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Digital PID

Temperature/Process Controllers

FU Series

Integrated Mold 、
Technology Leadership

High Light LED New feelings - new release

Best comparison of price and function

Programmable　Fuzzy　Autotuning　MODBUS

CE　RoHS Pb compliant　Match to RoHs System

Patent No.：ZL200820301949.5 、M347604

Digital PIDTemperature Controllers / Process Controllers

BEST CHOICE FOR PROCESS AND TEMPERATURE CONTROL

Application:Control temperature , humidity , pressure , flow and PH.

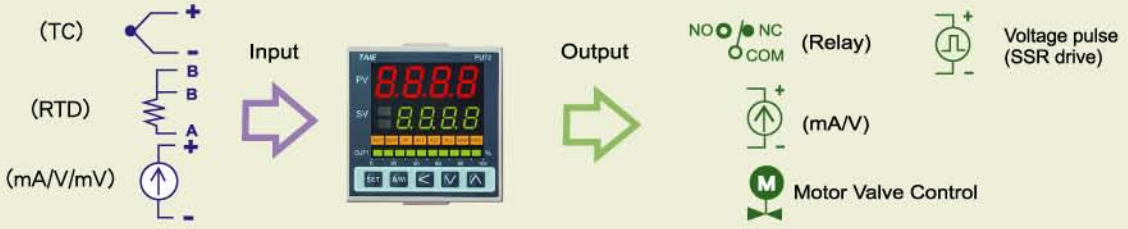
FU series controllers are microprocessor based controllers.Which have been designed with high accuracy input , various ouput selection , useful options and good reliability at a competitive price.
FU series use "PID+FUZZY" algorithm to implement excellent control.
The output status is displayed on the built in "Bar-Graph" display.
FU series also provide "Programmable RAMP/SOAK" function and has 2 patterns by 8 segments, to elevate or decrease temperature.
FU series support MODBUS protocol. Communication with HMI is more convenient.

Available in 4 sizes,the models and sizes are as below:

FU48:48X48mm (DIN 1/16)	FU86:48X96mm (DIN 1/8)
FU72:72X72mm (DIN 3/16)	FU96:96X96mm (DIN 1/4)

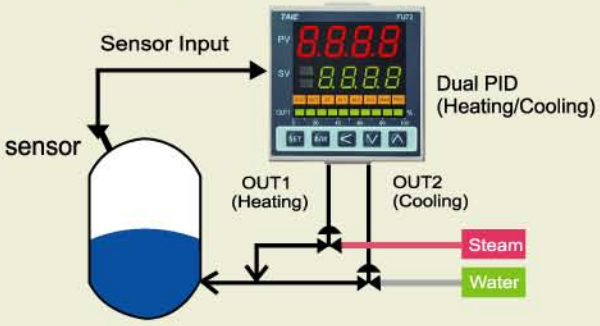
Multi-Option of input & output

◎ Completely correspond to any kinds of input signal like Thermo couple, RTD PT100, and DC4~20mA. 0~5V.etc.
◎ Satisfy any requests for output mode like DC4~20mA, 0~5V Voltage, Current & the relay output of capacity 8A
◎ It provides with 3 features of Controller, Signal converter and Alarm monitor. It can be changed the signal of mV, V, RTD to the output of Voltage & Current 4~20mA instead of the signal converter.
◎ Separately design for signal circuit and power circuit on PC board, effectively restrain the external interference of electric wave.



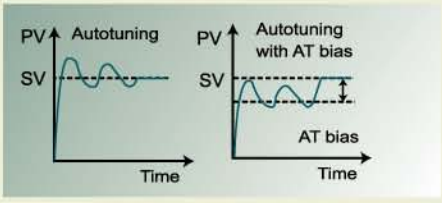
Optimize function

Heating and Cooling Control



PID autotuning control

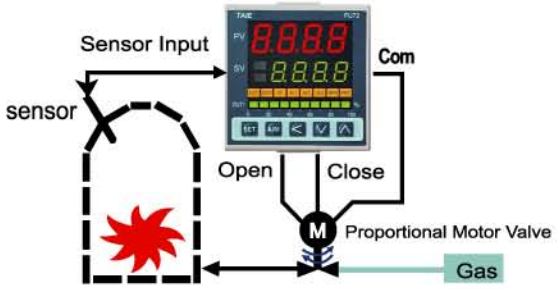
It will make to calculate optimize PID value.



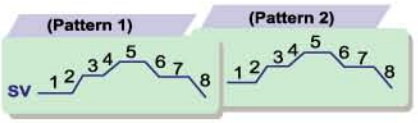
When autotuning acts ,it will make PV hunting 1~2 cycle to calculate optimize PID value. To protect user's device , **FU** series controller can perform PV hunting below SV by setting AT bias value(ATVL) .

Special Function Design

Motor Valve Control



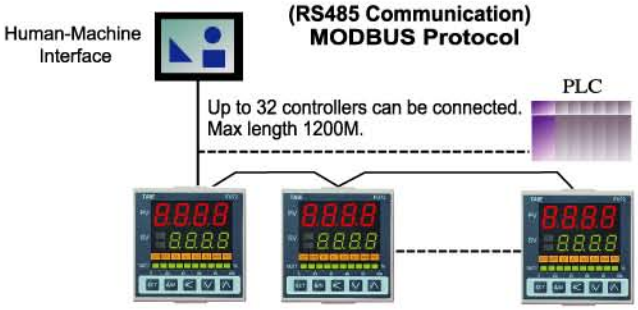
Ramp/Soak Program



There are 2 patterns by 8 segments can be used in ramp/soak program.

There are 2 patterns can be linked together as16 segments in ramp/soak program.

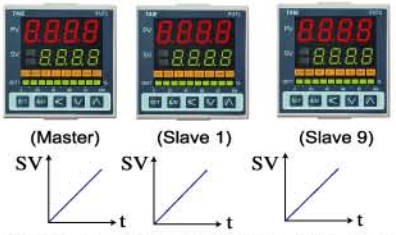
RS-485 Communication



TTL Communication

(TTL Communication)

Up to 10 controllers can be connected.
Max length 1M.



The SV value of slave controllers will be remoted by master controller,and reached to max value at the same time

Operations

1.Power ON: Controller will display as the following

Light all LEDs and all 7 segment displays | Display series type | Display input type | Display range (0.0 ~ 400.0) | Ready for use

2.Change the Set Value(SV): Change SV from 0.0 to 100.0

Press ◁ Key — The SV number started to flash.The flashing digit indicates which digit can be set.

Press ◁ Key — To select the hundreds digit.

Press △ Key — To change the number to 1.

Press SET Key — To store the new set value.

3.Auto Tuning (AT):

Use AT function to automatically calculate and set the optimize PID value for your system.

Press SET Key — To display parameter AT.

Press ◁ Key — To change AT setting.

Press △ Key — Change AT to " YES "

Press SET Key — Start Autotuning process (AT lamp will be lighted on)
AT light on → Auto Tuning started.
AT light off → Auto Tuning finished.

4.Change the Alarm value:

Change AL1 value to"5.0"(AL1 active ,if PV exceeds SV over 5.0)

Press SET Key — To display parameter AL1

Press ◁ Key — To change AL1 value

Press △ Key — Increase AL1 value

Press SET Key — Store the new value of AL1

* To change Alarm mode, press SET + ◁ key 3 seconds to enter Level 3(Input Level) and then change the value of ALD1/ALD2/ALD3.

Alarm Types

Alarm types list as below:

Deviation
- Deviation High Alarm
- Deviation Low Alarm
- Deviation High/Low Alarm
- Band Alarm

System
- System Failed Alarm
- System Normal Alarm

PV
- PV High Alarm
- PV Low Alarm

Program
- Program Run Alarm
- Program End Alarm
- Segment End Alarm

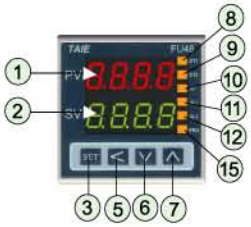
5.Alarm mode type (Referenced for ALD1/ALD2/ALD3)

01	Deviation high alarm with hold action*
11	Deviation high alarm
02	Deviation high alarm with hold action*
12	Deviation low alarm
03	Deviation high/low alarm with hold action*
13	Deviation high/low alarm
04 / 14	Band alarm
05	Process high alarm with hold action*
15	Process high alarm
06	Process low alarm with hold action*
16	Process low alarm
07	Segment End alarm (Only for Programmable controller) (1)ALD1~3,set 07 (2)ALD1~3=Alarm Segment (3)ALD1~3 defines as follows: =0 = flicker alarm; =99.59 = continued alarm; =others = alarm ON Delay time
17	Program Run alarm (Only for Programmable controller) Run / Stop — ON / OFF — AL
08	System failed alarm*(ON) Normal / Failed — OFF / ON — AL
18	System failed alarm*(OFF) Normal / Failed — ON / OFF — AL
00 / 10	No alarm

▲:SV △: Alarm set value

Parts Description

FU48



FU72

FU86

FU96

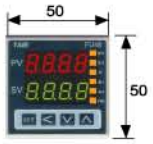
SYMBOL	NAME		FUNCTION
PV	①	Measured value (PV)display	Displays PV or various parameter symbols(Red)
SV	②	Setting value (SV)display	Displays SV or various parameter values(Green)
SET	③	Set Key	Used for parameter calling up and set value registration
A/M	④	Auto/Manual key	Switches between Auto(PID) output mode and Manual output
<	⑤	Shift Key	Shift digits when settings are changed
∨	⑥	Down Key	Decrease numbers (*Only for programmable controller)
∧	⑦	Up Key (*Program Run)	Increase numbers (*Only for programmable controller)

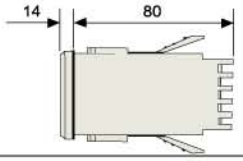
SYMBOL	NAME		FUNCTION
OUT1	⑧	OUT1 lamp	Lights when OUT 1 is on(Orange)
OUT2	⑨	OUT2 lamp	Lights when OUT 2 is on(Orange)
AT	⑩	Autotuning lamp	Lights when Autotuning is activated(Orange)
AL1	⑪	Alarm 1 lamp	Lights when Alarm 1 is activated(Orange)
AL2	⑫	Alarm 2 lamp	Lights when Alarm 2 is activated(Orange)
AL3	⑬	Alarm 3 lamp	Lights when Alarm 3 is activated(Orange)
MAN	⑭	Manual output lamp	Lights when manual output is activated (Orange)
PRO	⑮	*Program Running lamp	*Flashes when program running (Only for programmable controller)
OUT1%	⑯	Output 1% Bar-Graph display	Output 1% is displayed on 10-dot LEDs (Green)

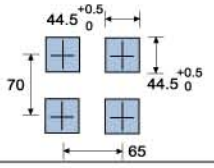
Unit : mm

External Dimension

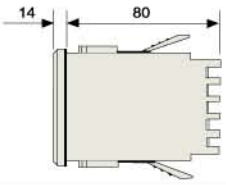
FU48

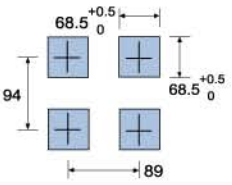




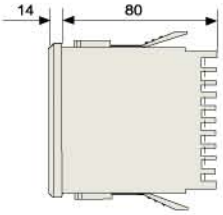


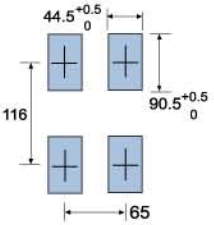
FU72



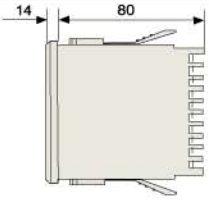


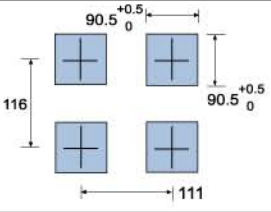
FU86





FU96

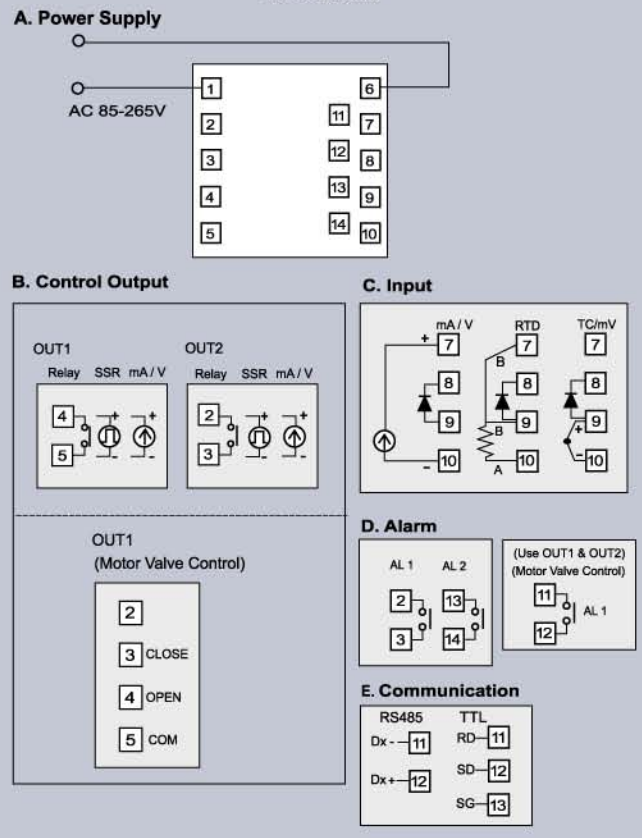




Terminal Arrangement

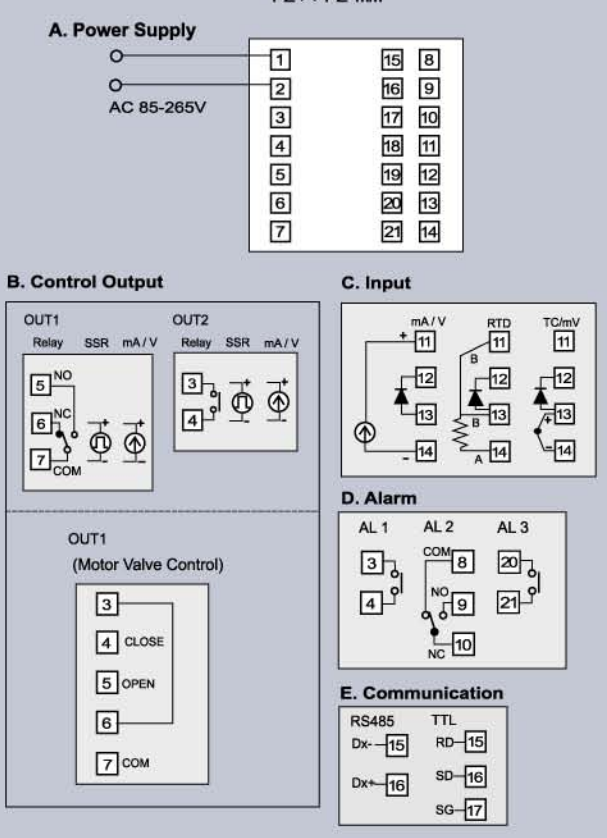
FU48

48×48 mm



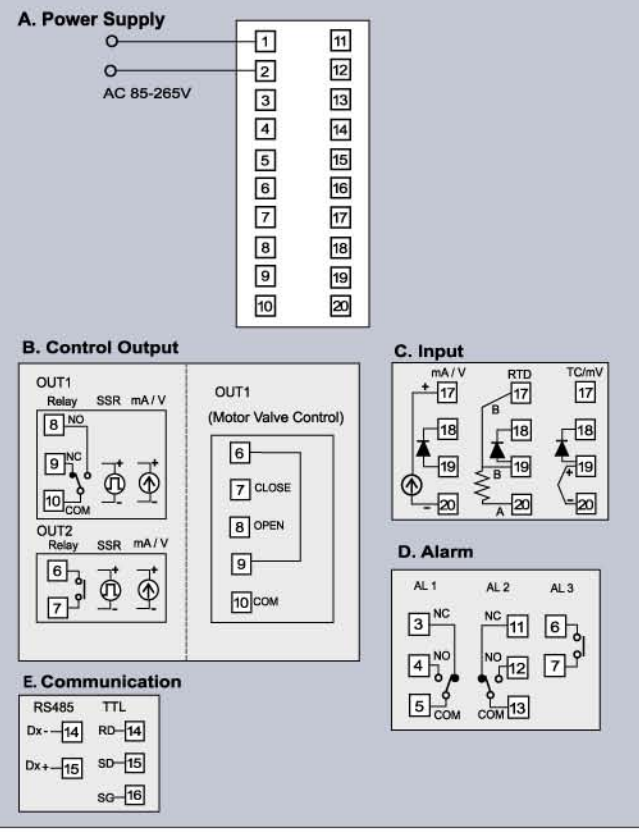
FU72

72×72 mm



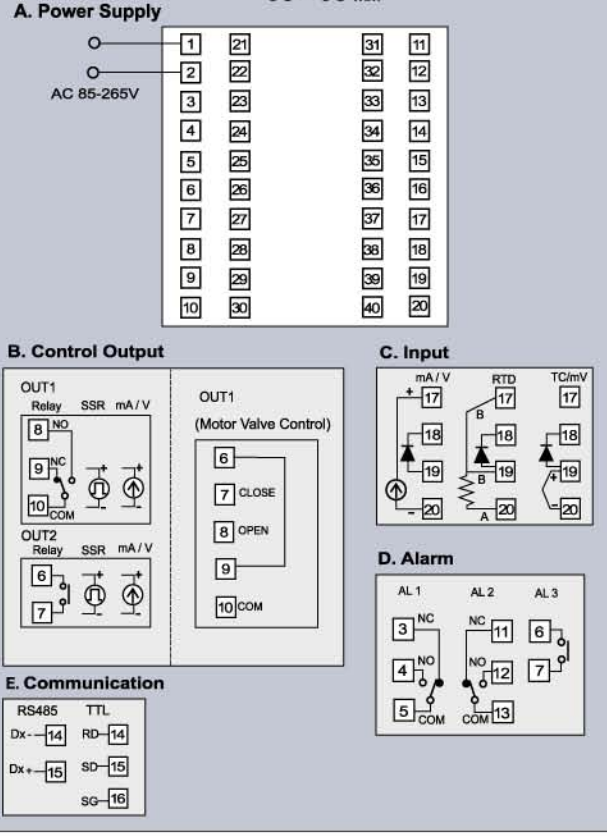
FU86

48×96 mm



FU96

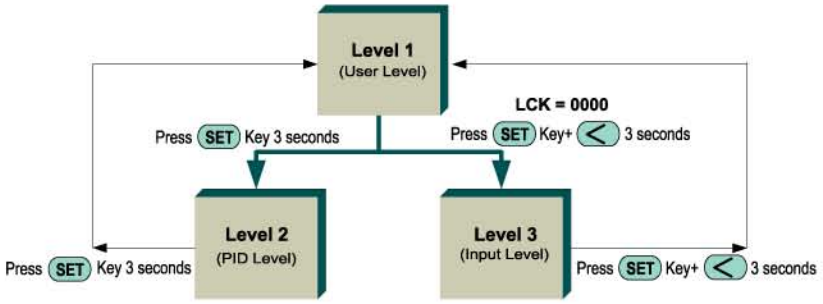
96×96 mm



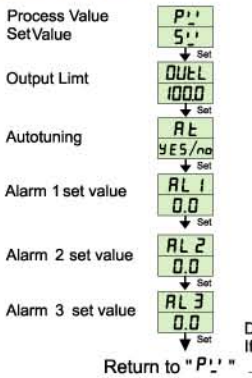
Levels Explanation

Levels Diagram

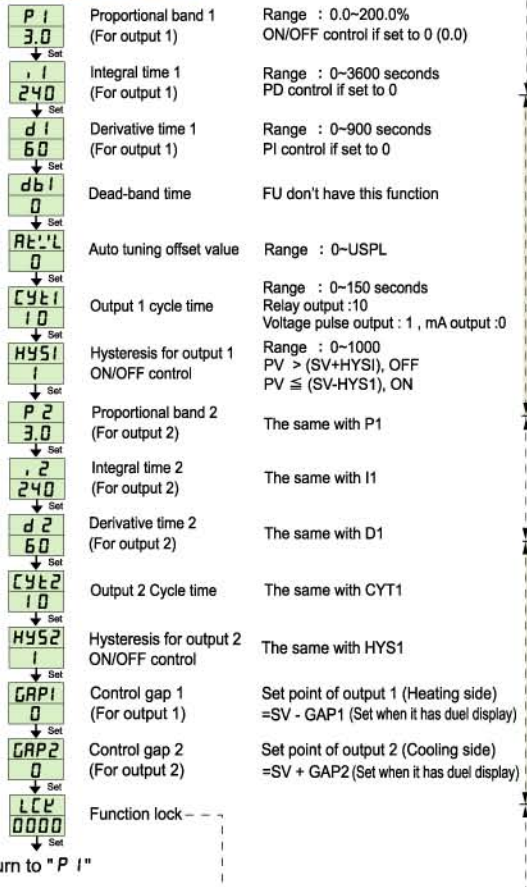
1. When the power is on, it will stay at Level 1(User Level) automatically.
2. The controller returns to Level 1 if there is no key operation within 60 seconds.
3. In any Level, press (A/M) key twice will return to Level 1.
   (FU48 don't have (A/M) key)



Level 1 (User Level)



Level 2 (PID Level)



LCK	Levels entering available			Parameters can be changed or not
	Level 1 (User Level)	Level 2 (PID Level)	Level 3 (Input Level)	
0000	Yes	Yes	Yes	All parameters (Factory set value)
1111	Yes	Yes	No	All parameters
0100	Yes	Yes	No	All parameters except Level 3
0110	Yes	Yes	No	Parameters in Level 1
0001	Yes	Yes	No	SV" and "LCK"
0101	Yes	Yes	No	Only "LCK"

Level 3 (Input Level)

Input parameter

INP1	Input type selection	
ANL1	Analog input low limit calibration (Used for mA and V input)	Range : -1999 ~ 9999
ANH1	Analog input high limit calibration (Used for mA and V input)	Range : 0 ~ 9999
dP	Decimal point position (Available for mA and V input)	0000 , 000.0 , 00.00 , 0.000
L.SP.L	Lower Set-Point Limit	Scaling Low Limit
U.SP.L	Upper Set-Point Limit	Scaling High Limit
ANL2	Remote input low limit calibration	(FU don't have this function)
ANH2	Remote input high limit calibration	(FU don't have this function)

Alarm parameter

AL d1	Alarm mode of AL1	Range:00~18 Refer to "Alarm mode type"
AL t1	Alarm time of AL1	Range : 0~99 Min 59 Secs 0=Flicker Alarm , 99:59=Continued Others=On delay time (If ALD=07 , ALT means alarm on time)
AL d2	Alarm mode of AL2	The same with AL d1
AL t2	Alarm time of AL2	The same with AL t1
AL d3	Alarm mode of AL3	(FU48 don't have AL3)
AL t3	Alarm time of AL3	(FU48 don't have AL3)
HYSA	Hysteresis of all Alarm	Range : 0~1000

Linear signal adjust

CLO1	Output 1 low limit calibration (Used for mA and V output)	Range : 0 ~ 9999
CHO1	Output 1 high limit calibration (Used for mA and V output)	Range : 0 ~ 9999
CLO2	Output 2 low limit calibration (Used for mA and V output)	The same with CLO1
CHO2	Output 2 high limit calibration (Used for mA and V output)	The same with CHO1
CLO3	Retransmission low limit calibration	(FU don't have this function)
CHO3	Retransmission high limit calibration	(FU don't have this function)

Particular parameter

rU.CY	Full run time of proportional motor (Used for proportional motor valve control output)	Range : 5~200 seconds
UA.t	Used for programmable controller to wait continued operation	0=Not wait Others=Wait value

Communication parameter

SEtA	Alarm forward / inverse action setting can force the use of a-contact into b-contact	Level 4 setting please ask distributor
PSL	Communication Protocol Selection	MODBUS RTU / MODBUS ASCII / TAIE
b.tS	Communication Bits Configuration	O _ 81 / O _ 82 / E _ 81 / E _ 82
Id.NO	ID number	Range : 0 ~ 255
bAUd	Baudrate	2400 / 4800 / 9600 / 19200 / 38400 bps

SV.PV parameter

SV.OS	SV compensation	Range : -1000~1000
PV.OS	PV compensation	Range : -100.0~500.0
UNIt	Unit of PV & SV	C(℃) / F(℉) / A(Analog)
PV.Ft	PV Filter	PV will responese faster if PVFT is smaller.
CASC	Reserved	FU don't use it

Control way

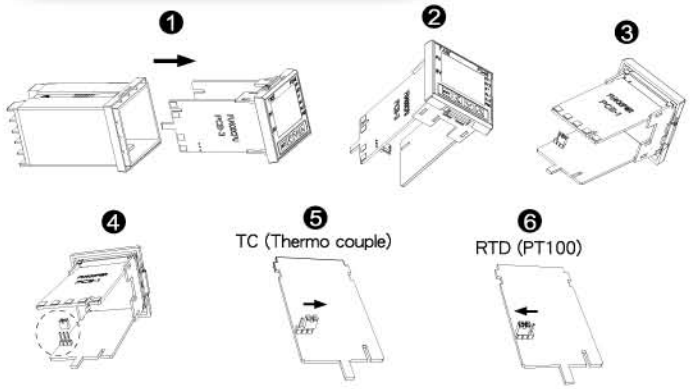
OUd HEAt	Action mode	Heat / Cool
OPAd P.d	Control algorithm	PID / Fuzzy
Hz 60Hz	Frequency	50 / 60HZ

Return to "INP1"

Specifications

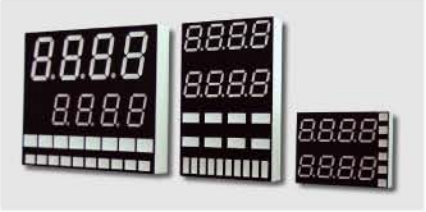
	Model	FU48	FU72	FU86	FU96
Standard Spec.	Dimension	48X48mm	72X72mm	48X96mm	96X96mm
	Supply voltage	AC 85～265V			
	Frequency	50/60 HZ			
	Power Consumption	approx 3VA	approx 3VA	approx 4VA	approx 4VA
	Memory	Non-volatile memory E^2PROM			
	Input	Accuracy : 0.2%FS,Sample time : 250ms			
	TC	K , J , R , S , B , E , N , T , W5Re/W26Re , PL2 , U , L			
	RTD	PT100 , JPT100			
	mA dc	DC 4～20mA , 0～20mA			
	Voltage dc	DC 0～1V , 0～5V , 0～10V , 1～5V , 2～10V -10～10mV , 0～10mV , 0～20mV , 0～50mV , 10～50mV			
	DP Position	0000 , 000.0 , 00.00 , 0.000 (available for mA or Voltage dc input) According to the input type, ℃/℉ can be displayed to one decimal			
	Output 1	Main control output to HEAT mode or COOL mode			
	Relay	SPST type	SPDT type	SPDT type	SPDT type
	Voltage Pulse	8A , 240V, electrical life : 100,000 times or more(under the rated load).			
		For SSR drive. ON:24V , OFF:0V , maximum load current:20mA.			
	mA dc	DC 4～20mA , 0～20mA ◦ maximum load resistance: 560Ω.			
	Voltage dc	DC 0～5V , 0～10V , 1～5V , 2～10V ◦ maximum load current : 20mA.			
	Alarm 1	SPST type	SPST type	SPDT type	SPST type
		8A , 240V , electrical life : 100,000 times or more(under the rated load).			
	Control algorithms	PID , P , PI , PD , ON/OFF(P=0) , FUZZY			
	PID range	P : 0～200% , I : 0～3600 Secs , D : 0～900 Secs			
	Isolation	Output terminal (control output , alarm ,transmission) and Input terminal are isolated separately.			
	Isolated resistance	10M Ω or more between input terminals and case(ground) at DC 500V 10M Ω or more between output terminals and case(ground) at DC 500V			
	Dielectric strength	1000V AC for 1 minute between input terminals and case(ground) 1500V AC for 1 minute between output terminals and case(ground)			
	Operating temperature	0～65℃			
	Humidity range	0～50℃ / 20～90% RH			
	Weight (approx)	approx150g	approx 225g	approx 225g	approx300g
	LED Display(PAT.)	high light technology, Red/Green/Orange with in one Module			
Optional Spec.	RAMP/SOAK Program	2 Patterns with 8 segments each . can be linked together as 16 segments use			
	Output 2	For heating and cooling control use *Acctron mode is opposite with Output 1			
	Relay	SPST type	SPST type	SPST type	SPST type
	Voltage Pulse	For SSR drive. ON:24V , OFF:0V , maximum load current:20mA.			
	mA dc	DC 4～20mA , 0～20mA ◦ maximum load resistance :560Ω.			
	Voltage dc	DC 0～5V , 0～10V ,1～5V ,2～10V ◦ maximum load current : 20mA .			
	Alarm 2	SPST type	SPDT type	SPDT type	SPDT type
	Alarm 3	——	SPST type	SPST type	SPST type
	Communication	Protocol : MODBUS RTU , MODBUS ASCII , TAIE			
		Interface : RS485.TTL			
		Baudrate : 38400, 19200 , 9600 , 4800 , 2400 bps			
		8 bit , Start bit : 1 bit , Parity : Odd or Even , Stop bit : 1 or 2 bit			

Input Type Change of TC↔RTD



1.Take out the main body from outer case: adjust the jumper to the correct place
2.Start power after setting jumper to the correct place
3.Amend the input type from the front membrane to enter in Level 3 to set.
4.Please be sure to cut off power and start again after amending input type so that the new parameters could be effective.
5.To change input type of TC or RTD is available but linear input is unavailable. Please ask our local distributor for help.

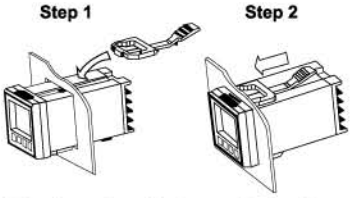
New High Light LED Module Display



Brand-new one set of LED Module design provides more easy and clear reading.

To mount panel easily

Step 1 Step 2



To push the clamp of special structure design without using screw to the end can be smoothly fixed on the panel.

Model selection guide

Model		Output1	Output2	Alarm			Commu-nication		Input Type		Power
FU48	—	1	0	1	0	0	0	—	02	—	A

(STANDARD)

FU48	48x48mm
FU72	72x72mm
FU86	48x96mm
FU96	96x96mm

(RAMP/SOAK Programmable)

PFU48	48x48mm
PFU72	72x72mm
PFU86	48x96mm
PFU96	96x96mm

	Output1	Output2
0	None	None
1	Relay	Relay
2	Voltage Pulse (SSR Drive)	Voltage Pulse (SSR Drive)
3	4~20mA	4~20mA
4	0~20mA	0~20mA
7	Motor valve control	
A	0~5V	0~5V
B	0~10V	0~10V
C	1~5V	1~5V
D	2~10V	2~10V

Alarm	
0	None
1	1 Set
2	2 Sets
3	3 Sets

*FU48 None Alarm3

Communication	
0	None
3	TTL
B	RS485_MODBUS

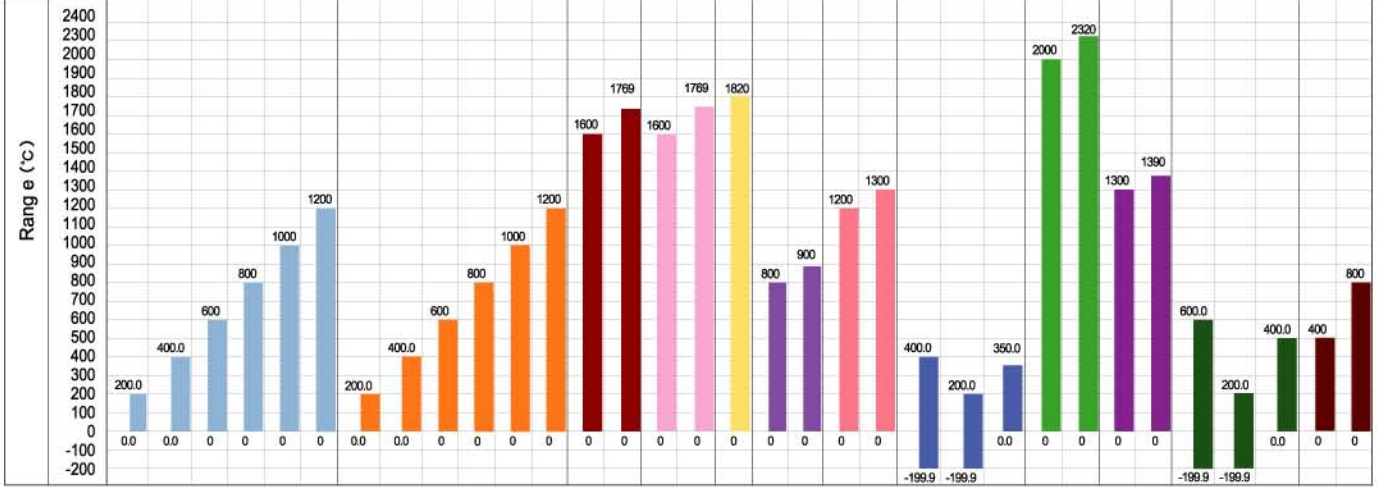
Input Type: See Input Codes

Power	
A	AC 85~265V

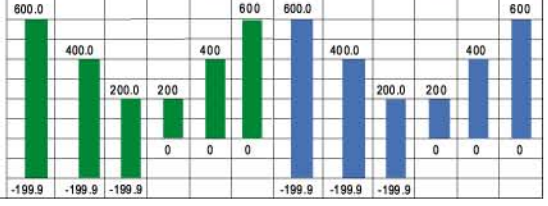
* Block means optional functions with additional charge.

Input Types

Type	TC (Thermocouple)																																	
	K						J						R		S		B	E		N		T			W		PLII		U			L		
	K1	K2	K3	K4	K5	K6	J1	J2	J3	J4	J5	J6	R1	R2	S1	S2	B1	E1	E2	N1	N2	T1	T2	T3	W1	W2	PL1	PL2	U1	U2	U3	L1	L2	
Code	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	
Rang e (°C)	2400 2300 2000 1900 1800 1700 1600 1500 1400 1300 1200 1100 1000 900 800 700 600 500 400 300 200 100 0 -100 -200																																	



Type	RTD											
	JPT 100						PT 100					
	JP1	JP2	JP3	JP4	JP5	JP6	DP1	DP2	DP3	DP4	DP5	DP6
Code	41	42	43	44	45	46	47	48	49	50	51	52
Rang e (°C)	600 500 400 300 200 100 0 -100 -200											



Distributor

Type	DC LINEAR																
	AN1				AN2	AN3	AN4							AN5			
Code	61	62	63	64	71	76	81	82	83	84	85	86	87	91	92	93	94
Input Range	-10~10mV	-2~2V	-5~5V	-10~10V	0~10mV	0~20mV	0~50mV	0~20mA	0~1V	0~5V	0~10V	0~5KΩ	0~2V	10~50mV	4~20mA	1~5V	2~10V
Set Range	Four Kinds of choices: -1999~9999 -199.9~999.9 -19.99~99.99 -1.999~9.999																