

Dear clients, thanks for choosing IBEST TCH Series Digital Adjustor! Before installing and operating the products, please read this instruction manual carefully. For any questions, please contact our sales people immediately.

PREREAD INSTRUCTIONS

⚠ SAFETY CAUTIONS:

- Please do not turn on the power supply until all of the wiring is completed. Otherwise electrica shock, fire or malfunction may result.
- Do not wire when the power is on. Do not connect the unused terminals. Do not turn on the power supply when cleaning this instrument.
- Do not disassemble, repair or modify the instrument. This may cause electrica shock, fire or malfunction.
- Use this instrument in the scope of its specifications. Otherwise fire or malfunction may result.
- The use life of the output relay is quite different according to is capacity and condicions. If use out of its scope, fire or malfunction may result.

⚠ STOCK AND MAINTAINENCE NOTICE:

- This instrument should be installed in a domestic environment. Otherwires electrical shock, fire or malfuncti-on may result. The operating temperature environment should between 0 (32F) to 50 (122F).
- To avoid using this instrument in environment full of dust or caustic gas. To avoid using this instrument in environment of stronge shock or concussion.
- To avoid using this instrument in environment of overflow water or explosive oil.
- The is no current protection power supply or fuse in this instrument. If reinforced is needed, the specifications of the fuse should be: 250VAC, 0.5A.
- The power supply wire should not put together with large current wire to aviod electromagnetic radiation, If it ust to put together, we suggest to use the individual pipe.
- In case the instrument is used in environment of strong noise, (such as motor, transformer, solenoid, etc.) A current suppresser or noise filter should be used. In case the instrument is use in environment of nuclear control, iatrical equipment, auto, train, airplane or security equipment that need protections, please contact the manufacturer for details.

1. FEATURES

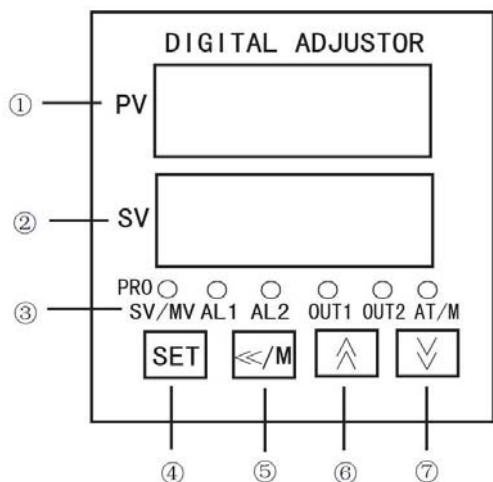
- Micro processor digital adjustor, with built in SMT technology and digit filter circuit.
- Auto-tune PID, Fuzzy PID, ON-OFF function; cooling/heating function.
- Soft buttons, easily operate
- Dual line 4 LED digit display: upper LED : red; lower LED: green
- Optional input signals: TC, RTD, mA, mV, A, V, Rt
- 1 or 2 input (2nd input used as remote setpoint)
- Optional control output: Relay, SSR/logic, SCR, linear current (4~20mA/0~10mA) and pulse width output.
- Up to 3 alarm output and up to 5 alarm output modes.
- 24V DC transmitter supply
- With RS485 communication interface, modbus protocol
- Measuring accuracy: $\pm 0.3\% F.S \pm 2$ digit (under normal conditions)
- Optional instrument size: 48W×48H; 48W×96H; 72W×72H; 96W×48H; 96W×96H. (mm)
- Application ranges: food&beverage; oven, furnance, plastic extruder, chemicals processing, heating process...etc. (can measure temperature, humidity, level, weight, pressure...etc. (with differencnt sensors)

2. ORDERING CODE

T C	H	—		R	R	R	R	4	1	C	
Temperatruue controller/adjustor											No. RS485 interface
H series										C	With RS485 interface
Function: Blank: PID function									1		1 input
Function: Open/close loop position proportion control									2		2 input
Function: 3 phase shift control									4		48W×48H dimension
Function: Reomot set point control									6		48W×96H dimension
Function: PWM time curve control									7		72W×72H dimension
Function: 3 phase SCR contact control									8		96W×48H dimension
Function: single phase shift control									9		96W×96H dimension
Out 1: Relay output				R				R			AL3: Relay alarm output
Out 1: Ssr (logic) output				S				S			AL3: Ssr (logic) alarm output
Out 1: SCR output				K				K			AL3: SCR alarm output
Out 1: current (4~20mA/0~10mA) output				C				C			AL1: current (4~20mA/0~10mA) output
Out 1: pulse width output				P				P			AL3: pulse width output
Out 2/AL2: Relay output				R		R					AL3: Relay alarm output
Out 2/AL2: Ssr (logic) output				S		S					AL1: Ssr (logic) alarm output
Out 2/AL2: SCR output				K		K					AL1: SCR alarm output
Out 2/AL2: current (4~20mA/0~10mA) output				C		C					AL1: current (4~20mA/0~10mA) output
Out 2/AL2: pulse width output				P		P					AL1: pulse width output

Notice: 1, Out2 (output 2) and AL2 (alarm 2) use the same terminal points, user can select either Out2 or AL2.
 2, Out2 (output 2) is used as cooling function related to heating function.
 3, If user have special request besides the ordering code, please indicate when order.

3.PANEL INSTRUCTIONS



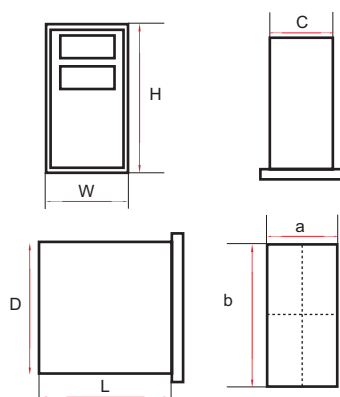
- ① Measured value (PV)/Various parameter symbols
- ② Set value (SV)/Various parameters set value
- ③ Indication lamps:
 - * PRO(SV/MV):Program lamp/ Convert indicate lamp
 - Flashing: Program running or displaying PV2 (when the second input is available)
 - On: Program stop or displaying SV set value
 - Off: MV output displaying
 - * AL1:Alarm 1 lamp
 - * AL2:Alarm 2 lamp
 - * OUT1:Output 1 lamp (PID1) On: Output Off: No output
 - * OUT2:Output 2 lamp (PID2/AL3) On: Output Off: No output
 - * AT/M:Autotuning/Manual On: Autotuning Off: Manual
 - Flashing: Online PID autotuning
 - * AL: Alarm1 output lamp On: Output Off: No output
- ④ Set key:Used for parameter registration/calling up
- ⑤ Shift/Autotuning key: Press this key can shift digit of parameter value. Press and hold for more than 2 seconds can convert autotuning/manual operation.
- ⑥ Up key:Used to increase numerals
- ⑦ Down key:Used to decrease numeral

4.TECHNICAL SPECIFICATIONS

Power supply:	90-260V AC 50/60HZ
Power consumption:	≤ 6VA
Main control output:	Relay: NO., contact capacity: AC 250V /3A or DC 30V /3A Cosφ=1 ; SSR/Logic: DC 24V/20mA
Alarm output:	Relay: NO., contact capacity: AC 250V /3A or DC 30V /3A Cosφ=1 ; SSR/Logic: DC 24V/20mA
Sampling rate:	<8 times/s
Input:	TC/RTDmV/mA/V/A/Rt
Accuracy:	±0.3% F.S (under normal conditions)
Output:	Relay, SSR, SCR, Linear current 4~20mA, 0~20mA
Transmitter supply:	Isolated DC 24V/30mA or DC 12V/30mA
Communication:	RS485 (Modbus protocol)
Withstand voltage:	1500V Rms (between terminal points and the plastic case)
Insulation strength:	Min. 50m Ω (500V DC, between the terminal points and case)
Ambient temperature:	0~50℃
Stock temperature:	-10~60℃ 35~85%(RH)

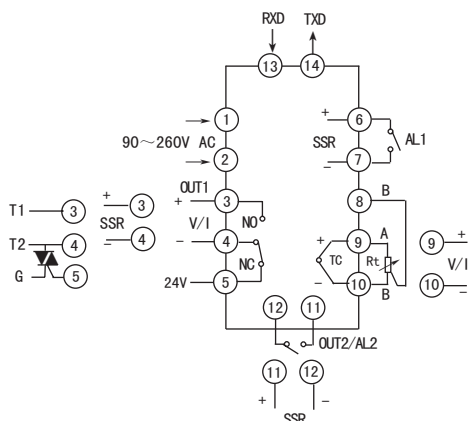
INPUT TYPE	MEASURING RANGE	INPUT IMPEDANCE	FACTORY SETTING
A(AA/DA)	AC 0~5A / 0~20A	CT configurable	0~5A
mA	0~1mA / 0~10mA /4~20mA	≤150Ω	4~20mA
V(AV/DV)	0~5V / 0~10V / 0~500V	≤200KΩ	0~10V
mV	0~10mV (± 100mV)	≤2MΩ	0~75mV
Rt	0~400Ω / 0~10K 0~1K / 0~50K	≤0.2mA ≤0.1mA	0~400Ω
TC	K: 0~1200℃	≤2MΩ	K
	J: 0~1000℃		
	E: 0~1000℃		
	T: 0~400.0℃		
	B: 600~1700℃		
	R: 500~1600℃		
RTD	S: 0~1700℃	≤0.2mA	Pt100
	Pt100: -200~650 ℃ Cu50/Cu100: -50~150 ℃		

5.DIMENSION AND INSTALLATION HOLE DIMENSION(unit: mm)

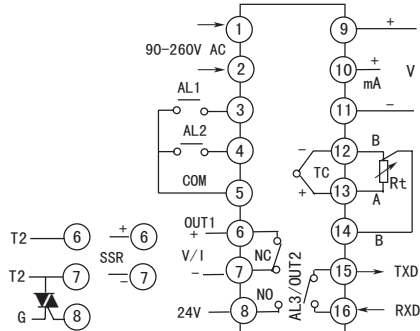


MODE	DIMENSION		INSTALLATION HOLE DIMENSION a × b(mm)
	W × H(mm)	C × D × L(mm)	
TCH-□4	48 × 48	44 × 44 × 80	45 × 45 (+0.5)
TCH-□6	48 × 96	44 × 90×100	45 × 91 (+0.5)
TCH-□7	72 × 72	66 × 66× 100	67.5 × 67.5
TCH-□8	96 × 48	90 × 44 × 100	91 × 45 (+0.5)
TCH-□9	96 × 96	90 × 90 × 100	91 × 91 (+0.5)

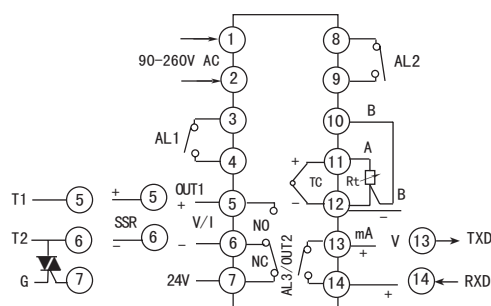
6. ELECTRICAL CONNECTION DRAWING



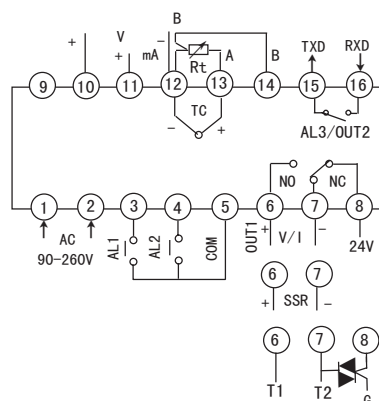
TCH-4 (48×48)



TCH-6 (96×48) / TCH-9 (96×96)



TCH-7 (72×72)



TCH-8 (48×96)

7. OPERATION INSTRUCTIONS

a. Mode convert (Right Figure)

The instrument will return to the displaying estate main setting mode without key operation for 25 seconds in any case.

b. Key operation

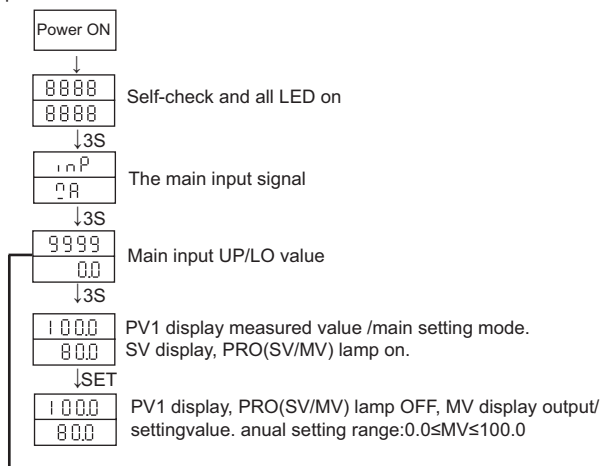
- * Press "SET" key to select the parameter you want to modify
- * Press "<</M" key to shift the digit you want to modify
- * Press "▲/▼" key to modify the value of the parameter
- * Press "SET" key to confirm

c. Basic function convert

- * SV displaying convert: Press "SET" key, PRO(SV/MV) lamp ON, displaying "MV" value. PRO(SV/MV) lamp OFF, displaying "SV" value, PRO(SV/MV) lamp flashes, displaying "PV2" value.
- * SV setting operation: The value can be modified when PRO(SV/MV) lamp OFF. Press key to shift the digit, and press "▲/▼" key to modify, and then press SET key to confirm.
- * MV setting operation: When PRO(SV/MV) lamp ON, it is for manual operation, please modify the value as B.
- * Manual/Autotuning convert: Press "<</M" key for more than 2 seconds, when AT/M lamp ON it means manual, when the lamp off, it means autotuning.

e: Autotuning operation: When the system is running correctly, please let the instrument enter autotuning. Please don't set parameter AT=0, the AT/M lamp flashes, it means the instrument are in autotuning estate. When the AT/M lamp off, it means autotuning finished. The data will be record in memory. If the the system not changed too much, no need autotuning next time.

f. Operation menu



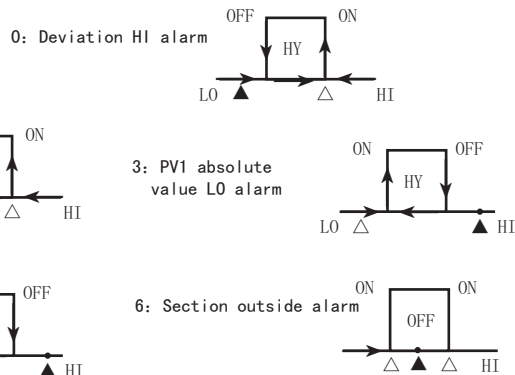
100.0	PV1 display
50.0	PV 2 display, PRO(SV/MV) lamp flashes.
SET	
AL1	AL1 value setting, -1999≤AL1≤9999
900.0	
SET	
AL2	AL2 value setting, -1999≤AL2≤9999
90.0	
SET	
AL3/OUT1	OUT2 output display, 0.0≤MV1≤100.0 or 1999≤AL3≤9999, AL3 and OUT2 is for option, but not both.
0.0	
SET	
Cdb	Cooling clearance or SV1 setting for PID2 SV1=SV+GAP -100≤GAP≤100
0.0	
SET	
At	Autotuning
0	0: Non 1: Normal PID 2: Fuzzy PID

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ON/OFF control: ▲ Setting value



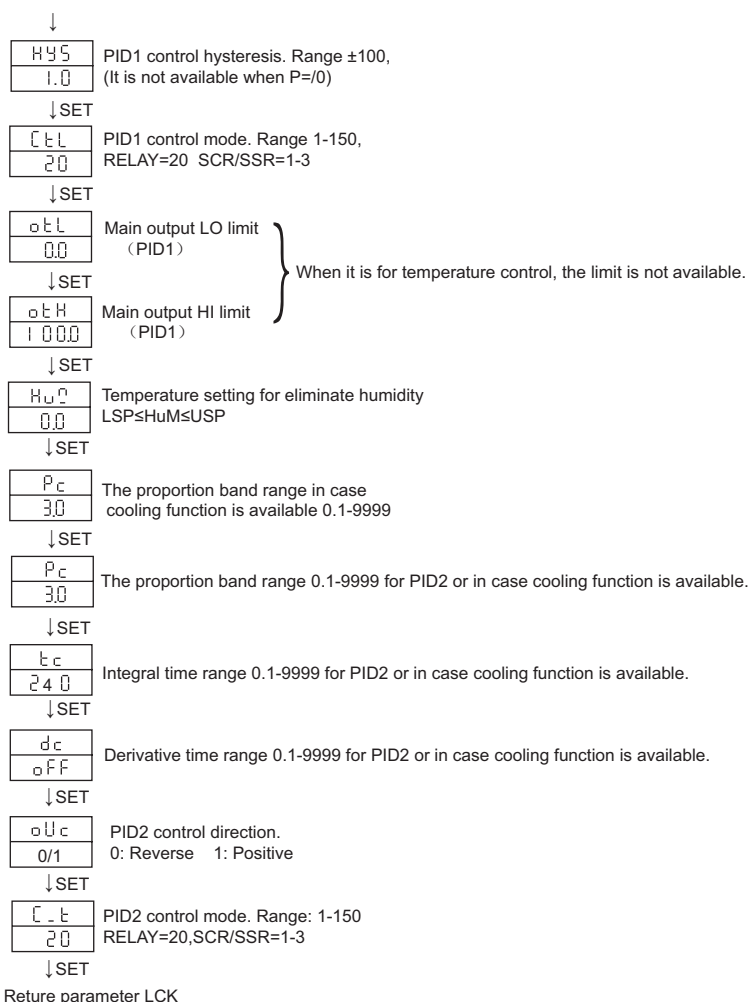
Alarm mode: ▲ Set value △ Alarm value



☆All the factory setting value of deviation alarm is 1.0. If the user want to change, please contact us or our distributors. Alarm mode 6 and 7 is reserved for use.

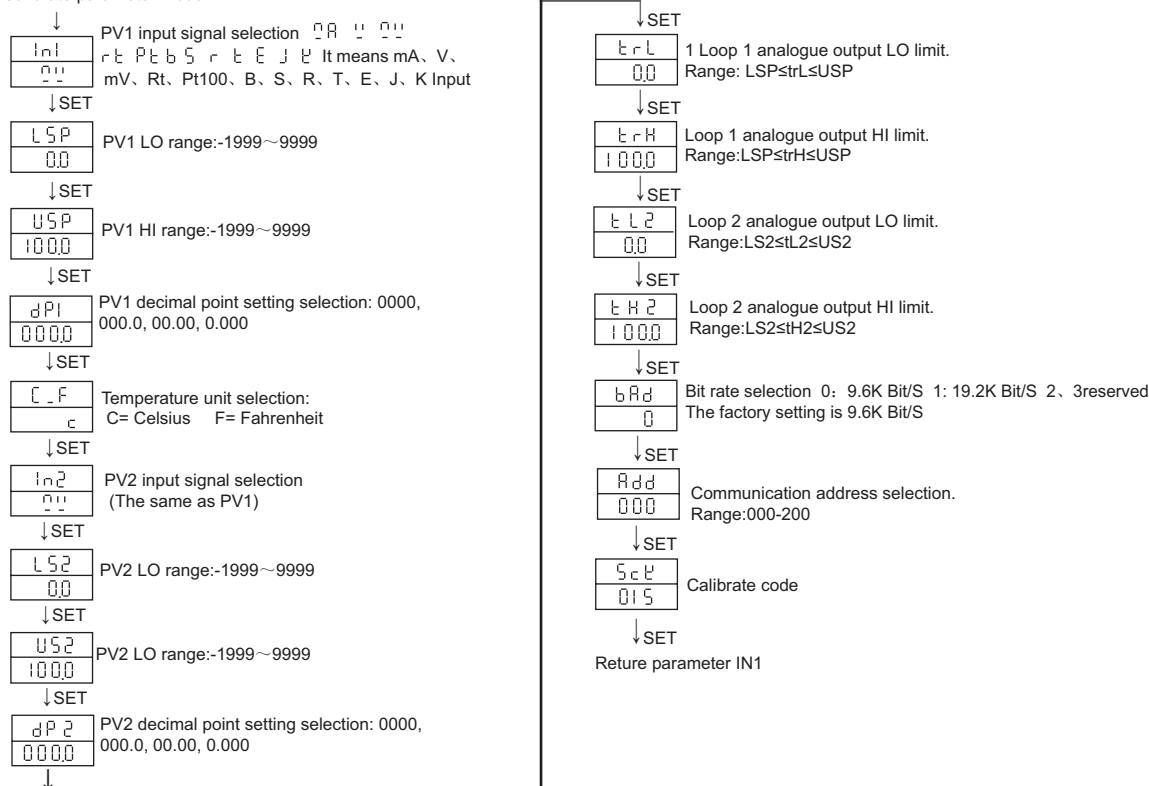
g.Control parameters menu

↓	
LcK	Parameter lock setting. Lck=000 means parameter unlocked, Lck=010 means parameter locked, it is for read only.
000	
↓SET	
Man	0: Manual operation permit
-0	1: Manual operation forbid
↓SET	
PS1	Main measured value shift. Range: -100≤PS1≤100
0.0	PV (Display value)=PV1(Measured value)+PS1
↓SET	
PS2	PV2 measured value shift. Range: -100≤PS1≤100
0.0	PV(Display value)=PV2(Measured value)+PS2
↓SET	
HY1	AL1 hysteresis
1.0	Range: 100≤HY1≤100
↓SET	
AL1	AL1mode: 0: 0:Deviation HI alarm 1:Deviation LO alarm 2: PV1 absolute value HI alarm 3: PV1 absolute value LO alarm 4: PV2 absolute value HI alarm 5: PV2 absolute value LO alarm 6: Fail wire connection alarm 7: Program end alarm 8: Section outside alarm 9: Section inside alarm 10: The first HI value not alarm 11: The first LO value not alarm 12: The first inside not alarm 13: The first outside not alarm 14: Delay alarm
2	
SET	
HY2	AL2 hysteresis
1.0	Range: 100≤HY2≤100
↓SET	
AL2	AL2 mode (Same as AL1)
3	
↓SET	
HY3	AL3 hysteresis
1.0	Range: -100≤HY3≤100
↓SET	
AL3	AL3 mode (Same as AL1)
0	
↓SET	
P	Proportion band. Range: 0.1-9999.
3.0	P=0 means on/off control
↓SET	
I	Integral time. Range: 0.1-9999.
240	I=0 means cancel integral
↓SET	
D	Derivative time. Range: 0.1-9999,
0FF	D=0 means cancel derivative
↓SET	
od	Control direction.
0/1	0: Reverse 1: Positive
↓SET	



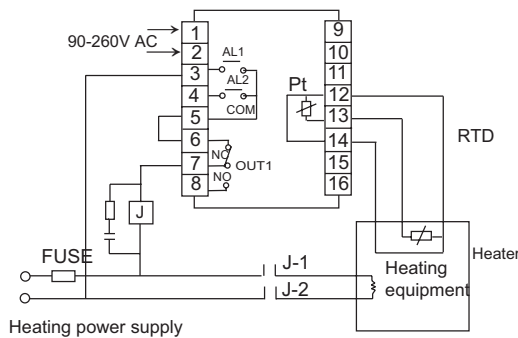
f. Calibration parameters menu

Calibrate parameter mode

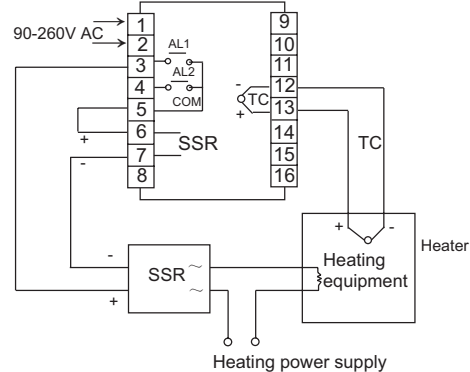


8. OPERATION INSTRUCTIONS

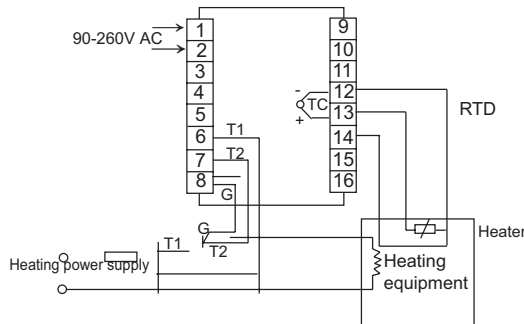
a, Relay output control (for TH9)



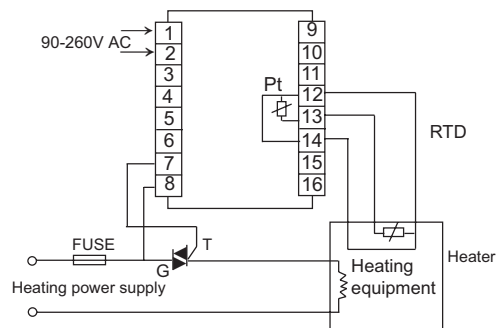
b, Heating control



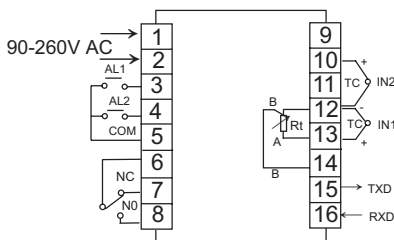
c, SSR reverse and positive connection



d, SSR both directions connection



e, Two input connection



9. MALFUNCTION ESTIMATE

- No displaying: check all the connection and wiring if it is correct. Specially pay attention to the power supply terminals and signal input terminals, please do not wrong connect. As well pay attention to do not short the output terminals by strong current.
- Incorrect displaying: check if the input signal is conformity with the selected symbol. For TC input, please use the relative compensation cable. For RTD input, please use low impedance cable. The 3 wires should at the same length. If the user doubts the accuracy of the sensor or the instrument, please put the sensor into the boiling water to check if the instrument indicates 100 C degrees. And put the sensor into the ice-water admixture to check if the instrument indicates 0 C degrees.
- Wrong control: if the temperature becomes higher and higher, but the numerals showing lower and lower, the TC input connection must be contrary. If the instrument has been used for a long time, the user find that the displaying float or the temperature is hard to rise up to the set value, meanwhile the outside system running well, there must be something wrong with the parameters of the instrument. The user need to re-autotuning the instrument. If the instrument lost control, please check if the connection of the control is correct. If external load is shorted, broken, wrong connection or components is damaged, it will cause lost control as well. When it is necessary, please push out the PCB to check the if the output terminals is damaged and not available.
- Display "UUUU", "LLLL" or "cJr" when the instrument displays "UUUU", it means the input signal exceed the measured HI range. When the instrument displays "LLLL", it means the input signal exceed the measured LO range, or input signal terminal connection is contrary. When the instrument displays "cJr", it means there is error for the temperature compensation. Please check if the the compensation diode is damaged.

10. PACKAGING NOITICE

- Complete packaging includes: instrument, instrument supports brackets and screws, instrument user manual, product label, connection drawing label, QC label.
- Guarantee peroid: 12 months from date of shipping.