DRW170775AA

Autonics

TEMPERATURE CONTROLLER
TC4 Series

INSTRUCTION MANUAL

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

▣ Safety Considerations

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

※Safety considerations are categorized as follows.
⚠**Warning** Failure to follow these instructions may result in serious injury or death.
⚠**Caution** Failure to follow these instructions may result in personal injury or product damage.

※The symbols used on the product and instruction manual represent the following
⚠ symbol represents caution due to special circumstances in which hazards may occur.

⚠Warning

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

⚠Caution

1. **When connecting the power input and relay output, use AWG 20(0.50mm²) cable or over and tighten the terminal screw with a tightening torque of 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.
2. **Use the unit within the rated specifications.**
   Failure to follow this instruction may result in fire or product damage.
3. **Use dry cloth to clean the unit, and do not use water or organic solvent.**
   Failure to follow this instruction may result in electric shock or fire.
4. **Do not use the unit in the place where flammable/explosive/corrosive gas, humidity, direct sunlight, radiant heat, vibration, impact, or salinity may be present.**
   Failure to follow this instruction may result in fire or explosion.
5. **Keep metal chip, dust, and wire residue from flowing into the unit.**
   Failure to follow this instruction may result in fire or product damage.

▣ Ordering Information

T	C	4	S	-	1	4	R

Control output	**N**	Indicator - Without control output
	R	Relay output+SSR drive output※1
Power supply	**2**	24VAC 50/60Hz, 24-48VDC
	4	100-240VAC 50/60Hz
Sub output	**N**	No alarm output
	1	Alarm1 output
	2	Alarm1 + Alarm2 output※2
Size	**S**	DIN W48 × H48mm (terminal block type)
	SP	DIN W48 × H48mm (11pin plug type)※3
	Y	DIN W72 × H36mm
	M	DIN W72 × H72mm
	H	DIN W48 × H96mm
	W	DIN W96 × H48mm
	L	DIN W96 × H96mm
Digit	**4**	9999 (4 Digit)
Setting type	**C**	Set by touch switch
Item	**T**	Temperature controller

※**1:** In case of the AC voltage model, SSR drive output method (standard ON/OFF control, cycle control, phase control) is available to select.
※**2:** It is unavailable for TC4SP, TC4Y.
※**3:** Sockets for TC4SP (PG-11, PS-11(N)) are sold separately.

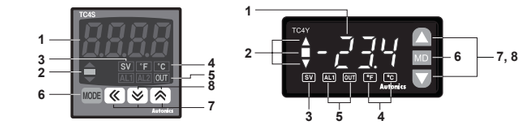
※The above specifications are subject to change and some models may be discontinued without notice.
※Be sure to follow cautions written in the instruction manual and the technical descriptions (catalog, homepage).

▣ Specifications

Series		TC4 Series TC4S	TC4SP	TC4Y	TC4M	TC4W	TC4H	TC4L
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. 5VA (24VAC 50/60Hz), Max. 3W (24-48VDC)						
Display method		7Segment (Red), Other display (Green, Yellow, Red LED)						
Character size (W×H)		7.0×15.0mm		7.4×15.0mm	9.5×20.0mm	9.5×20.0mm	7.0×14.6mm	11.0×22.0mm
Input type	RTD	DPt100Ω, Cu50Ω (Allowable line resistance max.5Ω per a wire)						
	TC	K (CA), J (IC), L (IC)						
Display accuracy※1	RTD	• At room temperature (23℃±5℃): (PV ±0.5% or ±1℃, select the higher one) ±1digit • Out of room temperature range: (PV ±0.5% or ±2℃, select the higher one) ±1digit						
	TC	※ For TC4SP, add ±1℃ by accuracy standard.						
Control output	Relay	250VAC～ 3A 1a						
	SSR	12VDC⎓ ± 2V 20mA Max.						
Alarm output		AL1, AL2 Relay: 250VAC～ 1A 1a (※TC4SP, TC4Y have AL1 only.)						
Control method		ON/OFF and P, PI, PD, PID control						
Hysteresis		1 to100℃/℉ (0.1 to 50.0℃/℉) variable						
Proportional band (P)		0.1 to 999.9℃/℉						
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	2,000VAC 50/60Hz for 1min. (between input terminal and power terminal)						
	AC/DC Power	1,000VAC 50/60Hz for 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: Min. 5,000,000 operations, AL1/2: Min. 5,000,000 operations						
	Electrical	OUT: Min. 200,000 operations (250VAC 3A resistive load), AL1/2: Min. 300,000 operations (250VAC 1A resistive load)						
Insulation resistance		Min. 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 temp.	-10 to 50℃, Storage: -20 to 60℃						
	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 cULus						
Weight※2		Approx. 141g (approx. 94g)	Approx. 123g (approx. 76g)	Approx. 174g (approx. 85g)	Approx. 204g (approx. 133g)	Approx. 194g (approx. 122g)	Approx. 194g (approx. 122g)	Approx. 254g (approx. 155g)

※1: Thermocouple L (IC) type, RTD Cu50Ω
• At room temperature (23℃ ±5℃): (PV ±0.5% or ±2℃, select the higher one) ±1digit
• Out of room temperature range: (PV ±0.5% or ±3℃, select the higher one) ±1digit
In case of TC4SP Series, ±1℃ will be added.
※2: The weight includes packaging. The weight in parentheses is for unit only.
※Environment resistance is rated at no freezing or condensation.

▣ Unit Description



1. Present temperature (PV) display
• RUN mode: Present temperature (PV) display.
• Parameter setting mode: Parameter or parameter setting valuedisplay.

2. Deviation indicator, Auto-tuning indicator
It shows current temperature (PV) deviation based on set temperature (SV) by LED.

No.	PV deviation temp.	Deviation display
1	Over 2℃	▲ indicator ON
2	Below ±2℃	■ indicator ON
3	Under -2℃	▼ indicator ON

The deviation indicators (▲ ■ ▼) flash by every 1 sec. when operating auto tuning.

3. Set temperature (SV) indicator
Press any front key once to check or change current set temperature (SV), the set temperature (SV) indicator is ON and preset set value is flashed.

4. Temperature unit (℃/℉) indicator
It shows current temperature unit.

5. Control/alarm output indicator
• OUT: It will turn ON when control output (Main Control Output) is ON.
※In case of CYCLE/PHASE control of SSR drive output, it will turn ON when MV is over 3.0%. (only for AC power type)
• AL1/AL2: It will light up when alarm output Alarm1/ Alarm2 are on.

6. MODE key
Used when entering into parameter group, returning to RUN mode, moving parameter, and saving setting values.

7. Adjustment
Used when entering into set value change mode, digit moving and digit up/down.

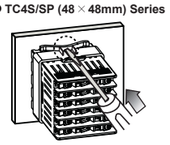
8. FUNCTION key
Press ▽+△ keys for 3 sec. to operate function (RUN/STOP, alarm output cancel, auto-tunning) set in inner parameter [dI -Y].
※Press ▽+△ keys at the same time in set value operation to move digit.

▣ Input Sensor and Temperature Range [in-t]

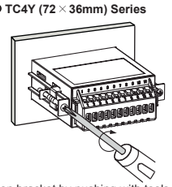
Input sensor		Display	Temperature range (℃)	Temperature range (℉)
Thermocouple	K (CA)	K CA	-50 to 1200	-58 to 2192
	J (IC)	J IC	-30 to 500	-22 to 932
	L (IC)	L IC	-40 to 800	-40 to 1472
RTD	DPt100Ω	dPt.H	-100 to 400	-148 to 752
		dPt.L	-100.0 to 400.0	-148.0 to 752.0
	Cu50Ω	Cu5H	-50 to 200	-58 to 392
		Cu5L	-50.0 to 200.0	-58.0 to 392.0

▣ Installation

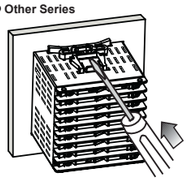
● **TC4S/SP (48 × 48mm) Series**



● **TC4Y (72 × 36mm) Series**



● **Other Series**

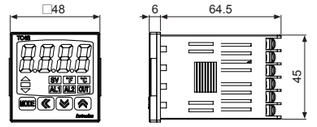


※Mount the product on the panel, fasten bracket by pushing with tools as shown above.
(In case of TC4Y, fasten bolts for bracket.)

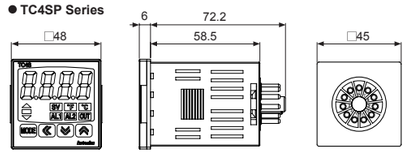
▣ Dimensions

(unit: mm)

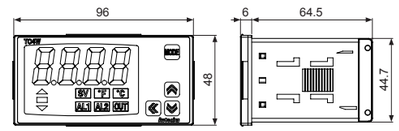
● **TC4S Series**



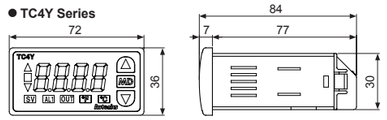
● **TC4SP Series**



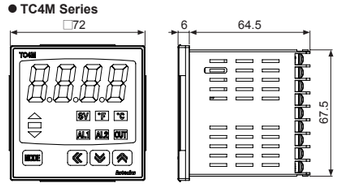
● **TC4W Series**



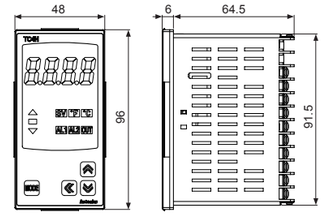
● **TC4Y Series**



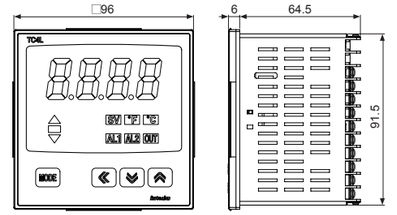
● **TC4M Series**



● **TC4H Series**

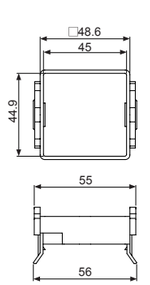


● **TC4L Series**

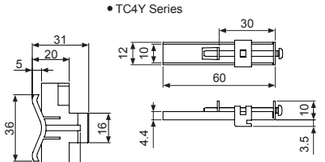


● **Bracket**

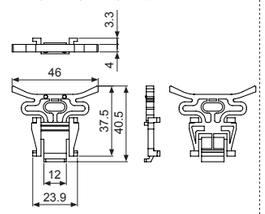
● TC4S/TC4SP Series



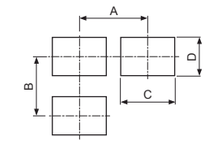
● TC4Y Series



● TC4M, TC4W, TC4H, TC4L Series



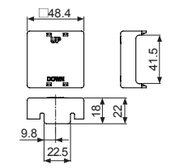
● **Panel cut-out**



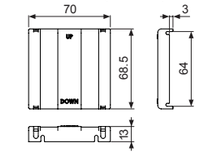
Size / Model	A	B	C	D
TC4S	Min. 65	Min. 65	45$^{+0.6}_{0}$	45$^{+0.6}_{0}$
TC4SP	Min. 65	Min. 65	45$^{+0.6}_{0}$	45$^{+0.6}_{0}$
TC4Y	Min. 91	Min. 40	68$^{+0.7}_{0}$	31.5$^{+0.5}_{0}$
TC4M	Min. 90	Min. 90	68$^{+0.7}_{0}$	68$^{+0.7}_{0}$
TC4H	Min. 65	Min. 115	45$^{+0.6}_{0}$	92$^{+0.8}_{0}$
TC4W	Min. 115	Min. 65	92$^{+0.8}_{0}$	45$^{+0.6}_{0}$
TC4L	Min. 115	Min. 115	92$^{+0.8}_{0}$	92$^{+0.8}_{0}$

● **Terminal cover (sold separately)**

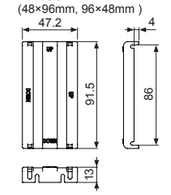
● RSA-COVER (48×48mm)



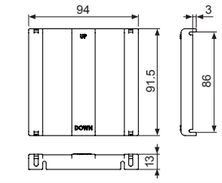
● RMA-COVER (72×72mm)



● RHA-COVER (48×96mm, 96×48mm)



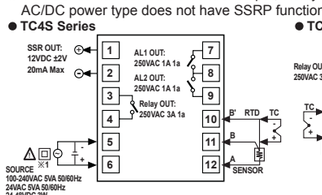
● RLA-COVER (96×96mm)



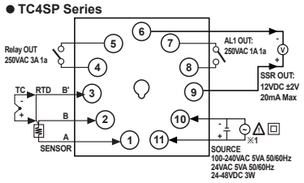
▣ Connections

※TC4 Series has selectable control output; Relay output, and SSR drive output. AC/DC power type does not have SSRP function.

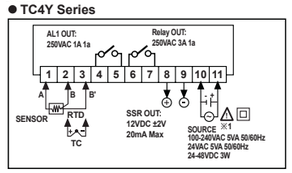
● **TC4S Series**



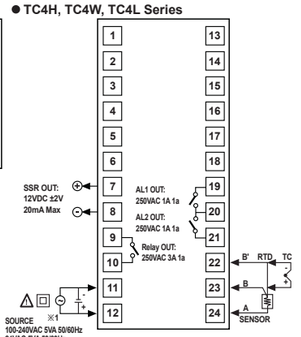
● **TC4SP Series**



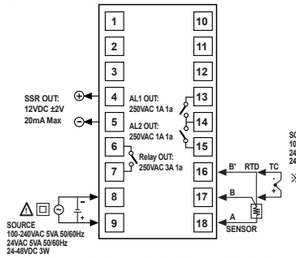
● **TC4Y Series**



● **TC4H, TC4W, TC4L Series**

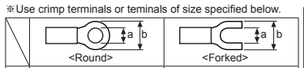


● **TC4M Series**

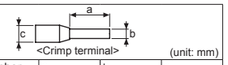


※1: AC power: 100-240VAC 5VA 50/60Hz
AC/DC power: 24VAC 5VA 50/60Hz
24-48VDC 3W

※Use crimp terminals or teminals of size specified below.



	<Round>	<Forked>
a	Min. 3.0mm	Min. 3.0mm
b	Max.5.8mm	Max.5.8mm

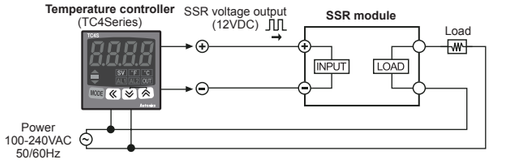


(unit: mm)

Terminal number	a	b	c
1 to N	6	Max. 1.9	Max. 4.0

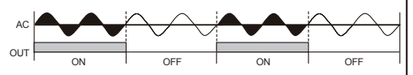
▣ SSR Drive Output Selection Function (SSRP Function)[SSrn]

- 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 [Stnd], cycle control [CYCL] , phase control [PHAS] at [SSrn] parameter of Parameter group 2. For cycle control, connect zero cross turn-on SSR or random turn-on SSR. For phase control, connect random turn-on SSR.

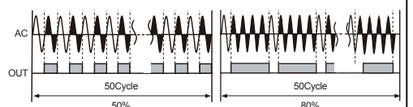


※When selecting cycle or phase control mode, **the power supply for a load and a temperature controller must be the same.**
※In case of selecting cycle [CYCL] or phase [PHAS] control mode for PID control, control cycle [t] is not allowed to set.
※For AC/DC power model (TC4□-□2R), this parameter [SSrn] is not displayed and it is available only standard control by relay or SSR.

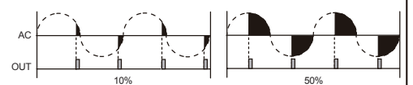
1)Standard ON/OFF control [Stnd]
A mode to control the load in the same way as Relay output type.
(ON: output level 100%,
OFF: output level 0%)



2)Cycle control [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 [PHAS]
A mode to control the load by controlling the phase within AC half cycle. Serial control is available.
Random turn-on SSR must be used for this mode.



■ Parameter Groups

RUN mode

Press any key among MODE, ≪, ≫, ≪. ① → SV setting

② MODE 2sec. → Parameter group 1 [PAr 1] → MODE 3sec.

③ MODE 4sec. → Parameter group 2 [PAr 2] → MODE 3sec.

⑤

④

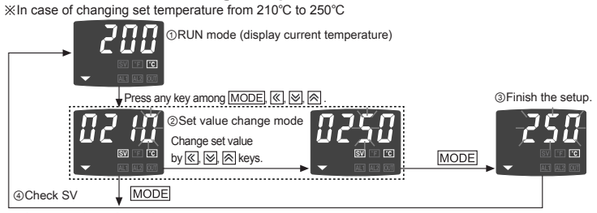
AL 1	AL1 alarm temperature
AL2	AL2 alarm temperature
AT	Auto tuning
P	Proportional band
I	Integral time
d	Derivative time
rEST	Manual reset (Normal deviation correction)
HYS	ON/OFFcontrol hysteresis

In-t	Input type
Unit	Temperature unit
In-b	Input correction
nAvF	Input digital filter
L-SU	SV low-limit value
H-SU	SV high-limit value
o-Ft	Control output operation
C-Ad	Control type
oUt	Control output
SSr.n	SSR drive output method※1
t	Control cycle
AL-1	AL1 alarm operation mode
AL-2	AL2 alarm operation mode
AHYS	Alarm output hysteresis
LbAt	LBA monitoring time
LbAb	LBA detection range
di-E	Digital input key
Er.nu	Control output MV in case of input break error
LoC	Parameter lock

※1: It is not displayed for AC/DC power model (TC4□-□2R).
※If no key entered for 30 sec., it returns to RUN mode automatically and the set value of parameter is not be saved.
※: This parameter might not be displayed depending on other parameter settings.
① Press any key once in RUN mode, it advances to set value setting group.
② Press MODE key over 2sec. in RUN mode, it advances to parameter group 1.
③ Press MODE key over 4sec. in RUN mode, it advances to Parameter group 2.
④ First parameter will be displayed on viewer when it advances to the setting group.
⑤ Press MODE key over 3sec. in the setting group, it returns to RUN mode.
※Exception: Press MODE key once in SV setting group it returns to RUN mode.
※Press MODE key again within a sec after return to RUN mode by press MODE key over 3sec., it advances to the first parameter of previous setting group.
※Parameter setup Parameter group 2 → Parameter group 1 → SV setting
• Set parameter as the above considering parameter relation of each setting group.
• Check parameter set value after change parameter of Parameter group 2.
※Indicator model (TC4□-N□N)displays shaded parameter ( ) of Parameter group 2.
※AL-1, AL-2 parameters of Parameter group 2 is decided whether to display according by alarm output type.
※If alarm operation mode[AL-1, AL-2] of Parameter group 2 is set to AnO_/ SbA□ / LbA□, AHYS parameter is not displayed.

● Flow Chart For SV Setting Group

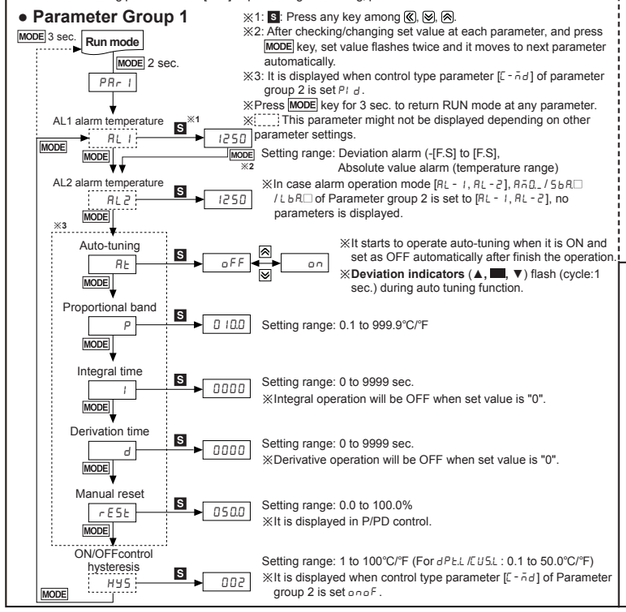
※In case of changing set temperature from 210℃ to 250℃



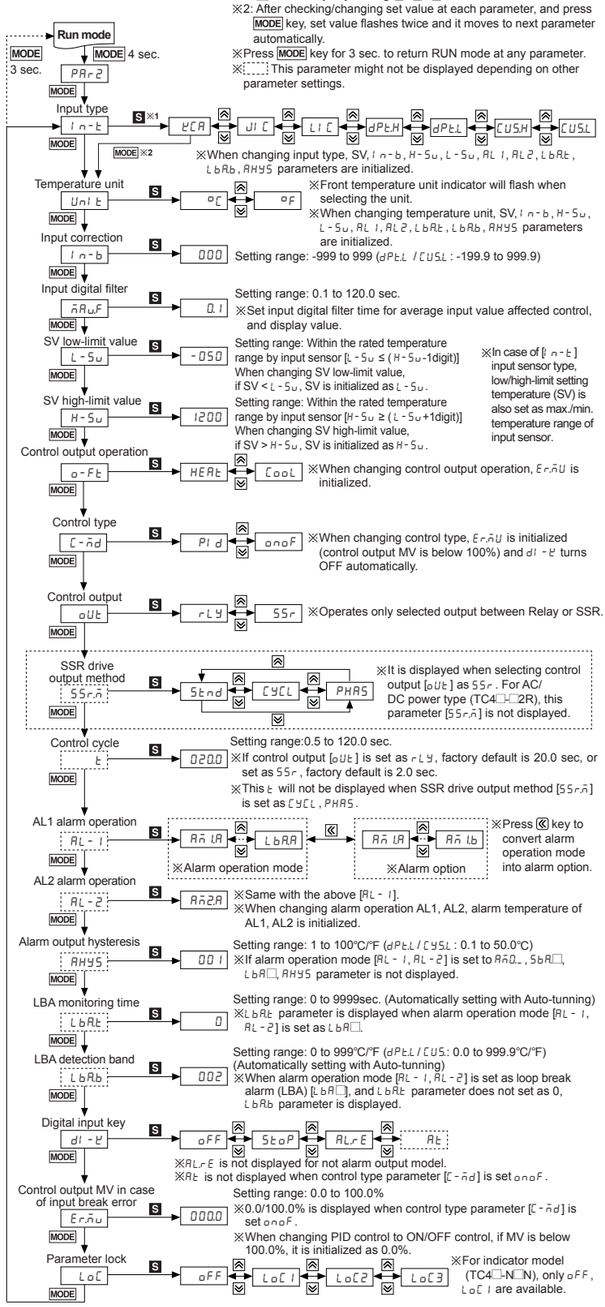
● Parameter Reset

Reset all parameters as factory default. Hold the front ≪+≫+≪ keys for 5 sec., to enter parameter reset [Init] 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.

● Parameter Group 1



● Parameter Group 2



■ Factory Default

● SV setting

Parameter	Factory default
–	0

● Parameter Group 1

Parameter	Factory default
AL 1	1250
AL2	
AT	oFF
P	0.100
I	0000
d	
rESt	050.0
HYS	002

● Parameter Group 2

Parameter	Factory default	Parameter	Factory default
In-t	tCA	t	020.0
Unit	°C	AL-1	AnlA
In-b	0000		
nAvF	000.1	AL-2	An2A
L-SU	-050	AHYS	000.1
H-SU	1200	LbAt	0000
o-Ft	HEAt	LbAb	002
C-Ad	Pid	di-E	StoP
oUt	rLY	Er.nu	000.0
SSr.n	Stnd	LoC	oFF

※AC/DC power type has no SSR drive output method [SSr.n] and supports only ON/OFF output when selecting SSr in control output [oUt].

■ Alarm [AL-1/AL-2]

AnA.tA
Alarm operation / Alarm option

Set both alarm operation and alarm option by combining. Each alarm operates individually in two alarm output models. 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(≪+≫ 3 sec., digital input key[di-E] of Parameter group 2 set as ALrE), or turn OFF the power and turn ON to clear alarm.

1)Alarm operation

Mode	Name	Alarm operation		Description
AnO_	—	—		No alarm output
An1□	Deviation high-limit alarm	OFF H ON; PV 90℃ SV 100℃ High deviation: Set as 10℃	OFF H ON; PV 90℃ SV 100℃ High deviation: Set as -10℃	If deviation between PV and SV as high-limit is higher than set value of deviation temperature, the alarm output will be ON.
An2□	Deviation low-limit alarm	ON H OFF; PV 90℃ SV 100℃ Lower deviation: Set as 10℃	ON H OFF; SV 100℃ PV 110℃ Lower deviation: Set as -10℃	If deviation between PV and SV as low-limit is higher than set value of deviation temperature, the alarm output will be ON.
An3□	Deviation high/low-limit alarm	ON H OFF OFF H ON; PV 90℃ SV 100℃ PV 110℃ High/Lower deviation: Set as 10℃		If deviation between PV and SV as high/low-limit is higher than set value of deviation temperature, the alarm output will be ON.
An4□	Deviation high/low-limit reserve alarm	OFF H ON H OFF; PV 90℃ SV 100℃ PV 110℃ High/Lower deviation: Set as 10℃		If deviation between PV and SV as high/low-limit is higher than set value of deviation temperature, the alarm output will be OFF.
An5□	Absolute value high limit alarm	OFF H ON; PV 90℃ SV 100℃ Absolute-value Alarm: Set as 90℃	OFF H ON; SV 100℃ PV 110℃ Absolute-value Alarm: Set as 110℃	If PV is higher than the absolute value, the output will be ON.
An6□	Absolute value low limit alarm	ON H OFF; PV 90℃ SV 100℃ Absolute-value Alarm: Set as 90℃	ON H OFF; SV 100℃ PV 110℃ Absolute-value Alarm: Set as 110℃	If PV is lower than the absolute value, the output will be ON.
SbA□	Sensor break alarm	—		It will be ON when it detects sensor disconnection.
LbA□	Loop break alarm	—		It will be ON when it detects loop break.

※ H: Alarm output hysteresis[AHYS]

2)Alarm opetion

Option	Name	Description
An□A	Standard alarm	If it is an alarm condition, alarm output is ON. If it is a clear alarm condition, alarm output is OFF.
An□b	Alarm latch	If it is an alarm condition, alarm output is ON and maintains ON status. (Alarm output HOLD)
An□C	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.
An□d	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.
An□E	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.
An□F	Alarm latch and standby sequence 2	Basic operation is same as alarm latch and standby sequence1. 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.

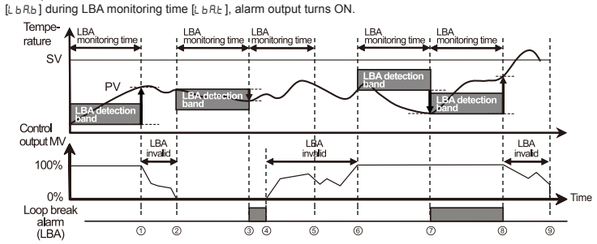
※ Condition of re-applied standby sequence for standby sequence 1, alarm latch and standby sequence 1: Power ON
Condition of re-applied standby sequence for standby sequence 2, alarm latch and standby sequence 2: Power ON, changing set temperature, alarm temperature [AL 1, AL2] or alarm operation [AL-1, 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 [SbAA] or alarm latch [SbAb].

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 [LbAb] during LBA monitoring time [LbAt], or when control output MV is 0% (100% for cooling control) and PV is not decreased below than LBA detection band [LbAb] during LBA monitoring time [LbAt], alarm output turns ON.



Start control to ①	When control output MV is 100%, PV is increased over than LBA detection band [LbAb] during LBA monitoring time [LbAt].
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 than LBA detection band [LbAb] during LBA monitoring time [LbAt], 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 [LbAb] during LBA monitoring time [LbAt], 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 [LbAb] during LBA monitoring time [LbAt], loop break alarm (LBA) turns OFF after LBA monitoring time.
⑧ to ⑨	The status of changing control output MV (LBA monitoring time is reset.)

※When executing auto-tuning, LBA detection band[LbAb] 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)[LbA□], LBA detection band [LbAb] and LBA monitoring time [LbAt] parameter is displayed.

■ Input Correction [In-b]

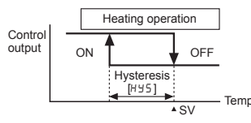
Controller itself does not have errors but there may be error by external input temperature sensor. This function is for correcting this error.
E.g.) If actual temperature is 80℃ but controller displays 78℃, set input correction value [In-b] as '002' and controller displays 80℃.
※As the result of input correction, if current temperature value (PV) is over each temperature range of input sensor, it displays 'HHHH' or 'LLLL'.

■ Input Digital Filter [nAvF]

If current temperature (PV) is fluctuating repeatedly by rapid change of input signal, it refl ects 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.

■ Hysteresis [HYS]

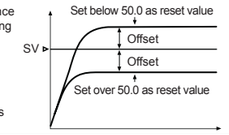
- If Hysteresis is too narrow, hunting (oscillation, chattering) could occur due to external noise.
- In case of ON / OFF control mode, even if PV reaches stable status, there still occurs hunting. It could be due to Hysteresis [HYS] SV, load's response characteristics or sensor's location. In order to reduce hunting to a minimum, it is required to take into following factors consideration when designing temp. controlling; proper Hysteresis [HYS], heater's capacity, thermal characteristics, sensor's response and location.



■ Manual Reset [rESt]

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 [rESt] 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%.

●Manual reset [rESt] by control result



■ Digital Input Key (≪ + ≪ 3sec.) [di-E]

Parameter		Operation
OFF	oFF	It does not use digital input key function.
RUN/STOP	StoP	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.) RUN STOP RUN STOP RUN
Clear alarm	AL.rE	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	AT	Starts/Stops auto-tuning. This function is same as auto-tuning[AT] of parameter group 1. (You can start auto-tuning [AT] of parameter group 1 and stop it by digital input key.) ※This parameter AT appears only when control method [C-Ad] Parameter group 2 is set as Pid. When control method [C-Ad] Parameter group 2 is set as onoF, this parameter is changed as oFF.

■ Control Output MV When Input Sensor Line Is Broken [Er.nu]

The function to set control output MV in case of open error. Users are able to set by ON/OFF setting or MV setting. It executes control output by set MV regardless of ON/OFF or PID control output.

■ Parameter Lock [LoC]

A function to prevent changing SV and parameters of each setting group. Parameter setting values are still possible to check when parameter lock is set.
※ oFF, Lo.1 are available only for indicator (TC4□-N□N).

Display	Description
oFF	Unlock
Lo.1	Lock parameter group 2
Lo.2	Lock parameter group 1, 2
Lo.3	Lock parameter group 1, 2, SV setting

■ Error

Display	Description	Troubleshooting
oPEn	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.	

■ Cautions during Use

1. Follow instructions in 'Cautions during Use'. Otherwise, It may cause unexpected accidents.
2. Check the polarity of the terminals before wiring the temperature sensor.
   For RTD temperature sensor, wire it as 3-wire type, using cables in same thickness and length.
   For thermocouple (CT) temperature sensor, use the designated compensation wire for extending wire.
3. Keep away from high voltage lines or power lines to prevent inductive noise.
   In case installing power line and input signal line closely, use line filter or varistor at power line and shielded wire at input signal line.
   Do not use near the equipment which generates strong magnetic force or high frequency noise.
4. Install a power switch or circuit breaker in the easily accessible place for supplying or disconnecting the power.
5. Do not use the unit for other purpose (e.g. voltmeter, ammeter), but temperature controller.
6. When changing the input sensor, turn off the power first before changing.
   After changing the input sensor, modify the value of the corresponding parameter.
7. 24VAC, 24-48VDC power supply should be insulated and limited voltage/current or Class 2, SELV power supply device.
8. 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.
9. Make sure that power supply voltage reaches to the rated voltage within 2 sec after supplying power.
10. Do not wire to terminals which are not used.
11. This unit may be used in the following environments.
    ①Indoors (in the environment condition rated in 'Specifications') ②Altitude max. 2,000m
    ③Pollution degree 2 ④Installation 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

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