FU

Series
Controller

FU400/48
FU72
FU86
FU96

Upgraded FU Series
Digital PID Temperature Controller

TAIE

TAIWAN INSTRUMENT & CONTROL CO., LTD

Classical Re-evolution
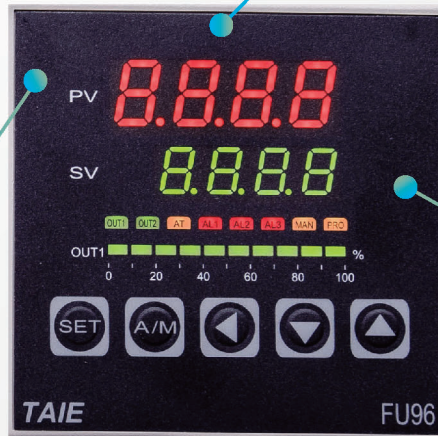
High Quality & High Performance
With Best Process Control

Double Loop

Precise Control

High Reliability

Sampling Time 50ms

PV

SV

OUT1

TAIE   FU96

High Accuracy ±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.

EMC Shielding ✓

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.

50ms ADC 18bit

Customize Function Key

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

A/M

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).

OUT1 OUT2 AT AL1 AL2 AL3 MAN PRO

IP65 Proof

IP65 dust & water proof is available for all models (optional function).

IP65

Certification and Universal Voltage

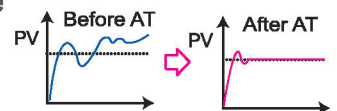All models get CE approval.operate on any voltage from AC 85~265V at 50/60 Hz,DC 24V is also available.

C E

Autotuning(AT)

AT Function can calculate the optimize PID value for your control system, without trying.
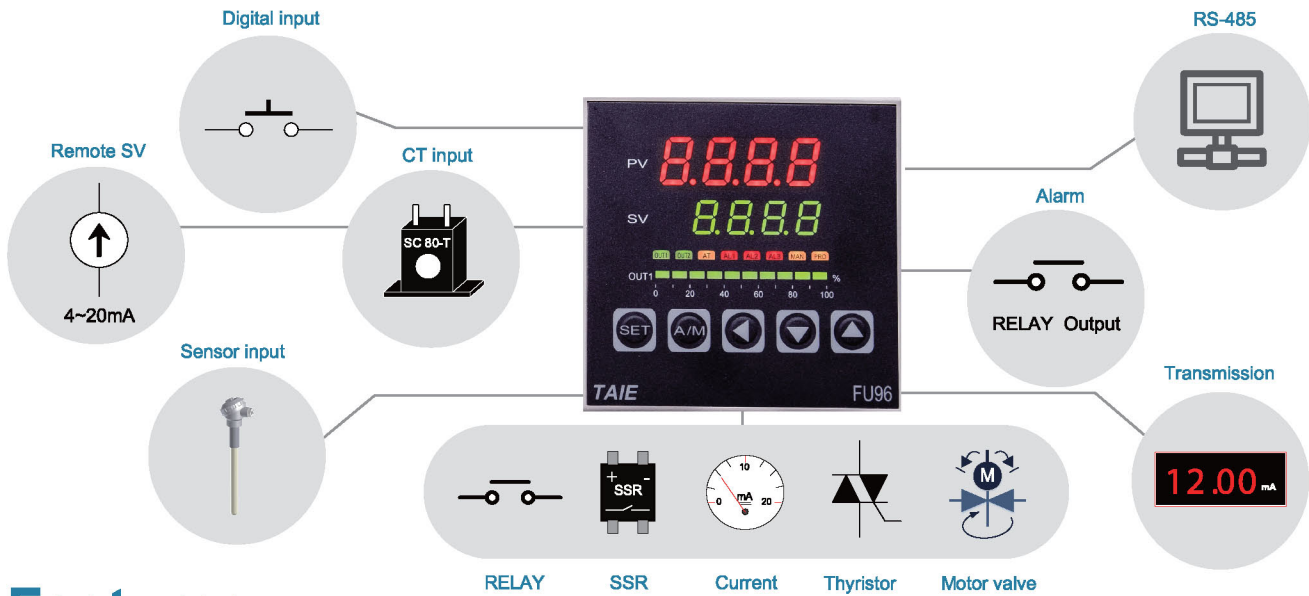
PV Before AT   PV After AT

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).
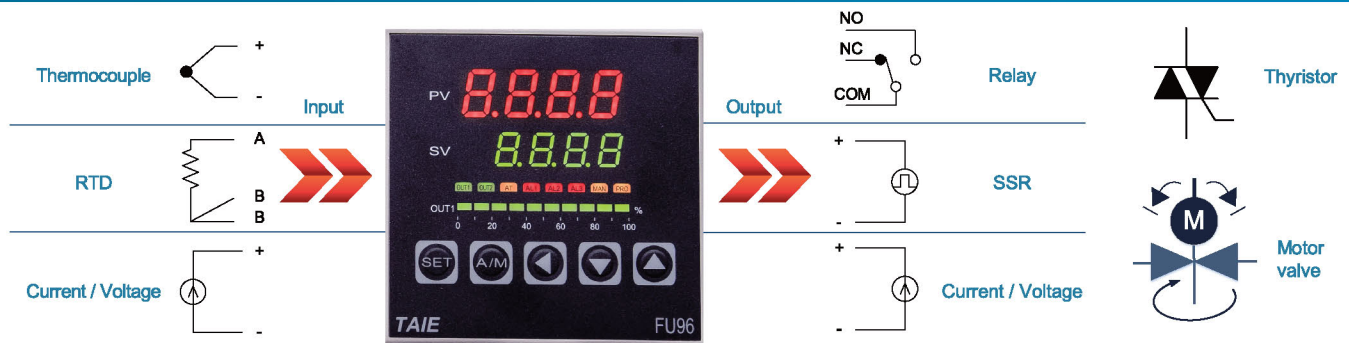
OUT1   %
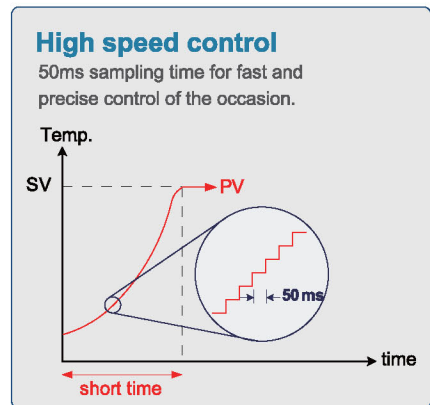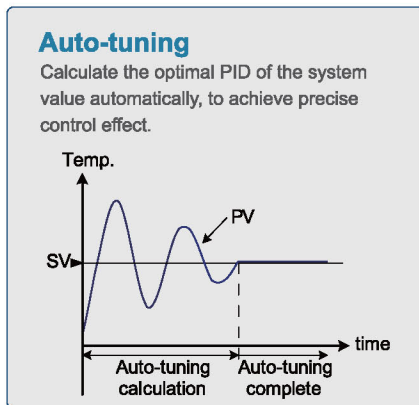0 20 40 60 80 100

Function block diagram

Digital input

Remote SV

4~20mA

CT input

SC 80-T

Sensor input

PV

SV

OUT1 0 20 40 60 80 100 %

SET A/M

TAIE FU96

RS-485

Alarm

RELAY Output

Transmission

12.00 mA

RELAY   SSR   Current   Thyristor   Motor valve

Features

Various I/O Types

Thermocouple + −

Input

RTD A B B

Current / Voltage + −

PV

SV

OUT1 0 20 40 60 80 100 %

SET A/M

TAIE FU96

Output

NO
NC
COM **Relay**

+ − **SSR**

+ − **Current / Voltage**

Thyristor

M **Motor valve**

Excellent Control Performance

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

Temp.

SV

PID control

PID + Super SV

controller output

time

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

Temp.

SV

PV

Auto-tuning calculation | Auto-tuning complete

time

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

Temp.

SV

PV

50 ms

short time

time

Powerful Program Control

Provides 18 patterns of 8 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 144 segments program control.

Execute by communication

Execute by key

PV

SV

OUT1 0 20 40 60 80 100

SET A/M

TAIE FU96

Pattern 1   Pattern 2   Pattern 15
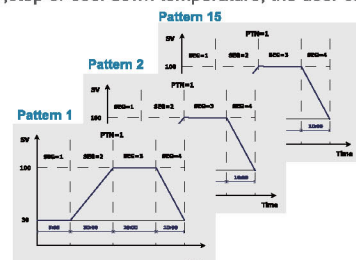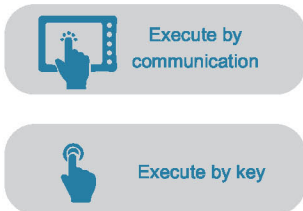
Features

Double Loop Control

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

LOOP2 control output → SCR-2

LOOP1 control output → SCR-1

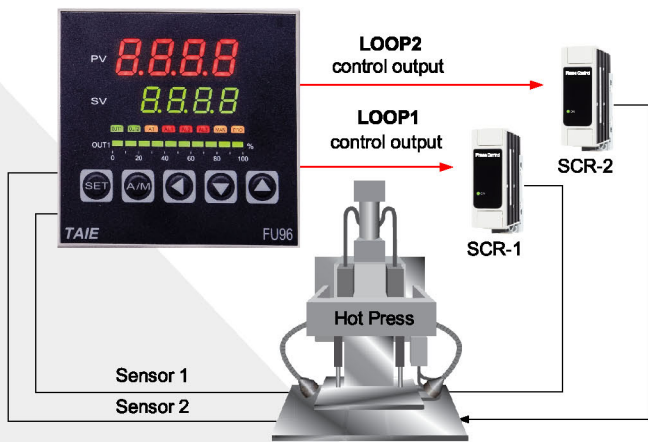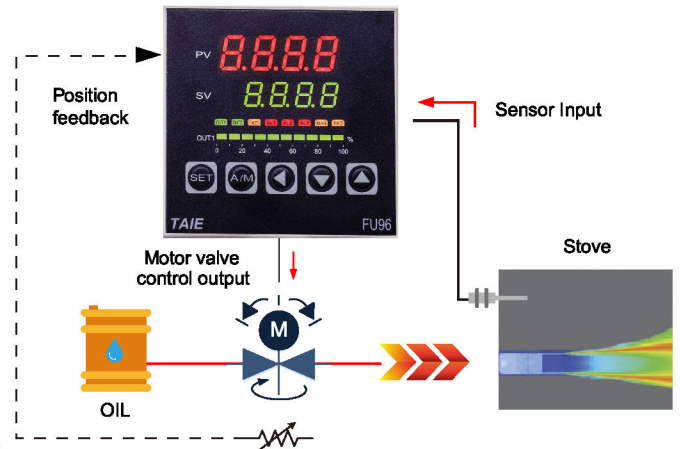PV SV OUT1 %
0 20 40 60 80 100
SET A/M
TAIE FU96

Hot Press

Sensor 1
Sensor 2

Motor Valve Control

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

Position feedback

PV SV OUT1 %
0 20 40 60 80 100
SET A/M
TAIE FU96

Sensor Input

Motor valve control output

OIL

M

Stove

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…

Sensor Input

PV SV OUT1 %
0 20 40 60 80 100
SET A/M
TAIE FU96

Transmission DC4~20mA

oven

12.00 mA

ammeter

Paperless Recorders
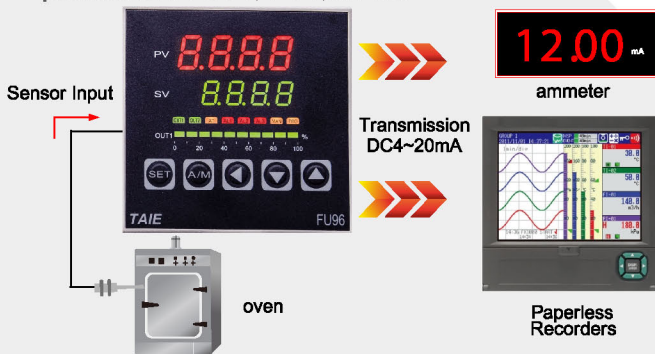
Remote SV

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

Sensor Input

PV SV OUT1 %
0 20 40 60 80 100
SET A/M
TAIE FU96

oven

Control output

SSR

Remote SV input

12.00 mA

Transmitter

Power
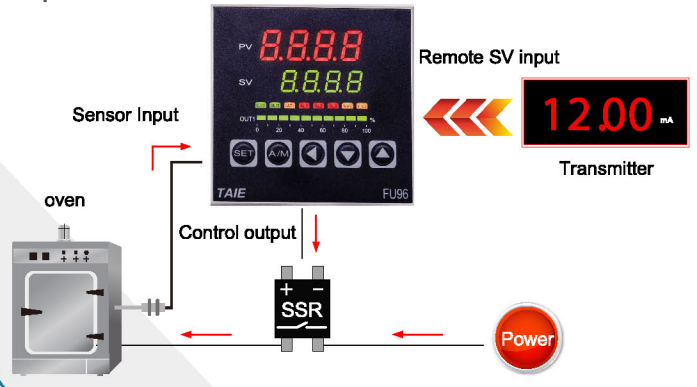
Communication

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

USB to RS-485 Converter

KA301

RS-485 up to 31 units

PV SV TAIE FU96

IDNO: 1   IDNO: 2   IDNO:3   IDNO:31
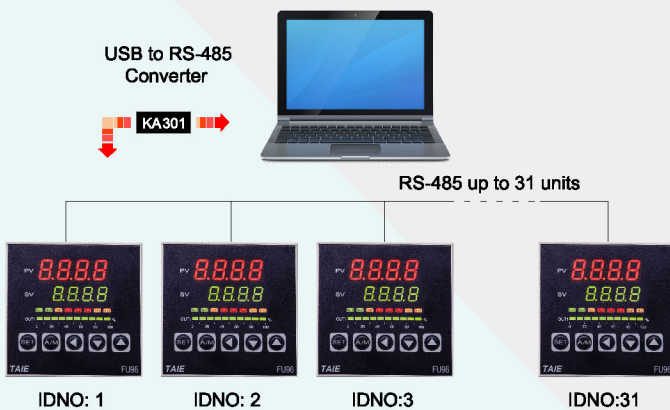
Heater Break Alarm(HBA)

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.

PV SV OUT1 %
0 20 40 60 80 100
SET A/M
TAIE FU96

Sensor Input

oven

Control output

SSR

CT

SC 80-T

Alarm action

Power

Appearance

FU48/400

FU72

FU86

FU96
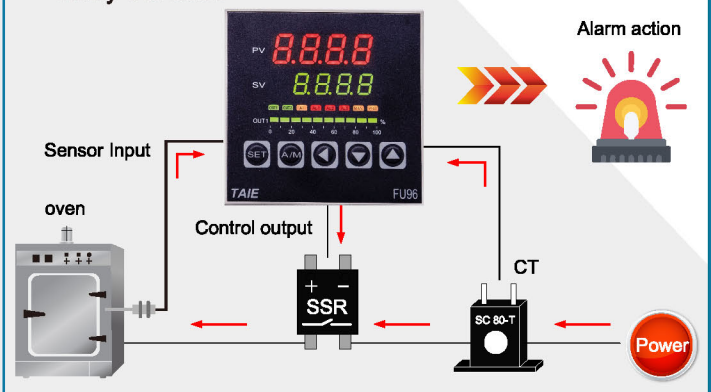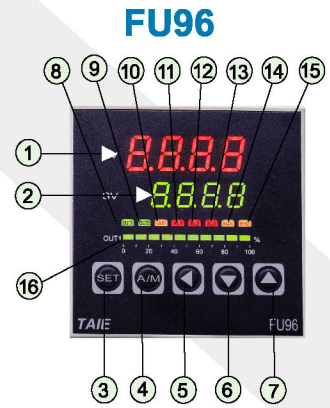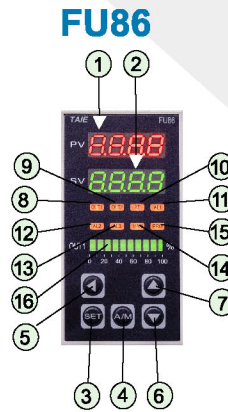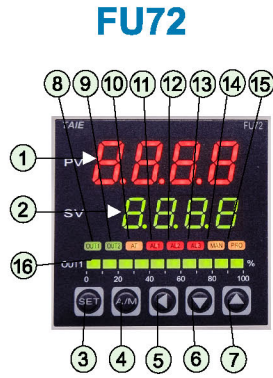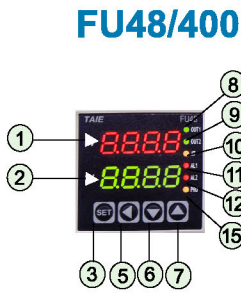
NO.	NAME	Function	NO.	NAME	Function
1	PV	Indicates PV (measured value) and character information such as parameter codes and error codes (Red)	9	OUT2	Lamp lit when OUT2 is activated (Green)
2	SV	Indicates SV (target set value) and parameter Values (Green)	10	AT	Lamp lit when Auto-tuning is activated (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

FU48/400	50 × 50	14 / 80.4	44.5 +0.5/0, 44.5 +0.5/0, 70, 70
FU72	74 × 74	14 / 81	68.5 +0.5/0, 68.5 +0.5/0, 98, 93
FU86	50 × 96	14 / 81.3	44.5 +0.5/0, 90.5 +0.5/0, 121, 70
FU96	96 × 96	14 / 81.4	90.5 +0.5/0, 90.5 +0.5/0, 121, 116

Terminal Arrangement

FU400/FU48

Power	1 L AC 85~265V 1 – DC 24V ⚠	Communication	11 T/R (B) RS-485 12 T/R (A)	Remote/CT Input	11 + mA/V 12 – 11 CT 12
Output-1	4 Relay 5 4 + SSR 5 – 4 + mA/V 5 –	1 Φ Zero cross	11 G1 12 K1 13 G2 14 K2	TRS	11 + mA/V 12 –
Output-2	2 Relay 3 2 + SSR 3 – 2 + mA/V 3 –	Motor valve	2 3 CLOSE 4 OPEN 5 COM	Input	7 B 9 TC/mV 10 7 + 9 RTD 10 A 7 + 9 mA/V 10 –
Alarm-1 Alarm-2	AL1 2 or 11 3 12 AL2 13 14				

FU72

Power	1 L AC 85~265V 1 – DC 24V ⚠ 2 N 2 +	Alarm-1 Alarm-2 Alarm-3	AL1 3 4 AL2 8 COM 9 NO 10 NC AL3 20 21	CTInput	15 CT 16 18 CT 19
Output-1	5 NO 6 NC 7 COM 6 + SSR 7 – 6 + mA/V 7 –	Communication	15 T/R (B) RS-485 16 T/R (A)	1 Φ Zerocross Phaseangle	15 G1 16 K1 17 G2 18 K2 1 Φ Zero cross 15 G1 16 K1 17 G2 18 K2 1 Φ Phase angle
Output-2	3 Relay 4 3 + SSR 4 – 3 + mA/V 4 –	TRS	18 + mA/V 19 –	Input	11 + 13 TC/mV 14 11 + 13 RTD 14 A 11 + 13 mA/V 14 –
Motor valve	3 4 CLOSE 5 OPEN 6 7 COM	Remote	9 mA/V 10 15 mA/V 16 18 mA/V 19		

FU86

Power	1 L AC 85~265V 1 – DC 24V ⚠ 2 N 2 +	Motor valve	6 7 CLOSE 8 OPEN 9 10 COM	TRS	12 + mA/V 13 – 14 + mA/V 15 –
Output-1	8 NO 9 NC 10 COM 9 + SSR 10 – 9 + mA/V 10 –	Alarm-1 Alarm-2 Alarm-3	AL1 3 NC 4 NO 5 COM AL2 11 12 NO 13 COM AL3 6 7	Remote/CT Input	14 + mA/V 15 – 14 CT 15
Output-2	6 Relay 7 6 + SSR 7 – 6 + mA/V 7 –	Communication	14 T/R (B) RS-485 15 T/R (A)	Input-1	17 + 19 TC/mV 20 17 + 19 RTD 20 A 17 + 19 mA/V 20 –

FU96

Power	1 L AC 85~265V 1 – DC 24V ⚠ 2 N 2 +	Alarm-1 Alarm-2 Alarm-3	AL1 3 NC 4 NO 5 COM AL2 11 NC 12 NO 13 COM AL3 6 7	Input-1	17 + 19 TC/mV 20 17 + 19 RTD 20 A 17 + 19 mA/V 20 –
Output-1	8 NO 9 NC 10 COM 9 + SSR 10 – 9 + mA/V 10 –	Communication	14 T/R (B) RS-485 15 T/R (A) or 31 T/R (B) RS-485 32 T/R (A)		31 RG1 32 RK1 33 RG2 34 RK2 35 TG1 36 TK1 37 TG2 38 TK2 3 ΦZero cross
Output-2	6 Relay 7 6 + SSR 7 – 6 + mA/V 7 –	TRS	39 + mA/V 40 –	1 Φ / 3 Φ Zero cross	31 G1 32 K1 33 G2 34 K2 1 Φ Zero cross
Motor valve	6 7 CLOSE 8 OPEN 9 10 COM	Remote/CT Input	14 + mA/V 15 – 14 CT 15	1 Φ Phase angle	31 G1 32 K1 33 G2 34 K2

Specifications

Standard Spec.

Supply voltage	AC 85 ~ 265V DC 24V ±10%
Power Consumption	AC approx. 6VA DC approx. 4W
Memory	Non-volatile memory Maximum writes : 1000,000 times Data retention : 10 years
Operating temperature	0~50℃ (32~122℉)
Humidity range	20% ~ 90% RH
Weight	FU400/48 approx. 120g FU72 approx. 150g FU86 approx. 170g FU96 approx. 230g
Dimension (mm)	FU400/48 48W X 48H X 95.5L (1/16 DIN) FU72 72W X 72H X 95.5L (3/16 DIN) FU86 48W X 96H X 95.5L (1/8 DIN) FU96 96W X 96H X 95.5L (1/4 DIN)
Operating environment	Non-corrosive, flammable gas, slight dust ring environment, no high frequency, no direct shock, places the sun is not directly exposed.

Input

Accuracy	Cold junction compensation diode external ±(0.1% of reading + 1 digit) Cold junction compensation diode inside ±(0.3% of reading + 1 digit)
Sampling time	50ms
TC	K、J、R、S、B、E、N、T、W、PLII、L
RTD	PT100
mA dc	0~5V、0~10V、0~2V、1~5V 2~10V、0~25mV、0~50mV、 0~20mA、4~20mA、0~1V、 10~50mV、0~70mV
Input filter	First-order low-pass filter Time constant : 0.1 to 10.0 sec.(When set to 0, the filter is off)
PV compensation	Both zero and high points can be compensated

Output

Set	Maximum 2 sets
Control	1.PID, P, PI, and PD control (including AT function) 2.ON/OFF control 3.Heat and Cooling PID control (including AT function)

Relay	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

SSR	ON : 24 V OFF: 0V Maximum load current : 20mA With short circuit protection circuit
mA	Resolution: 10 bits Signal type: 4~20mA, 0~20mA, 0~5V, 0~10V, 1~5V, 2~10V

Heater Break Alarm (HBA)

CT model	SC-80T, SC-100T
Maximum current	SC-80T : 80A, SC-100T : 100A
Accuracy	SC-80T : ±3%, SC-100T : ±5%
Aperture	SC-80T : 5.9mm, SC-100T : 12.6mm
Output	Free load alarm 1~3

Alarm

Set	Maximum 3 sets
Mode	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
Relay specifications (resistive load)	1.SPST-NO, 250VAC, 5A Electrical life: 100,000 times 2.SPDT-NO, 250VAC, 5A Electrical life: 50,000 timers 3.SPDT-NC, 250VAC, 2A Electrical life: 20,000 times

Transmission

set	1 set
Resolution	14 bits
Accuracy	0.1%
Parameters	PV、SV
Signal Type	4~20mA, 0~20mA, 0~5V,0~10V, 1~5V, 2~10V

Remote

set	1 set
Resolution	18 bits
Parameters	Local SV
Signal Type	4~20mA, 0~20mA, 0~5V,0~10V, 1~5V, 2~10V

Motor Valve

set	1 set
Resolution	18 bits
Parameters	PV2
Signal Type	1KΩ or 560Ω

Communication

Communication	RS-485
Protocol	Modbus RTU, TAIE
Baud rate	2400, 4800, 9600, 19200, 38400, 57600, 115200 bps
Communication format configuration	1. Starting bit : 1 2. Information bits : 8 3. Bit check : None, Odd, Even 4. Stop bits : 1 or 2
Reponses time	0~250ms
Maximum connections	31pcs

Order Information

Model	Output 1	Output 2	Alarm	TRS	Remote	COMM	Input type	Power	Accessories
	1	0	1	0	0	0	01	A	N

Model
- FU96(Red/Green light)
- PFU96(Program)

FU400 / 48	48x48mm
FU72	72x72mm
FU86	48x96mm
FU96	96x96mm

PFU400 / 48	48x48mm
PFU72	72x72mm
PFU86	48x96mm
PFU96	96x96mm

Output 1
- 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
- 5 1□SCR zero cross control
- 6 3□SCR zero cross control
- 7 Motor valve control
- 8 1□SCR phase angle control

Output 2
- 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

Alarm
- 0 None
- 1 1Set
- 2 2Sets
- 3 3Sets
- A HBA
- B HBA+AL2
- C HBA+AL2+AL3

TRS
- 0 None
- 1 4-20mA
- 2 0-20mA
- A 0-5V
- B 0-10V
- C 1-5V
- D 2-10V

Remote
- 0 None
- 1 4-20mA
- 2 0-20mA
- A 0-5V
- B 0-10V
- C 1-5V
- D 2-10V
- M Motor valve control feedback

COMM
- 0 None
- 3 TTL
- B RS-485

Input type
- See input type table code

Power
- A AC 85-265V
- D DC 24V

Accessories
- N None
- T Terminal Cover
- W IP65
- R Terminal Cover +IP65

※ HBA :Heater Break Alarm (HBA must use AL 1 as alarm relay)

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:
- K1: -50.0 ~ 600.0
- K2: -50 ~ 1200
- J1: -50.0 ~ 400.0
- J2: -50 ~ 1200
- R: -50 ~ 1760
- S: -50 ~ 1760
- B: -50 ~ 1820
- E: -50 ~ 900
- N: -50 ~ 1300
- T1: -199.9 ~ 400.0
- T2: -199 ~ 400
- W: -50 ~ 2320
- PLII: -50 ~ 1200
- L: -50 ~ 800
- DP1: -199.9 ~ 850.0
- DP2: -199 ~ 850
- DP3: 0 ~ 850

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.