temperature. The temperature must rise by the set ADF value to release the alarm.
The lower limit alarm temperature shall be set in the LPr menu.

Upper and Lower Limit Alarm

16 ALHL shall be selected for the AtYP menu to use this function.
An alarm is given when the current temperature rises above the set upper limit alarm temperature or drops below the set lower limit alarm temperature. The upper limit alarm and the lower limit alarm can be used simultaneously.



Sensor Error Alarm

o-E The sensor connection is poor or the cable is cut.

S-E The sensor cable is short. Check the wiring.

I-E The cold junction compensation sensor for the thermocouple is defective. Contact the manufacturer for A/S.

HHHH Analog signals (mV, V, mA etc) are entered outside the given upper limits.

LLLL Analog signals (mV, V, mA etc) are entered outside the given lower limits.

Loop Break Alarm

It is normal that the temperature changes when the controlled variable is 0% or 100% for the heating or the cooling device. If however, the temperature does not change, the output device may be faulty.

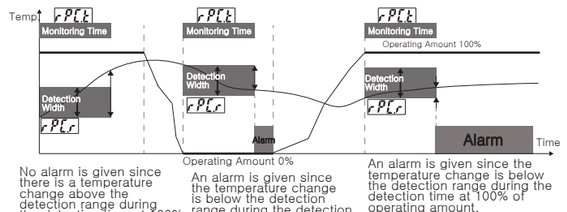
17 rPCr Loop Error Detection Temperature

Set the range of temperature change for the temperature to be changed within the detection time when the loop error detection function is started.

Example:
Loop error detection time = 5min. Loop error detection temp. = 2℃
=> An alarm is to be given when there is no temperature change by a minimum of 2℃ within 5 minutes while the controlled variable is 0% or 100%

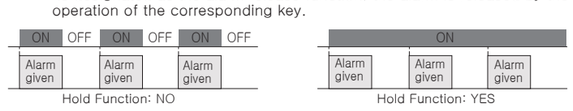
18 rPLt Loop Error Detection Time

Set the detection time to detect loop error. An alarm is given when there is no temperature change by the set detection temperature within the set time while the controlled variable is 0% or 100%.
The loop error detection function is disabled if the set value is "0".



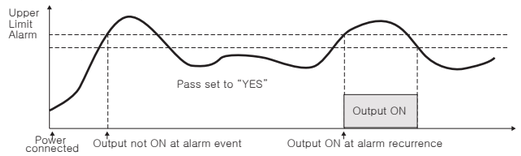
Alarm Hold Function

19 When AHLd is:
Set to no : The corresponding alarm output is OFF when the alarm is released.
Set to YES : The corresponding alarm output remains ON even if the alarm is released.
=> The alarm is released by re-connecting power, if the external digital input is designated as the alarm release function, the alarm is released by the operation of the corresponding key.



Alarm Pass Function

21 If [PASS] is:
Set to [no] : The corresponding alarm output is ON at the first alarm event after power on.
Set to [YES] : The corresponding alarm output is not ON at the first alarm event after power on.

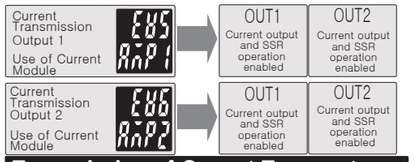


Output Direction Setup

22 If [nonC] is set to [no]: Output OFF at normal operation; Output ON at alarm event
[nC]: Output ON at normal operation; Output OFF at alarm event

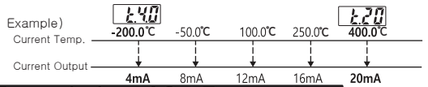
10 Current Transmission (Output 1, Output 2)

For output of Product, hardware is selected by each function. Please select one from OUT1 and OUT2 for the current transmission output.



Transmission of Current Temperature

23 The current temperature can be transmitted to current when [RtrS] is set to [PWt].



Transmission of Set Temperature

24 The set temperature can be transmitted to current when [RtrS] is set to [SWt].

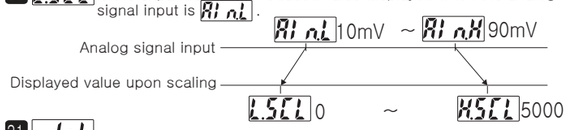
Transmission of Controlled Variable

25 The Controlled Variable can be transmitted when [RtrS] is set to [CntL].

11 Analog Scale Function

The analog scale function is used to display the analog signal input value reduced to the minimum or expanded to the maximum value as designated.
This function is enabled when the input sensor [In] is selected as

26 The analog scale function is enabled when [SCLE] is set to [YES].
27 [AI nH] is the menu to set the maximum value of the input analog signal.
28 [AI nL] is the menu to set the minimum value of the input analog signal.
29 [H.SCL] is the expanded or the reduced value displayed when the analog signal input is [AI nH].
30 [L.SCL] is the expanded or the reduced value displayed when the analog signal input is [AI nL].



31 [dot] is the menu to set a decimal point of the displayed value upon scaling of the analog input signal.

12 Digital Input

General functions of the controller can be controlled by connecting an external switch.

⚠ Caution
General functions can be controlled by the key on the controller, but they are disabled if they are set by external input.

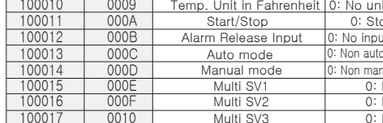
Terminal Wiring

How to use the switch according to the digital switch function setting

If set to the Start/Stop function	Use the Select switch.	
If set to the Release Alarm function	Use the Push switch.	
If set to Select Auto/Manual Mode function	Use the Select switch.	
If set to the Auto Tuning function	Use the Push switch.	
If set to the Multi SV function	Use the Select switch.	

The Select switch is a type where singles are maintained when the switch is turned on. The Push switch is a type where signals are not maintained when the switch is pressed and released.

32 [diG.1] [diG.2] [diG.3] Functions of external switches can be set.
[no] : NO : The corresponding switch is not to be used.
[rnSt] Start/Stop : If this is set to "Stop" all outputs are turned OFF and "Stop" is displayed.
[rELA] Release Alarm : The alarm output is OFF when this switch is pressed while the alarm output is ON.
[AUto] Auto Tuning : The auto tuning refers to the process of identifying a suitable control coefficient for auto control.
Operate the switch to start or stop tuning.
[AtAM] Select Auto/Man : The Auto mode facilitates an accurate control by automatic calculation of the controlled variable.
The Manual mode facilitates the direct setup of the controlled variable.
[mULA] [mULb] Multi SV : The set temperature can be designated from Set Temp. 1 to Set Temp. 4.



If there is no external input signal, it operates with SV1 set value.

33 [iTP.1] [iTP.2] [iTP.3] The input type of external switch can be set.
When set to [no]: Normally OFF, but turns ON when the switch is pressed.
When set to [nC]: Normally ON, but turns OFF when the switch is pressed.

13 Input Sensor and Others

34 [In] is used to select an input sensor.
35 [Cor] is used to correct the difference between the displayed value by the input sensor and other precision device.
Example:
Current temp. = 20℃, The temp. by precision device: 22 ℃
=> COR correction value: Enter "2 ℃" and the current temperature is displayed as "22 ℃".
36 [Unit] is used to change the unit of display of the input sensor.
This menu is enabled only when the input sensor is designate as the temperature sensor. You can select either Celsius or Fahrenheit.

14 Communication

* The RS485 MODBUS RTU type protocol is embedded.
* Non-synch 2-line half duplex communication method
* Communication distance: within 1.2km
* Communication speed: 1200 / 2400/ 4800 / 9600 / 19200Bps
* Start bit: 1 bit; Stop bit: 1 bit; Parity bit: None; Data bit: 8 bit

37 [Addr] is used to set the RS485 communication address.
38 [bPS] is used to set the RS485 communication speed.

< Func 0x02 : Read Discrete Inputs >

Brief information (such as the controller status) can be received in the bit format.

NO	Address	Description	Range	Unit	Default Value
100001	0000	Sensor Open Error	0 / 1		
100002	0001	Sensor Short Error	0 / 1		
100003	0002	Cold Joint Correction Sensor Error	0 / 1		
100004	0003	Auto Tuning	0: No tuning / 1: Tuning in progress		
100005	0004	Output at heating side	0 : Off / 1 : On		
100006	0005	Output at cooling side	0 : Off / 1 : On		
100007	0006	Alarm Output 1	0 : Off / 1 : On		
100008	0007	Alarm Output 2	0 : Off / 1 : On		
100009	0008	Temp. Unit in Celsius	0: No unit / 1: Celsius		
100010	0009	Temp. Unit in Fahrenheit	0: No unit / 1: Fahrenheit		
100011	000A	Start/Stop	0: Stop / 1: Start		
100012	000B	Alarm Release Input	0: No input / 1: Release input		
100013	000C	Auto mode	0: Non automatic / 1: Auto mode		
100014	000D	Manual mode	0: Non manual / 1: Manual mode		
100015	000E	Multi SV1	0: No / 1: SV1		
100016	000F	Multi SV2	0: No / 1: SV2		
100017	0010	Multi SV3	0: No / 1: SV3		
100018	0011	Multi SV4	0: No / 1: SV4		
100019	0012	Heating control use/unuse	0: Not use / 1: Use		
100020	0013	Cooling control use/unuse	0: Not use / 1: Use		
100021	0014	Alarm Output 1 use/unuse	0: Not use / 1: Use		
100022	0015	Alarm Output 2 use/unuse	0: Not use / 1: Use		
100023	0016	Current output 1 use/unuse	0: Not use / 1: Use		
100024	0017	Current output 2 use/unuse	0: Not use / 1: Use		
100025	0018	Analogue scale decimal point position	100026 100025 00 : 0000 01 : 000.0 0019 0018 10 : 00.00 11 : 0.000		
100026	0019				

< Func 0x04 : Read Inputs Registers

Able to receive simple information such as current temperature, sensor status, and output status.

NO	Address	Description	Range	Unit	Default Value
300001	0000	Current Temp.	If in a sensor error: -5000	℃	
300002	0001	Input Sensor Type	0 DPT100 1 JPT100 Thermo resistor 2 TC.K 3 TC.N 4 TC.T 5 TC.J Thermo couple 6 TC.E 7 NTC LT 8 NTC HT NTC10K 9 0~100mV 10 0~5V 11 1~5V 12 0~10V Voltage 13 0~20mA 14 4~20mA Current		
300003	0002	Current Set Temp.	The lamp temperature in case the lamp function is in operation.	℃	
300004	0003	Controlled variable - heating side	0.0 ~ 100.0	%	
300005	0004	Controlled variable - cooling side	0.0 ~ 100.0	%	
300006	0005	System Status bit(100016-100001)	Func 0x02 : Read Discrete Inputs		
300007	0006	System Status bit(100026-100017)	Func 0x02 : Read Discrete Inputs		
300008	0007	Model Name	0x5037('P', '7')		
300009	0008	Model Name	0x3030('0', '0')		
300010	0009	Model Name	0x0000		

300006(0005) System Status(bit) 15bit ADDR 000F | 14bit ADDR 000E | 13bit ADDR 000D | 12bit ADDR 000C | 11bit ADDR 000B | 10bit ADDR 000A | 9bit ADDR 0009 | 8bit ADDR 0008 | 7bit ADDR 0007 | 6bit ADDR 0006 | 5bit ADDR 0005 | 4bit ADDR 0004 | 3bit ADDR 0003 | 2bit ADDR 0002 | 1bit ADDR 0001 | 0bit ADDR 0000

300007(0006) System Status(bit) X | X | X | X | X | X | 15bit ADDR 0019 | 14bit ADDR 0018 | 13bit ADDR 0017 | 12bit ADDR 0016 | 11bit ADDR 0015 | 10bit ADDR 0014 | 9bit ADDR 0013 | 8bit ADDR 0012 | 7bit ADDR 0011 | 6bit ADDR 0010

< Func 0x03 : Read Hoding Registers >

You can read the controller setting menu.

< Func 0x06 :Write Single Registers >

You can change the controller setting menu, each one menu.

< Func 0x10 :Write Multiple Registers >

You can change many controller setting menus.

NO	Address	Description	Range	Unit	Default Value
400001	0000	Sensor information	Func 0x04 : Read Inputs Registers Refer to item 3000002		0 : DPT100
400002	0001	PID Operation type	0: Standard operation, 1: High speed operation		0: Standard operation
400003	0002	No over shoot tuning deviation setup	0 .0 ~ 30.0℃	℃	0.0℃
400004	0003	Multi SV1	Varies depending on the input sensor. DPT100,JPT100 : -199.9~400.0℃ K,N,J : -50 ~ 1200℃ T : -50 ~ 400℃ E : -50 ~ 1000℃ NTC Low temp. : -55.0 ~ 99.9℃ NTC high temp. : -20.0 ~ 250.0℃ mV : 0.0 ~ 100.0mV 0~5V : 0.00 ~ 5.00V 1~5V : 1.00 ~ 5.00V 0~10V : 0.00 ~ 10.00V 0~20mA : 0.00 ~ 20.00mA 4~20mA : 4.00 ~ 20.00mA		0
400005	0004	Multi SV2			
400006	0005	Multi SV3			
400007	0006	Multi SV4			
400008	0007	Manual Controlled Variable at Heating Side	The controlled variable in Man Mode at heating side	%	0
400009	0008	Manual Controlled Variable at Cooling Side	The controlled variable in Man Mode at cooling side	%	0
400010	0009	Heating control output number	OUT1 / OUT2 / OUT3 / OUT4		OUT1
400011	000A	Cooling control output number	OUT1 / OUT2 / OUT3 / OUT4		OUT2
400012	000B	Output number for alarm output 1	OUT3 / OUT4		OUT3
400013	000C	Output number for alarm output 2	OUT3 / OUT4		OUT4
400014	000D	Output number current transmission 1	OUT1 / OUT2		NO
400015	000E	Output number current transmission 2	OUT1 / OUT2		NO
400016	000F	Control type for heating side	0: SSR ON/OFF control 1: SSR ON/OFF PID control 2: SSR Cycle PID control 3: SSR Phase PID control 4: Current PID control 5. Relay ON/OFF control 6: Relay ON/OFF PID control		1: SSR ON/OFF PID control
400017	0010	Control type for cooling side			0: SSR ON/OFF control
400018	0011	ON/OFF deviation at heating side	0.1 ~ 20.0	℃	1.0
400019	0012	ON/OFF deviation at cooling side	0.1 ~ 20.0	℃	1.0
400020	0013	Output delay at heating side	0 ~ 1999	sec.	0
400021	0014	Output delay at cooling side	0 ~ 1999	sec.	0
400022	0015	Control cycle at heating side	0 ~ 120	sec.	20
400023	0016	Control cycle at cooling side	0 ~ 120	sec.	20
400024	0017	PB at heating side	0 ~ 30.0	℃	10.0
400025	0018	PB at cooling side	0 ~ 30.0	℃	10.0
400025	0019	TI at heating side	0 ~ 9999	sec.	0
400027	001A	TI at cooling side	0 ~ 9999	sec.	0
400028	001B	TD at heating side	0 ~ 9999	sec.	0
400029	001C	TD at cooling side	0 ~ 9999	sec.	0
400030	001D	Steady state error correction at heating	-30.0 ~ 30.0	℃	0
400031	001E	Steady state error correction at cooling	-30.0 ~ 30.0	℃	0
400032	001F	Max current output at heating side	0 ~ 20.0	mA	20.0
400033	0020	Max current output at cooling side	0 ~ 20.0	mA	20.0
400034	0021	Min current output at heating side	0 ~ 20.0	mA	4
400035	0022	Min current output at cooling side	0 ~ 20.0	mA	4
400036	0023	Alarm type - Alarm Output 1	0: Upper limit alarm output 1: Lower limit alarm output 2: Upper and lower limits alarm output 3: Sensor error output 4: Loop error output		Upper limit alarm
400037	0024	Alarm type - Alarm Output 2			Lower limit alarm
400038	0025	Alarm Hold - Alarm Output 1	0: No hold, 1: Hold enabled		0: No hold
400039	0026	Alarm Hold - Alarm Output 2	0: No hold, 1: Hold enabled		0: No hold
400040	0027	Initial Alarm Pass - Alarm Output 1	0: No pass, 1: Pass the initial alarm		0: No pass
400041	0028	Initial Alarm Pass - Alarm Output 2	0: No pass, 1: Pass the initial alarm		0: No pass
400042	0029	Upper limit alarm - Alarm Output 1	Refer to 400002 "Multi SV".	℃	Max Multi SV
400043	002A	Upper limit alarm - Alarm Output 2	Refer to 400002 "Multi SV".	℃	Max Multi SV
400044	002B	Lower limit alarm - Alarm Output 1	Refer to 400002 "Multi SV".	℃	Min. Multi SV
400045	002C	Lower limit alarm - Alarm Output 2	Refer to 400002 "Multi SV".	℃	Min. Multi SV
400046	002D	Alarm deviation - Alarm Output 1	0.1 ~ 20.0	℃	0.1
400047	002E	Alarm deviation - Alarm Output 2	0.1 ~ 20.0	℃	0.1
400048	002F	Output direction - Alarm Output 1	0:Normal Open, 1:NormalClose	℃	1:NormalOpen
400049	0030	Output direction - Alarm Output 2	0:Normal Open, 1:NormalClose	℃	1:NormalOpen
400050	0031	Transmission type - Transmission output 1	0: Transmission of current temp. 1: Transmission of set temp. 2: Transmission of controlled variable		0: Transmission of current temp.
400051	0032	Transmission type - Transmission output 2			1: Transmission of set temp.
400052	0033	20mA data - Transmission output 1	Refer to 400004 "Multi SV".	℃	Max Multi SV
400053	0034	20mA data - Transmission output 2	Refer to 400004 "Multi SV".	℃	Max Multi SV
400054	0035	4mA data - Transmission output 1	Refer to 400004 "Multi SV".	℃	Min. Multi SV
400055	0036	4mA data - Transmission output 2	Refer to 400004 "Multi SV".	℃	Min. Multi SV
400056	0037	RS485 Comm. Address	1 ~ 99		1
400057	0038	RS485 Comm. Speed	1200/2400/4800/9600/19200		9600
400058	0039	Sensor input correction	-20.0 ~ 20.0		0.0
400059	003A	Digital input 1	1: Unuse, 1: Start/Stop 2: Release alarm, 3: Auto/Man 4: Auto Tuning, 5: Multi SV A		1: Start/Stop
400060	003B	Digital input 2	1: Unuse, 1: Start/Stop 2: Release alarm, 3: Auto/Man 4: Auto Tuning, 5: Multi SV B		2: Release alarm
400061	003C	Digital input 3	1: Unuse, 1: Start/Stop 2: Release alarm, 3: Auto/Man 4: Auto Tuning		4: Auto Tuning
400062	003D	Input type - Digital input 1	0:Normal Open, 1:NormalClose		1:NormalOpen
400063	003E	Input type - Digital input 2			
400064	003F	Input type - Digital input 3			
400065	0040	Temp. display unit	0: No unit, 1: ℃, 2: °F		1: ℃
400066	0041	Use of analog scale	0: Unuse, 1: Use		0: Unuse
400067	0042	Upper limit analog input	Refer to 400002 "Multi SV".		Max Multi SV
400068	0043	Lower limit analog input	Refer to 400002 "Multi SV".		Min Multi SV
400069	0044	Upper analog scale	-1999 ~ 9999		2000
400070	0045	Lower analog scale	-1999 ~ 9999		400
400071	0046	Decimal point for analog scale	0 : 0000 1 : 000.0 2 : 00.00 3 : 0.000		0 : 0000
400072	0047	Band setup	-20.0 ~ 20.0	℃	0
400073	0048	Lamp value	0 ~ 20.0		0
400074	0049	Lamp time	0 ~ 5999	Sec.	0
400075	004A	Loop short check value	0 ~ 20.0	℃	0
400076	004B	Loop short detection time	0 ~ 1000	Sec.	0

15 Miscellaneous

Sensor Extension

* Thermo resistor DPT100, JPT100 Sensor: All three wires must be in the same material and thickness.
* Thermocouple K, N, T, J, E sensors: Use the same wire as the sensor wire or the exclusive compensation wire for extension, if necessary.
* NTC sensor: Use the 2P shielded wire for extension, if necessary.

⚠ Warning
Lead soldering is recommended for joints for extension. Poor treatment of the joint may cause sensor error owing the entry of moisture.
The Company will not be held responsible for malfunction of the Product owing to sensor extension. Please order/manufacture the sensor in the desired length from the outset, if practicable.

Display of Memory Error

[Er1] is displayed when abnormal data is recorded in the non-volatile memory inside the Product, or it is damaged by severe external noise. Press the # key to reset to the factory default value.

■ Although the controller is protected against external noise, the interior may be damaged if the noise level is 2KV.
■ Warranty Period: One year from the date of purchase
■ The above specification may be changed without prior notice for further improvement in performance.
Please read and observe precautionary instructions during handling of the Product.
■ Regarging the English language manual, please download it at our website.
■ Address: Conotec Building, 26 Yoonsan-ro (Bugok-dong), Geumjeong-gu, Pusan-si, Republic of Korea
Factory: First underground floor, Administration and Sales: Second floor, Research Center and AS: Third floor
■ A/S : TEL 051-819-0425~7
(Please return the Product to the Company for A/S services.)
Direct Line: 070-7815-8266
■ e-mail : conotec@conotec.co.kr url : www.conotec.co.kr
■ This Product is suitable in the following environment:
Ambient temperature : 0℃ ~ 60℃
Ambient humidity : 80%Rh max.
Rated power : AC 100~240 VAC 50/60Hz

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