

Intellegient Temperature Controller

User Manual



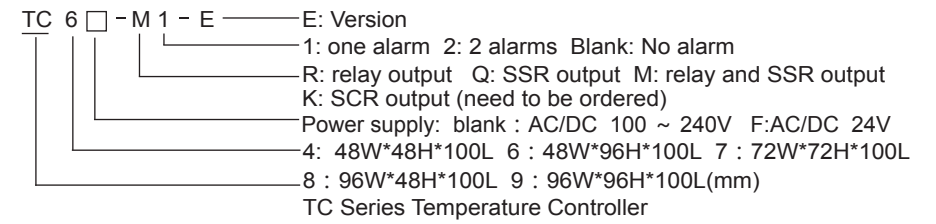
Features:

- Various of TC/RTD signal type are supported
- Using fuzzy PID control algorithm and auto-tuning without overshoot impulse
- Different control modes for selection, kindly refer to OT parameter for details
- Switch RUN/STOP function with one key

The instruction explain instrument settings, connections,name and etc,please read carefully before you use the temperature controller. Please keep it properly for necessary reference.

KKTCE02A-A/1-20190410

1.Model Illustration



Note: If need heating and cooling control mode , also need alarm function , please choose model with 2 alarms relay output.

2.Models Example

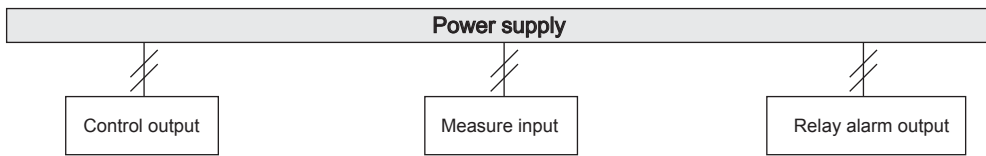
Model	Control output	Alarms
TC-□-M1	relay and SSR output	1
TC-□-M2	relay and SSR output	2

3.Technical Parameters

1.Specifications	
Sample rate	2 times/per second
Relay capacity	AC 250V /3A Life of rated load>100,000 times
Power supply	AC/DC 100 ~ 240V (85-265V) 24V(can be ordered)
Power consumption	< 6VA
Environment	0 ~ 50°C no condensation , Humidity : < 85%RH , altitude<2000m
Storage environment	-10 ~ 60°C, no condensation
SSR output	DC 24V pulse voltage , load<30mA
Insulation impedance	Input, output, power VS meter cover > 20MQ
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
Dielectric strength	Signal input /output /power 1500VAC , between lower than 60V circuits, DC500V1min
Total weight	About 400g
Panel material	PET (F150/F200)
Shell material	The shell and panel frame PC/ABS (Flame Class UL94V-0)
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)

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2.Isolation diagram



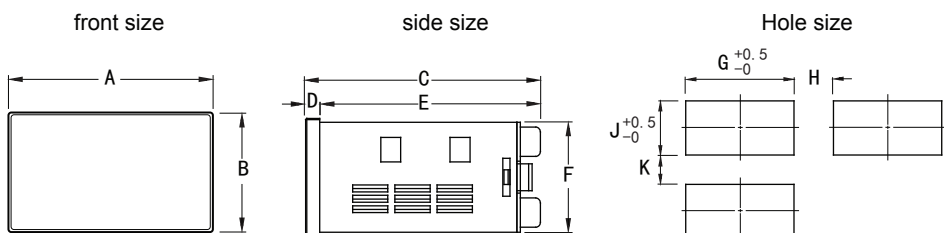
3.Measured signal specifications :

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

4.Name of universal panel

No	Symbol	Name	Function
1	OUT1	out1 indicate light(red) *	Main control output indicate light, it lights when the output is ON
	OUT2	out2 indicate light(red) *	Cooling output indicate light,it lights when output is ON
	AL1	Alarm1# indicate light(red)	1st alarm output indicate light
	AL2	Alarm2# indicate light(red)	2nd alarm output indicate light
	AL3	Alarm3# indicate light	3rd alarm output indicate light (can be ordered)
	AT	AT indicate light(green)	Auto-tuning indicate light,it indicates auto-tuning status when lighting on
	2	SET	SET function key
3	←AT	Shift/AT key	Activation/shift key/AT auto-tuning key,long press to enter/exit auto-tuning under measure control mode
4	▲R/S	Increase key/R/S	Increase key, long press it to shift RUN/STOP mode under measure control mode.
5	▼	Decrease key	Decrease key
6	SV	Display window (green)	Setting value/parameters display window,display "STP" =stop control
7	PV	Display window (red)	measured value/parameters code display window

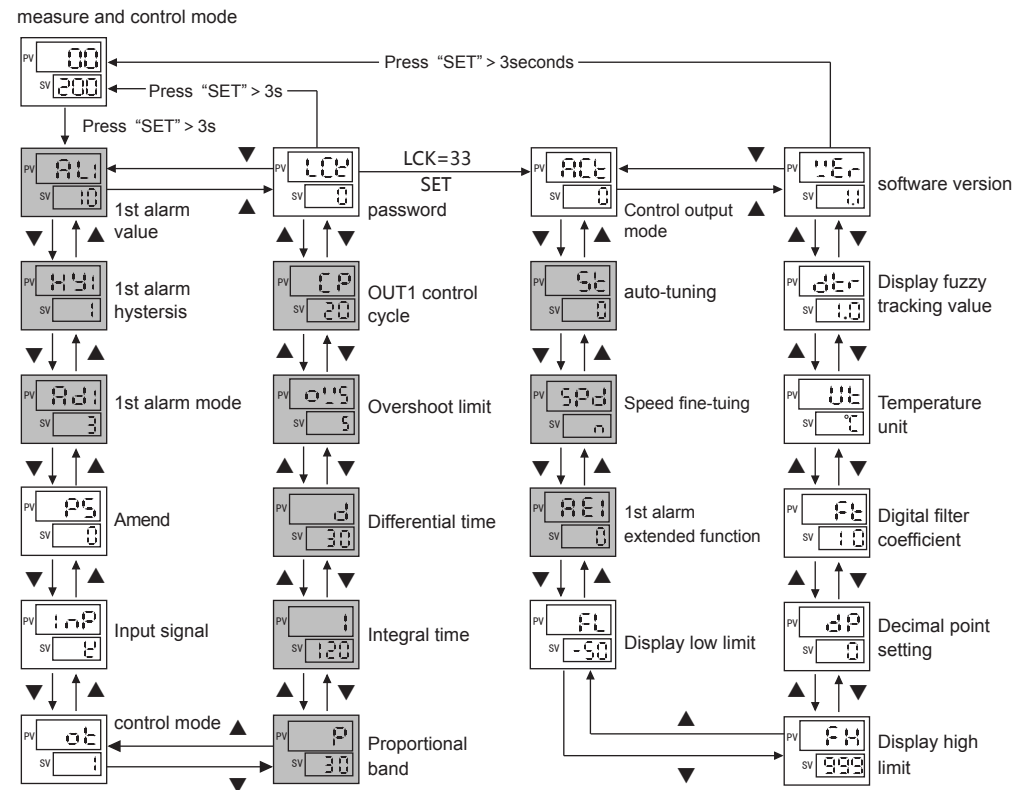
5.Dimension and installation size



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6.Operation & menu

1. Factory default menu procedure (pid heating mode)



(common menu)

(uncommon menu)

Note: Meter will hide non-related parameters based on selected OT working mode. Please set OT parameter well when using the meter.

- Parameters will keep displaying all the time for all the model and all the setting
- Parameters will be hidden based on model and menu setting

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2. Common use menu explanation

No.	symbol	Description	Set range	Factory setting
1	FL	1st alarm value, note: the minus is dealt as absolute value when it is as a deviation value .	FL ~ FH	10
2	HY	1st alarm hysteresis	0 ~ 100	1
3	AD1	1st alarm mode . Note: when 1st alarm is used as OUT2 , should set as 0. When setting as 0, it close alarm function. When set value >6, should set AD2 as 0. (refer to alarm output logic diagram on page 6)	0 ~ 12	3
4	FL2	2nd alarm value,note:the minus is dealt as absolute value when it is as a deviation value .	FL ~ FH	5
5	HY2	2nd alarm hysteresis	0 ~ 100	1
6	AD2	2nd alarm mode. Note: When AD1>6, should set this value as 0 to close the alarm function.(refer to alarm output logic diagram on page 6)	0 ~ 6	4
7	AM	Amend value,display value=actual measured value+ amend value	-199 ~ 999	0
8	INP	Optional input measured signal type:refer to input signal parameters table.Note:it need to change the relevant parameters after changing.	K ~ CU100	K
9	CT	Control type,0:ON/OFF control; related parameter: DB 1:PID heating control , related parameter: P , I , D, OVS, CP, ST, SPD 2:compressor cooling , parameter: DB , PT 3:PID heating & cooling control . related parameters: P, I, D, OVS,DB, CP, CP1, PC, ST, SPD 4: overtemperature cooling control.related parameter:DB	0 ~ 4	1
10	P	Proportional band,the lower of setting value,the faster of system heating . Increase proportional band can reduce vibration,but it may increase control bias.Reduce proportional band reduce control bias, may cause vibration	0 ~ 999	30
11	I	Integral time the lower of the value,the stronger of integral action,the more tendency to eliminate and deviation of set value.If integral action is too weak, it may not eliminate the deviation. Unit: Second	0 ~ 999	120
12	D	Differential time,reduce effect of differential time to proper value,which prevent system oscillation.The higher value,the stronger function of differential.Unit:s	0 ~ 999	30
13	OS	Overshoot limit,in the process of PID control,when PV>SV+OVS,it force off output; The lower value,the lower PID adjusted range,the worse control stability;please set a proper value according actual state.	0 ~ 999	5
14	DB	On-off control backlash(negative backlash on-off control) or cooling control and compressor cooling control dead zone. please change value according to decimal position,when you change input sigal type.	0 ~ 100	5
15	CP	OUT1 heating control cycle, 1:SSR control output, 4-200: relay control output. (Unit:second)	1 ~ 200	20
16	CP1	OUT2 control cycle,cooling relay output cycle.Unit:second	4 ~ 200	20
17	PC	OUT2 cooling proportionality coefficient,the higher of value,the stronger of cooling	1 ~ 100	10
18	LOCK	Lock function; 001: SV value can not be modified, 010:menu setting value only can be checked ,cannot modified. 033: If set it as 033 ,it can enter to uncommon menu . 123: reset to factory defalut setting	0 ~ 999	0

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8.Alarm function logic diagram

(1) Alarm parameters and output logic diagram:

Symbol description : "☆" means alarm hysteresis , "▲" means alarm value , "△" means SV value

No.	Type	Alarm output (AL1、AL2 is independent of each other) Image : the hatched section means the alarm action
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	
No.	Type	The following two group of alarm parameters(AL1、AL2) used in combination,AL1 alarm output , AD2 must set to 0
7	High/low limit absolute value alarm	
8	※High/low limit deviation value alarm	
9	※Alarm between high limit absolute value and low limit deviation value	
10	※Alarm between high limit deviation value and low limit absolute value.	
11	High/low absolute value alarm	
12	※High/low limit deviation alarm	

※When the alarm value with deviation alarm set to a negative number,it will deal with it as an absolute value.

(2) Alarm extension function table

AE1/AE2 value	Alarm handling mode when show HHHH/LLLL	Remark
0	The state when alarm keep HHH/LLL in previous time	Power on alarm , alarm does not inhibit (As long as meet the requirement of alarm , make alarm output)
1	Forced alarm output	
2	Forced alarm close	Power on alarm , alarm inhibits. (Before PV value reach the set value at the first time ,the alarm does not output)
3	The state when alarm keep HHH/LLL in previous time	
4	Forced alarm output	
5	Forced alarm close	

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3. Uncommon use menu explanation

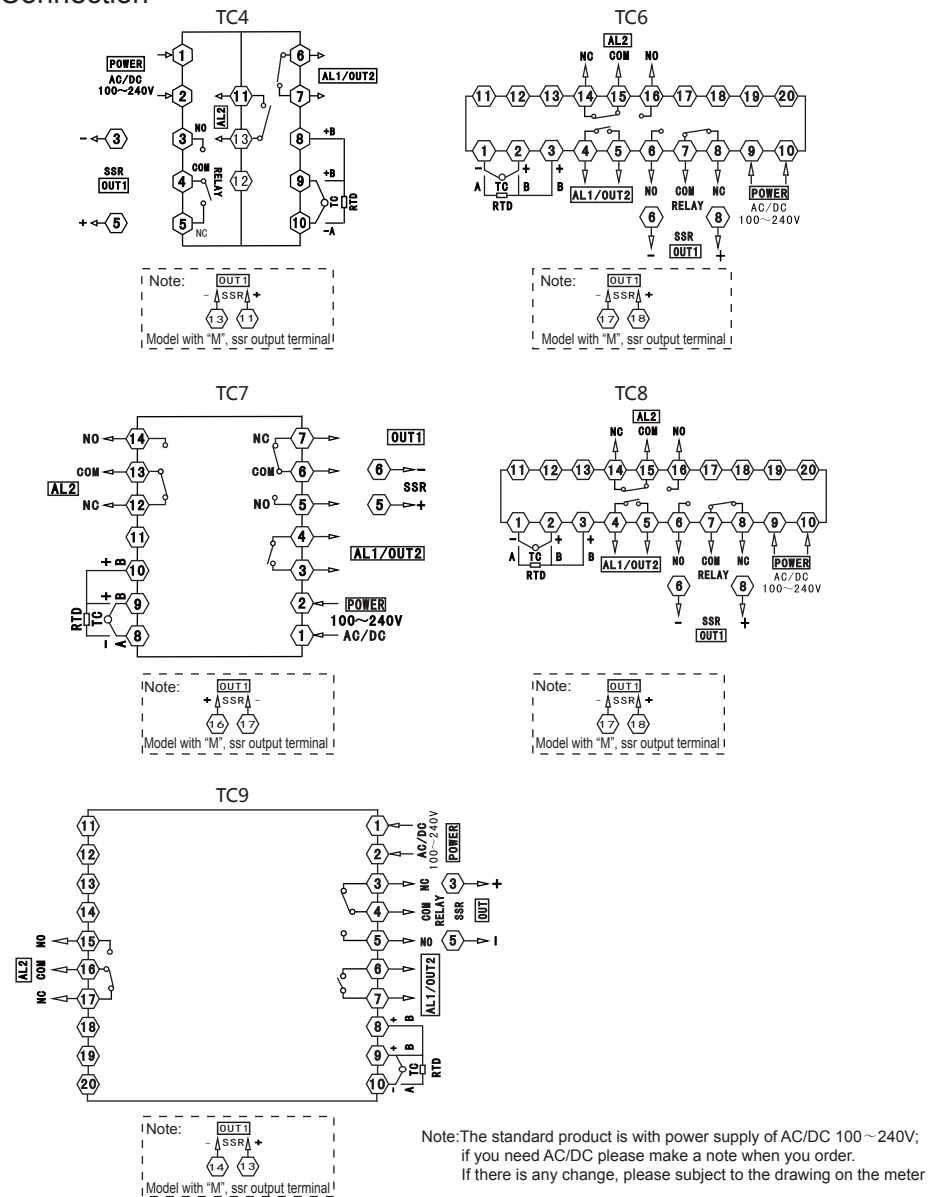
No.	symbol	Description	Set range	Factory setting
19	RC	Control output : 0: relay output 1: single SSR output	0 ~ 1	0
20	ST	Power on auto-tuning setting. 0: normal control after power on 1: meter enter into pid auto-tuning status after power on. long press ▲AT to exit the auto-tuning.	0 ~ 1	0
21	SP	Control speed fine tuning,optional 0(N)no function,1(slow),2(ss)medium slow, 3 (SSS) very slow , 4 (F) fast , 5 (FF) medium fast , 6 (FFF) express	0 ~ 6	N
22	PT	Compressor starting delay ,unit:s	0 ~ 999	180
23	RE1	1st alarm extended function	0 ~ 5	0
24	RE2	2nd alarm extended function	0 ~ 5	0
25	FL	Measure range low limit, setting value must be less than measure range high limit	refer to input signal table	-50
26	FH	Measure range high limit, setting value must be more than measure range low limit.	refer to input signal table	999
27	DP	Decimal point setting	0 ~ 1	0
28	FC	filter coefficient ,the higher of value,the stronger of filter function	0~255	10
29	UT	Temperature unit	°C、°F	°C
30	DR	PV fuzzy tracking value,it can get stable control display value in some status. Note:when the alarm setting value is equal with SV setting value after setting the DTR value,operation of alarm output is subject to actual measured value. Setting 0 to close the function.	0.0~2.0	1.0
31	UV	Software version	cannot modified	V1.0

7.Key function operation

- Run/stop operation
 - Under the measure mode,press "▲" into monitoring mode;and on the SV window display "STP" . Long Press "▲" to exit.
 - It can modify SV value and shift mode operation even if displaying STP.
 - Under the monitoring mode, main control output will stop
- PID Parameter confirmation and auto-tuning operation:
 - Factory default PID may not be suitable to usage occasion;please use auto-tuning function to get suitable PID setting.
 - The meter will make control output after power on a short period. User can set the meter to monitor mode to make sure auto-tuning effect, or switch off the power of control output load at temporary . No matter how to operate, it should guarantee the set value is larger than the present measured value, it is better if much larger.
 - In order to avoid the effect of alarm output,please set the proper alarm value,or remove the alarm effect.
 - Set proper SV value .
 - Set OT as 1 (PID control).
 - Under the condition of PV value at normal room temperature, exit the monitoring mode or switch on load power,and long press "▲AT" to enter auto-tuning mode, and AT indication light will flashing.
 - Auto-tuning need a period, 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. PID will update automatically, and can get good control result.
 - During auto-tuning, long press "▲AT" key, measure beyond the range,display abnormally, shift to "STP" status,power-off ect will stop the auto-tuning.
 - Experienced users can set a proper PID parameter according to their experience.
- PID & Cooling control operation (suitable for injection molding machine , extruding machine ect)
 - Please set OT parameter as 3
 - PID control act on main control output OUT1 ; Cooling control act on OUT2.
 - AL1 alarm relay will be used as OUT2 control output.
 - Please set the cooling start offset DB to a value bigger than 5,to ensure the cooling would not affect the PID control impact.
 - Please set cooling control cycle CP1 to a proper value,and modify the cooling proportional coefficient to a a proper value.
 - When PV value > SV+DB value,the cooling control start to effect;the bigger value of PV,the longer output time of OUT2

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9.Wire Connection



10.Simple TroubleShooting Method

Display	Methods
LLLL/HHHH	Check whether the input disconnection, check the FH and FL value, Check working environment temperature , Check whether input signal is selected correctly.

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