DIGITAL TEMPERATURE CONTROLLER

INSTRUCTION MANUAL

Please Carefully read all the instructions in this manual.
Please place this manual in a convenient location for easy reference.

SPECIFICATION

- Power Supply: 85~265VAC 50/60HZ, 24VDC or 24VAC available on request
- Input: :Thermocouple(K,E,J,N,Wu3_Re25,S,T,R,B,) Pt100(Up to 800 C)
  Voltage and Current(0-5VDC,0-10VDC,0-50mV,4-20mV,0-20mA 2-10VDC, 1-5VDC, 4-20mA)
- Display: Dual line 4 digits LED display
- Output: RELAY/SSR DRIVE/4-20mA/0-5VDC/0-10VDC/1-5VDC(specify when order)
- Power consumption: 5VA maximum
- Control method: PID, ON/OFF(P=0), Time proportional control(I=0, D=0)
- Measuring accuracy: 0.2%F.S
- Decimal points for all input signals: 0.1 resolution for thermocouple. 0.1 resolution for RTD. 0.001 for analog input
- Modbus RTU RS-485 communication, SV/PV 4-20mA Re-transmission
- Output bar graphic indication(for analog output such as 4-20mA only)
- Controller can display based on Centigrade or Fahrenheit, switchable between each other.
- Alarm Standby function intergrated
- Power up overshoot suppression function intergreated.
- Analog output buffer function
- ON/OFF Control: Set P=0.0,it will be changed as on/off control. Check manual"6.1 parameter P " . Position difference is HYS. when heating :PV>SV, OUT stop, when PV<SV-HYS, OUT start, fitting for OUT1. When Cooling:PV>SV+HYS, output start, when PV<SV,output stop.
- When anolog signal output, can using output buffer function when in some special control position, which can make output more stable.
  Check manual (6.1 level 2 bUFF parameter, and 6.3 level 2 bEr parameter)

1. Unique Features

Power Up Overshoot Supression

The overshoot is common when controller just power up, and the PV is getting closer to SV, this controller offers a useful features for application where the overshoot should be tolerated

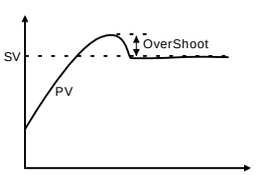


Figure 1

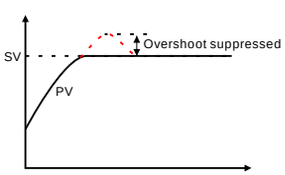


Figure 2

The figure 1 shows significant overshoot after PV reaches to SV, this is harmful to some of system, This controller offers a feature to suppress the overshoot

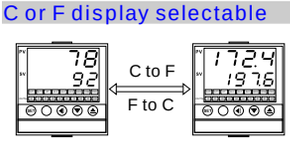
LED display and indicator built together on one PCB board

The LED display and LED indicators was built as one panel ,most of controller with their LED display and LED indicator installed separately, the chance of the malfunction is high. This controller with all the display and indicator units built together on board, makes it easier to install and easy to test with higher reliability.

PV/SV Re-transmission(Optional function)

The PV or SV value can be re-transmitted as analog signal 0-5VDC,0-10VDC,4-20mA, and the re-transmission signal can be feed to recorder ro digital display

C or F display selectable



This controller offers display based on Celcius and Fahrenh-eit. can the display is switchable between C and F.

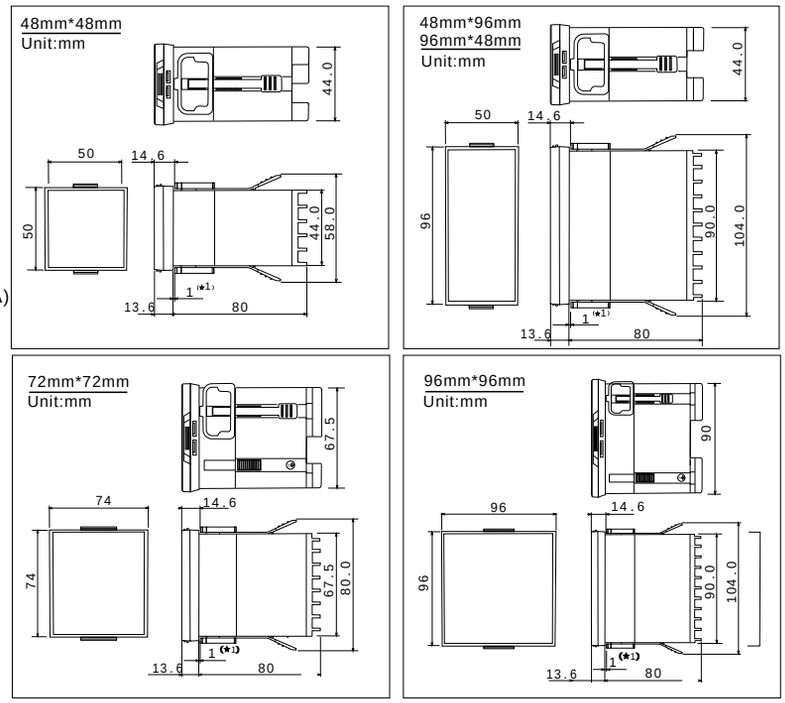
Decimal points for all input signals

The decimal points display is available for all input signals. For TC and RTD sensors, the resolution is 0.1, for analog signal, the resolution is 0.001.

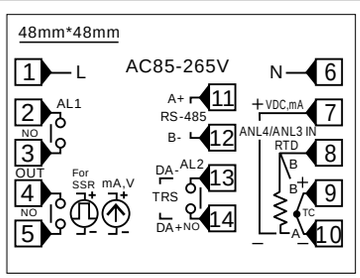
Output restriction for analog output

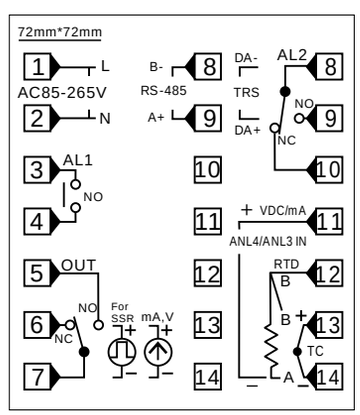
Controller offers a function when output is analog such as 4-20mA, to maintain a stable system, the output changing rate can be restrained in a certain range, for example, if the output changes from 4mA to 8mA in 1 seconds, then the changing rate is 4mA/S, the changing rate can be restrained within 5%,means in the next seconds, the output only changes between 4mA*(1-5%) to 4mA*(1+5%). which is 3.8mA to 4.2mA.

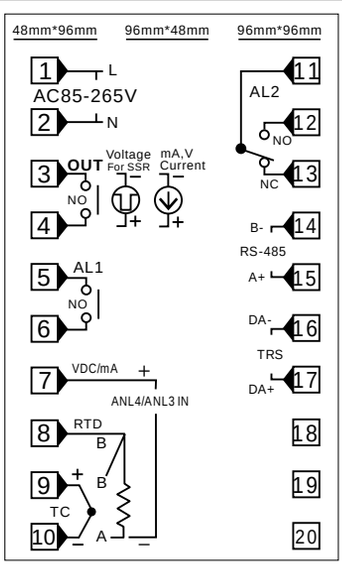
2. MOUNTING SIZE



3. WIRING

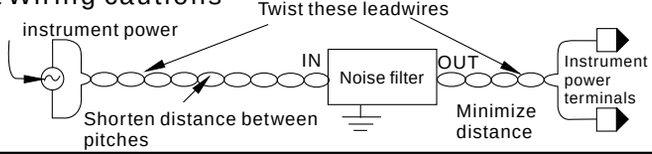




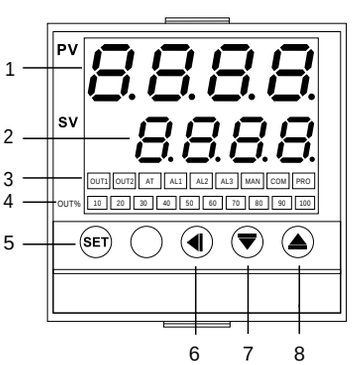


Alarm output rated:
Relay contact output：250V AC, 3A (Resistive load)
Control output rated：
Relay contact output: 250V AC,5A(Resistive load)
Voltage pulse output: 0/12 V DC or 0/24V DC (Load resistance 600 ohm or more)
Current output: 4 to 20mA DC (Load resistance 500 ohm or less)
Triac single phase zero crossing: 100A or less

3.1 Wiring cautions



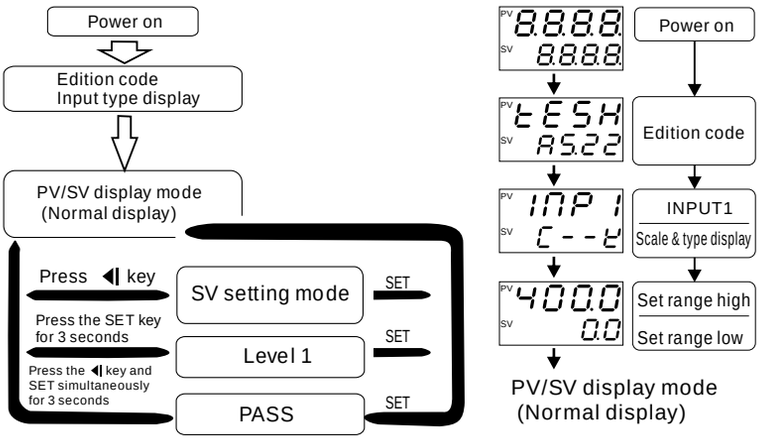
4. PANEL DESCRIPTION



1 Measured value (PV) display [RED]
2 Set value(SV)display [GREEN]
3 OUT1 lamp : Output indication
OUT2 lamp : Remark lamp
AT lamp : Autotuning indication
AL1 lamp : Alarm 1 output indication
AL2 lamp : Alarm 2 output indication
AL3 lamp : Remark lamp
MAN lamp : Remark lamp
COM lamp : Communication indication
PRG lamp : Remark lamp
4 LED bar: Output1 % value indication
5 SET key: Used for parameter calling up and set value registration
6 ▼ : Shift key and setting SV key
7 ▲ : Down key, decrease numbers
8 : Up key ,increase numbers

5. SETTING

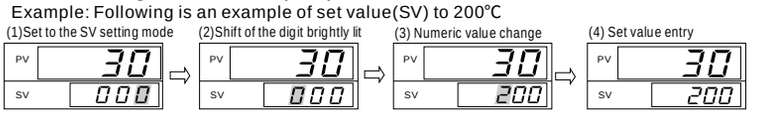
5.1 Basic operation flow charts



Display	AN4	AN3	AN2	AN1	Pt
Input	2-10VDC 1-5VDC 4-20mA	0-10VDC 0-5VDC 0-20mA	0-50mV	0-20mV	Pt100
Range					800 ℃

5.2 Setting set value(SV)

Example: Following is an example of set value(SV) to 200℃



In the normal display modePress ◀ key to enter the SV setting mode. The digit which flashing is configurable.

Press the shift key ◀ to shift the digit which lights brightly up to the hundreds dights

Press the UP key ▲ to set "2". Pressing the UP key increase numerals, and pressing the DOWN key ▼ decrease numerals.

After finishing the setting, Press the SET key, All of the set value digits stop flash and as a result the instrument return to PV/SV display mode.

5.3 Setting parameters other than set value (SV)

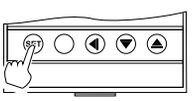
The setting procedures are the same as those of example (2) to (4) in the above "Setting set value (SV)". Press the SET key after the setting end shifts to the next parameter. When no parameter setting is required, return the instrument to the PV/SV display mode.

6. LEVEL

*In any time you can press SET key for 3 seconds to save value and exit level to PV/SV mode.

6.1 Level 1

Press the SET key for 3 seconds to level 1：



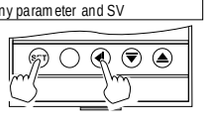
The following parameter symbols are displayed one by one every time the SET key is pressed.After the value be registered ,when no parameter setting is required, Press the SET key for 3 s to return the instrument to the normal display.

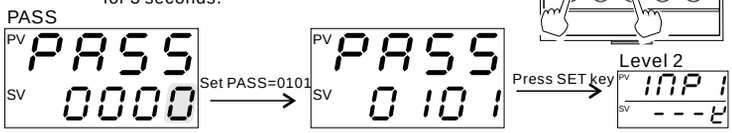
1# Factory set value

Symbol	Name	Range	1#	Description
AT	Autotuning	NO or YES	NO	YES: Autotuning on,NO: Autotuning off
AL1	Alarm 1	-1999 to 9999	10	Set the alarm value for alarm 1 . Alarm differential gap=AH1
AL2	Alarm 2	-1999 to 9999	10	Set the alarm value for alarm 2 Alarm differential gap=AH2
SC	PV bias	-199to 199	0.0	Sensor correction is made by adding bias value to measured value(PV).
P	Proportional band	0.0 to 200.0	30.0	Proportional band in PID with unit ℃ for OUT1 P=0.0, ON/OFF control
HYS	Control Hysteresis	0 to 999	1.0	Control out differential gap=HYS Only for ON/OFF action when P=0.0
I	Integral time	0 to 3600 s	240	Set the time of integral action to eliminate the offset occurring in proportional control.
d	Derivative time	0 to 3600 s	60	Set the time of derivative action to improve control stability by preparing for output changes.
CYC	Proportioning Cycle	0 to 999 s	20	Proportioning cycle time for PID control
rE	Overshoot protection	0.0 to 100.0	5.0	Overshoot protection for first power on or SV modify later. (Auto setting after autotuning)
rSt	Proportional reset	-199 to 200	0.0	Proportional reset for overshoot protection (Auto setting after autotuning)
OPL	Output limit (Low)	0.0 to 100.0%	0.0	Output manipulated variable lowest limit
OPH	Output limit (High)	0.0 to 100.0%	100.0	Output manipulated variable highest limit
bUFF	Output buffer	0.0 to 100%	100.0	Output variance value percentage per second buffer limit Only for 4-20mA output
LCK	Set data lock	0-2	0	LCK=0 : Allow to modify any parameter and SV LCK=1 : Only allow to modify SV and AT LCK=2 : Not allow to modify any parameter and SV

6.2 PASS

Press the ◀| key and the **SET** key simultaneously for 3 seconds.





6.3 Level 2

Press the ◀| key while pressing the **SET** key for 3 s to PASS, set PASS=0101, then press SET key to Level 2

The following parameter symbols are displayed one by one every time the SET key is pressed. After the value be registered ,when no parameter setting is required, Press the SET key for 3 s to return the instrument to the normal display.

1# Factory set value

Symbol	Name	Range	1#	Description
INP1	Main input type select	Setting: V E J N U S t r b Input: K E J N Wu3_Re25 S T R B Range: 1300 ℃ 600 ℃ 800 ℃ 1300 ℃ 2000 ℃ 1600 ℃ 400 ℃ 1700 ℃ 1800 ℃ Setting: AN4 AN3 AN2 AN1 Pt Input: 2-10VDC 1-5VDC 4-20mA / 0-10VDC 0-5VDC 0-20mA / 0-50mV / 0-20mV / Pt100 Range: 800 ℃		
dP	Decimal point	0 to 3	0	0，1 for TC or RTD or analog type 2,3 Only for Linear analog type input
LSPL	Low setting	-1999 to 9999	0	SV lower limit value Lower point of transmission
USPL	High setting	-1999 to 9999	1000	SV higher limit value Higher point of transmission
UNIT	Display scale	C ,F or A	C	C :Centigrade, F:Fahrenheit A:without scale
PVFT	PV follow-up PV input filter	0 to 60	55	PV variable-value control, 0-30: for general, 31-60: for enhanced
ANL1	Lower limit for PV display	-199~9999	0	Lowest value display when linear analog inputs ,Such as 4-20mA input.
ANH1	Higher limit for PV display	-1999~9999	2000	Highest value display when linear analog inputs ,Such as 4-20mA input.
ALd1	Alarm1 mode	00 to 16	11	Select the type of alarm 1， See(**ALARM TYPE TABLE)
AH1	Alarm1 differential gap	0.0 to 100.0	1.0	Alarm1 differential gap setting
ALd2	Alarm2 mode	00 to 16	10	Select the type of alarm 2， See(**ALARM TYPE TABLE)
AH2	Alarm2 differential gap	0.0 to 100.0	1.0	Alarm2 differential gap setting
OUd	Control action	HEAT or COOL	HEAT	HEAt:Reverse action (Heating) CooL:Direct action (Cooling)
bEr	Buffer mode for out1analog output	0,1,2	0	0: No buffer for analog output 1 1: Always with buffer for analog output 1 2: With buffer when the output 1 increases only. (Soft-start) Output variance value percentage per second buffer limit accordi ng BUFF in Level1
IdNO	Device address setting	0-127	1	Communication device address setting.
bAUd	Band-rate setting		9.6	BAUd=2.4K，4.8K，9.6K，19.2K

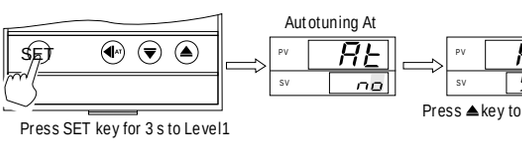
**ALARM TYPE TABLE (ALd_=00~16)

10: No alarm output	00: No alarm output
11: Deviation high alarm	01: Deviation high alarm with hold action
12: Deviation low alarm	02: Deviation low alarm with hold action
13: Deviation high/low alarm	03: Deviation high/low alarm with hold action
14: Deviation band alarm	04: Deviation band alarm with hold action
15: Process high alarm	05: Process high alarm with hold action
16: Process low alarm	06: Process low alarm with hold action

NOTE: With hold action, When Hod action is ON, the alarm action is suppressed at start-up until the measured value enters the non-al arm range.

7. AUTOTUNING

Auto-tuning shall be performed right after the power feed to controller when PV is far away from SV.



1, When begin to autotuning, AT light flash, which means to begin to autotuning,if you want to exit from autotuning, please enter into the AT menu, set AT=no

2,In the middle of the autotuning, it is ON/OFF control, according to the different systems, temperature may be have a big variance and the autotuning time is of a long short.

3,After finishing autotuning, AT light stops flashing, controller will automatically save P、I、d、rE、rSt parameters,then automatic return to the normal control state, controller will continue to run with new P、I、d、rE、rSt parameters value.

8. INPUT RANGE TABLE

Input type			Code	
K	0 to 400 ℃	K	A4	
	0 to 600 ℃	K	A6	
	0 to 1300 ℃	K	B3	
E	0 to 200 ℃	E	A2	
	0 to 400 ℃	E	A4	
	0 to 600 ℃	E	A6	
J	0 to 400 ℃	J	A4	
	0 to 600 ℃	J	A6	
	0 to 800 ℃	J	A8	
T	0 to 200 ℃	T	A2	
	0 to 300 ℃	T	A3	
	0 to 400 ℃	T	A4	
S	0 to 1600 ℃	S	B6	
R	0 to 1700 ℃	R	B7	
B	200 to 1800 ℃	B	B8	
N	0 to 1300 ℃	N	B3	
Wu3_Re25	600 to 2000 ℃	W	B0	

Input type			Code	
Pt100	0 to 400 ℃	D	A4	
	0 to 600 ℃	D	A6	
	0 to 800 ℃	D	A8	
	-100 to +200 ℃	D	C2	
	-200 to +800 ℃	D	C8	
	-100.0 to +200.0℃	D	F2	
	-50.0 to +200.0℃	D	G2	

Input type		Code	
0 to 20mV	-1999 to 9999	V	01
0 to 50mV		V	02
0 to 5VDC	-199.9 to 999.9	V	03
0 to 10VDC		V	04
1 to 5VDC	-19.99 to 99.99	V	08
2 to 10VDC		V	09
4 to 20mA	-1.999 to 9.999	A	03
0 to 20mA		A	02

Note: Clients can set TC, RTD by keyboard ,please set the input type coincide with thesensor. Check details of the manual"6.3"parameter INP1,If need analog signalinputs, please specified when order. (Except 0-20mV or 0-50mV input)

DTA Digital PID Temperature Controller Instruction Manual (Reference Revision 2)

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