

TC Series Temperature Controller User's Manual



Features:

- ⊙ K type TC input or PT100 RTD input .
- ⊙ Advanced two degrees of freedom PID arithmetic.
- ⊙ With displaying , controlling and alarm function.
- ⊙ Auto-tuning function for heating controlling system.
- ⊙ Relay / Solid state relay output.
- ⊙ Economic with high efficiency, can be operated conveniently

For your safe, please read the below content carefully before you use the temperature controller!

■ Safe Caution

※	Please read the manual carefully before you use the temperature controller.
※	Please comply with the below important points.
⚠	Warning An accident may happen if the operation does not comply with the instruction.
⚠	Notice An operation that does not comply with the instruction may lead to product damage.
※	The instruction of the symbol in the manual is as below.
⚠	An accident danger may happen in a special condition.

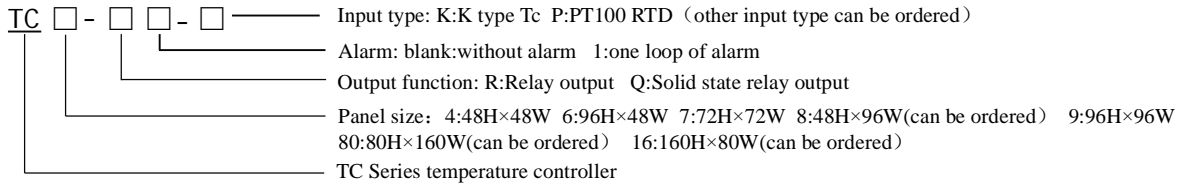
⚠ Warning

1. A safety protection equipment must be installed or please contact with us for the relative information if the product is used under the circumstance such as nuclear control, medical treatment equipment, automobile, train, airplane, aviation and equipment etc. Otherwise, it may cause serious loss, fire or person injury.
2. A panel must be installed, otherwise it may cause creepage (leakage).
3. Do not touch wire connectors when the power is on, otherwise you may get an electric shock.
4. Do not dismantle or modify the product. If you have to do so, please contact with us first. Otherwise it may cause electric shock and fire.
5. Please check the connection number while you connect the power supply wire or input signal, otherwise it may cause fire.

⚠ Caution

1. This product cannot be used outdoors. Otherwise the working life of the product will become shorter, or an electric shock accident may happen.
2. When you connect wire to the power input connectors or signal input connectors, the moment of the No.20 AWG (0.50 mm) screw tweaked to the connector is 0.74n.m - 0.9n.m. Otherwise the connectors may be damaged or get fire.
3. Please comply with the rated specification. Otherwise it may cause electric shock or fire, and damage the product.
4. Do not use water or oil base cleaner to clean the product. Otherwise it may cause electric shock or fire and damage the product.
5. This product should be avoid working under the circumstance that is flammable, explosive, moist, under sunshine, heat radiation and vibration. Otherwise it may cause explosion.
6. In this unit it must not have dust or deposit, otherwise it may cause fire or mechanical malfunction.
7. Do not use gasoline, chemical solvent to clean the cover of the product because such solvent can damage it. Please use some soft cloth with water or alcohol to clean the plastic cover.

1.Code Illustration



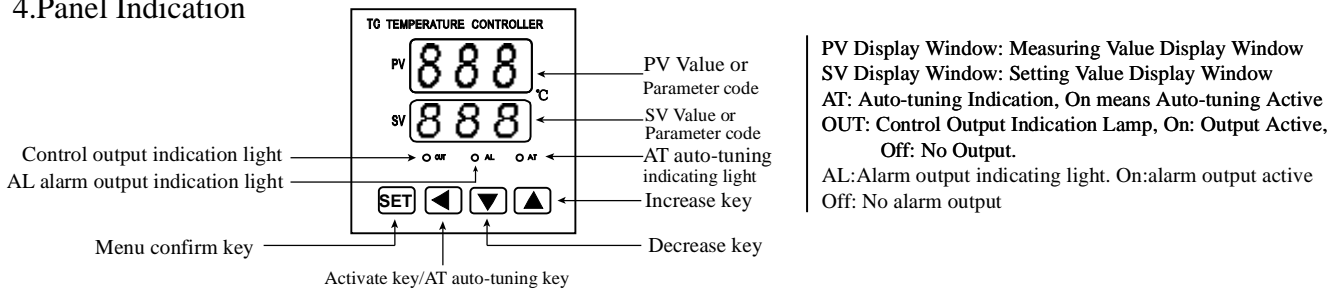
2.Ordering code

Code	Control output	Input signal	Measuring range	Dimension
TC□-R1-K	Relay output	K type Tc	0~400℃	4:48H×48W
TC□-R1-P	Relay output	Pt100	0~600℃	6:96H×48W
TC□-Q1-K	SSR output	K type Tc	0~400℃	7:72H×72W
TC□-Q1-P	SSR output	Pt100	0~600℃	9:96H×96W
				other size can be ordered

3.Main Technical Parameter

Input type	K type TC, Resolution 1℃ , Pt100 RTD , resolution 1℃
Measuring accuracy	0.5%F. S±3digits 25℃
Output type	Relay output: capacity 3A/250VAC SSR output: 24V pulse voltage ,loading n30mA
Alarm output	Relay output: capacity 1A/250VAC
Working voltage	100~240V AC/DC
Total current	<20mA (220VAC)
Ambient	0~50℃ 45~80%RH
Storing ambient	-10~60℃ 25~85%RH

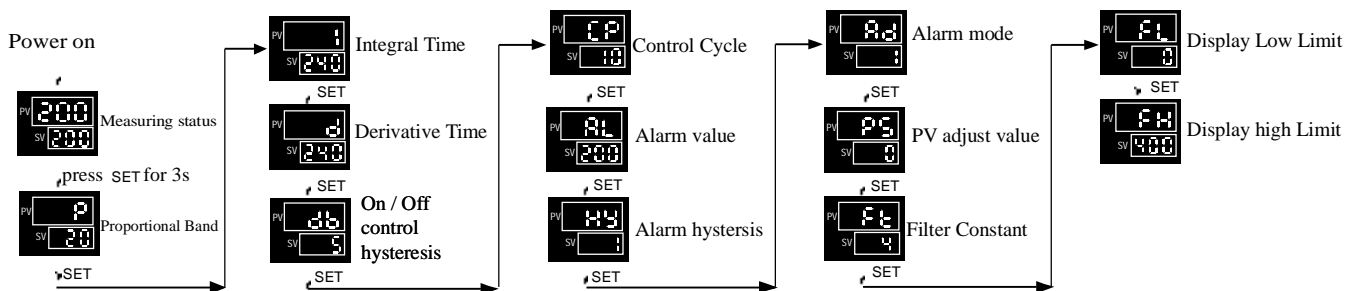
4.Panel Indication



5. Panel Key Operation

- (1) SET key: In normal status, long press SET key to enter setting menu; In SV value modifying status, after each parameter modifying completed, short press SET to confirm.
 - (2) “◀” key: In normal displaying status, short press ◀ key to enter SV value modifying status, the value of SV flicks. In normal displaying status, long press ◀ key to enter auto-tuning status, AT indicating light on; In setting menu, short press ◀ key to activate a parameter, then the parameter will flick, and can modify the parameter.
 - (3) “▲” in SV value modifying status, short press this key to raise the value slowly, long press this key can raise the value quickly.
 - (4) “▼” in SV value modifying status, short press this key to reduce the value slowly, long press this key to reduce the value quickly.
- Note: Short press means press a key less than 1s, long press means press a key more than 3s.

6. Operation Sequence



7. Setting menu and alarm function (Note: the value in the bracket is the setting range when the input is Pt100)

Parameter	Illustration	Setting range	Ex-factory set
P	Proportional Band. The smaller the proportional band is, the faster the system heats. Instead, the slower the system heats. Increase proportional band will decrease the oscillation, but increase control bias. Decrease proportional band will decrease control bias, but cause oscillation. (P=0 means On / Off control)	0~400 (600)	20
I	Integral Time. The smaller the integral time is, the stronger the integral action is and better for eliminating the bias between it and the setting value. If the integral time is too short, it may not eliminate the bias.	0~999	240
D	Derivative Time. To decrease the derivative time to a proper value can prevent the system from oscillating. The bigger the D is, the stronger the derivative action is.	0~999	240
d _b	On / Off control hysteresis. (This value is only effective for On / Off control)	1~200	5
CP	Control cycle, 1 is SSR control output, 4-255 is relay control output.	1~255	10
RL	Alarm value	0~400 (600)	200
HY	Alarm hysteresis	0~100	1
RL	Alarm mode: 0:low limit absolute value alarm 1:high limit absolute value alarm 2:low limit bias value alarm 3:high limit bias alarm	0~3	1
PS	PV adjust value, applied to amend the bias caused by the measuring process.	-50~50	0
Ft	Filter constant. The smaller Ft is, the faster response is, but it may cause fluctuation.	0~20	4
FL	Display low limit.	0~399 (599)	0
FH	Display high limit.	1~400 (600)	400 (600)

Alarm code	Alarm mode	Alarm output
0	Low limit absolute value alarm	on $\xrightarrow{\text{HY}}$ off AL
1	High limit absolute value alarm	off $\xrightarrow{\text{HY}}$ on AL

Alarm code	Alarm mode	Alarm output
2	Low limit bias value alarm	on $\xrightarrow{\text{HY}}$ off SV-AL
3	High limit bias value alarm	off $\xrightarrow{\text{HY}}$ on SV+AL

8. Advanced Function

P.I.D parameters setting & Auto-tuning operation

8.1. To set P.I.D. parameters manually;

The default PID value has been pre-set when the product is ex-factory. This P.I.D value is applicable to normal heating system for temperature control. If the temperature control performance is not very good with the default PID value, the value can be changed according to the experience for those users who have the automation control theory & experience.

8.2. To set P. I. D parameters automatically;

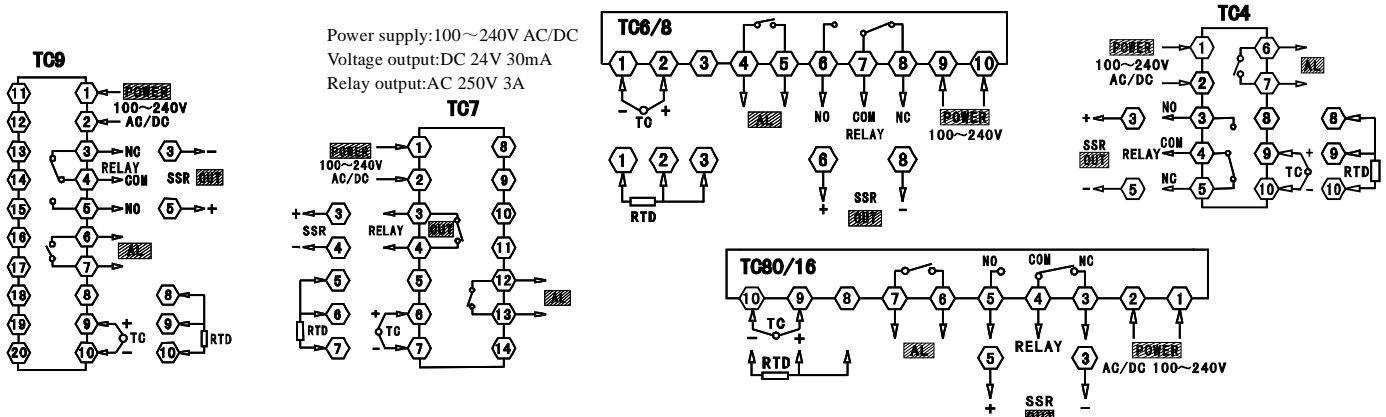
If users do not know how to set the PID value, they can use the Auto-tuning function of the product. The Auto-tuning function will calculate the P. I. D. value it needs automatically as per different heating system to control temperature.

Auto-tuning method: At first set the SV value, then press "◀" for more than 3S. Wait until the "AT" indicating lamp turning on, then release pressing. AT indicating light ON means Auto-tuning is running, at this time do not change SV value or other parameters of the controlling equipments to make sure the Auto-tuning gets an accurate result. After the AT lamp turn off, the controller will refresh the P.I.D value automatically. At this time, the controller can control temperature automatically and precisely.

9. Simple Problem Shooting

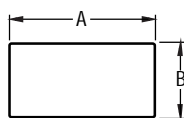
Display Message	Method
Display ERR	To check input signal connects or not. To check FH, FL value. To check working temperature is normal or not. To check input signal selection is right or not.

10. Connecting Drawing

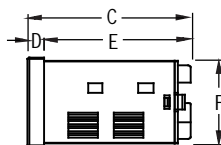


11. Dimension (unit:mm)

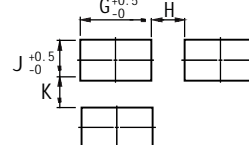
Panel size



Side-face size



Mounting size



Code	A	B	C	D	E	F	G	H (minimum)	J	K (minimum)
4: (48*48)	48	48	101	10	91	45	45.5	25	45.5	25
6: (96*48)	48	96	100	6	94	91	45.5	25	91.5	25
7: (72*72)	72	72	100	10	90	67.5	68	25	68	25
8: (48*96)	96	48	100	6	94	45	91.5	25	45.5	25
9: (96*96)	96	96	101	10	91	90.5	91	25	91	25
80: (80*160)	160	80	102	10	92	76	154	30	76.5	30
16: (160*80)	80	160	102	10	92	153.5	76	30	154	30