

■ Voltage pulse output(SSR)

Voltage pulse output is to control SSR unit installed in out of this unit. Generally the capacity of relay contact is limited. If the capacity of relay is getting bigger, the life cycle will be shortened by noise or spark.

- SSR output is 12VDC and it can use max. 30mA for load.
- Response speed of SSR is faster than relay cause of using semiconductor, it can proceed high speed control. If set "t" shorter(1 to 2sec.), it will be good condition to control the target.
- Radiation of semiconductor is very important in SSR. Therefore it is likely use 80% of rated of SSR and if SSR is damaged, it may result in a fire.

■ Current output(4-20mADC)

This output, called analogue output is to control the transducer(SCR unit), it can proceed stable control because there is no a sudden change. It outputs 4-20mADC, manipulated value is 100% at 20mADC, 0% at 4mADC.

- It is used with transducer and can not be used as the other application.
- This output operates through inner separated a constant current-circuit. Therefore current output is not changed even if the resistive load is connected in outside, but if resistive load is too high(over 600Ω), the current can be changed. (Please use the resistive load less than 600Ω.)
- Do not use a current output in case of using ON/OFF control.
- When current output is used, it is changing as analogue form, the manipulated value can rarely be 100% or 0%.
- Therefore LBA function is not used.
- Front OUT lamp does not operates in case of using a current output.

■ Retransmission output(4-20mADC)

Retransmission output is different with current output of control output and to retransmit current(4 to 20mADC) converting the measuring temperature to the recorder, PC, etc. But this current output can not use at over 600Ω resistive load.

- Mode of retransmission output is selected at FS-H, FS-L in the second flow chart.
- When PV reach at value of FS-L, it output 4mA.
- When PV reach at value of FS-H, it output 20mA.
- 4 to 20mADC is design as resolution of min. 16,000 divisions.

■ RS485 communication function

It is used on the purpose that transmitting PV to an external equipment, setting SV at the external equipment.

- It can be set at bps, Adrs in second setting group.
- bps setting : 2400, 4800, 9600(Start bit1, Stop bit1, Non parity)
- Adrs setting : 1 to 99
- Compatible PLC : LG, Mitsubishi, CIMON etc.

■ Decimal point(Dot) setting function

Decimal point is displayed as "dot" in second setting group when the input is only analog(0-10VDC, 1-5VDC, 4-20mADC).

■ Cool/Heat function

Generally there are two ways to control temperature, one(Heat-function) is to heat when PV is getting down(Heater). The other(Cool-function) is to cool when PV is getting high(Refrigerator). These functions are operating oppositely when it is ON/OFF control or proportional control. But in this case PID time constant will be different due to PID time constant will be decided according to control system when it is PID control.

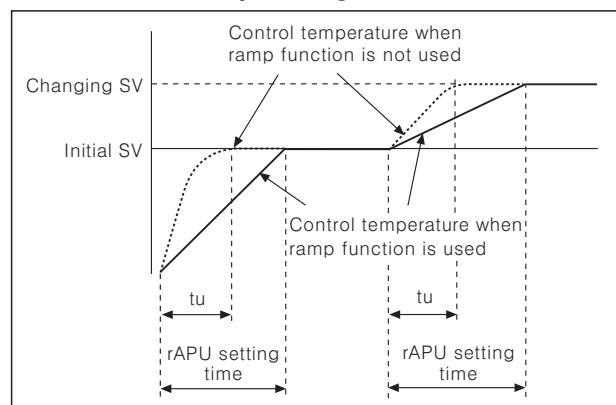
- Cool-function and heat-function can be set at "o-FL" mode in second setting group.
- Cool-function and heat-function must be set correctly according to the application, if set as opposite function, it may cause a fire. (If set cool-function at heater, even if temperature is getting high, it will be maintained ON and it may cause a fire.)
- Avoid changing heat-function to cool-function or cool-function to heat-function on the unit is operating.
- It is impossible to operate both functions at once in this unit. Therefore one function should be selected only.

■ Ramp function

Ramp function is to delay the rising time or falling time of temperature. If you change setting value at stable state of control, it forces to rise or fall the temperature of control system during setting time at rAPU, rAPd in first setting group. **If rAmP is not ON in second setting group, rAPu, rAPd will not be displayed in first setting group.**

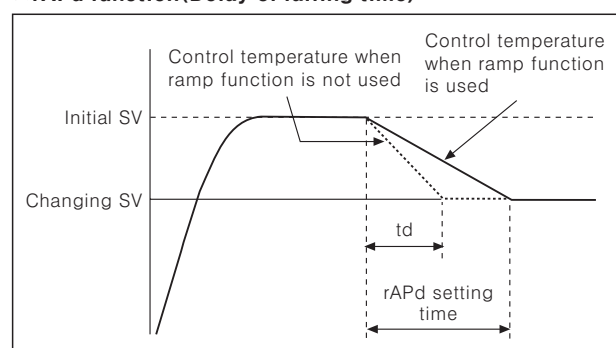
- Set rAmP is ON in second setting group for using Ramp function.
- Set the falling time and rising time in rAPU and rAPU mode of first setting group.
- Ramp function will be operating when changing the set value at stable control status or supply the power again after the power was removed.

※rAPU function(Delay of rising time)



It makes delay rising temperature when change the set value at stable control status or delay the initial rising temperature as like above picture. Note1)rAPu time cannot be set shorter than temperature rising time(tu), when Ramp function is not used.

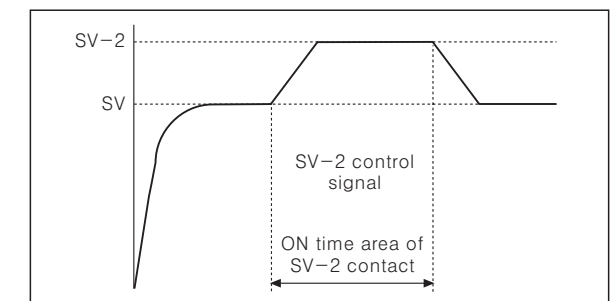
※rAPd function(Delay of falling time)



It controls falling temperature as above. Note1)rAPd time cannot be shorter than falling time(td) of not being ramp function operated.

■ SV-2 function

If using SV-2 function, it changes the temperature of control system to the second setting value by external relay contact signal. It can change the setting value as sequentially by relay contact without key operation.



- It can set SV-2 at required time and particular area as the above chart.
- SV-2 is in first setting group.
- Application : The control system, which has to maintain constant temperature such as oven application. If you open the door, temperature will go down. In this case if you set the second setting value higher than setting value, temperature will rise fast. Therefore, after installing a micro-switch in order to detect the door Open/Close and connect it to SV-2(the second setting value should be higher than SV) then it controls temperature of oven efficiently.

■ Input correction(In-b) function

Input revise is to correct deviation occurred from temperature sensor such as thermocouples, RTD, Analogue sensor etc. If you check the deviation of every thermo sensor precisely, it can measure temperature accurately.

- Input revise can be set at "First setting group".
- Use this mode after measuring deviation occurred from temperature sensor exactly. Because if measured deviation value is not corrected, displayed temperature may be too high or too low.
- Setting range of input revise is -49 to +50°C(-50.0 to +50.0°C).
- When you set the input revise value, you may need to record it, because it will be useful when performing maintenance.

■ Sub output(Event) function

Sub output can execute as main control output and sub function as well. There is one sub output in this unit.

- This sub output is relay "A" contact output.
- 1 or 2 sub mode can be selected among 7 kinds of alarm mode or LBA operated when the heater line is cut, SBA operated when the sensor line is cut.
- The sub output can be latched on or automatically reset depending on the alarm option mode selected.
- When the sensor line or the heater line is cut, SBA or LBA output turns on. This "output on" status must be reset by turning the power off.
- When using Alarm output it is able to change interval between ON and OFF within range of 1 to 100°C(0.1 to 100.0°C).
- Ex)When alarm set temperature is 200°C, the output turns on when PV increases from 100°C to 200°C. In the case, the output turns on at over 200°C, the output turns off at 198°C.
- [Above Ex] is that it set the interval between ON and OFF as 2°C.]
- Select function of Sub output in second setting group and set value of operation in first setting group.

■ Alarm output

This unit has output for control and sub(Alarm) output by option. (This alarm output is relay output and operates regardless to output for control.)

- Alarm output operates when the temperature of target is getting higher or lower than setting value.
- 1 alarm mode can be selected among 7 kinds of alarm mode at EV1, EV2 in the second setting group.
- Please note below "Operation chart for alarm output" & "Option of alarm output" regard to detailed operation and optional operation.

■ Operation chart for alarm output

RL-0	OFF	ON	No alarm output
RL-1	SV 100°C	PV 110°C	<ul style="list-style-type: none"> ■Deviation High-limit alarm If deviation between PV and SV is occurring higher than deviation temperature setting value, the output will be ON. The deviation temperature is set in AL 1 or AL 2 of first setting group.
RL-2	PV 90°C	SV 100°C	<ul style="list-style-type: none"> ■Deviation Low-limit alarm If deviation between PV and SV is occurring lower than deviation temperature setting value, the output will be ON. The deviation temperature is set in AL 1 or AL 2 of first setting group.
RL-3	PV 90°C	SV 100°C	<ul style="list-style-type: none"> ■Deviation High/Low-limit alarm If deviation between PV and SV is higher or lower than deviation temperature setting value, the output will be ON. The deviation temperature is set in AL 1 or AL 2 of first setting group.
RL-4	PV 90°C	SV 100°C	<ul style="list-style-type: none"> ■Deviation High/Low-limit reverse alarm. If deviation between PV and SV is higher or lower than deviation temperature setting value, the output will be OFF. The deviation temperature is set in AL 1 or AL 2 of first setting group.
RL-5	SV 100°C	PV 110°C	<ul style="list-style-type: none"> ■The absolute value High-limit alarm If PV is equal or higher than alarm temperature setting value, the output will be ON. The deviation temperature is set in AL 1 or AL 2 of first setting group.
RL-6	PV 90°C	SV 100°C	<ul style="list-style-type: none"> ■The absolute value Low-limit alarm If PV is equal or lower than alarm temperature setting value, the output will be ON. The alarm temperature is set in AL 1 or AL 2 of first setting group.

※"b" is interval between ON and OFF the setting range is 1 to 100°C(0.1 to 100.0°C) and can be set at "RHYS" mode in first setting group.

■ Alarm option setting

Symbol	Operation name	Function
RL-A	General alarm	No optional alarm output.
RL-b	Latch function	When alarm output turns on once, the output will be ON continuously.
RL-C	Standby sequency function	It doesn't output at first operation. (When it reaches to first object value)
RL-d	Latch & Standby sequency function	It operates latch & Standby sequence function together.

■ Loop break alarm(LBA)

LBA function is to diagnose an abnormal temperature of the control system. If the temperature of the control system is not changed within ±2°C during setting time of LBA, the LBA output will be ON.

Ex)When setting value(SV) is 300°C, processing value(PV) is 50°C, this unit controls 100%. In this time if there is no change of system temperature, it recognizes Heater is cut off then LBA output will be ON.

- LBA output can be selected at EV-1, EV-2 of the second setting group.
- If LBA output is not selected at event output, it will not be displayed.
- Setting range of LBA output is 1 to 999sec.
- If thermal response of the control system is slow, LBA value should be set to a high value.
- LBA output only operates when the manipulated value of the controller is 0% and 100% so, LBA cannot be used when it is Current output.
- In case the LBA output is ON, please check the following :
 - ①Short-circuit or cutting of the temp. sensor.
 - ②Abnormal condition of the equipment(Conductor, sub-relay, etc.)
 - ③Abnormal condition of the load(Heater, cooler)
 - ④Wrong-wiring or cutting of the other cables.
- Once LBA is ON due to broken sensor, it will not output. Although connect sensor again. In this case, turn off the power then turn on again.
- The output of LBA function is EV-1 and EV-2 output.
- If you use LBA function, SBA and alarm operation function cannot be used.

■ Sensor break alarm(SBA)

This function causes the sub output to turn on when the sensor line is cut or open. It can easily check that the sensor line is cut or not by operating a buzzer using the relay contact.

- Set SBA mode at EV-1 or EV-2 mode in second setting group.
- If intend to use SBA function, LBA and alarm operation function cannot be used.
- The output of SBA function is EV 1 and EV 2 output.

■ Error display

If error is occurred while the controller is operating, it will be displayed as follow.

- "LLLL" is flickering when measured input temperature is lower than input range of the sensor.
- "HHHH" is flickering when measured input temperature is higher than input range of the sensor.
- "oPEn" is flickering when the input sensor is not connected or its wire is cut.

Flow chart for second setting group

MD + Key If press MD & Key for 3sec. at once in RUN state, it will go to second setting group.

Temp. Sensor mode	Event 1	Event 2	Alarm mode	Auto-tuning	PID control mode	Heating & Cooling mode	Unit mode	Scale (High-limit)	Scale (Low-limit)	Decimal point	Retransmission output (High-limit)	Retransmission output (Low-limit)	Ramp function	Set communi-cation speed	Set communi-cation address	Lock mode	Temp. Sensor mode
In-t	EU-1	EU-2	AL-t	AL-t	PI d t	o-F t	Uni t	H-SC	L-SC	dot	FS-H	FS-L	rAP	bPS	AdrS	LoC	In-t
ECRH	LbA	LbA	AL-A	tun1	PI dS	HEAt	oC	1300	-100	0	1300	-100	oFF	2400	01	oFF	In-t
ECAL	SbA	SbA	AL-b	tun2	PI dF	CoOL	oF			0.0			on	4800		on	In-t
JICH	AL-0	AL-0	AL-C							0.00				9600			In-t
JICL	AL-1	AL-1	AL-d							0.000							In-t
JICL	AL-1	AL-1	AL-d							0.0000							In-t

In-t	Input sensor : Select from 19 kinds.	dot	Select decimal point position for Analog input.
EU-1	Event 1 : Select from 9 kinds.	FS-H	Set the high-limit scale value when retransmission output is applied. (20mA)
EU-2	Event 2 : Select from 9 kinds.	FS-L	Set the low-limit scale value when retransmission output is applied. (4mA)
AL-t	Alarm output : Select from 4 kinds.	rAP	Able to set ON and OFF of Ramp function.
AL-t	Auto-tuning : Selectable tun1 or tun2.	bPS	Set communication speed
PI d t	PID : Selectable PIDF or PIDS.	AdrS	Set communication address
o-F t	Selectable heat-function or cool-function.	LoC	The data cannot be changed when the lock key is ON.
Uni t	Temperature unit: °C or °F		
H-SC	Set high-limit scale value (Include analog output)		
L-SC	Set low-limit scale value (Include analog output)		

*It will start to flicker by pressing << key then select each mode by >, < keys.
 After that if press MD key, the DATA will be changed then display next mode.
 *The setting will be completed by pressing MD key for 3 sec. then it will return to RUN mode.
 *If no key touched for 60sec. in each mode, it will return to RUN mode automatically.
 *"(★)" might not be displayed according to the selection of input Sensor/Voltage/Current S/W.
 *"(Note)" might not be displayed according to the selection of option.

Flow chart for first setting group

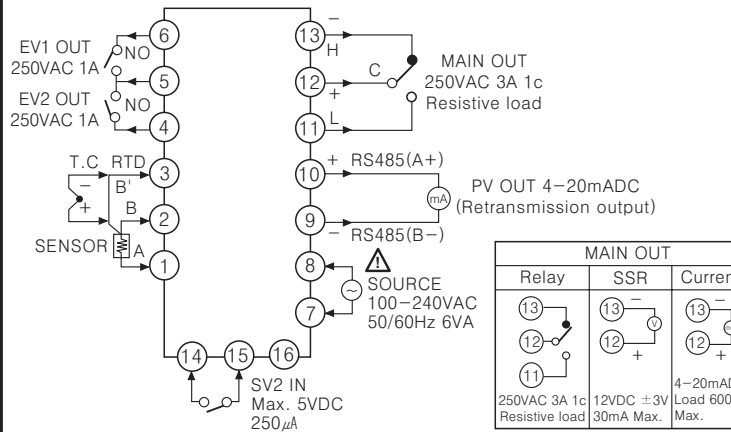
MD Key If press MD key for 3sec. This mode changes to second flow chart.

SU-2	SV-2 setting	0	Set SV-2 value within input range for each sensor.
AL1	Event 1	0	Set temperature of alarm output which is selected at EV-1. Setting range is within input range for each sensor type.
AL2	Event 2	0	Set temperature of alarm output which is selected at EV-2. Setting range is within input range for each sensor type.
LbA	Loop break alarm	999	Set LBA time(0 to 999sec.)
AHYS	Alarm hysteresis	2	Set Interval between ON and OFF for alarm output from 1 to 100°C (Decimal type : 0.1 to 100.0°C)
P	Proportional band	3.0	Set Proportional band from 0.0 to 100.0%. If setting P value as 0.0, it will be ON/OFF control.
I	Integral time	0	Set integral time from 0 to 3600 sec. If setting I value as 0 sec. This function will be OFF.
d	Derivative time	0	Set Derivative time from 0 to 3600 sec. If setting D value as 0 sec. This function will be OFF.
t	Control period	20	Set proportional control cycle from 1 to 120 sec. In case of SSR output, this value should be small. (Ex : 2sec.)
HYS	Hysteresis	2	Set Hysteresis from 1 to 100°C (Decimal type : 0.1 to 100.0°C), When the ON/OFF control function used.
In-b	Input correction	0	Correct the error in input sensor from -49 to +50°C (Decimal type : -50.0 to 50.0°C)
rEst	Manual reset	0.0	Set Manual reset value from 0.0 to 100.0%. This is for P control only, not for PID.
rAPU	RAMP rising	0	Set Ramp rising-time from 1 to 99 min. When Ramp function is selected only.
rAPd	RAMP falling	0	Set Ramp falling-time from 1 to 99 min. When Ramp function is selected only.
LoC	Key lock	oFF	This function is for locking the operation of setting value and front AT key.
		on	Setting ON, each data can not be changed.
		on1	When setting ON1 it is not able to change setting value of first setting group and operate AT Key.

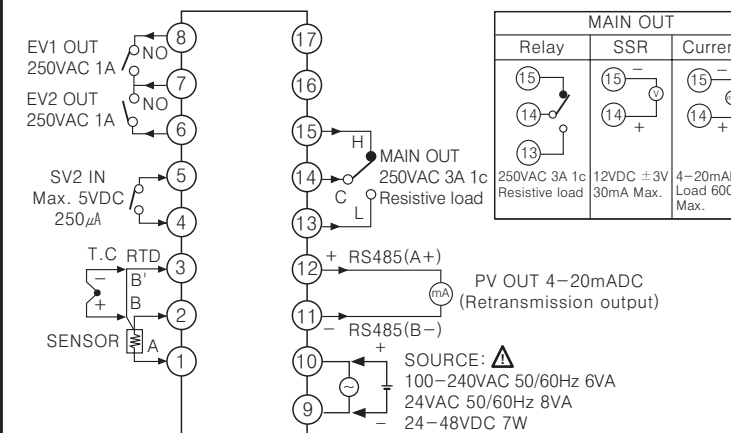
*It will start to flicker by pressing << key and the flicker will be moved by <, > keys then set the value by >, < keys. After that if pressing MD key the DATA will be changed then display next mode.
 *It returns to RUN status in case of pressing MD key for 3sec. after setting all mode to change.
 *If no key touched for 60sec., it will return to RUN mode automatically.
 *If not to set related mode in second setting group, AL1, AL2, LbA, AHYS, I, d, t, HYS, rAPU, rAPd mode will disappear.

Connections

TZ4M



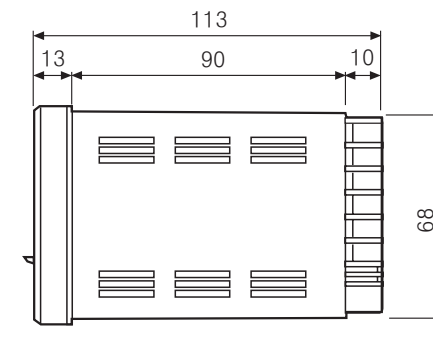
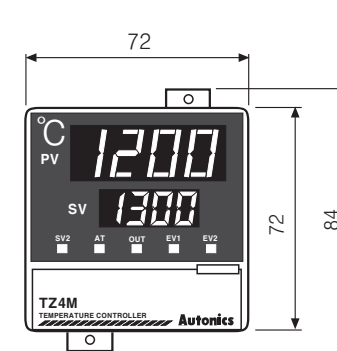
TZ4L



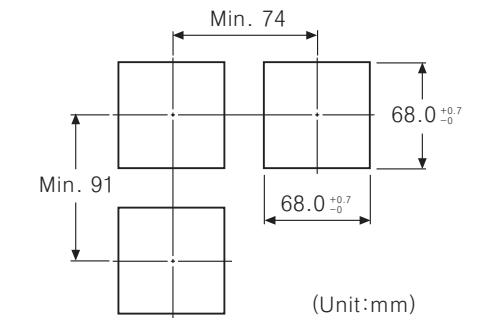
*Before connecting the power, please see the "Ordering information" of power supply categories by all means.

Dimensions

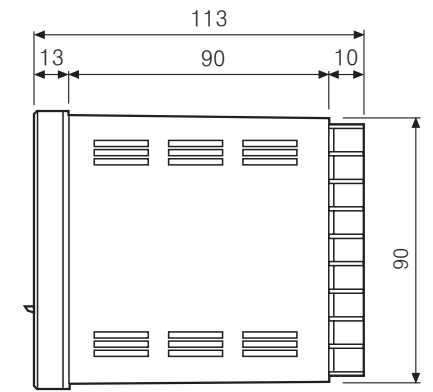
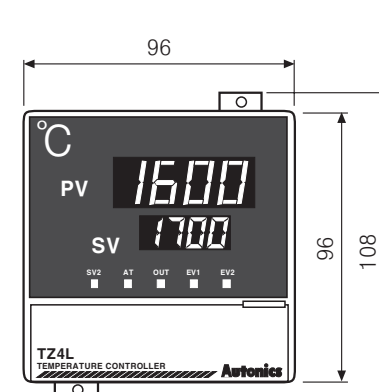
TZ4M



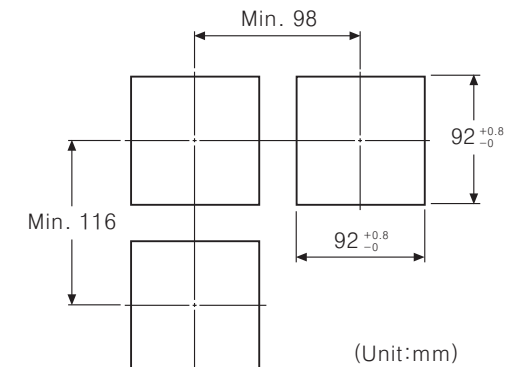
Panel cut-out



TZ4L



Panel cut-out



Factory defaults

Second setting group

Mode	Set value	Mode	Set value
In-t	PCRH	PI dt	PI dS
EU-1	AL-1	o-Flt	HEAt
EU-2	AL-2	Unit	°C
AL-t	AL-A	H-SC	1300
At-t	tun1	L-SC	-100
rARP	oFF	LoC	oFF

First setting group

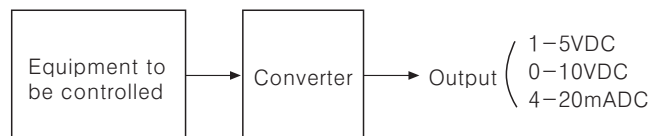
Mode	Set value	Mode	Set value
SU-2	0	t	20
AL1	10	HYS	2
AL2	10	In-b	0
LbA	600	rEst	0.0
AHYS	2	rAPU	10
P	3.0	rAPd	10
I	0	LoC	oFF
d	0		

Applications

Food	Packaging machinery, Banding machinery
Plastic	Plastic machinery, Film making system, etc.
Industry	Electric furnace, Auto soldering machine, Drying machine, etc.
Textile	Body press, Sizing machine

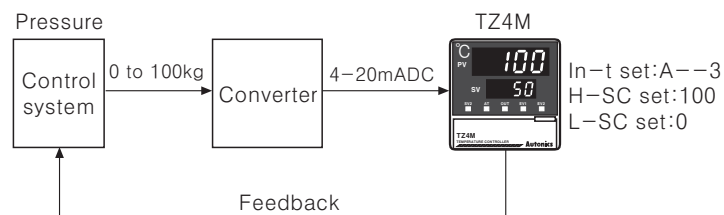
Analog input

In case of measuring or controlling humidity & pressure, flux, etc. it uses the proper converter which is converting the measuring value to 4-20mADC or 1-5VDC or 0-10VDC.



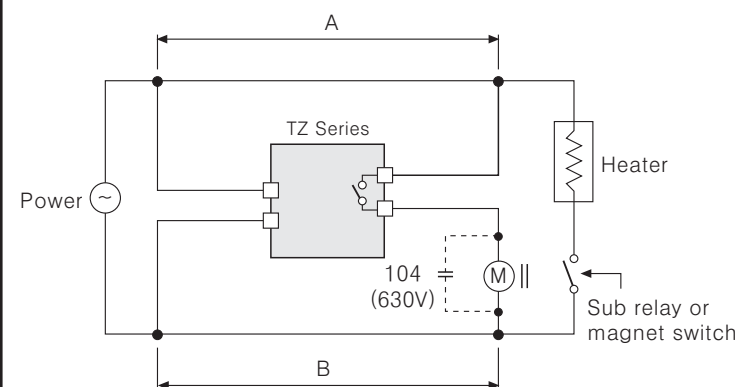
- This unit has the mode for the converter built-in. Please select A--1(0-10VDC) or A--2(1-5VDC) or A--3(4-20mADC) in selection mode of input in second setting group.
- Set the input value by H-SC and L-SC mode.
- The other operation function after doing that is same as controlling the temperature.

Applications



*In case of using the converter mode, please select the inner switching pin according to the chart in "Selection switch for Input sensor/Voltage/Current".

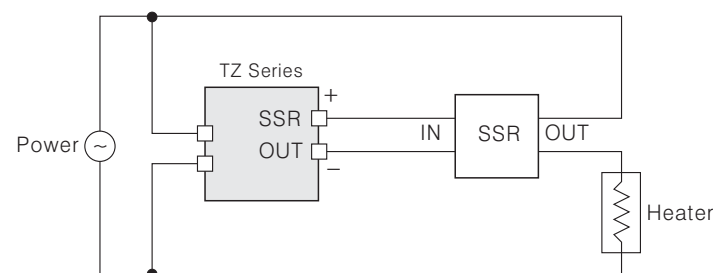
Application of relay output type



Caution for wiring.

- Keep power relay as far away as possible from TZ series. If wires length of A or B part is short, electromotive force occurred from a coil of magnet switch & power relay may flow in power line of the unit, it may cause malfunction.
- If wires length of A or B part is short, please connect a condenser 104(630V) across coil "M" of the power relay to protect electromotive force.

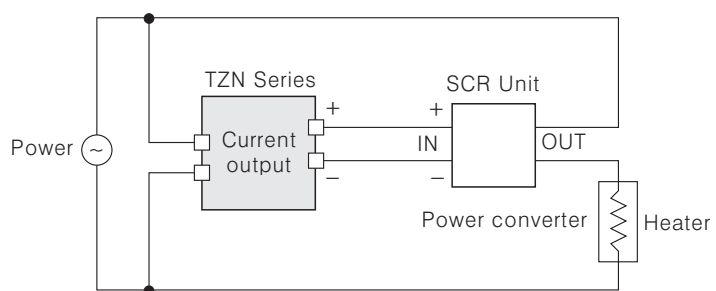
Application of SSR output type



Caution for using SSR

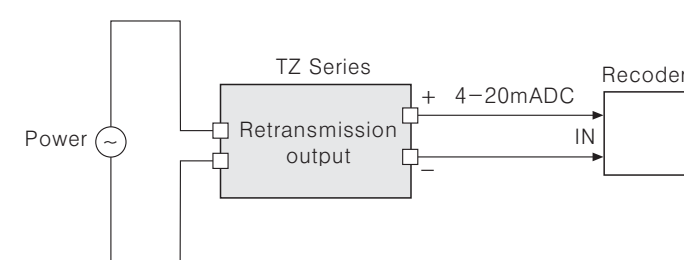
- SSR should be selected by the capacity of load, otherwise, it may short-circuit and result in a fire.
- Indirect heated should be used with SSR for efficient working.

Application of current output (4 to 20mADC)

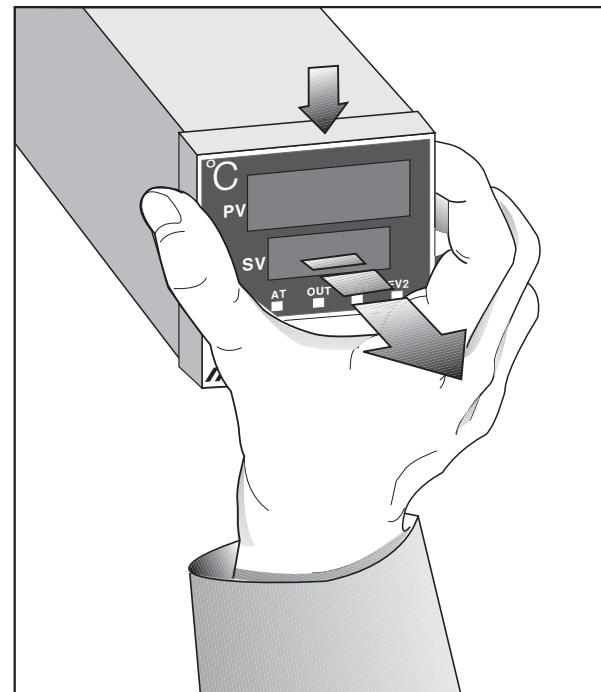


- It is important to select SCR unit after checking the capacity of the load.
- If the capacity is exceeded, it may cause a fire.

Application of Retransmission output (4 to 20mADC)



Case detachment



*How to take out the inner body from the case : Pull the front panel guide to forward on pushing it to down direction.

Simple "error" diagnosis

1. When it displays "Open" during operation.

This is a warning that external sensor is cut off.

Please turn off power and check the state of sensor.

If sensor is not cut off, disconnect sensor line from terminal block and +, - together.

When you turn on power it can check room temperature.

If this unit cannot indicate room temperature, this unit itself is faulty. Please remove this unit from equipment and service or replace.

[When input mode is sensor input mode(thermocouple) only, it can indicate room temperature.]

2. In case of not operating the output(the heater).

Please check operation of the Out lamp located in front panel of the unit.

If lamp does not operate, please check the parameter of all programmed mode.

If lamp is operating, please check the output(relay, operating voltage for SSR, current output) after separating output line from the unit.

3. In case of indicating "Err0" in display.

This Error message is indicated in case of damaging inner chip program data by outer strong noise.

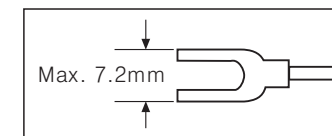
In this case, please send the unit to our after service center after removing the unit from system.

Noise protection is designed in this unit, but it does not stand up strong noise continuously.

If bigger noise than specified(Max. 2kV) flows in the unit, it can be damaged.

Caution for using

- Installation environment
 - It shall be used indoor
 - Altitude Max. 2000m
 - Pollution Degree 2
 - Installation Category II.
- Please use the terminal(M3.5, Max. 7.2mm) when connect the AC power source.



- Please use separated line from high voltage line or power line in order to avoid inductive noise.
- Please install power switch or circuit-breaker in order to cut power supply off.
- The switch or circuit-breaker should be installed near by users.
- Do not use this product as Volt-meter or Ampere-meter, this is a temperature controller.
- Be sure to use compensating wire when extending wire from controller to thermocouple, otherwise a temperature deviation will occur at the point where wires are connected to each other.
- In case of using RTD sensor, 3wires type must be used. If you need to extend the line, 3wires must be used with the same resistance as the line.

It might cause the deviation of temperature if the resistance of line is different.

- In case of making power line and input signal line close, line filter for noise protection should be installed at power line and input signal line should be shielded.

- Keep away from the high frequency instruments. (High frequency welding machine & sewing machine, big capacitive SCR controller)

- If you want to change the input sensor, reset switches (SW1, SW2) according to each input specification after power off. Turn on power and then set sensor mode by front keys at second flow chart.

- In case of changing input sensor, after change it according to SW1, SW2 inside of the unit, select changed sensor with key operation when power on.

- Do not connect power line to terminals of TZ4M No. 1, 2, 3, 4, 5, 6(Terminal No. 1, 2, 3 : Sensor connection, Terminal No. 4, 5, 6 : EV-1, EV-2) and TZ4L No. 1, 2, 3, 6, 7, 8(Terminal No. 1, 2, 3 : Sensor connection, Terminal No. 6, 7, 8 : EV1, EV2)

*It may cause malfunction if above instructions are not followed.

Main products

- COUNTER
- TIMER
- TEMPERATURE CONTROLLER
- PANEL METER
- TACHO/LINE SPEED/ PULSE METER
- DISPLAY UNIT
- PROXIMITY SENSOR
- PHOTOELECTRIC SENSOR
- FIBER OPTIC SENSOR
- PRESSURE SENSOR
- ROTARY ENCODER
- SENSOR CONTROLLER
- POWER CONTROLLER
- STEPPING MOTOR & DRIVER & CONTROLLER
- LASER MARKING SYSTEM (CO₂, Nd:YAG)

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