

Combo PID Temperature+Timer Controller Instruction Manual

MF10T/MF40T/MF70T/MF90T

MF0T-TT05-E1

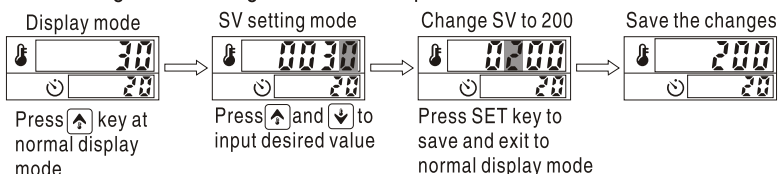
Please read this manual carefully before using and keep it in a safe place for future reference

General Information

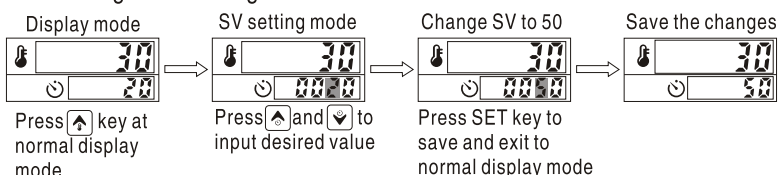
- This combo temperature +Timer controller, offer PID control and timer control 2 in 1 function, 4 digits Dual LED display with bar graphic for output indication, 0.3% measuring accuracy, 0.1 seconds resolution for timer
- Please make sure the power supply and the output was correctly wired prior to use, always refer to the stickers on the controller for wiring in field application. please refer to our selection guide for more information
- You can field select the input between thermocouple and RTDs, but the analog signal has to be specified prior to order. select a correct sensor input code is very important. you will see more information under section (6.3) in this manual for the input sensor configuration, the timer has two counting mode up or down which is selectable via software, the timer can be triggered manually via a dry contact switch and can be reset via dry contact switch as well
- Factory default control mode for controller is PID mode with auto-tuning function
- If you put P=0, control mode switch to ON/OFF mode, the hysteresis value is HYS, when PV>SV, OUT terminated in heating mode, Output initiated when PV<SV-HYS. Output initiated when PV>SV+HYS in cooling mode, Output terminated when PV<SV refer to section(6.1) in this manual for more information
- When P≠0, I=0, D=0, control switch to time proportional mode, Proportional reset value is rSt, control cycle time would be CYT, output decrease when rSt decrease in heating mode, Output decrease when rSt increase in cooling mode
- Please always perform auto-tuning process to get a optimized PID value to have a better control result, refer to section(7) in this manual for more info on the auto-tuning
- Soft-start function for analog output is very useful to have a stable control process, the soft-start can be initiated to achieve stable control effect, check section (6.1)
- RS-485 Modbus-RTU is available on request

1. Quick Start Guide

1.1 Setting value configuration for temperature controller

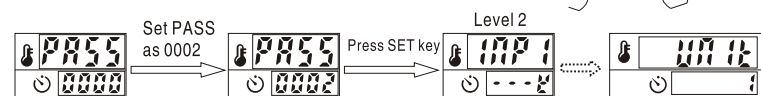


1.2 Setting value configuration for timer



1.3 Switch the display from Celsius to Fahrenheit

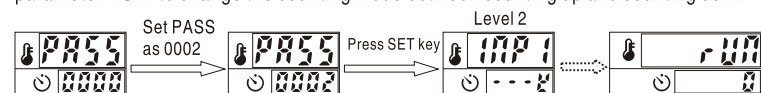
Press SET and $\downarrow$ the same time to pass word menu, input "0002" as password and goes to parameter level 2



Located the parameter "Unit" and change the value to 1, then the display will be changed to fahrenheit

1.4 Configure the timer counting mode

Following the procedure at above 1.3 and goes to parameter level 2, and locate the parameter "rUN" to change the counting mode between counting up and counting down



Put the value as "0" for counting up mode, put the value as "1" for counting down mode

1.5 Several mode to active the timer

Following the procedure at above 1.3 and goes to parameter level 2, and locate the parameter "d1" to configure the timer initiating mode



Put d1=2, the timer will be initiated if you "close and release" D1 dry contact switch.
Put d1=3, the timer will be initiated if D1 closed and keep it at closed status, the timer stop working if D1 released and timer reset.
Put d1=4, the timer will be initiated once d1 closed and will keep working regardless of the status of the d1 contact, no matter the status is closed or release

1.6 Timer reset contact D2 configuration

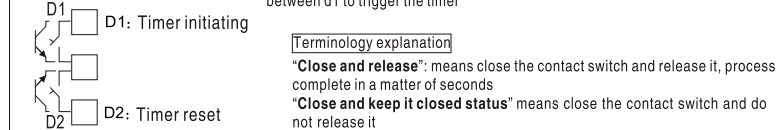
Following the procedure at above 1.3 and goes to parameter level 2, and locate the parameter "d2" to configure the timer initiating mode



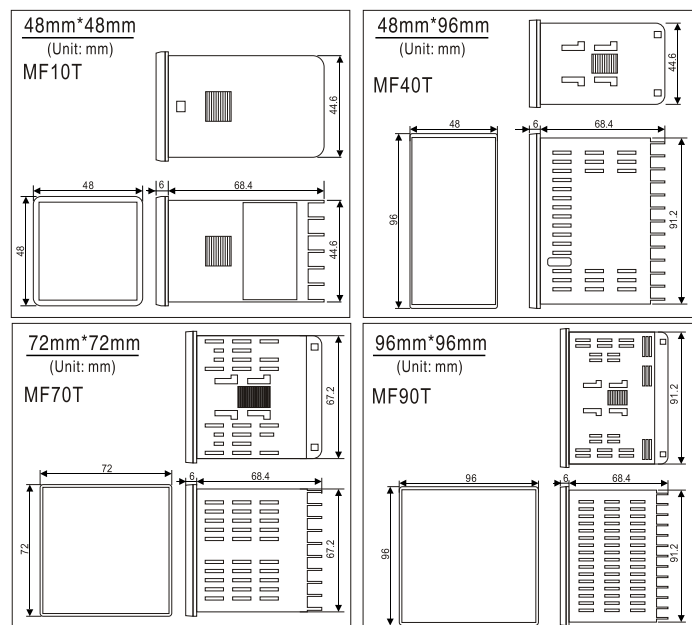
Put d2=0, the D2 contact switch for timer reset function disabled

Put d2=1, the D2 contact switch for timer reset function activated. timer reset once d2 closed

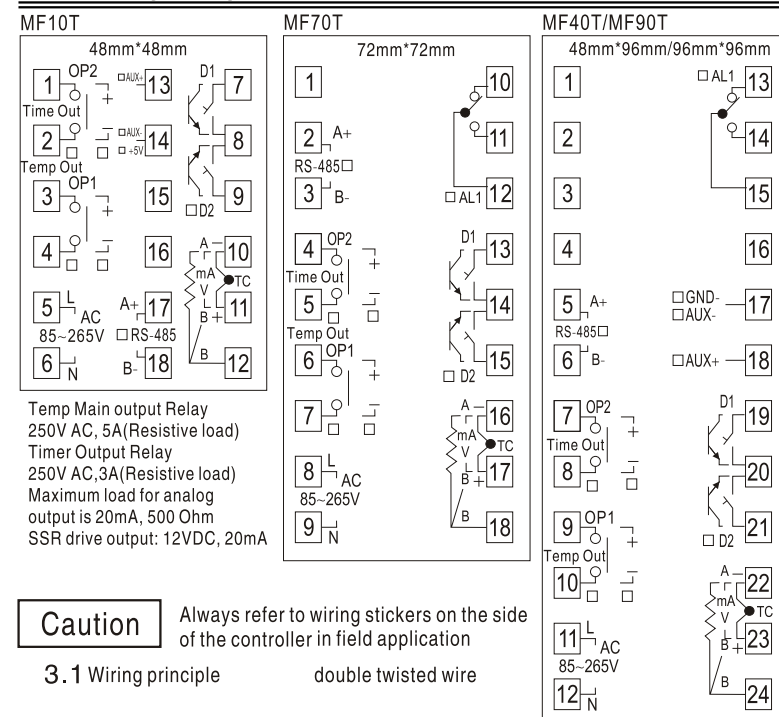
** Below is the wiring details for timer initiating and timer reset function, you can connect a foot switch or toggle switch between d1 to trigger the timer



2. Mounting and Dimensions



3. Wiring Diagram

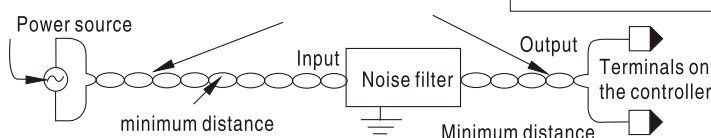


Caution

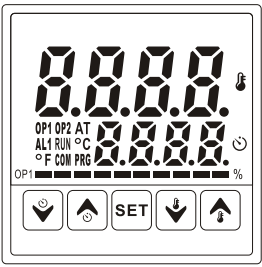
Always refer to wiring stickers on the side of the controller in field application

3.1 Wiring principle

double twisted wire



4. Panel discription



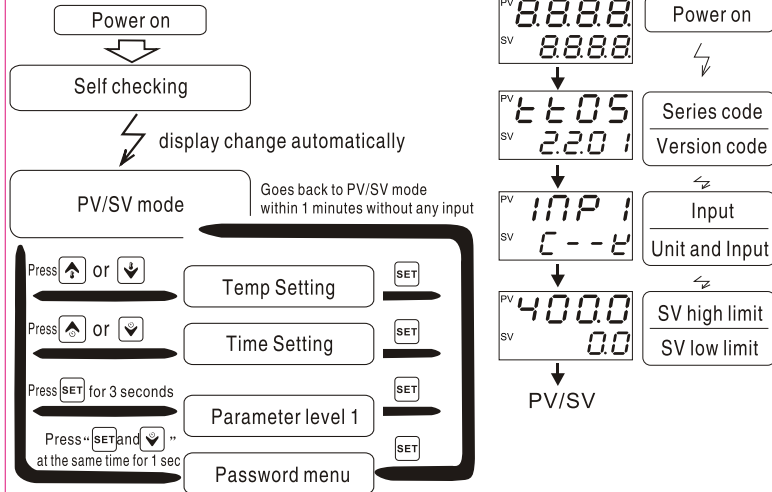
🔥 : Temperature control display
⌚ : Timer Display
Bar graphic: Output percentage display for temperature
Indicator: OP1 temperature output indication
OP2 timer output indication
AT auto-tuning process indication
AL1 Temperature alarm output indication
RUN, Timer operation indication
°C, Temperature unit display in Celcibus
°F, Temperature unit display in Fahrenheit
COM, communication indication
PRG, reversed for future use

SET Function Key, Enter Key

⬇ Time decrease ⬆ Time increase ⬇ Temp decrease ⬆ Temp increase

5. Setting

5.1 Access to setting mode



6. Parameters

6.1 Parameter level 1

Press SET key for 3 seconds to access to parameter level 1

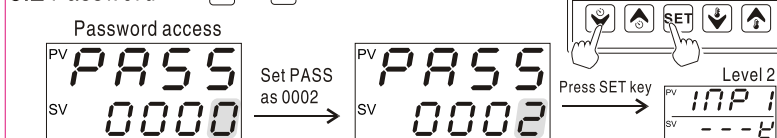
6.1.1 How to configure the parameter values

The parameter notation will be displayed one by one by pressing the SET key. press ⬇ ⬆ can increase and decrease the parameter value. press SET for 3 seconds to save the modification and exit to PV/SV state

1# Factory default

Notation	Name	Range	1#	Description
AL	Auto-tuing AT	NO or YES	NO	AT=Yes, AT activated. AT=No, AT disabled.
AL 1	Alarm 1 value	-1999 to 9999	10	Define the alarm value for alarm 1, Hysteresis=AH1
SC	Input offset	-199 to 199	0.0	To compensate the error caused by sensors
P	Proportional band	0.0 to 200.0	20.0	Proportional band in PID mode, P=0 for ON/OFF control When P=0, control mode switch to ON/OFF. Heating: PV>SV output terminated, PV<SV-HYS, Output activated Cooling: PV>SV+HYS output activated, PV<SV, output terminated
HYS	Hysteresis value for ON/OFF Control	0 to 999	1.0	
I	Integral time	0 to 3600 sec	210	Integral action off when I=0, system became less stable when decrease the I value but more efficient on the integral action
d	Derivative time	0 to 3600 sec	30	Derivative action off when D=0, increase the D value a little bit can counter balance the system overshoot
CYt	Cycle time	0 to 999 sec	20	Control cycle time for system, SET 20 seconds for Relay output 2 seconds for SSR drive output
rSt	Proportional Reset	-199 to 200	-5.0	Supress overshoot at first round of heating(rst>-P/2), better calculate via auto-tuning, heating up fast when decrease the value
OPL	Output lower limit	0.0 to 100.0%	0.0	Define the output lower limit value
OPH	Output higher limit	0.0 to 100.0%	100.0	Define the output higher limit value
t2	Timer output Reset delay t2	0.0 to 200.0 sec	0.0	When tot=0, the timer output when timing finished and reset delay for t2. t2=0.0 means no reset after timer output. other value means reset delay time
buFF	Soft-start for analog output	0.0 to 100%	100.0	This function only applies to analog output, it restrain the output variance at a preset ratio, 100% means no soft-start function, e.g. buF=5%, means the variance ratio of the output will be at 5% maximum
LCK	Access protection	0-2	0	LCK=0: All parameters can be modified LCK=1: SV and auto-tuning accessible LCK=2: Auto-tuning accessible

6.2 Password Press SET and ⬇ at the same time for 3 seconds



6.3 Parameter level 2

SET PASS=0002 to access parameter level 2, below notation will de displayed one by one after each press. press ⬇ ⬆ can increase and decrease the parameter value
Press SET for 3 seconds to save the configuration

1# Factory default

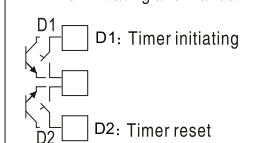
Notation	Name	Range	1#	Description
INP 1	Input code			
	Notation	E E J N S t r b		
	Name	K E J N Wu3_Re25 S T R B		
	Range	1300 °C 600 °C 800 °C 1300 °C 2000 °C 1600 °C 400 °C 1700 °C 1800 °C		
	Notation	AN4 AN3 AN2 AN 1 Pt		
	Name	2-10VDC 1-5VDC 4-20mA 0-10VDC 0-5VDC 0-20mA 0-50mV 0-20mV Pt100		
	Range			800 °C
dP	Decimal point	0 to 1	0	0: Without decimals 1: 1 decimals(For all inputs) 2: 2 decimals 3: 3 decimals(For analog input only)
LSPL	SV lower limit	-1999 to 9999	0	SV lower limit value, or zero point for re-transmission
USPL	SV higher limit	-1999 to 9999	400	SV higher limit value, or maximum point for re-transmission
UN It	Display unit	0 or 1	0	0: Celcibus F: Fahrenheit
PtFt	Digital filter strength	0 to 60	55	1-30: normal strength 31-60: Enhanced strength
ANL 1	lower limit display for analog input	-199~9999	0	E.g. for 4-20mA input, the display will be ANL1 when input is 4 mA
ANH 1	higher limit display for analog input	-1999~9999	2000	E.g. for 4-20mA input, the display will be ANL2 when input is 20 mA
ALD 1	Alarm mode for AL1	00 to 16	11	Alarm output mode for alarm 1, refer to alarm mode table for more information
ALH 1	HYS for alarm 1	0.0 to 100.0	0.4	Hysteresis for alarm 1 (high alarm: negative HYS, Low alarm: positive HYS)
dPt	Decimals for time display	0 or 1	0	=0 no decimal =1 1 decimal
rUN	Timing mode	0 or 1	0	RUN=0 timing up RUN=1 timing down
d1	Timer triggering mode via D1 terminal	2~4	2	=2: D1 close and release to initiate the timer =3: D1 close to initiate the timer, Open to stop timing and reset =4: D1 close and release or keep closing to initiate the timer
d2	Timer reset mode via D2 terminal	0 or 1	0	=0: No timer reset function =1: D2 used to reset the timer
tOt	Timer output mode	0 or 1	1	=0: Output when timing finished(Relay close or release after delay t2) =1: Output when timing starts, reset after timing finished
beF	Soft-start function for output	0, 1, 2	0	0: Without soft-start function 1: Soft-start function effective all the time 2: Soft-start kick in when output increase, disable when output decrease
IdNO	Controller address	0-127	1	To define the address for controller in communication
baud	Baud rate		9.6	2.4K, 4.8K, 9.6K, 19.2K

**Alarm mode description (ALD _=00~16)

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

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

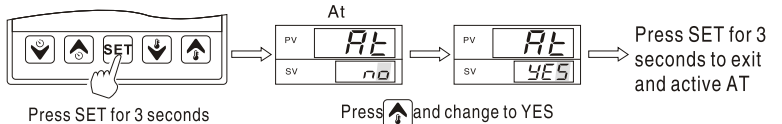
** Timer initiating and manual reset



"Close and release": D1 close for a moment and release, timer initiated
"Closing": Relay keep closing
"D2 reset": D2 close, timer reset and the output reset immediately

7. Auto-tuning

Better auto-tuning result can be achieved when units just power on and PV still far away from SV



8. Input sensor description

Input type	code
K	0 to 400 °C K A4 0 to 600 °C K A6 0 to 1300 °C K B3 0 to 200 °C E A2 0 to 400 °C E A4 0 to 600 °C E A6 0 to 800 °C J A4 0 to 600 °C J A6 0 to 800 °C J A8 0 to 200 °C T A2 0 to 300 °C T A3 0 to 400 °C T A4 0 to 1600 °C S B6 0 to 1700 °C R B7 200 to 1800 °C B B8 0 to 1300 °C N B3 Wu3_Re25 600 to 2000 °C W B0

Input 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

Input type	code
0 to 20mV	V 01
0 to 50mV	V 02
0 to 5VDC	V 03
0 to 10VDC	V 04
1 to 5VDC	V 08
2 to 10VDC	V 09
4 to 20mA	A 03
0 to 20mA	A 02