

# TAIE

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# FA series



## Digital PID Temperature/Process Controllers Operation Manual



# FY/FU Series



符合无铅无毒无害环保规范

# CONTENT

1.	Notice before start-up .....	3
2.	FU Series.....	4
2.1	Specifications.....	4
2.2	Outer Dimension.....	5
2.3	Terminal Wiring Diagram .....	6
2.4	Assembly & Wiring .....	7
3	FY Series .....	8
4.	Terminal arrangement.....	11
4.1	FY400 / FU48 Terminals ( 48mm x 48mm , DIN 1/16 ).....	11
4.2	FY600 Terminals ( 96mm x 48mm , DIN 1/8 ).....	12
4.3	FY700 / FU72 Terminals ( 72mm x 72mm).....	13
4.4	FY800 / FU86 Terminals ( 48mm x 96mm , DIN 1/8 ).....	14
4.5	FY900 / FU96 Terminals ( 96mm x 96mm , DIN 1/4 ).....	15
4.6	FY100 Terminals ( 175mm x 110mm ).....	16
4.7	FY101 Terminals ( 90mm x 90mm ).....	17
5.	External dimension and panel cutout 〈 Unit : mm 〉 .....	18
5.1	FY100.....	18
5.2	FY101.....	18
5.3	FY400~900 & FU48~96.....	19
6.	Parts description .....	20
7.	Operations .....	21
7.1	Power On.....	21
7.2	Change the Set Value (SV).....	21
7.3	Change the Alarm Value .....	21
7.4	Autotuning (AT).....	22
7.5	Programmable RAMP / SOAK (Only available for PFY model) .....	23
8.	Operation levels.....	24
8.1	Levels diagram .....	24
8.2	Lock function .....	24
9.	Parameters .....	25
9.1	Level 1 (User Level) .....	25
9.2	Level 2 (PID Level).....	26
9.2.1	Level 2 parameters display / hiding condition .....	26
9.2.2	Description of parameters.....	27
9.3	Level 3 (Input Level).....	28
9.4	Level 4 (SET level) .....	30
9.4.1	How to hide parameters (Use SET1~SET7).....	30
9.4.2	Special functions (Use SET8 / SET9 / SET0) .....	31
9.4.3	Remote SV type selection .....	32
9.4.4	Output mode selection (Use OUTY) .....	32
9.4.5	Modify caution .....	32
9.5	Program Level (Only displayed in programmable controller) .....	33
9.5.1	Description of parameters.....	33

9.5.2	Description of operation.....	34
10.	Input type table (INP1 selection).....	35
11.	Alarm .....	37
11.1	Alarm time (ALT1/ALT2/ALT3) .....	37
11.2	SETA.....	37
11.3	Alarm mode (ALD1 / ALD2 / ALD3).....	38
12	Heater Break Alarm (HBA).....	39
12.1	HBA Wiring Example .....	39
12.2	HBA Function Description.....	39
12.3	HBA setting procedure.....	40
12.4	Parameters for HBA function .....	40
12.5	Activated conditions of HBA .....	41
12.6	Remarks .....	41
12.7	CT specifications .....	42
12.7.1	SC-80T Specifications .....	42
12.7.2	SC-100T Specifications .....	42
11.7.3	SC-80T Linear Diagram .....	43
13.	Error codes .....	44
14.	Modify input type ("TC" "RTD").....	45
14.1	FY400~FY900 .....	45
14.2	FU48~96.....	46
14.3	FY100~FY101 .....	46
15.	Modify input type : Linear Input (mA ,V).....	48
15.1	FY400~900 & FU48~96 Hardware : .....	48
15.2	FY100/101 Hardware : .....	49
15.3	Calibration : .....	50
16.	Modify Output type : Relay , SSR , 4~20mA.....	51
17.	Modify output mode: OUT1/ALARM, OUT1/OUT2 .....	51
18.	Applications .....	52
18.1	RAMP & SOAK.....	52
18.2	TTL Communication : SV output and RATE function .....	53
18.3	1 $\psi$ Phase angle control (By SCR module).....	54
18.4	1 $\psi$ Phase angle control (By TRIAC) .....	55
18.5	3 $\psi$ Phase angle control (By DIODE/SCR module) .....	56
18.6	1 $\psi$ Zero crossing control (By SCR module).....	57
18.7	1 $\psi$ Zero crossing control (By TRIAC) .....	58
18.8	3 $\psi$ Zero crossing control (By SCR module).....	59
18.9	3 $\psi$ Zero crossing control (By TRIAC) .....	60
18.10	3 wires proportional motor valve control .....	61
18.11	Wiring diagram of PC communication.....	62

# 1. Notice before start-up

FY series controller has got the CE approvals as below:

LVD : D/N EN61010-1

EMC : EN 55 022 1994 /A1 : 1995/ A2 : 1997

EN 61 000-3-2 : 1995 / -3-3 : 1995

EN 61 000-4-2 : 1995 / -4-3 : 1996 / -4-5 : 1995 / -4-6

1996 / -4-8 : 1993 / -4-11 : 1996/ EN 50 204 : 1995

Please confirm the specification of controller is to totally with your requirement before using it, also read this manual in detail.

## **Danger**

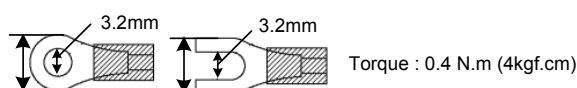
### 1. Danger! Electric Shock!

DON'T touch AC power wiring terminals when controller has been powered!

Keep the power off until all of the wirings are completed!

## **Warning**

1. Please confirm the AC power wiring to controller is correct, otherwise it would be caused aggravated damage on controller. ( FY400 connecting with Pin 1 and 6, FY100/FY101/FY600/700/800/900 with Pin 1 and 2).
2. Be sure to use the rated power supply (AC85~265V or DC24V), otherwise it would be caused aggravated damage on controller.
3. Please confirm wires are connected with correct terminal (Input, Output).
4. Use M3 screw-compatible crimp-on terminals with an insulation sleeve, as shown below



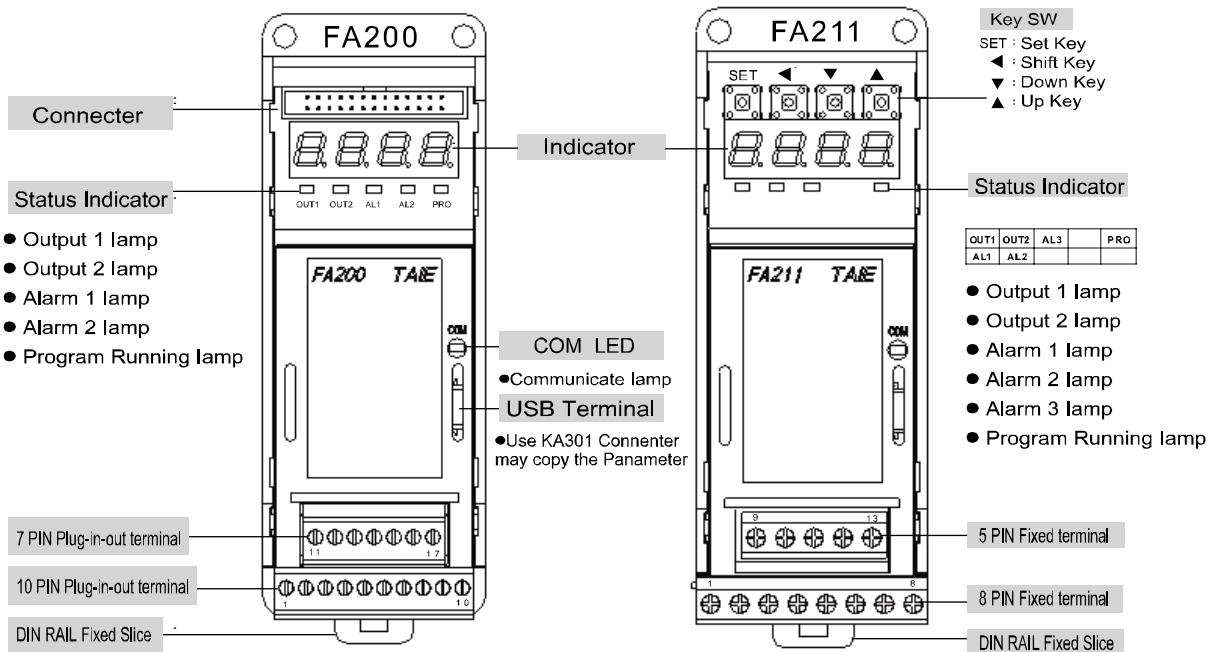
5. Avoid installing controller in following spaces:
  - I. A place where the ambient temperature may reach beyond the range from 0 to 50°C
  - II. A place where the ambient humidity may reach beyond the range from 20 to 90% RH.
  - III. A place where the controller likely to come into contact with water, oil, chemicals, steam and vapor.
  - IV. A place where the controller is subject to interface with static electricity, magnetism and noise.
6. For thermocouple (TC) input, use shield compensating lead wire.
7. For RTD input, use shield wires which have low resistance and no resistance difference between the 3 wires.

## 2. FA Series

### 2.1 Specifications

FA module controllers are divided two types FA200 Advance FA211 Economic

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



### ● 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)	
	High life SSR	Yes (Option)	
	Communication	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/s <sup>2</sup> (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	Approx x 115g	
Operating Ambient temperature	0~50°C	
Operating Ambient humidity	correspondent humidity 20-90% RH without dew	
Reserved Temperature	-25°C ~ + 65°C	

## ● Control Features

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

## ● Input Features

<b>Input</b>	<b>The point of signal point</b>	1 point
	<b>Accuracy</b>	0.2 % Full Scale ± 1digit
	<b>Sample time</b>	250 ms
	<b>TC</b>	K, J, R, S, B, E, N, T, W5Re/W26Re, PLII, U, L
	<b>RTD</b>	PT100, JPT100
	<b>mA (DC)</b>	4-20mA, 0-20mA
	<b>Voltage (DC)</b>	0-1V, 0-5V, 0-10V, 1-5V, 2-10V, -10-10mV, 0-10mV, 0-20mV, 0-50mV, 10-50mV
	<b>DP Position Option</b> 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

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

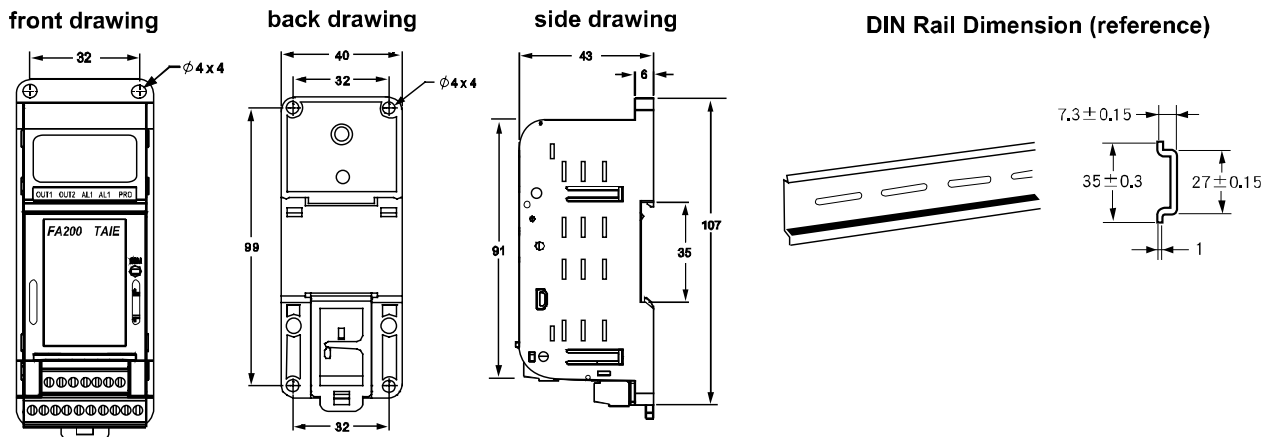
## ● Communication

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

## ● Alarms

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

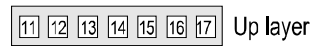
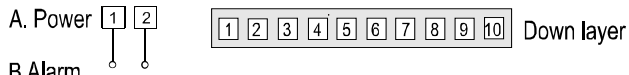
## 2.2 Outer Dimension



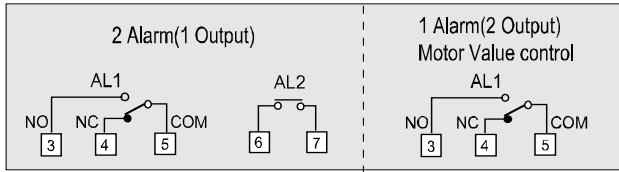
## 2.3 Terminal Wiring Diagram

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

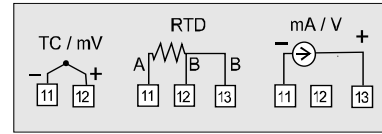
plug-in-out terminal M2.0 using "—" screwdriver



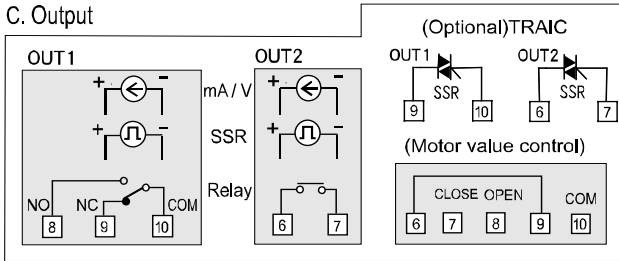
B. Alarm



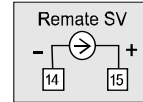
D. Input



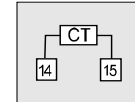
C. Output



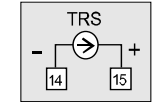
E. Remote SV



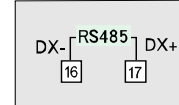
F. CT Input



G. Transmission

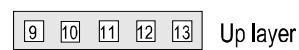
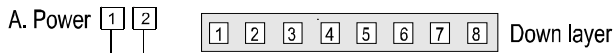


H. Communication

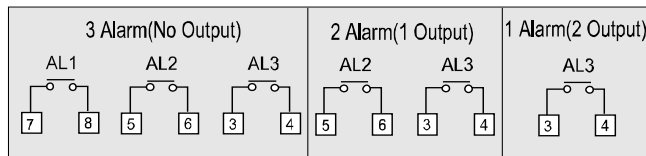


FA 211 Economic Type Fixed Pitch 5.0 mm

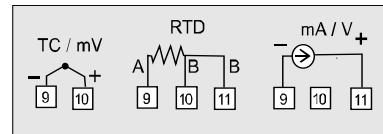
fixed terminal M2.6 using "+" screwdriver



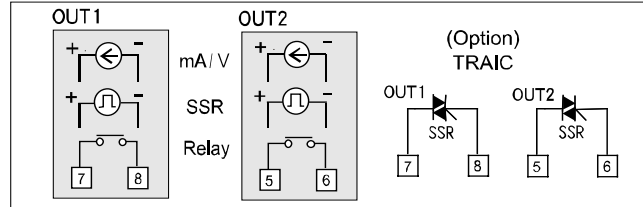
B. Alarm



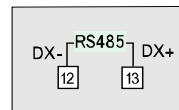
D. Input



C. Output



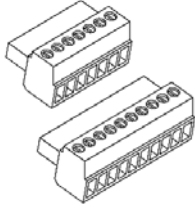
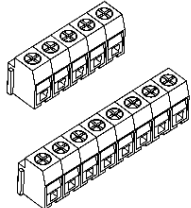
E. Communication



## 2.4 Assembly & Wiring

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

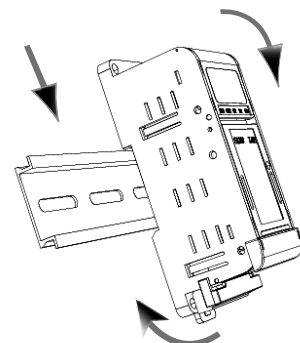
For FA211, please fixed wiring terminal => using width 3.0mm “+” screwdriver

plug-in-out terminal M2.0 using “—”screwdriver	fix terminal M2.6 using “+”screwdriver
	

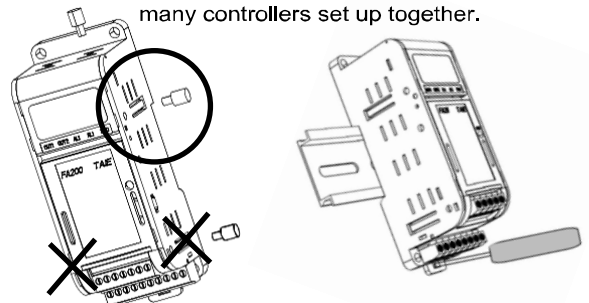
Selecting suitable electric wire of AWG 16 ~ AWG22 Lock Screw torque: 0.3 N.m (3 kgf.cm)

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°C , 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.
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.



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.



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



### 3 FY / FU Series

- Standard spec.

Model	FY400 / FU48	FY600	FY700 / FU72	FY800 / FU86	FY900 / FU96	FY100	FY101
Dimension	48X48mm	96X48mm	72X72mm	48X96mm	96X96mm	175X110mm	90X90mm
Supply voltage	AC 85~265V , DC 15~50V (Option)					AC 85~265V	
Frequency	50 / 60 HZ						
Power consumption	approx 3VA	approx 4VA	approx 3VA	approx 4VA	approx 4VA	approx 4VA	approx 3VA
Input	Accuracy	0.2 % FS ± 1digit					
	Sample time	250ms					
	TC	K , J , R , S , B , E , N , T , W5Re/W26Re , PLII , U , L					
	RTD	PT100,JPT100,JPT50					
	mA dc	4~20mA ,0~20mA					
	mV / V dc	0~1V,0~5V,0~10V,1~5V,2~10V -10~10mV,0~10mV,0~20mV,0~50mV,10~50mV					
	Decimal point position	0000 , 000.0 , 00.00 , 0.000 Available for linear input (mA / mV / V)					
Output 1	Relay	SPST type	SPDT type	SPST type	SPDT type	SPDT type	SPDT type
		3A , 220V , electrical life:100,000 times or more (under rated load)					
	Voltage pulse	For SSR drive. ON : 24V , OFF : 0V , max load current : 20mA					
	mA dc	4~20mA, 0~20mA. Maximum load resistance:560 Ω					
	Voltage dc	0~5V , 0~10V , 1~5V , 2~10V . Max load current:20mA					
Alarm 1	3A , 220V , electrical life:100,000 times or more (under rated load)						
Control algorithm	PID , PI , PD , P , ON / OFF(P=0) , FUZZY ◦						
PID range	P: 0.0 ~ 200.0 % , I: 0~3600s , D: 0~900s						
Isolation	Output terminals(control output , alarm , transmission) and input terminals are isolated separately						
Isolated resistance	10MΩ or more between input and case (ground) at DC 500 V 10MΩ or more between output and case (ground) at DC 500 V						
Dielectric strength	1000V AC for 1 minute between input terminal and case (ground) 1500V AC for 1 minute between output terminal and case (ground)						
Operating temperature	0~50°C						
Humidity range	20~90%RH						
Weight	150g	225g	225g	225g	300g	130g	80g
Display Height	PV:7mm SV:7mm	PV:7mm SV:7mm	PV:14mm SV:10mm	PV:7mm SV:7mm	PV:14mm SV:10mm	—	—

- **Optional Spec.**

Model	FY400 / FU48	FY600	FY700 / FU72	FY800 / FU86	FY900 / FU96	FY100	FY101
<b>Output 2</b>	For heating and cooling control use. Relay , SSR , 4~20mA , 0~20mA , 0~5V , 0~10V , 1~5V , 2~10V						
<b>Alarm 2</b>	Available	Available	Available	Available	Available	Available	Not
	SPST type	SPDT type	SPST type	SPDT type	SPDT type	SPDT type	available
3A , 220V , electrical life:100,000 times or more (under rated load)							
<b>Alarm 3</b>	Not	Available	Available	Available	Available	Available	Not
	available	SPST type	SPST type	SPST type	SPST type	SPST type	available
3A , 220V , electrical life:100,000 times or more (under rated load)							
<b>Heater Break Alarm (HBA)</b>	Display range of heater current : 0.0~99.9A , Accuracy : 1%FS						
	Included CT : SC-80-T (5.8mm dia , 0.0~80.0A) or SC-100-T (12mm dia , 0.0~99.9A)						
	Alarm relay : AL1						
<b>Transmission</b>	Available for PV or SV transmission						
	4~20mA , 0~20mA , 0~1V , 0~5V , 0~10V , 1~5V , 2~10V						
<b>Remote SV</b>	4~20mA , 0~20mA , 0~1V , 0~5V , 0~10V , 1~5V , 2~10V						
<b>Communication</b>	Protocol : MODBUS RTU , MODBUS ASCII , TAIE						
	RS232 , RS485 , TTL						
	Baud rate: 2400 , 4800 , 9600 , 19200 , 38400 bps.						
	Data bits : 8 , Stop bit : 1 or 2bit , Odd or Even parity.						
<b>Water/Dust proof</b>	IP65						

- **Special control output (OUT1)**

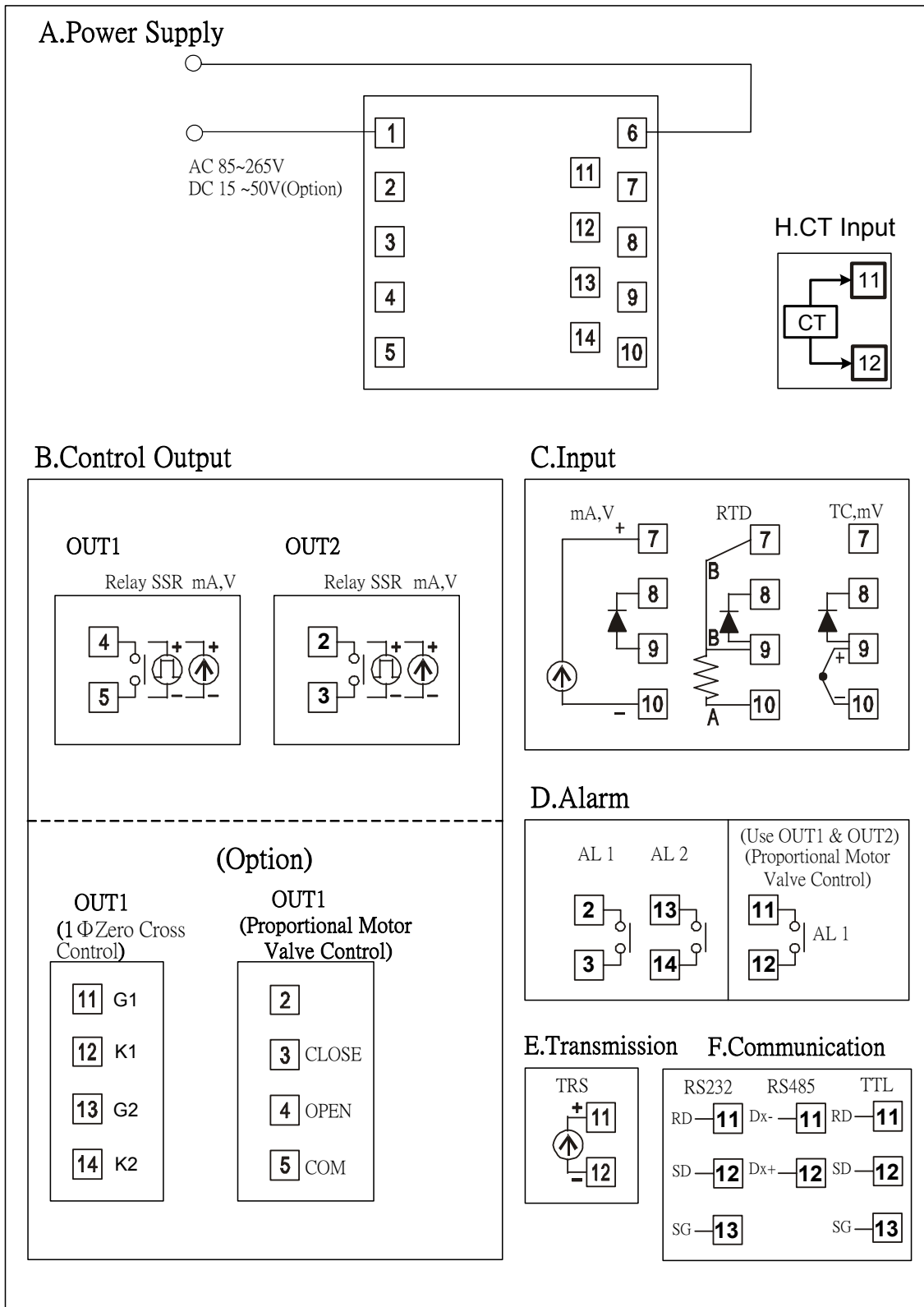
Model	FY400 / FU48	FY600	FY700 / FU72	FY800 / FU86	FY900 / FU96	FY100	FY101
<b>1φ zero crossing control(1φSSR)</b>	Available	Not available	Available	Not available	Available	Not available	Not available
<b>3φ zero crossing control(3φSSR)</b>	Not available				Available	Not available	Not available
<b>Motor valve control</b>	Available						
<b>1φ phase angle control(1φSCR)</b>	Not available	Available				Available	Not available
<b>3φ phase angle control(3φSCR)</b>	Not available				Available	Not available	Not available

- **Programmable RAMP/SOAK**

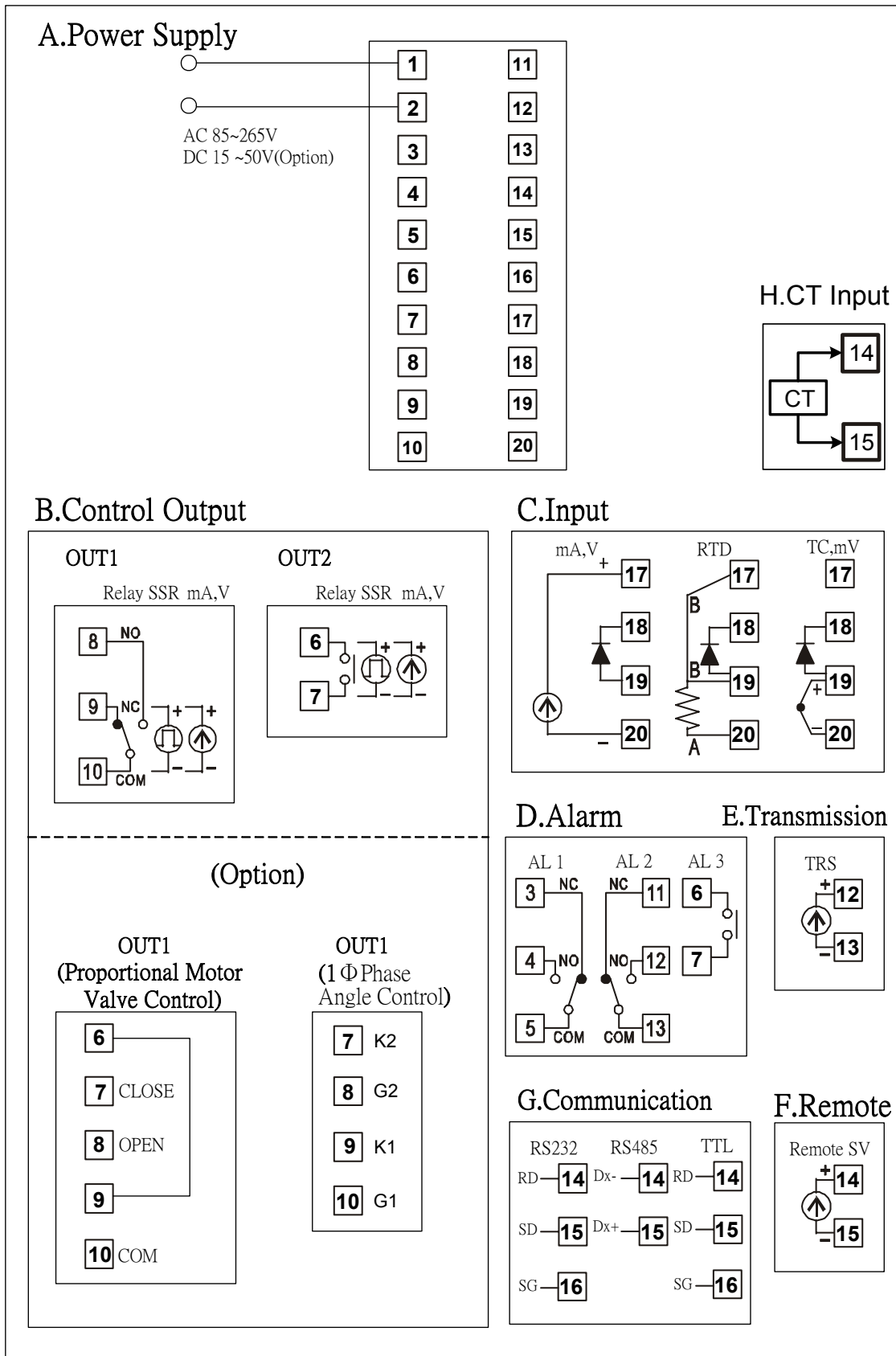
<b>Model</b>	<b>PFY400</b>	<b>PFY600</b>	<b>PFY700</b>	<b>PFY800</b>	<b>PFY900</b>	<b>PFY100</b>	<b>PFY101</b>
<b>Programmable RAMP/SOAK</b>	2 patterns with 8 segment each. The 2 patterns can be linked together as 16 segments use.						

## 4. Terminal arrangement

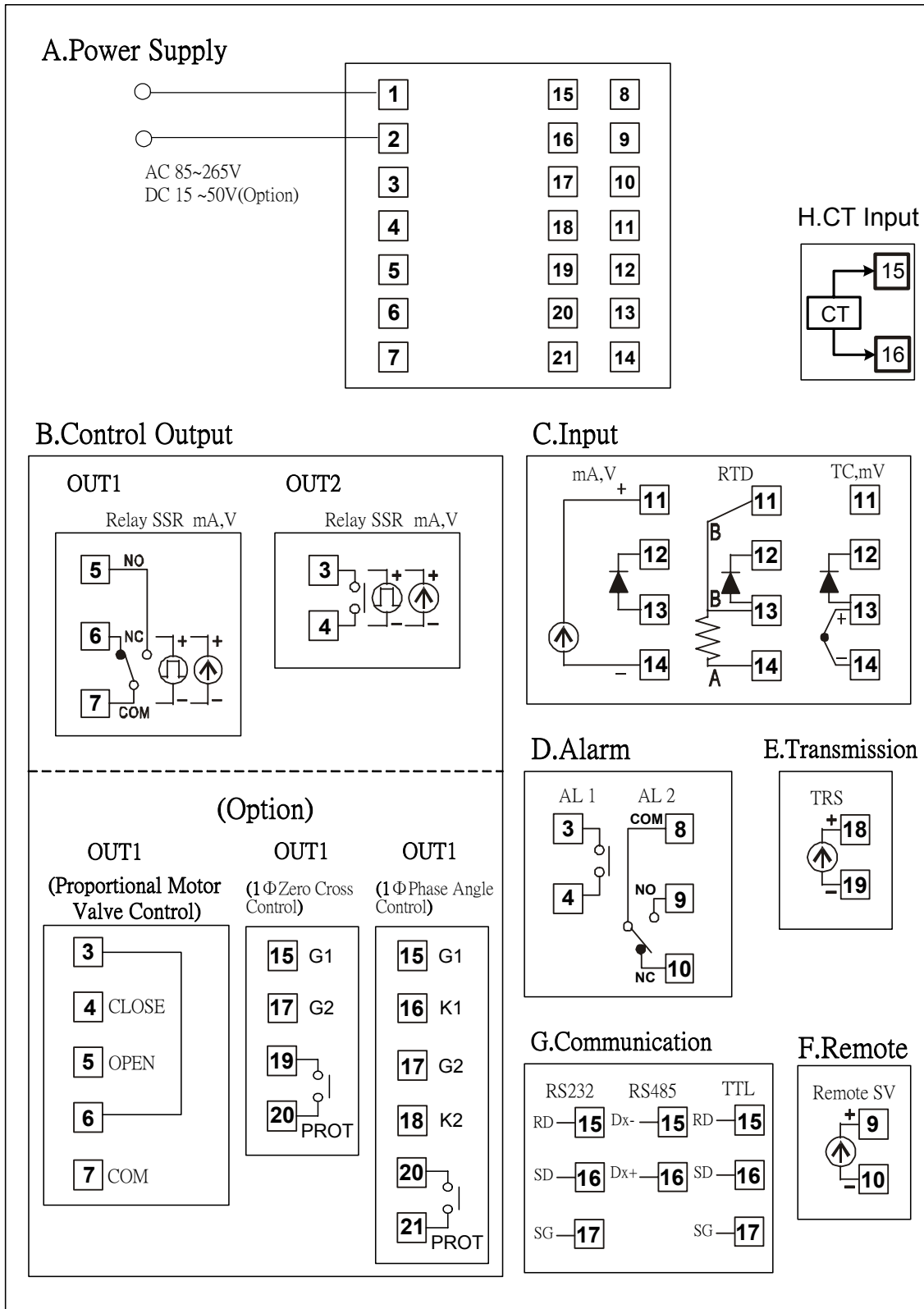
### 4.1 FY400 / FU48 Terminals ( 48mm x 48mm , DIN 1/16 )



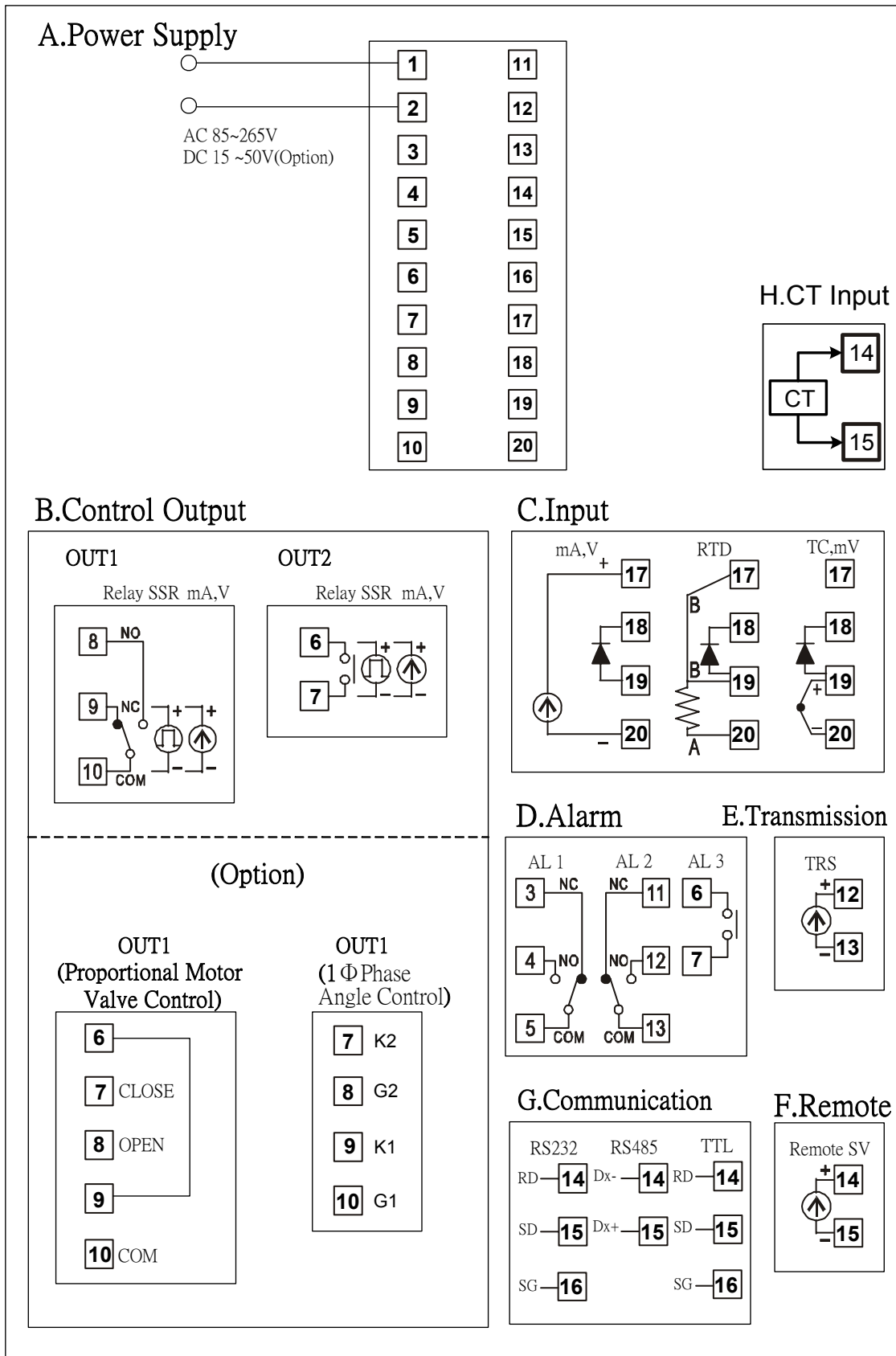
## 4.2 FY600 Terminals ( 96mm x 48mm , DIN 1/8 )



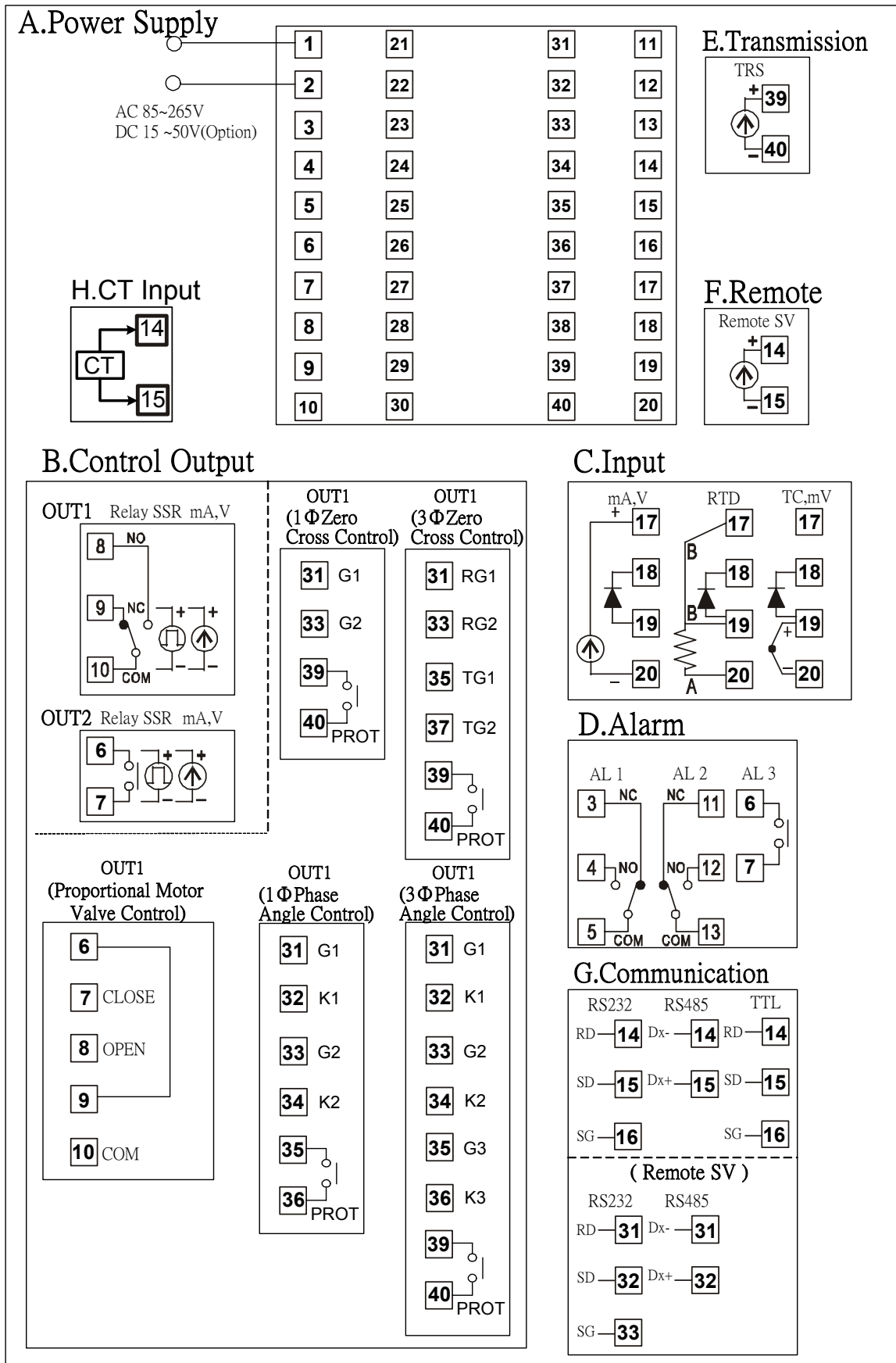
### 4.3 FY700 / FU72 Terminals ( 72mm x 72mm)



## 4.4 FY800 / FU86 Terminals ( 48mm x 96mm , DIN 1/8 )

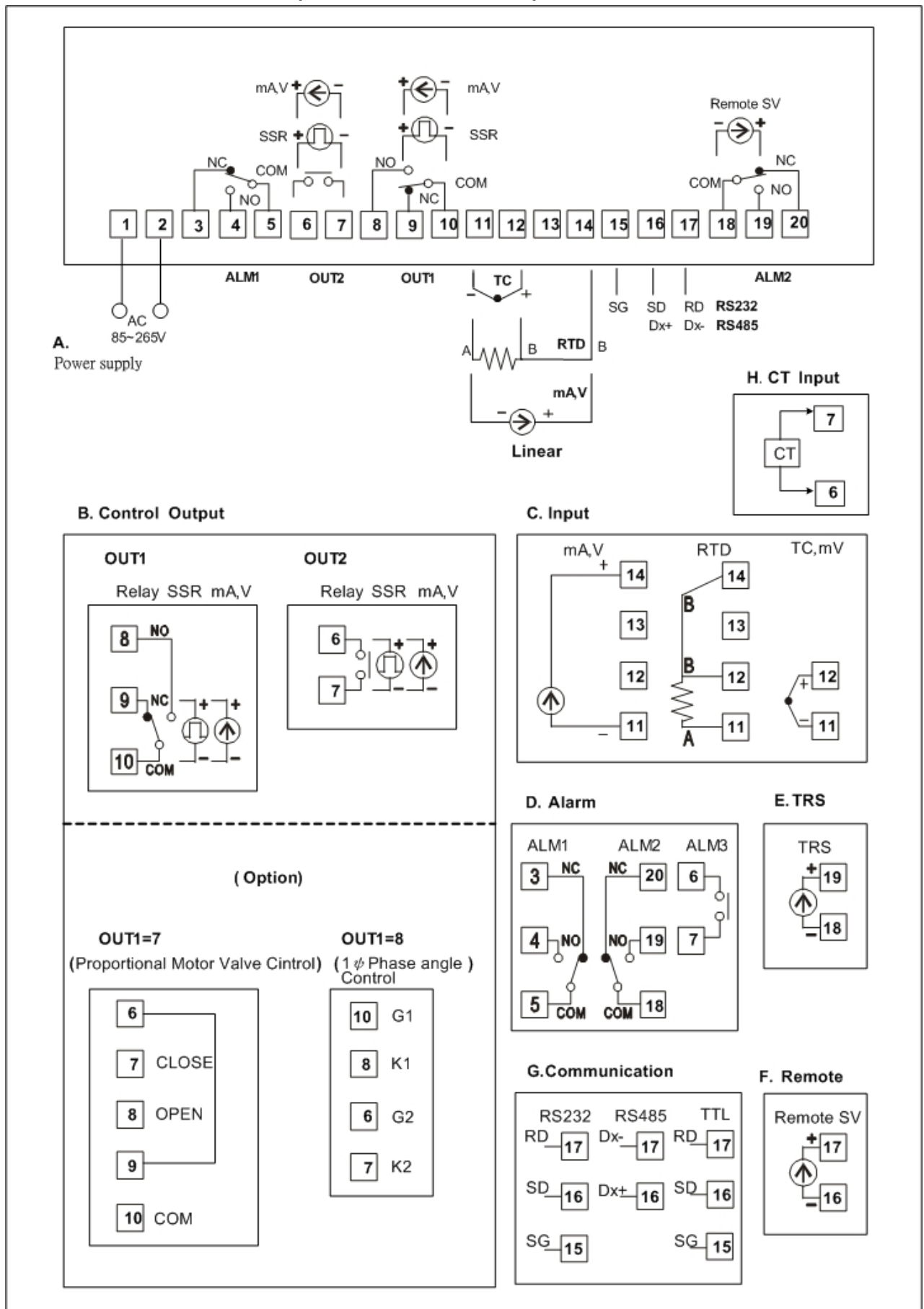


## 4.5 FY900 / FU96 Terminals ( 96mm x 96mm , DIN 1/4 )

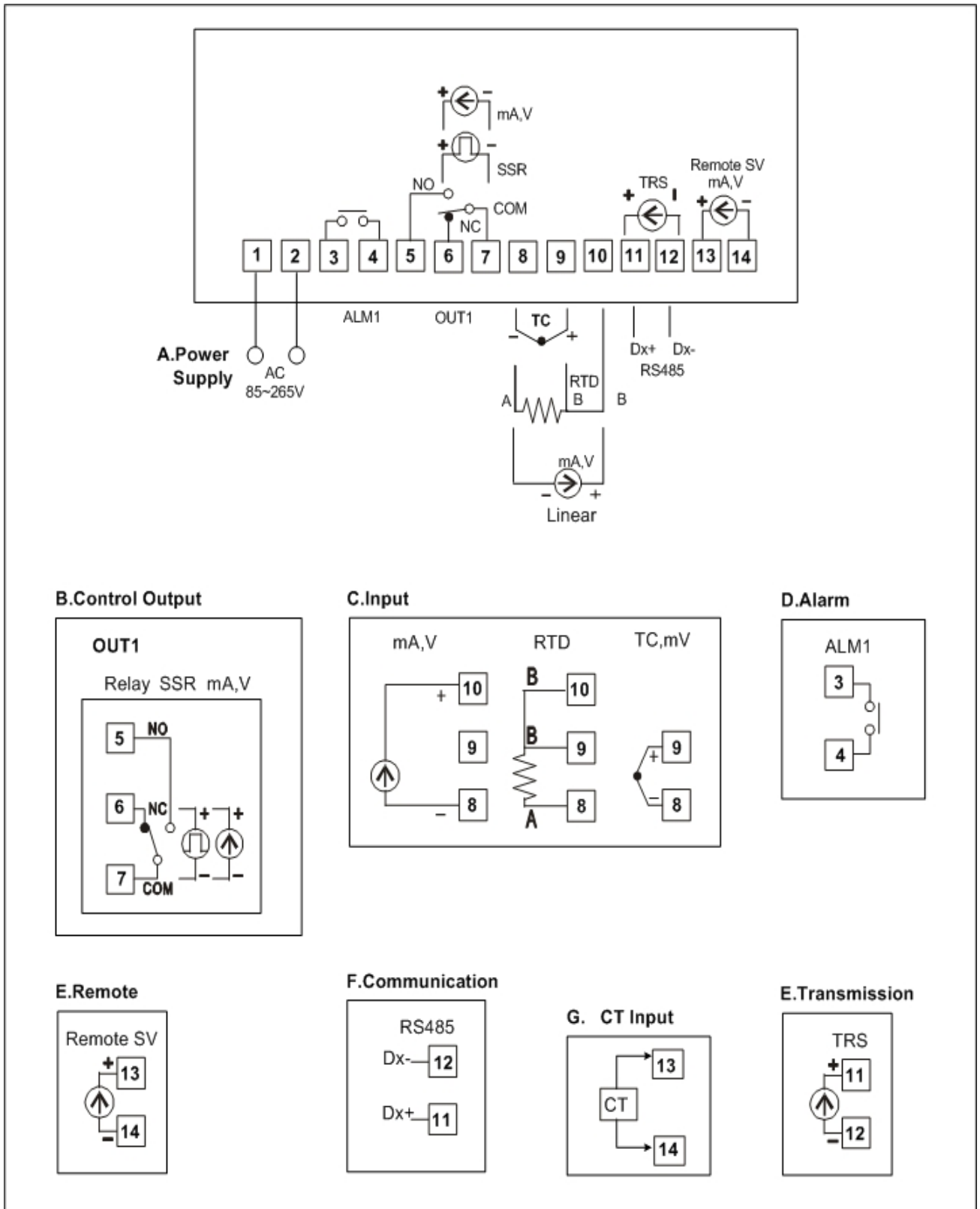




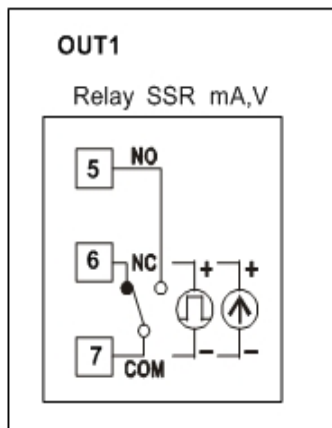
## 4.6 FY100 Terminals ( 175mm x 110mm )



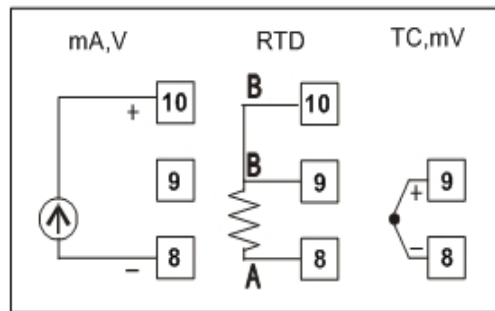
## 4.7 FY101 Terminals ( 90mm x 90mm )



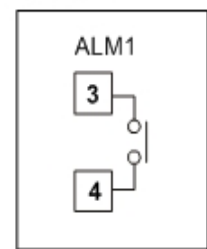
**B. Control Output**



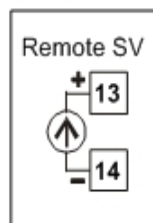
**C. Input**



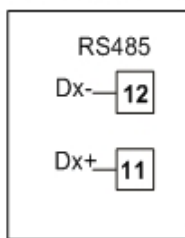
**D. Alarm**



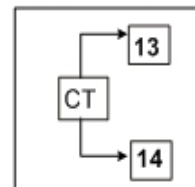
**E. Remote**



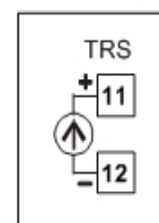
**F. Communication**



**G. CT Input**

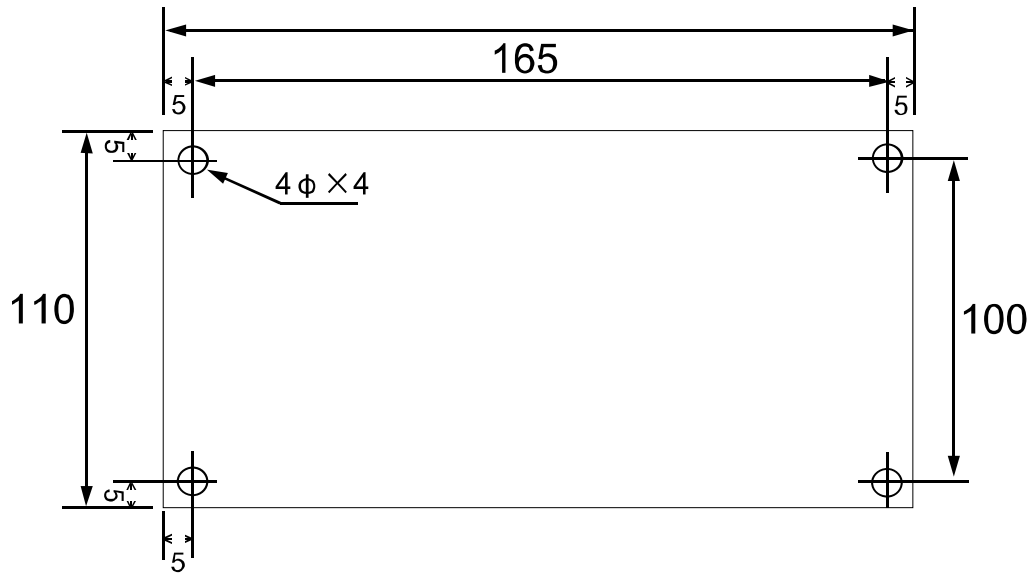


**E. Transmission**

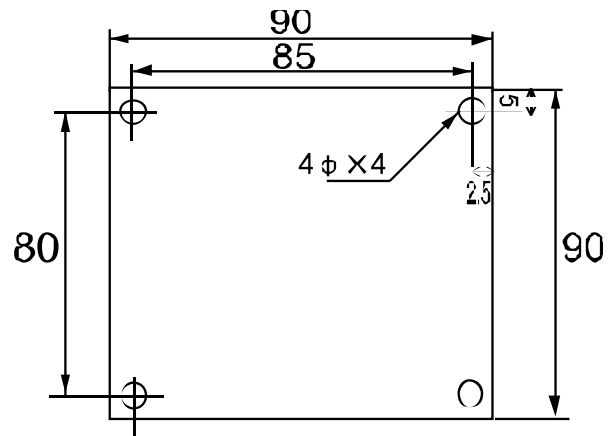


## 5. External dimension and panel cutout < Unit : mm >

### 5.1 FY100

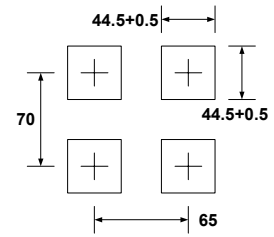
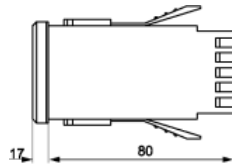
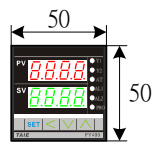


### 5.2 FY101

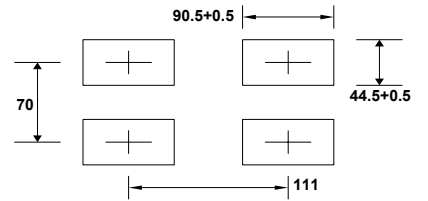
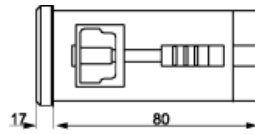
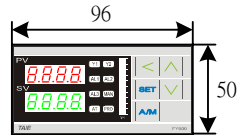


### 5.3 FY400~900 & FU48~96

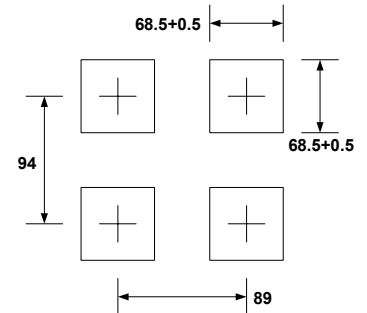
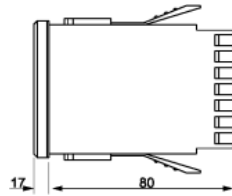
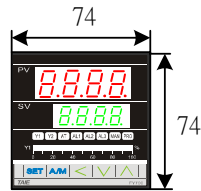
**FY400/  
FU48**



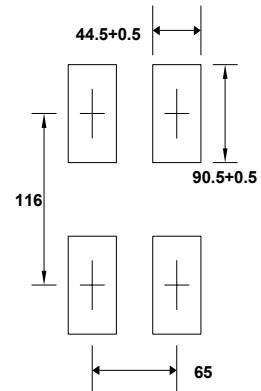
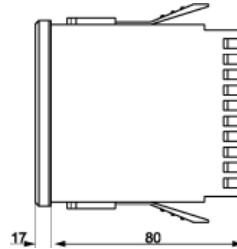
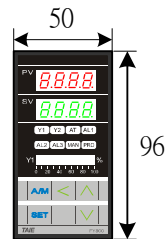
**FY600**



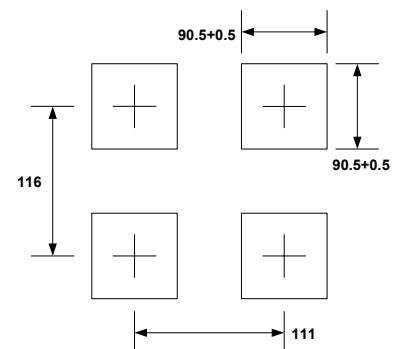
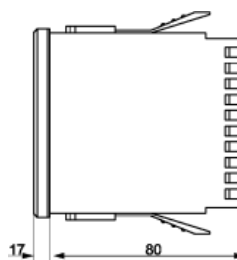
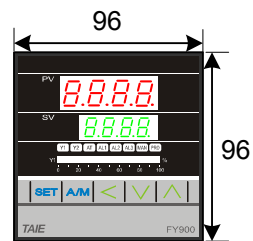
**FY700/  
FU72**



**FY800/  
FU86**

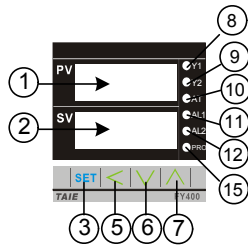


**FY900/  
FU96**

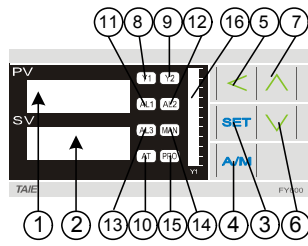


## 6. Parts description

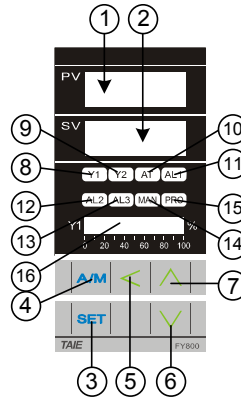
FY400/FU48



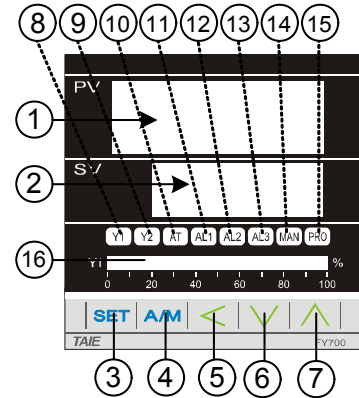
FY600



FY800/FU86



FY700/FY900/FU72/FU96  
FY100/101 External  
Interface Unit

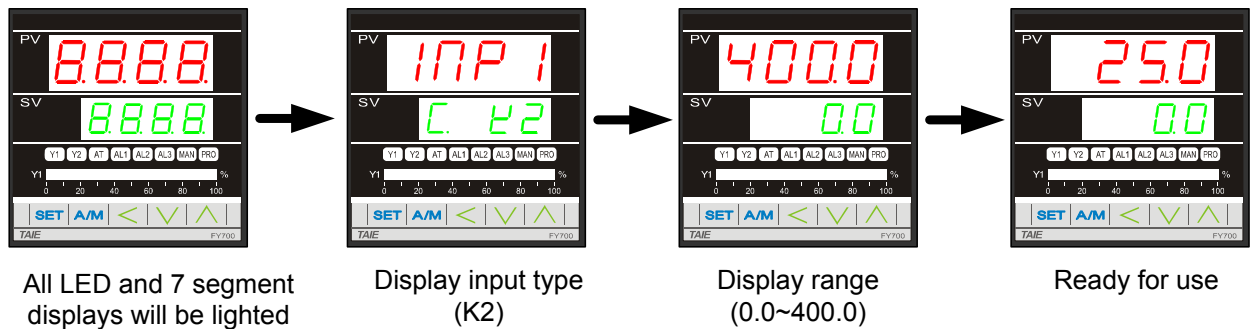


SYMBOL	NAME		FUNCTION
PV	①	Measured value (PV) display	Displays PV or various parameter symbols (Red)
SV	②	Set value (SV) display	Displays SV or various parameter set values (Green)
SET	③	Set key	Used for parameter calling up and set value registration
A/M	④	Auto/Manual key	Switches between Auto(PID) output mode and Manual output mode.
<	⑤	Shift key	Shift digits when settings are changed
∨	⑥	Down key <i>*Program hold</i>	Decrease numbers (-1000,-100,-10,-1) <i>* Program hold &lt;Programmable controller&gt;</i>
∧	⑦	Up key <i>*Program run</i>	Decrease numbers (+1000,+100,+10,+1) <i>* Program run &lt;Programmable controller&gt;</i>
OUT1	⑧	OUT1 lamp	Lights when OUT1 is activated (Green)
OUT2	⑨	OUT2 lamp	Lights when OUT2 is activated (Green) ◦
AT	⑩	Auto tuning lamp	Lights when Auto tuning is activated (Orange)
AL1	⑪	Alarm 1 lamp	Lights when Alarm 1 is activated (Red)
AL2	⑫	Alarm 2 lamp	Lights when Alarm 2 is activated (Red)
AL3	⑬	Alarm 3 lamp	Lights when Alarm 3 is activated (Red)
MAN	⑭	Manual output lamp	Lights when manual output is activated (Orange)
PRO	⑮	<i>*Program running lamp</i>	<i>*Flashes when program is running &lt;Programmable controller&gt; ◦</i>
OUT1%	⑯	OUT% bar-graph display	Output% is displayed on 10-dot LED.

## 7. Operations

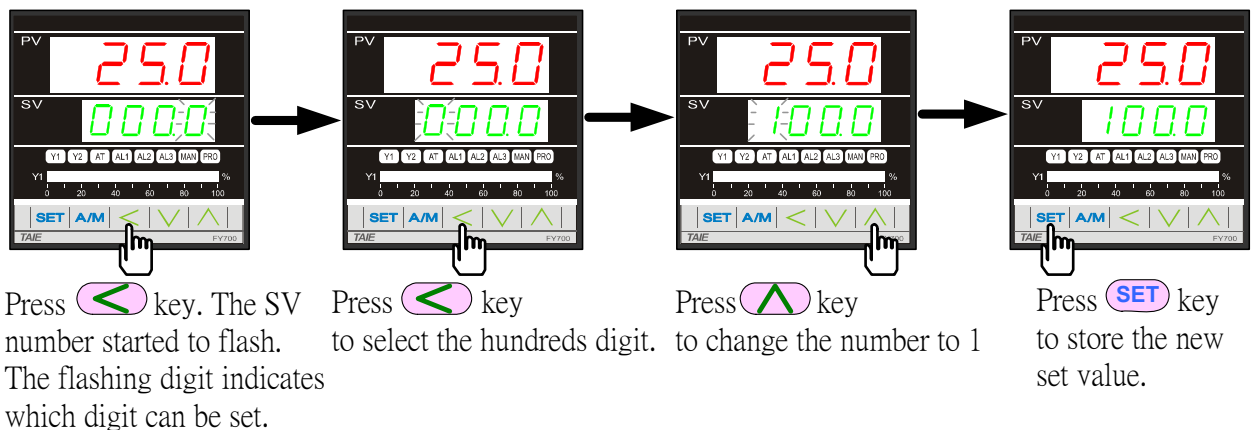
### 7.1 Power On

Controller will display as below



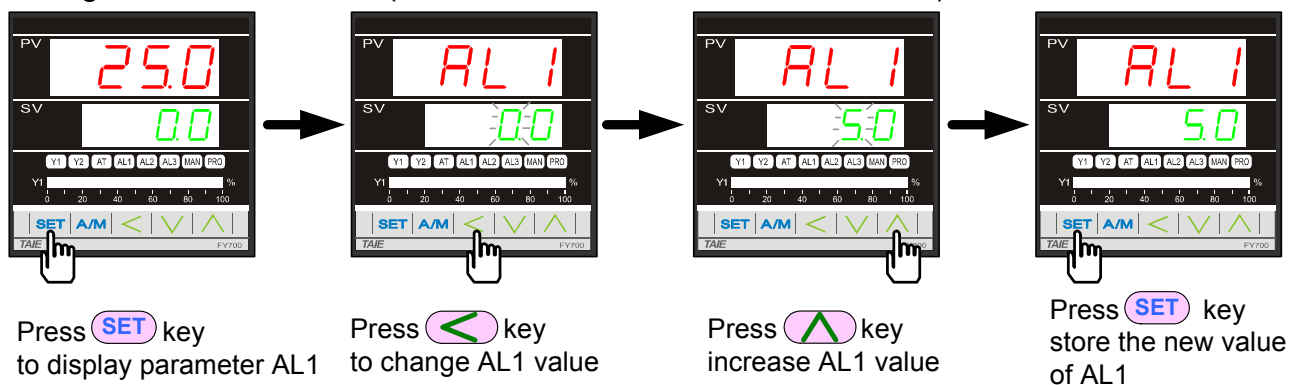
### 7.2 Change the Set Value (SV)

Change SV from 0.0 to 100.0



### 7.3 Change the Alarm Value

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

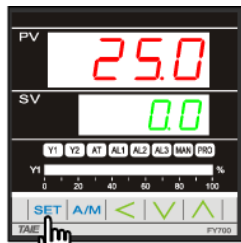


\* There are total 16 alarm mode types, please refer to "alarm mode" in page 30

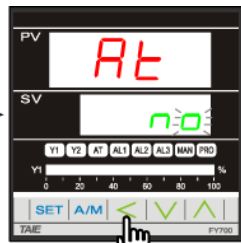
\* To change alarm mode, press + key 3 seconds to enter Level 3 (Input Level) and then change ALD1/ALD2/ALD3 value.

## 7.4 Autotuning (AT)

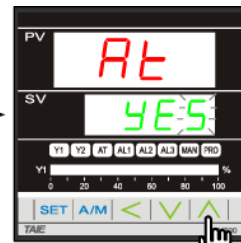
Use AT function to automatically calculate and set the optimize PID value for your system.



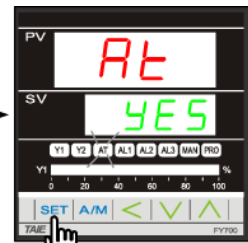
Press **SET** key to display parameter AT.



Press **←** key to change AT setting

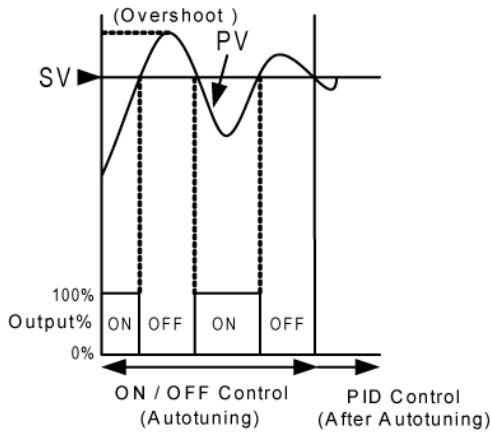


Press **→** key change AT to "YES"



Press **SET** key Start auto tuning (AT lamp will be lighted on)

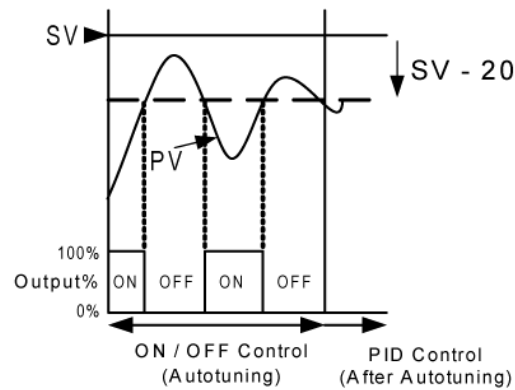
Autotuning  
ATVL=0



Autotuning  
ATVL=20

\*Set ATVL to prevent overshoot occurred during autotuning process.

To set ATVL, press **SET** key 3 seconds to enter Level 2 (PID Level) and then change the value.



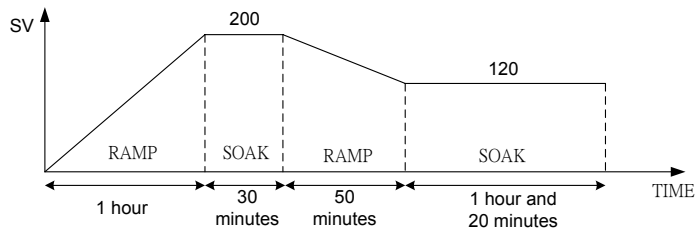
### Autotuning failure

- Possible cause 1: ATVL is too big. (If not sure, set ATVL=0)
- Possible cause 2: Calculation time is too long. (Set PID parameter manually)

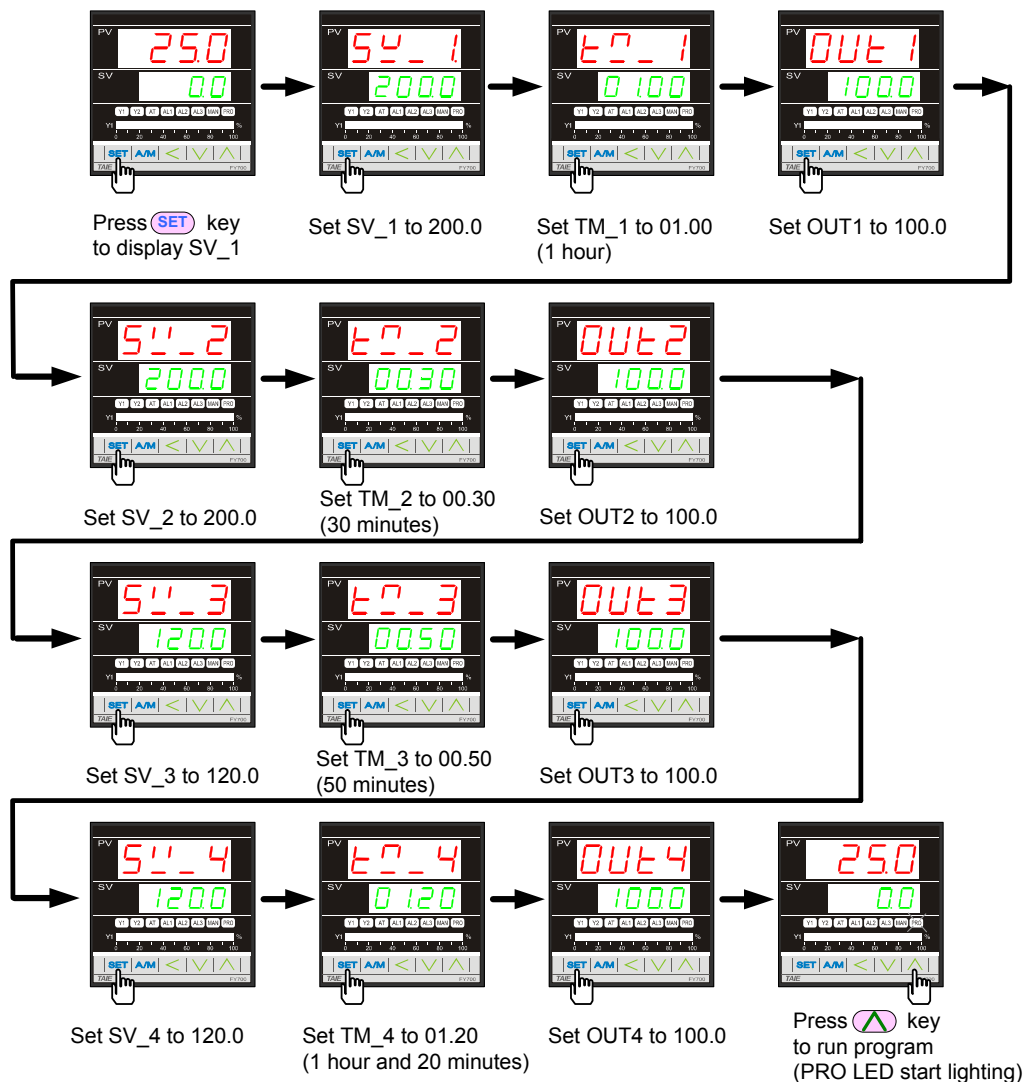
## 7.5 Programmable RAMP / SOAK (Only available for PFY model)

\*For detail of the programmable instruction, please refer with page 25.

Assume the temperature profile is as below (use total 4 segments )



Please operate controller as following steps:

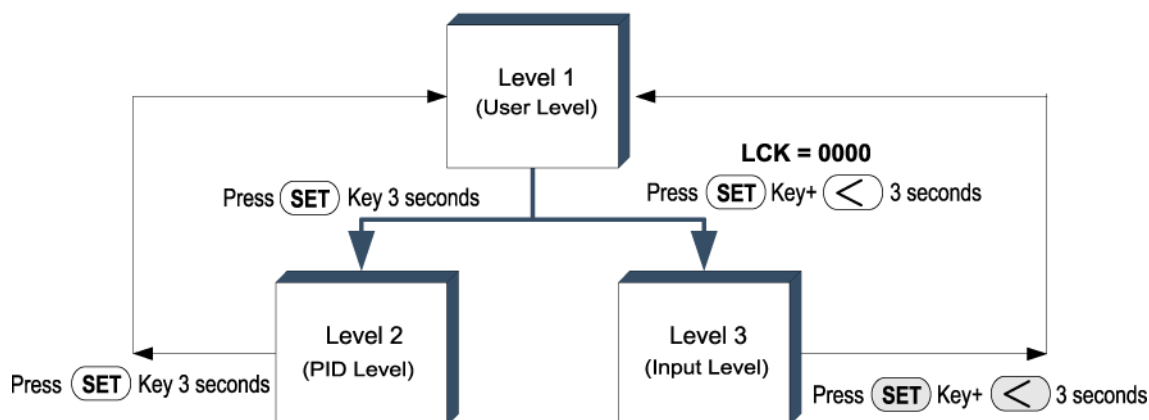




## 8. Operation levels

### 8.1 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)



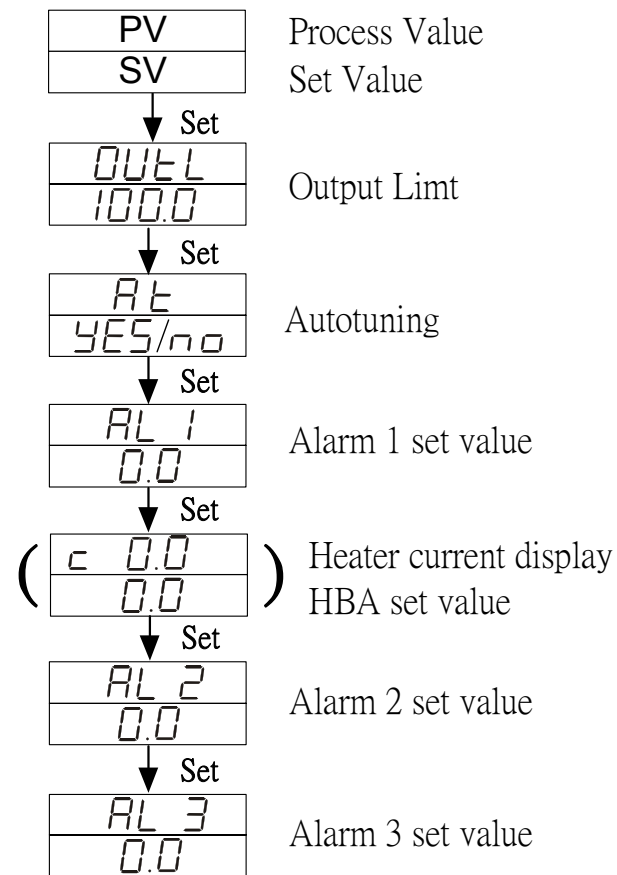
### 8.2 Lock function

To use lock function, please set parameter “LCK” in level 2.

LCK	Levels entering available				Parameters which can be changed
	Level 1 (User)	Level 2 (PID)	Level 3 (Input)	Level 4 (SET)	
0000	⊙	⊙	⊙	-----	All parameters (Factory set value)
1111	⊙	⊙	-----	⊙	All parameters
0100	⊙	⊙	-----	-----	All parameters except level 3
0110	⊙	⊙	-----	-----	Parameters in level 1
0001	⊙	⊙	-----	-----	“SV” and “LCK”
0101	⊙	⊙	-----	-----	Only “LCK”

## 9. Parameters

### 9.1 Level 1 (User Level)

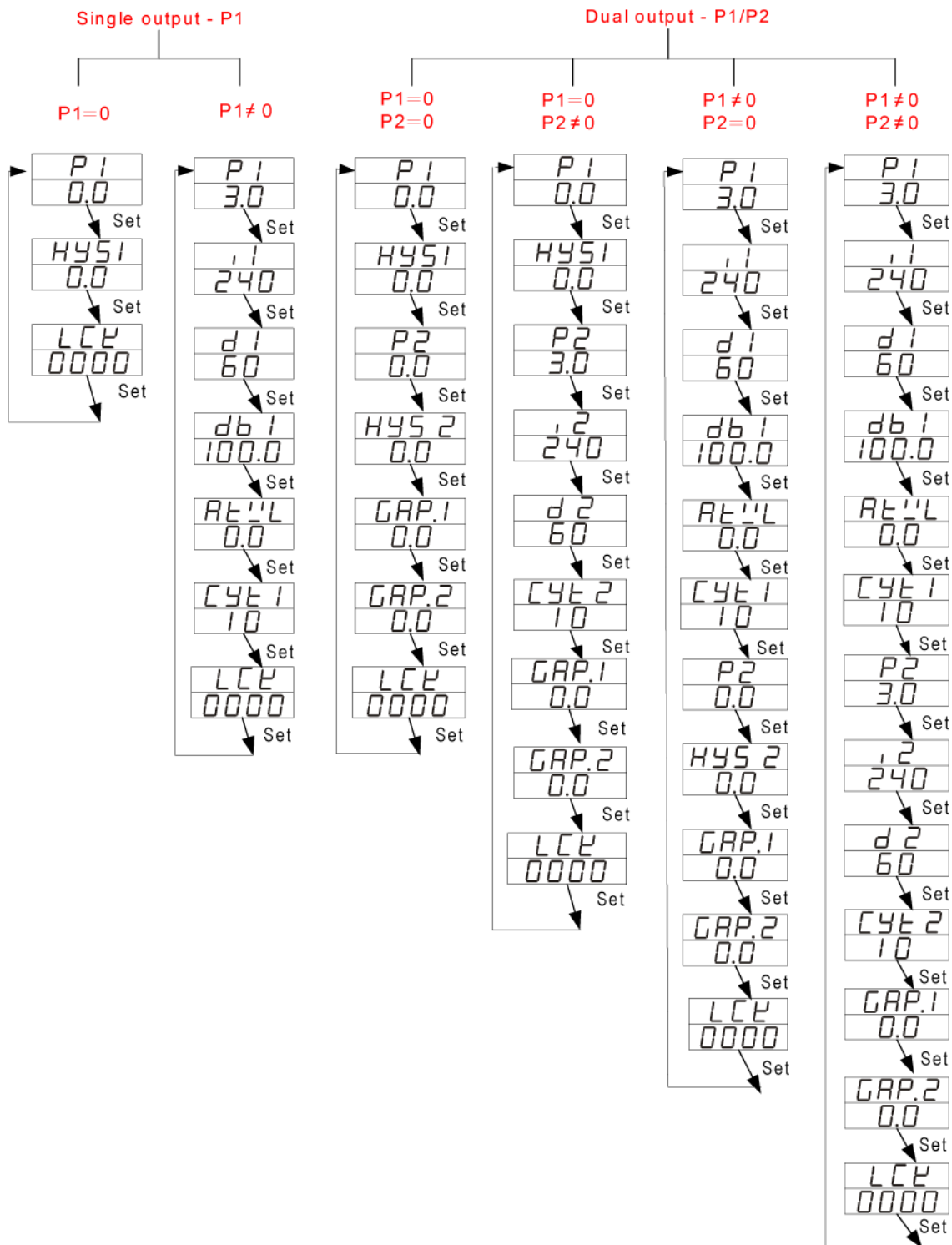


## 9.2 LEVEL 2 (PID Level)

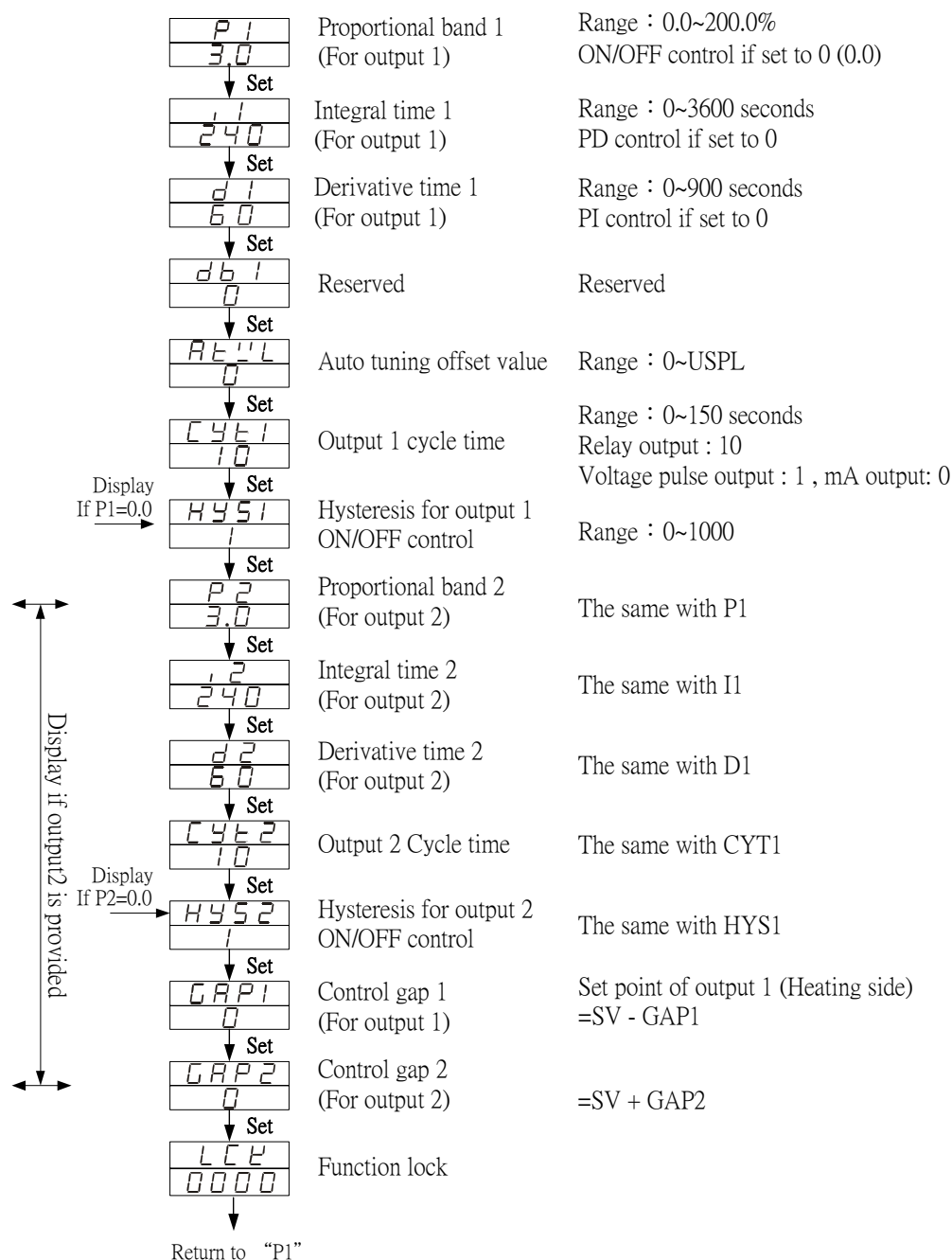
To enter level 2, press SET key 3 seconds in level 1

### 9.2.1 Level 2 parameters display /hiding condition

- |   |   |
|---|---|
| 1. Press <b>SET</b> key 3 seconds to enter level 2.                               | 1. Press <b>SET</b> key 3 seconds to enter level 2.                               |
| 2. Set LCK to "1111".   | 2. Set LCK to "1111".   |
| 3. Press <b>SET</b> key and <b>◀</b> key 3 seconds, to enter level 4 (Set level). | 3. Press <b>SET</b> key and <b>◀</b> key 3 seconds, to enter level 4 (Set level). |
| 4. Set <b>OUTY</b> to "0" (Single output-P1) .                                    | 4. Set <b>OUTY</b> to "1" (Dual output - P1/P2) .                                 |




## 9.2.2 Description of parameters

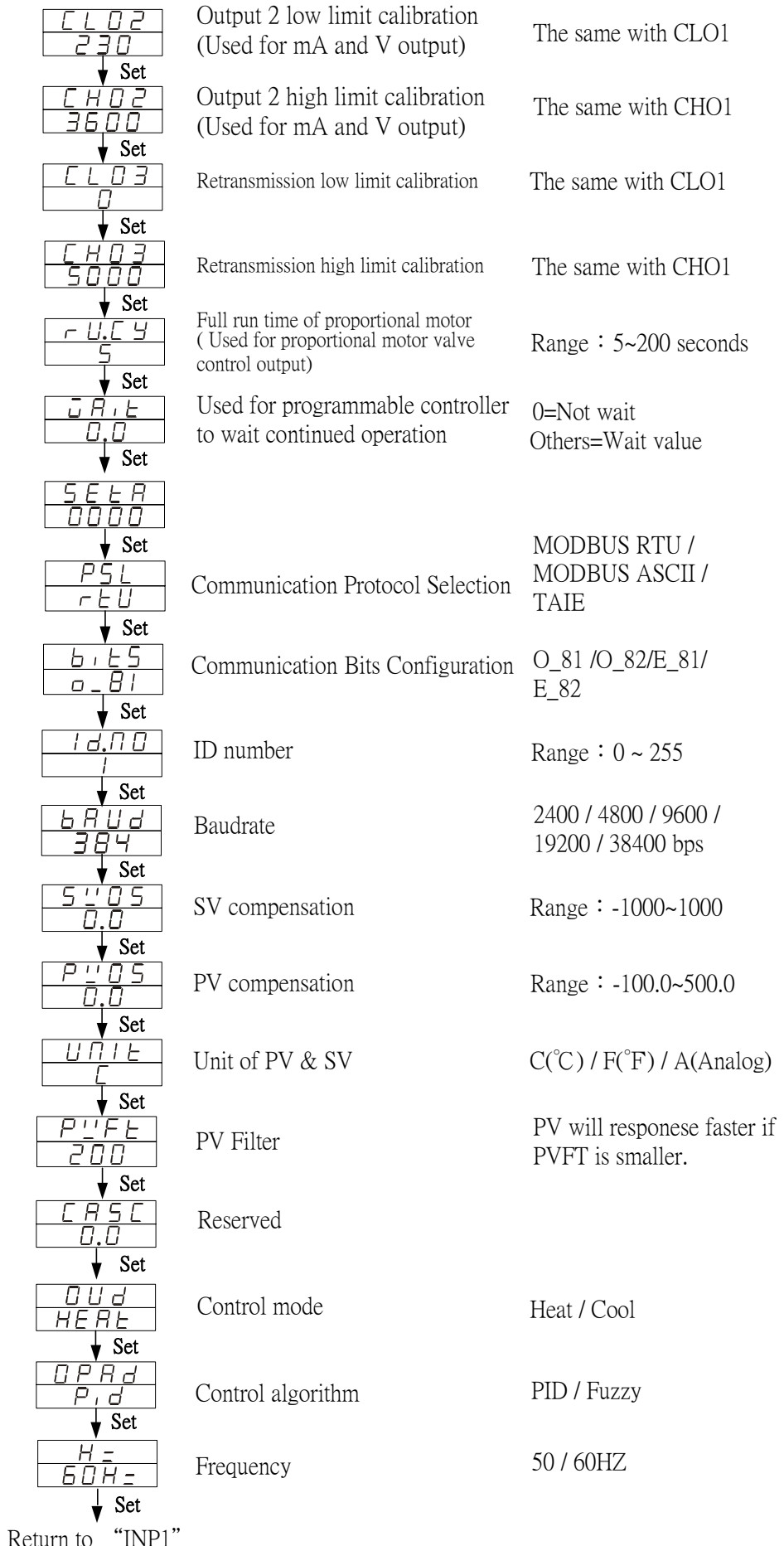


LCK	Levels entering available				Parameters which can be changed
	Level 1 (User)	Level 2 (PID)	Level 3 (Input)	Level 4 (SET)	
0000	⊙	⊙	⊙	-----	All parameters (default value)
1111	⊙	⊙	-----	⊙	All parameters
0100	⊙	⊙	-----	-----	All parameters except level 3
0110	⊙	⊙	-----	-----	Parameters in level 1
0001	⊙	⊙	-----	-----	"SV" and "LCK"
0101	⊙	⊙	-----	-----	Only "LCK"

### 9.3 LEVEL 3 (Input Level)

To enter level 3 , set LCK to "0000" and then press SET key + Shift(  ) key 3 seconds.

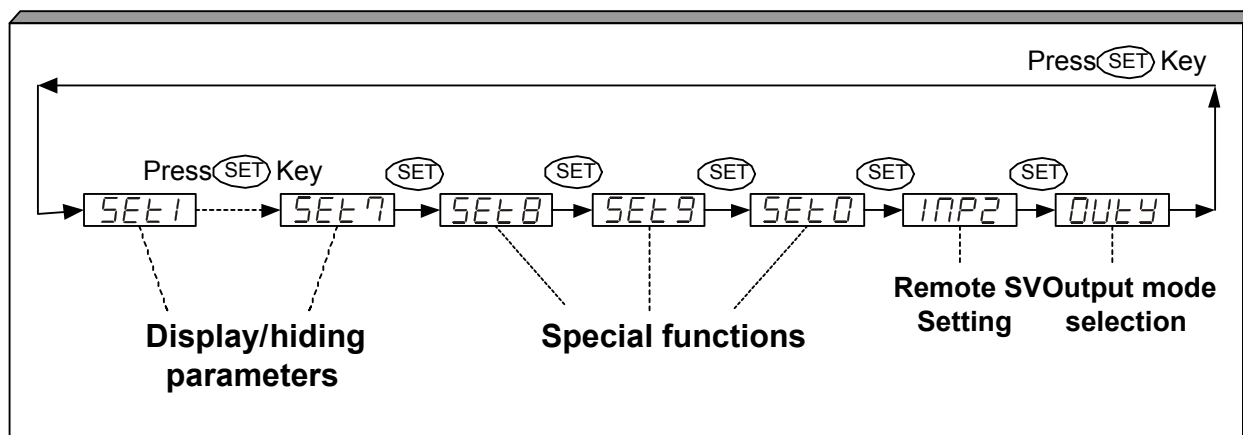
<div style="border: 1px solid black; padding: 2px; display: inline-block;">INP1</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">22</div>	Input type selection	
↓ Set		
<div style="border: 1px solid black; padding: 2px; display: inline-block;">ANL1</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">0</div>	Analog input low limit calibration (Used for mA and V input)	Range : -1999 ~ 9999
↓ Set		
<div style="border: 1px solid black; padding: 2px; display: inline-block;">ANH1</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">5000</div>	Analog input high limit calibration (Used for mA and V input)	Range : 0 ~ 9999
↓ Set		
<div style="border: 1px solid black; padding: 2px; display: inline-block;">dP</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">0000</div>	Decimal point position (Available for mA and V input)	0000 , 000.0 , 00.00 , 0.000
↓ Set		
<div style="border: 1px solid black; padding: 2px; display: inline-block;">L.S.P.L</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">0.0</div>	Lower Set-Point Limit	Scaling Low Limit
↓ Set		
<div style="border: 1px solid black; padding: 2px; display: inline-block;">U.S.P.L</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">400.0</div>	Upper Set-Point Limit	Scaling High Limit
↓ Set		
<div style="border: 1px solid black; padding: 2px; display: inline-block;">ANL2</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">0</div>	Remote input low limit calibration	Range : -1999 ~ 9999
↓ Set		
<div style="border: 1px solid black; padding: 2px; display: inline-block;">ANH2</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">5000</div>	Remote input high limit calibration	Range : 0 ~ 9999
↓ Set		
<div style="border: 1px solid black; padding: 2px; display: inline-block;">ALd1</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">11</div>	Alarm mode of AL1	Range:00~19 Refer to "Alarm mode type"
↓ Set		
<div style="border: 1px solid black; padding: 2px; display: inline-block;">ALt1</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">99.59</div>	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)
↓ Set		
<div style="border: 1px solid black; padding: 2px; display: inline-block;">ALd2</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">0</div>	Alarm mode of AL2	The same with ALD1
↓ Set		
<div style="border: 1px solid black; padding: 2px; display: inline-block;">ALt2</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">99.59</div>	Alarm time of AL2	The same with ALT1
↓ Set		
<div style="border: 1px solid black; padding: 2px; display: inline-block;">ALd3</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">0</div>	Alarm mode of AL3	The same with ALD1
↓ Set		
<div style="border: 1px solid black; padding: 2px; display: inline-block;">ALt3</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">99.59</div>	Alarm time of AL3	The same with ALT1
↓ Set		
<div style="border: 1px solid black; padding: 2px; display: inline-block;">HYSA</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">0.0</div>	Hysteresis of all Alarm	Range : 0~1000
↓ Set		
<div style="border: 1px solid black; padding: 2px; display: inline-block;">CLD1</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">230</div>	Output 1 low limit calibration (Used for mA and V output)	Range : 0 ~ 9999
↓ Set		
<div style="border: 1px solid black; padding: 2px; display: inline-block;">CHD1</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">3600</div>	Output 1 high limit calibration (Used for mA and V output)	Range : 0 ~ 9999
↓ Set		



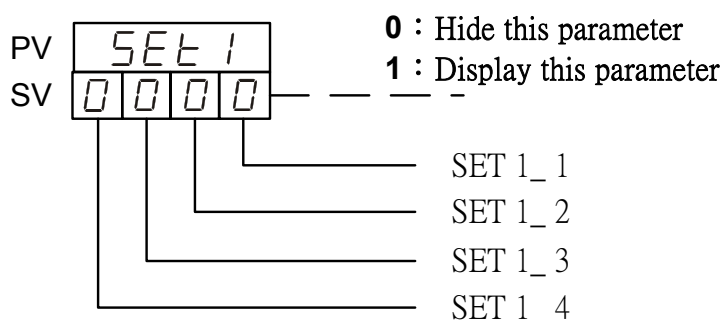
Return to "INP1"

## 9.4 Level 4 (SET level)

To enter level 4, set LCK to "1111" and then press SET key + Shift(◀) key 3 seconds.



### 9.4.1 How to hide parameters (Use SET1~SET7)



\*For the description of Level 1 parameters, please refer with page 17.

\*For the description of Level 3 parameters, please refer with page 20.

SET	Display / hiding	Level	SET	Display / hiding	Level
1_1	OUTL	Level 1	5_1	CL02,CH02	Level 3
1_2	AL	Level 1	5_2	CL03,CH03	Level 3
1_3	AL1	Level 1	5_3	FUCY,DATE,SEtA	Level 3
1_4	AL2	Level 1	5_4	PSL,bits,Id.NO,bAUD	Level 3
2_1	AL3	Level 1	6_1	SUDS	Level 3
2_2	ANL1,ANH1,dP	Level 3	6_2	PUDS	Level 3
2_3	L.SPL,U.SPL	Level 3	6_3	UNIT	Level 3
2_4	ANL2,ANH2	Level 3	6_4	P'Ft	Level 3
3_1	ALd1	Level 3	7_1	CRSC	Level 3
3_2	ALt1	Level 3	7_2	OUd	Level 3
3_3	ALd2	Level 3	7_3	OPAd	Level 3
3_4	ALt2	Level 3	7_4	H =	Level 3
4_1	ALd3	Level 3			
4_2	ALt3	Level 3			
4_3	HYSR	Level 3			
4_4	CL01,CH01	Level 3			

#### 9.4.2 Special functions (Use SET8 / SET9 / SET0)

<b>SET 8</b>		<b>Remark</b>
8_1	0 : Program not repeat	Only available for programmable controller
	1 : Program repeat	
8_2	0 : No power failure option	
	1 : With power failure option	
8_3	0 : Program starts from 0	
	1 : Program starts from PV	
8_4	0 : Reserved (Don't change it)	

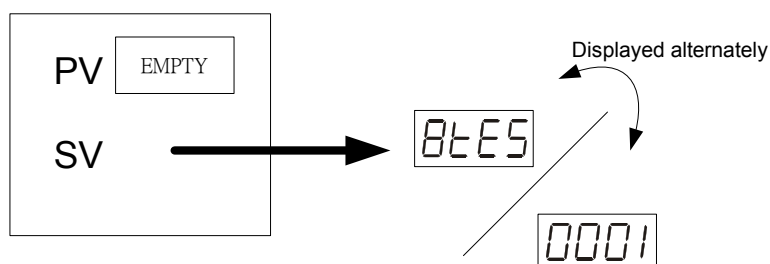
<b>SET 9</b>		<b>Remark</b>
9_1	0 : Reserved (Don't change it)	
9_2	0 : Timer Unit = "Hour : Minute"	Only available for programmable controller
	1 : Timer Unit = "Minute : Second"	
9_3	0 : Disable transmission	Used for transmission output
	1 : SV Transmission	
9_4	0 : Disable transmission	
	1 : PV Transmission	

<b>SET 0</b>		<b>Remark</b>
0_1	0 : TTL Communication (Slave)	Used for TTL communication
	1 : TTL Communication (Master)	
0_2	0 : Hide parameter "RATE"	AL3 will be replaced by "RATE"
	1 : Display parameter "RATE"	
0_3	0 : Disable Remote SV function	Used for Remote SV function
	1 : Enable Remote SV function	
0_4	0 : use output relay "b" contact when motor valve closed	Used for 3 wire proportional motor valve control
	1 : use output relay "a" contact when motor valve closed	



Please don't operate **SET 8\_4**, otherwise the controller's process will be in confusion.

If SET8.4 is set to "1", the controller will enter into "Single Display" mode, the PV LED will not display any values. The SV LED will display both the parameter value and the setting value alternately as shown in the diagram below.



To rectify the problem please press the SHIFT KEY (  ) and change the setting value to "0000".

#### 9.4.3 Remote SV type selection

INP2=0 None

INP2=1 10~50mV / 4~20mA / 1~5V / 2~10V

INP2=2 0~50mV / 0~20mA / 0~5V / 0~10V

INP2=4 CT input

※Remote SV function is not available for programmable controller

#### 9.4.4 Output mode selection (Use OUTY)

OUTY=0 Single output (OUT1)

OUTY=1 Dual output (OUT1 / OUT2)

OUTY=2 Reserved

OUTY=3 3 wire proportional motor valve control

OUTY=4 1 $\psi$ Phase angle control (1 $\psi$ SCR)

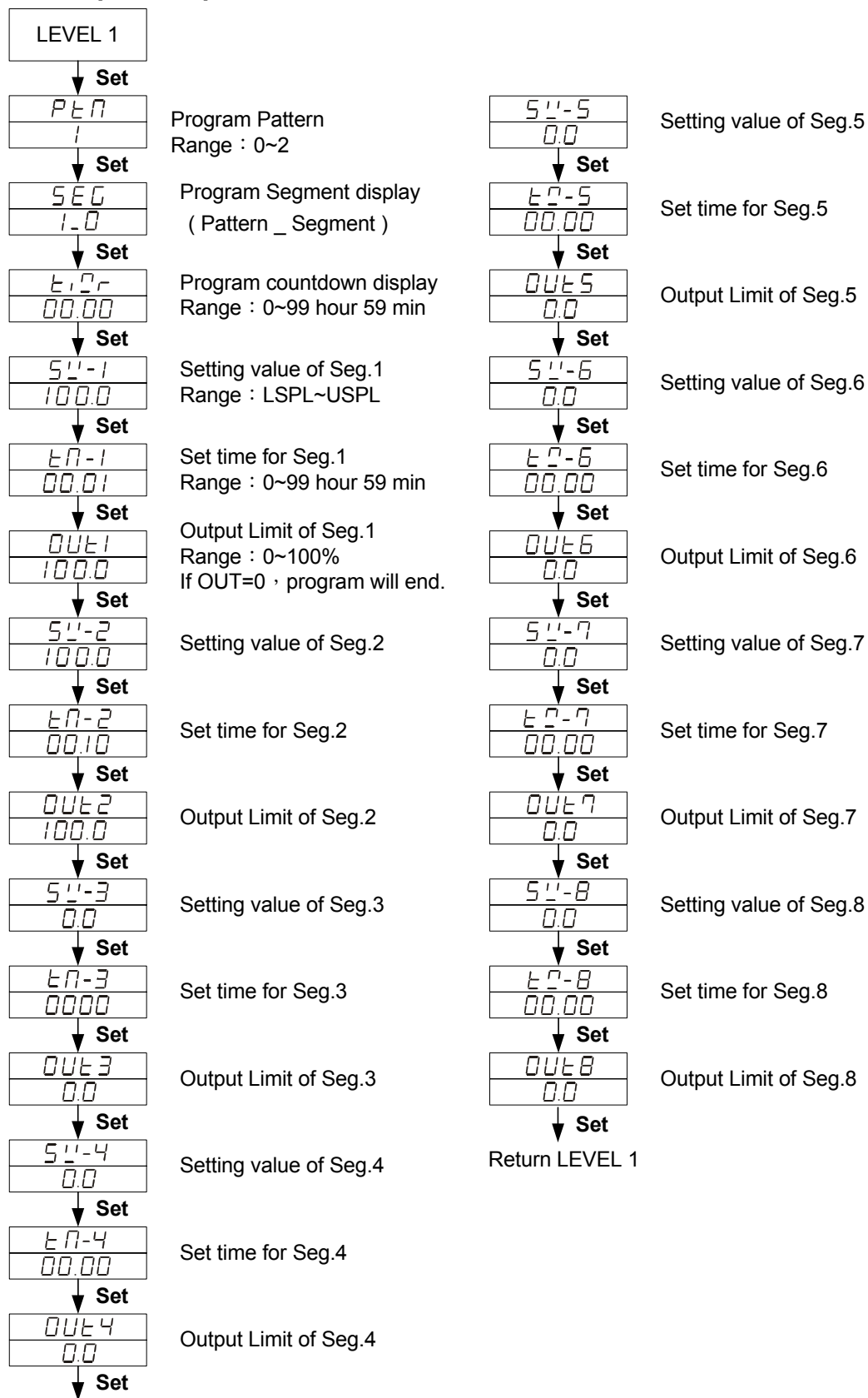
OUTY=5 3 $\psi$ Phase angle control (3 $\psi$ SCR)

#### 9.4.5 Modify caution

If change parameter "BAUD", "BITS", "RUCY", "OUTY" the power must be reset

## 9.5 Program Level (Only displayed in programmable controller)

### 9.5.1 Description of parameters



## 9.5.2 Description of operation

1. There are 2 patterns can be used , each pattern contains 8 segments.

2. Terminologies

**Pattern** : A program consists of some steps.

**Ramp status** : The status with changing SV.

**Soak status** : The status with fixed SV.

3. Operating

I. "KEY" function (no changing parameter)

△ (RUN) : Start program procedure , **PRO** LED in panel start flicking.

▽ (HOLD) : Suspend program procedure , **PRO** LED in panel will stop flicker but still light on.

△ + **SET**(JUMP) : Jump to previous segment.

▽ + **SET** (RESET) : Reset program procedure , **PRO** LED in panel will off.

II. Alarm Function :

**ALD1** = "07"(Segment end alarm) ,

**AL1** ="2"(It means when segment 2 end,AL1 will act) ,

**ALT1** ="00:10" (Relay on time is 10 seconds).

\* In this case , when program proceeds to segment 2 end , the relay of AL1 will be on 10 seconds.

III. END function :

The Controller doesn't have END order, so if program procedure is less than 8 segments, please set the last segments OUT to "0". Program will end in this segment. Otherwise , it will proceed 8 or 16 segments.

IV. Linking Function :

**PTN**=1 proceed pattern 1 , contains 8 segments.

**PTN**=2 proceed pattern 2 , contains 8 segments.

**PTN**=0 linking proceed pattern 1 and 2 totally 16 segments.

(Please set PTN1 and PTN2 at first , and then set PTN to 0)

V. Other function(\* refer to LEVEL 4)

SET 8\_1=1 Program repeats.

SET 8\_2=0 No power failure function.

SET 8\_2=1 Enable power failure function.

(When power shut down and on again , the controller will start from the segment which is near PV)

SET 8\_3=0 Program starts from 0.

SET 8\_3=1 Program starts from PV.

SET 9\_2=0 Timer Unit = "Hour: Minute"

SET 9\_2=1 Timer Unit = "Minute: Second"

## 10. Input type table (INP1 selection)

TYPE	CODE	RANGE
<b>K</b>	<i>K1</i>	0.0 ~ 200.0°C / 0.0 ~ 392.0°F
	<i>K2</i>	0.0 ~ 400.0°C / 0.0 ~ 752.0°F
	<i>K3</i>	0 ~ 600°C / 0 ~ 1112°F
	<i>K4</i>	0 ~ 800°C / 0 ~ 1472°F
	<i>K5</i>	0 ~ 1000°C / 0 ~ 1832°F
	<i>K6</i>	0 ~ 1200°C / 0 ~ 2192°F
<b>J</b>	<i>J1</i>	0.0 ~ 200.0°C / 0.0 ~ 392.0°F
	<i>J2</i>	0.0 ~ 400.0°C / 0.0 ~ 752.0°F
	<i>J3</i>	0 ~ 600°C / 0 ~ 1112°F
	<i>J4</i>	0 ~ 800°C / 0 ~ 1472°F
	<i>J5</i>	0 ~ 1000°C / 0 ~ 1832°F
	<i>J6</i>	0 ~ 1200°C / 0 ~ 2192°F
<b>R</b>	<i>R1</i>	0 ~ 1600°C / 0 ~ 2912°F
	<i>R2</i>	0 ~ 1769°C / 0 ~ 3216°F
<b>S</b>	<i>S1</i>	0 ~ 1600°C / 0 ~ 2912°F
	<i>S2</i>	0 ~ 1769°C / 0 ~ 3216°F
<b>B</b>	<i>B1</i>	0 ~ 1820°C / 0 ~ 3308°F
<b>E</b>	<i>E1</i>	0 ~ 800°C / 0 ~ 1472°F
	<i>E2</i>	0 ~ 900°C / 0 ~ 1652°F
<b>N</b>	<i>N1</i>	0 ~ 1200°C / 0 ~ 2192°F
	<i>N2</i>	0 ~ 1300°C / 0 ~ 2372°F
<b>T</b>	<i>T1</i>	-199.9 ~ 400.0°C / -199.9 ~ 752.0°F
	<i>T2</i>	-199.9 ~ 200.0°C / -199.9 ~ 392.0°F
	<i>T3</i>	0.0 ~ 350.0°C / 0.0 ~ 662.0°F
<b>W5Re/W26Re</b>	<i>W1</i>	0 ~ 2000°C / 0 ~ 3632°F
	<i>W2</i>	0 ~ 2320°C / 0 ~ 4208°F
<b>PL II</b>	<i>PL1</i>	0 ~ 1300°C / 0 ~ 2372°F
	<i>PL2</i>	0 ~ 1390°C / 0 ~ 2534°F
<b>U</b>	<i>U1</i>	-199.9 ~ 600.0°C / -199.9 ~ 999.9°F
	<i>U2</i>	-199.9 ~ 200.0°C / -199.9 ~ 392.0°F
	<i>U3</i>	0.0 ~ 400.0°C / 0.0 ~ 752.0°F
<b>L</b>	<i>L1</i>	0 ~ 400°C / 0 ~ 752°F
	<i>L2</i>	0 ~ 800°C / 0 ~ 1472°F

TYPE	CODE	RANGE
<b>JIS PT100</b>	<i>JP1</i>	-199.9 ~ 600.0°C / -199.9 ~ 999.9°F
	<i>JP2</i>	-199.9 ~ 400.0°C / -199.9 ~ 752.0°F
	<i>JP3</i>	-199.9 ~ 200.0°C / -199.9 ~ 392.0°F
	<i>JP4</i>	0 ~ 200°C / 0 ~ 392°F
	<i>JP5</i>	0 ~ 400°C / 0 ~ 752°F
	<i>JP6</i>	0 ~ 600°C / 0 ~ 1112°F
<b>DIN PT100</b>	<i>dP1</i>	-199.9 ~ 600.0°C / -199.9 ~ 999.9°F
	<i>dP2</i>	-199.9 ~ 400.0°C / -199.9 ~ 752.0°F
	<i>dP3</i>	-199.9 ~ 200.0°C / -199.9 ~ 392.0°F
	<i>dP4</i>	0 ~ 200°C / 0 ~ 392°F
	<i>dP5</i>	0 ~ 400°C / 0 ~ 752°F
	<i>dP6</i>	0 ~ 600°C / 0 ~ 1112°F
<b>JIS PT50</b>	<i>dP.1</i>	-199.9 ~ 600.0°C / -199.9 ~ 999.9°F
	<i>dP.2</i>	-199.9 ~ 400.0°C / -199.9 ~ 752.0°F
	<i>dP.3</i>	-199.9 ~ 200.0°C / -199.9 ~ 392.0°F
	<i>dP.4</i>	0 ~ 200°C / 0 ~ 392°F
	<i>dP.5</i>	0 ~ 400°C / 0 ~ 752°F
	<i>dP.6</i>	0 ~ 600°C / 0 ~ 1112°F
<b>AN1</b>	<i>AN1</i>	-10 ~ 10mV / -1999~9999
<b>AN2</b>	<i>AN2</i>	0 ~ 10mV / -1999~9999
<b>AN3</b>	<i>AN3</i>	0 ~ 20mV / -1999~9999
<b>AN4</b>	<i>AN4</i>	0 ~ 50mV / -1999~9999
<b>AN5</b>	<i>AN5</i>	10 ~ 50mV / -1999~9999

\* The initial setting in factory is "K2".

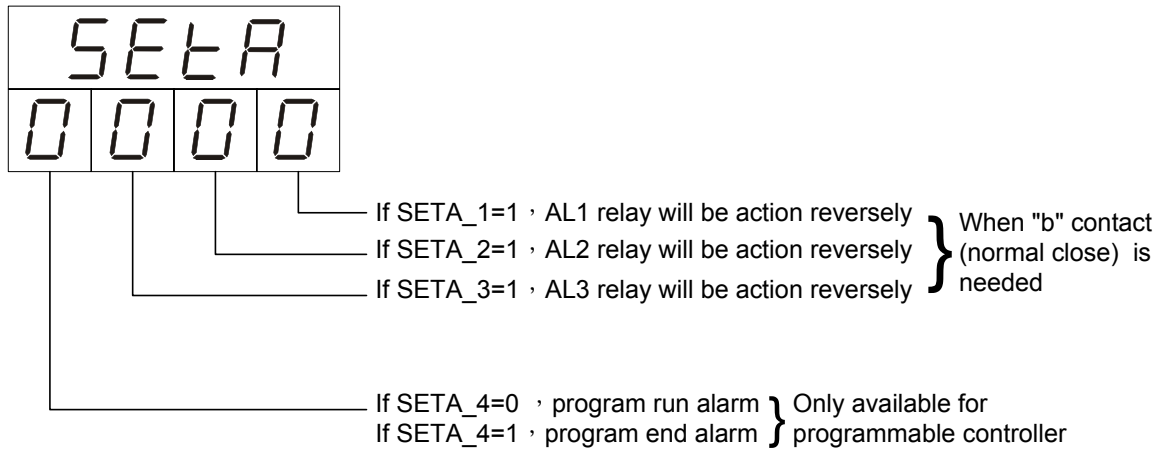
## 11. Alarm

### 11.1 Alarm time (ALT1/ALT2/ALT3)

ALT1=0                      Flicker alarm  
ALT1=99.59                Continued alarm  
ALT1=00.01 ~ 99.58    Alarm on delay time

### 11.2 SETA

\*SETA is in Level 3 (Input level)



### 11.3 Alarm mode (ALD1 / ALD2 / ALD3)

( ▲ :SV      △ :Alarm set value)

01	<b>Deviation high alarm with hold action*</b> OFF      ON ▲      △ HIGH → PV
11	<b>Deviation high alarm</b> OFF      ON ▲      △ HIGH → PV
02	<b>Deviation low alarm with hold action*</b> ON      OFF ▲      △ HIGH → PV
12	<b>Deviation low alarm</b> ON      OFF ▲      △ HIGH → PV
03	<b>Deviation high/low alarm with hold action*</b> ON      OFF      ON LOW △      ▲      △ HIGH → PV
13	<b>Deviation high/low alarm</b> ON      OFF      ON LOW △      ▲      △ HIGH → PV
04 14	<b>Band alarm</b> OFF      ON      OFF LOW △      ▲      △ HIGH → PV
05	<b>Process high alarm with hold action*</b> OFF      ON LOW △      HIGH → PV
15	<b>Process high alarm</b> OFF      ON LOW △      HIGH → PV

06	<b>Process low alarm with hold action*</b> ON      OFF LOW △      HIGH → PV
16	<b>Process low alarm</b> ON      OFF LOW △      HIGH → PV
07	<b>Segment End alarm (Only for Programmable controller)</b> (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 time
17	<b>Program Run alarm (Only for Programmable controller)</b> Run      Stop ON      OFF AL
08	<b>System failed alarm* (ON)</b> Normal      Failed OFF      ON AL
18	<b>System failed alarm* (OFF)</b> Normal      Failed ON      OFF AL
09	<b>Heater Break Alarm (HBA)</b> Please refer with HBA Function Description in Page39
00 10	<b>No alarm</b>
19	<b>RAMP &amp; SOAK</b> If PV=SV, Alarm will delay for a while then (alarm set value) action. Range: 00.00~99.59(hr.min.)

**\*Hold action:**

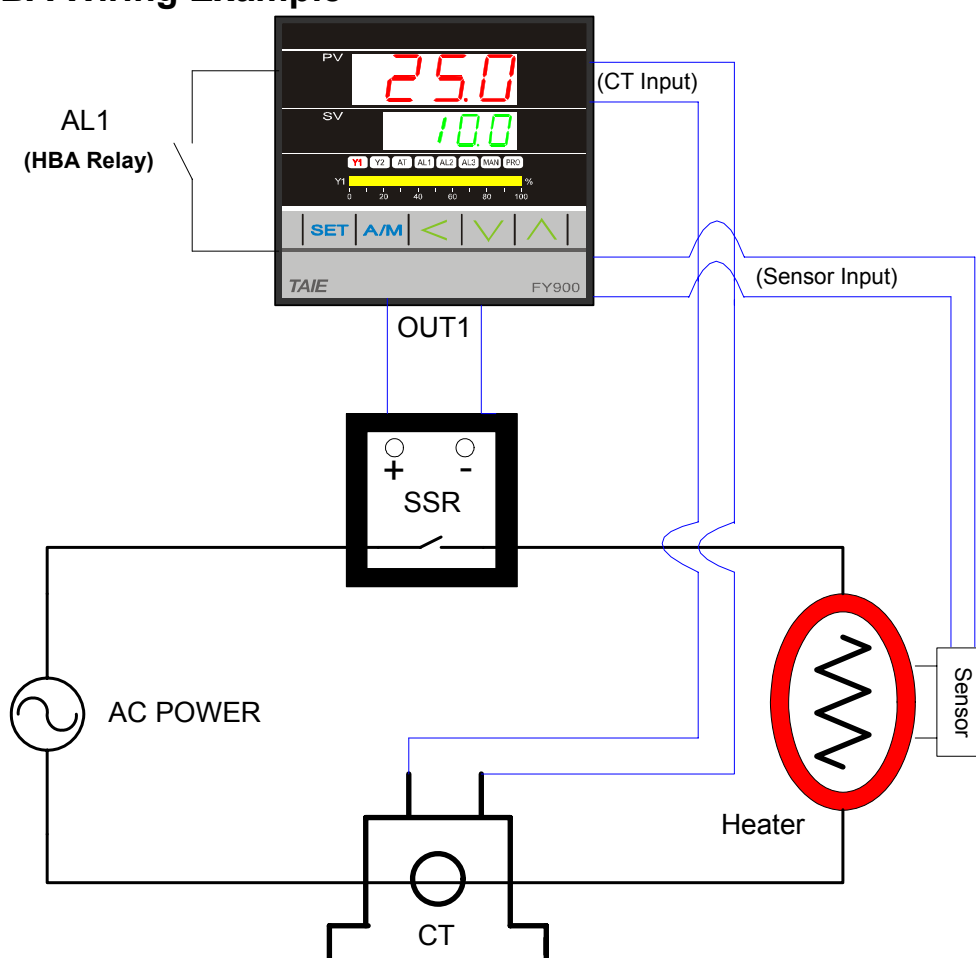
When Hold action is ON ,the alarm action is suppressed at start-up until the measured value(PV) enters the non-alarm range.

**\*System failed:**

It means that the controller display error message with one of following :  
"UUU1" or "NNN1" or "CJCE"

## 12 Heater Break Alarm (HBA)

### 12.1 HBA Wiring Example



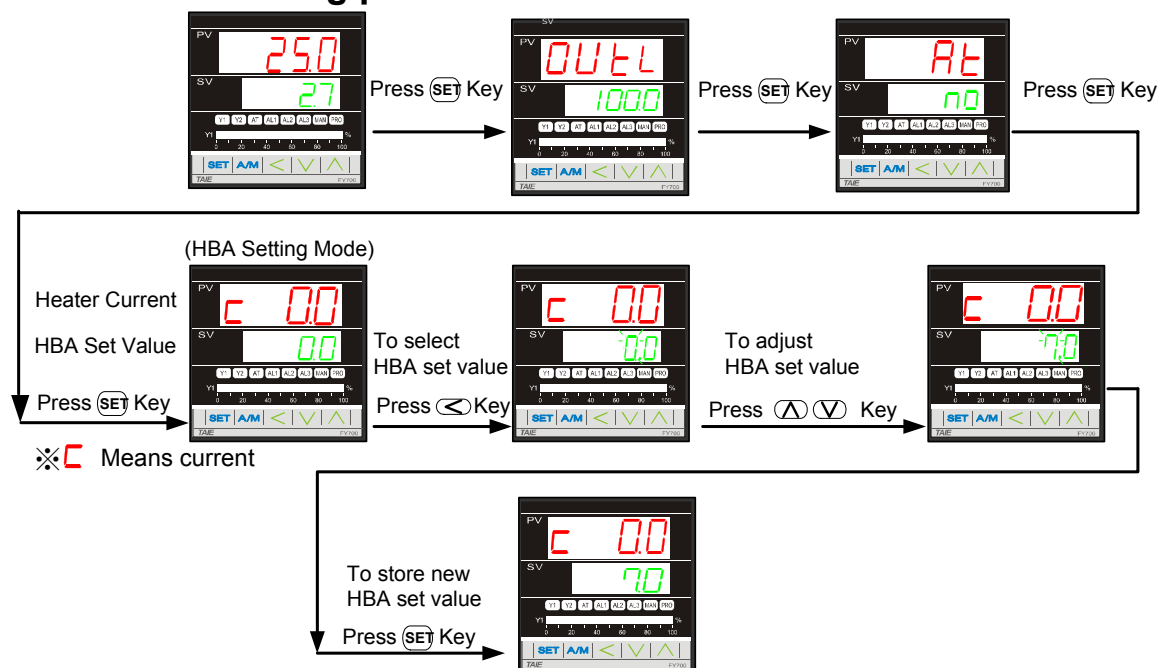
### 12.2 HBA Function Description

HBA function detects the AC current flowing through the heater by a Current Transformer (CT), and compares the CT input value and HBA set value. When OUT1 is ON and CT input value is less than HBA set value during 5 seconds, AL1 is activated. Otherwise, AL1 is not activated.

The AC current flowing through heater can also be monitored in HBA setting mode.



## 12.3 HBA setting procedure



## 12.4 Parameters for HBA function

Name	Value	Operation Level
AL1	HBA Set Value	Level 1
ALD1	9	Level 3
SET0	X1XX	Level 4
INP2	4	Level 4

- How to enter Level 3 : Set parameter “LCK” to 0000 in Level 2 , and then press “SET” key + “Shift” key 5 seconds to enter operation Level 3. ◦
- How to enter Level 4 : Set parameter “LCK” to 1111 in Level 2 , and then press “SET” key + “Shift” key 5 seconds to enter operation Level 4.
- ‘X’ value available 0 or 1

## 12.5 Activated conditions of HBA

Condition
1. OUT1 is ON
2. Heater current is less the HBA set value
3. Condition1 and 2 continued more than 5 seconds

AL1 will be activated, if condition 1&2&3 are all “true”.

## 12.6 Remarks

- Available output(OUT1) type for HBA
  - I. Relay
  - II. Voltage pulse (SSR drive)
  
- Since HBA function uses AL1 as alarm relay, please set temperature alarms in AL2 or AL3.

## 12.7 CT specifications

### 12.7.1 SC-80T Specifications

Rated Primary Current (Amp.) : 0.1A~80.0A

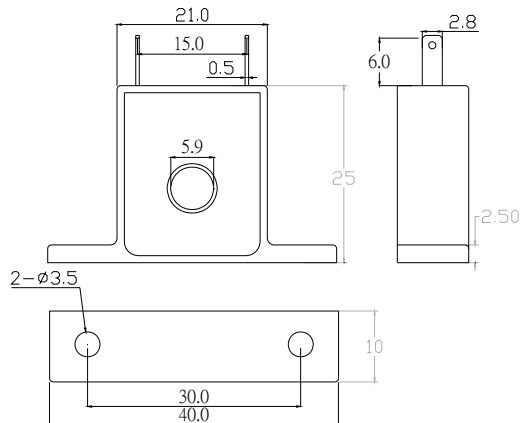
Turns Ratio : 800 : 1

D.C.Resistance Max.at 20 °C(Ω) : 45Ω

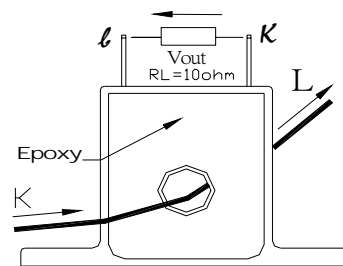
Accuracy ( Linearity ) : 3%

Dielectric Withstanding Voltage(Hi-pot) : 2500Vrms / 1 minute

Approx.Weight : 12g



SC-80T Mechanical Dimensions (mm)



Test Circuit

### 12.7.2 SC-100T Specifications

Rated Primary Current (Amp.) : 0.1A~100.0A

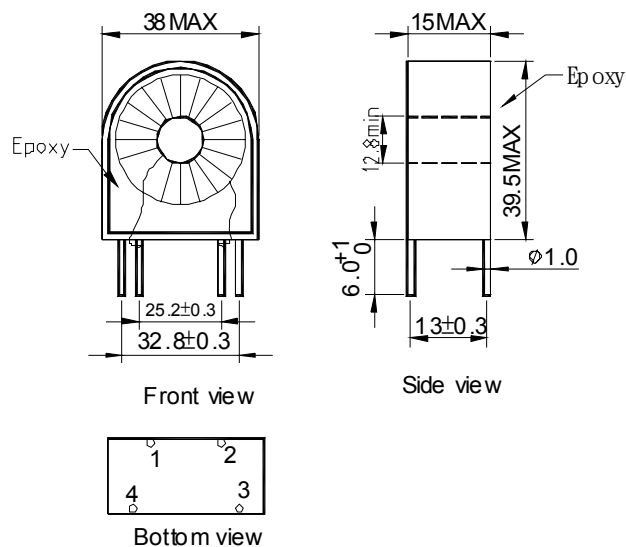
Turns Ratio : 1000 : 1

D.C.Resistance Max.at 20 °C(Ω) : 150Ω

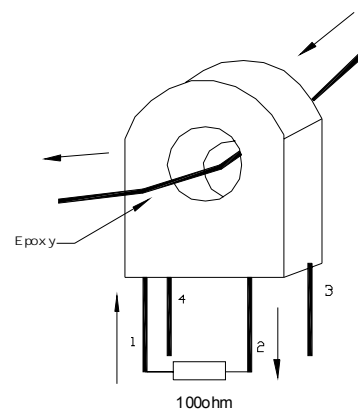
Accuracy ( Linearity ) : 3%

Dielectric Withstanding Voltage(Hi-pot) : 4000Vrms / 1 minute

Approx.Weight : 55g

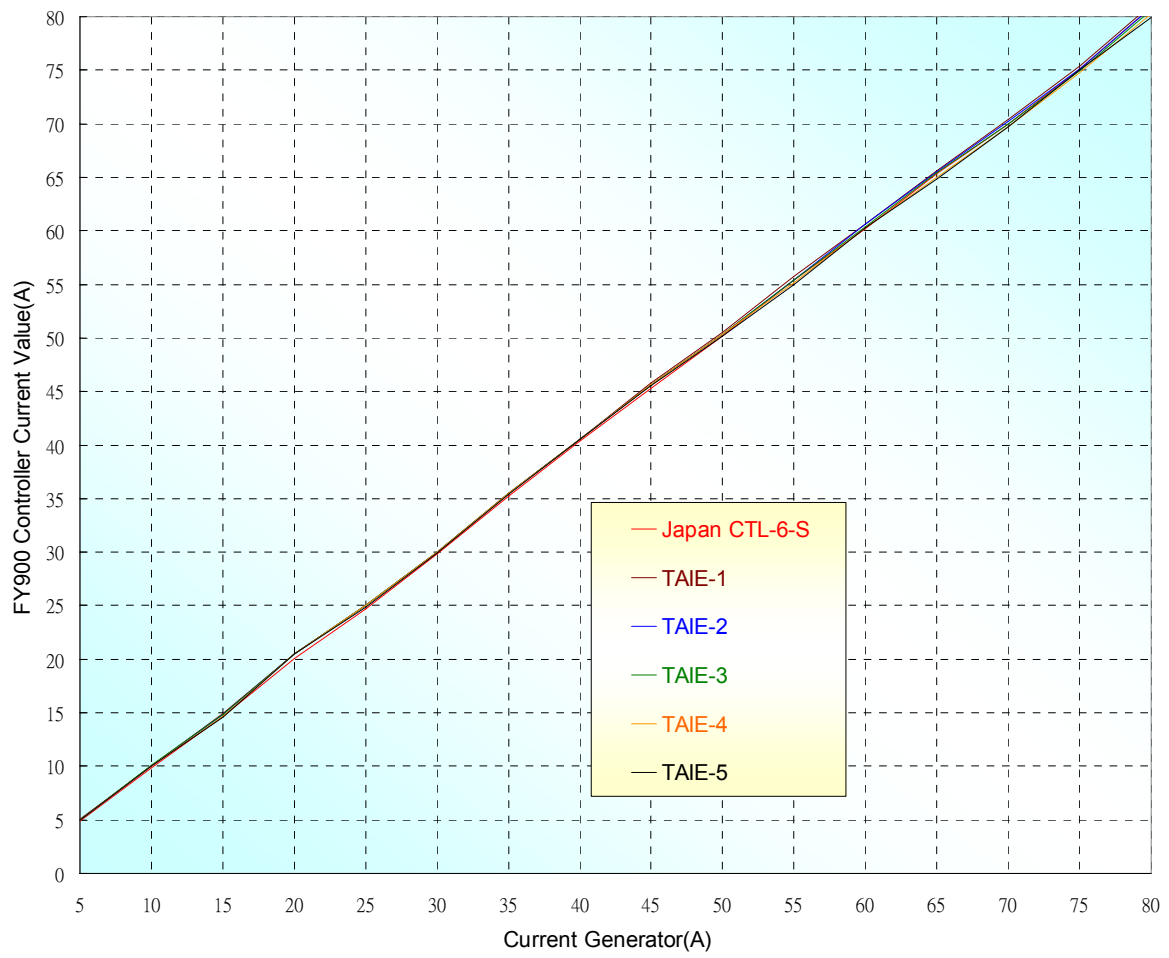


SC-100T Mechanical Dimensions (mm)



Test Circuit

### 11.7.3 SC-80T Linear Diagram



### 13. Error codes

DISPLAY	DESCRIPTION
<i>in1E</i>	Open circuit of main control sensor.(INP1)
* <i>RdCF</i>	A/D convert failed.
* <i>CJCE</i>	Cold junction compensation failed.
<i>in2E</i>	Open circuit of sub control sensor.(Remote SV)
<i>uuu1</i>	PV exceeds USPL.
<i>nnn1</i>	PV under LSPL.
<i>uuu2</i>	Input signal of sub control exceeds the upper limit. (Remote SV)
<i>nnn2</i>	Input signal of sub control under the lower limit. (Remote SV)
* <i>RAMF</i>	RAM failed.
<i>intF</i>	Interface failed.
<i>AUeF</i>	Auto tuning failed.

**NOTE :** If the “\*” marked error comes up , the controller needs to be repaired.  
Please send it to the nearest sales office or retail dealer.

## 14. Modify input type (“TC” $\rightleftharpoons$ “RTD”)

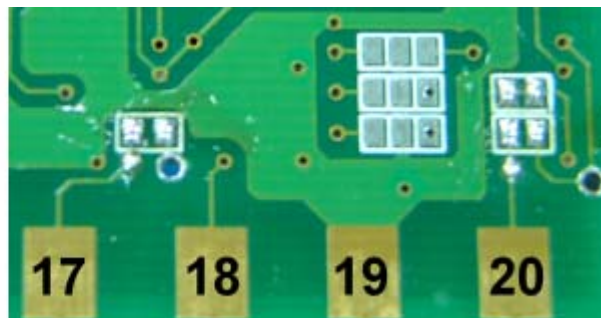
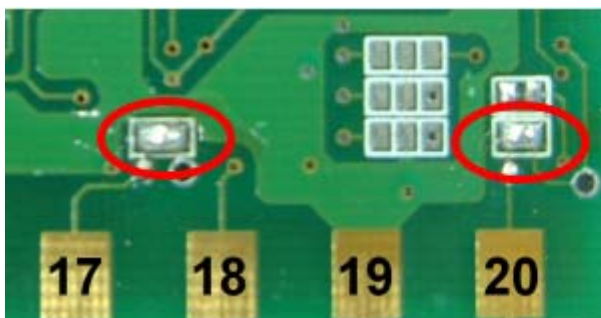
If the controller needs to modify input type from **TC** or **mV** to **RTD**, please make PAD short on the back side of PC board as following diagram and change input selection(INP1).  
On the contrary, modify from **RTD** to **TC** or **mV**, make PAD open.

### 14.1 FY400~FY900

FY900, FY800, FY600

RTD : Short pads

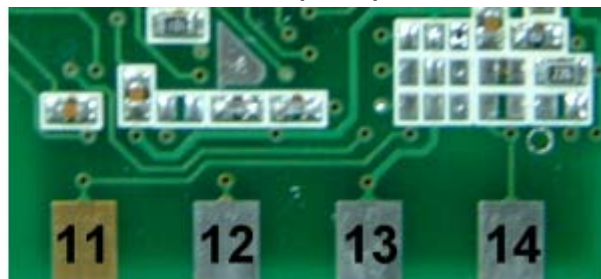
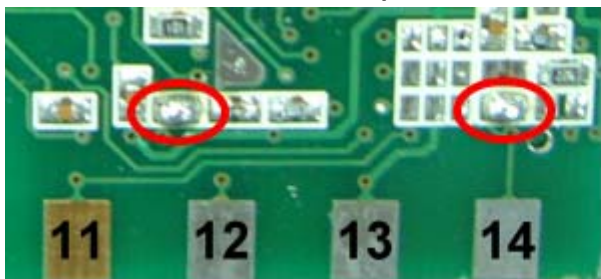
TC or mV : Open pads



FY700

RTD : Short pads

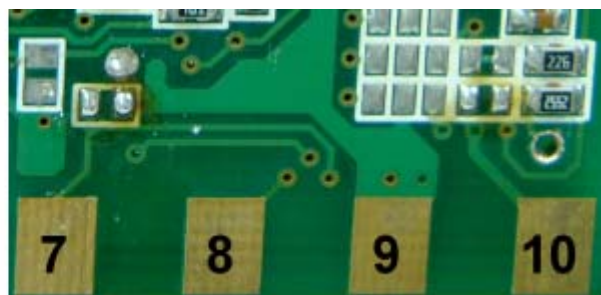
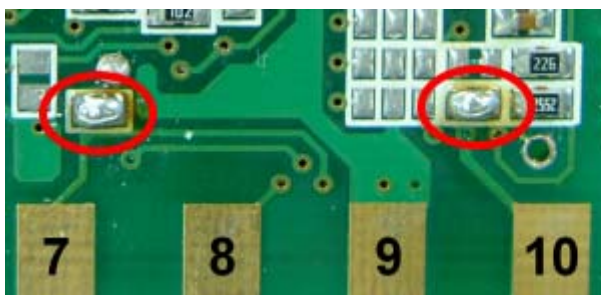
TC or mV : Open pads



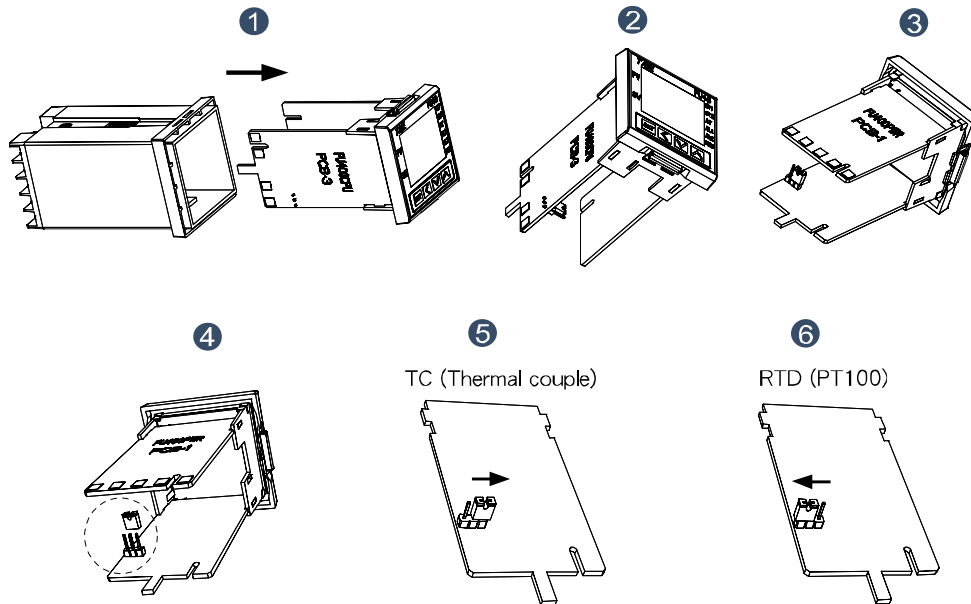
FY400

RTD : Short pads

TC or mV : Open pads



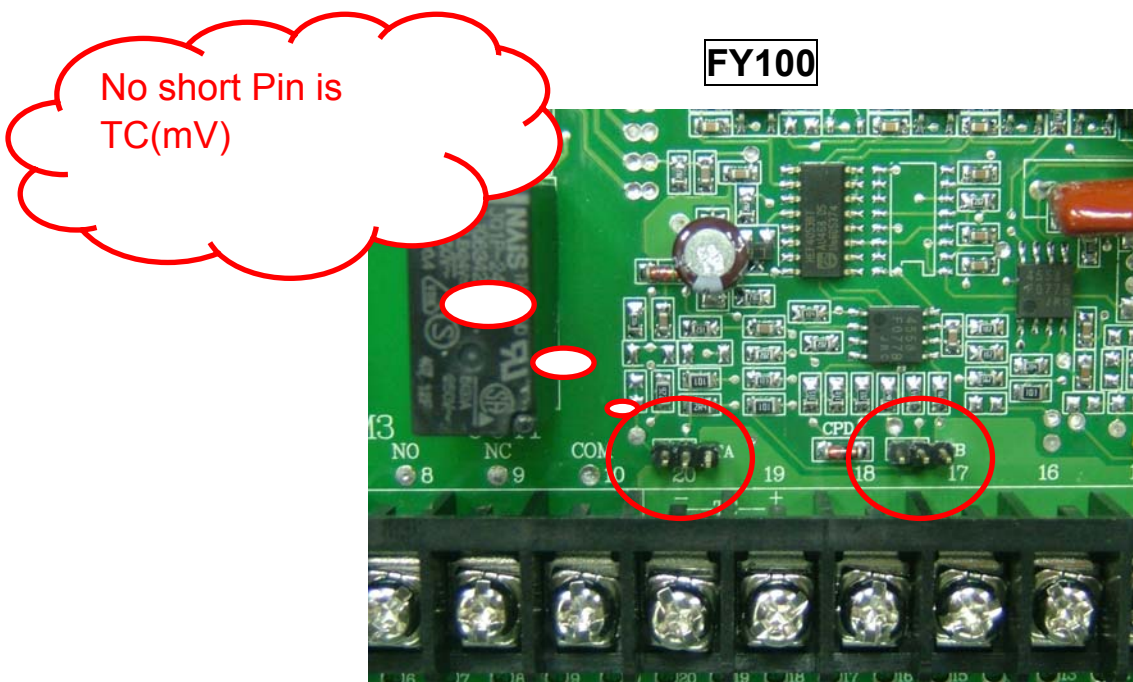
## 14.2 FU48~96



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.

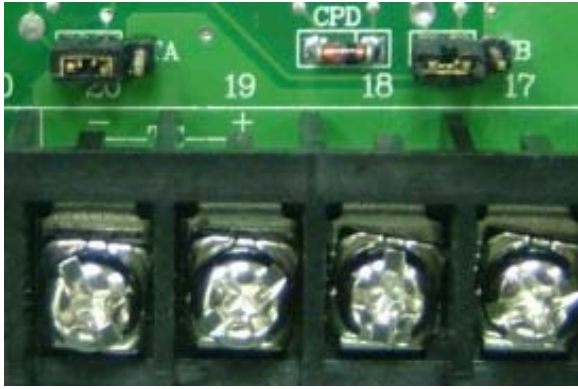
## 14.3 FY100~FY101

If the controller needs to modify input type from **TC** or **mV** to **RTD**, please make PAD short on the back side of PC board as following diagram and change input selection(INP1). On the contrary, modify from **RTD** to **TC** or **mV**, make PAD open.



## RTD

Short pin insert to **left**



## TC or mV

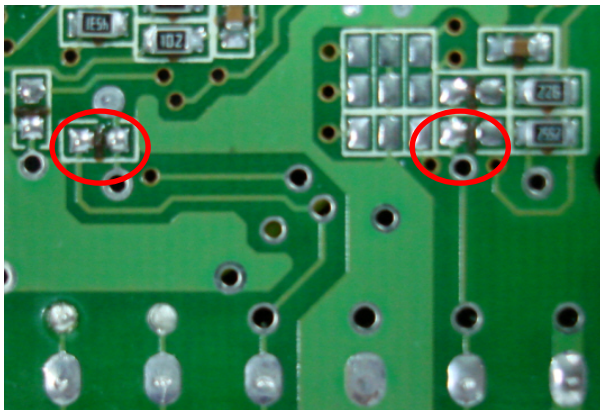
Short pin insert to **right or remove**



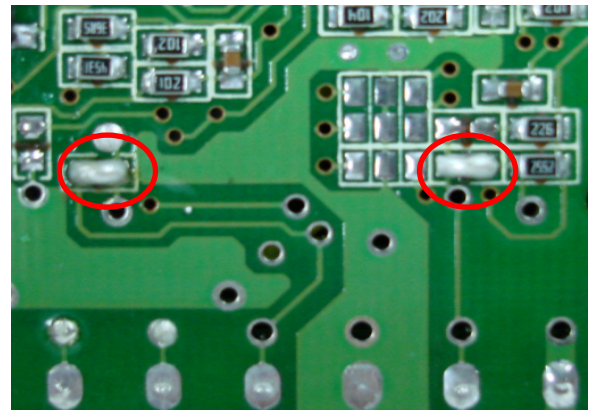
If the controller needs to modify input type from **TC or mV** to **RTD**, please make PAD short on the back side of PC board as following diagram and change input selection(INP1). On the contrary, modify from **RTD** to **TC or mV**, make PAD open.

FY101

## TC or mV



## RTD





# 15. Modify input type : Linear Input (mA ,V)

## 15.1 FY400~900 & FU48~96 Hardware :

	FY900 , FY600 , FY800 FU86 , FU96	FY700 FU72	FY400 FU48
INPUT ( + )	PIN 17	PIN 11	PIN 7
INPUT ( - )	PIN 20	PIN 14	PIN 10

0~20mA (INP1=AN4) : (R3 use 100Ω , R5 use 2.4Ω , S3 & S5 SHORT)

4~20mA (INP1=AN5) : (R3 use 100Ω , R5 use 2.4Ω , S3 & S5 SHORT)

0 ~ 1V (INP1=AN4) : (R1 use 2KΩ , R4 use 100Ω , S1 & S4 SHORT)

0 ~ 5V (INP1=AN4) : (R2 use 10KΩ , R4 use 100Ω , S2 & S4 SHORT)

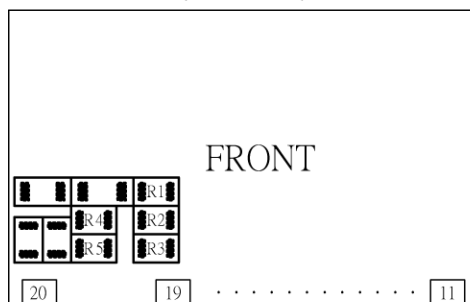
1 ~ 5V (INP1=AN5) : (R2 use 10KΩ , R4 use 100Ω , S2 & S4 SHORT)

0 ~ 10V (INP1=AN4) : (R3 use 22KΩ , R4 use 100Ω , S3 & S4 SHORT)

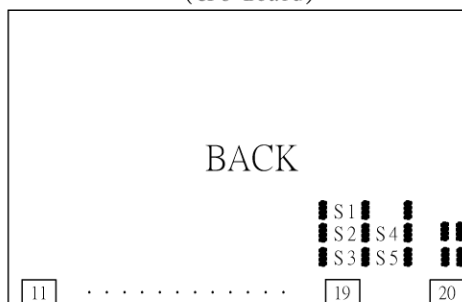
2 ~ 10V (INP1=AN5) : (R3 use 22KΩ , R4 use 100Ω , S3 & S4 SHORT)

FY600 , FY800 , FY900 & FU86, FU96

(CPU Board)

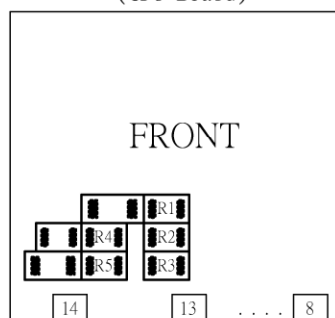


(CPU Board)

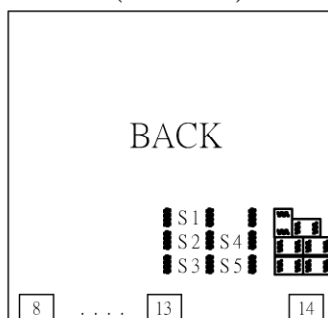


(CPU Board)

FY700 & FU72

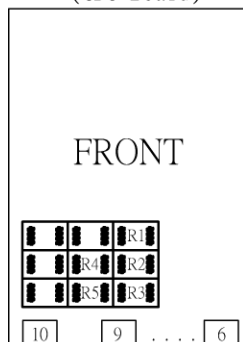


(CPU Board)

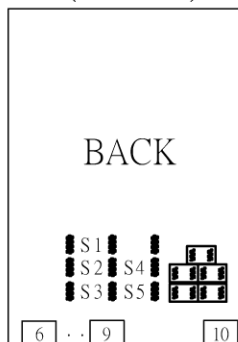


(CPU Board)

FY400 & FU48



(CPU Board)



## 15.2 FY100/101 Hardware :

	FY100	FY101
INPUT ( + )	PIN 14	PIN 10
INPUT ( - )	PIN 11	PIN 8

0~20mA (INP1=AN4) : (R3 use 100Ω , R5 use 2.4Ω , S3&S5 SHORT)

4~20mA (INP1=AN5) : (R3 use 100Ω , R5 use 2.4Ω , S3&S5 SHORT)

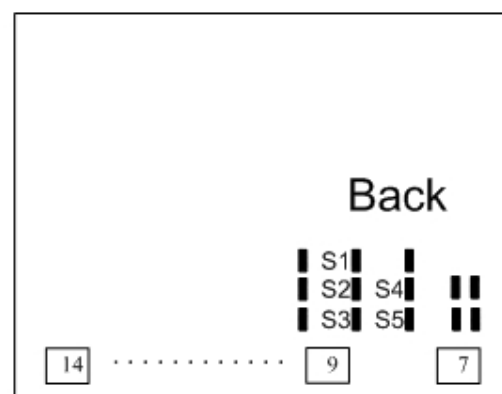
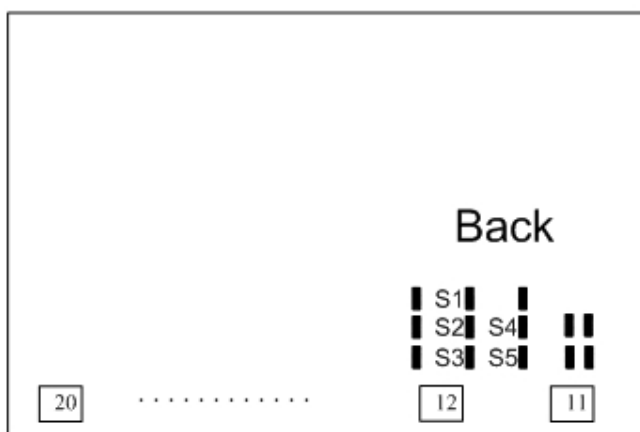
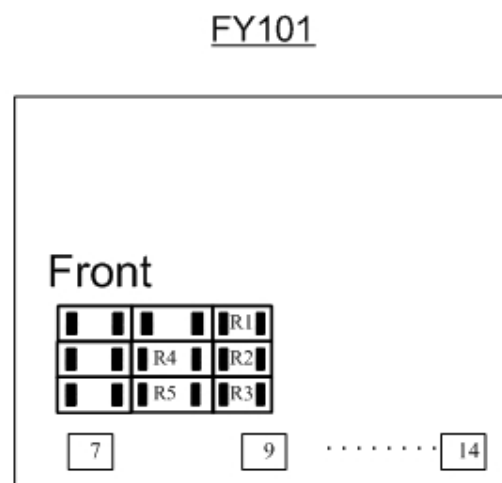
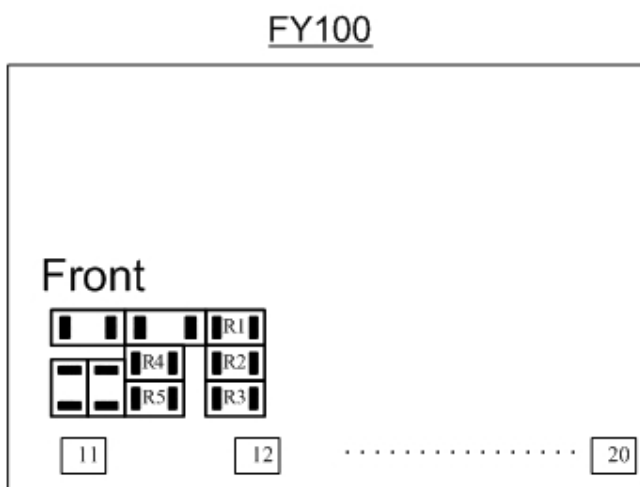
0 ~ 1V (INP1=AN4) : (R1 use 2KΩ , R4 use 100Ω , S1&S4 SHORT)

0 ~ 5V (INP1=AN4) : (R2 use 10KΩ , R4 use 100Ω , S2&S4 SHORT)

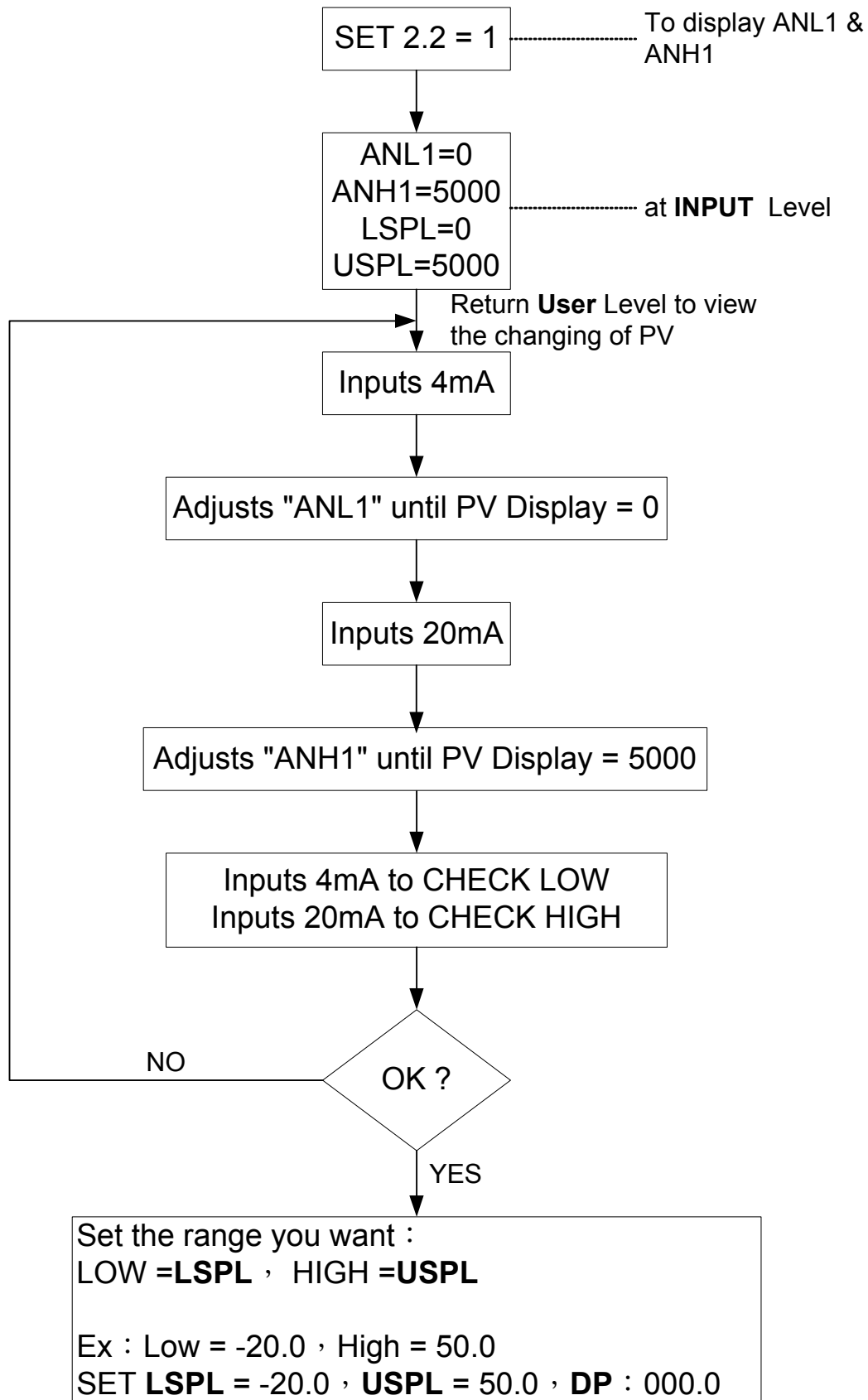
1 ~ 5V (INP1=AN5) : (R2 use 10KΩ , R4 use 100Ω , S2&S4 SHORT)

0 ~ 10V (INP1=AN4) : (R3 use 22KΩ , R4 use 100Ω , S3&S4 SHORT)

2 ~ 10V (INP1=AN5) : (R3 use 22KΩ , R4 use 100Ω , S3&S4 SHORT)



### 15.3 Calibration :



## 16. Modify Output type: Relay, SSR, 4~20mA

It just needs to change a module at the same position , and modify parameter **CYT1** in LEVEL 2 .

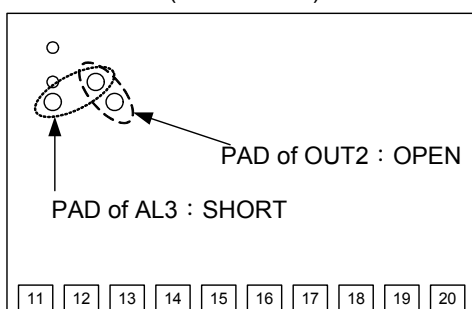
→Relay: CYT1=10, Voltage pulse: CYT1=1, 4~20mA:CYT1=0

## 17. Modify output mode: OUT1/ALARM, OUT1/OUT2

### OUT1 / ALARM

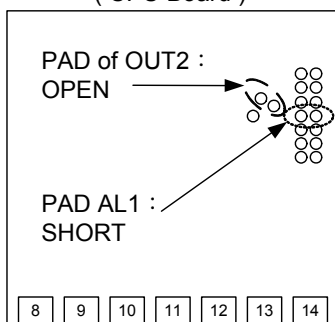
**FY600 , FY800 , FY900**

( CPU Board )



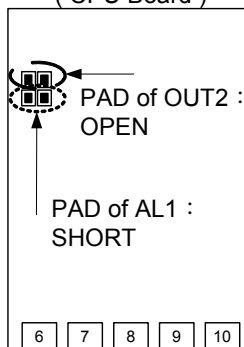
**FY700**

( CPU Board )



**FY400**

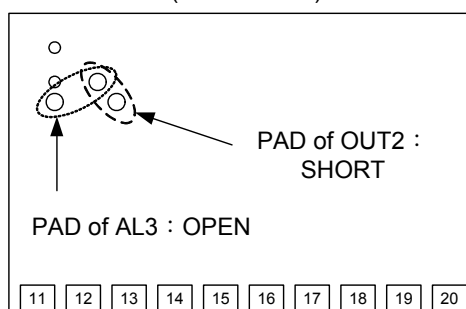
( CPU Board )



### OUT1 / OUT2

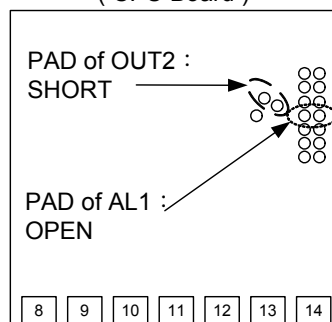
**FY600 , FY800 , FY900**

( CPU Board )



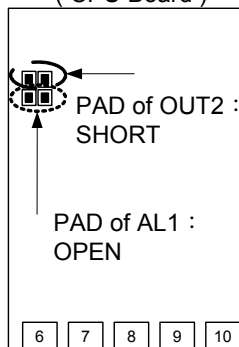
**FY700**

( CPU Board )



**FY400**

( CPU Board )



## 18. Applications

### 18.1 RAMP & SOAK

- **RAMP :**

- I. SET2.1=1 → To display AL3
- II. SET4.1=1 → To display ALD3
- III. ALD3=9 → Open RAMP option
- IV. Then, AL3 will not display. It was replaced by RAMP.

RAMP
00.00

Range : 00.00 ~ 99.99(°C/ min)  
 (If RAMP is not used , please set  
 ALD3 to 0)

- **SOAK :**

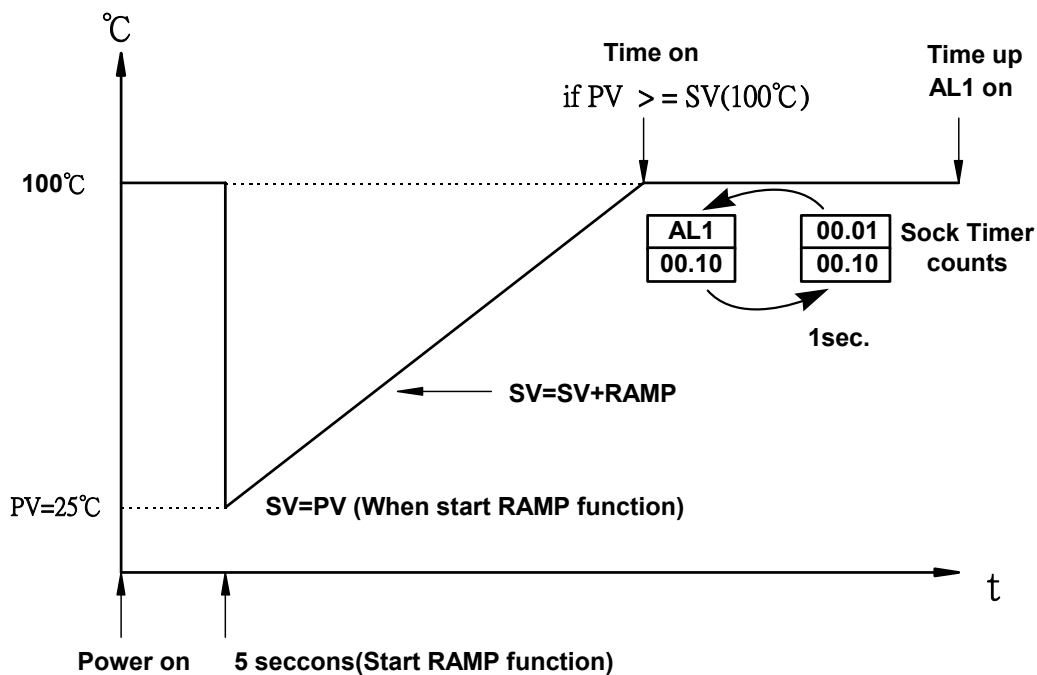
- I. ALD1 / ALD2=19 → To use Sock Timer.
- II. AL1 / AL2 will display as below:

AL1
00.00

Range : 00.00 ~ 99.59(Hour.Minute)

- **Example :**

SV=100°C , RAMP=10.00 (°C/min) , AL1=00.10 min , PV=25°C



## 18.2 TTL Communication : SV output and RATE function

- **Open RATE function (use for slave controller)**

Display AL3 : SET2.1=1

Display ALD3 : SET4.1=1

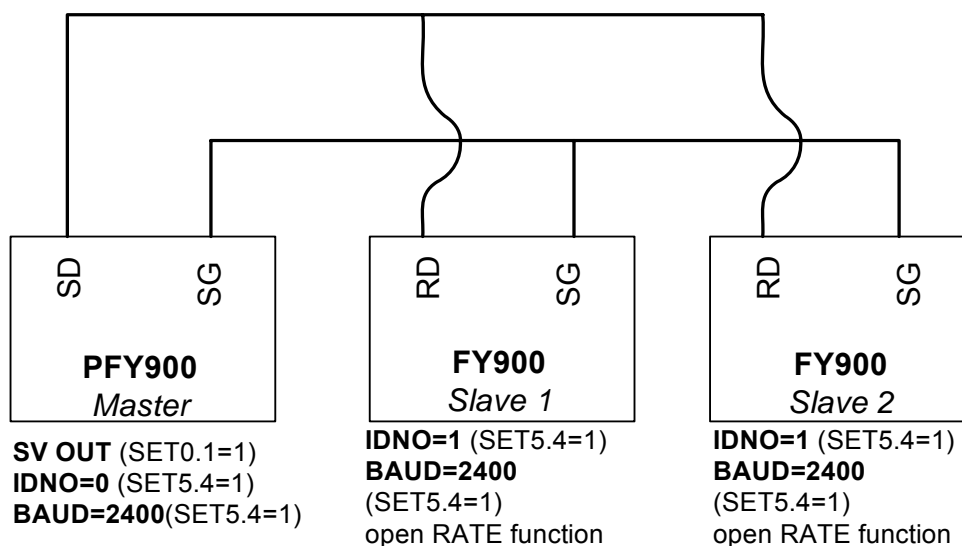
Display RATE(AL3 will be replaced) : SET0.2=1

Set ALD3 to 0. (In Level 3)

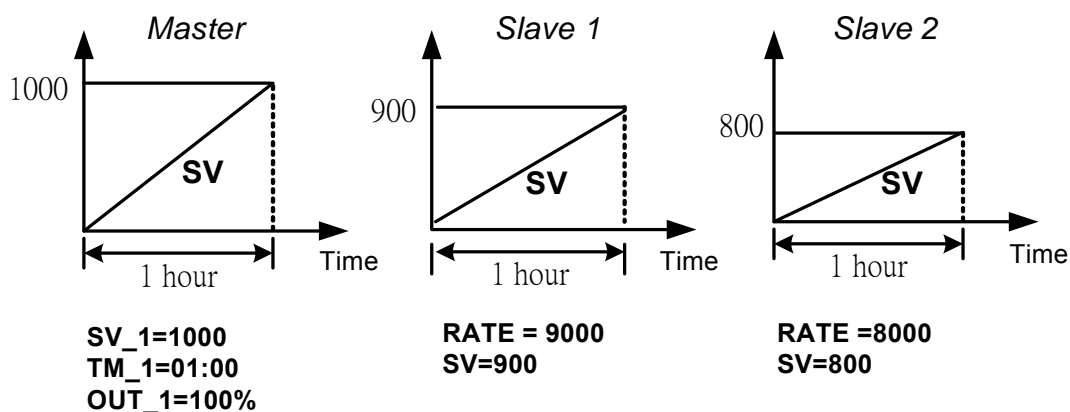
Slave SV = (RATE÷9999)×master SV

- **Example :**

### Connection Diagram



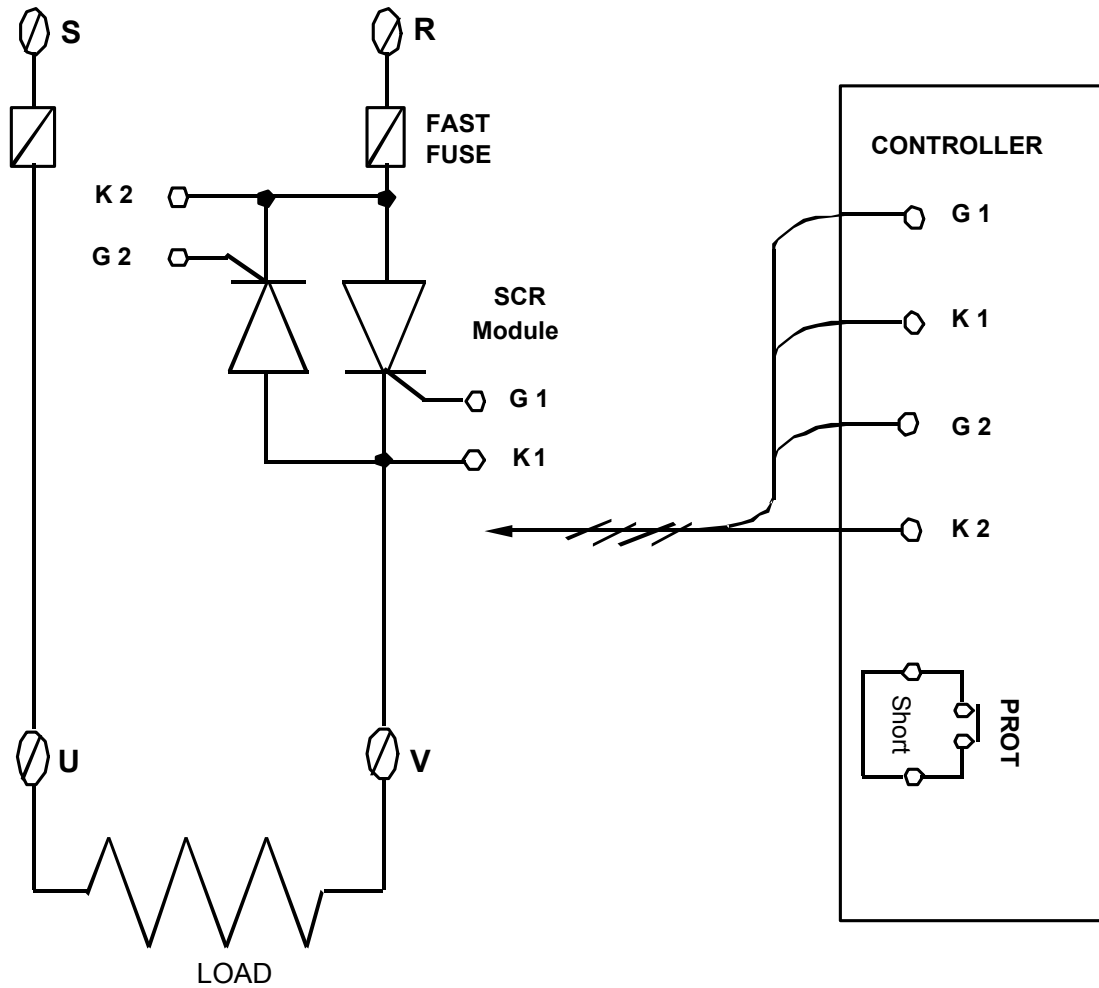
### Time Chart



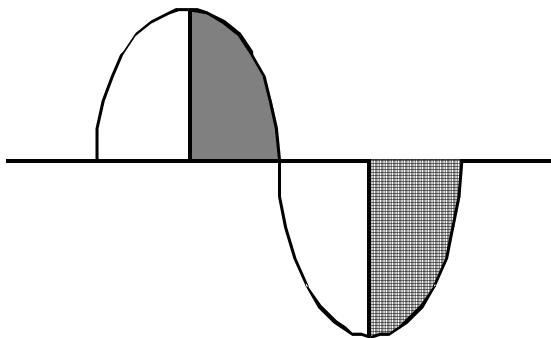
( Three controllers reach to the max value at the same time )

### 18.3 1 $\phi$ Phase angle control (By SCR module)

- Available Models : FY900 / PFY900 , FY700 / PFY700 , FY800 / PFY800  
FY100 / PFY100
- OUT1: 1  $\phi$  SCR phase angle control
- Parameter setting : OUTY=4  
CLO1=0 , CHO1=4500 if use for resistance load  
CLO1=0 , CHO1=4000 if use for inductor load

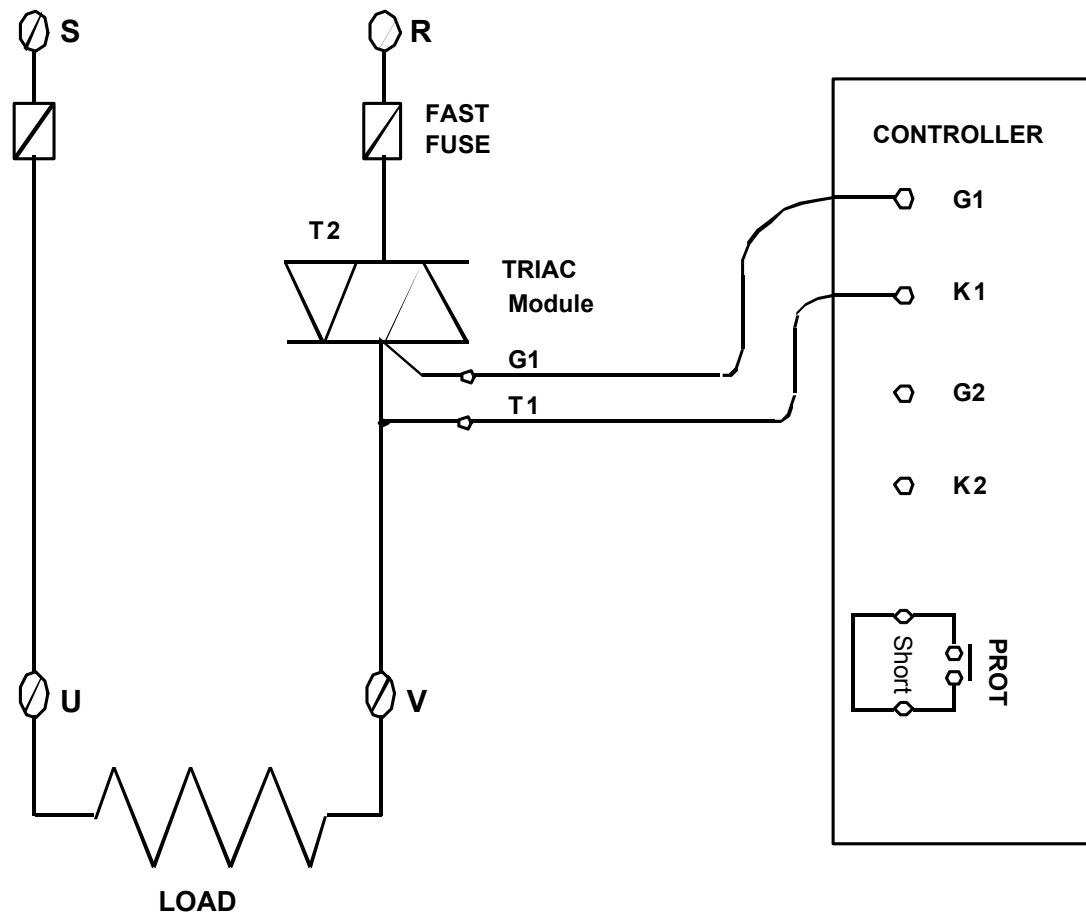


\*\* Controller source phase must be same as load source phase

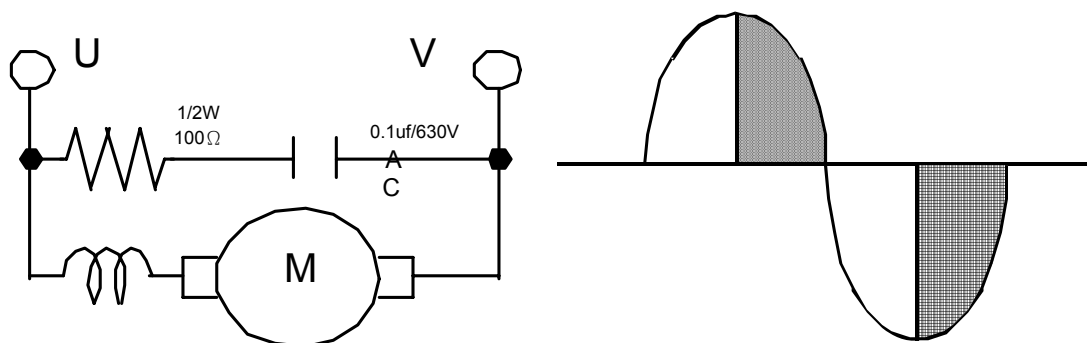


## 18.4 1 $\phi$ Phase angle control (By TRIAC)

- Available Models : FY900 / PFY900 , FY700 / PFY700 , FY800 / PFY800  
FY100 / PFY100
- OUT1: 1 $\phi$  SCR phase angle control
- Parameter setting : OUTY=4  
CLO1=0 , CHO1=4500 if use for resistance load  
CLO1=0 , CHO1=4000 if use for inductor load



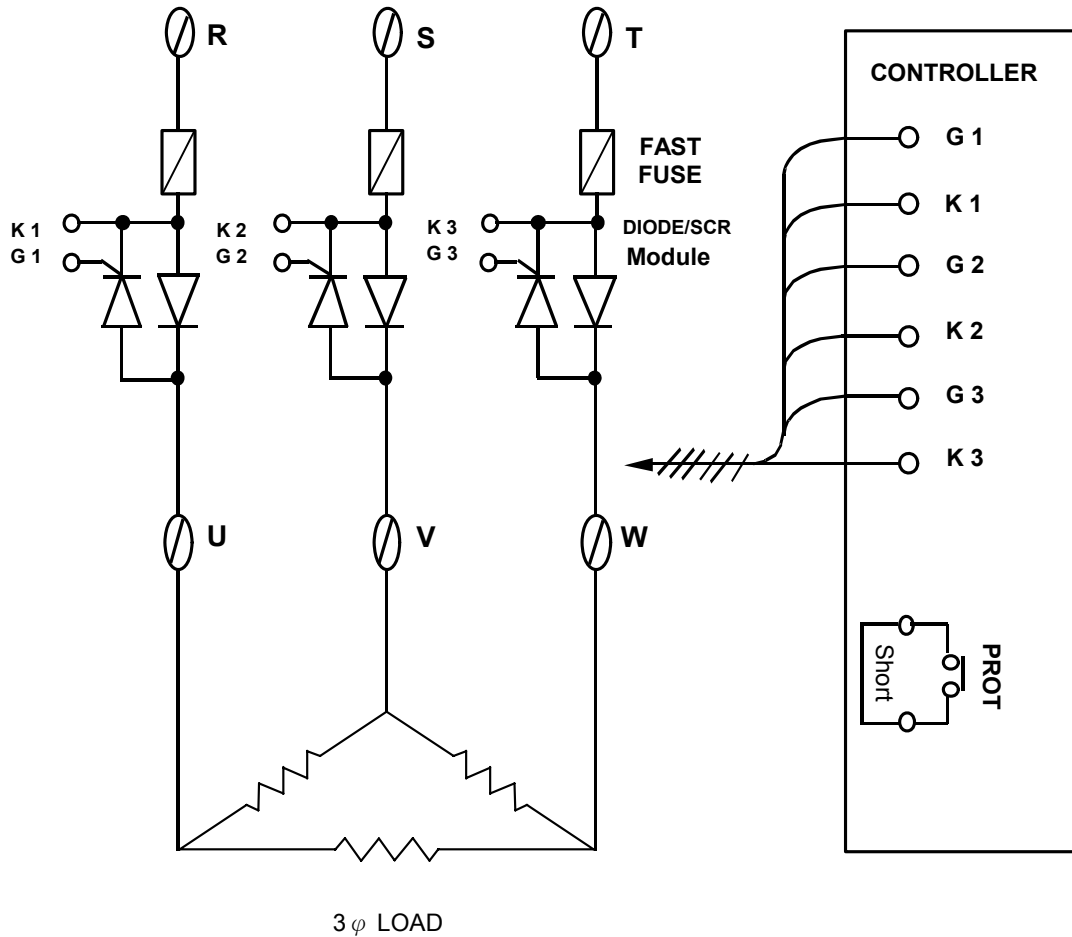
\*\* Controller source phase must be same as load source phase





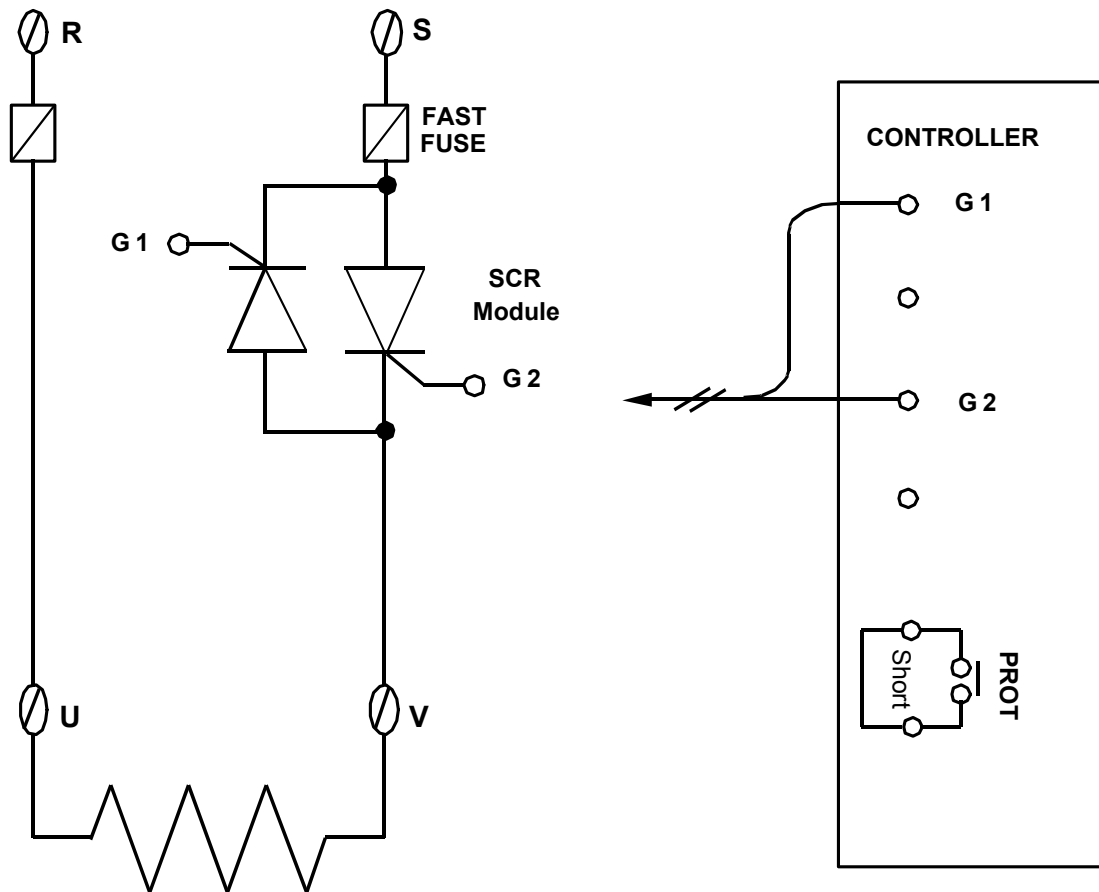
## 18.5 3 $\phi$ Phase angle control (By DIODE/SCR module)

- Available Models : FY900 / PFY900
- OUT1: 3 $\phi$  SCR phase angle control
- Parameter setting : OUTY=5  
 CLO1=0 , CHO1=4500 only if use for resistance load  
 CLO1=0 , CHO1=4000 if use for inductor load

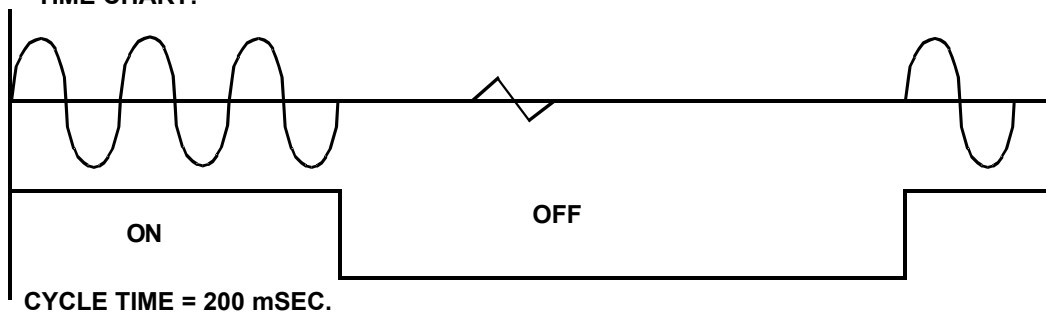


## 18.6 1 $\phi$ Zero crossing control (By SCR module)

- Available Models : FY900 / PFY900 , FY700 / PFY700  
FY400 / PFY400
- OUT1: 1 $\phi$  SCR zero cross control
- Parameter setting : OUTY=0  
CYT1=1

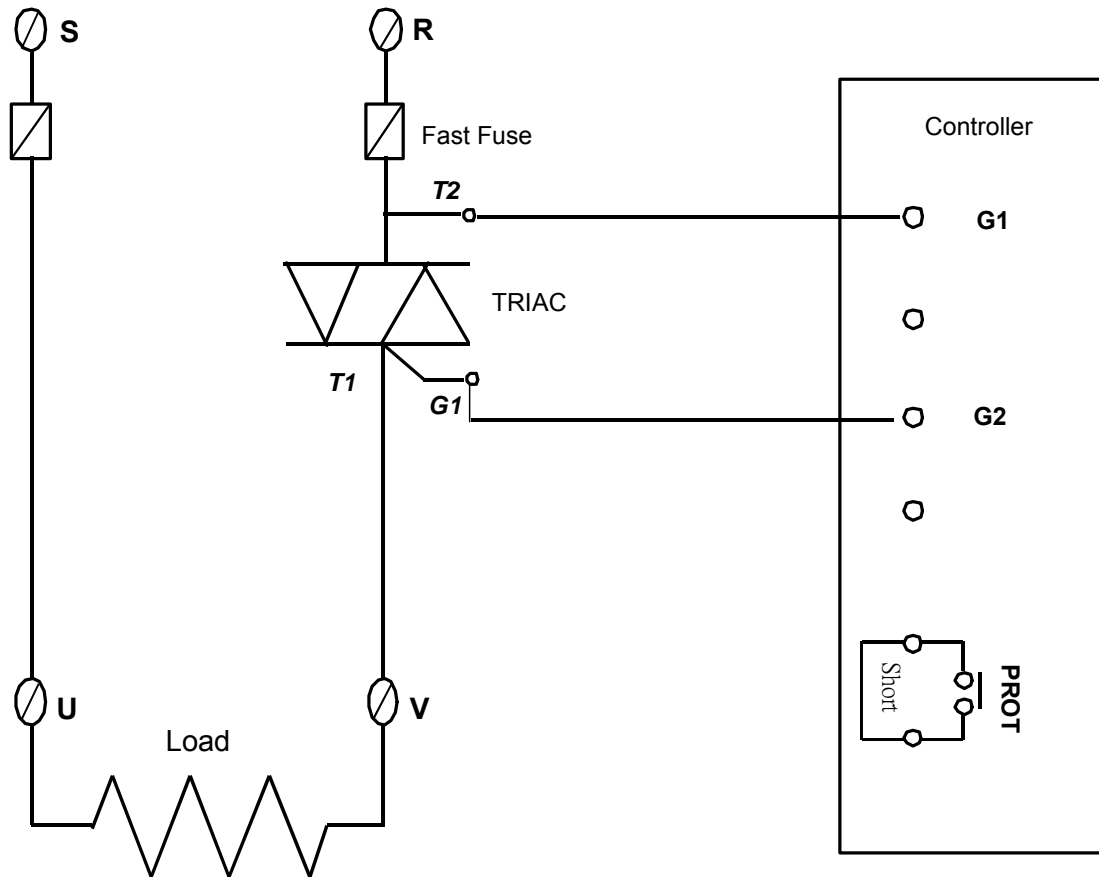


TIME CHART:



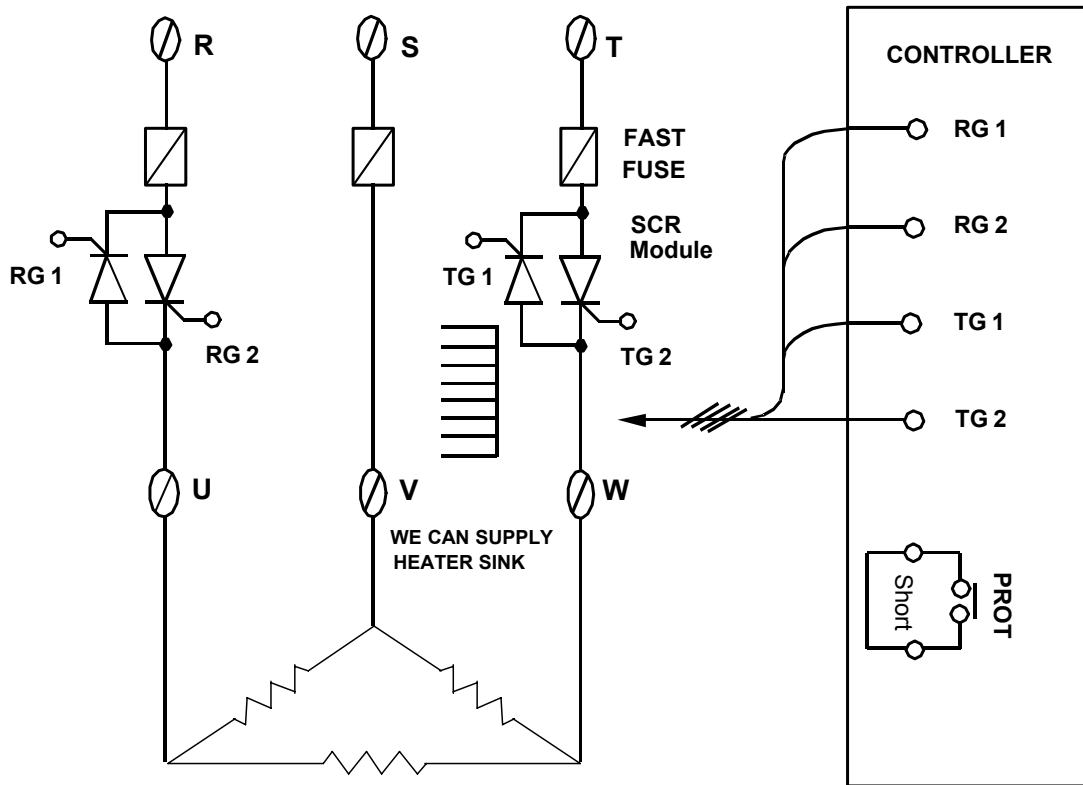
## 18.7 1 $\phi$ Zero crossing control (By TRIAC)

- Available Models : FY900 / PFY900 , FY700 / PFY700  
FY400 / PFY400
- OUT1: 1 $\phi$  SCR zero cross control
- Data Change : OUTY=0  
CYT1=1

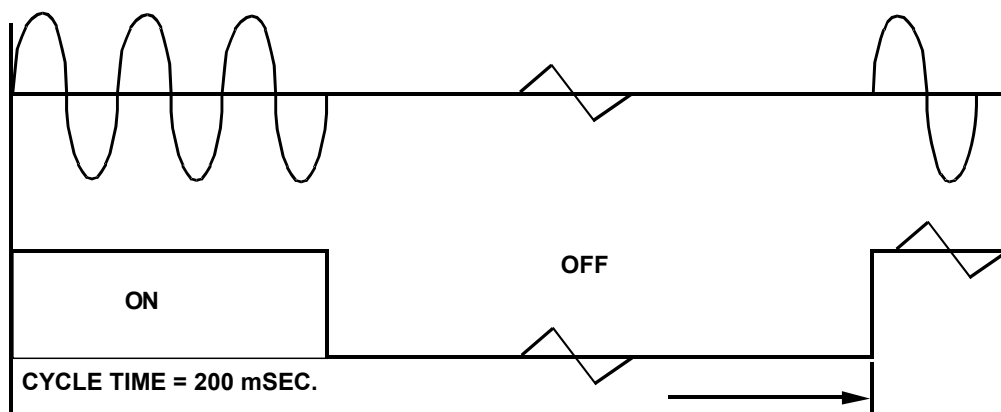


## 18.8 3 $\phi$ Zero crossing control (By SCR module)

- Available Models : FY900 / PFY900
- OUT1: 3 $\phi$  SCR zero cross control
- Data Change : OUTY=0  
CYT1=1

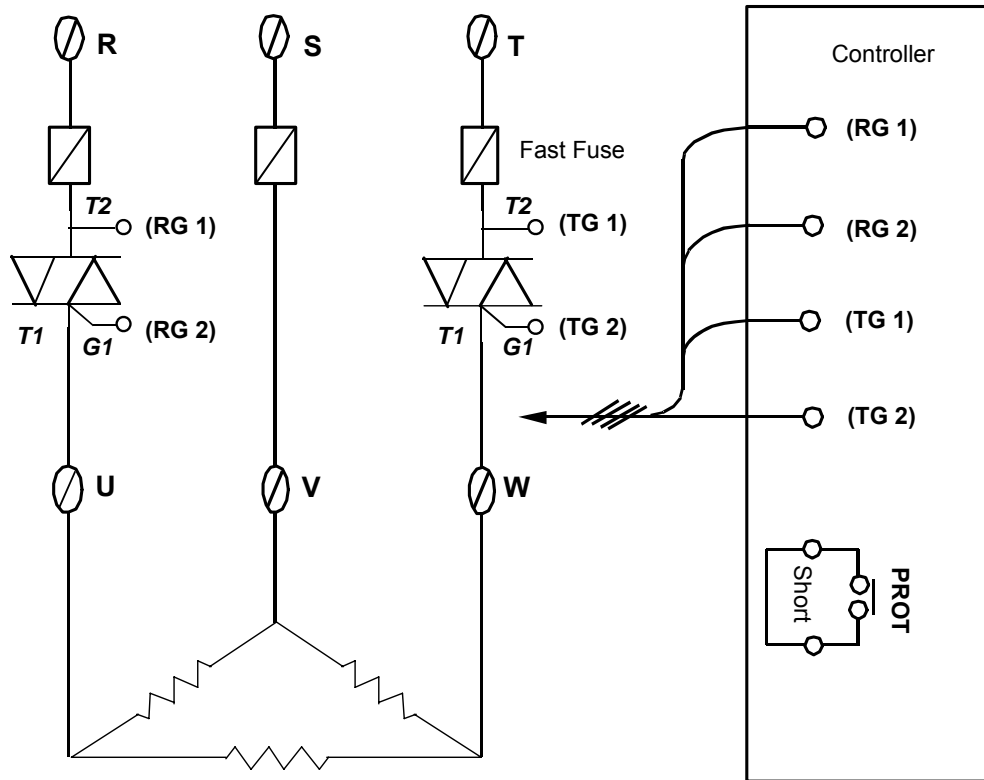


TIME CHART:



## 18.9 3 $\phi$ Zero crossing control (By TRIAC)

- Available Models : FY900 / PFY900
- OUT1: 3 $\phi$  SCR zero cross control
- Data Change : OUTY=0  
CYT1=1



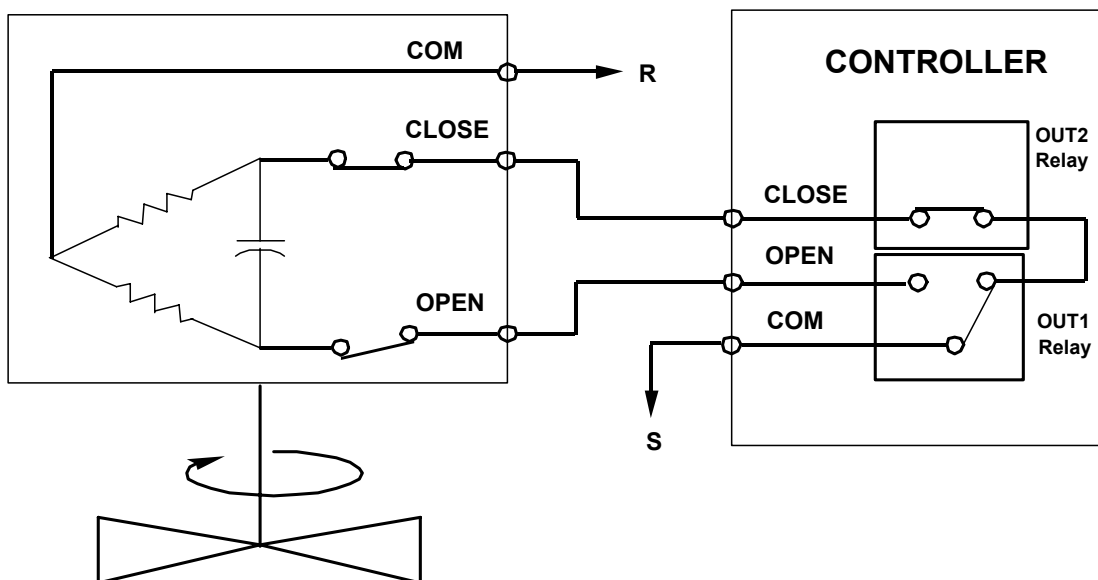
## 18.10 3 wires proportional motor valve control

- Available Models : FY900 / PFY900 , FY700 / PFY700  
FY800 / PFY800 , FY600 / PFY600  
FY400 / PFY400 , FY100 / PFY100  
FY101 / PFY101
- Data Change : OUTY=3  
CYT1=1 ~ 100sec.  
(Manufacturing default setting "5" seconds.)  
RUCY=5 ~ 200 seconds.

※After change "RUCY" the controller must be reset

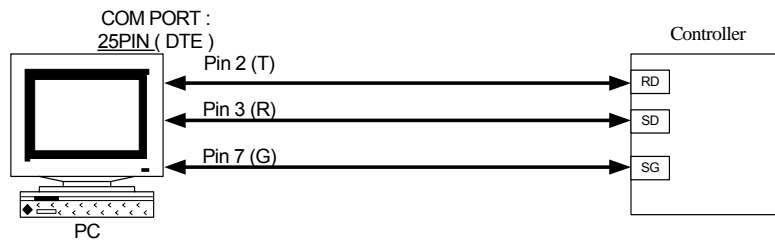
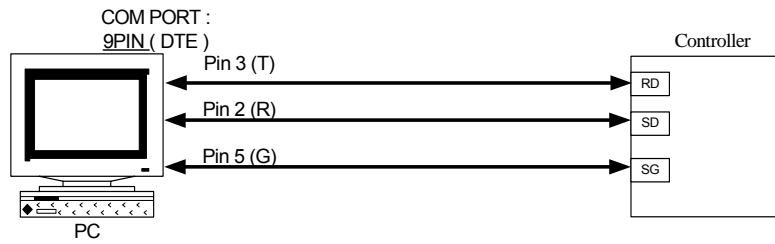
1. CYT1 is the cycle time of Open / Close
2. RUCY is the 0 ~ 100% running time of motor valve

### MOTOR VALVE



# 18.11 Wiring diagram of PC communication

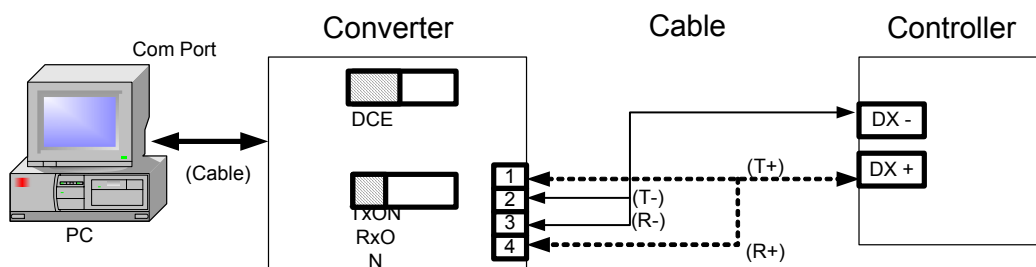
## RS232 Connection Diagram



**NOTE:**

- 1.The length of cable be connected between controller and PC can't exceed 15 meter.
- 2.One Com Port can only be connected to one controller.  
If more than one controller is connected to one Com Port , communication will be failed.
- 3.Ensure that the controller's IDNO and BAUD settings are the same with PC software's settings.
- 4.For the software communication format please refer to communication manual.

## RS485 Connection Diagram



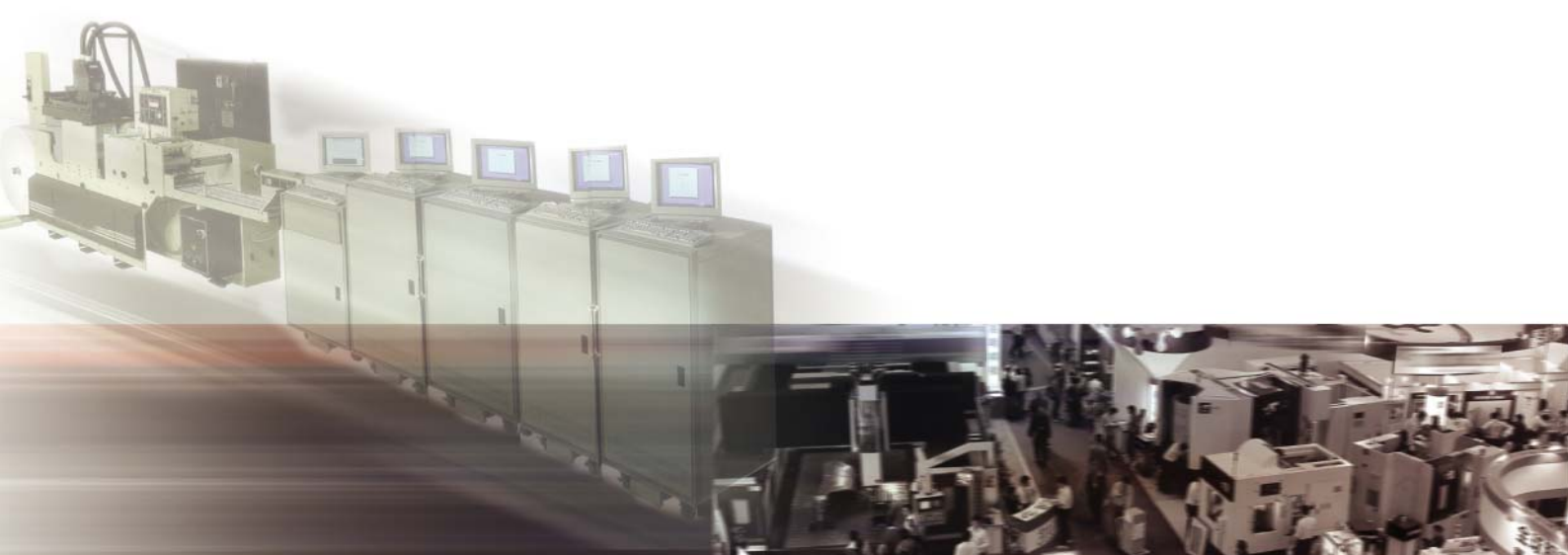
**NOTE:**

- 1.The length of cable be connected between Converter and Controller can't exceed 1.2 KM.  
Suggestion:choose "Shielded Cable".
- 2.One Com Port can be connected up to a maximum of 30 Controllers.
- 3.Ensure that the Controller's IDNO and BAUD settings are the same with PC software's settings.
- 4.For the software communication format ,please refer to communication manual.

## **19. Order Information**

### **19.1 FA Series**





Distubor

