

Intelligent Temperature Controller User Manual

Applicable for TCX-B version



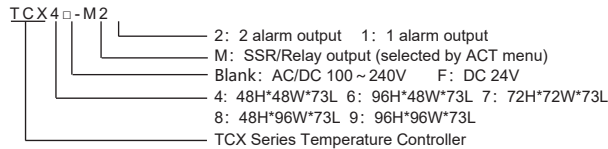
Features

- Support multiple thermocouple, thermal resistance signal types.
- Adopt fuzzy-PID control algorithm, with auto-tuning and no overshoot.
- Different control types (please refer OT parameters).
- RUN/STOP function can be switched.
- Heating — cooling dual output suitable for extruder control.

Hotline: 400-8866-986

Version code: KKTCX-B02E-A/0-20250509

I. Model Illustration



II. Order Information

No	Model	Control output	Alarm
1	TCX-4/6/7/8/9-M2	RELAY/SSR	2

III. Specifications

1. Electrical parameters:

Sample rate	8 times per second
Relay capacity	AC 250V /3A Rated load life >100,000 times
Power supply	AC/DC 100 ~ 240V (85-265V) ,DC 24V
Power consumption	< 10VA
Environment	Indoor use only, temperature: 0 ~ 50°C no condensation humidity: < 85%RH, altitude<2000m
Storage environment	-10 ~ 60°C, no condensation
SSR output	DC 24V impulse level, load<30mA
Insulation impedance	Input, output, power VS meter cover > 20MΩ
ESD	IEC/EN61000-4-2 Contact ±4KV /Air ±8KV perf.Criteria B
Pulse triap anti-interference	IEC/EN61000-4-4 ±2KV perf.Criteria B
Surge immunity	IEC/EN61000-4-5 ±2KV perf.Criteria B
Voltage drop & short interruption immunity	IEC/EN61000-4-29 0% ~ 70% perf.Criteria B
Isolation voltage	Signal input, output, power: 1500VAC 1min, <60V between low voltage circuit: DC500V, 1min
Total weight	About 400g
Cover material	The shell and panel frame PC/ABS (Flame Class UL94V-0)
Panel material	PET (F150/F200)
Power failure memory	10 years, times of writing: 1 million times
Panel Protection level	IP65 (IEC60529)
Safety Standard	IEC61010-1 Overvoltage category II, pollution level 2, levelII (Enhanced insulation)

2. Measured signal specifications:

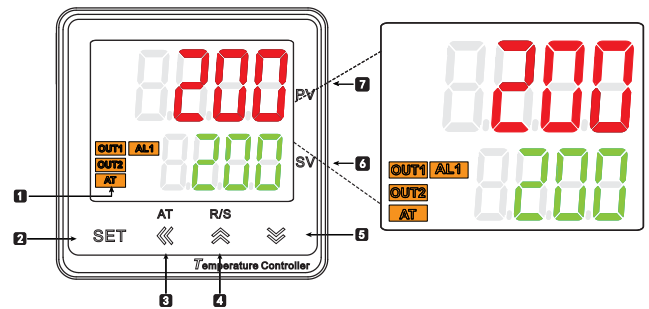
Input type	Symbol	Measure range	Resolution	Accuracy	Input impedance /auxiliary current
K	E	-50 ~ 999	1°C	0.5%F.S±3 digits	> 500kΩ
J	J	0 ~ 999	1°C	0.5%F.S±3 digits	> 500kΩ
E	E	0 ~ 850	1°C	0.5%F.S±3 digits	> 500kΩ
T	T	-50 ~ 400	1°C	0.5%F.S±2°C	> 500kΩ
PT100	PT	-200 ~ 600	1°C	0.5%F.S±3 digits	0.2mA
CU50	CU	-50 ~ 150	1°C	0.5%F.S±3°C	0.2mA
CU100	CU	-50 ~ 150	1°C	0.5%F.S±1°C	0.2mA

Temperature impact: 150ppm/°C

Note 1: 2°C cold end should be added to compensate for allowable errors when thermocouple input adopts internal cold end compensation.

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IV. Panel Illustration



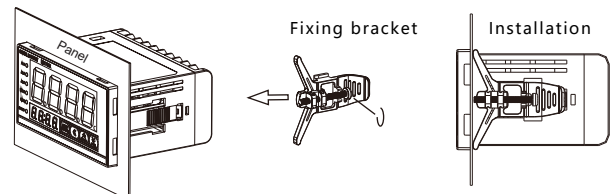
No.	Symbol	Name	Function
1	OUT1	OUT1 (Orange)	Main control output indicator, lights on when output ON.
	OUT2	OUT2 (Orange)	Cooling output indicator, lights on when output ON.
	AL1	Alarm 1# (Orange)	1st alarm output indicator, lights on when alarm output, lights off when no alarm output.
	AT	AT indicator(Orange)	Auto tune indicator, lights on when auto tune status on.
2	SET	SET/SET key	Menu key/confirm key, to enter/exit the modification mode, or to confirm and save the modified parameter.
3	⬅	SHIFT/AT key	Activate key/ shift key/ AT auto tune key (in measure and control mode, long press to enter/exit auto tune)
4	⬆	UP key/R/S	Add key, in measure and control mode, long press it to shift RUN/STOP mode, or check the menu in reverse order.
5	⬇	DOWN key	Reduce key, check the menu in sequence
6	SV	Display (green)	Set value / parameter display window, displays "STOP"when the control is stopped
7	PV	Display (red)	Measured value/ parameter code display window

V. Dimension and installation size

1. Dimension and cutout size

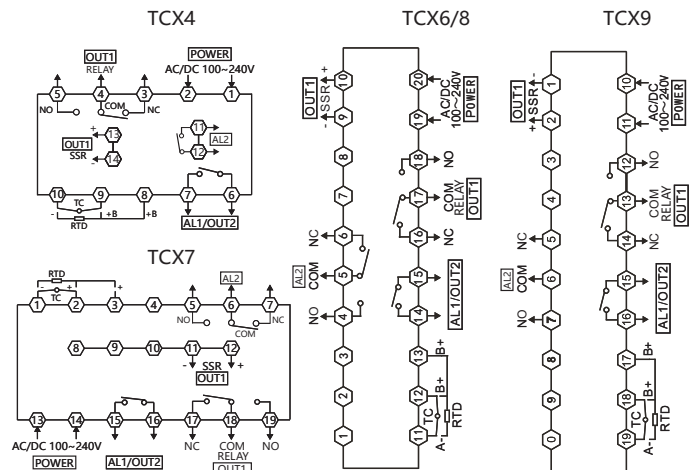
Model	A	B	C	D	E	F	G	H(Min)	J	K(Min)
4:(48*48)	48	48	73	6.5	66.5	44	45	25	45	25
6:(48*96)	48	96	73	6.5	66.5	90	91.5	25	45	25
7:(72*72)	72	72	73	6.5	66.5	66	67.5	25	67.5	25
8:(96*48)	96	48	73	6.5	66.5	44	45	25	91.5	25
9:(96*96)	96	96	73	6.5	66.5	90	91.5	25	91.5	25

2. Installation



Installation method: Put the instrument into the cutout hole, and then place the fixing bracket on the installation slot of the instrument housing, push the bracket towards the panel until the instrument is fixed. (As shown above)

VI. Connections

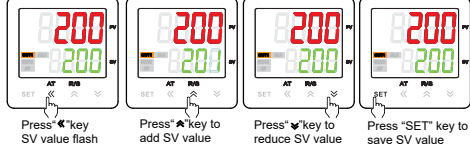


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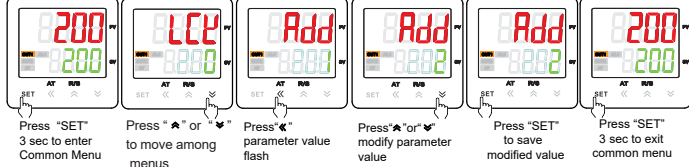
VIII. Operation process and menu illustration

1. Operation process & method

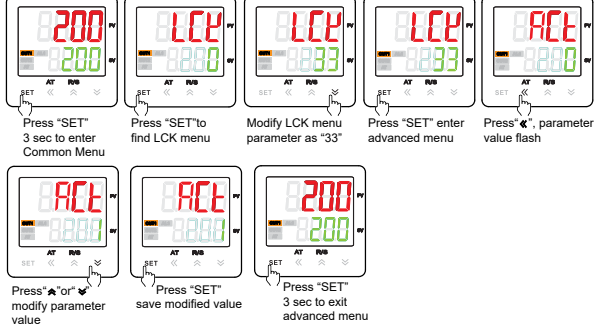
1) Modify SV Value



2) Common menu parameter setting



3) Advanced menu parameter setting



IX. Menu Illustration

Note: The meter will hide unrelated parameters according to OT parameter setting.

We suggest to set the OT parameter for the first use.

□: No matter under what model or control mode, it will always display these parameters.

■: According to different model and control mode, these parameters will be hidden.

1. Regular Menu

No.	Symbol	Name	Illustration	Setting range	Factory setting
1	AL1	AL1	1st alarm value. Note: When used as a deviation value alarm, a negative number will be treated as an absolute value.	FL ~ FH	10
2	HY1	HY1	1st alarm hysteresis	0 ~ 100	1
3	AD1	AD1	1st alarm mode. Note: when AL1 is used as OUT2, should set the value AD1=0(close alarm function). When AD1>6, should set AD2 as 0 (Except LBA alarm). Refer to alarm function logic diagram.	0 ~ 14	3
4	AL2	AL2	2nd alarm value. When used as a deviation value alarm, a negative number will be treated as an absolute value.	FL ~ FH	5
5	HY2	HY2	2nd alarm hysteresis	0 ~ 999	1
6	AD2	AD2	2nd alarm mode, 7-12 no function reserved	0 ~ 14	4
7	LBA	LBA	Loop break alarm time, Unit: sec	0 ~ 999	0
8	LBD	LBD	Loop break alarm not sensing temperature band, Unit: °C/°F	0 ~ 999	0
9	LBF	LBF	Loop break alarm judgment amplitude, Unit: °C/LBA or °F/LBA	0 ~ 999	0
10	PS	PS	Display correction value, display value = actual measured value + display correction value	-199 ~ 999	0
11	INP	INP	Optional input measured signal type: refer to input signal parameters table. Note: after the setting, need to modify other relevant parameters too.	K ~ CU100	K
12	OT	OT	Control mode 0: ON/OFF heating control, relevant parameter: DB 1: PID heating, relevant parameters: P,I,D,OVS,CP,ST,PDC 2: ON/OFF cooling control, relevant parameter: DB PT should be set when compressor control 3: PID heating & cooling control (cooling control OUT2 will output through AL1 relay) relevant parameters: P,I,D,P1,OVS, CP,CP1,PC,ST,PDC 4: Over temperature cooling output relevant parameter: DB 5: PID cooling, relevant parameters: P,I,D,OVS,CP,ST,PDC	0 ~ 5	1
13	P	P	Proportional band. The smaller the value is, the faster the system responds, otherwise, it is slower. Increasing proportional band can reduce the oscillation, but it will increase the control deviation. Reducing proportional band can reduce control deviation but cause oscillation.	0 ~ 999	30
14	I	I	Integral time. The smaller the value, the stronger the integral action, the better performance on eliminating the deviation between PV and SV. If the integral action is too weak, the deviation might not be eliminated. Unit: sec	0 ~ 999	120
15	D	D	Differential time. Reducing it to a suitable value can prevent the oscillation of the system. The greater the value, the stronger the differential action. Unit: sec	0 ~ 999	30
16	P1	P1	Cooling PID proportional band It works, when OT=3 (PID heating and cooling). The smaller the setting value, the faster the system cools, and vice versa.	0 ~ 999	30
17	OVS	OVS	Overshoot limit. During PID control, when PV (measured value) > SV(set value) + OVS (overshoot limit), force to close output. The smaller this value is, the smaller the PID adjustment range is, the worse the control stability is. Please set an appropriate value according to the actual situation.	0 ~ 999	5
18	DB	DB	ON/OFF control hysteresis (negative hysteresis control) or cooling control, compressor cooling control dead zone. Please change this parameter according to the decimal point position when changing the INP setting.	0 ~ 100	5
19	CP	CP	OUT1 heating control cycle, SSR control output set as 1, relay control output set as 4~200, 0.1~99.9 can be set as one decimal place, 100~150 is integer. Unit: sec	1 ~ 150	20.0
20	CP1	CP1	OUT2 relay output cycle, 4.0~99.9 can be set as one decimal place, 100~150 is integer. Unit: sec	4.0~150	20.0
21	PC	PC	OUT2 cooling proportionality coefficient. The higher the value, the stronger the cooling effect	1 ~ 999	100
22	LCK	LCK	Lock function. 001: SV value can't be modified. 010: menu set value can be checked only, can't be modified. 033: enter the advanced menu. 123: reset menu to factory setting.	0 ~ 999	0

2. Advanced menu illustration

No.	Symbol	Name	Illustration	Setting range	Factory setting
23	ACT	ACT	Control execution type. 0: relay output 1: SSR output	0 ~ 1	0
24	ST	ST	Auto-tune activation after power-on. 0: work normally after power-on, 1: automatically enter PID parameters auto-tune status after power-on; long press << AT key to exit auto-tune.	0 ~ 1	0
25	ATE	ATE	Auto-tuning algorithm selection 0: 90% auto-tuning algorithm 1: 50% auto-tuning algorithm	0 ~ 1	1
26	ATT	ATT	Auto-tuning timeout (Unit: min) When the auto-tuning exceeds the set time, the controller exits the auto-tuning and retains the PID parameters before tuning.	1~999	80
27	SPC	SPC	Industry PID parameter application: Ten sets of common PID parameters are built-in by factory setting, client can consult with after-sales personnel by providing information like industry, device, etc, and call PID parameter directly on this menu.	NUL, PD0-PD9	NUL
28	PT	PT	Compressor start delay time, unit: sec	0 ~ 999	0
29/30	AE1/AE2	AE1/AE2	Alarm extension function: Menu options: AE1/AE2=A×1+B×10 □□BA 1. A: Over-limit alarm and power-on alarm suppression A Alarm handling mode for display overlimit Whether suppress alarm or not when power-on 0 Alarm state unchanged Do not suppress 1 Force alarm output (Once alarm condition is reached, alarm output immediately) 2 Force alarm close 3 Alarm state unchanged Suppression 4 Force alarm output (After power-on, alarm force close before PV first reach SV, and it works normally after that) 5 Force alarm close 2. B: alarm indication B=0, no alarm indication B=1, When the alarm is triggered, the lower line led flashes and display alarm information.	0~15	10
31	FL	FL	Measure range low limit, the set value must be less than measure range high limit	Refer to measured signal parameter table	-50
32	FH	FH	Measure range high limit. The set value must be more than measure range low limit.	999	
33	SLL	SLL	Limit target setting value range low	FL~FH	FL
34	SLH	SLH	Limit target setting value range high	FL~FH	FH
35	DP	DP	Decimal point setting, effective below 100.	0 ~ 1	0
36	FT	FT	Filter coefficient. The higher the value, the stronger the filter function.	0~255	10
37	UT	UT	Temperature unit conversion, Celsius/Fahrenheit	°C, °F	°C
38	DTR	DTR	PV fuzzy tracking value, properly set this value on some occasions, it can get a more stable display value, this value is unrelated with actual measured value. Note: after setting this value, when alarm set value is equal to SV, alarm output operation is subject to actual measured value.	0.0~2.0	1.0
39	SSM	SSM	Enable R/S key to switch RUN / STOP operation. 0: Forbidden 1: Enable This setting is only for panel operation, not for communication operation.	0 ~ 1	1
40	VER	VER	Software version, read only		

IX. Alarm function logic diagram:

Appendix (1) alarm parameter and output logic diagram:

Symbol description: "☆" means HY, "▲" means alarm value, "Δ" means SV value

Alarm code	Alarm mode	Alarm output (AL1 & AL2 are independent from each) Image: the hatched section means the alarm action
0	Close alarm	
1	High limit absolute value alarm	
2	Low limit absolute value alarm	
3	High limit deviation value alarm	
4	Low limit deviation value alarm	
5	High/low limit deviation value alarm	
6	High/low limit interval value alarm	

Alarm code	Alarm mode	The below two alarm parameters (AL1,AL2) are used in combination, AL1 alarm output, AD2 must be set as 0.
7	High and low limit absolute value interval alarm	
8	High and low limit deviation value interval alarm	
9	High limit absolute value and low limit deviation value interval alarm	
10	High limit deviation value and low limit absolute value interval alarm	
11	High/low limit absolute value alarm	
12	High/low limit deviation value alarm	

Alarm code	Alarm mode	Alarm logic
AD1/AD2=14	LBA alarm	When PV value is not in the range of [SV-LBD,SV+LBD]; When MV(output percentage)=100, PV rise less than LBF in LBA time , ① alarm. When MV=0 and PV drop less than LBF in LBA time , ② alarm.

Note: In OT=3 heating and cooling control mode, cooling control acts on AL1, and alarm function acts on AL2. Menu AD1 is hidden, and the user needs to set AD2 appropriately.

X. Key function operation

- RUN/Stop mode
 - Under the measure mode, long press "R/S" key > 3 sec to enter STOP mode, SV window will display "STOP", then press "R/S" key again to exit STOP mode.
 - Even in STOP mode, can modify SV value and switch RUN/STOP mode.
 - Under STOP mode, main control output stops.
- PID parameter setting and auto-tune operation:
 - Usually, the default PID parameters of this product are not suitable for all occasions; please use auto-tuning function to get a suitable PID parameter.
 - Since the controller will make control output soon after power on, to not affect the auto-tuning result, please set the meter as MONITOR mode or switch off the power of control output load. No matter how to operate, should ensure the set value is larger than the current measured value; the greater the drop, the better.
 - In order to avoid the chain reaction of alarm output, please set the appropriate alarm value in advance; or eliminate the factors affecting the alarm.
 - Set SV value.
 - Set OT parameter as 1 (PID control).
 - Under the condition of PV value at normal room temperature, please exit MONITOR mode or turn on the load power, long press "AT" key to enter auto-tuning mode, then AT indicator turns on.
 - Auto-tuning will take some time, to ensure the auto-tuning result, please don't modify parameters or power-off during auto tuning.
 - When AT light is off , it will exit the auto-tuning mode, PID parameters will be updated automatically, and the meter will control automatically and precisely.
 - During the auto-tuning process, long pressing the "AT" key, measuring out of range, display abnormality, switching to "STOP" state, power failure, etc, will terminate the auto-tuning process.
 - Experienced user can set the proper PID parameter with their rich experience.
- PID heating & Cooling control operation
 (suitable for injection molding machine, extruder, etc.)
 - Set the control mode OT to 3.
 - PID heating control acts on OUT1; PID1 control acts on OUT2.
 - PID cooling control OUT2 will output through AL 1 alarm function terminal.
 - Please set CP1 (cooling control cycle) and PC (cooling proportional coefficient) to a proper value.

XI. Checking methods of simple fault

Display	Checking methods	Action
LLL	Check whether the sensor is disconnected, has poor contact or is wired incorrectly; check the FL value; check whether the working environment temperature is out of range; check whether the input signal selection is correct (INP menu);	Force to close output, measurement interface LLL flashes
HHH	Check whether the sensor is disconnected, has poor contact or is wired incorrectly; check the FH value; check whether the working environment temperature is out of range; check whether the input signal selection is correct (INP menu);	Force to close output, measurement interface HHH flashes force to output alarm

XII.Version and Revision Record

Date	Version	Revision Record
2025.5.9	A/0	First archive