

# TK-2 / TK-4 Series Multi-Loop Temperature Controllers

## Instruction manual

### I、Summary

The TK series temperature controls up to 2, 4, channels. The TK increases zone density and makes smaller numbers of loops affordable, yet still holds many of the advantages that a single loop controller might offer. It has a separate auto-tune mode and PID parameter function with more precision and more reliability in whole machine control. It saving labor costs, installation costs, electric panel sizes, and operation costs.

- Support universal inputs (Cu50/Pt100/K/E/J/T, 4-20mA , etc.)
- Various dimension; Output relay or SSR selectable.
- 2-8 kinds of combinations of temperature set value, PID constant, alarm set value, etc.
- An optional communications interface, RS-232C, or RS-485 is available for networking to computers, PLCs and SCADA software.
- An optional printer module interface.
- The Heat/Cool PID control features heat and cool outputs for use where process-generated heat exists.

### II、Primary technical standard:

- 1、Input signal: CU50 (-50.0~150.0°C) 、 Pt100 (-19.9~600.0°C) 、 K (0~1300°C) 、 E (0~700.0°C) 、 J (0~900.0°C)
- 2、Accuracy:  $\pm 0.5\%F.S \pm \text{byte}$
- 3、Output method: Relay AC220V 3A(resistance load)
- 4、control mode: difference control-on/off and PID control
- 5、Input power: AC110~242V 50/60Hz
- 6、Environment Temperature: 0 to 50°C, Humidity:  $\leq 85\%RH$
- 7、Face Size: 160×80×110 mm      Hole Size : 152×76 mm  
96×96×110 mm      Hole Size : 92×92 mm  
72×72×110 mm      Hole Size : 68×68 mm

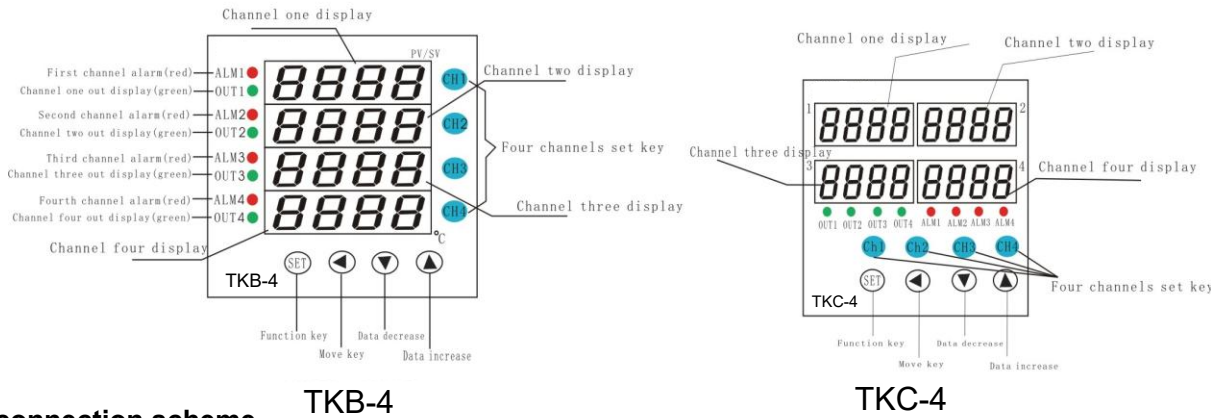
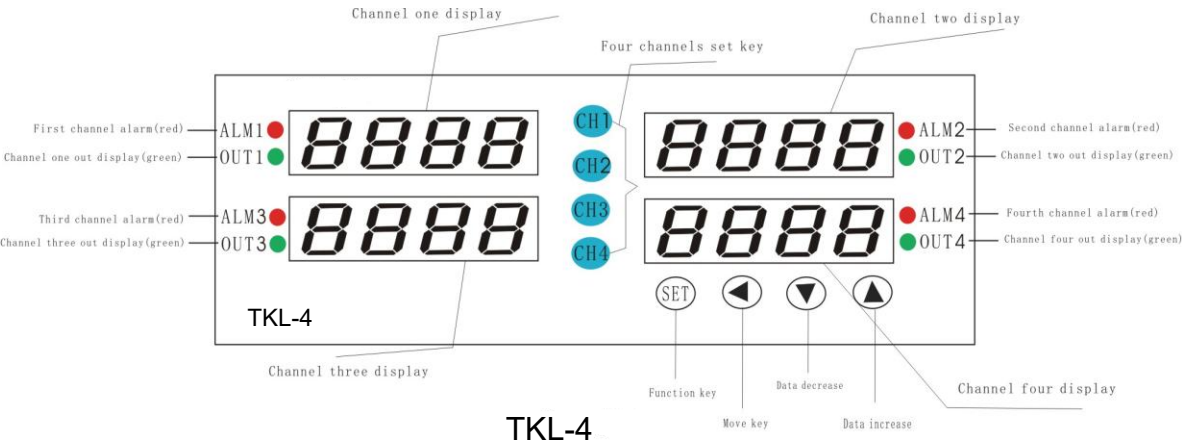


**How to Order**      TK -    -    -    -    -    -    -     
(1) (2) (3) (4) (5) (6) (7)

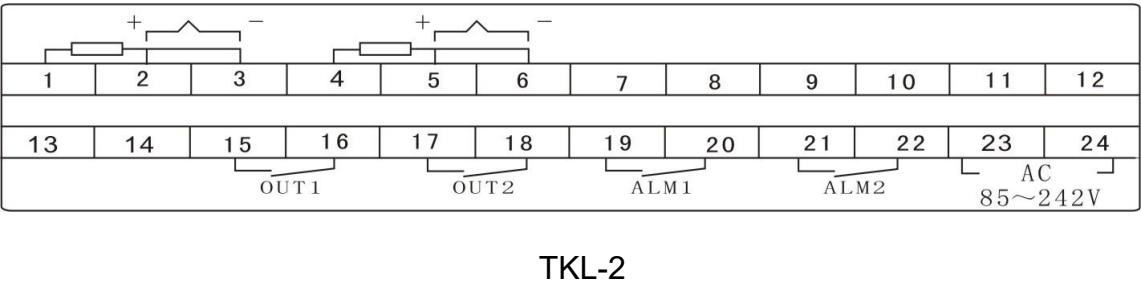
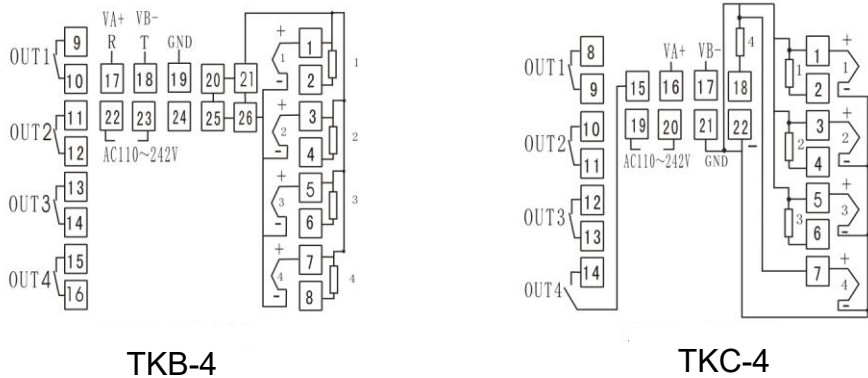
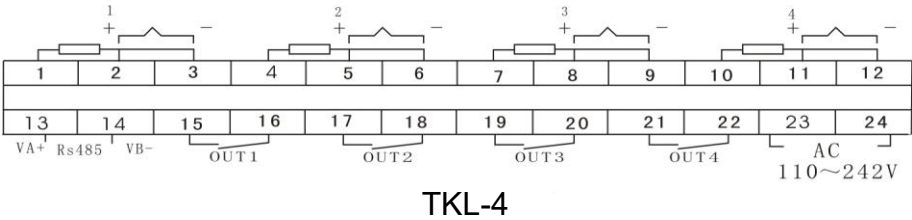


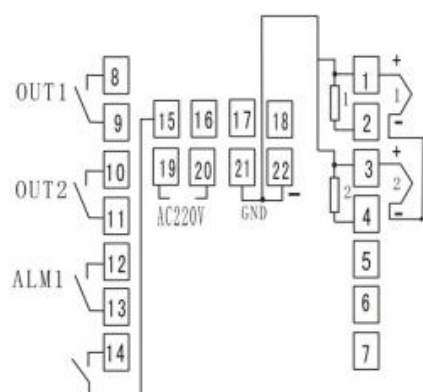
- (1) Series TK
- (2) Dimension (mm):    L:160×80×125    C:72×72×105  
                                  B:96×96×125
- (3) Number of channels: "2" 2-channel; "4" 4-channel
- (4) Alarm: '0': no set alarm; '1': one alarm ( The alarm method can be selected through the parameter ALP)
- (5) Suffix function: "Empty" Relay contact output;  
                              "G" Solid state relay output;
- (6) "R4" RS485 Modbus ;  
      "R2" RS232 Modbus communication interface;  
      "LG" Printer module interface
- (7) Customized

III、Panel board instruction

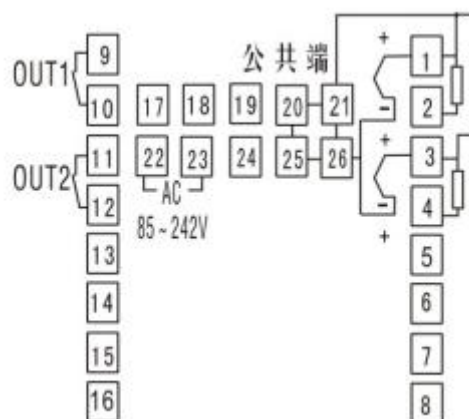


IV、connection scheme





TKB-2



TKC-2

### connection indicator :

PS: 1、MiNi printer connection

| Printer down-lead no | Meter port |
|----------------------|------------|
| 21                   | R          |
| 19                   | T          |
| 10-18                | GND        |
| others               | None       |

2、RS485 communication:connect corresponding 'VA+、VB-'.

3、RS232 communication:connect corresponding 'R'、'T'、'GND'.

4、only one function can be used between printer and communication functions at one time.

### V、Code setting mode

| Series |    | Code | Name             | Setting range   | Manual                                                                                                                                     | Remarks           |
|--------|----|------|------------------|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| first  | 0  | LOCK | Code lock        | 0~50            | 18-all the parameter can be revised,                                                                                                       | 18                |
|        | 1  | Sn   | Input type       | 0~4             | CU50、Pt100、K、E、J                                                                                                                           | K                 |
|        | 2* | ALP  | Alarm define     | 0~6             | 0: no alarm、1: upper limit alarm、2: low limit alarm、3: upper warp alarm、4: low warp alarm、5: between besides alarm、6: between inside alarm | 1                 |
|        | 3  | t    | Output cycle     | 0~120 S         | relay control action cycle setting                                                                                                         | 10 S              |
|        | 4  | dp   | display accuracy | 0~1             | 0. no decimal; 1.have decimal                                                                                                              | 0                 |
|        | 5  | P-SH | Upper limit      | P-SL~full range | this parameter resreict enactment value's upper                                                                                            | according request |

|        |     |           |                               |                             |                                                                                                                                                                                  |                   |
|--------|-----|-----------|-------------------------------|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
|        | 6   | P-SL      | lower limit                   | Range jumping-off ~ P-SH    | this parameter resreict enactment value's low                                                                                                                                    | according request |
|        | 7   | OPB       | Assistant output method       | 0~2                         | 0. no Assistant output;<br>1.RS485 communication<br>2.Mini pinter                                                                                                                | 0                 |
|        | 8   | Add       | address                       | 1~64<br>(1~9999 分)          | Meter's NO<br>(in minitype as print times)                                                                                                                                       | 1                 |
|        | 9   | bt        | baud rate                     | 0~3                         | 0: 1200; 1: 2400;<br>3: 4800; 4: 9600                                                                                                                                            | 9600              |
|        |     |           |                               |                             |                                                                                                                                                                                  |                   |
| Second | 10  | SP+N(1~4) | N channels control setting    | Range by P-SL 、 P-SH decide | Control value setting                                                                                                                                                            | default           |
|        | 11  | AL+N      | Alarm value setting           | Range by P-SL 、 P-SH decide | Output mode decide by 'AL-P'                                                                                                                                                     | default           |
|        | 12  | SC+N      | Sensor error amendment        | ±20.0                       | The sensor have deviation can                                                                                                                                                    | 0                 |
|        | 13  | P+N       | Proportion modulus            | 0~100                       | When the P increase,the the proportion function decrease<br>When P=0,the meter is ON/OFF control                                                                                 | 8                 |
|        | 14  | I+N       | Calculus time                 | 0~3000                      | It's mainly used to adjust the static difference. To increase it, the static difference will be reduced , but when it is too high, the static difference will drift instability. | 240               |
|        | 15  | d+N       | differential time             | 0~200S                      | When the I↓,the calculus function↑;<br>I↑the calculus function↓.<br>When I=0, no calculus fur adjustment instrument                                                              | 30                |
|        | 16  | Hy+N      | Main control by drop in level | 0.1~50.0                    | —                                                                                                                                                                                | 1.0               |
|        | 17* | At+N      | Setting itself                | 0~1                         | 0: close setting itself<br>function 1: open setting<br>inself function                                                                                                           | 0                 |

## VI、 Technical indexes

1. Accurately connect uires according as connect indicator,power on.
2. Press 'SET key' for 3 seconds,enter into first menu.then 'parameter 'and paraneter value tims will be shown respectively about 'CH1 window' and 'CH2 window',you can adjust these parameters by poressing '▲'、 '▼'、 '◀'、 and save the setting by prwss 'SET key ',every parameter should be saved after setting ,then enter next parameter set.
3. You can press 'CH1'、 'CH2'、 'CH3'、 'CH4' for 3 seconds to enter into corrsponding channel menu .After finished one parameter set,press 'SET' to save it,then enter into next parameter set .

## VII、Setting itself

The meter use in the first time or the surroundings have changer, finding it control not good, in this time you need use the setting itself. For example:The first set the AT=1,A-M light flickered, the meter enter into setting itself, press the SET key enter into parameter setting. Set the Hy is 0.5~1°C, if the output is relay set the t=2S, the meter have three times vibrate, automatic preserved P, I, D parameter and the A-M light off, the setting itself finish.

## VIII、Fault Analysis and Clearance

TKL-4 adopt advanced production process, and have the strict test before leaving factory, it improve the reliability of the meter .The usual fault caused by the wrong operation or parameter setting .If you find the fault couldn't be cope with, please record it, and contact with the agent or us. Sheet 8-1 is the usual fault of TKL-4 in the daily application :

Sheet 8-1 Common fault disposal

| Fault symptom                                                        | Analysis of causes                                            | Disposal measurement                                                             |
|----------------------------------------------------------------------|---------------------------------------------------------------|----------------------------------------------------------------------------------|
| Abnormal power                                                       | 1、 poor contact of power cord<br>2、 power switch without lose | Check the power                                                                  |
| Signal display do not correlate with the facts. (display 'HH'or 'L') | 1、 Sensor model mismatch<br>2、 wrong signal connect ion       | 1、 check sensor model and meter interior input parameter<br>2、 check signal wire |
| Abnormal control output                                              | wrong connection of output wire                               | Check output connection                                                          |

★Remark: Our company will improve product technology, design and specification, it is confirm to the object.

### Attached 1: Statement of meter's parameter attention letter and English letter

|          |          |          |          |          |          |          |          |          |          |          |          |          |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| A        | B        | C        | D        | E        | F        | G        | H        | I        | J        | K        | L        | M        |
| <i>A</i> | <i>b</i> | <i>C</i> | <i>d</i> | <i>E</i> | <i>F</i> | <i>G</i> | <i>H</i> | <i>I</i> | <i>J</i> | <i>K</i> | <i>L</i> | <i>M</i> |
| N        | O        | P        | Q        | R        | S        | T        | U        | Y        |          |          |          |          |

# TKL-8 series Intelligent Temperature Controller

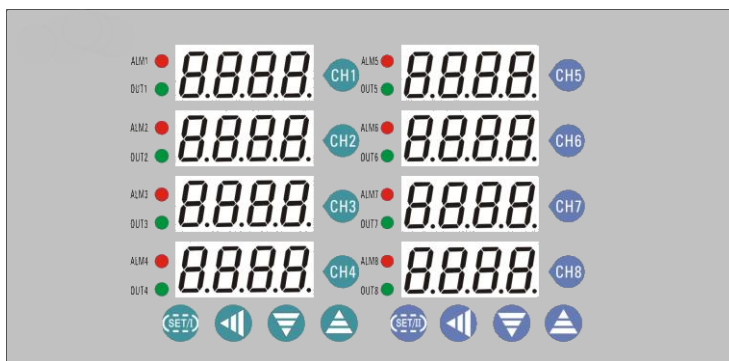
## 8 channel independent control

TKL-8 series intelligent temperature control instrument is a new meter to meet the market needs. The meter is controlled by single chip micro-computer, every channel setting value and some parameters can be set up independently. It has the advantages of small volume, low power consumption, simple operation, easy control, stable operation, reliable, economical characteristics. It is widely used in the temperature automatic control systems of machinery、chemical、ceramics、light industrial、metallurgy、petrification and heat treatment, and so on.

### I 、 Main technical specification

- 1、Input(can be selected):CU50(-50~150)、PT100 (-80~600)、K (-30~999)、E (-30~700)、J (-30~900)、T (199~400)
- 2、Measurement deviation:  $\pm 0.5\%F \cdot S \pm 1B$  Cold end compensating deviation:  $\pm 2.0^{\circ}C$
- 3、Sampling cycle: 0.5S
- 4、Control cycle: relay output 2~120S , other is 2S.
- 5、Relay output contact capacity: AC220V/5A (resistance load) or AC220V/0.3A (perceptual load)
- 6、Alarm relay contact output:AC220V/1A (resistance load)
- 7、Driving solid relay signal output: driving electric current $\geq 15mA$ , voltage $\geq 9V$ .
- 8、Power supply: AC85V~242V, 50/60Hz
- 9、Working condition: temperature 0~50.0 $^{\circ}C$ , relative humidity $\leq 85\%RH$ , without corrode and strong electric radiation.

### II 、 Panel instruction(consult)



- ALM1~ALM8:The first channel to the eighth channel alarm output indicator light ( red);
- OUT1~OUT8:The first channel to the eighth channel control output indicator light ( green );
- CH1~CH8 key:The first channel to the eighth channel corresponding channel parameter setting key;
- SET/ I key:The first channel to the fourth channel function setting key;
- SET/ II key:The fifth channel to the eighth channel function setting key;
- ◀ key (left) :The first channel to the fourth channel shift key;
- ▶ key (right) :The fifth channel to the eighth channel shift key;
- ▼ key (left) :The first channel to the fourth channel data decrease key;
- ▼ key (right) :The fifth channel to the eighth channel data decrease key;
- ▲ key (left) :The first channel to the fourth channel data increase key;
- ▲ key (right) :The fifth channel to the eighth channel data increase key;

### III、How to order:

TKL- 8 -    -    -    -    -     
 (1) (2) (3) (4) (5) (6) (7)

- (1)TKL: size 160×80×130mm; Setting hole 152×76mm;  
 (2)Design serial number:8 channel independent control meter, PID and ON/OFF control can optional;  
 (3) Alarm: '0':no set alarm; '1':one alarm ( alarm mode optional);  
 (4)Main control mode: 'space': relay normally-open normally-closed contact output;  
       'A':Single phase zero trigger control; 'G': Solid state relay control output  
 (5) "R4": Modbus RS485 or "R2" RS232 Communication module interface;  
 (6) LG: Printer's module interface  
 (7) Customized

### IV、Internal parameters:

| Internal parameters: |    |           |                                        |                                      |                                                                                                                                                                                             |            |
|----------------------|----|-----------|----------------------------------------|--------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| Series               |    | Code      | Name                                   | Setting range                        | Manual                                                                                                                                                                                      | Ex-Factory |
| First                | 0  | LOCK      | Electronics lock                       | 0~50                                 | LOCK=18 all the parameter can be revised;<br>LOCK≠18 all the parameter can not be revised                                                                                                   | 18         |
|                      | 1  | Sn        | Input type                             | CU50、Pt2、E、J                         | CU50 (CU50) -50.0~150.0℃<br>Pt100 (Pt2) -199.9~600.0℃<br>K (K)、-30.0~1300℃<br>E (E)、-30.0~700.0℃<br>J (J) -30.0~900.0℃                                                                      | E          |
| Menu                 | 2  | ALP       | Alarm output definition                | 0~6                                  | '0'no alarm; '1'upper limit alarm;<br>'2'lower limit alarm;<br>'3'positive deviation alarm<br>'4'negative deviation alarm.<br>'5'outside the interval alarm<br>'6'inside the interval alarm | 1          |
|                      | 3  | t         | Output cycle                           | 2~120 S                              | Relay set for 10S;SSR set for 2S.                                                                                                                                                           | 10 S       |
|                      | 4  | dp        | Decimal point                          | 0~1                                  | 0:have not decimal point;<br>1:have decimal point                                                                                                                                           | 0          |
|                      | 5  | P-SH      | The max. value of temperature range    | —                                    | They are used to reset proper temperature range as per user's application. As for the Max. temperature range for different inputs, please refer to Sn, P-SH≥P-SL.                           | 1300       |
|                      | 6  | P-SL      | The min. value of temperature range    | —                                    |                                                                                                                                                                                             | 0          |
|                      | 7  | OPB       | Assistant output method                | 0~2                                  | 0:No assistant output;<br>1:RS485 serial communication;<br>2:Mini printer                                                                                                                   | 0          |
|                      | 8  | Add       | Communications address / interval time | 1~64<br>(1~9999)                     | Instrument No. in the centralized control system (in the band miniature printing, as printing interval time )                                                                               | 1          |
| 9                    | bt | baud rate | —                                      | 1200;2400;4800;9600<br>Four optional | 9600                                                                                                                                                                                        |            |

| In the following parameters, N represents the corresponding channel number 1 ~ 8. |    |             |                                     |                                                               |                                                                                                                                                                                                                     |        |
|-----------------------------------------------------------------------------------|----|-------------|-------------------------------------|---------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| Second                                                                            | 10 | <b>SP+N</b> | N channel temperature setting value | Rang decide by P-SL, P-SH, deviation alarm range :<br>0.5~100 | According to users need to set the controlling temperature value                                                                                                                                                    | random |
|                                                                                   | 11 | <b>AL+N</b> | Alarm setting value                 |                                                               | Output mode decide by 'AL-P'                                                                                                                                                                                        | random |
| Menu                                                                              | 12 | <b>SC+N</b> | Sensor error amendment              | ±20.0                                                         | When the sensor have deviation, You can use it to revisal                                                                                                                                                           | 0      |
|                                                                                   | 13 | <b>P+N</b>  | Proportion modulus                  | 0~100                                                         | When the P increase, the proportion function decrease.<br><b>When P=0,the meter is ON/OFF control</b>                                                                                                               | 8      |
|                                                                                   | 14 | <b>I+N</b>  | Integral time                       | 0~3000                                                        | Set integral time so as to unchain residual. Deflection caused by proportion control. To increase it, the static difference will be reduced, but when it is too high, the static difference will drift instability. | 240    |
|                                                                                   | 15 | <b>d+N</b>  | Differential time                   | 0~200S                                                        | Set the differential time, so as to avoid. The output's fluctuation, Improve the control's stability.                                                                                                               | 30     |
|                                                                                   | 16 | <b>Hy+N</b> | The main control return difference  | 0.1~50.0                                                      | It makes sense when only ON/OFF control.                                                                                                                                                                            | 1.0    |
|                                                                                   | 17 | <b>At+N</b> | Setting itself (auto-tune)          | 0~1                                                           | 0:Close setting itself function<br>1:Open setting itself function<br>Please refer to "VII、Setting itself"                                                                                                           | 0      |

## V、Instrument operation:

### 5.1、The first menu setting ( public menu setting ):

Press the function key ( SET / I key) 3 seconds, enter into the first channel to the fourth channel the first menu setting state, this time ' the first channel display window ' and ' the second channel display window ' respectively display the first menu parameter symbols and parameter values, this time you can press respectively correspond to the ◀ (shift)、▲、▼ keys to change the parameter value, after the completion modified, press SET / I key to preserve and enter into the next parameter; modify the other parameters by the same method. If in the setting without any operation 10 seconds, the meter will automatically save and exit the modified state.

Press the function key ( SET / II key) 3 seconds, enter into the fifth channel and the eighth channel the first menu setting state, this time ' the fifth channel display window ' and ' the sixth channel display window ' respectively display the first menu parameter symbols and parameter values, modification method is as above.

### 5.2、The second menu setting ( each channel corresponding to the menu setting ):

The first channel to the fourth channel parameters respectively press CH1~CH4 three seconds to enter into the corresponding channel menu item, this time 'the first channel display window ' and 'the second channel display window ' respectively display the corresponding channel the second menu parameter symbols and parameter values, this time you can press respectively correspond to the ◀ (shift)、▲、▼ keys to change the parameter value, modification method is as above "5.1、The first menu setting".

The fifth channel to the eighth parameters respectively press CH5~CH8 three seconds to enter into the corresponding channel menu item, this time 'the fifth channel display window' and 'the sixth channel display window' respectively display the corresponding channel the second menu parameter symbols and parameter values, this time you can press respectively correspond to the ◀ (shift)、▲、▼ keys to change the parameter value, modification method is as above "5.1、The first menu setting".

## VI、Setting itself:

The meter use in the first time or the surroundings have changer, finding it control not good, this time you need use the setting itself. For example:

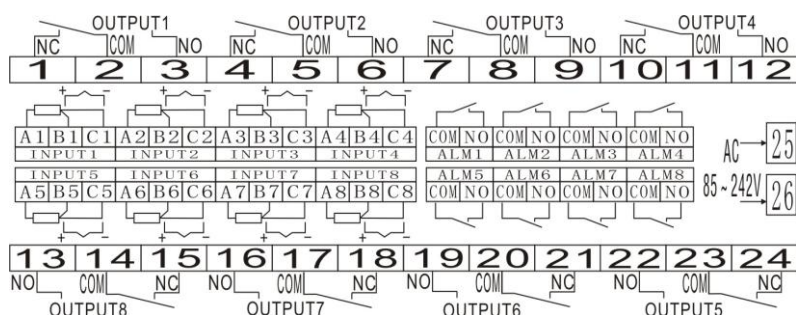
At first set up the corresponding channel setting value, and then enter into the corresponding channel menu, set the corresponding Hy is 0.5~1°C, set the AT=1, "AT" and the measured temperature value flash alternately, the meter enter into setting itself, the meter have three times vibrate, automatic preserved P, I, D parameter and the setting itself finish.

Note:①when the power off during setting itself, as the meter has the memory, it will restart setting itself next time.

②when it need artificially exit during setting itself, set the corresponding channel self-tuning

the parameter AT to 0 so that can exit, but the setting result will not be valid.

## VII、Connection scheme(consult):



**Note:1)**The above diagram is an example of TKL-8, only for reference, controller's specific connection should be confirm to the case's connection.

**2)**The meter's signal input used to isolate type sensor, or that may affect the meter's measurement.

## VIII、Fault Analysis and Clearance:

TKL-8 series adopt advanced production process, and have the strict test before leaving factory, it improve the reliability of the meter .The usual fault caused by the wrong operation or parameter setting. If you find the fault couldn't be cope with, please record it, and contact with the agent or us. Sheet 8-1 is the usual fault of TKL-8 series in the daily application:

Sheet 8-1 Common fault handling

| Fault symptom                                                  | Analysis of causes                                          | Disposal measurement                                                           |
|----------------------------------------------------------------|-------------------------------------------------------------|--------------------------------------------------------------------------------|
| Abnormal power                                                 | 1、Poor contact of power cord<br>2、Power switch without lose | Check the power                                                                |
| Signal display do not correlate with the facts. (display 'HH') | 1、Sensor model mismatch<br>2、Wrong signal connection        | 1、Check sensor model and meter interior input parameter<br>2、Check signal wire |
| Abnormal output control                                        | 1、Wrong connecting output wire                              | 1、Check output connection                                                      |
|                                                                |                                                             |                                                                                |

### Attached 1:Statement of meter's parameter attention letter and English letter

|          |          |          |          |          |          |          |          |          |          |          |          |          |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| A        | B        | C        | D        | E        | F        | G        | H        | I        | J        | K        | L        | M        |
| <i>A</i> | <i>b</i> | <i>c</i> | <i>d</i> | <i>e</i> | <i>f</i> | <i>g</i> | <i>h</i> | <i>i</i> | <i>j</i> | <i>k</i> | <i>l</i> | <i>m</i> |
| N        | O        | P        | Q        | R        | S        | T        | U        | Y        |          |          |          |          |
| <i>n</i> | <i>o</i> | <i>p</i> | <i>q</i> | <i>r</i> | <i>s</i> | <i>t</i> | <i>u</i> | <i>y</i> |          |          |          |          |

**Note:** Our company will continue to improve product technology, design specification. If change, please subject to the material object, without notice.