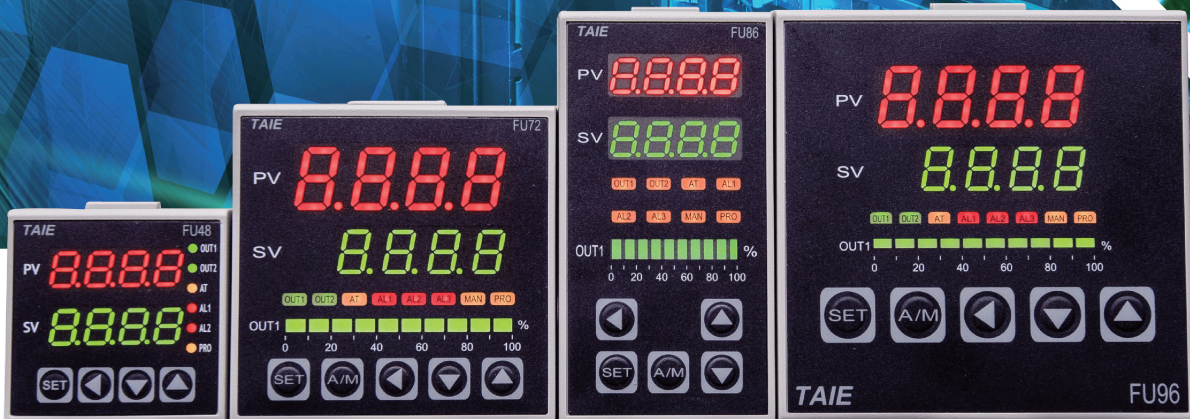


# NFU

Series  
Controller

NFU400/48  
NFU72  
NFU86  
NFU96

## New-Generation NFU Series Digital PID Temperature Controller



**TAIE**

TAIWAN INSTRUMENT & CONTROL CO., LTD

# Classical Re-evolution

High Quality & High Performance  
With Best Process Control

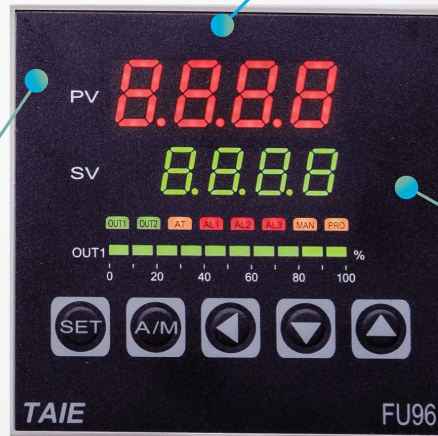
Double Loop

Precise Control

High Reliability

Sampling Time 50ms

High Accuracy  $\pm 0.1\%$



Speed upper to  
115200 bps

## Excellent Anti-Interference Ability

Adopt new anti-interference algorithm and pass the highest level of EMC verification in CE certification. It can resist electromagnetic interference in heavy noise environment.



## Double-Loop Design

The input adopts double-loop design, which can accept two sensor input and drive two output module at the same time, realize temperature and humidity control on a NFU96.



## High Speed Sampling and High Accuracy

Both loops can perform high-speed sampling for 50ms, enabling stable control and response. Built-in 18-bit high resolution ADC circuit provides up to 0.1% accuracy.



## Certification and Universal Voltage

All models get CE approval, operate on any voltage from AC 85~265V at 50/60 Hz, DC 24V is also available.



## Customize Function Key

It can be quickly executed the event by A/M key.  
Ex: auto/manual switch, run/stop switch etc.



## Parameter Lock Function

All parameters are separated in five operation levels (Level1~Level5). Each parameter can be hidden or locked to prevent users unauthorized changes.



## Status Indicator Light

Real time monitor the status of output(OUT1/OUT2) , alarm(AL1/AL2/AL3), auto-tunning(AT), manual output(MAN) and program execute(PRO).

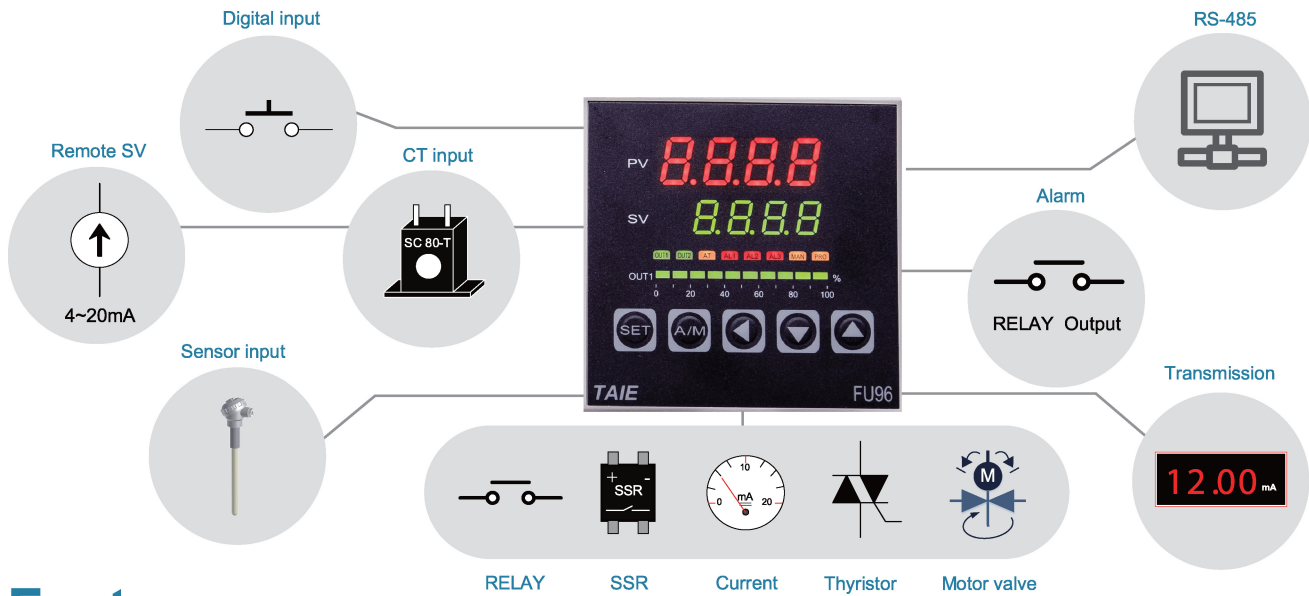


## Bar-Graph

The output percentage is directly displayed on the panel with a bar-graph indicator 10 LED's corresponding to every 10% differential in output (0~100%) (except NFU400/NFU48).

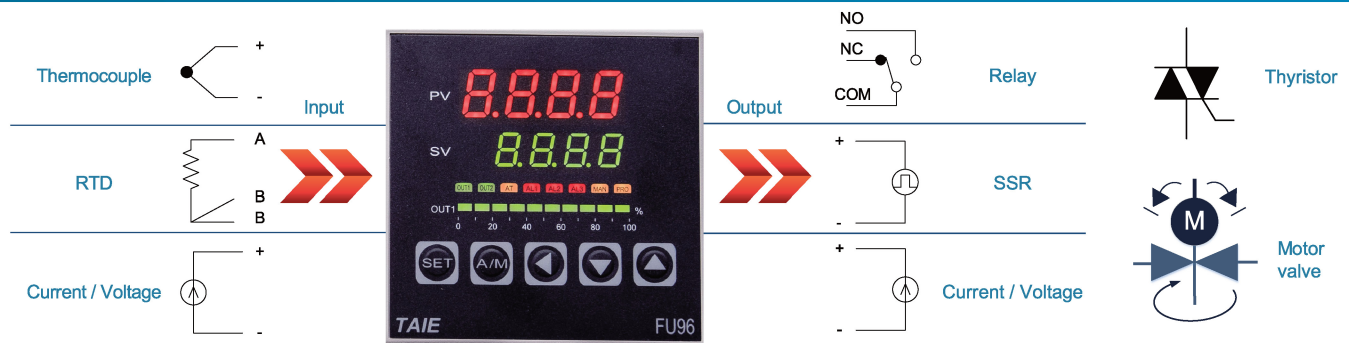


# Function block diagram



## Features

### Various I/O Types



### Excellent Control Performance

**PID Control**  
Super SV function can effectively suppress temperature overshoot and quickly reach the set temperature.

**Auto-tuning**  
Calculate the optimal PID of the system value automatically, to achieve precise control effect.

**High speed control**  
50ms sampling time for fast and precise control of the occasion.

### Powerful Program Control

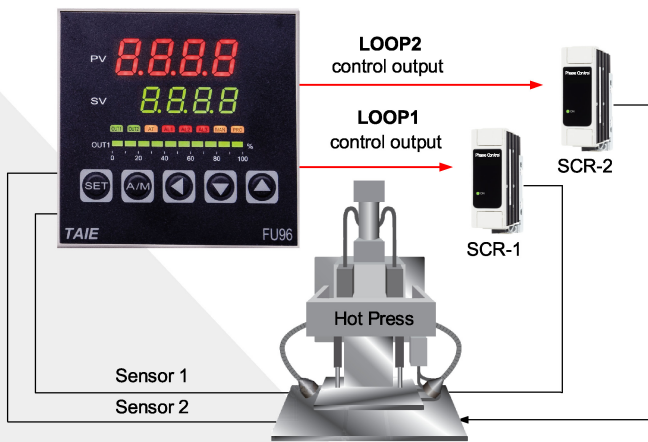
Provides 15 patterns of 10 segments of program control, each segment can be arbitrarily set to ramp, soak, step or cool down temperature, the user can be arbitrary according to the demand, the maximum can support to 150 segments program control.



# Features

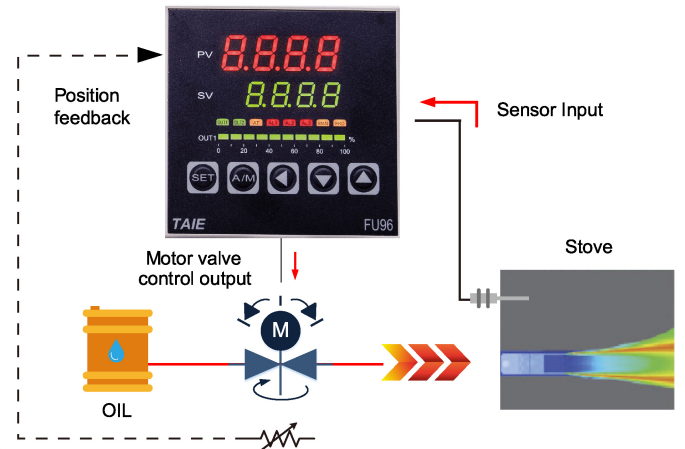
## Double Loop Control

Double Loop design, accept two sensor inputs at the same time, independently control two systems, effectively reduce system costs.



## Motor Valve Control

Can use position feedback control of valve opening input or servo control without valve opening input.

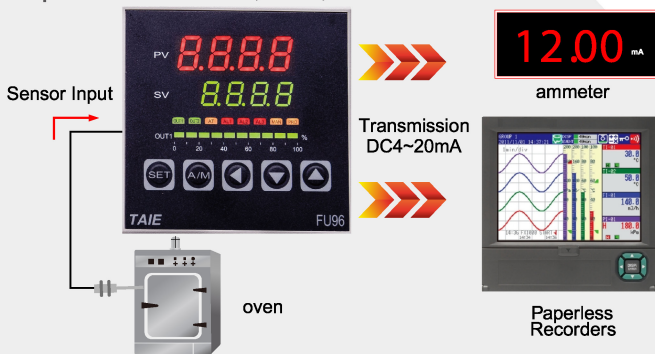


## Transmission

Transfer parameter digital values as analog signals to external devices.

signals : 0~20mA , 4~20mA , 0~5V , 1~5V , 0~10V ...

parameters : SV1, PV1, MV1...

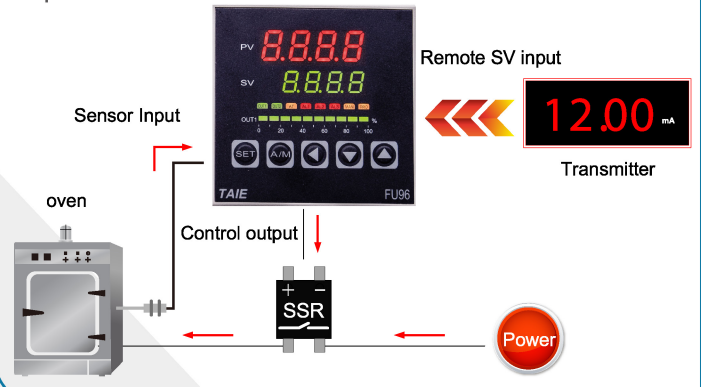


## Remote SV

SV value is controlled by an analog signal from an external device.

signals : 0~20mA , 4~20mA , 0~5V , 1~5V , 0~10V ...

parameters : SV



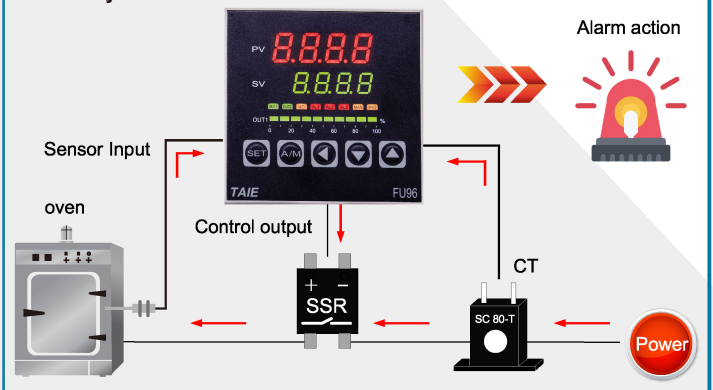
## Communication

Compatible with Modbus RTU communication protocol to quickly establish links with HMI, PLC or SCADA software.

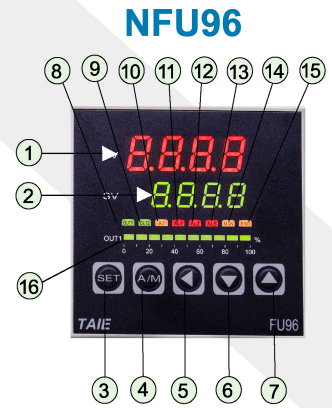
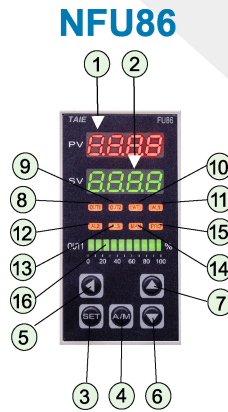
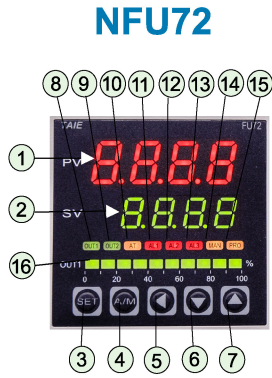
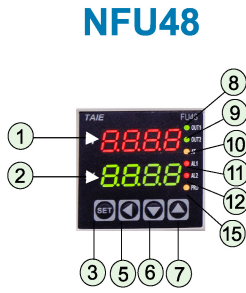


## Heater Break Alarm(HBA)

With a CT (current transformer) to monitor the heater current in real time, when the current value is abnormally reduced an alarm signal can be output to notify the user.



# Appearance



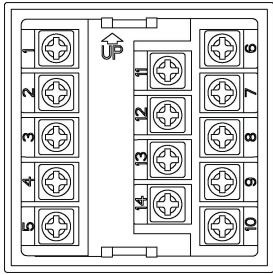
NO.	NAME	Function	NO.	NAME	Function
1	PV	Indicates PV (measured value) and character information such as parameter codes and error codes (Red)	9	OUT2	Lamp lit when OUT2 is activated (Green)
2	SV	Indicates SV (target set value) and parameter Values (Green)	10	AT	Lamp lit when Auto-tuning is activated (Orange)
3	SET	Used for parameter calling up and set value registration	11	AL1	Lamp lit when Alarm 1 is activated (Red)
4	A/M	Auto/manual switch or others function start	12	AL2	Lamp lit when Alarm 2 is activated (Red)
5	<	Shift digits when settings are changed	13	AL3	Lamp lit when Alarm 3 is activated (Red)
6	∨	Decrease Key (-1000,-100,-10,-1)	14	MAN	Lamp lit when controller in manual mode or get error condition (Orange)
7	∧	Increase Key (+1000,+100,+10,+1)	15	PRO	Lights when program running (Orange)
8	OUT1	Lamp lit when OUT1 is activated (Green)	16	OUT%	Output percentage (Green)

## External and Panel Cutout Dimensions

<b>NFU48</b>			
<b>NFU72</b>			
<b>NFU86</b>			
<b>NFU96</b>			

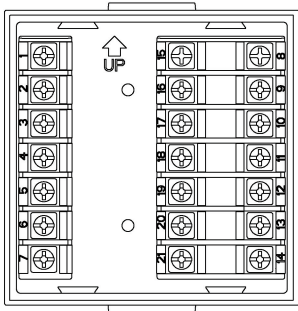
# Terminal Arrangement

## NFU400/NFU48



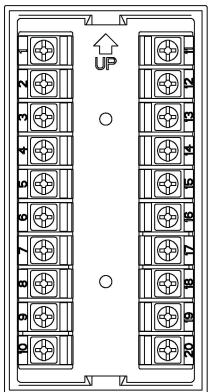
<b>Power</b>		<b>Communication</b>		<b>Motor valve</b>	
<b>Output-1</b>		<b>1 Φ Zero cross</b>		<b>Remote/CT Input</b>	
<b>Output-2</b>				<b>TRS</b>	
<b>Alarm-1 Alarm-2</b>		<b>DI Input</b>		<b>Input</b>	

## NFU72



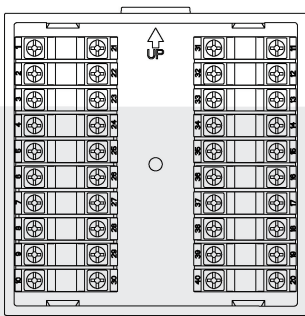
<b>Power</b>		<b>Alarm-1 Alarm-2 Alarm-3</b>		<b>1 Φ Zero cross Phase angle</b>	
<b>Output-1</b>		<b>Communication</b>		<b>DI Input</b>	
<b>Output-2</b>		<b>TRS</b>			
<b>Motor valve</b>		<b>Remote CT Input</b>		<b>Input</b>	

## NFU86



<b>Power</b>		<b>Alarm-1 Alarm-2 Alarm-3</b>		<b>DI Input</b>	
<b>Output-1</b>		<b>Communication</b>		<b>Input-1</b>	
<b>Output-2</b>				<b>Input-2</b>	
<b>Motor valve</b>		<b>TRS Remote/CT Input</b>			

## NFU96



<b>Power</b>		<b>Alarm-1 Alarm-2 Alarm-3</b>		<b>1 Φ / 3 Φ Zero cross</b>	
<b>Output-1</b>		<b>Communication</b>			
<b>Output-2</b>		<b>TRS</b>		<b>1 Φ Phase angle</b>	
<b>DI Input</b>		<b>Remote/CT Input</b>			
<b>Motor valve</b>		<b>Input-1</b>		<b>Input-2</b>	

# Specifications

Standard Spec.	
<b>Supply voltage</b>	AC 85 ~ 265V DC 24V ±10%
<b>Power Consumption</b>	AC approx. 6VA DC approx. 4W
<b>Memory</b>	Non-volatile memory Maximum writes : 1000,000 times Data retention : 10 years
<b>Operating temperature</b>	0~50°C (32~122°F)
<b>Humidity range</b>	20% ~ 90% RH
<b>Weight</b>	NFU400/48 approx. 120g NFU72 approx. 150g NFU86 approx. 170g NFU96 approx. 230g
<b>Dimension (mm)</b>	NFU400/48 48W X 48H X 95.5L (1/16 DIN) NFU72 72W X 72H X 95.5L (3/16 DIN) NFU86 48W X 96H X 95.5L (1/8 DIN) NFU96 96W X 96H X 95.5L (1/4 DIN)
<b>Operating environment</b>	Non-corrosive, flammable gas, slight dust ring environment, no high frequency, no direct shock, places the sun is not directly exposed.
Input	
<b>Set</b>	Maximum 2 sets
<b>Accuracy</b>	Cold junction compensation diode external ±(0.1% of reading + 1 digit) Cold junction compensation diode inside ±(0.3% of reading + 1 digit)
<b>Sampling time</b>	50ms
<b>TC</b>	K · J · R · S · B · E · N · T · W · PL11 · L
<b>RTD</b>	PT100
<b>mA dc</b>	0~5V · 0~10V · 0~2V · 1~5V 2~10V · 0~25mV · 0~50mV · 0~20mA · 4~20mA · 0~1V · 10~50mV · 0~70mV
<b>Input filter</b>	First-order low-pass filter Time constant : 0.1 to 10.0 sec.(When set to 0, the filter is off)
<b>PV compensation</b>	Both zero and high points can be compensated
Output	
<b>Set</b>	Maximum 2 sets
<b>Control</b>	1.PID, P, PI, and PD control (including AT function) 2.ON/OFF control 3.Heat and Cooling PID control (including AT function)
<b>Relay</b>	1.SPST-NO, 250VAC, 5A Electrical life : 100,000 times 2.SPDT-NO, 250VAC, 5A Electrical life : 50,000 times 3.SPDT-NC, 250VAC, 2A Electrical life : 20,000 times
<b>SSR</b>	ON : 24 V OFF: 0V Maximum load current : 20mA With short circuit protection circuit
<b>mA</b>	Resolution: 10 bits Signal type: 4~20mA, 0~20mA, 0~5V, 0~10V, 1~5V, 2~10V
Heater Break Alarm (HBA)	
<b>CT model</b>	SC-80T, SC-100T
<b>Maximum current</b>	SC-80T : 80A, SC-100T : 100A
<b>Accuracy</b>	SC-80T : ±3%, SC-100T : ±5%
<b>Aperture</b>	SC-80T : 5.9mm, SC-100T : 12.6mm
<b>Output</b>	Free load alarm 1~3

Alarm	
<b>Set</b>	Maximum 3 sets
<b>Mode</b>	Program end, System error, HBA, Soak timer, Deviation high, Deviation low, Band, Process high, Process low, Program run, System normal, Ramp Soak Timer, Timer, Counter, 24H Timer
<b>Relay specifications (resistive load)</b>	1.SPST-NO, 250VAC, 5A Electrical life: 100,000 times 2.SPDT-NO, 250VAC, 5A Electrical life: 50,000 times 3.SPDT-NC, 250VAC, 2A Electrical life: 20,000 times
Timer	
<b>set</b>	1 set
<b>Time Format</b>	Hour : Minute. or Minute : second
<b>Maximum Time</b>	99hr.59min · 99min.59sec
<b>output</b>	Free load alarm 1~3
Transmission	
<b>set</b>	1 set
<b>Resolution</b>	14 bits
<b>Accuracy</b>	0.1%
<b>Parameters</b>	SV1, PV1, MV1, SV1R, PV1R, MV1R, SV2, PV2, MV2, SV2R, PV2R, MV2R
<b>Signal Type</b>	4~20mA, 0~20mA, 0~5V,0~10V, 1~5V, 2~10V
Remote	
<b>set</b>	1 set
<b>Resolution</b>	18 bits
<b>Parameters</b>	Local SV
<b>Signal Type</b>	4~20mA, 0~20mA, 0~5V,0~10V, 1~5V, 2~10V
Motor Valve	
<b>set</b>	1 set
<b>Resolution</b>	18 bits
<b>Parameters</b>	PV2
<b>Signal Type</b>	1KΩ or 560Ω
Digital Input	
<b>set</b>	2 sets
<b>External contact specifications</b>	Dry contact without electricity Open circuit : over 500KΩ Short circuit : less 10Ω
<b>Function</b>	1.SV switching 2.RUN/STOP switching 3.Manual switching 4.AT RUN/STOP 5.Remote SV RUN/STOP 6.Retransmission RUN/STOP 7.Timer RUN/STOP 8.Counter 9.Program RUN/STOP
Communication	
<b>Communication</b>	RS-485
<b>Protocol</b>	Modbus RTU, TAIE
<b>Baud rate</b>	2400, 4800, 9600, 19200, 38400, 57600, 115200 bps
<b>Communication format configuration</b>	1. Starting bit : 1 2. Information bits : 8 3. Bit check : None, Odd, Even 4. Stop bits : 1 or 2
<b>Reponses time</b>	0~250ms
<b>Maximum connections</b>	31pcs

# Order Information

Block means optional functions with additional charge

Model	Output 1	Output 2	Alarm	TRS	Remote	COMM	Input type	Power	Accessories
NFU96(Red/Green light) PNFU96(Program)	1	0	1	0	0	0	01	A	N
NFU400 / 48 NFU72 NFU86 NFU96	0 None 1 Relay 2 Voltage Pulse (SSR Drive) 3 4-20mA 4 0-20mA A 0-5V B 0-10V C 1-5V D 2-10V	0 None 1 Relay 2 Voltage Pulse (SSR Drive) 3 4-20mA 4 0-20mA A 0-5V B 0-10V C 1-5V D 2-10V	0 None 1 1Set 2 2Sets 3 3Sets A HBA B HBA+AL2 C HBA+AL2+AL3	0 None 1 4-20mA 2 0-20mA A 0-5V B 0-10V C 1-5V D 2-10V	0 None 1 4-20mA 2 0-20mA A 0-5V B 0-10V C 1-5V D 2-10V E DI F Remote+DI M Motor valve control feedback J PT(Second Input) K TC(Second Input) L Linear(Second Input)	0 None 3 TTL B RS-485(FY) C RS-485(NFY)	See input type table code	A AC 85-265V D DC 24V	N None T Terminal Cover W IP65 R Terminal Cover +IP65
PNFU400 / 48 PNFU72 PNFU86 PNFU96	48x48mm 72x72mm 48x96mm 96x96mm	48x48mm 72x72mm 48x96mm 96x96mm							
	5 1□SCR zero cross control 6 3□SCR zero cross control 7 Motor valve control 8 1□SCR phase angle control								

## Input Type Table

TYPE	Thermocouple														RTD		
	K		J		R	S	B	E	N	T	W	PLII	L	PT100			
Kind	K1	K2	J1	J2	R	S	B	E	N	T1	T2	W	PLII	L	DP1	DP2	DP3
Code	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17
Range °C	600.0	1200	400.0	1200	1760	1760	1820	900	1300	400.0	400	2320	1200	800	850.0	850	850
	-50.0	-50	-50.0	-50	-50	-50	-50	-50	-50	-199.9	-199	-50	-50	-50	-199.9	-199	0

TYPE	LINEAR												
	AN1		AN2				AN3		AN4				
Code	18	19	20	21	22	23	24	25	26	27	28	29	
Range	0~25mV		0~50mV	0~20mA	0~1V	0~2V	0~5V	0~10V	0~70mV	4~20mA	10~50mV	1~5V	2~10V
	4 kinds of choices : -1999~9999 -199.9~999.9 -19.99~99.99 -1.999~9.999												



Before operating this product, read the instruction manual carefully to avoid incorrect operation.  
This product is intended for use with industrial machines, test and measuring equipment.

It is not design for use with medical equipment.

If it is possible that an accident may occur as a result of the failure of the product or some other abnormality, an appropriate independent protection device must be installed.



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