Operation Manual

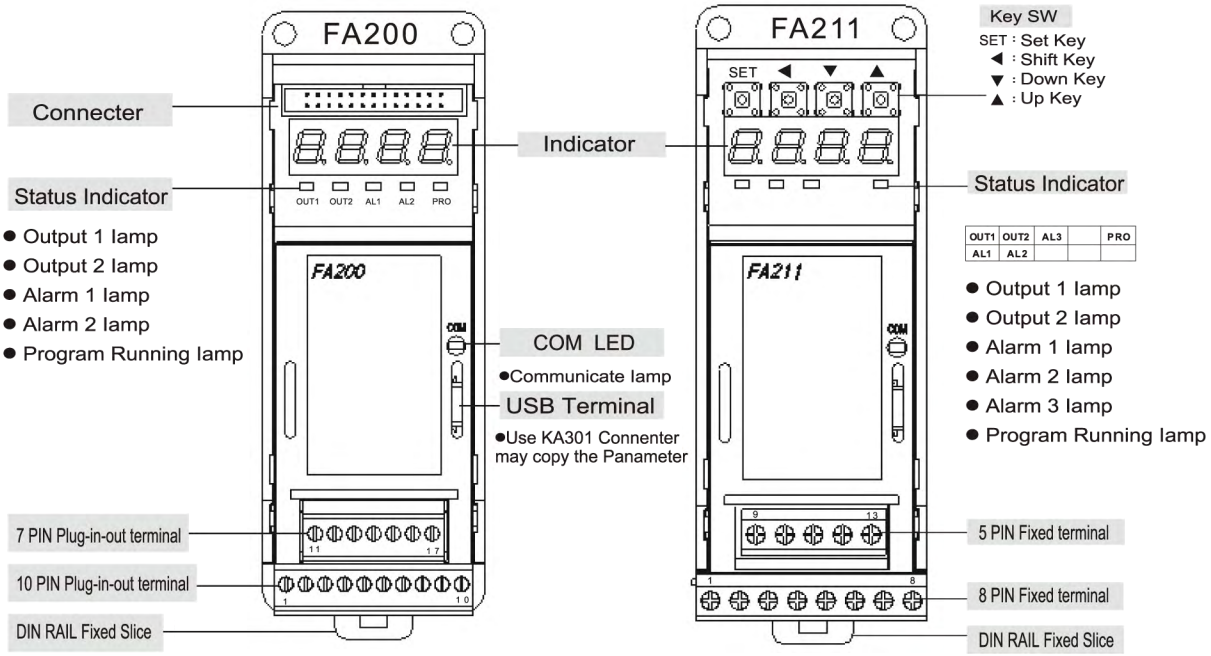
FA200 / FA211
Modular DIN Rail
Miniature Digital PID
Temperature & Process Controllers

No.FA2EV1

Thanks for selecting and using our new products FA series Digital PID Temperature & Process Controllers. FA series provide super power and accurate signal analysis of analogy input and have the ability of monitor, control and high noise resistance.
Provided the advance SMT manufacturing system, compact module assembly design, and high quality and high reliability to satisfy customers requirements.

FA module controllers are divided two types FA200 Advance FA211 Economic

FA200 Advance Type	Plug in out terminal, External operating box with double displays
FA211 Economic Type	Fixed terminal, Build in 4 operating keys, Single display



Please be sure the category of input signal and range before selecting & using the controllers to perform the utmost efficiency. To understand output types and specifications is match your requests or not. Please refer to this Operation Manual. Please visit our website www.fa-taie.com.tw 、 www.fa-taie.com or call for our agents for assistance.

1. Notice

⚠ Danger

1. Danger! Electric Shock!
2. Don't touch AC power wiring terminals when controller has been powered on.
3. Keep the power off until all of the wirings are completed.

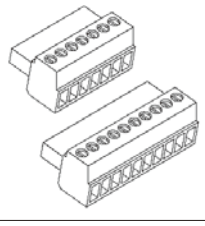
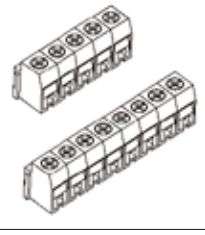
⚠ Warning

1. The wiring Terminals of FA200 / FA211 are Pin-1 and Pin-2
2. Please check the AC power wiring to controller correcting or not, otherwise it will be caused a
3. serious damage on controller after power on. Be sure to use the rated power supply for wiring terminals (AC Power、Sensor Input、Output、Alarm)

2. Assembly & Wiring

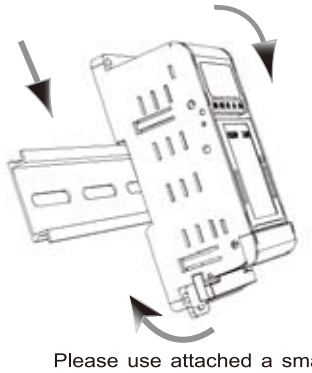
For FA200, please use plug-in-out wiring terminal = > using width 2.4mm "—" screwdriver

For FA211, please fixed wiring terminal => using width 3.0mm "+" screwdriver

plug-in-out terminal M2.0 using "—" screwdriver	fixed terminal M2.6 using "+" screwdriver
	

Selecting suitable electric wire of AWG 16 ~ AWG22 Lock screw torque：0.3 N.m (3 kgf.cm)

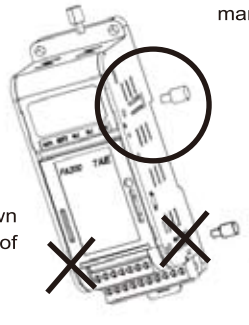
1. Please prevent the controllers from the environment of high noise, corrosive gas and high temperature and high humidity when controllers are assembling. (Normal operating environment : 0 ~ 50℃ , 20 ~ 90%RH)
2. Power wiring must be distant from main power and load power to avoid the interference of noise.
3. To extend the wires of thermocouple input, please use the correspondent compensation leading wires.
4. To extend the wires of RTD input, please use shield wires which have the same materials among 3 wires with low resistance.

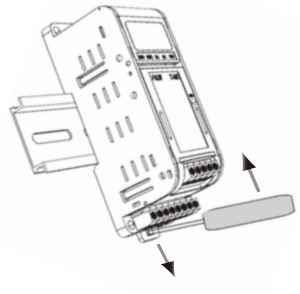


Please use attached a small interval stick in the up half both of controllers to assure the heat issuing good when many controllers set up together.

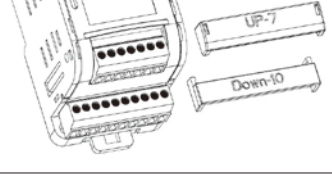
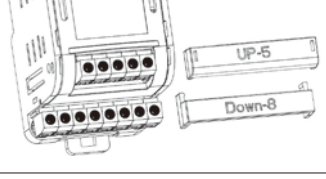
5. Please vertically install FA series by crabwise direction, hear the light voice of "Ka" to sure fixing and no loose when assembling FA series with on DIN rail.

Do not insert a small interval stick in the down half both of controllers to prevent the efficiency of compensating normal temperature.





6. Separated secure cover of terminals are divided to up and down of two covers, please avoid the mistake and assure fixing when assembling

FA200	FA211
	

3. Specifications

⊙ Standard Spec.

Model		Advance Type FA200	Economic Type FA211
Outer case color		two colors of deep black & light gray are available	
Wiring terminal		Plug in out terminal	fixed terminal
Parameter setting		by external control box or by communication	build in 4 operating keys or by communication
Assembly		DIN rail, M4 screw hole, magnetic seat	DIN rail or M4 screw hole
Display		External control box with double display + PV single display	single display
Standard accessories		1 Output + 1 Alarm	
Maximum expansibility		1 Output + 2 Alarms or 2 Outputs + 1 Alarm	
Additional Option	Programmable 2 patterns by 8 segments	Yes (Option)	Yes (Option)
	High life SSR	Yes (Option)	Yes (Option)
	Communication	Yes (Option)	Yes (Option)
	Motor Valve Control	Yes (Option)	No
	TRS	Yes (Option)	No
	Remote SV	Yes (Option)	No
	Heater Break Alarm (HBA)	Yes (Option)	No

⊙ General Spec.

Supply Voltage	AC 85-265V
Frequency	50 / 60 HZ
Power Consumption	Approx 4VA
Data Protection	EEPROM, Endurance : 1 Million write cycles, Data Retention : 10 years
Isolated resistance	main loop –case(ground) 、control loop – case(ground) DC500V > 10MΩ
Dielectric Strength	main loop –case(ground) AC 1500V 1min / control loop – case(ground) AC 1000V 1min
Vibration Endurance	10~55HZ 0.5mm (MAX 2G) XYZ various direction 2h
Assault Endurance	100m/s2 (Approx 10G) XYZ various direction 3 times
Protection Configuration	IP00
Display Height of Control box	LED Module PV : 14mm SV : 10mm / without control box
Display Height of single range LED	7 section digital display : 7mm
Dimension	40 x 107 x 43 mm
Weight	Appro x 115g
Operating Ambient temperature	0~50℃
Operating Ambient humidity	correspondent humidity 20-90% RH without dew
Reserved Temperature	-25℃ ~ + 65℃

⊙ Control Features

Control method	Heating,Cooling single output or Heating & Cooling both output PID,PI,PD,P,ON/OFF(P=0), FUZZY
PID Parameter	P : 0.0 - 200.0% I : 0 ~3600 sec. D : 0 ~900 sec.
Control Cycle	0~150 sec.

⊙ Input Features

Input	The point of signal point	1 point
	Accuracy	0.2 % Full Scale ± 1digit
	Sample time	250 ms
	TC	K , J , R , S , B , E , N , T , W5Re/W26Re , PLII , U , L
	RTD	PT100 , JPT100
	mA (DC)	4-20mA , 0-20mA
	Voltage (DC)	0-1V , 0-5V , 0-10V , 1-5V , 2-10V, -10-10mV , 0-10mV , 0-20mV , 0-50mV , 10-50mV
	DP Position Option 0000 000.0 00.00 0.000	When using the input of sensor signal, DP position for PV can be selected the sensor code No. 1~ 52 When using the input of DC mA or Voltage, DP position for PV can be selected code No. 61 ~96 by DP Parameter.

⊙ Output Features

		Advance Type FA200	Economic Type FA211
Output 1	Relay	SPDT type (a point 8A, b point 3A 220V)	SPST type (1a point 8A 220V)
	For external SSR drive	ON : 24V , OFF : 0V, Max. load current 20mA	
	4-20mA / 0-20mA	Max. load resistance 560 Ω	
	0-5V , 0-10 V	Max. load current 20mA	
	SSR high life relay	1A TRIAC SSR (Option)	
Output 2	Relay	SPST type 8A 220V	
	For external SSR drive	ON : 24V , OFF : 0V , Max. load current 20mA	
	4-20mA / 0-20mA	Max. load resistance 560 Ω	
	0-5V , 0-10 V	Max. load current 20mA	
	High life relay	1A TRIAC SSR (Option)	

⊙ Communications

Interface	RS-485 two wires Half Duplex
Protocol	Modbus RTU 、Modbus ASCII 、TAIE
Data bit	8 bit
Start bit	1 bit
Stop bit	1 bit or 2 bit
Baud rate	38400 、19200 、9600 、4800 、2400 bps。
Error examine	Parity even 、 odd or CRC-16 (in Modbus)
Connective pieces	Maximum 32 pcs
Communicate range	Maximum 1200 m

⊙ Alarms

Alarm 1 Relay	SPDT type (a point 8A, b point 3A 220V)	SPST type 1a point 8A 220V
Alarm 2 Relay	SPST type 8A 220V	
Alarm setting range	-1999~9999 (Dot positions are different depended on the various Input Types)	

Alarm mode type (Referenced for ALD1/ALD2/ALD3) (▲ SV △ Alarm set value)

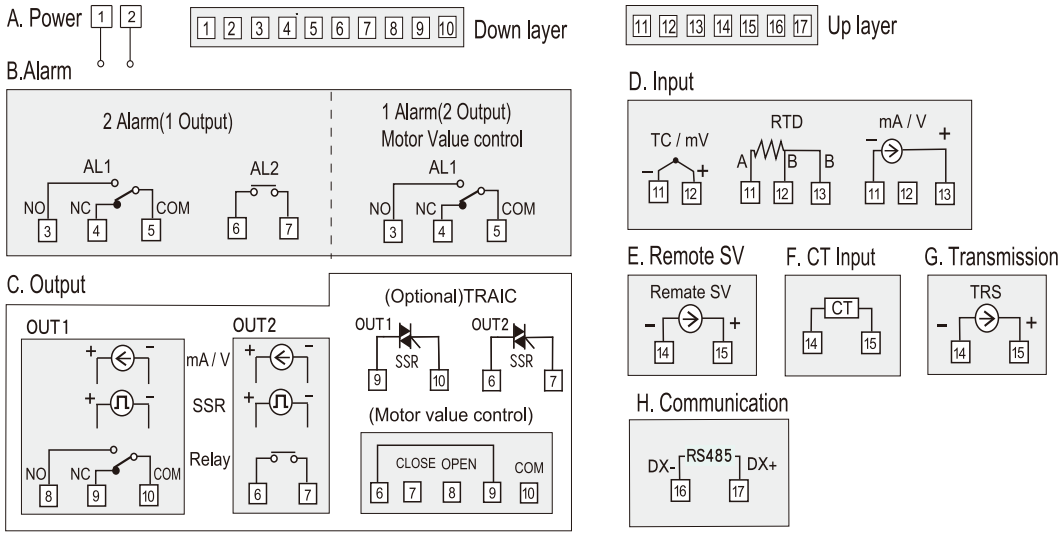
01	Deviation high alarm with hold action*
11	Deviation high alarm
02	Deviation low alarm with hold action*
12	Deviation low alarm
03	Deviation high/low alarm with hold action*
13	Deviation high/low alarm
04 14	Band alarm
05	Process high alarm with hold action*
15	Process high alarm
06	Process low alarm 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) ALT1~3 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
09	Heater Break Alarm (HBA)
00 10	No alarm

＊Hold action:
When Hold action is ON ,the alarm action is suppressed at start-up until the measured value(PV) enters the non-alarm range.
＊System failed:
It means that the controller display error message with one of following : " UUU1 " or" NNN1" or" CJCE"

4. Terminal Wiring Diagram

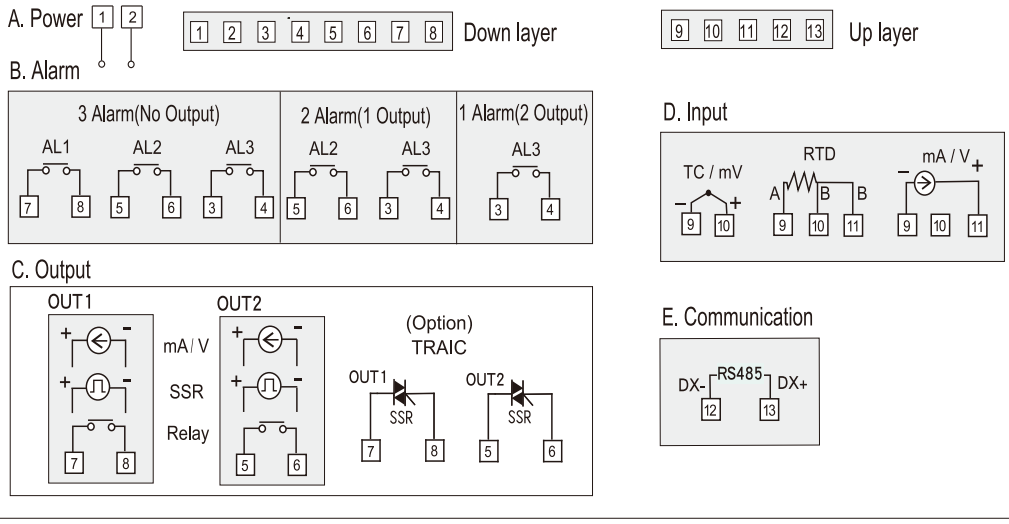
FA 200 Advance Type Plug-in-out Pitch 3.5 mm

plug-in-out terminal M2.0 using "—" screwdriver



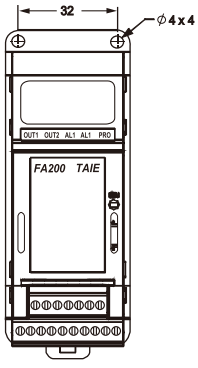
FA 211 Economic Type Fixed Pitch 5.0 mm

fixed terminal M2.6 using "+" screwdriver

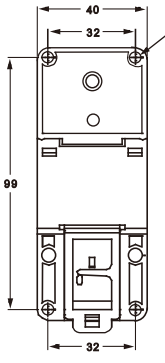


5. Outer Dimension

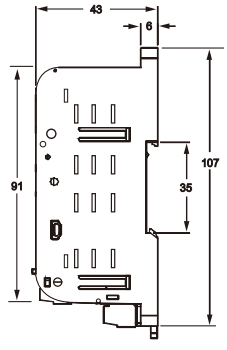
front drawing



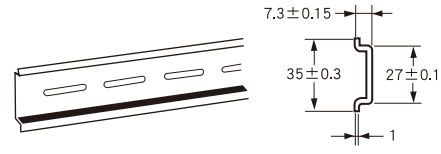
back drawing

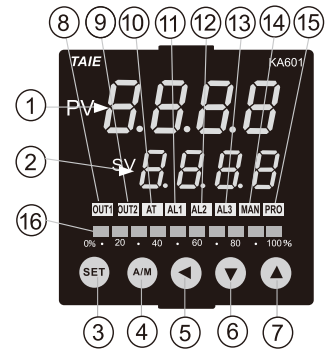


side drawing



DIN Rail Dimension (reference)





6. KA601 External Control Box

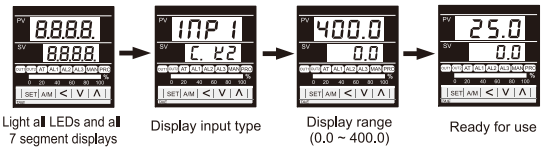
KA601 Outer Dimension
74 x 76 x 16 mm
Cable length 150 cm

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	Pressing “SET” key before and after setting or shifting parameters to call up or save the setting value.
A/M	④	Auto/Manual Key	Switching between Auto (PID) and Manual output mode.
＜	⑤	Shift Key	Shifting digits when settings are changed
V	⑥	Down Key	Decrease the parameters or digit being modified *Program Hold 〈Only for programmable controller〉
Λ	⑦	Up Key (*Program Run)	Increase the parameters or digit being modified *Program run 〈Only for programmable controller〉
OUT1	⑧	OUT1 lamp	Lights when OUT1 is on (Green)
OUT2	⑨	OUT2 lamp	Lights when OUT2 is on (Green)
AT	⑩	Autotuning lamp	Lights when Auto tuning is activated (Orange)
AL1	⑪	Alarm1 lamp	Lights when Alarm 1 is activated (Red)
AL2	⑫	Alarm2 lamp	Lights when Alarm 2 is activated (Red)
AL3	⑬	Alarm3 lamp	Lights when Alarm 3 is activated (Red)
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	OUT% Bar-Graph display	Output % is corresponded to display on 10-dot LED

7. Operations

■ 1.Power ON:

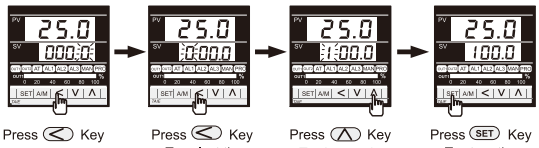
Controller wiil display as following



Light all LEDs and all 7 segment displays | 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.

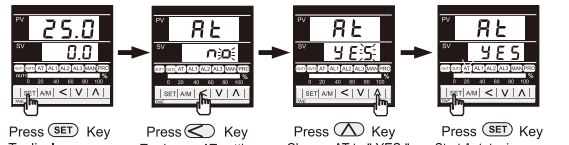
Press ＜ Key — To select the hundreds digit.

Press Λ Key — To change the number to 1.

Press SET Key — To store the new set value.

■ 3.Autotuning (AT):

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



Press SET Key — To display parameter AT.

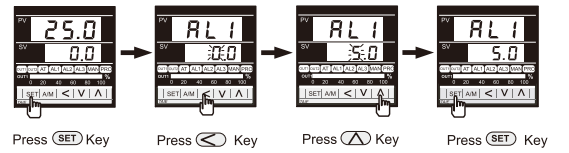
Press ＜ Key — To change AT setting.

Press Λ Key — Change AT to " YES "

Press SET Key — Start Autotuning process (AT lamp will be lighted on)

■ 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

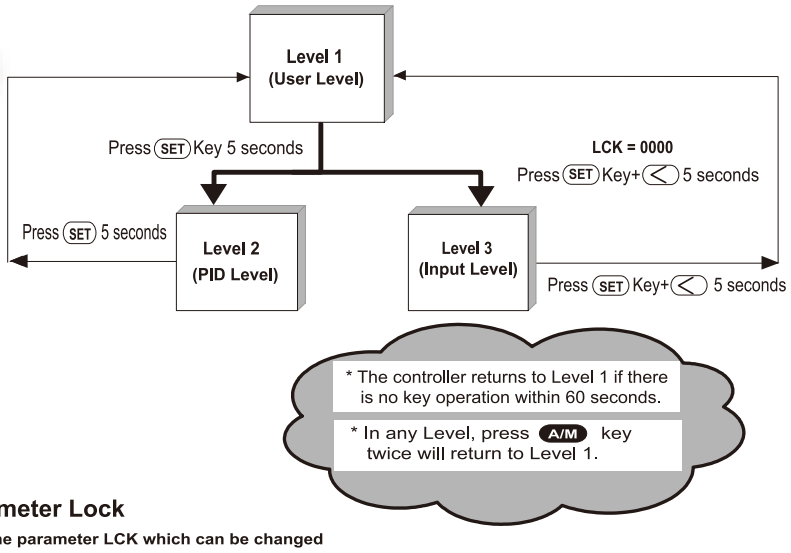
Press Λ Key — Increase AL1 value

Press SET Key — Store the new value of AL1

* There are total 16 alarm mode types ,referenced as below:
* To change Alarm mode, press SET + ＜ key 5 seconds to enter Level 3(Input Level) and then change the value of ALD1/ALD2/ALD3.

8. Levels Explanation

8.1 Levels Diagram



8.2 Levels in and out & Parameter Lock

Please enter in level 2 (PID level) to set the parameter LCK which can be changed

LCK	Levels entering available			Parameters which can be changed
	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	
0100	Yes	Yes	No	
0110	Yes	Yes	No	Parameters in Level 1
0001	Yes	Yes	No	SV" and "LCK"
0101	Yes	Yes	No	Only "LCK"

9. Parameters List

Level 1 (User Level)

Process Value / Set Value — PV / SV

↓ Set

Output Limt — OUtL / 100.0

↓ Set

Autotuning — At / YES/no

↓ Set

Alarm1 set value — AL1 / 0.0

↓ Set

Heater current display (HBA set value) — cT 0.0 / 0.0

← * it will show, when HBA function enable

↓ Set

Alarm 2 set value — AL2 / 0.0

↓ Set

Alarm 3 set value — AL3 / 0.0

↓ Set

Display If P1=0 →

Display if output2 is provided ↕

Display If P2=0 →

Level 2 (PID Level)

P1 / 3.0	Proportional band 1 (For output 1)	Range : 0.0~200.0% ON/OFF control if set to 0 (0.0)
I1 / 240	Integral time 1 (For output 1)	Range : 0~3600 seconds PD control if set to 0
d1 / 60	Derivative time 1 (For output 1)	Range : 0~900 seconds PI control if set to 0
db1 / 0	Dead-band time	Don't care
AtVL / 0	Auto tuning offset value	Range : 0~USPL
CYt1 / 10	Output 1 cycle time	Range : 0~150 seconds Relay output :10 Voltage pulse output : 1 , mA output :0
HYS1 / 1	Hysteresis for output 1 ON/OFF control	Range : 0~1000
P2 / 3.0	Proportional band 2 (For output 2)	The same with P1
I2 / 240	Integral time 2 (For output 2)	The same with I1
d2 / 60	Derivative time 2 (For output 2)	The same with D1
CYt2 / 10	Output 2 Cycle time	The same with CYT1
HYS2 / 1	Hysteresis for output 2 ON/OFF control	The same with HYS1
GAP1 / 0	Control gap 1 (For output 1)	Set point of output 1 (Heating side) =SV - GAP1
GAP2 / 0	Control gap 2 (For output 2)	Set point of output 2 (Cooling side) =SV + GAP2
LCK / 0000	Function lock	

↓ Set

Return to "P1"

Level 3 (Input Level)

Set LCK to“0000”and then press SET Key+shift（◄）Key 5 seconds to enter level 3

INP1 / K2 / Set	Input type selection		CHO2 / 3600 / Set	Output 2 high limit calibration (Used for mA and V output)	The same with CHO1
ANL1 / 0 / Set	Analog input low limit calibration (Used for mA and V input)	Range ：-1999 ~ 9999	CLO3 / 0 / Set	Retransmission low limit calibration	The same with CLO1
ANH1 / 5000 / Set	Analog input high limit calibration (Used for mA and V input)	Range ：0 ~ 9999	CHO3 / 5000 / Set	Retransmission high limit calibration	The same with CHO1
dP / 0000 / Set	Decimal point position (Available for mA and V input)	0000 ， 000.0 00.00 ， 0.000	rU.CY / 5 / Set	Full run time of proportional motor (Used for proportional motor valve control output)	Range ：5~200 seconds
L.SP.L / 0.0 / Set	Lower Set-Point Limit	Scaling Low Limit	dA.t / 0.0 / Set	Used for programmable controller to wait continued operation	0=Not wait Others=Wait value
U.SP.L / 400.0 / Set	Upper Set-Point Limit	Scaling High Limit	SEtA / 0000 / Set		
ANL2 / 0 / Set	Remote input low limit calibration	Range ：-1999 ~ 9999	PSL / rtU / Set	Communication Protocol Selection	MODBUS RTU / MODBUS ASCII / TAIE
ANH2 / 5000 / Set	Remote input high limit calibration	Range ：0 ~ 9999	b.tS / o_81 / Set	Communication Bits Configuration	O _ 81 / O _ 82 / E _ 81 / E _ 82
ALd1 / 11 / Set	Alarm mode of AL1	Range:00~19 Refer to "Alarm mode type"	Id.NO / 1 / Set	ID number	Range ：0 ~ 255
ALt1 / 99.59 / Set	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)	bAUd / 384 / Set	Baudrate	2400 / 4800 / 9600 / 19200 / 38400 bps
ALd2 / 0 / Set	Alarm mode of AL2	The same with ALD1	SV.OS / 0.0 / Set	SV compensation	Range ：-1000~1000
ALt2 / 99.59 / Set	Alarm time of AL2	The same with ALT1	PV.OS / 0.0 / Set	PV compensation	Range ：-100.0~500.0
ALd3 / 0 / Set	Alarm mode of AL3	The same with ALD1	UNIt / C / Set	Unit of PV & SV	C(℃) / F(℉) / A(Analog)
ALt3 / 99.59 / Set	Alarm time of AL3	The same with ALT1	PV.Ft / 200 / Set	PV Filter	PV will responese faster if PVFT is smaller.
HYSA / 0.0 / Set	Hysteresis of all Alarm	Range ：0~1000	CASC / 0.0 / Set	Reserved	
CLO1 / 230 / Set	Output 1 low limit calibration (Used for mA and V output)	Range ：0 ~ 9999	OUd / HEAt / Set	Action mode	Heat / Cool
CHO1 / 3600 / Set	Output 1 high limit calibration (Used for mA and V output)	Range ：0 ~ 9999	OPAd / P.d / Set	Control algorithm	PID / Fuzzy
CLO2 / 230 / Set	Output 2 low limit calibration (Used for mA and V output)	The same with CLO1	H= / 60H= / Set	Frequency	50 / 60HZ

Return to "INP1"

10. Order Information

★ Factory basic value: FA200-101000-02A FA211-101000-02A

Model	Output 1	Output 2	Alarm	Transmission	Remote SV	Communication	Input Type	Power
FA 200 — PFA 200 (Programmable) Plug-in-out terminal (Advance Type)	1	0	1	0	0	0	02	A
FA 211 — PFA 211 (Programmable) (Economic Type)								

	Output 1	Output 2	Alarm	Transmission	Remote SV	Communication
0	None	None	None	None	None	None
1	(Relay)	(Relay)	1Set	4~20mA	4~20mA	
2	Voltge Pulse (SSR Drive)	Voltge Pulse (SSR Drive)	2Sets	0~20mA	0~20mA	
3	4~20mA	4~20mA				
4	0~20mA	0~20mA				
A	0~5V	0~5V	HBA	0~5V	0~5V	
B	0~10V	0~10V	HBA+AL2	0~10V	0~10V	RS485 - MODBUS
C	1~5V	1~5V		1~5V	1~5V	
D	2~10V	2~10V		2~10V	2~10V	
T	TRIAC (SSR)	TRIAC (SSR)				
7	Motor value control					

Input Type: See Input Codes

Power: A AC 85~265V

★Above black blocks are optional functions with additonal agents.

★Factory set value K2, code 02

★TC Input(K. J.R.S.B.E.N.T.W.PLII.U.L...)setting, can be changed to any types by user

★RTD(JPT 100, PT100)setting, can be changed to any type by user

★TC, RTD, LINEAR can be changed each other but need to change the parts of hardware. For more details, please contact local agents.

11. Function Option

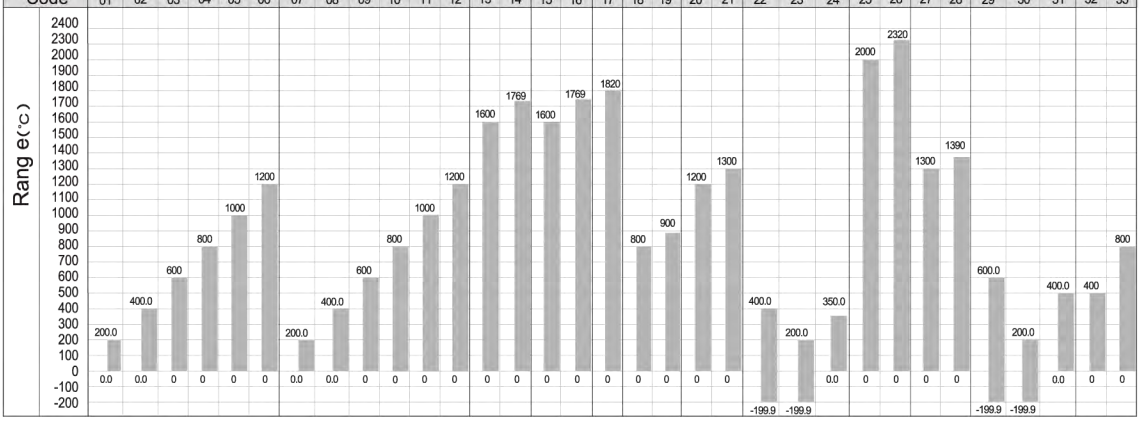
★ Maximum expand is 1 Output 2 Alarm or 2 Output 1 Alarm

★ "HBA" & "Remote" function can not be selected at the same time.

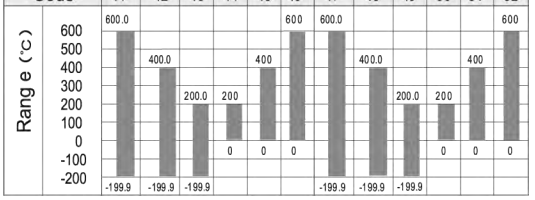
Type	RAMP/SOAK PROGRAM	Communication	★ Output 1		★ Output 2	★ Alarm 2	HBA	Transmission	Remote SV
			Motor value control	TRIAC SSR					
FA 200	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FA 211	Yes	Yes	No	Yes	Yes	Yes	No	No	No

12. Input Types

Type	T C (Thermocouple)																														
	K						J						R		S		B	E		N		T			W		PL II		U			L	
Code	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
	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



Type	R T D											
	JPT 100						PT 100					
Code	JP1	JP2	JP3	JP4	JP5	JP6	DP1	DP2	DP3	DP4	DP5	DP6
	41	42	43	44	45	46	47	48	49	50	51	52



Type	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																

No.FA2EV1