

Thumbwheel Switch Setting Type Temperature Controller

■ Features

- Various size as DIN specifications
(W48×H48, W48×H96, W72×H72, W96×H96mm)
- Various control output (Relay/SSR drive/current)
- Dual setting for simultaneous control for heater and cooler (T4LP)

⚠ Please read "Safety Considerations" in operation manual before using.

■ Ordering Information

T	3	S		-	B	4	R	P	4	C	-	N		
												New ^{※1}	N	New type
												Temperature unit	C	°C
													F	°F
												Temperature range ^{※4}	0	-99 to 199°C, -99.9 to 199.9°C
													1	0 to 99.9°C
													2	0 to 200°C, 0 to 200.0°C
													4	0 to 400°C
													8	0 to 800°C/°F
													A	0 to 999°C
													C	0 to 1200°C
													F	600 to 1600°C
												Input type ^{※4}	P	DPt100Ω
													J	J(IC)
													K	K(CA)
													R	R(PR)
												Control output ^{※3}	R	Relay output
													S	SSR drive output
													C	Current output
												Power supply	4	100-240VAC 50/60Hz
												Control method	B	ON/OFF control, Proportional control
												Alarm/Sub output ^{※3}	No-mark	None
													A	Alarm output
													S	Sub output
													P	Dual setting output
												Size	S	DIN W48×H48mm (8-pin plug type) ^{※2}
													M	DIN W72×H72mm
													H	DIN W48×H96mm
													L	DIN W96×H96mm
												Digit	3	999 (3-digit)
													4	9999 (4-digit)
												Item	T	Temperature Controller

※1: Name plate and connections are different from previous T3/T4 Series.

※2: Sockets (PG-08, PS-08(N)) are sold separately.

※3: Output by Series

Series	T3S	T3H	T3HA	T3HS	T4M	T4MA	T4L	T4LA	T4LP
Control output	●	●	-	-	●	-	●	-	-
Control output+Alarm/Sub output	-	-	●	●	-	●	-	●	-
Dual setting output	-	-	-	-	-	-	-	-	●



(A) Photoelectric Sensors

(B) Fiber Optic Sensors

(C) Door/Area Sensors

(D) Proximity Sensors

(E) Pressure Sensors

(F) Rotary Encoders

(G) Connectors/Connector Cables/Sensor Distribution Boxes/Sockets

(H) Temperature Controllers

(I) SSRs / Power Controllers

(J) Counters

(K) Timers

(L) Panel Meters

(M) Tacho / Speed / Pulse Meters

(N) Display Units

(O) Sensor Controllers

(P) Switching Mode Power Supplies

(Q) Stepper Motors & Drivers & Controllers

(R) Graphic/Logic Panels

(S) Field Network Devices

(T) Software

T3 / T4 Series

※4: Input type and temperature range by Series

Input type			Series Model	T3S	T3H	T3HA	T3HS	T4M T4MA	T4L T4LA	T4LP
Thermocouples	K(CA)	0 to 400°C	4	●	●	●	●	●	●	●
		0 to 800°C	8	●	●	●	-	●	●	●
		0 to 999°C	A	-	●	●	-	-	-	-
		0 to 1200°C	C	-	-	-	-	●	●	●
	J(IC)	0 to 200°C	2	●	-	-	-	-	-	-
		0 to 400°C	4	●	●	●	●	●	●	●
		0 to 800°F	8	-	●	-	-	-	-	-
RTD	DPT 100Ω	R(PR) 600 to 1600°C	F	-	-	-	-	●	●	●
		-99.9 to 199.9°C	0	-	-	-	-	●	●	-
		-99 to 199°C	0	-	●	●	-	-	-	-
		0 to 99.9°C	1	●	●	-	-	-	-	-
		0 to 200.0°C	2	-	-	-	-	-	-	●
		0 to 200°C	2	●	-	-	-	-	-	-
		0 to 400°C	4	●	●	●	●	●	●	●

※Please contact us for temperature unit °F model.

■ Specifications

Series		T3S	T3H	T3HA	T3HS	T4M	T4MA	T4L	T4LA	T4LP	
Power supply		100-240VAC~ 50/60Hz									
Allowable voltage range		90 to 110% of rated voltage									
Power consumption		Max. 5VA									
Display method		7-segment (red) LED method									
Character size (W×H)		3.8×7.6mm			6.0×10.0mm			8.0×14.2mm			
Input type	RTD	DPT100Ω (Allowable line resistance max.5Ω per a wire)									
	TC	K(CA), J(IC)				K(CA), J(IC), R(PR)					
Display accuracy※1	RTD	●At room temperature (23°C ± 5°C): (PV ± 0.5% or ±1°C, select the higher one) ± 1-digit									
	TC	●Out of room temperature range: (PV± 0.5% or ±2°C, select the higher one)± 1-digit									
Control output	Relay	OUT1: 250VAC~ 5A, 30VDC≒ 5A, 1c, OUT2: 250VAC~ 2A, 30VDC≒ 2A, 1c※2									
	SSR	Max. 12VDC≒±2V 20mA									
	Current	DC4-20mA (resistive load max. 500Ω)									
Alarm/Sub/ Dual setting output		—			250VAC~ 2A 1c		—		250VAC~ 2A 1a	—	250VAC~ 2A 1c
Sampling period		100ms									
Control method		ON/OFF, Proportional control									
Hysteresis		F.S. 0.5%		F.S. 0.2 to 3% variable							
Proportional band		F.S. 3%		F.S. 1 to 10% variable							
Proportional cycle		20 sec									
RESET range		F.S. -3 to 3% variable									
Relay life cycle	Mechanical	Over 5,000,000 times									
	Electrical	OUT1: Over 100,000 times, OUT2: Over 200,000 times									
Dielectric strength		2,000VAC 50/60Hz for 1min (between input terminal and power terminal)									
Vibration		0.75mm amplitude at frequency of 10 to 55Hz (for 1 min) in each X, Y, Z direction for 2 hours									
Insulation resistance		Over 100MΩ (at 500VDC megger)									
Noise immunity		Square-wave noise by noise simulator (pulse width 1μs) ±2kV R-phase and S-phase									
Memory retention		Approx. 10 years (when using non-volatile semiconductor memory type)									
Environ- ment	Ambient temperature	-10 to 50°C, Storage: -20 to 60°C									
	Ambient humidity	35 to 85% RH, Storage: 35 to 85% RH									
Weight※3		Approx. 135g (approx. 95g)		Approx. 239g (approx. 176g)			Approx. 246g (approx. 180g)		Approx. 310g (approx. 222g)		

※1: In case of the T3S Series and the decimal point display models

At room temperature (23°C±5°C): (PV ±0.5% or ±2°C, select the higher one)±1-digit

Out of room temperature range: (PV ±0.5% or ±3°C, select the higher one)±1-digit

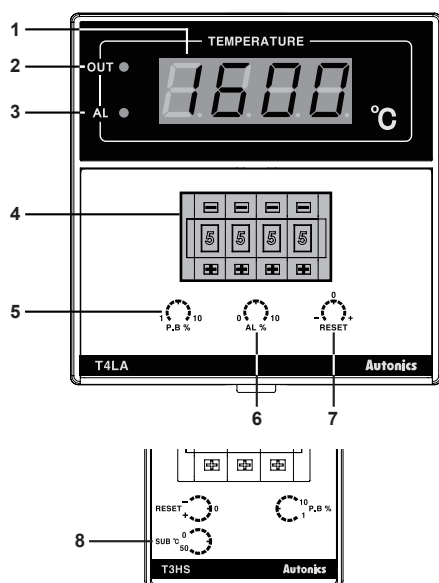
※2: Dual setting output of the T4LP is fixed as relay output and, it is also available as alarm output.

※3: The weight includes packaging. The weight in parenthesis is for unit only.

※Environment resistance is rated at no freezing or condensation.

Thumbwheel Switch Setting Type

Unit Description



1. Present temperature (PV) display

It displays present temperature.

2. Control output (OUT) indicator

It turns ON when control output is ON.

※In case of the T3S, the upper DOT of last digit flashes.



3. Alarm output (AL) indicator

It turns ON when alarm output is ON. (only for alarm output model)

In case of the sub output model (T3HS), the sub (SUB) indicator turns ON when sub output is ON.

4. Set value (SV) thumbwheel switch

Switch for setting temperature.

(-) button: Decreases number, (+) button: Increases number

If the setting is out of the temperature range of temperature sensor, the present temperature (PV) display part flashes 5.0E- and the present value in turn.

※The models which temperature range is 0 (-99.9 to 199.9°C, -99 to 199°C) of temperature sensor DPT100Ω are only set 1↔0↔(-).

※The dual setting output model (T4LP) has two thumbwheel switches.

LO SET
(low set output)



HI SET
(high set output)



LO SET (low set output) heating control, HI SET (high set output): cooling control

5. Hysteresis/Proportional width volume switch (except T3S)

ON/OFF control: Setting for hysteresis. [Setting range] F.S. 0.2 to 3% (For T3S, F.S. 0.5% fixed)

Proportional control: Setting for proportional width. [Setting range] F.S. 1 to 10% (For T3S, F.S. 3% fixed)

Proportional cycle: 20 sec fixed

6. Alarm output value volume switch (only for alarm output model)

It sets alarm output value. [Setting range] F.S. 0 to 10%

7. RESET volume switch

In case of proportional control, it sets offset. [Setting range] F.S. -3 to 3%

8. Temperature setting of sub output volume switch (only for T3HS)

It sets temperature of the sub output. This output operates as deviation low-limit alarm based on the set sub-output temperature (SV). Setting range: 0 to 50°C

Connections

※Use terminals of size specified below.

	<Round>	<Forked>
a	Min. 3.5mm	Min. 3.5mm
b	Max. 7.2mm	Max. 7.2mm

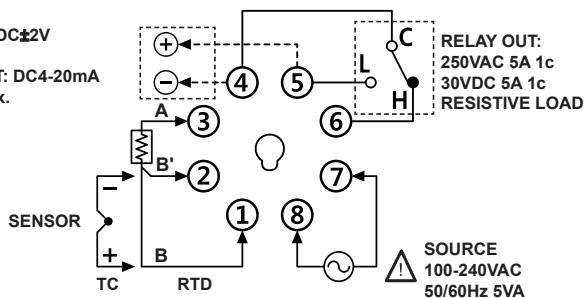
● T3S

SSR OUT: 12VDC±2V

20mA Max.

CURRENT OUT: DC4-20mA

Load 500Ω Max.



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(P) Switching Mode Power Supplies

(Q) Stepper Motors & Drivers & Controllers

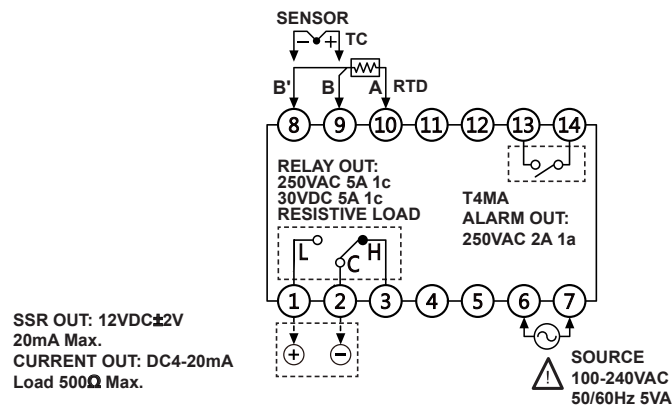
(R) Graphic/ Logic Panels

(S) Field Network Devices

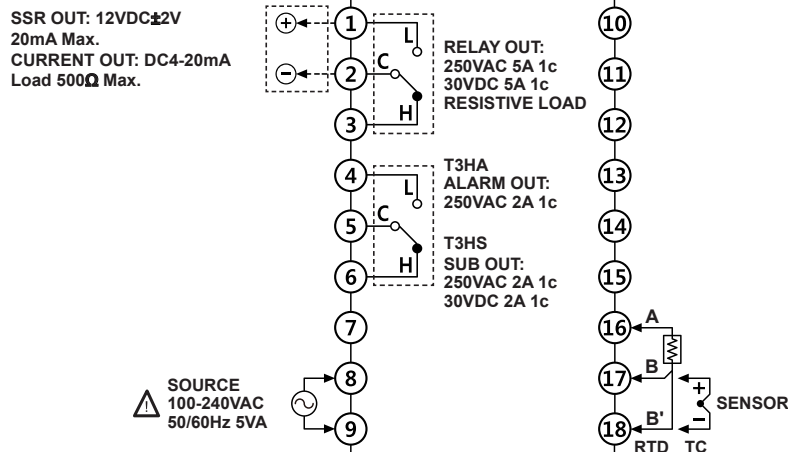
(T) Software

T3 / T4 Series

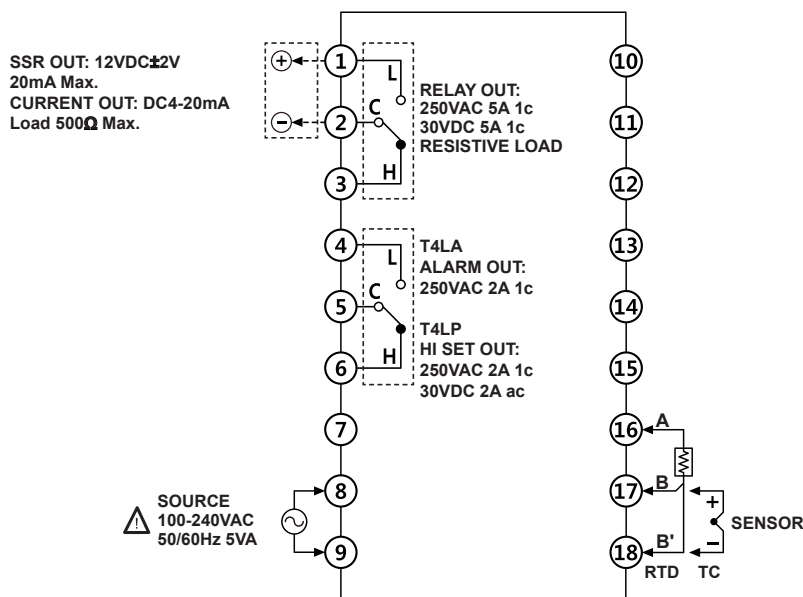
● T4M/T4MA



● T3H/T3HA/T3HS



● T4L/T4LA/T4LP

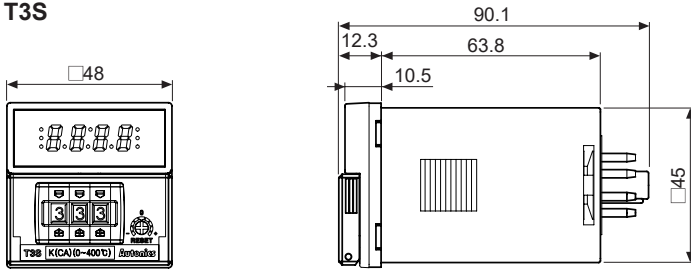


Thumbwheel Switch Setting Type

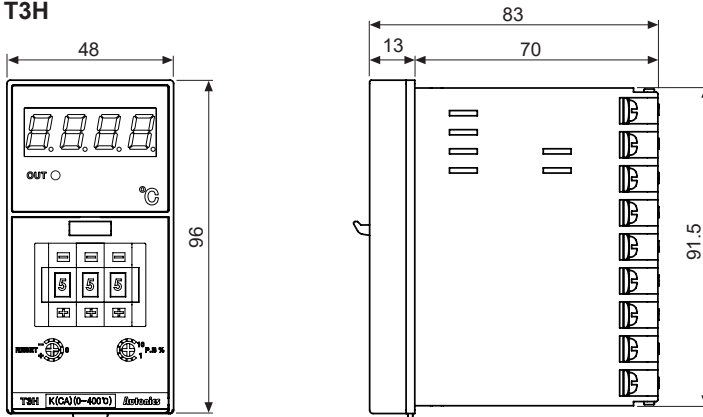
■ Dimensions

(unit: mm)

● T3S



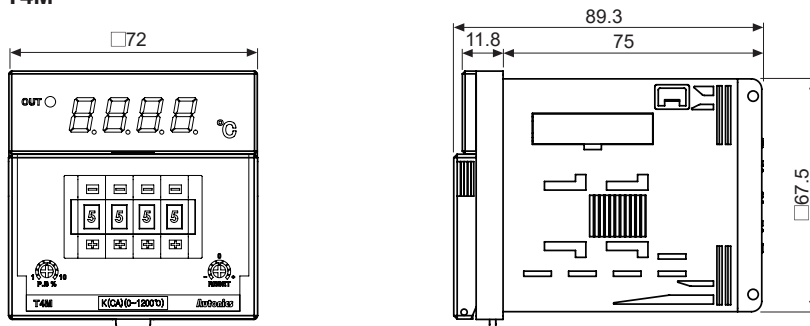
● T3H



※T3HA, alarm output model, has the alarm output value volume switch.

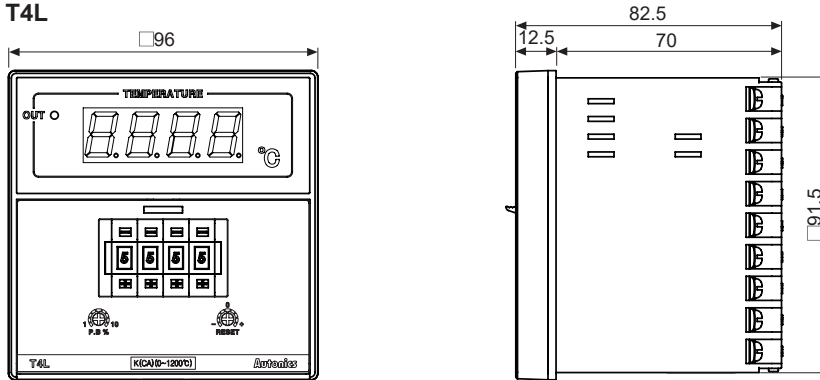
※T3HS, sub output model, has the temperature setting of sub output volume switch.

● T4M



※T4MA, alarm output model, has the alarm output value volume switch.

● T4L



※T4LA, alarm output model, has the alarm output value volume switch.

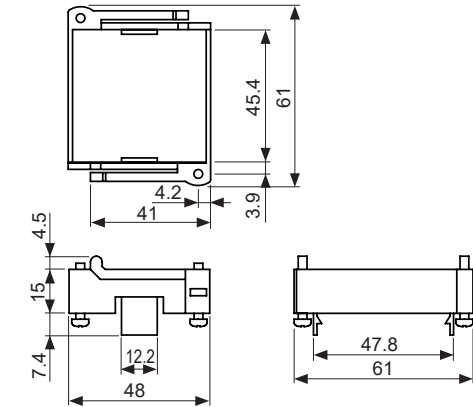
※T4LP, dual setting output model, has the two thumbwheel switches.

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(B)	Fiber Optic Sensors
(C)	Door/Area Sensors
(D)	Proximity Sensors
(E)	Pressure Sensors
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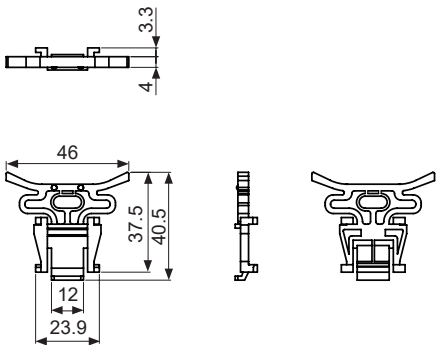
T3 / T4 Series

● Bracket

●T3S

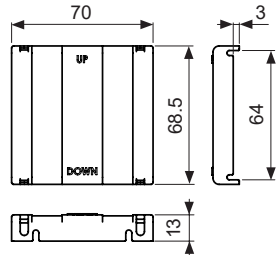


●T3H/T4M/T4L

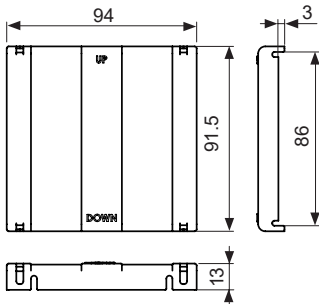


● Terminal cover (sold separately)

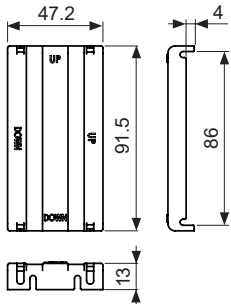
●RMA-COVER (72×72mm)



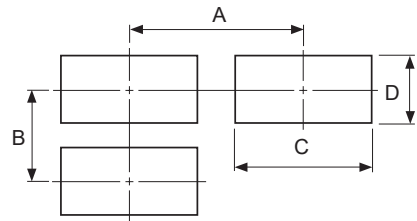
●RLA-COVER (96×96mm)



●RHA-COVER (48×96mm)



●Panel cut-out



Series	Size	A	B	C	D
T3S		Min. 65	Min. 65	45 ^{+0.6} ₀	45 ^{+0.6} ₀
T3H		Min. 65	Min. 115	45 ^{+0.6} ₀	92 ^{+0.8} ₀
T4M		Min. 90	Min. 90	68 ^{+0.7} ₀	68 ^{+0.7} ₀
T4L		Min. 115	Min. 115	92 ^{+0.8} ₀	92 ^{+0.8} ₀

Thumbwheel Switch Setting Type

■ Function

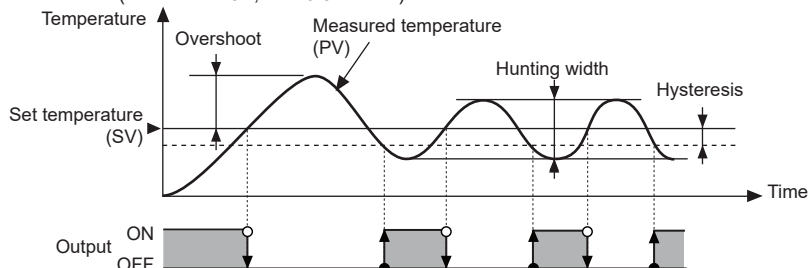
1. Control method

1) ON/OFF control

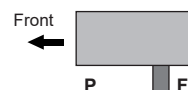
Comparing the present measured temperature and the set temperature, the temperature controller turns ON/OFF of the load power. Interval between ON and OFF of control output is set by the set hysteresis. When hysteresis of control output is too narrow, hunting (overshoot, chattering) may occur by external noise.

[Setting range of Hysteresis] F.S. 0.2 to 3%

(In case of T3S, F.S. 0.5% fixed)

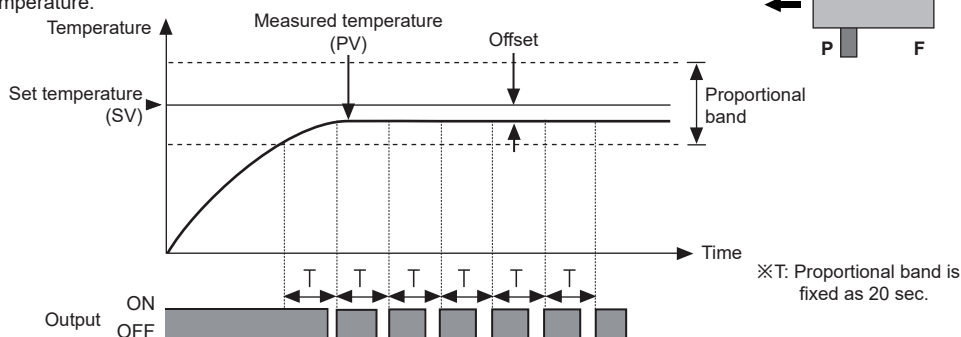


※Control method setting switch

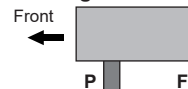


2) Proportional control

Proportional control has control output which is proportional to deviation from the present temperature to the set temperature in the proportional band to the set temperature.



※Control method setting switch



It is available to control without overshoot or hunting comparing ON/OFF control but it may cause offset. Correct the offset with the RESET volume switch.

[Setting range of Proportional band] F.S. 1 to 10% (In case of T3S, F.S. 3% fixed)

[Setting range of RESET] F.S. -3 to 3%

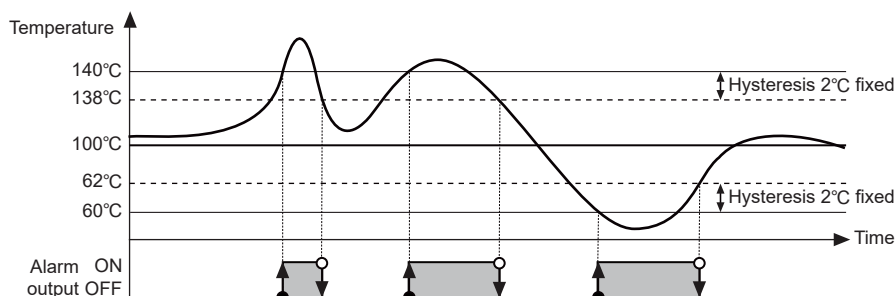
2. Alarm output

Alarm temperature is applied to the high/low-limit based on the set temperature. Alarm output operates deviation high/low-limit.

Setting range of Alarm temperature: F.S. 0 to 10%

E.g.) When F.S. is 400°C and max. alarm temperature (F.S. 10%) is 40°C.

When the set temperature is set as 100°C, alarm output operation range is 140°C to 60°C.



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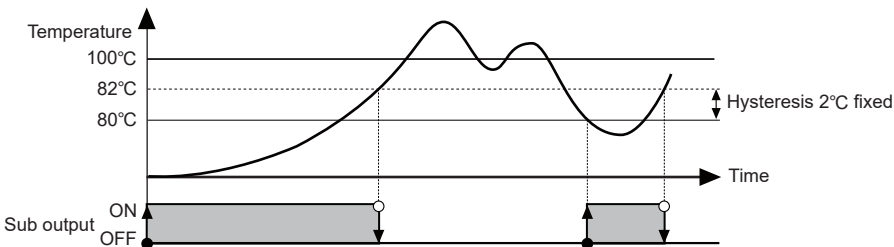
T3 / T4 Series

3. Sub output (Only for T3HS)

Only the T3HS model has sub output. This output operates as deviation low-limit alarm.

[Setting range of Sub output]: 0 to 50°C

E.g.)Set temperature is set as 100°C and sub-output is set as 20°C



4. Dual setting output (Only for T4LP)

Only the T4LP model has dual setting output.

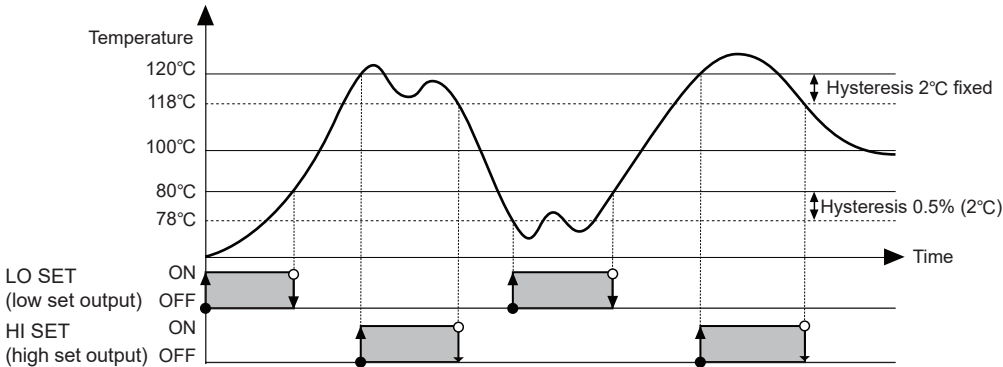
-LO SET (low set output): ON/OFF control (Hysteresis: F.S. 0.2 to 3%),

Proportional control (Proportional band: F.S. 1 to 10%)

-HI SET (high set output): Absolute value high-limit alarm output (Hysteresis: 2°C fixed)

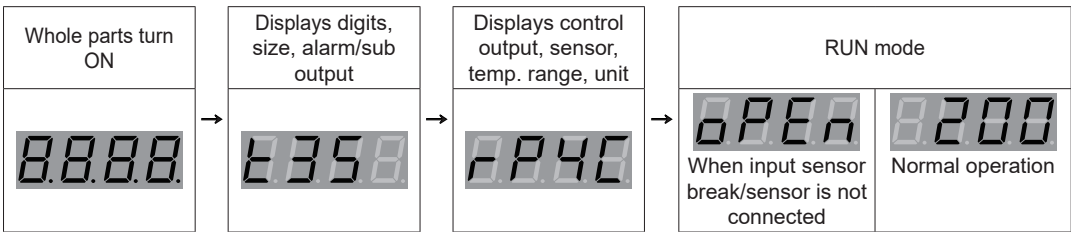
E.g.)T4LP, temperature sensor: DPT100, temperature range: 0 to 400°C

Type	Set temperature	Output	Hysteresis
LO SET (low set output)	80°C	ON/OFF control	0.5% (400×0.5%=2°C)
HI SET (High set output)	120°C	Absolute value high-limit alarm output	2°C (fixed)



■ Display When Power Is ON

When power is supplied, whole display parts turn ON for 1 sec. It displays model type (digits, size, alarm/sub output and control output, sensor, temp. range, unit). Afterward, it returns to RUN mode.



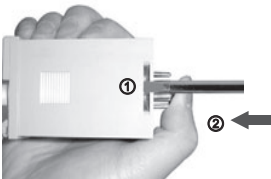
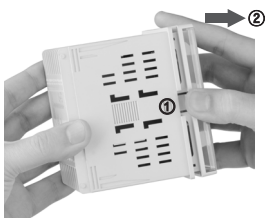
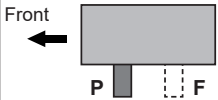
When input sensor break/sensor is not connected, it displays [PEA]. In case of normal operation, it displays the present input temperature and controls temperature.

※During displaying model type, control output does not operate.

Thumbwheel Switch Setting Type

■ Control Method (ON/OFF, Proportional Control) Setting

Before supplying power, remove the case and set the control method by the control method setting switch.

T3S	Other Series	Control method setting switch
 Press the 8-pin plug with your thumb. Insert a flat head driver to the ① groove and uplift the case (same as the other side). Push it to the ② direction and the case is removed.	 Press the ① with your thumb. Pull the case to the ② direction and it is removed.	 P: Proportional control (default) F: ON/OFF control

■ Error Display and Output Operation

●: ON
○: OFF

Display	Description	Control output ^{※1}	Alarm output	Sub output	Dual output	Troubleshooting
$\alpha P E n$	Flashes when a temperature sensor is broken or not connected.	○	●	○	●	Check the status of the temperature sensor. When the sensor is connected correctly, it is clear.
$HHHH$	Flashes when the measured input value is higher than the temperature range of the sensor.	○	●	○	●	When the measured temperature is within the temperature range of the sensor, it is clear.
$LLLL$	Flashes when the measured input value is lower than the temperature range of the sensor.	●	●	●	○	
$SuEr$ ^{※2}	Flashes with the present value when the set value is out of the temperature range of the sensor.	○	○	○	○	The set value should be within the temperature range of the sensor.

※1: T4LP (Dual setting output) is the single output.

※2: When $SuEr$ and $\alpha P E n / HHHH / LLLL$ occur at the same time, $SuEr$ and $\alpha P E n / HHHH / LLLL$ flash in turn and all output turns OFF.

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