Sanyou

TH Series of Digital Adjustor Instruction Manual

Thanks a lot for selecting Sanyou products!
Before operating this instrument, please carefully read this manual and fully understand its contents. If have probroms, please contact our sales or distributors whom you buy from. This manual is subject to change without prior notice.

■ Warning

Please do not turn on the power supply until all of the wiring is completed. Otherwise electricla 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 condictions. If use out of its scope, fire or malfunction may result.

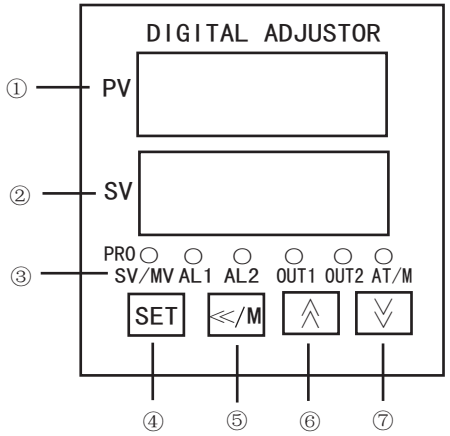
⚠ Caution

This instrument should be installed in a domestic environment. Otherwires electricla shock, fire or malfunction 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 specifictions 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 must 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 noiwse 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.

★ Applications

TH series of temperature controller is available for many TC or RTD input, adopt some advanced techonology such multi digital filter circuit, autotuning PID, fuzzy PID that make it is very precise, stable, strong anti-interference and simple operation. The instrument is widely applied to automation systems of mechanism, chemical industrial, chinaware, light industrial, metallurgy and petroleum chemical industrial. It is also applied to the production line of foodware, packing, printing, dry machine, metal heat process equipment to control the temperature.

■ Name of parts



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: Ouput Off: No output
OUT2:Output 2 lamp (PID2/AL3)
On: Ouput 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 conver autotuning/manual operation.

⑥ Up key:Used to increase numerals

⑦ Down key:Used to decrease numerals

■ ORDERING CODE

Part-Number												Specifications
TH	□	□	—	□	□	□	□	□	□	□	□	TH series
Size	4											48H×48W mm
	6											96H×48W mm
	7											72H×72W mm
	8											48H×96W mm
	9											96H×96W mm
	10											80H×160W mm
	11											160H×80W mm
Power		Default										90-260V AC
		E										24V±10% DC
Control			Default									Normal PID
			V									Proportion control
			F									3 phase shift control
			R									Remote setting control
			P									Programmable curve control
			G									3 phase logic control
			K									Simple phase shift control
Main output (Heating)				R								Relay control output
				S								SSR/Logic control output
				T								SCR control output
				I								4-20mA or 0-10mA
				G								Pulse output
				E								Others
AL2 (Cooling)					N							No OUT2/AL2
					R							Relay control output
					S							SSR/Logic control output
					T							SCR control output
					I							4-20mA or 0-10mA
					G							Pulse output
					E							Others
AL1						N						No AL1
						R						Relay control output
						S						SSR/Logic control output
						T						SCR control output
OUT2/AL3							N					Non
							R					Relay control output
							S					SSR/Logic control output
							T					SCR control output
Communi-cation								Default				Without communication
								2				RS232
								4				RS485
Auxiliary Power									Default			Without Auxiliary power
									A			+12V DC/30mA
									B			+24V DC/30mA
Input Signals 1										0		TC/RTD
										1		0-10mA
										2		4-20mA
										3		1-5V
										4		0-10V
										5		0-75mV
										6		AV, AA, DA, DV
										7		-30～30mV
										8		Pulse 0～5KHZ
										E		Other:Special input signa
Input Signals 2											N	No Input Signals
											0	TC/RTD
											1	0-10mA
											2	4-20mA
											3	1-5V
											4	0-10V
											5	0-75mV
											6	AV, AA, DA, DV
											7	-30～30mV
											8	Pulse 0～5KHZ
											E	Other:Special input signa

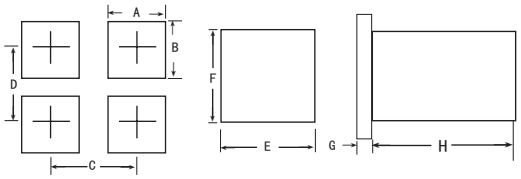
★Thermocouple or RTD input selection

Input Type	Measured Range	Input Impedance	Factory Setting
TC	K:0～1200℃	＞100K	Yes
	J:0～1000℃		
	E:0～1000℃		
	T:0～400℃		
	B:600～1700℃		
	R:500～1600℃		
	S:0～1700℃		
Pt	-200～600℃	≤0.2mA	
Cu50 Cu100	-50～150℃		Special order

■ Specifications

Power supply	AC 90-260V
Consumption	≤6VA
Display range	-1999℃～9999℃
Accuracy	±0.3%FS±2digit
Sampling cycle	≤300MS
Function selection	programmable curve control, pulse width control, proportion control, phase shift control, normal PID, fuzz PID and autotuning PID control
OUT1 (PID1)	RELAY: Normal closed/ normal open AC 250V/3A DC 30V/3A COSφ=1 SSR/LOGIC: DC 24V±1V/20mA TRIGIC (SCR): External connect with SCR I: 4-20mA、0-10mA、0-20mA
OUT2/AL3 (PID2)	RELAY: Normal closed/ normal open AC 250V/3A DC 30V/3A COSφ=1 SSR/LOGIC: DC 24V±1V/20mA TRIGIC (SCR): External connect with SCR I: 4-20mA、0-10mA、0-20mA
AL1、AL2 AL3 11 types of alarm modes	RELAY: Normal closed/ normal open AC 250V/3A DC 30V/3A COSφ=1 SSR/LOGIC: DC 24V±1V/20mA TRIGIC (SCR): External connect with SCR
Withstand voltage strength	1500V Rms (Between power terminal and the housing)
Insulation resistance	Min 50MΩ (500V DC) (Between power terminal and the housing)
Environment temperature	0-50℃
Save temperature	-10℃～60℃
Environment humidity	35～85%RH
Weight	TH4≤250g TH6/TH7/TH9: ≤300g

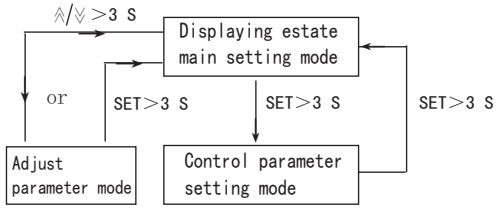
■ Mounting and Sizes



Sizes / Model	A	B	C	D	E	F	G	H
TH4	44.5+0.5	45+0.5	65	65	48	48	8	80
TH6	43.5+0.5	91+0.5	65	115	48	96	12	100
TH7	67.5+0.5	67.5+0.5	95	95	72	72	12	100
TH8	91+0.5	44.5+0.5	115	65	96	48	12	48
TH9	91+0.5	91+0.5	115	115	96	96	12	100
TH10	152+0.5	76+0.5	180	100	160	80	12	80
TH11	76+0.5	152+0.5	100	180	80	160	12	80

■ Operation instructions

1. Mode convert



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

2. Key operation

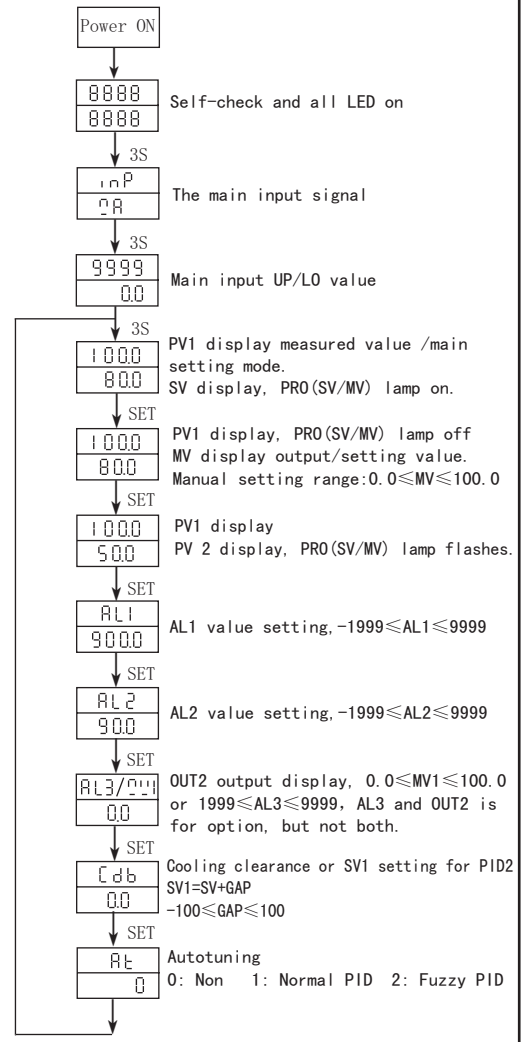
A:Press SET key to select the parameter you want to modify
B:Press＜＜/M key to shift the digit you want to modify
C:Press∧/∨ key to modify the value of the parameter
D:Press SET key to confirm

3. Basic function convert

A:SV displaying convert: Press SET key, PRO(SV/MV) lamp on, dispaying MV value. PRO(SV/MV) lamp off, displaying SV value, PRO(SV/MV) lamp flashes, displaying PV2 value.
B: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.
C:MV setting operation: When PRO(SV/MV) lamp on, it is for manual operation, please modify the value as B.
D: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.

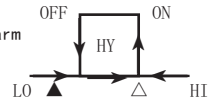
■ Operation process



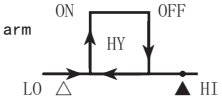
ON/OFF control: ▲Setting value

Alarm mode: ▲Set value △Alarm value

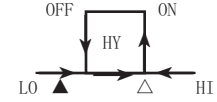
0: Deviation HI alarm



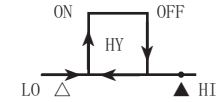
1: Deviatian LO alarm



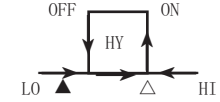
2: PV1 absolute value HI alarm



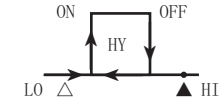
3: PV1 absolute value LO alarm



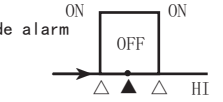
4: PV2 absolute value HI alarm



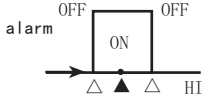
5: PV2 absolute value LO alarm



8: Section outside alarm

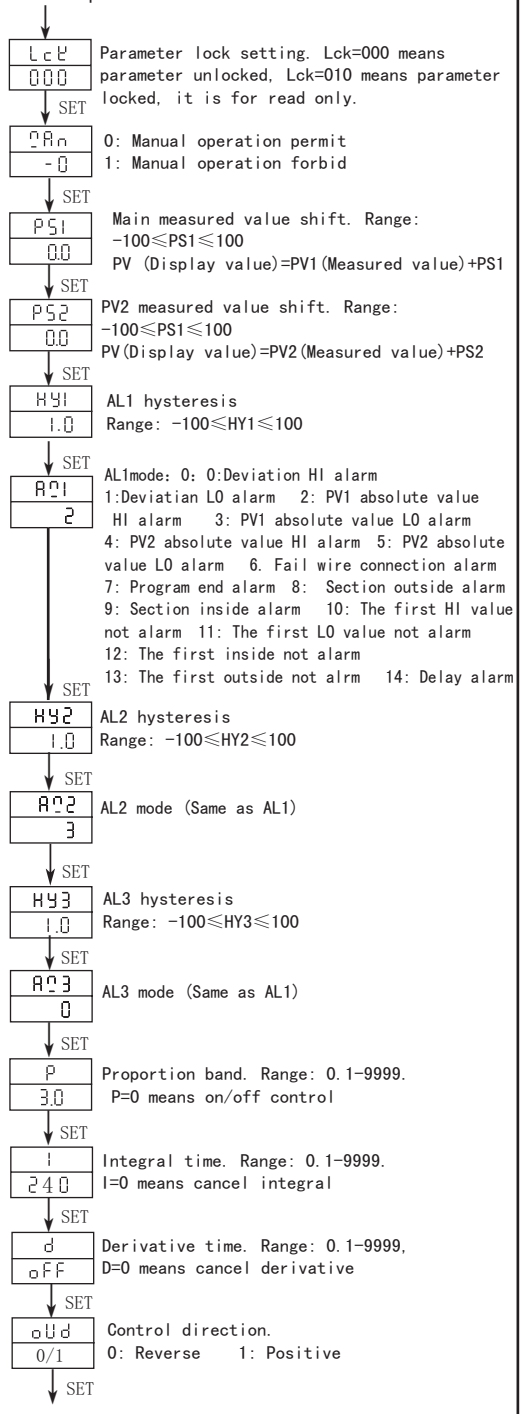


9: Section inside alarm



☆All the factory setting value of deiation 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.

Control parameter mode



HYS 1.0 — PID1 control hysteresis. Range ±100, (It is not available when P=/0)

SET

CtL 20 — PID1 control mode. Range 1-150, RELAY=20 SCR/SSR=1-3 Current=0

SET

otL 0.0 — Main output LO limit (PID1)

SET

otH 100.0 — Main output HI limit (PID1)

When it is for temperature control, the limit is not available.

SET

HuM 0.0 — Temperature setting for eliminate humidity LSP≤HuM≤USP

Pc 3.0 — The proportion band range in case cooling function is available 0.1-9999

SET

Pc 3.0 — The proportion band range 0.1-9999 for PID2 or in case cooling function is available.

SET

tc 240 — Integral time range 0.1-9999 for PID2 or in case cooling function is available.

SET

dc oFF — Derivative time range 0.1-9999 for PID2 or in case cooling function is available.

SET

oUc 0/1 — PID2 control direction. 0: Reverse 1: Positive

SET

C_t 20 — PID2 control mode. Range: 1-150 RELAY=20, SCR/SSR=1-3 Current=0

SET

Reture parameter LCK

Calibrate parameter mode

InI 0-U — PV1 input signal selection 0A 0-U 0U rt Pt b S r t E J K It means mA、V、mV、Rt、Pt100、B、S、R、T、E、J、K Input (This instrument select 0-U for 4-20mA input)

SET

LSP 0.0 — PV1 LO range:-1999～9999

SET

USP 100.0 — PV1 HI range:-1999～9999

SET

dPI 0000 — PV1 decimal point setting selection: 0000, 000.0, 00.00, 0.000

SET

C_F C — Temperature unit selection: C= Celsius F= Fahrenheit

SET

In2 0-U — PV2 input signal selection (The same as PV1)

SET

LS2 0.0 — PV2 LO range:-1999～9999

SET

US2 100.0 — PV2 LO range:-1999～9999

SET

dP2 0000 — PV2 decimal point setting selection: 0000, 000.0, 00.00, 0.000

SET

trL 0.0 — 1 Loop 1 analogue output LO limit. Range: LSP≤trL≤USP

SET

trH 100.0 — Loop 1 analogue output HI limit. Range:LSP≤trH≤USP

SET

tL2 0.0 — Loop 2 analogue output LO limit. Range:LS2≤tL2≤US2

SET

tH2 100.0 — Loop 2 analogue output HI limit. Range:LS2≤tH2≤US2

SET

bAd 0 — Bit rate selection 0: 9.6K Bit/S 1: 19.2K Bit/S 2、3reserved The factory setting is 9.6K Bit/S

SET

Add 000 — Communication address selection. Range:000-200

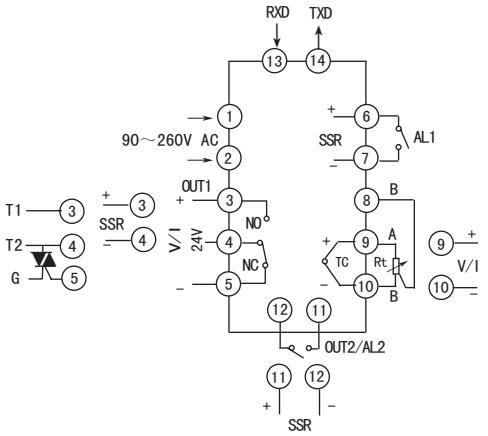
SET

ScY 015 — Calibrate code

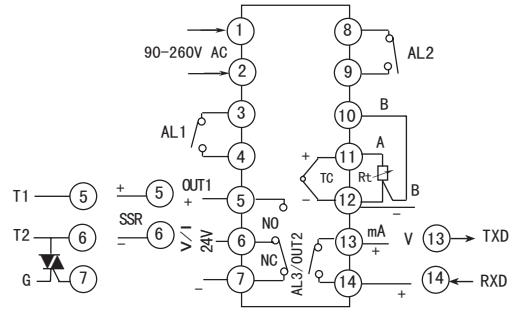
SET

Reture parameter IN1

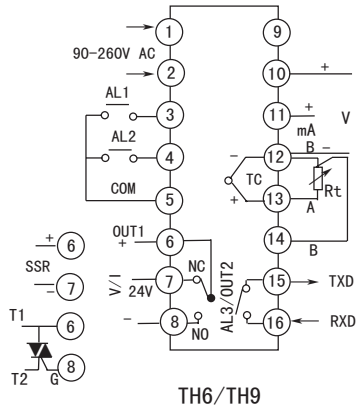
■ Terminal connections



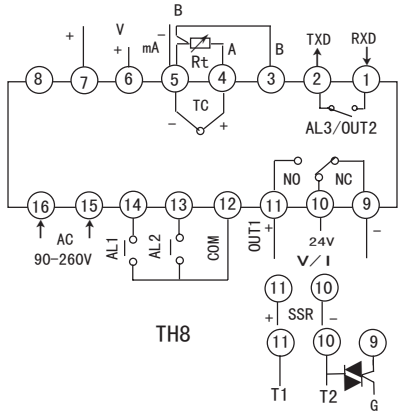
TH4



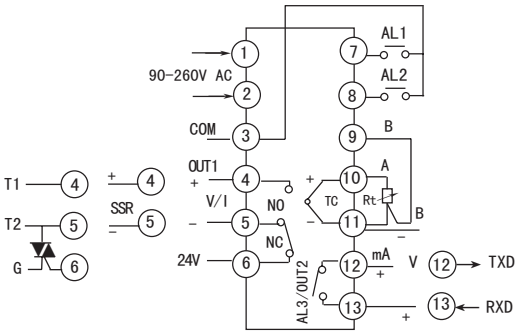
TH7



TH6/TH9



TH8

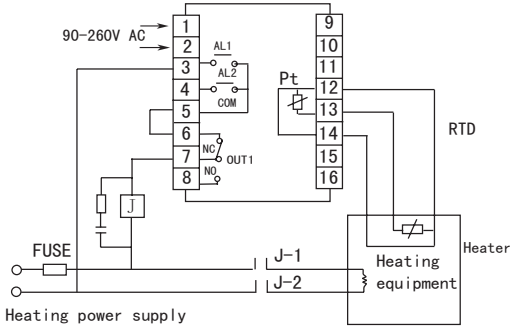


TH10/TH11

(If any changed, please refer to the product showing)

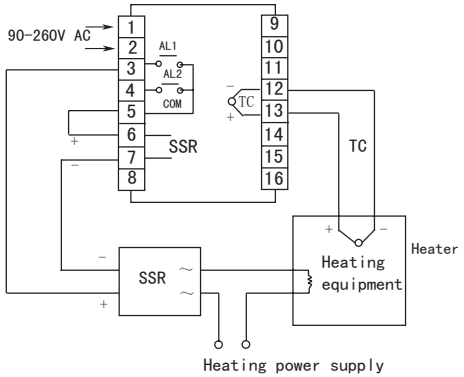
■ Application examples

1、Relay output control (for TH9)

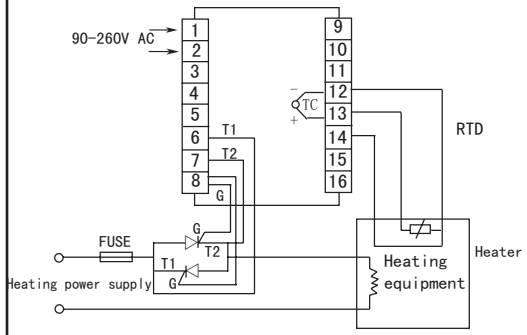


Suggestion: If it is relay output, please don't connect it directly to the equipment in case the current is more than 1A. It should be used with an AC connector. Otherwise it probably cause demage of the relay.

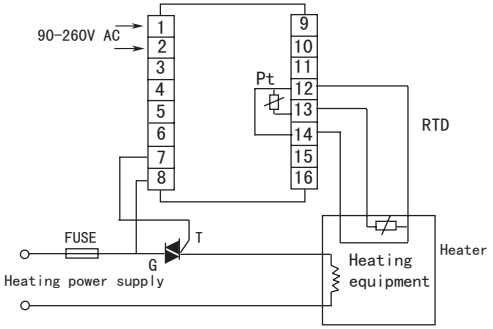
2、Heating control



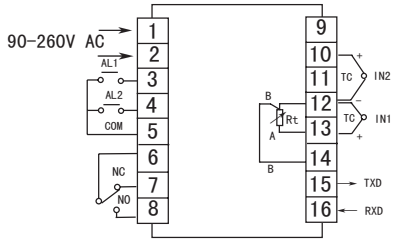
3、SSR reverse and positive connection



4、SSR both directions connection



5、Two input connection



■ Malfunction estimate

1、No displaying

Check all the connection and wiring if it is correct. Specially pay attention to the power supply terminals and signal input ternimals, please do not wrong connect. As well pay attention to do not short the output terminals by strong current.

2、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 impedence 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.

3、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.

4、Display "UUUU", "LLLL" or "cJr"

When the instrument displays "UUUU", it means the input signal exeed the measured HI range. When the instrument displays "LLLL", it means the input signal exeed the measured LO range, or input signal terminal connection is contrary. When the instrument displays "cJr", it means there is error for the temperature conpensation. Please check if the the compensation diode is damaged.