CNAOB

AOB808 Intelligent Industrial Regulator

Operational Instruction Manual

Please read through the manual before installment and operation

Contents

The input, output and function parameters must be set before use, only well-configured instrument can be put to work.

Chapter 1. General Introduction

AOB808 intelligent industrial regulator can be applied in high-precision measurement and control of temperature, pressure, discharge, liquid level and humidity etc.

The key features include:

◆ 21 signals including signals of thermocouple, resistance thermometer detector (RTD), direct voltage, direct current, resistance can be input freely, and the measuring range as well as the display resolution can be freely configured.

◆ Modular output structure with control output options, including relay contact switch, solid-state relay driving voltage, non-contacting thyristor switch, single-phase thyristor zero-crossing or phase-shifting trigger signal, three-phase thyristor zero-crossing or phase-shifting trigger signal and direct current. Any of the outputs can be set freely as on-off control or PID control with configurable direct/reverse action modes.

◆ Two ways of programmable alarm outputs are provided with a number of alarm modes including higher limit, lower limit, higher and lower limits, double higher limits and double lower limits, as well as alarm pattern options between absolute value type and deviation type. The alarm feature can also be temporarily disabled when applying the power.

◆ A common programmable DC output module that can be freely switched among 0-10mA, 0-20mA and 4-20mA, either being used as control output or transmitting output.

◆ Providing feeding outputs including DC 24V, 12V, 10V and 5V for external transmitter or other circuits

◆ Employing RS485 serial communication and supporting standard MODBUS_RTU communication protocols for easy combination with third-party background monitoring software to build a total distributed control system

◆ Function menu with all-character interface, detailed menu parameter description, human-oriented operation guide for quick start, in addition to simple and practical self-tuning capability of PID parameter will help you configure the instrument with easy.

◆ Comprehensive self-detection and protectionthe built-in software dog and dongle, together with monitoring module of the system ensure the system security by monitoring and controlling of program running out of track, EEPROM error, A/D error, cold junction com pensation error, out-of-range, and output module status. In case of error, it provides automatic repair or prompt message and closes the output.

Chapter 2. Type and Designation

AOB808 – □ □ □ □ □
①　②　③　④　⑤

①**Dimension code designation of the instrument panel**

A:96 × 96mm　D:72 × 72mm　E:48 × 96mm　F:96 × 48mm

G:48 × 48mm　H:160 × 80mm　S:80 × 160mm

②**type of the module installed at OUT, 0 for no module installment**

③**type of the module installed at AL1, 0 for no module installment or no AL1**

④**type of the module installed at AL2, 0 for no module installment or no AL2**

⑤**type of the module installed at AUX, 0 for no module installment**

Note: the applicable module type for each part of the instrument can be selected according to instrument wiring instructions discussed in Chapter 7.

Chapter 3. Technical Parameters

1. Input specification and measuring range (freely changeable with keypad)

Input type	Code	Measuring range	Input type	Code	Measuring range
Thermocouple (TC)	K	－50℃ ~ +1350℃	Direct voltage(U)	0－20mV	Customized range within −1999 ~ +9999
	S	－50℃ ~ +1750℃		0－60mV	
	R	－50℃ ~ +1750℃		0－100mV	
	T	－200℃ ~ +400℃		0－1V	
	E	－50℃ ~ +800℃		0－5V	
	J	－50℃ ~ +1000℃		1－5V	
	B	0℃ ~ +1800℃	Direct current(I)	0－10mA	
	N	－50℃ ~ +1300℃		0－20mA	
	WRe3−WRe25	0℃ ~ +2300℃		4－20mA	
Resistance thermometer detector (RTD)	Cu50	－50℃ ~ +150℃	Resistance (R)	30－350Ω	
	Pt100	－200℃ ~ +850℃			

2. Intrinsic error

±0.2%FS ± 1 digit (when employing external cold junction compensation for input of resistance thermometer detector, resistance, direct voltage, direct current and thermocouple)

±0.2%FS ± 2 ℃ ± 1 digit (when employing internal cold junction compensation for input of thermocouple)

Note: the instrument provides measurement during the range of 0−+1800 ℃ for B−type thermocouple, but the intrinsic error can not be guaranteed below 600 ℃.

3. Sampling period: <0.3s

4. Control modes (freely changeable with keypad)
On-off control (configurable direct/reverse action and differential gap)
PID control (configurable direct/reverse action, manual or automatic configuration of PID parameters)
Manual control (directly editing the output value with keypad)
5. Alarm modes (freely changeable with keypad)
Maximum of 2-way alarm outputs; each alarm output can be freely configured as absolute value higher limit alarm, absolute value lower limit alarm, deviation higher limit alarm or deviation lower limit alarm. In addition, the alarm feature can also be temporarily disabled when applying the power.
6. Output specifications (modularization)

Code	Module name	Technical parameters
L2	Output module of relay contact switch	Normally closed + normally open (absorbed by varistor), 30VDC/1A, 250VAC/1A
L4	Output module of relay contact switch	Normally closed + normally open (absorbed by varistor), 30VDC/5A, 250VAC/5A
G	Output module of solid-state relay (SSR) driving voltage	12VDC/25mA
W1	Output module of non-contacting thyristor switch	Normally open, 100-240VAC/0.2A (consistent), 2A (20ms,instantaneous, repeat circle >5s), recommended for controlling AC contactor of 100A below
K1	Output module of single-phase thyristor zero-crossing trigger signal	100-380VAC, adaptive electric network frequency, capable of triggering 5-500A TRIAC or 2 SCRs in inverse parallel connection or thyristor power module
X	Output module of direct current	For controlling or transmitting (0.5 level) output, output voltage> 10.5VDC, freely changeable among 0-10mA, 0-20mA and 4-20mA, resolution no less than 0.1%
X5	Output module of direct voltage	For controlling or transmitting (0.5 level) output, output impedance: 250Ω, freely changeable between 0-5V and 1-5V, resolution no less than 0.1%
K5/K7	Output module of single-phase thyristor phase-shifting trigger signal	K5:220-380VAC / K7:100-220VAC, adaptive electric network frequency, capable of triggering 5-500A TRIAC or 2 SCRs in inverse parallel connection or thyristor power module
S	RS485 communication interface module	Optoelectronic isolation
U24/U12/U10/U5	Feeding output module	DC 24V, 12V, 10V, 5V, voltage ± 5%, current<50mA

Note: (1) Inside the instrument there are one set of +24V and one set of +12V power supplies, which are isolated from the main circuit. +24V power supply serves U24, U12, U10 and U5 output modules while +12V power supply serves G, X, X5 and S output modules. There is no electrical insulation between the output modules using the same power supply.

(2) The default alarm output module is L2, and K5 is the default output module of thyristor phase-shifting trigger signal.

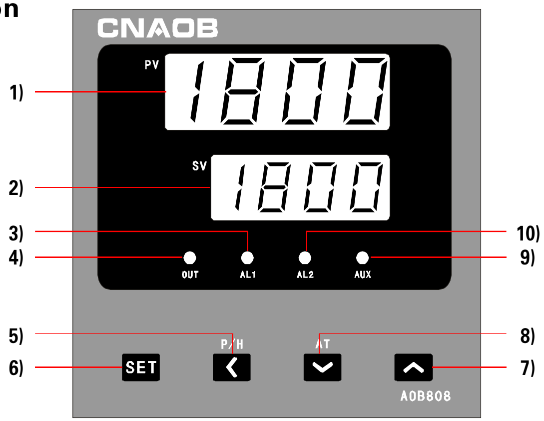
If module L4, G, W1, K1 need to be used as alarm outputs, module K7 as control output and module X5 as control or transmitting output, please order for product with special specification requirement.

7. Working power supply: 85-264VAC, 50/60Hz, power consumption<10VA
8. Operational environment: places free of corruption with temperature of 0-50℃, and relative humidity≤85%
9. Weight and outline dimension

Type	Panel dimension(W × H)	Case dimension(W × H × D)	Hole cutout dimension (W × H)	Weight
AOB808-A	96 × 96mm	91 × 91 × 100mm	92 × 92mm	About 350g
AOB808-D	72 × 72mm	66 × 66 × 100mm	68 × 68mm	About 250g
AOB808-E	48 × 96mm	44 × 90 × 100mm	45 × 92mm	About 250g
AOB808-F	96 × 48mm	90 × 44 × 100mm	92 × 45mm	About 250g
AOB808-G	48 × 48mm	44 × 44 × 100mm	45 × 45mm	About 150g
AOB808-H	160 × 80mm	150 × 75 × 84mm	152 × 76mm	About 400g
AOB808-S	80 × 160mm	75 × 150 × 84mm	76 × 152mm	About 400g

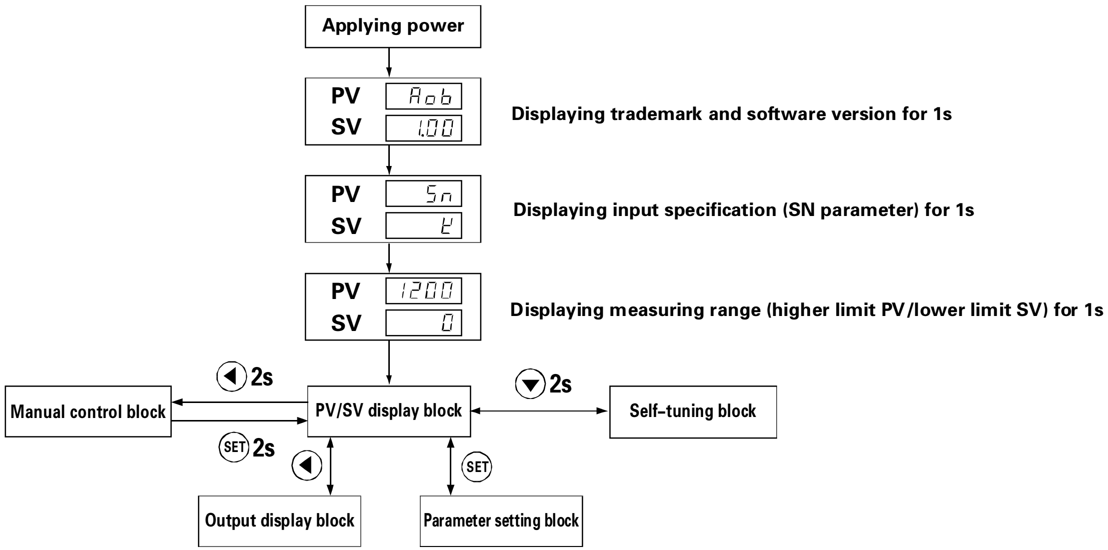
Chapter 4. Description of Panel and the Operation

1. Panel description
1) Process value display screen (PV)
2) Set value display screen (SV)
3) AL1 lamp
4) OUT lamp
5) Shift key (also as entry and output display switch in manual control)
6) Setting key
7) Up key
8) Down key (also as self-tuning switch)
9) AUX lamp
10) AL2 lamp



The meaning of the 4 LED indicator lamps on the panel is defined respectively as the following:
OUT lamp: OUT lamp remains lit while controlling output actions (for output modes including relay, solid-state relay, thyristor zero-crossing and non-contacting thyristor switch) or indicates the output value by way of the proportion of flashing period (for output modes including thyristor phase-shifting, direct current and direct voltage).
Al1, AL2 and AUX lamps: the corresponding lamp will be lit when output action takes place at AL1, or AL2, or AUX.

2. Display status



3. How to operate

The instrument will automatically enter PV/SV display block 3.5s after applying power. The PV screen and the SV screen will display process value and set value respectively.

1) Parameter setting block

Under PV/SV display block, the instrument will enter parameter setting block by pressing down SET key for 2s. The PV screen displays parameter name and the SV screen displays parameter value, the last figure of which will flash. Edit parameter value with◀ ,▼ , ▲ keys (if LOC≠0, the last figure will not flash and the parameter cannot be changed). Then press SET key to confirm the change and switch to the next parameter name, or press down SET key for 2s to confirm the change and return to PV/SV display block. The instrument will return to PV/SV display block if there is no key action for 20s, in this case, the last change to the parameter will be cancelled.

2) Output display block

Under PV/SV display block, the instrument will enter output display block by pressing ◀ key. The PV screen displays the process value, and the thousands place on the SV screen displays character P while the last three digits will display the current control output value (%). The instrument will return to PV/SV display block by pressing ◀ key or after 20s without any key action.

3) Manual control block (only available when LOC=0 and the instrument is under PID control mode)

Under PV/SV display block, the instrument will enter manual control block by pressing down ◀ key for 2s. The PV screen displays the process value, and the thousands place on the SV screen displays character H while the last three digits will display the current control output value (%), the last figure of which will flash. Edit parameter value with◀ ,▼ , ▲keys. The instrument will stop PID operation under manual control block. The output value is fully controlled by keypad. Press down SET key for 2s to exit manual control block, the instrument will then return to PV/SV display block and switch to instrument automatic control.

4) Self-tuning block (only available when LOC=0 and the instrument is under PID control mode)

Under PV/SV display block, the instrument will enter self-tuning block by pressing down key for 2s. The PV screen displays the process value, and the SV screen displays a flashing ▼ at interval of 0.5s (during the process, the instrument can enter and exit parameter setting block and output display block with no effect on self-tuning. But the self-tuning prompt will disappear). On completion of self-tuning, the PID parameters of the instrument will be automatically changed and saved and the instrument will return to PV/SV display block automatically. Press down ▼ key for 2s when “ -At- ” on the SV screen stops flashing to exit the self-tuning block during self-tuning process.

Chapter 5. Function Configuration

AOB808 intelligent industrial regulator can be freely configured with parameters and output modules. The table below provides parameter functions:

Serial number	Parameter code	Parameter name	Setting range	Description	Factory-set value
Menu A					
1	SU	Primary control setting value (SV)	INPL toINPH	INPL≤SV≤INPH	Random
2	AL 1	Setting value of alarm 1 (AL1)	INPL to INPH or 0 to (INPH–INPL)	When alarm type 1 AL1T is absolute value alarm, INPL≤AL1≤INPH; When alarm type 1 AL1T is deviation alarm, 0≤AL1≤(INPH–INPL)	Random
3	AL 2	Setting value of alarm 2 (Al2)	INPL to INPH or 0 to (INPH–INPL)	When alarm type 2 AL2T is absolute value alarm, INPL≤AL2≤INPH; When alarm type 2 AL1T is deviation alarm, 0≤AL2≤(INPH–INPL)	Random
4	Loc	Parameter modification level and keypad control LOC	0 ~ 9999	When LOC=0, changes in Menu A are allowed; When LOC≠0, changes in Menu A are not allowed (LOC itself changeable); When LOC=808, viewing and changes in Menu B are allowed; after exiting Menu B,LOC will automatically restore to the value before entry. Manual control block and self-tuning block are only available for entry when LOC=0.	0
Menu B					
			K S	The SN parameter is changeable to select input specification: K–type thermocouple=0 S–type thermocouple=1	

Serial number	Parameter code	Parameter name	Setting range	Description	Factory-set value
5	Sn	Input specification SN	r t E J b n 3-25 Cu50 Pt 0-1U 0-5U 1-5U U20 U60 U100 0-10 0-20 4-20 rESi	R-type thermocouple=2 T-type thermocouple=3 E-type thermocouple=4 J-type thermocouple=5 B-type thermocouple=6 N-type thermocouple=7 WRe3-WRe5 type thermocouple=8 Cu50-type RTD(resistance thermometer detector)=9 Pt100-type RTD=10 0-1V direct voltage=11 0-5V direct voltage=12 1-5V direct voltage=13 0-20mV direct voltage=14 0-60mV direct voltage=15 0-100mV direct voltage=16 0-10mA direct current=17 0-20mA direct current=18 4-20mA direct current=19 30-350 賠esistance=20	K

Serial number	Parameter code	Parameter name	Setting range	Description	Factory-set value
6	dP	Decimal point position DP	0 ~ 3	When DP=0, the display format is XXXX, with no decimal point; When DP=1, the display format is XXX.X, with decimal point at tens place; When DP=2, the display format is XX.XX, with decimal point at hundreds place; When DP=3, the display format is X.XXX, with decimal point at thousands place; When applying thermocouple or RTD input, DP can only be set to 0 or 1; When DP=0, the temperature display resolution is 1 ℃ (the internal part resolution remaining 0.1 ℃ for control operation) ; When DP=1, the temperature display resolution is 0.1 ℃ (automatically switching to 1 ℃ for display value over 999.9 ℃) ; Changing the decimal point position only results in different display and has no effect on measuring and control precision	0
7	inPL	Lower limit of measuring range INPL	－1999 ~ ＋9999	Working with INPH for defining the lower limit scale value of linear input signal, or the lower limit temperature measurement or the lower limit value of transmitting output range of thermocouple and RTD. The parameter setting should also meet the requirements of part 1 discussed in chapter 3: technical parameters. The parameter must be set within the allowed measuring range. For example, when pressure (or other physical quantities such as temperature, discharge and moisture) is converted through pressure transmitter into standard 4–20mA signal input, it is required that the pressure value for 4mA signal input be set to 0MPa and that for 20mA as 1MPa, and the instrument display resolution be set to 0.001 MPa. The parameters are set as follows: SN=4–20 (selecting 4–20mA direct current input) DP=3 (the decimal point position, in X.XXX format) INPL=0.000 (specifying the display pressure value for lower limit input of 4mA) INPH=1.000 (specifying the display pressure value for higher limit input of 20mA) The instrument measuring range set by INPL and INPH also acts as transmitting output range of the instrument. For example, assuming that INPL=0, INPH=300, and 4–20mA current transmitting output is selected, then, the transmitting output current would be 4mA when the process value is no greater than 0, or 20mA when the process value is no less than 300. The transmitting output current would change in linear proportion between 4mA and 20mA when the process value is within the range of 0–300.	0

Serial code	Parameter code	Parameter name	Setting range	Description	Factory-set value
8	inPH	Higher limit of measuring range INPH	－1999～＋9999	Working with INPL for defining the higher limit scale value of linear input signal, or the higher limit temperature measurement or the higher limit value of transmitting output range of thermocouple and RTD.	1200
9	ScL	Correction of lower limit process value SCL	－1999～＋9999	Working with SCH for correcting the process value on the spot to compensate for errors from sensor or the input signal itself. For thermocouple input signals, the error in cold junction temperature automatic compensation can be corrected with SCH and SCL. If SCH is consistent with SCL, the translation correction of the process value can be implemented. Otherwise the slope correction can be carried out. Translation correction: assuming that the input signal is constant, and the instrument display value is 500 ℃ when SCL=0 and SCH=0, then the instrument display value would be 505 ℃ (+5 ℃ within the measuring range) when SCL=5 and SCH=5, and the display value would be 495 ℃ (-5 ℃ within the measuring range) when SCL=-5 and SCH=-5. Slope correction: when the input signal itself has error, the instrument would automatically adjust the input signal range by setting SCH and SCL. For example, when configured with a 0-6MPa resistance transmission pressure gauge, assuming that the instrument display value is -0.050MPa when the gauge display value is 0MPa and that the instrument display value is 1.850MPa when the gauge display value is 1.6MPa, after setting SCL=0.050 and SCH=-0.250, the instrument would display 0.000MPa and 1.6000MPa respectively for display value of 0MPa and 1.6MPa on the pressure gauge. SCH and SCL are set to 0 through factory internal correction.	0

Serial code	Parameter code	Parameter name	Setting range	Description	Factory-set value
10	ScH	Correction of higher limit process value SCH	－1999～＋9999	Working with SCL for correcting the process value on the spot to compensate for errors from sensor or the input signal itself.	0
11	FiLt	Input digital filtering FILT	0～100	Inside the instrument there is a median filtering and first-order integral digital filtering system. The median filtering will pick the middle value from three continuous values. The integral filtering has the same effect as resistance-capacitance integral filtering in electronic circuit. The digital filtering can smooth digital jitter resulting from input interference. The setting range of FILT is 0-100, with no filtering at 0, only median filtering at 1 and both median filtering and integral filtering during the range of 2-100. The greater FILT is, the stabler the process value would be, although with slower response. FILT should be set to 0 or 1 to increase response speed when conducting metrological verification of the instrument (only testing for response time) in laboratory.	10
12	CtrL	Control mode CTRL	bit.r bit.d Pid.r Pid.d	BITR On-off control, reverse action =0 BITD On-off control, direct action=1 PIDR PID control, reverse action=2 PIDD PID control, direct action=3 Reverse action: control in which output is tuned down as input signal increases. For example, in a heating control system, assuming that output power is required to decrease as the measured temperature goes up, in this case, reverse action control should be applied. Direct action: control in which output is tuned up as input signal increases. For example, in a cooling control system, assuming that output cooling power is required to increase as the measured temperature goes up, in this case, direct action control should be applied.	Pid.r

Serial code	Parameter code	Parameter name	Setting range	Description	Factory-set value
13	dFct	Differential gap of on-off control DFCT	0.1 ~ 2000	DFCT includes only one digit after decimal point for thermocouple or RTD input, and the decimal point will be positioned according to DP for other input types. For example, assuming that the set value (SV) is 200 ℃ and DFCT is set to 0.3, DFCT has the following effects on control output in reverse action on-off control: 1) The closed output will be cut off when the measured temperature is greater than 200.3℃; 2) The open output will be closed to heat when the measured temperature is less than 199.7℃.For on-off control, the longer the make-and-break period is, the greater DFCT will be, with lower control precision.In turn, the shorter the make-and-break period is, the less DFCT will be, with higher control precision. However, fluctuation of the process value is apt to produce misoperation, resulting in shorter working life of mechanical switches such as relay or contactor. DFCT has no effect on PID control. However, since the parameter self-tuning process also belongs to on-off control, DFCT will affect the self-tuning result. Generally speaking, the smaller DFCT is, the higher the self-tuning precision is. But the self-tuning process failure caused by display value jitter, owing to process value disturbance, should be prevented.	0.3
14	oPL	Output lower limiting OPL	0 ~ 100.0%	Limiting the minimum control output value, with no effect on the on-off control (except current output and thyristor phase-shifting output). In segmented power control, it is the maximum output power at the position which is lower than (for reverse action) or higher than (for direct action) the limiting point.	0.0
15	oPH	Output higher limiting OPH	0 ~ 100.0%	Limiting the maximum control output value, with no effect on the on-off control (except current output and thyristor phase-shifting output). In segmented power control, it is the maximum output power at the position which is higher than (for reverse action) or lower than (for reverse action) the limiting point.	100.0

Serial code	Parameter code	Parameter name	Setting range	Description	Factory-set value
16	FdP	Segmented power limiting point FDP	0 ~ 100% of setting value of SV	The segmented power limitation would be canceled when FDP=100. The parameter is only effective for controlling current output and thyristor phase-shifting output. For some high temperature electric resistance furnaces such as those employing silicon-molybdenum bar and tungsten filament as heating material, due to its very low cold state resistance, the current of these furnaces in low temperature would greatly exceed the rated current without power limitation, which would result in tripping or significantly shorten the working life of such heating material. The parameter, working with OPL and OPH, provides a solution for the problem. For example, assuming that OPL=20.0%, OPH=100.0%, SV=1000, FDP=60%, then the output power range would be 0~20.0% when the process value is less than 1000*60%=600; and the range would be 0~100.0% for the process value more than 600.	100
17	AL1t	Alarm type 1 AL1T	oFF HJ HJb HP HPb LJ LJb LP LPb	OFF no alarm=0 HJ absolute value higher limit alarm=1 HJB absolute value higher limit alarm holding =2 HP deviation higher limit alarm=3 HPB deviation higher limit alarm holding =4 LJ absolute value lower limit alarm=5 LJB absolute value higher limit alarm holding =6 LP deviation lower limit alarm=7 LPB deviation lower limit alarm holding =8 Absolute value higher limit alarm: alarm 1 will produce action in case the process value is greater than AL1, and alarm 1 will be release if the process value is less than (AL1-DFAL); Absolute value lower limit alarm: alarm 1 will produce action in case the process value is less than AL1, and alarm 1 will be release if the process value is greater than (AL1+DFAL); Deviation higher limit alarm: alarm 1 will produce action in case the process value is greater than (SV+AL1) , and alarm 1 will be release if the process value is less than (SV+AL1-DFAL); Deviation lower limit alarm: alarm 1 will produce action in case the process value is less than (SV-AL1), and alarm 1 will be release if the process value is greater than (SV-AL1+DFAL).	HJ

Serial code	Parameter code	Parameter name	Setting range	Description	Factory-set value
				Alarm holding: the instrument often produces alarm when applying power or changing the SV set value. Take a heating control (reverse action) system, for example, the actual temperature may be far lower than SV when applying power on the instrument. In this case, if user has set the lower limit alarm, the alarm conditions are fulfilled at the moment the power is turned on, whereas the control system has no problem. On the contrary, a higher limit alarm could happen when applying power for cooling control (direct action) system. The alarm holding enables the instrument to prevent alarm on power up or change of SV value. The instrument will not produce alarm instantly when the power is turned on or SV is changed, although the alarm condition is fulfilled. After canceling alarm condition, the alarm output will be launched, if the alarm condition happens again. The alarm holding for the change of SV value only has effects on deviation alarm. The parameter must be set for alarm 1 if the instrument has only one way alarm output.	
18	AL2t	Alarm type 2 AL2T	oFF HJ HJb HP HPb LJ LJb LP LPb	OFF no alarm=0 HJ absolute value higher limit alarm=1 HJB absolute value higher limit alarm holding =2 HP deviation higher limit alarm=3 HPB deviation higher limit alarm holding =4 LJ absolute value lower limit alarm=5 LJB absolute value higher limit alarm holding =6 LP deviation lower limit alarm=7 LPB deviation lower limit alarm holding =8 Absolute value higher limit alarm: alarm 2 will produce action in case the process value is greater than AL2, and alarm 2 will be release if the process value is less than (AL2−DFAL); Absolute value lower limit alarm: alarm 2 will produce action in case the process value is less than AL2, and alarm 2 will be release if the process value is greater than (AL2+DFAL); Deviation higher limit alarm: alarm 2 will produce action in case the process value is greater than (SV+AL2) , and alarm 2 will be release if the process value is less than (SV+AL2−DFAL); Deviation lower limit alarm: alarm 2 will produce action in case the process value is less than (SV−AL2), and alarm 2 will be release if the process value is greater than (SV−AL2+DFAL).	LJb

Serial code	Parameter code	Parameter name	Setting range	Description	Factory-set value
19	dFAL	Alarm differential gap DFAL	1 ~ 2000	Used in alarm 1 and alarm 2.	2
20	Addr	Communication address ADDR	0 ~ 127	When employing RS485 communication, instruments on the same line should be assigned with different ADDR values for unique identity.	1
21	bAud	Communication baud rate BAUD	2400 4800 9600	2400bit/s=0 4800bit/s=1 9600bit/s=2	4800
22	P	Proportional band P	0.1 ~ 999.9% of the measuring range	The proportional band parameter of PID regulator, with unilateral distribution beside SV set value. For example, assuming INPL=0, INPH=500, P=4.0 and SV=100, the proportional band of the instrument is (500–0) × 4.0%=20. Then, in reverse action tuning, the proportional band range of the instrument is 80–100, and 100–200 in direct action tuning.	4.0
23	I	Integral time I	0 ~ 9999s	The integral parameter of PID regulator, used to eliminate steady–state error. The integral action will be cancelled if parameter I is set to 0. The smaller parameter I is, the stronger the integral action will be, which facilitates the elimination of steady–state error, but often leads to system overshoot.	240
24	d	Derivative time D	0 ~ 999.9s	The derivative parameter of PID regulator, used to produce pre–act control to suppress system fluctuation. The derivative action will be cancelled if parameter D is set to 0. The greater parameter D is, the stronger the integra l action will be, although often leading to system oscillation.	40.0
25	t	Output period T	1 ~ 120s	T represents the sampling period and control output period of PID operation within the instrument. The principles of setting T value are as follows: 1) When SSR (solid–state relay) and thyristor are employed as output actuators or the instrument output is linear current (voltage), the control period is generally set within 1–5s to accelerate response and improve control precision; 2) When AC contactor is employed as output actuator, the control period is generally set within 20–60s to meet the requirements of the contactor's mechanical working life and control precision.	2or20

Serial code	Parameter code	Parameter name	Setting range	Description	Factory-set value
26	SF	Overshoot suppression coefficient SF	0.00 ~ 1.99	Integral separation and variable-speed integral are applied to optimize the integral term. The decimal part of parameter SF (0.00-0.99) sets the integral starting point for PID operation. The greater the number is, the more convenient it is to reduce overshoot, but the time to reach a stable state will increase correspondingly. The integer of parameter SF decides whether or not to apply the variable-speed integral, as =1 for yes, =0 for no. The variable-speed integral has a significant effect on overshoot suppression, but the time to reach a stable state will increase exponentially. The default value of parameter SF is generally acceptable for most applications. A quick response can be achieved by setting parameter SF to 0.00 or canceling the variable-speed integral. When SF is set at 0.00, the instrument will implement the standard PID operation. In this case, the time for the system to reach the set point is the shortest, although with significant overshoot and oscillation.	1.60
27	CFt	Thermocouple cold junction compensation type CFT	int 0°C 20°C	INT internal automatic compensation =0 0 ℃ external compensation=1 20 ℃ external compensation=2 According to thermocouple temperature measurement principle, in the case of thermocouple input, the thermocouple cold junction needs temperature compensation. The instrument can provide automatic compensation (CFT=0℃) for the thermocouple cold junction by measuring the temperature near the connecting terminal at its rear part. However, the factors including the error of the temperature measuring component, the heat generated by the instrument itself and other nearby heat sources, often lead to obvious deviation in the internal automatic compensation, with the most undesirable value of 2-4℃. Putting the thermocouple cold junction (the connecting point between the common conductor and the thermocouple or the compensation conductor) into an ice-water mixture (CFT=0℃) would make the 0 ℃ external compensation, with compensation precision up to 0.1 ℃. When the thermocouple cold junction is placed in environment under 20 ℃, the 20 ℃ external compensation (CFT=20 ℃) can be implemented. In this case, the compensation precision depends on the ambient temperature.	int

Serial code	Parameter code	Parameter name	Setting range	Description	Factory-set value
28	Pout	**Definition of OUT output module POUT**	nc rLY SSr SCrK SCrn 3Crn b010 b020 b420 U24 U12 U10 U5 0-10 0-20 4-20 SCrc 3Crc	**OUT is mainly used for control output of the instrument. It is also employed as feeding output and transmitting output. Parameter POUT should be consistent with the type of output module installed at OUT: NC module N/A=0 RLY relay contact switch output module L2/L4=1 SSR solid-state relay driving voltage output module G=2 SCRK thyristor non-contacting switch output module W1=3 SCRN single-phase thyristor zero-crossing trigger signal output module K1=4 3CRN three-phase thyristor zero-crossing trigger signal output module K1=5 (for three-phase thyristor zero-crossing triggering) B010 direct current output module X(transmitting current output of 0-10mA)=6 B020 direct current output module X(transmitting current output of 0-20mA)=7 B420 direct current output module X(transmitting current output of 4-20mA)=8 U24 feeding output module U24=9 U12 feeding output module U12=10 U10 feeding output module U10=11 U5 feeding output module U5=12 0-10 direct current output module X (control current output of 0-10mA) =13 0-20 direct current output module X (control current output of 0-20mA) =14 4-20 direct current output module X (control current output of 4-20mA) =15 SCRC single-phase thyristor phase-shifting trigger signal output module K5/K7=16 3CRC three-phase thyristor phase-shifting trigger signal output module K5/K7=17 (for three-phase thyristor phase-shifting triggering) The three-phase thyristor phase-shifting trigger capability is only available when POUT is combined with PAL1, PAL2 and PAUX to form 2-way or 3-way thyristor zero-crossing trigger signal.When X5 direct voltage output module is installed at OUT for transmitting or control output, parameter POUT should be selected according to corresponding direct current, with 0-5V for 0-20mA and 1-5V for 4-20mA. That is, B020 should be selected for POUT in 0-5V direct voltage transmitting output, and B420 should be selected in 1-5V direct voltage transmitting output. And, 0-20 should be selected for POUT in 0-5V direct voltage control output, and 4-20 should be selected for POUT in 1-5V direct voltage control output.When NC is selected for POUT, the control capability is not available in transmitting output or feeding output module, and the SV display will be switched off.**	**set according to specific module type**

Serial code	Parameter code	Parameter name	Setting range	Description	Factory-set value
29	PAL1	**Definition of AL1 output module PAL1**	nC rLY SSr SCrK SCrn 1d3 b010 b020 b420 U24 U12 U10 U5	AL1 is mainly used for alarm output 1 of the instrument. It is also employed as feeding output and transmitting output. Parameter PAL1 should be consistent with the type of output module installed at AL1: NC module N/A=0 RLY relay contact switch output module L2/L4=1 SSR solid-state relay driving voltage output module G=2 SCRK thyristor non-contacting switch output module W1=3 SCRN single-phase thyristor zero-crossing trigger signal output module K1=4 1D3 working with POUT to provide three-phase thyristor zero-crossing or phase-shifting trigger capability (which should be consistent with the module installed at OUT) =5 B010 direct current output module X(transmitting current output of 0-10mA)=6 B020 direct current output module X(transmitting current output of 0-20mA)=7 B420 direct current output module X(transmitting current output of 4-20mA)=8 U24 feeding output module U24=9 U12 feeding output module U12=10 U10 feeding output module U10=11 U5 feeding output module U5=12 If certain alarm mode is set for alarm type 1(AL1T), alarm 1 will be produced on AL1 output by default. If AL1 is not available, then alarm 1 will be produced on AUX output. In case AUX has not installed output module for alarm, alarm 1 output will be unavailable. When X5 direct voltage output module is installed at AL1 for transmitting output, parameter PAL1 should be selected according to corresponding direct current, with 0-5V for 0-20mA and 1-5V for 4-20mA. That is, B020 should be selected for PAL1 in 0-5V direct voltage transmitting output, and B420 should be selected in 1-5V direct voltage transmitting output.	set according to specific module type

Serial code	Parameter code	Parameter name	Setting range	Description	Factory-set value
30	PAL2	Definition of AL2 output module PAL2	nc rLY SSr SCrK SCrn 1d3 b010 b020 b420 U24 U12 U10 U5	AL2 is mainly used for alarm output 2 of the instrument. It is also employed as feeding output and transmitting output. Parameter PAL2 should be consistent with the type of output module installed at AL2: NC module N/A=0 RLY relay contact switch output module L2/L4=1 SSR solid-state relay driving voltage output module G=2 SCRK thyristor non-contacting switch output module W1=3 SCRN single-phase thyristor zero-crossing trigger signal output module K1=4 1D3 working with POUT to provide three-phase thyristor zero-crossing or phase-shifting trigger capability (which should be consistent with the module installed at OUT) =5 B010 direct current output module X(transmitting current output of 0-10mA)=6 B020 direct current output module X(transmitting current output of 0-20mA)=7 B420 direct current output module X(transmitting current output of 4-20mA)=8 U24 feeding output module U24=9 U12 feeding output module U12=10 U10 feeding output module U10=11 U5 feeding output module U5=12 If certain alarm mode is set for alarm type 2(AL2T), alarm 2 will be produced on AL2 output by default. If AL2 is not available, then alarm 2 will be produced on AUX output. In case AUX has not installed output module for alarm, alarm 2 output will be unavailable. When X5 direct voltage output module is installed at AL2 for transmitting output, parameter PAL2 should be selected according to corresponding direct current, with 0-5V for 0-20mA and 1-5V for 4-20mA. That is, B020 should be selected for PAL2 in 0-5V direct voltage transmitting output, and B420 should be selected in 1-5V direct voltage transmitting output.	set according to specific module type

Serial code	Parameter code	Parameter name	Setting range	Description	Factory-set value
31	PAUY	**Definition of AUX output module PAUX**	nc rLY SSr SCrK SCrn 1d3 b010 b020 b420 U24 U12 U10 U5 r485	AUX is mainly used for communication or transmitting output of the instrument. It is also employed as feeding output and alarm output. Parameter PAUX should be consistent with the type of output module installed at AUX: NC module N/A=0 RLY relay contact switch output module L2/L4=1 SSR solid-state relay driving voltage output module G=2 SCRK thyristor non-contacting switch output module W1=3 SCRN single-phase thyristor zero-crossing trigger signal output module K1=4 1D3 working with POUT to provide three-phase thyristor zero-crossing or phase-shifting trigger capability (which should be consistent with the module installed at OUT) =5 B010 direct current output module X(transmitting current output of 0-10mA)=6 B020 direct current output module X(transmitting current output of 0-20mA)=7 B420 direct current output module X(transmitting current output of 4-20mA)=8 U24 feeding output module U24=9 U12 feeding output module U12=10 U10 feeding output module U10=11 U5 feeding output module U5=12 R485 RS485 communication output module S=13 When X5 direct voltage output module is installed at AUX for transmitting output, parameter PAUX should be selected according to corresponding direct current, with 0-5V for 0-20mA and 1-5V for 4-20mA. That is, B020 should be selected for PAUX in 0-5V direct voltage transmitting output, and B420 should be selected in 1-5V direct voltage transmitting output. The direct current output module X or the direct voltage output module X5, which are used for transmitting, can be installed at OUT, AL1,AL2 and AUX. However, the instrument will produce only one output in sequence of AUX, AL2, AL1 and OUT. If an alarm output module is installed at AUX, alarm 1 can be implemented when AL1 is not available; and alarm 2 can be implemented when AL2 is not available. In case that AL1 and AL2 are unavailable, only alarm 1 can be implemented.	set according to specific module type

Chapter 6. Operation Guide A Quick Start

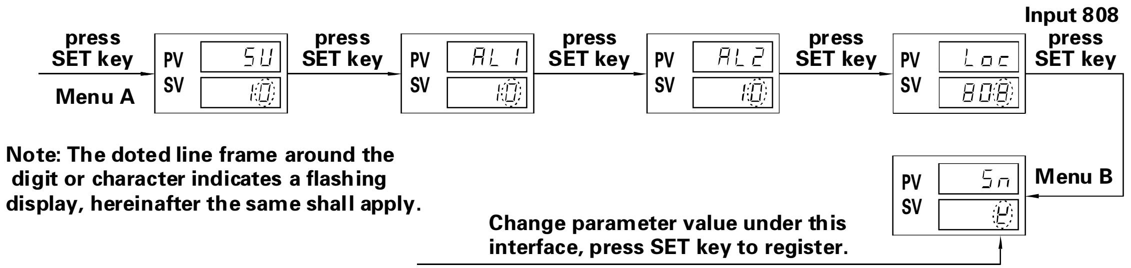
The input, output and function parameters of XMT–800 intelligent industrial regulator must be set before use, only well–configured instrument can be put to work.

Before start the setting, please read Chapter 4 and part 4 of Chapter 6. If you are familiar with basic operation of the instrument, please go on.

Note: This chapter could only provide the instrument setting method and the procedure instead of a truly completed configuration, for the instrument setting depends on your selection of parameters. Each parameter is presented in Chapter 6 with detailed description, according to which you can make your selection. For those not discussed, generally, the default value will work. Be sure to set the instrument in the following order to avoid unnecessary trouble:

1. Parameter setting related to measurement

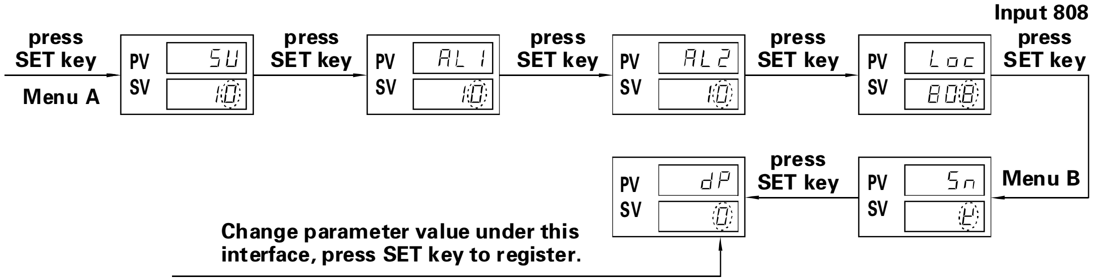
1) Setting the input specification (Parameter SN)



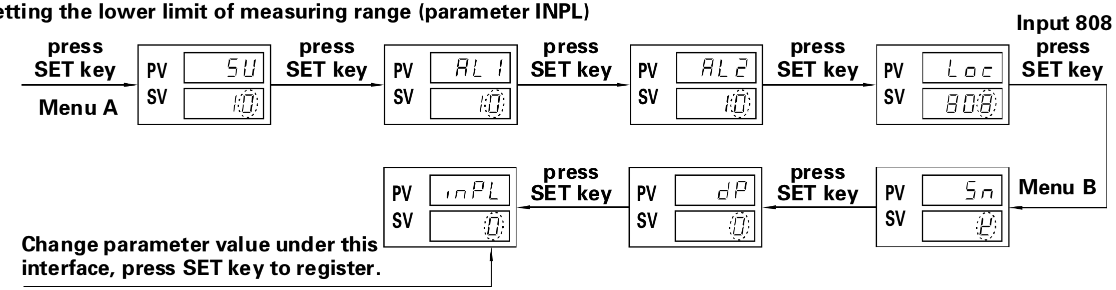
Note: A period of 15 minutes is required after applying power or changing the input type to ensure precise measurement.

For AOB808-G series with direct current signal input, apart from setting parameter SN, the instrument housing should be opened to set the JP1 connector pin near the signal input connecting terminal. When pin 1 and pin 2 of JP1 connector pin are connected with each other (using the auxiliary short-circuit block on pin 2 and pin 3), the instrument only supports direct current signal of 0-10mA, 0-20mA and 4-20mA. When pin 1 is disconnected from pin 2, the instrument will accept any signal input except direct current signal input.

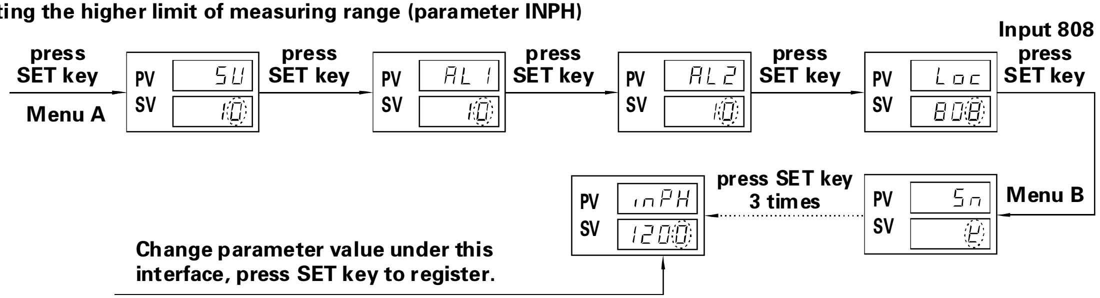
2) Setting the decimal point position (parameter DP)



3) Setting the lower limit of measuring range (parameter INPL)



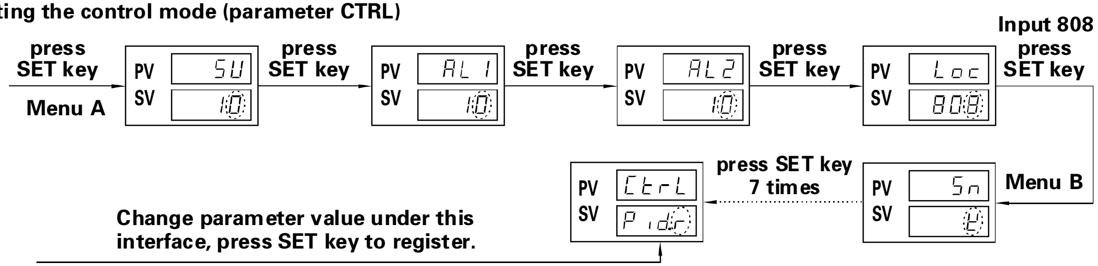
4) Setting the higher limit of measuring range (parameter INPH)



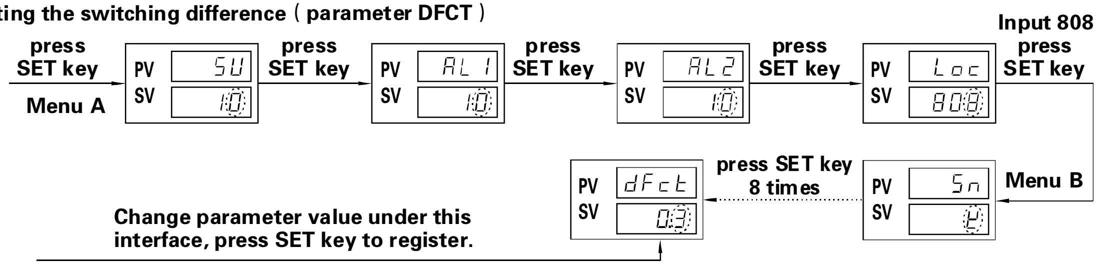
2. Parameter setting related to control

If the instrument has no control output, jump directly to part 3 on the next page.

1) Setting the control mode (parameter CTRL)



2) Setting the switching difference (parameter DFCT)

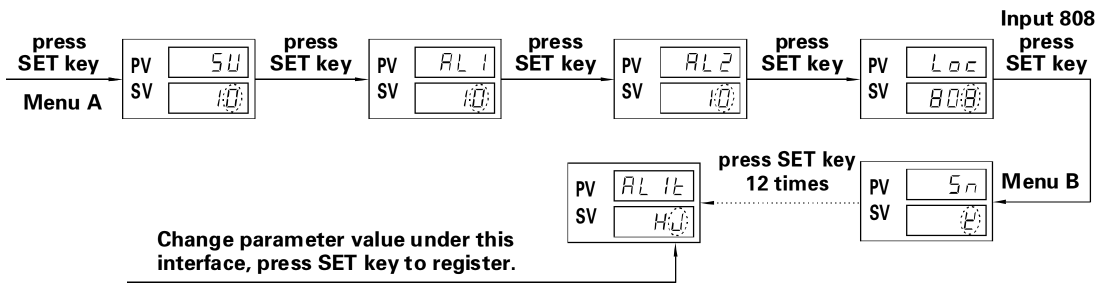


3. Parameter setting related to alarm

If the instrument has no alarm output, AL1T and AL2T should be set to OFF.

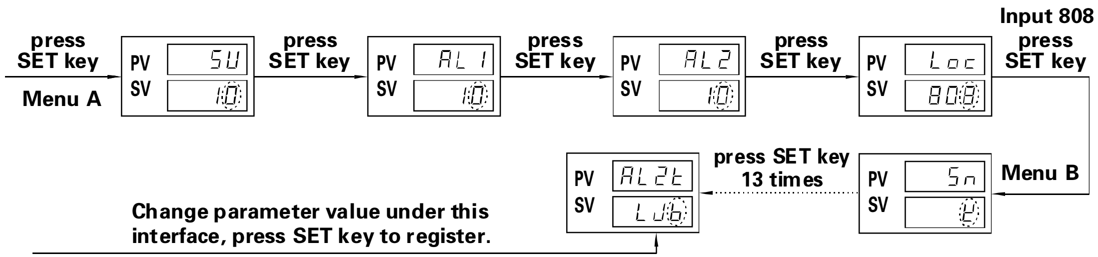
1) Setting alarm type 1 (parameter AL1T)

If the instrument has only one way alarm output, parameter AL1T should be set for alarm 1.



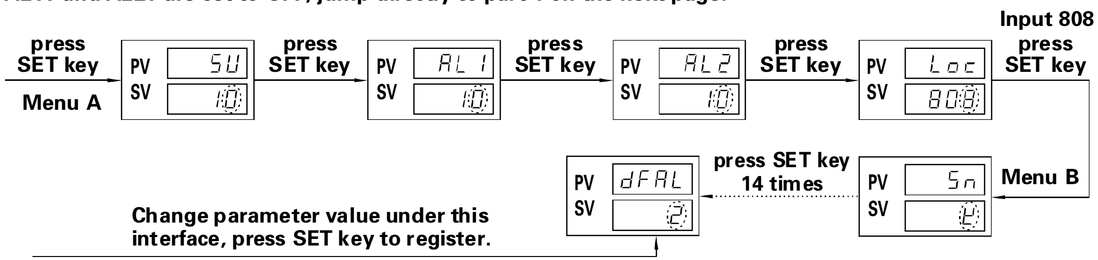
2) Setting alarm type 2 (parameter AL2T)

If the instrument has 2–way alarm outputs, set AL2T for alarm 2. In the case that the instrument has only one way alarm output, AL2T should be set to OFF.



3) Setting alarm differential gap (parameter DFAL)

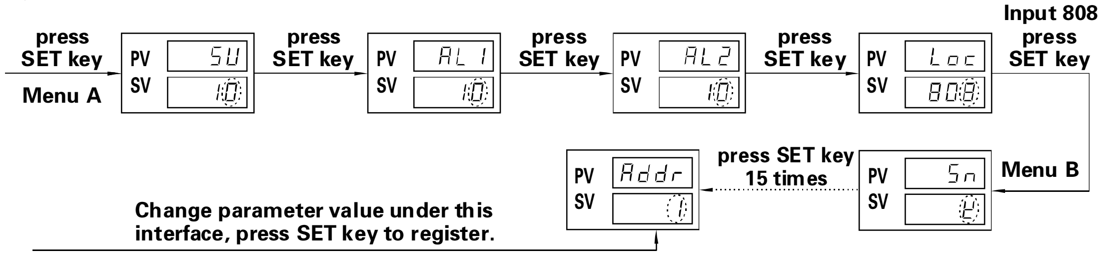
If both AL1T and AL2T are set to OFF, jump directly to part 4 on the next page.



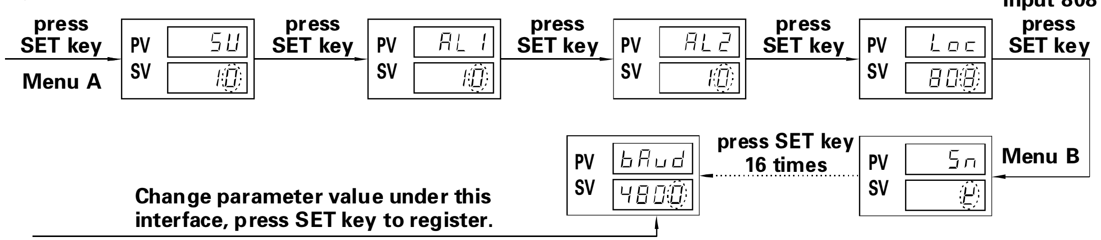
4. Parameter setting related to communication

If the instrument provides no communication feature, jump directly to part 5 on the next page.

1) Setting communication address (parameter ADDR)



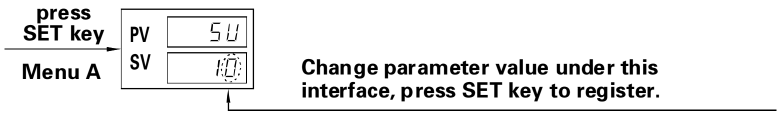
2) Setting communication baud rate (parameter BAUD)



5. Setting the control and alarm set value

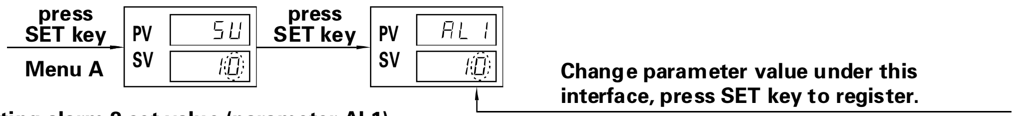
1) Setting the control set value (parameter SV)

If the instrument has no control output, jump directly to step 2.



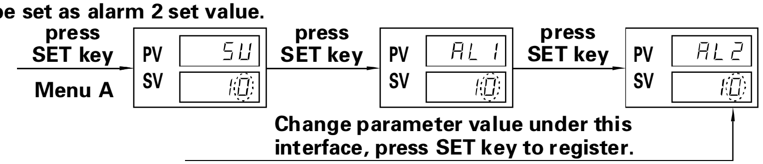
2) Setting alarm 1 set value (parameter AL1)

If the instrument has no alarm output, jump directly to part 6 on the next page. Otherwise the parameter will be set as alarm 1 set value.



3) Setting alarm 2 set value (parameter AL1)

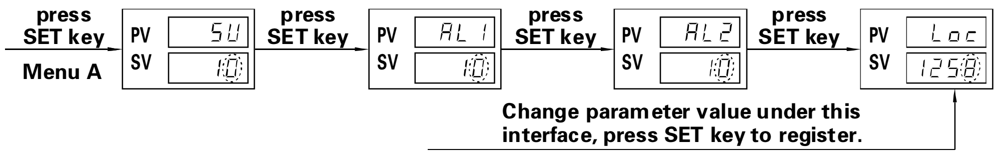
If the instrument has only one way alarm output, jump directly to part 6 on the next page. Otherwise the parameter will be set as alarm 2 set value.



6. Finishing the setting

If you select PID tuning mode, in the first running on power up when the settings and system wiring has been completed, remember to launch the self-tuning by pressing down key for 2s. The system will enter on-off control during self-tuning process in which the process value will oscillate. After 1.5 oscillation periods, the self-tuning will be completed and the instrument will automatically calculate and save P, I, D parameters applicable for the system. The duration of self-tuning process, ranging from several seconds to several hours, depends on the system instead of the instrument.

In some cases, the parameter setting is changed by accident; the self-tuning is repeatedly started by misoperation; or the manual control mode is selected by misoperation when there is no need to launch it. The parameter modification level and keypad control feature (parameter LOC) can be set to any large number but 0 and 810 to avoid such unintentional misoperation.



Note: The self-tuning capability of XMT-8000 series instrument features high precision to meet the operation requirements of over 90% users. But in some special applications, the self-tuned parameter may not be the best value due to complexity of objects controlled. Parameter P, I, D after the self-tuning process sometimes needs manual adjustment according to experience listed below:

A. The overshoot is too large before reaching a stable state as for this condition, if there is no strict requirement on the time to reach stable state, the proportional band can be extended to deal with overshoot.

B. If a small amount of overshoot is allowable, the proportional band can be decreased to shorten the time to reach stable state.

C. In case the process value fluctuates slowly around the set value, try to extend the integral time or increase the proportional band.

D. In case the process value fluctuates frequently around the set value, try to shorten the integral time or increase the proportional band.

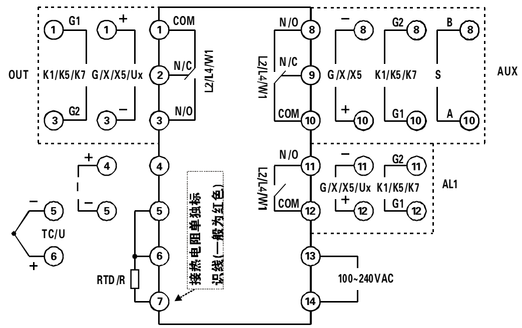
E. For some devices, the self-tuned P value under cold state and the one under hot state are quite different. In this case, the larger of them applies. If persistent oscillation occurs in the system with self-tuned PID parameters, doubling the P value by hand will provide a solution.

Chapter 7. Instrument wiring

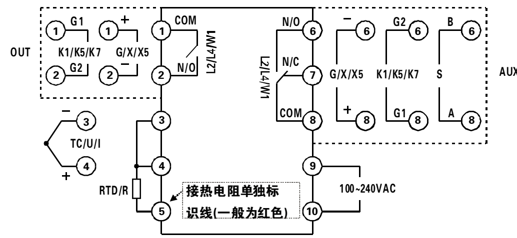
Description of symbols in the wiring diagram (see Chapter 3: technical parameter for detailed information):

L2/L4: relay contact switch
X: direct current output
Ux: feeding voltage output
K1: single-phase thyristor zero-crossing trigger signal output
S: RS485 communication interface
I: direct current input
TC: thermocouple input
G: solid-state relay driving voltage output
X5: direct voltage output
W1: non-contacting thyristor switch output
K5/K7: single-phase thyristor phase-shifting trigger signal output
U: direct voltage input
RTD/R: RTD or resistance input

Wiring Diagram,AOB808-D series

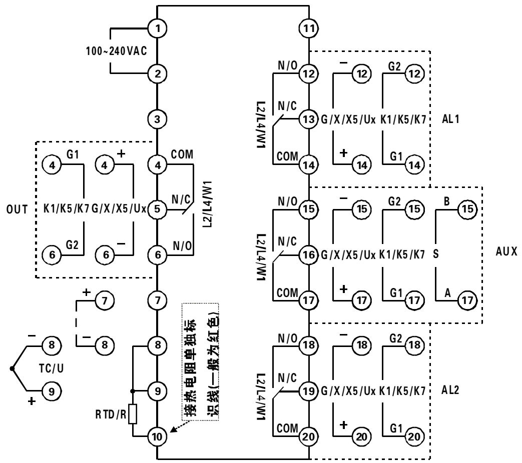


Wiring Diagram,AOB808-G series

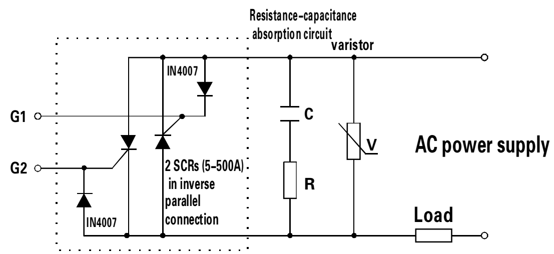


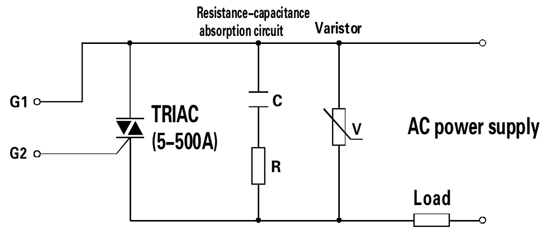
Note: 1) For XMTG-8000 series, L4 modules cannot be installed simultaneously at OUT and AUX.
2) The JP1 connector pin inside XMTG-8000 series must be preset for direct current signal input. When pin 1 and pin 2 of JP1 connector pin are connected with each other, the instrument only supports direct current signal input of 0-10mA, 0-20mA and 4-20mA. When pin 1 is disconnected from pin 2 (factory default setting), the instrument will accept any signal input except direct current signal input.

Wiring Diagram, AOB808-A/E/F/H/S series



Wiring diagram of thyristor trigger output





Note: The three-phase thyristor phase-shifting trigger must employ three-phase four-wire system. In order to protect thyristor, varistor should be selected according the voltage and current of the load. The thyristor power module (the part enclosed by doted line in the diagram) is highly recommended for applying thyristor. The resistance-capacitance absorption is necessary in the case of inductive load or phase-shifting trigger.

Chapter 8. Communication Protocol

AOB808 intelligent industrial regulator supports standard RS485 communication interface and MODBUS_RTU communication protocol.

1. Communication format

The instruction code and data are represented in hexadecimal system and transmitted in a master/slave asynchronous way. Each message consists of 1 start bit (0), 8 data bits and 2 stop bits (1).

Address code	Function code	Start address of the data	high 8 bits of the data	Low 8 bits of the data	low 8 bits of CRC	high 8 bits of CRC

2. Transmission process of communication message

The master device sends communication instructions to the slave device which has the same address as the address code of master device. After successful CRC verification without error, the corresponding operation will be conducted and the result (data), including address code, function code, data after execution and CRC verification code, is returned to the master device. In case of CRC verification failure, no message would be returned; in case of function code error, the highest bit (1) of the function code will be returned.

1) Address code

Address code (0–127) is the first byte of each communication message frame. Each slave device must have a unique address code. Only the slave device which has identical address with the address code of the master device can respond and send back message, which contains the same address code as that sent by the master device.

2) Function code

Function code is the second byte of each communication message frame. The master device tells the slave device what to do by means of function code. When the slave device responds with returned function code identical to that sent by the master device, it can be confirmed that the slave device has performed the related operation in responding to the master device. XMT–8000 series instrument supports two function codes:

03: Reading data from the register 06: Writing data to the register

3) Data sector

Data sector occupies the 3rd to the 5th byte of each communication message frame. It is composed of start address of data and data content.

Through communication instructions (function codes of 03 or 06), the master device could deliberately read or change the register data of XMT-8000 series instrument.

4) 16-bit CRC verification code

With the verification code, the master or slave device can check if it has received the right message. Errors may occur during the transmission process of message, due to electronic noise or some other disturbance. The verification code can be used to check whether the communication message in master/slave transmission has errors or not.

The 16-bit CRC verification code, placed at the end of the message frame being delivered, is calculated by the device which sends the message. The message-receiving device will recalculate CRC of the received message to compare with the received CRC. CRC inconsistency indicates errors.

Only 8 data bits are involved in CRC calculation, with the exclusion of start bit and end bit.

Algorithm of CRC code:

1) Presetting a 16-bit register to hex FFFF (namely 1 for all bits in binary system). The register is called CRC register;

2) XORing the first 8-bit binary data (the first byte of the communication message frame) with the low 8-bit of 16-bit CRC register, then storing the result in
CRC register;

3) Right-shifting the register data by one bit (towards lower bit) and filling the highest bit with 0, then checking the shift-out bit;

4) If the shift-out bit is 0, repeat step 3 (right-shifting one more bit);

If the shift-out bit is1, XOR the CRC register data with polynomial A001 (1010 0000 0000 0001);

5) Repeating step 3 and step 4 until all of the 8-bit data have been processed after 8 right-shift operations;

6) Repeating step 2 to step 5 to process the next byte of the communication message frame;

7) When calculation procedures of the first 5 bytes in the communication message frame are completed, the 16-bit CRC verification code will be generated in the 16-bit CRC register.

3. Brief introduction to function code

1) Function code 03: reading data from the register

For example, assuming the master device is going to read the register data starting at 40H from the slave device with address of 01H, the master device will send:

Message sent from master device	Number of byte	Data content	Note
Slave device address	1	01H	
Function code	1	03H	
Start address	1	40H	
Empty data	2	0000H	
CRC code	2	1850H	CRC calculated by the master device according to the first 5 bytes

If register 40H and 41H of the slave device store 01H and F4H respectively, then the slave device will return:

Message returned from master device	Number of byte	Data content	Note
Slave device address	1	01H	
Function code	1	03H	
Start address	1	40H	
Data read out from register	2	01F4H	
CRC code	2	1847H	CRC calculated by the slave device according to the first 5 bytes

2) Function code 06: writing data to the register

For example, assuming the master device is going to save 03E8H to the register starting at 40H of the slave device with address of 01H, the master device will send:

Message sent from master device	Number of byte	Data content	Note
Slave device address	1	01H	
Function code	1	06H	
Start address	1	40H	
Data written to register	2	03E8H	
CRC code	2	1822H	CRC calculated by the master device according to the first 5 bytes

The slave device will return:

Message returned from master device	Number of byte	Data content	Note
Slave device address	1	01H	
Function code	1	06H	
Start address	1	40H	
Data written to register	2	03E8H	
CRC code	2	1822H	CRC calculated by the slave device according to the first 5 bytes

4. Address definition of the data register

Parameter Address	Parameter Code	Parameter Name	Note
1CH		Control output, high 8 bits	With one digit after decimal point; read–only register
1DH		Control output, low 8 bits	
2FH	SF	Overshoot suppression coefficient	With two digits after decimal point
30H	CFt	Thermocouple cold junction compensation type	
31H	Sn	Input specification	
32H	dP	Decimal point position	
33H	FiLt	Input digital filtering	
34H	CtrL	Control mode	
35H	AL1t	Alarm type 1	
36H	AL2t	Alarm type 2	
37H	Addr	Communication address	
38H	bAud	Communication baud rate	
39H	t	Output period	

Parameter Address	Parameter Code	Parameter Name	Note
3AH	Pout	Definition of OUT output module	
3BH	PAL1	Definition of AL1 output module	
3CH	PAL2	Definition of AL2 output module	
3DH	PAUX	Definition of AUX output module	
3EH	FdP	Segmented power limiting point	
3FH		Self-tuning switch	00H: off, 01H: on
40H	SV	primary control setting value, high 8 bits	The decimal point position will be specified by parameter DP
41H		primary control setting value, low 8 bits	
42H	AL1	Setting value of alarm 1, high 8 bits	The decimal point position will be specified by parameter DP
43H		Setting value of alarm 1, low 8 bits	
44H	AL2	Setting value of alarm 2, high 8 bits	The decimal point position will be specified by parameter DP
45H		Setting value of alarm 2, low 8 bits	
46H	Loc	Parameter modification level and keypad control, high 8 bits	
47H		Parameter modification level and keypad control, low 8 bits	

Parameter Address	Parameter Code	Parameter Name	Note
48H	inPL	Lower limit of measuring range, high 8 bits	The decimal point position will be specified by parameter DP
49H		Lower limit of measuring range, low 8 bits	
4AH	inPH	Higher limit of measuring range, high 8 bits	The decimal point position will be specified by parameter DP
4BH		Higher limit of measuring range, low 8 bits	
4CH	ScL	Correction of lower limit process value, high 8 bits	The decimal point position will be specified by parameter DP
4DH		Correction of lower limit process value, low 8 bits	
4EH	ScH	Correction of higher limit process value, high 8 bits	The decimal point position will be specified by parameter DP
4FH		Correction of higher limit process value, low 8 bits	
50H	dFct	Differential gap of on–off control, high 8 bits	One digit after decimal point will be included for thermocouple or RTD input. The decimal point position will be specified by parameter DP for other input types.
51H		Differential gap of on–off control, low 8 bits	
52H	oPL	Output lower limiting, high 8 bits	With one digit after decimal point
53H		Output lower limiting, low 8 bits	
54H	oPH	Output higher limiting, high 8 bits	With one digit after decimal point
55H		Output higher limiting, low 8 bits	
56H	dFAL	Alarm differential gap, high 8 bits	The decimal point position will be specified by parameter DP
57H		Alarm differential gap, low 8 bits	

Parameter Address	Parameter Code	Parameter Name	Note
58H	P	Proportional band, high 8 bits	With one digit after decimal point
59H		Proportional band, low 8 bits	
5AH	I	Integral time, high 8 bits	
5BH		Integral time, low 8 bits	
5CH	d	Derivative time, high 8 bits	With one digit after decimal point
5DH		Derivative time, low 8 bits	
7CH		Process value, high 8 bits	The decimal point position will be specified by parameter DP; Read-only register
7DH		Process value, low 8 bits	

Note: 1) The number after "="of the parameter option in the description column in Chapter 6 is expressed in decimal system for parameter value in RS485 communication.

2) The current alarm and control output state can be read from 25H register (read-only).

25H.4=1 on-off control output action

25H.5=1 alarm 1 output action

25H.6=1 alarm 2 output action

3) Registers within 00H-FFH are accessible for reading. Writing operation on undefined or read-only register will not be executed. If a single byte parameter requires alteration, the start address should be the parameter address and the parameter value to be written should be placed at high 8 bits of the data sector (or low 8 bits). If a double bytes parameter requires alteration, the start address should be the high 8 bits of the parameter address, and the parameter value to be written should be placed at high 8 bits and low 8 bits of the data sector.

Chapter 9. Troubleshooting

Serial code	Problem	PV display	SV display	Control output and indicator lamp	Alarm 1	Alarm 2
1	The input value is too small	LLLL	SV value	Closed	In normal operation	In normal operation
2	The input value is too large	HHHH	SV value	Closed	In normal operation	In normal operation
3	Control output communication error	PV value	oPEr	Closed	In normal operation	In normal operation
4	Transmitting output communication error	PV value	bSEr	Closed	In normal operation	In normal operation
5	EEPROM read-write error	EEEr	Closed	Closed	Operation stopped	Operation stopped
6	A/D conversion error	AdEr	Closed	Closed	Operation stopped	Operation stopped
7	Thermocouple cold junction compensation error	ntEr	Closed	Closed	Operation stopped	Operation stopped

1. In case of problem 1 and problem 2, check if the input specification parameter SN is consistent with the sensor applied. If they are compatible, please check if the sensor wiring is correct and if the sensor output signal is in normal state. Otherwise change parameter SN to match with the sensor.
2. In case of problem 3 and problem 4, check if the type of module installed at OUT, AL1, AL2 and AUX are consistent with parameter POUT, PAL1, PAL2 and PAUX. If they are not compatible, adjust the corresponding parameter. Otherwise change the output module.
3. In case of problem 5, 6 and 7, the instrument can only be sent back to the factory for troubleshooting.
4. If the parameter value can not be changed after entering parameter setting block by pressing down SET key for 2s, check if parameter LOC is 0. If it is not, setting the parameter to 0 will work.
5. Unable to enter Menu B: Menu B is only accessible when parameter LOC is set to 810.
6. Unable to enter the self-tuning block by pressing down ◀ key for 2s: check if PID control mode is set for parameter CTRL. If PID control mode is not selected, the condition is normal; if it is selected, check if parameter LOC is 0. If it is not the case, setting the parameter to 0 will work.
7. Unable to enter the manual control block by pressing down ◀ key for 2s: check if PID control mode is set for parameter CTRL. If PID control mode is not selected, the condition is normal; if it is selected, check if parameter LOC is 0. If it is not the case, setting the parameter to 0 will work.
8. Flashing display of the process value: when the process value goes beyond the measuring range of the instrument but still within the allowable measuring range of current input graduation mark, it is normal that PV display flashes at interval of 0.5s.

Chapter 10. Transportation and Storage

The transportation and storage of the instrument should comply with GB/T 15464–1995 (General–purpose specification for the packaging of instrumentation products).

Chapter 11. Maintenance

Metrological verification should be conducted annually for the instrument. If the instrument goes beyond error limit, which often results from a damper environment, dust or corrosive gas, the inner part of the instrument should be cleaned and dried. In case the accuracy can not be restored by cleaning and drying, the instrument should be sent back as faulted product to the factory for troubleshooting.

The instrument is guaranteed of 18–month free maintenance after the date when product leaves the factory.

For product damaged by misuse or product with expired warranty, the maintenance will require some charge.

Dear customer:

We would like you to do us a favor in order to protect our environment. Please process the product or the part material for reuse. For those non–recyclable, please make appropriate arrangement. Thanks for your cooperation and support.

Please keep the manual for future use

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