*OPERATING MANUAL*

# RTD TRANSMITTER
**(2 channel, PC programmable)**

MODEL **M1EXR-2**

## CONTENTS




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# BEFORE USE ....

Thank you for choosing M-System. Before use, please check contents of the package you received as outlined below.
If you have any problems or questions with the product, please contact M-System's Sales Office or representatives.

### ■ PACKAGE INCLUDES:

RTD transmitter (body) .....(1)

### ■ MODEL NO.

Confirm Model No. marking on the product to be exactly what you ordered.

### ■ OPERATING MANUAL

This manual describes detailed operation regarding settings.
The M1EXR-2 is programmable using a PC. For detailed information on the PC configuration, refer to the M1ECFG users manual (EM-5981).
The M1ECFG Configurator Software is downloadable at M-System's web site: http://www.m-system.co.jp

# POINTS OF CAUTION

### ■ CONFORMITY WITH EU DIRECTIVES

- This equipment is suitable for Pollution Degree 2 and Installation Category II (transient voltage 2500V). Reinforced insulation (signal input or output to power input: 300V) is maintained. Prior to installation, check that the insulation class of this unit satisfies the system requirements.
- Altitude up to 2000 meters.
- The equipment must be mounted inside a panel.
- The equipment must be installed such that appropriate clearance and creepage distances are maintained to conform to CE requirements. Failure to observe these requirements may invalidate the CE conformance.
- The actual installation environments such as panel configurations, connected devices, connected wires, may affect the protection level of this unit when it is integrated in a panel system. The user may have to review the CE requirements in regard to the whole system and employ additional protective measures to ensure the CE conformity.
- Install lightning surge protectors for those wires connected to remote locations.

### ■ POWER INPUT RATING & OPERATIONAL RANGE

- Locate the power input rating marked on the product and confirm its operational range as indicated below:

100 – 240V AC rating: 85 – 264V, 47 – 66 Hz,
≤ 7VA at 100V AC
≤ 10VA at 200V AC
≤ 12VA at 264V AC
24V DC rating: 24V ±10%, ≤ 4W
110V DC rating: 85 – 150V, ≤ 4W

### ■ GENERAL PRECAUTIONS

- Before you remove the unit from its base or mount it, turn off the power supply and input signal for safety.

### ■ ENVIRONMENT

- Indoor use.
- When heavy dust or metal particles are present in the air, install the unit inside proper housing with sufficient ventilation.
- Do not install the unit where it is subjected to continuous vibration. Do not subject the unit to physical impact.
- Environmental temperature must be within -5 to +55°C (23 to 131°F) with relative humidity within 10 to 85% RH in order to ensure adequate life span and operation.
- Be sure that the ventilation slits are not covered with cables, etc.

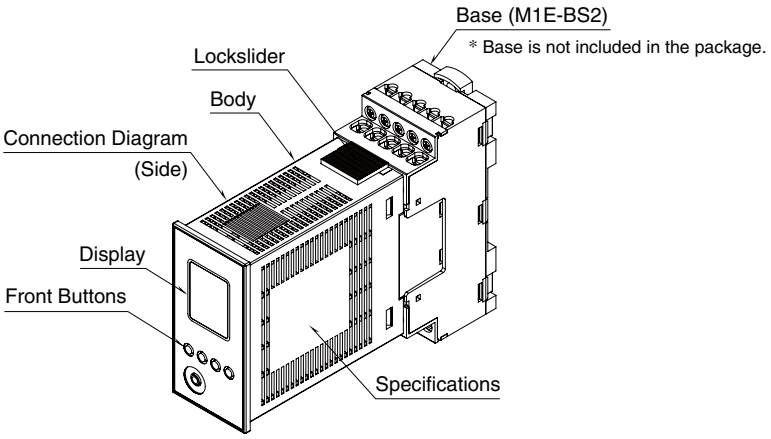
### ■ WIRING

- Do not install cables close to noise sources (relay drive cable, high frequency line, etc.).
- Do not bind these cables together with those in which noises are present. Do not install them in the same duct.

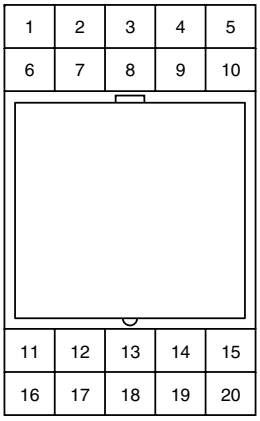
### ■ AND ....

- The unit is designed to function as soon as power is supplied, however, a warm up for 10 minutes is required for satisfying complete performance described in the data sheet.
- With voltage output, do not leave the output terminals shortcircuited for a long time. The unit is designed to endure it without breakdown, however, it may shorten appropriate life duration.

# COMPONENT IDENTIFICATION




## ■ TERMINAL ASSIGNMENTS




| No. | FUNCTION | No. | FUNCTION |
|---|---|---|---|
| 1 | Unused | 11 | Ch1 Output + |
| 2 | Unused | 12 | Ch1 Output – |
| 3 | Ch1 Input A | 13 | Unused |
| 4 | Ch1 Input B (3-wire) | 14 | Ch2 Output + |
| 5 | Ch1 Input B | 15 | Ch2 Output – |
| 6 | Unused | 16 | Unused |
| 7 | Unused | 17 | Unused |
| 8 | Ch2 Input A | 18 | Unused |
| 9 | Ch2 Input B (3-wire) | 19 | Power U (+) |
| 10 | Ch2 Input B | 20 | Power V (–) |

# INSTALLATION

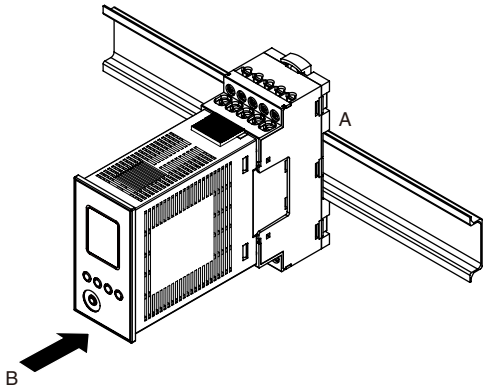
Pulling out the base while pushing the lockslider on the top of the unit enables to remove the base from the unit (base is not included in the package).

## ■ DIN RAIL MOUNTING (SIDE)

**• Mounting the unit**

A) Hang the upper hook at the rear side of unit on the DIN rail.

B) Push the lower part of the unit in the direction of the arrow until the unit is firmly fixed to the DIN rail.

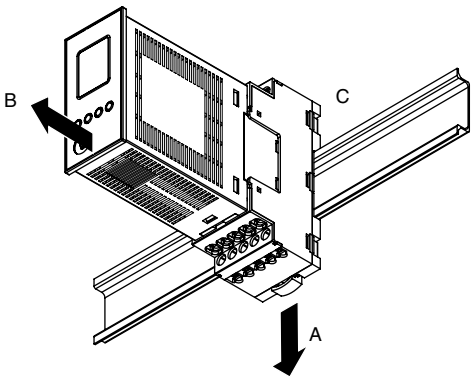



**• Removing the unit**

A) Push down the DIN rail adaptor using a minus screwdriver.

B) Pull out the lower part of the unit.

C) Remove the upper part from the DIN rail.



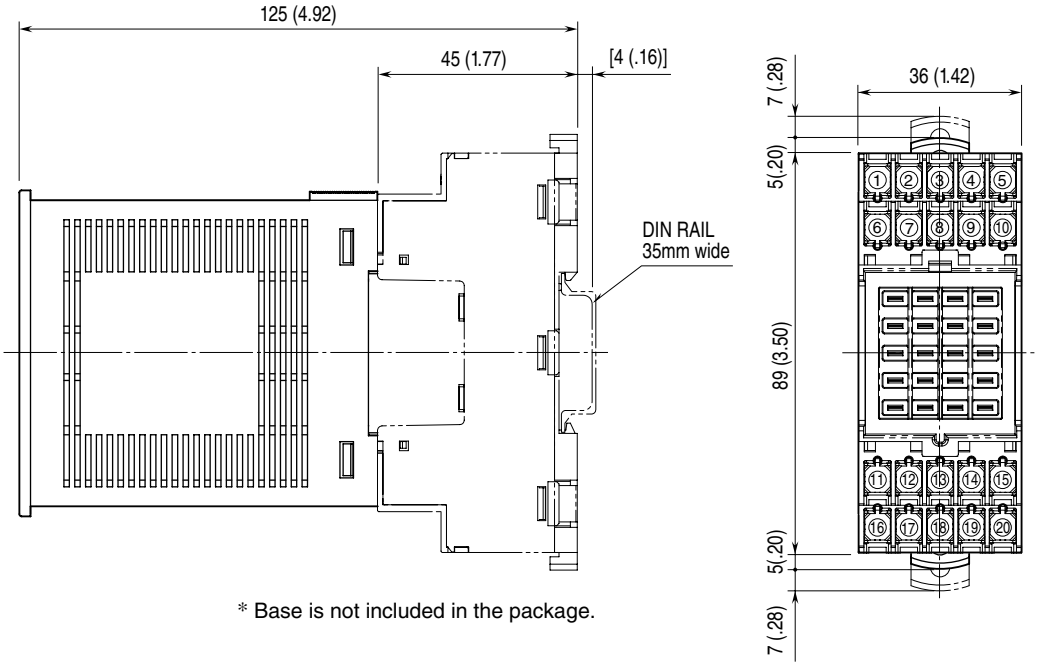

## ■ WALL MOUNTING

Referring to "MOUNTING REQUIREMENTS unit: mm (inch)" on page 4, pull out the upper and lower sliders of the unit and fix them with M4 screws (Torque: 1.4 N·m).

# TERMINAL CONNECTIONS

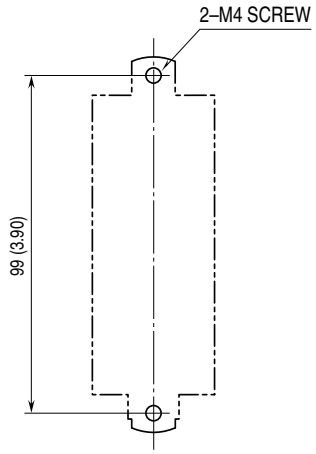
Connect the unit as in the diagram below or refer to the connection diagram on the side of the unit.

### ■ EXTERNAL DIMENSIONS unit: mm (inch)



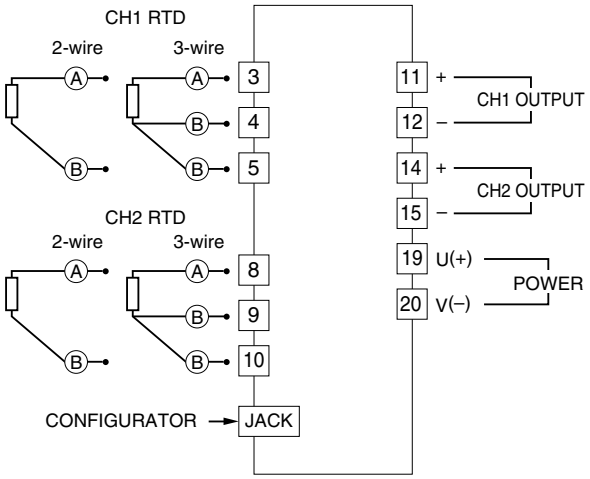

* Base is not included in the package.

### ■ MOUNTING REQUIREMENTS unit: mm (inch)

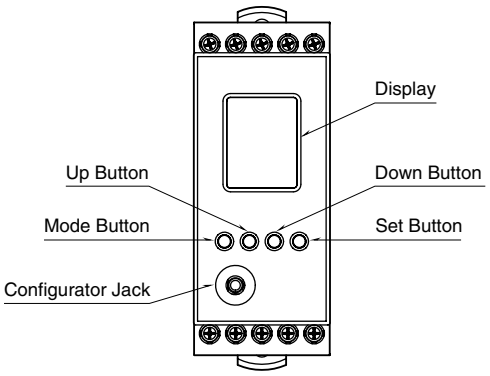



* Mounting requirements for base.

### ■ CONNECTION DIAGRAM



# EXTERNAL VIEWS




| COMPONENT | FUNCTION |
|---|---|
| Display | Indicates present values, setting values and abnormal information. Two types of present values at upper and lower are displayed by setting. |
| Mode button | Used to shift from measuring mode to each setting mode. Destination to shift is changed by the time pressing and holding the button. Used to return from each setting mode to measuring mode (press and hold for 2 sec. or more). |
| Set button | Used to change setting value of setting parameter. When at setting changeable state, used to enter (save) the setting value. Used to move on through digits of setting value at setting changeable state. |
| Up button | Used to shift through setting parameter, and to increase or select setting value. |
| Down button | Used to shift through setting parameter, and to decrease or select setting value. |
| Configurator Jack | Used to configure with M1E configurator software (model: M1ECFG). At the same time, set the lockout setting of the unit to 'lock'. |

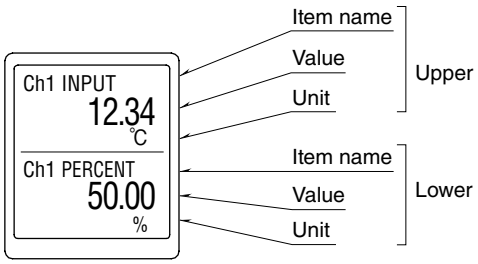
# SCREEN DISPLAY

## ■ DISPLAY IN MEASURING MODE

### • Double tiered display

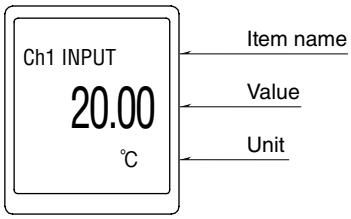
The unit can select and display any two items out of input engineering value of each channel, input resistance, % value*, output engineering value, and output scaling value.

* Percent value for input.




### • Single tiered display

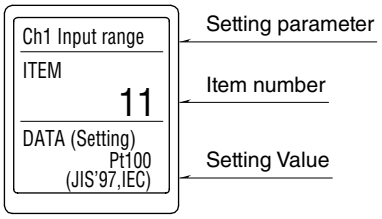
When displayed item is one, it is available to show big characters in single tiered display.



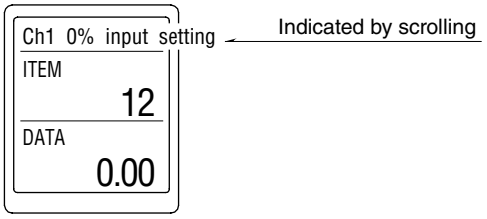

Refer to the Display setting of the Advanced mode for settings.

## ■ DISPLAY IN EACH SETTING MODE

For each setting, current values of setting parameter, ITEM number and setting value are indicated. During setting, "Setting" is indicated at the side of data display.
If the power is mistakenly shut down during setting, setting values are discarded (Return to the value before setting change).




The long setting parameter is indicated by scrolling.

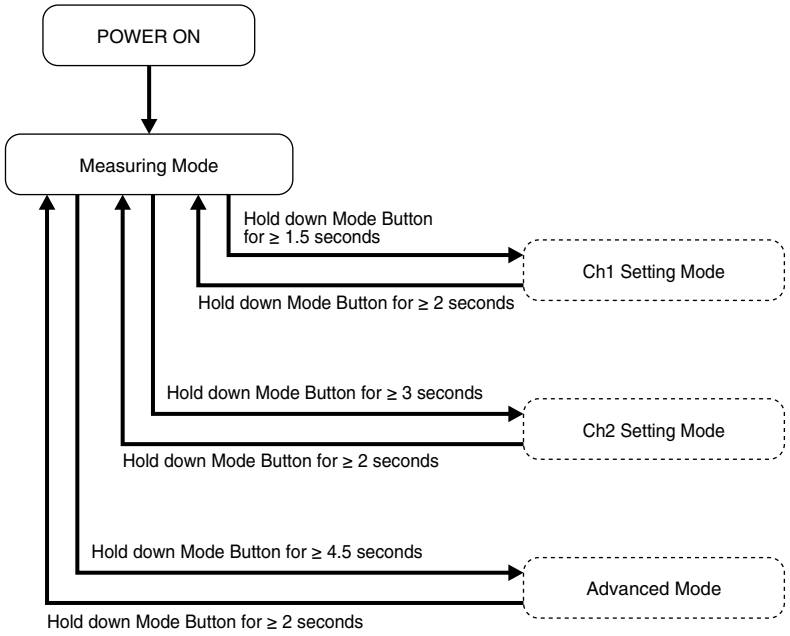



## ■ DISPLAY TIMEOUT

When there is no operation within the setting time of display timeout, display is turned off. Pressing Mode, Set, Up or Down button or occurring error enables to return from display off. Set '0' to display 'always on'.

# PROGRAMMING

## ■ SETTING FLOWCHART



## ■ OPERATION IN EACH SETTING MODE

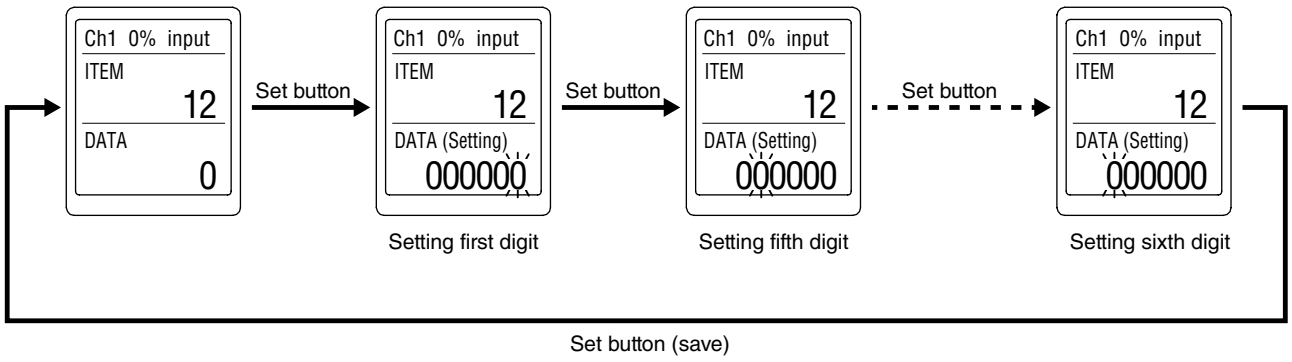
### • Basic operation

| | |
|---|---|
| Mode Button: | In measuring mode, holding down Mode button for ≥ 1.5 seconds, ≥ 3 seconds or ≥ 4.5 seconds enables to move on to each setting mode. Holding down Mode button for ≥ 2 seconds at each setting item display enables to return to measuring mode.<br>Holding down Mode button for ≥ 2 seconds while changing settings ('(Setting)' is displayed next to 'DATA') enables to discard setting value in changing, and to return to the state before change settings ('(Setting)' next to 'DATA' is off). |
| Set Button: | Pressing Set button at each setting parameter enables to blink setting value and changing settings is ready ('(Setting)' is displayed next to 'DATA'). Pressing Set button while changing settings enables to save (enter) setting value and change from blinking to on. |
| Up Button: | Press Up button to move through setting parameters. Selecting setting value while changing settings, increasing a setting value to set value. Keeping pressing Up button enables to increase the value continuously. |
| Down Button: | Press Down button to move through setting parameters. Selecting setting value while changing settings, decreasing a setting value to set value. Keeping pressing Down button enables to decrease the value continuously. |

Note: DO NOT press 2 or more buttons simultaneously.

### • Numerical value setting parameter

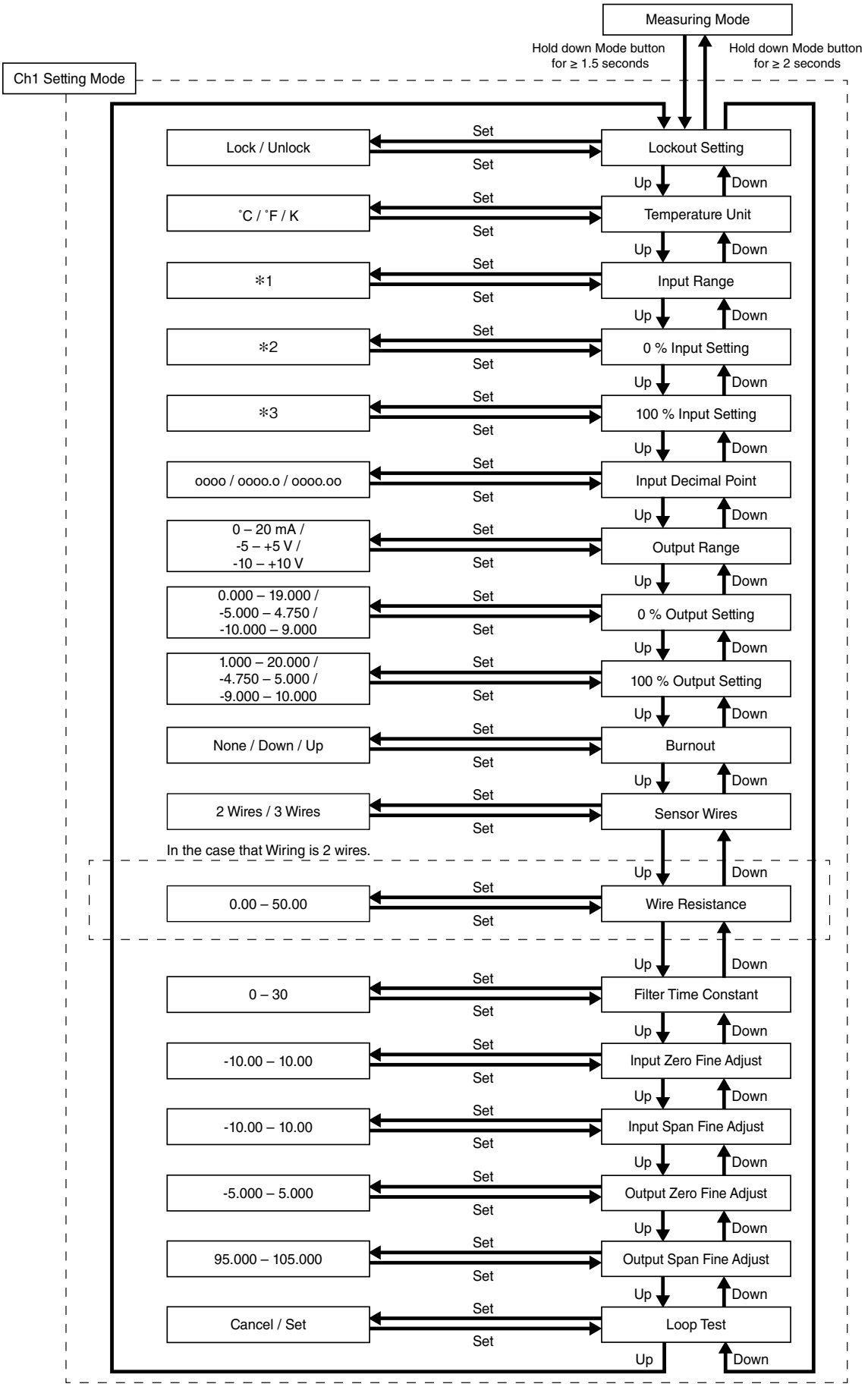
For Numerical value setting parameter, set values digit by digit. Pressing Set button enables to move blinking digit. Adjust blinking digit to set numerical value with Up and Down button. Holding down Up or Down Button each digit blinking, which enable to increase and decrease from most number to least number of numerical value at parameter. Blinking digit moves from least significant digit with pressing Set button. At most significant digit, pressing Set button again enables to turn on and determine the setting value. During setting, press and hold Mode button for ≥ 2 seconds to discard the setting value.




### • Lockout setting

'Lockout setting' is available for the unit. When unlocking the lockout setting, indicate 'Lockout Setting' of 'ITEM 01' in each setting mode and set 'Unlock'. To enable lockout setting again, set 'Lock'. Even when lockout setting is enabled, it is available to confirm the each setting value. 'DATA (Locked)' is indicated in that case.

## ■ CH1 SETTING MODE




*1. Regarding available input range, refer to [11] Input range.
*2. Available range differs according to input type. Refer to [12] 0 % input setting.
*3. Available range differs according to input type. Refer to [13] 100 % input setting.

**• Parameters**

| MODE | ITEM | SETTING PARAMETER | RANGE | UNIT | INITIAL VALUE |
|---|---|---|---|---|---|
| Ch1 setting | 01 | Lockout setting | Lock / Unlock | — | Lock |
| | 09 | Ch1 Temperature unit | °C / °F / K | — | °C |
| | 11 | Ch1 Input range | JPt 100 (JIS '89)<br>Pt 100 (JIS '89)<br>Pt 100 (JIS '97, IEC)<br>Pt 50 Ω (JIS '81)<br>Ni 508.4 Ω<br>Pt 1000<br>Ni 100<br>Cu 10 @ 25°C | — | Pt 100 (JIS '97, IEC) |
| | 12 | Ch1 0 % input setting | JPt 100 (JIS '89) : -200.00 – 480.00<br>Pt 100 (JIS '89) : -200.00 – 630.00<br>Pt 100 (JIS '97, IEC) : -200.00 – 830.00<br>Pt 50 Ω (JIS '81) : -200.00 – 629.00<br>Ni 508.4 Ω : -50.00 – 180.00<br>Pt 1000 : -200.00 – 830.00<br>Ni 100 : -50.00 – 180.00<br>Cu 10 @ 25°C : -50.00 – 230.00 | °C | 0.0 |
| | 13 | Ch1 100 % input setting | JPt 100 (JIS '89) : -180.00 – 500.00<br>Pt 100 (JIS '89) : -180.00 – 650.00<br>Pt 100 (JIS '97, IEC) : -180.00 – 850.00<br>Pt 50 Ω (JIS '81) : -180.00 – 649.00<br>Ni 508.4 Ω : -30.00 – 200.00<br>Pt 1000 : -180.00 – 850.00<br>Ni 100 : -30.00 – 200.00<br>Cu 10 @ 25°C : -30.00 – 250.00 | °C | 100.0 |
| | 16 | Ch1 Input decimal point | No decimal point<br>The number of decimal places : 1 or 2 | — | 1 place of decimals |
| | 18 | Ch1 Output range | 0 – 20 mA<br>-5 – +5 V<br>-10 – +10 V | — | 0 – 20 mA |
| | 19 | Ch1 0 % output setting | 0.000 – 19.000<br>-5.000 – 4.750<br>-10.000 – 9.000 | mA<br>V<br>V | 4.000 |
| | 20 | Ch1 100 % output setting | 1.000 – 20.000<br>-4.750 – 5.000<br>-9.000 – 10.000 | mA<br>V<br>V | 20.000 |
| | 74 | Ch1 Burnout | None / Down / Up | — | Up |
| | 75 | Ch1 Sensor wires | 2 Wires / 3 Wires | — | 3 Wires |
| | 76 | Ch1 Wire resistance | 0.000 – 50.000 | Ω | 0.000 |
| | 79 | Ch1 Filter time constant | 0 – 30 | Sec. | 0 |
| | 80 | Ch1 Input zero fine adjust | -10.00 – 10.00 | °C | 0.00 |
| | 81 | Ch1 Input span fine adjust | -10.00 – 10.00 | °C | 0.00 |
| | 82 | Ch1 Output zero fine adjust | -5.000 – 5.000 | % | 0.000 |
| | 83 | Ch1 Output span fine adjust | 95.000 – 105.000 | % | 100.000 |
| | 89 | Ch1 Loop test | -10.00 – 110.00 | % | Cancel |

**[01] Lockout setting**

Set Lock / Unlock of lockout setting.

| SETTING VALUE | DESCRIPTION | INITIAL VALUE |
|---|---|---|
| Lock | Lockout setting enable | Lock |
| Unlock | Lockout setting disable | |

Even when setting is 'Lock', it is available to move on to each setting mode and confirm the setting value of each setting parameter. In each setting parameter display, when 'Lock', 'DATA (Locked)' is indicated, when 'Unlock', 'DATA' is indicated.

**[09] Ch1 Temperature unit**

Set the temperature unit for the display and setting.

| SETTING VALUE | DESCRIPTION | INITIAL VALUE |
|---|---|---|
| °C | Celsius | °C |
| °F | Fahrenheit | |
| K | Absolute | |

**[11] Ch1 Input range**

Set the type of RTD connected to the input.

| INPUT RANGE | SETTING RANGE | | | INITIAL VALUE |
|---|---|---|---|---|
| | °C | °F | K | |
| JPt 100 (JIS '89) | -200.00 – +500.00 | -328.00 – +932.00 | 73.15 – 773.15 | Pt 100 (JIS '97, IEC) |
| Pt 100 (JIS '89) | -200.00 – +650.00 | -328.00 – +1202.00 | 73.15 – 923.15 | |
| Pt 100 (JIS '97, IEC) | -200.00 – +850.00 | -328.00 – +1562.00 | 73.15 – 1123.15 | |
| Pt 50 Ω (JIS '81) | -200.00 – +649.00 | -328.00 – +1200.20 | 73.15 – 922.15 | |
| Ni 508.4 Ω | -50.00 – +200.00 | -58.00 – +392.00 | 223.15 – 473.15 | |
| Pt 1000 | -200.00 – +850.00 | -328.00 – +1562.00 | 73.15 – 1123.15 | |
| Ni 100 | -50.00 – +200.00 | -58.00 – +392.00 | 223.15 – 473.15 | |
| Cu 10 @ 25°C | -50.00 – +250.00 | -58.00 – +482.00 | 223.15 – 523.15 | |

**[12] Ch1 0 % input setting**

Set the 0 % input setting.
Setting range differs according to input range.

| INPUT RANGE | SETTING RANGE | | | MIN. SPAN | | INITIAL VALUE |
|---|---|---|---|---|---|---|
| | °C | °F | K | °C, K | °F | |
| JPt 100 (JIS '89) | -200.00 – 480.00 | -328.00 – 896.00 | 73.15 – 753.15 | 20.00 | 36.00 | 0.0 |
| Pt 100 (JIS '89) | -200.00 – 630.00 | -328.00 – 1166.00 | 73.15 – 903.15 | | | |
| Pt 100 (JIS '97, IEC) | -200.00 – 830.00 | -328.00 – 1526.00 | 73.15 – 1103.15 | | | |
| Pt 50 Ω (JIS '81) | -200.00 – 629.00 | -328.00 – 1164.20 | 73.15 – 902.15 | | | |
| Ni 508.4 Ω | -50.00 – 180.00 | -58.00 – 356.00 | 223.15 – 453.15 | | | |
| Pt 1000 | -200.00 – 830.00 | -328.00 – 1526.00 | 73.15 – 1103.15 | | | |
| Ni 100 | -50.00 – 180.00 | -58.00 – 356.00 | 223.15 – 453.15 | | | |
| Cu 10 @ 25°C | -50.00 – 230.00 | -58.00 – 446.00 | 223.15 – 503.15 | | | |

Set as follows.
[12] 0 % input setting < [13] 100 % input setting

**[13] Ch1 100 % input setting**

Set the 100 % input setting.
Setting range differs according to input range.

| INPUT RANGE | SETTING RANGE | | | MIN. SPAN | | INITIAL VALUE |
|---|---|---|---|---|---|---|
| | °C | °F | K | °C, K | °F | |
| JPt 100 (JIS '89) | -180.00 – 500.00 | -292.00 – 932.00 | 93.15 – 773.15 | 20.00 | 36.00 | 100.0 |
| Pt 100 (JIS '89) | -180.00 – 650.00 | -292.00 – 1202.00 | 93.15 – 923.15 | | | |
| Pt 100 (JIS '97, IEC) | -180.00 – 850.00 | -292.00 – 1562.00 | 93.15 – 1123.15 | | | |
| Pt 50 Ω (JIS '81) | -180.00 – 649.00 | -292.00 – 1200.20 | 93.15 – 922.15 | | | |
| Ni 508.4 Ω | -30.00 – 200.00 | -22.00 – 392.00 | 243.15 – 473.15 | | | |
| Pt 1000 | -180.00 – 850.00 | -292.00 – 1562.00 | 93.15 – 1123.15 | | | |
| Ni 100 | -30.00 – 200.00 | -22.00 – 392.00 | 243.15 – 473.15 | | | |
| Cu 10 @ 25°C | -30.00 – 250.00 | -22.00 – 482.00 | 243.15 – 523.15 | | | |

Set as follows.
[12] 0 % input setting < [13] 100 % input setting

**[16] Ch1 Input decimal point**

Set the decimal point position measurement value.

| SETTING VALUE | DESCRIPTION | INITIAL VALUE |
|---|---|---|
| oooo | Decimal point: None | 1 place of decimals |
| oooo.o | Number of decimal places: 1 | |
| oooo.oo | Number of decimal places: 2 | |

When number of digit after the decimal point decreased, hidden digit for [12] 0 % input setting and [13] 100 % input setting is rounded down.

**[18] Ch1 Output range**

Set the range of output signal of the unit.

| SETTING VALUE | DESCRIPTION | INITIAL VALUE |
|---|---|---|
| 0 – 20 mA | Output: 0 – 20 mA DC | 0 – 20 mA |
| -5 – +5 V | Output: -5 – +5 V DC | |
| -10 – +10 V | Output: -10 – +10 V DC | |

**[19] Ch1 0 % output setting**

Set the 0 % output setting.

| OUTPUT RANGE | SETTING RANGE | MIN. SPAN | INITIAL VALUE |
|---|---|---|---|
| 0 – 20 mA | 0.000 – 19.000 | 1.000 | 4.000 |
| -5 – +5 V | -5.000 – 4.750 | 0.250 | -5.000 |
| -10 – +10 V | -10.000 – 9.000 | 1.000 | -10.000 |

Set as follows.
[19] 0 % output setting < [20] 100 % output setting
The value is indicated by 'OUTPUT' at measuring mode.

**[20] Ch1 100 % output setting**

Set the 100 % output setting.

| OUTPUT RANGE | SETTING RANGE | MIN. SPAN | INITIAL VALUE |
|---|---|---|---|
| 0 – 20 mA | 1.000 – 20.000 | 1.000 | 20.000 |
| -5 – +5 V | -4.750 – 5.000 | 0.250 | 5.000 |
| -10 – +10 V | -9.000 – 10.000 | 1.000 | 10.000 |

Set as follows.
[19] 0 % output setting < [20] 100 % output setting
The value is indicated by 'OUTPUT' at measuring mode.

**[74] Ch1 Burnout**

Set the operation at Burnout.

| SETTING RANGE | DESCRIPTION | INITIAL VALUE |
|---|---|---|
| None | No detection | Up |
| Down | Go downscale | |
| Up | Go upscale | |

**[75] Ch1 Sensor wires**

Set the number of sensor wires of RTD.

| SETTING RANGE | DESCRIPTION | INITIAL VALUE |
|---|---|---|
| 2 Wires | 2 Wires | 3 Wires |
| 3 Wires | 3 Wires | |

**[76] Ch1 Wire resistance**

Set wire resistance for 2 wires. Available range is 0.000 – 50.000 Ω (In the Case of Cu 10, 0.000 – 20.000 Ω). It is not available for 3 wires.
Initial value: 0.000

**[79] Ch1 Filter time constant**

Set the filter time constant of the first order low pass filter.
The primary low-pass filter is enabled for the set time.
When this parameter is set to 0, filter processing is not performed (Response time 0.5 s or less (0→90%)).
The set time constant changes when the input changes from 0% to 100%, it will be the time it takes for the output to track up to approximately 63%. Enabling set in the range of 0 to 30 seconds.
Initial value: 0

**[80] Ch1 Input zero fine adjust**

Perform fine adjustment of input signal.

| SETTING RANGE | | INITIAL VALUE |
|---|---|---|
| °C, K | °F | |
| -10.00 – +10.00 | -18.00 – +18.00 | 0.00 |

**[81] Ch1 Input span fine adjust**

Perform fine adjustment of input signal.

| SETTING RANGE | | INITIAL VALUE |
|---|---|---|
| °C, K | °F | |
| -10.00 – +10.00 | -18.00 – +18.00 | 0.00 |

**[82] Ch1 Output zero fine adjust**

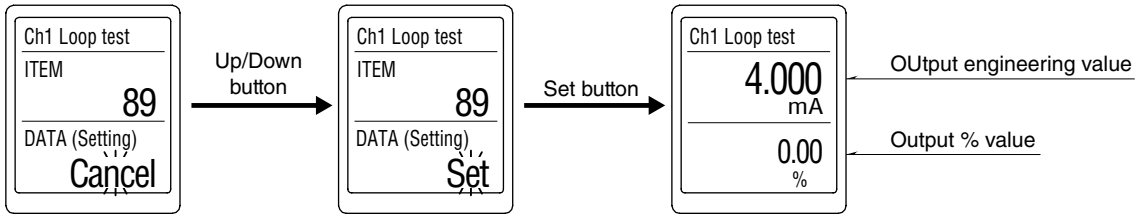
Perform fine adjustment of output signal.
Enabling set within the range of -5.000 – +5.000%.
Initial value: 0.000

**[83] Ch1 Output span fine adjust**

Perform fine adjustment of output signal.
Enabling set within the range of -95.000 – +105.000%.
Initial value: 100.000

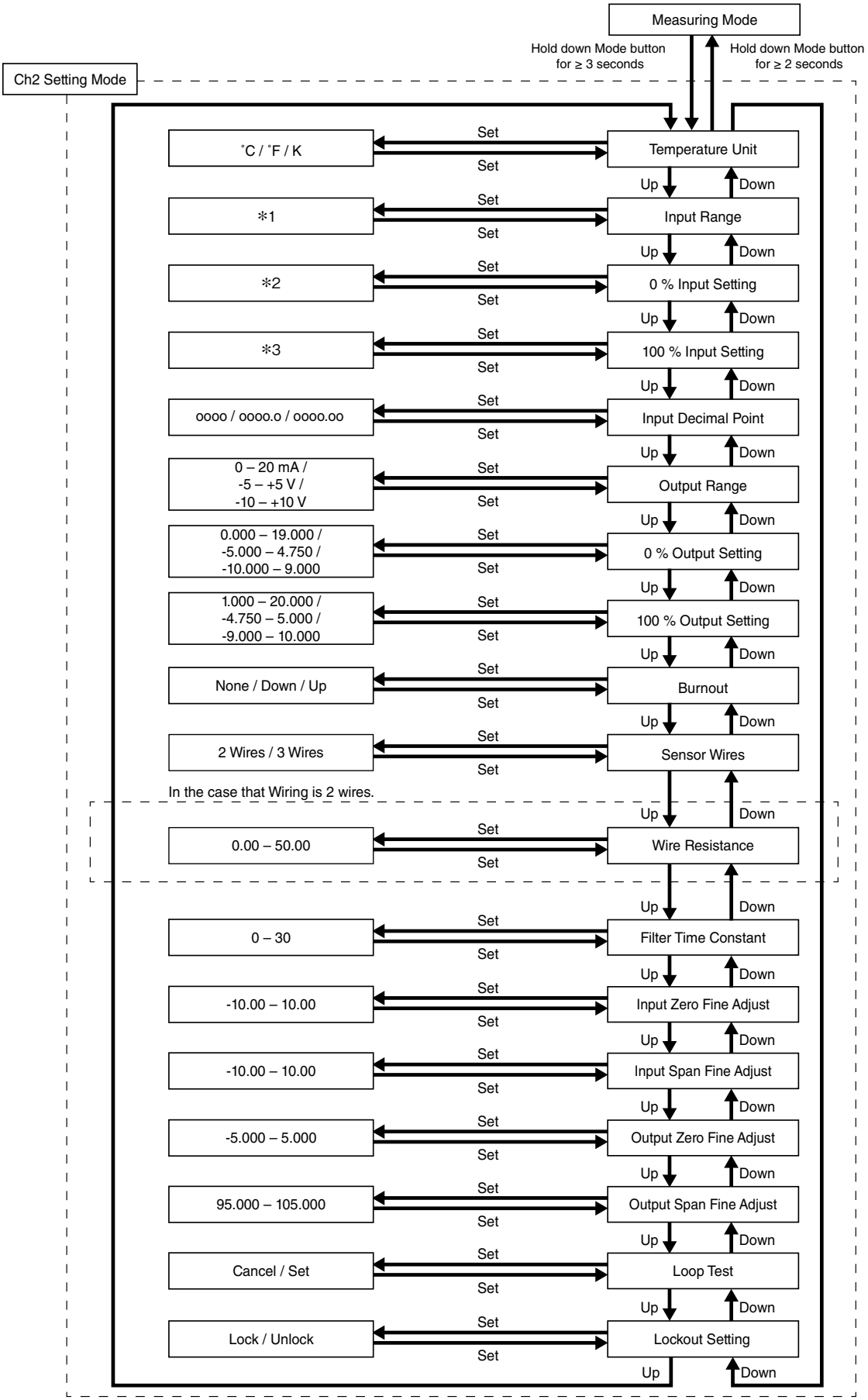
**[89] Ch1 Loop test**

As pressing Set button enables to blink 'Cancel', changing to 'Set' by pressing Up or Down and pressing 'Set' allows to indicate Loop Test display.
Present value is indicated. Increase or decrease it by pressing Up and Down button. Press and hold them enables to change value continuously.*1
Pressing and holding Mode button more than 2 seconds or turning off the power enable to exit loop test.




*1. While loop test is performing, actual input is disregarded.
While loop test is performing and 'Display timeout' is enabled to display off, return to the display on by pressing a front button.

## ■ CH2 SETTING MODE




*1. Regarding available input range, refer to [111] Input range.
*2. Available range differs according to input type. Refer to [112] 0 % input setting.
*3. Available range differs according to input type. Refer to [113] 100 % input setting.

**• Parameters**

| MODE | ITEM | SETTING PARAMETER | RANGE | UNIT | INITIAL VALUE |
|---|---|---|---|---|---|
| Ch2 setting | 109 | Ch2 Temperature unit | °C / °F / K | — | °C |
| | 111 | Ch2 Input range | JPt 100 (JIS '89)<br>Pt 100 (JIS '89)<br>Pt 100 (JIS '97, IEC)<br>Pt 50 Ω (JIS '81)<br>Ni 508.4 Ω<br>Pt 1000<br>Ni 100<br>Cu 10 @ 25°C | — | Pt 100 (JIS '97, IEC) |
| | 112 | Ch2 0 % input setting | JPt 100 (JIS '89) : -200.00 – 480.00<br>Pt 100 (JIS '89) : -200.00 – 630.00<br>Pt 100 (JIS '97, IEC) : -200.00 – 830.00<br>Pt 50 Ω (JIS '81) : -200.00 – 629.00<br>Ni 508.4 Ω : -50.00 – 180.00<br>Pt 1000 : -200.00 – 830.00<br>Ni 100 : -50.00 – 180.00<br>Cu 10 @ 25°C : -50.00 – 230.00 | °C | 0.0 |
| | 113 | Ch2 100 % input setting | JPt 100 (JIS '89) : -180.00 – 500.00<br>Pt 100 (JIS '89) : -180.00 – 650.00<br>Pt 100 (JIS '97, IEC) : -180.00 – 850.00<br>Pt 50 Ω (JIS '81) : -180.00 – 649.00<br>Ni 508.4 Ω : -30.00 – 200.00<br>Pt 1000 : -180.00 – 850.00<br>Ni 100 : -30.00 – 200.00<br>Cu 10 @ 25°C : -30.00 – 250.00 | °C | 100.0 |
| | 116 | Ch2 Input decimal point | No decimal point<br>The number of decimal places : 1 or 2 | — | 1 place of decimals |
| | 118 | Ch2 Output range | 0 – 20 mA<br>-5 – +5 V<br>-10 – +10 V | — | 0 – 20 mA |
| | 119 | Ch2 0 % output setting | 0.000 – 19.000<br>-5.000 – 4.750<br>-10.000 – 9.000 | mA<br>V<br>V | 4.000 |
| | 120 | Ch2 100 % output setting | 1.000 – 20.000<br>-4.750 – 5.000<br>-9.000 – 10.000 | mA<br>V<br>V | 20.000 |
| | 174 | Ch2 Burnout | None / Down / Up | — | Up |
| | 175 | Ch2 Sensor wires | 2 Wires / 3 Wires | — | 3 Wires |
| | 176 | Ch2 Wire resistance | 0.000 – 50.000 | Ω | 0.000 |
| | 179 | Ch2 Filter time constant | 0 – 30 | Sec. | 0 |
| | 180 | Ch2 Input zero fine adjust | -10.00 – 10.00 | °C | 0.00 |
| | 181 | Ch2 Input span fine adjust | -10.00 – 10.00 | °C | 0.00 |
| | 182 | Ch2 Output zero fine adjust | -5.000 – 5.000 | % | 0.000 |
| | 183 | Ch2 Output span fine adjust | 95.000 – 105.000 | % | 100.000 |
| | 189 | Ch2 Loop test | -10.00 – 110.00 | % | Cancel |
| | 01 | Lockout setting | Lock / Unlock | — | Lock |

**[109] Ch2 Temperature unit**

Set the temperature unit for the display and setting.

| SETTING VALUE | DESCRIPTION | INITIAL VALUE |
|---|---|---|
| °C | Celsius | °C |
| °F | Fahrenheit | |
| K | Absolute | |

**[111] Ch2 Input range**

Set the type of RTD connected to the input.

| INPUT RANGE | SETTING RANGE | | | INITIAL VALUE |
|---|---|---|---|---|
| | °C | °F | K | |
| JPt 100 (JIS '89) | -200.00 – +500.00 | -328.00 – +932.00 | 73.15 – 773.15 | Pt 100 (JIS '97, IEC) |
| Pt 100 (JIS '89) | -200.00 – +650.00 | -328.00 – +1202.00 | 73.15 – 923.15 | |
| Pt 100 (JIS '97, IEC) | -200.00 – +850.00 | -328.00 – +1562.00 | 73.15 – 1123.15 | |
| Pt 50 Ω (JIS '81) | -200.00 – +649.00 | -328.00 – +1200.20 | 73.15 – 922.15 | |
| Ni 508.4 Ω | -50.00 – +200.00 | -58.00 – +392.00 | 223.15 – 473.15 | |
| Pt 1000 | -200.00 – +850.00 | -328.00 – +1562.00 | 73.15 – 1123.15 | |
| Ni 100 | -50.00 – +200.00 | -58.00 – +392.00 | 223.15 – 473.15 | |
| Cu 10 @ 25°C | -50.00 – +250.00 | -58.00 – +482.00 | 223.15 – 523.15 | |

**[112] Ch2 0 % input setting**

Set the 0 % input setting.
Setting range differs according to input range.

| INPUT RANGE | SETTING RANGE | | | MIN. SPAN | | INITIAL VALUE |
|---|---|---|---|---|---|---|
| | °C | °F | K | °C, K | °F | |
| JPt 100 (JIS '89) | -200.00 – 480.00 | -328.00 – 896.00 | 73.15 – 753.15 | 20.00 | 36.00 | 0.0 |
| Pt 100 (JIS '89) | -200.00 – 630.00 | -328.00 – 1166.00 | 73.15 – 903.15 | | | |
| Pt 100 (JIS '97, IEC) | -200.00 – 830.00 | -328.00 – 1526.00 | 73.15 – 1103.15 | | | |
| Pt 50 Ω (JIS '81) | -200.00 – 629.00 | -328.00 – 1164.20 | 73.15 – 902.15 | | | |
| Ni 508.4 Ω | -50.00 – 180.00 | -58.00 – 356.00 | 223.15 – 453.15 | | | |
| Pt 1000 | -200.00 – 830.00 | -328.00 – 1526.00 | 73.15 – 1103.15 | | | |
| Ni 100 | -50.00 – 180.00 | -58.00 – 356.00 | 223.15 – 453.15 | | | |
| Cu 10 @ 25°C | -50.00 – 230.00 | -58.00 – 446.00 | 223.15 – 503.15 | | | |

Set as follows.
[112] 0 % input setting < [113] 100 % input setting

**[113] Ch2 100 % input setting**

Set the 100 % input setting.
Setting range differs according to input range.

| INPUT RANGE | SETTING RANGE | | | MIN. SPAN | | INITIAL VALUE |
|---|---|---|---|---|---|---|
| | °C | °F | K | °C, K | °F | |
| JPt 100 (JIS '89) | -180.00 – 500.00 | -292.00 – 932.00 | 93.15 – 773.15 | 20.00 | 36.00 | 100.0 |
| Pt 100 (JIS '89) | -180.00 – 650.00 | -292.00 – 1202.00 | 93.15 – 923.15 | | | |
| Pt 100 (JIS '97, IEC) | -180.00 – 850.00 | -292.00 – 1562.00 | 93.15 – 1123.15 | | | |
| Pt 50 Ω (JIS '81) | -180.00 – 649.00 | -292.00 – 1200.20 | 93.15 – 922.15 | | | |
| Ni 508.4 Ω | -30.00 – 200.00 | -22.00 – 392.00 | 243.15 – 473.15 | | | |
| Pt 1000 | -180.00 – 850.00 | -292.00 – 1562.00 | 93.15 – 1123.15 | | | |
| Ni 100 | -30.00 – 200.00 | -22.00 – 392.00 | 243.15 – 473.15 | | | |
| Cu 10 @ 25°C | -30.00 – 250.00 | -22.00 – 482.00 | 243.15 – 523.15 | | | |

Set as follows.
[112] 0 % input setting < [113] 100 % input setting

**[116] Ch2 Input decimal point**

Set the decimal point position measurement value.

| SETTING VALUE | DESCRIPTION | INITIAL VALUE |
|---|---|---|
| oooo | Decimal point: None | 1 place of decimals |
| oooo.o | Number of decimal places: 1 | |
| oooo.oo | Number of decimal places: 2 | |

When number of digit after the decimal point decreased, hidden digit for [112] 0 % input setting and [113] 100 % input setting is rounded down.

**[118] Ch2 Output range**

Set the range of output signal of the unit.

| SETTING VALUE | DESCRIPTION | INITIAL VALUE |
|---|---|---|
| 0 – 20 mA | Output: 0 – 20 mA DC | 0 – 20 mA |
| -5 – +5 V | Output: -5 – +5 V DC | |
| -10 – +10 V | Output: -10 – +10 V DC | |

**[119] Ch2 0 % output setting**

Set the 0 % output setting.

| OUTPUT RANGE | SETTING RANGE | MIN. SPAN | INITIAL VALUE |
|---|---|---|---|
| 0 – 20 mA | 0.000 – 19.000 | 1.000 | 4.000 |
| -5 – +5 V | -5.000 – 4.750 | 0.250 | -5.000 |
| -10 – +10 V | -10.000 – 9.000 | 1.000 | -10.000 |

Set as follows.
[119] 0 % output setting < [120] 100 % output setting
The value is indicated by 'OUTPUT' at measuring mode.

**[120] Ch2 100 % output setting**

Set the 100 % output setting.

| OUTPUT RANGE | SETTING RANGE | MIN. SPAN | INITIAL VALUE |
|---|---|---|---|
| 0 – 20 mA | 1.000 – 20.000 | 1.000 | 20.000 |
| -5 – +5 V | -4.750 – 5.000 | 0.250 | 5.000 |
| -10 – +10 V | -9.000 – 10.000 | 1.000 | 10.000 |

Set as follows.
[119] 0 % output setting < [120] 100 % output setting
The value is indicated by 'OUTPUT' at measuring mode.

**[174] Ch2 Burnout**

Set the operation at Burnout.

| SETTING RANGE | DESCRIPTION | INITIAL VALUE |
|---|---|---|
| None | No detection | Up |
| Down | Go downscale | |
| Up | Go upscale | |

**[175] Ch2 Sensor wires**

Set the number of sensor wires of RTD.

| SETTING RANGE | DESCRIPTION | INITIAL VALUE |
|---|---|---|
| 2 Wires | 2 Wires | 3 Wires |
| 3 Wires | 3 Wires | |

**[176] Ch2 Wire resistance**

Set wire resistance for 2 wires. Available range is 0.000 – 50.000 Ω (In the Case of Cu 10, 0.000 – 20.000 Ω). It is not available for 3 wires.
Initial value: 0.000

**[179] Ch2 Filter time constant**

Set the filter time constant of the first order low pass filter. The primary low-pass filter is enabled for the set time.
When this parameter is set to 0, filter processing is not performed (Response time 0.5 s or less (0→90%)).
The set time constant changes when the input changes from 0% to 100%, it will be the time it takes for the output to track up to approximately 63%. Enabling set in the range of 0 to 30 seconds.
Initial value: 0

**[180] Ch2 Input zero fine adjust**

Perform fine adjustment of input signal.

| SETTING RANGE | | INITIAL VALUE |
|---|---|---|
| °C, K | °F | |
| -10.00 – +10.00 | -18.00 – +18.00 | 0.00 |

**[181] Ch2 Input span fine adjust**

Perform fine adjustment of input signal.

| SETTING RANGE | | INITIAL VALUE |
|---|---|---|
| °C, K | °F | |
| -10.00 – +10.00 | -18.00 – +18.00 | 0.00 |

**[182] Ch2 Output zero fine adjust**

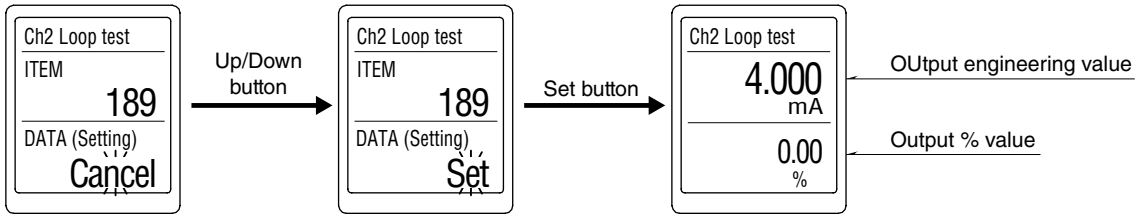
Perform fine adjustment of output signal.
Enabling set within the range of -5.000 – +5.000%.
Initial value: 0.000

**[183] Ch2 Output span fine adjust**

Perform fine adjustment of output signal.
Enabling set within the range of -95.000 – +105.000%.
Initial value: 100.000

**[189] Ch2 Loop test**

As pressing Set button enables to blink 'Cancel', changing to 'Set' by pressing Up or Down and pressing 'Set' allows to indicate Loop Test display.
Present value is indicated. Increase or decrease it by pressing Up and Down button. Press and hold them enables to change value continuously.*1
Pressing and holding Mode button more than 2 seconds or turning off the power enable to exit loop test.




*1. While loop test is performing, actual input is disregarded.
While loop test is performing and 'Display timeout' is enabled to display off, return to the display on by pressing a front button.

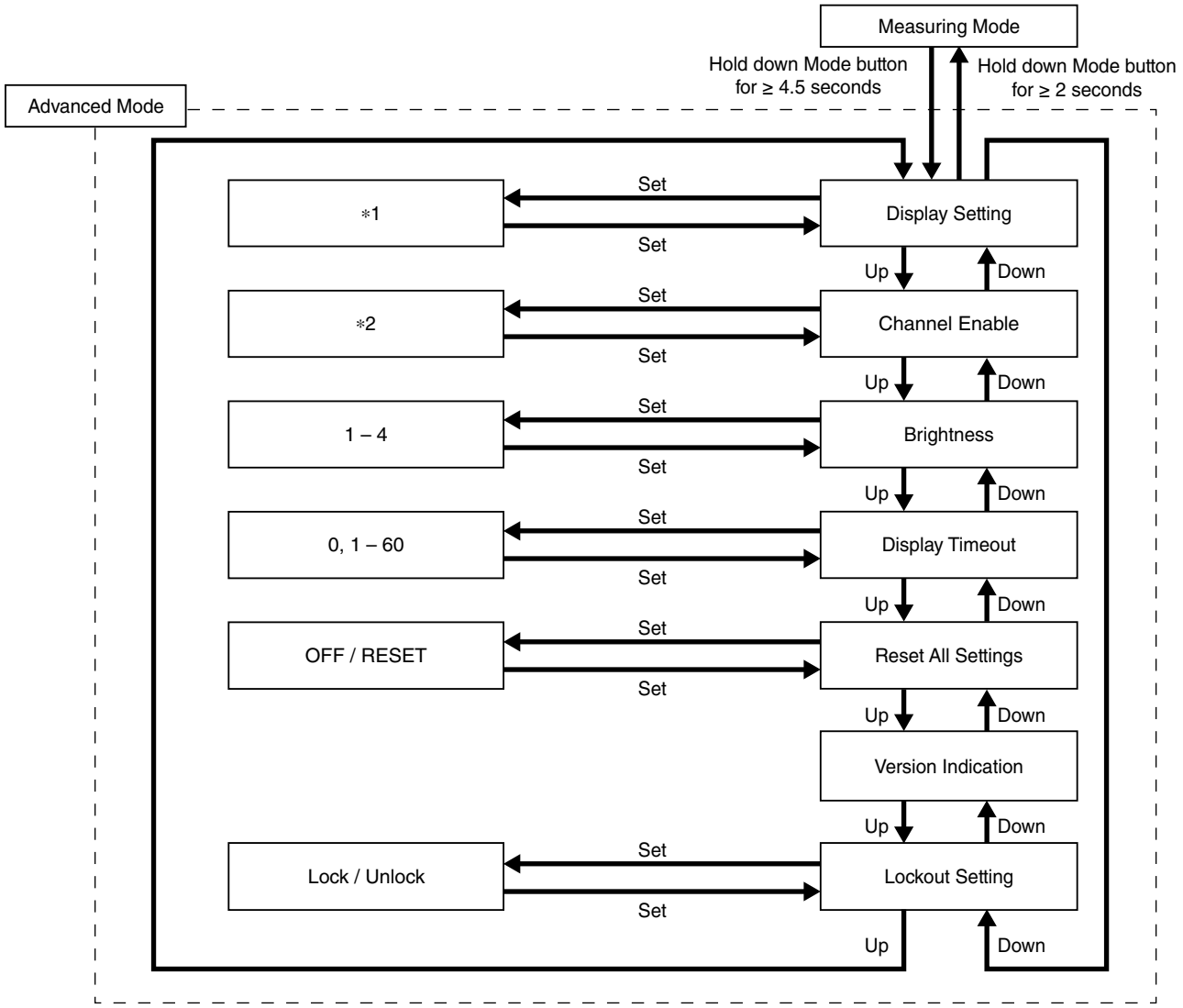
**[01] Lockout setting**

Set Lock / Unlock of lockout setting.

| SETTING VALUE | DESCRIPTION | INITIAL VALUE |
|---|---|---|
| Lock | Lockout setting enable | Lock |
| Unlock | Lockout setting disable | |

Even when setting is 'Lock', it is available to move on to each setting mode and confirm the setting value of each setting parameter. In each setting parameter display, when 'Lock', 'DATA (Locked)' is indicated, when 'Unlock', 'DATA' is indicated.

## ■ ADVANCED MODE




∗1. For detail, refer to [201] display setting.
∗2. For detail, refer to [202] channel enable.

**• Parameters**

| MODE | ITEM | SETTING PARAMETER | RANGE | UNIT | INITIAL VALUE |
|---|---|---|---|---|---|
| Advanced | 201 | Display setting | Upper: choose from 8 types<br>Lower: choose from 9 types | — | Upper: Ch1 INPUT<br>Lower: Ch2 INPUT |
| | 202 | Channel enable | Choose from 3 types | — | Ch1 enable<br>Ch2 enable |
| | 203 | Brightness | 1 (darkest) – 4 (brightest) | — | 4 |
| | 204 | Display timeout | 0 (always on), 1 – 60 | min. | 10 |
| | 205 | Reset all settings | OFF / RESET | — | OFF |
| | 206 | Version indication | — | — | — |
| | 01 | Lockout setting | Lock / Unlock | — | Lock |

**[201] Display setting**

Set display setting in measuring mode. Display is divided, indicating item can be set for each upper and lower. Pressing Set button once is setting for upper, pressing again for lower, pressing once more for setting determined.

**Upper**

| SETTING VALUE | DESCRIPTION | INITIAL VALUE |
|---|---|---|
| Ch1 INPUT | Ch1 Input engineering unit value | Ch1 INPUT (engineering value) |
| Ch1 RESISTANCE | Ch1 Input resistance value | |
| Ch1 PERCENT | Ch1 Percent value*1 | |
| Ch1 OUTPUT | Ch1 Output engineering unit value | |
| Ch2 INPUT | Ch2 Input engineering unit value | |
| Ch2 RESISTANCE | Ch2 Input resistance value | |
| Ch2 PERCENT | Ch2 Percent value*1 | |
| Ch2 OUTPUT | Ch2 Output engineering unit value | |

**Lower**

| SETTING VALUE | DESCRIPTION | INITIAL VALUE |
|---|---|---|
| Ch1 INPUT | Ch1 Input engineering unit value | Ch2 INPUT (engineering value) |
| Ch1 RESISTANCE | Ch1 Input resistance value | |
| Ch1 PERCENT | Ch1 Percent value*1 | |
| Ch1 OUTPUT | Ch1 Output engineering unit value | |
| Ch2 INPUT | Ch2 Input engineering unit value | |
| Ch2 RESISTANCE | Ch2 Input resistance value | |
| Ch2 PERCENT | Ch2 Percent value*1 | |
| Ch2 OUTPUT | Ch2 Output engineering unit value | |
| None | No display | |

*1. Display the value converted as 0.00 to 100.00% based on input setting value.

**[202] Channel enable**

Set the enable/disable of Ch1 and Ch2.
The channel which is set to disable does not display output signal and presence value in Measuring Mode.

| SETTING VALUE | DESCRIPTION | INITIAL VALUE |
|---|---|---|
| Ch1 enable<br>Ch2 enable | Ch1 enable<br>Ch2 enable | Ch1 enable<br>Ch2 enable |
| Ch1 enable<br>Ch2 disable | Ch1 enable<br>Ch2 disable | |
| Ch1 disable<br>Ch2 enable | Ch1 disable<br>Ch2 enable | |

For example, in case that Ch2 is disable, it enable to set of Ch2.

**[203] Brightness**

Adjust brightness of display. It is available to set the range between 1 (darkest) – 4 (brightest).
Initial value: 4

**[204] Display timeout**

Set the time to off the display when there is no operation within a certain time.
It is available to set the range between 0 – 60 minutes.
Set '0' to display 'always on'.
When error is occurred at display off, the display returns from off.
Initial value: 10

**[205] Reset all settings**

Return settings to initial value.

| SETTING VALUE | DESCRIPTION |
|---|---|
| OFF | Not initialized |
| RESET | Initialize all settings*1 |

*1. When setting value is initialized, each parameters currently set are over written by initial value. 'COMPLETE' is indicated when initializing setting value is completed. Notice that it does not return to the setting value, which is specified by the option Ex-factory setting (/SET).

**[206] Version indication**

Indicate firmware version.

**[01] Lockout setting**

Set Lock / Unlock of lockout setting.

| SETTING VALUE | DESCRIPTION | INITIAL VALUE |
|---|---|---|
| Lock | Lockout setting enable | Lock |
| Unlock | Lockout setting disable | |

Even when setting is 'Lock', it is available to move on to each setting mode and confirm the setting value of each setting parameter. In each setting parameter display, when 'Lock', 'DATA (Locked)' is indicated, when 'Unlock', 'DATA' is indicated.

## ERROR MESSAGES

| DISPLAY | ERROR DESCRIPTION | WHAT TO DO |
|---|---|---|
| BURNOUT ERROR U | Input wires broken (upward) | Check the input wires. |
| BURNOUT ERROR D | Input wires broken (downward) | Check the input wires. |
| OVER RANGE U | The input exceeds 105 %. | Return the input signal not exceed 105 %. |
| OVER RANGE D | The input exceeds lower limit of -5 %. | Return the input signal -5 % or more. |
| EEPROM I ERROR | Internal data error | Repair is needed if the display does not recover after the power is reset. |
| EEPROM R ERROR | Memory reading error | 'Reset all settings' in advanced mode.*1 |
| EEPROM W ERROR | Memory writing error | 'Reset all settings' in advanced mode.*1 |

*1. All setting parameters are initialized. Repair is needed if it does not recover.

Indicated errors vary as follows depending on setting value of display setting.
Error is indicated blinking at upper or lower.
When multiple error occurs, only high priority error is displayed.
Order of priority is EEPROM ERROR, BURNOUT ERROR, OVER RANGE in descending order.

| | | DISPLAY SETTING | | |
|---|---|---|---|---|
| | | INPUT ENGINEERING UNIT VALUE | INPUT RESISTANCE VALUE | PERCENT VALUE |
| ERROR MESSAGES | BURNOUT ERROR U | ✓ | ✓ | — |
| | BURNOUT ERROR D | | | |
| | OVER RANGE U | ✓ | ✓ | — |
| | OVER RANGE D | | | |
| | EEPROM I ERROR | ✓ | | |
| | EEPROM R ERROR | | | |
| | EEPROM W ERROR | | | |

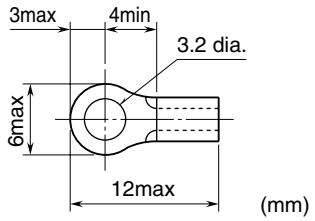
## WIRING INSTRUCTIONS FOR BASE

### ■ SCREW TERMINAL

Torque: 0.5 N·m

### ■ SOLDERLESS TERMINAL

Refer to the drawing below for recommended ring tongue terminal size. Spade tongue type is also applicable.
Recommended manufacturer: Japan Solderless Terminal MFG.Co.Ltd, Nichifu Co.,ltd (Solderless terminals with insulation sleeve do not fit)
Applicable wire size: 0.25 to 1.65 mm²




## CHECKING

1) Terminal wiring: Check that all cables are correctly connected according to the connection diagram.
2) Power input voltage: Check voltage across the terminal 19 – 20 with a multimeter.
3) Input: Check that the input signal is within 0 – 100% of the full-scale.
   If the RTD wires are broken, the output goes over 100% (below 0% with downscale protection) due to burnout function. Confirm the burnout error and check leadwires in such a case.
4) Output: Check that the load resistance meets the described specifications.

# MAINTENANCE

Regular calibration procedure is explained below:

### ■ CALIBRATION

Warm up the unit for at least 10 minutes. Apply 0%, 25%, 50%, 75% and 100% input signal. Check that the output signal for the respective input signal remains within accuracy described in the data sheet. If the output signal is out of accuracy, when the input display value is out of accuracy, perform the input fine adjustment. When the input display value is correct but the output is out of accuracy, perform the output fine adjustment. Refer to this manual, when adjusting with front buttons. Refer to the M1ECFG users manual (EM-5981), when adjusting with M1E Configurator Software (model: M1ECFG). And then follow the procedure shown below.

#### • INPUT FINE ADJUSTMENT

1) Set the simulated input signal to 0 %, and adjust the input display to 0 % by [80]/[180] Input Zero fine adjust.
2) Set the simulated input signal to 100 %, and adjust the input display to 100 % by [81]/[181] Input Span fine adjust.
3) Again set the simulated input to 0 %, confirm the input display.
4) If input display is shifted, repeat the procedure from 1) to 3).

#### • OUTPUT FINE ADJUSTMENT

1) Set the simulated input to 0 %, and adjust the output signal to 0 % by [82]/[182] Output Zero fine adjust.
2) Set the simulated input to 100 %, and adjust the output signal to 100 % by [83]/[183] Output Span fine adjust.
3) Again set the simulated input to 0 %, confirm the output signal.
4) If output signal is shifted, repeat the procedure from 1) to 3).

# LIGHTNING SURGE PROTECTION

M-System offers a series of lightning surge protector for protection against induced lightning surges. Please contact M-System to choose appropriate models.