

# N-6000

## Intelligent Digital Display Temperature Controller

### INSTRUCTION MANUAL

Please read this manual thoroughly for the instruction of correct usage before using this product and keep this manual as a reference.

### CAUTION WHEN OPERATING

- Before cleaning the controller, please ensure that the power is switch off.
- Please remove stains on the display panel by using a soft cloth only.
- No scrubbing or touching the display panel with any hard object, the display panel can be easily scratched.
- Do not press any button on the display panel using pointy objects such as ballpoint pen or screw driver, it can easily scratch the panel or damage buttons on the panel.

## I. Confirmation of the product

Please confirm the product you received is in full agreement with the model that you selected according to the following codes:

N □-□□□□□□□-□  
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

#### ① Panel Dimensions (mm)

D:96×96 F:96×48

E:72×72 G:48×48

#### ② Type of Display

6: Double rows display

#### ③ Type of control action

0: On-off action Relay 3: Time proportion action

4: On-off PID action with auto-tuning

7: Single phase zero-across pulse PID action with auto-tuning

#### ④ On-off position Alarm

0: No alarm 1: High alarm

#### ⑤ Type of Input

1: Thermocouple signal

2: Thermo-resistance signal (RTD input)

#### ⑥ Type of Output

No: Relay contact (Maximum 3A)

V: Logic output for SSR

A: Relay contact (Maximum 16A)

B: Relay contact (Maximum 16A)

#### ⑦ Type of calibration

⑧ Lower limit of the span

⑨ Upper limit of the span

Accessories  
Mounting bucket: 2 pieces  
Instruction manual: 1 copy

## II. Installation

### 2.1 Caution when installing

Please install the controller under the following conditions:

- Temperature: 0 to 50 degrees C.
- Humidity: 45% to 85% RH.
- Atmospheric pressure: 86 to 106kPa

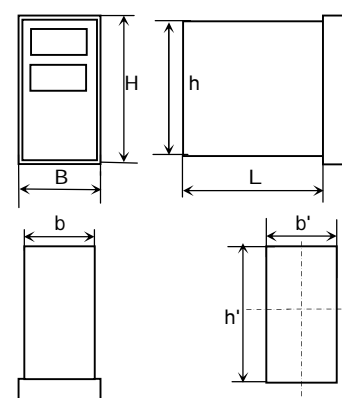
Please avoid the following conditions during installation:

- Rapid temperature changes, leading to dew condensation.
- Corrosive gases (especially sulfide gas, ammonia, etc.) or flammable gases.
- Direct vibration or shock
- Contact with water, oil, chemicals, steam, smoke, or hot water
- High concentrations of atmospheric dust, salt or iron particles
- Large inductive interference, resulting in static electricity, magnetic fields or noise.
- Direct sunlight.
- Radiant heat sources, etc

### 2.2 Mounting Process

- Cut out rectangle holes on the panel for installing the controller according to the required hole size. When installing more than one controller, the minimum horizontal and vertical distance between two holes should be 25mm and 30mm respectively.
- Insert the controller into the hole on the panel.
- Insert mounting bracket in the slot for mounting the controller.
- Push the mounting bracket tightly to connect the instrument and the panel firmly

### 2.3 Dimension in millimeters



Model	H×B	h×b×L	h'×b'
ND	96×96	92×92×70	(92+1)×(92+1)
NE	72×72	68×68×70	(68+1)×(68+1)
NF	96×48	92×44×70	(92+1)×(44+1)
NG	48×48	44×44×100	(44+1)×(44+1)

## III. Wiring

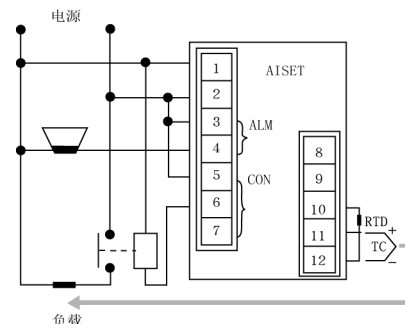
### 3. 1 Wiring cautions

- For thermocouple input, use the specified compensation wire.
- For RTD input, use leads with low resistance and having no resistance differences among the 3 leads.
- Conduct input signal wiring away from instrument power, electric equipment power and load lines to avoid noise induction.

### 3. 2 Terminals' configuration

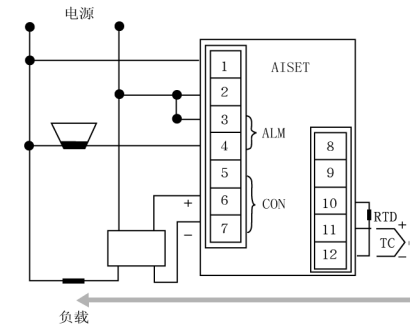
(1) Terminals for Model:

ND/F/E-6011, 6311, 6411, 6012, 6312, 6412

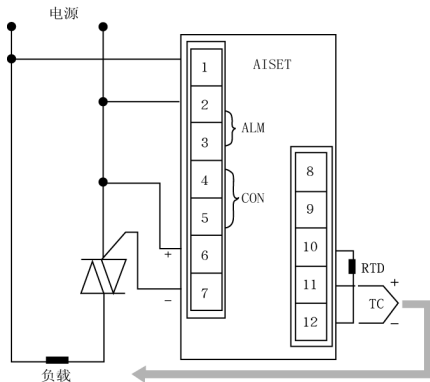


(2) Terminals for Model (with SSR):

ND/F/E-6401V, 6401V, 6302V, 6402V

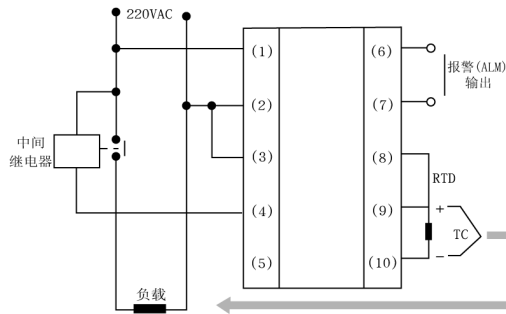


(3) Terminals for Model (with bi-directional thyristor):  
ND/F/E-6701M, 6702M

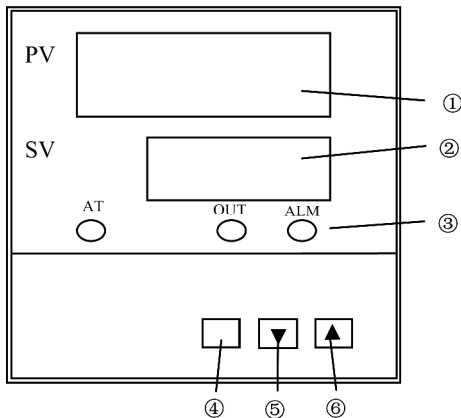


Power supply voltage:  
198 to 242 VAC (Including power supply voltage variation)(50Hz)  
Control output rated:  
Relay contact output: 240 VAC, 3A(Resistive load)  
Voltage output:0 to 12 VDC (Load resistance 600  $\Omega$  or more)

(4) Terminals for Model:  
NG-6001, 6401, 6002,6302, 6402,  
6011,6411,6012,6312,6412



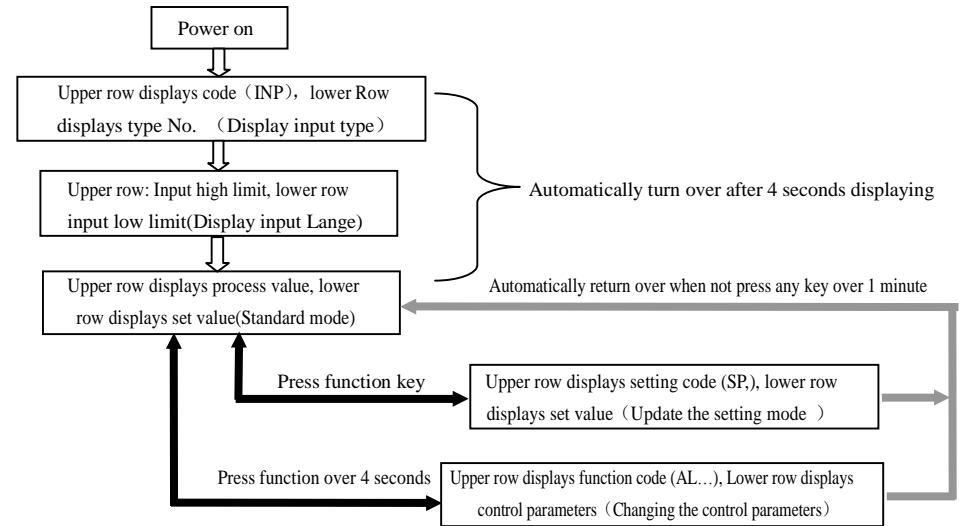
### 3.3 Panel layout



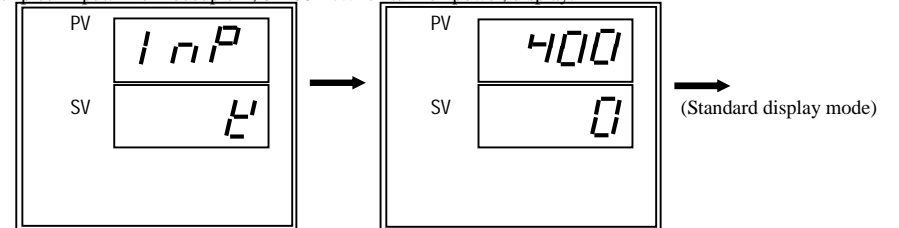
- ① Measured value (PV) display unit (Red)
  - Displays measured value (PV).
  - Displays various characters depending on the instrument.
- ② Set value (SV) display unit (Green)
  - Displays set value (SV)
  - Displays various each parameter set value depending on the instrument.
- ③ Indicator
  - Auto-tuning(AT) Indicator [Green]. Flashes during auto-tuning execution.
  - Control output (OUT) indicator [Green] turned on when outputs operate
  - Alarm output indicator (ALM)[Red] turned on when output operate
- ④ Function key
  - Used for displaying the change and confirm of the Parameters
- ⑤、⑥ Adjusting key to change the digital code and/or the key to express entering the auto-tuning state
  - Used for adjusting the digital code displayed or entering the auto-tuning state.

## IV. Operation

### 4. 1 Sequence to pick up the functions of the instrument



Example: Input: Thermocouple E, 0~400℃.When turn on power, display:



Code	InP	Type
Type of input	1	E
	2	K
	3	PT100L
	4	PT100H
	5	Cu50

Input signal	Type	Range (℃)
Thermocouple	E	0~600
	K	0~800
RTD	Pt100	0~99.9
	Pt100	-200~800
	Cu50	0~99.9

### 4.2 The detail description for every function

- If upper row displays "OVER" the sensor is in open circuit or the input signal exceeds the range of measurement.
- The method for changing set value:  
Press  $\rightarrow$  key the high row displays SP. Press  $\uparrow$  or  $\downarrow$  key, the low row displays the needed value. Again press  $\rightarrow$  key, return to the standard display mode.
- The method for changing control parameter:  
Press  $\rightarrow$  key over 4 seconds, the high row displays the parameter display code. Press  $\uparrow$  or  $\downarrow$  key the low row displays th

needed parameter value. Again press  $\rightarrow$  key over 4 seconds, return to the standard display mode. (If not press any key over 1 minute, return to the standard display mode automatically.)

• Following table lists the function parameters

Prompt Symbol	Name	Setting Range	Illustration	Beginning Value
<b>AL1</b>	Setting of Alarm1	0...Range ℃	Setting of Alarm1, Insensitive interval of alarm is equal to a constant value 0.4	50 or 50.0
<b>AL1</b>				
<b>AL2</b>	Setting of Alarm 2	0...Range ℃	Setting of Alarm 2, Insensitive interval of alarm is equal to a constant value 0.4	50 or 50.0
<b>AL2</b>				
<b>P</b>	Proportional band (Heating Side)	0...300 ℃	Proportional Control: The more the value of P, the less the proportional action and the less the system gain; only acting on the heating side. (P=0 is ON/OFF Control)	30 or 30.0
<b>P</b>				
<b>I</b>	Integral Time	0...999 Seconds	Integral Time: The more the value of I, the less the Integral action I=0 is PD Control, Ar= (Remained Error/P)×100	240
<b>I</b>				
<b>d</b>	Differential Time	0...999 seconds	Differential time: The more the Value of the more the differential action, which able to overcome overshoot (D=0 is Control)	60
<b>d</b>				
<b>Ar</b>	Overshoot restrain (Proportion re-setting) (Insensitive interval of ON/OFF Control)	0~100%	Used to restrain Overshoot (Ar is set to 1.5~2 times of the output empty ratio in the steady state of the system)	100
<b>Ar</b>				
<b>T</b>	Control period (Heating Side)	1...100 Seconds	When the relay output $\leq 20s$ , SSR and Si-controlled switch transwitch $\leq 2s$ , continuous output T is equal to 1s, only acting on heating side	20
<b>T</b>				
<b>Pb</b>	Offset of the Process Value	-10 (-10.0) ~ 10 (10.0) ℃	Using for correct the measurement error caused by the sensor and the compensate line of the thermocouple	0 or 0.0
<b>Pb</b>				
<b>LCK</b>	coded lock	000, 001, 002	000: All parameters can be updated 001: Only the Set Point Value can be updated 002: All parameters cannot be updated.	000
<b>LCK</b>				

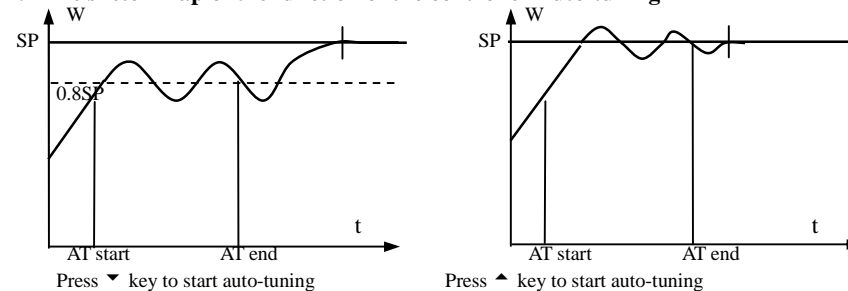
Notice: Change of each function parameter in the table may alter the control effect of the system.

#### 4.3 The function of the controller Auto-tuning

After pressing  $\blacktriangle$  key 8 seconds the lamp of AT flashes and the auto-tuning process starts; after the end of auto-tuning the lamp of AT would be turned out. Then a set of PID parameters can be got automatically for quickly increasing the process temperature. The controller operates according to this set of PID parameters.

After pressing  $\blacktriangledown$  key 8 seconds the lamp of AT flashes and the auto-tuning press starts; after the end of auto-tuning the lamp of AT be turned out. A set of PID parameters can be got automatically for overcoming temperature overshoot. The controller operates according to this set of PID parameters.

#### 4.4 The sketch map of the function of the controller Auto-tuning



## V. Service and Maintenance

- This controller is under warranty for 12 months since the day of purchase (the warranty only stands if the problem is caused by the malfunction due to manufacturing). Any repairment for damages caused by improper use of the controller will be charged. The controller is provided with lifetime maintenance and repair on cost.
- Please keep the controller in a dry place with air and NO corrosive gas.

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