Changzhou Winpark Electronics Co., Ltd
Address: 6th Floor of Tianan Industrial Village A plus, Xinbei, Changzhou 213022, China
Tel: 0086-519-85132277 Email: winpark@cnwinpark.com
Fax: 0086-519-85108252 Web: www.cnwinpark.com

XMT - 3A Series Temperature Controller Operation Manual

Version No.:V4.02

XMT – 3A Series Temperature Controller is a universal model controller. It could be used in control and display temperature, pressure, flux etc. Different sensor inputs are compatible with the controller. Varied alarm type number reaches 225. The well designed software, high quality components and elegant workmanship provide customers perfect using experience. It is widely used in plastic, biology engineering, metallurgy, packing, chemical and boiler products and industry.

General Electrical Data

Rated voltage	85V AC~260V AC
Insulation Strength	Power supply- input：1500V AC 1min Input-relay output：1500V AC 1min Power supply-relay output：1500V AC 1min
Insulation Resistance	Input-relay output：>20MΩ Input-power supply：>20MΩ Power supply-relay output：>20MΩ
Working Environment	Ambient temperature：0°C ~50°C Relative humidity：35%~85%（no condensation）

Input/output Data

Input		Output	
Measuring range	-200~1800°C	SCR zero-crossing trigger	100mA
Accuracy	0.5 class	Relay output	3A 220V; resistive load or designated
Analog input measuring display range	-999~9999°C (set by user)	SSR trigger signal	voltage:12±3V current:35mA
Analog input accuracy	12-bit A/D	Transmission output accuracy	10-bit A/D

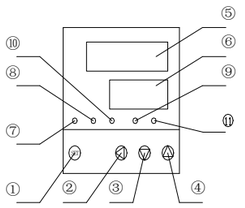
Product model

XMT□ - 3A □ □ □ - □□ □ □ □ □ □□ □□

(1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12)

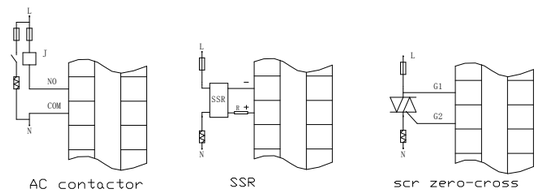
SN	Name	Explanation
(1)	Outer Dimension	A: 48*48*100 B:48*96*65 C: 96*48*65 D:72*72*85 E:96*96*65 G: 160*80*115
(2)	Design Code	3A：3A series product
(3)	OUT1 output type	0: No output 1: relay output (customize NO contact) 2: logic level (to control SSR) 3: single-phase SCR zero-crossing trigger 4: 0~10mA 5: 0~20Ma 6: 4~20mA 7: 0~5V 8: 1~5V 9: 0~10V
(4)	OUT2/ALM1 output type (public use)	0: No output 1: relay contact switch 2: logic level (to control SSR) 4: single-phase SCR zero-crossing trigger
(5)	ALM2 output type	0: No output 1: relay output 2: logic level (to control SSR)
(6)	Input type	01: K 02:E 03:J 04:S 05: R 06:B 07: T 08: N 09: Pt100 10: Cu50 11:0~1V 12: 0~5V 13: 1~5V 14: 0~10V 15: 0~10mA 16: 0~20mA 17: 4~20mA
(7)	Measuring range	See input type & measuring range table, current/voltage measuring display range(-999~9999) is set by user
(8)	Display accuracy	0: 1 1: 0.1 2: 0.01 3: 0.001
(9)	OUT1 control methods	0: no control output 1: PID auto-tuning and fuzzy control 2: 2-bit type return difference 3: 3-bit type 4: transmission output
(10)	OUT2 control methods	0: no control output 1: PID auto-tuning and fuzzy control 2: 2-bit type return difference 3: 3-bit type 4: reversed direction PID refrigeration control
(11)	ALM1 alarm methods	See alarm type and code table
(12)	ALM2 alarm methods	See alarm type and code table (not for XMTA type)

Panel explanation



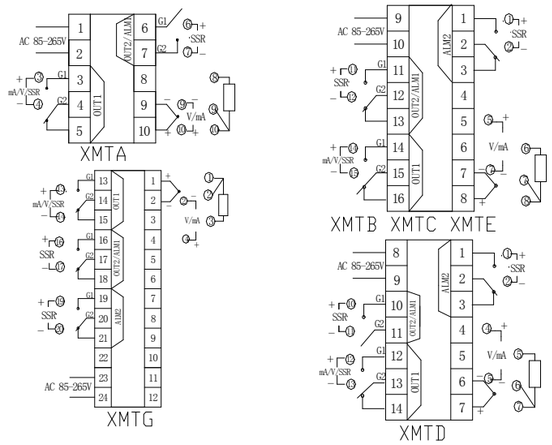
(1) set key（SET） (2) shift key（<）
(3) minus key（v） (4) plus key（Λ）
(5) PV measuring value（PV,red）
(6) SV setting value（SV,green）
(7) OUT1output indicator（OUT1，green）
(8) OUT2 output indicator（OUT2，green）
(9) AT auto-tuning indicator（AT，red）
(10) ALM1 alarm indicator（ALM1，red）
(11) ALM2 alarm indicator（ALM2，red）

Output connection:



Wiring connection

OUT1/OUT2: control or transmission output ALM1/ALM2: alarm output



Operation instruction

Turn on interface and explanation

Display	Explanation
PV u322 SV 2	Version No. and sensor type page After turning on the controller, the upper line displays software version and the lower line displays input sensor type. Enter measuring and controlling range page automatically in 3 seconds.
PV 400 SV -100	Measuring and controlling range page The upper line displays the upper limit of measured temperature range and the lower line displays the lower limit of measured temperature range Enter measuring and controlling page automatically in 3 seconds.
PV 25 SV 200	Measuring and controlling page upper line: measured temperature lower line: set temperature This page is in the normal working condition

How to set parameters

Display	Explanation
PV 30 SV 25	For example if the controller displays the present temperature as 30℃ and setting value is25℃, user wants to set the setting value into 200℃
PV Su SV -025	Press SET key, the upper line displays “SV” and the lower line would flash, the controller is in setting mode.
PV Su SV 200	By pressing shift key, plus key and minus key to change setting value. As the keys shift, the corresponding position will flash.
PV 30 SV 200	After setting finished, press SET key, the controller return to the PV/SV display status. The parameters are saved and the controller is working.

Temperature setting parameter explanation

Display	Explanation
PV 20 SV 100	normal working condition
Su 0 100	Press set key, the first line displays “SV”, the second line flashes. The controller is in temperature setting mode. Change setting value by pressing shift key, minus key and plus key. The corresponsive number would flash.
PV 20 SV 100	After setting the values, press set key to save parameters. The controller would start to work.

The second level parameter setting

Display	Explanation			Range & default
PV 250 SV 1000	Measuring and controlling mode: Press SET key for 5 seconds in measuring and controlling mode to ender the second level menu.			
PV LoC2 SV oFF1	**LCK2**：set data lock for SV and second level manu; **On:** SV value and second level data could be set; **oFF1:** only SV value could be set; **oFF2**：SV value and second level data could not be set. Press SET to enter next page.			default：oFF1
PV tr SV 0000	This controller provides two solutions to modify measuring error caused by sensor position and other factors.	Translational temperature correction method	Tr: temperature deviation. Press SET to enter next page. Normally translational method is used the most frequently.	range：-99.9~100.0 ℃ default：0.0
PV nEA1 SV 20		Two-point method (or called slope method) temperature correction. When the values are default, the slope is 1, which means the Two-point method (or called slope method) is cancelled	nEA1: the first point The present measured temperature value. Press SET to enter next page.	range：as measuring scale default：20
PV FAC1 SV 20			FAC1: the first point The present actual temperature value. Press SET to enter next page.	range：as measuring scale default：20
PV nEA2 SV 200			nEA2: the second point The present measured temperature value. Press SET to enter next page.	range：as measuring scale default：200
PV FAC2 SV 200			FAC2: the second point The present actual temperature value. Press SET to enter next page.	range：as measuring scale default：200
PV Ad1 SV 05	Setting alarm parameters	Ad1：Alarm1 method. To select alarm 1 method. See alarm methods table. Press SET to enter next page.		range：0~16 default：5
PV AL1 SV 0		AL1: Alarm1 control value. See alarm methods table. Press SET to enter next page.		range：0~11 default：0
PV HY1 SV 1		HY1：Alarm1 return difference value. Return difference is used to avoid frequent turning on and off to the alarm relay. Press SET to enter next page.		range：as measuring scale default：1
PV Ad2 SV 0		Ad 2：Alarm2 method. To select alarm 1 method, See alarm methods table. Press SET to enter next page.		range：0~11 default：0
PV AL2 SV 10		AL2：Alarm2 control value. See alarm methods table. Press SET to enter next page.		range：0~255 default：10
PV HY2 SV 1		HY2：Alarm2 return difference value. Return difference is used to avoid frequent turning on and off to the alarm relay. Press SET to enter next page.		range：as measuring scale default：1

PV FIL SV 20	FIL: input filter factor, used for input signal. The bigger is this factor the smoother is the input. But it cause delay to the input. Press SET to enter next page.	range：0~32 default：20
PV oFIL SV 160	OFIL：Output filter factor, used for current (voltage) output. The bigger is this factor the smoother is the output. But it cause delay to the output. Press SET to enter next page.	range：0~255 default：160
PV PoEr SV 100	PoEr：Power setting for soft-start. Adjust range: 0%~100%. The added power in each minute after start. Press SET to enter next page.	range：0~100 default：100
PV AT SV 0	AT：auto-tuning Value 0: temperature controlling mode 1: enter general auto-tuning mode; 2: enter special auto-tuning mode; Press SET to enter LCK lock setting page.	range：0,1,2 default：0
PV P SV 050	P：Proportional band Proportional band for heat-side. Press SET to enter next page. (when P=0, the controller in stepping control mode)	range：0~100.0 default：5.0
PV I SV 400	I：Integral time Integral time for heat-side (time for the next adjustment). Press SET to enter next page. (When it is stepping control, this parameter is return difference value)	Range：0~3600 default：400
PV d SV 040	D：Derivative time Derivative time for heat-side (time for advance adjustment)。 Press SET to enter next page.	Range：0~999 default：40
PV IT SV 010	IT：Overshooting restrain The smaller is the value, the smaller is the first overshooting, but it will reduce the time to reach the setting temperature. Press SET to enter next page.	Range：3~100 default：10
PV SP SV 020	SP：Proportional band separation To prevent overshooting caused by proportional function. Press SET to enter next page.	range：0~255 default：20
PV T SV 020	T：Heat cycle time Heat cycle means the controller would output the action one time in the cycle when using break output. Press SET to enter next page.	Range：1~180seconds default：20
PV PC SV 050	PC：Refrigeration proportional band. Proportional band of cool-side time proportional control. Press SET to enter next page.	Range：0~100 default：5
PV Po SV 010	Po：Deviation of refrigeration proportional band Proportional band deviation of cool-side time proportional control. Press SET to enter next page.	Range：-99~100 default：10
PV Ct SV 020	CT：Refrigeration cycle time. Refrigeration cycle, output action one time in this cycle under break control. Press SET to return to LCK2 lock setting page.	Range：1~180seconds default：20
PV 250 SV 1000	Measuring and controlling page	

Exit of the second level parameter setting: in second level parameter setting mode, press SET key for 5 seconds at any time to save the data and return to the measuring and controlling page. In working mode, press “∧”key for 10 seconds to recover all the parameters to default value.

The third level parameter setting

Display	Explanation
PV 250 SV 1000	Measuring and controlling page: In measuring and controlling mode press SET key for 10 seconds to enter the third level parameter setting menu.
PV LoE3 SV oFF	LCK3：set data lock for third level menu. Select by pressing "∧""∨"keys. on: data could be set; oFF: data could not be set. Press SET to enter next page.
PV P-In SV J	P-In：Input sensor type selecting page. Press "∧" "∨" key to select corresponding input type. The input type explanation refers to "input type and measuring range table" Press SET to enter next page.
PV 400 SV -100	measuring range and accuracy selecting page: Press "∧" "∨" key to select needed measuring range. Refer to "input type and measuring range table" Press SET to enter next page.
PV dP SV 0000	dP：Display accuracy selecting: Press "∧" "∨" key to select: 0000 = 1 000.0=0.1 00.00=0.01 0.000=0.001 Press SET to enter next page
PV PoutE SV tYP1	Pout: output type page: Press "∧" "∨" key to select: see "output type table" Press SET to enter next page
PV dIL SV 0	DIL： Input lower limit display and transmission output lower limit value. Press SET to enter next page
PV dIH SV 100	DIH：Input upper limit display and transmission output upper limit value. Press SET to enter next page
PV oL SV 39	OL：The minimum current when using current or voltage output, the setting of this parameter would cause zero-point moving of current output. Press SET to enter next page
PV oH SV 100	OH： The maximum current when using current or voltage output, the setting of this parameter would cause amplitude value moving of current output. Press SET to enter next page
PV v322 SV J	Start page, version No. and sensor type, display new sensor type, enter the next page automatically
PV 200 SV 0	Display the upper/lower limit of new measuring range. Enter measuring and controlling page automatically.
PV 250 SV 1000	Measuring and controlling page

These three pages will be showed by sequence when exit the third level parameter setting mode.

Exit of the third level parameter setting: in third level parameter setting mode, press SET key for 5 seconds at any time to save the data, the controller will display in sequence the present software version No. & sensor type, measuring range and return to the measuring and controlling page.

Output type table

Output type	OUT1	OUT2 、ALM1 share the same output port		ALM2
		OUT2	ALM1	
TYP1	Main control break output	no output	alarm output	alarm output
TYP2	Main control break output	reversed direction PID control output	no output	alarm output
TYP3	Main control forward direction continuous output	no output	alarm output	alarm output
TYP4	Main control reversed direction continuous output	no output	alarm output	alarm output
TYP5	forward direction transmission output	no output	alarm output	alarm output
TYP6	reversed direction transmission output	no output	alarm output	alarm output
TYP7	forward direction transmission output	Main control break output	no output	alarm output
TYP8	reversed direction transmission output	Main control break output	no output	alarm output

See the third level parameter setting for the output methods Pout: output type selecting page.
Remark: break output means output by break ways such as relay, SSR etc; continuous output means analog output such as 4~20m A output; forward direction means the direction of analog output from small to big; reversed direction means just oppositely.

Notes:

1. The set parameters would only be saved after press SET key and turn back to the working page. If the electricity break during setting, the set value would be lost and the system recovers to the existed parameters.
2. During the process of auto-tuning, press SET would suspend auto-tuning, and the system recovers to the existed parameters.
3. to check the measuring accuracy of the controller, the following experiment could be processed: connect sensor to the controller and put the sensor into boiling water and water-ice mixture. The controller would display 100℃ and 0℃ respectively. If the differences are too big, the problem probably lies in the mismatch of sensor type. If the temperatures are normal in the experiment, but the measured temperature is different from that of thermometer, the problem probably lies in the position of sensor. Modifying the second level parameter tr value or two-point modification would solve this problem.

Example 1: alarm parameter setting

Equipment requirement: when the temperature is 10℃ higher than setting value, alarm 1 output alarm signal; when the temperature is 15℃ lower than setting value, alarm 2 output alarm signal. But no alarm output with cold start.

Setting methods: press SET key to enter the second level parameter page, set AL1=10, AL2=15, Ad1=5, Ad2=9. Then press SET key for 5 seconds to exit setting mode.

Example 2: modification to the measured temperature

Equipment status: temperature control setting value is in accordance with the measured value, but the measured value is 5°C higher than that of thermometer. This problem is basically caused by the position of the sensor. To modify this difference, the user could enter the second level parameter page and set TRv=-5, the problem would be solved.

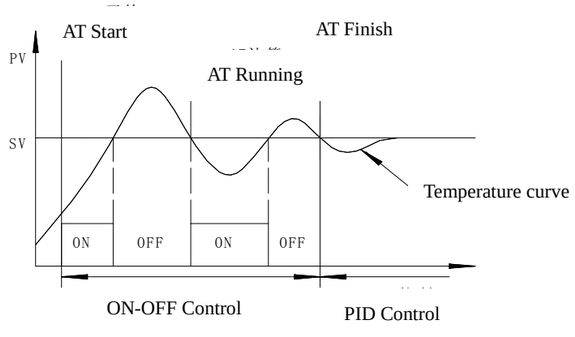
Error display

display	Explanation
PV ---- SV 100	Measured value exceeds the upper limit of measuring range or the input sensor is disconnected
PV ---- SV 100	Measured value exceeds the lower limit of measuring range or the input sensor is disconnected

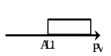
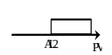
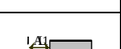
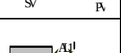
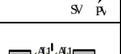
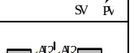
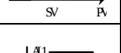
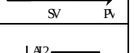
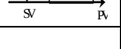
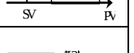
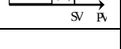
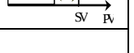
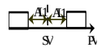
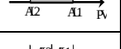
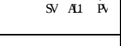
How to start and stop auto-tuning

PV AT SV 1	Method 1：In second level, press SET key to adjust SV to auto-tuning page. Use plus/minus key to set value of the second display line to 1 Method 2：Press shift key for 10 seconds in measuring and controlling page, and then enter auto-tuning function.
PV 250 SV 1000	The auto-tuning indicator would light up in processing
PV 20 SV 100	In processing of auto-tuning, the controller would figure out a group of new PID parameter by detecting the controlled object automatically. After auto-tuning, the new PID parameter would be saved automatically and auto-tuning would end then. And the controller would turn back to measuring and controlling page In processing of auto-tuning, press SET key would stop auto-tuning and turn the controller back to the measuring and controlling page

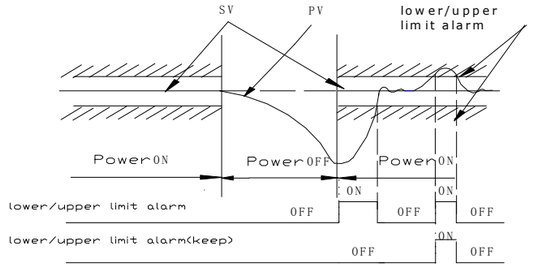
Auto-tuning process illustration



Alarm type and code

	Alarm type	Ad1 (ALM1)	operation	Ad2 (ALM2)	operation
	No alarm	00	→	00	→
Absolute value alarm	absolute value upward	01		01	
	absolute value downward	02		02	
	absolute value upward (keep)	03		03	
	absolute value downward (keep)	04		04	
Deviation alarm	upper limit	05		05	
	lower limit	06		06	
	upper&lower limit	07		07	
	upper limit (keep)	08		08	
	lower limit (keep)	09		09	
	upper&lower limit (keep)	10		10	
Area alarm	upper&lower limit area (ALM1/2 act separately)	11		11	
	upper&lower limit absolute value area	12			
	upper&lower limit area (ALM1 acts separately)	13			
	upper limit absolute value and lower limit area	14			
	upper limit and lower limit absolute area	15			

See the second level parameter setting for alarm type selecting.



Remark:

(1) The range marked by hatched line is ON

(2) What is "alarm keep"?

"Alarm keep" means no alarm outputs at the first time when turn on the controller or after setting parameters, even if the measured value is in the range of alarm.

When the measured value goes out of the alarm range and turns back to this range again, the controller would output alarm (ON).

This function is only available when the setting value is jumping program and deviation alarm.

Input type and measuring range:

Sensor type& P-in display		Measuring scale	Sensor type& P-in display		Measuring scale	Sensor type& P-in display		Measuring scale
TC: K PV P-In SV K	1	-100~100	TC: N PV P-In SV n	1	-200~100	TC: J PV P-In SV J	1	-100~100
	2	-100~200		2	-100~200		2	-100~200
	3	0~100		3	0~100		3	0~100
	4	0~200		4	0~200		4	0~200
	5	0~400		5	0~400		5	0~400
	6	0~600		6	0~600		6	0~600
	7	0~1000		7	0~1000		7	0~1000
	8	0~1200		8	0~1300			
TC: E PV P-In SV E	1	-100~100	RTD: Pt100 PV P-In SV Pt	1	-200~100	RTD: Cu50 PV P-In SV Cu	1	-50~150
	2	-100~200		2	-100~200		2	0~150
	3	0~100		3	0~100			
	4	0~200		4	0~200			
	5	0~400		5	0~400			
	6	0~750		6	0~600			
TC: B PV P-In SV b	1	60~600	TC: S PV P-In SV S	1	0~200	TC: R PV P-In SV r	1	0~200
	2	60~1000		2	0~600		2	0~600
	3	60~1400		3	0~1000		3	0~1000
	4	60~1800		4	0~1600		4	0~1600
TC: T PV P-In SV t	1	-150~100	Voltage: V PV P-In SV u	1	0~1V	Current: I PV P-In SV I	1	0~10mA