



Digital Temperature Controller

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User's Manual

CNT-P500



- * PID temperature controller
- * Two relay output
- * Two output used as electric current /SSR (Cycle / Phase control General On/Off)
- Alarm output with the hardware select function / Current transmission / The user can select control output
- Resistance temperature detector Thermocouple, NTC Sensor, Voltage (mV. Volt), Current (4-20mA) and other variety of sensor input
- * Supports RS485 Communication (MOD BUS - RTU)
- ** 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 web-site.



Safety Precaution

Please read all precautionary information before use, to ensure

X 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. Check the terminal number before connecting to power.
- 4. Do not disassemble, process, improve or repair the Product.



Caution

- 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

- 5. Reep the power cable away from a riight voltage whe. 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.

- 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
- Using 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

- 16.Use of the Product in Violation of the maintacturers 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 1	00~240VAC 50/60Hz Display Accuracy ±1% rdg ±1digit
Display Metho	7 7 7 7 7 7 7 7 9 7 9 9 9 9 9 9 9 9 9 9

OUT1: Current output and transmission / SSR output (general, cycle, phase control) - Current : Within resistive load 500 ohm, SSR: Within 11VDC ± 2V 20mA

Type | Sensor Name & range | Type | Sensor Name & range

Selectable Output Format

OUT2: Current output and transmission / SSR output (general, cycle, phase control) Output Spec.

- Current: Within resistive load 500 ohm, SSR: Within 11VDC ± 2V 20mA

AL1 or OUT3: 1c 250VAC 2A Relay AL2 or OUT4: 1a 250VAC 2A Relay

	1,700	5011501 14	arrie a rarige	1,700	Serisor Harrie & range		
	ו חדם ו	DPT100	-199.9 ~ 400.0℃	The constitution	NTC10K(L⊤)	-55.0 ~ 99.9℃	
		JPT100	-199.9 ~ 400.0℃	Inermistor	NTC10K(⊣⊤)	-20.0 ~ 250.0℃	
	TC	K	-50 ~ 1200℃		mV	0.0 ~ 100.0mV	
nsor Spec.		N	-50 ~ 1200℃	Voltage	0~5V	0.00 ~ 5.00V	
'		T	-50 ~ 400℃		1~5V	1.00 ~ 5.00V	
		J	-50 ~ 1200℃			0.00 ~ 10.00V	
		E	-50 ~ 1000℃	Current	0~20mA	0.00 ~ 20.00mA	
					4~20mA	4.00 ~ 20.00mA	
munication Spec	RS48 ^r	MODRI	IS RTIJ Data	8 hit P	arity Non	e Stop hit 1	

4 KS485, MODBUS KTO, Data 8 Dit, Parity None, Stop Dit 1 Ambient $0\sim55^{\circ}$ C, $35\sim80^{\circ}$ Rh (to be free of freezing or condensation)

Permitted voltage 90~110% of the supply voltage Type | Selectable Hardware

Output Selection	Control Output 1 (Heating Control)	OUT1, OUT2	SSR On/Off, SSR General PID, SSR Cycle PID, SSR Phase PID Current PID		
	Control)	OUT3, OUT4	Relay On/Off, Relay PID		
	Control Output 1 (Cooling Control)	OUT1, OUT2	SSR On/Off, SSR General PID, SSR Cycle PID, SSR Phase PID Current PID		
relay, current module, or SSR	Control)	OUT3, OUT4	Relay On/Off, Relay PID		
according to each function	Alarm Output 1	OUT3, OUT4	High temperature alarm, low temperature alarm, high- low		
	Alarm Output 2	OUT3, OUT4	temperature alarm Sensor error, roof error (output error)		
	Transmission Output 1	OUT1, OUT2	Current temperature transmission, set temperature transmission,		
	Transmission Output 2	OUT1, OUT2	Controlled variable transmission		
Digita l I nput	Input 1, 2, 3		Start/stop, alarm disable, automatic/manual Auto tuning, Multi SV		

✓!\ Caution

Power Outage Compensation

* 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.

Approx. 10 years (Non-volatile semiconductor memory type)

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) Switches on in the automatic control mode. Flickers during auto tuning.

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

Initialize AUTO + SET Press and hold the left and the right keys for 3 seconds to initialize all setup values

Switched to the Auto or the Manual mode Auto/Manual when pressed on the Operation Screen.

AUTO for the automatic mode; MAN for

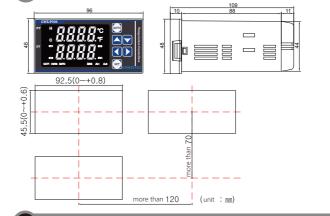
the manual mode Switched to the Start or the Stop mode Start/Stop when pressed on the Operation Screen. **52.07** indicating the stop mode

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

The automatic tuning starts or stops when Auto Tuning **(** pressed on the operation screen

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.

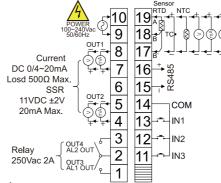
External Dimensions and Panel Processing Size



Terminal Wiring Diagram

Method of Switch Use depending on the Digital Switch Function Setup

1 3	J	
If set to the Start/Stop function	Use the Select switch	-0 0
If set to the Release Alarm function	Use the Push switch	
If set to Select Auto/Manual Mode function	Use the Select switch	96
If set to the Auto Tuning function	Use the Push switch	-0
If set to the Multi SV function	Use the Select switch	-0'0-
_	_	



<u>/!</u> Caution

* 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.

✓ Warning

* 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

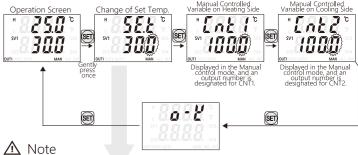
If the logo is displayed repeatedly upon power-on, it is probable that the input power is incorrect. If not, please contact the Company.



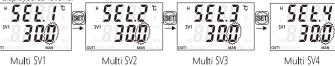
Unstable power supply may cause damage to the internal memory.

7 Program Setup

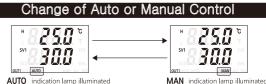
Change of Set Temp. and Manual Controlled Variable



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



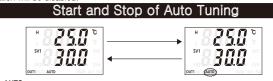
* If the Multi SV function is not selected, only the SV1 setup is displayed as same as the screen under "Change of Set Temp." as above



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).

Both the heating and the cooling sides are controlled by the Manual Controlled variable as described as above, regardless of the controlled variable

 \star If the external digital input function is set to "AUTO/MANUAL control", the front key



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).

AUTO Flickering of indication lamp The automatic tuning progresses by which the ptimum proportional band (Pb), integral time (Ti) and differential time (Td) are identified through a series of on/off operations.

⚠ Caution

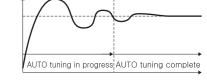
* If the external digital input function is set to "Start/Stop Auto Tuning" the front key operation Some menus cannot be changed during auto furning. The word <code>\EunE</code> will be displayed for *a short period of time to indicate that funing is in progress.

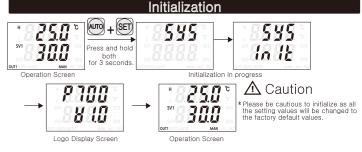
AUTO Tuning

XXXX

300

This is a procedure to search for an





Error Display





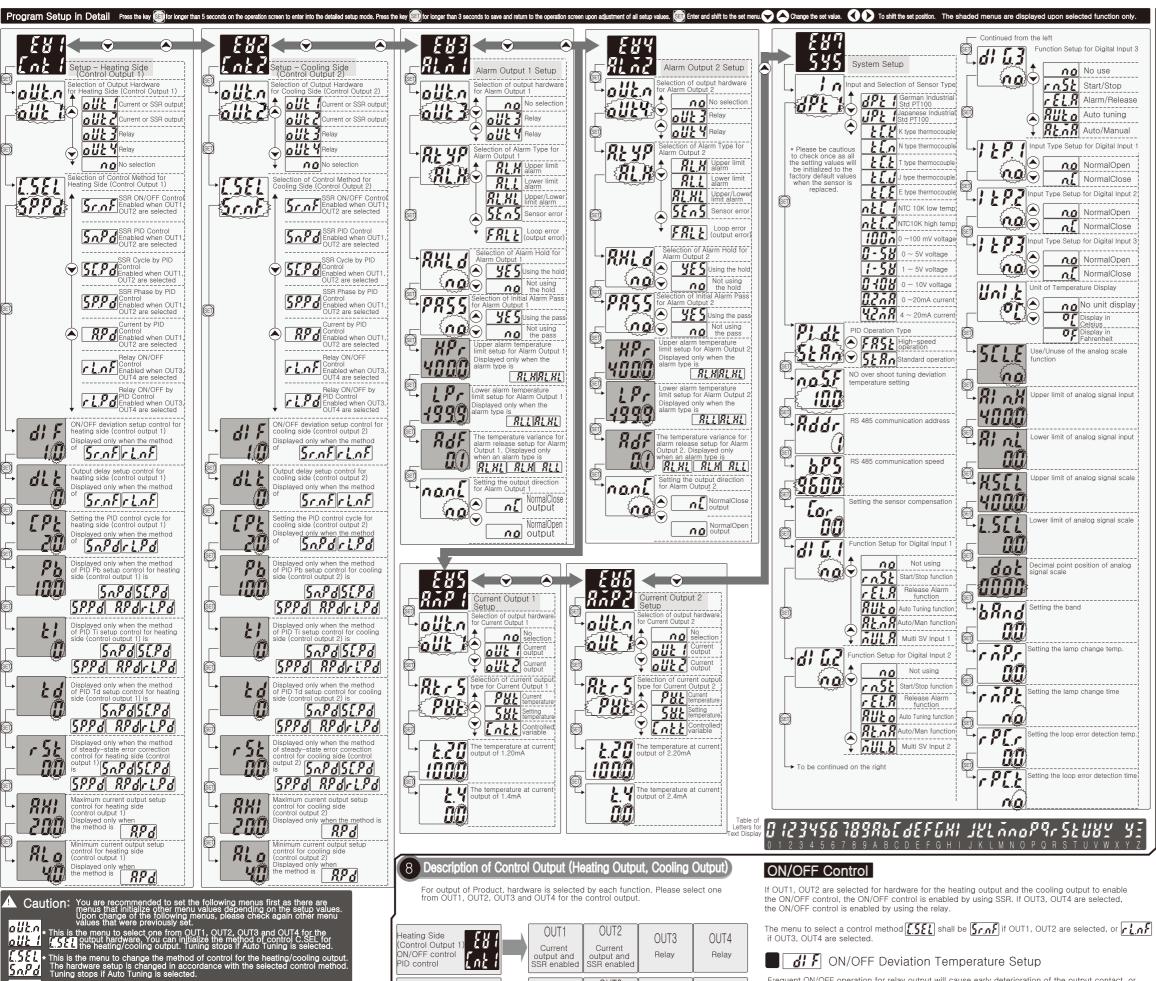
The sensor cable is short

Analog signals (mV, V, mA

Check the wiring.

250° "5Łop

All outputs will become OFF



OUT2

Current output and SSR enable

OUT3

Relay

OUT4

Relay

OUT1

output and SSR enable

Cooling Side

PID control

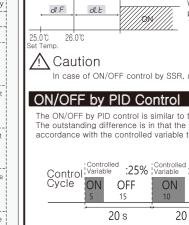
ON/OFF control

[ntc

This is the menu to change the input sensor. The following menus will be

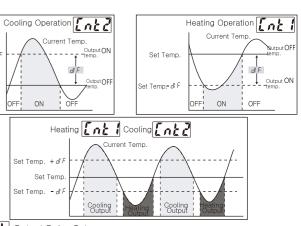
rst Rdf Corband rife rflr nost

Temp.sensor Band setting Lamp change Loop error No over shing correction



0

0



2 Output Delay Setup

Set Tem

OFF ON

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.

Θ : 25.0°C, dLt : 1.30, ESP : CoL, dl F: 1.0 ? When the current temperature rises and passes the point 'B' (i.e. 26.0°C), the relay is ON at the point 'C' at the dLt set time (i.e. 1m 30s).

- When is the output ON if the set temp. is

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

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

The menu to select a control method $\boxed{\textbf{L.5EL}}$ shall be $\boxed{\textbf{5nPd}}$ if OUT1, OUT2 are selected, or it shall be \(\begin{align*} \begin{a

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.

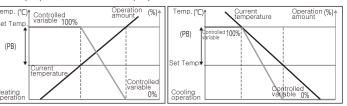
In case of ON/OFF PID control by SSR, use zero Crossing SSR to reduce noise generation.

3 [P] 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.

Pb Proportional Band Width

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



[5] **Ł**: 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

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.

- * 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 **Ł d** 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.

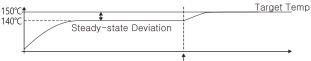
The differential operation monitors sudden deviations in disturbance, and adds the operating amount in case of large difference to the previous deviation to facilitate quick response to disturbance.

- * 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 F 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.



Correction of steady-state deviation by 10°C

PID SSR Cycle Control

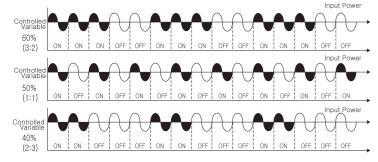
The PID SSR cycle control uses a Non Zero Crossing type SSR, making outputs by adjusting the number of ON/OFF operations in unit of one cycle of AC power according to the controlled variable. This method can lower the open/close noise compared to the zero crossing AC power control for the phase control, 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

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

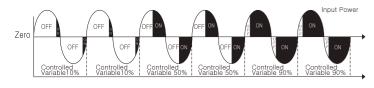
In order to detect the zero pass of the load power in the product, when applying NonZero Crossing type SSR, product operation power and load must be common power.



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 In the control method selection menu[[5F]], select [5PP]

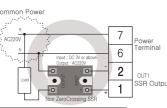


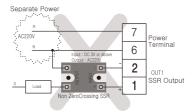


To enable the PID control with SSR, SSR must be of the non zero-crossing type and its reaction speed must be within 1ms.

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.



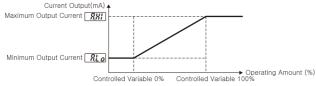


PID Current Control

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

In the control method selection menu **[.5£]**, select **[.76]**

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



8 RXX Maximum Current Output Setup

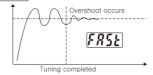
This refers to the current output during the PID current control at 100% operating Example) If A.HI is 15.0mA, the current output is 15.0mA at 100% operating amount.

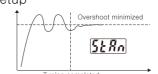
| 🤼 🔊 Minimum Current Output Setup

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

PID Operation Type

9 Pi di PID Operation Type Setup



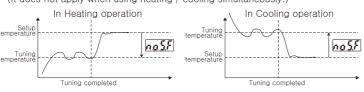


In FAST mode, the target temperature is reached faster, even if there is some overshoot. In STANDARD mode, the target temperature is reached while minimizing

PID tuning temperature setup

10 no 5F No over shoot tuning deviation temperature setup

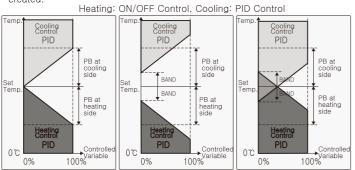
In auto tuning operation, tuning is performed at a distance of NO overshoot tuning deviation temperature from the set temperature to reach the set temperature so hat the current temperature does not exceed the set temperature. (It does not apply when using heating / cooling simultaneously.)



Band Function

11 b Rnd Band Function Setup

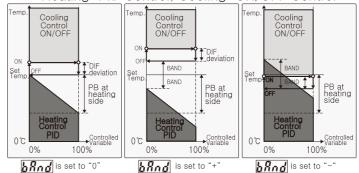
You can designate a zone between the heating control and the cooling control when both the heating and cooling outputs are used. This does not apply if the set value is 0. If the set value is "+" a zone having 0% of the controlled variable for both the heating and the cooling sides will be created. If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



bRnd is set to "0" <u>៤កីក៤</u> is set to "+" the set temperature. a zone having the controlled variable of 0 is created

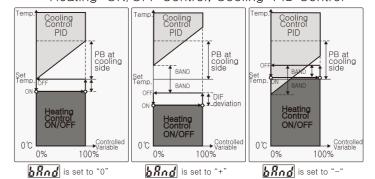
៤កីក៤ is set to "−" the set temperature a zone with the heating and cooling controls overlapped is created

Heating: PID Control, Cooling: ON/OFF Control

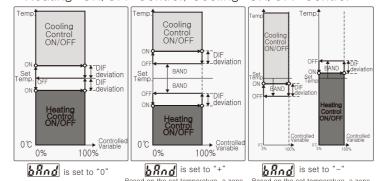


ได้ก็กดี is set to "+"

Heating: ON/OFF Control, Cooling: PID Control



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



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

Set Value (SV) Shape of changes in set temp $r n p_r$ Current Set Temr rnok

12 FAPA 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.

Lamp temperature change: 5°C, Current set temp.: 10°C, Set target temp.: 50°C Lamp changing time: 1min.

The set temperature is increased by 5°C every minute and the lamp stops when the temperature reaches to 50°C.

13 rapk 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"

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 RLK shall be selected for the REYP 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 **KP**r menu.

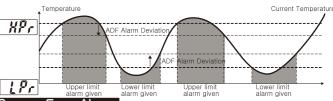
Lower Limit Alarm

15 REYP shall be selected for the RLL 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

The lower limit alarm temperature shall be set in the $\mathcal{L}_{\mathcal{F}_{\mathcal{F}}}$ menu.

Upper and Lower Limit Alarm

16 RL.KL shall be selected for the REYP 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

a - [The sensor connection is poor or the cable is cut. 5-F The sensor cable is short. Check the wiring.

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

KKKK Analog signals (mV, V, mA etc) are entered outside the given upper

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% 100% for the heating or the cooling device. If however, the temperature does not change, the output device may be faulty.

17 FFLF Loop Error Detection Temperature

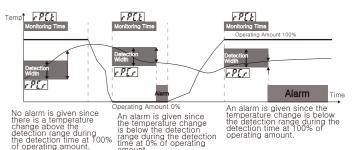
Set the range of temperature change for the temperature to be changed within the detection time when the loop error detection function is started.

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

18 PIX 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 RKL of is:

Set to [

The corresponding alarm output is OFF when the alarm is released. Set to ______: The corresponding alarm output is OFF when the alarm is released to ______: 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.

_	ON	UFF	ON	OFF	ON	UFF		
	Alarm given		Alarm given		Alarm given			
Hold Function: NO								

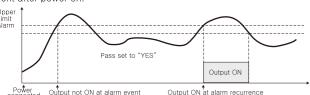
Hold Function: YES

Alarm Pass Function

21 If **PRSS** is

Set to **no** The corresponding alarm output is ON at the first alarm event after power on.

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 nant is set to no : Output OFF at normal operation; Output ON at alarm event

Aputput ON at normal operation; Output OFF at alarm event

írm event

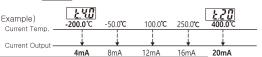
10 Current Transmission (Output 1, Output 2)

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

Current Transmission Output 1 Use of Current Module	885 879 (OUT1 Current output and SSR operation enabled	OUT2 Current output and SSR operation enabled
Current Transmission Output 2	£86	OUT1 Current output and SSR	OUT2 Current output and SSR
Use of Current Module	XnYC	 operation enabled	operation enabled

Transmission of Current Temperature

The current temperature can be transmitted to current when Rtr5 is set to Fbt.



Transmission of Set Temperature

The set temperature can be transmitted to current when Rtr5

Transmission of Controlled Variable

25 The Controlled Variable can be transmitted when Rtr5 set to

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 selected as

0-58 (-58 0408 02AA 42AA

The analog scale function is enabled when 5555 set to 555

27 R nx is the menu to set the maximum value of the input analog signal. $28 |\mathcal{R}|$ \mathcal{A} is the menu to set the minimum value of the input analog signal.

is the expanded or the reduced value displayed when the analog signal input is **RI AN**.

is the expanded or the reduced value displayed when the analog signal input is **31 a.t.**.

Rink 10mV $\sim Rink$ 90mV Analog signal input Displayed value upon scaling **1.5[1**] 0 **X5[]** 5000

s the menu to set a decimal point of the displayed value upon scaling of the analog input signal

Digital Input

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

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.	9
If set to the Release Alarm function	Use the Push switch.	0
If set to Select Auto/Manual Mode function	Use the Select switch.	00
If set to the Auto Tuning function	Use the Push switch.	-0 -0
If set to the Multi SV function	Use the Select switch.	-0 0-

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 di Li di Li di Li di Li functions of external switches can be set.

NO: The corresponding switch is not to be used.

Start/Stop: If this is set to "Stop" all outputs are turned OFF and "Stop" is displayed.

Release Alarm: The alarm output is OFF when this switch is pressed while the alarm output is ON.

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.

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

Multi SV: The set temperature can be designated from Set Temp. 1 to Set Temp. 4.

ex) SV1	SV2		SV	3		SV4
IN3 IN2 IN1	COM	IN1	COM	IN2	COM	IN2 IN1
22 23 24 25	22	25	22	24	22	24 25

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

na: Normally OFF, but turns ON when the switch is pressed.

n[: Normally ON, but turns OFF when the switch is pressed.

Input Sensor and Others

is used to select an input sensor

35 [[] is used to correct the difference between the displayed value by the input sensor and other precision device.

Current temp. = 20°C, The temp. by precision device: 22 °C => COR correction value: Enter "2 °C" and the current temperature is displayed as "22 °C".

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 Ragar is used to set the RS485 communication address. 58 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	8000	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			
100025	0018	Analogue scale	100026 100025 00:0000 01:000.0		
100026	0019	decimal point position	0019 0018 10:00.00 11:0.000		

< Func 0x04 : Read Inputs Registers

ble to receive simple information such as current temperature, sensor status, and output status.							
NO	Address			Unit	Default Value		
300001	0000	Current Temp.	If in a sensor error: -5000	O			

NO	Address	Description	Range	Unit	Default Value
300002	0001	Input Sensor Type	0 DPT100 1 JPT100 Thermoresistor 2 TC.K 3 TC.N 4 TC.T 5 TC.J Thermore Couple 6 TC.E		
	0001		7 NTC LT 8 NTC HT NTC10K 9 0~100mV10 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.	°C	
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) | 15th $300007(0006) System \ Status(bit) \ \frac{15801}{X} \ \frac{14801}{X} \ \frac{12801}{X} \ \frac{11801}{X} \ \frac{11801}{X} \ \frac{11801}{X} \ \frac{10801}{X} \ \frac{8801}{X} \$

NO Address Description Range Unit Default Value

< Func 0x03 : Read Hoding Registers > < Func 0x06 : Write Single Registers >

You can read the controller setting menu. You can change the controller setting menu.

< Func 0x10 : Write Multiple Registers >

You can change many controller setting menus.

110	71001000	Doddinption	riango	OTTIL	Dorault valu
400001	0000	Sensor information	Func 0x04: Read Inputs Registers		0 : DPT100
400002	0001	DID Operation time	Refer to item 3000002 0: Standard operation, 1: High speed operation		
400002	0001	PID Operation type No over shoot tuning deviation setup		20	0: Standard operati
400003	0002	No over shoot turning deviation setup		°C	0.00
400004	0003	Multi SV1	Varies depending on the input sensor.		
			DPT100,JPT100:-199,9~400,0℃ K,N,J:-50 ~ 1200℃		
			T:-50 ~ 400°C		
400005	0004	Multi SV2	E:-50 ~ 1000℃		
			NTC Low temp. : -55.0 ~ 99.9°C		0
		Marie: CV/O	NTC high temp, : -20,0 ~ 250,0°C mV : 0.0 ~ 100.0mV		
400006	0005	Multi SV3	0~5V : 0.00 ~ 5.00V		
			1~5V: 1.00 ~ 5.00V		
400007	0006	Multi SV4	0~10V: 0.00 ~ 10.00V 0~20mA: 0.00 ~ 20.00mA		
400001	0000	Walti OV-	4~20mA: 4.00 ~ 20.00mA		
400008	0007	Manual Controlled Variable at Heating Side	The controlled variable in Man Mode	%	0
400009	0008	Manual Controlled Variable 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	0: SSR ON/OFF control		1: SSR ON/OF
100010	0001	heating side	1: SSR ON/OFF PID control 2: SSR Cycle PID control		PID control
			3: SSR Phase PID control		
		Control type for	4: Current PID control		N. 66B ON/OR
400017	0010	Control type for cooling side	Relay ON/OFF control Relay ON/OFF PID control		0: SSR ON/OF control
			o. Helay ON/OTT TID CONTO		00111101
400018	0011	ON/OFF deviation at heating side	0.1 ~ 20.0	°C	1.0
400019	0012	ON/OFF deviation at cooling side	0.1 ~ 20.0	C	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	Ĉ	10.0
400025	0018	PB at cooling side	0 ~ 30.0	°C	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	°C	0
400031	001E	Steady state error correction at cooling		C	0
400032	001F	Max current output at heating side	0 ~ 20.0	mΑ	20.0
400033	0020	Max current output at cooling side	0 ~ 20.0	mΑ	20.0
400034	0021	Min current output at heating side	0 ~ 20.0	mΑ	4
400035	0022	Min current output at cooling side	0 ~ 20.0	mΑ	4
			0: Upper limit alarm output		
400036	0023	Alarm type - Alarm Output 1	1: Lower limit alarm output		Upper limit alarr
			2: Upper and lower limits alarm output		
400037	0024	Alarm tupa Alarm Output 3	3: Sensor error output 4: Loop error output		Lower limit alarn
	0024	Alarm type - Alarm Output 2	4- Loop error output		
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
400042	0029		Refer to 400002 "Multi SV".	°C	Max Multi SV
400043	002A		Refer to 400002 "Multi SV".	°C	Max Multi SV
400044	002B	Lower limit alarm - Alarm Output 1		°C	Min. Multi SV
400045	002C		Refer to 400002 "Multi SV".	Ĉ	Min. Multi SV
400046	002D	Alarm deviation - Alarm Output 1	0.1 ~ 20.0	Ĉ	0.1
400047	002E	Alarm deviation - Alarm Output 2	0.1 ~ 20.0	Ĉ	0.1
400047	002E	Output direction - Alarm Output 1	0:Normal Open, 1:NormalClose	Ĉ	1:NormalOper
400049	0030	Output direction - Alarm Output 2	0:Normal Open, 1:NormalClose	0	1:NormalOper
		Transmission type	o morniar opon, i morniaronoso	U	0: Transmission
400050	0031	- Transmission output 1	0: Transmission of current temp. 1: Transmission of set temp.		of current tem
400051	0032	Transmission type	2: Transmission of set temp.		1: Transmission of set temp.
400052		- Transmission output 2	Refer to 400004 "Multi SV".	°C	
		20mA data - Transmission output 1			Max Multi SV
	0033				
400053	0034	20mA data - Transmission output 2	Refer to 400004 "Multi SV".	T T	Max Multi SV
400053 400054	0034 0035	20mA data - Transmission output 2 4mA data - Transmission output 1	Refer to 400004 "Multi SV".	C	Min. Multi SV
400053 400054 400055	0034 0035 0036	20mA data – Transmission output 2 4mA data – Transmission output 1 4mA data – Transmission output 2	Refer to 400004 "Multi SV". Refer to 400004 "Multi SV".		Min. Multi SV Min. Multi SV
400053 400054	0034 0035	20mA data - Transmission output 2 4mA data - Transmission output 1	Refer to 400004 "Multi SV".	C	Min. Multi SV

NO	Address	Description	Range	Unit	Default Value
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/Mar 4: Auto Tuning, 5: Multi SV B		2: Release alarr
400061	003C	Digital input 3	1: Unuse, 1: Start/Stop 2: Release alarm, 3: Auto/Mar 4: Auto Tuning		4: Auto Tuning
400062	003D	Input type - Digital input 1	l 1:NormalClose		1:NormalOper
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: ° C
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	°C	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	°C	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.

Lead soldering is recommended for joints for extension. Poor treatment of the joint may cause sensor error owing the entry of

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

 $\mid \xi r \mid \mid$ 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.

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This Product is suitable in the following environment:

Ambient temperature : 0°C ~ 60°C Ambient humidity: 80%Rh max.

Rated power: AC 100~240 VAC 50/60Hz

