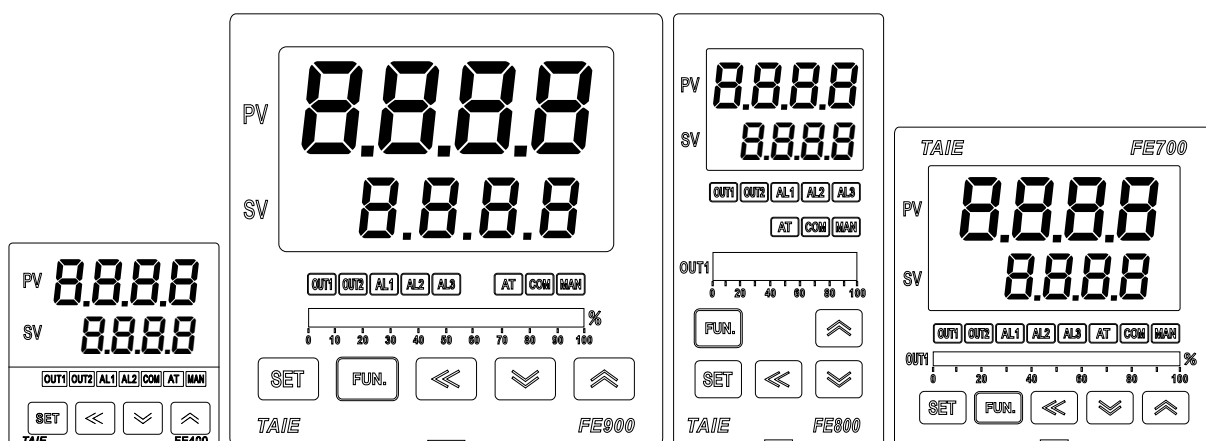

Digital Temperature Controller

Model: FE400/700/800/900

Ver 2.7

Operation Manual



台灣儀控股份有限公司

TAIWAN INSTRUMENT & CONTROL CO., LTD

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Thanks for purchase FE series Digital Temperature Controller.
 Before using controller, please make sure the spec and type is correspond your demand.
 Please check the Voltage` Frequency and input/output range.
 Please follow the operation manual and pass the user to keep it.
 FE series controller is the newest generation using the latest technology and SMT equipment plus our
 plentiful exploitation experience to publish it.

1. Notice



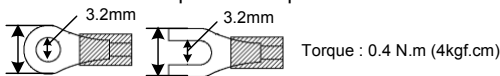
Warning

1. Danger! Electric Shock!
2. DON'T touch AC power wiring terminals when controller has been activated!
3. Make sure the power off until all of the wirings are completed!



Warning

1. Please confirm the AC power wiring to controller is correct, otherwise it will be caused an aggravated damage on controller.
2. Make sure to use the rated power supply (AC85~265V or DC24V), otherwise it will be caused severely damage on controller.
3. Please confirm wirings are connected with correct terminals (Input, Output, Alarm).
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 ~ 50°C
 - II. A place where the ambient humidity may reach beyond the range from 20 ~ 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 3 wires.

2. Order information

| | Output 1 | Output 2 | Alarm | TRS | Remote | COMM | Input type | Power |
|-------|-----------------------------|-----------------------------|---------------|----------|---------------|----------|---------------------------|--------------|
| FE400 | 1 | 0 | 1 | 0 | 0 | 0 | 0 1 | A |
| FE700 | | | | | | | | |
| FE800 | 0 None | 0 None | 0 None | 0 None | 0 None | 0 None | See input Range type code | A AC 85~265V |
| FE900 | 1 Relay | 1 Relay | 1 1 Set | 1 4~20mA | 1 4~20mA | B RS-485 | | D DC 24V |
| | 2 Voltage Pulse (SSR Drive) | 2 Voltage Pulse (SSR Drive) | 2 2 Sets | 2 0~20mA | 2 0~20mA | | | |
| | 3 4~20mA | 3 4~20mA | 3 3 Sets | A 0~5V | A 0~5V | | | |
| | 4 0~20mA | 4 0~20mA | | B 0~10V | B 0~10V | | | |
| | A 0~5V | A 0~5V | | C 1~5V | C 1~5V | | | |
| | B 0~10V | B 0~10V | A HBA | D 2~10V | D 2~10V | | | |
| | C 1~5V | C 1~5V | B HBA+AL2 | | E DI | | | |
| | D 2~10V | D 2~10V | C HBA+AL2+AL3 | | F Remote + DI | | | |

※ : ■ Block means optional functions with additional charge.

3. Specifications

| Model | | FE400 | FE700 | FE800 | FE900 |
|---|----------------|--|-----------------|-----------------|-----------------|
| Power supply voltage | | 85 ~ 265 VAC, DC 24V (Optional) | | | |
| Frequency | | 50/60 Hz | | | |
| Power consumption | | Approx. 6VA | | | |
| Memory | | Non-volatile memory EEPROM | | | |
| Sensor input ※ Please refer to input range table | | Accuracy : 0.2% FS | | | |
| | | Sample time 50ms | | | |
| | | TC : K、J、R、S、B、E、N、T、W、PL II、L | | | |
| | | RTD : PT100 | | | |
| | | Linear : 0~20mA、4~20mA 0~1V、0~5V、0~10V、0~2V、1~5V、2~10V 0~25mV、0~50mV、10~50mV、0~70mV | | | |
| Control output | Output 1 Relay | 1a | 1c | 1c | 1c |
| | | 1a SPST-NO, 250 VAC, 8A (resistive load), electrical life: 100,000 operations 1c SPDT-NO, 250 VAC, 5A (resistive load), electrical life: 50,000 operations SPDT-NC, 250 VAC, 2A (resistive load), electrical life: 20,000 operations | | | |
| | Output 2 Relay | SPST-NO, 250 VAC, 8A (resistive load), electrical life: 100,000 operations | | | |
| | SSR driver | ON: 24 V OFF: 0V max. load current: 20 mA, with short-circuit protection circuit | | | |
| Linear | | 4~20mA, 0~20mA, 0~5V, 0~10V, 1~5V, 2~10V | | | |
| Control method | | ON-OFF or P,PI,PID control | | | |
| Alarm output | Alarm 1 | 1a | 1a | 1c | 1c |
| | | 1a SPST-NO, 250VAC, 8A (resistive load), electrical life: 100,000 operations 1c SPDT-NO, 250VAC, 5A (resistive load), electrical life: 50,000 operations SPDT-NC, 250VAC, 2A (resistive load), electrical life: 20,000 operations | | | |
| | Alarm 2 | SPST-NO, 250VAC, 8A (resistive load), electrical life: 100,000 operations | | | |
| | Alarm 3 | --- | 1a | 1a | 1a |
| SPST-NO, 250VAC, 8A (resistive load), electrical life: 100,000 operations | | | | | |
| Transmission | | Signal : 4~20mA、0~20mA、0~5V、0~10V、1~5V、2~10V Channel : SV,PV,SV2,PV2,OP1 | | | |
| Remote SV | | Signal : 4~20mA、0~20mA、0~5V、0~10V、1~5V、2~10V | | | |
| Digit input | | 2 points | | | |
| Communication | Interface | RS-485 Maximum unit : 32 pcs Maximum distance : 1200m | | | |
| | Protocol | Modbus RTU , TAIE | | | |
| | Parity | None , odd , even | | | |
| | Data bit | 8bit | | | |
| | Stop bit | 1 or 2 bit | | | |
| | Baud rate | 2400,4800,9600,19200,38400,57600,115200 bps | | | |
| | Delay time | 0~250ms | | | |
| Special features | | 3 SV choose(SV1,SV2,SV3), Power-on soft start, Timer function (1 minute to 99 hours,59 minutes) | | | |
| Operating temperature humidity | | 0 ~ 50°C (with no icing or condensation) 20% ~ 90% RH | | | |
| Storage temperature | | -25 ~ 65°C (with no icing or condensation) | | | |
| Dimension (mm) | | W48 x H48 x D91 | W72 x H72 x D73 | W48 x H96 x D73 | W96 x H96 x D73 |
| Weight (approx.) | | 120g | 150g | 170g | 230g |

4. Input range table

| Model | Input type | | Code | Range | |
|--------|------------|--------|------|--|--------------|
| | | | | °C | °F |
| TC | K | K1 | 01 | -50.0~400.0 | -50.0~750.0 |
| | | K2 | 02 | 0~1200 | 0~2190 |
| | J | J1 | 03 | -50.0~400.0 | -50.0~750.0 |
| | | J2 | 04 | 0~1200 | 0~2190 |
| | R | R | 05 | 0~1760 | 0~3200 |
| | S | S | 06 | 0~1760 | 0~3200 |
| | B | B | 07 | 0~1820 | 0~3300 |
| | E | E | 08 | 0~900 | 0~1650 |
| | N | N | 09 | 0~1300 | 0~2370 |
| | T | T1 | 10 | -199.9~400.0 | -199.9~750.0 |
| | | T2 | 11 | -199~400 | -199~750 |
| | W | W | 12 | 0~2320 | 0~4200 |
| | PL II | PL II | 13 | 0~1200 | 0~2190 |
| | L | L | 14 | 0~800 | 0~1470 |
| RTD | PT100 | DP1 | 15 | -199.9~600.0 | -199.9~999.9 |
| | | DP2 | 16 | -199~600 | -199~1110 |
| | | DP3 | 17 | 0~600 | 0~1110 |
| Linear | AN1 | 0~25mV | 18 | -1.999~9.999 -19.99~99.99 -199.9~999.9 -1999~9999 | |
| | AN2 | 0~50mV | 19 | | |
| | | 0~20mA | 20 | | |
| | | 4~20mA | 21 | | |
| | | 0~1V | 22 | | |
| | | 0~5V | 23 | | |
| | | 0~10V | 24 | | |
| | | 0~2V | 25 | | |
| | | 1~5V | 26 | | |
| | | 2~10V | 27 | | |
| | | other | 28 | | |
| | AN3 | 0~70mV | 29 | | |

5. Packing list & Label information

5.1 Packing list

FE400 packing list :

- | |
|---|
| <ol style="list-style-type: none"> 1. Temperature Controller1pcs 2. Mounting frame.....1pcs 3. Terminal protect cover.....1pcs 4. Manual.....1pcs |
|---|

FE700/800 packing list :

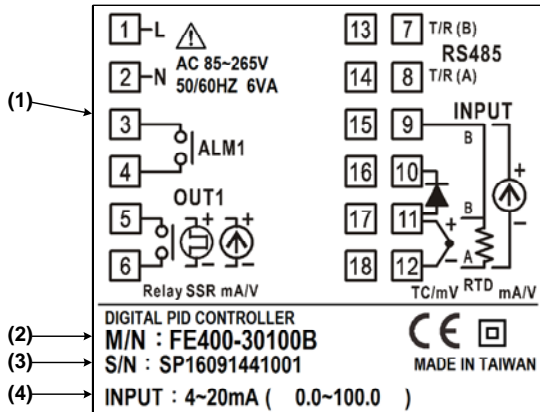
- | |
|---|
| <ol style="list-style-type: none"> 1. Temperature Controller1pcs 2. Mounting frame.....2pcs 3. Terminal protect cover.....1pcs 4. Manual.....1pcs |
|---|

FE900 packing list :

- | |
|---|
| <ol style="list-style-type: none"> 1. Temperature Controller1pcs 2. Mounting frame.....2pcs 3. Terminal protect cover.....2pcs 4. Manual.....1pcs |
|---|

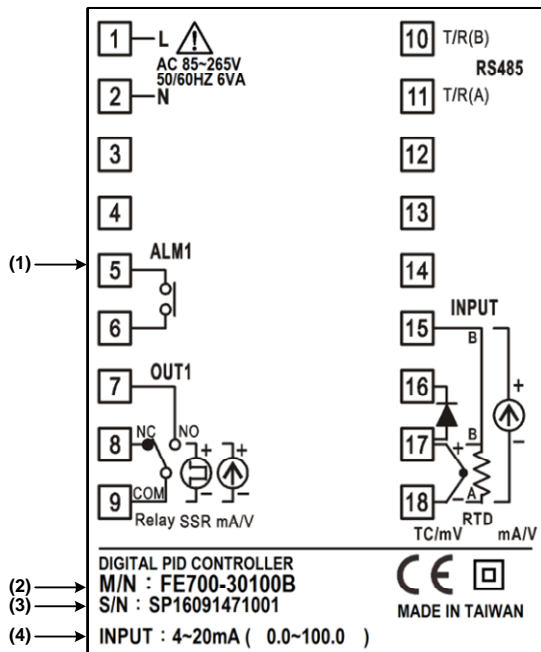
5.2 Label Explanation

5.2.1 FE400 label



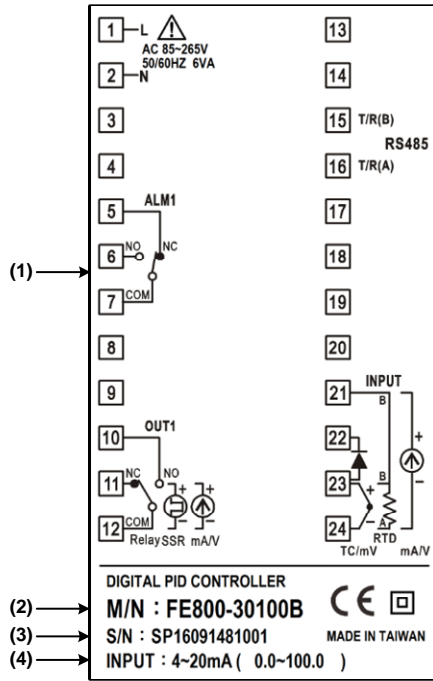
| NO. | Explanation | Indication Example |
|-----|----------------------|------------------------------------|
| (1) | Terminal arrangement | Terminal arrangement for the FE400 |
| (2) | Model Number | FE400-30100B |
| (3) | Series Number | 16091441001 |
| (4) | Input type | Multi-range (Multi-range input) |

5.2.2 FE700 label



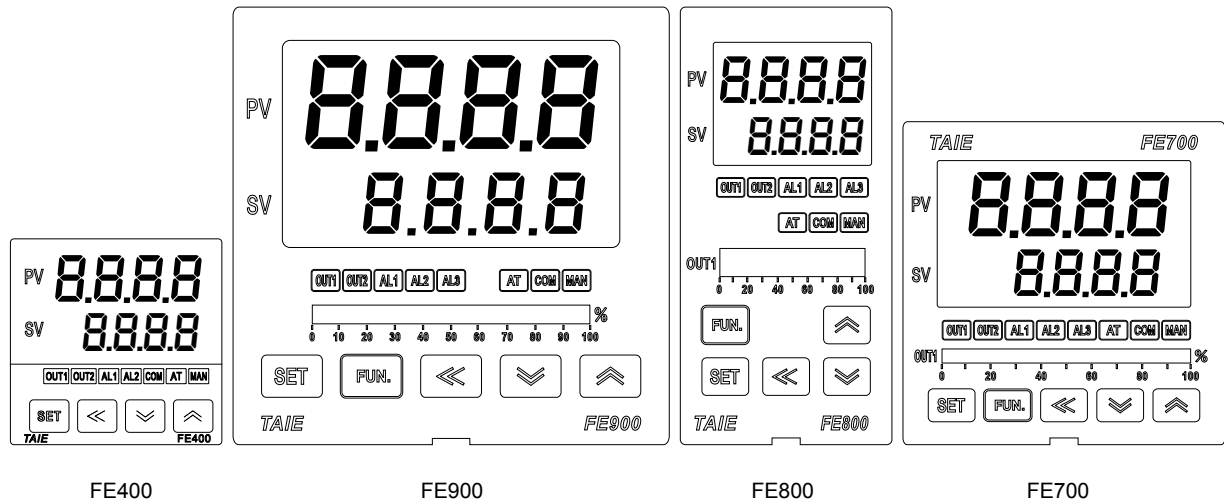
| NO. | Explanation | Indication Example |
|-----|----------------------|------------------------------------|
| (1) | Terminal arrangement | Terminal arrangement for the FE700 |
| (2) | Model Number | FE700-30100B |
| (3) | Series Number | 16091471001 |
| (4) | Input type | Multi-range (Multi-range input) |

5.2.3 FE800/900 label



| NO. | Explanation | Indication Example |
|-----|----------------------|------------------------------------|
| (1) | Terminal arrangement | Terminal arrangement for the FE800 |
| (2) | Model Number | FE800-30100B |
| (3) | Series Number | 16091481001 |
| (4) | Input type | Multi-range (Multi-range input) |

6. Parts description

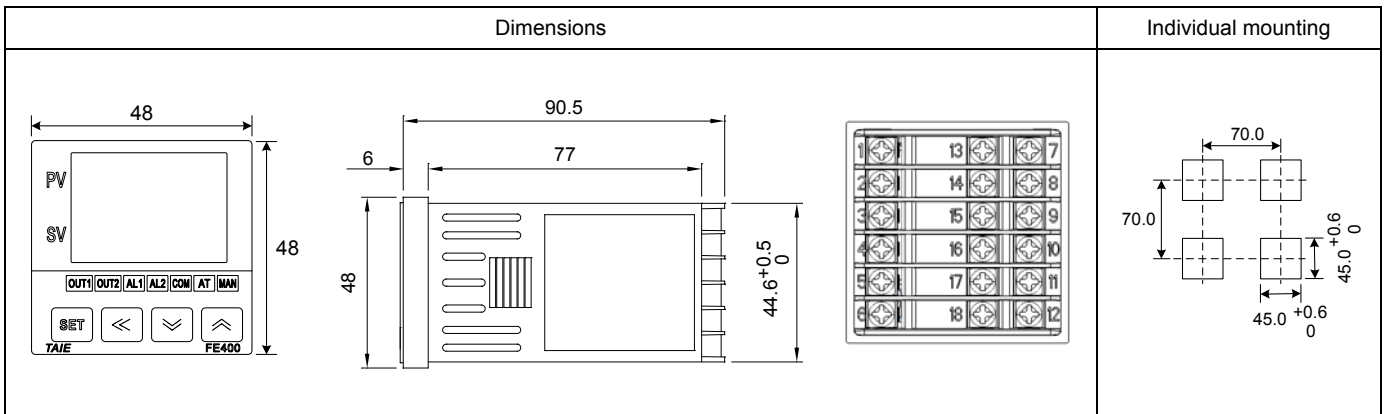


| | | | | |
|---|--------|-----|--|--|
| | 1 | PV | Indicates PV (measured value) and character information such as parameter codes and error codes(Red) | |
| | 2 | SV | Indicates SV (target set value) and parameter values(Green) | |
| | 3 | LED | OUT1 | Lamp lit when OUT1 is activated (Orange) |
| | | | OUT2 | Lamp lit when OUT2 is activated (Orange) |
| | | | AL1 | Lamp lit when Alarm 1 is activated (Red) |
| | | | AL2 | Lamp lit when Alarm 2 is activated (Red) |
| | | | COM | Lamp lit when controller response data (Orange) |
| | | AT | Lamp lit when Auto tuning is activated (Orange) | |
| | | MAN | Lamp lit when controller in manual mode or get error condition (Orange) | |
| 4 | Keypad | SET | SET | Used for parameter calling up and set value registration |
| | | << | SHIFT | Shift digits when settings are changed |
| | | >> | DOWN | Decrease numerals |
| | | << | UP | Increase numerals |

7. Installation

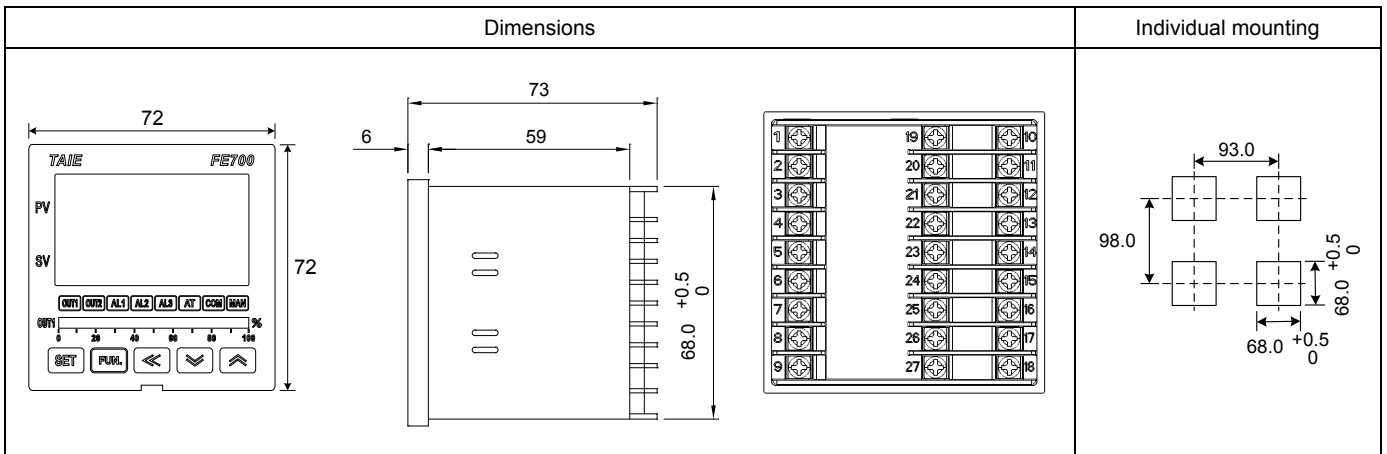
7.1 FE400 Dimensions

(Unit : mm)



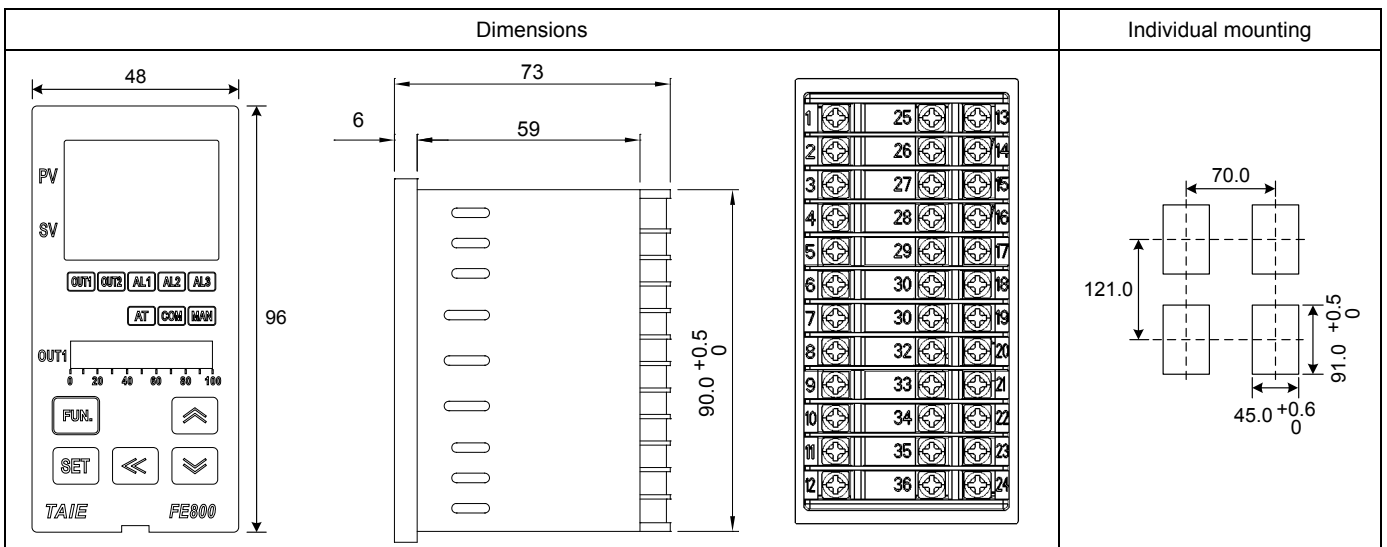
7.2 FE700 Dimensions

(Unit : mm)



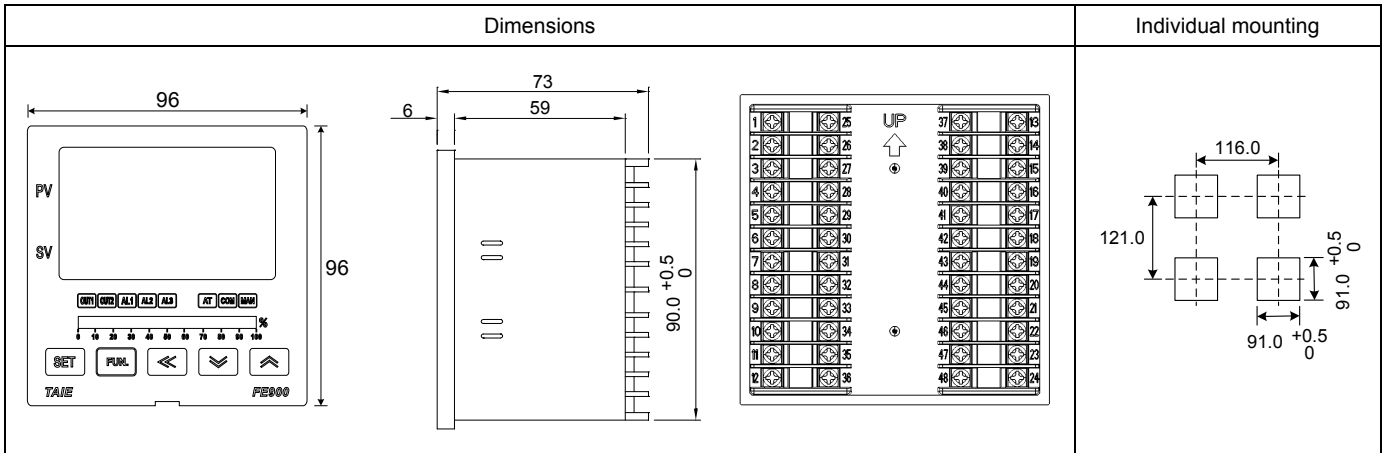
7.3 FE800 Dimensions

(Unit : mm)



7.4 FE900 Dimensions

(Unit : mm)

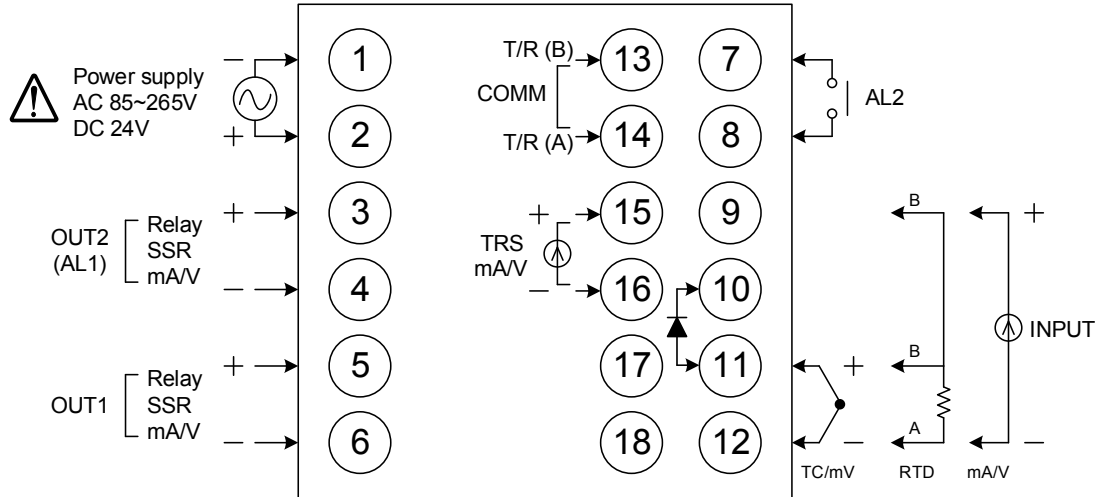


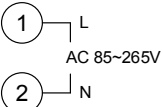
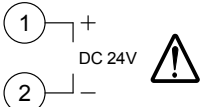
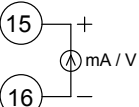
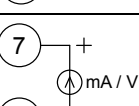
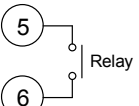
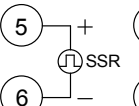
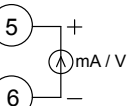
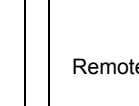
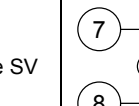
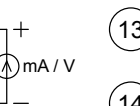
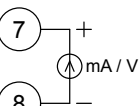
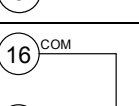
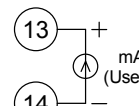

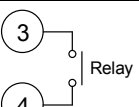
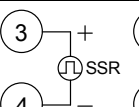
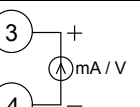
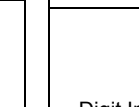
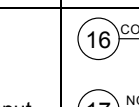
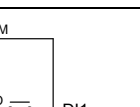
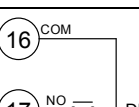


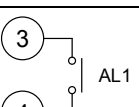
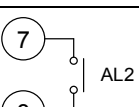

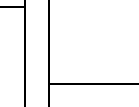
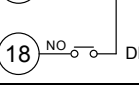



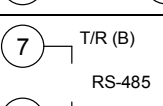
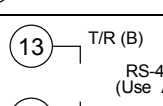
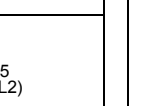
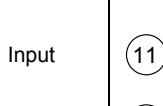
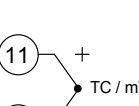
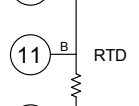
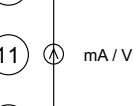

8. Terminal arrangement

Notice

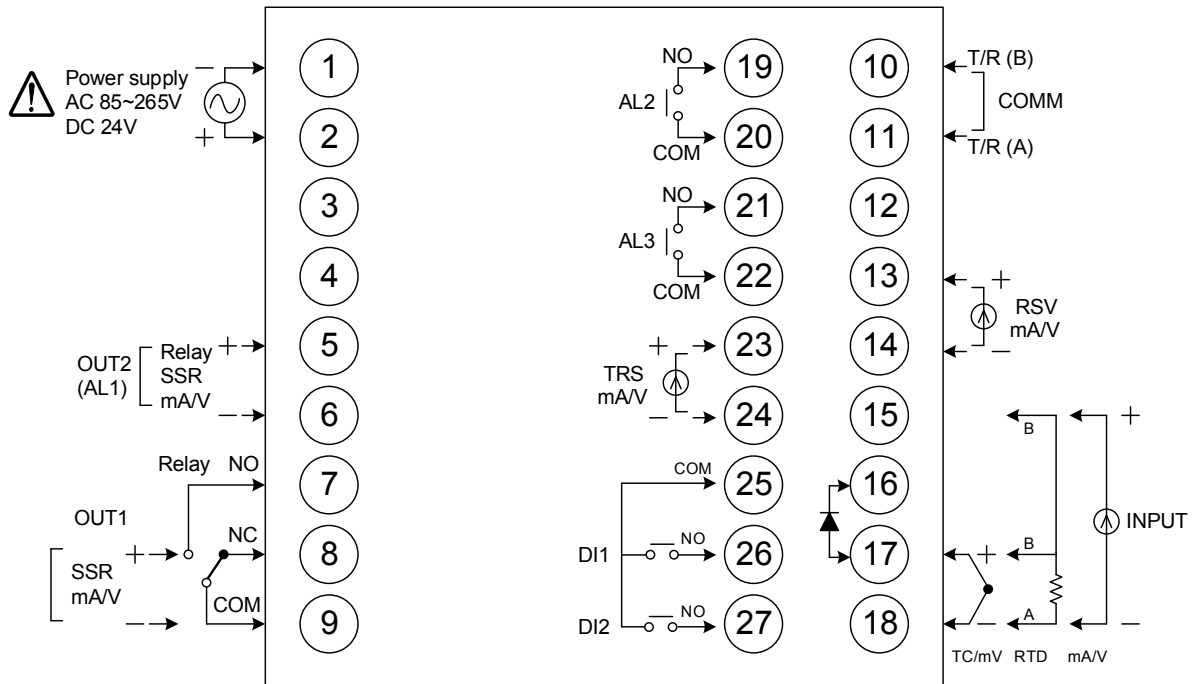
Make sure the power off until all of the wirings are completed!
Turn the power supply to the instrument off before wiring or checking.
Working on or touching the terminal with the power switched on may result in severe injury or death due to electric shock.

8.1 FE400 Terminal arrangement



| | | |
|--------------------|--|--|
| Power |   |   |
| Output-1 |       |     |
| Output-2 |       |    |
| Alarm-1 Alarm-2 |     |     |
| Communication |     |     |

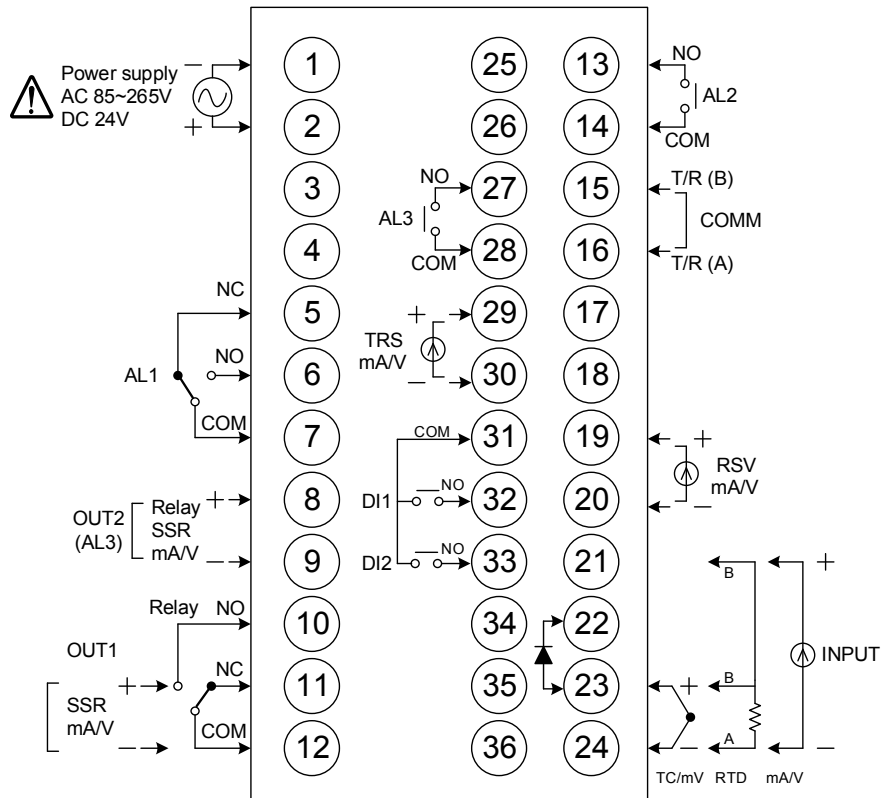
8.2 FE700 Terminal arrangement



| | |
|-------------------------------|--|
| Power | |
| Output-1 | |
| Output-2 | |
| Alarm-1 Alarm-2 Alarm-3 | |
| Communication | |

| | |
|--------------|--|
| Transmission | |
| Remote SV | |
| Digit Input | |
| Input | |

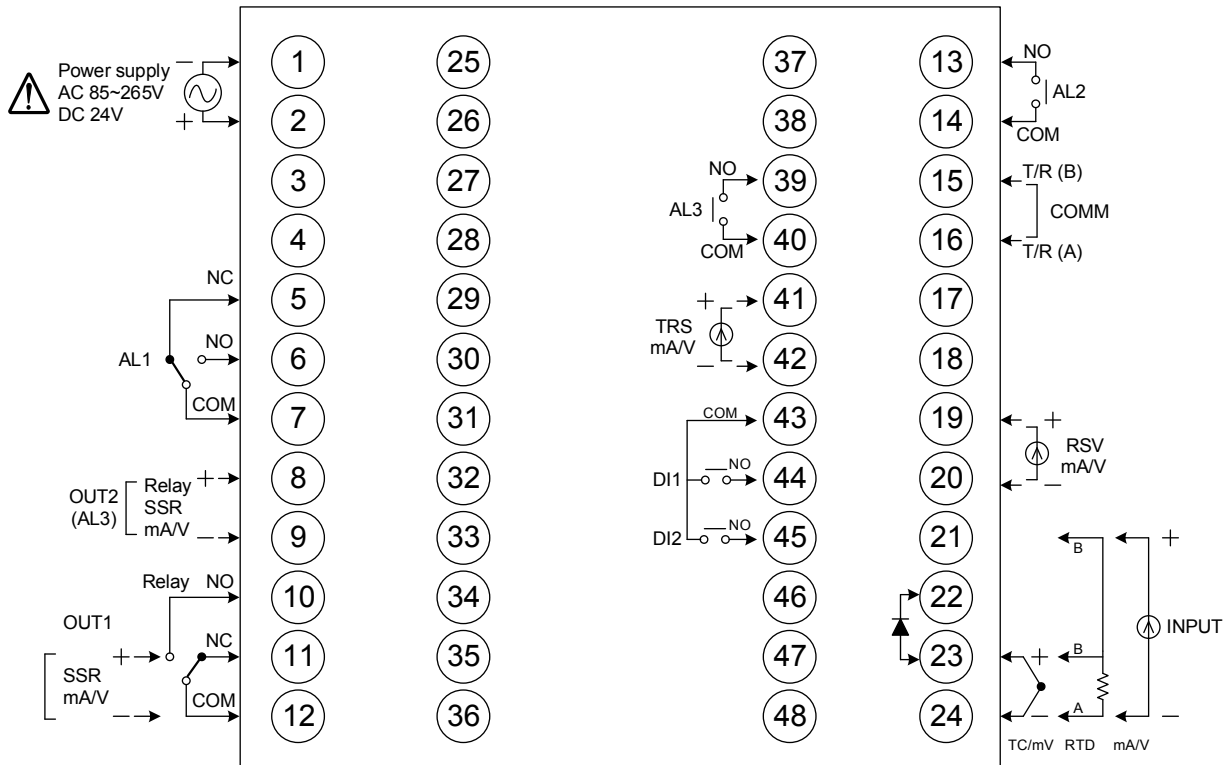
8.3 FE800 Terminal arrangement



| | |
|-------------------------------|--|
| Power | |
| Output-1 | |
| Output-2 | |
| Alarm-1 Alarm-2 Alarm-3 | |
| Communication | |

| | |
|--------------|--|
| Transmission | |
| Remote SV | |
| Digit Input | |
| Input | |

8.4 FE900 Terminal arrangement



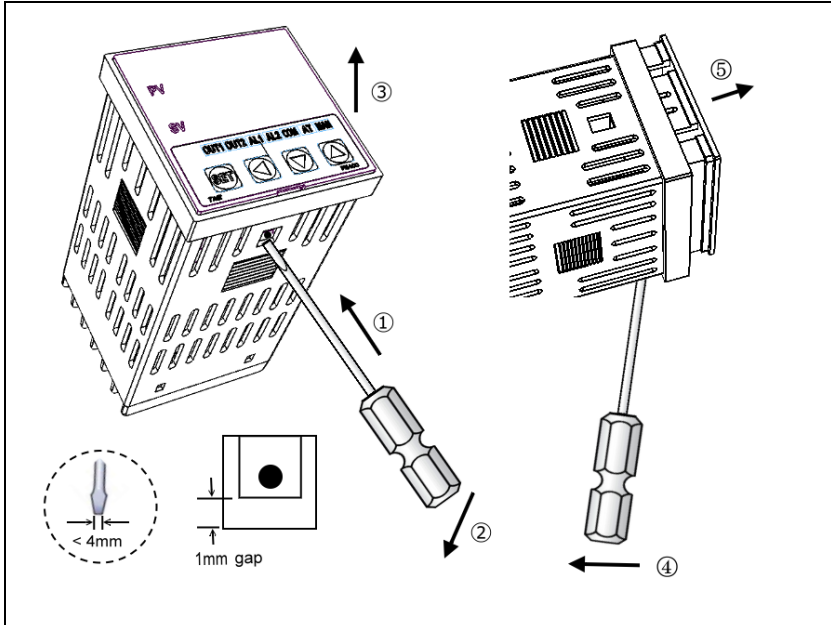
| | |
|-------------------------------|--|
| Power | |
| Output-1 | |
| Output-2 | |
| Alarm-1 Alarm-2 Alarm-3 | |
| Communication | |

| | |
|--------------|--|
| Transmission | |
| Remote SV | |
| Digit Input | |
| Input | |

9. Mounting procedures

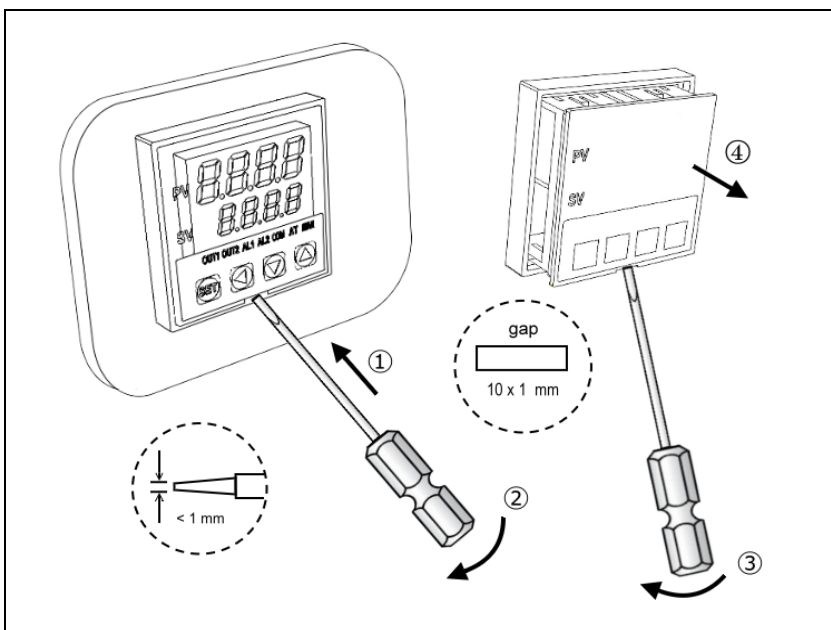
9.1 Before wiring

1. Turn controller to upside down, control panel forward face the label side, will see the little point in the square hole.
2. Use "-" type screwdriver (head width <4mm) and vertically insert the square hole into the top of the shell about 1 mm gap.
3. Please be noted: take the screwdriver into the slit (do not withstand and pressed down the plastic Exposed hook, it will cause the plastic exposed hook broken)
4. Push forward the screwdriver with leverage theory to extrusion the controller from the opposition direction.
5. After pulling out the body, you can exchange output module or add the additional option or repairing.













9.2 After wiring

1. It can only be pulled out from the front direction main body if the controller is already installed on the machine.
2. Use a small - type screwdriver (front thickness <1mm) and let screwdriver front to insert the controller panel below the small rectangular hole about 1 mm gap.
3. Use the screwdriver head to insert 2 ~ 3mm and withstand the controller to go to the opposite direction to squeeze and pick up the controller body.
4. If the body is exposed little it cannot be a complete extrusion. Take the screwdriver to insert the front two square holes of the exposed transparent cover of the body.
5. Use a small "-" type screwdriver to insert the square hole and then forward and pick the hole and pull out the controller body via the opposite direction of extrusion.
6. After pulling out the body, you can exchange output module or add the additional option, or repairing.











10. Basic function setting

10.1 Input type setting











| | | | | | |
|----|--|---|--|--|--|
| 1. | PV  SV  | Operation panel display. | 2. | PV  SV  | Hold SET key + << key 3 seconds, then the controller will enter LEVEL_3 upper display show "INP1" lower display show current input type. |
| 3. | PV  SV  | When << key is pressed, the lower display flashes. | 4. | PV  SV  | Press ⏴ key and ⏵ key to set the desire input type. |
| 5. | PV  SV  | Press SET key to store new value of INP1. | Modify input type needs to interchange of jumper location, and it needs to recalibration for linear input type change. Please refer to ch18 Input type modification. | | |

※ : INP1 setting value refer the "Input range table"











10.2 SV value setting

| | | | | | |
|----|---|---|----|---|---|
| 1. | PV  SV  | Operation panel display. | 2. | PV  SV  | When << key is pressed, the lower display flashes. |
| 3. | PV  SV  | Press << key to choose digit and pressing ⏵ key and ⏴ key to set the desire value. | 4. | PV  SV  | Press SET key to store new value of SV. |











10.3 RUN/STOP mode selection

| | | | | | |
|----|--|---|---|--|--|
| 1. | PV  SV  | Operation panel display. | 2. | PV  SV  | Press SET key to get parameter setup display, "r-s" shown on the upper display. |
| 3. | PV  SV  | When << key is pressed, the lower display flashes. | 4. | PV  SV  | Press ⏵ key or ⏴ key to select run/stop mode. |
| 5. | PV  SV  | Press SET key to store new value of R-S. | When controller selection STOP mode, close all OUTPUT and ALARM function. | | |

10.4 Auto tuning execution



















| | | | | | |
|----|--|---|---|--|---|
| 1. | PV  SV  | Operation panel display. | 2. | PV  SV  | Press SET key to get parameter setup display, "AT" shown on the upper display. |
| 3. | PV  SV  | When << key is pressed, the lower display flashes. | 4. | PV  SV  | Press ⏵ key or ⏴ key to select auto tuning execution or not. |
| 5. | PV  SV  | Press SET key to store new value of AT. | When auto tuning AT LED lamp lit and start to output, through a few circles to get new PID value with the precise control, if finished the AT LED will be lamp off. | | |

10.5 PID value setting













| | | | | | |
|----|--|---|--|--|--|
| 1. | PV  SV  | Operation panel display. | 2. | PV  SV  | Hold SET key 3 seconds, then the controller will enter LEVEL_2 upper display show "P1" lower display show current P1 value. |
| 3. | PV  SV  | When << key is pressed, the lower display flashes. | 4. | PV  SV  | Press ⇩ key and ⇧ key to set the desire P1 value. |
| 5. | PV  SV  | Press SET key to store new value of P1. | Similarly, use the same ways to set integral value(I1) and derivative value(D1). | | |

※ : Press SHIFT key the upper display will show PV value, this function can let user easy to monitor PV and this parameter relationship.










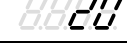
10.6 ON/OFF control setting

| | | | | | |
|----|--|---|--|--|--|
| 1. | PV  SV  | Operation panel display. | 2. | PV  SV  | Hold SET key 3 seconds, then the controller will enter LEVEL_2 upper display show "P1" lower display show current P1 value. |
| 3. | PV  SV  | When << key is pressed, the lower display flashes, upper display will show current PV value. | 4. | PV  SV  | Press ⇩ key until P1 = on.oF (0.0) |
| 5. | PV  SV  | Press SET key to store new value. | 6. | PV  SV  | Press SET key to get parameter setup display, "HYO1" shown on the upper display. |
| 7. | PV  SV  | When << key is pressed, the lower display flashes. | 8. | PV  SV  | Press ⇩ key and ⇧ key to set the desire HYO1 value. |
| 9. | PV  SV  | Press SET key to store new value. | Heat mode formula: $PV \geq (SV + HYO1) \rightarrow OUT1 \text{ OFF}$ $PV \leq (SV - HYO1) \rightarrow OUT1 \text{ ON}$ Cool mode formula: $PV \geq (SV + HYO1) \rightarrow OUT1 \text{ ON}$ $PV \leq (SV - HYO1) \rightarrow OUT1 \text{ OFF}$ | | |


















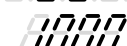
10.7 Alarm mode setting

| | | | | | |
|----|--|---|----|--|--|
| 1. | PV  SV  | Operation panel display. | 2. | PV  SV  | Hold SET key + << key 3 seconds, then the controller will enter LEVEL_3 upper display show "INP1" lower display show current input type. |
| 3. | PV  SV  | Press SET key to get parameter setup display, "ALD1" shown on the upper display. | 4. | PV  SV  | When << SHIFT key is pressed, the lower display flashes. |
| 5. | PV  SV  | Press ⇩ key and ⇧ key to set the desire ALD1 value. | 6. | PV  SV  | Press SET key to store new value of ALD1. ※ Please refer to ch16.1 Alarm mode. |

10.8 Alarm value setting

| | | | | | |
|----|--|---|----|--|---|
| 1. | PV  SV  | Operation panel display. | 2. | PV  SV  | Press <input type="button" value="SET"/> key to get parameter setup display, "AL1H" shown on the upper display. |
| 3. | PV  SV  | When <input type="button" value="←←"/> key is pressed, the lower display flashes. | 4. | PV  SV  | Press <input type="button" value="⇩"/> key and <input type="button" value="⇧"/> key to set the desire AL1H value. |
| 5. | PV  SV  | Press <input type="button" value="SET"/> key to store new value of AL1H. | | | |

10.9 Manual mode selection

| | | | | | |
|----|--|---|---|---|---|
| 1. | PV  SV  | Operation panel display. | 2. | PV  SV  | Press <input type="button" value="SET"/> key to get parameter setup display, "A-M" shown on the upper display. |
| 3. | PV  SV  | When <input type="button" value="←←"/> key is pressed, the lower display flashes. | 4. | PV  SV  | Press <input type="button" value="⇩"/> key or <input type="button" value="⇧"/> key to select Auto/Man mode. |
| 5. | PV  SV  | Press <input type="button" value="SET"/> key to store new value of A-M. | 6. | PV  SV  | Press <input type="button" value="SET"/> key to get parameter setup display, "MOP" shown on the upper display. |
| 7. | PV  SV  | When <input type="button" value="←←"/> key is pressed, the lower display flashes. | 8. | PV  SV  | Press <input type="button" value="←←"/> key to choose digit and pressing <input type="button" value="⇩"/> key and <input type="button" value="⇧"/> key to set the desire value. |
| 9. | PV  SV  | Press <input type="button" value="SET"/> key to store new value of MOP. | In manual mode MOP=100.0 output=100.0% continuous | | |

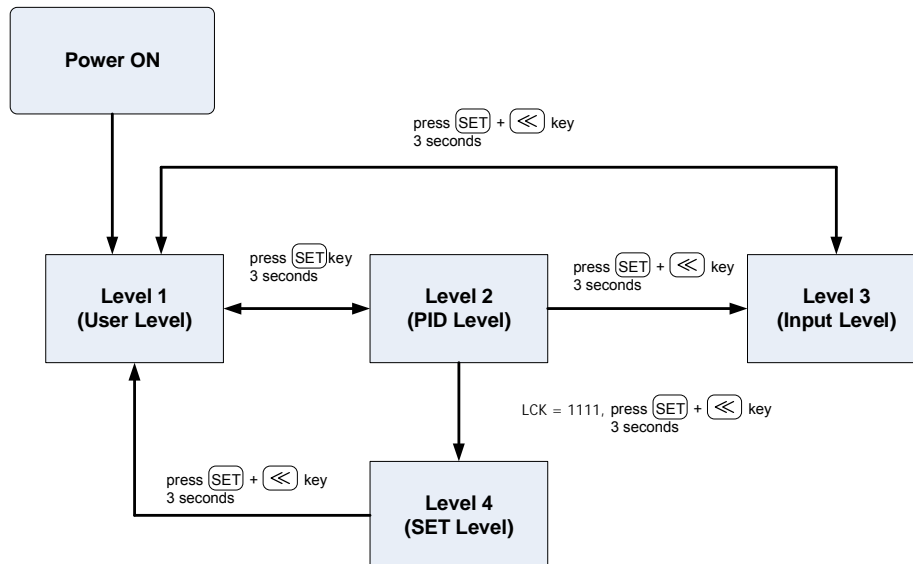
※ : SET8.2=1 (Show A-M & MOP parameter)

11. Flow chart of parameters setting

11.1 Levels operation mode

1. LEVEL 1 enter to the LEVEL 2
Press and hold SET key for 3 seconds then enter to LEVEL 2
2. LEVEL 1 enter to the LEVEL 3
Press and hold SET key + press SHIFT key for 3 seconds then enter to LEVEL 3
3. LEVEL 1 enter to the LEVEL 4
Press and hold SET key for 3 seconds then enter to LEVEL 2 in LEVEL 2
press SET key to find parameter "LCK" , modify LCK value from current value to 1111
then Press and hold SET key + press SHIFT key for 3 seconds enter to LEVEL 4
4. LEVEL 2 return to the LEVEL 1
Press and hold SET key for 3 seconds then return to LEVEL 1
5. LEVEL 3 return to the LEVEL 1
Press and hold SET key + press SHIFT key for 3 seconds then return to LEVEL 1
6. LEVEL 4 return to the LEVEL 1
Press and hold SET key + press SHIFT key for 3 seconds then return to LEVEL 1

11.2 Levels operation diagram



※ : This instrument returns to the PV/SV display mode if no key operation is performed for more than one minute.

11.3 Data lock (LCK) function

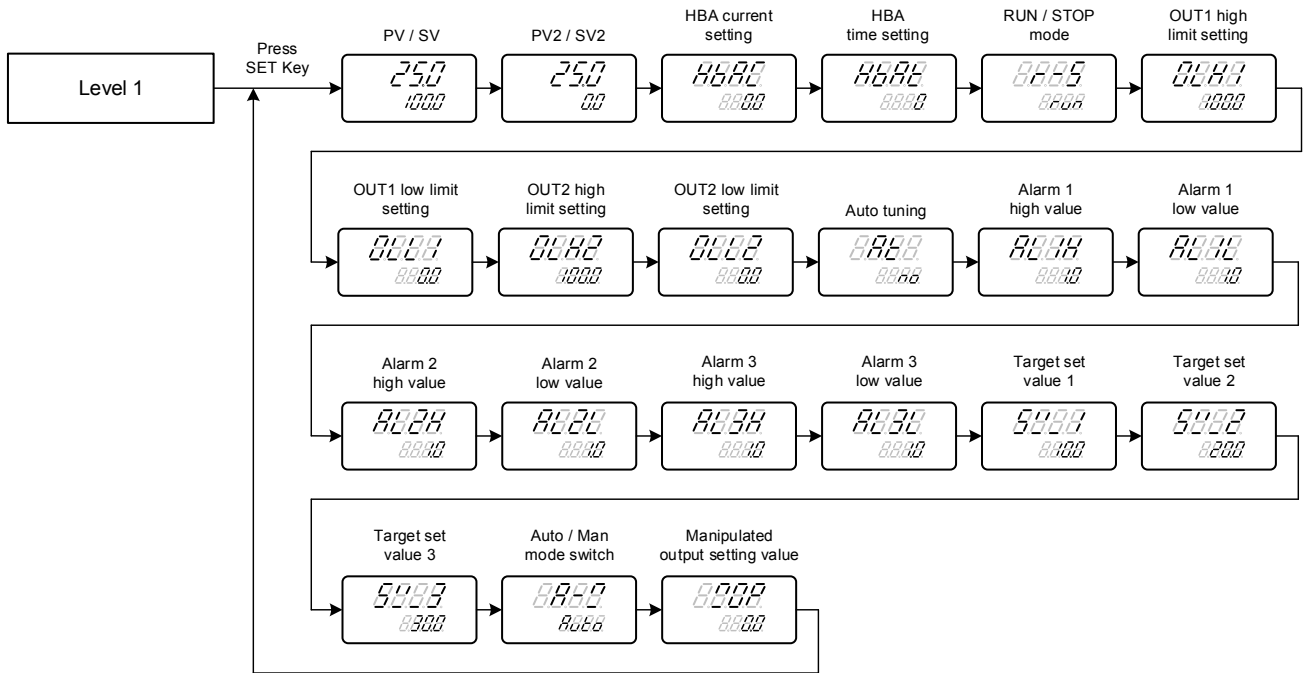
Lock and protect set data of parameters. this function avoid the important parameters to being changed by operator during operation. If parameter cannot be changed check the LCK setting value first.

LCK-function table

| LCK | LEVEL | | | | Remark |
|------|---------|---------|---------|---------|--|
| | Level_1 | Level_2 | Level_3 | Level_4 | |
| 0000 | ◎ | ◎ | ◎ | X | modify LEVEL_1_2_3 parameter available (initial) |
| 1111 | ◎ | ◎ | X | ◎ | modify LEVEL_1_2_4 parameter available |
| 0110 | ◎ | ◎ | X | X | modify LEVEL_1 parameter available |
| 0001 | ◎ | ◎ | X | X | only approval modify parameter SV · LCK |
| 0011 | ◎ | ◎ | X | X | only approval modify parameter SV · LCK · R-S |
| 0101 | ◎ | ◎ | X | X | only approval modify parameter LCK |

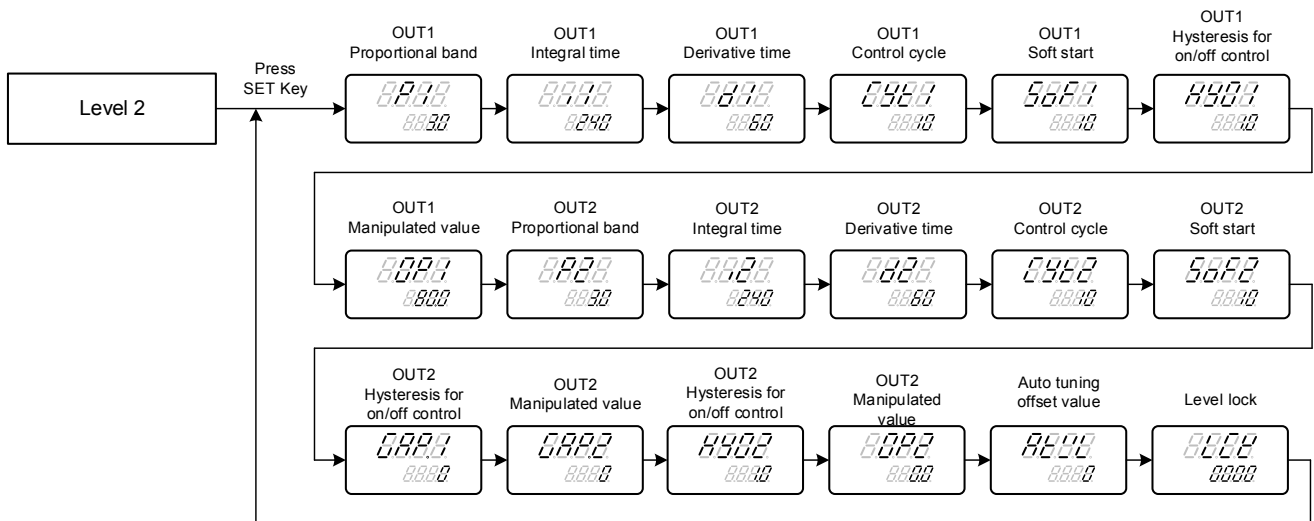
◎ : approval X : inhibit

11.4 Level 1 (User Level) all parameters display



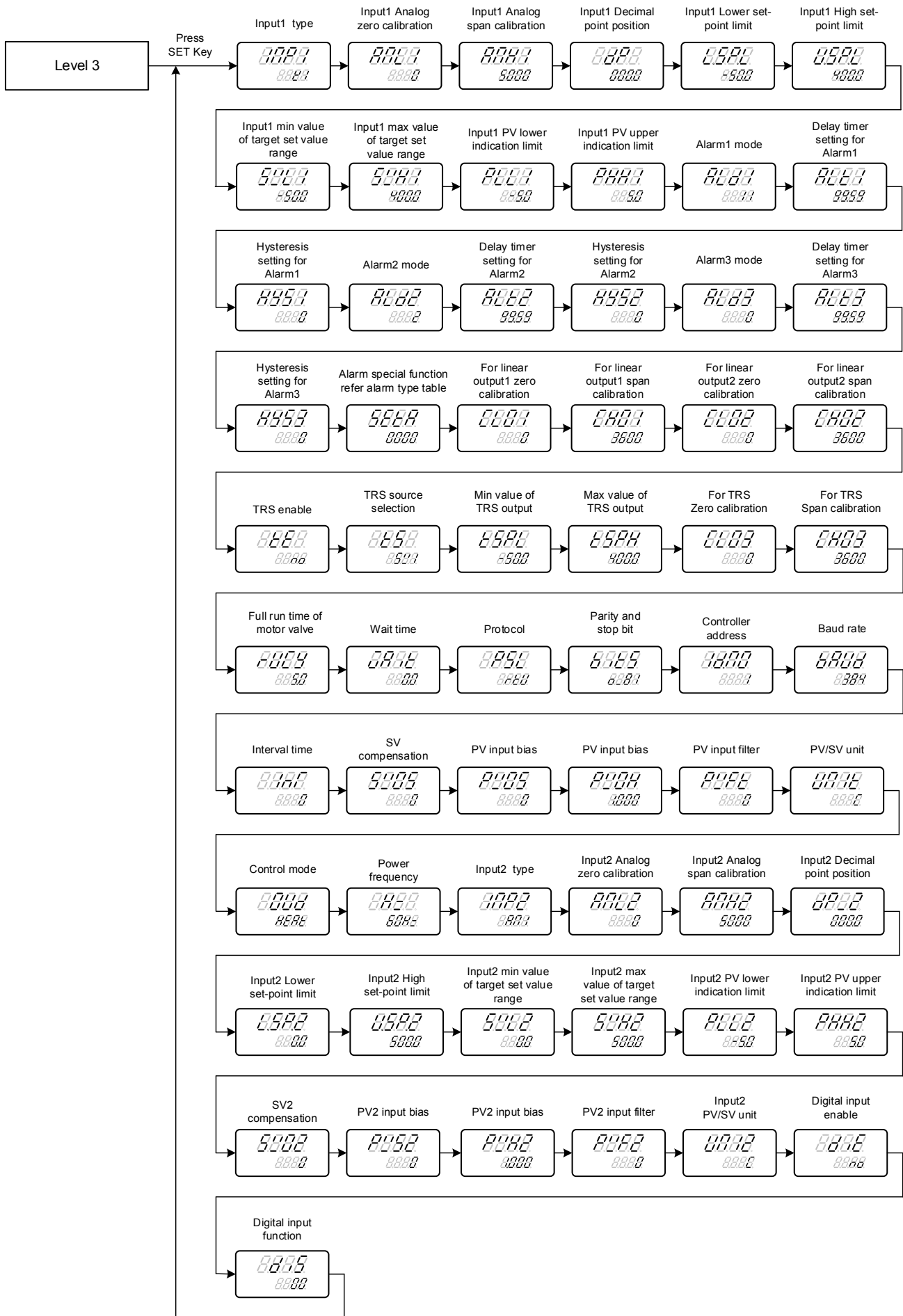
※ : This instrument returns to the PV/SV display mode if no key operation is performed for more than one minute.

11.5 Level 2 (PID Level) all parameters display



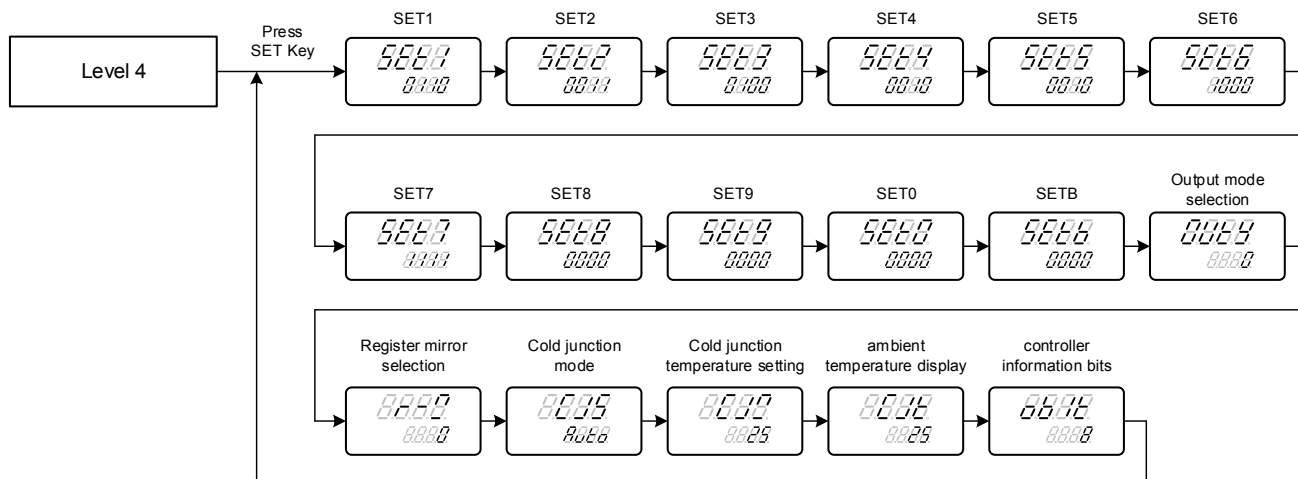
※ : This instrument returns to the PV/SV display mode if no key operation is performed for more than one minute.

11.6 Level 3 (Input Level) all parameters display



※ : This instrument returns to the PV/SV display mode if no key operation is performed for more than one minute.

11.7 Level 4 (Setting Level) all parameters display



※ : This instrument returns to the PV/SV display mode if no key operation is performed for more than one minute.

12. Troubleshooting

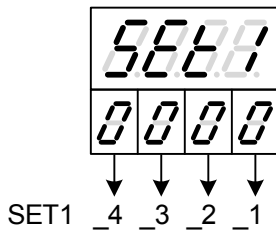
If the controller displays one of the following, carry out the appropriate remedy for the particular error.

| LED | Error | Solution |
|------|---------------------------|---|
| 8888 | INIE: Input1 Error | Check whether input loop is opened or wiring incorrect. |
| 8888 | UUU1: PV is above USPL | Check whether the input value is correct or not. |
| 8888 | NNN1: PV is below LSPL | Check whether the input value is correct or not. |

If any of the indication in the table below appear, the controller need to be repaired do not try to repair the controller by yourself, order a new one or contact us to repair.

| LED | Error | Solution |
|------|--|-------------------|
| 8888 | ADCF: A/D convert failed | Send back repair. |
| 8888 | CJCE: Cold junction compensation failed | Send back repair. |
| 8888 | RAMF: EEPROM failed | Send back repair. |

13. Parameters hide / display table on Level 4



| | | | | |
|-------------|--------|---|---------|---------------------------|
| <i>5888</i> | SET1_1 | 0 | hide | HBAC HBAT |
| | | 1 | display | HBAC HBAT |
| | SET1_2 | 0 | hide | R-S |
| | | 1 | display | R-S |
| | SET1_3 | 0 | hide | OLH1 OLL1 |
| | | 1 | display | OLH1 OLL1 |
| | SET1_4 | 0 | hide | OLH2 OLL2 |
| | | 1 | display | OLH2 OLL2 |
| <i>5888</i> | SET2_1 | 0 | hide | AT |
| | | 1 | display | AT |
| | SET2_2 | 0 | hide | AL1H AL1L |
| | | 1 | display | AL1H AL1L |
| | SET2_3 | 0 | hide | AL2H AL2L |
| | | 1 | display | AL2H AL2L |
| | SET2_4 | 0 | hide | AL3H AL3L |
| | | 1 | display | AL3H AL3L |
| <i>5888</i> | SET3_1 | 0 | hide | SV_1 SV_2 SV_3 |
| | | 1 | display | SV_1 SV_2 SV_3 |
| | SET3_2 | 0 | hide | ANL1 ANH1 DP |
| | | 1 | display | ANL1 ANH1 DP |
| | SET3_3 | 0 | hide | LSPL USPL |
| | | 1 | display | LSPL USPL |
| | SET3_4 | 0 | hide | SVL1 SVH1 |
| | | 1 | display | SVL1 SVH1 |
| <i>5888</i> | SET4_1 | 0 | hide | PLL1 PHH1 |
| | | 1 | display | PLL1 PHH1 |
| | SET4_2 | 0 | hide | ALD1 ALT1 HYS1 |
| | | 1 | display | ALD1 ALT1 HYS1 |
| | SET4_3 | 0 | hide | ALD2 ALT2 HYS2 |
| | | 1 | display | ALD2 ALT2 HYS2 |
| | SET4_4 | 0 | hide | ALD3 ALT3 HYS3 |
| | | 1 | display | ALD3 ALT3 HYS3 |
| <i>5888</i> | SET5_1 | 0 | hide | SETA |
| | | 1 | display | SETA |
| | SET5_2 | 0 | hide | CLO1 CHO1 |
| | | 1 | display | CLO1 CHO1 |
| | SET5_3 | 0 | hide | CLO2 CHO2 |
| | | 1 | display | CLO2 CHO2 |
| | SET5_4 | 0 | hide | TE TS TSPL TSPH CLO3 CHO3 |
| | | 1 | display | TE TS TSPL TSPH CLO3 CHO3 |

| | | | | |
|-------------|--------|---|---------|------------------------|
| <i>5668</i> | SET6_1 | 0 | hide | RUCY WAIT |
| | | 1 | display | RUCY WAIT |
| | SET6_2 | 0 | hide | PSL IDNO BITS BAUD INT |
| | | 1 | display | PSL IDNO BITS BAUD INT |
| | SET6_3 | 0 | hide | SVOS |
| | | 1 | display | SVOS |
| | SET6_4 | 0 | hide | PVOS PVOH |
| | | 1 | display | PVOS PVOH |

| | | | | |
|-------------|--------|---|---------|------|
| <i>5668</i> | SET7_1 | 0 | hide | PVFT |
| | | 1 | display | PVFT |
| | SET7_2 | 0 | hide | UNIT |
| | | 1 | display | UNIT |
| | SET7_3 | 0 | hide | OULD |
| | | 1 | display | OULD |
| | SET7_4 | 0 | hide | HZ |
| | | 1 | display | HZ |

| | | | | |
|-------------|--------|---|---------|----------------------|
| <i>5668</i> | SET8_1 | 0 | hide | DIE DIS |
| | | 1 | display | DIE DIS |
| | SET8_2 | 0 | hide | A-M MOP |
| | | 1 | display | A-M MOP |
| | SET8_3 | 0 | hide | reserve ,do not care |
| | | 1 | display | reserve ,do not care |
| | SET8_4 | 0 | hide | reserve ,do not care |
| | | 1 | display | reserve ,do not care |

| | | | |
|-------------|--------|---|--|
| <i>5668</i> | SET9_1 | 0 | Channel 2 input disable |
| | | 1 | Channel 2 input enable |
| | SET9_2 | 0 | Channel 1 analog input reverse display disable |
| | | 1 | Channel 1 analog input reverse display enable |
| | SET9_3 | 0 | Channel 2 analog input reverse display disable |
| | | 1 | Channel 2 analog input reverse display enable |
| | SET9_4 | 0 | register mirror disable |
| | | 1 | register mirror enable |

| | | | |
|-------------|--------|---|-------------------------------|
| <i>5668</i> | SET0_1 | 0 | power – on soft start disable |
| | | 1 | power – on soft start enable |
| | SET0_2 | 0 | hot runner disable |
| | | 1 | hot runner enable |
| | SET0_3 | 0 | Remote SV disable |
| | | 1 | Remote SV enable |
| | SET0_4 | 0 | reserve ,do not care |
| | | 1 | reserve ,do not care |

| | | | |
|-------------|--------|---|--|
| <i>5668</i> | SETB_1 | 0 | In TP-15 power-on in idle mode disable |
| | | 1 | In TP-15 power-on in idle mode enable |
| | SETB_2 | 0 | In TP-15 HBA detect disable |
| | | 1 | In TP-15 HBA detect enable |
| | SETB_3 | 0 | Modbus RTU RAM only mode disable |
| | | 1 | Modbus RTU RAM only mode enable |
| | SETB_4 | 0 | reserve ,do not care |
| | | 1 | reserve ,do not care |

14. List of parameters

14.1 COMM GROUP

| Parameter | LED | Content | Range | | Initial | Level |
|-----------|------|---|-------|-----|------------|---------|
| | | | MAX | MIN | | |
| PSL | 8850 | Protocol selection 0: TAIE 1: Modbus RTU | 1 | 0 | Modbus RTU | Level 3 |
| BITS | 8885 | Parity and stop bit 0: O_81 1: O_82 2: E_81 3: E_82 4: N_81 5: N_82 | 5 | 0 | O_81 | Level 3 |
| IDNO | 8800 | Controller address | 255 | 0 | 1 | Level 3 |
| BAUD | 8808 | Baud rate 0: 2400 1: 4800 2: 9600 3: 19200 4: 38400 5: 57600 6: 115200 | 6 | 0 | 38400 | Level 3 |
| INT | 8880 | Interval time (ms) Use for data response delay | 250 | 0 | 0 | Level 3 |
| R-M | 8888 | Register mirror selection | 20 | 0 | 0 | Level 4 |

14.2 DI GROUP

| Parameter | LED | Content | Range | | Initial | Level |
|-----------|------|--|-------|------|---------|---------|
| | | | MAX | MIN | | |
| DIE | 888E | Digital input enable 0: NO (disable) 1: YES (enable) | 1 | 0 | NO | Level 3 |
| DIS | 8885 | Digital input function Please refer to ch15.1. | 9999 | 0000 | 0000 | Level 3 |

14.3 ALARM GROUP

| Parameter | LED | Content | Range | | Initial | Level |
|-----------|------|--|-------|-------|---------|---------|
| | | | MAX | MIN | | |
| AL1H | 888H | Alarm value upper limit 1 | 9999 | -1999 | 10 | Level 1 |
| AL1L | 888L | Alarm value lower limit 1 | 9999 | -1999 | 10 | Level 1 |
| AL2H | 882H | Alarm value upper limit 2 | 9999 | -1999 | 10 | Level 1 |
| AL2L | 882L | Alarm value lower limit 2 | 9999 | -1999 | 10 | Level 1 |
| AL3H | 883H | Alarm value upper limit 3 | 9999 | -1999 | 10 | Level 1 |
| AL3L | 883L | Alarm value lower limit 3 | 9999 | -1999 | 10 | Level 1 |
| ALD1 | 8088 | Alarm1 mode selection | 30 | 0 | 11 | Level 3 |
| ALD2 | 8082 | Alarm2 mode selection | 30 | 0 | 2 | Level 3 |
| ALD3 | 8083 | Alarm3 mode selection | 30 | 0 | 0 | Level 3 |
| ALT1 | 8088 | 00.00: Flicker 99.59: Continued ON 00.01~99.58: delay time | 99.59 | 00.00 | 99.59 | Level 3 |
| ALT2 | 8082 | | 99.59 | 00.00 | 99.59 | Level 3 |
| ALT3 | 8083 | | 99.59 | 00.00 | 99.59 | Level 3 |
| HYS1 | 8858 | Hysteresis setting for alarm1 | 1000 | 0 | 0 | Level 3 |
| HYS2 | 8852 | Hysteresis setting for alarm2 | 1000 | 0 | 0 | Level 3 |
| HYS3 | 8853 | Hysteresis setting for alarm3 | 1000 | 0 | 0 | Level 3 |
| SETA | 5888 | Alarm special function Please refer to ch16.2 . | 1111 | 0000 | 0000 | Level 3 |

14.4 PID GROUP

| Parameter | LED | Content | Range | | Initial | Level |
|-----------|------|---|-------|-----|---------|---------|
| | | | MAX | MAX | | |
| ※ P1 | 8888 | OUT1 Proportional band 0 : 8888 ON/OFF control 0.1~200.0 : PID control | 200.0 | 0.0 | 3.0 | Level 2 |
| ※ I1 | 8888 | OUT1 Integral time | 3600 | 0 | 240 | Level 2 |
| ※ D1 | 8888 | OUT1 Derivative time | 2400 | 0 | 60 | Level 2 |
| CYT1 | 8888 | OUT1 Control cycle 0 : 8888 Linear signal 1 : 8558 SSR drive 2~150 : Relay | 150 | 0 | 10 | Level 2 |
| GAP.1 | 8888 | Control gap 1 (for output 1) | 1000 | 0 | 0 | Level 2 |
| ※ P2 | 8888 | OUT2 Proportional band 0 : 8888 ON/OFF control 0.1~200.0 : PID control | 200.0 | 0.0 | 3.0 | Level 2 |
| ※ I2 | 8888 | OUT2 Integral time | 3600 | 0 | 240 | Level 2 |
| ※ D2 | 8888 | OUT2 Derivative time | 2400 | 0 | 60 | Level 2 |
| CYT2 | 8888 | OUT2 Control cycle 0 : 8888 Linear signal 1 : 8558 SSR drive 2~150 : Relay | 150 | 0 | 10 | Level 2 |
| GAP.2 | 8888 | Control gap 2 (for output 2) | 1000 | 0 | 0 | Level 2 |
| HYO1 | 8800 | Hysteresis for OUT1 on/off control | 1000 | 0 | 1 | Level 2 |
| HYO2 | 8802 | Hysteresis for OUT2 on/off control | 1000 | 0 | 1 | Level 2 |

※ : Press SHIFT key the upper display will show PV value, this function can let user easy to monitor PV with this parameter effect.

14.5 SV GROUP

| Parameter | LED | Content | Range | | Initial | Level |
|-----------|------|--|-------|-------|---------|---------|
| | | | MAX | MIN | | |
| SV | 8888 | Local set value for input1 | SVH1 | SVL1 | 0 | Level 1 |
| SV2 | 8888 | Local set value for input2 | SVH2 | SVL2 | 0 | Level 1 |
| SV-1 | 5088 | Target set value 1 | SVH1 | SVL1 | 0 | Level 1 |
| SV-2 | 5488 | Target set value 2 | SVH1 | SVL1 | 0 | Level 1 |
| SV-3 | 5888 | Target set value 3 | SVH1 | SVL1 | 0 | Level 1 |
| SVL1 | 5088 | Minimum value of target set value range for input1 | 9999 | -1999 | LSPL | Level 3 |
| SVH1 | 5088 | Maximum value of target set value range for input1 | 9999 | -1999 | USPL | Level 3 |
| SVL2 | 5082 | Minimum value of target set value range for input2 | 9999 | -1999 | LSP2 | Level 3 |
| SVH2 | 5082 | Maximum value of target set value range for input2 | 9999 | -1999 | USP2 | Level 3 |
| SVOS | 5005 | SV compensation | 5000 | -1000 | 0 | Level 3 |
| SVO2 | 5002 | SV2 compensation | 5000 | -1000 | 0 | Level 3 |

14.6 AT GROUP

| Parameter | LED | Content | Range | | Initial | Level |
|-----------|------|-----------------------------------|-------|-----|---------|---------|
| | | | MAX | MIN | | |
| AT | 8888 | Auto-tuning 0: 8888 1: 8888 | 1 | 0 | NO | Level 1 |
| ATVL | 8888 | Auto tuning offset value | 9999 | 0 | 0 | Level 2 |

14.7 SYSTEM GROUP

| Parameter | LED | Content | Range | | Initial | Level |
|-----------|------|---|-------|------|---------|---------|
| | | | MAX | MIN | | |
| LCK | 8888 | Function lock Please refer to "LCK-function table" | 1111 | 0000 | 0000 | Level 2 |
| UNIT | 0000 | Temperature unit 0: 8888 °C 1: 8888 °F 2: 8888 Linear signal | 2 | 0 | C | Level 3 |
| HZ | 8888 | Power frequency 0: 5088 50HZ 1: 6088 60HZ | 1 | 0 | 60HZ | Level 3 |
| UNI2 | 0000 | Temperature unit 0: 8888 °C 1: 8888 °F 2: 8888 Linear signal 3: 8888 HBA current | 3 | 0 | C | Level 3 |
| OBIT | 8888 | Communication bits configuration Bit_0 : OUT1 Bit_1 : OUT2 Bit_2 : AT Bit_3 : AL1 Bit_4 : AL2 Bit_5 : AL3 Bit_6 : COM Bit_7 : MAN Bit_8 : INIE Bit_9 : ADCF Bit_10 : CJCE Bit_11 : IN2E Bit_12 : UUU1 Bit_13 : NNN1 Bit_14 : UUU2 Bit_15 : NNN2 | --- | --- | --- | Level 4 |
| CJS | 8888 | Cold junction mode selection 0: 8888 Automatic compensation 1: 8888 Manual compensation | 1 | 0 | Auto | Level 4 |
| CJM | 8888 | Cold junction temperature setting | 50 | 0 | 25 | Level 4 |
| CJT | 8888 | Ambience temperature display | --- | --- | --- | Level 4 |

14.8 CONTROL GROUP

| Parameter | LED | Content | Range | | Initial | Level |
|-----------|------|--|-------|-----|---------|---------|
| | | | MAX | MIN | | |
| R-S | 8888 | Run/stop mode 0: 5668 Output stop 1: 8888 Output enable | 1 | 0 | RUN | Level 1 |
| OLH1 | 0000 | High limit setting of manipulated value for output1 | 100.0 | 0.0 | 100.0 | Level 1 |
| OLL1 | 0000 | low limit setting of manipulated value for output1 | 100.0 | 0.0 | 0.0 | Level 1 |
| OLH2 | 0000 | High limit setting of manipulated value for output2 | 100.0 | 0.0 | 100.0 | Level 1 |
| OLL2 | 0000 | low limit setting of manipulated value for output2 | 100.0 | 0.0 | 0.0 | Level 1 |
| A-M | 8888 | Auto/Man mode switch 0: 8888 Automatic 1: 8888 Manual | 1 | 0 | Auto | Level 1 |
| MOP | 8000 | Manipulated output setting value | 100.0 | 0.0 | 0.0 | Level 1 |
| SOF1 | 5888 | Power-ON soft start function for output1 | 5000 | 5 | 10 | Level 2 |
| OP1 | 8000 | Manipulated value for output1 | 100.0 | 0.0 | --- | Level 2 |
| SOF2 | 5888 | Power-ON soft start function for output2 | 5000 | 5 | 10 | Level 2 |
| OP2 | 8000 | Manipulated value for output2 | 100.0 | 0.0 | --- | Level 2 |
| ※ CLO1 | 0000 | output1 zero calibration only for linear signal | 9999 | 0 | 0 | Level 3 |
| ※ CHO1 | 0400 | output1 span calibration only for linear signal | 9999 | 0 | 3600 | Level 3 |
| ※ CLO2 | 0000 | Output2 zero calibration only for linear signal | 9999 | 0 | 0 | Level 3 |
| ※ CHO2 | 0000 | Output2 span calibration only for linear signal | 9999 | 0 | 3600 | Level 3 |
| OUT | 8000 | Control mode 0 : 8888 Heating mode 1 : 0000 Cooling mode | 1 | 0 | HEAT | Level 3 |

※ : Each controller calibration values are different, before the modifying please record the current value.

14.9 INPUT GROUP

| Parameter | LED | Content | Range | | Initial | Level |
|-----------|------|--|-------|-------|---------|---------|
| | | | MAX | MIN | | |
| PV | --- | Process value for input1 | USPL | LSPL | --- | Level 1 |
| PV2 | --- | Process value for input2 | USP2 | LSP2 | --- | Level 1 |
| INP1 | 8888 | Input1 type selection Please refer to ch4 Input range table | 19 | 1 | 1 | Level 3 |
| ※ ANL1 | 8888 | Analog input zero calibration for input1 Please refer to ch18.4 Input calibration flowchart | 9999 | -1999 | 0 | Level 3 |
| ※ ANH1 | 8888 | Analog input span calibration for input1 Please refer to ch18.4 Input calibration flowchart | 9999 | -1999 | 5000 | Level 3 |
| DP | 8888 | Decimal point position for input1 0: 0000 1: 000.0 2: 00.00 3: 0.000 | 3 | 0 | 1 | Level 3 |
| LSPL | 8888 | Minimum value of measured input1 scale | 9999 | -1999 | --- | Level 3 |
| USPL | 8888 | Maximum value of measured input1 scale | 9999 | -1999 | --- | Level 3 |
| PLL1 | 8888 | PV lower indication limit for input1 $PV < (LSPL + PLL1) \Rightarrow$ show under range error message | 1000 | -1000 | -5.0 | Level 3 |
| PHH1 | 8888 | PV upper indication limit for input1 $PV > (USPL + PHH1) \Rightarrow$ show over range error message | 1000 | -1000 | 5.0 | Level 3 |
| ※ PVOS | 8888 | PV input1 bias(for zero) $PV = (PV \times PVOH) + PVOS$ | 5000 | -1000 | 0 | Level 3 |
| ※ PVOH | 8888 | PV input1 bias(for span) $PV = (PV \times PVOH) + PVOS$ | 2.000 | 0.000 | 1.000 | Level 3 |
| PVFT | 8888 | Is used to eliminate noise against the measure input1 0 : 8888 : no filter 0.1~10.0 : digital filter | 10.0 | 0.0 | 0.0 | Level 3 |
| INP2 | 8888 | Input2 type selection Please refer to ch4 Input range table | 19 | 1 | 1 | Level 3 |
| ※ ANL2 | 8888 | remote input zero calibration for input2 | 9999 | -1999 | 0 | Level 3 |
| ※ ANH2 | 8888 | remote input span calibration for input2 | 9999 | -1999 | 5000 | Level 3 |
| DP_2 | 8888 | Decimal point position for input2 0: 0000 1: 000.0 2: 00.00 3: 0.000 | 3 | 0 | 1 | Level 3 |
| LSP2 | 8888 | Minimum value of measured input2 scale | 9999 | -1999 | --- | Level 3 |
| USP2 | 8888 | Maximum value of measured input2 scale | 9999 | -1999 | --- | Level 3 |
| PLL2 | 8888 | PV2 lower indication limit for input2 $PV2 < (LSP2 - PLL2) \Rightarrow$ show under range error message | 1000 | -1000 | -5.0 | Level 3 |
| PHH2 | 8888 | PV2 upper indication limit for input2 $PV2 > (USP2 + PHH2) \Rightarrow$ show over range error message | 1000 | -1000 | 5.0 | Level 3 |
| ※ PVS2 | 8888 | PV input2 bias(for zero) $PV2 = (PV2 \times PVH2) + PVS2$ | 5000 | -1000 | 0 | Level 3 |
| ※ PVH2 | 8888 | PV input2 bias(for span) $PV2 = (PV2 \times PVH2) + PVS2$ | 2.000 | 0.000 | 1.000 | Level 3 |

※ : Press SHIFT key the upper display will show PV/PV2 value, this function can let user easy to monitor PV with this parameter effect.

14.9 INPUT GROUP

| Parameter | LED | Content | Range | | Initial | Level |
|-----------|-------------|---|-------|-----|---------|---------|
| | | | MAX | MIN | | |
| PVF2 | <i>8888</i> | Is used to eliminate noise against the measure input2 0 : <i>8888</i> : no filter 0.1~10.0 : digital filter | 10.0 | 0.0 | 0.0 | Level 3 |

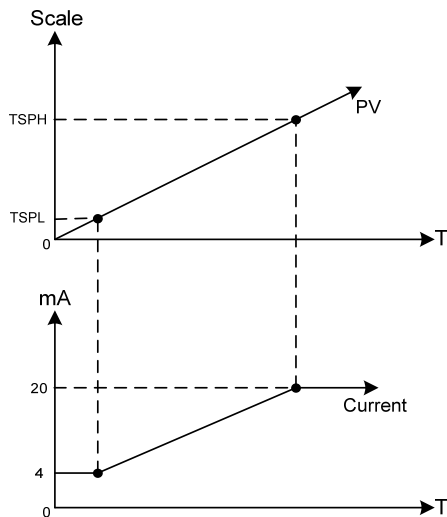
※ : Press SHIFT key the upper display will show PV/PV2 value, this function can let user easy to monitor PV with this parameter effect.

14.10 TRANSMISSION GROUP

| Parameter | LED | Content | Range | | Initial | Level |
|-----------|-------------|---|-------|------|---------|---------|
| | | | MAX | MIN | | |
| TE | <i>8888</i> | Transmission function enable 0: <i>8888</i> (disable) 1: <i>8888</i> (enable) | 1 | 0 | 0 | Level 3 |
| TS | <i>8888</i> | Transmission output signal choose 0: SV 1: PV 2: SV2 3: PV2 4: OP1 | 10 | 0 | 0 | Level 3 |
| TSPL | <i>8888</i> | Minimum value of retransmission output | USPL | LSPL | LSPL | Level 3 |
| TSPH | <i>8888</i> | Maximum value of retransmission output | USPL | LSPL | USPL | Level 3 |
| ※ CLO3 | <i>8888</i> | For transmission zero calibration | 9999 | 0 | 0 | Level 3 |
| ※ CHO3 | <i>8888</i> | For transmission span calibration | 9999 | 0 | 3600 | Level 3 |

※ : Refer to the transmission example.

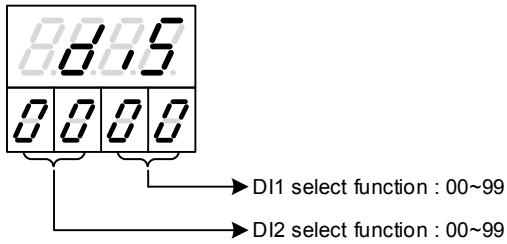
FE series controller transmission function allows digital value PV1/PV2/SV1/OP1 parameters with analog signaled to an external device according to predetermined range. (TSPL ~ TSPH)



14.11 HBA GROUP

| Parameter | LED | Content | Range | | Initial | Level |
|-----------|-------------|--|-------|-----|---------|---------|
| | | | MAX | MIN | | |
| HBAC | <i>8888</i> | HBA current setting unit : ampere(A) | 100.0 | 0.0 | 1.0 | Level 1 |
| HBAT | <i>8888</i> | HBA disconnection set time unit : second(S) | 300 | 0 | 10 | Level 1 |

15. Digital input function



15.1 DIS mode table

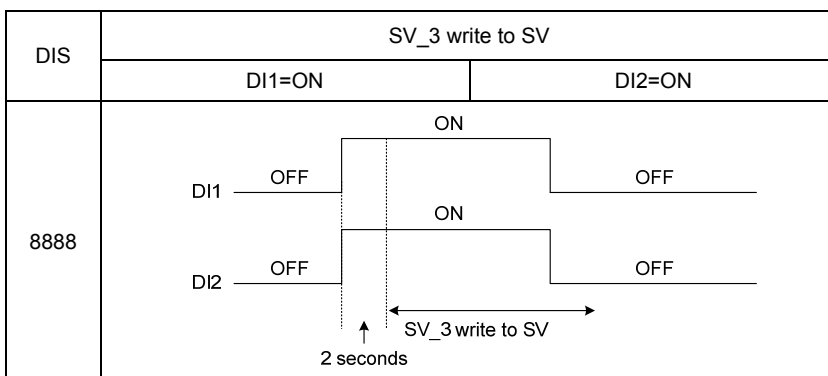
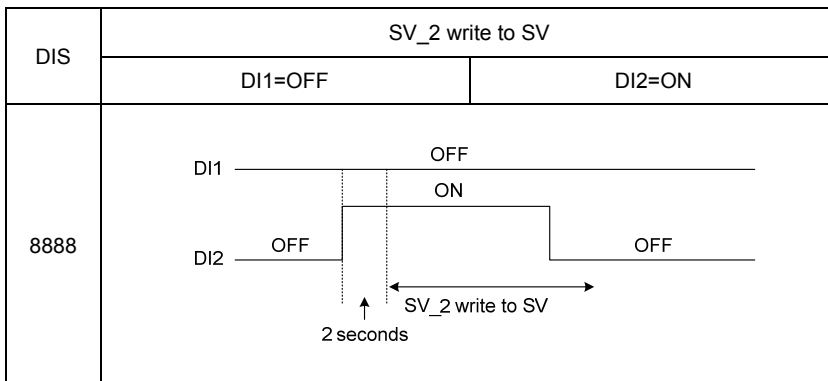
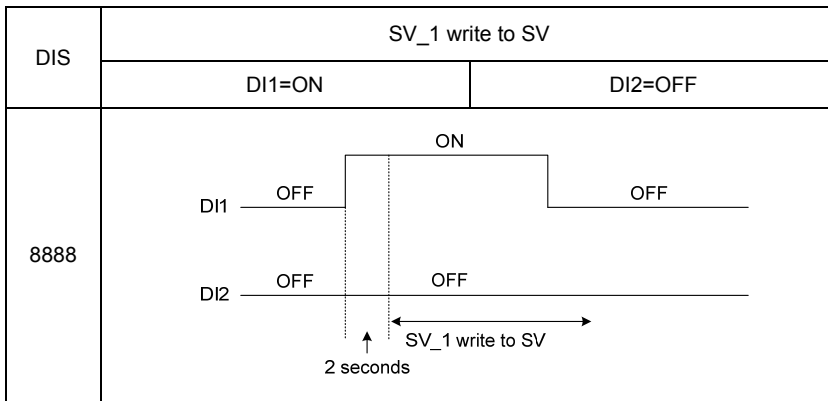
DIS parameter is digital input mode selection, low byte of the first group DI1 mode setting, its range 00~99
high byte of the second group DI2 mode setting, its range 00~99

| Mode | DI1 (XX00~XX99) | DI2 (00XX~99XX) |
|------|---------------------------------|------------------|
| 00 | Disable Digital Input function | |
| 01 | SV_1 write to SV | |
| | | |
| 02 | SV_2 write to SV | |
| | | |
| 03 | AT = YES / NO | |
| | | |
| 04 | R-S = RUN / STOP | |
| | | |
| 05 | Timer 1 = RUN / STOP | |
| | ※ set ALD1 = 7 (timer mode) | |

| Mode | DI1 (XX00~XX99) | DI2 (00XX~99XX) |
|------|---|------------------|
| 06 | Timer 2 = RUN / STOP | |
| | ※ set ALD2 = 7 (timer mode) | |
| 07 | Power saving = RUN / STOP | |
| | | |
| 08 | A-M = AUTO / MAN | |
| | | |
| 09 | SV & SV_1 toggle | |
| | | |
| 10 | SV & SV_2 toggle | |
| | | |
| 8888 | Choose SV_1~SV_3 to write to SV , Please refer to DI for SV table | |

※ : Dry contact output rated open >500 KΩ or more, close <10Ω, sample time >10 ms.

15.2 DI for 3SV



※ : Dry contact output rated open >500 K Ω , close <10 Ω , sample time >2 sec.

16. Alarm action explanation

16.1 Alarm mode

▲ : SV △ : Alarm set value X : 1 or 2

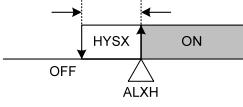
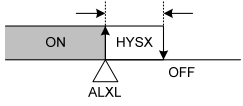
| ALDX | Alarm type | Description |
|------|--|---|
| 00 | No alarm | Not drive any alarm relays and the corresponding LED lamp. |
| 01 | Deviation high With hold action | |
| 11 | Deviation high | Formula $PV > (SV + ALXH) \rightarrow$ Alarm ON $PV \leq (SV + ALXH - HYSX) \rightarrow$ Alarm OFF |
| 02 | Deviation low With hold action | |
| 12 | Deviation low | Formula $PV < (SV + ALXL) \rightarrow$ Alarm ON $PV \geq (SV + ALXL + HYSX) \rightarrow$ Alarm OFF |
| 03 | Deviation high/low With hold action | |
| 13 | Deviation high/low | Formula $PV < (SV - ALXL) \rightarrow$ Alarm ON $PV \geq (SV - ALXL + HYSX) \rightarrow$ Alarm OFF $PV > (SV + ALXH) \rightarrow$ Alarm ON $PV \leq (SV + ALXH - HYSX) \rightarrow$ Alarm OFF |
| 04 | Band With hold action | |
| 14 | Band | Formula $PV \geq (SV - ALXL) \rightarrow$ Alarm ON $PV < (SV - ALXL) \rightarrow$ Alarm OFF $PV \leq (SV + ALXH) \rightarrow$ Alarm ON $PV > (SV + ALXH) \rightarrow$ Alarm OFF |
| 05 | PV high With hold action | |
| 15 | PV high | Formula $PV > ALXH \rightarrow$ Alarm ON $PV \leq (ALXH - HYSX) \rightarrow$ Alarm OFF |
| 06 | PV low With hold action | |
| 16 | PV low | Formula $PV < ALXL \rightarrow$ Alarm ON $PV \geq (ALXL + HYSX) \rightarrow$ Alarm OFF |

※ : With hold action

When hold action is ON, the alarm action is suppressed at start-up until measured value has entered the non-alarm range.

16.1 Alarm mode

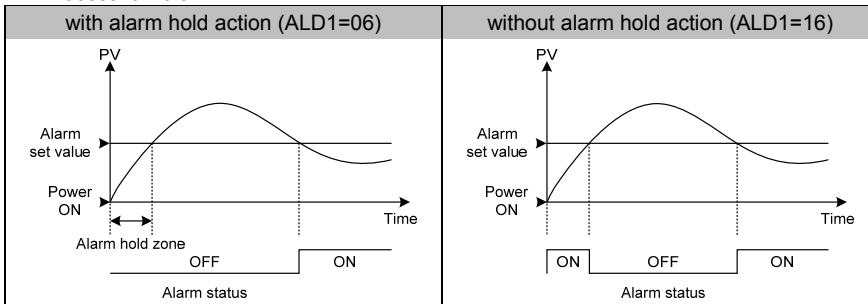
▲ : SV △ : Alarm set value , X : 1 or 2

| ALDX | Alarm mode | Description |
|------|------------|---|
| 07 | Timer | (1) set ALXH = 1000 timer start counting , when timer count to ALTX setting value alarm action ON (2) set ALXH = 0 stop and reset timer ALTX="hour"." minute" |
| 08 | Error | when PV show error message alarm ON when PV show normal temperature alarm OFF |
| 09 | SV high |  Formula $SV > ALXH \rightarrow \text{Alarm ON}$ $SV \leq (ALXH - HYSX) \rightarrow \text{Alarm OFF}$ |
| 10 | SV low |  Formula $SV < ALXL \rightarrow \text{Alarm ON}$ $SV \geq (ALXL + HYSX) \rightarrow \text{Alarm OFF}$ |
| 21 | HBA | Activated conditions : 1. Heater current is less the HBA set value 2. OUT1 output of more than 90% 3. Condition1 and 2 continued more than HBA set the number of seconds |

※ : With hold action

When hold action is ON, the alarm action is suppressed at start-up until measured value has entered the non-alarm range.

Ex: Process low alarm



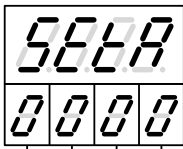
16.2 Alarm special function

1. Alarm Reverse Function

After power-on if no alarm events generate the alarm relay will contact in close condition
if alarm events generate the alarm relay will contact in open condition.

2. Alarm Lock Function

When alarm events generate the alarm relay contact and led indicator continuous will on
even PV/SV return to normal band led still not release until power reset the contact.





SETA default value 0000



- 0 : ALARM 1 reverse function disable (Normal Open)
- 1 : ALARM 1 reverse function enable (Normal Close)
-
- 0 : ALARM 2 reverse function disable (Normal Open)
- 1 : ALARM 2 reverse function enable (Normal Close)
-
- 0 : ALARM 1 lock function disable
- 1 : ALARM 1 lock function enable
-
- 0 : ALARM 2 lock function disable
- 1 : ALARM 2 lock function enable
-

17. Control module modification

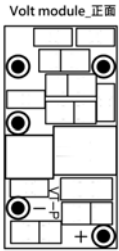
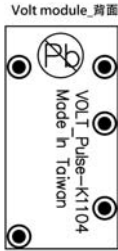
17.1 RELAY Control (1a)

| Top view | Side view | Software Setting |
|---|---|-----------------------------|
|  |  | Set the parameter "CYT1=10" |

17.2 RELAY Control (1c)

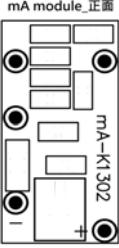
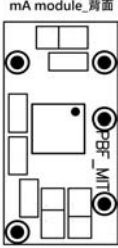
| Top view | Side view | Software Setting |
|---|---|-----------------------------|
|  |  | Set the parameter "CYT1=10" |

17.3 SSR Control

| Top view | Bottom view | Software Setting |
|--|--|---------------------------------|
|  |  | Set the parameter "CYT1=SSr(1)" |

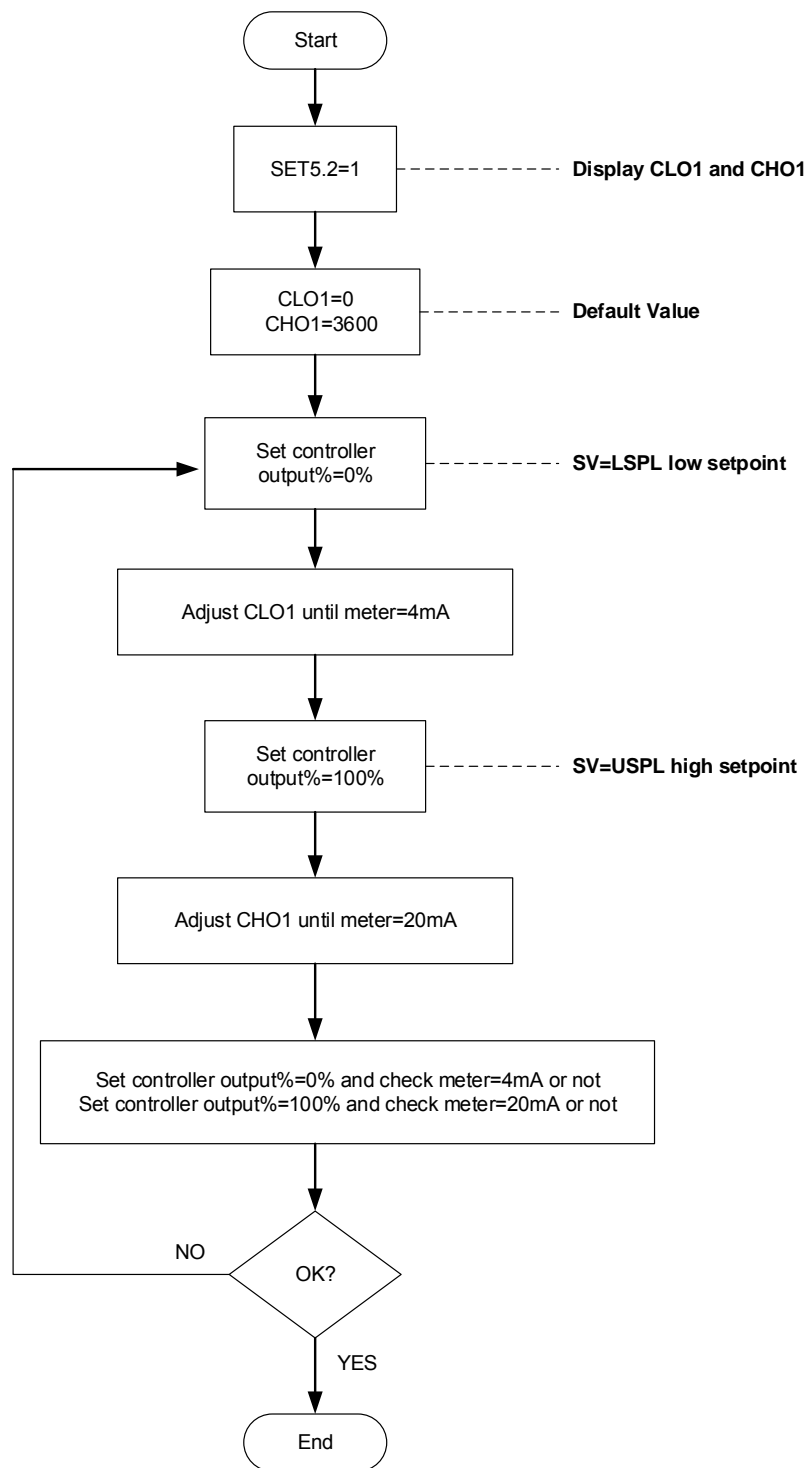
17.4 Linear Control

※ : When modify linear module need to calibrate output signal, please refer to ch17.4 Output calibration flowchart.

| Top view | Bottom view | Software Setting |
|---|---|----------------------------------|
|  |  | Set the parameter "CYT1=LinE(0)" |

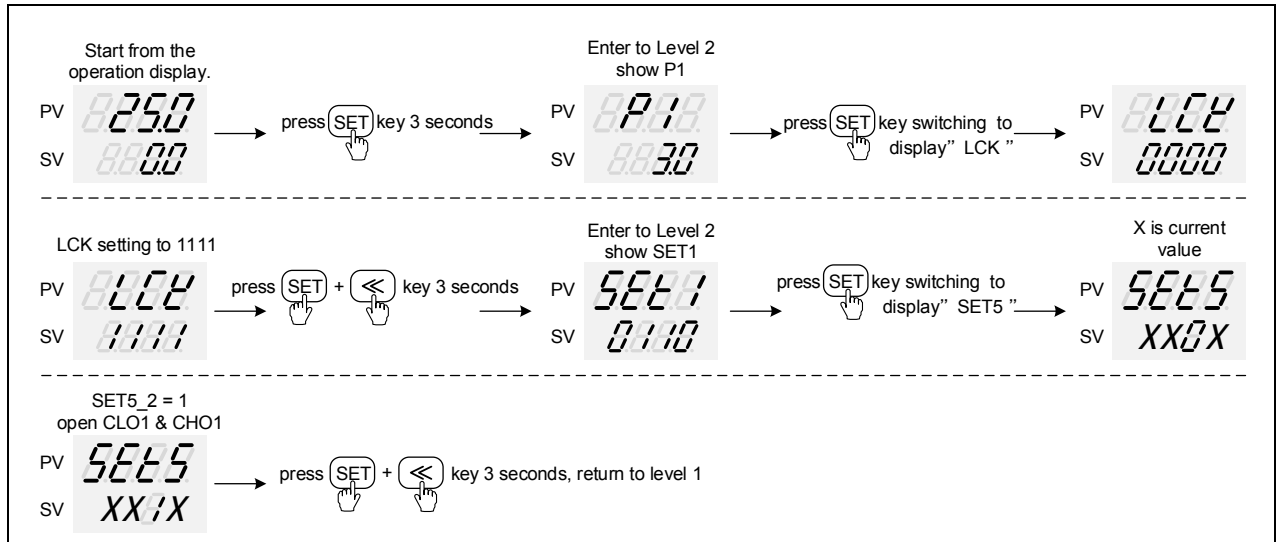
17.5 Output calibration flowchart

Output1 Signal (4mA~20mA) calibration flowchart



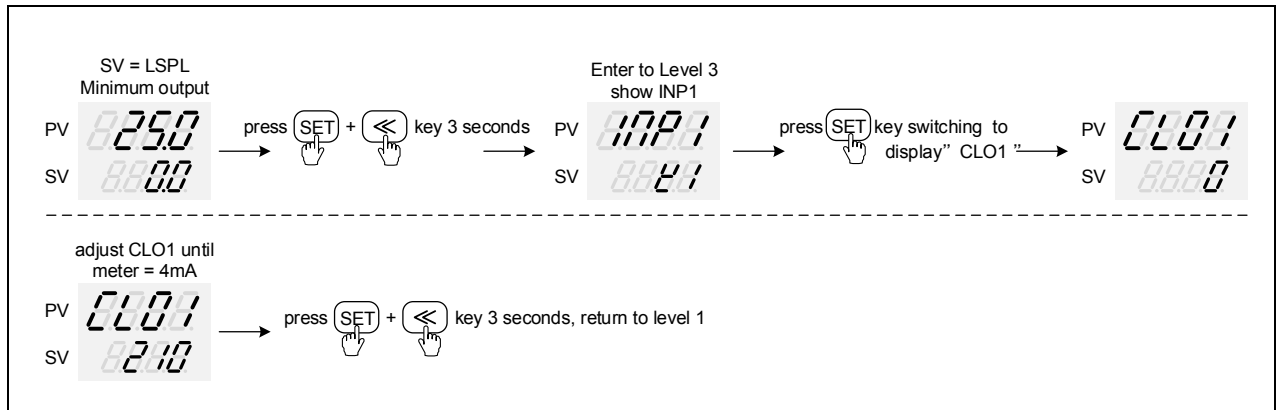
17.6 Output calibration steps

1. Display CLO1 & CHO1 :



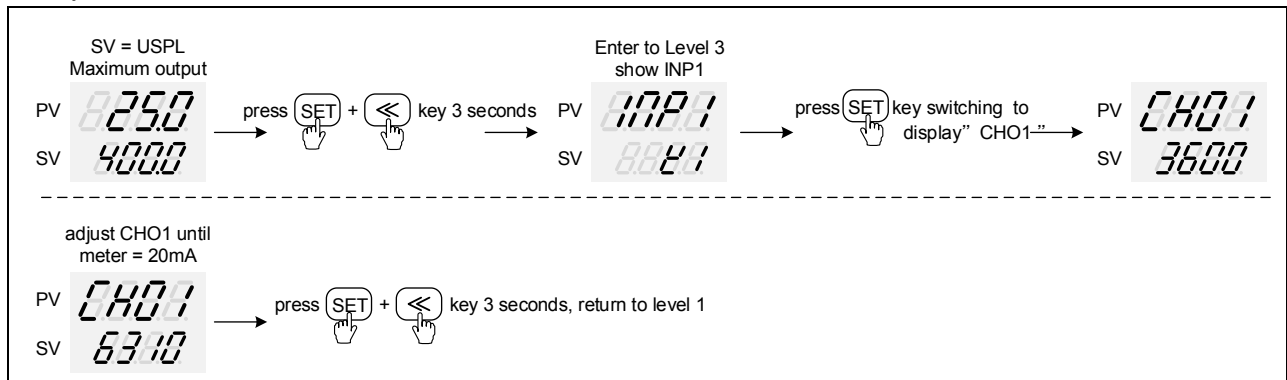
※ : X is current value

2. Adjust CLO1 value :



※ : Each controller CLO1 value is different.

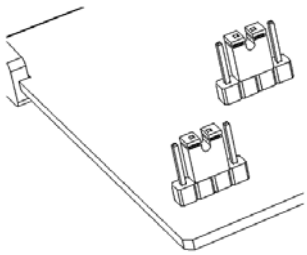
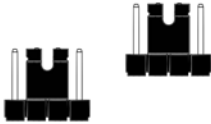
3. Adjust CHO1 value :



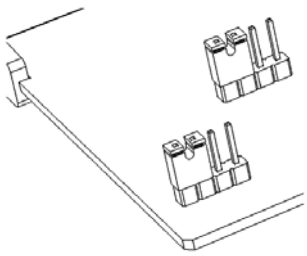
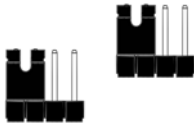
※ : Each controller CHO1 value is different.

18. Input type modification

18.1 Modify to Thermocouple

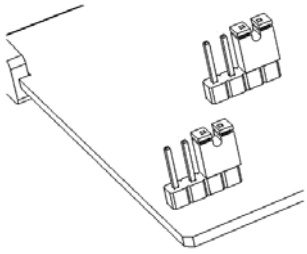
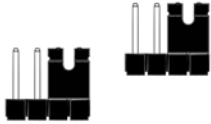
| Jumper Address | | Software Setting |
|---|---|-------------------------------|
| Middle location | | |
|  |  | Set the parameter "INP1=K1~L" |

18.2 Modify to RTD

| Jumper Address | | Software Setting |
|---|---|-------------------------------------|
| Left location | | |
|  |  | Set the parameter "INP1=DP1~DP3" |

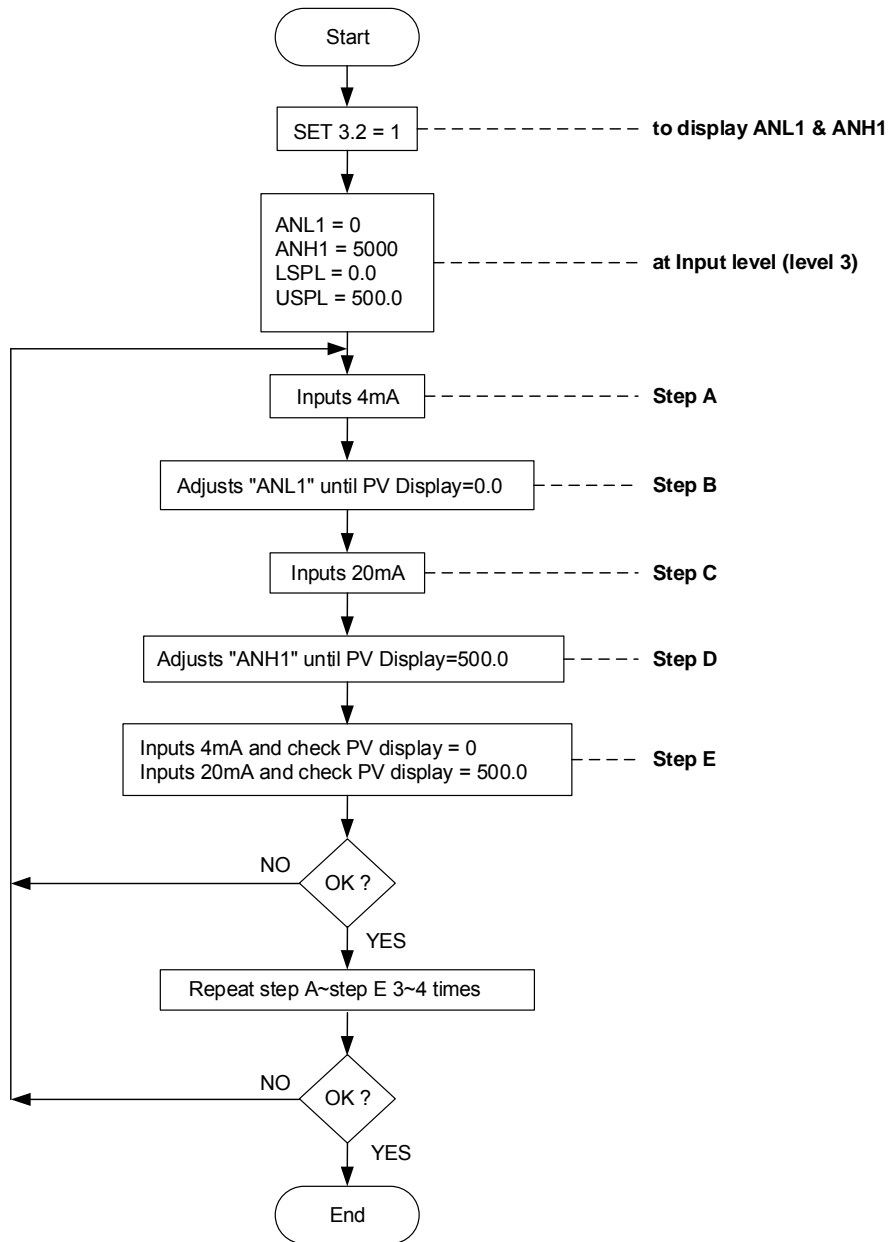
18.3 Modify to Linear (4~20mA)

- ※ : 1. When modify input type to linear signal need to calibrate input signal, please refer to ch18.4 Input calibration flowchart
 2. If want modify to other linear signal, please send it to the retail dealer.

| Jumper Address | | Software Setting |
|---|---|------------------------------|
| Right location | | |
|  |  | Set the parameter "INP1=AN2" |

18.4 Input calibration flowchart

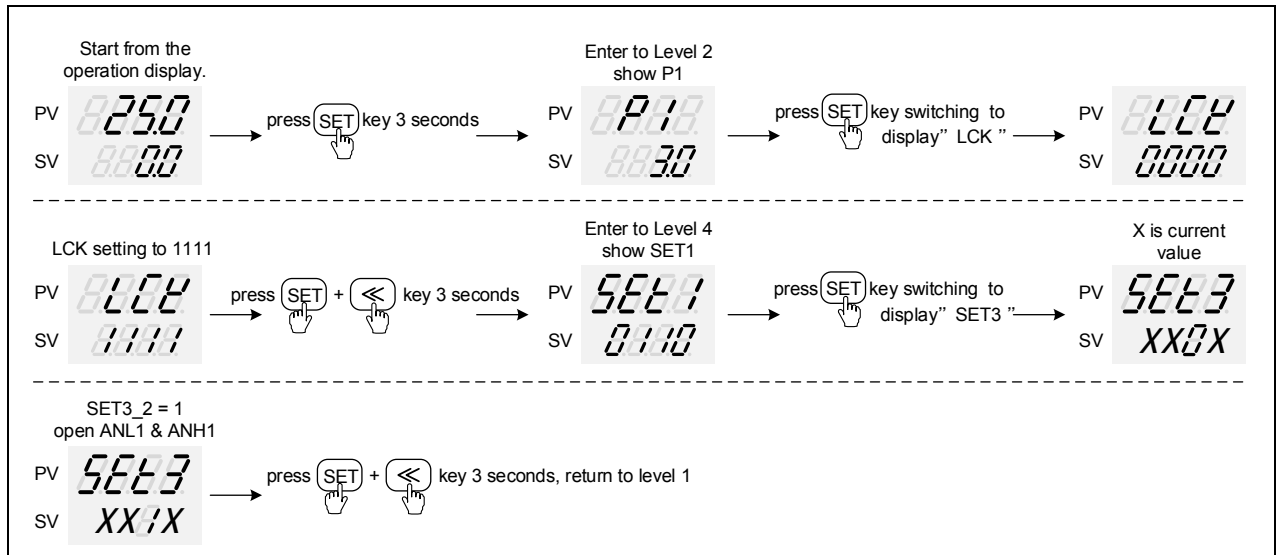
Input Signal (4mA~20mA) calibration flowchart



Set the range you want
 Low = LSPL , High = USPL
 Ex: Low = -10.0 , High = 10.0
 SET LSPL = -10.0 , USPL = 10.0 , DP: 000.0

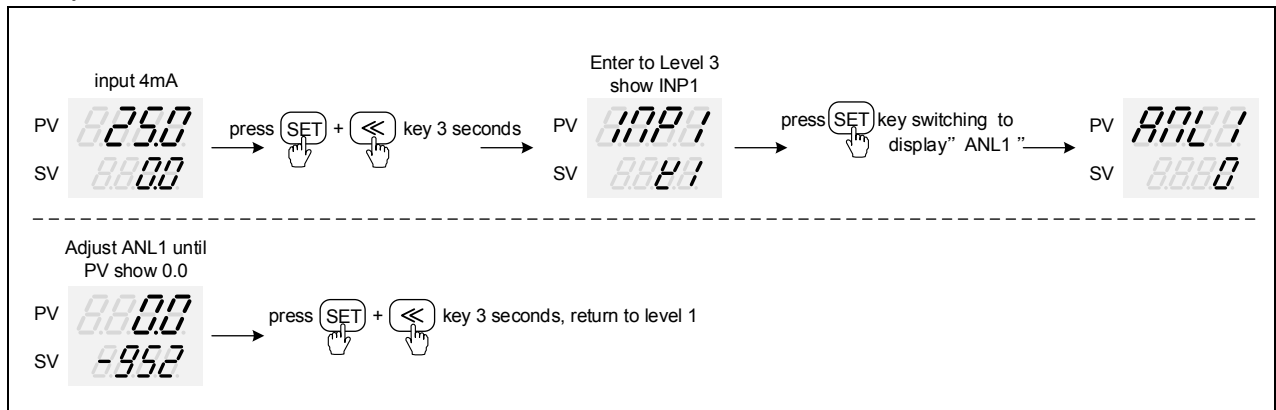
18.5 Input calibration steps

1. Display ANL1 & ANH1 :



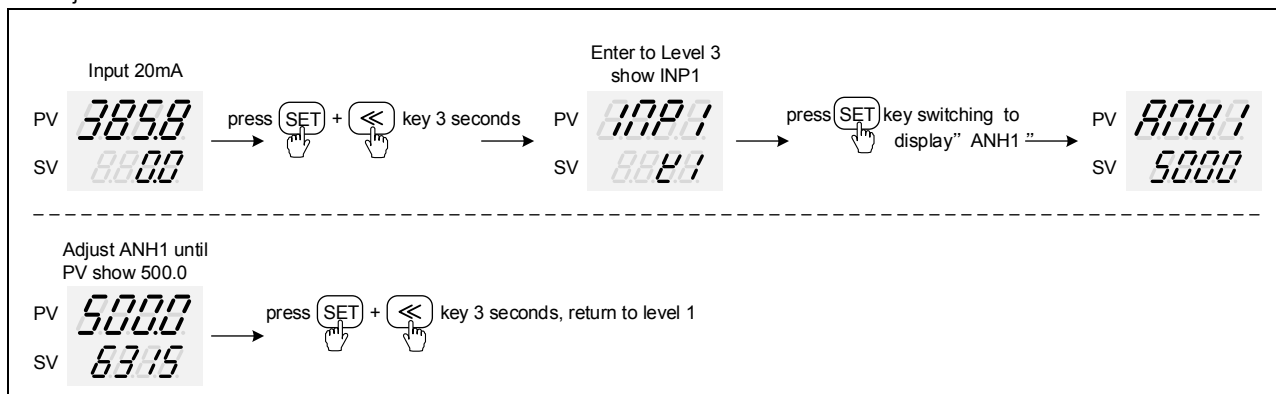
※ : X is current value

2. Adjust ANL1 value :



※ : Each controller ANL1 value is different.

3. Adjust ANH1 value :



※ : Each controller ANH1 value is different.

19. Communication register address table

| Parameter | Register Address | | R / W |
|-----------|------------------|-----|-------|
| | Hex | Dec | |
| SV | 0x00 | 0 | R / W |
| PV | 0x01 | 1 | R |
| SV2 | 0x02 | 2 | R / W |
| PV2 | 0x03 | 3 | R |
| HBAC | 0x04 | 4 | R / W |
| HBAT | 0x05 | 5 | R / W |
| R-S | 0x06 | 6 | R / W |
| OLH1 | 0x07 | 7 | R / W |
| OLL1 | 0x08 | 8 | R / W |
| OLH2 | 0x09 | 9 | R / W |
| OLL2 | 0x0A | 10 | R / W |
| AT | 0x0B | 11 | R / W |
| AL1H | 0x0C | 12 | R / W |
| AL1L | 0x0D | 13 | R / W |
| AL2H | 0x0E | 14 | R / W |
| AL2L | 0x0F | 15 | R / W |
| AL3H | 0x10 | 16 | R / W |
| AL3L | 0x11 | 17 | R / W |
| SV_1 | 0x12 | 18 | R / W |
| SV_2 | 0x13 | 19 | R / W |
| SV_3 | 0x14 | 20 | R / W |
| A-M | 0x15 | 21 | R / W |
| MOP | 0x16 | 22 | R / W |
| P1 | 0x35 | 53 | R / W |
| I1 | 0x36 | 54 | R / W |
| D1 | 0x37 | 55 | R / W |
| CYT1 | 0x38 | 56 | R / W |
| SOF1 | 0x39 | 57 | R / W |
| HYO1 | 0x3A | 58 | R / W |
| OP1 | 0x3B | 59 | R |
| P2 | 0x3C | 60 | R / W |
| I2 | 0x3D | 61 | R / W |
| D2 | 0x3E | 62 | R / W |
| CYT2 | 0x3F | 63 | R / W |
| SOF2 | 0x40 | 64 | R / W |
| GAP.1 | 0x41 | 65 | R / W |
| GAP.2 | 0x42 | 66 | R / W |
| HYO2 | 0x43 | 67 | R / W |
| OP2 | 0x44 | 68 | R |
| ATVL | 0x45 | 69 | R / W |
| LCK | 0x4B | 75 | R / W |
| INP1 | 0x4C | 76 | R / W |
| ANL1 | 0x4D | 77 | R / W |
| ANH1 | 0x4E | 78 | R / W |
| DP | 0x4F | 79 | R / W |
| LSPL | 0x50 | 80 | R / W |
| USPL | 0x51 | 81 | R / W |
| SVL1 | 0x52 | 82 | R / W |
| SVH1 | 0x53 | 83 | R / W |
| PLL1 | 0x54 | 84 | R / W |
| PHH1 | 0x55 | 85 | R / W |
| ALD1 | 0x56 | 86 | R / W |
| ALT1 | 0x57 | 87 | R / W |
| HYS1 | 0x58 | 88 | R / W |
| ALD2 | 0x59 | 89 | R / W |
| ALT2 | 0x5A | 90 | R / W |
| HYS2 | 0x5B | 91 | R / W |
| ALD3 | 0x5C | 92 | R / W |
| ALT3 | 0x5D | 93 | R / W |
| HYS3 | 0x5E | 94 | R / W |
| SETA | 0x5F | 95 | R / W |
| CLO1 | 0x60 | 96 | R / W |
| CHO1 | 0x61 | 97 | R / W |
| CLO2 | 0x62 | 98 | R / W |
| CHO2 | 0x63 | 99 | R / W |
| TE | 0x64 | 100 | R / W |
| TS | 0x65 | 101 | R / W |
| TSPL | 0x66 | 102 | R / W |
| TSPH | 0x67 | 103 | R / W |

| Parameter | Register Address | | R / W |
|-----------|------------------|-----|-------|
| | Hex | Dec | |
| CLO3 | 0x68 | 104 | R / W |
| CHO3 | 0x69 | 105 | R / W |
| RUCY | 0x6A | 106 | R / W |
| WAIT | 0x6B | 107 | R / W |
| PSL | 0x6C | 108 | R / W |
| BITS | 0x6D | 109 | R / W |
| IDNO | 0x6E | 110 | R / W |
| BAUD | 0x6F | 111 | R / W |
| INT | 0x70 | 112 | R / W |
| SVOS | 0x71 | 113 | R / W |
| PVOS | 0x72 | 114 | R / W |
| PVOH | 0x73 | 115 | R / W |
| PVFT | 0x74 | 116 | R / W |
| UNIT | 0x75 | 117 | R / W |
| ODU | 0x76 | 118 | R / W |
| HZ | 0x77 | 119 | R / W |
| INP2 | 0x78 | 120 | R / W |
| ANL2 | 0x79 | 121 | R / W |
| ANH2 | 0x7A | 122 | R / W |
| DP_2 | 0x7B | 123 | R / W |
| LSP2 | 0x7C | 124 | R / W |
| USP2 | 0x7D | 125 | R / W |
| SVL2 | 0x7E | 126 | R / W |
| SVH2 | 0x7F | 127 | R / W |
| PLL2 | 0x80 | 128 | R / W |
| PHH2 | 0x81 | 129 | R / W |
| SVO2 | 0x82 | 130 | R / W |
| PVS2 | 0x83 | 131 | R / W |
| PVH2 | 0x84 | 132 | R / W |
| PVF2 | 0x85 | 133 | R / W |
| UNI2 | 0x86 | 134 | R / W |
| DIE | 0x8C | 140 | R / W |
| DIS | 0x8D | 141 | R / W |
| SET1 | 0x8E | 142 | R / W |
| SET2 | 0x8F | 143 | R / W |
| SET3 | 0x90 | 144 | R / W |
| SET4 | 0x91 | 145 | R / W |
| SET5 | 0x92 | 146 | R / W |
| SET6 | 0x93 | 147 | R / W |
| SET7 | 0x94 | 148 | R / W |
| SET8 | 0x95 | 149 | R / W |
| SET9 | 0x96 | 150 | R / W |
| SET0 | 0x97 | 151 | R / W |
| OUTY | 0x9D | 157 | R / W |
| R-M | 0x9E | 158 | R / W |
| CJS | 0x9F | 159 | R / W |
| CJM | 0xA0 | 160 | R / W |
| CJT | 0xA1 | 161 | R |
| OBIT | 0xA2 | 162 | R |
| D_01 | 0xA5 | 165 | R / W |
| D_02 | 0xA6 | 166 | R / W |
| D_03 | 0xA7 | 167 | R / W |
| D_04 | 0xA8 | 168 | R / W |
| D_05 | 0xA9 | 169 | R / W |
| D_06 | 0xAA | 170 | R / W |
| D_07 | 0xAB | 171 | R / W |
| D_08 | 0xAC | 172 | R / W |
| D_09 | 0xAD | 173 | R / W |
| D_10 | 0xAE | 174 | R / W |
| D_11 | 0xAF | 175 | R / W |
| D_12 | 0xB0 | 176 | R / W |
| D_13 | 0xB1 | 177 | R / W |
| D_14 | 0xB2 | 178 | R / W |
| D_15 | 0xB3 | 179 | R / W |
| D_16 | 0xB4 | 180 | R / W |
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