



Digital PID Temperature Controller

USER MANUAL

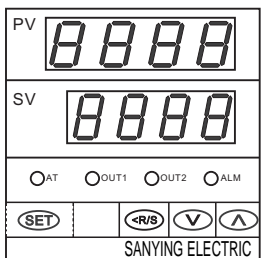
Digital PID Temperature Controller

Thank you for purchasing our products, please read this manual before using and keep this manual for future reference

 In normal operation, the operator must not remove the controller from its housing or have unrestricted access to the rear terminals, as this would provide potential contact with hazardous live parts.


 Installation and configuration must be undertaken only by technically-competent servicing personnel.


1 Panel description




PV: Process value/Parameters display

SV: Setting value/Value for various parameters

: Function key, to goes to parameters list, to shift between parameters to save and exit from parameters list

: Shift to target digits/run or stop the program

: Down key, decrease numerals

: Up key, increase numerals

OUT1: Main output LED indicator

OUT2: Output 2 LED indicator


AT: Auto-tuning process LED indicator


ALM: Alarm status LED indicator


2 Base display mode and basic configuration

2.1 Power up self-check


This device will perform self-checking after power up, below is the display sequence for this process


 Upper display shows a symbol for input
Lower display shows the temperature unit and input sensor type


 Upper display shows the default high limit for setting value
Lower display shows the default low limit for setting value

 Upper display shows the current process value
Lower display shows the current setting value




2.2 Error Display

 Upper display show "uuuu" and flashes, indicates overscale, check the sensor wiring and input code

 Upper display show "oooo" and flashes, indicates underscale, check the sensor wiring and input code

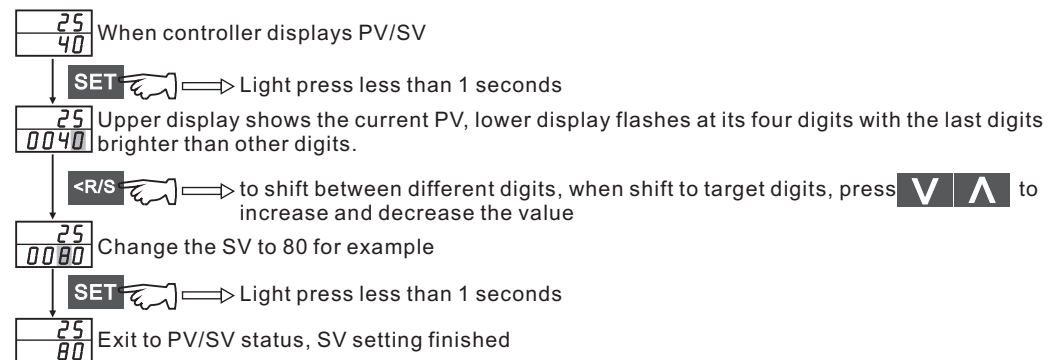
 Upper display shows the PV value but flashes means all wiring are correct but the PV has exceed the range of setting value high or low limit, adjust the setting value range.

2.3 Run and stop the program

   Press shift key and hold still for more than three seconds can run/stop the program

2.4 Setting value(SV) configuration



Setting value can only be configured when controller shows PV in the upper display and SV at the lower display

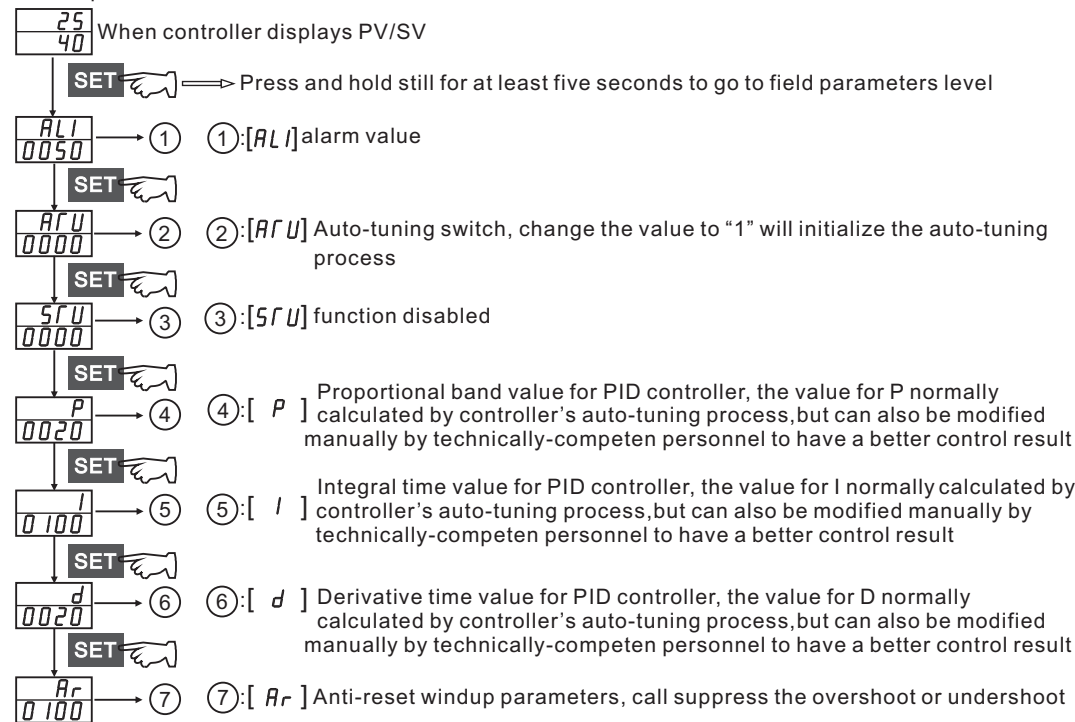


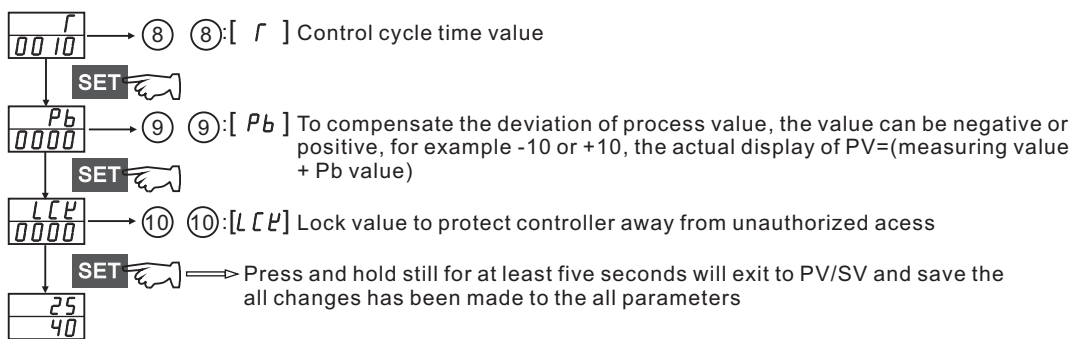
3 Field parameters and setting

Some crucial parameters can be configured within field parameters level listed as below:

- Alarm value
- Auto-tuning switch on and off
- Proportional band value setting (referred as P in PID control)
- Integral time value setting (referred as I in PID control)
- Derivative time value setting (referred as D in PID control)
- Anti-reset windup value setting
- Control cycle time setting
- Protection Lock setting
- PV Bias value

Below sequence for configuring the parameters within field parameters level, press   can change the value of parameters.





● Table 1--- Field parameter details

| Legend | Meaning | Range | Factory default | Sequence |
|------------|--------------------|-------------------------------|-----------------|----------|
| <i>ALI</i> | Alarm value | -1999 to 9999 | 50/50.0 | ① |
| <i>AFU</i> | auto-tuning switch | 0 or 1 | 0 | ② |
| <i>SFU</i> | not applicable | not applicable | not applicable | ③ |
| <i>P</i> | Proportional band | 0-9999 or 0.1~999.9 | 15/15.0 | ④ |
| <i>I</i> | Integral time | 1-3600 S | 40 | ⑤ |
| <i>d</i> | derivative time | 1-3600 S | 20 | ⑥ |
| <i>Ar</i> | anti-reset windup | 0~100% | 25 | ⑦ |
| <i>r</i> | cycle time | 1-100S | 20/2 | ⑧ |
| <i>Pb</i> | PV Bias | -1999 to 1999/-199.9 to 999.9 | 0 | ⑨ |
| <i>LCK</i> | Data Lock | See table 2 | 0000 | ⑩ |

● Table 2— Protection lock details

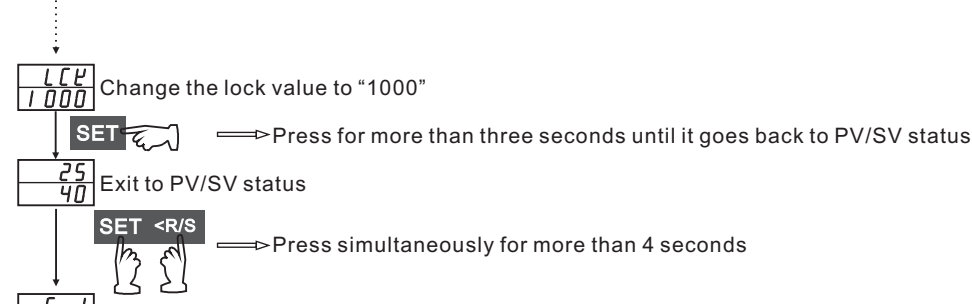
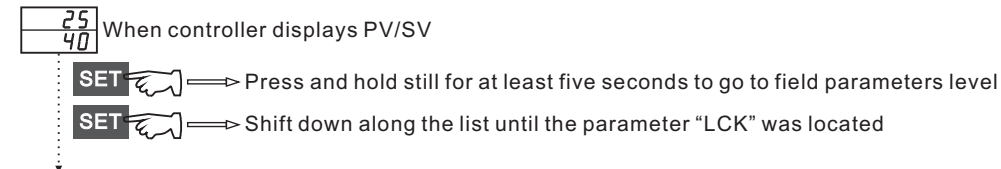
| Lock value | Protection | Lock value | Protection |
|------------|---|------------|--|
| 0000 | SV and all parameters can be modified | 0011 | Only SV can be modified |
| 0001 | Only SV and alarm value can be modified | 0101 | Only alarm value can be modified |
| 0010 | All parameters except alarm can be modified | 0110 | All parameters can be modified except SV and alarm |
| 0100 | All parameters except SV can be modified | 0111 | All parameters are locked |

4 System parameters setting(LEVEL 1)

Parameters can be configured within system parameter level 1 listed as below

- Input sensor selection
- Alarm mode selection
- Output type code,output was fixed when products ready to ship, should not be modified.
- Run/Stop function configuration

Follow below sequence to go to system parameters level 1



⑪:[*SL 1*] Input sensor type parameters, this controller support universal input signals, to configure the controller and work with different signals, please refer to table 3 for details,press ∇ \wedge to change the value of parameters

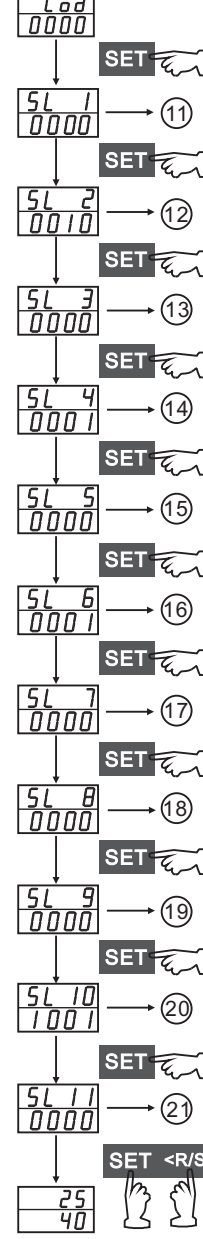
● Table 3— Input sensor description

| Value | | | | Input Type | Range |
|-------|---|---|---|----------------|--------------------|
| 0 | 0 | 0 | 0 | K | (0 to 1372 °C) |
| 0 | 0 | 0 | 1 | J | (0 to 1200 °C) |
| 0 | 0 | 1 | 0 | L | (0 to 900 °C) |
| 0 | 0 | 1 | 1 | E | (0 to 1000 °C) |
| 0 | 1 | 0 | 0 | N | (0 to 1300 °C) |
| 0 | 1 | 1 | 1 | R | (0 to 1769 °C) |
| 1 | 0 | 0 | 0 | S | (0 to 1769 °C) |
| 1 | 0 | 0 | 1 | B | (0 to 1820 °C) |
| 1 | 0 | 1 | 0 | W5Re/W26Re | (0 to 2320 °C) |
| 1 | 0 | 1 | 1 | PL II | (0 to 1390 °C) |
| 0 | 1 | 0 | 1 | T | (-199.9 to 400 °C) |
| 0 | 1 | 1 | 0 | U | (-199.9 to 600 °C) |
| 1 | 1 | 0 | 0 | Pt100(JIS/IEC) | (-199.9 to 649 °C) |
| 1 | 1 | 0 | 1 | JPt100(JIS) | (-199.9 to 649 °C) |
| 1 | 1 | 1 | 0 | 0 to 5V DC | -1999 to 9999 |
| 1 | 1 | 1 | 1 | 1 to 5V DC | (configurable) |
| 1 | 1 | 1 | 0 | 0 to 20mA DC | -1999 to 9999 |
| 1 | 1 | 1 | 1 | 4-20mA DC | (configurable) |

⑭:[*SL 4*] Alarm mode for #1 alarm
Refer to table 4 for details

● Table 4— Alarm mode description

| Value | | | | Alarm Type |
|-------|---|---|---|--|
| 0 | 0 | 0 | 0 | Alarm disabled |
| 0 | 0 | 0 | 1 | Deviation high-limit alarm |
| 0 | 0 | 1 | 0 | Deviation high/low-limit alarm |
| 0 | 0 | 1 | 1 | Absolute value high-limit alarm |
| 0 | 1 | 0 | 1 | Deviation low-limit alarm |
| 0 | 1 | 1 | 0 | Deviation high-low limit reverse alarm |
| 0 | 1 | 1 | 1 | Absolute value low-limit alarm |



①6: [SL 6] Output type parameters, this parameter was pre-determined and shall only be configured in the factory.

②0: [SL 10] Run/Stop function configuration, set value as "1001" will activate the Run/Stop function via panel by press <R/S>, set value as "1000" to disable the Run/Stop function

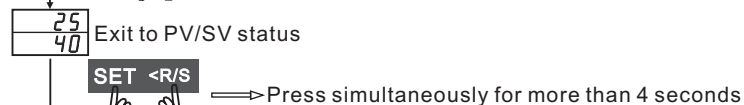
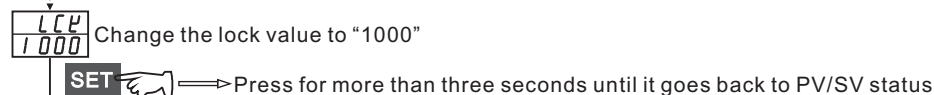
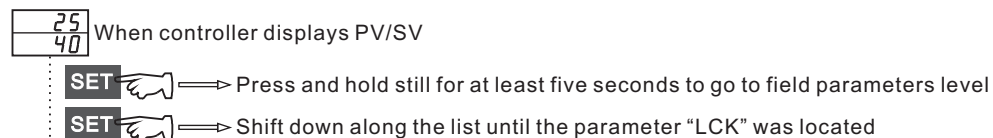
▲ Parameters "SL2" "SL3" "SL5" "SL7" "SL8" "SL9" are not available for configuration

5 System parameters setting (LEVEL 2)

Some crucial parameters can be configured within in system parameters level 2 listed as below:

- Setting range high/low limit when input is TC/RTD
- Display range when input signal is analog signal(4-20ma/0-10ma/0-5V/1-5V)
- Decimal point setting when input signal is analog signal
- Action dead bank for on/off control mode
- Hysteresis value for alarm

Follow below sequence to go to system parameters level 1



Upper shows the "Cod" level code
Lower shows "0000"

Change "Cod" value to "0001"



②2: [SLH] Setting value high limit when input is TC/RTD
Upper limit display when input is analog(0-10mA/4-20mA/0-5V/1-5V)



②3: [SLL] Setting value low limit when input is TC/RTD
Lower limit display when input is analog(0-10mA/4-20mA/0-5V/1-5V)



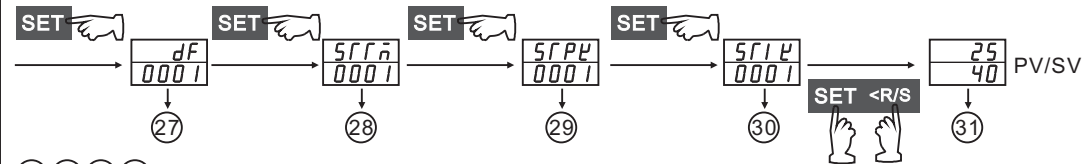
②4: [PGdP] Decimal point setting when input is analog signal, maximum 3 decimals(parameters not available when input is RTD/TC)



②5: [oH] Hysteresis value for on/off control mode.
0 to 100 or 0.0 to 100.0
0.0% to 10.0% of full scale for analog input(Factory default is 2.0)



②6: [AH I] Hysteresis for alarm
0 to 100 or 0.0 to 100.0
0.0% to 10.0% of full scale for analog input(Factory default is 2.0)

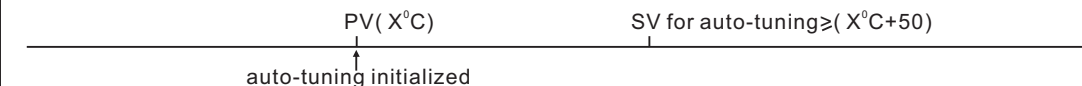


②7②8②9③0 is not available for configuration

6 Auto-tuning

Auto-tuning is a basic function of this controller, to have a better control result, the auto-tuning shall be initialized from ambient temperature and shall only be initialized after the wiring was done properly on the entire system.

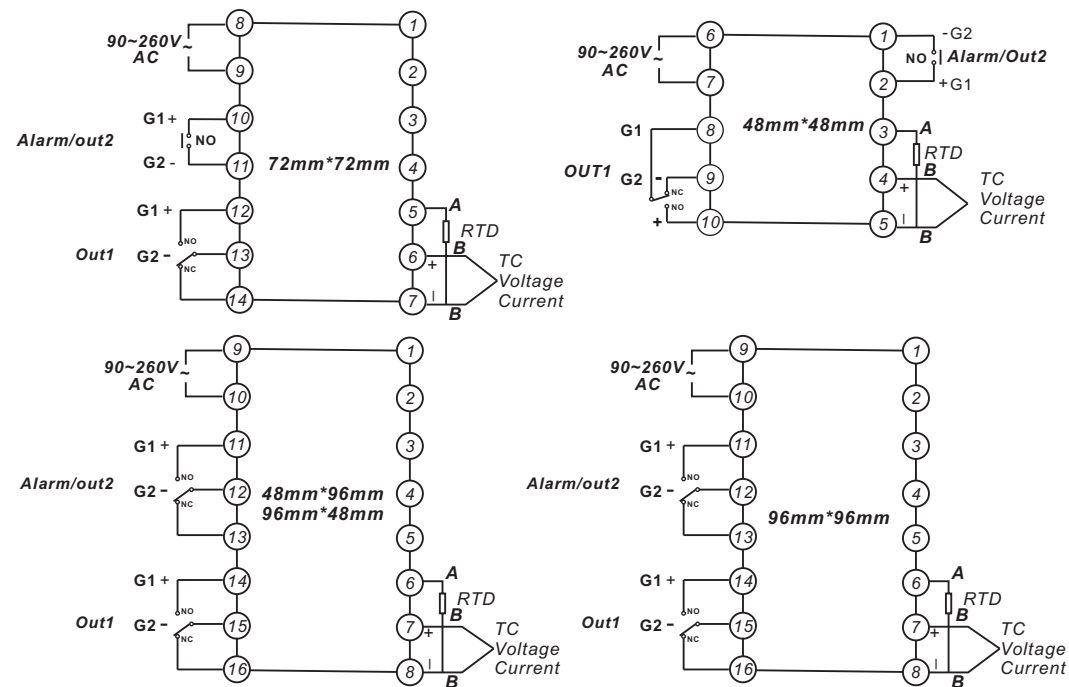
The Setting value for auto-tuning process should be larger than the initial temperature where the auto-tuning was triggered, and the minimum temperature difference should be 50C



The auto-tune will stop automatically after three cycles of heating and natural cooling process. No action should be made to the controller during the auto-tuning process. otherwise the auto-tuning will abort.

⚠ The controller will at on-off control mode during the auto-tuning process, grave overshoot is expected. be sure to pay strict attention if the system is vulnerable to the overshoot. be sure to set proper SV during auto-tuning in such a vulnerable system to avoid damage

7 Terminal Arrangement



Size: 48mm*48mm/cutout: 45mm*45mm*78mm(behind the back)
48mm*96mm(96mm*48mm)/cutout: 45mm*91.5mm*78mm(behind the back)
72mm*72mm/cutout: 67.5mm*67.5mm*92mm(behind the back)
96mm*96mm/cutout: 91.5mm*91.5mm*70mm(behind the back)