

DF4

INSTRUCTION MANUAL

Thank you for purchasing Hanyoung Nux products. Please read the instruction manual carefully before using this product, and use the product correctly. Also, please keep this instruction manual where you can view it any time.

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Safety information

Please read the safety information carefully before the use, and use the product correctly. The alerts declared in the manual are classified into **Danger**, **Warning** and **Caution** according to their importance

	DANGER	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury
	WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury
	CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in minor injury or property damage

DANGER

The input/output terminals are subject to electric shock risk. Never let the input/output terminals come in contact with your body or conductive substances.

WARNING

- 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.
- 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: 250 V 0.5 A)
- To prevent deflection or malfunction of this product, apply a proper power voltage in accordance with the rating.
- To prevent electric shock or malfunction of product, do not supply the power until the wiring is completed.
- Since this product is not designed with explosion-protective structure, do not use it any place with flammable or explosive gas.
- Do not decompose, modify, revise or repair this product. This may be a cause of malfunction, electric shock or fire.
- Reassemble this product while the power is OFF. Otherwise, it may be a cause of malfunction or electric shock.

CAUTION

- The contents of this manual may be changed without prior notification.
- Before using the product you purchased, make sure that it is exactly what you ordered.
- Make sure that there is no damage or abnormality of the product during the delivery.
- Do not use this product at any place with occurring corrosive (especially noxious gas or ammonia) or flammable gas.
- Do not use this product at any place with direct vibration or impact.
- 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)
- Do not polish this product with substances such as alcohol or benzene. (Use neutral detergent.)
- Do not use this product at any place with a large inductive difficulty or occurring static electricity or magnetic noise.
- Do not use this product at any place with possible thermal accumulation due to direct sunlight or heat radiation.
- Install this product at place under 2,000m in altitude.
- When the product gets wet, the inspection is essential because there is danger of an electric leakage or fire.
- In case of inputting thermocouple, use a compensating cable. (If using a normal wire, there is a possibility of occurring temperature error.)
- For R.T.D input, use a cable which is a lead wire has small resistance and resistances of three wires shall be the same. (If the three wires have different resistances then there will be a temperature error.)
- To avoid an effect of inductive noise to input signal cables, use the product after separating the input signal cables from power, output and load cables.
- Separate an input signal cable from an output signal cable. If separating is not possible, please use the input signal cable after shielding it.
- Use non-earth sensor with thermocouple. (In case of using earth sensor, there is a possibility of occurring malfunction caused by a short circuit.)
- If there is excessive noise from the power supply, using insulating transformer and noise filter is recommended. The noise filter must be attached to a panel which is already connected to a ground and the wire between the filter output side and power supply terminal must be short as possible.
- If twisting the power cables closely together then it is effective against noise.
- Turn the power OFF when replacing a sensor.
- Use an auxiliary relay in case of high frequent operation such as proportional operation or etc. its life span will be shorter if connecting a load without permissible rating of output relay. In this case, using SSR output type is recommended.
- Using Electromagnetic Switch: Proportional Cycle set it above 20 sec.
- Using SSR: Proportional Cycle set it above 1 sec.
- Life Span of Contact Point Output: Mechanical Life Span: above 10 million times (with no load)
Electrical Life Span: 100 thousand times (250 VAC 3 A: with the rated load)
- Do not connect anything to the unused terminals.
- After checking the polarity of terminal, connect wires at the correct position.
- When this product is connected onto a panel, use a circuit breaker or switch approved with IEC60947-1 or IEC60947-3.
- Install a circuit breaker or switch at near place for convenient use.
- Please specify on the panel that, since switches or circuit breakers are installed, if the switches or circuit breakers are activated, the power will be cut off.
- For the continuous and safe use of this product, the periodical maintenance is recommended.
- Some parts of this product have limited life span, and others are changed by their usage.
- The warranty period of this product, is 1 year, including its accessories, under normal conditions of use.
- The preparation period of the contact output
- The preparation period of the contact output is required during power supply. If used as a signal to external interlock circuit, etc. please use a delay relay together.

Suffix code

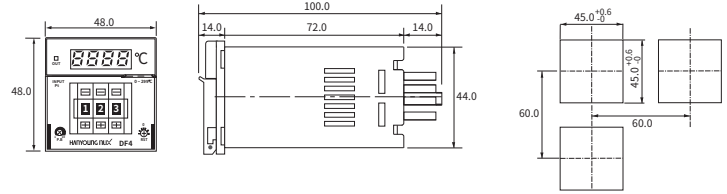
Model	Code	Content
DF	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Economical Digital Temperature Controller
Appearance	4	48(W) X 48(H) mm (socket type, 8-pin)
Control type	P	Proportional control
Input	K	K thermocouple
	P	RTD Pt100 Ω (IEC)
Control output	M	Relay output
Control operation (internal selection)	R	Reverse action (heating control)
Range code		Refer to "Range and input code chart"

※ 110 V power voltage is available (order-made)

Range and input code chart

Classification	Code	Input	Range (°C)
Thermocouple	6	K	0 ~ 399
RTD	6	Pt100 Ω	0 ~ 399

Dimensions and panel cutout

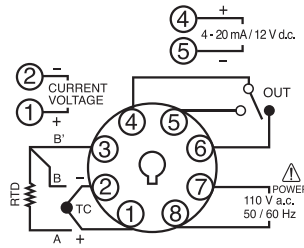


Specifications

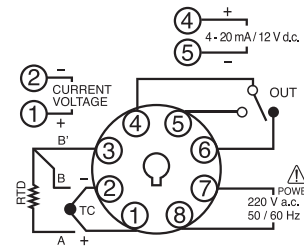
Input	Thermocouple input	K
	RTD input	Pt100 Ω
	Input sampling cycle	500 ms
	Input display resolution	1 °C
	Allowable signal source resistance	Thermocouple max. 100 Ω
	Lead wire allowable resistance	RTD (max. 10 Ω, but the resistance among 3 lines should be same)
Performance	Display accuracy	±1 % of FS ±1 Digit
Control functions and output	Control type	Proportional control
	Control operation	Reverse action or direct action (by suffix code)
	Setting range	Same as range and input code
	Proportional band	1 ~ 10 % of FS
	Manual reset (MR)	-50 ~ +50 % (Output amount)
	Proportional period	Approx. 20 sec (relay output)
	Input disconnection detection	The output is OFF when the range is over 10 °C
Control output	Contact capacity: 1 C, 250 V a.c. 3 A (resistive load)	
Power voltage	※ 110 V a.c., 220 V a.c. 50/60 Hz	
Voltage fluctuation rate	±10 % of power voltage	
Power consumption	Max. 3 VA	
Ambient temperature & humidity	0 ~ 50 °C, 35 ~ 85 % RH (without condensation)	
Storage temperature	-25 ~ 65 °C	
Weight (g)	200	

Connection diagrams

110 V a.c.



220 V a.c.



Switch between ON/OFF control and Proportional Control

Users can select a control method by dip switch located in the internal body. Proportional control mainly used for heaters, ON/OFF control mainly used for freezers, pump and valve controls etc.



- ※ Located on upper side of internal body
- ※ **Factory setting: Proportional control**

Term & Function

Proportional Control

Proportional control means that the manipulated value to the set value operates in proportion to the deviation. The width of the manipulated variable value from 0-100% is called the proportional band. In case of reversal control, if the PV (Process Value) is lower than the proportional band, the manipulated value becomes 100%, and then it is higher, it becomes 0%. If SV (Set value) matches to PV, the manipulated value becomes 50%.

Volume switch in front

Proportional Band (PB) Only for

When PB range decreased, the time for approaching to the SV will be shorten and offset will be decreased. But the excessive narrow PB may lead to over-shooting and hunting. DF4 can set PB from 1 to 10% using the volume switch of the front panel of the device. Turning the volume clockwise increases the proportional band, conversely, the proportional band becomes narrow.

Reset Volume (RST) adjustment

In proportional control, the device designed to give 50% output when the PV approach to the SV, and this makes offset. To reduce offset, the output change be adjusted by the RST volume switch.

- PV<SV : Turn the volume switch clockwise.
- PV>SV : Turn the volume switch outer clockwise