#### **Autonics**

### **Dual PID Control Temperature Controller** TZ SERIES

#### INSTRUCTION MANUAL





Thank you for choosing our Autonics product. Please read the following safety considerations before use.

#### ■ Safety Considerations

\*\*Please observe all safety considerations for safe and proper product operation to avoid hazards.

\*Safety considerations are categorized as follows.

▲ Warning Failure to follow these instructions may result in serious injury or death.

▲ Caution Failure to follow these instructions may result in personal injury or product damage.

\*\*The symbols used on the product and instruction manual represent the following

▲ symbol represents caution due to special circumstances in which hazards may occur.

#### **⚠** Warning

- 1. Fail-safe device must be installed when using the unit with machinery that may cause serious injury or substantial economic loss. (e.g. nuclear power control, medical equipment, ships, vehicles, railways, aircraft, combustion apparatus, safety equipment, crime/disaster prevention devices, etc.) Failure to follow this instruction may result in fire, personal injury, or economic loss 2. Install on a device panel to use.
- Failure to follow this instruction may result in electric shock.
- 3. Do not connect, repair, or inspect the unit while connected to a power source.
  Failure to follow this instruction may result in electric shock or fire.

  4. Check 'Connections' before wiring.
  Failure to follow this instruction may result in fire.

  5. Do not disassemble or modify the unit.

- Failure to follow this instruction may result in electric shock or fire

#### **⚠** Caution

- 1. When connecting the power input and relay output, use AWG 20(0.50mm²) cable or over and tighten
- the terminal screw with a tightening torque of 1.0N-m.

  When connecting the sensor input and communication cable without dedicated cable, use AWG 28~16 cable or over and tighten the terminal screw with a tightening torque of 1.0N-m. Failure to follow this instruction may result in fire or malfunction due to contact failure.
- Use the unit within the rated specifications.
   Failure to follow this instruction may result in fire or product damage
- 3. Use dry cloth to clean the unit, and do not use water or organic solvent.

  Failure to follow this instruction may result in electric shock or fire.

  4. Do not use the unit in the place where flammable/explosive/corrosive gas, humidity, direct sunlight,
- radiant heat, vibration, impact, or salinity may be present. Failure to follow this instruction may result in fire or explosion.
- 5. Keep metal chip, dust, and wire residue from flowing into the unit.
- Failure to follow this instruction may result in fire or product damage

#### Ordering Information

Z	4 S	P -	- [1	1 [4	4	R		
						Control	R	Relay output
						output	s	SSR drive output
							С	Current output
					Pov	wer supply	4	100-240VAC 50/60Hz
							<b>1</b> <sup>*1, *2</sup>	Event 1
							<b>2</b> <sup>**2</sup>	Event 1 + Event 2
				Opt	ion o	utput	R <sup>×2</sup>	Event 1 + PV transmission (DC4-20mA)
							Т	Event 1 + RS485 communication
							Α	Event 1 + Event 2 + PV transmission (DC4-20mA)
							В	Event 1 + Event 2 + RS485 communication
							SP	DIN W48×H48mm (plug type) <sup>x3</sup>
							ST	DIN W48×H48mm (terminal block type)
		Size					M	DIN W72×H72mm
							w	DIN W96×H48mm
							Н	DIN W48×H96mm
							L	DIN W96×H96mm
	Digit						4	9999 (4-digit)
Item							TZ	Temperature controller

- \*The unit cannot be configured with any random combination from the above ordering information. Please refer to Specifications for possible configurations.

  X1: TZ4SP only supports Event 1 option output.
- X2: TZ4ST only supports Event 1, Event 1 + Event 2, and Event 1 + PV transmission (DC4-20mA) option
- output. %3: 11-pin sockets (PG-11, PS-11(N)) are sold separately.
- \*\*The above specifications are subject to change and some model may be discontinued
- \*Be sure to follow cautions written in the instruction manual and the technical descriptions (catalog, homepage).

#### ■ Specifications

Series		TZ4SP	TZ4ST	TZ4M	TZ4W	TZ4H	TZ4L		
Power su	ipply	100-240VAC~ 50/60Hz							
Allowable	e voltage range	90 to 110% of rated power voltage							
Power cor	nsumption	Max. 5VA (100-240VAC 50/60Hz) Max. 6VA (100-240VAC 50/60Hz)							
Display n	nethod	7-segment LE	D (PV: red, S)	V: green)					
Character	PV (W×H)	4.8×7.8mm		9.8×14.2mm	8.0×10.0mm	2 0 v 7 6 mm	9.8×14.2mn		
size	SV (W×H)	4.0^7.011111		8.0×10.0mm	0.02 10.011111	3.8×7.6mm	8.0×10.0mr		
	RTD	DPt100Ω, JPt	100Ω, 3-wire (	allowed resista	ance: max. 5Ω	per line)			
Input type	TC		C (CA), J (IC), R (PR), E (CR), T (CC), S (PR), N (NN), W (TT) allowed resistance: max. 100Ω per line)						
	Analog	1-5VDC:, 0-	1-5VDC::-, 0-10VDC::-, DC4-20mA						
Display accuracy		F.S. ±0.3% or	3°C, greater v	alue					
	Relay	250VAC~ 3A	1c						
Control	SSR	Max. 12VDC=	= ±3V 30mA						
output	Current	DC4-20mA (load resistance max. 600Ω)							
$\overline{}$	EVENT1	250VAC~ 1A		,					
Option	EVENT2	_	250VAC~ 1A	1a					
Option	PV transmission	_		oad resistance	max. 600O)				
Ì	Communication	_		RS485 comm					
Control n	nethod	ON/OFF, P, PI, PD, PIDF, PIDS control							
	tput hysteresis	1 to 100°C (0.1 to 100.0°C) variable							
	nal band (P)	0.0 to 100.0%							
Integral ti	. ,	0 to 3.600 sec							
	e time (D)	0 to 3,600 sec	D						
Control p		1 to 120 sec							
Sampling		0.5 sec							
LBA setti		1 to 999 sec							
Ramp se		Ramp Up. Ra	mp Down: 1 to	99 min each					
Dielectric		2,000VAC 50/60Hz for 1 min (between input and power terminals)							
	Mechanical	0.75mm amplitude at frequency 10 to 55Hz (for 1 min) in each X, Y, Z direction for 2 hour							
Vibration	Electrical	0.5mm amplitude at frequency 10 to 55Hz (for 1 min) in each X, Y, Z direction for 10 min							
Relav	Control output	Mechanical: min. 10,000,000 operations, Electrical: min. 100,000 operations (250VAC 3A resistance load)							
life cycle	Option output	Mechanical: min. 20,000 operations (250VAC 3A resistance load)  Mechanical: min. 20,000,000 operations,  Electrical: min. 500,000 operations (250VAC 1A resistance load)							
Insulation	resistance	Over 100MΩ (at 500VDC megger)							
Noise im		Square shaped noise by noise simulator (pulse width 1µs) ±2kV R-phase, S-phase							
Memory		Approx. 10 years (non-volatile semiconductor memory type)							
Environ-	1	-10 to 50°C, storage: -20 to 60°C							
ment		35 to 85%RH, storage: 35 to 85%RH							
Annroval		( <b>6.74</b> us	,						
Approval Ambient humi.		Approx. 205q	Approx. 218q	Approx. 360q	Approx. 365a		Approx. 474q		

#### Input Type and Range

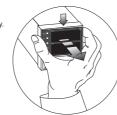
Input type		Decimal point	Display	Input range (°C)	Input range (°F)	
	K (CA)	1	E E BH	-100 to 1300	-148 to 2372	
	K (CA)	0.1	PERL	-100.0 to 999.9	Not supported	
	J (IC)	1	JI E.H	0 to 800	32 to 1472	
	J (IC)	0.1	JI E.L	0.0 to 800.0	Not supported	
	R (PR)	1	r Pr	0 to 1700	32 to 3092	
Thermo	E (CR)	1	EEr.H	0 to 800	32 to 1472	
couple	E (CR)	0.1	E [ r.L	0.0 to 800.0	Not supported	
	T (CC)	1	E C C.H	-200 to 400	-328 to 752	
	T (CC)	0.1	FEEL	-199.9 to 400.0	Not supported	
	S (PR)	1	5 Pr	0 to 1700	32 to 3092	
	N (NN)	1	Поп	0 to 1300	32 to 2372	
	W (TT)	1	UEE	0 to 2300	32 to 4172	
	JPt100Ω	1	JPE.H	0 to 500	32 to 932	
RTD	JPt100Ω	0.1	JPE.L	-199.9 to 199.9	-199.9 to 391.8	
KID	DPt100Ω	1	dPt.H	0 to 500	32 to 932	
	DPt100Ω	0.1	dPt.L	-199.9 to 199.9	-199.9 to 391.8	
	Valtage	0 - 10VDC	A1	-1999 to 9999		
Analog	Voltage	1 - 5VDC	A5	(display range will var	y depending on the	
	Current	DC4 - 20mA	A3	decimal point.)		

#### **■** Configuring Input Type

Please configure the internal switches before supplying power. After supplying power, configure the input type [ n- E] in parameter group 2 according to the input type

Input typ	ре	S/W 1	S/W 2
Thermo	couple		<b>-</b>
RTD		1 1	mA V
Analog	Voltage (0-10VDC, 1-5VDC)	2 2	mA V
	Current (DC4-20mA)	2 2	mA V

Detaching the case
Press the front case then pull the case to detach the case from the body.
Configure the internal switches as input type.



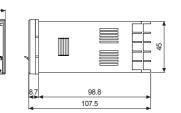
#### Dimensions

## 



•T74ST

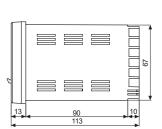




•TZ4L



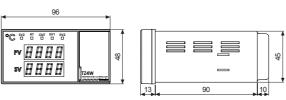
•T74M



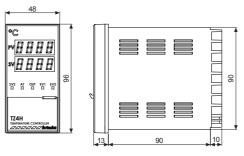
(unit: mm)

•TZ4W

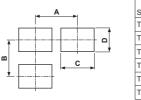
•T74SP





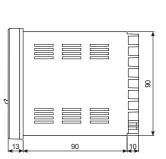


Panel cut-out dimensions



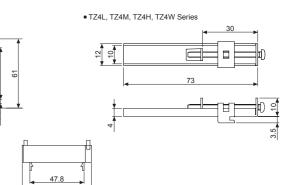
			(4	
Size Series	А	В	С	D
TZ4SP	Min. 55	Min. 62	45.5 0 5	45.5 0 5
TZ4ST	Min. 55	Min. 62	45.5 0 5	45.5 0 5
TZ4M	Min. 74	Min. 91	68.5 <sup>+0.5</sup>	68.5 0.5
TZ4W	Min. 112	Min. 50	92*08	45.5*0.8
TZ4H	Min. 50	Min. 102	45*0.6	92 0 0
TZ4L	Min. 98	Min. 106	91*0.5	91*0.5
		100	10.0	10.0

# 8v #### SV2 AT OUT EV1 EV2

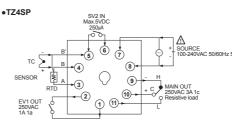




12.2



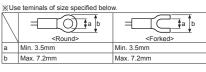
#### Connections



MAIN OUT					
SSR	Current				
9 0	9 10 +				
12VDC ±3V 30mA Max.	DC4-20mA Load 600Ω Max.				

(unit: mm)

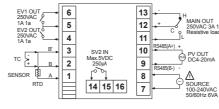




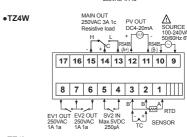
8 14

MAII	TUO
SSR	Current
12	12 13
12VDC ±3V 30mA Max.	DC4-20mA Load 600Ω Max

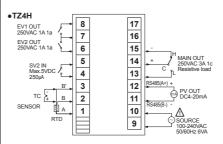
●TZ4M



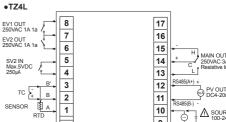
MAIN OUT				
SSR	Current			
12 + 12VDC ±3V 30mA Max.	13 mA 12 ± DC4-20mA Load 600Ω Max.			



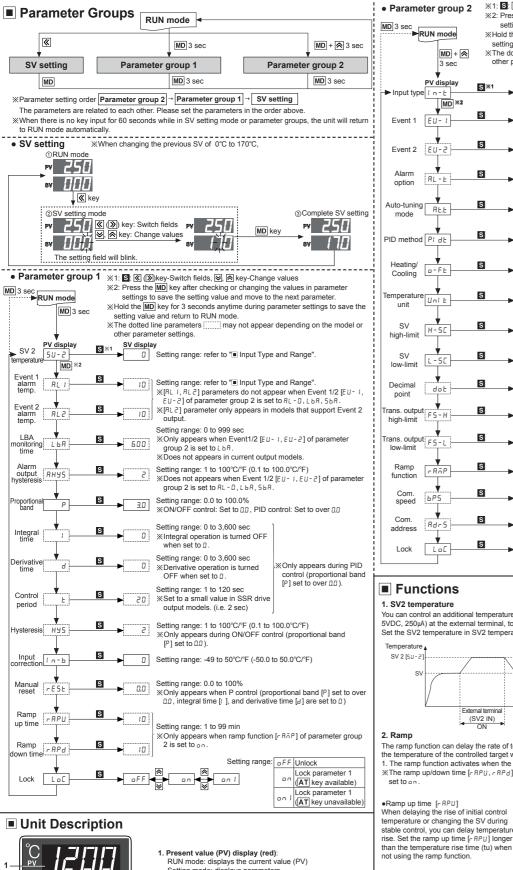
MAI	N OUT
SSR	Current
15	15 mA
12VDC ±3V 30mA Max.	DC4-20mA Load 600Ω Max.

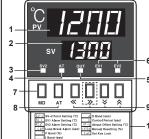


MAIN OUT					
SSR	Current				
15 14 12VDC ±3V 30mA Max.	15 14 DC4-20mA Load 600Ω Max.				



MAIN	OUT
SSR	Current
15 V 14 + 12VDC ±3V 30mA Max.	15 14 DC4-20mA Load 600Ω Max.
łz 6VA	
	15 14 + 12VDC ±3V 30mA Max.





- Setting mode: displays parameters
- 2. Set value (SV) display (green): RUN mode: displays the set value (SV)
- Setting mode: displays parameter setting values
  3. SV2 operation indicator: turns ON when SV2 is operating
- A. Auto-tuning indicator: turns ON when auto-tuning
   Control output operation indicator: turns ON when control output is ON. Does not operate when the input type is current
- 6. Event output indicator: turns ON when the according event
- output is ON. \*The Event 2 output indicator does not operation in TZ4SP.
- 7. Mode key: enter parameter group, return to RUN mode, switch parameters, save setting values 8. Auto-tuning key: hold the key for 3 seconds to start auto-tuning. Hold the key for 5 seconds while autotuning to stop auto-tuning.
- ing keys: enter SV change mode, switch fields, change value (x) key in the dotted line is only available in TZ4M and TZ4L models)
- 10. Key adjustment order chart

settings to save the setting value and move to the next parameter. XHold the MD key for 3 seconds anytime during parameter settings to save the

setting value and return to RUN mode. \*\*The dotted line parameters ::::: may not appear depending on the model or

→ LERH Setting range: refer to " Input Type and Range". Setting range: refer to '3. Alarm'. ※Event 2 [EU-2] only appears in models that support Event
2 output.

Setting range: refer to '3. Alarm'.

\*\*Does not appear when Event 1/2 [EU-1, EU-2] is set to AL-O.LbA.SbA

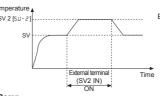
Please set according to control application HERE COOL Do not change the settings during operation. It may result in fire or accidents.

1300 Setting range: refer to "Input Type and Range". 400

Setting range: 0, 00, 000, 0000 \*\*Only appears with analog input. → 1300 Setting range: refer to "■ Input Type and Range".

▶ 100 **→** 2400 ♣ 4800 ♣ 9600 \*Only appears in models that support RS485 □ I Setting range: 1 to 99 (address)

You can control an additional temperature value at a desired range by using SV2. Connect a contact signal (under 5VDC, 250µA) at the external terminal, to operate in the range where the signal turns ON. Set the SV2 temperature in SV2 temperature [5U-2] in parameter group 1.



E.g.)The internal temperature of an electric oven may drop rapidly if the door is opened while the oven is maintaining a specific temperature. Set SV2 temperature [5".-2] to a higher value than SV, and input a signal to the external terminal (SV2 IN), to quickly raise the temperature.

XOnly appears in models that support PV transmission.

□FF Unlock

on Lock parameter 2

·····:: Not using ramp function

----: Using ramp function

The ramp function can delay the rate of temperature rise/fall. If the SV value is changed during stabilized control the temperature of the controlled target will rise/fall during ramp up/down time [-#PU, -#Pu] of parameter group 1. The ramp function activates when the power is reset or when the SV value is changed during stable control. \*The ramp up/down time [-RPU, -RPu] appear only when the ramp function [-RBP] of parameter group 2 is

Changed SV

Initial SV

stable control, you can delay temperature rise. Set the ramp up time [-RPU] longer

using the ramp function

tu -¦ Ramp up time Ramp up time Ramp down time [- RP⊿] Delays declining temperature. Set the ramp down time [- RP d] longer than the Changed SV temperature decline time (td) when not Initial S

·····:: Not using ramp function - : Using ramp function **td** 

Ramp down time

3. Alarm (Event)

Alarm output can be configured by combining alarm operation and alarm options. Set the alarm operation in event 1/2 [EU 1, EU2] of parameter group 2, and set the alarm options in alarm option[AL - E].

)Alarm	operation				
Mode	Name	Alarm operation		Description	П
AL-O	-	-		Alarm output not used.	Ш
AL-I	Deviation high-limit alarm	OFF SV 100°C High-limit de	H ON  A PV 110°C viation: 10°C	If the deviation of PV and SV are higher than the high-limit deviation, the alarm output turns ON.	
AL-2	Deviation low-limit alarm	ON THU PV 90°C Low-limit dev	SV 100°C	If the deviation of PV and SV are higher than the low-limit deviation, the alarm output turns ON.	
AL-3	Deviation high-limit /low-limit alarm	ON H OF  PV SV 90°C 100° High-limit/low-limit	PV 110°C	If the deviation of PV and SV are higher than the high-limit deviation or low-limit deviation, the alarm output turns ON.	
AL-4	Deviation high-limit /low-limit reverse alarm	OFF H ON  PV SV 90°C 100°  High-limit/low-limit	/ PV ℃ 110°C	If the deviation of PV and SV are higher than the high-limit deviation or low-limit deviation, the alarm output turns OFF.	
AL-5	Absolute value high-limit alarm	OFF H ON  A  PV SV  90°C 100°C  Absolute value alarm:  90°C	OFF HON  SV PV 100°C 110°C Absolute value alarm: 110°C	Alarm output turns ON when PV is higher than the absolute value.	
AL-6	Absolute value low-limit alarm	ON H OFF  A SV 90°C 100°C  Absolute value alarm: 90°C	ON TH OFF  SV PV 100°C 110°C  Absolute value alarm: 110°C	Alarm output turns ON when PV is lower than the absolute value.	
56R	Sensor break	_		Alarm output turns ON when sensor disconnection is detected.	
LЬЯ	Loop break	_		Alarm output turns ON when loop break is detected.	
K H: Ala	arm output h	nysteresis [AHY5]			Ľ

2)Alarm	2)Alarm options			
Mode	Name	Description		
AL-A	Standard alarm	Alarm output turns ON upon alarm condition, and alarm output turns OFF when condition is cleared.		
AL-b	Alarm latch	Alarm output turns ON and maintains ON upon alarm condition.		
AL-C	Standby sequence	The first alarm condition is ignored. It will operate as standard alarm from the second alarm condition. If it is under alarm condition when power is supplied, it will ignore the condition and operate as standard alarm from the next alarm condition.		
AL-d	Alarm latch and standby sequence	It will operate as both alarm latch and standby sequence upon alarm condition. If it is under alarm condition when power is supplied, it will ignore the condition and operate as alarm latch from the next alarm condition.		

) Sensor break alarm larm output turns ON when sensor is not connected or loses its connection during temperature control. Ser isconnection can be tested by connecting buzzers or other devices to the alarm output contact. Sensor bre larm output operates through EV1 OUT or EV2 OUT contacts. Alarm output is disengaged after resetting the

oower. 4) Loop break Alarm (LBA)

4) Loop break Alarm (LBA)
Diagnose control loop and transmit alarm output through temperature change of control target. During heating(cooling) control, the alarm output turns ON if the PV does not rise/drop by a specific amount (approx. 2°C) during LBA monitoring period [£ bA] while control output amount is at 100%(0%).

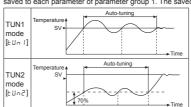
XIf the thermal response of the control target is slow, the LBA monitoring period [£ bA] of parameter group 1

should be set longer.

KLBA only operates when the control output amount is 100%(0%) so it cannot be used in current output models.

If the alarm output turns ON after the sensor has been disconnected, the alarm output will not turn OFF even after reconnecting the sensor. To disengage the alarm output, the temperature controller power must be reset

4. Auto-tuning
Auto-tuning allows the temperature controller to detect the thermal characteristics and response rates of the
control target. It then calculates the PID time constant and sets the value to allow fast response rates and high
accuracy. Hold the ATI key for 3 seconds during RUN mode to start auto-tuning. The auto-tuning indicator will
blink. When auto-tuning is completed, the auto-tuning indicator will durin off and the PID time constant will be
saved to each parameter of parameter group 1. The saved parameters can be adjusted as desired.



To manually stop auto-tuning, hold the AT key for 5 seconds. When auto-tuning is stopped, the controlle maintains the PID value before auto-tuning.

TZ Series supports 2 auto-tuning modes IZ Series supports 2 auto-tuning modes.

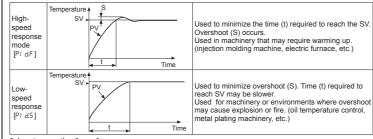
Select TUNI mode or TUNZ mode [EUn 1,EUn2] from auto-tuning mode [RELE] of parameter group 2.

KRun auto-tuning during initial setup of the temperature controller.

Kif the thermal characteristics of the control target device has changed after extended usage, re-run auto turies.

auto-tuning.

5. Dual PID control
The response rate of the PID control can be selected depending on the characteristics of the control target.
Select high-speed response mode or low-speed response mode [P1 dF, P1 d5] from PID method [P1 dE] of



6. Input correction [i n-b]
Used to correct deviation from external devices such as temperature controllers.

E.g.)If the actual temperature is 80°C but the display value is 78°C, set the input correction [! n - b] value to 2 and it will display 80°C as the display value. Configuring manual reset [r E 5 b ] according to control results.

and it will display 80°C as the display value.

7. Manual reset [-E5Ł]
When using proportional control (P control), the time of temperature rising time and falling time may differ depending on factors such as the heat capacity of the control device or the heater. A certain amount of deviation occurs even under stable conditions.
This deviation is referred to as offset, and can be configured/corrected using manual reset [-E5Ł].
When PV and SV are equal, the reset value is 50.0%. If the PV is lower than the SV during stable control, set the value to over 50.0%, and if the PV is higher than the SV, set the value to under 50.0%

Reset value set at under 50.0% Offset Offset eset value set at over 50.0%

#### ■ RS485 Communication

Synchronization method Asynchronous

Communication distance | Within 1.2km

Applicable for models that support RS485 communication. Please refer to '■ Ordering Information'

It is used to transmit PV or SV, and/or set the SV. EIA RS485 Applied standard Start bit 31 units (address: 1 to 99) Data bit 8-bit fixed Communication method 2-wire half duplex Parity bit

#### ■ Comprehensive Device Management Program[DAQMaster]

Stop bit

DAQMaster is a comprehensive device management software for setting parameters and monitoring processes. DAQMaster can be downloaded from our website at www.autonics.com.

em	Minimum specifications
System	IBM PC compatible computer with Pentium III or above
perations	Windows 98/NT/XP/Vista/7/8/10
1emory	256MB+
lard disk	1GB+ of available hard disk space
'GA	Resolution: 1024×768 or higher
Others	RS232C serial port (9-pin), USB port

#### ■ Troubleshooting

_ moubleanooning				
Symptoms	Troubleshooting			
oPEn is displayed on the PV display during operation	Disconnect the power and check the input connection. If the input is connected, disconnect the input wiring from the temperature controller and short the $+$ and $-$ terminals. Power the temperature controller and check if it displays the room temperature. If it does not display the room temperature and continues to display $a^p E_n$ , the controller is broken. Please contact our technical support. (Input type is thermocouple)			
Load (heater, etc.) does not operate during operation	Check the state of the control output indicator on the front panel.  If the indicator is not working, check parameter settings. If the indicator is working, disconnect the wiring from the output terminal of the temperature controller and check the output (replay contact, SSR drive, current)			
Err (error) is displayed on the PV display during operation	Indicates damage to internal chip by strong noise (2kVAC). Please contact our technical support. Locate the source of the noise and devise countermeasures.			

#### Error Dispaly

Display	Description	Troubleshooting	
oPEn	Blinks when input is disconnected.	Check input status.	
нннн	Blinks when the measured input value is higher than the temperature range.	Adjust the value to within	
LLLL	Blinks when the measured input value is lower than the temperature range.	the temperature range.	

#### ■ Factory Default

#### Parameter group 1

• .					
Parameter	Default	Parameter	Default	Parameter	Default
5U-2	0	Р	3.0	In-b	0
RL I	10	1	0	r E S E	0.0
RL2	10	d	0	r RPU	10
LBR	600	Ł	20	rRPd	10
AHY5	2	H95	2	LoC	oFF

#### Parameter group 2

Parameter	Default	Parameter	Default	Parameter	Default
In-E	FCUH	o-FE	HERL	F5-L	400
EU-I	AL-I	Uni E	٥٤	rRñP	oFF
EU-2	AL-2	H-50	1300	bP5	2400
AL-E	AL-A	L-5C	400	Adr5	0 1
Rt.L	Eun I	dot	0	LoC	oFF
PIdE	PI d.5	F5-H	1300		

#### Cautions during Use

1. Follow instructions in 'Cautions during Use'. Otherwise, It may cause unexpected accidents.
2. Check the polarity of the terminals before wiring the temperature sensor.
For RTD temperature sensor, wire it as 3-wire type, using cables in same thickness and length.
For thermocouple (CT) temperature sensor, use the designated compensation wire for extending wire.
3. Keep away from high voltage lines or power lines to prevent inductive noise.
In case installing power line and input signal line closely, use line filter or varistor at power line and shielded wire at joint signal.

wire at input signal line.

wire at input signal line.

Do not use near the equipment which generates strong magnetic force or high frequency noise.

Install a power switch or circuit breaker in the easily accessible place for supplying or disconnecting the

power.

5. Do not use the unit for other purpose (e.g. voltmeter, ammeter), but temperature controller.

6. When changing the input sensor, turn off the power first before changing.

After changing the input sensor, specify internal switch and modify the value of the corresponding parameter. Do not overlapping communication line and power line.

Use twisted pair wire for communication line and connect ferrite bead at each end of line to reduce the effect of external noise

Make a required space around the unit for radiation of heat.
 For accurate temperature measurement, warm up the unit over 20 min after turning on the power.
 Make sure that power supply voltage reaches to the rated voltage within 2 sec after supplying power.
 Do not wire to terminals which are not used.

11. This unit may be used in the following environments.
①Indoors (in the environment condition rated in 'Specifications')

②Altitude max. 2.000m (a)Installation category I ③Pollution degree 2

#### Major Products

Photoelectric Sensors

Fiber Optic Sensors

Door Sensors

Temperature/Humidity Transducers

SSRs/Power Controllers

Counters
Timers
Panel Meters
Tachometer/Pulse (Rate) Meters

Fiber Optic Sensors

Door Sensors

Door Side Sensors

Area Sensors

Proximity Sensors

Pressure Sensors

Rotary Encoders

Connector/Sockets ■ Display Units
■ Sensor Controllers

■ Connector/Sockets ■ Sensor Controllers
■ Switching Mode Power Supplies
■ Control Switches/Lamps/Buzzers
■ I/O Terminal Blocks & Cables
■ Stepper Motors/Drivers/Motion Controllers
■ Graphic/Logic Panels
■ Field Network Devices
■ Laser Marking System (Fiber, CO₂, Nd: YAG)
■ Laser Welding/Cutting System



