ENVTC Series

Intelligent Temperature Controller

User Manual

ENVTC-S,ENVTC-M,ENVTC-V,ENVTC-L

ENERVY

Verified to Energize

ENVTC Intelligent temperature controller

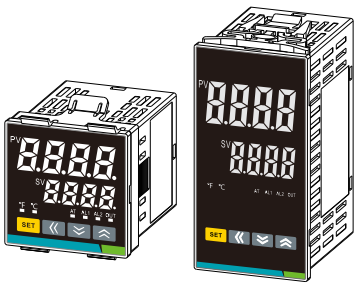
Model Description:

ENV TC- S 4 R C1 1 A

- ENV: ENERVY Products Identity
- TC: Temp. Controllers Family
- S: Panel Size classification
- 4: Working power supply
  - 1: AC-220V,50/60HZ Power supply (Transformer)
  - 2: AC/DC - 20~80V Switching power supply
  - 3: AC-380V,50/60HZ Power supply (Transformer)
  - 4: AC/DC - 80~260V Switching power supply
- R: Communication: R---RS485; Blank---□Non communication
- C1: Control output
  - C0: SSR (DC 12V)
  - C1: Relay
  - C2: Reserved
  - C3: Relay + SSR
  - C4: 0~10vAC (Analog Voltage)+SSR
  - C5: Reserved
  - C6: 4~20mA (Analog Current) +SSR
- 1: Alarm Output
  - 1: 1 xAlarm Unit AL1
  - 2: 2xAlarm Unit AL1 , AL2
- A: Input signal
  - A: Input full function (Factory default K-type)
  - K: K-type thermocouple
  - E: E-type thermocouple
  - P: Thermal resistance Pt100
  - C: Thermal resistance Cu50

Working environment

- Air pressure 86-106kPa
- Relative humidity 45-85%RH
- Environment temperature : 0-50℃



Precautions for installation:

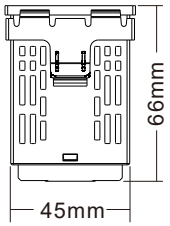
1、 Excessive dust, salt, or metal powder;
2、 Corrosive and flammable gas;
3、 Direct vibration or impact on the main structure;
4、 Water, oil, chemical, smog or steam pollution;
5、 A sharp change in environmental humidity may cause condensation;
6、 Direct air conditioning, direct sunlight, heat radiation accumulation.

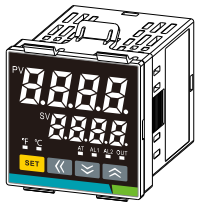
Main technical parameters

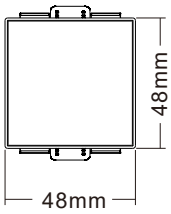
1、Compatible input: thermocouple（E. J. K. S. B）：Thermal resistance （Cu50. Pt100）
2、Display tolerance: less than or equal to 1.0% ± 1 word of full scale
3、Cold end compensation error：≤2℃ / Resolution ratio:(1℃ or 0.1℃)
4、Sampling period:300milliseconds
5、Main control mode: PID control or Stepping control
6、Main control output : SSRDrive voltage （DC12V, Load capacity ≤30mA）
Relay output （Capacity：AC 220V □□Resistive load 3A）
7、Alarm output：Relay contact AC 250V 3A（□□Resistive load）

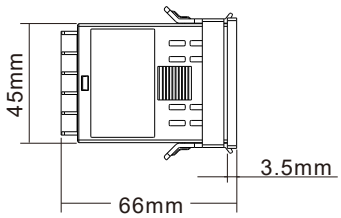
Product appearance and installing size		
Specifications	External dimension Height × width × depth	Panel hole dimension Height × width
S	48×48×66	46×46
M	72×72×66	68×68
H	48×96×66	46×92
V	96×48×66	92×46
L	96×96×66	92×92

S









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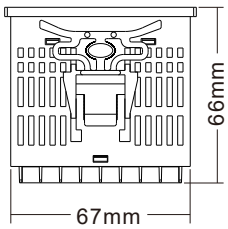



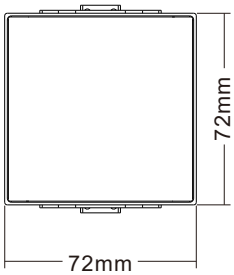

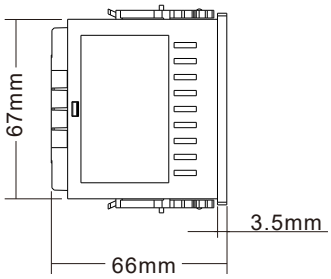

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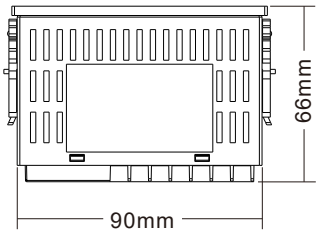

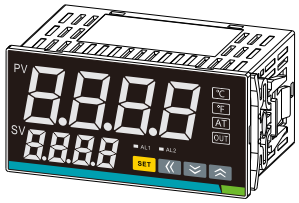

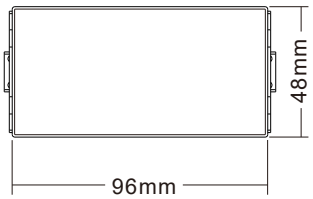

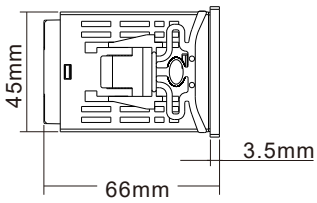

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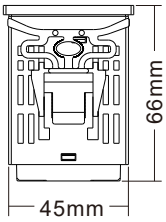

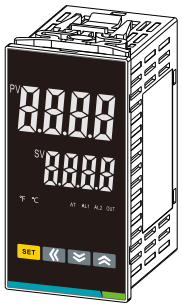

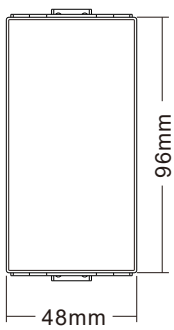

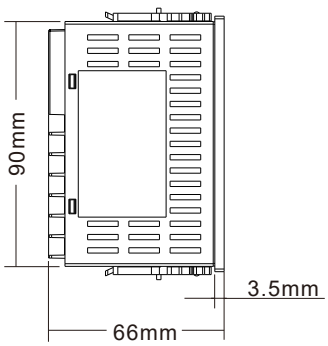

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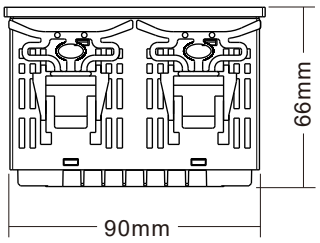
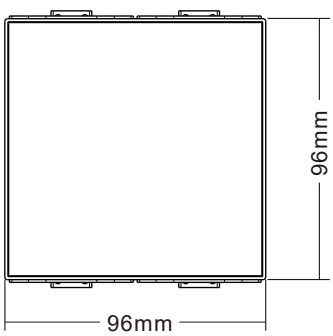
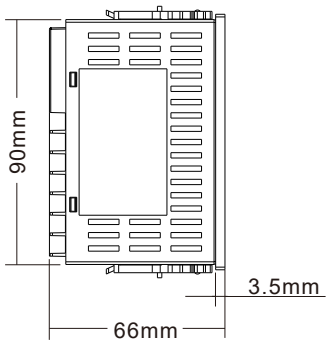
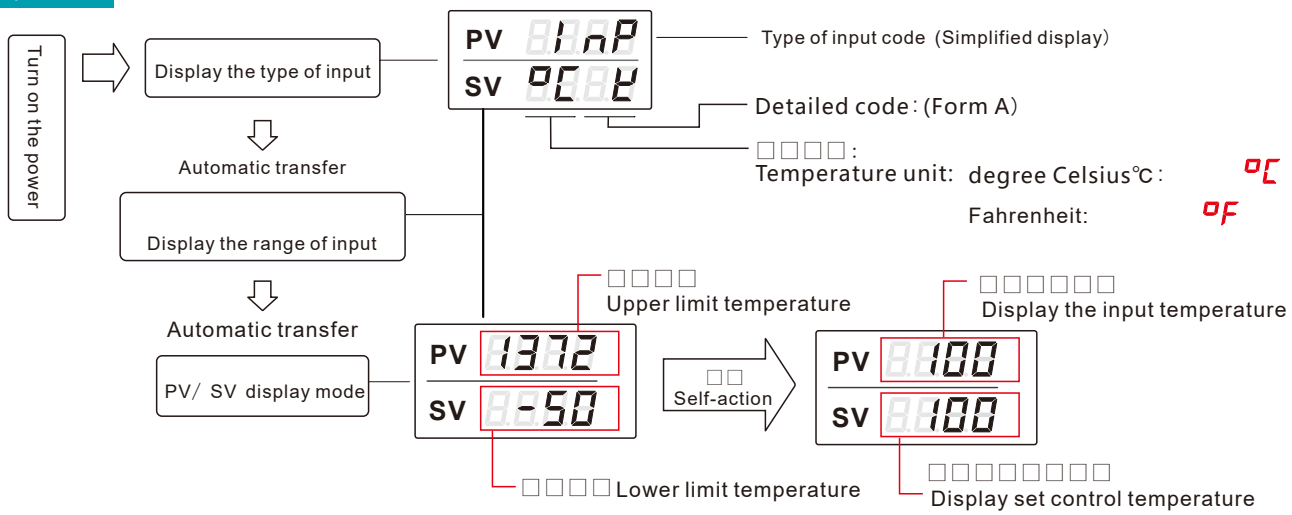








Display



First-level menu (function) comparison table:

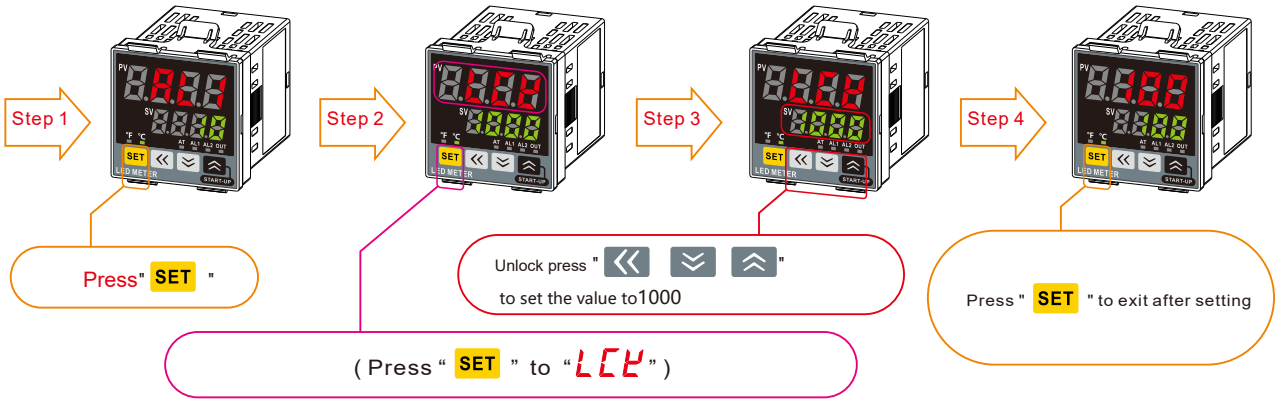
Press " SET " for a long time to enter the first-level menu parameter setting mode, and click " SET " to find the function number of the corresponding parameter: (The following table)

AT Automatic adjustment	Setting the switching mode	PID Switching operation value	
AT U	P	1	Integral time Original"0240"
Original"0000" ⇩ Adjusted"0001" Long press " SET " to start the automatic adjustment,and the AT indicator lights up. After waiting for the indicator to go out, the best temperature control state is completed. Using AT auto-adjustment function for the first time can better control the heating process (intelligent heating), If only need "general temperature control", can set " P " to "0000" to enter the submenu to set up and down the switch difference to select the setting;	Original"0030" According to the actual temperature control needs of the equipment, the P value can be adjusted to "0010 or 0020" to obtain the optimal switching difference operation value of PID. ⇩ Adjusted"0000" SET Press " SET " to enter the submenu settings Up switching difference : oH Down switching difference : oHH Recommendation of conventional temperature control parameters (The switching difference is 3 degrees up and down.) Up" oH "set to" 0001 " Down" oHH "set to" 0002 "	d	Derivative time Original"0060"
		Ar	Limit the effective range of integral action Original"0100"
		AT will be automatically generated after rectification. When " P " set to "0000", these three items will not be displayed.	

Output response time	Temperature difference adjustment	Data lock
r	SC	LCY
Initial value "0020" (output control is relay) ⇩ Output such as "solid state relay", namely SSR, in order to obtain a faster response,can set the output response time value to "0002"	Initial value"0000" ⇩ The difference between the measured temperature and the displayed temperature can be adjusted by " ⩔ ⩓ ",after setting, press " SET " to confirm the exit.	Initial value "1000" (unlocked state) ⇩ Data lock Settings

Data lock Settings

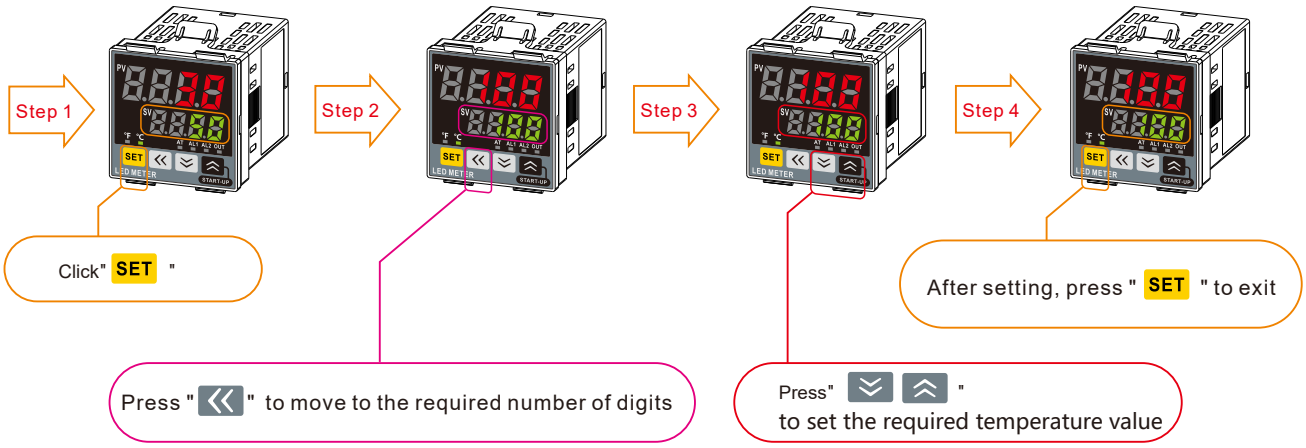
Press " SET " to enter the setting mode, then press " SET " to find the data lock parameter " LCY " ,set the code to "1000", that is, the unlocked state (the factory default is the unlocked state);Code "0000" is in the locked state (in this state, the data secondary menu cannot be accessed)：Press " SET " to exit after setting.



Code	Protection range of locks at all levels	Code	Protection range of locks at all levels
0000	SV and all parameters can be set	0011	Only SV can be set
0001	Only SV and alarm (AL1 、AL2) can be set	0101	Only alarm (AL1 、AL2) can be set
0010	All items can be set except alarm (AL1 、AL2)	0110	SV and alarm (AL1 、AL2) can be set
0100	All items except SV can be set	0111	SV and all parameters cannot be set

SV（Temperature control）Setting:

Under the normal display state of SV/PV, click " SET " to make the SV column display in a flashing state.Press " " to find the number of digits of the required temperature, and then press " " or " " to set the required temperature value.After setting, it will automatically exit if there is no operation for 20 seconds, or you can directly press " SET " to exit the setting;



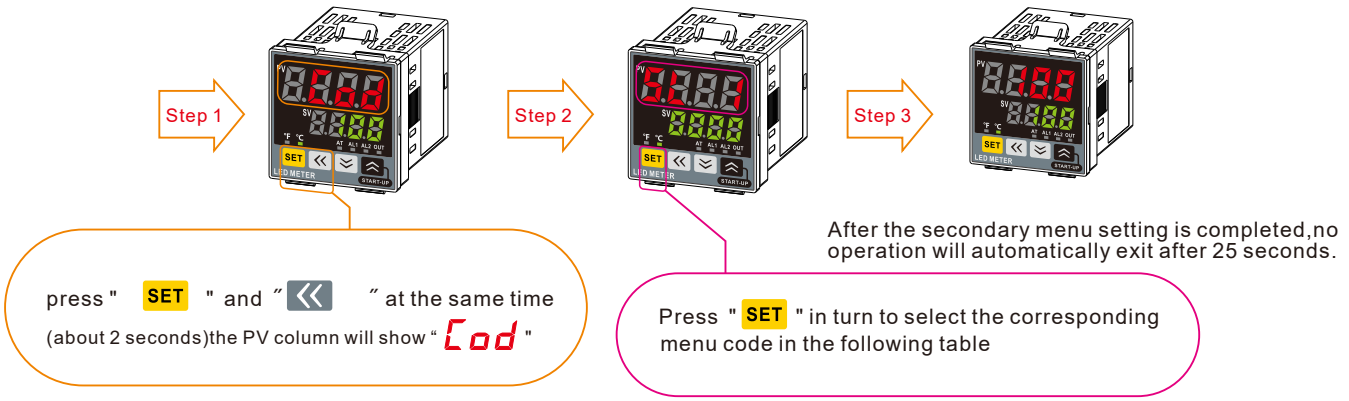
SETTING OF AT SELF-TUNING FUNCTION

Press and hold the " SET " key for about 3 seconds to enter the SETting menu. After entering, click the " SET " key instead, find "ATU" in turn, set it to "0001", and then click " SET " to confirm and exit. AT this time, the "at" indicator light in the instrument panel window flashes, indicating that the instrument has entered the self-setting mode. When the self-setting of the instrument is completed, the "AT" indicator light goes out automatically. At this time, the instrument completes the self-tuning function and enters the normal temperature control state.

Secondary menu (function) access mode:

Press " SET " to enter the setting mode, then press " SET " to find the data lock parameter " LCY " ,set the code to "**1000**", that is, the unlocked state (the factory default is the unlocked state)

When the data lock is unlocked, press " SET " and " ≪ " at the same time (about 2 seconds)the PV column will show " Cod ", then press " SET " in turn to select the corresponding code according to "Secondary menu (comparison table)",enter the secondary menu settings.



When "Cod"= 0 0 0 0, press " SET " in turn to get and display the following secondary menus (codes) circularly:

Secondary menu (code)	Secondary menu (content)	Secondary menu (comparison table)
SL 1	Input type selection	1 (See table 1)
SL 2	Temperature display unit selection	2 (See table 2)
SL 3	“HBA”. “LBA” and “LBA” channel selection	3 (See table 3)
SL 4	The first alarm mode selection	4 (See table 4)
SL 5	Second alarm mode selection	5 (See table 5)
SL 6	Control output type selection	6 (See table 6)
SL 7	Alarm relay state selection	7 (See table 7)
SL 8	None	————
SL 9	None	————
SL 10	RUN/STOP and communication function selection	8 (See table 8)
SL 11	Selection of SV alarm type	9 (See table 9)

Enter the settings for sensor type selection: secondary menu

Press " SET and « " at the same time (about 2 seconds) and PV will display "Cod" ,then press " SET ", PV selects "SL 1",and press " « " to cooperate with " ⌄ ⌃ " set SV (refer to" Table 1") to correspond to the digital code of sensor (factory default is Type K thermocouple), after setting, press " SET and « " at the same time, or automatically quit after 25 seconds of no operation.

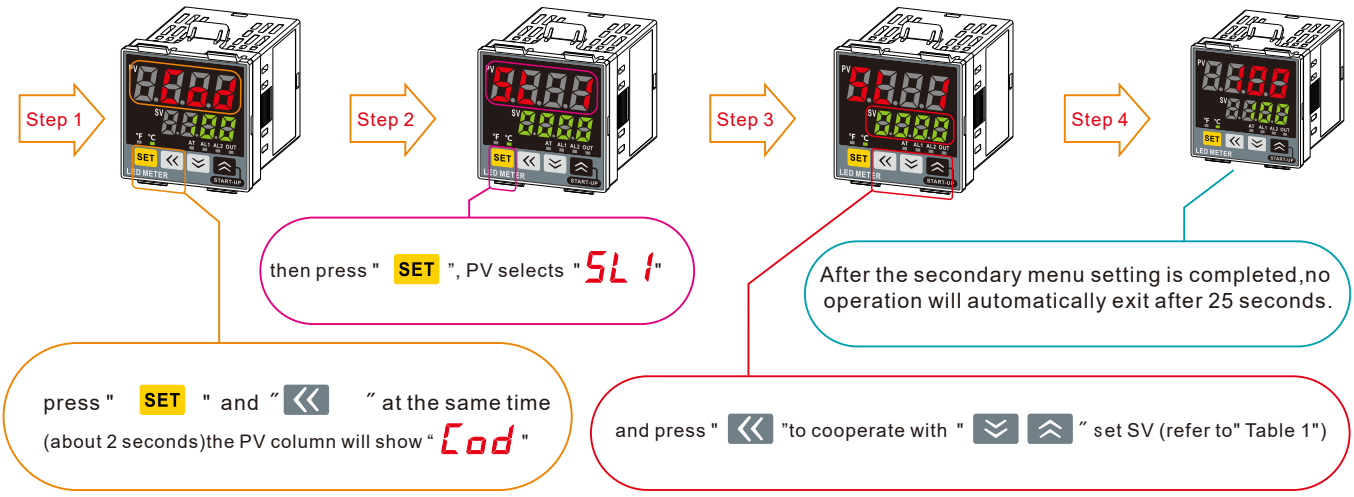


Table A (Comparison Table of Signal Input Types)

Code	K	J	r	S	b	E	T	n	P	ū	U	L	Cu50	PT	H
Type of input	thermocouple（TC）												RTD		voltage (current)
	K	J	R	S	B	E	T	N	PL II	W5Re/ W26Re	U	L	Cu50	Pt 100	

(Table 1) SL 1 Input type selection

Code				Sensor input type	
0	0	0	0	K	
0	0	0	1	J	
0	0	1	0	R	
0	0	1	1	S	
0	1	0	0	B	Thermocouple input
0	1	0	1	E	(TC)
0	1	1	0	N	

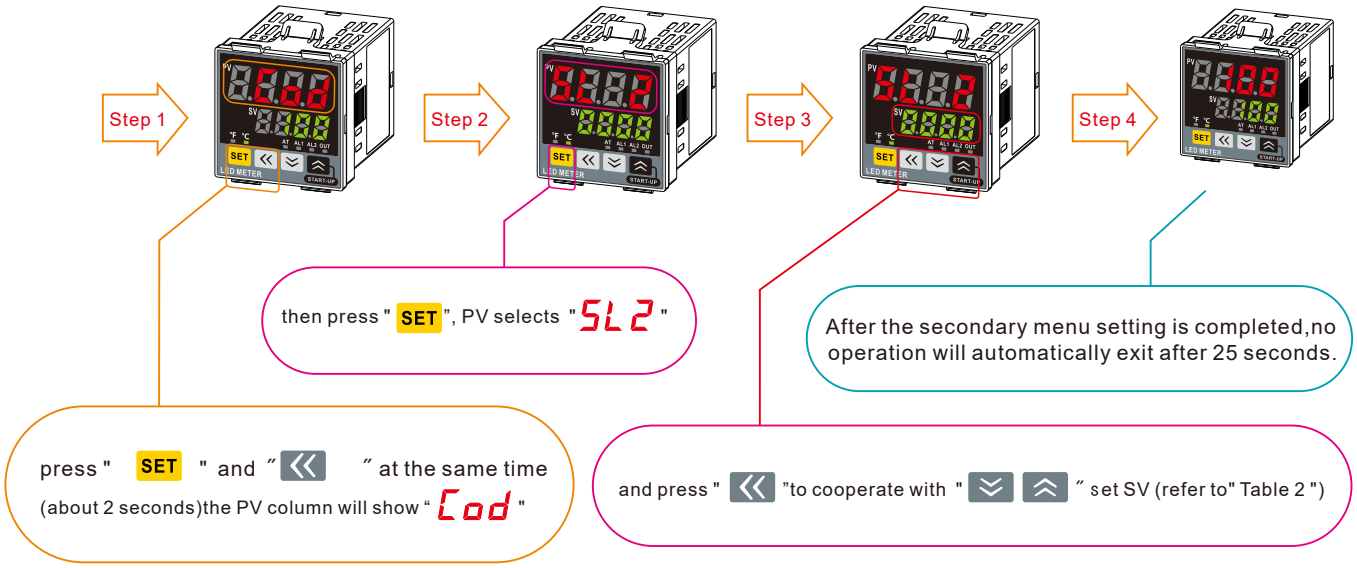
Code				Sensor input type	
0	1	1	1	T	
1	0	0	0	PT100	Thermal resistance input
1	0	0	1	Cu50	(RTC)
1	0	1	0	0-400 Ω	Linear resistance input
1	0	1	1	0-50mV	Millivolt voltage input
1	1	0	0	0-5V (0-20mA)	Continuous input
1	1	0	1	1-5V (4-20mA)	Voltage and current

1、When the current is input, it should be set as voltage input, and a 250Ω resistor should be connected to the input terminal in parallel.

2、Thermocouple and thermal resistance can be mutually converted. If it is converted with voltage input, please submit it to our company for adjustment.

Note: The factory default (signal input type) without special requirements is " Type K thermocouple "

Press " SET and ≪ " at the same time (about 2 seconds) and PV will display " Cod ", then press " SET ", PV selects "SL 2", and press" ≪ " to cooperate with " ≫ ≫ " set SV (refer to" Table 2") to corresponding digital code of temperature unit (factory default is ℃, code: 0000), after setting, press " SET and ≪ " at the same time, or automatically quit after 25 seconds of no operation.



(Table 2) SL 2 Temperature display unit selection

Code				Unit selection
0	0	0	0	Centigrad
0	0	0	1	Fahrenheit

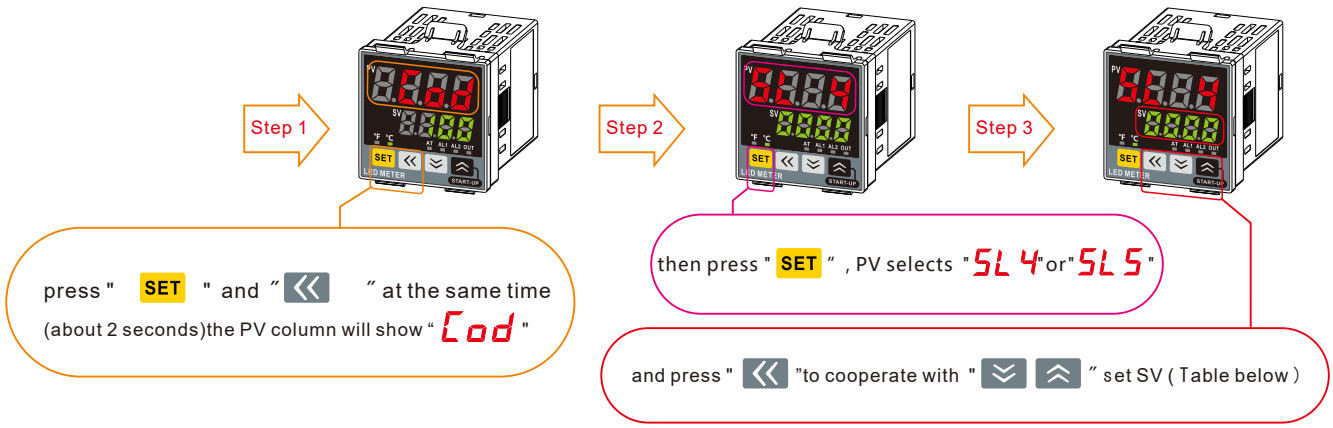
(Table 3) SL 3 Channel selection

Code				Comparison table	
0	0	0	0	not provide	Heater break alarm (HBA) selection
0	0	0	1	provide	
0	0	0	0	not provide	Loop break alarm (LBA) selection
0	0	1	0	provide	
0	0	0	0	LBA From the first alarm output	Loop break alarm (LBA) output channel selection
1	0	0	0	LBA From the second alarm output	

Setting of upper and lower alarm output: secondary menu

secondary menu

When the data lock is unlocked, press " SET " and " ≪ " at the same time (about 2 seconds) the PV column will show "Cod", then press " SET ", refer to the following table "Secondary Menu (Comparison Table)" to select the corresponding code to enter the secondary menu settings, after setting, press " SET " and " ≪ " at the same time, or automatically quit after 25 seconds of no operation.



When "Cod"= 0 0 0 0, press " SET " in turn to get and display the following secondary menus (codes) circularly:

Secondary menu (code)	Secondary menu (content)	Comparison table
SL 4	The first alarm mode selection	(Table 4)
SL 5	Second alarm mode selection	(Table 5)

(Table 4) SL 4

Factory setting value: the type specified when ordering

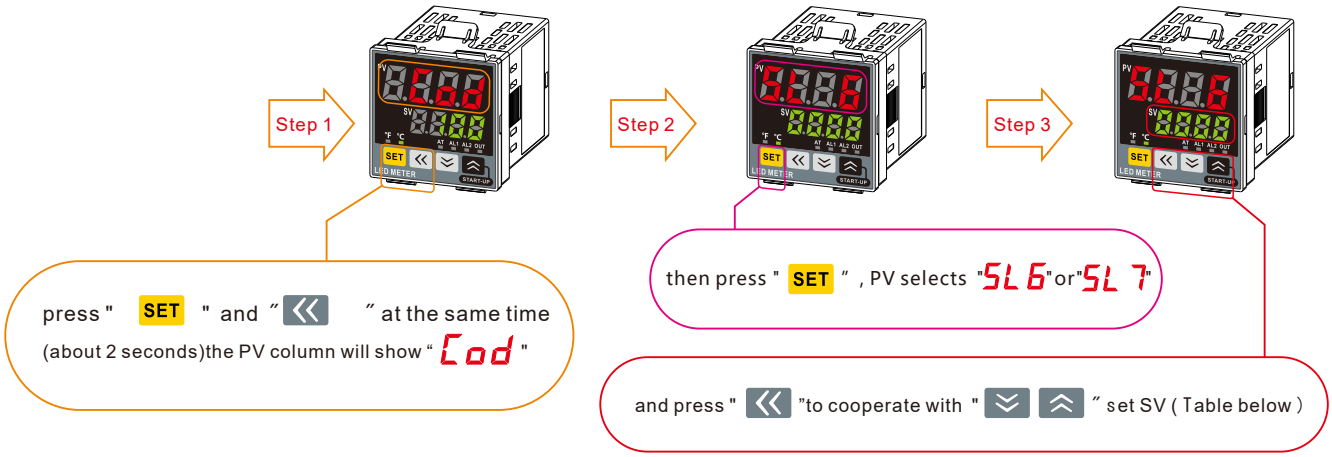
Code				Comparison table	
0	0	0	0	The first alarm is not set (ALM1)	The first alarm (ALM1) type selection When the alarm function is turned on, the "AL 1" window will be directly displayed in the first-level menu.
0	0	0	1	Upper limit deviation alarm	
0	0	1	0	Upper/lower limit deviation alarm	
0	0	1	1	Process value upper limit alarm	
0	1	0	1	Lower limit deviation alarm	
0	1	1	0	With alarm	
0	1	1	1	Process value lower limit alarm	

(Table 5) SL 5

Factory setting value: the type specified when ordering

Code				Comparison table	
0	0	0	0	The first alarm is not set (ALM2)	The first alarm (ALM2) type selection When the alarm function is turned on, the "AL 2" window will be directly displayed in the first-level menu.
0	0	0	1	Upper limit deviation alarm	
0	0	1	0	Upper/lower limit deviation alarm	
0	0	1	1	Process value upper limit alarm	
0	1	0	1	Lower limit deviation alarm	
0	1	1	0	With alarm	
0	1	1	1	Process value lower limit alarm	

When the data lock is unlocked, press " SET " and " ≪ " at the same time (about 2 seconds) the PV column will show " Cod ", then press " SET ", refer to the following table "Secondary Menu (Comparison Table)" to select the corresponding code to enter the secondary menu settings, after setting, press " SET and ≪ " at the same time, or automatically quit after 25 seconds of no operation.



(Table 6) SL 6

Factory setting value: the type specified when ordering

Code				Comparison table	
0	0	0	0	Positive action (type D)	Positive/Reverse action selection
0	0	0	1	Reverse action (type F, A, W)	
0	0	0	0	(PID self-tuning) ---------- *1	Control action type selection
0	0	1	0	PID self-tuning of heating/cooling	
0	0	0	0	Heating side time proportional output (M, V, G and T output)	Selection of output type (heating side)
0	1	0	0	Heating side continuous output (current 420mA.DC)	
0	0	0	0	Cooling side time proportional output (M, V and T output)	Selection of output type (cooling side)
1	0	0	0	Cooling side continuous output (current 420mA.DC)	

*1 Type D: PID self-tuning (Positive action)
Type F: PID self-tuning (Reverse action)

*2 Type A: PID self-tuning of heating/cooling (AC air-cooled)
Type W: PID self-tuning of heating/cooling (water-cooling)

*3 M Output: contactor contact output
G Output: SCR trigger output
V Output: voltage pulse output
T Output: SCR output

(Table 7) SL 7

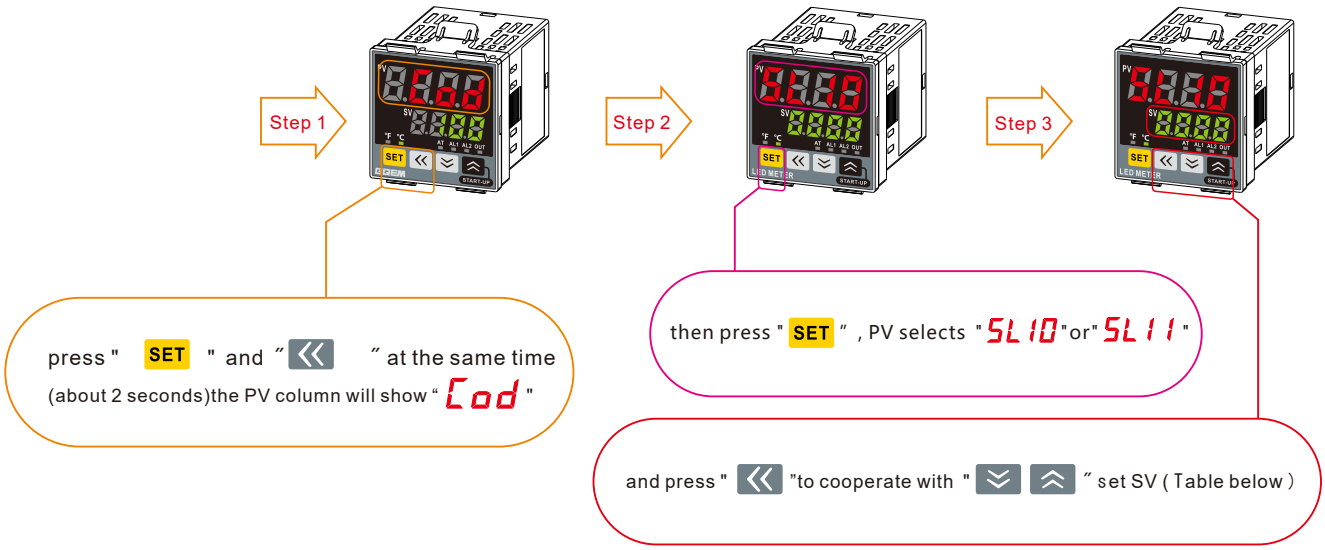
Factory setting value: the type specified when ordering

Code				Comparison table	
0	0	0	0	Excitation alarm	Excitation alarm/non-excitation alarm (first alarm side)
0	0	0	1	Non-excitation alarm	
0	0	0	0	Excitation alarm	Excitation alarm/non-excitation alarm (second alarm side)
0	0	1	0	Non-excitation alarm	
0	0	0	0	Non-phase shift output	Master control phase shift output (after setting, the third bit setting of SL6 is invalid)
0	1	0	0	Master control phase shift output	
0	0	0	0	Turn off timing	— — — — — — —
1	0	0	0	Open timing	

Note: Excitation alarm means that the contact of alarm relay changes from: NO to NC
Non-excitation alarm means that the contact of alarm relay changes from NC to NO.

RUN/STOP and communication function selection/SV alarm type selection: Secondary menu

When the data lock is unlocked, press " SET " and " ≪ " at the same time (about 2 seconds) the PV column will show " Cod ", then press " SET ", refer to the following table "Secondary Menu (Comparison Table)" to select the corresponding code to enter the secondary menu settings, after setting, press " SET and ≪ " at the same time, or automatically quit after 25 seconds of no operation.



8(Table 8) SL 10 RUN/STOP and communication function selection

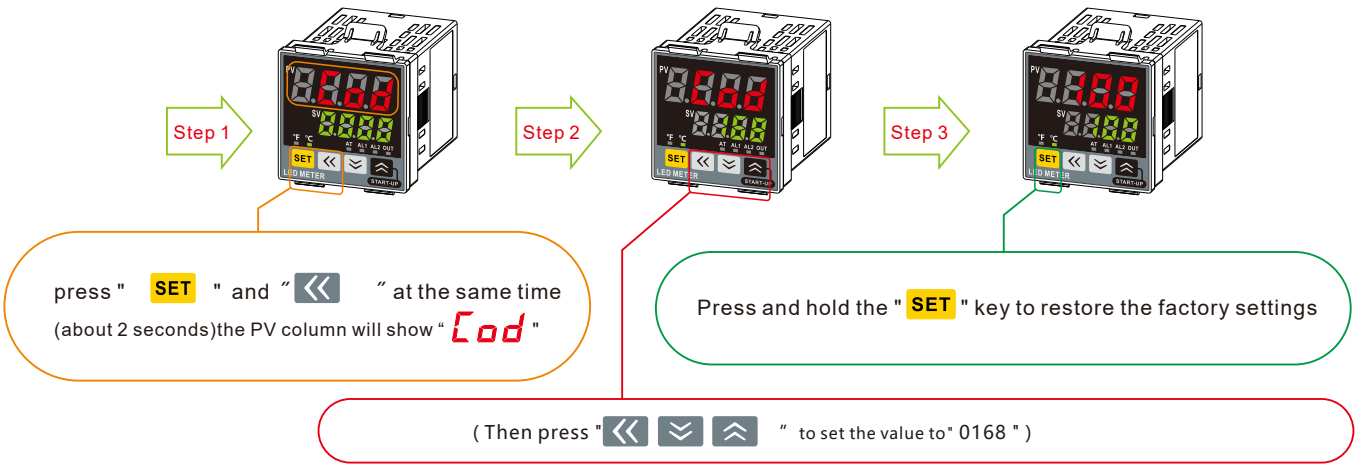
Code				Comparison table	
0	0	0	0	RUN / STOP No RUN/STOP function	RUN / STOP RUN/STOP function selection
0	0	0	1	RUN / STOP Have RUN/STOP function	
0	0	0	0	Invalid	
0	0	0	0	No communication function	Communication function selection
0	1	0	0	Have communication function.	
0	0	0	0	No autonomous correction function	Autonomous correction function selection
1	0	0	0	Have autonomous correction function	

(Table 9) SL 11 Selection of SV alarm type

Code				Comparison table (Reserved function)	
0	0	0	0	No SV alarm	First alarm, SV alarm selection
0	0	0	1	Have SV alarm	
0	0	0	0	SV lower limit alarm	First alarm, SV alarm mode selection
0	0	1	0	SV upper limit alarm	
0	0	0	0	No SV alarm	Second alarm, SV alarm selection
0	1	0	0	Have SV alarm	
0	0	0	0	SV lower limit alarm	Second alarm, SV alarm mode selection
1	0	0	0	SV upper limit alarm	

Factory setting value: the type specified when ordering

When the data lock is unlocked, press " SET " and " ≪ " at the same time (about 2 seconds)the PV column will show " Cod ", press again " ≪ ≫ ≫ ", adjust the initial value of "0000" to "0168", then press " SET " to exit, and the factory settings will be restored.



Setting mode: | Factory default value

This parameter is used to set alarm, PID constant and other parameters.In the normal display state, after pressing and holding " SET " for three seconds,the PV display displays the parameter setting state,the SV display displays its corresponding value,press " SET " to display the following parameter symbols:

Symbol	Name	Setting range	Description	Factory setting value
CT1	Current detector input 1	0.0100.0A	Displays the input value of the current detector. When there is an HBA alarm	
AL1	First alarm	Input temperature deviation alarm, process value alarm and set value alarm: 1999to+9999 °C [°F] or 199.9to+999.99 °C [°F]	Setting a first alarm setting value and a second alarm setting value Alarm action gap	150
AL2	Second alarm	SV alarm is the same as SV set range Voltage/Current input: Alarm deviation ±9999 Input alarm is the same as input range. SV alarm is the same as SV setting range	Enter the temperature of 2 or 2.0 °C [°F] Voltage/current input 0.2%	150
HBA1	Heater break alarm (HBA) See *1	0. 0100. 0A	Alarm value refers to the input value of current detector,Set (CT) for single phase only	0. 0
LBA	Control loop break alarm (LBA) See *2	0.1200.0min (cannot be set to 0.0)	Set the alarm setting value of control ring break	8. 0

Symbol	Name	Setting range	Description	Factory setting value
LBD	LBA No induction control	Temperature range 09999 ℃ [℉] Action clearance 0.8℃ [℉] Voltage/current input (0 range) Action clearance, 0.8% of range	Set to 0, then there is no LBA and no induction control	0
ATU	Automatic calculus	0 Automatic calculation is completed or stopped. 1 Automatic calculus starts.	Implement ON/OFF of automatic calculation	0
STU	Self-calibration	0 Self-calibration completed or stopped. 1 Self-calibration starts.	Implement ON/OFF of self-calibration	0
P	Proportional band (heating side)	9999 (999.9) ℃ [℉] temperature range1(0.1) to full scale or 9999(999.9)℃ [℉] Voltage/current 0.1 to 100.0% of full range * When set to 0, it is bit control.	**Proportional band ON/OFF** the proportional band is turned ON/OFF when the heating side * is set to **0(0.0)**. Action clearance 2℃[℉] Set this value when performing PLPD or PID control.In the heating/cooling PID operation,	Input temperature 30 (30.0) voltage current input 3.0
OH	Lower limit return difference of main control	1-100	Hysteresis Bit control, the lower limit return difference P=0 is effective.	2
OHH	Upper limit return difference of main control	0-100	Hysteresis Bit control, the upper limit return difference P=0 is effective.	0
I	Integration time	13600sec * When set to 0, PD control will be implemented.	Set the integration time to remove the residual deviation caused by proportional control.	240
D	Derivative Time	13600sec * When set to 0, PI control will be implemented.	Set derivative time to prevent output fluctuation and improve control stability.	60
Ar	Limit the effective range of integral action	1100% of Proportional band (heating side)	Prevent over-limit or under-limit according to integral action.	100
T	Proportional period	1100sec (cannot be set to 0) * No display when the current is output.	Set the action cycle,Heating/cooling PID action: Proportional period of heating side.	See *3
PC	Proportional band (cooling side)	1-1000% of Proportional band (heating side)	Heating/cooling PID action: Set proportional band of cooling side.	100
DB	No induction control	Temperature input 10 +10℃ [℉] or10.0 +10.0℃ [℉] Voltage/current input 10.0+10.0% of full range	Set the non-inductive control of the control action between the proportional band (heating side) and the proportional band (cooling side), and cannot set a negative number.	0 or 0.0

Symbol	Name	Setting range	Description	Factory setting value
T	Proportional period (cooling side)	1100sec (cannot be set to 0) * No display when the current is output.	Heating/cooling PID action: Set the cooling side control output cycle.	(See *4)
SC	Process value deviation	Temperature input 199.9+999.9℃[℉] Voltage/current input ±range	The measured value of the sensor is added to this value.As PV value	0 or 0.0
LCK	Set the data locking function.	See Table*5	Make change data valid/invalid	0000

Note：Some parameter symbols may not be displayed

*1 Setting of heater break alarm (HBA)

· It is only displayed when HBA is selected as the second alarm.

·HBA cannot be used for current output.

Set value of HBA,Please set it to about 85% (CT) of the input value of the current detector.When the power supply changes greatly, please set a slightly smaller value.In addition, when several heaters are installed in parallel, please set a slightly larger value.(within the input value of current detector).So that it can be ON even when only one branch is broken.

When the HBA is set to "0.0" or the current detector is not installed, the HBA is ON. Please note.

*2 Control ring break alarm setting

Only displayed when LBA is selected as the first or second alarm.

The setting value of LBA is usually set at about 2 times of the integration time (I).

Heating/cooling PID action has no control loop break alarm.

LBA cannot be used when AT function is used.

When the PID calculation value is 0% or 100%,the LBA function can be used.Therefore, after a failure occurs,the LBA action time is 0% or 100% of the calculation time of PID.plus the set time of LBA, then can be used.

When the setting time of LBA is too short,or it is not suitable for the control object, it will cause LBA to turn ON-OFF, or not turn ON,In this case, please set the LBA setting time slightly longer.

Relay contact output: 20sec,Voltage pulse output/Thyratron control tube drive output by flip-flop/Thyratron control tube output 2sec.

*4 （Relay contact output: 20sec, Voltage pulse output 2sec）。

*5 Data lock level selection.

Every data can only be monitored after being locked.

Every alarm data (HBA.LBA.LBD)Can be locked at the level of "0001.0011.0101.0111".

Code	Protection range of locks at all levels
0000	SV and all parameters can be set
0001	Only SV and alarm (AL1.AL2) can be set
0010	All items can be set except alarm (AL1.AL2)
0100	All items except SV can be set
0011	Only SV can be set
0101	Only alarm (AL1.AL2) can be set
0110	SV and alarm (AL1.AL2) can be set
0111	SV and all parameters cannot be set