New Series

MC Based Digital Controllers

# Measure-Indicate -Control Instrument

- Microprocessor-based high performance auto-adjustment
- User-friendly fully accessible parameter setting
- Variety of standard universal input selection
- Ease-to use networking data communications

New series instruments are developed by our expertise of designing and manufacturing of instruments for years, which provided with newest components and control algorithm. They will present the features of intelligent, standardization, as well as high reliability of microprocessor-based instruments to our customers.

Based upon many customers are already familiar with our instruments, New series will bring up a new way to setting the internal parameters(including input type, calculation, output parameter, communication protocol, etc.)of instruments. The feature of instrument with several purposes will provide more flexibility for our customers to deal parameters without depending on the manufacturer.

New series instruments support multiple units networking data communication, different kinds of standard, non-standard serial bi-direction communication function. Many data communication protocols can be chosen, such as **RS-232**, **RS-422**, **RS-485**, etc. It is possible for multiple units to communicate to a computer or programmer, baud rate is **300-9600**bp/s.

We believe that our customers will obtain more advantages with using New series instruments.

**MAIN FEATURES:**

. All new concept of digitized automatic adjustment

. Support multi-units data communications, user-programmable protocol

. Unique fully accessible user-programmable setting

. Setting of input signal . Setting of zero and range of measuring value

. Alarm setting . Setting of outputs

. Parameters saved in memory to against power failure and password protection

. Total digitized cold-junction compensation

.Variety of external dimensions

.AC/DC switching power supply

**1. SPECIFICATIONS:**

| | |
|---|---|
| **INPUT** | RTD: (Detail see Table 2)PT**100**, CU**100**, CU**50**, etc. |
| | Thermocouple: (Detail see Table 2)B, S, K, E, J, T, W, etc. |
| | Analog Signal: (Detail see Table 1)mV, mA, V, R, etc. |
| **RANGE** | **-1999—9999** digit |
| **ACCURACY** | **0.2%** of Full Scale **±1** digit or **0.5%** of Full Scale **±1** digit |
| **DISTINGUISH ABILITY** | **±1** digit |
| **TEMPRATURE COMPENSATION** | **0—50**℃ |
| **DISPLAY** | **-1999—9999** Measuring Value Display |
| | **-1999—9999** Set Point Value Display |
| | Light Emitting Diode Status Display |
| | Bright LED digital display |
| | Selectable **0.28**" LED display |
| | Selectable **0.56**" LED display |

| | |
|---|---|
| | Selectable **0.8**" LED display |
| **CONTROL METHOD** | Three position ON/OFF with hysteresis |
| **OUTPUT** | Relay contact output: **220**V AC/**3**A; **24**V DC/**5**A(resistive load) |
| | Standard analog signal output: **0～10** mA(≤**500**ohm) |
| | **4～20** mA(≤**250**ohm) |
| | **0 ～ 5** V(≥**250** K ohm) |
| | **1 ～ 5** V(≥**250** K ohm) |
| | Control output: SCR output **400V/0.5A** |
| | SSR output **6V/50mA** |
| | Power supply: DC24V/30mA |
| **ALARM** | Selectable relay high/low alarm output, **LED** indication |
| **ALARM SENSITIVITY** | ±**1** digit |
| **COMMUNICATIONS** | Different standard bi-directional serial data communication, i.e. RS-485, RS422, RS232, etc. |
| | Baud rate **300～9600** bp/s internal parameters are flexible. |
| | The RING connections are used for the communications between multi-instruments and main computer (PC, Programmer, Varity of computers, etc.) |

| | |
|---|---|
| **SETTING** | Front Panel touch keypad digital setting<br>Data retention upon power failure via nonvolatile memory password protection for parameter settings |
| **PROTECTION** | Input loop break Alarm (Relay output, LED indication)<br>break Alarm(Relay output, LED indication)<br>Under-pressure automatic recovery<br>Unusual operation automatic recovery (watch dog) |
| **OPERATING EVIROMENT** | Ambient Temperature **0～50**℃<br>Relative Humidity ≤**85RH**<br>Power Supply AC220V+10-15% 50Hz±2Hz<br>AC90V～260V---Switching Power Supply<br>DC24V±2V---Switching Power Supply<br>Avoid heavy corrodent gas |
| **POWER CONSUMPTION** | ≤5W(AC220V Power Supply)<br>≤3W(AC90～260V---Switching Power Supply )<br>≤1.5W(DC24V---Switching Power Supply ) |
| **CONSTRUCTION** | Standard Inserting Type |

| | |
|---|---|
| **WEIGHT** | 400g(AC220V Power Supply ) |
| | 240g(Switching Power Supply) |

## 2. OPERATION THEORY

### (1)Input Signal Conversion and Indication:

The thermoemf from thermocouple or the resistance of RTD is converted to the voltage signal through the input circuit (Stansdard signal through electrical filter circuit), it will be fed to the amplifier after the interference of high frequency signal is filtered by the anti-disturbance circuit.

The DC amplifier, which composed of high accuracy, low zero shifting linear amplifier and multi-switching circuit with microprocessor-based automatic zero adjustment will eliminate efficiently, the zero shifting caused by the amplifier internally and will amplify the input signal to a preset value, and then fed to the Analog Digital(A/D)converter.

The A/D converter which made of accurate 4 1/2 digit double integral type A/D converter, has high anti-disturbance and good linearity characteristic. The DC voltage signal amplified, which is converted to the corresponding pulses signal by the A/D converter, will be fed into the microprocessor(CPU).

The computing (conversion between thermo-electric and function, adjustment of non-linearity, etc.)in the CPU depending on the input type which set by the instrument, the result of computing will be converted to the corresponding BCD code and the scanning signal of positioning, as well as the display of LED.

**(2). Control Output**

The operation of control output is that the microprocessor (CPU) computes the calculated result and the parameters in the EEPROM( Electrically Erasable Programmable Read Only Memory ), and sending the result of computing and control requirement to the output as a control signal ( Relay contacts, SCR-Silicon Controlled Rectifier zero-cross pluses control, Analog signal, etc. ).

**(3). Analog Signal Output**

The microprocessor (CPU) output the analog signal (DC voltage, current, etc. ), converted by Digital/ Analog(D/A)circuit from the computed result.

Recently, the permanent current and voltage sources as follows:

International standard: 4—20mA, 1—5V（compatible with DDZ-III type instruments）;

National standard: 0—10mA, 0—5V（compatible with DDZ-II type instruments）.

The high and low limits of analog signal output in the instrument can be preset by the internal parameters.

**(4). Data Communications**

This instrument can be communicated to the variety of equipment with serial input/output communication capability. Higher level instruments can acquire variety of measuring data and signal, as well as set up as a management and control system.

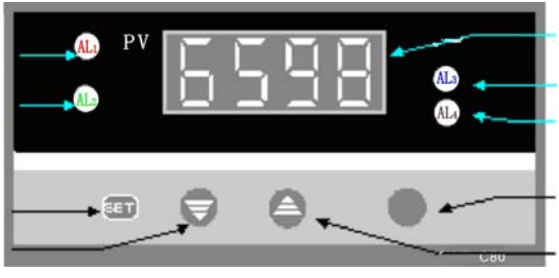
The communication protocol might be 2-wiretype, 3-wiretype or 4 wire type, its communication baud rate can be

set by the secondary parameters of the unit. Both interface and main circuit use optical isolation, which will increase the reliability of operation and safety of data transmission. If network control is applied, the current token ring bus method of 2-wire(4-wire) for its communication protocol can be chosen. Only one cable with two (four) wires for the entire control loop is needed. Up to 64 units can be connected to one or multiple units to proceed bi-directional communications. Higher level microprocessor can poll the address which set by the user, and acquired the field data from each unit anytime, remote measurement and control is also possible. Maximum communication distance can be as long as one kilometer.

### 3. FRONT PANEL LAYOUT and OPERATIONS:

Operation is based on **C803** models are similar.

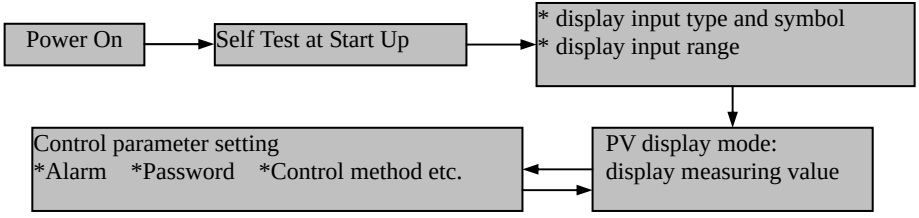
Front Panel



| | NAME | DESCRIPTION |
|---|---|---|
| **Operation Key** | Parameter Setting Selection Key | . recording previous set value<br>. change parameters setting mode in turn<br>. change display or parameters setting |
| | Setting Point Decrement Key | . used for increment the value when changing setting continuous depressing will increment quickly |
| | Setting Point Increment Key | . used for decrement the value when changing setting continuous depressing will decrement quickly |
| | Reset Key<br>(Not be shown on Front Pane) | . used for program zeroing (self-testing) |
| **Display** | Measuring Value PV Display | . display measuring value<br>. display symbol or setting value when in the parameter setting mode |
| **Indicator** | First Limit Alarm Indicator | . light on when high alarm ON<br>. light on when input wire broken<br>. out-of-limit indicator when used in time ratio mode |
| | Second Limit Alarm Indicator | . light on when low alarm ON<br>. output indicator when used in time ratio mode |

## 4. OPERATION

### (1). Flow Chat of Operation




### (2). Wiring Correctly:

After inserting the unit into the control panel., please connect the input, output and power wires according to the wiring diagram, and check if the connection is correct.

### (3). Power on

There is not power switch on the unit, therefore, the unit will be start-up as soon as power is connected.

### (4). Display of Input Types and Ranges:

As soon as power on, the input type and range will be designated immediately. After 3 seconds, unit will go into operation mode, measuring value will be displayed on PV. If the self-test is required again, by pressing the RESET key located on the right lower corner of the front panel, the unit will start its self-test procedure again.

**(5). Parameter Settings:**

**① Type of Parameters**

When the measuring value PV is displayed, pressing SET key, nit will enter the parameter setting mode. Each time SET key is depressed, he parameter setting will be changed following the orders listed below (cyclical step). Parameter setting mode and Parameters list as follow:

NOTE: The parameters might not be displayed in some models.

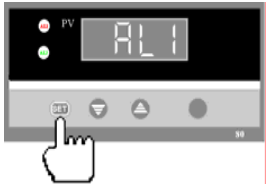
| SYMBOL | NAME | RANGE | DESCRIPTION | PRESET VALUE |
|---|---|---|---|---|
| AL1 | Alarm 1 | -1999—9999 | . Display Alarm 1 Setting Value<br>. Other Functions Refer to<br>(AL1,AL2 Description)<br>please mention when ordering | 50 or 50.0 |
| AL2 | Alarm 2 | -1999—9999 | . Display Alarm 2 Setting Value<br>. Other Functions Refer to<br>(AL1,AL2 Description)<br>please mention when ordering | 50 or 50.0 |
| AH1 | Alarm 1 | 0—255 | Display Alarm 1Hysteresis | 2 or 2.0 |
| AH2 | Alarm 2 | 0—255 | Display Alarm 2Hysteresis | 2 or 2.0 |
| CLK | Parameter Locking | CLK=0<br>CLK=132<br>CLK≠0,132 | Unlock (Parameter Changeable)<br>Go to Secondary Parameter Setting<br>Lock(Parameter Unchangeable) | 00 |

When setting parameters, setting value will be displayed in PV displays the symbol of the parameter first, and then the actual parameter value which corresponds to the symbol

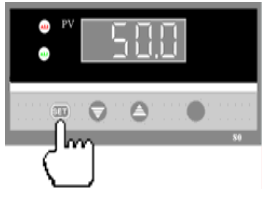
② **Method of Parameter Setting**

Using **C803** as an example, the description of method and procedure for parameter setting as follow (Setting high alarm value to 100℃)

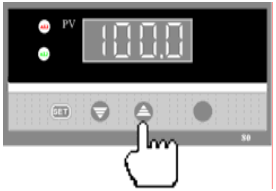
Note: Before changing the parameters, make sure CLK=00, otherwise parameter will be unchangeable.



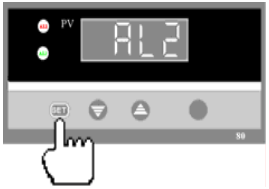

When PV displays the measuring value, depress SET key, the parameter setting mode is entered, the symbol AL1 of Alarm1 parameter will be displayed.




When PV displays AL1, depress SET key, PV will display the manufacturer's preset value of Alarm 1.




When PV displays preset value of Alarm 1 ,press setting value increment key, PV value will be increased quickly. Adjust the value to 100.




Depress SET key, accept the correct setting value and go to the next parameter setting. The parameter setting of Alarm 1 is done.

. using the same method, you can continue to set AL2, ALH1, ALH2, etc. as well as locking (CLK)parameter settings.

**Note:**

- After parameter is changed, the value must be stored by pressing the SET key.
- If parameter value can not be modified, because of the locked parameter setting, you need to change the CLK value to 00 for unlocking.

- To set the negative value, depressing the DECREMENT key to reduce setting value toward zero, continue pressing the key, the negative value will be appeared.
- As soon the parameter are accepted, they will be kept permanently even though the power is removed.

**5. Return to Operation Mode**

**(1). Manual Return**

In parameter setting mode, depress SET key for 5 seconds, instrument will be returned to the measuring value display (Operation Mode).

**(2). Automatic Return**

In parameter setting mode, if no key has been pressed for 30 seconds, instrument will be returned to the measuring value display (Operation Mode).

**(3). Reset Return**

In parameter setting mode, if RESET key is pressed, unit will go to self-test procedure and then return to the measuring value display(Operation Mode).

**6.OUTPUT**

**(1). Description of AL1 and AL2**

| SYMBOL | NAME | RANGE | DESCRIPTION | OUTPUT COND. |
|---|---|---|---|---|
| AL1 | Alarm 1 | Full Scale | . Selectable High Alarm<br>. Selectable Low Alarm<br>. Selectable High High Alarm<br>. Selectable No Alarm | See Alarm Output Condition |
| AL2 | Alarm2 | Full Scale | . Selectable High Alarm<br>. Selectable Low Alarm<br>. Selectable Low Low Alarm<br>. Selectable No Alarm | |

**Note:** Only one alarm can be set for each Alarm function, "High High" or " Low Low" alarm settings require using both AL1 and AL2.

**7. EXAMPLES:**

Heating System Control

Requirement: Control Temperature 800℃

. High Alarm 820℃; . Low Alarm 790℃

. High/Low Relay Output Hysteresis 3℃

Sensor Type: Thermocouple E

Unit Selection: C803-01-E-HL

**(1). Operation**

Check all the connections are correct, power on and unit goes to working condition.

Confirm that the specification, input type and range, are met the requirement.

**(2). Parameter Setting**

1).Alarm 1 (AL1)Setting

Press SET key, when PV displays the measuring value, PV display change to:

AL1 ——Alarm1 Symbol

Press SET key again, PV display changes to:

50 ——Manufacturer Preset Value

In this Situation, pressing INCREMENT/DECREMENT key to change setting value to meet the control requirement. In this example the setting value is 820℃.

2). Alarm 2 (AL2)Setting

Press SET key, PV displays change to:

AL2 ——Alarm2 Symbol

Press SET key again, PV display changes to:

50 ——Manufacturer Preset Value

In this Situation, pressing INCREMENT/DECREMENT key to change setting value to meet the control requirement. In this example the setting value is 790℃.

3). Alarm 1 Hysteresis (AH2)Setting

Press SET key, PV displays change to:

AH1 ——Alarm1 Hysteresis

Press SET key again, PV display changes to:

02 ——Manufacturer Preset Value

In this Situation, pressing INCREMENT/DECREMENT key to change setting value to meet the control requirement. In this example the setting value is 3℃.

4). Alarm 2 Hysteresis (AH2)Setting

Press SET key, PV displays change to:

AH2 ——Alarm2 Hysteresis

Press SET key again, PV display changes to:

02 ——Manufacturer Preset Value

In this Situation, pressing INCREMENT/DECREMENT key to change setting value to meet the control requirement. In this example the setting value is 3℃.

5). Parameter Setting LOCK/UNLOCK

Press SET key, PV displays change to:

AH1 ——LOCK/UNLOCK

Press SET key again, PV display changes to:

02 ——Manufacturer Preset Value

In this Situation, pressing INCREMENT/DECREMENT key to change setting value to meet the control requirement. In this example the setting value is 1.

**Note:**

**.** Now, all the parameter settings are locked and no parameters can be changed. If you need to modify the parameters, unlocking can be done by setting CLK to 00.

**.** After finishing the parameter modifications, pressing SET key to accept the changes, the parameter setting will complete.

**.** Return to operation mode , the modified parameters will be used for the real time control by the instrument.

## 8.INSTALLATION and OPERATING

The instrument uses standard insertion type structure for its enclosure, it can be directly mounted into the panel.

(1)How to Wire

1)To avoid noise induction, the input wire should be separated as far as possible from the instrument power wire, other power wires and power loaded circuit, etc.

2)In the case of noise induction from the power supply, the use of an isolated transformer and a noise filter are recommended.(Note: power voltage of the instrument needs to be concerned first).

(2)The selection of frequency, the filters' characteristics are the important factors to obtain a good noise reduction.

1)It is efficacious against noise induction to twist the power wires. The shorter pitch of the twisted wire, the better noise reduction.

2)It is necessary for the filter to install on the panel with good grounding, and minimize the distance of wire connection between filter and instrument power terminals.

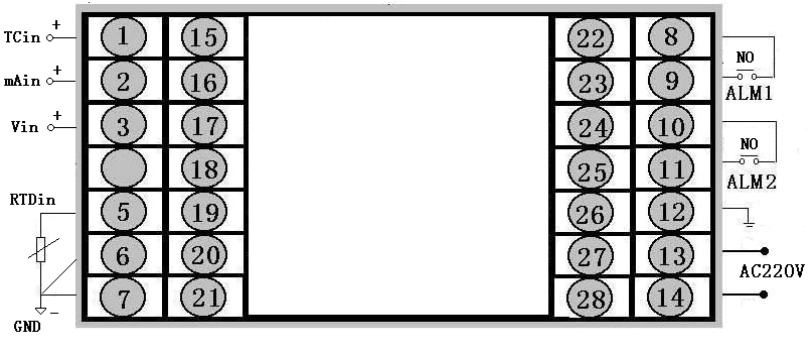
Note: Long distance wire connection between filter and instrument power terminal will greatly reduce the efficient of the filter.

3)If the fuses is installed in the line of filter output, the efficient of filter will also be greatly reduced.

4)Use wires with National Standard Code (using wire with cross area 1.5-2.0$mm^2$ , and minimized its connection distance to ground).

5)There is 2-3 seconds delay on the contact output after power on. If the contact output is used for the signal of external loop, it is recommended that time delay relay should be used.

**9.WIRING DIAGRAM**




Note: The wiring diagram for the special model instruments, please refer to wiring diagram put on the instrument.

## 10.TYPE CODE for Series Measure-Display-Control CONTROLLER

| Types | Codes | Notes |
|---|---|---|
| | □ □ □□ -□ □ □ -□□ -□ □ □ | |
| Appearance | C S | Horizontal instrument<br>Vertical instrument |
| Size | 4 8 9 | 96×48mm(D),48×96mm(S)<br>160×80mm(D),80×160mm(S)<br>96×96 mm |
| Control function | 01 03 04 | Measuring display<br>3-position control<br>4-limit control or 4-limit alarm output l |
| Communication Method | 0 2 4 8 | No communication<br>Port: RS-232（or with print port）<br>Port: RS-422<br>Port: RS-485 |
| Output Method | □ | See Output Method |
| Input type | □□ | See *Input Type* |
| First alarm method | N H L | No Alarm (can be omitted)<br>Upper limit alarm<br>Lower limit alarm |

| Types | Codes | Notes |
|---|---|---|
| | □ □ □□ -□ □ □ -□□ -□ □ □ | |
| Second alarm method | N<br>H<br>L | No Alarm (can be omitted)<br>Upper limit alarm<br>Lower limit alarm |
| Feed output | P | DC24V Feed output |
| Power supply method | W<br>T | DC24V Power supply<br>AC90～265V power(switch power, note 3)<br>AC220V power (Linear power, can omit) |

★ output method：

| Code | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|---|
| Output method | No output | Relay contacts | 4～20mA | 0～10mA | 1～5V | 0～5V | SCR Output | SSR Output | Special Output |

★ Input Type：

| Code | Input type | Measure Range | Code | Input type | Measure Range | Code | Input type | Measure Range |
|---|---|---|---|---|---|---|---|---|
| 01 | B | 400～1800 ℃ | 09 | Pt100.1 | -99.9~199.9℃ | 17 | 30～350 Ω | -1999～9999 d |
| 02 | S | 0 ～1600 ℃ | 10 | Cu50 | -50.0~150.0 ℃ | 18 | Special | By user |
| 03 | K | 0 ～1300 ℃ | 11 | Cu100 | -50.0~150.0 ℃ | 19 | 4～20 mA s.r. | -1999～9999 d |
| 04 | E | 0 ～1000 ℃ | 12 | 4～20 mA | -1999～9999 d | 20 | 0～10mA s.r. | -1999～9999 d |

| Code | Input type | Measure Range | Code | Input type | Measure Range | Code | Input type | Measure Range |
|---|---|---|---|---|---|---|---|---|
| 05 | T | -200～400 ℃ | 13 | 0～10 mA | -1999～9999 d | 21 | 1～ 5 V s.r. | -1999～9999 d |
| 06 | J | 0 ～1200 ℃ | 14 | 1～5 V | -1999～9999 d | 22 | 0～5 V s.r. | -1999～9999 d |
| 07 | WRe | 0 ～3200 ℃ | 15 | 0～5 V | -1999～9999 d | 23 | Switch input | |
| 08 | Pt100 | -200～650 ℃ | 16 | 0～20 mA | -1999～9999 d | 24 | Frequency input | 0～5kHz |

## 11. SETTING the 2nd PARAMETERS

**Warning! Non-engineering designer is NOT allowed to change the 2nd parameters. Otherwise the instrument will control in error!**

Under the state of setting the 1st parameters, after changing CLK =132, press SET key again till the parameter CLK appears and the value is 132. Then loosen SET key. Again, simultaneously press SET key and ^ key for 30 seconds, the instrument goes into the state of setting the 2nd parameters. Under this state, every time pressing SET key will switch as the following order (turn after turn).

The 2nd parameters are listed as follows:

| Parameter | Name | Set Range (byte) | Explanation |
|---|---|---|---|
| SL0 | Input scale | 0～20 | .set type of input scale（NOTE :6） |
| SL1 | Decimal Point | SL1=0 | .NO Decimal Point |
| | | SL1=1 | . Decimal point is at tenth digit.（display XXX.X） |
| | | SL1=2 | . Decimal point is at hundredth digit（display XX.XX） |
| | | SL1=3 | . Decimal point is at thousandth digit（displays X.XXX） |
| SL2 | The 1st Alarm Type | SL2=0 | . No alarm |
| | | SL2=1 | The 1st Alarm Type is Low limit alarm |
| | | SL2=2 | .The 1st Alarm Type is High limit alarm |
| SL3 | The 2st Alarm Type | SL3=0 | . No alarm |
| | | SL3=1 | The 2st Alarm Type is Low limit alarm |
| | | SL3=2 | .The 2st Alarm Type is High limit alarm |
| SL2. | The 3st Alarm Type | SL2.=0 | . No alarm |
| | | SL2.=1 | The 3st Alarm Type is Low limit alarm |
| | | SL2.=2 | .The 3st Alarm Type is High limit alarm |

| Parameter | Name | Set Range (byte) | Explanation |
|---|---|---|---|
| SL3. | The 4st Alarm Type | SL3.=0 | . No alarm |
| | | SL3.=1 | The 4st Alarm Type is Low limit alarm |
| | | SL3.=2 | .The 4st Alarm Type is High limit alarm |
| SL5 | flicker Alarm | SL5=0 | . NO flicker Alarm |
| | | SL5=1 | . flicker Alarm |
| SL6 | filter coefficient | 1～10 | Set filter coefficient in case of fluctuating of display values |
| DE | Equipment No | 0～250 | The equipment code of instrument when setting communication |
| bT | Communicating baud rate | BT=0 | Communicating baud rate is 300bps |
| | | BT=1 | Communicating baud rate is 600bps |
| | | BT=2 | Communicating baud rate is 1200bps |
| | | BT=3 | Communicating baud rate is 2400bps |
| | | BT=4 | Communicating baud rate is 4800bps |
| | | BT=5 | Communicating baud rate is 9600bps |

| Parameter | Name | Set Range (byte) | Explanation |
|---|---|---|---|
| Pb1 | Zero Off-set of Input | Full Range | . Set display off-set of input measured zero |
| KK1 | Range Proportion of Input | 0～1.999 time | .Set proportion of input range |
| Pb2 | Zero Off-set of cold-junction compensation | Full Range | . Set off-set of cold-junction compensation zero |
| KK2 | Range Proportion of cold-junction compensation | 0～1.999 time | .Set proportion of cold-junction compensation range |
| Pb3 | Zero Off-set of output | Full Range | . Set display off-set of output measured zero |
| KK3 | Range Proportion of output | 0～1.999 time | .Set proportion of output range |
| OUL | L limit of transmit output range | Full Range | Set L limit range of transmit output. |
| OUH | H limit of transmit output | Full Range | . Set H limit range of transmit output. |

| Parameter | Name | Set Range (byte) | Explanation |
|---|---|---|---|
| PVL | L limit of flicker Alarm | Full Range | Set L limit range of flicker Alarm |
| PVH | H limit of flicker Alarm | Full Range | Set H limit range of flicker Alarm |
| SLL | L limit of Measure range | Full Range | . Set L limit range of input signal |
| SLH | H limit of Measure range | Full Range | Set L limit range of input signal |
| SLU | Measure small signal resect | Full Range | set small signal resect of input signal |