

**THERMOCOUPLE TRANSMITTER**  
(PC programmable)

MODEL **M2EXT**

**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:**

Signal conditioner (body + base socket + CJM) .....(1)

**■ MODEL NO.**

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

**■ OPERATING MANUAL**

This manual describes detailed operation regarding settings. The M2EXT is programmable using a PC. For detailed information on the PC configuration, refer to the M2ECFG users manual (EM-5147).

The M2ECFG 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. Reinforced insulation (signal input or output to power input: 300V) and basic insulation (signal input to output: 300V) are 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,  
  - ≤ 4.5VA at 100V AC
  - ≤ 6.5VA at 200V AC
  - ≤ 8.5VA at 264V AC

24V DC rating: 24V ±10%, ≤ 2.3W

110V DC rating: 85 – 150V, ≤ 2.3W

**■ GENERAL PRECAUTIONS**

Before you remove the unit from the socket 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.

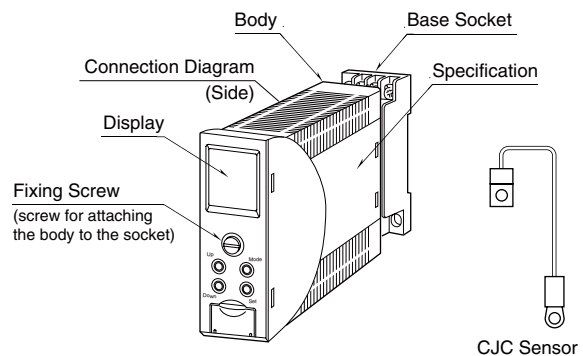
**■ WIRING**

- 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.
- The edge of the display may be hidden by the frame and invisible depending on the view angle.

**COMPONENT IDENTIFICATION**

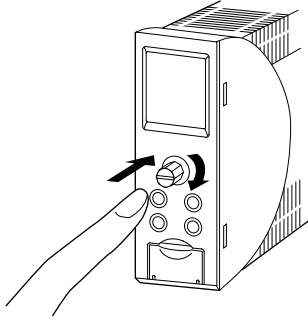


## INSTALLATION

Loosen the fixing screw in front of the unit in order to separate the body from the base socket.

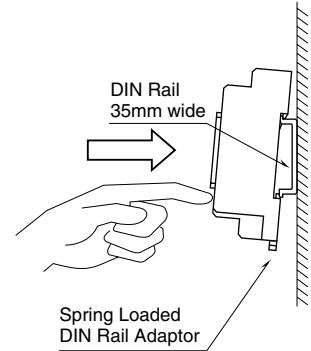
### ■ FIXING SCREW

The fixing screw can be pushed into the body when it is not in use. Tighten the knob until the body is securely attached to the base socket. Push it into the body and turn it clockwise to lock. Push the knob and turn it counterclockwise to unlock so that the knob pops out.



### ■ DIN RAIL MOUNTING

Set the base socket so that its DIN rail adaptor is at the bottom. Position the upper hook at the rear side of base socket on the DIN rail and push in the lower. When removing the socket, push down the DIN rail adaptor utilizing a minus screwdriver and pull.



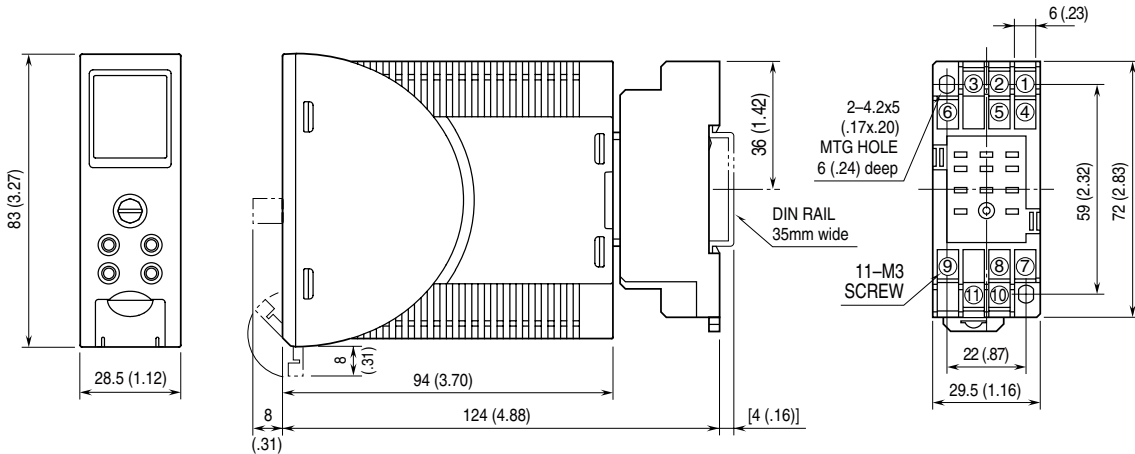
### ■ WALL MOUNTING

Refer to the drawings in the shown below.

## TERMINAL CONNECTIONS

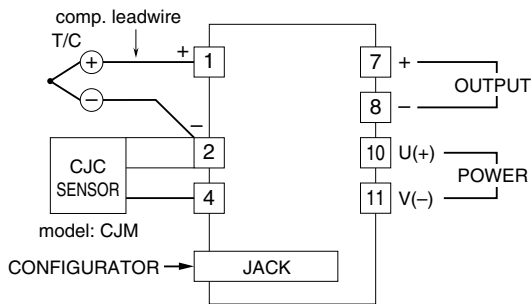
Connect the unit as in the diagram below or refer to the connection diagram on the side of the unit.

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

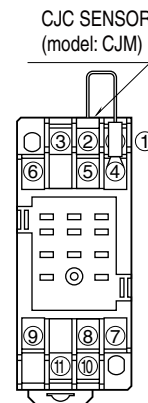


• When mounting, no extra space is needed between units.

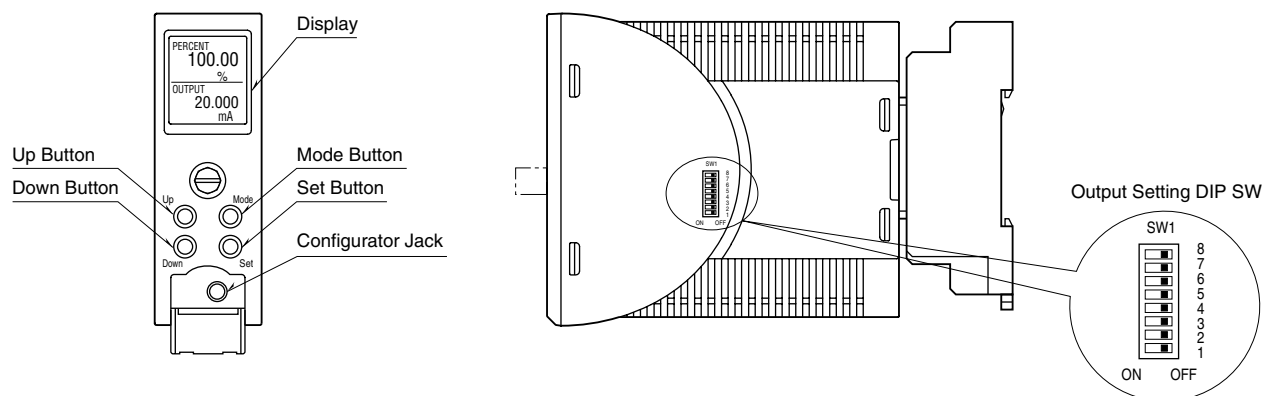
### ■ CONNECTION DIAGRAM



### ■ TERMINAL ASSIGNMENTS



## 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 for input/output scaling 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 M2E configurator software (model: M2ECFG). At the same time, set the lock-out setting of the unit to 'lock'.  |

## DIP SWITCH

The internal DIP switch for output setting is required to select output types before setting a precise output range using front buttons or setting with a PC.

Refer to the "PROGRAMMING" for the operation with front buttons. Refer to the operation manual (EM-5147) of M2E Configurator Software (model: M2ECFG) for setting with PC.

| Output Range | SW1 |     |     |     |     |     |     |     |
|--------------|-----|-----|-----|-----|-----|-----|-----|-----|
|              | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   |
| 0–20mA       | OFF | ON  | OFF | OFF | OFF | OFF | ON  | OFF |
| -5–+5V       | OFF | OFF | ON  | OFF | ON  | OFF | OFF | ON  |
| -10–+10V     | OFF | OFF | ON  | OFF | OFF | ON  | OFF | ON  |

**!** CAUTION: DO NOT set DIP switches while power is supplied. Otherwise, the unit may fail.

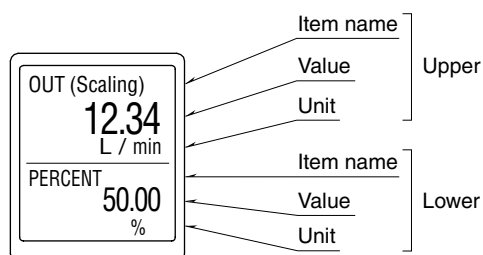
## SCREEN DISPLAY

### ■ DISPLAY IN MEASURING MODE

#### • Double tiered display

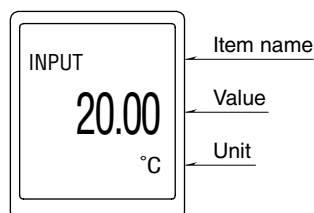
The unit can select and display any two items out of input engineering value, input electromotive force value, % value\*, output engineering value, and output scaling value.

\* Percent value for input.



#### • Single tiered display

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

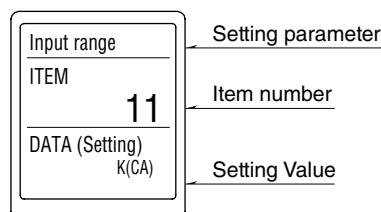


Refer to the Display setting of the Advanced mode for settings.

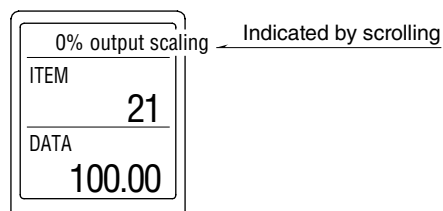
### ■ DISPLAY IN EACH SETTING MODE

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.) Setting display previously displayed before power shutdown is indicated at next power up.



The long setting parameter is indicated by scrolling.

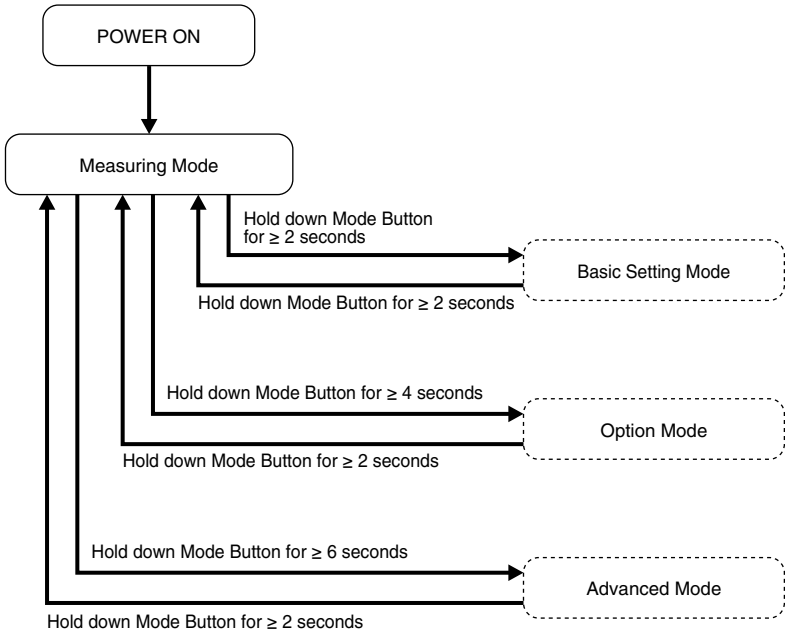


### ■ DISPLAY TIMEOUT

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



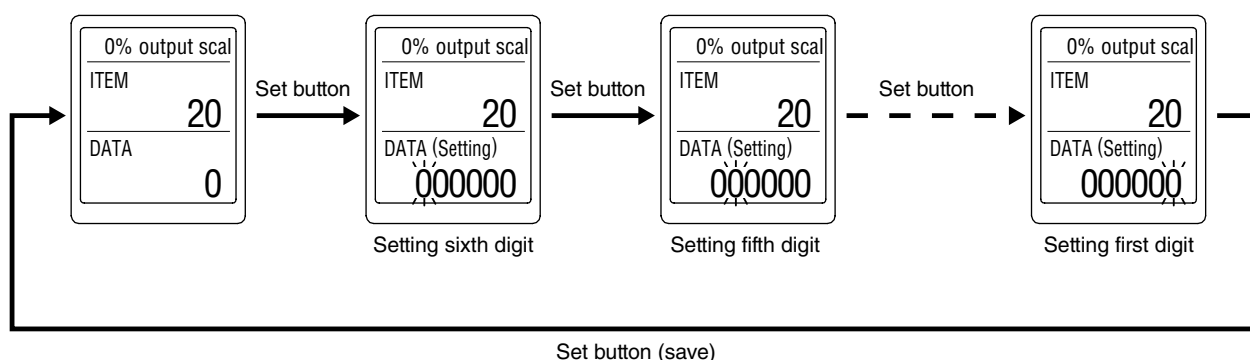
## ■ OPERATION IN EACH SETTING MODE

### • Basic operation

|              |   |
|--------------|---|
| Mode Button: | In measuring mode, holding down Mode button for $\geq 2$ seconds, $\geq 4$ seconds or $\geq 6$ seconds enables to move on to each setting mode. Holding down Mode button for $\geq 2$ seconds at each setting item display enables to return to measuring mode.<br>Holding down Mode button for $\geq 2$ 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.  |

### • Output display scaling setting parameter

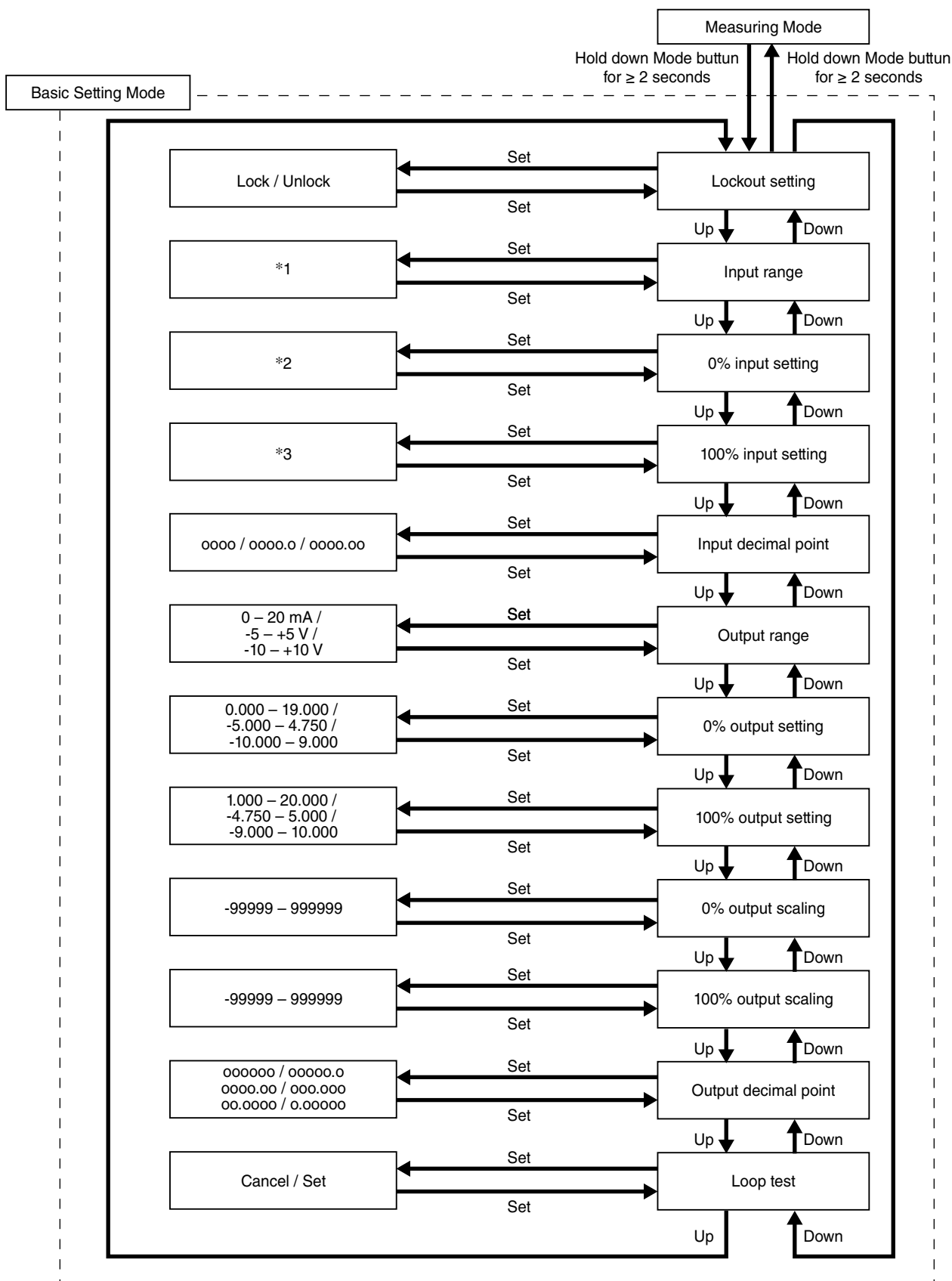
For output display scaling setting parameter, set values digit by digit. Pressing Set button enables to move blinking digit. Adjust blinking digit to set numerical value with Up and Down button. Blinking digit moves from most significant digit with pressing Set button. At least significant digit, pressing Set button again enables to turn on and determine the setting value. During setting, press and hold Mode button for  $\geq 2$  seconds to discard the setting value.



### • Lockout setting

'Lockout setting' is available for the unit. When unlocking the lockout setting, indicate 'Lockout Setting' of [01] Lookout setting 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.

■ BASIC 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 |
|--------------------------------|----------------------|---|---|----------------------|---------------|
| Basic setting                  | 01                   | Lockout setting   | Lock / Unlock   | —                    | Lock          |
|                                | 11                   | Input range   | (PR)<br>K (CA)<br>E (CRC)<br>J (IC)<br>T (CC)<br>B (RH)<br>R<br>S<br>C (WRe 5-26)<br>N<br>U<br>L<br>P (Platinel II) | —                    | K (CA)        |
|                                | 12                   | 0 % input setting   | (PR): 0.0 – 1740.0  | °C                   | 0.0           |
|                                |                      |   | K (CA): -270.0 – 1350.0   |                      |               |
|                                |                      |   | E (CRC): -270.0 – 980.0   |                      |               |
|                                |                      |   | J (IC): -210.0 – 1180.0   |                      |               |
|                                |                      |   | T (CC): -270.0 – 380.0  |                      |               |
|                                |                      |   | B (RH): 0.0 – 1800.0  |                      |               |
|                                |                      |   | R: -50.0 – 1740.0   |                      |               |
|                                |                      |   | S: -50.0 – 1740.0   |                      |               |
|                                |                      |   | C (WRe 5-26): 0.0 – 2295.0  |                      |               |
|                                |                      |   | N: -270.0 – 1280.0  |                      |               |
|                                |                      |   | U: -200.0 – 580.0   |                      |               |
|                                |                      |   | L: -200.0 – 880.0   |                      |               |
|                                |                      |   | P (Platinel II): 0.0 – 1375.0   |                      |               |
|                                | 13                   | 100 % input setting                                       | (PR): 20.0 – 1760.0   | °C                   | 1000.0        |
|                                |                      |   | K (CA): -250.0 – 1370.0   |                      |               |
|                                |                      |   | E (CRC): -250.0 – 1000.0  |                      |               |
|                                |                      |   | J (IC): -190.0 – 1200.0   |                      |               |
|                                |                      |   | T (CC): -250.0 – 400.0  |                      |               |
| B (RH): 20.0 – 1820.0          |                      |   |   |                      |               |
| R: -30.0 – 1760.0              |                      |   |   |                      |               |
| S: -30.0 – 1760.0              |                      |   |   |                      |               |
| C (WRe 5-26): 20.0 – 2315.0    |                      |   |   |                      |               |
| N: -250.0 – 1300.0             |                      |   |   |                      |               |
| U: -180.0 – 600.0              |                      |   |   |                      |               |
| L: -180.0 – 900.0              |                      |   |   |                      |               |
| P (Platinel II): 20.0 – 1395.0 |                      |   |   |                      |               |
| 16                             | Input decimal point  | No decimal point<br>The number of decimal places : 1 or 2 | —   | 1 place of decimals  |               |
| 17                             | Output range         | 0 – 20mA<br>-5 – +5V<br>-10 – +10V                        | —   | 0 – 20mA             |               |
| 18                             | 0 % output setting   | 0.000 – 19.000  | mA<br>V<br>V  | 4.000                |               |
|                                |                      | -5.000 – 4.750  |   |                      |               |
|                                |                      | -10.000 – 9.000   |   |                      |               |
| 19                             | 100 % output setting | 1.000 – 20.000  | mA<br>V<br>V  | 20.000               |               |
|                                |                      | -4.750 – 5.000  |   |                      |               |
|                                |                      | -9.000 – 10.000   |   |                      |               |
| 20                             | 0 % output scaling   | -99999 – 999999   | —   | 0.00                 |               |
| 21                             | 100 % output scaling | -99999 – 999999   | —   | 100.00               |               |
| 22                             | Output decimal point | No decimal point<br>The number of decimal places : 1 – 5  | —   | 2 places of decimals |               |
| 26                             | 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.

**[11] Input range**

Set the type of T/C connected to the input.

| SETTING TYPE    | SETTING RANGE      |                    |                  | INITIAL VALUE |
|-----------------|--------------------|--------------------|------------------|---------------|
|                 | °C                 | °F                 | K                |               |
| (PR)            | 0.00 - 1760.00     | 32.00 - 3200.00    | 273.15 - 2033.15 | K (CA)        |
| K (CA)          | -270.00 - +1370.00 | -454.00 - +2498.00 | 3.15 - 1643.15   |               |
| E (CRC)         | -270.00 - +1000.00 | -454.00 - +1832.00 | 3.15 - 1273.15   |               |
| J (IC)          | -210.00 - +1200.00 | -346.00 - +2192.00 | 63.15 - 1473.15  |               |
| T (CC)          | -270.00 - +400.00  | -454.00 - +752.00  | 3.15 - 673.15    |               |
| B (RH)          | 0.00 - 1820.00     | 32.00 - 3308.00    | 273.15 - 2093.15 |               |
| R               | -50.00 - +1760.00  | -58.00 - +3200.00  | 223.15 - 2033.15 |               |
| S               | -50.00 - +1760.00  | -58.00 - +3200.00  | 223.15 - 2033.15 |               |
| C (WRe 5-26)    | 0.00 - +2315.00    | 32.00 - 4199.00    | 273.15 - 2588.15 |               |
| N               | -270.00 - +1300.00 | -454.00 - +2372.00 | 3.15 - 1573.15   |               |
| U               | -200.00 - +600.00  | -328.00 - +1112.00 | 73.15 - 873.15   |               |
| L               | -200.00 - +900.00  | -328.00 - +1652.00 | 73.15 - 1173.15  |               |
| P (Platinel II) | 0.00 - 1395.00     | 32.00 - 2543.00    | 273.15 - 1668.15 |               |

**[12] 0 % input setting**

Set the 0 % input setting for input to the unit.

Setting range differs according to input range.

| INPUT RANGE     | SETTING RANGE      |                    |                  | MINIIMUM SPAN |       | INITIAL VALUE |
|-----------------|--------------------|--------------------|------------------|---------------|-------|---------------|
|                 | °C                 | °F                 | K                | °C, K         | °F    |               |
| (PR)            | 0.00 - 1740.00     | 32.00 - 3164.00    | 273.15 - 2013.15 | 20.00         | 36.00 | 0.0           |
| K (CA)          | -270.00 - +1350.00 | -454.00 - +2462.00 | 3.15 - 1623.15   |               |       | 0.0           |
| E (CRC)         | -270.00 - +980.00  | -454.00 - +1796.00 | 3.15 - 1253.15   |               |       | 0.0           |
| J (IC)          | -210.00 - +1180.00 | -346.00 - +2156.00 | 63.15 - 1453.15  |               |       | 0.0           |
| T (CC)          | -270.00 - +380.00  | -454.00 - +716.00  | 3.15 - 653.15    |               |       | 0.0           |
| B (RH)          | 0.00 - 1800.00     | 32.00 - 3272.00    | 273.15 - 2073.15 |               |       | 500.0         |
| R               | -50.00 - +1740.00  | -58.00 - +3164.00  | 223.15 - 2013.15 |               |       | 500.0         |
| S               | -50.00 - +1740.00  | -58.00 - +3164.00  | 223.15 - 2013.15 |               |       | 0.0           |
| C (WRe 5-26)    | 0.00 - +2295.00    | 32.00 - 4163.00    | 273.15 - 2568.15 |               |       | 0.0           |
| N               | -270.00 - +1280.00 | -454.00 - +2336.00 | 3.15 - 1553.15   |               |       | 0.0           |
| U               | -200.00 - +580.00  | -328.00 - +1076.00 | 73.15 - 853.15   |               |       | 0.0           |
| L               | -200.00 - +880.00  | -328.00 - +1616.00 | 73.15 - 1153.15  |               |       | 0.0           |
| P (Platinel II) | 0.00 - 1375.00     | 32.00 - 2507.00    | 273.15 - 1648.15 |               |       | 0.0           |

Set as follows.

[12] 0 % input setting &lt; [13] 100 % input setting

**[13] 100 % input setting**

Set the 100 % input setting for input to the unit.

Setting range differs according to input range.

| INPUT RANGE     | SETTING RANGE      |                    |                  | MINIIMUM SPAN |       | INITIAL VALUE |
|-----------------|--------------------|--------------------|------------------|---------------|-------|---------------|
|                 | °C                 | °F                 | K                | °C, K         | °F    |               |
| (PR)            | 20.00 - 1760.00    | 68.00 - 3200.00    | 293.15 - 2033.15 | 20.00         | 36.00 | 1600.0        |
| K (CA)          | -250.00 - +1370.00 | -418.00 - +2498.00 | 23.15 - 1643.15  |               |       | 1000.0        |
| E (CRC)         | -250.00 - +1000.00 | -418.00 - +1832.00 | 23.15 - 1273.15  |               |       | 500.0         |
| J (IC)          | -190.00 - +1200.00 | -310.00 - +2192.00 | 83.15 - 1473.15  |               |       | 500.0         |
| T (CC)          | -250.00 - +400.00  | -418.00 - +752.00  | 23.15 - 673.15   |               |       | 300.0         |
| B (RH)          | 20.00 - 1820.00    | 68.00 - 3308.00    | 293.15 - 2093.15 |               |       | 1600.0        |
| R               | -30.00 - +1760.00  | -22.00 - +3200.00  | 243.15 - 2033.15 |               |       | 1600.0        |
| S               | -30.00 - +1760.00  | -22.00 - +3200.00  | 243.15 - 2033.15 |               |       | 1600.0        |
| C (WRe 5-26)    | 20.00 - +2315.00   | 68.00 - 4199.00    | 293.15 - 2588.15 |               |       | 2000.0        |
| N               | -250.00 - +1300.00 | -418.00 - +2372.00 | 23.15 - 1573.15  |               |       | 1000.0        |
| U               | -180.00 - +600.00  | -292.00 - +1112.00 | 93.15 - 873.15   |               |       | 300.0         |
| L               | -180.00 - +900.00  | -292.00 - +1652.00 | 93.15 - 1173.15  |               |       | 500.0         |
| P (Platinel II) | 20.00 - 1395.00    | 68.00 - 2543.00    | 293.15 - 1668.15 |               |       | 1200.0        |

Set as follows.

[12] 0 % input setting &lt; [13] 100 % input setting

**[16] 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.

**[17] 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 |               |

When output range is changed, turn the power off, and then set the output setting DIP SW on the side of the unit. Setting is as follows. Output setting value is changed to initial value.

| OUTPUT RANGE | SW1 |     |     |     |     |     |     |     |
|--------------|-----|-----|-----|-----|-----|-----|-----|-----|
|              | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   |
| 0 – 20 mA    | OFF | ON  | OFF | OFF | OFF | OFF | ON  | OFF |
| -5 – +5 V    | OFF | OFF | ON  | OFF | ON  | OFF | OFF | ON  |
| -10 – +10 V  | OFF | OFF | ON  | OFF | OFF | ON  | OFF | ON  |

**[18] 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.

[18] 0 % output setting < [19] 100 % output setting

The value is indicated by 'OUTPUT' at measuring mode.

**[19] 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.

[18] 0 % output setting < [19] 100 % output setting

The value is indicated by 'OUTPUT' at measuring mode.

**[20] 0 % output scaling**

Set the display value of [18] 0 % output setting.

| SETTING RANGE   | INITIAL VALUE |
|-----------------|---------------|
| -99999 – 999999 | 0.00          |

**[21] 100 % output scaling**

Set the display value of [19] 100 % output setting.

| SETTING RANGE   | INITIAL VALUE |
|-----------------|---------------|
| -99999 – 999999 | 100.00        |

**[22] Output decimal point**

Set decimal point position for [20] 0 % and [21] 100 % output scaling.

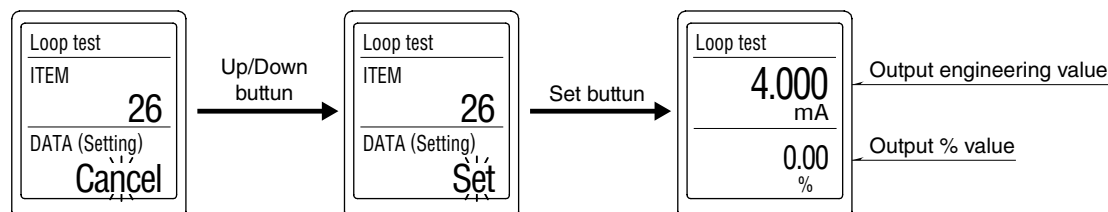
| SETTING VALUE | DESCRIPTION                 | INITIAL VALUE        |
|---------------|-----------------------------|----------------------|
| oooooo        | Decimal point: None         | 2 places of decimals |
| ooooo.o       | Number of decimal places: 1 |                      |
| oooo.oo       | Number of decimal places: 2 |                      |
| ooo.ooo       | Number of decimal places: 3 |                      |
| oo.oooo       | Number of decimal places: 4 |                      |
| o.ooooo       | Number of decimal places: 5 |                      |

**[26] 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

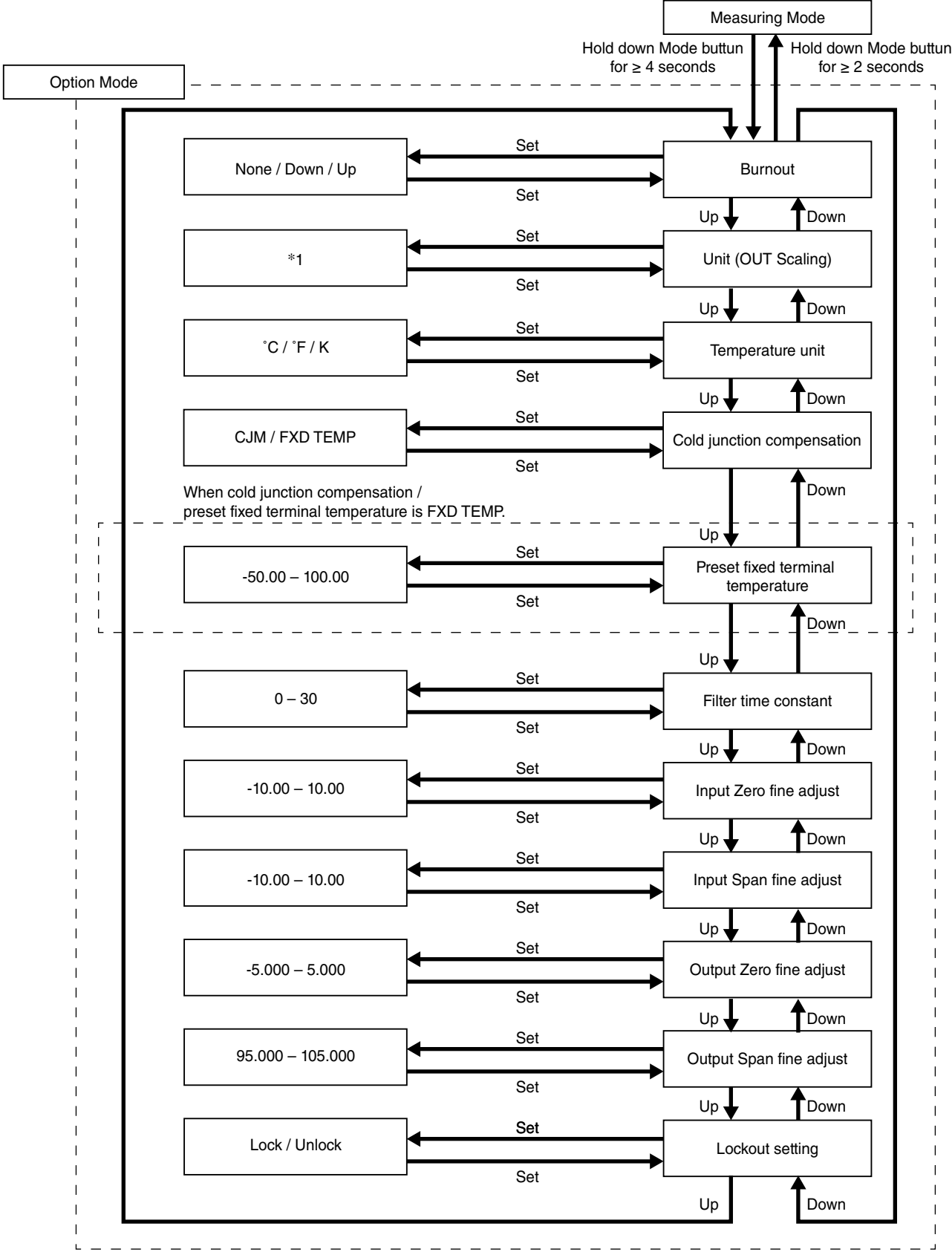
Pressing and holding Mode button more than 2 seconds or turning off the power enable to exit loop test.



\*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.

■ OPTION MODE



\*1. Refer to [61] Unit (OUT scaling) for usable unit.

## • Parameters

| MODE           | ITEM | SETTING PARAMETER                 | RANGE                | UNIT | INITIAL VALUE |
|----------------|------|-----------------------------------|----------------------|------|---------------|
| Option setting | 51   | Burnout                           | None / Down / Up     | —    | Up            |
|                | 61   | Unit (OUT Scaling)                | Choose from 68 types | —    | %             |
|                | 64   | Temperature unit                  | °C / °F / K          | —    | °C            |
|                | 65   | Cold junction compensation        | CJM/FXD TEMP         | —    | CJM           |
|                | 66   | Preset fixed terminal temperature | -50.00 – 100.00      | °C   | 0.00          |
|                | 67   | Filter time constant              | 0 – 30               | sec. | 0             |
|                | 69   | Input Zero fine adjust            | -10.00 – 10.00       | °C   | 0.00          |
|                | 70   | Input Span fine adjust            | -10.00 – 10.00       | °C   | 0.00          |
|                | 71   | Output Zero fine adjust           | -5.000 – 5.000       | %    | 0.000         |
|                | 72   | Output Span fine adjust           | 95.000 – 105.000     | %    | 100.000       |
|                | 01   | Lockout setting                   | Lock / Unlock        | —    | Lock          |

**[51] Burnout**

Set the operation at burnout.

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

**[61] Unit (OUT Scaling)**

Set the unit to display output scaling.

Available units are following 68 types.

DC, AC, mV, V, kV,  $\mu$ A, mA, A, kA, mW, W, kW, var, kvar, Mvar, VA, Hz,  $\Omega$ , k $\Omega$ , M $\Omega$ , cm, mm, m, m/sec, mm/min, cm/min, m/min, m/h, m/s<sup>2</sup>, inch, L, L/s, L/min, L/h, m<sup>3</sup>, m<sup>3</sup>/sec, m<sup>3</sup>/min, m<sup>3</sup>/h, Nm<sup>3</sup>/h, N·m, N/m<sup>2</sup>, g, kg, kg/h, N, kN, Pa, kPa, Mpa, t, t/h, °C, °F, K, %RH, J, kJ, MJ, rpm, sec, min, min<sup>-1</sup>, pH, %, ppm, deg. (blank), User

Selecting 'User' enables to move on to user's unit setting display. A unit can be created by using any characters. Up to 13 characters available.\*1 Up and Down button enables to move on selected characters. Set button enables to select a character. While setting, pressing Mode button enables to delete a character, pressing and holding Mode button enables to discard the settings. Pressing and holding Set button enables to determine the setting and return to setting display of [61] Unit (OUT Scaling). The unit is indicated by 'OUTPUT (Scaling)' at measuring mode display.

If turning power off while setting, it returns to setting display of [61] Unit (OUT Scaling). (The setting value is discarded.)

\*1. Settable characters

0 - 9 A - Z a - z ! " # \$ % & ' ( ) = -  
+ \* ^ | @ ` [ ] { } ; : < > ? \_ , . /

**[64] Temperature unit**

Set the temperature unit for the display and setting.

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

**[65] Cold junction compensation**

Choose the cold junction compensation method.

| SETTING VALUE | DESCRIPTION                       | INITIAL VALUE |
|---------------|-----------------------------------|---------------|
| CJM           | Measuring terminal temp. with CJM | CJM           |
| FXD TEMP      | Set fixed terminal temperature    |               |

**[66] Preset fixed terminal temperature**

When FXD TEMP is chosen with [65] Cold junction compensation, set fixed terminal temperature.

| SETTING RANGE    |                  | INITIAL VALUE |
|------------------|------------------|---------------|
| °C, K            | °F               |               |
| -50.00 – +100.00 | -58.00 – +212.00 | 0.00          |

**[67] Filter time constant**

Set filter time constant of the first order lag filter.

The first order lag filter is available with setting time.

When '0' is set to this parameter, the first order lag filter is not available. (Response time:  $\leq 0.5$  sec. (0  $\rightarrow$  90 %))

The first order lag filter is equivalent to general CR filter. The setting time constant is the time to follow until about 63 %, when input varies from 0 % to 100 %.

It is available to set the range between 0 – 30 seconds.

Initial value: 0

**[69] 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          |

**[70] 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          |

**[71] Output Zero fine adjust**

Perform fine adjustment of output signal. Available range between -5.000 – +5.000 %.

Initial value: 0.000

**[72] Output Span fine adjust**

Perform fine adjustment of output signal. Available range between 95.000 – 105.000 %.

Initial value: 100.000

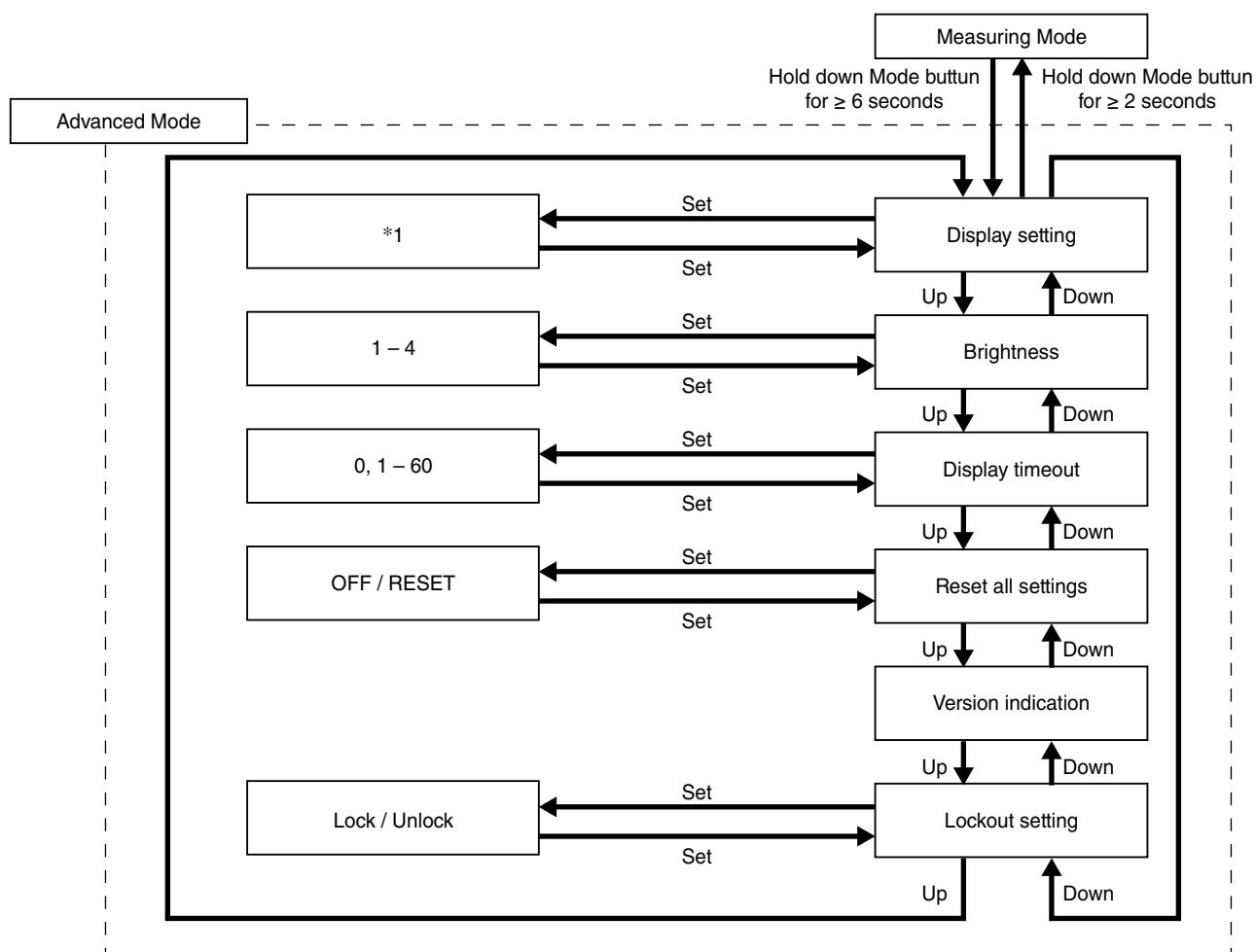
**[01] Lockout setting**

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 [90] Display setting.

### • Parameters

| MODE             | ITEM | SETTING PARAMETER  | RANGE  | UNIT | INITIAL VALUE                  |
|------------------|------|--------------------|--|------|--------------------------------|
| Advanced setting | 90   | Display setting    | Upper: choose from 5 types<br>Lower: choose from 6 types | —    | Upper: INPUT<br>Lower: PERCENT |
|                  | 91   | Brightness         | 1 (darkest) – 4 (brightest)                              | —    | 4                              |
|                  | 92   | Display timeout    | 0 (always on), 1 – 60                                    | min. | 10                             |
|                  | 93   | Reset all settings | OFF / RESET  | —    | OFF                            |
|                  | 94   | Version indication | —  | —    | —                              |
|                  | 01   | Lockout setting    | Lock / Unlock  | —    | Lock                           |

**[90] 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                     | INPUT                        |
|--------------------|---------------------------------|------------------------------|
| INPUT              | Input engineering unit value    | INPUT<br>(engineering value) |
| VOLTAGE            | Input electromotive force value |                              |
| PERCENT            | Percent value*2                 |                              |
| OUTPUT             | Output engineering unit value   |                              |
| OUTPUT (Scaling)*1 | Output scaling                  |                              |

\*1. Display at measuring mode is OUT (Scaling).

\*2. Input percent value.

**Lower**

| SETTING VALUE      | DESCRIPTION                     | INPUT                        |
|--------------------|---------------------------------|------------------------------|
| INPUT              | Input engineering unit value    | PERCENT<br>(percent value)*2 |
| VOLTAGE            | Input electromotive force value |                              |
| PERCENT            | Percent value*2                 |                              |
| OUTPUT             | Output engineering unit value   |                              |
| OUTPUT (Scaling)*1 | Output scaling                  |                              |
| None               | No display                      |                              |

\*1. Display at measuring mode is OUT (Scaling).

\*2. Input percent value.

**[91] Brightness**

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

Initial value: 4

**[92] 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

**[93] 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). Configure initialized value again with DIP switch with power off for output setting.

**[94] 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 (Output upward)              | Check the input wires.   |
| BURNOUT ERROR D | Input wires broken (Output 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.                                      |
| SCALING ERROR U | Output scaling value exceeds 999999 (upward).   | Return the output signal not exceed 999999..                               |
| SCALING ERROR D | Output scaling value exceeds -99999 (downward). | Return the output signal not lower than -99999.                            |
| 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, SCALING ERROR in descending order.

| ERROR MESSAGES           | DISPLAY SETTING              |                 |               |                               |                      |
|--------------------------|------------------------------|-----------------|---------------|-------------------------------|----------------------|
|                          | INPUT ENGINEERING UNIT VALUE | INPUT EMF VALUE | PERCENT VALUE | OUTPUT ENGINEERING UNIT VALUE | OUTPUT SCALING VALUE |
| BURNOUT ERROR U          | ✓                            | ✓               | —             | ✓                             | ✓                    |
| BURNOUT ERROR D          |                              |                 |               |                               |                      |
| OVER RANGE U             | ✓                            | ✓               | —             | ✓                             | ✓                    |
| OVER RANGE D             |                              |                 |               |                               |                      |
| SCALING ERROR U (OUTPUT) |                              |                 |               | ✓                             | ✓                    |
| SCALING ERROR D (OUTPUT) |                              |                 |               |                               |                      |
| EEPROM I ERROR           |                              |                 |               |                               |                      |
| EEPROM R ERROR           | ✓                            |                 |               |                               |                      |
| EEPROM W ERROR           |                              |                 |               |                               |                      |

## WIRING INSTRUCTIONS

### ■ SCREW TERMINAL

Torque: 0.8 N·m

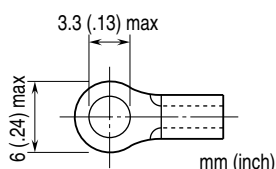
### ■ SOLDERLESS TERMINAL mm (inch)

Refer to the drawing below for recommended ring tongue terminal size. Spade tongue type is also applicable.

Applicable wire size 0.25 to 1.65 mm<sup>2</sup> (AWG 22 to 16)

Recommended manufacturer: Japan Solderless Terminal

MFG.Co.Ltd, Nichifu Co.,Ltd



## CHECKING

- 1) Terminal wiring: Check that all cables are correctly connected according to the connection diagram.
- 2) Check DIP switch setting.
- 3) Power input voltage: Check voltage across the terminal 10 – 11 with a multimeter.
- 4) Input: Check that the input signal is within 0 – 100% of the full-scale.  
If the thermocouple or its extension 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.
- 5) Output: Check that the load resistance meets the described specifications.

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## 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 M2ECFG operating manual (EM-5147), when adjusting with M2E Configurator Software (model: M2ECFG). And then follow the procedure shown below.

#### • INPUT FINE ADJUSTMENT

- 1) Set the input signal to 0 %, and adjust the input display to 0 % by [69] Input Zero fine adjust.
- 2) Set the input signal to 100 %, and adjust the input display to 100 % by [70] 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 [71] Output Zero fine adjust.
- 2) Set the simulated input to 100 %, and adjust the output signal to 100 % by [72] 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).

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## 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.