ATO-TEMPC-P2D series Programmable Temperature controller

User Manual

I. Main Technical Specification

1. Basic error: ≤±0.5%F.S±1B
2. Cold end compensating deviation: ≤±2.0℃
3. Sampling period: 0.5s
4. Control cycle: relay output 2~120S, other is 2S.
5. Alarm output the drop in level: 0.5 or 5
6. Relay output contact capacity: AC220V/5A (resistance load) or AC250V/0.3A (perceptual load)
7. Driving controllable pulse output: ≥3V scope, ≥50μs width's over zero or trigger contact pulse
8. Driving solid relay signal output: driving electric current≥15mA, voltage≥9V.
9. Continuous PID: 0~10mA (load 500±200Ω), 4~20mA (load 250±100Ω), or 0~5V (load≥100kΩ), 1~5V (load≥100kΩ)
10. Power: AC85V~242V, 50/60Hz
11. Work environment: temperature 0~50.0℃, relative humidity≤85%RH, without corrode and strong electric radiation.

II. Product Selection

1. Meter faceplate dimension:

Overall size	Installation hole
D1: 160mm ×80mm x 120mm	152mm x 76mm
D2: 96mm x 96mm x 110mm	92mm x 92mm
D3: 48mm x 96mm x 110mm	44mm x 92mm
D4: 96mm x 48mm x 110mm	92mm x 44mm
D5: 72mm x 72mm x 110mm	68mm x 68mm
D6: 48mm x 48mm x 110mm	44mm x 44mm
D7: DIN Rail 72mm*88mm*59mm	

2. Input signal:

I1: Temperature sensor

I2: Analog signal

3. Output Mode:

O1: Relay output

O2: SSR output

O3: SCR output

O4: Transmitter output 4-20mA/0-10V

4. Alarm Mode:

A1: 1 alarm (Optional alarm mode, please refer to the parameter "ALP")

A2: 2 alarm (Optional alarm mode, please refer to the parameter "ALP")

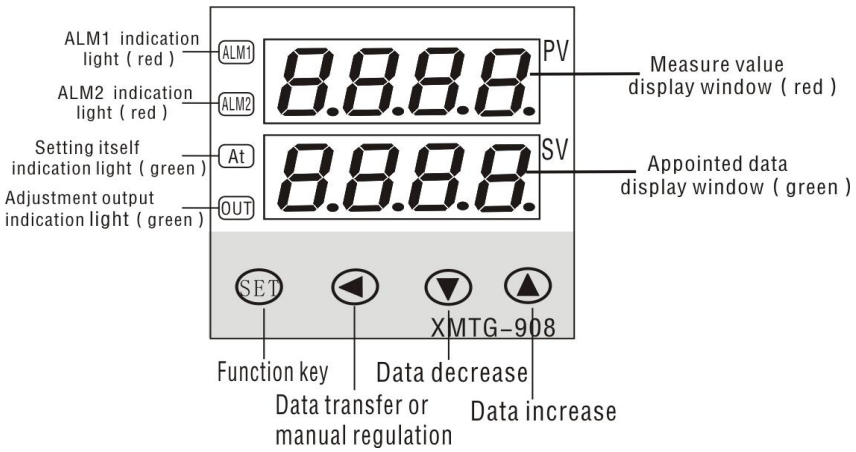
5. Additional power supply: DC 24V for sensor of input signal I2

6. Additional output mode:

RS: RS485/232 communication (MODBUS-RTU protocol)

TS: 4-20mA/1-5V, 0-10mA/0-5V transmitter

III. Panel instruction (consult):



IV. Code setting mode:

Series	Code	Name	Remarks	Setting range	Ex-Factory
0	**SP**	Appointed data	Control output corresponds to indicator light "OUT". Please refer to "5.2.The SP setting"	Determined by P-SL P-SH	50
1	**AL-1**	Alarm 1	Please refer to ALP Corresponds to "ALM1" indicator light	Determined by P-SL, P-SH when the upper and lower limit alarm, other alarm range is 0~50.0	200
2	**AL-2**	Alarm 2	Please refer to ALP Corresponds to "ALM2" indicator light		100
3	**Pb**	Deviation revisal	The sensor have deviation can use item to revisal	±20.0	0.0
4	**P**	Proportion area	When the P↑, the proportion and differential function↑; if the P ↓, the proportion and differential function↓. When P=0, the meter is ON/OFF control	1~9999	100
5	**I**	Calculus time	When the I↓, the calculus function ↑; I↑ the calculus function↓. When I=0, no calculus function, it is PD adjustment instrument	0~3000	500
6	**d**	Differential time	Differential time When the d ↓ , the proportion and calculus function ↑ ; if d ↑ , the proportion and calculus Function ↓ but the differential function ↑ when d≤t, it has no differential function	0~2000S	100S
7	**t**	Control period	This function is no meaning under "ON/OFF". It is presented 20s in factory.	2~120	20S
8	**FILT**	Filt modulus	Is the software filter constant of measurement sampling. The constant ↑, the measurements anti-jamming capability measurements anti-jamming capability↑, but the measurement and system time ↓	0~99	20
9	**Hy**	Main control by drop in level	Main control by drop in level, when the meter is ON/OFF control, the value lower the control is good. But when the relay outputs it will detriment to the service life.	0.1~50.0	0.5or1.0
10	**dp**	Decimal position	When thermocouple and thermal resistance input, the decimal point set up the range of 0~1; when current and voltage input , the decimal point set up the range of 0~3	0~3	0 or 1or According to request

11	**outH**	Output high limit	Can achieve low and high output limiter. Meaningless when manual and ON/OFF control	outL~200	According to request
12	**outL**	Output low limit		0~outH	According to request
13	**AT**	Setting itself	0: close setting itself function 1: open setting itself function	0~1	0
14	**LocK**	Electronics lock	0-all the parameter can be revised 1-only the SP can be revised	0~50	0
15	**Sn**	Input specification	Cu50(Cu50)–50.0~150.0℃; Pt100(Pt 1) –199.9~200.0℃; Pt100 (Pt2)–199.9~600.0℃; K(K) -30.0~1300℃; E(E) -30.0~700.0℃; J (J)-30.0~900.0℃; T(t) -199.9~400.0℃; S(S) -30~1600℃; R(r) -30.0~1700.0℃; WR25(r25) -30.0~2300℃; N(n) -30.0~1200.0℃; F2(F2); 0~50mV(0_50); 10~50mV(A_50); 0~5V/0~10mA(0_5u); 1~5V/4~20mA(1_5u		K
16	**OP-A**	Main control by output method	'0' no output; '1'relay output; '2' solid relay output; '3' phase over zero trigger adjustment; '4' phase trigger adjustment; '5' 0~10mAor 0~5V; '6' 4~20mAor 1~5V; '7' valve control	0~7	—
17	**OP-B**	Vice control by output meth	'0' no output; '1' RS232 or RS485; '2' contact the micro-printer; '3' 0~10mA or 0~5V output; '4' 4~20mAor 1~5V output	0~4	—
18	**ALP**	Alarm output definition	'0' no alarm; '1' upper limit alarm; '2' lower limit alarm; '3' upper, lower limit alarm '4' positive deviation alarm '5' negative deviation alarm. '6' positive, negative deviation alarm '7' outside the interval alarm '8' inside the interval alarm '9' two high limit alarm '10' two low limit alarm	0~10	—
19	**COOL**	System function choice	'0': reverse control(heat) '1': positive control(cool)	0~1	0
20	**P-SH**	Display the high limit	They are used to reset proper temperature range as per user' application. As for the Max. temperature range for	P-SL~9999	According to request
21	**P-SL**	Display the low limit		-1999~P-SH	According to request

			different inputs, please refer to **Sn, P-SH≥P-SL**		
22	**Addr**	Communication address	The meter's number in the control system	0~63	0
23	**bAud**	Communication baud rate	1200; 2400; 4800; 9600		9600

V. Operation Instructions

1. The parameter setting area

Press the SET key 3S enter into the first setting area, the controller will display the parameter code 1~24 in the window at the upper row and display the parameter data at the low row. In this time press the ▲.▼ or ◀ key to adjust the parameter, and then press the SET key to preserve. If within 10 seconds do not press every key then it will automatically to preserve the data and withdraw the setting.

The LOCK is electronics lock, when Lock=0, all the parameter can be revised; when Lock=1, only the "SP" can be revised; when the Lock＞1, all the parameter can not be revised. But don't set the Lock＞50,

2. The appointed data setting area (The SP setting)

Press the ▲key 3s enter into the appointed data setting area, you can according the '**5.1**'to setting the "SP".

3. The third setting (Time parameter)

Curve parameter setting area. Press SET+◀3 Second to enter into the other operation is the same above.

4. Manual regulation

When the controller is set up with the electricity, press the ◀ key about 3S enter into the manual regulation, it will display "H" at the lower row, in this time can set the output power; press the ◀ key about 3S again it will withdraw the manual regulation.

When the control object is valve, the manually operation value >50,and is co rotating，where as is reversal，stable output duty ratio is 100%。

5. Normal using ,it shows the measurement data in the window at the upper row and display the setting data SV at the lower row, press the▼ key it will display the main control output data, the first LED display "F"， latter three LED 0~100 output data.

VI. Setting itself

The meter use in the first time or the surroundings have changer, finding it control not good, in this time you need use the setting itself. For example:

Set the HY is 0.5~1℃, if the output is relay set the t=2S, then set the AT=1, A-M light flickered, in this time the meter enter into setting itself. It have three times vibrate, automatic preserved P, I, D parameter and the A-M light off, the setting itself finish.

Note:

1. When setting itself, the instrument should not change the set value.
2. When the power off during setting itself, as the meter has the memory, it will restart setting itself next time.
3. When it need artificially exit during setting itself, set the parameter to 0 so that can exit，but the setting result will not be valid.
4. The parameter set suitable for most of the system, but not for the minority system. So we can adjust P.I.D value.

When artificially adjust, look into the response curve. If it is the short cycle oscillate (about the same long as the oscillation cycle of setting itself or on-off control), decrease P (priority), increase I and D; If it is the long cycle oscillate (more times as on-off control), increase I (priority), increase P.D; if with no oscillate but with steady-state error. Decrease I (priority), increase P; if last can control steady but need long time decrease D (priority), increase P, decrease I. The adjustment can adopt step-by –step method, first to increase or decrease 30-50% with one parameter of P.I.D. If the control result is get better, then keep on increasing or decreasing the

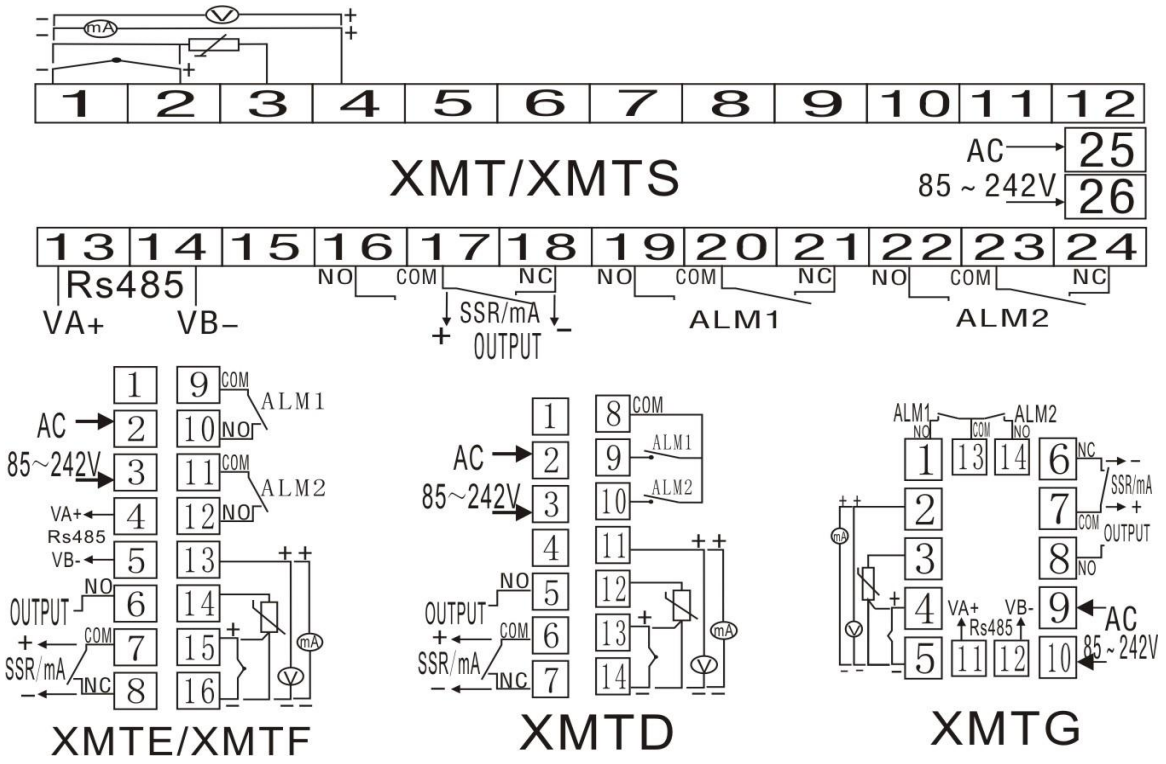
parameter till the result is best. In general, we modify P first, then I, if the result is also not well, and modify D parameter. When modify these three parameter, we should consider the overshoot and control precision these two index.

When output control valve, as the cycle of open and closed is too long, it should artificially modify PID parameter on the basis of Ex-Factory value if the result of setting itself is not well. (In general P↑ on the basis of Ex-Factory value, diminish and in order to avoid continual action, D should adjust smaller.

VII. Connection (consult)

Note1: Only one way for alarm use Alarm 1. Only when alarm method ALP is 3 (upper and lower limit alarm),6 (upper and lower deviation alarm), 9 (upper and upper limit alarm), 10 (lower and lower limit alarm), it should use Alarm 2. When upper and lower limit alarm or upper and lower deviation alarm, it should use Alarm 2 as lower limit or lower deviation alarm. The indicator light will be lightening when the alarm has output.

Note2: When input current signal 0-10mA or 4-20mA, it should respectively combine 1K or 250Ω to input port. Change the current signal to voltage signal.



The connection should be subject to the connection diagram attached with the controller.