®

Tempsen

SINCE :1987

User Manual

Auto Tuning PID

Temperature Controller

TUPC-T series

(Applicable for accurate controls of Temperature)

TEMPSEN DEVICES

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₱ Introduction

Thank you for buying the product , Tempsen Mp Based Auto Tuning PID controller is basically a single Input Temperature controller, which accepts Thermocouples ,RTD inputs user selectable and display their corresponding process values and Set Value. Also available option Relay and SSR control output , 2 and 4 group alarm output, 48VAC/24VDC supply.

I. Ordering Code Symbol

Model	1	2	3	4	5
TUPC	9696	T	L2	N	N

1. Front panel dimension Size

code	Front Panel	Cut Out
	Width ×height × height	width ×height
9696	96×96X 100mm	92 X92 mm
4848	48×48X 100mm	45 X45 mm

2. Basic function of instrument

T - Economical Intelligent Temperature Controller 0.3%FS ± 0.1° C (0.0 Decimal)

3, Control Output Modules

N   (or none) no module installed
L4   Relay contact output module (Capacity: 2A/250VAC, normal open and close terminal, can absorb spark)
L2   Relay contact output module (Capacity: 1A/250VAC, normal open and close terminal)
G   SSR voltage output module (30mA/12VDC)

4, Alarm Output Modules

N   (or none) no module installed
L4   Relay contact output module (Capacity: 2A/250VAC, normal open and close terminal, can absorb spark)
L2   Relay contact output module (Capacity: 1A/250VAC, normal open and close terminal)
L5   Output module of dual normal open relay contact (Capacity: 2A/250VAC, support ALM1and ALM2 alarm output)
G5   Duel SSR voltage output module (30mA/12VDC)

5, Alarm Output Modules (Only Size A)

N   (or none) no module installed
L4   Relay contact output module (Capacity: 2A/250VAC, normal open and close terminal, can absorb spark)
L2   Relay contact output module (Capacity: 1A/250VAC, normal open and close terminal)
L5   Output module of dual normal open relay contact (Capacity: 2A/250VAC, support ALM1and ALM2 alarm output)
G5   Duel SSR voltage output module (30mA/12VDC)

II. Technical Specifications

Input Type   : Thermocouple (K S R E J N) ,RTD (PT100)
Measure Range   : K (0~1300°C),S (0~1700°C),R (0~1600°C),E (0~1000°C),J (0~1200°C)N (0~1300°C),PT100 (-200~800°C)
Accuracy   : 0.3%FS ± 0.1°C
Display Resolution : 0.1°C /0.1°F
Control Method   : ON / OFF Control , AI PID Control with Auto Tuning (AT)
Output Type
(Modularization)   : Relay Output , Voltage Output for SSR
Alarm
(Modularization)   : Limit High / Low , Deviation High/ Deviation Low
Supply Voltage   : 100~240VAC (-15%, +10%) , 24 VDC (Modular) 50~60Hz
Power Consumption : =3W
Operating Environments : Temperature: -10~+60°C / 14~140°F ,humidity: 0~90 RH%
Electromagnetic compatibility (EMC) : IEC61000-4-4: ± 4KV/5KHz, IECy1000-4-5: 4KV

DISPLAY AND OPERATIONS

1 .Upper display window, displays PV, parameter code, etc.
2 .Lower display window, displays SV, parameter value, or alarm
3. Setup key, for accessing parameter table and conforming parameter modification.
4 .Data shift key, and auto tuning.
5. Data decrease key
6.Data increase key
7. LED indicator. MAN, PRG, MIO,
COM and OP2 indicators is
non-applicable.
OP1, AL1, AL2, AU1 and AU2 will indicate I/O operation of the corresponding
module.
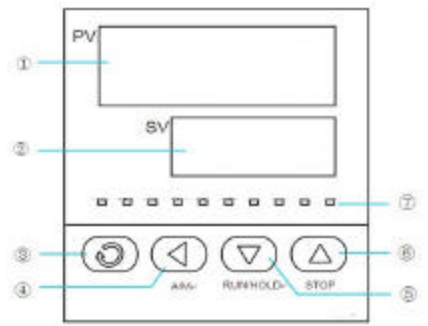
Basic display status:

When power on, the upper display window of the instrument shows the process value (PV), and the lower window shows the set-point (SV). This status is called basic display status. When the input signal is out of the measurable range (for example, the thermocouple or RTD circuit is break, or input specification sets wrong), the upper display window will alternately display "orAL" and the high limit or the low limit of PV, and the instrument will automatically stop output. If the lower display window alternately display "HIAL", "LoAL", "HdAL" or "LdAL", it means high limit alarm, low limit alarm, deviation high alarm, a nd deviation low alarm happening.

Note 1: If the setpoint is different, the parameters obtained from auto-tuning are possible different. So you'd better set setpoint to an often-used value or middle value first, and then start auto-tuning. For the ovens with good heat preservation, the setpoint can be set at the highest applicable temperature. Depending on the system, the auto-tuning time can be from several seconds to several hours.
Note 2: Parameter Ctl (on-off differential, control hysteresis) has influence on the accuracy of auto-tuning. Generally, the smaller the value of Ctl, The higher the precision of auto tuning. But Ctl parameter value should be large enough to prevent the instrument from error action around setpoint due to the oscillation of input. Ctl is recommended to be 2.0.
Note 3: The instrument has the function of self-learning. It is able to learn the process while working. The control effect at the first run after auto Tuning is probably not perfect, but excellent control result will be obtained after a period of time because of self-learning.

III. PARAMETER AND SETTING

Field parameter table (Primary parameters)

Code	Description	Remarks	Setting Range	Default
HIAL	High limit alarm	Alarm on when PV>HIAL alarm off when PV<HIAL-AHYS Set to 3000 will disable this function	-999—+3000	3000
LoAL	Low limit alarm	Alarm on when PV<LoAL; alarm off when PV>LoAL+AHYS Set to -999 will disable this function	-999—+3000	-999
HdAL	Deviation high alarm	Alarm on when PV-SV>HdAL; alarm off when PV-SV<HdAL-AHYS Set to 3000 will disable this function	-999—+3000	3 000
LdAL	Deviation high alarm	Alarm on when PV-SV>HdAL; alarm off when PV-SV<HdAL-AHYS Set to -999 will disable this function	-999—+3000	-999
Loc	Parameter Lock	**Loc Auto Tuning SV Primary Secondary** 0 v v v X 1 X v v X 2 X X v X 3 X X X X 808 v v v v v : allow to modify data or execute AT X : not allow to modify data or execute AT	0—255	0

System parameter table (Secondary parameters)

Set the parameter 'Loc'=808 to enter:

| AHYS	Alarm Hysteresis	Avoid frequent alarm on-off action because of the fluctuation of PV	0—200	2
AOP	Alarm output assignment	Alarm LdAL HdAL LoAL HIAL Output (x1000) (x100) (x10) (x1) None 0 0 0 0 AL1 1 1 1 1 AL2 2 2 2 2 AU1 3 3 3 3 AU2 4 4 4 4 eg: AOP=101 means HdAL and HIAL are outputted to AL1 and LoAL and LdAL has no output	0—4444	1111 Or according to fixed module
CtrL	Control mode	onoF : On-off control APId : AI PID control, high precision and no-overshot	onoF, APId	APId
Act	Acting Method	rE: Reverse acting. Increase in measured variable causes an decrease in the output, such as heating control. dr: Direct acting. Increase in measured variable causes an increase in the output, such as refrigerating control. rEbA: Reverse acting with low limit alarm and deviation low alarm blocking at the beginning of power on. drbA: Direct acting with high limit alarm and deviation high alarm blocking at the beginning of power on.	rE / dr rEbA/drbA	
P	Proportion band	Proportion band in PID with unit ? or ?	10—999	30
I	Time of Integral	No integral effect when I=0	1—9999 Sec	100 sec
D	Time of Derivative	No derivative effect when d=0	0—999.9 Sec	50.0 sec

| CtI	Control period	Small value can improve control accuracy. For SSR or TRIAC output, generally 0.5 to 3seconds. Large value can increase using life of relay. For Relay output, generally 15 to 40 seconds	0.5—120 Sec	2 s Or 20 s
CHYS	Control Hysteresis	CHYS is used for ON-OFF Control. PV > SV, Output turns OFF; PV<SV-CHYS, Output turns ON.	0—200	2
InP	Input specification	**InP** **Input spec.** **InP** **Input spec.** **0** K **1** S **2** R **3** Spare **4** E **5** J **6** Spare **7** N **8-20** Spare **21** Pt100	0— 21	0
dPt	Resolution	0 : 1 ℃/℉ 0.0 : 0.1 ℃/℉		0.0
Scb	Input Shift	Parameter Sc is used to make input shift to compensate the error produced by sensor or input signal itself. PV-after-compensation= PV-before -compensation + Scb.	-200—+400	0
FILt	PV input filter	The value of FILt will determine the ability of filtering noise. When a large value is set, the measurement input is stabilized but the response speed is slow. Generally, if great interference exists, then you can increase parameter "FILt" gradually to make momentary fluctuation of measured value less than 2 to 5. When the meter of the instrument is being examined at laboratory, "FILt" should be set to 0 or 1 to short the response time.	0—40	1
Fru	Selection of power frequency and temperature scale	50C: 50Hz, ℃ 50F: 50Hz, ℉ 60C: 60Hz, ℃ 60F: 60Hz, ℉	50C, 50F, 60C, 60F	50C
SPL	Low limit of SV	Limit minimum SV value	-999—3000	0
SPH	Upper limit of SV	Limit maximum SV value	-999—3000	400

IV. Symbol Description for Error code

	Description
orAL	Input specification setting is incorrect Or Input wiring is disconnected
HIAL	High limit alarm
LoAL	Low limit alarm
HdAL	Deviation high alarm
dLAL	Negative deviation alarm
EErr	IC Software error
8888	IC Software error

V. INSTRUMENT INSTALLATION AND WIRING

TUPC9696
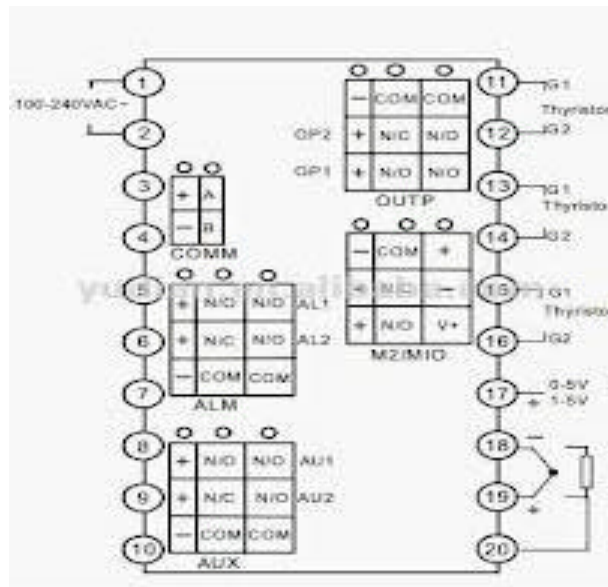
TUPC4848
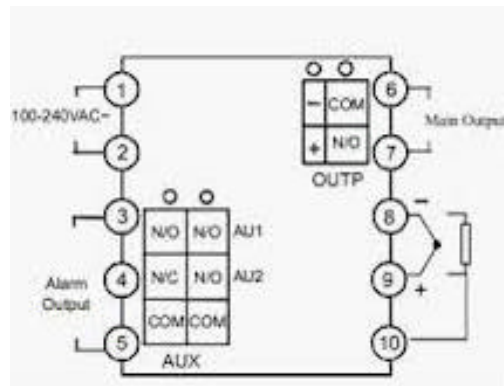
Contact .

TEMPSEN DEVICES

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