Autonics

LCD Display PID Temperature Controller

TX4S 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 personal injury, fire, or economic loss.
2. **The unit must be installed on a device panel before use.**
   Failure to follow this instruction may result in electric shock.
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.
4. **Check the terminal numbers before connecting the power source.**
   Failure to follow this instruction may result in fire.
5. **Do not disassemble or modify the unit. Please contact us if necessary.**
   Failure to follow this instruction may result in electric shock or fire.

⚠ Caution

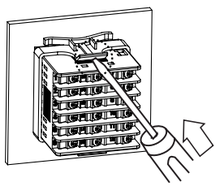
1. **Do not use the unit outdoors.**
   Failure to follow this instruction may result in shortening the life cycle of the unit, or electric shock.
2. **When connecting the power input and relay output cables, use AWG20 (0.05mm²) cables and make sure to tighten the terminal screw bolt above 0.74N·m to 0.90N·m.**
   Failure to follow this instruction may result in fire due to contact failure.
3. **Use the unit within the rated specifications.**
   Failure to follow this instruction may result in shortening the life cycle of the unit, or fire.
4. **Do not use loads beyond the rated switching capacity of the relay contact.**
   Failure to follow this instruction may result in insulation failure, contact melt, contact failure, relay broken, or fire.
5. **Do not use water or oil-based detergent when cleaning the unit. Use dry cloth to clean the unit.**
   Failure to follow this instruction may result in electric shock or fire.
6. **Do not use the unit where flammable or explosive gas, humidity, direct sunlight, radiant heat, vibration, or impact may be present.**
   Failure to follow this instruction may result in fire or explosion.
7. **Keep dust and wire residue from flowing into the unit.**
   Failure to follow this instruction may result in fire or product damage.
8. **Check the polarity of the measurement input contact before wiring the temperature sensor.**
   Failure to follow this instruction may result in fire or explosion.
9. **For installing the unit with reinforced insulation, use the power supply unit which basic level is ensured.**

▣ Ordering Information

TX	4	S	-	1	4	R

Control output	**R**	Relay output
	S	SSR drive output
	C	Selectable current output or SSR drive output
Power supply	**4**	100-240VAC 50/60Hz
Option output	**1**	Alarm output 1
	2	Alarm output 1+Alarm output 2
	A	Alarm output 1+Alarm output 2+Trans. output
	B	Alarm output 1+Alarm output 2+RS485 com. output
Size	**S**	DIN W48×H48mm
Digit	**4**	9999(4 digit)
Item	**TX**	LCD display standard PID temperature controller

▣ Installation



Mount the unit on the panel. Push the bracket with tools to fix the unit as the figure.

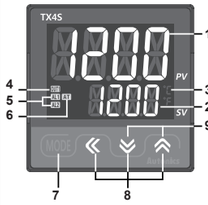
※**The above specifications are subject to change and some models may be discontinued without notice.**

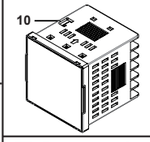
▣ Specifications

Series		**TX4S**
Power supply		100-240VAC 50/60Hz
Allowable voltage range		90 to 110% of rated voltage
Power consumption		Max. 8VA
Display method		11 segments (PV: white, SV: green), other display (yellow) with LCD method※1
Character size	PV(W×H)	6.9×15.3mm
	SV(W×H)	4.1×9.2mm
Input type	RTD	DPt100Ω, Cu50Ω (permissible line resistance max. 5Ω)
	TC	K(CA), J(IC), L(IC), T(CC), R(PR), S(PR)
Display accuracy※2	RTD	●At room temperature (23℃±5℃): (PV ±0.3% or ±1℃, select the higher one) ±1digit
	TC	●Out of room temperature: (PV ±0.5% or ±2℃, select the higher one) ±1digit
Control output	Relay	250VAC 3A 1a
	SSR	Max. 12VDC ± 2V 20mA
	Current	DC4-20mA or DC0-20mA (load resistance max. 500Ω)
Option output	Alarm output	AL1, AL2 Relay: 250VAC 3A 1a
	Trans. output	DC4-20mA (load resistance max. 500Ω, output accuracy: ±0.3%F.S.)
	Com. output	RS485 Communication output (Modbus RTU method)
Control method		ON/OFF control, P, PI, PD, PID control
Hysteresis		1 to 100℃/℉ (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		50ms
Dielectric strength		3,000VAC 50/60Hz for 1 min. (between all terminals and case)
Vibration		0.75mm amplitude at frequency 5 to 55Hz (for 1 min.)in each X, Y, Z direction for 2 hours
Relay life cycle	Mechanical	OUT, AL1/2: Min. 5,000,000 operations
	Electrical	OUT, AL1/2: Min. 200,000 (250VAC 3A resistance load)
Insulation resistance		Min. 100MΩ (at 500VDC megger)
Noise resistance		Square shaped noise by noise simulator (pulse width 1μs) ±2kV R-phase, S-phase
Memory retention		Approx. 10 years (non-volatile semiconductor memory type)
Environment	Ambient temp.	-10 to 50℃, storage: -20 to 60℃
	Ambient humi.	35 to 85%RH, storage: 35 to 85%RH
Protection structure		IP50 (front panel, IEC standards)
Insulation type		Double insulation (mark: ▣, dielectric strength between all terminals and case: 3kV)
Approval		CE c UL us KC
Weight※3		Approx. 135.2g (approx. 85.2g)

※1: When using the unit at low temperature (below 0℃), display cycle is slow. Control output operates normally.
※2: ◎ At room temperature(23℃±5℃)
• TC R(PR), S(PR), below 200℃: (PV ±0.5% or ±3℃, select the higher one) ±1 digit
over 200℃: (PV ±0.5% or ±2℃, select the higher one) ±1 digit
• TC L(IC), RTD Cu50Ω: (PV ±0.5% or ±2℃, select the higher one) ±1 digit
◎ Out of room temperature range
• TC R(PR), S(PR): (PV ±1.0% or ±5℃, select the higher one) ±1 digit
• TC L(IC), RTD Cu50Ω: (PV ±0.5% or ±3℃, select the higher one) ±1 digit
※3: The weight includes packaging. The weight in parentheses is for unit only.
※Environment resistance is rated at no freezing or condensation.

▣ Unit Description

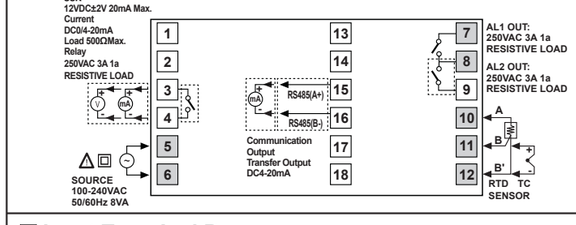




1. **Measured value (PV) component:**
   RUN mode: Displays current measured value (PV).
   SETTING mode: Displays parameters.
2. **Setting value (SV) display component:**
   RUN mode: Displays setting value(SV).
   SETTING mode: Displays setting value of parameter.
3. **Temperature unit(℃/℉) indicator:**
   Displays the set temperature unit as temperature unit [UNIt] of parameter 2 group.
4. **Control output (OUT1) indicator:** Turns ON while control output is ON.
   ※Turns ON when MV is over 3.0% at cycle/phase control of SSR drive output method.
5. **Alarm output (AL1, AL2) indicator:**
   Turns ON when the corresponding alarm output turns ON.
6. **Auto-tuning indicator:**
   Flashes during auto-tuning every 1 sec.
7. **MODE key:** Enters parameter group, returns to RUN mode, moves parameters, and saves the setting value.
8. **Setting value adjutment key:** Enters SV setting mode and move digits.
9. **Digital input key:** Press the ▽+△ keys for 3 sec. to execute the digital input key functions which is set at digital input key[di -I]of parameter 2 group (RUN/STOP, clear alarm output, auto-tuning).
10. **PC loader port:** It is for serial communication to set parameter and monitoring by DAQMaster installed in PC. Use this for connection EXT-US (converter cable, sold separately) + SCM-US (USB to Serial converter, sold separately).

▣ Connection

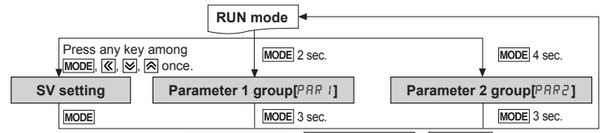
※Shaded terminals is standard model.



▣ Input Type And Range

Input type		Decimal point	Display	Input range(℃)	Input range(℉)
Thermocouple	K(CA)	1	K CRH	-50 to 1200	-58 to 2192
		0.1	K CRL	-50.0 to 999.9	-58.0 to 999.9
	J(IC)	1	J IRH	-30 to 800	-22 to 1472
		0.1	J IRL	-30.0 to 800.0	-22.0 to 999.9
	L(IC)	1	L IRH	-40 to 800	-40 to 1472
		0.1	L IRL	-40.0 to 800.0	-40.0 to 999.9
	T(CC)	1	t CRH	-50 to 400	-58 to 752
		0.1	t CRL	-50.0 to 400.0	-58.0 to 752.0
	R(PR)	1	RPR	0 to 1700	32 to 3092
	S(PR)	1	SPR	0 to 1700	32 to 3092
RTD	DPt 100Ω	1	dPtH	-100 to 400	-148 to 752
		0.1	dPtL	-100.0 to 400.0	-148.0 to 752.0
	CU50Ω	1	CUSH	-50 to 200	-58 to 392
		0.1	CUSL	-50.0 to 200.0	-58.0 to 392.0

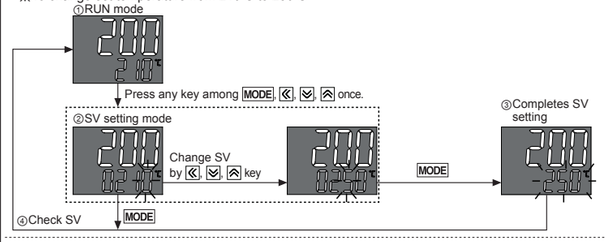
▣ Parameter Groups



※Order of parameter setup **Parameter 2 group** → **Parameter 1 group** → **SV setting**
●All parameters are related one another. Set the parameters as above order.
※If there is no key input for 30 sec. while setting SV or the parameters, the new settings are ignored, and the unit will return to RUN mode with previous settings.
※When returning to RUN mode by holding the MODE key for over 3 sec., press the MODE key within 1 sec. to re-enter the first parameter of previous parameter group.
※Hold the ◁+▽+△ keys for 5 sec. in RUN mode, to enter re-set parameter menu. Select 'YES' and all parameters are reset as factory default.

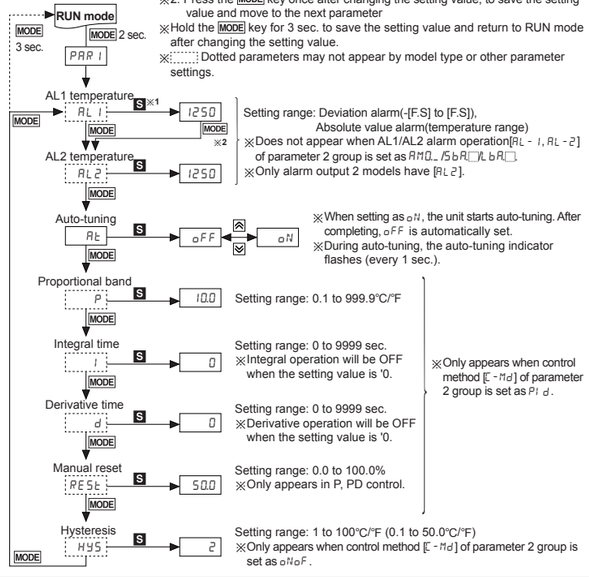
● SV setting

※To change set temperature from 210℃ to 250℃



● Parameter 1 group

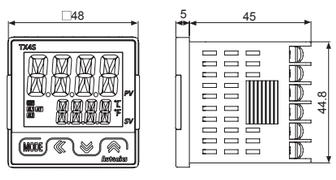
※1: S: Press any key among ◁, ▽, △.
※2: Press the MODE key once after changing the setting value, to save the setting value and move to the next parameter
※Hold the MODE key for 3 sec. to save the setting value and return to RUN mode after changing the setting value.
※: Dotted parameters may not appear by model type or other parameter settings.



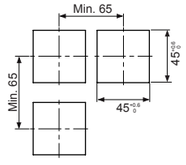
Setting range: Deviation alarm(-[F.S] to [F.S]), Absolute value alarm(temperature range)
※Does not appear when AL1/AL2 alarm operation[AL-1, AL-2] of parameter 2 group is set as AMD_ /bAR□/LbA□.
※Only alarm output 2 models have [AL2].
※When setting as oN, the unit starts auto-tuning. After completing, oFF is automatically set.
※During auto-tuning, the auto-tuning indicator flashes (every 1 sec.).
※Only appears when control method [C-Md] of parameter 2 group is set as PId.
Setting range: 0.1 to 999.9℃/℉
Setting range: 0 to 9999 sec.
※Integral operation will be OFF when the setting value is '0.
Setting range: 0 to 9999 sec.
※Derivative operation will be OFF when the setting value is '0.
Setting range: 0.0 to 100.0%
※Only appears in P, PD control.
Setting range: 1 to 100℃/℉ (0.1 to 50.0℃/℉)
※Only appears when control method [C-Md] of parameter 2 group is set as oNoF.

▣ Dimensions

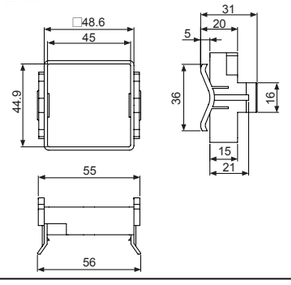
(unit:mm)



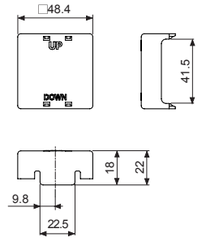
● **Panel cut-out dimensions**



● **Bracket**

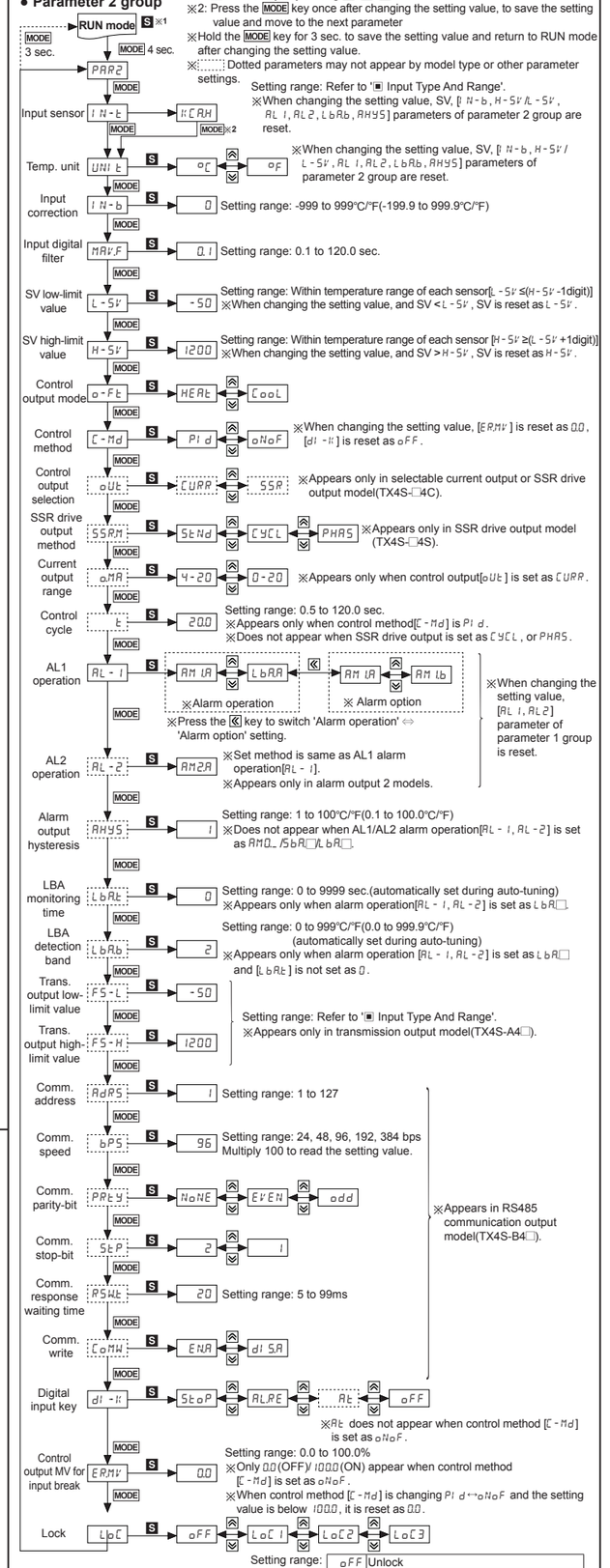


● **Terminal cover(sold separately)**
●RSA-COVER(48×48mm)



● Parameter 2 group

※1: S: Press any key among ◁, ▽, △.
※2: Press the MODE key once after changing the setting value, to save the setting value and move to the next parameter
※Hold the MODE key for 3 sec. to save the setting value and return to RUN mode after changing the setting value.
※: Dotted parameters may not appear by model type or other parameter settings.

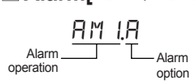


※When changing the setting value, [AL 1, AL2] parameter of parameter 1 group is reset.
※Press the ◁ key to switch 'Alarm operation' ⇔ 'Alarm option' setting.
※Set method is same as AL1 alarm operation[AL-1].
※Appears only in alarm output 2 models.
Setting range: 1 to 100℃/℉(0.1 to 100.0℃/℉)
※Does not appear when AL1/AL2 alarm operation[AL-1, AL-2] is set as AMD_ /bAR□/LbA□.
Setting range: 0 to 9999 sec.(automatically set during auto-tuning)
※Appears only when alarm operation[AL-1, AL-2] is set as LbA□.
Setting range: 0 to 999℃/℉(0.0 to 999.9℃/℉) (automatically set during auto-tuning)
※Appears only when alarm operation [AL-1, AL-2] is set as LbA□ and [LbAt] is not set as 0.
Setting range: Refer to '▣ Input Type And Range'.
※Appears only in transmission output model(TX4S-A4□).
Setting range: 1 to 127
Setting range: 24, 48, 96, 192, 384 bps
Multiply 100 to read the setting value.
※Appears in RS485 communication output model(TX4S-B4□).
Setting range: 0 to 99ms
※At does not appear when control method [C-Md] is set as oNoF.
Setting range: 0.0 to 100.0%
※Only 00(OFF)/1000(ON) appear when control method [C-Md] is set as oNoF.
※When control method [C-Md] is changing PId↔oNoF and the setting value is below 1000, it is reset as 00.

Setting range:

oFF	Unlock
LoC 1	Parameter 2 group lock
LoC2	Parameter 1,2 group lock
LoC3	Parameter 1,2 group, SV setting lock

▣ Alarm[AL - 1/AL - 2]



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 -K] of parameter 2 grouр set as RLRE), or turn OFF the power and turn ON to clear alarm.

• Alarm operation

Mode	Name	Alarm operation	Description
AM0_	–	–	No alarm output
AM 1□	Deviation high-limit alarm	OFF H ON, SV 100℃ PV 110℃ / High-limit deviation: Set as 10℃ ; OFF H ON, PV 90℃ SV 100℃ / High-limit 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.
AM2□	Deviation low-limit alarm	ON H OFF, PV 90℃ SV 100℃ / Low-limit deviation: Set as 10℃ ; ON H OFF, SV 100℃ PV 110℃ / Low-limit 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.
AM3□	Deviation high/low-limit alarm	ON H OFF H ON, PV 90℃ SV 100℃ PV 110℃ / High, Low-limit 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.
AM4□	Deviation high/low-limit reserve alarm	OFF H ON H OFF, PV 90℃ SV 100℃ PV 110℃ / High, Low-limit 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.
AM5□	Absolute value high limit alarm	OFF H ON, PV 90℃ SV 100℃ / Alarm absolute-value: Set as 90℃ ; OFF H ON, SV 100℃ PV 110℃ / Alarm absolute-value: Set as 110℃	If PV is higher than the absolute value, the output will be ON.
AM6□	Absolute value low limit alarm	ON H OFF, PV 90℃ SV 100℃ / Alarm absolute-value: Set as 90℃ ; ON H OFF, SV 100℃ PV 110℃ / Alarm absolute-value: 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]

• Alarm option

Option	Name	Description
AM□A	Standard alarm	If it is an alarm condition, alarm output is ON. If it is a clear alarm condition, alarm output is OFF.
AM□b	Alarm latch	If it is an alarm condition, alarm output is ON and maintains ON status. (Alarm output HOLD)
AM□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.
AM□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.
AM□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.
AM□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.

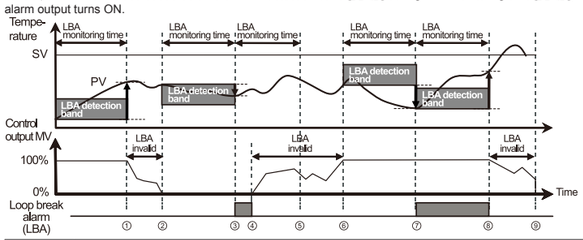
※Condition of re-applied standby sequence for standby sequence 1, alarm latch and standby sequence 1: Power ON Condition of re-applied standby sequence for standby sequence 2, alarm latch and standby sequence 2: Power ON, changing set temperature, alarm temperature [AL 1, AL2] or alarm operation [AL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

•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].

• 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.

▣ Functions

1. 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.

Ex) If actual temperature is 80℃ but controller displays 78℃, set input correction value [IN-b] as '2' and controller displays 80℃.

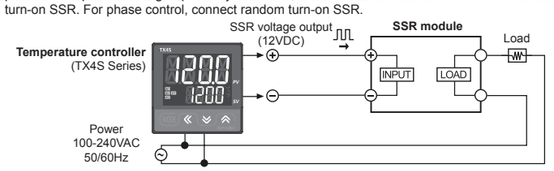
※As the result of input correction, if current temperature value (PV) is over each temperature range of input sensor, it displays HHHH or LLLL.

2. Input digital filter[MAVF]

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 these values. Current temperature may be different by actual input value.

3. SSR drive output method (SSRP function)[SSRM]

- SSRP function is selectable one of standard ON/OFF control, cycle control, phase control by utilizing standard SSR drive output.
- This function parameter appears only in SSR drive output model (TX4S-□4S).
- Realizing high accuracy and cost effective temperature control with both current output (4-20mA) and linear output(cycle control and phase control)
- Select one of standard ON/OFF control [StNd], cycle control [CYCL] , phase control [PHAS] at SSRM parameter of parameter 2 group. For cycle control, connect a 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.**

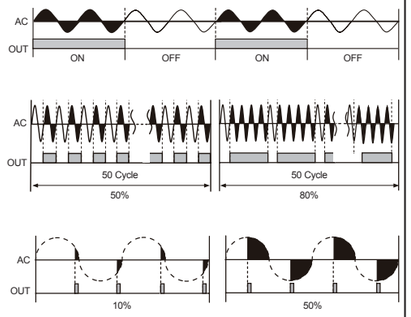
※Control cycle[t] is able to set only when control method[C-Md]of parameter group 2 is set as Pid and SSR drive output method [SSRM] is set as StNd.

※In case of selectable current output or SSR drive output model(TX4S-□4C), this parameter does not appear. Standard ON/OFF control by SSR is only available.

1)Standard ON/OFF control [StNd]
Controls ON (100% output)/OFF (0% output) as same as standard relay output.

2)Cycle control [CYCL]
Controls the load by repeating output ON / OFF according to the rate of output within setting cycle based on certain period (50-cycle).
Control accuracy is almost the same with phase control's.
This control has improved ON/OFF noise than phase control's due to zero cross type which turns ON/OFF at zero point of AC.

3)Phase control [PHAS]
Controls the load by controlling the phase within AC half cycle. Serial control is available.
Must use random turn-on SSR for this mode.



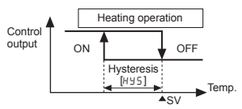
4. Current output range[oMA]

In case of selectable current output or SSR drive output model(TX4S-□4C), when control output [oUt] parameter 2 group is set as [CURR], you can select high/low-limit range, 4-20mA [4-20] or 0-20mA [0-20] of current output.

5. Hysteresis[HYS]

Set interval between ON and OFF of control output for ON/OFF control.

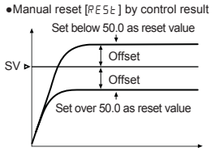
- If hysteresis is too narrow, hunting(oscillation, chattering) could occur due to external noise.
- In case of ON / OFF control mode, even if PV reaches stable status, there still occurs hunting. It could be due to hysteresis [HYS] setting value, load's response characteristics or sensor's location. 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.



6. 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



7. Digital input key(▽ + △ 3 sec.)[di -K]

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	ALRE	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 1 group. (You can start auto-tuning [At] of parameter 1 group and stop it by digital input key.) ※This parameter At appears only when control method [C-Md] parameter 2 group is set as Pid. When control method [C-Md] parameter 2 group is set as oNoF, this parameter is changed as oFF.

8. Control output MV for input break[ERMV]

When input sensor is break, set control output MV.
When control method[C-Md] of parameter 2 group is set as oNoF, set control output MV as 00.0(OFF) or 100.0(ON). When control method[C-Md] is set as Pid, setting range for control output MV is 00.0 to 100.0.

▣ Comprehensive Device Management Program[DAQMaster]

DAQMaster is a comprehensive device management software for setting parameters and monitoring processes. DAQMaster can be downloaded from our web site at www.autonics.com.

Item	Minimum specifications
System	IBM PC compatible computer with Pentium III or above
Operations	Windows 98/NT/XP/Vista/7/8/10
Memory	256MB+
Hard disk	1GB+ of available hard disk space
VGA	Resolution: 1024×768 or higher
Others	RS232C serial port (9-pin), USB port

▣ RS485 Communication Output

Applicable for models with RS485 communication output through option output(TX4S-B4□).
Please refer to '▣Ordering Information'.

1. Communication Specifications

Com. protocol	Modbus RTU	Com. speed	2400, 4800, 9600, 19200, 38400 bps
Applied standard	EIA RS485		
Max. connections	31 units(address: 1 to 99)	Start-bit	1-bit fixed
Com. method	2-wire half duplex	Data-bit	8-bit fixed
Synchronization method	Asynchronous	Parity-bit	None, Even, Odd
Com. distance	Within 800m	Stop-bit	1, 2Bit
Com. response time	5 to 99ms		

2. Modbus Mapping Table

2-1. Read Coil Status (Func 01) / Force Single Coil (Func 05) [Func: 01/05, R/W: R/W]

No.(Address)	Type		Description	Setting/Display range	Unit	Default
000001(0000)	RUN/STOP	Related coil, variable	Control output run/stop	0: RUN 1: StoP	-	StoP
000002(0001)	AT		Auto-tuning run/stop	0: oFF 1: oN	-	oFF
000003(0003)	Alarm Reset		Alarm output clear	0: oFF 1: oN	-	oFF
000004 to 000050	Reserved					

2-2. Read Discrete Inputs(Func 02) [Func: 02, R/W: R]

No.(Address)	Type		Description	Setting/Display range	Unit	Default
100001(0000)	℃ indicator	Front indicator	Unit indicator	0: OFF 1: ON	-	-
100002(0001)	℉ indicator		Unit indicator	0: OFF 1: ON	-	-
100003(0002)	OUT indicator		Control output indicator	0: OFF 1: ON	-	-
100004(0003)	AT indicator		Auto-tuning indicator	0: OFF 1: ON	-	-
100005(0004)	AL1 indicator		Alarm output 1 indicator	0: OFF 1: ON	-	-
100006(0005)	AL2 indicator		Alarm output 2 indicator	0: OFF 1: ON	-	-
100006 to 100050	Reserved					

2-3. Read Input Registers (Func 04) [Func:02, R/W : R]

No.(Address)	Type	Description	Setting/Display range	Unit	Default
300001 to 300100	Reserved				
300101(0064)	-	Product number H	-	-	Dedicated model number
300102(0065)	-	Product number L	-	-	
300103(0066)	-	Hardware version	-	-	□
300104(0067)	-	Software version	-	-	□
300105(0068)	-	Model 1	-	-	"TX"
300106(0069)	-	Model 2	-	-	" 4"
300107(006A)	-	Model 3	-	-	"S "
300108(006B)	-	Model 4	-	-	"14"
300109(006C)	-	Model 5	-	-	"R "
300110(006D)	-	Model 6	-	-	" "
300111(006E)	-	Model 7	-	-	" "
300112(006F)	-	Model 8	-	-	" "
300113(0070)	-	Model 9	-	-	" "
300114(0071)	-	Model 10	-	-	" "
300115(0072)	-	Reserved	-	-	-
300116(0073)	-	Reserved	-	-	-
300117(0074)	-	Reserved	-	-	-
300118(0075)	-	Coil status start address	-	-	0000
300119(0076)	-	Coil status quantity	-	-	0
300120(0077)	-	Input status start address	-	-	0000
300121(0078)	-	Input status quantity	-	-	0
300122(0079)	-	Holding register start address	-	-	0000
300123(007A)	-	Holding register quantity	-	-	0
300124(007B)	-	Input register start address	-	-	0000
300125(007C)	-	Input register quantity	-	-	0
300127 to 300200	Reserved				
301001(03E8)	PV	Present value	-1999 to 9999	℃/℉	-
301002(03E9)	DOT	Decimal point location	0:0, 1:00.0, 2:000.0, 3:0000	-	-
301003(03EA)	UNIT	Display unit	0: ℃, 1: ℉	-	-
301004(03EB)	SV	Setting value	Within L-SV to H-SV	℃/℉	0
301005(03EC)	℃ indicator	Front indicator	Unit indicator	0: OFF 1: ON	-	-
	℉ indicator		Unit indicator	0: OFF 1: ON	-	-
	OUT indicator		Control output indicator	0: OFF 1: ON	-	-
	AT indicator		Auto-tuning indicator	0: OFF 1: ON	-	-
	AL1 indicator		Alarm output 1 indicator	0: OFF 1: ON	-	-
	AL2 indicator		Alarm output 2 indicator	0: OFF 1: ON	-	-
310006 to 310050	Reserved					

2-4. Read Holding Register (Func 03)/Preset Single Register (Func 06)/ Preset Multiple Registers (Func 16)[Func:03/06/16, R/W : R/W]

2-4-1. SV setting

No.(Address)	Parameter	Description	Setting/Display range	Unit	Default
400001(0000)	Set value	SV setting value	Within L-SV to H-SV	℃/℉	0
400002 to 400050	Reserved				

2-4-2. Parameter 1 group [PAR1]

No.(Address)	Parameter	Description	Setting/Display range	Unit	Default
400051(0032)	AL1	AL1 temperature	Deviation temperature: -F.S. to F.S. Absolute value alarm: Temperature range	℃/℉	1250
400052(0033)	AL2	AL2 temperature			
400053(0034)	At	Auto-tuning	0: oFF 1: oN	-	oFF
400054(0035)	P	Proportional band	1 to 9999: 0.1 to 9999	℃/℉	100
400055(0036)	I	Integral time	0 to 9999: 0 to 9999	Sec.	0
400056(0037)	d	Derivative time	0 to 9999: 0 to 9999	Sec.	0
400057(0038)	RESt	Manual reset	0 to 1000: 00.0 to 1000	%	50.0
400058(0039)	HYS	Hysteresis	1 to 100(1 to 500): 1 to 100(0.1 to 50.0)	-	2
400059 to 400100	Reserved				

2-4-3. Parameter 2 group [PAR2]

No.(Address)	Parameter	Description	Setting/Display range	Unit	Default
400101(0064)	IN-t	Input sensor	Refer to '▣ Input Type And Range'	-	K CRH
400102(0065)	UNIt	Temperature unit	0: ℃, 1: ℉	-	℃
400103(0066)	IN-b	Input correction	-999 to 999(-1999 to 9999): -999 to 999(-1999 to 9999)	-	0
400104(0067)	MAVF	Input digital filter	1 to 1200: 0.1 to 120.0	Sec.	0.1
400105(0068)	L-SV	SV low-limit value	Refer to '▣ Input Type And Range'	℃/℉	-50
400106(0069)	H-SV	SV high-limit value			1200
400107(006A)	o-Ft	Control output mode	0: HEAt, 1: CooL	-	HEAt
400108(006B)	C-Md	control method	0: Pid, 1: oNoF	-	Pid
400109(006C)	oUt	Control output selection	0: SSR, 1: CURR	-	CURR
400110(006D)	SSRM	SSR drive output method	0: StNd, 1: CYCL, 2: PHAS	-	StNd
400111(006E)	oMA	Current output range	0: 4-20, 1: 0-20	-	4-20
400112(006F)	t	Control cycle	5 to 1200: 0.5 to 120.0	Sec.	20.0(Relay) 2.0(SSR drive)
400113(0070)	AL-1	AL1 operation	00: AM0_, 10 to 15: AM 1A to AM 1F, ... 60 to 65: AM6A to AM6F, 70: SbAA, 71: SbAb, 80: LbAA, 81: LbAb	-	AM 1A
400114(0071)	AL-2	AL2 operation			AM2A
400115(0072)	AHYS	Alarm output hysteresis	1 to 100(1 to 500): 1 to 100(0.1 to 50.0)	-	1
400116(0073)	LbAt	LBA detection time	0 to 9999: 0 to 9999	Sec.	0
400117(0074)	LbAb	LBA detection band	0 to 999(0 to 9999): 0 to 999(00 to 9999)	℃/℉	2
400118(0075)	FS-L	Trans. output low-limit value	Refer to '▣ Input Type And Range'.	-	-50
400119(0076)	FS-H	Trans. output high-limit value		-	1200
400120(0077)	AdRS	Com. address	1 to 127: 1 to 127	-	1
400121(0078)	bPS	Com. speed	0: 24, 1: 48, 2: 96, 3: 192, 4: 384	-	96
400122(0079)	PRtY	Com. parity bit	0: NoNE, 1: EVEN, 2: odd	-	NoNE
400123(007A)	StP	Com. stop bit	0: 1, 1: 2	-	2
400124(007B)	RSWt	Com. response waiting time	5 to 99: 5 to 99	ms	20
400125(007C)	CoMW	Com. write	0: ENA, 1: diSA	-	ENA
400126(007D)	di -K	Digital input key	0: oFF, 1: StoP, 2: ALRE, 3: At	-	StoP
400127(007E)	ERMV	Control output MV for input break	0 to 1000: 00.0(OFF) to 100.0(ON)	%	00.0
400128(007F)	LoC	Lock	0: oFF, 1: LoC 1, 2: LoC2, 3: LoC3	-	oFF
400129 to 400150	Reserved				

▣ Error

Display	Description	Troubleshooting
oPEN	Flashes when input sensor is disconnected or sensor is not connected.	Check input sensor status.
HHHH	Flashes when measured value is higher than input range.	When input is within the rated input range, this display disappears.
LLLL	Flashes when measured value is lower than input range.	

▣ Factory Default

• SV setting

Parameter	Factory default
-	0

• Parameter 1 group

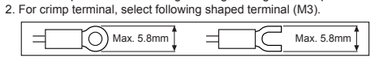
Parameter	Factory default
AL 1	1250
AL2	
At	oFF
P	100
I	0
d	
RESt	50.0
HYS	2

• Parameter 2 group

Parameter	Factory default	Parameter	Factory default
IN-t	K CRH	AHYS	1
UNIt	℃	LbAt	0
IN-b	0	LbAb	2
MAVF	0.1	FS-L	-50
L-SV	-50	FS-H	1200
H-SV	1200	AdRS	1
o-Ft	HEAt	bPS	96
C-Md	Pid	PRtY	NoNE
oUt	CURR	StP	2
SSRM	StNd	RSWt	20
oMA	4-20	CoMW	ENA
t	20.0 (Relay)	di -K	StoP
	2.0 (SSR drive)	ERMV	0.0
AL-1	AM 1A	LoC	oFF
AL-2	AM2A		

▣ Caution During Use

1. Please separate the unit wiring from high voltage lines or power lines to prevent inductive noise.
2. For crimp terminal, select following shaped terminal (M3).



3. Install a power switch or circuit breaker to control the power supply.
4. The power switch or circuit breaker should be installed where it is easily accessible by the user.
5. The unit is for temperature controller. Do not use the unit as volt-meter or ampere-meter.
6. When using RTD temperature sensor, must wire it as 3-wire type. If cable is extended, use 3 wires which are same thickness as the line. It might cause the deviation of temperature when line resistance is different.
7. If power line and input signal line are close each other, install line filter for noise protection at power line and use shielded input signal line.
8. Keep away from the high frequency instruments.(High frequency welding machine & sewing machine, large capacity SCR controller).
9. When supplying the measured input, the unit displays HHHH or LLLL, the measured input may have problem. Turn OFF the power to the unit and check the line. .
10. This unit may be used in the following environments.
    ①It shall be used indoor. ②Altitude up to 2,000m.
    ③Pollution degree 2. ④Installation category II.

※Failure to follow these instructions may result in product damage.

▣ 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
- SSR/Power Controllers
- Counters
- Timers
- Panel Meters
- Tachometer/Pulse(Rate)Meters
- Display Units
- Sensor Controllers