

User's Manual



Chromalock Digital Controller

PID-48/PID-486H/PID-72/PID-486/PID-96



PID-48



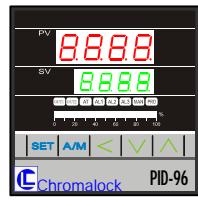
PID-486H



PID-72



PID-486



PID-96

1 Notice

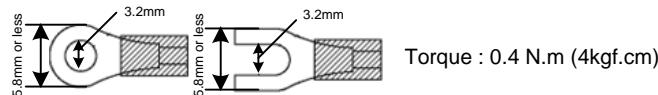
Please confirm the specification of controllers is to totally with your requirement before using it, also read this user's manual in detail.

⚠ 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

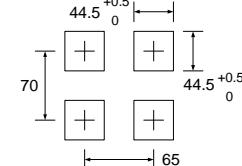
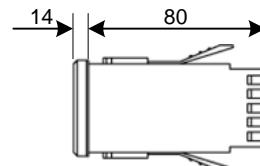
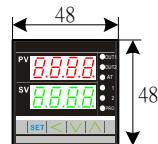
1. Please confirm the AC power wiring to controller is correct, otherwise it would be caused aggravated damage on controller. (FY400 connecting with Pin 1 and 6,FY600/700/800/900 with Pin 1 and 2).
2. Be sure to use the rated power supply(AC85~265V or DC24V), otherwise it would be caused aggravated damage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



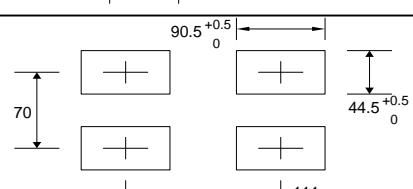
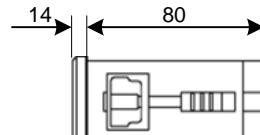
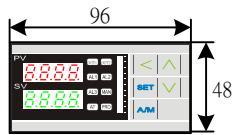
5. Avoid to install controller in following spaces :
 - I. A place where the ambient temperature may reach beyond the range from 0 to 50°C
 - II. A place where the ambient humidity may reach beyond the range from 50 to 85% RH.
 - III. A place where the controller likely to come into contact with water ,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 >

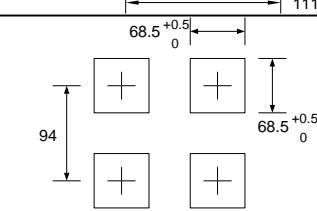
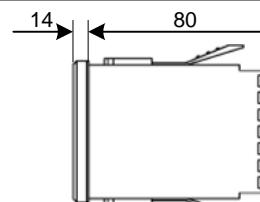
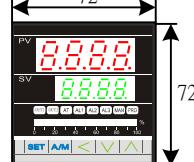
PID-48



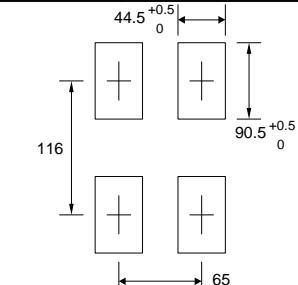
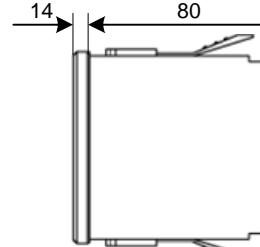
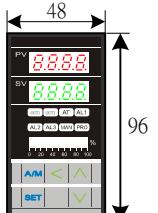
PID-486H



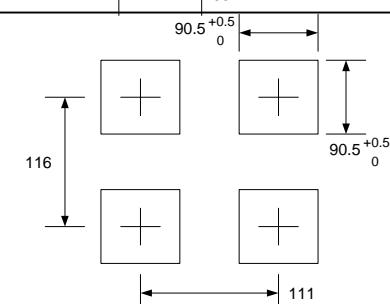
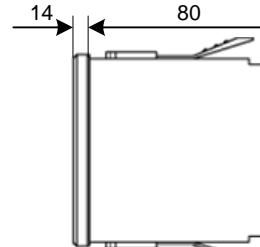
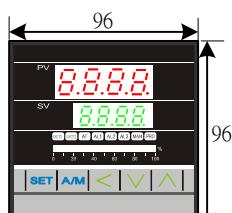
PID-72



PID-486

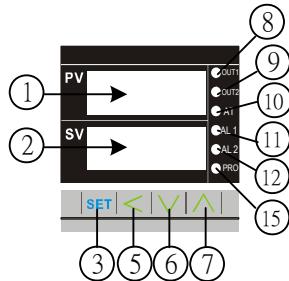


PID-96

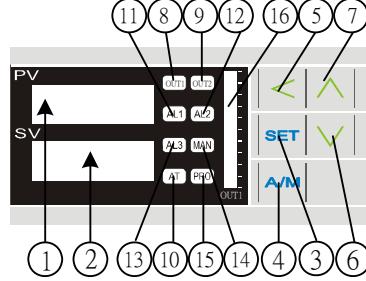


3 Parts Description

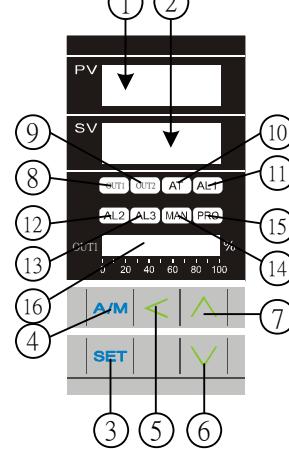
PID-48



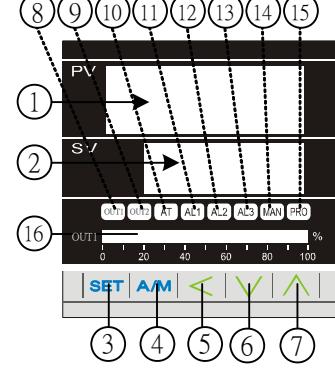
PID-486H



PID-486



PID-72/PID-96

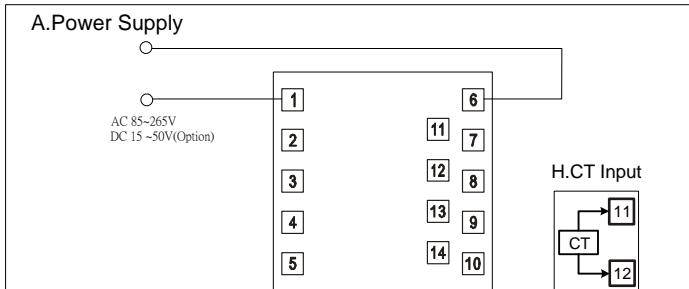


SYMBOL	NAME	FUNCTION
PV	① Measured value (PV) display	Displays PV or various parameter symbols (Red)
SV	② Setting value (SV) display	Displays SV or various parameter set values (Green)
SET	③ Set key	Used for parameter calling up and set value registration
A/M	④ Auto/Manual key	Switches between Auto(PID)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

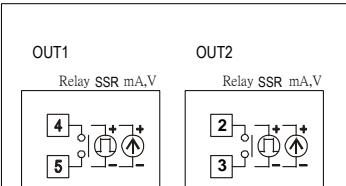
SYMBOL	NAME	FUNCTION
OUT1	⑧ OUT1 lamp	Lights when OUT1 is on (Green)
OUT2	⑨ OUT2 lamp	Lights when OUT2 is on (Green)
AT	⑩ Autotuning lamp	Lights when Autotuning is activated (Orange)
AL1	⑪ Alarm 1 lamp	Lights when Alarm 1 is activated (Red)
AL2	⑫ Alarm 2 lamp	Lights when Alarm 2 is activated (Red)
AL3	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

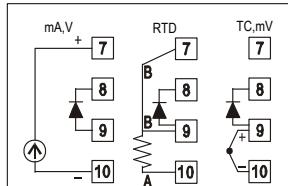
PID-48



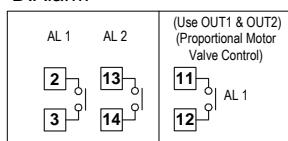
B.Control Output



C.Input



D.Alarm



(Option)

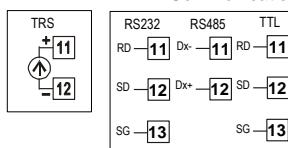
OUT1 (1ΦZero Cross Control)

- [11] G1
- [12] K1
- [13] G2
- [14] K2

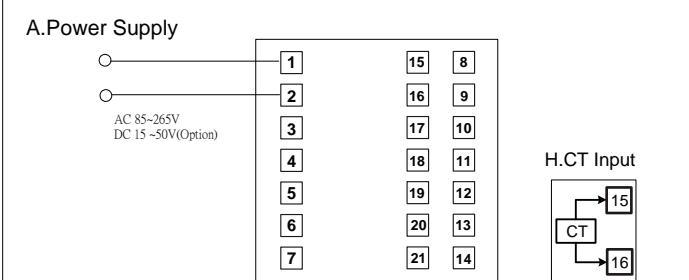
OUT1 (Proportional Motor Valve Control)

- [2] CLOSE
- [3] OPEN
- [5] COM

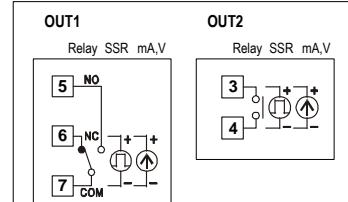
E.Retransmission F.Communication



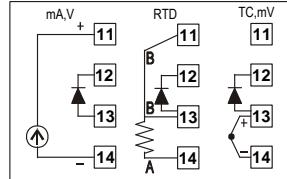
PID-72



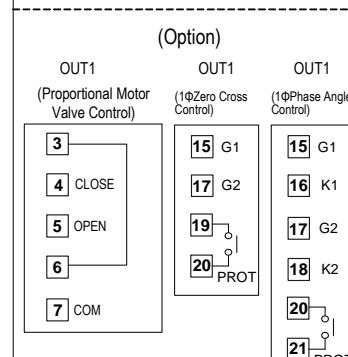
B.Control Output



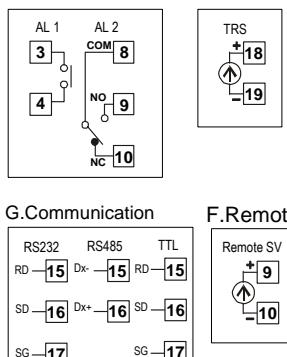
C.Input



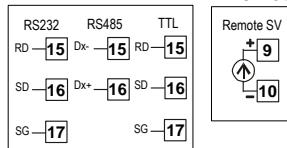
D.Alarm



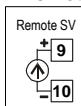
E.Retransmission

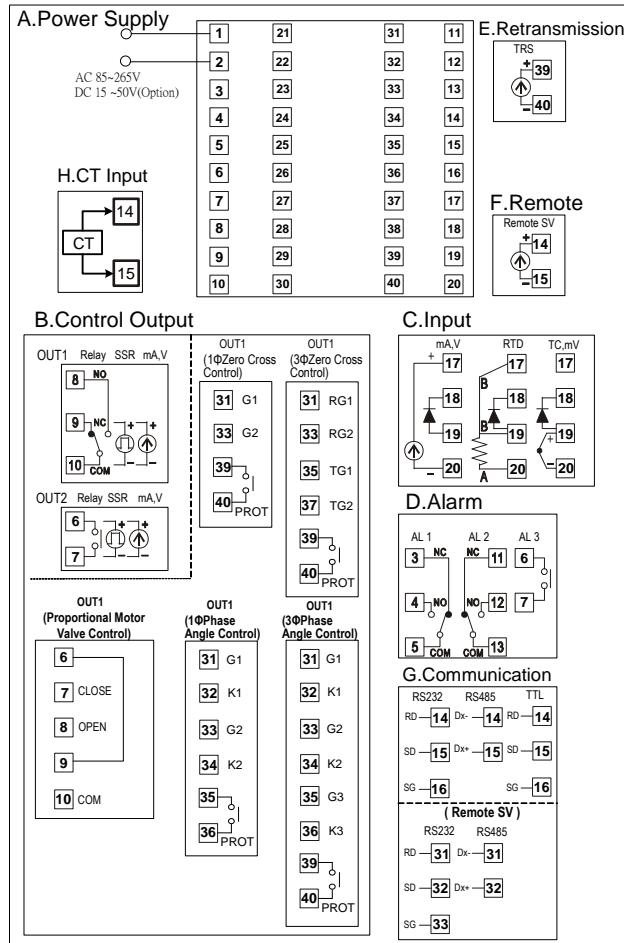
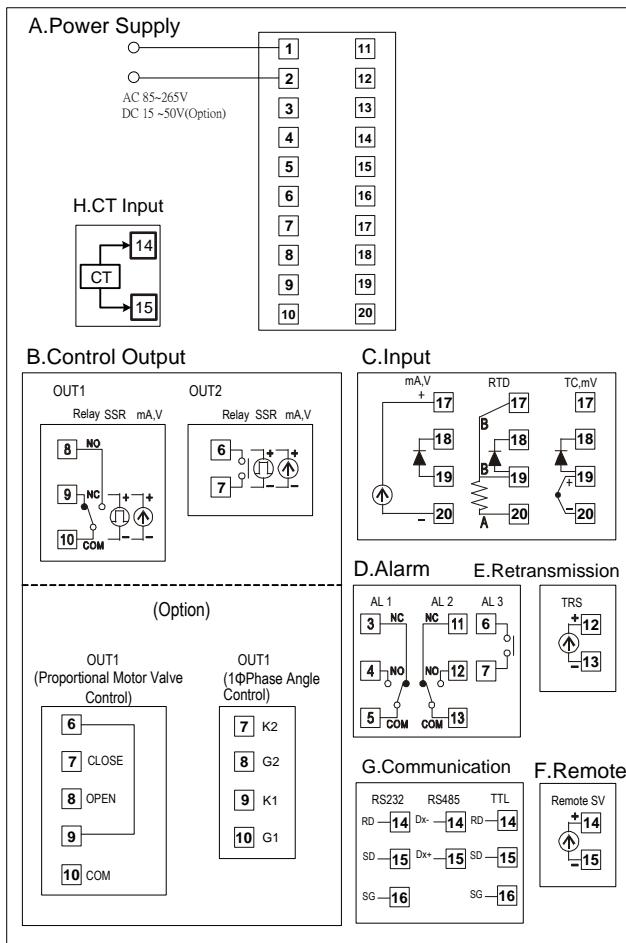


G.Communication



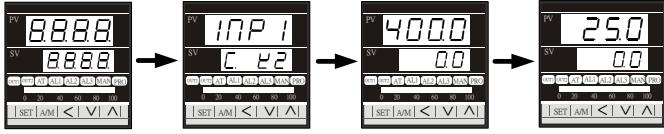
F.Remote





5 Operations

1. Power ON: Controller will display as following



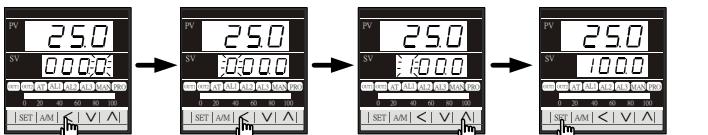
Light all LEDs and all 7 segment displays

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

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

Press **SET** Key

To select the hundreds digit. To change the number to 1.

Press **SET** Key

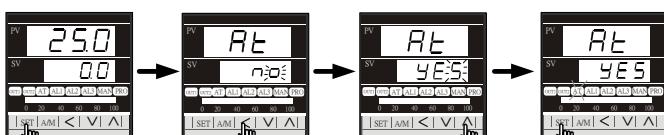
To change the number to 1. To store the new set value.

Press **SET** Key

To store the new set value.

3. Autotuning (AT):

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



Press **SET** Key
To display parameter AT.

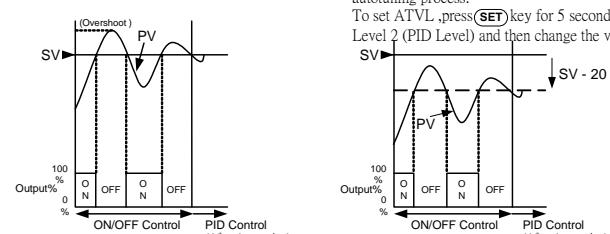
Press **SET** Key
To change AT setting.

Press **SET** Key
Change AT to "YES"

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

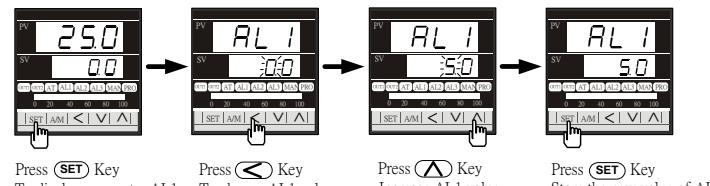
Autotuning
ATVL=0

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 **SET** Key
To change AL1 value

Press **SET** 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**+ **SET** 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 HIGH → PV	07	Segment End alarm (Only for Programmable controller)
11	Deviation high alarm	OFF ON LOW HIGH → PV	05	Process high alarm with hold action*	OFF ON LOW HIGH → PV	12	(1) ALD1~3, set 07 (2) ALD1~3=Alarm Segment (3) ALT1~3 defines as follows: 0 =flicker alarm 99.99 =continued alarm others =alarm ON time
02	Deviation low alarm with hold action*	ON OFF LOW HIGH → PV	15	Process high alarm	OFF ON LOW HIGH → PV	17	Program Run alarm (Only for Programmable controller)
12	Deviation low alarm	ON OFF LOW HIGH → PV	06	Process low alarm with hold action*	ON OFF LOW HIGH → PV	08	System failed alarm* (ON)
03	Deviation high/low alarm with hold action*	ON OFF ON HIGH → PV	16	Process low alarm	ON OFF LOW HIGH → PV	18	System failed alarm* (OFF)
13	Deviation high/low alarm	ON OFF ON HIGH → PV	17	Heater Break Alarm (HBA)		09	No alarm
10			18			10	

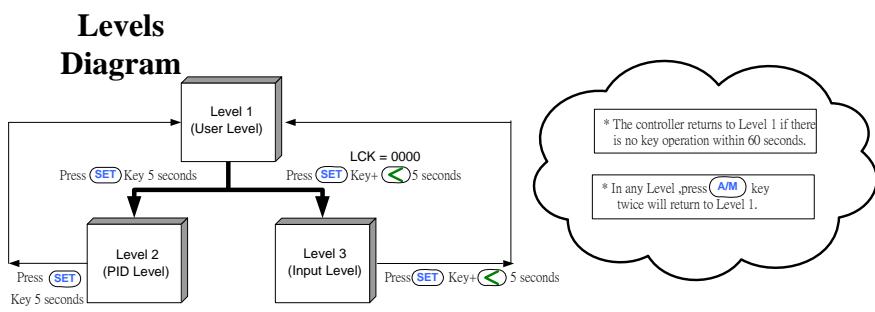
*Hold action:

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 following : "UUU1" or "NNN1" or "CJCE"

6 Parameter List



Parameter	Default Value	Description
-----------	---------------	-------------

Level 1 (User Level)

Process Value	<input type="text" value="P11"/> 5.0	Proportional band 1 (For output 1)	Range : 0.0~200.0% ON/OFF control if set to 0 (0.0)
Set Value	<input type="text" value="LCK"/> 0000	Integral time 1 (For output 1)	Range : 0~3600 seconds PD control if set to 0
Output Limit	<input type="text" value="DL1"/> 1000	Derivative time 1 (For output 1)	Range : 0~900 seconds PI control if set to 0
Autotuning	<input type="text" value="AL1"/> YES/no	Dead-band time	Don't care
Alarm 1 set value	<input type="text" value="RL1"/> 0.0	Auto tuning offset value	Range : 0~USPL
Heater current display (HBA set value)	<input type="text" value="C00"/> 0.0	Output 1 cycle time	Range : 0~150 seconds Relay output : 10 Voltage pulse output : 1 , mA output: 0
Alarm 2 set value	<input type="text" value="RL2"/> 0.0	Hysteresis for output 1 ON/OFF control	Range : 0~1000
Alarm 3 set value	<input type="text" value="RL3"/> 0.0	Proportional band 2 (For output 2)	The same with P1
		Integral time 2 (For output 2)	The same with I1
		Derivative time 2 (For output 2)	The same with D1
		Output 2 Cycle time	The same with CYT1
		Hysteresis for output 2 ON/OFF control	The same with HYS1
		Control gap 1 (For output 1)	Set point of output 1 (Heating side) =SV - GAP1
		Control gap 2 (For output 2)	Set point of output 2 (Cooling side) =SV + GAP2
		Function lock	
			Return to "P1"

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

Level 3 (Input Level)

<input type="text" value="INP1"/> LCK	Set	Input type selection
<input type="text" value="RNL1"/> 0	Set	Analog input low limit calibration (Used for mA and V input) Range : -1999 ~ 9999
<input type="text" value="RNH1"/> 5000	Set	Analog input high limit calibration (Used for mA and V input) Range : 0 ~ 9999
<input type="text" value="DP"/> 0.000	Set	Decimal point position (Available for mA and V input) 0000 , 000.0 , 00.00 , 0.000
<input type="text" value="LSPL"/> 0.0	Set	Lower Set-Point Limit Scaling Low Limit
<input type="text" value="USPL"/> 400.0	Set	Upper Set-Point Limit Scaling High Limit
<input type="text" value="RNL2"/> 0	Set	Remote input low limit calibration Range : -1999 ~ 9999
<input type="text" value="RNH2"/> 5000	Set	Remote input high limit calibration Range : 0 ~ 9999
<input type="text" value="RLd1"/> 11	Set	Alarm mode of AL1 Range:0~19 Refer to "Alarm mode type"
<input type="text" value="RLd1"/> 55.59	Set	Alarm time of AL1 Range : 0~99 Min 59 Secs 0=Flicker Alarm ; 99:59=Continued Others=On delay time (If ALD=07 , ALT means alarm on time)
<input type="text" value="RLd2"/> 0	Set	Alarm mode of AL2 The same with ALD1
<input type="text" value="RLd2"/> 55.59	Set	Alarm time of AL2 The same with ALT1
<input type="text" value="RLd3"/> 0	Set	Alarm mode of AL3 The same with ALD1
<input type="text" value="RLd3"/> 55.59	Set	Alarm time of AL3 The same with ALT1
<input type="text" value="HYSR"/> 0.0	Set	Hysteresis of all Alarm Range : 0~1000
<input type="text" value="EL01"/> 230	Set	Output 1 low limit calibration (Used for mA and V output) Range : 0 ~ 9999
<input type="text" value="EL01"/> 3600	Set	Output 1 high limit calibration (Used for mA and V output) Range : 0 ~ 9999
<input type="text" value="EL02"/> 230	Set	Output 2 low limit calibration (Used for mA and V output) Range : 0 ~ 9999
<input type="text" value="EL02"/> 3600	Set	Output 2 high limit calibration (Used for mA and V output) Range : 0 ~ 9999
<input type="text" value="CL03"/> 0	Set	Retransmission low limit calibration Range : 0 ~ 9999
<input type="text" value="CL03"/> 5000	Set	Retransmission high limit calibration Range : 0 ~ 9999
<input type="text" value="ULC4"/> 5	Set	Full run time of proportional motor (Used for proportional motor valve control output) Range : 5~200 seconds
<input type="text" value="GR1t"/> 0.0	Set	Used for programmable controller to wait continued operation 0=Not wait Others=Wait value
<input type="text" value="SELR"/> 0000	Set	
<input type="text" value="PSL"/> REU	Set	Communication Protocol Selection MODBUS RTU / MODBUS ASCII / TAIE
<input type="text" value="BL5"/> BL1	Set	Communication Bits Configuration O_ 81 / O_ 82 / E_ 81 / E_ 82
<input type="text" value="IDR"/> 1	Set	ID number Range : 0 ~ 255
<input type="text" value="BRUD"/> 384	Set	Baudrate 2400 / 4800 / 9600 / 19200 / 38400 bps
<input type="text" value="SVD5"/> 0.0	Set	SV compensation Range : -1000~1000
<input type="text" value="PV05"/> 0.0	Set	PV compensation Range : -100.0~500.0
<input type="text" value="UNI1e"/> C	Set	Unit of PV & SV C(°C) / F(°F) / A(Analog)
<input type="text" value="PVFF"/> 200	Set	PV Filter PV will response faster if PVFT is smaller.
<input type="text" value="CRSC"/> 0.0	Set	Reserved
<input type="text" value="DUD"/> HERe	Set	Action mode Heat / Cool
<input type="text" value="DPRd"/> P,i,d	Set	Control algorithm PID / Fuzzy
<input type="text" value="HZ"/> 60Hz	Set	Frequency 50 / 60HZ
		Return to "INP1"

8 Specifications

Standard Spec.

Model	PID-48	PID-486H	PID-72	PID-486	PID-96
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	PT100 , 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			
Output 1	DP Position				
	0000 , 000.0 , 00.00 , 0.000 (available for mA or Voltage dc input)				
	Main control output				
	Relay	SPST 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.			
Output 2	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
		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	20~90% 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	PID-48	PID-486H	PID-72	PID-486	PID-96
Programmable RAMP/SOAK	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 , SSR , 4~20mA , 0~20mA , 0~5V , 0~10V , 1~5V , 2~10V				
Alarm 2	SPST type 3A , 220V , electrical life : 100,000 times or more(under the rated load).	SPDT type	SPDT type	SPDT type	SPDT type
Alarm 3	Not available 3A , 220V , electrical life : 100,000 times or more(under the rated load).	Available SPST type	Available SPST type	Available SPST type	Available SPST type
Heater Break Alarm (HBA)	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				
Transmission	Available for PV or SV transmission 4~20mA , 0~20mA , 0~1V , 0~5V , 0~10V , 1~5V , 2~10V				
Remote SV Input	4~20mA , 0~20mA , 0~1V , 0~5V , 0~10V , 1~5V , 2~10V				
Communication	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.				
	WaterProof/DustProof				
	IP65				

9 Order Information

Model & Suffix codes

Model	Output1	Output2	Alarm	TRS	Remote SV	Communication	Input Type	Power	Water/Dust Proof
PID-48	—	1	0	1	0	0	02	A	N
PID48 48x48mm	0	None	0	None	0	None	None	AC 85~265V	None
PID486H96x48mm	1	Relay	1	Relay	1	1 Set	RS232	A	RS232 Codes
PID72 72x72mm	2	Voltage Pulse (SSR Drive)	2	Voltage Pulse (SSR Drive)	2	2 Sets	RS485	D	DC 24V
PID486 48x96mm	3	4~20mA	3	4~20mA	A	0~5V	TTL		IP65
PID96 96x96mm (STANDARD)	4	0~20mA	4	0~20mA	B	0~10V	RS232_MODBUS		
					C	1~5V	RS485_MODBUS		
					D	2~10V			
P PID48 48x48mm	A	0~5V	B	0~10V	A	HBA *			
P PID486H96x48mm	B	0~10V	C	1~5V	B	HBA + AL2			
P PID72 72x72mm	C	1~5V	D	2~10V	C	HBA + AL2+AL3			
P PID48648x96mm	D	2~10V							
(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							

* HBA: Heater Break Alarm (HBA must use AL1 as alarm relay)
 * ■ Block means option functions with additional charge

Combination of options and models O Available X Not available

Options Model	RAMP/SOAK PROGRAM	Output 1					Output2	Alarm2	Alarm3	HBA	TRS	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								
PID-48	O	O	X	O	X	X	O	O	X	O	O	O	O	O
PID-486H	O	X	X	O	O	X	O	O	O	O	O	O	O	O
PID-72	O	O	X	O	O	X	O	O	O	O	O	O	O	O
PID-486	O	X	X	O	O	X	O	O	O	O	O	O	O	O
PID-96	O	O	O	O	O	O	O	O	O	O	O	O	O	O

* HBA function and Remote SV function can not be specified in the same model

Input type table

	TYPE	CODE	RANGE	TYPE	CODE	RANGE	TYPE	CODE	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)
RTD	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)			
	JP100	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	0~600.0°C (1112°F)
	PT100	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)
	JPT50	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
LINEAR	AN1	61	-10~10mV
		62	-2~2V
		63	-5~5V
		64	-10~10V
	AN2	71	0~10mV
		76	0~20mV
		81	0~50mV
		82	0~20mA
	AN4	83	0~1V
		84	0~5V
		85	0~10V
		86	0~5KR
	AN5	87	0~2V
		91	10~50mV
		92	4~20mA
		93	1~5V
		94	2~10mV