

DUAL INDICATOR TEMPERATURE CONTROLLER

TS4 SERIES

INSTRUCTION MANUAL



Thank you for choosing our 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

- 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.
- Install on a device panel to use.**
Failure to follow this instruction may result in electric shock or fire.
- 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.
- Check 'Connections' before wiring.**
Failure to follow this instruction may result in fire.
- Do not disassemble or modify the unit.**
Failure to follow this instruction may result in electric shock or fire.

Caution

- 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 0.74-0.90N·m.**
When connecting the sensor input and communication cable without dedicated cable, use AWG 28-16 cable and tighten the terminal screw with a tightening torque of 0.74-0.90N·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.
- 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.
- Do not use the unit in the place where flammable/explosive/corrosive gas, humid, direct sunlight, radiant heat, vibration, impact, or salinity may be present.**
Failure to follow this instruction may result in fire or explosion.
- 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

T	S	4	M	-2	4	R	-P
Wiring method							
Control output							
Power supply							
Sub output							
Size							
Digit							
Setting type							
Item							
No-mark	Bolt wiring method						
P	Connector plug connection method ^{※1}						
R	Relay contact + SSR drive output ^{※2}						
2	24VAC 50/60Hz, 24-48VDC						
4	100-240VAC 50/60Hz						
M	DIN W48 × H48mm						
C	DIN W72 × H72mm						
H	DIN W48 × H96mm						
B	DIN W96 × H96mm						
4	9999 (4 digit)						
S	Dual display type, set by touch switch						
T	Temperature controller						

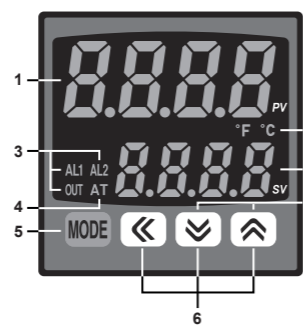
- ※1: Only for TS4-M model.
 ※2: In case of the AC voltage model, SSR drive output method (standard ON/OFF control, cycle control, phase control) is available to select.
 ※The above specifications are subject to change and some models may be discontinued without notice.
 ※Be sure to follow cautions written in the instruction manual and the technical descriptions (catalog, homepage).

Specificatio

Series	TS4-M	TS4-C	TS4-H	TS4-B
Power supply	AC Power 100-240VAC~ 50/60Hz	AC/DC Power 24VAC~ 50/60Hz, 24-48VDC=		
Allowable voltage range	90 to 110% of rated voltage			
Power consumption	AC Power Max. 5VA(100-240VAC 50/60Hz)	AC/DC Power Max. 5V(24VAC 50/60Hz), Max. 3W(24-48VDC)		
Display method	7 segment (PV: red, SV: green), other display part(green, red) LED method			
Character size	PV(W×H) 7.0×15.0mm	9.5×20.0mm	7.0×14.6mm	11.0×22.0mm
Input type	RTD	DIN Pt100Ω, Cu50Ω (Allowable line resistance max.5Ω per a wire)		
Display accuracy	TC	K(CA), J(IC), L(IC), T(CC), R(PR), S(PR)		
Control output	Relay	250VAC~ 3A 1a		
Alarm output	SSR	12VDC±2V 20mA Max.		
Control method	AL1, AL2	Relay: 250VAC~ 1A 1a		
Hysteresis	1 to 100°C/°F	(0.1 to 50.0°C/°F)		
Proportional band(P)	0.1 to 999.9°C/°F			
Integral time(I)	0 to 9999 sec.			
Derivative time(D)	0 to 9999 sec.			
Control period(T)	0.5 to 120.0 sec.			
Manual reset	0.0 to 100.0%			
Sampling period	100ms			
Dielectric strength	AC power	2000VAC 50/60Hz 1min.(between input terminal and power terminal)		
	AC/DC power	1000VAC 50/60Hz 1min.(between input terminal and power terminal)		
Vibration	0.75mm amplitude at frequency of 5 to 55Hz in each X, Y, Z direction for 2 hours			
Relay life cycle	Mechanical	OUT: Over 5,000,000 times, AL1/2: Over 5,000,000 times		
	Electrical	OUT: Over 200,000 times(250VAC 3A resistive load) AL1/2: Over 300,000 times(250VAC 1A resistive load)		
Insulation resistance	Min. 100MΩ(at 500VDC megger)			
Noise	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 temp.	-10 to 50°C, Storage: -20 to 60°C		
	Ambient humi.	35 to 85%RH, Storage: 35 to 85%RH		
Insulation type	Double insulation or reinforced insulation (mark: □, dielectric strength between the measuring input part and the power part : AC power 2kV, AC/DC power 1kV)			
Approval	CE			
Weight	Approx. 147g (approx. 100g)	Approx. 203g (approx. 133g)	Approx. 194g (approx. 124g)	Approx. 275g (approx. 179g)

- ※1: ○ At room temperature(23°C±5°C)
 - Below 200°C of thermocouple R(PR), S(PR) is (PV ±0.5% or ±1°C, select the higher one) ±1 digit
 - Over 200°C of thermocouple R(PR), S(PR) is (PV ±0.5% or ±2°C, select the higher one) ±1 digit
 - Thermocouple L (IC), RTD Cu50Ω is (PV ±0.5% or ±2°C, select the higher one) ±1 digit
 ○ Out of room temperature range
 - Below 200°C of thermocouple R(PR), S(PR) is (PV ±1.0% or ±6°C, select the higher one) ±1 digit
 - Over 200°C of thermocouple R(PR), S(PR) is (PV ±0.5% or ±5°C, select the higher one) ±1 digit
 - Thermocouple L(IC), RTD Cu50Ω is (PV ±0.5% or ±3°C, select the higher one) ±1 digit
 For TS4M-□-P, add ±1°C by accuracy standard.
 ※2: The weight includes packaging. The weight in parentheses is for unit only.
 ※ Environment resistance is rated at no freezing or condensation.

Unit Description

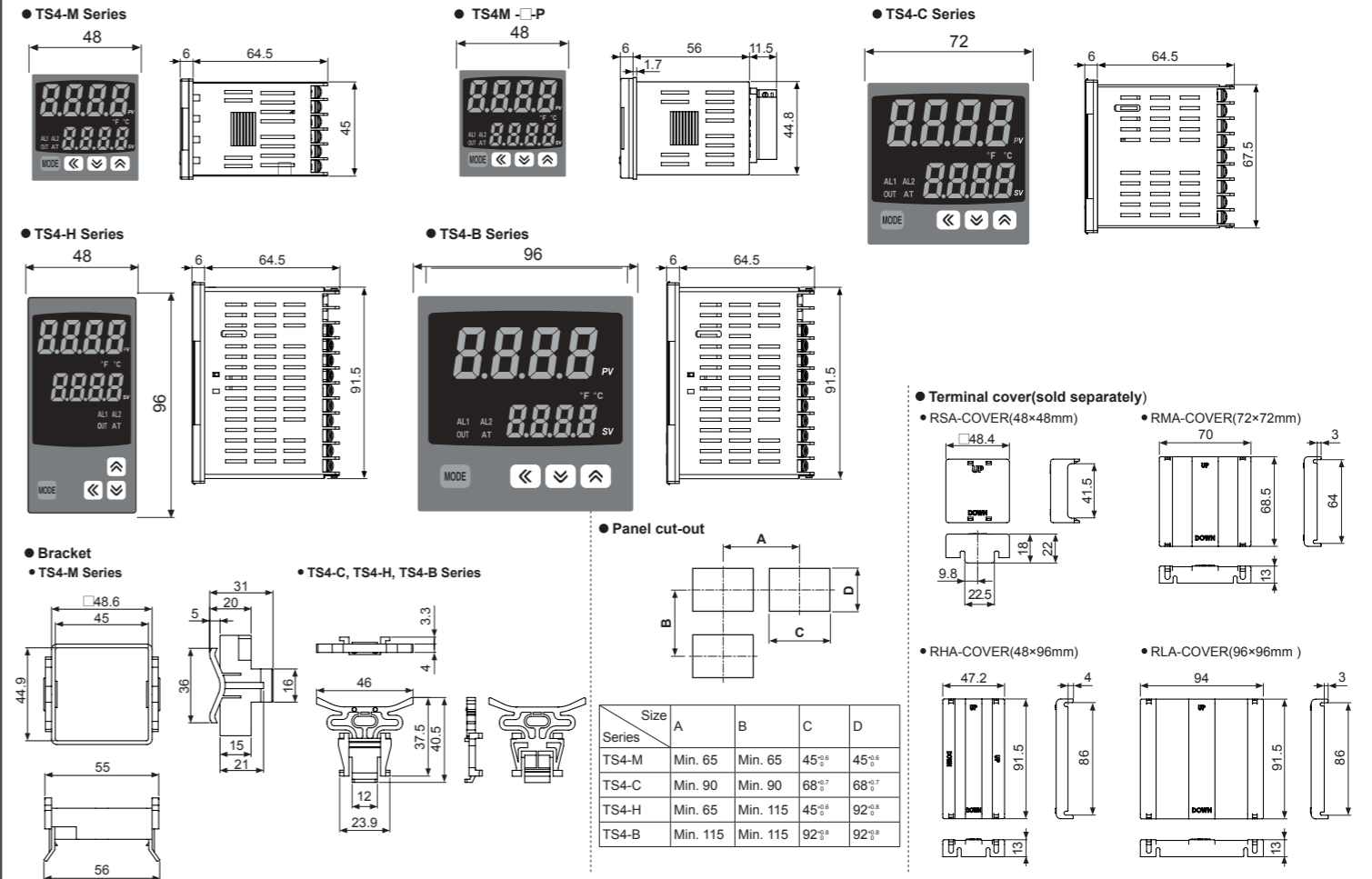


- Present temperature (PV) display (Red)**
1) RUN mode: Present temperature (PV) display
2) Parameter setting mode: Parameter display
- Set temperature (SV) display (Green)**
1) RUN mode: Set temperature (SV) display
2) Parameter setting mode : Parameter setting value display
- Control/Alarm output display indicator**
1) OUT: It turns ON when the control output is ON.
During SSR drive output type in CYCLE/ PHASE control, this indicator turns ON when MV is over 3.0%.
2) AL1/AL2: It turns ON when the alarm output is ON.
- Auto tuning indicator**
AT indicator flashes by every 1 sec during operating auto tuning.
- MODE key**
Used when entering into parameter groups, returning to RUN mode, moving parameter, and saving setting values.

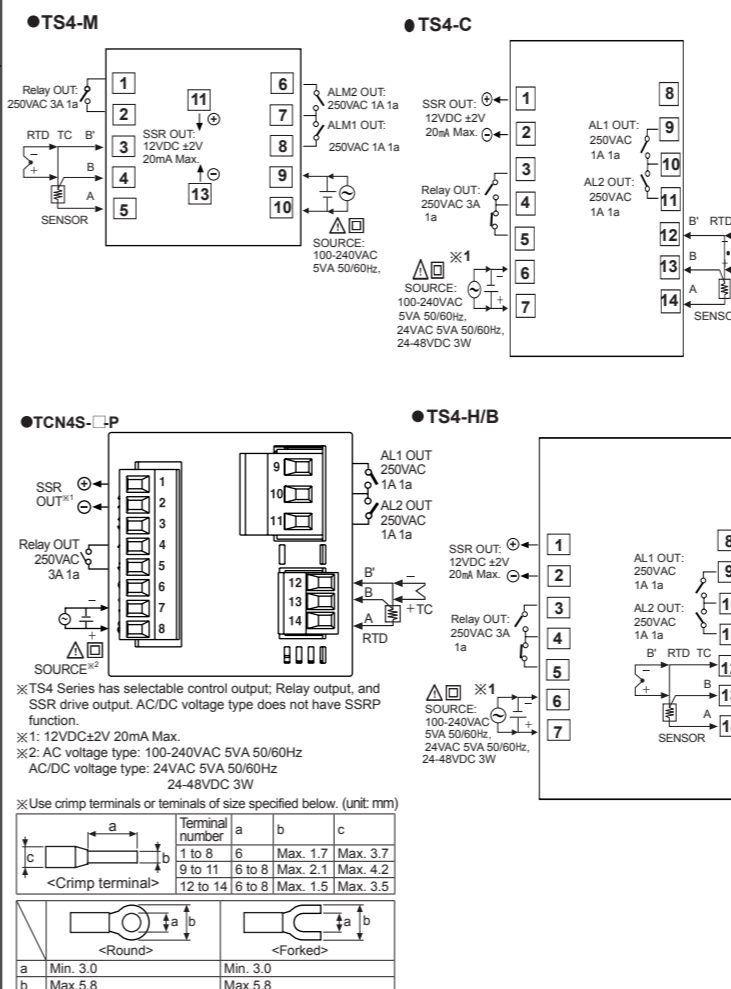
Input Sensor and Temperature Range

Input sensor	Display	Temperature range(°C)	Temperature range(°F)		
Thermocouple	K(CA)	tcRH	-50 to 1200	-58 to 2192	
		tcRL	-50.0 to 999.9	-58.0 to 999.9	
		tcH	-30 to 800	-22 to 1472	
		tcL	-30.0 to 800.0	-22.0 to 999.9	
		tcLH	-40 to 800	-40 to 1472	
		tcLH	-40.0 to 800.0	-40 to 999.9	
	T(CC)	tcCH	-50 to 400	-58 to 752	
		tcCL	-50.0 to 400.0	-58.0 to 752.0	
		tcCH	0 to 1700	32 to 3092	
		tcPR	0 to 1700	32 to 3092	
		RTD	DPt100Ω	-100 to 400	-148 to 752
			dpEtL	-100.0 to 400.0	-148.0 to 752.0
Cu50Ω	-50 to 200		-58 to 392		
Cu50Ω	-50.0 to 200.0		-58.0 to 392.0		

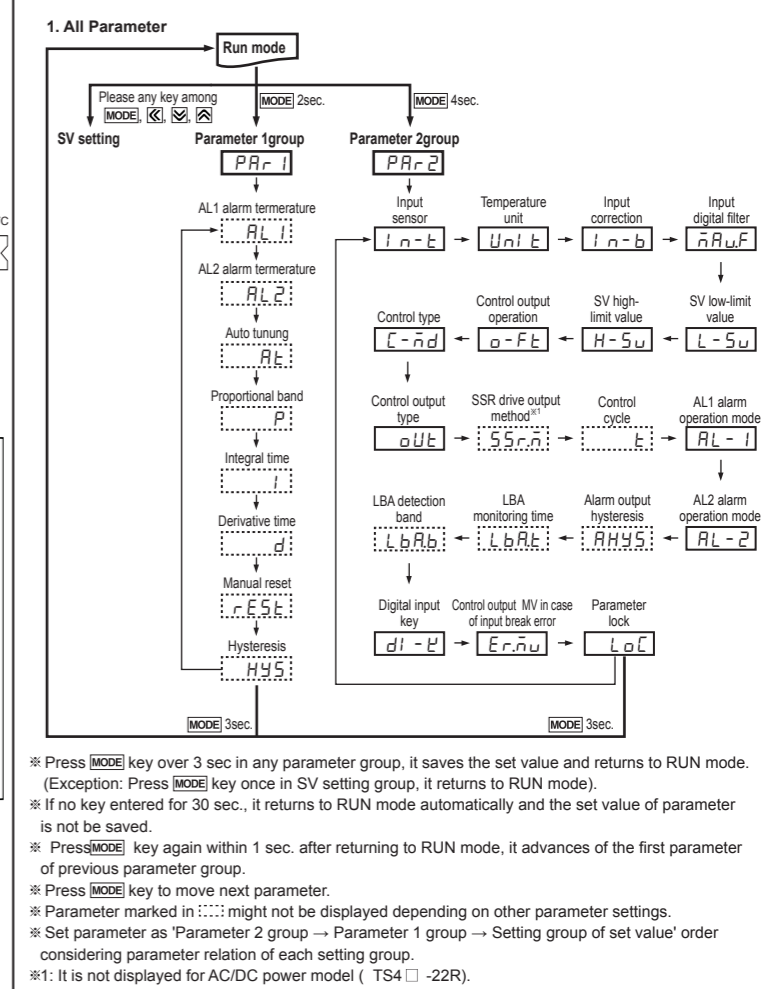
Dimensions



Connections

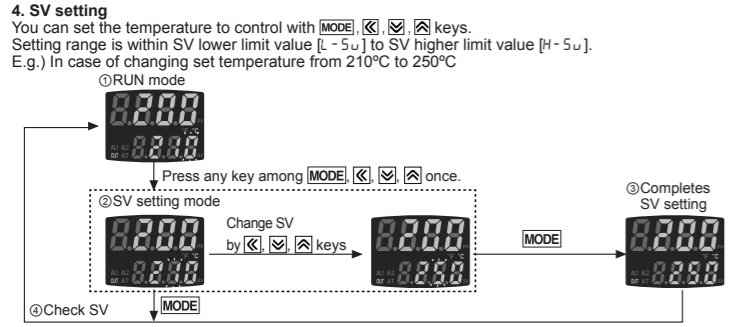


Parameter Groups



Parameter	Display	Description
Input sensor	$i n - t$	Setting range: Refer to 'Input Sensor And Temperature Range'. * If changing input sensor, SV, $i n - b$, $H - 5u$, $L - 5u$, $AL 1$, $AL 2$, $LbRt$, $LbRb$, $AH5$ parameter values are initialized.
Temperature unit	$U n - t$	Setting range: $0C \leftrightarrow 0F$ * If changing temperature unit, SV, $i n - b$, $H - 5u$, $L - 5u$, $AL 1$, $AL 2$, $LbRt$, $LbRb$, $AH5$ parameter values are initialized.
Input correction	$i n - b$	Setting range: • $ECRH, JI, CH, LI, CL, t, CCH, rPr, Sp, dPEH, CUSH: -999$ to $999^{\circ}C/^{\circ}F$ • $ECRL, JI, CL, LI, CL, t, CCL, dPEL, CUSL: -199.9$ to $999.9^{\circ}C/^{\circ}F$
Input digital filter	$nRdF$	Setting range: 0.1 to 120.0 sec.
SV low-limit value	$L - 5u$	Setting range: Within the rated temperature range by input sensor [$L - 5u \leq (H - 5u - 1digit)$]. * When changing SV lower limit value, if $SV < L - 5u$, SV is initialized as $L - 5u$. * In case of changing input sensor type [$n - t$], it changes automatically as min. value of the changed input sensor.
SV high-limit value	$H - 5u$	Setting range: Within the rated temperature range by input sensor [$H - 5u \geq (L - 5u + 1digit)$]. * When changing SV higher limit value, if $SV > H - 5u$, SV is initialized as $H - 5u$. * In case of changing input sensor type [$n - t$], it changes automatically as max. value of the changed input sensor.
Control output operation	$o - Ft$	$HErE \leftrightarrow CoOL$ * When changing control output operation, $Ernu$ is initialized.
Control type	$C - nd$	$PI d \leftrightarrow OnoF$ * When changing control type, $Ernu$ is initialized (control output MV is below 100%) and $dI - t$ turns OFF automatically.
Control output type	oUt	$rLy \leftrightarrow S5r$
SSR drive output method	$S5r$	Setting range: 0.5 to 120.0 sec. * It is displayed when selecting control output [oUt] as [$S5r$]. It is not displayed for AC/DC power model (TS4 □-22R).
Control cycle	t	Setting range: 0.5 to 120.0 sec. * In case of Relay drive output [rLy] of control output [oUt], it is set as 20.0 sec. In case of SSR drive output [$S5r$] of that, it is set as 2.0 sec. * t is not displayed when SSR drive output [$S5r$] method is set as $CyCL$, $PHAS$.
AL1 alarm operation mode	$AL - 1$	Setting range: Refer to 'Functions 6. Alarm'. * Black: Flashes, Gray: Fixed * When changing AL1, AL2 alarm operation mode, AL1, AL2 alarm temperature value are initialized.
AL2 alarm operation mode	$AL - 2$	Setting range: Refer to 'Functions 6. Alarm'. * Black: Flashes, Gray: Fixed * When changing AL1, AL2 alarm operation mode, AL1, AL2 alarm temperature value are initialized.
Alarm output hysteresis	$AH5$	Setting range: Refer to 'Functions 4. Alarm output hysteresis'. * $AH5$ is not displayed when AL1, AL2 alarm operation mode [$AL - 1$, $AL - 2$] is set as [$RA0$], [$SbRA$], [$LbRA$].
LBA monitoring time	$LbRt$	Setting range: 0 to 9999 sec. * '0' is set, loop break alarm function is OFF. * $LbRt$ is displayed when AL1, AL2 alarm operation mode [$AL - 1$, $AL - 2$] is set as [$LbRA$].
LBA monitoring range	$LbRb$	Setting range: 0 to 999(0.0 to 999.9) $^{\circ}C/^{\circ}F$. '0' is set, loop break alarm function is OFF. * $LbRb$ is displayed when AL1, AL2 alarm operation mode [$AL - 1$, $AL - 2$] is set as [$LbRA$] and [$LbRt$] is not '0'.
Digital input key	$dI - t$	Setting range: 3 to 3 sec. and it executes the set function. Press $\text{[MODE]} + \text{[KEY]}$ keys for 3 sec. and it executes the set function. For more information, refer to 'Functions 5. Digital input key'. * When control type [$C - nd$] is $OnoF$, $dI - t$ is not displayed.
Control output MV in case of input break error	$Ernu$	Setting range 0.0 to 100.0% * Only 0.0, 100% are displayed when control type [$C - nd$] is set as $OnoF$. * When changing PID control to ON/OFF control, if MV is below 100.0%, it is initialized as 0.0%.
Parameter lock	LoC	$oFF \leftrightarrow LoC1 \leftrightarrow LoC2 \leftrightarrow LoC3$ $LoC1$: Locks parameter 2 group, $LoC2$: Locks parameter 1, 2 group $LoC3$: Locks parameter 1, 2 group and SV setting * Parameter setting values are still possible to check when parameter lock is set.

Parameter	Display	Description
AL1 alarm temp.	$AL 1$	Setting range: Deviation alarm (F-S to F-S), Absolute value alarm (temperature range) In case alarm operation mode [$AL - 1$, $AL - 2$] of Parameter 2 group [$RA0$], [$SbRA$], [$LbRA$], no parameters is displayed.
AL2 alarm temp.	$AL 2$	Setting range: Deviation alarm (F-S to F-S), Absolute value alarm (temperature range) In case alarm operation mode [$AL - 1$, $AL - 2$] of Parameter 2 group [$RA0$], [$SbRA$], [$LbRA$], no parameters is displayed.
Auto tuning	Rt	Setting range: 0.1 to 999.9 $^{\circ}C/^{\circ}F$
Proportional band	P	Setting range: 0 to 9999 sec. Integral operation is OFF when set value is "0".
Integral time	I	Setting range: 0 to 9999 sec. Derivative operation is OFF when set value is "0".
Derivative time	d	Setting range: 0.0 to 100.0% / It is displayed in P/PD control.
Manual reset	$rE5t$	Setting range: 0.0 to 100.0% / It is displayed in P/PD control.
Hysteresis	$H5$	Setting range: • $ECRH, JI, CH, LI, CL, t, CCH, rPr, Sp, dPEH, CUSH: 1$ to $100^{\circ}C/^{\circ}F$ • $ECRL, JI, CL, LI, CL, t, CCL, dPEL, CUSL: 0.1$ to $50.0^{\circ}C/^{\circ}F$ * It is displayed when control type [$C - nd$] of parameter 2 group is set $OnoF$.

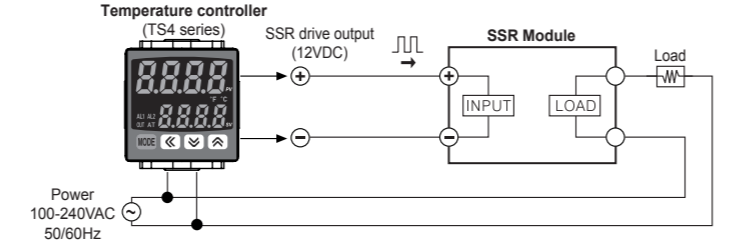
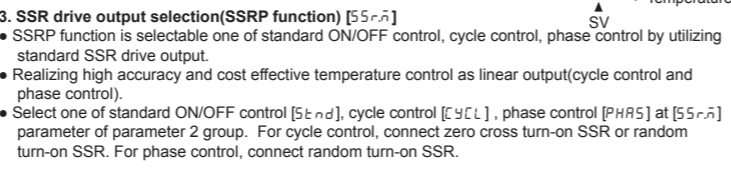


5. Parameter reset
Reset all parameters as factory default. Hold the front $\text{[MODE]} + \text{[MEMO]} + \text{[F1]}$ keys for 5 sec., to enter parameter reset [$n - t$] parameter. Select 'YES' and all parameters are reset as factory default. Select 'no' and previous settings are maintained. If setting parameter lock [LoC] or processing auto-tuning, parameter reset is unavailable.

Functions

1. Auto tuning [Rt]
Auto tuning measures the control subject's thermal characteristics and thermal response rate, and then determines the necessary PID time constant. (When control type [$C - nd$] is set as $PI d$, it is displayed.) Application of the PID time constant realizes fast response and high precision temperature control. If error [dPE] occurs during auto tuning, it stops this operation automatically. To stop auto tuning, change the set as [oFF]. (It maintains P, I, D values of before auto tuning.)

2. Hysteresis [H5]
In case of ON/OFF control, set between ON and OFF intervals as hysteresis. (When control type [$C - nd$] is set as $OnoF$, it is displayed.) If hysteresis is too small, it may cause control output hunting (takeoff, chattering) by external noise, etc.



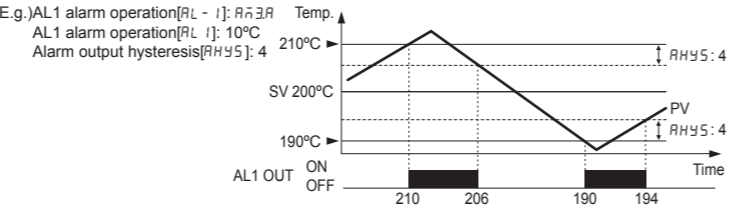
3. SSR drive output selection (SSRP function) [S5r]
SSRP function is selectable one of standard ON/OFF control, cycle control, phase control by utilizing standard SSR drive output.
• Realizing high accuracy and cost effective temperature control as linear output (cycle control and phase control).
• Select one of standard ON/OFF control [$S5r$], cycle control [$CyCL$], phase control [$PHAS$] at [$S5r$] parameter of parameter 2 group. For cycle control, connect zero cross turn-on SSR or random turn-on SSR. For phase control, connect random turn-on SSR.

1) Standard ON/OFF control mode [S5r]
A mode to control the load in the same way as Relay output type. (ON: output level 100%, OFF: output level 0%)

2) Cycle control mode [CyCL]
A mode to control the load by repeating output ON / OFF according to the rate of output within setting cycle. Having improved ON / OFF noise feature by Zero Cross type.

3) Phase control mode [PHAS]
A mode to control the load by controlling the phase within AC half cycle. Serial control is available. RANDOM Turn-on type SSR must be used for this mode.

4. Alarm output hysteresis [AH5]
It displays alarm output ON and OFF interval and hysteresis is applied to both AL1 OUT and AL2 OUT.
• $ECRH, JI, CH, LI, CL, t, CCH, rPr, Sp, dPEH, CUSH: 1$ to 100
• $ECRL, JI, CL, LI, CL, t, CCL, dPEL, CUSL: 0.1$ to 50.0



5. Digital input key [dI - t] 3sec.

Parameter	Operation
OFF	oFF It does not use digital input key function.
RUN/STOP	$S5oP$ Pauses control output. Auxiliary output (except loop break alarm, sensor break alarm) except Control output operates as setting. Hold the digital input keys for 3 sec. to restart. Digital input key (t: over 3 sec.)
Clear alarm	$AL - E$ Clears alarm output by force. (only when alarm option is alarm latch, or alarm latch and standby sequence 1/2.) This function is applied when present value is out of alarm operation range but alarm output is ON. Alarm operates normally right after clearing alarm.
Auto-tuning	Rt Starts/Stops auto-tuning. This function is same as auto-tuning [Rt] of parameter 1 group. (You can start auto-tuning [Rt] of parameter 1 group and stop it by digital input key.) * This parameter Rt appears only when control method [$C - nd$] parameter 2 group is set as $PI d$. When control method [$C - nd$] parameter 2 group is set as $OnoF$, this parameter is changed as oFF .

6. Alarm
Set both alarm operation and alarm option by combining. Alarm outputs are two and each one operates individually. When the current temperature is out of alarm range, alarm clears automatically. If alarm option is alarm latch or alarm latch and standby sequence 1/2, press digital input key [$dI - t$] 3 sec., digital input key [$dI - t$] of parameter 2 group set as $AL - E$, or turn OFF the power and turn ON to clear alarm.

Mode	Name	Alarm operation	Description
$RA0$	—	—	No alarm output
$RA1$	Deviation high-limit alarm	OFF \downarrow H \uparrow ON High deviation: Set as 10°C	If deviation between PV and SV as high-limit is higher than set value of deviation temperature, the alarm output will be ON.
$RA2$	Deviation low-limit alarm	ON \downarrow H \uparrow OFF Low deviation: Set as 10°C	If deviation between PV and SV as low-limit is higher than set value of deviation temperature, the alarm output will be ON.
$RA3$	Deviation high/low-limit alarm	ON \downarrow H \uparrow OFF High/Low deviation: Set as 10°C	If deviation between PV and SV as high/low-limit is higher than set value of deviation temperature, the alarm output will be ON.
$RA4$	Deviation high/low-limit reserve alarm	OFF \downarrow H \uparrow ON High/Low deviation: Set as 10°C	If deviation between PV and SV as high/low-limit is higher than set value of deviation temperature, the alarm output will be OFF.
$RA5$	Absolute value high limit alarm	OFF \downarrow H \uparrow ON Absolute-value Alarm: Set as 90°C	If PV is higher than the absolute value, the output will be ON.
$RA6$	Absolute value low limit alarm	ON \downarrow H \uparrow OFF Absolute-value Alarm: Set as 110°C	If PV is lower than the absolute value, the output will be ON.
$SbRA$	Sensor break alarm	—	It will be ON when it detects sensor disconnection.
$LbRA$	Loop break alarm	—	It will be ON when it detects loop break.

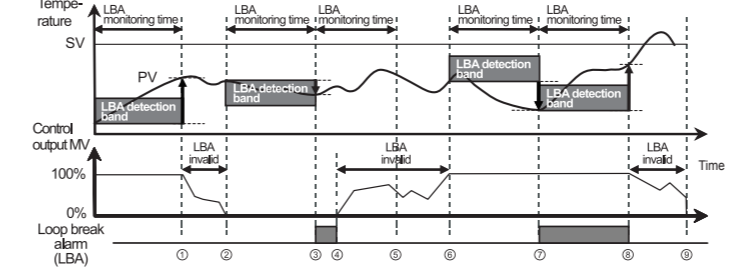
* H: Alarm output hysteresis [AH5]
2) Alarm option

Option	Name	Description
$RAOR$	Standard alarm	If it is an alarm condition, alarm output is ON. If it is a clear alarm condition, alarm output is OFF.
$RAOb$	Alarm latch	If it is an alarm condition, alarm output is ON and maintains ON status. (Alarm output HOLD)
$RAOc$	Standby sequence 1	First alarm condition is ignored and from second alarm condition, standard alarm operates. When power is supplied and it is an alarm condition, this first alarm condition is ignored and from the second alarm condition, standard alarm operates.
$RAOd$	Alarm latch and standby sequence 1	If it is an alarm condition, it operates both alarm latch and standby sequence. When power is supplied and it is an alarm condition, this first alarm condition is ignored and from the second alarm condition, alarm latch operates.
$RAOe$	Standby sequence 2	First alarm condition is ignored and from second alarm condition, standard alarm operates. When re-applied standby sequence and if it is alarm condition, alarm output does not turn ON. After clearing alarm condition, standard alarm operates.
$RAOf$	Alarm latch and standby sequence 2	Basic operation is same as alarm latch and standby sequence 1. It operates not only by power ON/OFF, but also alarm setting value, or alarm option changing. When re-applied standby sequence and if it is alarm condition, alarm output does not turn ON. After clearing alarm condition, alarm latch operates.

* Condition of re-applied standby sequence for standby sequence 1, alarm latch and standby sequence 1: Power ON
Condition of re-applied standby sequence for standby sequence 2, alarm latch and standby sequence 2: Power ON, changing set temperature, alarm temperature ($AL 1$, $AL 2$) or alarm operation ($AL - 1$, $AL - 2$), switching STOP mode to RUN mode.

3) Sensor break alarm
The function that alarm output will be ON when sensor is not connected or when sensor's disconnection is detected during temperature controlling. You can check whether the sensor is connected with buzzer or other units using alarm output contact. It is selectable between standard alarm [$SbRA$] or alarm latch [$SbRA$].

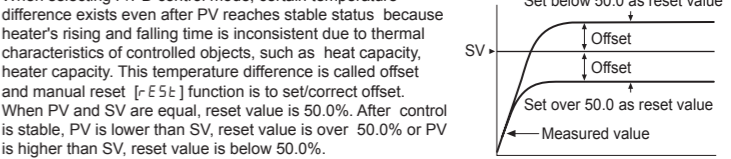
4) Loop break alarm (LBA)
It checks control loop and outputs alarm by temperature change of the subject. For heating control (cooling control), when control output MV is 100% (0% for cooling control) and PV is not increased over than LBA detection band [$LbRb$] during LBA monitoring time [$LbRt$], or when control output MV is 0% (100% for cooling control) and PV is not decreased below LBA detection band [$LbRb$] during LBA monitoring time [$LbRt$], alarm output turns ON.



Start control to	Operation
①	When control output MV is 100%, PV is increased over than LBA detection band [$LbRb$] during LBA monitoring time [$LbRt$].
① to ②	The status of changing control output MV (LBA monitoring time is reset.)
② to ③	When control output MV is 0% and PV is not decreased below LBA detection band [$LbRb$] during LBA monitoring time [$LbRt$], loop break alarm (LBA) turns ON after LBA monitoring time.
③ to ④	Control output MV is 0% and loop break alarm (LBA) turns and maintains ON.
④ to ⑥	The status of changing control output MV (LBA monitoring time is reset.)
⑥ to ⑦	When control output MV is 100% and PV is not increased over than LBA detection band [$LbRb$] during LBA monitoring time [$LbRt$], loop break alarm (LBA) turns ON after LBA monitoring time.
⑦ to ⑧	When control output MV is 100% and PV is increased over than LBA detection band [$LbRb$] during LBA monitoring time [$LbRt$], loop break alarm (LBA) turns OFF after LBA monitoring time.
⑧ to ⑩	The status of changing control output MV (LBA monitoring time is reset.)

* When executing auto-tuning, LBA detection band [$LbRb$] and LBA monitoring time are automatically set based on auto tuning value. When alarm operation mode [$AL - 1$, $AL - 2$] is set as loop break alarm (LBA) [$LbRA$], LBA detection band [$LbRb$] and LBA monitoring time [$LbRt$] parameter is displayed.

7. Manual reset [rE5t]
When selecting P/PD control mode, certain temperature difference exists even after PV reaches stable status because heater's rising and falling time is inconsistent due to thermal characteristics of controlled objects, such as heat capacity, heater capacity. This temperature difference is called offset and manual reset [$rE5t$] function is to set/correct offset. When PV and SV are equal, reset value is 50.0%. After control is stable, PV is lower than SV, reset value is over 50.0% or PV is higher than SV, reset value is below 50.0%.



8. Input correction [i n - b]
Controller itself does not have errors but there may be error by external input temperature sensor. This function is for correcting this error.
E.g.) If actual temperature is 80°C but controller displays 78°C, set input correction value [$i n - b$] as '002' and controller displays 80°C.

* As the result of input correction, if current temperature value (PV) is over each temperature range of input sensor, it displays 'HHHH' or 'LLLL'.

9. Input digital filter [nRdF]
If current temperature (PV) is fluctuating repeatedly by rapid change of input signal, it reflects to MV and stable control is impossible. Therefore, digital filter function stabilizes current temperature value. For example, set input digital filter value as 0.4 sec, and it applies digital filter to input values during 0.4 sec and displays this values. Current temperature may be different by actual input value.

Display	Description	Troubleshooting
$oPE n$	Flashes if input sensor is disconnected or sensor is not connected.	Check input sensor state.
HHHH	Flashes if measured sensor input is higher than temperature range.	When input is within the rated temperature range, this display disappears.
LLLL	Flashes if measured sensor input is lower than temperature range.	

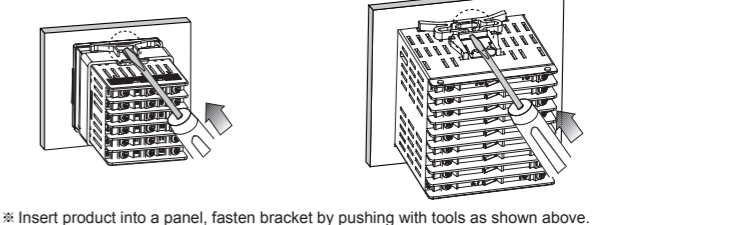
Factory Default

Parameter	Default	Parameter	Default	Parameter	Default	Parameter	Default
$RA 1$	1250	$AL 2$	1250	$AL 1$	1250	$AL 2$	1250
$AL 1$	1250	$AL 2$	1250	$AL 1$	1250	$AL 2$	1250

Parameter	Default	Parameter	Default	Parameter	Default	Parameter	Default
$i n - t$	$ECRH$	$H - 5u$	1200	t	0200	$LbRb$	0002
$U n - t$	$0C$	$o - Ft$	$HErE$	$AL - 1$	$RA1A$	$dI - t$	5t0P
$i n - b$	0000	$C - nd$	$PI d$	$AL - 2$	$RA2A$	$Ernu$	0000
$nRdF$	000.1	oUt	rLy	$AH5$	00.1	LoC	oFF
$L - 5u$	-05.0	$S5r$	$S5r$	$S5r$	0000	$LbRA$	0000

* The AC/DC voltage models do not have SSR drive output method [$S5r$]. In case of control output [oUt], if set as $S5r$, it supports only ON/OFF output.

Installation



* Insert product into a panel, fasten bracket by pushing with tools as shown above.

Cautions during Use

- Follow instructions in 'Cautions during Use'. Otherwise, it may cause unexpected accidents.
- 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.
- 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 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.
- Do not use the unit for other purpose (e.g. voltmeter, ammeter), but temperature controller.
- When changing the input sensor, turn off the power first before changing.
After changing the input sensor, modify the value of the corresponding parameter.
- 24VAC, 24-48VDC power supply should be insulated and limited voltage/current or Class 2, SELV power supply device.
- 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.
- This unit may be used in the following environments.
① Indoors (in the environment condition rated in 'Specifications')
② Altitude max. 2,000m
③ Pollution degree 2
④ Installation category II

Major Products

- Photoelectric Sensors
- Fiber Optic Sensors
- Door Sensors
- Door Side Sensors
- Area Sensors
- Proximity Sensors
- Pressure Sensors
- Rotary Encoders
- Connector/Sockets
- 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
- Temperature Controllers
- Temperature/Humidity Transducers
- SSRs/Power Controllers
- Counters
- Timers
- Panel Meters
- Tachometer/Pulse (Rate) Meters
- Display Units
- Sensor Controllers