

User's Manual

TAIE Digital Controller

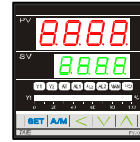
FY400/600/700/800/900



FY400



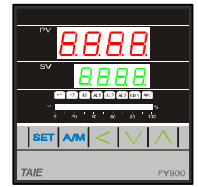
FY600



FY700



FY800



FY900

1 Notice

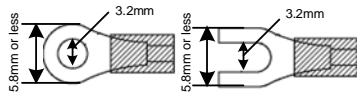
Please confirm the specification of controllers is to totally with your requirement before using it, also read this user's manual in detail.

⚠ Danger

1. Danger! Electric Shock!
DON'T touch AC power wiring terminal when controller has been powered!
Keep the power off until all of the wiring are completed!

⚠ Warning

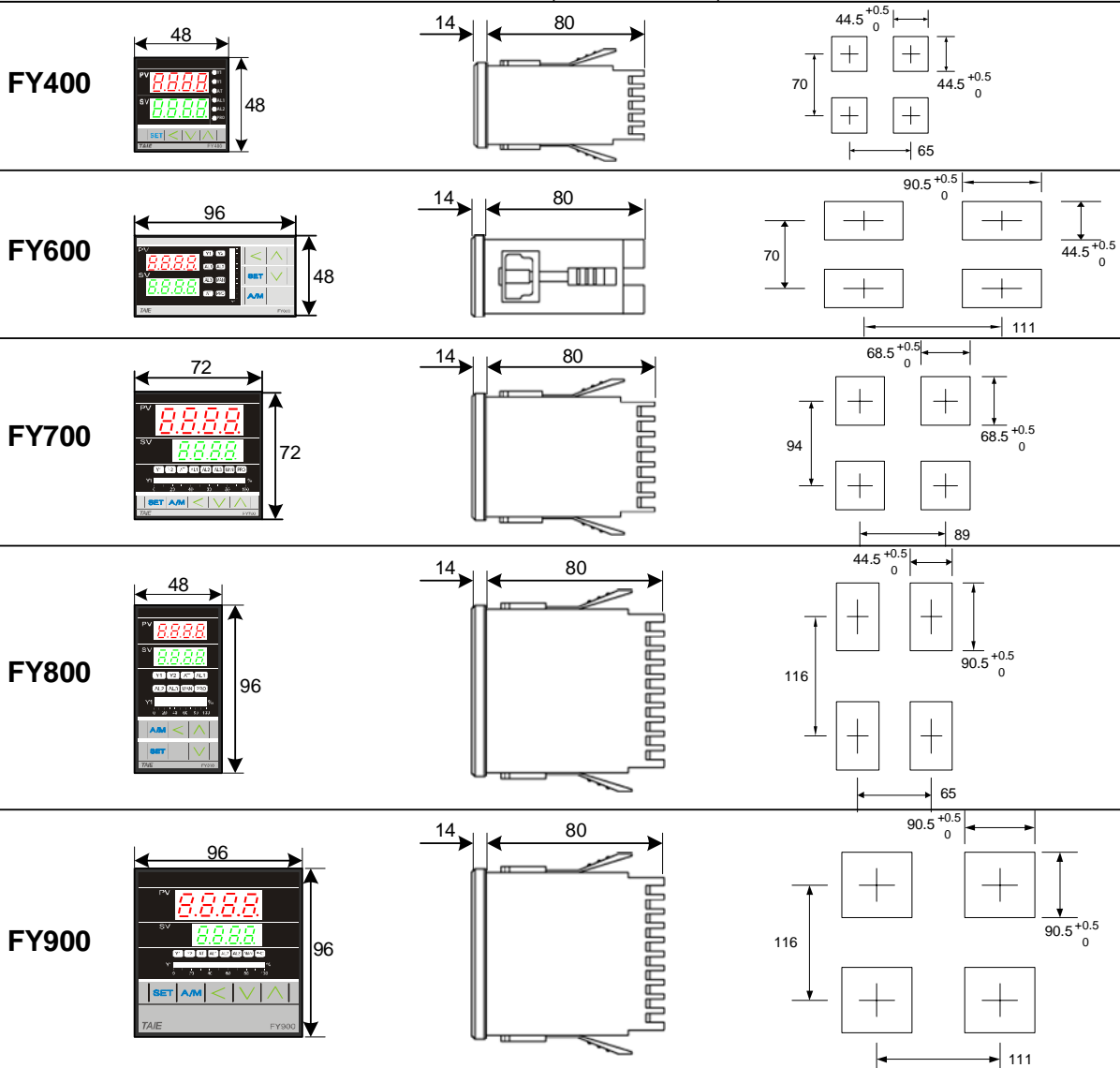
1. Please confirm the AC power wiring to controller is correct, otherwise it would be caused aggravated damage on controller. (FY400 connecting with Pin 1 and 6, FY600/700/800/900 with Pin 1 and 2).
2. Be sure to use the rated power supply(AC85~265V or DC24V), otherwise it would be caused aggravated 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



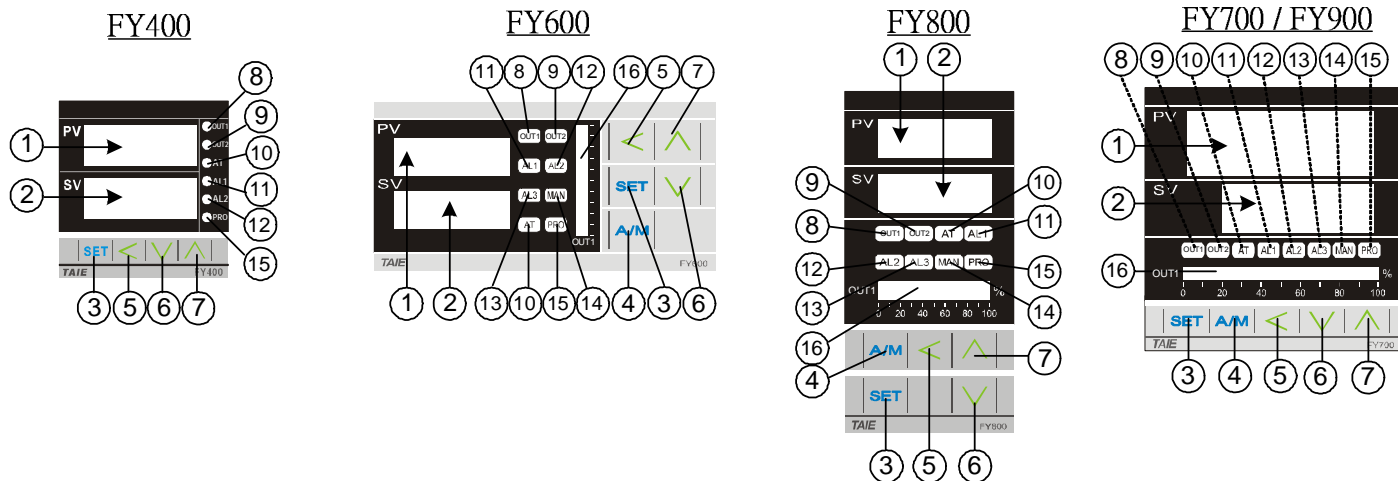
Torque : 0.4 N.m (4kgf.cm)

5. Avoid to install 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 50 to 85% RH.
 - III. A place where the 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 External Dimension and Panel Cutout (Unit : mm)



3 Parts Description

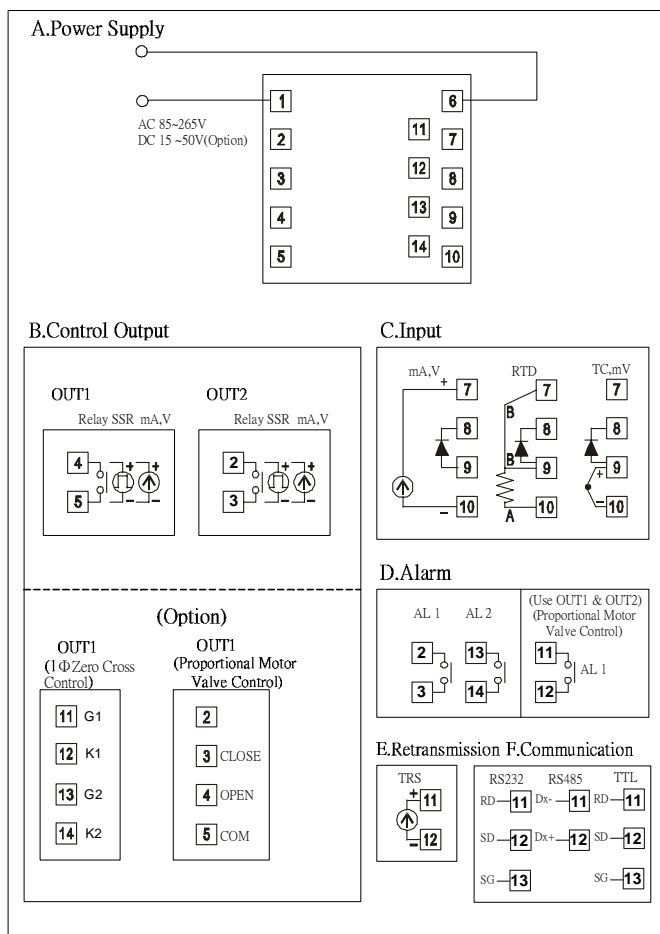


SYMBOL	NAME	FUNCTION
PV ①	Measured value (PV) display	Displays PV or various parameter symbols (Red)
SV ②	Setting value (SV) display	Displays SV or various parameter set values (Green)
SET ③	Set key	Used for parameter calling up and set value registration
A/M ④	Auto/Manual key	Switches between Auto(PID)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

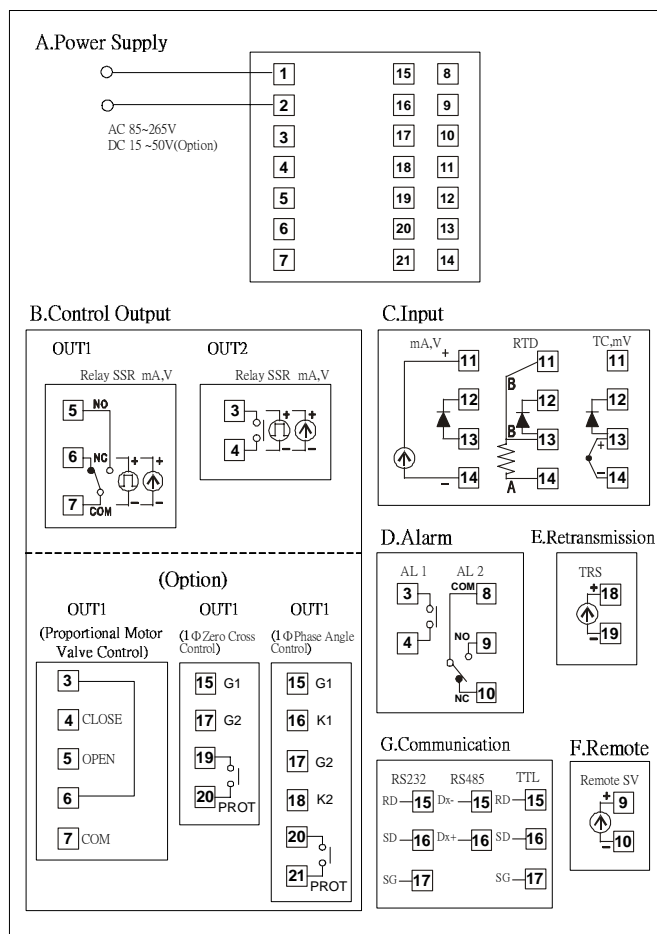
SYMBOL	NAME	FUNCTION
OUT1 ⑧	OUT1 lamp	Lights when OUT1 is on (Green)
OUT2 ⑨	OUT2 lamp	Lights when OUT2 is on (Green)
AT ⑩	Autotuning lamp	Lights when Autotuning is activated (Orange)
AL1 ⑪	Alarm 1 lamp	Lights when Alarm 1 is activated (Red)
AL2 ⑫	Alarm 2 lamp	Lights when Alarm 2 is activated (Red)
AL3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

4 Terminal Arrangement

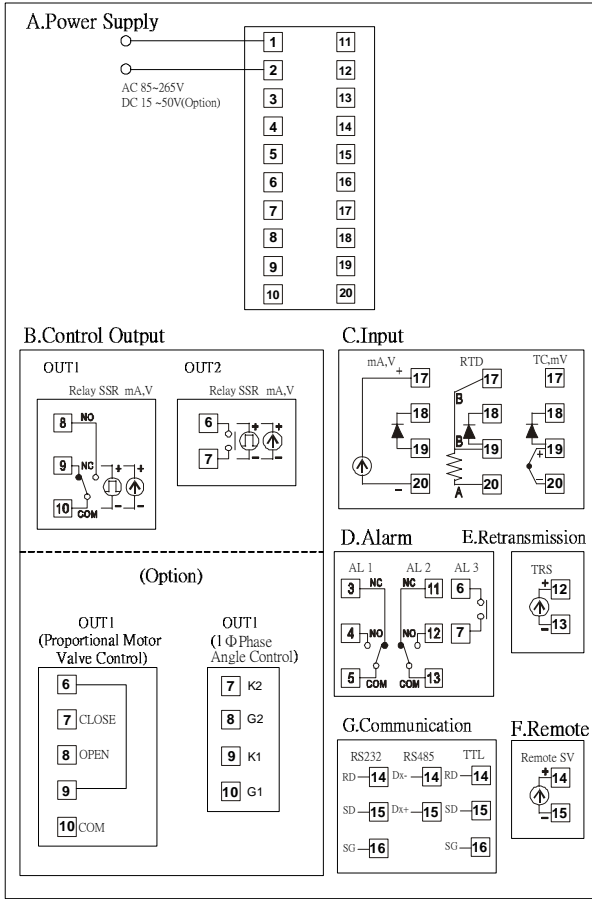
FY400



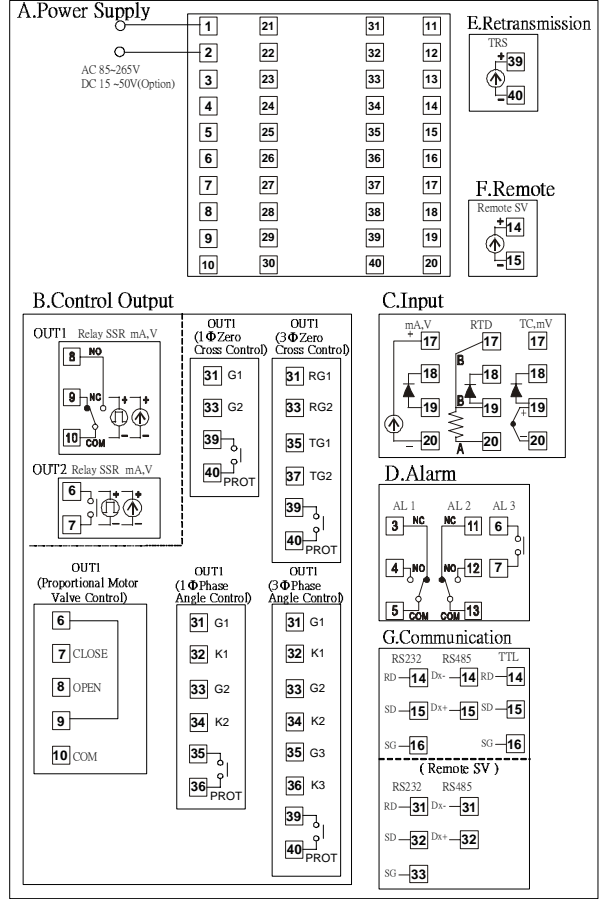
FY700



FY600 / FY800

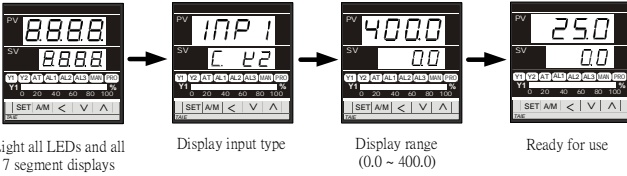


FY900



5 Operations

1. Power ON: Controller will display as following



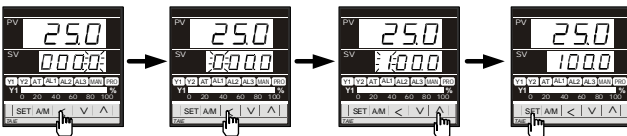
Light all LEDs and all 7 segment displays

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 (SET) Key To display parameter AT.

Press (LEFT) Key To select the hundreds digit. To change the number to 1.

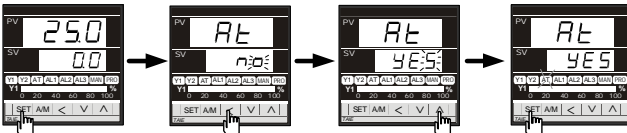
Press (RIGHT) Key To change the number to 1.

Press (SET) Key To store the new set value.

The SV number started to flash. The flashing digit indicates which digit can be set.

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 (LEFT) Key To change AT setting.

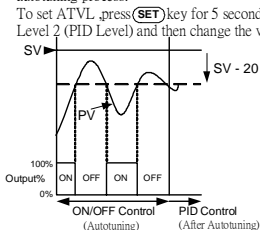
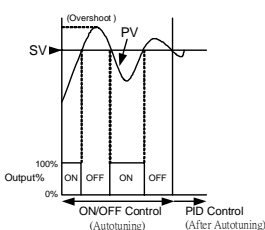
Press (RIGHT) Key Change AT to "YES"

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

Autotuning ATVL=0

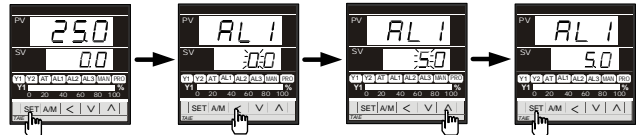
Autotuning ATVL=20

*Set ATVL to prevent overshoot occurred during autotuning process. To set ATVL, press (SET) key for 5 seconds to enter Level 2 (PID Level) and then change the value.



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 (LEFT) Key To change AL1 value

Press (RIGHT) 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) + (LEFT) key 5 seconds to enter Level 3 (Input Level) and then change the value of ALD1/ALD2/ALD3.

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

(▲:SV △:Alarm set value)

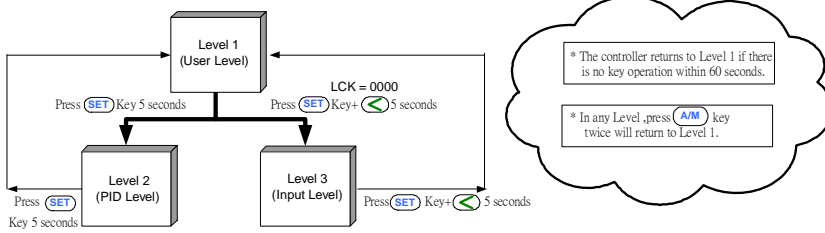
01	Deviation high alarm with hold action* OFF ON HIGH → PV	04	Band alarm OFF ON OFF → PV	07	Segment End alarm (Only for Programmable controller) (1) ALD1-3, set 07 (2) ALD1-3=Alarm Segment (3) ALT1-3 defines as follows: 0: timer alarm 99.59: scattered alarm others: alarm on time
11	Deviation high alarm OFF ON HIGH → PV	05	Process high alarm with hold action* OFF ON HIGH → PV	17	Program Run alarm (Only for Programmable controller) Run Stop ON OFF → AL
02	Deviation low alarm with hold action* ON OFF HIGH → PV	15	Process high alarm OFF ON HIGH → PV	08	System failed alarm* (ON) Normal Failed OFF ON → AL
12	Deviation low alarm ON OFF HIGH → PV	06	Process low alarm with hold action* ON OFF HIGH → PV	18	System failed alarm* (OFF) Normal Failed ON OFF → AL
03	Deviation high/low alarm with hold action* LOW OFF ON HIGH → PV	16	Process low alarm ON OFF HIGH → PV	00	No alarm
13	Deviation high/low alarm LOW OFF ON HIGH → PV			10	

*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 the following: "UUU1" or "NNN1" or "CJCE"

6 Parameter List

Levels Diagram



Parameter	Default Value	Description
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Level 1 (User Level)

- PV** Process Value
- SV** Set-Point
- OUeL** Output Limit (Default: 100.0)
- At** Autotuning (Default: YES/no)
- AL 1** Alarm 1 set value (Default: 0.0)
- AL 2** Alarm 2 set value (Default: 0.0)
- AL 3** Alarm 3 set value (Default: 0.0)

Level 2 (PID Level)

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

Level 3 (Input Level)

- INP1** Input type selection
- ANL1** Analog input low limit calibration (Used for mA and V input) Range: -1999 ~ 9999
- ANH1** Analog input high limit calibration (Used for mA and V input) Range: 0 ~ 9999
- DP** Decimal point position (Available for mA and V input) 0000 · 000.0 · 00.00 · 0.000
- LSPL** Lower Set-Point Limit Scaling Low Limit
- USPL** Upper Set-Point Limit Scaling High Limit
- ANL2** Remote input low limit calibration Range: -1999 ~ 9999
- ANH2** Remote input high limit calibration Range: 0 ~ 9999
- ALd1** Alarm mode of AL1 Range: 00~19 Refer to "Alarm mode type"
- ALt1** 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) The same with ALD1
- ALd2** Alarm mode of AL2 The same with ALD1
- ALt2** Alarm time of AL2 The same with ALT1
- ALd3** Alarm mode of AL3 The same with ALD1
- ALt3** Alarm time of AL3 The same with ALT1
- HYSA** Hysteresis of all Alarm Range: 0~1000
- CL01** Output 1 low limit calibration (Used for mA and V output) Range: 0 ~ 9999
- CH01** Output 1 high limit calibration (Used for mA and V output) Range: 0 ~ 9999
- CL02** Output 2 low limit calibration (Used for mA and V output) The same with CL01
- CH02** Output 2 high limit calibration (Used for mA and V output) The same with CH01
- CL03** Retransmission low limit calibration The same with CL01
- CH03** Retransmission high limit calibration The same with CH01
- run** Full run time of proportional motor (Used for proportional motor valve control output) Range: 5~200 seconds
- wait** Used for programmable controller to wait continued operation 0=Not wait Others=Wait value
- ID** ID number Range: 0 ~ 99
- BAUD** Baudrate 110 / 300 / 1200 / 2400 / 4800 / 9600 bps
- SV05** SV compensation Range: -1000~1000
- PV05** PV compensation Range: LSPL~USPL
- UNIT** Unit of PV & SV C(°) / F(°) / A(Analog)
- SOFT** Soft Filter 0.200
- CR5C** Reserved
- OUd** Action mode Heat / Cool
- OPAd** Control algorithm PID / Fuzzy
- F=** Frequency 50 / 60HZ

LCK	Levels entering available			Parameters which can be changed
	Level 1 (User Level)	Level 2 (PID Level)	Level 3 (Input Level)	
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"

7 Error Displays

IN1E	IN1E : Input 1 Error Check whether input loop is opened or wiring incorrect.
CJCE	CJCE :Cold Junction Compensation Failed Check the compensation diode outside controller.
UUU1	UUU1 : PV is above USPL Check whether the input value is correct or not.
NNN1	NNN1 : PV is below LSPL Check whether the input value is correct or not.
ADCF	ADCF :A/D Convert Failed Controller needs to be repaired.
RAMF	RAMF :RAM Failed Controller needs to be repaired.

Return to "INP1"

8 Specifications

Standard Spec.

Model	FY400	FY600	FY700	FY800	FY900	
Dimension	48X48mm	96X48mm	72X72mm	48X96mm	96X96mm	
Supply voltage	AC 85~265V , DC24V (Optional)					
Frequency	50/60 HZ					
Power Consumption	approx 3VA	approx 4VA	approx 3VA	approx 4VA	approx 4VA	
Memory	Non-volatile memory E ² PROM					
Input	Measurement input. Sample time : 250ms,0.2% of FS					
	TC	K , J , R , S , B , E , N , T , W , PL2 , U , L				
	RTD	DPT100 , JPT100 , JPT50				
	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	0000 , 000.0 , 00.00 , 0.000 (available for mA or Voltage dc input)				
Output 1	Main control output					
	Relay	SPST type	SPDT type	SPDT type	SPDT type	SPDT type
		3A , 220V , electrical life : 100,000 times or more(under the rated load).				
	Voltage Pulse	For SSR drive. ON:24V , OFF:0V , maximum load current:20mA.				
	mA dc	4~20mA , 0~20mA .Maximum load resistance:560 Ω				
Voltage dc	0~5V , 0~10V , 1~5V , 2~10V. Maximum load current:20mA.					
Alarm 1	SPST type	SPDT type	SPST type	SPDT type	SPDT type	
	A , 220V , electrical life : 100,000 times or more(under the rated load).					
Control algorithms	PID , P , PI , PD , ON/OFF(P=0) , FUZZY					
PID range	P:0~200% , I:0~3600 Secs , D:0~900 Secs					
Isolation	Output terminal (control output , alarm ,transmission) and Input terminal are isolated separately.					
Isolated resistance	10M Ω or more between input terminals and case(ground) at DC 500V ,10M Ω or more between output terminals and case(ground) at DC 500V					
Dielectric strength	1000V AC for 1 minute between input terminals and case(ground) ,1500V AC for 1 minute between output terminals and case(ground)					
Operating temperature	0~50°C					
Humidity range	50~85% RH					
Weight	FY400 approx 150g ,FY600/700/800 approx 225g , FY900 approx 300g.					
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	FY600	FY700	FY800	FY900	
RAMP/SOAK Program	2 Patterns with 8 segments each . The 2 patterns can be linked together as 16 segments use.					
Output 2	For heating and cooling control use					
	Relay	SPST type	SPST type	SPST type	SPST type	SPST type
		3A , 220V , electrical life : 100,000 times or more(under the rated load).				
	Voltage Pulse	For SSR drive. ON:20V , OFF:0V , maximum load current:20mA.				
	mA dc	4~20mA , 0~20mA .Maximum load resistance:560 Ω				
Voltage dc	0~5V , 0~10V , 1~5V , 2~10V. Maximum load current:20mA.					
Alarm 2	SPST type	SPDT type	SPDT type	SPDT type	SPDT type	
	3A , 220V , electrical life : 100,000 times or more(under the rated load).					
Alarm 3	X	SPST type	X	SPST type	SPST type	
	3A , 220V , electrical life : 100,000 times or more(under the rated load).					
Transmission	Signal type : PV,SV					
	mA dc	4~20mA , 0~20mA .Maximum load resistance:560 Ω				
	Voltage dc	0~5V,0~10V,1~5V,2~10V. Maximum load current:20mA.				
Remote SV Input	4~20mA , 0~20mA , 0~5V , 0~10V , 1~5V , 2~10V are available					
Communication	RS232 , RS485 , TTL					
	Baudrate : 9600 , 4800 , 2400 , 1200 , 300 , 110 bps.					
	Start bit : 1 , Stop bit : 1 , Odd parity					
WaterProof/DustProof	IP65(NEMA4)					

9 Order Information

Model & Suffix codes

Model	Output1	Output2	Alarm	TRS	Remote SV	Communication	Input Type	Power	Water/Dust Proof
FY400	— 1	0	1	0	0	0	— 02	— A	N
FY400	48x48mm 0 None	0 None	0 None	0 None	0 None	0 None	See Input Codes	A AC 85-265V	N None
FY600	96x48mm 1 Relay	1 Relay	1 1 Set	1 4-20mA	1 4-20mA	1 RS232		D DC 24V	W IP65
FY700	72x72mm 2 Voltage Pulse	2 Voltage Pulse 2	2 Sets 2	0-20mA	2 0-20mA	2 RS485			
FY800	48x96mm (SSR Drive)	(SSR Drive) 3	3 Sets A	0-5V	A 0-5V	3 TTL			
FY900	96x96mm (STANDARD)	3 4-20mA	3 4-20mA	B 0-10V	B 0-10V				
	4 0-20mA	4 0-20mA	C 1-5V	C 1-5V					
PFY400	48x48mm A 0-5V	A 0-5V	D 2-10V	D 2-10V					
PFY600	96x48mm B 0-10V	B 0-10V							
PFY700	72x72mm C 1-5V	C 1-5V							
PFY800	48x96mm D 2-10V	D 2-10V							
PFY900	96x96mm (RAMP/SOAK Programmable)	5 1 φ SCR ZERO CROSS CONTROL							
	6 3 φ SCR ZERO CROSS CONTROL								
	7 Motor valve control								
	8 1 φ SCR PHASE ANGLE CONTROL								
	9 3 φ SCR PHASE ANGLE CONTROL								

Combination of options and models O Available X Not available

Options Model	RAMP/SOAK PROGRAM	Output 1					Output2	Alarm2	Alarm3	Transmission	Remote SV	Communication	DC 24V Power
		1 φ SCR_Z	3 φ SCR_Z	Motor valve control	1 φ SCR_P	3 φ SCR_P							
FY400	O	O	X	O	X	X	O	O	X	O	X	O	O
FY600	O	X	X	O	O	X	O	O	O	O	O	O	O
FY700	O	O	X	O	O	X	O	O	X	O	O	O	O
FY800	O	X	X	O	O	X	O	O	O	O	O	O	O
FY900	O	O	O	O	O	O	O	O	O	O	O	O	O

Input type table

	TYPE	CODE	RANGE		TYPE	CODE	RANGE		TYPE	CODE	RANGE	
			TYPE	RANGE			TYPE	RANGE			TYPE	RANGE
TC	K	K1	01	0.0-200.0°C (392.0°F)	K2	02	0.0-400.0°C (752.0°F)	K3	03	0-600°C (1112°F)		
		K4	04	0-800°C (1472°F)	K5	05	0-1000°C (1832°F)	K6	06	0-1200°C (2192°F)		
	J	J1	07	0.0-200.0°C (392.0°F)	J2	08	0.0-400.0°C (752.0°F)	J3	09	0-600°C (1112°F)		
		J4	10	0-800°C (1472°F)	J5	11	0-1000°C (1832°F)	J6	12	0-1200°C (2192°F)		
	R	R1	13	0-1600°C (2912°F)	R2	14	0-1769°C (3216°F)					
	S	S1	15	0-1600°C (2912°F)	S2	16	0-1769°C (3216°F)					
	B	B1	17	0-1820°C (3308°F)								
	E	E1	18	0-800°C (1472°F)	E2	19	0-1000°C (1832°F)					
	N	N1	20	0-1200°C (2192°F)	N2	21	0-1300°C (2372°F)					
	T	T1	22	0.0-400.0°C (752.0°F)	T2	23	0.0-200.0°C (392.0°F)	T3	24	0.0-350.0°C (662.0°F)		
	W	W1	25	0-2000°C (3632°F)	W2	26	0-2320°C (4208°F)					
	PLII	PL1	27	0-1300°C (2372°F)	PL2	28	0-1390°C (2534°F)					
U	U1	29	-199.9-600.0°C (999.9°F)	U2	30	-199.9-200.0°C (392.0°F)	U3	31	0.0-400.0°C (752.0°F)			
L	L1	32	0-400°C (752°F)	L2	33	0-800°C (1472°F)						
RTD	JPT 100	JP1	41	-199.9-600.0°C (999.9°F)	JP2	42	-199.9-400.0°C (752.0°F)	JP3	43	-199.9-200.0°C (392.0°F)		
		JP4	44	0-200°C (392°F)	JP5	45	0-400°C (752°F)	JP6	46	0-600°C (1112°F)		
	DPT 100	DP1	47	-199.9-600.0°C (999.9°F)	DP2	48	-199.9-400.0°C (752.0°F)	DP3	49	-199.9-200.0°C (392.0°F)		
		DP4	50	0-200°C (392°F)	DP5	51	0-400°C (752°F)	DP6	52	0-600°C (1112°F)		
	JPT 50	JP.1	53	-199.9-600.0°C (999.9°F)	JP.2	54	-199.9-400.0°C (752.0°F)	JP.3	55	-199.9-200.0°C (392.0°F)		
		JP.4	56	0-200°C (392°F)	JP.5	57	0-400°C (752°F)	JP.6	58	0-600°C (1112°F)		

	TYPE	CODE	RANGE	
			TYPE	RANGE
LINEAR	AN1	61	-10-10mV	
		62	-2-2V	
		63	-5-5V	
		64	-10-10V	
	AN2	71	0-10mV	
	AN3	76	0-20mV	
	AN4	81	0-50mV	-1999-9999
		82	0-20mA	or -199.9-999.9
		83	0-1V	or -19.99-99.99
		84	0-5V	or -1.999-9.999
		85	0-10V	
	AN5	91	10-50mV	
		92	4-20mA	
		93	1-5V	
94		2-10mV		