Temperature Controller CD401/CD901/CD701/CD501/CD100/CD101
Instruction Manual

Ⅰ. Warn

Warning of connection

If the controller fails to operate or error occurs, the system will bring fault for it, please mount external protective circuit to prevent this accident. To prevent the damage or failure of controller, please select the proper fuse, protective power line, input wire and output wire to avoid impact from high current.

Power supply

To prevent the damage or failure of controller, please use the rated power supply.

To prevent electric shock or failure of controller, please finish all connections firstly, and then switch on.

No using in the location containing flammable gas

To proof fire or explosion or protect the controller against damage, never use the controller in the location that contains flammable/explosive gas or steam.

No contacting the inner of controller

Never contact the inner of controller, because there are high-voltage and high-temperature parts in the controller, otherwise, some accidents like electronic shock or burning would occur. Only our service engineer can check the inner circuit or replace the parts.

No changing the controller.

To prevent accident or damage of controller, never change the controller.

Maintenance

To prevent electric shock or failure of controller, never change the parts randomly, only our service engineer can change the parts.

Please give the regular maintenance for the sake of guaranteeing the durable and safe use of controller. Some parts in controller may be damaged for long-term service.

Ⅱ. Main Technical Index

1. Input

   Refer to table B for Thermocouple (TC), Resistance Temperature Detector (RTD),

   Standard Current and Voltage signals.

2. Accuracy

   Measurement Accuracy: +/- 0.5%FS;

   Compensation error of cold terminal: +/- 2℃ (amend within -~50℃ by software);

   Resolution: 14bit;

   Sampling period: 0.5 Sec.

3. Display

   Process Value (PV), Setting Value (SV): -1999 ~ +9999

   Output, Alarm, Auto setting state indicated by: LED

4. Control way

   (1) PID Control (including ON/OFF, position PID and continuous PID);

   (2) Auto Setting Control

5. Setting Range

   Setting Value (SV): Same range with PV;

   Proportional Band (P): 0~full range (ON/OFF Control when set to 0);

   Integration Time (I): 0~3600Sec (No integral action when set to 0);

   Derivative Time (D): 0~3600Sec (No derivative action when set to 0);

   Proportional Period: 1~100Sec;

   On-off control output hysteretic loop width: 1~100℃ (or other PV units).

6. Other Parameters

   (1) Insulation resistance: ＞50MΩ(500VDC);

   (2) Insulation strength: 1500V AC/min;

   (3) Power consumption: ＜10V；

   (4) Service environment: 0~50℃, 0~85RH, no corrosive gas;

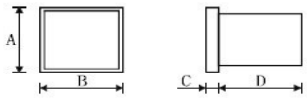
   (5) Weight: ~ 0.5Kg (C900type).

Ⅲ. Outline, Mounting, Boring and Connection

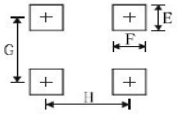
1. Outline & Boring size

● Outline & boring size

Outline size



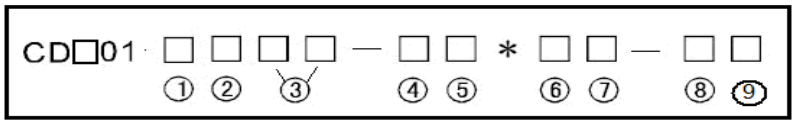
Panel boring



	A	B	C	D	E	F	G	H
CD101	48	48	10	100	45	45	80	80
CD401	96	48	10	100	92	45	116	80
CD501	48	96	10	100	45	92	80	116
CD701	72	72	10	100	68	68	96	96
CD901	96	96	10	100	92	92	116	116

2. Connection Picture (The diagram is subjected to the controller itself connection drawing)

Ⅳ. Model Description and Model Selection



1. Control action

   F: PID operation and auto calculation (Reverse operation);

   D: PID operation and auto calculation (Forward operation);

   W: Heat/Cool PID action with auto tuning (Water cooling);

   A: Heat/Cool PID action with auto tuning (Air cooling);

2. Input type
3. Range code: Refer to the “Input range table” (section VII)
4. First Control Output (OUT1) (Heating side)

   M: Relay contact output,

   8: Current output (DC 4~20mA)

   V: Voltage impulse output

   G: Trigger (for Triac driving)

   T: Triac

5. Second Control Output (OUT2) (Refrigeration side)*2;

   No symbol: When control operation is F or D,

   M: Relay contact output,

   V: Voltage impulse output

   T: Triac

6. First Alarm (ALM1)

   N: No alarm

   A: Upper-limit bias alarm (Deviation high alarm)

   B: Lower-limit bias alarm (Deviation low alarm)

   C: Upper/Lower limit bias alarm

   D: Alarm in area

   E: Standby upper-limit bias alarm attached

   F: Standby lower-limit bias alarm attached

   G: Standby upper/lower-limit bias alarm attached

   H: Upper-limit input value alarm

   J: Lower-limit input value alarm

   K: Standby upper-limit input value alarm attached

   L: Standby lower-limit input value alarm attached

7. Alarm 2 (ALM2)

   N: No alarm

A: Upper-limit bias alarm

B: Lower-limit bias alarm

C: Upper/Lower limit bias alarm

D: Alarm in area

E: Standby upper-limit bias alarm attached

F: Standby lower-limit bias alarm attached

G: Standby upper/lower-limit bias alarm attached

H: Upper-limit input value alarm

J: Lower-limit input value alarm

K: Standby upper-limit input value alarm attached

L: Standby lower-limit input value alarm attached

8. Communication function

N: No communication function.

5: RS-485 (2-wire system)

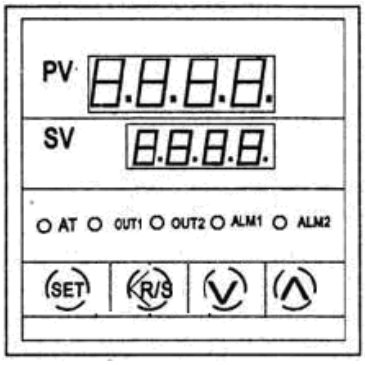
9. Communication function (2)

N: No communication function.

5: RS-485 (2-wire system)

Note: Please show the model referring to the above indication when order.

Ⅴ. Panel Name and Function



PV: Measurement value/Mode display value

SV: Setting value/mode display value

AT: PID auto calculation indicator lamp

OUT1: Output1 indicator lamp

OUT2: Output 2 indicator lamp

ALM1: Alarm 1

ALM2: Alarm 2 indicator lamp

∧: Down key

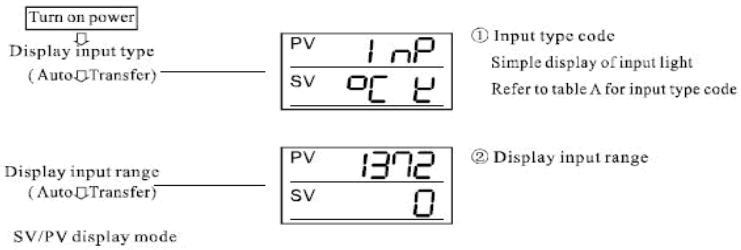
∨: Up key

<R/S: Shift key

SET: Setting mode key

Ⅵ. Operation Procedures

1. Procedures of starting



Input Type Table

Display														
Input type	Thermocouple (TC)								Resistance temperature detector RTD		Voltage & current			
	K	J	R	S	B	E	N	T	PT 100	CU 50	oM	mV	mA	V

2. SV setting mode

Under SV/PV normal display state, first, press SET key to make the SV display in the flashing state;

Second, press the "<R/S" key to find the place number of required setting temperature. Third, press UP or DOWN key to set the required temperature, after ending the setting, press SET key again to let the meter come back to SV/PV normal display state.

3. Parameter setting mode

This parameter is used to set the alarming parameter, PD constant & etc. Under the normal display state, press the SET key for three seconds, the PV display will show the parameter setting state, and SV display will show the corresponding value. Then press SET key in turn to display the parameter symbol specified in the following table:

Notice: This machine has auto-return function, if the operator is amending the parameters and forgets coming back to the main display mode, the meter will return to the main display mode after 30s. Prior to using this meter or amending the parameter, please read the following information earnestly. If the meter doesn't display the following information, it means that it is malfunctioned.

Display Symbol	Name	Description	Setting range	Factory value
	PV SV	Measurement value	Full range	
AL 1	Alarm (ALM1)	Set the alarm set value. Alarm differential gap: 2 or 2.0 °C	Deviation alarm, Process alarm, SV alarm: -1999 to +1999 °C -199.9 to +999.9 °C	50 (50.0)
AL2	Alarm (ALM2)	Set the alarm set value. Alarm differential gap: 2 or 2.0 °C	Deviation alarm, Process alarm, SV alarm: -1999 to +1999 °C -199.9 to +999.9 °C	50 (50.0)
ATU	Auto-tuning (AT)	Turns the auto-tuning ON/OFF	0:Auto-tuning ends or suspends 1:Auto-tuning starts	0
STU	Self-tuning 9ST)	Turns the self-tuning ON/OFF	0: ST suspends 1: ST starts	0
P	Proportional band (P)	Set when PI, PD or PID control is performed. *ON/OFF action control when set to 0 (0.0) Differential gap: 2 (0.0) °C	1 (0.1) to span or 9999 (999.9) °C	30 (30.0)
I	Integral Time (I)	Set the time of integral action which eliminates the offset occurring in proportional control.	1 to 3600 sec *PD control when set to 0 sec	240
d	Derivative time (D)	Set the time of derivative action which prevents ripples by predicting output changes and thus improves control stability.	1 to 3600 sec *PI control when set to 0 sec	60
Ar	Reference value (Ar)	After AT, set automatically.	0 to 100% *1	25
r	Heat-reset Proportional cycle (T)	Set control output cycle.	1 to 100 sec (0 can not be set) *2	20
Pc	Cool-side Proportional band (Pc)	Set cool-side proportional band when heat/cool PID action.	1 to 1000% of heat-side Proportional band (0 cannot be set)	100
db	Dead-band (db)	Set control action dead-band between heat-side and cool-side proportional bands.	Temperature input: -10 to +10 °C or -10.0 to +10.0 °C	0 or 0.0
t	Cool-side Proportional cycle (t)	Set control cool-side output cycle for heat/cool PID action.	1 to 100 sec (0 cannot be set) *2	20
Pb	PV bias (Pb)	Sensor correction is made by adding bias value to measured value (PV).	-1999 to +9999 °C or -199.9 to +999.9 °C	0 or 0.0
LCK	Set data lock function (LCK)	Performs set data change enable/disable.	See *3	0000

*1. The reference value can't be manually set within PID, after "AT" auto-tuning, set the value automatically.

*2. Relay contact output: 20s, voltage impulse output or value control the tube is made by trigger output or the value control the tube output for 2s.

*3. **Details of set data lock level selection:**

Setting	Details of lock levels
0000	SV and parameter can be set.
0001	Only SV and alarm (ALM1, ALM2) can be set.
0010	Only setting items other than alarms (ALM1, ALM2) can be set.
0011	Only setting items other than SV can be set.
0100	Only SV can be set.
0101	Only alarms (ALM1, ALM2) can be set.
0110	Only setting items other than SV and alarms (ALM1, ALM2) can be set.
0111	SV and parameter cannot be set.

- Each locked setting item can only be monitored.

4. Fault information indication

When meter can't work normally, the meter diagnosed automatically to display the message prompt.

Message	Description	Solutions
Err	Meter occurs fault	Send it for repairing.
0000	The wire is disconnected at inputting, the polarity is connected inversely or above input range	Check the input signal if it is wrong.
UUUU	The wire is disconnected at inputting, the polarity is connected inversely or below input range	Check the input signal if it is wrong.

5. Setting of meter parameter mode

When the meter is energized normally, find the data lock parameter "LCK" according to the parameter setting mode, set the code to 1000, then press "SET" key to make the meter confirm, press both "SET" key and "<R/S" key at the same time for 3s, the PV display will show "Cod". When "Cod"=0000, press "SET" key in turn to display the following parameters in cycle.

Display Symbol	Setting value	Description	Remark
SL 1	0 0 0 0	K	
	0 0 0 1	J	
	0 0 1 0	L	
	0 0 1 1	E	
	0 1 0 0	N	
	0 1 0 1	T	
	0 1 1 0	U	
	0 1 1 1	R	
	1 0 0 0	S	
	1 0 0 1	B	
	1 0 1 0	W5Re/W26Re	
	1 0 1 1	P12	
	1 1 0 0	PT100	
	1 1 0 1	JPT100	
SL 2	0 0 0 0	Omit	
SL 3	0 0 0 0	Omit	
SL 4	0 0 0	No set alarm 1 function	Selection to Alarm1 (ALM1) type.
	0 0 1	Upper-limit bias alarm	
	0 1 0	Upper/lower-limit bias alarm	
	0 1 1	Process value upper-limit alarm	
	1 0 1	Lower-limit bias alarm	
	1 1 0	With alarm (Alarm in area)	
	1 1 1	Process value lower limit alarm	
	0	No standby alarm function	Selection of Alarm 1 standby function
	1	With standby alarm function	
SL 5	0 0 0 0	Setting of Alarm 2 function	Ditto
SL 6	0	Forward-operation control (Refrigeration)	Main forward/reverse operation selection
	1	Reverse-operation control (Heating)	
	0	Main control time scale output	Selection of main control output type
	1	Main control continuous output (4-20mA)	
	0	Excitation alarming	Excitation alarming/Non-excitation

SL 7	1	Non-excitation alarming	alarming (Alarm 1 side)
	0	Excitation alarming	Excitation alarming/Non-excitation alarming (Alarm 2 side)
	1	Non-excitation alarming	
SL 8	0 0 0 0	Omit	
SL 9	0 0 0 0	Omit	
SL 10	0 0 0 0	Omit	
SL 11	0 0 0 0	Omit	

When Cod=0001, press SET key in turn to get the following parameters in circuit display.

Display symbol	Factory value	Description	Setting range
SLH	As per order	Upper limit of setting value measurement range	Refer to above table
SLL	As per order	Lower limit of setting value measurement range	Refer to above table
PGdP	0	Place number of decimal	0-3
oH	2 or 2.0	Main output no-operation band width	0~100 or 0.0~100.0
AH 1	2 or 2.0	Alarm 1 output no-operation band width	0~100 or 0.0~100.0
AH2	2 or 2.0	Alarm 2 output no-operation band width	0~100 or 0.0~100.0
SLH	1	Digital filtering constant	0~100

VIII. Input Range Table

Thermocouple

K	**K01**	0-200℃	**K02**	0-400℃	**K03**	0-600℃
	K04	0-800℃	**K05**	0-1000℃	**K06**	0-1200℃
	K07	0-137 2℃	**K13**	0-100℃	**K14**	0-300℃
J	**J01**	0-200℃	**J02**	0-400℃	**J03**	0-600℃
	J04	0-800℃	**J05**	0-1000℃	**J06**	0-1200℃
R *1	**R01**	0-1600℃	**R02**	0-1769℃	**R04**	0-1350℃
S *1	**S01**	0-1600℃	**S02**	0-1769℃		
B *1	**B01**	400-1800℃	**B02**	0-1769℃		
E	**E01**	0-800℃	**E02**	0-1000℃		
N	**N01**	0-1200℃	**N02**	0-1300℃		
T *2	**T01**	0-350℃	**T02**	-199.9-100.0℃	**T03**	-199.9-200.0℃
	T04	-199.9-400.0℃				

RTD

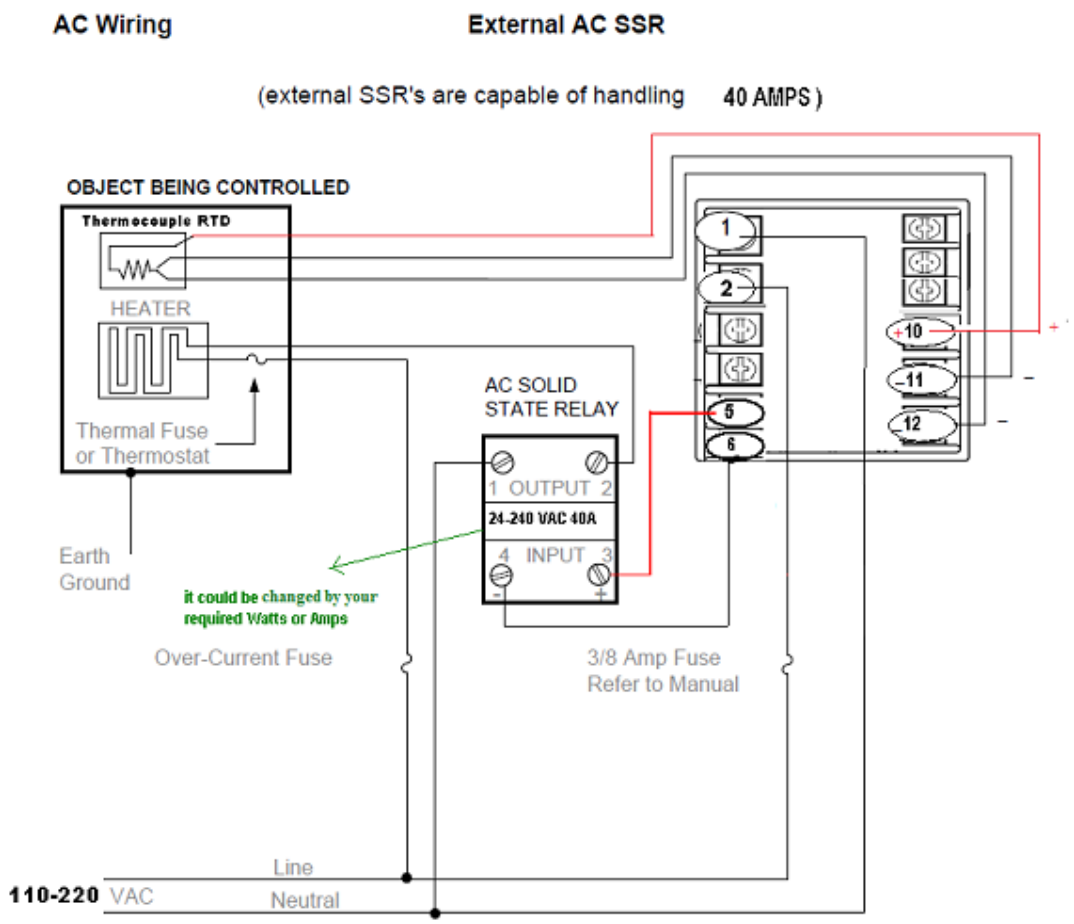
PT100	**D01**	-199.9-649.0℃	**D02**	-199.9-200.0℃	**D03**	-199.9-50.0℃
	D04	-100-100.0℃	**D05**	-100-200.0℃	**D06**	0.0-50.0℃
	D07	0.0-100.0℃	**D08**	0.0-200.0℃	**D09**	0.0-300.0℃
	D10	0.0-500℃				
JPT100	**P01**	-199.9-649.0℃	**P02**	-199.9-200.0℃	**P03**	-199.9-50.0℃
	P04	-100-100.0℃	**P05**	-100-200.0℃	**P06**	0.0-50.0℃
	P07	0.0-100.0℃	**P08**	0.0-200.0℃	**P09**	0.0-300.0℃
	P10	0.0-500℃				

Voltage & Current

0-5V	**401**	0.0-100℃	
1-5V	**601**	0.0-100℃	
0-20mA	**701**	0.0-100℃	*3
4-20mA	**801**	0.0-100℃	*3

IX. Wiring Diagrams

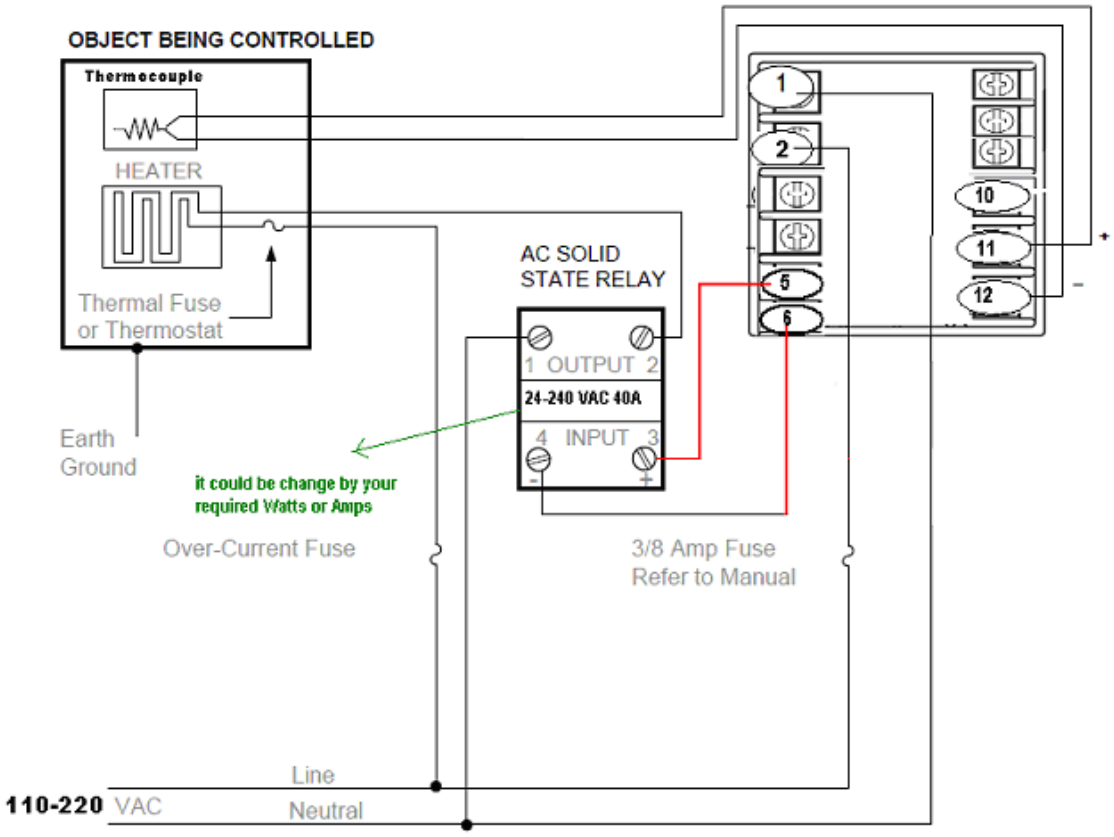
CD101-SSR OUTPUT AND RTD



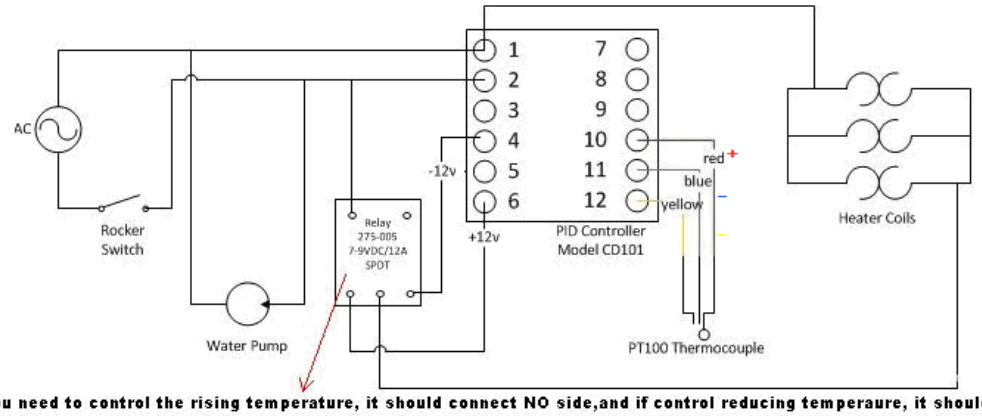
CD-101 - SSR OUTPUT and Thermocouple

AC Wiring **External AC SSR**

(external SSR's are capable of handling **40 AMPS**)



CD-101 RELAY OUTPUT and RTD



If you need to control the rising temperature, it should connect NO side,and if control reducing temperaure, it should connect NC side.

Terminals 4 & 6 are for NO and 4 & 5 are for NC

CD101 CD901 PID Temperature Controller Instruction Manual

For current product information, availability, and compatible options, use the verified ThermoMart links below. The preceding pages remain the original manual content.

ONLINE MANUAL

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