Quick Operation Guide for AI Artificial Intelligence Industrial Regulator

（Suitable for precise control of temperature, pressure, flow, liquid level, humidity）

（V9.1）

Precautions

1.Those who use this product must have sufficient knowledge of electrical systems and ensure that this product will not be used in situations where there is danger to people and property.
2.The content of this guide is for reference only. Depending on the product model and version, part of the functions for some models or versions have been described in this guide while other functions are not introduced. If you have any questions, please go to our official website www.yudian.com to download the PDF file of the latest version of the complete manual.
3.Before using this product for the first time, please carefully read the complete manual of this product to ensure correct use.
4.The company's liability for the product is limited to the product itself, and is not responsible for any other direct or indirect losses or liabilities.

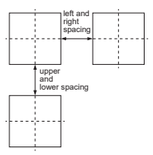
1. Technical Specifications

● Input specifications (one instrument can be compatible):
Thermocouples: K, S, R, E, J, T, B, N, WRe3-WRe25, WRe5-WRe26, etc.
Thermal resistance: Cu50, Pt100, Ni120
Linear voltage: 0~5V, 1~5V, 0~1V, 0~100mV, 0~20mV, -5~+5V, -20mV~+20mV, etc
Linear current (requires external shunt resistor or I4 module installed): 0~10mA, 0~20mA, 4~20mA, etc.
Extended Specifications: On the basis of retaining the above input specifications, users are allowed to customize an additional input specification.
● Measurement range:
K(-50~+1300 ℃), S(-50~+1700 ℃), R(-50~+1700 ℃), T(-200~+350 ℃), E(0~800℃), J(0~1000℃), B(200~1800℃), N(0~1300℃), WRe3-WRe25(0~2300℃), WRe5-WRe26 (0~2300℃), Cu50(-50~+150℃), Pt100(-200~+800℃), Pt100(-80.00~+300.00℃)
Linear input: -9990~+32000 defined by user
● Measurement accuracy (depending on the model):
Class 0.05~0.1/0.1/0.15/0.2/0.25/0.3 (Note:The thermocouple input should be compensated with an external Cu50 copper resistor, and an additional ±1℃ compensation error will be added during internal compensation;)
● Measurement temperature drift: ≤ 25PPm/℃ (level 0.05~0.1); ≤ 50PPm/℃ (level 0.1~0.15); ≤ 100PPm/℃ (level 0.2~0.3)
● Control period: 0.1~300.0 seconds adjustable
● Regulating method: on-off, AI artificial intelligent, standard PID , cascade
● Output specifications (modular):
Relay output: 250VAC/2A or 30VDC/2A; modules available: L1, L2, L4, L5, etc.
SCR non-contact switch output: 100~240VAC/0.2A (continuous), 2A (20mS momentary, 5S repetition period); modules used: W1, W2, W5, etc.
SSR voltage output: 12VDC/30mA; modules available: G, G5, etc.
Triac trigger output: triggering 5~500A bidirectional thyristor, 2 unidirectional thyristors connected in anti-parallel or thyristor power module; modules available: K1, K3, K50, K60, etc.
Linear current output: 0~20mA or 4~20mA can be defined (maximum output voltage of energy-saving module ≥ 5.5V; high-voltage type output voltage ≥ 10.5V); modules available: X3, X5, etc.
● Alarm : upper limit, lower limit, upper limit deviation, lower limit deviation, Up to 4 channels of alarms can be output, with power-on exemption alarm selection function; modules available : L0, L3, etc.
● Communication : RS485, RS232, MODBUS-TCP ; modules available: S, S1, S4, S6, R, etc.
● Retransmission: measured value transmission, set value transmission; modules available (OUTP or COMM port): X3, X5, etc.
● Electromagnetic compatibility: IEC61000-4-4 (electrical fast transient burst) ±6KV/5KHz, IEC61000-4-5 (surge) 6KV and there will not appear crash and the I/O port malfunctions under 10V/m high-frequency electromagnetic field interference, in addition, the fluctuation of the measured value does not exceed ±5% of the range
● Isolation withstand voltage: the voltage between power supply terminal, relay contact and signal terminal is ≥ 2300V; weak current signal terminals isolated from each other are ≥ 600V
● Power supply: 100~240VAC or DC, -15%, +10% / 50~60Hz; or 24VDC/AC, -15%, +10%
● Power consumption: ≤ 0.3W (including CPU, measurement, display and communication, excluding any output or external power consumption)
● Operating environment: temperature -10~60℃ ; humidity ≤ 90%RH

2. Installation Method

2.1 Panel-mounted Instrument

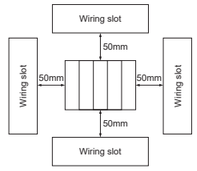
① The spaces among panel cut-out should be set at an appropriate distance according to different sizes and mounting brackets. If it is necessary, the instruments are allowed to be installed side by side closely. It is recommended that the left and right spacing of A/D/D61/C/E size is ≥ 8mm, and the upper and lower spacing is ≥ 30mm; the left and right spacing of B/F size is ≥ 30mm, and the upper and lower spacing is ≥ 8mm.



② Insert the instrument into the panel cut-out, and press the mounting bracket from the opening side of the case to temporarily fix the main body.
③ When tightening the mounting bracket and terminal wiring, please set the tightening torque to 0.39~0.58N·m.

2.2 Rail-mounted Instrument

① Mount the module on a 35mm DIN rail.
② The rail module must be installed vertically, and the recommended distance is at least 50mm.
③ The tightening torque to 0.39 ~ 0.58N·m.during wiring.



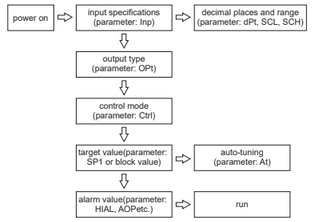
3. Panel Description

① The upper display window displays the measured value PV, parameter title, etc.
② The middle display window displays the set value SV, alarm code, parameter value, etc.
③ The lower display window displays the output percentage MV. When there is feedback signal position proportional output, it displays the valve feedback value.
④ Setting key is used to enter parameter setting state and confirm parameter modification.
⑤ Data shift (also fixed-point control operation)
⑥ Data reduction key (also run/pause operation)
⑦ Data increase key (also stop operation)
⑧ When 10 LED indicators and the MAN indicator is on, it means it is in the manual output state; when the PRG indicator is on, it means the program is running, and the flashing means it is in the waiting function state; while MIO, OP1, OP2, AL1, AL2, AU1, AU2 lights respectively correspond to the input and output actions of the corresponding position module; and COM light flashes to indicate that it is communicating with the host computer.

Note: Some panels do not have the third row display window (lower display window)

4. Typical Setting Process and Common Parameters

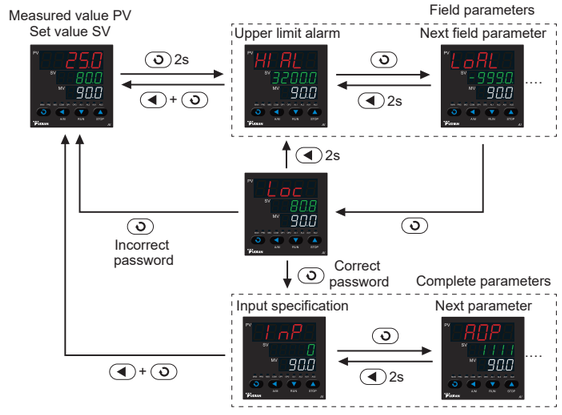
① Please refer to the complete parameter table for the description of the parameters in the figure. For other functions, please refer to the description of common functions.
② The input range does not need to be set when the thermocouple or thermal resistance is selected for the input specification, and the range is only set when the analog signal is input or the retransmission function is required.
③ Auto-tuning is only required when APID or nPID is selected as the control mode. It must be performed when the equipment can work normally.
④ After the setting, if the instrument is in the stop or pause state, it needs to run manually or execute the running command from the host computer.



5. Operation Process Flow

5.1 Parameter setting process Flow

The parameters are divided into two parts: field parameters and complete parameters, the complete parameter table can be entered after the LOC is set to the correct password (808 by default).



5.2 Auto-tuning Process Flow

If the control mode Ctrl adopts APID or nPID mode, the PID parameters can be determined by auto-tuning. When the measured value PV is room temperature, please set the set value SV (parameter SP1) to about 60% of the commonly set temperature (for signals such as pressure or flow, it can be directly set to the commonly used set value), Pressand hold ◁ for two seconds to call out the At parameter(if At=FOFF, the tuning cannot be started quickly, to modify the At value to start the tuning can be achieved by entering the complete parameter to change At value), then change the parameter value from OFF to on and click ↻ to start the auto-tuning, When the auto-tuning At symbol does not flash automatically, the instrument can work normally.

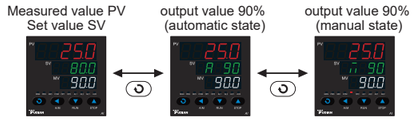
Rapid auto-tuning function AAT: press and hold ◁ for two seconds, the At parameter will appear, press △ to change the OFF of the lower display window to AAt, and press ↻ to confirm, then the instrument will automatically start the AAT advanced rapid parameter auto-tuning function, and the PID parameters can be preset without the need for traditional periodic oscillation auto-tuning when the instrument is in full power heating output state after power-on. In most cases, accurate control can be achieved after heating for the first time; if the instrument exits the full power output state before the AAt is automatically completed, then the AAT fails; terminating rapid auto-tuning will not lead to the modification of the PID parameters; next time when the instrument is in full power heating output state, the AAT function will be activated again. When AAT is rapidly auto-tuning, the lower display of the instrument will flash and display "AAt". When the auto-tuning is done, , the At parameter will automatically returns to OFF.

5.3 Run / Stop Switching Process Flow

For those parameters Pno ≥ 1 or Pno=0 and Srun=StoP/run, the panel keys can quickly switch the stop or running state of the instrument.

5.4 Manual / Automatic Control Switching Process

When the instrument with manual automatic control function with the A-M parameter set as MAn/Auto mode, it can be switched to manual or automatic output state through the panel.

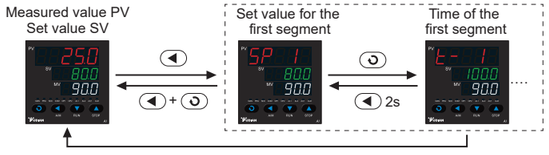


5.5 Segment Running Status Viewing Process Flow

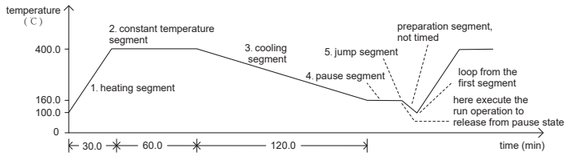
When the parameter Pno of the program segment number is ≥ 1, program segment number currently running , the set time of the current segment, and the running time of the current segment can be viewed through the panel keys.

5.6 Segment Setting Process Flow

When the parameter Pno of program segment number of the instrument is ≥ 1 (the number of program segments varies with models up to 50 segments), users can program the instrument to change the set value rising and falling at different slope; with programmable/operable commands such as jump, run, pause and stop, The program can be modified during program control operation; with power failure processing mode, measurement value start function and preparation function, to compete and increase efficiency of program execution.



Program segment setting example: The format of temperature – time – temperature is uniformly used in program programming, which is defined as setting the temperature from the current segment, and reaching the next temperature after the time set in this segment.
SP 1=100.0t 1=30.0; from 100 ° C, the temperature rises linearly to SP 2, the heating time is 30 minutes, and the heating slope is 10 ° C/min.
SP 2=400.0t 2=60.0; hold at 400 ° C for 60 minutes.
SP 3=400.0t 3=120.0; cooling to SP 4, cooling time is 120 minutes, cooling slope is 2℃ / min.
SP 4=160.0t 4=0.0; after cooling to 160 ° C, it enters the pause state, and it needs to execute the run to continue to run the next stage.
SP 5=160.0t 5=-1.0; jump to the first segment to execute, and start the cycle from the beginning.



6. Complete parameter table

6.1 Parameter lock Loc

The parameter lock Loc can provide a variety of different parameter operation privileges and password input operation to enter the complete parameter table, and its functions are as follows:
Loc=0, Allowed to modify the field parameters and allowed to directly modify the set value in the basic display state;
Loc=1, Forbidden to modify the field parameters, but allowed to directly modify the given value in the basic display state;
Loc=2~3, Allowed to modify the field parameters but forbidden to directly modify the set value in the basic display state;
Loc=4~255, Forbidden to modify any parameters other than Loc and all shortcut operations .

6.2 Complete Parameter Table

The complete parameter table is divided into 8 blocks, including alarm, adjustment control, input, output, communication, system function, set value/program and field parameter definition. Please note that there are differences in the parameter sequence and number of parameters for different models. Please follow the corresponding parameters displayed on the actual purchased instrument. The specific parameters are as follows:

Para-meters	Meaning	Description	Range
Addr Addr	Commu-nication address	The Addr parameter is used to define the communication address of the instrument, the valid range is 0~80. Instruments on the same communication line should set a different Addr value to distinguish them from each other.	0-80

bAud bAud	Baud rate	The bAud parameter defines the communication baud rate, and the definable range is 0~28800bit/s (28.8K). When the COM position is not used for the communication function, the bAud parameter can be set to use the COM port as other functions:
		bAud=1, as an external digital input, the function is the same as the MIO position, when the MIO position is occupied, the I2 module can be installed in the COMM position.
		bAud=3, use COMM port as 0~20mA measurement value retransmission;
		bAud=4, use COMM port as 4~20mA measurement value retransmission;
		bAud=8, use COMM port as 0~20mA set value retransmission;
		bAud=12, use COMM port as 4~20mA set value retransmission;
			0~28.8K

AFC AFC	Commu-nication mode	The AFC parameter is used to select the communication mode, and its calculation method is as follows: AFC=A × 1+D × 8 A=0: Standard MODBUS; A=1: t AIBUS; A=2: MODBUS compatible mode; A=4, S6 module compatible communication mode. D=0: no parity; D=1, even parity. Note: When AFC is set to MODBUS protocol, 03H (read parameters and data) and 06H (write single parameter). Among them, when AFC=0, 4, the 03H instruction can read up to 20 words of data at a time; when AFC=2, the 03H instruction read data is fixed to 4 words. For details, please refer to the description of individual the communication protocol document .	0~12
InP InP	Input specifi-cation code	InP is used to select the input specification, and the input specification corresponding to its value is as follows: 0 K 21 Pt100 1 S 22 Pt100 (-80.00~+300.00℃) 2 R 25 0~75mV voltage input 3 T 26 0~80 ohm resistance input 4 E 27 0~400 ohm resistance input 5 J 28 0~20mV voltage input 6 B 29 0~100mV voltage input 7 N 30 0~60mV voltage input 8 WRe3-WRe25 31 0~1V voltage input 9 WRe5-WRe26 32 0.2~1V voltage input 10 User-specified extended input specification 33 1~5V voltage input 12 F2 Radiation Pyrometer 34 0~5V voltage input 15 MIO input 1 (4~20mA when I4 is installed) 35 -20~+20mV voltage input 16 MIO input 2 (0~20mA when I4 is installed) 36 -100~+100mV voltage input 17 K (0~300.00℃) 37 -5V~+5V voltage input 18 J (0~300.00℃) 39 20~100mV voltage input 19 Ni120 43 T(0~300.00℃) 20 Cu50 While InP=10, the non-linear table can be self-defined or input by factory under a paid service.	0~43
AOP AOP	Alarm output definition	The 4-digit ones, tens, hundreds and thousands of AOP are used to define the output positions of 4 alarms such as HIAL, LoAL, HdAl and LdAL, as follows: AOP = 3 (LdAL) 3 (HdAL) 0 (LoAL) 1 (HIAL) ; The value range is 0-4. 0 means that there is alarm output allocated to any port. any port, 1, 2, 3, 4 means that the alarm is output by AL1, AL2, AU1, AU2 respectively. Note 1: When AUX is used as auxiliary output in the two-way regulation system, the output of alarm designated AU1 and AU2 is invalid. Note 2: If AL2 or AU2 is required, the L3 dual relay module can be installed in the ALM or AUX slot.	0~4444
OPt OPt	Output type	SSr : SSR driving voltage or thyristor zero-crossing trigger time proportional signal. rELy: relay contact switch. 0-20, 0~20mA linear current output. 4-20, 4~20mA linear current output. PHA1: thyristor single-phase phase-shift trigger output. In this setting state, AUX cannot be used as the cold output . nFEd:position proportional output without feedback signal, directly controlling the forward/reverse rotation of the valve motor, The valve travel time is defined by the Strt parameter. FEd: position proportional output with feedback signal, the valve travel time should be more than 10 seconds. The feedback signal is input from the 0~5V/1~5V input terminal of the instrument. *Note: The external reference function can no longer be used in this output mode.* FEAt: auto-tuning valve position. The instrument will first close the valve and record the feedback signal in the SPSL parameter, then fully open the valve to memorize the control mode of the valve feedback signal in SPSH parameter d. SSr4: 4 solid-state relay synchronous outputs.	

At AtE	Auto-tuning	OFF,: the auto-tuning At function disabled. on: start the PID and Ctl parameter auto-tuning function, This parameter value will automatically turn to FOFF when the auto-tuning is completed. FOFF:auto-tuning function disabled start the auto-tuning from the panel operation. AAt: fast auto-tuning This value will turn to OFF when the auto-tuning is completed.	
A-M A-M	Automatic/ manual control selection	MAn: manual control, the output magnitude of OUTP is adjusted manually by the operator. Auto: automatic control , The output of OUTP is calculated according to the control method set in CtrL parameter. FSv: compatible to the hands-free automatic mode. It is forbidden to enter the manual automatic switching interface. FAut: fixed in the automatic control mode. This mode prohibits switching from the direct key operation on the front panel to the manual state.	
Srun Srun	Running status	run:Regulating is active and running. PRG light is on. StoP:Regulating and program is stopped. Lower display flashes "StoP". PRG light is off. HoLd: "run" state is maintained. If the instrument is set as program controlling (Pno>0). The run time will be suspended, The lower display flashes "HoLd" PRG light flashes.The instrument will continue to control the output.	
Pno Pno	Segment number	Used to define the number of valid segments. The instrument is in constant temperature mode; 1:a single-segment program mode. By providing a set value and a hold time, the instrument will enter to the stop state when the hold is reached, 2~50: working as a programmable controller.	0~50
PonP PonP	Power-on auto-running mode	Cont: if it is in the stop state before the power failure, it will continue to stop otherwise it will continue to execute at the original termination point after the instrument is powered on. StoP: no matter what happens after the power is turned on, the instrument will enter the stop state. run1:if it is in the stop state before the power failure, it will continue to stop otherwise the program will automatically start from the first segment after the power is turned on. dASt: after power- is turned on, if there is no deviation alarm, the program will continue to execute, and if there is a deviation alarm, it will stop running. HoLd (only when Pno ≥ 1), the instrument is powered off during operation it will enter the pause state . However, if the instrument is in the stopped state before the power failure, it will remain in the stopped state after the power is turned on.	
Et Et	Event input type *(I2 module installed in MIO or COMM position)*	nonE: event input function disabled. ruSt: run/stop function, Short-connecting MIO for a short time will activate running control (run), Keep connecting for more than 2 seconds, the instrument will stop the control (StoP). SP1.2: In fixed-point control (Pno=0), set value SV=SP1 when MIO is open. SV=SP2 when MIO is closed. Pld2: Switching first group of PID and second group PID parameters. In single direction control (not heating and cooling bi-directional control), P, I, d and Ctl are used for regulating when MIO is open. P2, I2, d2 and Ctl2 are used instead when MIO is closed. EAct: external switch toggles heating/cooling control functions. When the MIO is open, the parameters P, I, d and Ctl are used for heating regulation, . When the MIO is closed, the parameters P2, I2, d2 and Ctl2 are switched to be used for cooling regulation. Erun: for external switch to switch run/stop. The instrument stops when MIO is open. The instrument runs MIO is closed. Eman: for external switch to switch manual/automatic. When MIO is open, the instrument is in the automatic state,When MIO is closed, the instrument is in the manual state.	
CtrL CtrL	Control method	OnoF: on-off control, for situation not requiring high precision. APID: an advanced artificial intelligence PID control, is recommended. nPID: the standard PID adjustment algorithm, with anti-windup integral function. PoP: direct PV retransmission, working as a temperature re-transmitter. SoP: direct SV retransmission, working as a program generator.	
OPL OPL	Output low limit	0~100%: OPL is the minimum output of OUTP in single directional control system. -1~-110%: The instrument works for a bidirectional system, and has heating/refrigerating dual output.	-110~ +110%
OPH OPH	Output upper limit	OPL limits the maximum of OUTP (main output) when PV<OEF. OPH should be greater than OPL	0~110%
Aut Aut	Cooling output type	Define AUX only when AUX is used as auxiliary output in heating/cooling bidirectional system. SSr, output SSR driving voltage or thyristor zero-crossing trigger signal. rELy, the output is a relay contact . 0-20, 0~20mA linear current output. 4-20, 4~20mA linear current output. Note: If the heating or cooling output signal is 4-20mA, when one has output, the other output signal be to zero, and the output is 0mA instead of 4mA.	
CHYS CHYS	Control hysteresis (dead zone, hyster-esis)	It is used to avoid frequent action of control of relay. For a reverse acting (heating) system, when PV > SV, output turns off; when PV<SVCHYS, output turns on. For a direct acting (cooling) system, when PV<SV, output turns off; when PV>SV+CHYS, output turns on.	0~2000 unit

Act AcE	Acting method	rE: Reverse acting. Increase in measured variable causes a decrease in the output, such as heating control. dr: Direct acting. Increase in measured variable causes an increase in the output, such as refrigerating control. rEbA: Reverse acting with low limit alarm and deviation low alarm blocking at the beginning of power on. drbA: Direct acting with high limit alarm and deviation high alarm blocking at the beginning of power on.	
P P	Propor-tional bands	To define the proportional band for APID and PID control,Instead of percentage of the measurement range, the unit is the same as PV.	1~32000 unit
I I	Integral time	To define the integral time of PID adjustment, the unit is second, No integral effect when I=0	0~9999 s
d d	Differential time	To define the differential time of PID adjustment, the unit is 0.1 seconds, No derivative effect when d=0.	0~3200 s
Ctl CtI	Control period	For SSR, thyristor or linear current output, it is generally 0.5 to 3 seconds. For Relay output or in a heating/refrigerating dual output control system, generally 15 to 40 seconds, because small value will cause the frequent on-off action of mechanical switch or frequent heating/refrigerating switch, and shorten its service life. Ctl is recommended to be 1/5 – 1/10 of derivative time. (It should be integer times of 0.5 second.)	0.2~ 300.0s
P2 P2	Propor-tional band for cold output	To define the cold output proportional band for APID and PID regulation, Instead of percentage of the measurement range, the unit is the same as PV.	1~32000 unit
I2 I2	Integral time of cold output	To define the integral time of cold output PID adjustment, the unit is second, No integral effect when I=0.	0~9999 s
d2 d2	Differential time of cold output	To define the differential time for cold output PID tuning, in units of 0.1 seconds. No derivative effect when d=0.	0~3200 s
Ctl2 CtI 2	Cold output period	Same description and function as parameter as **"Ctl"**	0.2~ 300.0s
dPt dPt	Display Resolution	Four formats (0, 0.0, 0.00, 0.000) are selectable. It is generally recommended to select 0 or 0.0 for thermocouple .	
Scb Scb	Input Shift Adjustment	Scb is used to shift input to compensate the error caused by transducer, input signal, or auto cold junction compensation of thermocouple.	-9990~ +4000unit
SCL SCL	Signal scale low limit	Define scale low limit of input. It is also the low limit of transmitter output (CtrL=POP or SOP) and light bar display.	-9990~ +32000 unit
SCH SCH	Signal scale high limit	Define scale high limit of input. It is also the high limit of retransmission output (CtrL=POP or SOP) and light bar display.	
FILt FI LE	PV input filter	FILt determines the digital filtering strength. The larger the setting, the stronger the filtering, but the slower the response speed of the measured data.	0~40
Fru Fru	Selection of power frequency and temper-ature scale	50C: 50Hz,display ℃ . 50F: 50Hz, display ℉ 60C: 60Hz, display ℃ 60F: 60Hz, display ℉	
SPSL SPSL	Lower limit of the external given scale	Define the lower limit of the external given input signal scale; Define the lower limit of the valve position feedback signal, which can be automatically adjusted by the valve auto-tuning function.	-9990~ +32000 unit
SPSH SPSH	Upper limit of the external given scale	Define the upper limit of the scale of the external given input signal; Define the upper limit of the valve position feedback signal, which can be determined by the valve self-tuning function. Warning: the values after valve position auto-tuning are for display reference only, unless professionals, otherwise, do not modify SPSH and SPSL parameters.	
AF AF	Advanced function code	Below is used to select advanced functions and is calculated as felow: AF=A×1+B×2 +C×4 +D×8+E×16+F×32+G×64 A=0, HdAL and LdAL are deviation alarms; A=1, HdAL and LdAL are absolute value alarms. B=0, Alarm and control hysteresis work as unilateral hysteresis; B=1, it is bilateral hysteresis. C=0, the resolution of the third row is 0.1%; C=1, the resolution of the third row is 1%. D=0, Loc=808 can access the whole parameter table; D=1, Loc=PASd can access the parameter table. E=0, Normal application on HIAL and LoAL; E=1, HIAL and LOAL are deviation alarms. F=0, fine control mode; F=1, Wide range display mode, when the value is bigger than 3200 ,chooses this option. G=0, When the thermocouple or RTD input is burnt out, PV value will increase and trigger the high limit alarm.; G=1, When the thermocouple or RTD input is burnt out, PV value will increase and NOT trigger the high limit alarm. Note: in this mode, even the normal alarm upper limit alarm (HIAL) will be delayed for about 15 seconds before it acts.	0~255
AF2 AF2	2nd advanced function code	AF2 is used to select the second advanced function codes, and its calculation method is as follows: AF2=A×1+B×2 +C×4 +D×8+E×16+F×32+G×64 A=0, Internal given mode; A=1, External given mode, and the signal is input from the 5V input terminal. B=0, the external given signal is 1~5V; B=1, the external given signal is 0~5V. C=0, normal input mode; C=1, square root processing of linear input signal. D=0, SCH/SCL define the transmission scale; D=1, SPSL\ SPSH define the transmission scale (Note: Do not use it when there is a valve feedback signal input). E=0, output 0 when the sensor is disconnected; E=1, output Ero parameter when the sensor is disconnected. F=0, the system automatically sets Ero; F=1, manually sets Ero. G=0, spare.	0~255

PAF PAF	Program running mode (Pno ≥ 1)	The PAF parameter is used to select the program control function, and its calculation method is as follows: PAF=A×1+B×2 +C×4 +D×8+E×16+F×32+G×64+H×128 A=0, Enable ready (rdy) function A=1, Disenable ready (rdy) function B=0, Ramp mode; B=1, Soak mode (constant temperature mode), each program defines a set value and holding time, reaching the next condition can be limited by the rdy function, and the heating/cooling rate can be limited by SPr/SPrL parameters; In addition, even if B=0 is set, if the last segment of the program is not the end command, the constant temperature mode will also be executed, and it will end automatically when the time expires. C=0, Time unit in Minute; C=1, Time unit in Hour. D=0, Disable PV start up function; D=1, Enable PV start up function. E=0, When work as program generator, upper windows display PV.; E=1, When work as program generator, upper windows display the current step. F=0, the standard operation mode; F=1, Hold and Run switching can operate on panel. G=0, Time units in minutes; G=1, Time unit in seconds. H=0, standard operation mode; H=1, each segment has a preparation function (rdy) in ramp mode.	0~255
SPr SPr	Heating rate limit	The heating rate can be limited , unit: ℃ /min. This function is not used in program ramp mode. When the C term of PAF = 1, the units of SPr and SPrL become ℃ /1 hour.	0~3200 ℃ /min
SPrL SPrL	Cooling Rate Limit	The cooling rate can be limited, unit ℃ /min. This function is not used in program ramp mode. If the system has no cooling output, when the natural cooling rate is lower than SPrL, the instrument cannot guarantee the cooling ramp, and will cool down at the natural cooling rate. When the C term of PAF = 1, the units of SPr and SPrL become ℃ /1 hour.	0~3200 ℃ /min
Ero Ero	Output value when overrange	When the control method is PID or APID, Ero defines the output value when the input value is out of range.	-110 ~110%
OPrt OPrt	Soft-start time	At the beginning of power on, if PV<OEF, it takes OPrt for the output value of OUTP to rise to OPH; if PV>OEF, then the time for OUTP output value to rise to 100% is not more than 5 seconds. This function is only needed by special requirement. The soft start function is used to reduce the inrush current of the inductive load, and set Ctl=0.5s, OPrt=5s.	0~3600 s
OEF OEF	Work range of OPH	When PV<OEF, the upper limit of OUTP is OPH; when PV>OEF, the upper limit of OUTP is 100%. For example, to avoid that the temperature raises too quickly, under 150℃ , a heater can work only under 30% of power, then we can set OEF=150.0 (℃), OPH=30 (%)	-999.0~ +3200.0 ℃ or linear unit
HIAL HI AL	High limit alarm	Alarm on when PV>HIAL Alarm off when PV<HIAL-AHYS	-9990~ +32000 unit
LoAL LoAL	Low limit alarm	Alarm on when PV<LoAL; Alarm off when PV>LoAL+AHYS	
HdAL HdAL	Deviation high limit alarm	Alarm on when PV-SV>HdAL; Alarm off when PV-SV<HdAL-AHYS When the value set to Max. will disable this function	
LdAL LdAL	Deviation low limit alarm	Alarm on when PV-SV<LdAL; Alarm off when PV-SV>LdAL+AHYS When the value set to Min. will disable this function	
AHYS AHYS	Alarm hysteresis	Avoid frequent alarm on-off action because of the fluctuation of PV	0~2000 unit
AdIS AdI S	Alarm display	OFF, Will not display alarm message in the lower display window when alarming; ON: Alternately display alarm message in the lower display window when alarming. FOFF, energy saving/confidential mode, in this mode, the instrument will display its address or "-" , and do not display the measured value and the given value.	
SPL SPL	SV low limit	The minimum value of SP allowed .	-9990~ +32000 unit
SPH SPH	SV high limit	The maximum value of SP allowed.	
SP1 SP 1	Set point 1	When parameter Pno=0 or 1, the given value SV=SP1.	SPL~ SPH
SP2 SP2	Set point 2	When parameter Pno=0 or 1, I2 can be installed at the MIO position to switch SV=SP2 with an external switch.	
PASd PASd	Password	PASd=0~255 or AF.D=0, set Loc=808 to enter the complete parameter table. PASd=256~9999 and AF.D=1, set Loc=PASd to enter the parameter table. Note: Only expert users can set PASd, it is recommended to use a unified password to avoid forgetting.	0-9999
Strt Strt	Valve Rotation travel Time	Strt defines the travel time for valve rotation when the instrument is a position proportional control output.	10~240s

OPH1 OPH 1	Output high limit	High limit of output 1.	0~100%
OPH2 OPH2	Output high limit	High limit of output 2.	
OPH3 OPH3	Output high limit	High limit of output 3.	
OPH4 OPH4	Output high limit	High limit of output 4.	
Cc Cc	Cascade function and dual input mode selection	Cc=0, normal control mode Cc=1~200, cascade control mode, input 1 is the main control, input 2 is the secondary control, the specification of input 1 should be the same as input 2, the output of the main control is the set value of the secondary control, it will output after the instrument completes the calculation . The smaller the delay time of the secondary control loop is relative to the delay time of the main control loop, the larger the allowable Cc parameter value can be. If Cc is set too high, it will cause oscillation. Cc=201, dual input hot backup mode Cc=202, Small value mode (dual input) , and the measured value of the two channels with the lowest measured value is taken as the main control measured value. Cc=203, tLarge value mode (dual input), and the measured value of the two channels with the highest measured value is taken as the main control measured value.	0~203
EP1 -EP8 EP 1 - EP8	Field parameter definition	Define 0~8 of the parameters as field parameters	

Note: Due to different product versions and models, the number and order of parameters will change, which does not affect the use or the arrangement of parameter addresses during communication.

7. Display/alarm symbols

Power on the instrument, it enters the basic display state, and the SV display window can alternately display symbols or display symbols to indicate the state, as following table:

Para-meters	Description	Solution
At AtE	Indicates that the instrument is in auto-tuning state	Wait for the end of the tuning, or manually modify the At parameter to OFF
AAt AAtE	Indicates that the instrument is in the fast auto-tuning state	Wait for the end of the tuning, or manually modify the At parameter to OFF
StoP StoP	Indicates that the instrument is stopped	Press (▽) for two seconds to run the instrument. If it fails to run, please check whether there are functions such as communication and event input to limit the running operation.
run run	Indicates that the instrument is running	This symbol is displayed once when the run operation is successful and does not need to be handled
HoLd HoLd	Indicates that the instrument program function is suspended	Press (▽) for two seconds to run the instrument, if it can't run, please check whether there are functions such as communication, block setting, etc. to restrict the running operation
rdy rdy	Indicates that the instrument program function is in a ready state	After waiting for the measurement signal to meet the setting requirements, it will automatically continue to run the program, or modify the PAF parameters to cancel this function
A 50 A 50	Indicates that the instrument is in automatic output state, and the number represents the output percentage	Press (↻) to switch to the SV value display state or press (◁) to switch to the manual output state
M 50 M 50	Indicates that the instrument is in the manual output state, and the number represents the output percentage	At this time, the MAN light on the panel is on, press (◁) to switch to the automatic output state, and press (△) and (▽) to modify the output percentage.
orAL orAL	Indicates that the input measurement signal is out of range	Check whether the input specifications and parameters are set correctly, check whether the input wiring is correct, and check whether the input signal is normal
HIAL HI AL	Indicates that an upper limit alarm has occurred	When the measured value PV is less than the HIAL-AHYS value, the alarm will be canceled automatically, or modify HIAL to 32000 to cancel the alarm
LoAL LoAL	Indicates that a lower limit alarm has occurred	When the measured value PV is greater than LoAL+AHYS, the alarm will be canceled automatically, or modify LoAL to -9990 to cancel the alarm
HdAL HdAL	Indicates that a deviation upper limit alarm has occurred	When the deviation between PV and SV of the measured value is less than HdAL-AHYS, the alarm will be canceled, or modify HdAL to 32000 to cancel the alarm
LdAL LdAL	Indicates that a deviation lower limit alarm has occurred	When the deviation between PV and SV of the measured value is greater than LdAL+AHYS, the alarm will be canceled, or modify LdAL to -9990 to cancel the alarm
FErr FErr	Indicates that the valve feedback or external given signal is over-range	Check whether the valve feedback signal and wiring are normal
EErr EErr	Indicates that an error is detected within the system, such as parameter loss, etc.	Need to return to the factory for repair

Note: If necessary, it's allowed to close the upper, lower limit and deviation alarm character flashing function to avoid excessive flashing (set the ADIS parameter to oFF).