

Temperature Controller

# ND4

## INSTRUCTION MANUAL

This manual primarily describes precautions required in installing and wiring the temperature controller. When using the temperature controller, please refer to the pertinent catalog for detailed information.

### MAIN PRODUCTS

- DIGITAL : Temperature Controller, Counter, Timer, Speedmeter, Tachometer, Panel Meter, Recorder
- SENSOR : Proximity Sensor/Photo Electric Sensor, Rotary Encoder, Optical Fiber Sensor, Pressure Sensor
- ANALOG : Timer, Temperature Controller

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**HANYOUNG NUX**



## ■ Safety information

Before you use, read safety precautions carefully, and use this product properly. The precautions described in this manual contain important contents related with safety; therefore, please follow the instructions accordingly. The precautions are composed of DANGER, WARNING and CAUTION.

### ⚠ DANGER

There is a danger of occurring electric shock in the input/output terminals so please never let your body or conductive substance is touched.

### ⚠ WARNING

1. If there is a concern about a serious accident caused by a malfunction or abnormality of this product, please install an external protection circuit and devise a scheme for preventing an accident.
2. This product does not contain an electric switch or fuse, so the user needs to install a separate electric switch or fuse externally. (Fuse rating: 250V 0.5A)
3. To prevent deflection or malfunction of this product, apply a proper power voltage in accordance with the rating.
4. To prevent electric shock or malfunction of product, do not supply the power until the wiring is completed.
5. Since this product is not designed with explosion-protective structure, do not use it any place with flammable or explosive gas.
6. Do not decompose, modify, revise or repair this product. This may be a cause of malfunction, electric shock or fire.
7. Reassemble this product while the power is OFF. Otherwise, it may be a cause of malfunction or electric shock.
8. If you use the product with methods other than specified by the manufacturer, there may be bodily injuries or property damages.
9. There is a possibility of occurring electric shock so please use this product after installing it onto a panel while it is operating.

### ⚠ CAUTION

1. The contents of this manual may be changed without prior notification.
2. Before using the product you purchased, make sure that it is exactly what you ordered.
3. Make sure that there is no damage or abnormality of the product during the delivery.
4. Please do not use it in case of the time setting is 0. It may be a cause of its malfunction.
5. Please turn the power off before changing the time setting. In case of changing the time setting while it is ON, please reset it.
6. Do not use this product at any place with occurring corrosive (especially noxious gas or ammonia) or flammable gas.
7. Do not use this product at any place with direct vibration or impact.
8. Do not use this product at any place with liquid, oil, medical substances, dust, salt or iron contents. (Use at Pollution level 1 or 2)
9. Do not polish this product with substances such as alcohol or benzene. (Use neutral detergent.)
10. Do not use this product at any place with a large inductive difficulty or occurring static electricity or magnetic noise.
11. Do not use this product at any place with possible thermal accumulation due to direct sunlight or heat radiation.
12. Install this product at place under 2,000m in altitude.
13. When the product gets wet, the inspection is essential because there is danger of an electric leakage or fire.
14. If there is excessive noise from the power supply, using insulating transformer and noise filter is recommended. The noise filter must be attached to be a panel grounded, and the wire between the filter output side and power supply terminal must be as short as possible.
15. If putting the power cables closely together then it is effective against noise.
16. Do not connect anything to the unused terminals.
17. After checking the polarity of terminal, connect wires at the correct position.

18. When this product is connected onto a panel, use a circuit breaker or switch approved with IEC947-1 or IEC947-3.
19. Install a circuit breaker or switch at near place for convenient use
20. Write down on a label that if the circuit breaker or switch is operating then the power will be disconnected since the circuit breaker or switch is installed.
21. For the continuous and safe use of this product, the periodical maintenance is recommended.
22. Some parts of this product have limited life span, and others are changed by their usage.
23. The warranty period for this product including parts is one year if this product is properly used.
24. When the power is on, the preparation period of contact output is required. In case of using signals of external interlock circuit or etc., use it with a delay relay.

## ■ Model and Suffix code

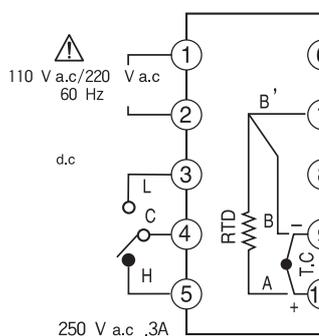
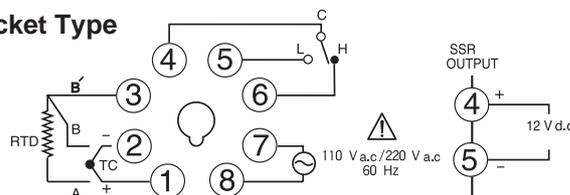
Model	Suffix Code	Description
<b>ND4</b>	□ □ □ □ □	Non-display Temperature Controller
Adjusting Action	F	2-Position Control (ON/OFF)
	P	Time-Division Proportion
Input	K	Thermocouple K Input
	J	Thermocouple J Input
	P	R.T.D Input (Pt100B)
Control Output	M	Relay Output
	S	Voltage Pulse (12V d.c)
Control Action	R	Reverse Action Control (for Heating Control)
	D	Direct Action Control (for Cooling Control)
Range Code		Standard Range Code Number Selection

## ■ Standard Scale Range

Power Supply	Input	Temperature Range (°C)	Power Supply	Input	Temperature Range (°C)
1	Pt	-50 ~ 50	4	Pt, K	0 ~ 100
2	Pt	-100 ~ 100	5	Pt, K	0 ~ 200
3	Pt	0 ~ 100	6	Pt, K	0 ~ 300

## ■ Wiring Diagram

### ■ Socket Type



## ■ Specification

Contents	Model	ND4
Power Supply	110 V a.c / 220 V a.c, 60 Hz	
Permissible Voltage Fluctuation Range	Rated Voltage $\pm 10\%$	
Consumption Power	Approx. 2 V A	
Input	Thermocouple, RTD (Pt100 $\Omega$ )	
Adjusting Sensitivity	0.2 % (fixed) of Max. Range	
Control Method	Proportional Control, ON/OFF Control	
Setting Method	Analog Setting	
Control Output	Relay Output: Capacity 250 V a.c 3 A (Resistive Load) SPDT SSR Output: Voltage Pulse 12 V a.c (Resistive Load: above 800 $\Omega$ )	
Setting Accuracy	Same as display value without relative error	
Proportional Band	0.3 % (fixed) of Max Range	
Relay Life Expectancy	Mechanical: above 10 millions times Electrical : above 100 thousands times (250 V a.c, 5 A Resistive Load)	
Sampling Cycle	Relay Output: approx. 20 s, SSR Output: approx. 2 s	
External Input Resistance	Thermocouple: below 100 $\Omega$ Resistive: below 10 $\Omega$ per 1 wire (the resistance of each wire should be the same.)	
Dielectric Strength	2000V a.c 60 Hz for 1 minute	
Operating Ambient Temperature/Humidity	0 ~ 50 $^{\circ}\text{C}$ , 35 ~ 85 % R.H. (without condensation)	
Vibration resistance	Durability	2-55 Hz, 2G, each X · Y · Z direction for 10 minutes
	Malfunction	10-55 Hz, 0.76 mm, each X · Y · Z direction for 2 minutes
Shock Resistance	Durability	300 $\beta$ æ (approx. 30G)
	Malfunction	200 $\beta$ æ (approx. 10G)
Weight	Approx. 220g (including installation adaptor)	

## ■ Terminology & Function Explanation

### ■ Proportional Control

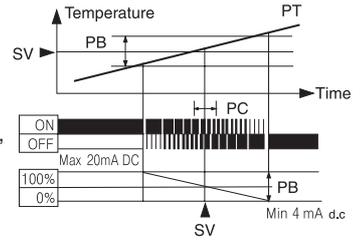
Proportional Control is that an output capacity regarding a setting value (SV) is proportionally operated by a deviation. The width which the output is varied within 0 ~ 100% is called Proportional Band (PB).

Therefore, for Reverse Action, if PT=Present (Process)Temperature, PB=Proportional Band

PT < PB → Output capacity 100%

PT > PB → Output capacity 0%

PT = PB → Output capacity 50%

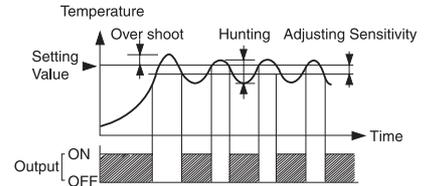


PT: Present (Process) Temperature PB: Proportional Band  
SV: Setting Value (Temperature) PC: Proportional Cycle

### ■ position Control, ON-OFF Control

This is a control method that if PT is higher than SV then output will be OFF or if PT is less than SV, then the output will be ON. Also, it is called 2-position control since it outputs either 0% or 100%. The status which the temperature is unstable and there is high/low wave around SV is called hunting. The width between the point where its output is OFF because PT is higher than SV and the point where its output is ON since PT is less than SV is called adjusting sensitivity, hysteresis. If the width, hysteresis, is narrow, then high/low wave becomes smaller but the cycle of ON-OFF gets smaller so that it may severely damage to electromagnetic switch, electrovalve or etc..

Especially, for controlling burner which is using freezer or electrovalve, 2-position control is generally used.



PT: Present (Process) Temperature  
SV: Setting Value (Temperature)

### ■ Proportional Control/ ON-OFF Control Selection

It is depending on its specification code when you are ordering.

## ■ Aspect & Panel Cutout

Unit: mm

### ● Panel Cutout Dimension

