
CXT□-1000 Series Intelligent digital temperature controller

Operation manual

Warn! (Before operating the products, please read this manual carefully for correct use)

● **Wiring warn**

To avoid the instrument being damaged or failure, please use suitable fuse and input/output wire for preventing the strong current impact.

● **Power supply**

To avoid electric shock or prevent the instrument from failure, the product can't be energized until all connections have been finished.

● **Never to be used in the environment with flammable gas.**

To proof the fire and explosion and prevent the instrument being damaged, never use the instrument in the location with steam or flammable or explosive gas.

● **Not allowed to modify the instrument**

To prevent accident or instrument failure, user mustn't modify the instrument.

● **Maintain**

* To avoid electric shock or prevent instrument failure, only our technicians can change the parts.

* For the sake of long service life, the instrument shall be maintained regularly.

● **Removal of faults**

* In case that the graduation number of full-input instrument can't changed, please check if LCK is locked or not, and if the input terminal is open circuit or not.

* If PV window displays $\square\square\square\square$, please examine the sensor is open circuit or not.

* If the control of temperature is abnormal, please check whether the parameters of instrument are amended by mistake, and whether the sensor part is failure or not.

* The instrument can't be operated by pressing button, please check if LCK parameters are locked or not.

* Note: We reserve the right to update or revise this manual.

1. Introduction

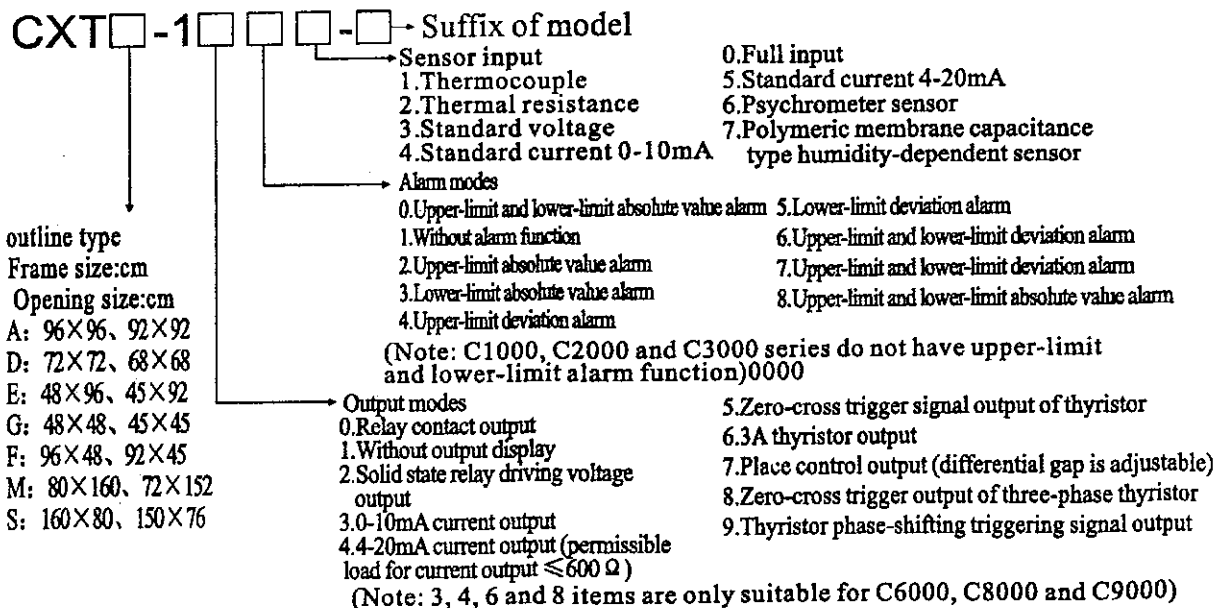
CXT□-1000 intelligent digital temperature controller is the fifth generation of high-performance intelligent instrument researched and developed by us, with excellent control performance, convenient operation mode and the best performance/price ratio, it is enjoyed very much by lots of users. According to the instrument's different suffix extension functions, users can select fuzzy automatic control instrument, ultra-thin instrument, 30-step variable velocity program control instrument, instrument with power output or instrument with the communication function correspondingly. The technology of sensing the room temperature automatically and adjusting the max output power of box to get the min temperature overshooting automatically according to the difference of setting temperature and room temperature has got the national patent for invention.

2. Main technical parameters

- Accuracy class: 0.5
- Basic error: $\leq \pm 0.5F.S \pm 1b$
- Alarming range: Full range
- Contact capacity of relay: AC220V/3A (resistance load)
- Trigger signal of solid state relay: No-load voltage >12V, current >15mA
- Zero-cross trigger signal of thyristor: Trigger current >100mA.
- Current: AC220V $\pm 10\%$ 50Hz
- Power: <4W
- Working environment: 0~50°C RH $\leq 85\%$ (No condensation), without corrosion or strong electromagnetic interference.
- Control mode: Industrial expert auto-tuning PID technology is used, compared with traditional PID technology, it has advantages like rapid temperature-control response, min overshoot, high accuracy, etc.
- Voltage withstand: Withstand output end up to 1500V/min, others up to 500V/min
- Measured range:

Name	Graduation no.	Measured range	Name	Graduation no.	Measured range
Nickel-chromium/copper-nickel	E	0~800°C	Copper resistance	Cu50	-50.0~150.0°C
Nickel-chromium/nickel-silicon	K	0~1300°C	DC voltage	1~5V	Specified
Platinum rhodium 10-platinum	S	0~1600°C	DC voltage	0~10mA	Specified (250Ω)
Platinum rhodium 30-platinum rhodium 6	B	0~1800°C		4~20mA	Specified (250Ω)
Platinum resistor	Pt100	-100~600°C	Humidity sensor		0~100%RH
	Pt100	-100.0~300.0°C	(If any special requirements or need other graduation numbers, user can contact us)		

3. Model description

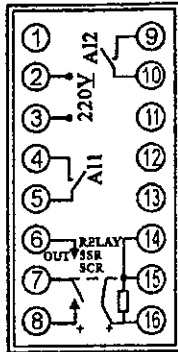


Suffix of model:

- A- Fuzzy control instrument, it can sense room temperature and change heating power automatically
- B- Ultra-thin instrument
- D- Full-input type instrument
- P- 30-step program control instrument
- J- Supporting instrument for extruding machines, it controls the output power of fan
- W- Two-place control instrument
- G- Current tracking output instrument
- T- Instrument with timing control function
- Tx- Instrument with communication function (485 interface)
- Pr- Instrument with typing function (232 interface)
- I, II and III has power output, I -1000W, II -2000W, III-3000W

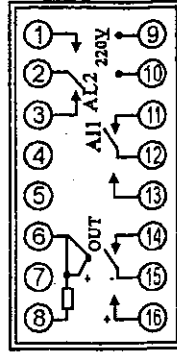
4. Wiring diagram (it is subject to change, please refer to instrument's box label as to allow)

Common type



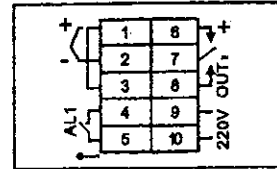
CXTA-1000

Full-input type



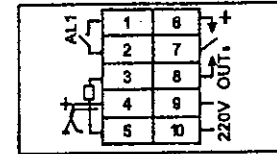
CXTF-1000

Common type



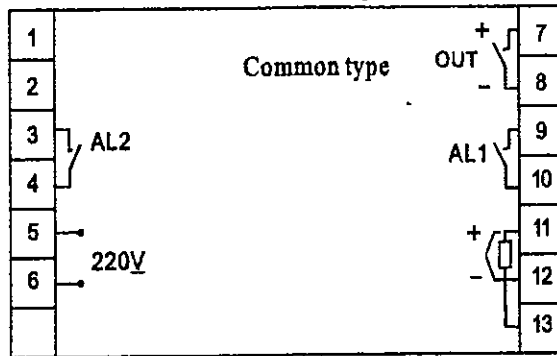
CXTE-1000

Full-input type



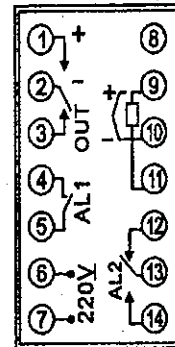
CXTG-1000

OUTPUT CONTROL: ① RELAY
② SSR
③ SCR

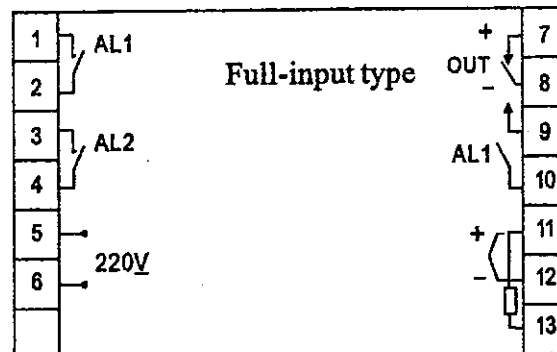


CXTM-1000 CXTS-1000

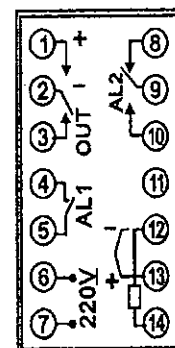
Common type



CXTD-1000

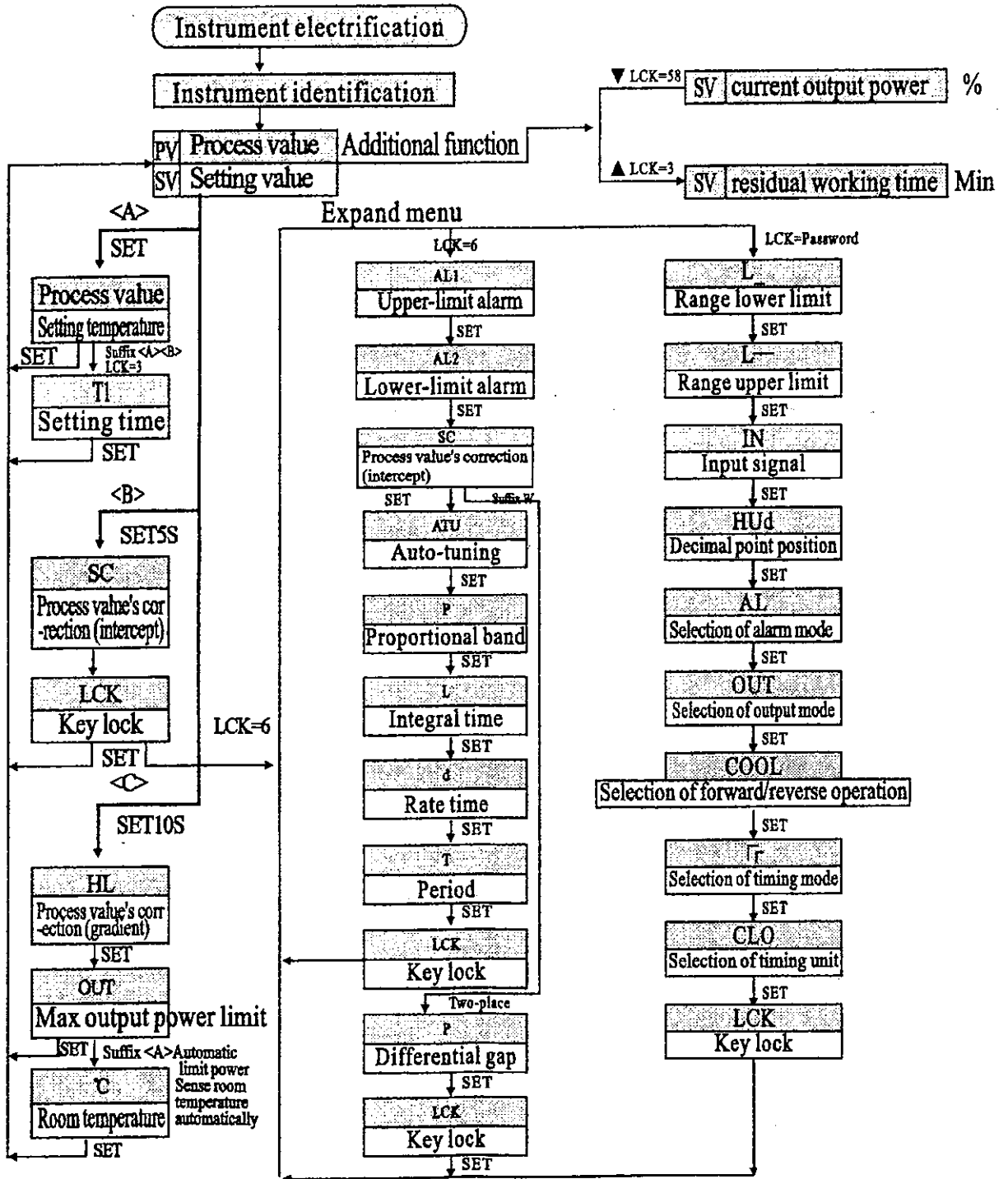


Full-input type



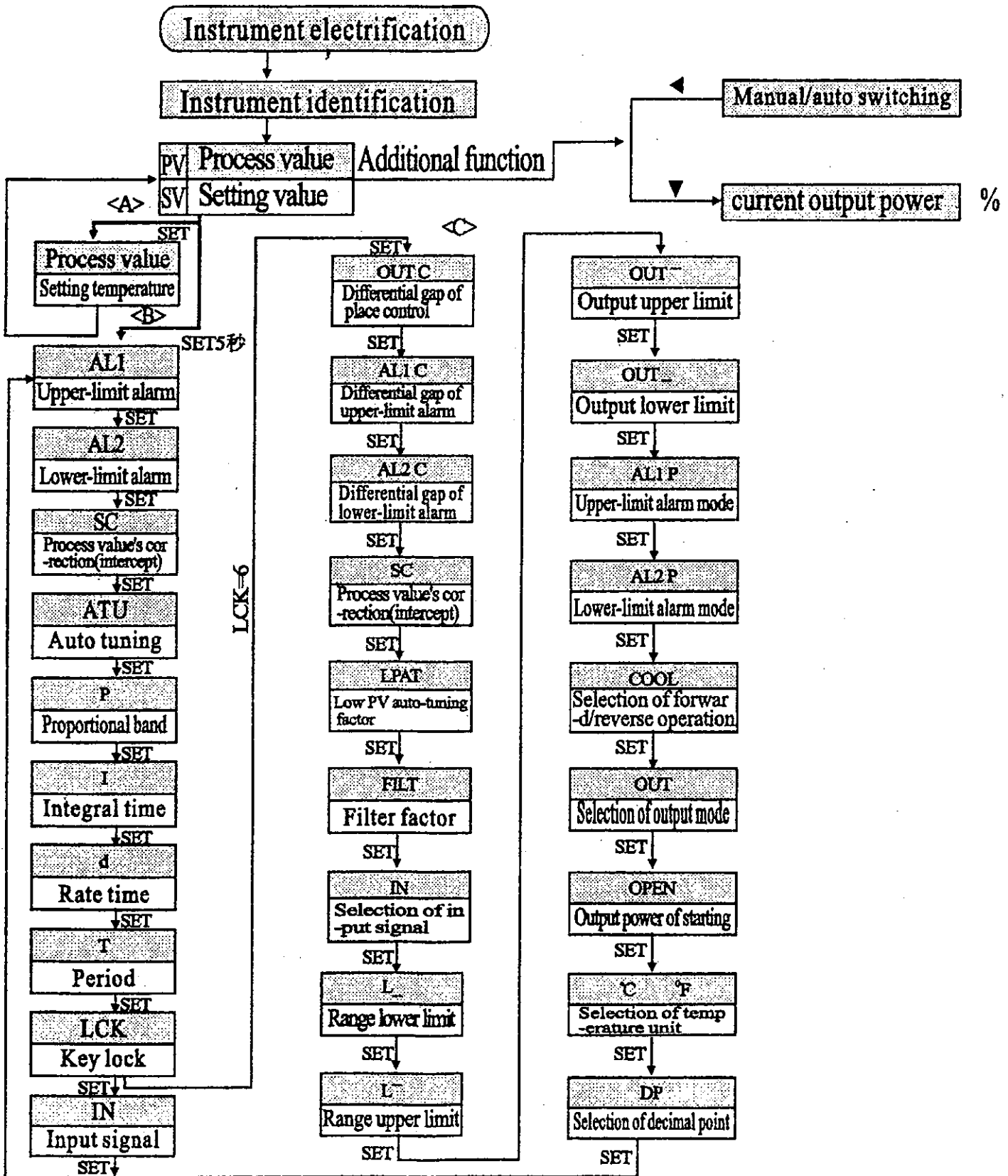
5. Operation flow

General instrument



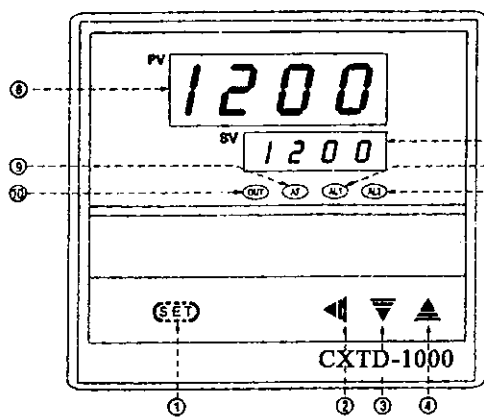
Differential gap of two-place control (suffix W) = $\pm 1/2P$ Unit: $^{\circ}\text{C}$

Full-input instrument (Suffix D)



When <C> menu program is finished, it enters into menu automatically, the default LCK is equal to 2. Enter <C> menus, and press SET key for 5s or 30s, the instrument will exit.

6. Panel function



- ①Function key
- ②Shift key
- ③Down key
- ④Up key
- ⑤Lower-limit alarm indication (ALM2)
- ⑥Upper-limit alarm indication (ALM1)
- ⑦Setting value (SV)
- ⑧Process value (PV)
- ⑨Auto-tuning indication (AT)
- ⑩Output indication (OUT)

7. Main functions

• <C> menu that is the one with special functions, press SET key for 10s to enter into.

1. HL gradient correction coefficient

Because of installing position of sensor, the reading of instrument is always different from the reading of glass thermometer. However, they can be identical with this function. General instrument only has SC intercept correction function, for example, the temperature difference of a point is 5°C, it is corrected with the intercept correction function, but, 0°C is corrected to 5°C too, the whole range can't kept the same.

With the slope correction function, if the 0 place of range upper limit is not changed, the correction method as follows:

Reading after corrected = Instrument process value × HL (factor).

2. OUT Max output power limit

The max output power limit is effective only when the instrument enters into the proportion band, except for full-input instrument. For preventing temperature overshooting, beside suitable PID parameter, OUT max output power limit shall be 2~5 times of power required by controlled point temperature, the smaller multiple, the smaller overshooting.

The max output power of instrument with suffix <A> changes with the setting temperature, its calculation as follows:

$$OUT = \frac{(SV - \text{℃})}{(L - \text{℃})} \times 100\%$$

3. Environment temperature °C Only instrument with the suffix <A> has this function, it samples automatically when energized.

8. Parameter list

Parameter	Setting range	Definition of parameter	Unit	Default
AI1	0-100%FS	Upper-limit alarm setting value	Degree	Random
AI2	0-100%FS	Lower-limit alarm setting value	Degree	Random
P	0.1-100%	Proportional band	%	3.0%
I	0-4320	Integral time	S	250S
D	0-1200	Rate time	S	50S
AT	ON-OFF	Auto tuning	ONE	OFF
T	1-60	Period	S	20s or 2s
LCK	0-9	0: No locking 1: Full locking 2: Menu A is not locked, but menu B is locked	ONE	0
SC	± 200 or ± 20.0	Process value's correction	Degree	0
IN	K,E,J,S,PT,CU	Graduation no. of input signal	ONE	According to demand
OUTC	0-1000	Differential gap of place control	Degree	0.1 or 1
AL1C	0-1000	Differential gap of upper-limit alarm	Degree	0.1 or 1
AL2C	0-1000	Differential gap of lower-limit alarm	Degree	0.1 or 1
LPAT	0-100.0%FS	Auto-tuning factor of low PV	%	5
FILT	0/1	Filter factor	ONE	1
L_	0-100.0%FS	Range lower limit	Degree	According to demand
L_	0-100.0%FS	Range upper limit	Degree	According to demand
OUT_	0-100%	Output upper limit	%	100
OUT_	0-100%	Output lower limit	%	0
OUT	0/1/2	0: Two-place PID 1: Continuous PID 2: Place control	ONE	0
AL1P	0/1	0: Absolute value 1: Deviation value	ONE	0
AL2P	0/1	0: Absolute value 1: Deviation value	ONE	0
COOL	ON/OFF	ON: Cool OFF: Heat	ONE	OFF
OPEN	0-100%	Output power of starting (operate in the first period)	%	100
°C °F	°C °F	Selection of temperature unit	ONE	°C
DP	0/1	0: Without decimal point 1: One digit decimal point	ONE	According to demand

● PID Correct use of PID and auto tuning

1.If the default PID parameter is not ideal in the practical service, it may be adjusted automatically with the auto-tuning function, the methods as follows: When the setting value of instrument's displaying temperature \ll is in the state of full-power heating, please press SET key f or 5s to enter into B menu (LCK=6), then set ATU=ON, AT lamp goes on, at last, exit B menu, this instrument is about to get into auto tuning, at this moment, instrument's SV window displays setting value and AT character alternately, after two-period waving, auto tuning is finished.

(Note: If $PV \approx SV$ or $PV > SV$, the auto-tuning effect would be very bad.)

2.Hand setting for PID parameter

As for the locations where have strict requirements on the overshooting of temperature, PID parameter may be set by hand on the basis of auto tuning to get the best efficiency.

P is the proportion band, positioned on the heating side, multiply it by instrument's range to get the action range, and observe the current output power variation of instrument to make proper adjustment, when $PV > SV$, $OUT=0$, it indicates that P is too small, it shall be increased, when $PV < SV$, $OUT > 0$, but temperature rises continuously, P shall be decreased appropriately. In principle, P shall be as small as possible, the smaller P, the higher sensitivity of temperature output variation, and it is good for controlling the temperature.

I is the integral time, controls the speed that the process value getting close to the setting value. If I is too small, it would cause waving easily, if I is too large, the time of varying would be too long. Therefore, under no wave, I shall be as small as possible.

D is the rate time, controls the dynamic response. The faster temperature rise makes the output down, and the faster temperature fall makes the output up, but it doesn't affect the static response, in general, it is 1/10-1/5 of integral time.

● Hand/auto no-disturbance switching (Full-input instrument)

The instrument is usually in the state of auto control, if need hand control state, please press \blacktriangleleft key, SV windows thousands place will display H (Hand), and the later three places will indicate current output power, thus, the no-disturbance switching is realized, at this time, please press \blacktriangle key or \blacktriangledown key to realize manual output control. If want to return to auto control state, just press \blacktriangleleft key again.

● Selection of forward/reverse operation

When the control object is required in the state of heating, the output will be the reverse operation, that is, the lower temperature, the higher output power; when the control object is required in the state of cooling, the output must be the forward operation. In operating, users find the “cool” in the expand menu, then set it to “ON” , thus, the instrument is about to switch to forward operation output at once.

● Input signal switching (Full-input instrument)

Kinds of graduation numbers and ranges are available. To prevent error operation, in normal service, the instrument's input end shall be open circuit, besides LCK=0, thus, the graduation number can be changed, otherwise, it would be ineffective.

9. Attentions

①When the instrument is energized, it will begin working at once, press SET key, SV window will flash, the setting value may be changed at this moment, press SET key again to finish, if need to amend other parameters, user must press SET key for 5s, then find B menu, till now, the parameters may be amended according to requirements, if finishing amendment, press SET key for 5s to exit B menu, otherwise, the instrument would return to the working state automatically after 30s, the last amendment data wouldn't be preserved.

②When the input signal exceeds the range upper limit, the instrument will display $\overline{\text{=====}}$, when it exceeds 10% of range lower limit, it will regard the input signal as open circuit, and still display $\overline{\text{=====}}$ and cut off output circuit; when the input signal is slightly smaller than the range lower limit, the instrument will display $\overline{\text{=====}}$

③Pay attention that 4~20mA output shall be PID output, if need 4~20mA correspondingly to input signal, please indicate the characters that “4~20mA tracing” clearly when ordering.

④If any special requirements, please state when ordering.

⑤If necessary, users may change the range, decimal point, alarm mode, two-placeswitching, output mode, etc., but please contact us first, we can provide the guide service for you.

10.After-sale service

Within 18 months from delivery date, if the products occur faults for quality problem under normal use, all changes or repairs are free. If the product is damaged for improper use, all repairs would be billed at cost, the instruments are provided with lifelong maintenance service.