

MTD Series Temperature Controller

Instruction Manual

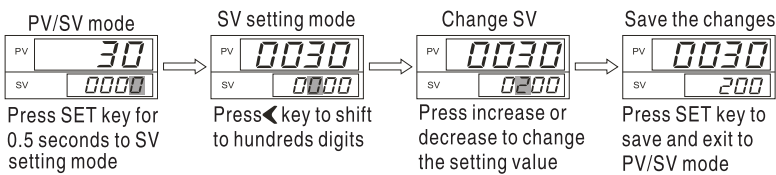
Thank you for choosing our products, Please read this manual carefully and keep it in a safe place for further reference

General Information

- MTD has 4 digits dual LED display, 0.3% measuring accuracy with bar graphic display, 0.1 resolution for TC and RTD sensors
- Please make sure the power supply and the outputs both correctly configured before using, always refer to connection stickers on the side of the controller
- This controller supports various TC and RTD sensors, you can switch between TC and RTD via key pad, please select a correct input sensor code based on field sensors, check "6.3" parameter INP1 for more information
- OUT was configured as reverse action(heating) as factory default, user can change it to direct(cooling) action, refer to "6.3" parameter Outd for more information
- This controller is a PID controller with auto-tuning function
- ON/OFF control, change P=0 to active ON/OFF control mode, the hysteresis for the ON/OFF controller is HYS. For heating, OUT off when PV>SV, OUT on when PV<SV-HYS. For cooling, OUT on when PV>SV+HYS, OUT off when PV<SV "Refer to 6.1 for details"
- Time proportional control, when I=0, d=0 P≠0, control mode change to time proportional control, rest windup is rSt, control cycle time is Cyt, output gets smaller when rSt gets smaller at heating mode, outputs increase when rSt decrease at cooling mode
- Please always perform auto-tuning to have a better control result at PID mode, refer to "7 auto-tuning"
- Output selectable between Relay, SSR Drive, standard SSR trigger, random SSR trigger, phase angled trigger, refer to "6.3" parameter OUT for more details

1. Quick Start Guide

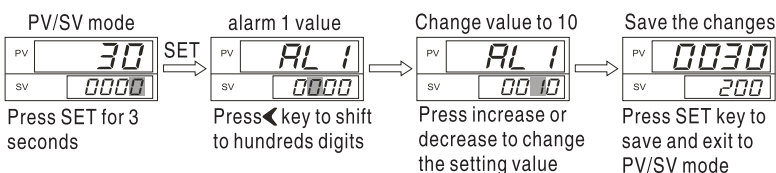
1.1 Setting Value Configuration(change SV from 0 to 200)



Press increase or decrease once, the value will increase or decrease by 1 unit at each time, Press decrease or increase and hold it to fast decreasing or increasing the numbers controller goes back to PV/SV mode and SV configuration saved if no input within 3 seconds Press ◀ for as long as it takes to goes back to previous parameters

1.2 Alarm value configuration

Press SET for as long as it takes to goes to parameter level 1, and change the alarm 1 value to 10



1.3 Switch the display from Celsius to Fahrenheit

Press SET and ◀ the same time to pass word menu, input "0101" as password and goes to parameter level 2

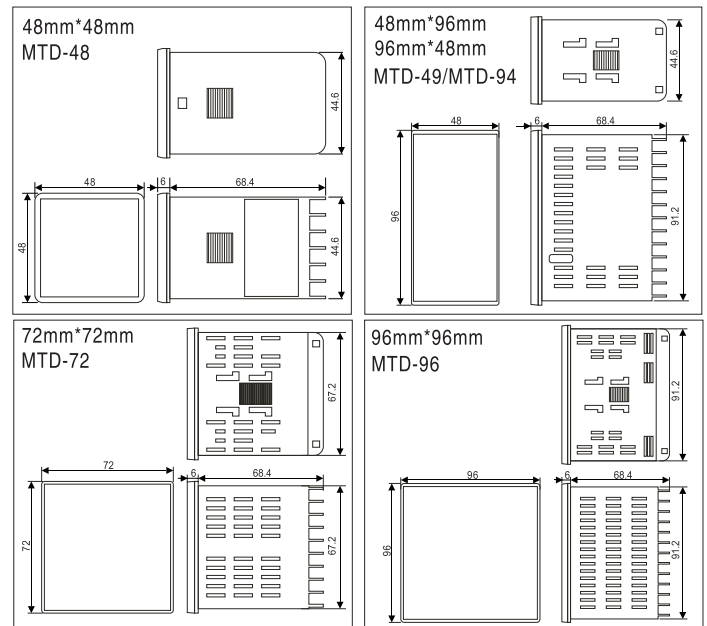


1.4 Switch output from Relay to SSR Drive

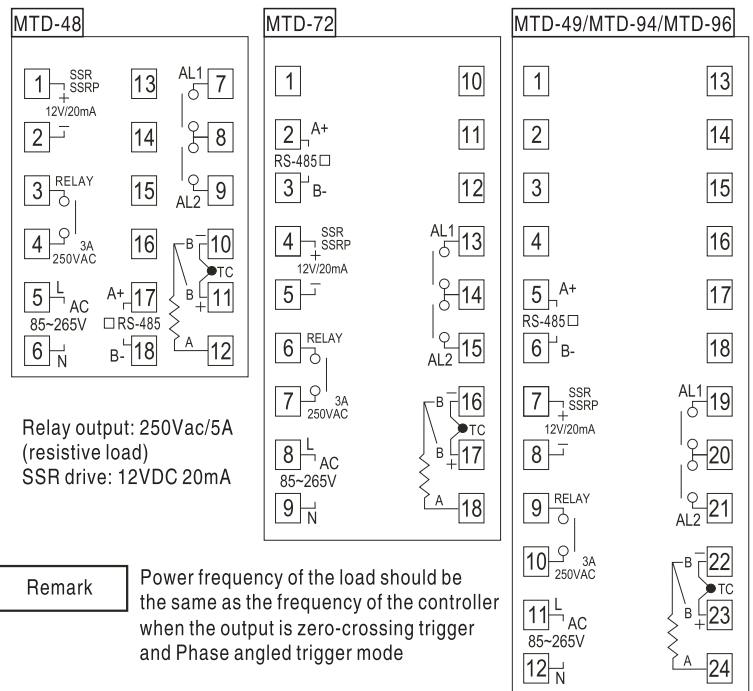
Press SET and ◀ the same time to pass word menu, input "0101" as password and goes to parameter level 2



2. Mounting and Dimensions



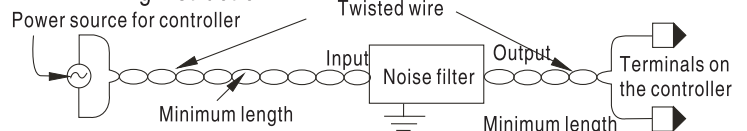
3. Wiring Diagram



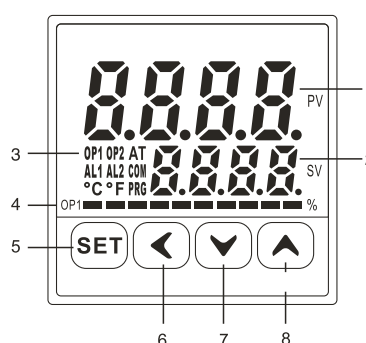
Remark

Power frequency of the load should be the same as the frequency of the controller when the output is zero-crossing trigger and Phase angled trigger mode

3.1 Wiring instruction



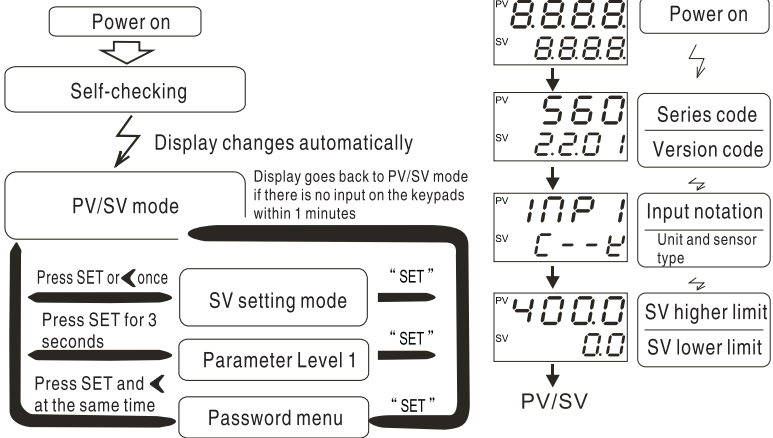
4. Panel Discription



- 1 PV PV display window, display PV
- 2 SV SV display window, display SV
- 3 OP1 : OUT indication
AT : Auto-tuning indication
AL1 : Alarm 1 indication
AL2 : Alarm 2 indication
COM : Communication indication
°C : Celsius indication
°F : Fahrenheit indication
- 4 Bar graphic, output percentage indication
- 5 SET Function key
- 6 ◀ Shift key, exit key
- 7 ◻ Value decrease
- 8 ▲ Value increase

5. Setting and Configuration

5.1 Setting flow chart



5.2 Compatible input sensors and Range

This controller will display factory default sensors and range as well as display unit during the power up process, below is a table you can use to check if the controller has been configured with the correct sensor and display unit, you may switch to other sensor type and display unit if you want.

Notation	<i>E</i>	<i>E</i>	<i>J</i>	<i>N</i>	<i>U</i>
Sensor type	K	E	J	N	Wu3_Re25
Range	1300 °C	600 °C	800 °C	1300 °C	2000 °C
Notation	<i>S</i>	<i>t</i>	<i>r</i>	<i>b</i>	<i>Pt</i>
Sensor type	S	T	R	B	Pt100
Range	1600 °C	400 °C	1700 °C	1800 °C	800 °C

Refer to table at right for compatible sensors and their range

5.3 Parameter configuration(except SV)

Use increase and decrease to change the parameter value and press SET to save the configuration after locate the parameters

6. Parameter Level

6.1 Parameter level 1

Press SET key for 3 seconds to parameter level 1

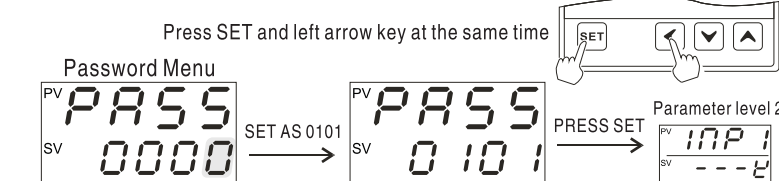
6.1.1 Parameter list

Below parameter will be displayed one by one, press SET key can shuffle among each parameters Press SET key for 3 seconds to save the configuration and exit to PV/SV mode

1# factory default

Notation	Name	Range	1#	Description
<i>AL</i>	Autotune	NO or YES	NO	AT=YES, Autotune activated, AT=NO, Autotune off
<i>AL1</i>	Alarm 1	-1999 to 9999	10	Value for alarm 1, HYS for alarm1=AH1
<i>AL2</i>	Alarm 2	-1999 to 9999	10	Value for alarm 2, HYS for alarm2=AH2
<i>SC</i>	Input offset	-199 to 199	0.0	to compensate the error caused by sensor
<i>P</i>	Proportional band	0.0 to 200.0	20.0	Proportional band for PID, Set P=0 for ON/OFF mode
<i>HYS</i>	Hysteresis for ON/OFF	0 to 999	1.0	HYS for ON/OFF mode Heating: Out off when PV>SV, Out on when PV<SV-HYS cooling: Out on when PV>SV+HYS, Out off when PV<SV
<i>I</i>	Integral time	0 to 3600 Sec	210	Integral off when I=0. I gets smaller integral gets stronger, but oscillation can be expected
<i>d</i>	Derivative time	0 to 3600 Sec	30	Derivative off when d=0 Counter balance the overshoot if increase d a little bit
<i>CYt</i>	Cycle time	0 to 999 Sec	20	Cycle time, Set as 20 for Relay output and 2 for SSR drive output
<i>rSt</i>	Rest Windup	-199 to 200	-5.0	overshoot suppression after power on (rst>-P/2) recommend to calculate by autotune process
<i>LCK</i>	Protection lock	0-2	0	LCK=0: Be able to modify all parameters LCK=1: Only access to SV and auto-tune LCK=2: Only access to SV

6.2 Password



6.3 Parameter level 2

Refer to "6.2" and Set PASS=0101 to go to parameter level 2
Below parameter will be displayed one by one, press SET key can shuffle among each parameters Press SET key for 3 seconds to save the configuration and exit to PV/SV mode

Notation	Name	Range	1#	Description
<i>INP1</i>	Input sensor type	Notation: <i>E</i> <i>E</i> <i>J</i> <i>N</i> <i>U</i> <i>S</i> <i>t</i> <i>r</i> <i>b</i> <i>Pt</i> Type: K E J N Wu3_Re25 S T R B Pt100 Range: 1300 °C 600 °C 800 °C 1300 °C 2000 °C 1600 °C 400 °C 1700 °C 1800 °C 800 °C		1# factory default
<i>dP</i>	Decimal points	0 to 1	0	0: without decimal 1: 1 decimal
<i>LSPL</i>	SV lower limit	-1999 to 9999	0	SV lower limit or zero point for re-transmission
<i>USPL</i>	SV higher limit	-1999 to 9999	400	SV higher limit or maximum point for re-transmission
<i>UNIt</i>	Display unit	C or F	C	C: Celsius F: Fahrenheit
<i>PtFt</i>	Digital filter strength	0 to 60	55	1-30: normal strength 31-60: Enhanced strength
<i>ALd1</i>	alarm mode for AL1	00 to 16	11	Used to define the alarm mode for AL1, refer to alarm mode table below for more details
<i>AH1</i>	HYS for AL1	0.0 to 100.0	0.4	Hysteresis for AL1
<i>ALd2</i>	alarm mode for AL2	00 to 16	12	Used to define the alarm mode for AL2, refer to alarm mode table below for more details
<i>AH2</i>	HYS for AL2	0.0 to 100.0	0.4	Hysteresis for AL2
<i>OUT</i>	Control mode	Control Mode	HEAT	Heat: Reverse(heating) Cool: Direct(cooling)
<i>OUT</i>	Output selection	rLY or Ssr	RLY	Relay or SSR Drive <i>rLY</i> ↔ <i>SSr</i>
<i>SSr</i>	SSR output mode	Stnd or CYCL or PHAS	Stnd	Standard SSR drive, full wave zero-crossing trigger, phase angled trigger <i>Stnd</i> ↔ <i>CYCL</i> ↔ <i>PHAS</i>
<i>HZ</i>	Power source frequency	50HZ or 60HZ	60HZ	<i>50HZ</i> ↔ <i>60HZ</i> 50HZ or 60HZ
<i>LbAt</i>	Loop break time duration	0-9999 Sec	80	Reverse control(Heating): When output power at 100%, within LbAt time duration, the temperature increase less than LbAb value, LBA alarm go off
<i>LbAb</i>	Loop break temperature differential value	0-999.9 Sec	2.0	Direct control(cooling): When output power at 100%, within LbAt time duration, the temperature decrease less than LbAb value LBA alarm go off
<i>IdNO</i>	Device address	0-127	1	Define the address list for device
<i>BAUD</i>	Baud rate		9.6	2.4K, 4.8K, 9.6K, 19.2K

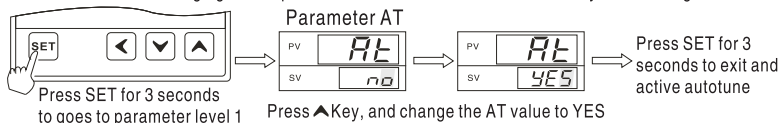
**Alarm mode description (ALd_ =00~16)

- | | |
|------------------------------|---|
| 10: No alarm output | 00: No alarm output |
| 11: Deviation high alarm | 01: Deviation high alarm with hold action |
| 12: Deviation low alarm | 02: Deviation low alarm with hold action |
| 13: Deviation high/low alarm | 03: Deviation high/low alarm with hold action |
| 14: Deviation band alarm | 04: Deviation band alarm with hold action |
| 15: Process high alarm | 05: Process high alarm with hold action |
| 16: Process low alarm | 06: Process low alarm with hold action |
| | 09: LBA loop break alarm |

NOTE: The alarm action will be suppressed right after power on even the condition is satisfied, and the alarm standby only works 1 time right after power on. the alarm will go off if the condition satisfied again after suppression at the first time

7. Auto-tuning

Please active auto-tuning right after power on when Process value still far away from Setting value



Goes to parameter AT and change the AT value to NO if you want to turn off the auto-tuning. AT indicator flashing after auto-tuning initiated. Auto-tuning is an ON/OFF control mode, significant temperature oscillation is expected and the time duration for the auto-tuning could be extra long then expected depends on different system AT indicator stop flashing after autotune finished, P, I, D, rSt value was calculated automatically during the autotune process. controller goes back to PV/SV mode and with all the mentioned parameter saved with a new value. Controller starts to control the system with new parameter

8. Sensor type and Range

Sensor type	Code	Sensor type	Code
K	0 to 400 °C K A4 0 to 600 °C K A6 0 to 1300 °C K B3	Pt100	0 to 400 °C D A4 0 to 600 °C D A6 0 to 800 °C D A8 -100.0 to +200.0 °C D C2 -200 to +800 °C D C8 -100.0 to +200.0 °C D F2 -50.0 to +200.0 °C D G2
E	0 to 200 °C E A2 0 to 400 °C E A4 0 to 600 °C E A6		
J	0 to 400 °C J A4 0 to 600 °C J A6 0 to 800 °C J A8		
T	0 to 200 °C T A2 0 to 300 °C T A3 0 to 400 °C T A4		
S	0 to 1600 °C S B6		
R	0 to 1700 °C R B7		
B	200 to 1800 °C B B8		
N	0 to 1300 °C N B3		
Wu3_Re25	600 to 2000 °C W B0		

Remark: The accuracy is not guaranteed for S type sensor at 0-100C