

MTD Series Temperature Controller

Instruction Manual

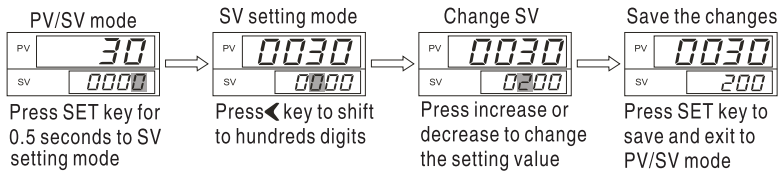
Thank you for choosing our products, Please read this manual carefully and keep it in a safe place for further reference

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 Oud 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

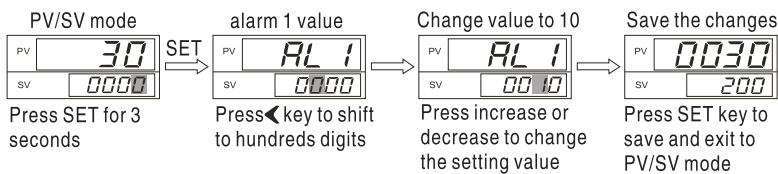
1.1 Setting Value Configuration (change SV from 0 to 200)



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 go back to previous parameters

1.2 Alarm value configuration

Press SET for as long as it takes to go 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

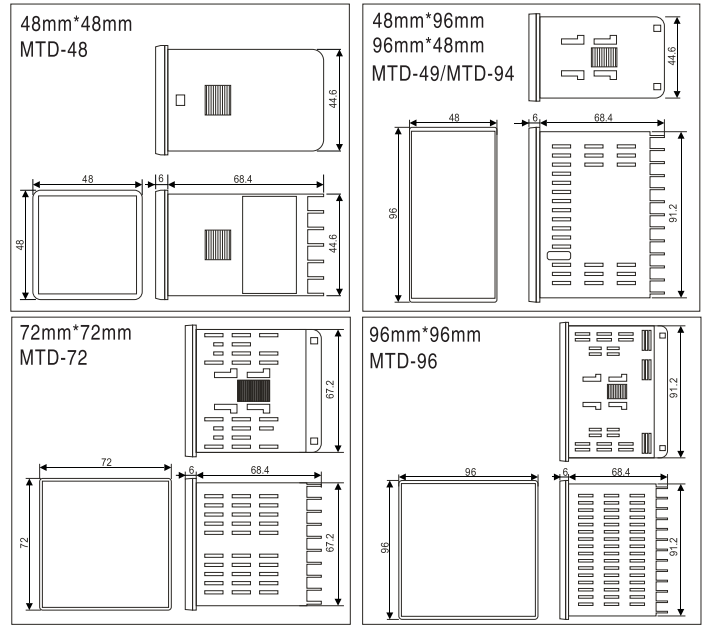


1.4 Switch output from Relay to SSR Drive

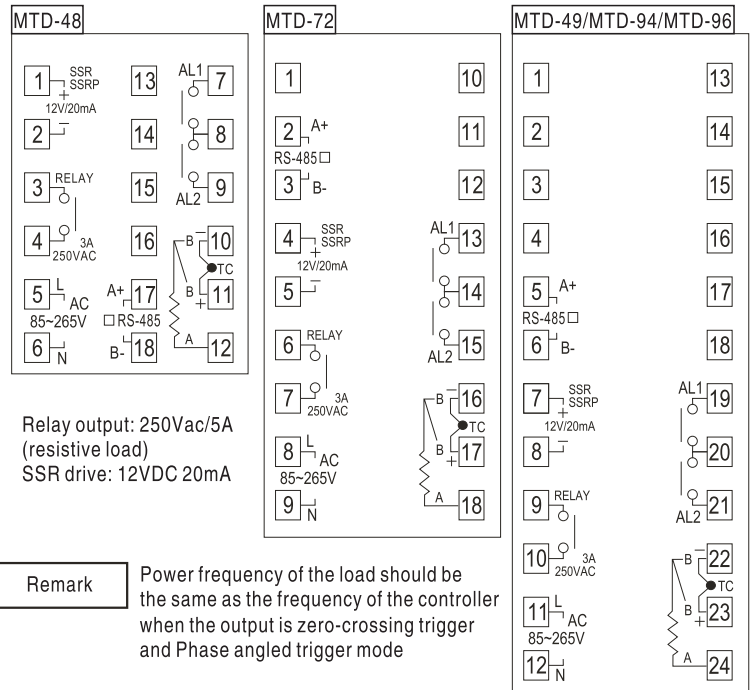
Press SET and ◀ the same time to pass word menu, input "0101" as password and goes to parameter level 2



2. Mounting and Dimensions

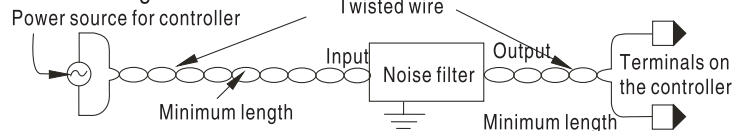


3. Wiring Diagram

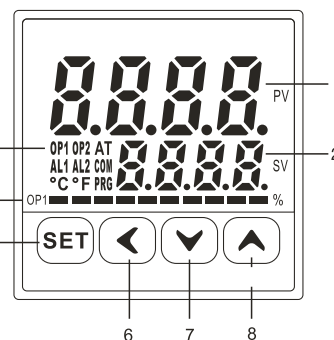


Remark Power frequency of the load should be the same as the frequency of the controller when the output is zero-crossing trigger and Phase angled trigger mode

3.1 Wiring instruction



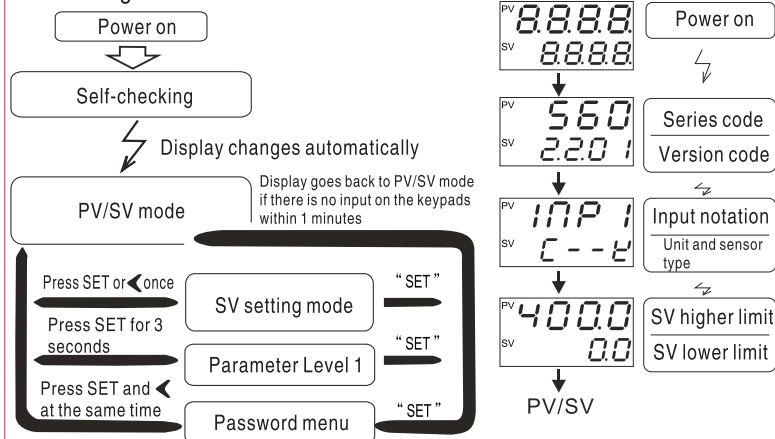
4. Panel Description



- 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 : Celcius 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.

Refer to table at right for compatible sensors and their range

Notation	E	E	J	N	W
Sensor type	K	E	J	N	Wu3_Re25
Range	1300 °C	600 °C	800 °C	1300 °C	2000 °C
Notation	S	T	R	B	Pt
Sensor type	S	T	R	B	Pt100
Range	1600 °C	400 °C	1700 °C	1800 °C	800 °C

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

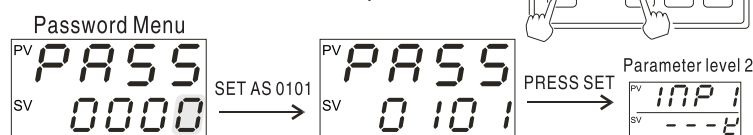
Below parameter will be displayed one by one, press SET key can shuffle among each parameters Press SET key for 3 seconds to save the configuration and exit to PV/SV mode

1# factory default

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

Press SET and left arrow key at the same time



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

1# factory default

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

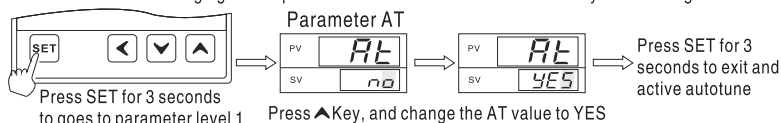
**Alarm mode description (ALd_=00-16)

- | | |
|------------------------------|---|
| 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
K	0 to 400 °C K: A4
	0 to 600 °C K: A6
	0 to 1300 °C K: B3
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

Sensor type	Code
Pt100	0 to 400 °C D: A4
	0 to 600 °C D: A6
	0 to 800 °C D: A8
	-100 to +200 °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	

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