

DIN size W48 × H48mm Dual PID Auto tuning controller

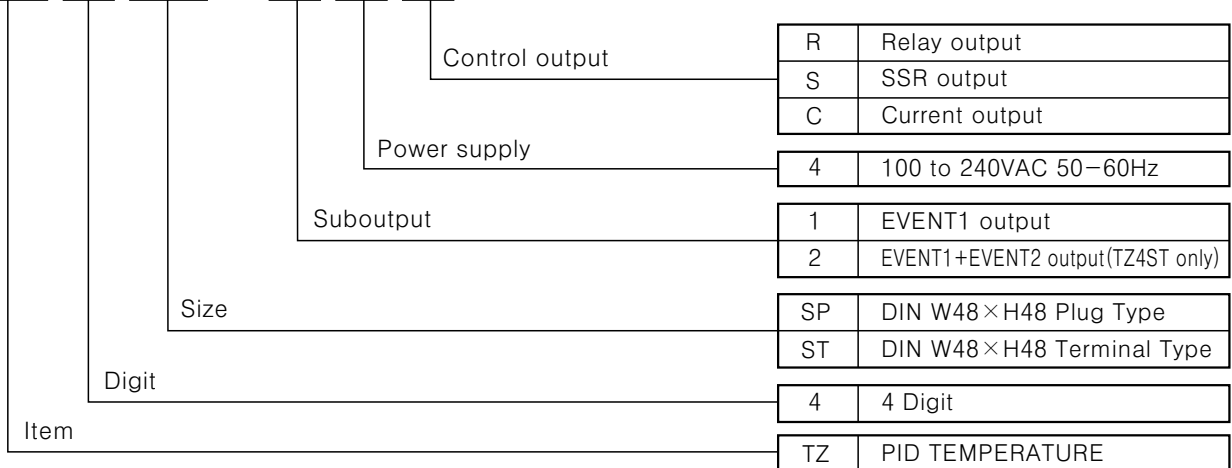
■ Features

- Multi-input type selectable 15 kinds of input modes.
- Diverse output for Relay output, SSR output, Current output(4 to 20mA), Sub-output(EVENT1, EVENT2)
 - ※ Each EVENT1, EVENT2 can select one mode among 7 kinds of alarm modes & LBA, SBA
 - ※ TZ4SP has EVENT1 only.
- Free power voltage. 100 to 240VAC 50–60Hz, 100 to 240VDC
- Dual PID function selectable fast response PID action(PIDF) or slow response PID action(PIDS).
 - ※ PIDS mode is to minimize overshoot.
- Indicating accuracy of ±0.3%(F.S)



■ Ordering information

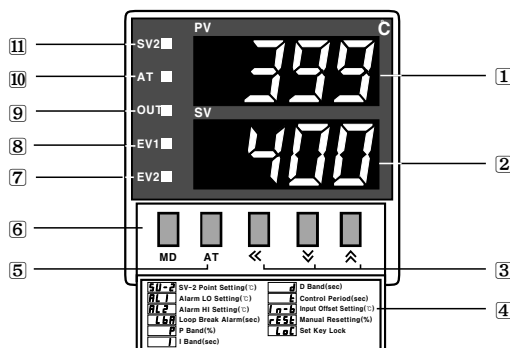
TZ 4 ST - 1 4 R



※ There is no EVENT2 output in TZ4SP(Plug Type)

※ Retransmission output is not applied in TZ4SP(Plug Type), TZ4ST(Terminal Type)

■ Part name



- 1 PV: Processing value indicator(Red color)
- 2 SV: Setting value indicator(Green color)
- 3 << : Key shifting the display.
 ↕ : Up/Down key.
- 4 Information for operation mode.
- 5 AT Key: The mode key to execute Auto tuning function.
- 6 MD Key: The mode key to change the items to be set, such as alarm value, etc.
- 7 EV2: EVENT2 Output signal lamp.
- 8 EV1: EVENT1 Output signal lamp.
- 9 OUT: Output signal lamp.
- 10 AT: Flashing signal lamp while Auto tuning is being executed.
- 11 SV2: Signal lamp for SV2 operation.

※ PRODUCT: TZ4SP/T(W48 × H48mm)

※ There is no EVENT2 output in TZ4SP(Plug Type)

※ Retransmission output is not applied in TZ4SP(Plug Type), TZ4ST(Terminal Type)

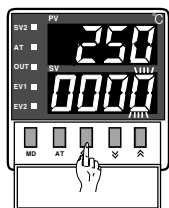
TZ SERIES

Rating

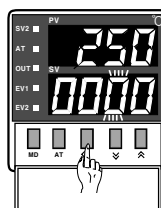
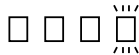
Model	TZ4SP	TZ4ST
Power supply	100 to 240VAC 50–60Hz	
Operating voltage range	90 to 110% of rated voltage	
Power consumption	About 5VA	
Display method	7Segment LED display 【processing value(PV):red color, setting value(SV):green color】	
Input sensor	Thermocouple:K(CA), J(IC), R(PR), E(CR), T(CC), S(PP), N(NN), W(TT)(tolerance outer resistive is 100Ω)	
	RTD:DIN Pt100Ω, JIS Pt100Ω, (3 wires type, tolerance of outer resistive is 5Ω per a wire)	
Control method	Voltage:1 to 5VDC, 0 to 10VDC, Current:DC4 to 20mA	
	ON/OFF Control(Hysteresis:1 to 100°C adjustable)	
Control output	P, PI, PD, PIDF, PIDS	
	Relay output:250VAC 3A SPDT(1c)	
	SSR output:12VDC ±2V 30mA Max.	
Retransmission output	Current output:DC4 to 20mA(load : Max. 600Ω)	
Sub output	PV value : DC4 to 20mA(load : Max. 600Ω)	
Sub output	EVENT1 output:Relay output 250VAC 1A SPST(1a)	EVENT1,2 output:Relay output 250VAC 1A SPST(1a)
Indicating accuracy	±0.3% based on SV or 3°C Max.	
Setting accuracy	Setting by front push buttons	
Hysteresis	Adjustable 1 to 100(0.1 to 100.0) °C at ON / OFF control action	
Proportional band(P)	0 to 100%	
Integral time(I)	0 to 3600sec.	
Derivative time(D)	0 to 3600sec.	
	1 to 120sec.	
Sampling time	0.5sec.	
LBA setting time	1 to 999sec.	
RAMP setting time	Ramp up, Ramp down at 1 to 99 minute	
Dielectric strength	2000VAC for 1min. Between power circuit and external sensor power.	
Mechanical durability	5 to 55Hz 0.5mm double amplitude at X, Y, Z directions for 2 hour	
Insulation resistance	Min. 100MΩ(500VDC)	
Noise	±2KV R Phase & S Phase 1μs	
Memory retention	10 years(by EEPROM)	
Ambient operating temperature	-10 to 50°C(at non-freezing status)	
Ambient storage temperature	-20 to 60°C(at non-freezing status)	
Ambient humidity	35 to 85% RH	
Weight	About 136g	

※The weight of above chart is net weight.

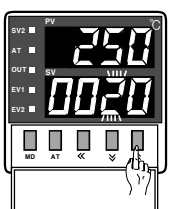
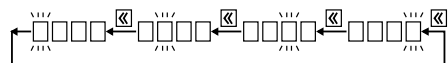
How to change the set value



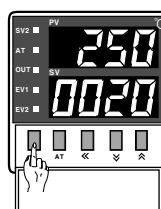
- ① In case of changing the set value at status of RUN, push "←" key. 10⁰digit of SV indicator will be flashed.



- ② Push "→" key, and then the digit will be shifted step by step.



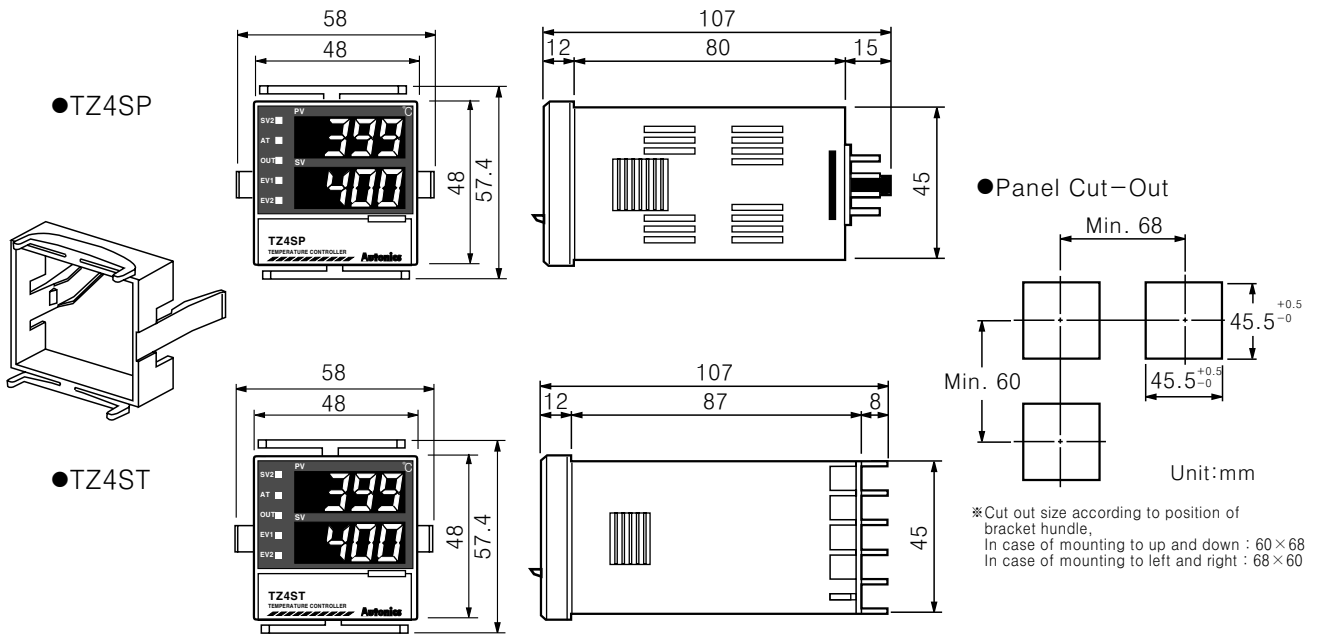
- ③ Push "↓" or "↑" at the flashing digit, and then change the set value.



- ④ Push MD key after setting the set value to be changed and then flashing of the digit stops and the reset value is applied at status of RUN.

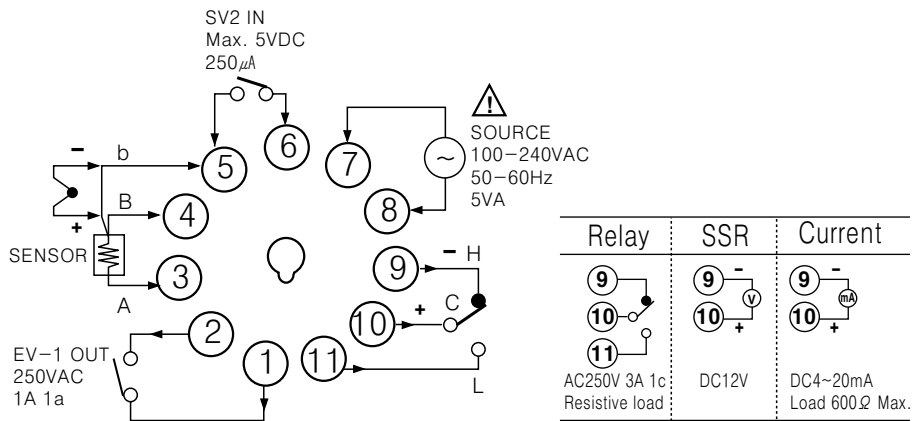
DUAL PID AUTO TUNING TYPE

Dimension

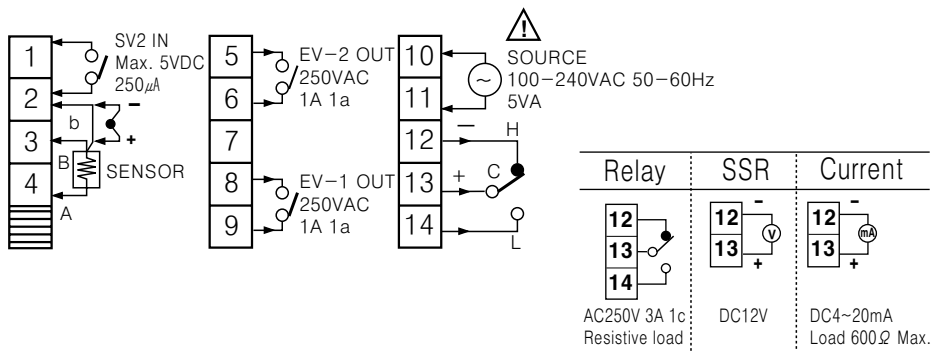


Connection

●TZ4SP



●TZ4ST



DIN size W48 × H48mm Dual PID Auto tuning controller

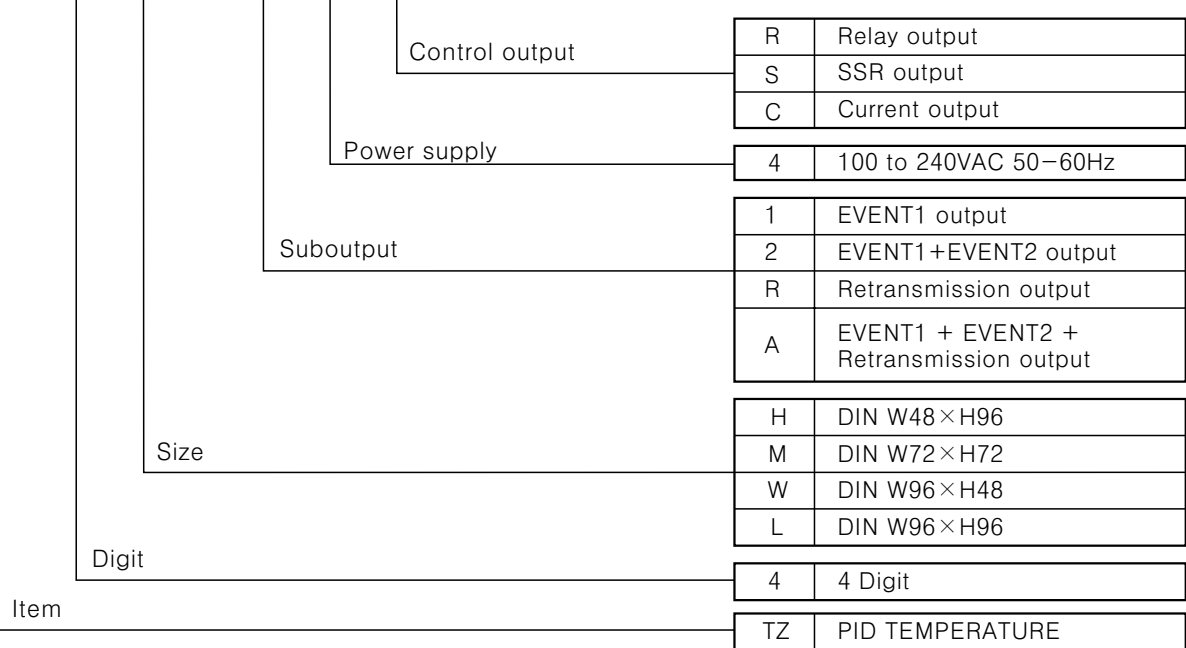
■ Features

- Multi-input type selectable 15 kinds of input modes.
- Diverse output for Relay output, SSR output, Current output(4 to 20mA), Sub-output(EVENT1, EVENT2)
 - ※ Each EVENT1, EVENT2 can select one mode among 7 kinds of alarm modes & LBA, SBA
 - ※ TZ4SP has EVENT1 only.
- Free power voltage. 100 to 240VAC 50-60Hz, 100 to 240VDC
- Dual PID function selectable fast response PID action(PIDF) or slow response PID action(PIDS).
 - ※ PIDS mode is to minimize overshoot.
- Indicating accuracy of ±0.3%(F.S)

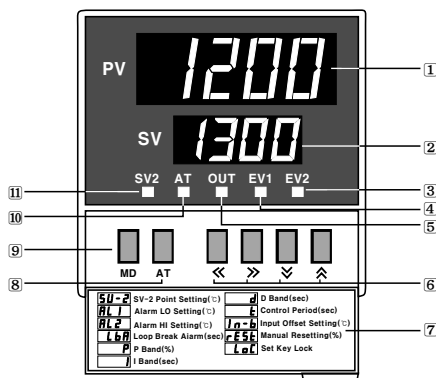


■ Ordering information

TZ 4 H - 1 4 R



■ Part name



- 1 PV: Processing value indicator (Red color)
- 2 SV: Setting value indicator (Green color)
- 3 EV2: EVENT2 Output signal lamp.
- 4 EV1: EVENT1 Output signal lamp.
- 5 OUT: Output signal lamp.
- 6 <> : Key shifting the display.
 ↕ : Up/Down key.
- 7 Information for operation mode.
- 8 AT Key: The mode key to execute Auto tuning function.
- 9 MD Key: The mode key to change the items to be set, such as alarm value, etc.
- 10 AT: Flashing signal lamp while Auto tuning is being executed.
- 11 SV2: Signal lamp for SV2 operation.

※ PRODUCT : TZ4M(W72×H72mm)

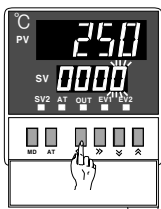
DUAL PID AUTO TUNING TYPE

Rating

Model	TZ4H	TZ4M	TZ4W	TZ4L
Power supply	100 to 240VAC 50–60Hz			
Operating voltage range	90 to 110% of rated voltage			
Power consumption	About 6VA			
Display method	7Segment LED display 【processing value(PV):red color, setting value(SV):green color】			
Input sensor	Thermocouple:K(CA), J(IC), R(PR), E(CR), T(CC), S(PP), N(NN), W(TT)(tolerance outer resistive is 100Ω)			
	RTD:DIN Pt100Ω, JIS Pt100Ω, (3 wires type, tolerance of outer resistive is 5Ω per a wire)			
	Voltage:1 to 5VDC, 0 to 10VDC, Current:DC4 to 20mA			
Control method	ON/OFF Control(Hysteresis:1 to 100℃ adjustable)			
	P, PI, PD, PIDF, PIDS			
Control output	Relay output:250VAC 3A SPDT(1c)			
	SSR output:12VDC ±2V 30mA Max.			
	Current output:DC4 to 20mA(load : Max. 600Ω)			
Retransmission output	PV value : DC4 to 20mA(load : Max. 600Ω)			
Sub output	EVENT1,2 output:Relay output 250VAC 1A SPST(1a)			
Indicating accuracy	±0.3% based on SV or 3℃ Max.			
Setting accuracy	Setting by front push buttons			
Hysteresis	Adjustable 1 to 100(0.1 to 100.0)℃ at ON / OFF control action			
Proportional band(P)	0 to 100%			
Integral time(I)	0 to 3600sec.			
Derivative time(D)	0 to 3600sec.			
	1 to 120sec.			
Sampling time	0.5sec.			
LBA setting time	1 to 999sec.			
RAMP setting time	Ramp up, Ramp down at 1 to 99 minute			
Dielectric strength	2000VAC for 1min. Between power circuit and external sensor power.			
Mechanical durability	5 to 55Hz 0.5mm double amplitude at X, Y, Z directions for 2 hour			
Insulation resistance	Min. 100MΩ (500VDC)			
Noise	±2KV R Phase & S Phase 1μs			
Memory retention	10 years(by EEPROM)			
Ambient operating temperature	–10 to 50℃ (at non–freezing status)			
Ambient storage temperature	–20 to 60℃ (at non–freezing status)			
Ambient humidity	35 to 85% RH			
Weight	About 259g	About 270g	About 270g	About 360g

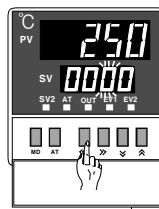
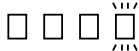
※The weight of above chart is net weight.

How to change the set value

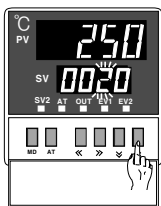
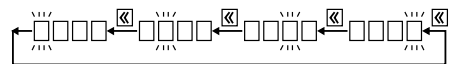


- 1 In case of changing the set value at status of RUN, push "◀" key.

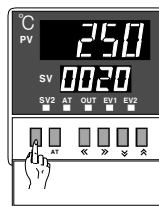
10⁰ digit of SV indicator will be flashed.



- 2 Push "◀" key, and then the digit will be shifted step by step.



- 3 Push "▲" or "▼" at the flashing digit, and then change the set value.

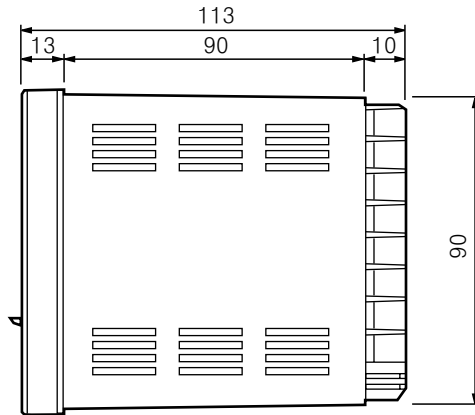
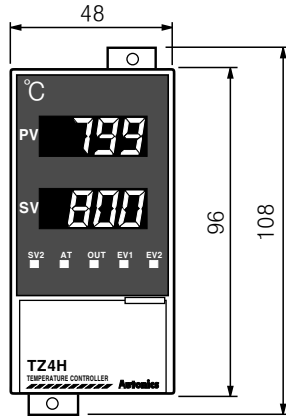


- 4 Push MD key after setting the set value to be changed and then flashing of the digit stops and the reset value is applied at status of RUN.

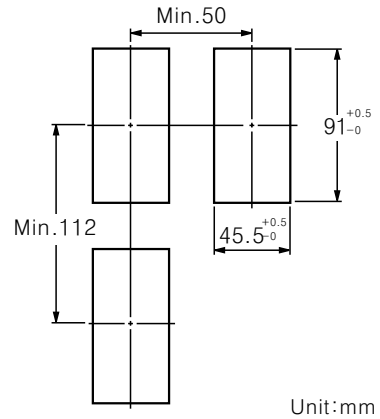
TZ SERIES

Dimension

●TZ4H

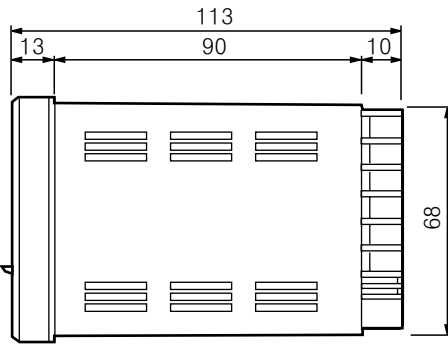
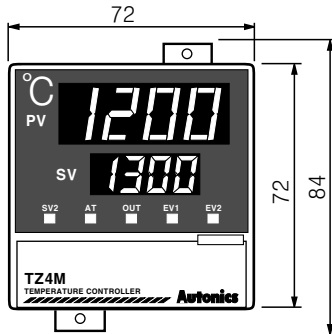


●Panel Cut-out

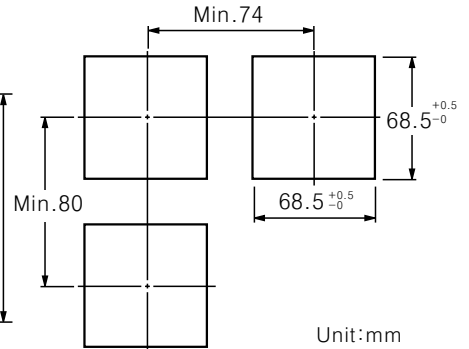


Unit:mm

●TZ4M

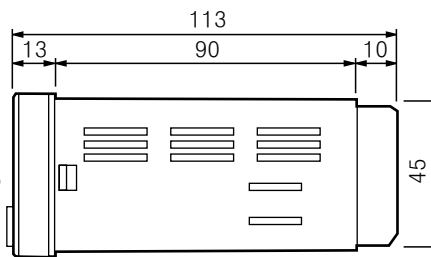
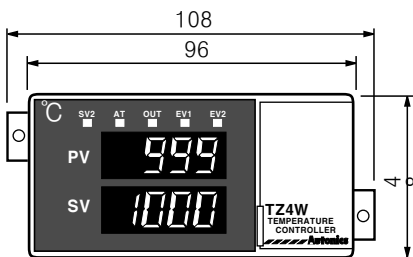


●Panel Cut-out

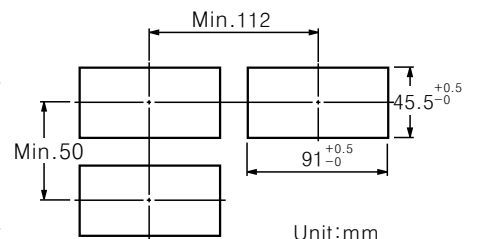


Unit:mm

●TZ4W

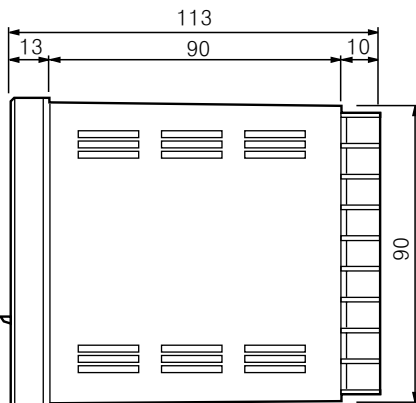
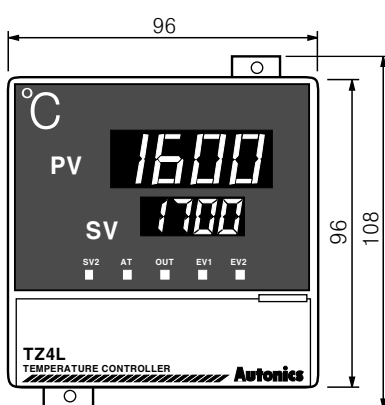


●Panel Cut-out

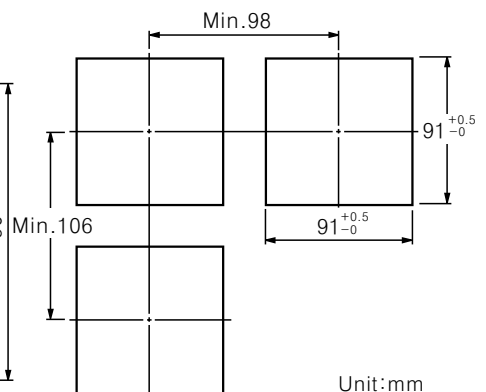


Unit:mm

●TZ4L



●Panel Cut-out

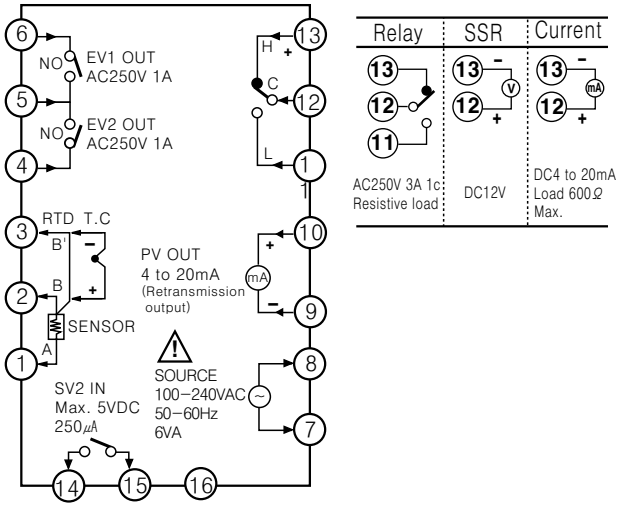


Unit:mm

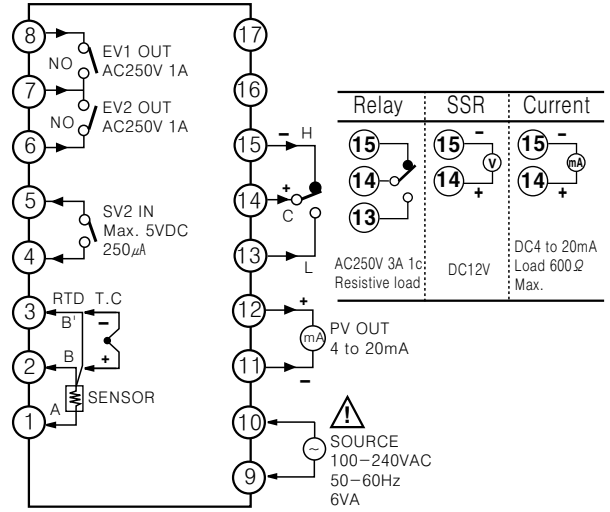
DUAL PID AUTO TUNING TYPE

Connections

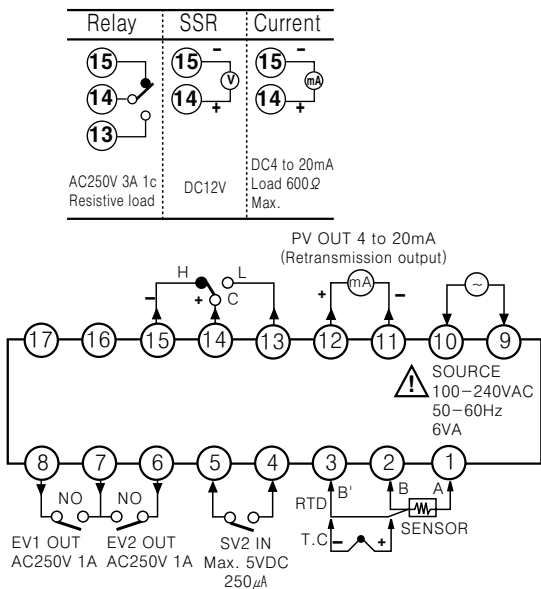
●TZ4M



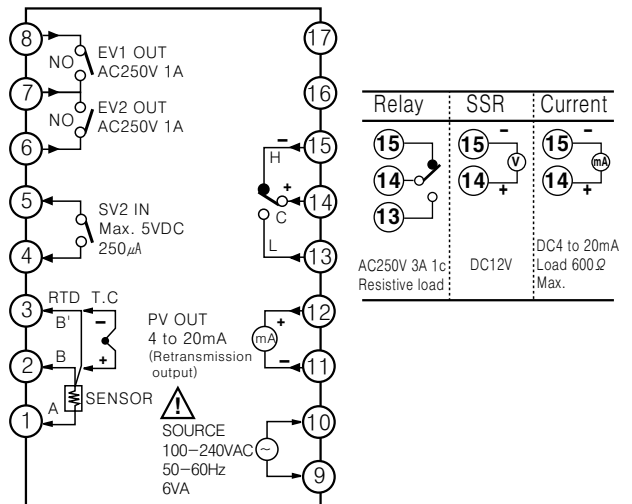
●TZ4H



●TZ4W

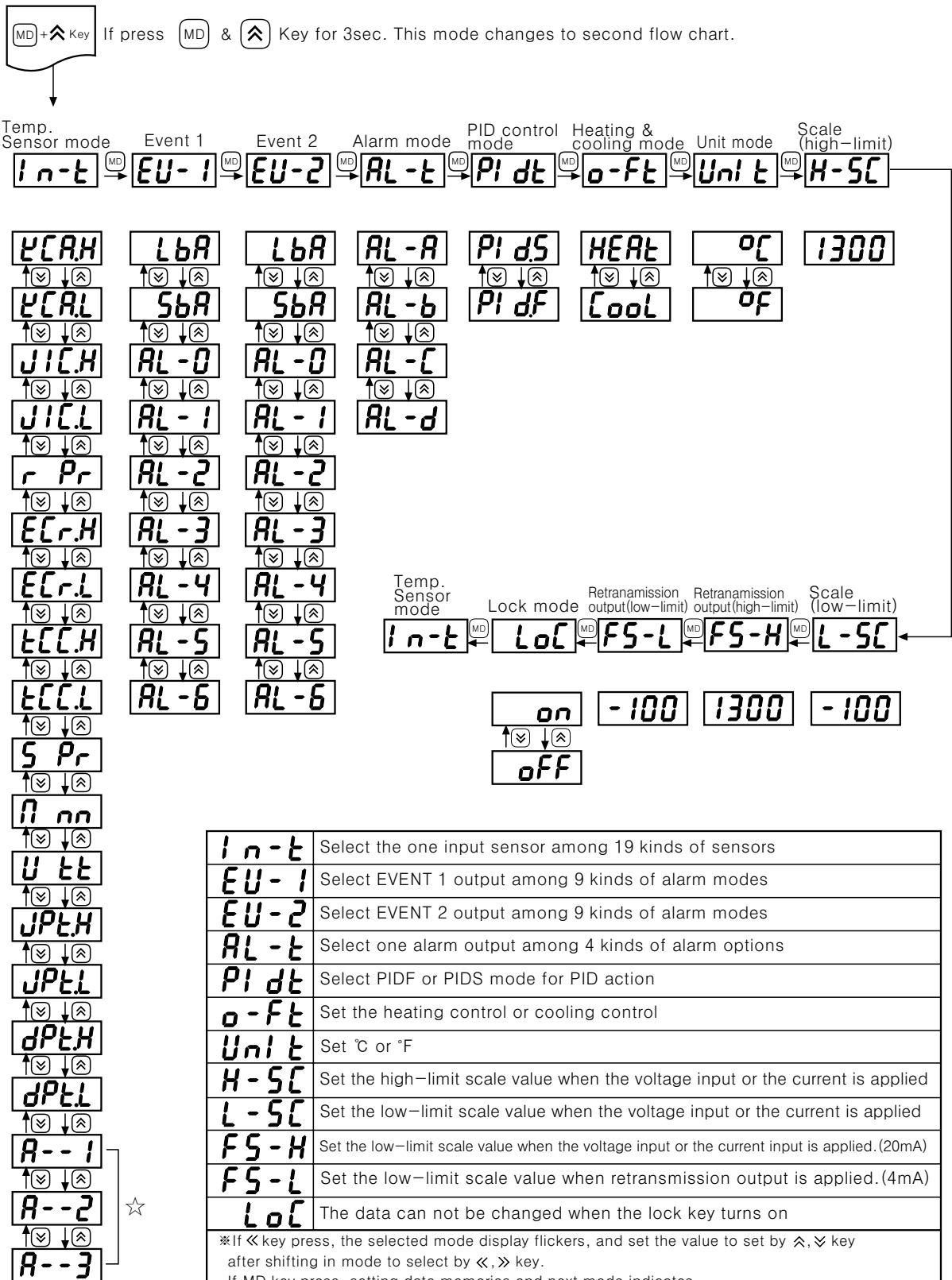


●TZ4L



TZ SERIES

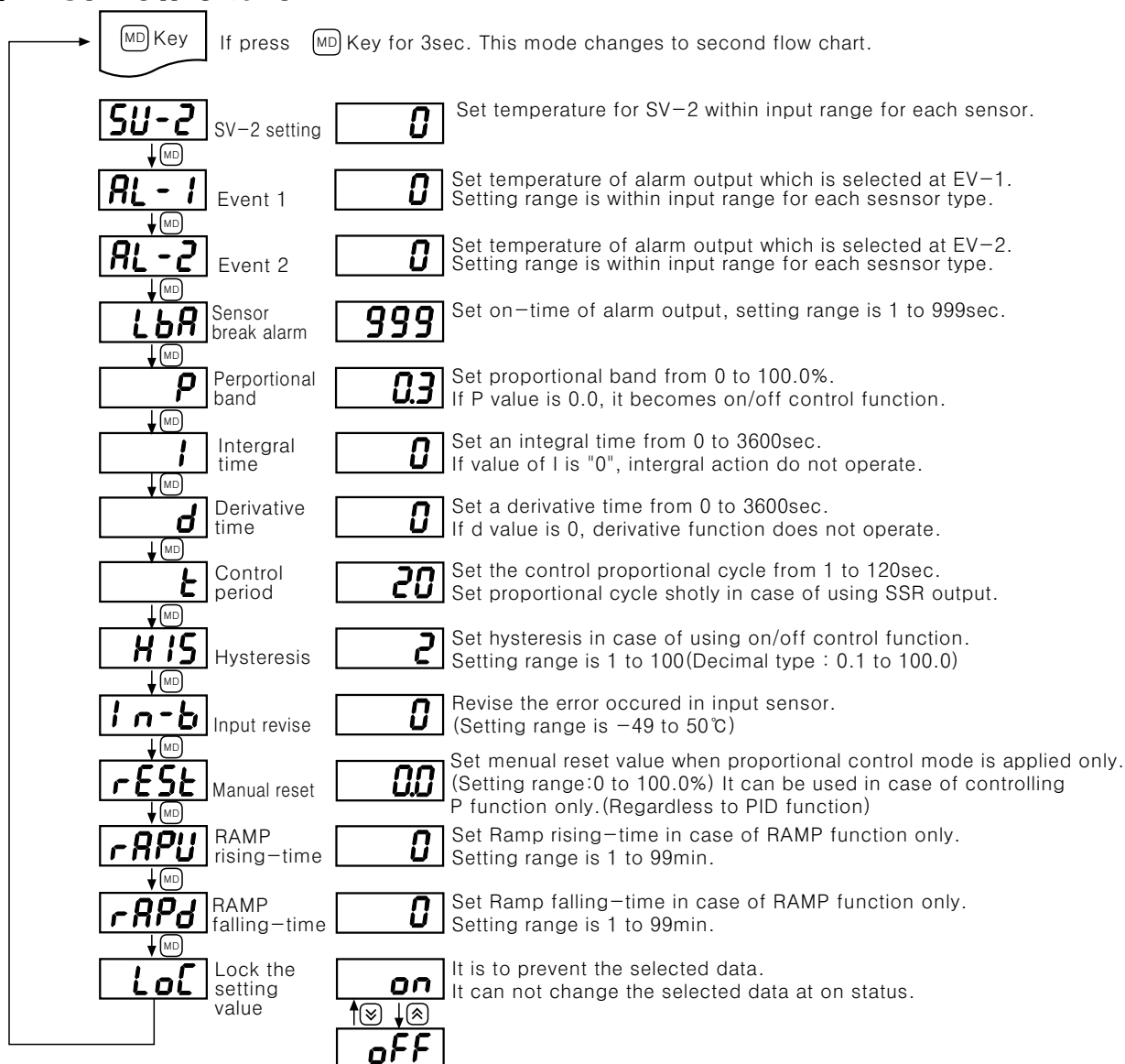
Second flow chart



1 n-t	Select the one input sensor among 19 kinds of sensors
EU-1	Select EVENT 1 output among 9 kinds of alarm modes
EU-2	Select EVENT 2 output among 9 kinds of alarm modes
AL-t	Select one alarm output among 4 kinds of alarm options
PI dt	Select PIDF or PIDS mode for PID action
o-ft	Set the heating control or cooling control
Unit	Set °C or °F
H-SC	Set the high-limit scale value when the voltage input or the current is applied
L-SC	Set the low-limit scale value when the voltage input or the current is applied
FS-H	Set the low-limit scale value when the voltage input or the current input is applied. (20mA)
FS-L	Set the low-limit scale value when retransmission output is applied. (4mA)
LoC	The data can not be changed when the lock key turns on
※ If « key press, the selected mode display flickers, and set the value to set by ⏴, ⏵ key after shifting in mode to select by ⏴, ⏵ key. If MD key press, setting data memories and next mode indicates.	
※ If it presses MD key for 3sec. after setting each modes to be set, it is returned to mode. ※ If any key is not pressed, it returns to RUN status automatically.	
※ If not to set input, alarm, retransmission output, these mode do not indicated in the window.	
※ If not to select the sensor by plug pin, modes of "☆" mark may not indicated.	

DUAL PID AUTO TUNING TYPE

First flow chart



How to shift the mode.

※If « key press, the selected mode display flickers, and set the value to set by » key after shifting in mode to select by «, » key.

If MD key press, setting data memories and next mode indicates.

※It returns to RUN status in case of press MD key for 3sec. After setting all mode to change.

※If any key is not pressed, it returns to RUN status automatically.

※If not to set related mode in second flow chart, EVENT1, EVENT2, LbA, I, d, t, HIS, RaPu, rAPu, rAPd do not indicated in the window.

Fixed specification before it makes a shipment

Second flow

Mode	Setting mode	Mode	Setting mode
In-t	2CAH	Unit	°C
EU-1	AL-1	H-SC	1300
EU-2	AL-2	L-SC	-100
AL-t	AL-A	FS-H	1300
PI dt	PI dS	FS-L	-100
o-ft	HEAt	LoC	off

First flow

Mode	Setting mode	Mode	Setting mode
SU-2	0	t	20
AL-1	0	HIS	2
AL-2	0	In-t	0
LbA	600	rEst	00
P	3.0	rAPU	0
I	0	rAPd	0
d	0	LoC	off

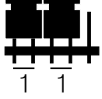

Input range for the range

Input sensor	Display	Selectable temperature range °C	Selectable temperature range °F
K(CA)H	<i>ƷCAH</i>	-100~1300°C	-148~2372°F
K(CA)L	<i>ƷCAL</i>	-100.0~999.9°C	
J(IC)H	<i>JICH</i>	0~800°C	32~1472°F
J(IC)L	<i>JICL</i>	0.0~800.0°C	
R(PR)	<i>rPr</i>	0~1700°C	32~3092°F
E(CR)H	<i>ƷCrH</i>	0~800°C	32~1472°F
E(CR)L	<i>ƷCrL</i>	0.0~800.0°C	
T(CC)H	<i>ƷCCH</i>	-200~400°C	-328~752°F
T(CC)L	<i>ƷCCL</i>	-199.9~400.0°C	
S(PR)	<i>SPr</i>	0~1700°C	32~3092°F
N(NN)	<i>n nn</i>	0~1300°C	32~2372°F
W(TT)	<i>U ƷƷ</i>	0~2300°C	32~4172°F
JPtH	<i>JPEH</i>	0~500°C	32~932°F
JPtL	<i>JPEL</i>	-199.9~199.9°C	-199.9~363.0°F
DPtH	<i>dPEH</i>	0~500°C	32~932°F
DPtL	<i>dPEL</i>	-199.9~199.9°C	-199.9~363.0°F
DC0~10V	<i>A - - 1</i>	-1999~9999°C	-1999~9999°F
DC1~5V	<i>A - - 2</i>	-1999~9999°C	-1999~9999°F
DC4~20mA	<i>A - - 3</i>	-1999~9999°C	-1999~9999°F

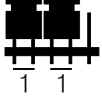

How to select the S/W for each input sensor

※ Please select the inner switch of the controller for each the temperature sensor as follow.

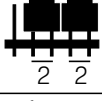

A) In case of thermocouples < K(CA), J(IC), R(PR), E(CR), T(CC), S(PP), N(NN), W(TT) >

S/W1  **S/W2**  S/W1: 1
S/W2: V

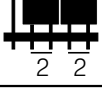

B) In case of RTD (DPtL, DPtH, JPtL, JPtH)

S/W1  **S/W2**  S/W1: 1
S/W2: V

C) In case of voltage input (1 to 5VDC, 0 to 10VDC)

S/W1  **S/W2**  S/W1: 2
S/W2: V

D) In case of current input (DC4 to 20mA)

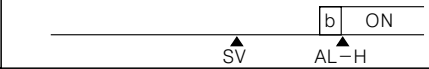


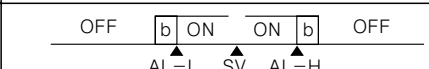


S/W1  **S/W2**  S/W1: 2
S/W2: mA

Alarm output

This unit provides 1 or 2 alarm output except the control output according to model. This alarm output is relay output and operates regardless to the control output.

- Alarm output operates when higher or lower temperature than alarm setting value.
- 1 alarm mode can be selected among 7 kinds of alarm mode in EV-1 and EV-2 indicated in second flow chart.
- Please note below "Operation chart for alarm output" & "Option of alarm output" regard to detailed operation and optional operation.

Operation chart for alarm output

AL-0		
AL-1		■ Deviation high-limit: Output turns on when deviation between PV value and SV value is accured higher than setting value of AL-H.
AL-2		■ Deviation low-limit: Output turns on when deviation between PV value and SV value is accured lower than setting value of AL-L.
AL-3		■ Deviation high/low-limit: Output turns on when deviation between PV value and SV value is accured higher than setting value of AL-H, AL-L.
AL-4		■ Reverse deviation high/low-limit: Output turns off when deviation between PV value and SV value is accured higher than setting value of AL-H, AL-L.
AL-5		■ The absolute value high-limit Output turns on when PV value is higher than value of AL-H or same value (PV □ AL-H)
AL-6		■ The absolute value low-limit Output turns on when PV value is lower than value of AL-L or same value (PV □ AL-L)

※ "b" means fixed 2°C as interval between on and off when alarm output is operating.

Option of alarm output

Mode	Action name	function
AL-A	General alarm	No optional alarm output.
AL-b	Latch function	When alarm output turns on once, its turn-on condition is latched.
AL-c	Standby sequency function	The alarm output is not turned on when PV value is reached at output condition first, it turns on when the PV value is deviated from output condition or when it is reached at the output condition again.
AL-d	Latch & Standby sequency function	It is applied latch & standby sequency function together.

DUAL PID AUTO TUNING TYPE

■ Auto tuning operation

PID Auto tuning function is automatically to measure thermal characteristics and response of the control object and then to execute its value under high response & stability after calculating the time constant of PID required to control optimum temperature.

- Execute the Auto tuning function at initial time after connecting the controller & the sensor.
- Execution of Auto tuning is started when it is press AT key for 3sec. more.
- While the Auto tuning function is executing, AT LED on the front panel flashes.when execution of auto tuning is finished, AT LED turns off.
- While the auto tuning function is executing, it is stopped as pressing AT key for 5sec. more.
- When the power turns off or the stop signal is applied while auto tuning function is executing, time constant of PID is not changed and is memorized the value before power turns off.
- Time constant of PID selected by Auto tuning function can be changed with certain time constant by manual reset according to explanation of first flow chart for the setting mode.
- Execute the Auto tuning function again periodically, because the thermal characteristics for the control object can be changed when the controller is used continuously during long time.

■ Sub output(EVENT) function

This unit provides 1 sub output basically in the unit except the control output or 2 sub output according to model.

- 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.
 - There are function holding on status and function returning automatically according to alarm option mode in case of selecting alarm mode.
 - When the sensor line or the heater line cut off, SBA or LBA output turns on. This "output on" status must be return as the power turns off.
 - Band width between on and off is fixed as 2°C in case of selecting alarm mode.
- Ex)When alarm set temperature is 200°C, the output turns on when PV reach from 1002°C to 200°C. In the case, the output turns on at over 200°C, the output turns off at over 198°C.(This width band can not change.)
- Sub output mode selects in second flow chart, setting value for sub output sets in first flow chart.

■ Sensor break alarm(SBA)

This function is that the sub output turns on when the sensor line cuts off in first or on using this unit.

It can easy check that the sensor line cuts off or not as operating the buzzer by outer a relay contact.

- Set SBA mode EVENT1 or EVENT2 mode in second flow chart.
- If SBA output turns on by problems of the sensor line, the output does not return even if sensor line is wired correctly, in this case, turns on the power again after turning off the power.

■ Loop break alarm(LAB)

LBA function is to diagnose an abnormal temperature of the control object. If the temperature of the control object is changed within $\pm 2^{\circ}\text{C}$ during setting time of LBA, the LBA output turns on.

- LBA output can be selected at EV-1, EV-2 of the second flow chart.
- If LBA output is not selected at event output, it can not applied in the controller.
- Setting range of LBA output is 1 to 999sec.
- If thermal response of the control object is slow, the setting value of LBA must be set with large value.
- LBA output turns on when the manipulated variable of the controller is 0% and 100%.
- In case the LBA output turns on, please take care as follow:
 - ①Short-circuit or cutting of the temp. sensor.
 - ②Abnormal condition of the equipment (conductor, sub-relay, etc.)
 - ③bnormal condition of the load(heating, cooling)
 - ④Wrong-wiring or cutting of the other cables.

■ Error indicator

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

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

■ ON/OFF control

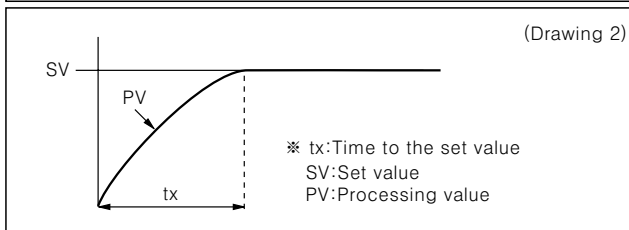
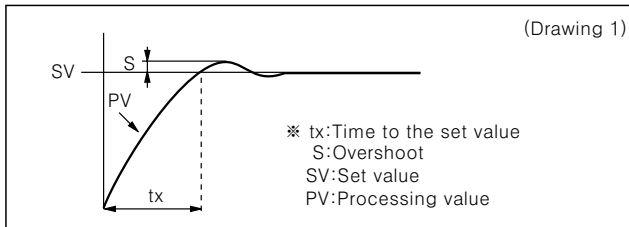
ON/OFF control action, called 2 position control is that the output turns on when PV falls lower than SV and the output turns off when PV reaches at SV.

- ON/OFF control operates as setting 0.0 value in P position of first flow chart.
- There is regular interval time between ON and OFF in ON/OFF control, if interval time is too short, the hunting(chartering) can be occurred by noise. Interval time can be set in HIS position of first flow chart. Setting range is 1 to 100(or 0.1 to 100.0)
- HIS indicates when value of P position in first flow chart is "0", HIS do not indicate when value of P position is not "0"
- This ON/OFF control can be applied in the equipment (Cooling compressor) to be controlled which error can occur by frequent ON/OFF action.
- Even if ON/OFF control is stable status, the hunting can be occurred by setting value in HIS or capacity of the heater or reponse characteristic of the equipment to be controlled or installing position of the sensor. Please consider above points to minimize the hunting when designs the system.

TZ SERIES

■ Dual PID control function

There are 2 kinds of PID actions at TZ series. The one is that PV is reached at SV as fast response speed, but a little of overshoot is occurred (Drawing 1), the other is that PV is reached at SV as slow response speed, but overshoot is minimized (Drawing 2).

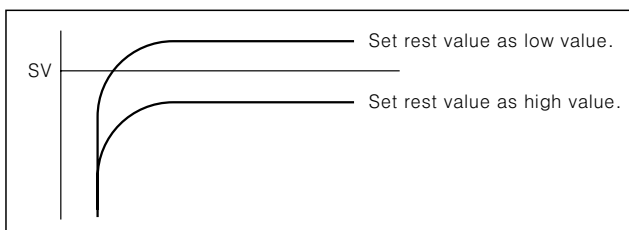


- TZ series has fast response PID action & slow response PID action, you can select PIDF & PIDS by front push buttons according to the application.
- PIDF & PIDS mode of dual PID action can be selected at the second flow chart for setting mode.
- PIDF (fast response PID action)
 - This mode is applied at the machines or systems which are required fast response speed, but allowable a little of overshoot.
 - ex) Machines which must be applied preliminary heat before it operates
 - ※ Injection machine, an electric furnace, etc.
- PIDS (Slow response PID action)
 - This mode is applied at the machine which overshoot must not be occurred, because the fire can be occurred by overshoot of the controller
 - ※ Plating machine to control temperature, oiling system to control temperature of oil, etc.
- TZ series is fixed as PIDF mode before making shipments.

■ Manual reset

Proportional control has offset because rising time is not same with falling time, even if the unit operates normally. Manual reset function is used at proportional control mode only.

- Manual reset function is used at proportional control mode only.
- Manual reset function operates in case of setting rEst.
- When PV and SV is same, proportional band is 50%, when PV is lower than SV, rEst% value sets over 50% value PV is larger than SV, rEst value sets under 50% value. 2).



■ Main control output

There are 3 kinds of main output in this such as relay output, SSR output, current (4 to 20mA), but this unit has one main output only. Therefore please select one main output in ordering information according to your application.

- Relay output rated 250VAC 3A is indicated as "R"
 - SSR output rated DC 12V \pm 2V is indicated "S", the load of over 30mA can not use.
 - Current output rated 4 to 20mA is indicated as "C", resistive load is 600 Ω .
- (Note) DC4 to 20mA current output is different from DC4 to 20mA retransmission output.
TZ4ST/SP series has no retransmission output.

■ Relay output

Relay output is to heat or cool temperature of the load continuously by turning on and off repeatedly by the unit's inner relay contact.

The load must be controlled by magnet switch, power relay, etc.

Operated by inner relay contact of the unit.

- Please use this unit within rated relay specification, because a cause of fire may occur by damage of the relay contact of the unit.
- Do not to flow a electromotive force occurred from a coil of magnet switch & power relay in the unit. Because the unit may malfunction or damage.
- Electrical and mechanical life cycle of inner relay is indicated in a manual. Please design the system after checking this life cycle.
If it set "t" time long in first flow chart, relay life cycle is extended, in case of setting "t" time shortly because of response characteristic of the heater, be sure to use SSR output.

■ Voltage pulse(SSR) output

This output is to control outer SSR (Solid state relay). If the relat life cycle is limited, but SSR life cycle is semi-permanent.

- SSR output is 12DCV, it can be use the load to Max. 30mA.
- SSR output can be control as high speed response, therefore it can be got a good control condition in case of setting the control cycle (t) shortly (1 or 2sec.)
- Radiation is important to SSR which composed of the semiconductor relay, Please use it within rated Max. 80% because of a cause of fire by damage of SSR.

■ Current output(DC4 to 20mA)

This output, called analogue output is to control the transducer (SCR unit), it can proceed safe control because there is no a sudden change.

It outputs 4 to 20mA, operating value is 100% at 20mA, 0% at 4mA.

- It is used with transducer and can 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 large value (over 600 Ω), the current can be changed. (Please use the resistive load less than 600 Ω)
- Do not use a current output in case of using ON/OFF control.
- Operating value almost does not control at 100% or 0% position because of converting an analogue output form in case of using a current output. Therefore LbA mode does not use in this current output, because LbA mode as monitoring function operates at 100% or 0% position only.
- Front OUT lamp does not operates in case of using a current output.

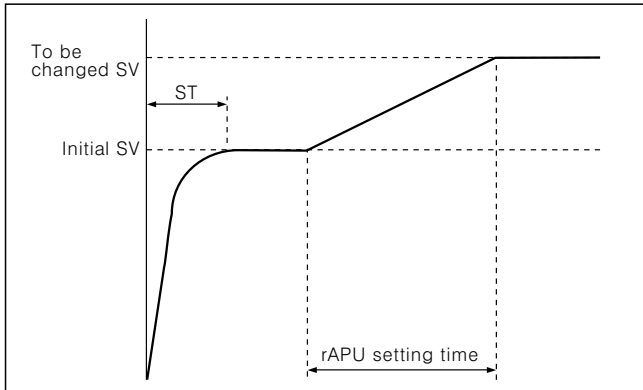
DUAL PID AUTO TUNING TYPE

■ Ramp function

Ramp function is to delay the rising time or falling time of PV (processing value) by force.

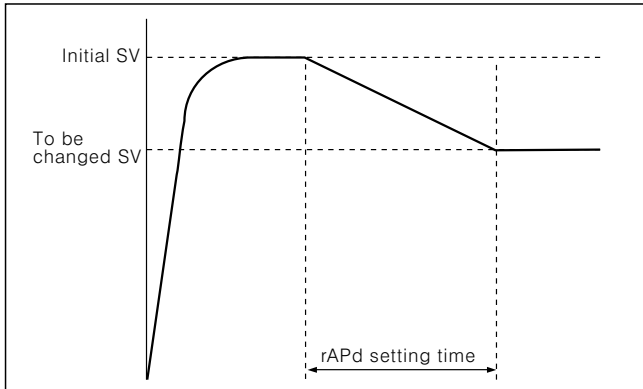
If SV changes at status of stabilized control, PV rises within setting time of rAPu or falls within setting time of rAPd

- rAPu function (Delay of rising time)



But rAPu setting time can not set shorter than ST.

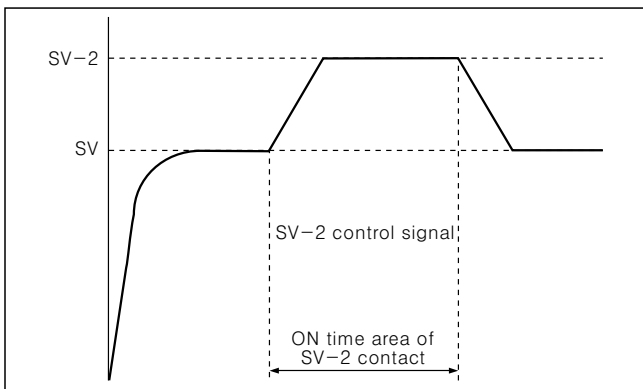
- rAPd function (Delay of falling time)



But rAPd setting time can not set shorter than falling time of PV. RAPU or rAPd is not indicated in display if selection switch located in main P.C. board is not selected to RAMP position.

■ SV-2 function

SV-2 function is to set the second setting value to the unit and to change the setting value to the second setting value (SV-2) as applying the contact signal to SV-2 terminal.



- It can set SV-2 at required time and area as like the above chart.
- SV-2 set in first flow chart.
- EX) If opens the door of the electric oven which is controlling with regular temperature, its inner temperature will be fall. In this case, after installing the micro switch to the door of the oven, and then connect the switch contact as SV-2 control signal. If setting value of SV-2 sets higher than SV, it can control the oven efficiently as rising inner temperature rapidly.

■ CoolHeat function

Cool-function is to operate the heater when PV falls, and heat-function is to operate the refrigerator when PV rises. Cool-function and heat-function is opposite operation exactly in on/off control mode & proportional control mode, but PID constant is different according to the characteristic of the load controlled by PID mode.

- Cool-function and heat-function can be set at "Second flow chart".
- Cool-function and heat-function must be set exactly according to the application, If set as opposite function, it can occurs a cause of a fire. (If heat-function is changed to cool-function on operating heat-function, it can occur a cause of a fire, because the output keeps on status, even if temperature rises)
- Avoid changing heat-function to cool-function or cool-function to heat-function on operating the unit.
- It is impossible to operate both functions at once in this unit. Therefore select one function out of both function.

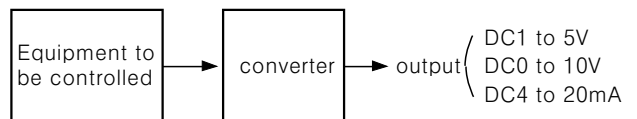
■ Input revise(In-b) function

Input revise is to adjust deviation occurred from the temperature sensor such as thermocouples, RTD, Analogue sensor, etc.

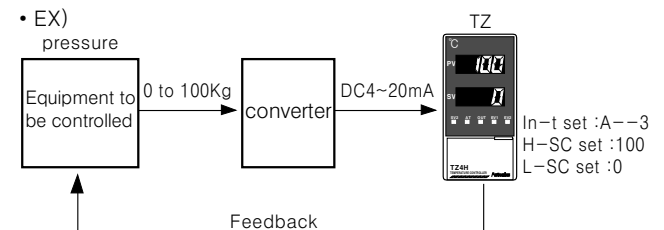
- Input revise can be set at "First flow chart".
- Use this mode after measuring deviation occurred from temperature sensor exactly. Because if measured deviation value is not correct, deviation of temperature is occurred large.
- Setting range of input revise is -49 to $+50^{\circ}\text{C}$ (-49.0 to $+50.0^{\circ}\text{C}$)
- Record the value of input revise after setting it. (It needs for maintenance)

■ Analogue input

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



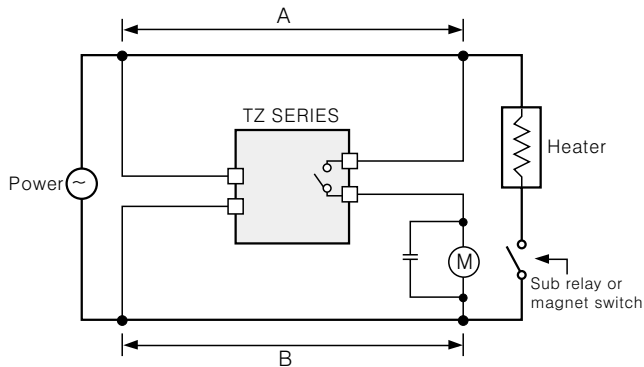
- This unit built-in the mode for the converter. Please select A--1(0 to 10VDC) or A--2(1 to 5VDC) or A--3(4 to 20mA) in selection mode of input in second flow chart.
- Set the input value by H-SC and L-SC mode.
- The other operation function after doing that is same as controlling the temperature.



※ In case using the converter mode, please select the inner switching pin according to the chart in "How to select the switch for each input sensor".

TZ SERIES

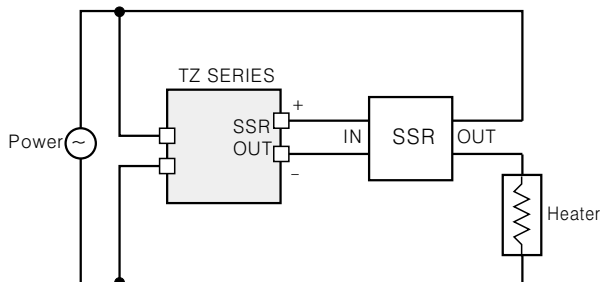
Application of relay output type



Caution for wiring.

1. A part keeps away from B part as much as possible. If wiring length of A or B part is short, electromotive force occurred from a coil of magnet switch & power relay flows in power line of the unit, the unit malfunctions.
2. If wiring length of A or B part is short, please connect a condenser 104(630V) between "M" position of the power relay to protect electromotive force.

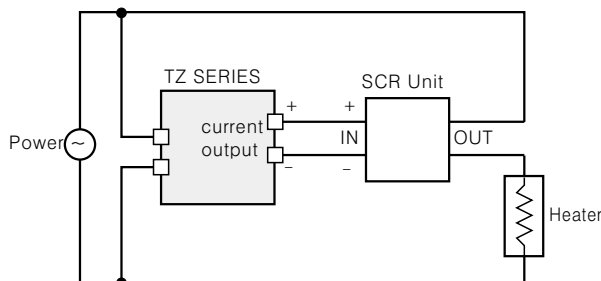
Application of SSR output type



Caution

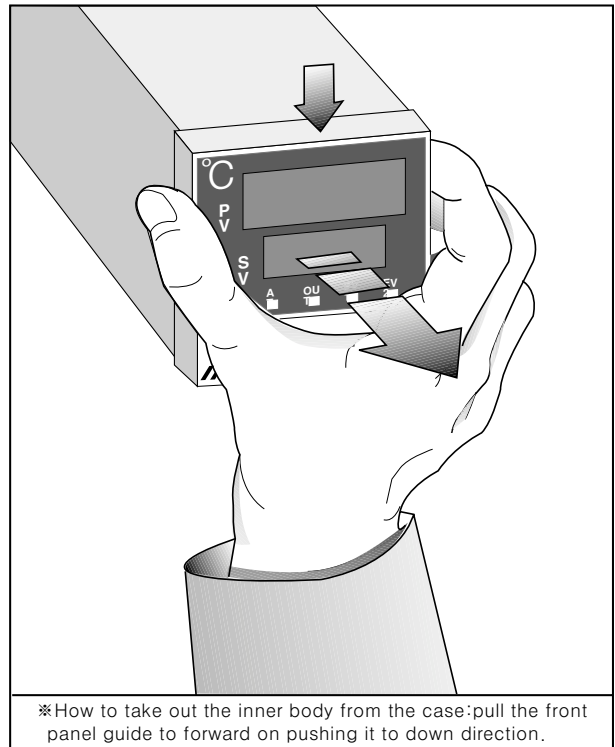
1. Check the capacity of the load in case of using SSR output, if the capacity of the load is not enough, the inner circuit of unit can be broken and then SSR closes, therefore please use bigger capacity of the load than capacity of SSR because of a cause of fire by damage of SSR.
2. If SSR to be used applies full(100%), it must radiate a heat from SSR as 100%. In case of not mounting the radiation plate to SSR, please apply 20 to 30% capacity of SSR specified.

Current output(DC4 to 20mA)



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

How to take out the inner body from the case.



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

How to check diagnosis simple troubles

1. In case of indicating "OPEN" in display.
When the sensor disconnects, OPEN indicates.
IN this case, check disconnection of the sensor after turning off the power.
If it does not disconnect, short-circuit + and - sensor input terminal after separating the sensor line from the unit and then check the display indicates indoor temperature or not.
If the unit does not indicate a indoor temperature and indicates "OPEN" continuously, the unit has some problems. In this case, please send the unit to our after service after separating the unit from system.
But indoor temperature indicates in thermocouple mode only.
2. In case of not operating the output(the heater).
Please check operation of the OUT ramp 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, SSR, current output) after separating output line from the unit.
3. In case of indicating "ERROR" 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 separating the unit from system. If a noise protection is designed in this unit as, but it does not stand up strong noise continuously. If bigger noise than specified (Max. 2KV) flows in the unit, it can be broken.

■ Caution

DANGER (Caution, risk of electric shock)

- Electric shock: When the power is supplying, don't touch AC power terminals, because of electric shock.
- Be sure to check the power line after opening the power voltage.
- The unit (TZ series) must be isolated or disconnected from the Hazardous live voltage before access.

CAUTION

This unit is not designed for safety device, therefore when this unit is applied at dangerous application such as serious human injury, serious property damage, be sure to install fail-safe device.

- Please use the connection-terminal (M3.5W, Max. 7.2mm) in case of connecting AC power cable.
- In case of using the socket for the unit of plug in (TZ4SP series), please use the socket which has rated 250VAC 7A and dielectric min. 2000V between terminals.
- Please make space in inner panel to disconnect the socket wired and the unit of plug in type.
- Please use the switch approved IEC947-1 or IEC947-3 to turn on or off the power voltage when this unit is installed in the panel.
- mark indicated on the diagram of this unit means Caution –refer to accompanying documents.
- In case of cleaning the unit, please keep as following Cautions;
 - Clean dust with a dry tissue.
 - Be sure to use alcohol to clean the unit, do not use alkali acid, chromic acid, solvent, etc.
 - Be sure to clean the unit after turning off the power and then turn on the power after passing 30minute after cleaning.
- If this unit is used in a manner not to be specified by the manufacture, it can be injury to a person or damage to property.
- Be sure that metal dust and wire-dregs do not flow in the unit, because of malfunction damage of the unit or the cause of a fir.
- "~" means Alternating Current.
- Do not modify the unit or open housing of the unit, because of malfunction damage of the unit.
- Service life for the relay of the unit is indicated in this manual, life cycle is different according to the load capacity and switching times, therefore please use the unit after checking the load capacity and switching times.
 - Service life : Mechanically (Min. 10,000,000 times), Electrically (Min. 100,000 times at 250VAC 3A resistive load.)
- Do not connect anything at non-using terminals.
- Connect wires correctly after checking polarity of terminals.
- Be sure to separate wiring the cable of this unit from high voltage or main power line to prevent the inductive noise.
- Do not this unit as following place;
 - Place dust, corrosiveness gas, oil, moisture are occurred.
 - Place there are high humidity or freezing place.
 - Place sunshine, radiant heat is occurred.
 - Place vibration, shock is occurred.
- If the equipment is used in a manner not specified by the manufacture the protection provided by the equipment may be impaired.
- The temperature controller, model TZ series, shall be installed with a switch or circuit-breaker as the means for disconnection of mains supply source as follows; A switch or circuit-breaker meeting the relevant requirements of IEC947-1 and IEC947-3 shall be included in equipment when the temperature controller. TZ series is built into the equipment. The switch or circuit-breaker shall be in close proximity to the equipment and within easy reach of the operator. The switch or circuit-breaker shall be marked to indicate the function of disconnection for the equipment.
- This controller model TZ series is controlled temperatures, so do not use volt meter and ampere meter.
- Environment conditions: The model TZ series is designed to use with the following environment conditions;
 - Altitude up to 2000m.
 - Pollution degree 2.
 - This product is intended to be indoor/outdoor use.
 - Installation category II.
- Use the rated compensated wire when the controller is wired with thermocouple. If non-compensated wire is applied between the controller and the sensor temperature deviation will be occurred.
- Use RTD of 3 wire types. If you want to extend lead-wires, use lead wires which has resistance value as same as load wired applied. If extended lead-wirer has different resistance value against original lead-wire, temperature deviation will be occurred.
- Separate input line from power line, load line to avoid noise.
- When input line is wired at power line closely, use line filter at power line and input line must be used with shielded wire.
- Keep away from the high frequency instruments. (High frequency welding machine & sewing machine, big capacitive SCR controller)
- If you want to change the sensor, reset switches (SW1, SW2) according to each input specification. Turn on power and than set sensor mode by front keys at second flow chart.
- Each SSR output, Current output, Retransmission output is isolated with inner power line.
- Avoid to use this unit at the place where voltage & noise which is exceed the rated is occurred.
- Do not connect Hazardous Live onto terminals 1, 2, 3 and 4. The terminlas 1, 2, 3 and 4 can not be used for Hazardous Live parts.