Digital PID Controller

MF102 / MF402 / MF702 / FM902

INSTRUCTION MANUAL

MF02-210-E1

Carefully read all the instructions in this manual.
Please place this manual in a convenient location for easy reference.

Specification

- MF02 series instrument: 3 big LED display, Accuracy: (Max±0.5% fus or ±1)≤±1 digit
- Pleases make sure that the power and output types are right before using, there is a wire diagram beside the controller, in the code NO4 ,you can see the output mode, such as relay, SSR or 4-20mA etc. (SEE 1. PRODUCT CHECK)
- TC input type controller ,clients can set TC input(K,E,J)by keyboard,but can not used for RTD input type. Pt100 input type controller can not used for TC input type and Cu50 type. Cu50 input type controller can not used for TC input type and Pt100 type.
- As usual, controllers were set as out1(heating) before leaving factory, of course, users can select out1(cooling), check manual "6.3 Parameter ACt in level3 "
- PID control: As usual, controllers have PID control before leaving factory, with Auto-tuning function.
- ON/OFF Control: Set CrL=OF1 or OF2,it will be changed as on/off control. Check manual"6.3 parameter CrL " . Position difference is HYS.
- when PID Control, we suggest adopt the Autotuning to improve the control effect. Check "7.Autotuning"

1. PRODUCT CHECK

MODEL (Size: wideXhigh)

MF102 (48mmX48mm)
MF402 (48mmX96mm)
MF702 (72mmX72mm)
MF902 (96mmX96mm)

CODE

□□□□-□ N ✱ □□ N - N □ N - □ - N
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫ ⑬

(1) Control action
N: No action
F: ReversePID action (for Heating) D: Direct PID action (for cooling)
B: ON/OFF control (for heating) M: ON/OFF control (for cooling)

(2) Input type, (3) Range code: See"8.INPUT RANGE TABLE"

(4) Control output [OP1]
N: No action
M: Relay contact V: Voltage pulse(for SSR)
2: Current(DC0~20mA) 8: Current(DC4 ~ 20 mA)
5: 0~5VDC 6: 0~10VDC
7: 1~5VDC T:Triac single phase zero crossing control

(5) SPARE CODE: N

(6) Alarm 1[AL1] (7) Alarm 2[AL2]

A: Deviation high alarm	G: Deviation high/low alarm with hold action
B: Deviation low alarm	M: Deviation band alarm with hold action
C: Deviation high/low alarm	H: Process high alarm
D: Deviation band alarm	J : Process low alarm
E: Deviation high alarm with hold action	K: Process high alarm with hold action
F: Deviation low alarm with hold action	L: Process low alarm with hold action

(8) SPARE CODE: N

(9) SPARE CODE: N

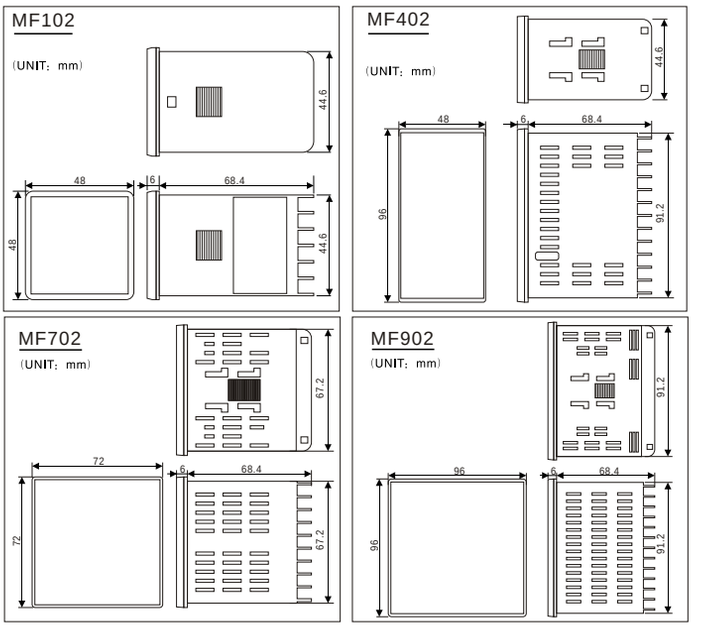
(10) Communication
N: No Communication M : Rs485 communication Modbus-RTU

(11) SPARE CODE: N

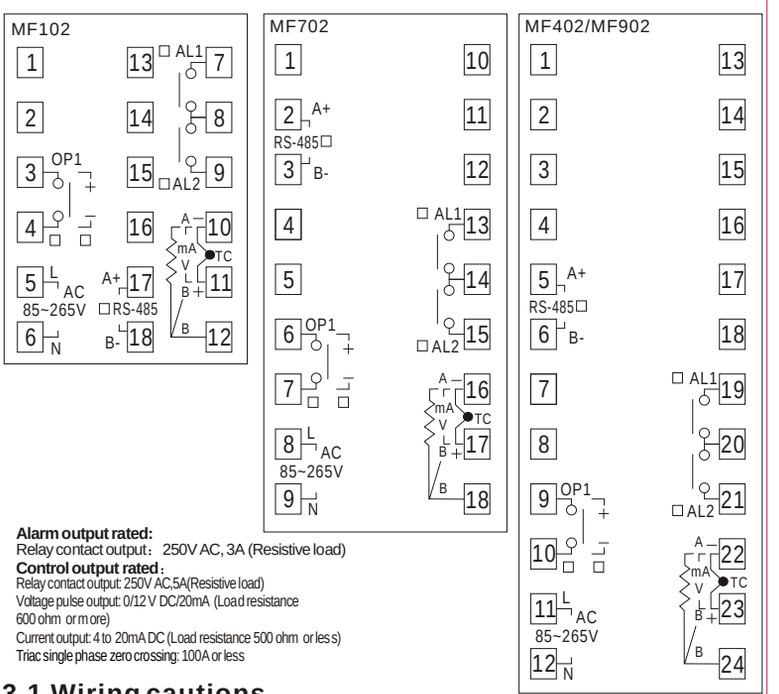
(12) Power
A: 220VAC B: 85-265VAC

(13) SPARE CODE: N

2. MOUNTING SIZE

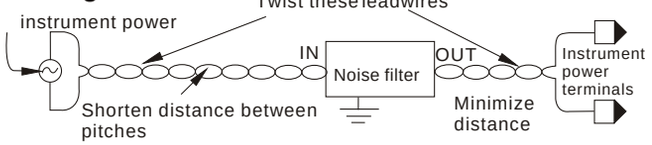


3. WIRING

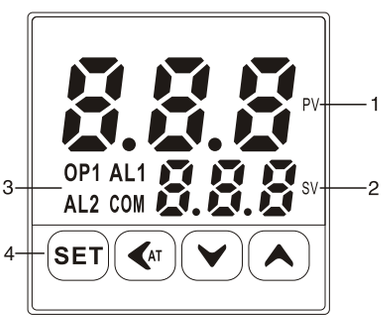


Alarm output rated:
Relay contact output: 250V AC, 3A (Resistive load)
Control output rated:
Relay contact output: 250V AC,5A(Resistive load)
Voltage pulse output: 0/12 V DC/20mA (Load resistance 600 ohm or more)
Current output: 4 to 20mA DC (Load resistance 500 ohm or less)
Triac single phase zero crossing: 100A or less

3.1 Wiring cautions



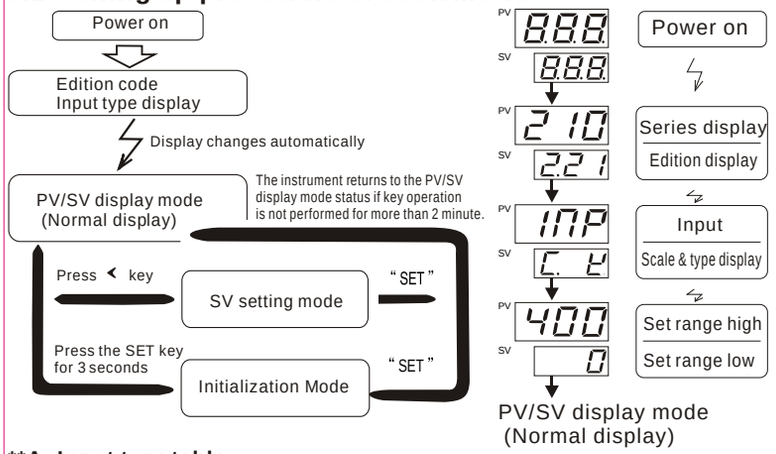
4. PARTS DESCRIPTION



1 Measured value (PV) display
2 Set value(SV)display
3 OP1lamp: Output1 indication
AL1 lamp: Alarm 1 output indication
AL2 lamp: Alarm 2 output indication
COM lamp: Communication indication
4. **SET** (Set key)
Used for parameter calling up and set value registration
AT Shift & Autotuning key
(Down key) Decrease numbers
(Up key) Decrease numbers

5. SETTING

5.1 Calling up procedure of each mode

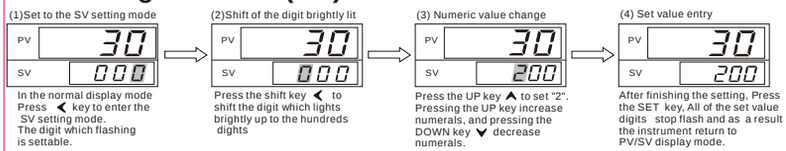


**A: Input type table

Display	F	t	E	J	n	Pt
Input	K	T	E	J	N	Pt100
Range	0 to 999 ℃	0 to 400 ℃	0 to999 ℃	0 to999 ℃	0 to 999 ℃	0 to 800 ℃

5.2 Setting set value(SV)

Example: Following is an example of set value(SV) to 200℃



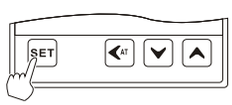
5.3 Setting parameters other than set value (SV)

The setting procedures are the same as those of example (2) to (4) in the above "Setting set value (SV)". Press the SET key after the setting end shifts to the next parameter. When no parameter setting is required, return the instrument to the PV/SV display mode.

6.Initialization Mode

6.1 User level (Level 1)

Press the SET key for 3 seconds to User level:



6.1.1 After the value be registered ,you can press SET key for 3 seconds to return the instrument to the PV/SV display mode.
The following parameter symbols are displayed one by one every time the SET key is pressed.

Symbol	Name	Range	Description
AL 1	Alarm 1	-199 to 999	Set the alarm value for alarm 1 . Alarm differential gap=AH1
AL2	Alarm 2	-199 to 999	Set the alarm value for alarm 2 Alarm differential gap=AH2
LcY	Set data lock	0 to 999	Lck=0,Allow to modify any parameter and SV Lck=1,Only allow to modify SV, Lck=2,Only allow to modify SV,AL1,AL2, Lck=3, , Not allow to modify any parameter and SV Lck=808,Set to 808 and press SET key to level 2 Lck=809,Set to 809 and press SET key to level 3

6.2 PID level (Level 2)

Set to LcK to 808 and press SET key to PID level
The following parameter symbols are displayed one by one every time the SET key is pressed.

1# Factory set value

Symbol	Name	Range	1#	Description
P	Proportional band	1.0 to 200	20.0	Proportional band in PID with unit ℃
I	Integral time	0 to 999	210	Set the time of integral action to eliminate the offset occurring in proportional control.
d	Derivative time	0 to 999	30	Set the time of derivative action to improve control stability by preparing for output changes.
CYt	Proportioning cycle	0 to 999	20	Proportioning cycle time for PID control (or compressor protect timer for cooling ON/OFF control)
HYS	Control Hysteresis	0 to 999	1.0	Control out differential gap=HYS (ON/OFF action)
rSt	Proportional reset	-199 to 200	-5	Proportional reset for overshoot protection (Auto setting after autotuning)
OPL	Output limit (Low)	0.0 to 100%	0	Output manipulated variable lowest limit
OPH	Output limit (High)	0.0 to 100%	100	Output manipulated variable highest limit
bUF	Output buffer	0.0 to 100%	100	Output variance value percentage per second buffer limit Only for 4-20mA output

6.3 Input level (Level 3)

Set to LcK to 809 and press SET key to Input level
The following parameter symbols are displayed one by one every time the SET key is pressed.

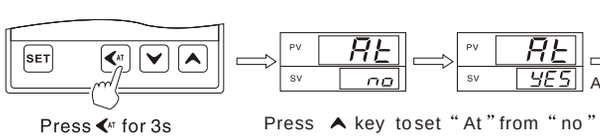
1# Factory set value

Symbol	Name	Range	1#	Description
INP	Main input type select	/	K	K, E, J, Pt, Cu
SPL	Low setting limiter	-199 to 999	0.0	Set lower setting limiter
SPH	High setting limiter	-199 to 999	400	Set high setting limiter
UNt	Display scale	C or F	C	C: Centigrade F: Fahrenheit
SCb	PV bias	-199to 999	0.0	Sensor correction is made by adding bias value to measured value(PV).
F IL	PV follow-up PV input filter	0 to 60	55	PV variable-value control, 0-30: for general, 31-60: for enhanced
Act	Control action	/	rE	rE: PID action (reverse action) dr: PID action (Direct action)
CrL	Contron mode	/	Pid	Pid: PID control oF1: On/Off control oF2:On/Off control with compressor protect timer
Ad 1	Alarm1 mode	00 to 16	11	Select the type of alarm1 See(**ALARM TYPE TABLE)
AH 1	Alarm1 differential gap	0.1 to 999	0.4	Alarm1 differential gap setting
Ad2	Alarm2 mode	00 to 16	10	Select the type of alarm2 See(**ALARM TYPE TABLE)
AH2	Alarm2 differential gap	0.1 to 999	0.4	Alarm2 differential gap setting
Add	Device address setting	0-127	1	Communication device address setting.
bAU	Band-rate setting	/	9.6	BAUd=2.4K, 4.8K, 9.6K, 19.2K

**ALARM TYPE TABLE (Ad_=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

7.AUTOTUNING



Press ◄AT for 3s

Press ▲ key to set "At" from "no" to "YES"

Change "At" from "on" to "OFF", then press SET key to confirm, then the Autotuning process will be cancelled.

8. INPUT RANGE TABLE

INPUT TYPE			CODE	
K	Ambient to 100	℃	K	A1
	Ambient to 200	℃	K	A2
	Ambient to 300	℃	K	A3
	Ambient to 400	℃	K	A4
E	Ambient to 100	℃	E	A1
	Ambient to 200	℃	E	A2
	Ambient to 300	℃	E	A3

INPUT TYPE			CODE	
J	Ambient to 100	℃	J	A1
	Ambient to 200	℃	J	A2
	Ambient to 300	℃	J	A3
	Ambient to 400	℃	J	A4

INPUT TYPE			CODE	
Pt100	-50 to 100	℃	D	C1
	-50 to 200	℃	D	C2
	-50 to 300	℃	D	C3
Cu50	-50 to 150	℃	C	C2

1.TC input type controller, clients can set TC input(K,E,J) by keyboard, but can not used for RTD input type.
2. Pt100 input type controller can not used for TC input type and Cu50 type.
3. Cu50 input type controller can not used for TC input type and Pt100 type.