Digital Panel Meters 47 Series

POTENTIOMETER INPUT DIGITAL PANEL METER
(4 digit, LED display type)

Model: 47LM

OPERATING MANUAL

CONTENTS

1. INTRODUCTION

1.1 BEFORE USE....

Thank you for choosing us. Before use, please check contents of the package you received as outlined below.

■ **PACKAGE INCLUDES**

Digital panel meter

Accessories

Mounting bracket (2)	Terminal cover (1)	Watertight packing (1)
	(tethered to the meter with a strap)	
Engineering unit sticker label sheet (1)	Instruction manual	Ordering Information Sheet
		(included with the option code '/SET' only)

■ **MODEL NO.**

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

1.2 SAFETY PRECAUTIONS (that must be observed)

The following signs are used in this manual to provide precautions required to ensure safe usage of the unit. Please understand these signs and graphic symbols, read the manual carefully and observe the description.

The following signs show seriousness of safety hazard or damage occurred when used wrongly with the signs ignored.

⚠ **WARNING**	Indicates a potentially hazardous situation which, if not avoided, may result in serious injury or death.

⚠ **CAUTION**	Indicates a potentially hazardous situation which, if not avoided, may result in injury or in property damage.

🚫 Indicates prohibitions.	⬤ Indicates mandatory cautions.	△ Indicates cautions.

⚠ WARNING

CAUTION
For safety, make sure that wiring is performed by qualified personnel only.
  • Failure to do so may result in a fire, electric shock or injury.

CAUTION ELECTRIC SHOCK
Do not touch the terminals while the power is on.
  • Doing so may result in electric shock.

MANDATORY CAUTION
Check the connection diagram carefully before wire connection.
  • Failure to do so may result in malfunction, a fire or electric shock.

MANDATORY CAUTION
Provide safety measures outside of the unit to ensure safety in the whole system if an abnormality occurs due to malfunction of the unit or another external factor affecting the unit's operation.

PROHIBITION TO BE WET
Do not splash water on the unit except for the front panel installed correctly.
  • Doing so may result in a fire, electric shock or injury.

MANDATORY CAUTION
Stop using the unit immediately if smokes, unusual smell or abnormal noises come(s) from it.
  • Using the unit continuously may result in a fire or electric shock.

MANDATORY CAUTION
Stop using the unit if it is dropped or damaged.
  • Using the unit continuously may result in a fire or electric shock.

MANDATORY CAUTION

Tighten the terminal blocks and terminal block screws with a specified torque.
• Excessive fastening may result in damage of the screws and loose screws may occasionally result in ignition.

PROHIBITION

Do not throw the unit into the fire.
• Doing so may result in rupture of the electronic component.

⚠ CAUTION

PROHIBITION TO DISCOMPOSE

Never discompose or remodel the unit.
• Doing so may result in electric shock, malfunction or injury.

PROHIBITION

Do not connect or remove the unit while its power is on.
• Doing so may result in electric shock, malfunction or injury.

MANDATORY CAUTION

Do not allow fine shavings or wire scraps to enter the unit in machining screws or wiring.
• Doing so may result in malfunction of the unit.

MANDATORY CAUTION

Make sure to attach the terminal cover.
• Failure to do so may result in electric shock.

PROHIBITION

Do not pull the wires connecting to the unit.
• Doing so may result in electric shock, damage of the unit or injury.

PROHIBITION

Do not use the unit in an atmosphere where combustible gas is present.
• Doing so may result in inflammation, ignition, or smoke.

PROHIBITION

Do not cover the ventilation slits with cables, etc.
• Doing so may result in malfunction or heating.

1.3 POINTS OF CAUTION

■ CONFORMITY WITH EU DIRECTIVES

This product conforms to the following Low Voltage, EMC and RoHS Directives.

• This equipment is suitable for Pollution Degree 2, Measurement Category II (alarm output, transient voltage 2500 V) and Installation Category II (transient voltage 2500 V). Reinforced insulation (input or DC output to alarm output to power: 300 V) and basic insulation (input to DC output: 300 V) are maintained. Prior to installation, check that the insulation class of this unit satisfies the system requirements.

• 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.

• Our's products conforming to the EU Directives conforms to the standards required based on the premise that they are built into various equipment, apparatus or control panels to use. Because the EMC performance depends on the configuration, wiring or arrangement of the equipment, apparatus and control panels you build, it is necessary for you to make such equipment, apparatus or control panels to conform finally to the CE Marking by yourselves.

⚠ CAUTION

This product conforms to the EMC Directive for electrical and electronic apparatus intended for use in industrial environments. If it is used in the residential environments, it may cause radio interference, and the user is requested to take appropriate measures.

■ ENVIRONMENT

Install the unit within the installation specifications.

• Indoors use.

• Environmental temperature must be within -10 to +55°C (14 to 131°F) with relative humidity within 30 to 90% RH without condensing.

• Altitude up to 2000 meters.

• Provide sufficient space around the unit for heat dissipation.

• Mount the unit to a panel between 1.6 and 8 mm thick.

• Install the unit in a well-ventilated place in order to prevent internal temperature rise.

• Refer to "PANEL CUTOUT" to install several units. In mounting the unit with other equipment side by side, provide sufficient space between them, according to the dimensions in the panel cutout.

• Do not use the unit under the following environments:
    – Where the unit is exposed to direct sunlight, rain or wind. (The unit is not designed for outdoor use.)
    – Where condensation may occur due to extreme temperature changes.
    – Where corrosive or flammable gas is present.
    – Where heavy dust, iron powder or salt is present in the air.
    – Where organic solvent such like benzine, thinner, and alcohol, or strong alkaline materials such like ammonia and caustic soda may attach to the unit, or where such materials are present in the air.
    – Where the unit is subject to continuous vibration or physical impact.
    – Where there are high-voltage lines, high-voltage equipment, power lines, power equipment, equipment with transmission unit such like a ham radio equipment, or equipment generating large switching surges around the unit.

■ WIRING

• In order to prevent potential electric shock, wire the unit after turning off the power supply and making sure that the power is not supplied to the cable.

• In order to enable the operator to turn off the power input immediately, install a switch or a circuit breaker according to the relevant requirements in IEC 60947-2 and properly indicate it.

• Be sure to confirm the name and polarity of each terminal before wiring to the terminal block.

• Do not connect anything to unused terminals.

• Be sure to attach the terminal cover to prevent electric shock.

■ HANDLING CAUTIONS

• 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.
• Use the unit within the noted supply power voltage and rated load.
• The last measured values are held in mode transition. Take this into consideration when configuring the control system.
• Clean the surface of the unit with wet soft cloth. Do not use organic solvent such like benzine, thinner and alcohol. Doing so may result in deformation or discoloration of the unit.
• When abnormality is found such like smokes, unusual smell and abnormal noises coming from the unit, immediately cut the power supply and stop using it.

■ TO ENSURE DUSTPROOF AND WATERPROOF (degree of protection IP66)

To ensure dustproof and waterproof for front panel follow conditions below.
• Observe the designated panel cutout size (W92 × H45 mm) specified by us.
• The watertight packing included in the product package must be placed between the body and panel when installing on the panel.
• Insert the unit into the panel cutout, and fasten both mounting brackets tightly until they hit the panel.
• After installation, confirm that there are no following abnormalities.
    – The packing is contorted.
    – There are some spaces between front panel and panel.
    – The packing is run off the edge.
    – The packing is cut off.
    – There are foreign objects sticking.

1.4 COMPONENT IDENTIFICATION

■ **FRONT VIEW**

Display

Engineering unit
sticker label position

mm

Max/Min   Alarm/↓   Scale/↑   Shift   Up
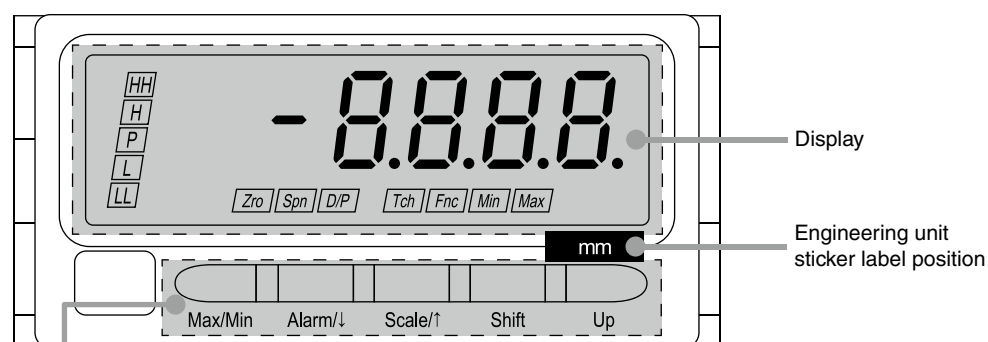
BUTTON	FUNCTION
Max/Min	Used to switch the main display to show the present value, MAX value or MIN value, and to reset the MAX and MIN values. Also used to cancel a set item.
Alarm/↓	Used to confirm the alarm setpoints, to move on to the alarm and other setting modes, or to shift through setting items in each setting mode.
Scale/↑	Used to move on to the scaling and other setting modes, or to shift through setting items in each setting mode.
Shift	Used to move on to the setting standby status of each setting mode and to shift through display digits in each setting item.
Up	Used to change setting values in a setting standby mode and to execute/cancel Forced Zero in Measuring Mode.

NOTE

- The engineering unit sticker label position is our recommended position.
- When an engineering unit is specified by the Ordering Information Sheet, the unit(s) will be shipped with the sticker label put on the above position.

■ **DISPLAY**

COMPONENT	FUNCTION
Main display	Indicates present, MAX and MIN values, parameters, setting values and error codes.

INDICATOR	MODE	FUNCTION
Alarm	Setting	Indicates parameters in Alarm Setting Mode. (Refer to 7. SETTING ALARM OUTPUT.)
	Confirming alarm setpoints	'HH', 'H', 'L' or 'LL' indicator blinks in confirming each alarm setpoint. (Refer to 14.1 CONFIRMING ALARM SETPOINTS.)
	Measuring	Indicates the comparison result between alarm setting values and present values. 'HH' indicator turns on when the HH alarm is tripped. 'H' indicator turns on when the H alarm is tripped. 'L' indicator turns on when the L alarm is tripped. 'LL' indicator turns on when the LL alarm is tripped. 'P' indicator turns on when none of the other alarms is tripped.

INDICATOR	MODE	FUNCTION
Function	Setting	Indicates parameters in each mode. 'Zro', 'Spn', 'D/P', 'Tch', 'Fnc', 'Min' and 'Max' indicators turn on in combination depending on the parameters.
		Teach Calibration. 'Zro' or 'Spn' indicator turns on and 'Tch' indicator blinks. (Refer to 15.1 TEACH CALIBRA-TION.)
		'Max' and 'Min' indicators blink when a parameter is within invalid range while setting.
	Measuring	Indicates Forced Zero mode. 'Zro' and 'Fnc' indicators turn on. (Refer to 14.2 FORCING THE PRESENT DISPLAY VALUE TO ZERO.)
		Indicates MAX or MIN value. 'Max' or 'Min' indicator turns on. (Refer to 14.3 RETAINING MAX AND MIN VALUES.)

■ TOP VIEW

Specifications

MODEL

INPUT　100Ω–10kΩ

OUTPUT

POWER

SER No

XXXXXN

C€

MADE IN JAPAN

TAG NO

TAG NO

TAG No. sticker label position
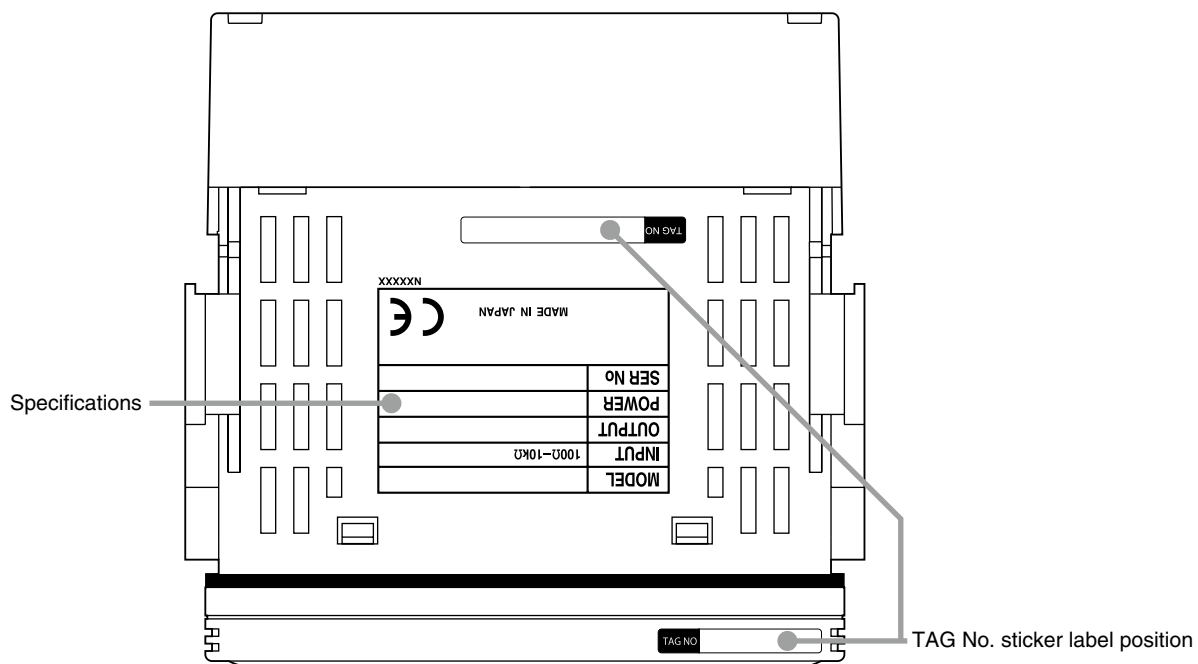
NOTE

- Contents of the specification label depend on the specifications.
- The tag No. label sticker position is our recommended position.
- When a tag No. is specified, the unit(s) will be shipped with the tag No. sticker label put on the above position. Max. 17 alphanumeric characters can be specified. Please consult us.

■ REAR VIEW

• With Terminal Cover

Connection diagram

MAX ← MIN

OUT PWR
+ − U(+) V(−)

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |

HHa Ha COM La LLa COM
ALM H ALM L

NXXXXX

MODEL

Terminal cover

Model No.

Strap
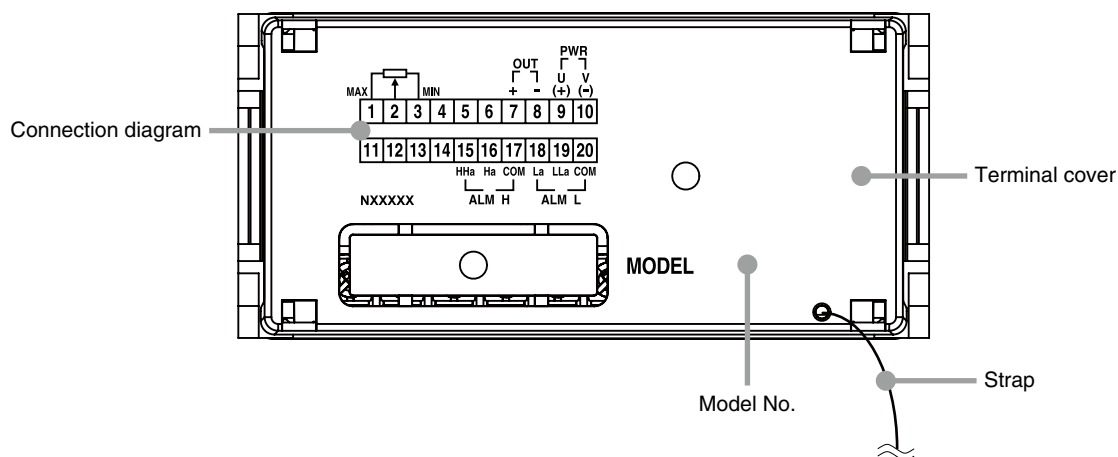
NOTE

- The connection diagram depends on the specifications.
- The MODEL shows the same as that in the specification label on the top of the unit.

• Without Terminal Cover

No alarm output

Terminal block (separable)

1 2 3 4 5 6 7 8 9 10

Strap

Alarm output

Terminal block (separable)

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16 17 18 19 20

Strap

Terminal block (separable)
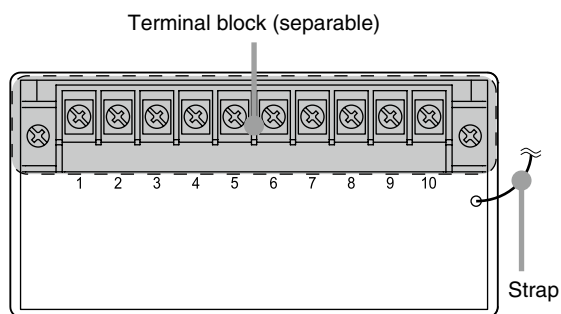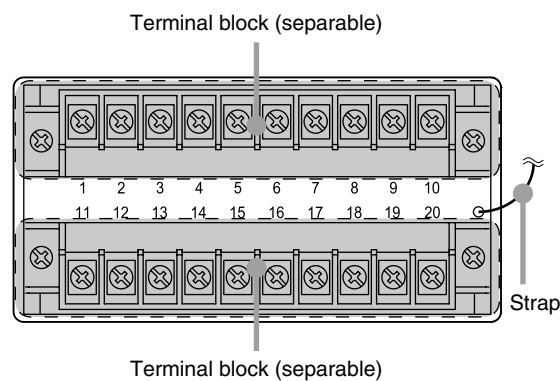
1.5 INSTALLATION

1.5.1 EXTERNAL DIMENSIONS

unit: mm (inch)

■ TOP VIEW

95 (3.74)

■ FRONT VIEW

103 (4.06)

96 (3.78)

48 (1.89)

■ SIDE VIEW

98.5 (3.88)

12.5 (.49)   86 (3.39)

2 (.08)

47 (1.85)
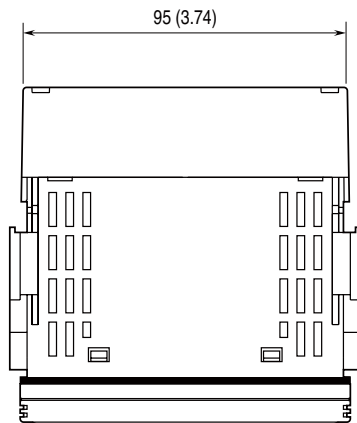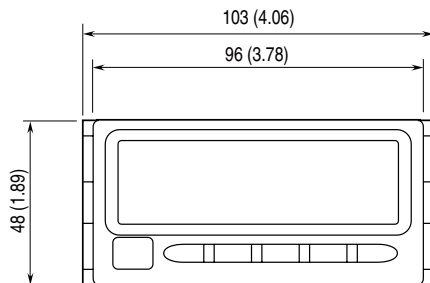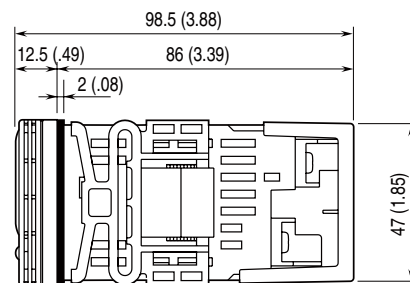
■ REAR VIEW
• No Alarm Output

6.6 (.26)

10–M3 SCREW TERMINAL

2–M3 SCREW

45 (1.77)

1 2 3 4 5 6 7 8 9 10

91.5 (3.60)

• Alarm Output

20–M3 SCREW TERMINAL

4–M3 SCREW

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16 17 18 19 20
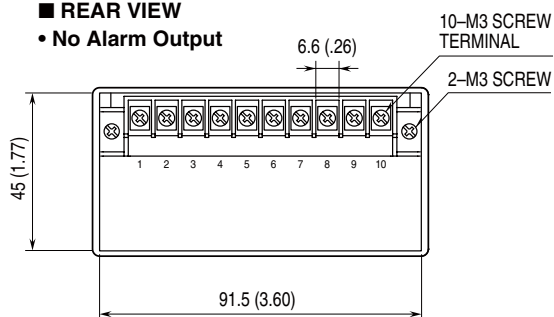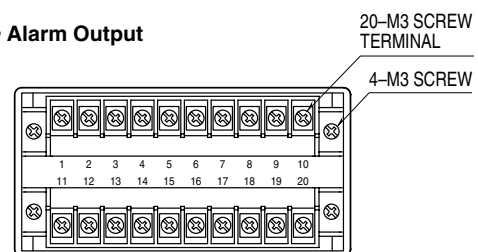
1.5.2 PANEL CUTOUT DIMENSIONS

unit: mm

$92 ^{+0.8}_{-0}$

$45 ^{+0.6}_{-0}$

min. 75

min. 120
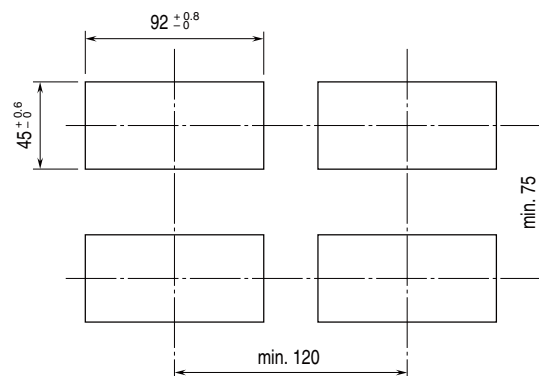
Panel thickness: 1.6 to 8.0 mm

1.5.3 INSTALLATION

(1) Remove the terminal cover.
   (a) Insert the minus tip of a screwdriver into a hole at the lower left corner of the cover.
   (b) Pull the handle upward.
   (c) Then insert the screwdriver into a hole at the lower right corner.
   (d) Pull the handle upward to separate the terminal cover.
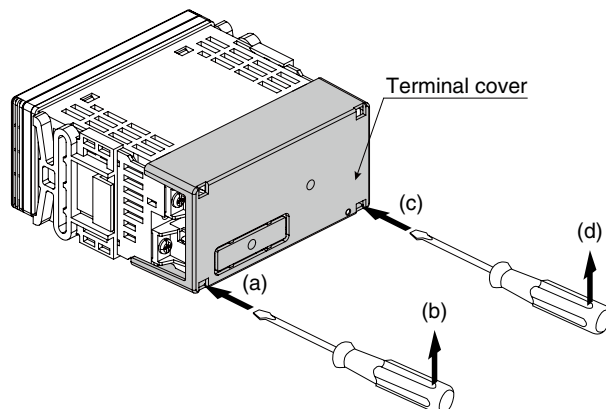
(2) Remove the mounting brackets.
   (a) Flip a tab of a bracket.
   (b) Then pull the bracket toward the terminal block to remove it.
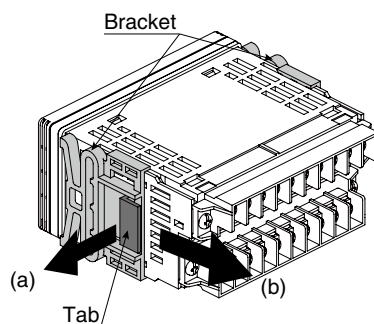
(3) Put the terminal cover through the panel cutout.
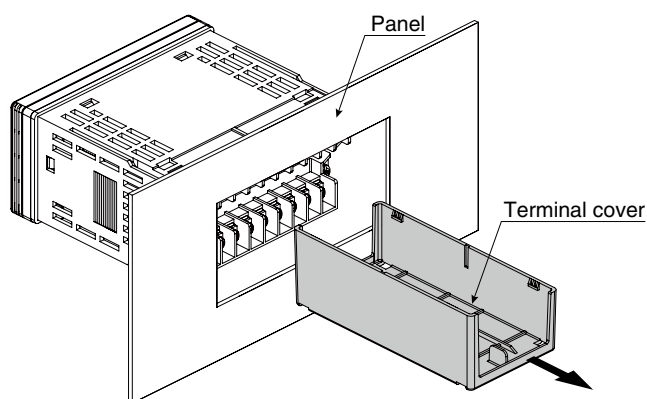
(4) Make sure that the watertight packing is placed behind the front cover regardless of necessity of water-tightness.

Watertight packing

(5) Insert the unit into the panel cutout.

Watertight packing   Panel
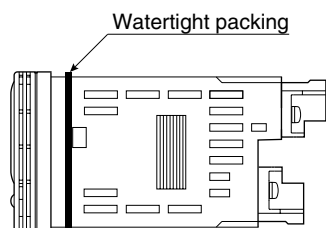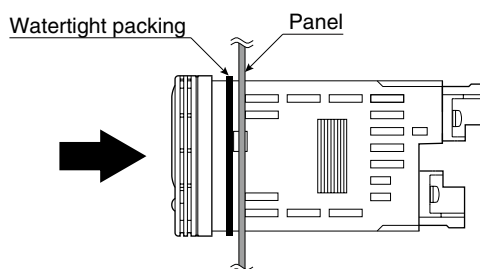
(6) Push the mounting brackets into the grooves on both sides of the rear module, until they hit the panel's rear side.

Panel   Bracket   Fixing groove
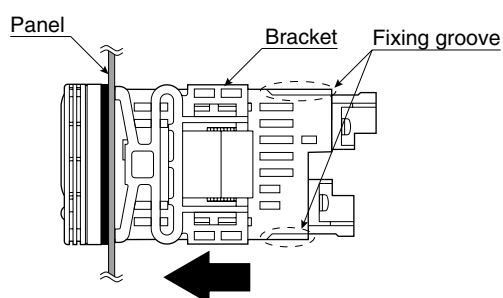
IMPORTANT

To conform to degree of protection IP66, confirm visually that the packing is not contorted, cut off or excessively run off the edge after installation.

1.6 WIRING INSTRUCTIONS

1.6.1 CAUTION IN WIRING
• For safety, make sure that wiring is performed by qualified personnel only.
• In order to prevent potential electric shock, wire the unit after turning off the power supply and making sure that the power
  is not supplied to the cable.
• Be sure to confirm the name and polarity of each terminal before wiring to it.
• Do not connect anything to unused terminals.
• We offer a series of lightning surge protectors for protection against induced lightning surges. Please contact us to
  choose appropriate models.

1.6.2 RECOMMENDED SOLDERLESS TERMINAL
• Use solderless terminals for M3. Refer to the drawings below.

unit: mm (inch)
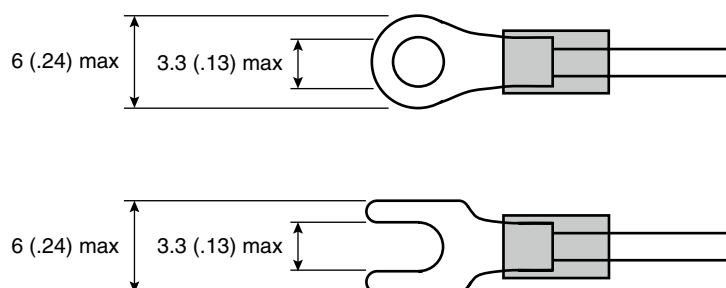
Applicable wire size: 0.25 to 1.65 mm^2
Torque: 0.6 N·m
Recommended manufacturer: Japan Solderless Terminal MFG. Co., Ltd., Nichifu Co., Ltd.

IMPORTANT

• Insulated solderless terminals are recommended.
• In using non-insulated solderless terminals, cover them with insulating caps or tubes.
• Ring tongue terminals are recommended rather than spade tongue terminals to prevent from falling off.

1.6.3 TERMINAL ASSIGNMENT
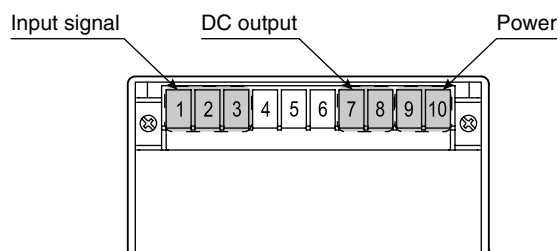
■ **NO ALARM OUTPUT**   ■ **ALARM OUTPUT**
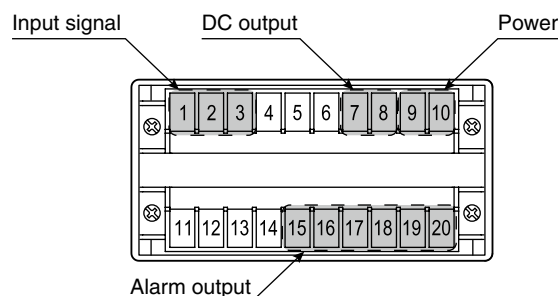
1.6.4 WIRING INPUT SIGNAL
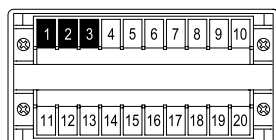
Connect a potentiometer.

IMPORTANT

- Be sure to confirm the terminal No. of the potentiometer in wiring.
- Take measures to reduce noise as much as possible, e.g. by using shielded twisted pair wires for the input signal.
  Ground the input shield to the most stable earth to prevent noise troubles.
- Do not connect anything to unused terminals.

Potentiometer input

Ground (resistance 100 ohms or less)

Max.   Min.
Potentiometer
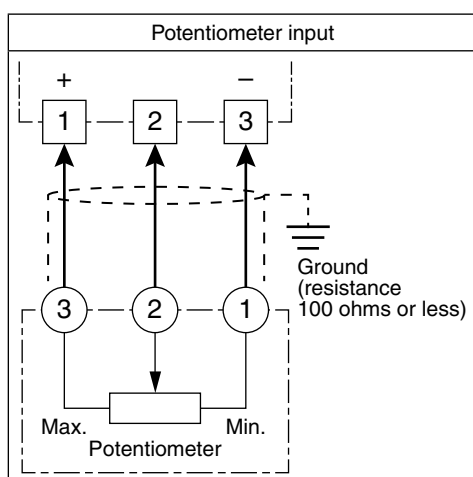
1.6.5 WIRING DC OUTPUT
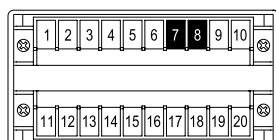
Voltage or current is output depending on the specified DC output code.

IMPORTANT

- Connect load resistance within the specifications.
- Do not connect anything with no-DC-output type.
- Take measures to reduce noise as much as possible, e.g. by using shielded twisted pair wires for the output signal.
  Ground the output shield to the most stable earth to prevent noise troubles.

DC output

Ground (resistance 100 ohms or less)
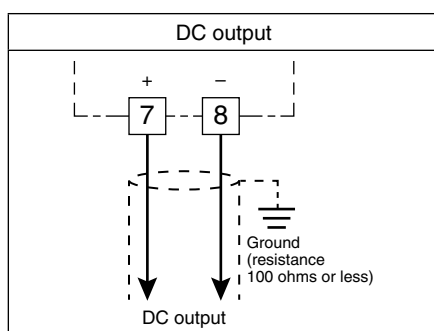
DC output

1.6.6 WIRING ALARM OUTPUT
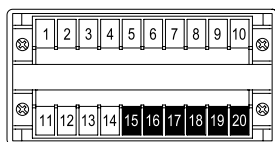
Two or four alarm contacts are output depending on the specified alarm output code.

- Connect load within the specifications.
- The mechanical lifetime of the relays is 5,000,000 operations.
- With inductive load such as an external relay or a motor, insert a CR circuit (for AC or DC power), a diode (for DC power), or a varistor (for AC or DC power) in parallel to protect the contacts and eliminate noise.

| Alarm output code: 1 | Alarm output code: 2 |

| 15 | 16 | 17 | 18 | 19 | 20 | 15 | 16 | 17 | 18 | 19 | 20 |
| HHa | Ha | Hc, HHc | La | LLa | Lc, LLc | Ha (NO) | Hb (NC) | Hc (COM) | La (NO) | Lb (NC) | Lc (COM) |

H output
LL output
HH output
L output

H output   L output
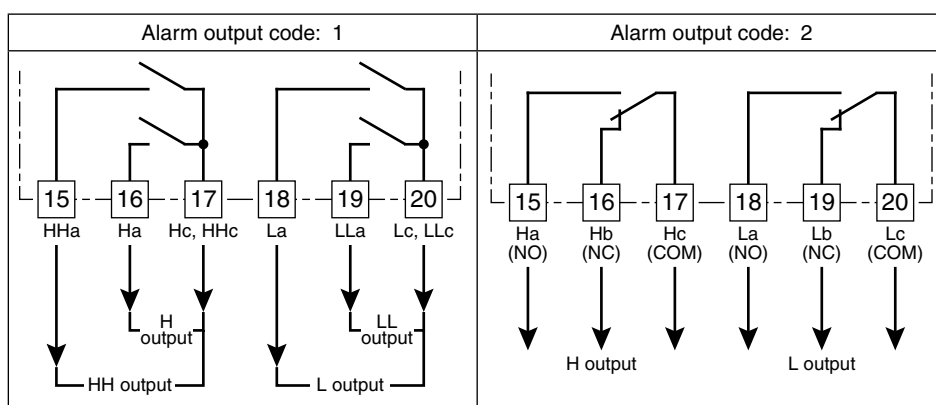
NOTE

Example of contact protection circuit with inductive load

■ **DC powered**

47LM

Power
Inductive load
Varistor
RC circuit
Diode
C
R

■ **AC powered**

47LM

Power
Inductive load
Varistor
RC circuit
C
R
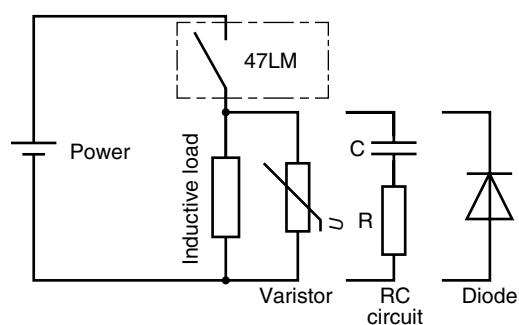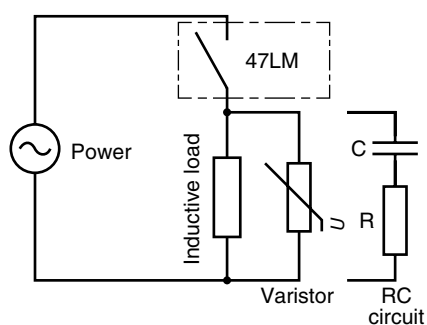
∗ It is effective to connect a varistor across a load with the supply voltage 24 to 28 V, and across a contact with 100 to 200 V.

1.6.7 WIRING POWER
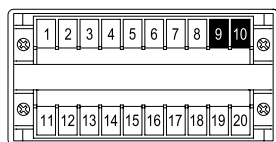
Connect power according to the power input code. The power specifications are shown in the following table.

CODE	RATING	PERMISSIBLE RANGE
M2	100 to 240 V AC	85 to 264 V AC, 50/60 Hz approx. 6.5 VA
R	24 V DC	±10% approx. 3 W
P	110 V DC	85 to 150 V DC approx. 3 W

IMPORTANT

• For safety, make sure that wiring is performed by qualified personnel only.
• In order to prevent potential electric shock, wire the unit after turning off the power supply and making sure that the power is not supplied to the cable.
• Use wires as thick as possible and twist them from the end.
• For DC power, confirm the polarity.
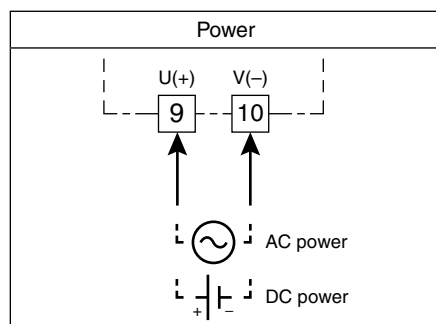
1.6.8 INSTALLING/SEPARATING TERMINAL BLOCK

The terminal block is separable in two pieces. Tighten (loosen) uniformly two screws on both sides of the terminal block to install (separate).

Torque: 0.6 N·m

IMPORTANT

Be sure to turn off the power supply, input signal and power supply to the output relays before installing/separating the terminal block.

Terminal block

Terminal block screw
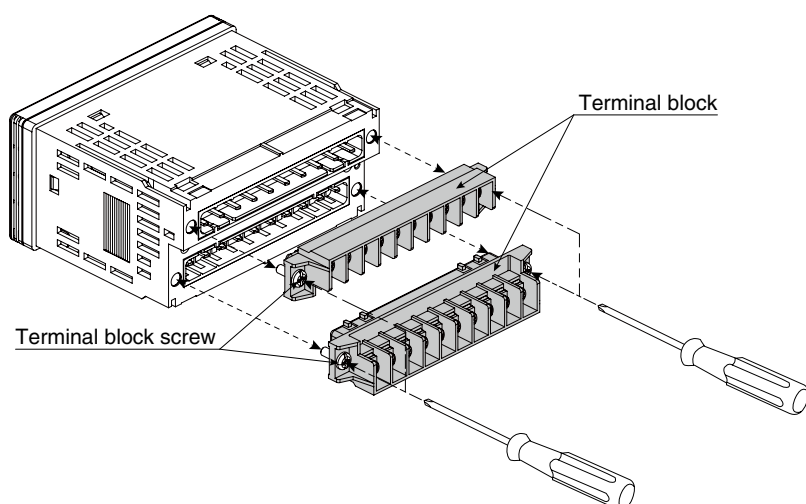
1.6.9 ATTACHING/REMOVING TERMINAL COVER

Be sure to put the terminal cover on for safety after wiring.

■ ATTACHING TERMINAL COVER

Fit the convex part A of the meter in the concave part B of the terminal cover and push the cover until it clicks into place.

Terminal cover

A

B
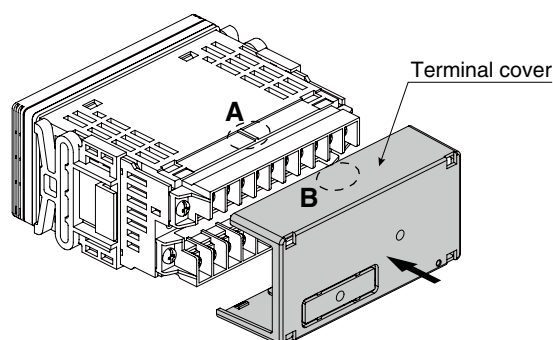
■ REMOVING TERMINAL COVER

(a) Insert the minus tip of a screwdriver into a hole at the lower left corner of the cover.
(b) Pull the handle upward.
(c) Then insert the screwdriver into a hole at the lower right corner.
(d) Pull the handle upward to separate the terminal cover.

Terminal cover

(a)
(b)
(c)
(d)
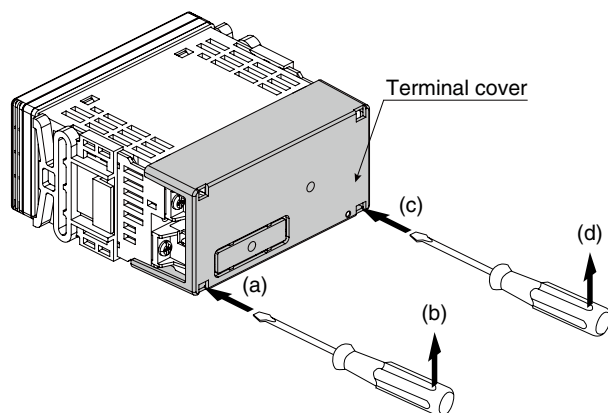
2. BASIC SETTING AND OPERATION

2.1 BASIC SETTING

This section describes flow and procedure of the basic setting.
The following shows the flow and procedure to set the input to 2 – 8 kΩ with the total resistance 10 kΩ and the display to 0.0 – 100.0% as an example.

2.1.1 BASIC SETTING FLOW
The basic setting is as shown in the following flowchart.

```
            ╭──────────────╮
            │   Power ON    │
            ╰──────────────╯
                   │
                   ▼
       ┌──────────────────────────┐
       │ Setting input scaling value A │
       └──────────────────────────┘
                   │
                   ▼
       ┌──────────────────────────┐
       │ Setting display scaling value A │
       └──────────────────────────┘
                   │
                   ▼
       ┌──────────────────────────┐
       │ Setting input scaling value B │
       └──────────────────────────┘
                   │
                   ▼
       ┌──────────────────────────┐
       │ Setting display scaling value B │
       └──────────────────────────┘
                   │
                   ▼
       ┌──────────────────────────┐
       │ Setting decimal point position │
       └──────────────────────────┘
                   │
                   ▼
            ╭──────────────╮
            │ Starting measurement │
            ╰──────────────╯
```
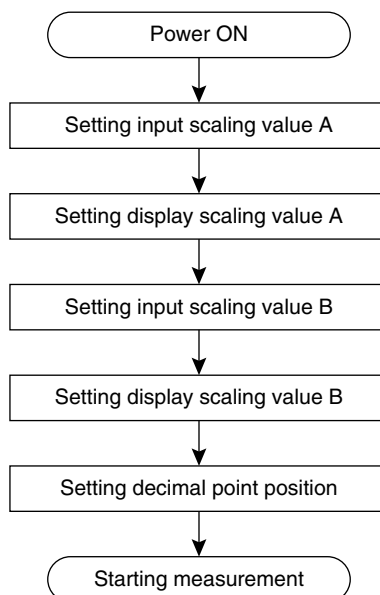
2.1.2 RELATION BETWEEN INPUT SCALING AND DISPLAY SCALING
The relation between input scaling and display scaling is as shown in the following figure and chart.

0 kΩ ├──── Total resistance (10 kΩ) ────┤ 10 kΩ

Input scaling value A
2 kΩ ├──── Input scaling ────┤ Input scaling value B
8 kΩ

Display scaling value A
0.0% ├──── Display scaling ────┤ Display scaling value B
100.0%

Display value
100.0%
0.0%
2 kΩ   8 kΩ
Input value

Total resistance: nominal resistance of a potentiometer
Input scaling: 0% input value (input scaling value A) and 100% input value (input scaling value B)
Display scaling: 0% display value (display scaling value A) and 100% display value (display scaling value B)

IMPORTANT

The input scaling can be set by applying actual input signals even if the value is unknown.

2.1.3 BASIC SETTING PROCEDURE

The following shows the procedure to set the input to 2 – 8 kΩ with the total resistance 10 kΩ and the display to 0.0 – 100.0% as an example. Set values meeting signals of the equipment to use. Refer to 3. SETTING SCALING VALUES for details of setting.

■ **PARAMETER LIST FOR BASIC SETTING**

Parameters used in the basic setting are as shown in the following table.

PARAMETER	SETTING VALUE	FUNCTION INDICATOR	SETTING
Input scaling value A	ZERO	Zro, Tch	0% input: 2 kΩ[*1]
Display scaling value A	0000[*2]	Zro, D/P	0% display: 0.0%
Input scaling value B	SPAN	Spn, Tch	100% input: 8 kΩ[*1]
Display scaling value B	1000[*2]	Spn, D/P	100% display: 100.0%
Decimal point position	100.0	D/P	1 decimal place (10^{-1})

*1 Index for description. Actual inputs are used to set.
*2 The decimal point position depends on the decimal point position setting.

■ **BASIC SETTING PROCEDURE**

The basic setting procedure is as follows.

1 **Confirm the wiring, and turn on the power.**

• Warm up the unit for 10 minutes or more.

2 **Move on to Scaling Setting Mode and set the input scaling value A (measurement stopped).**

• Hold down Scale/↑ button for 3 seconds or more.
• Press Up button to go to the teach calibration (ZERO) setting.
• Apply 0% input and press Up button to register the value.

3 **Set the display scaling value A.**

• Press Alarm/↓ or Scale/↑ button to go to the next or previous parameter setting.
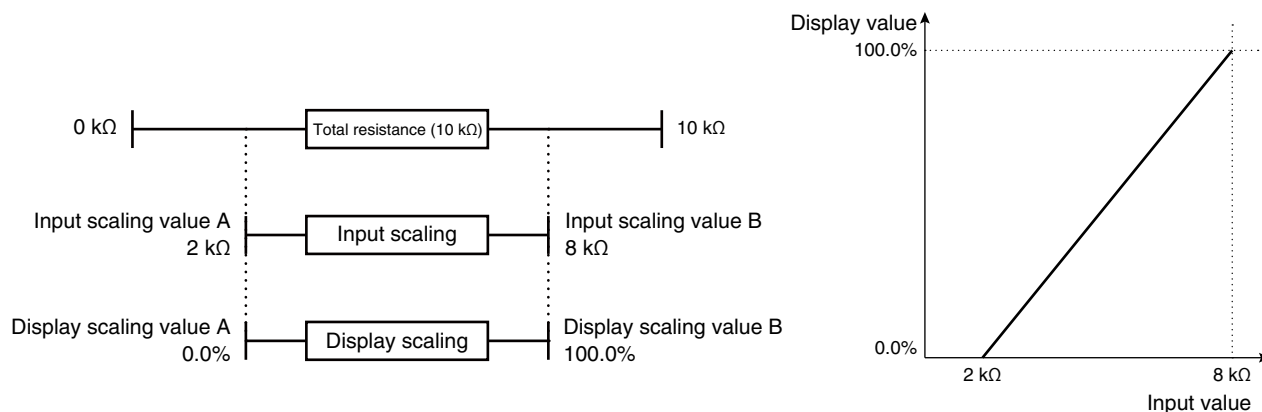• Press Shift button to shift the display into the setting standby mode.
• Press Shift button to go to the next digit and Up button to change the blinking value.

4 **Set the input scaling value B.**

• Press Alarm/↓ or Scale/↑ button to apply the new setting and go to the next or previous parameter setting.
• Press Up button to go to the teach calibration (SPAN) setting.
• Apply 100% input and press Up button to register the value.

5 **Set the display scaling value B.**

• Press Alarm/↓ or Scale/↑ button to go to the next or previous parameter setting.
• Press Shift button to shift the display into the setting standby mode.
• Press Shift button to go to the next digit and Up button to change the blinking value.

6 **Set decimal point position.**

• Press Alarm/↓ or Scale/↑ button to apply the new setting and go to the next or previous parameter setting.
• Press Shift button to shift the display into the setting standby mode and Up button to select the decimal point position.

7 **Return to Measuring Mode (measurement started).**

• Hold down Alarm/↓ or Scale/↑ button for 1 second or more to apply the new setting and return to Measuring Mode.

2.2 BASIC SETTING OPERATION AND INSTRUCTIONS

This section describes basic operation and instructions when setting parameters.

2.2.1 BASIC SETTING OPERATION

Parameters can be grouped into three setting types, "numerical value setting", "setting value selection" and "decimal point position selection". Basic operation of each type is as shown below.

■ NUMERICAL VALUE SETTING

1 **Press Shift button to shift the display into the setting standby mode.**
• The most significant digit starts blinking.

2 **Press Shift and Up buttons to set a numerical value.**

• Press Shift button to go to the next digit.
• Press Up button to change the blinking value.

3 **Press Alarm/↓ or Scale/↑ button to apply the new setting.**

• The next or previous parameter setting is indicated.

*1 Display depands on the specifications and settings.

NOTE

■ SHIFTING DIGITS

Each time pressing Shift button, the blinking digit moves to the right.
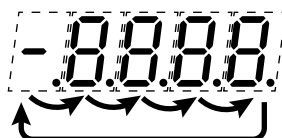
■ SETTING A NUMERICAL VALUE

• Each time pressing Up button, the numeral is incremented by 1. In setting an alarm setpoint, the indication following '9' will be '-'.
• The negative sign (-) must be set to the leftmost digit. For example, set '-04.00' instead of '-4.00'.

* Fifth digit
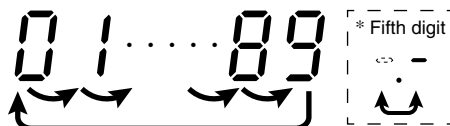
■ SETTING VALUE SELECTION

1 **Press Shift button to shift the display into the setting standby mode.**
• The current set value starts blinking.
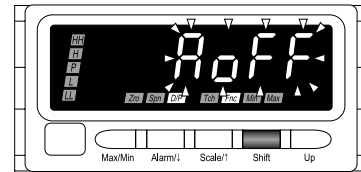
2 **Press Up button to select your desired setting value.**

3 **Press Alarm/↓ or Scale/↑ button to apply the new setting.**

• The next or previous parameter setting is indicated.

*1 Display depands on the specifications and settings.

■ DECIMAL POINT POSITION SELECTION

1 **Press Shift button to shift the display into the setting standby mode.**
• The current set value starts blinking.
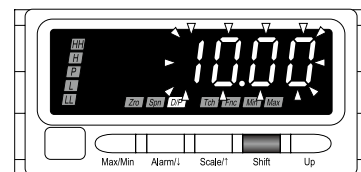
2 **Press Up button to select a desired decimal point position.**
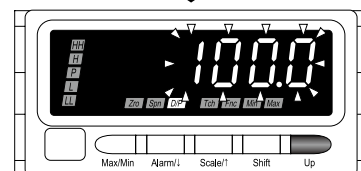
3 **Press Alarm/↓ or Scale/↑ button to apply the new setting.**

• The next or previous parameter setting is indicated.

*1 Display depands on the specifications and settings.

NOTE

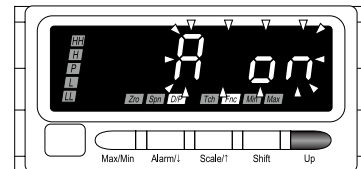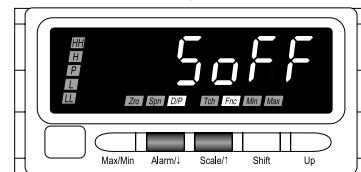### ■ MOVING THE DECIMAL POINT
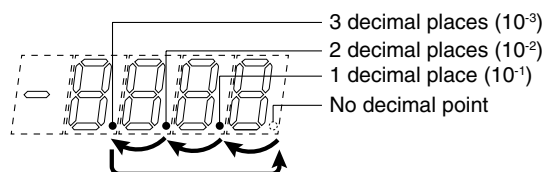
Pressing Up button moves the decimal point one place to the left.

3 decimal places (10^{-3})
2 decimal places (10^{-2})
1 decimal place (10^{-1})
No decimal point

■ DECIMAL POINT POSITION

"No decimal point" to "3 decimal places" can be selected in the decimal point position setting.

SETTING VALUE	FUNCTION	SETTING VALUE	FUNCTION
⌐ 1000	No decimal point	⌐ 10.00	2 decimal places (10^{-2})
⌐ 100.0	1 decimal place (10^{-1})	⌐ 1.000	3 decimal places (10^{-3})

2.2.2 INSTRUCTIONS ON BASIC OPERATION

■ INVALID PARAMETERS

- 'Max' and 'Min' indicators start blinking when a parameter is within invalid range (following cases). Return the setting within the valid range.
- Setting 'input scaling value A ≥ input scaling value B', or setting the negative sign (-) to a digit other than the leftmost one is invalid.

■ IF THE FRONT BUTTONS ARE LEFT UNTOUCHED…

- The indication turns on with applying the last changes after the specified time period (default: 15 sec.) while it is in the setting standby mode.
- The display goes back automatically to Measuring Mode after the specified time period (default: 15 sec.) in one of the other modes.
- This time period (automatic return time) is configurable. (Refer to 11. GOING BACK AUTOMATICALLY TO MEASURING MODE.)

■ TO ABORT A SETTING…

- Hold down Max/Min button for 1 second or more to return to Measuring Mode without applying the last changes while the display is in the setting standby mode.
- If you get lost in a setting mode, you can execute initialization. (Refer to 17.2 INITIALIZING SETTING VALUES.)

■ IN MOVING ON TO EACH SETTING MODE FROM MEASURING MODE

- The last values of the DC and alarm outputs before mode transition are held.
- Some alarm indicators turn on with the function indicators in setting each parameter. The alarm indication is due to the last status before mode transition held but does not show the unit failure.

■ ORDER TO DISPLAY PARAMETERS

- Refer to 5. PARAMETER CONFIGURATION for details.

■ DIFFERENCES IN FIRMWARE VERSIONS

- Some displays depend on the firmware versions. Refer to 18.6 DIFFERENCES IN FIRMWARE VERSIONS for details. Also refer to 17.3 CONFIRMING FIRMWARE VERSION to confirm the firmware version.

3. SETTING SCALING VALUES

■ INPUT SCALING

Teach Calibration means setting an input value by applying an actual input signal. The calibrated value is called input scaling value.

The input scaling values include A and B.

• Input scaling value A is minimum value (0%) of input signal.
• Input scaling value B is maximum value (100%) of input signal.

   e.g. Usage range 2 – 8 kΩ with total resistance 10 kΩ
   Input scaling value A   2 kΩ
   Input scaling value B   8 kΩ

IMPORTANT

• Set 'input scaling value A + 10% of total resistance ≤ input scaling value B'.
• 2 kΩ and 8 kΩ are given in the above example. However even when the values are unknown, the input scaling can be performed by applying 0% and 100% signals of the equipment or device on site by the Teach Calibration.

NOTE

■ **POTENTIOMETER**

• A potentiometer has a wiper, which slides on a fixed resistor. Then the resistance values between 1 and 2, 2 and 3 vary. The variation is used to detect position or angle.
• The 47LM measures the resistance value between 1 and 2 to display.
• Minimum input to be used is input scaling value A, and maximum is input scaling value B.
• When the wiper slides toward 1, the resistance value between 1 and 2 decreases, and when it slides toward 3, it increases.
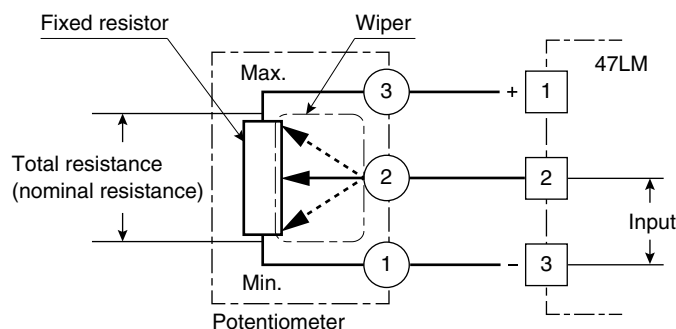
■ DISPLAY SCALING

Display scaling means setting a value to display actually.

The display scaling values include A and B. A decimal point can be set in any position.

• Display scaling value A is a display value for the input scaling value A.
• Display scaling value B is a display value for the input scaling value B.
• Decimal point position can be set in common for both display scaling value A and B.

   e.g. Display value 0.0 – 100.0%
   Display scaling value A   0.0%
   Display scaling value B   100.0%
   Decimal point position   0.0 (1 decimal place)

Both normal scaling (display scaling value A < display scaling value B) and inverted scaling (display scaling value A > display scaling value B) can be set within the range of -9999 to 9999.

■ **Normal Scaling**
The display value increases
when the input signal increases.
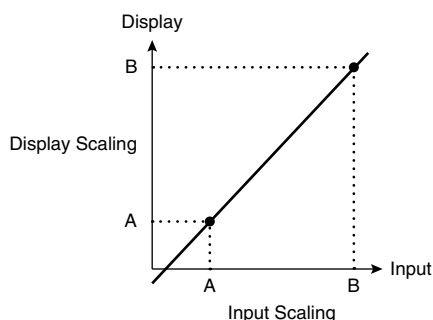
■ **Inverted Scaling**
The display value decreases
when the input signal increases.
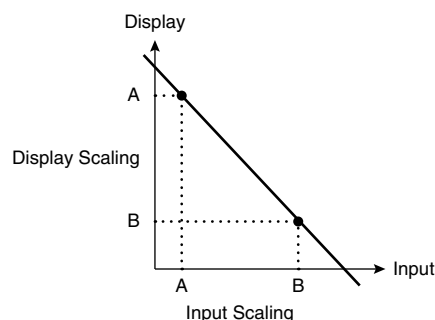
■ **RELATION BETWEEN INPUT SCALING AND DISPLAY SCALING**
The relation between input scaling and display scaling is as shown in the following figure.

e.g. To display 2 – 8 kΩ input with total resistance 10 kΩ as 0.0 – 100.0%
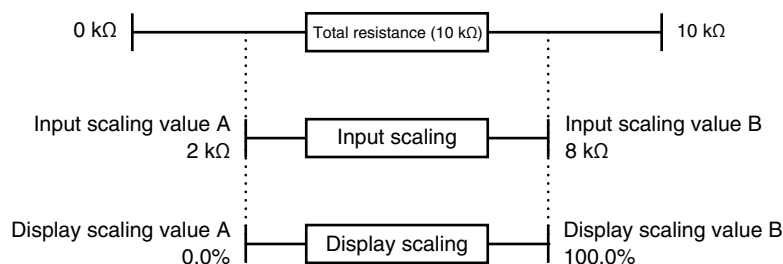
■ **PROCEDURE TO SET SCALING VALUES**
• Flow in setting scaling values
5-step settings are necessary to set scaling values.
To set the input scaling values A and B, actual input signals are used. It is necessary to set a potentiometer of the equipment or device on site to 0% and 100%. You can set the display scaling values A and B, and the decimal point position first, and then set the input scaling values A and B after operating the equipment or device on site.
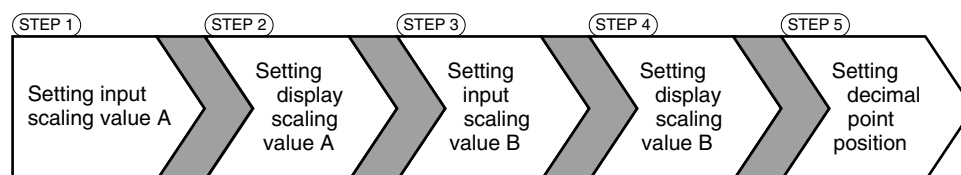
• Operating procedure to set scaling values
Following pages describe operating procedures in each step to set the input scaling to 2 – 8 kΩ, and the display scaling to 0.0 – 100.0% as an example.

3.1 STEP 1. INPUT SCALING VALUE A

3.1.1 OPERATING PROCEDURE

2   **3,4**

· ·

1 **Confirm the wiring, and turn on the power.**

• All the indications turn on for approximately 3 seconds and then
the display moves on to Measuring Mode.

■ Immediately after power on (all indicators on)

NOTE

Warm up the unit for 10 minutes or more.

■ Measuring Mode

*1 Display depends on the settings and input.

· ·

2 **Hold down Scale/↑ button for 3 seconds or more to move on to
Scaling Setting Mode.**

• The input scaling value A is indicated.
• 'Zro' and 'Tch' indicators turn on.

NOTE

Some alarm indicators turn on with the function indicators. The alarm indication is due to the last status before mode
transition held but does not show the unit failure.

· ·

3 **Press Up button to go to the teach calibration (ZERO) setting.**

• 'Tch' indicator starts blinking.
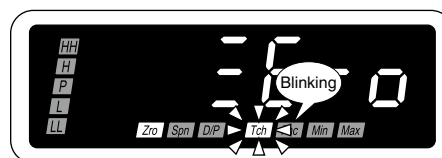
4 **Apply 0% input and press Up button to register the value.**

- The teach calibration (ZERO) is registered.
- 'Tch' indicator turns ON.

```
HH              ‾  ‾
H               ‾Ero
P
L
LL
   Zro  Spn  D/P    Tch  Fnc  Min  Max
```

IMPORTANT

- Confirm that the input signal is stable before pressing Up button.
- Set 'input scaling value A + 10% of total resistance ≤ input scaling value B'.

NOTE

'Min' and 'Max' indicators start blinking when the set value is same as the input scaling value B. Return the setting within the valid range.

---

5 ■ **TO GO ON TO SET THE DISPLAY SCALING VALUE A,**
Skip to Step 3 in "3.2 STEP 2. DISPLAY SCALING VALUE A"

■ **TO QUIT,**
Hold down Alarm/↓ or Scale/↑ button for 1 second or more to return to Measuring Mode.

NOTE

■ **IF THE FRONT BUTTONS ARE LEFT UNTOUCHED…**
- The display goes back automatically to Measuring Mode after the specified time period (default: 15 sec.).
- This time period (automatic return time) is configurable. (Refer to 11. GOING BACK AUTOMATICALLY TO MEASURING MODE.)

■ **TO ABORT A SETTING…**
- Hold down Max/Min button for 1 second or more in Step 3 to return to Measuring Mode without applying the last changes.
- If you get lost in a setting mode, you can execute initialization. (Refer to 17.2 INITIALIZING SETTING VALUES.)

3.2 STEP 2. DISPLAY SCALING VALUE A

3.2.1 OPERATING PROCEDURE

3,6   **4,5**

2,3, 6   **5**

1 **Confirm the wiring, and turn on the power.**
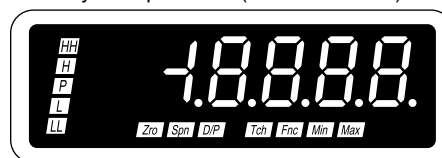
• All the indications turn on for approximately 3 seconds and then the display moves on to Measuring Mode.

■ Immediately after power on (all indicators on)

■ Measuring Mode

*1 Display depends on the settings and input.

2 **Hold down Scale/↑ button for 3 seconds or more to move on to Scaling Setting Mode.**

• The input scaling value A is indicated.
• 'Zro' and 'Tch' indicators turn on.

NOTE

Some alarm indicators turn on with the function indicators. The alarm indication is due to the last status before mode transition held but does not show the unit failure.

---

3 **Press Alarm/↓ or Scale/↑ button to go to the display scaling value A setting.**

• The display scaling value A is indicated.
• 'Zro' and 'D/P' indicators turn on.

Skip to Step 7 if the default value is acceptable.

4 **Press Shift button to shift the display into the setting standby mode.**

• The fifth digit starts blinking, to which you can apply changes.
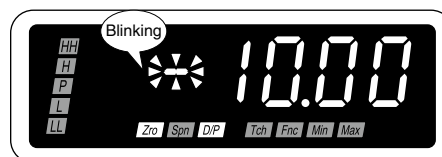
5 **Press Shift and Up buttons to set to '00.00'.**
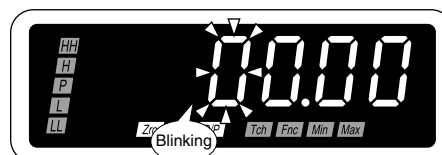
• Press Shift button to go to the next digit and Up button to change the blinking value.

• '00.00' is a display example. Set any value within the range of -9999 to 9999.
• The decimal point position depends on the decimal point position setting. Disregard the decimal point here.
• The negative sign (-) must be set to the leftmost digit. For example, set '-04.00' instead of '-4.00'.

6 **Press Alarm/↓ or Scale/↑ button to apply the new setting.**

• And the next parameter setting is indicated.

• Press Alarm/↓ button, and the input scaling value B 'SPAN' will be indicated.
• Press Scale/↑ button, and the input scaling value A 'ZERO' will be indicated.

7 ■ **TO GO ON TO SET THE INPUT SCALING VALUE B,**
Skip to Step 3 in "3.3 STEP 3. INPUT SCALING VALUE B".

■ **TO QUIT,**
Hold down Alarm/↓or Scale/↑ button for 1 second or more to return to Measuring Mode.

NOTE

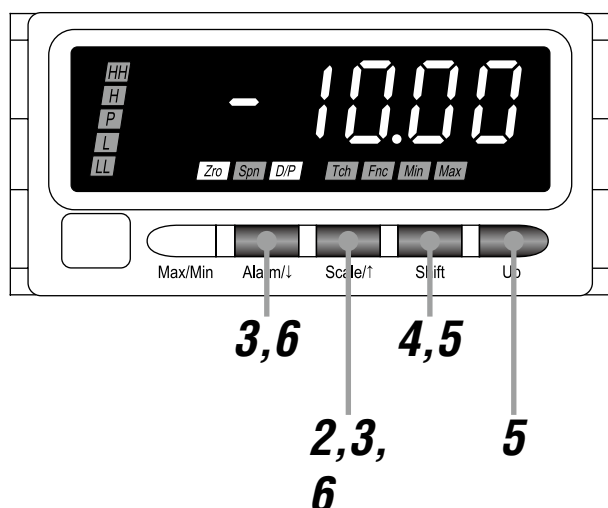■ **IF THE FRONT BUTTONS ARE LEFT UNTOUCHED…**
- The indication turns on with applying the last changes after the specified time period (default: 15 sec.) while it is in the setting standby mode (indication blinking in Step 4 and 5).
- The display goes back automatically to Measuring Mode after the specified time period (default: 15 sec.) in one of the other modes.
- This time period (automatic return time) is configurable. (Refer to 11. GOING BACK AUTOMATICALLY TO MEASURING MODE.)

■ **TO ABORT A SETTING…**
- Hold down Max/Min button for 1 second or more in the setting standby mode (indication blinking in Step 4 and 5) to return to Measuring Mode without applying the last changes.
- If you get lost in a setting mode, you can execute initialization. (Refer to 17.2 INITIALIZING SETTING VALUES.)

■ **SHIFTING DIGITS**
- Each time pressing Shift button, the blinking digit moves to the right.

■ **SETTING A NUMERICAL VALUE**
- Each time pressing Up button, the numeral is incremented by 1.

* Fifth digit

3.3 STEP 3. INPUT SCALING VALUE B

3.3.1 OPERATING PROCEDURE

---

1 **Confirm the wiring, and turn on the power.**

• All the indications turn on for approximately 3 seconds and then the display moves on to Measuring Mode.

■ Immediately after power on (all indicators on)

■ Measuring Mode

*1 Display depends on the settings and input.

> **NOTE**
>
> Warm up the unit for 10 minutes or more.

---

2 **Hold down Scale/↑ button for 3 seconds or more to move on to Scaling Setting Mode.**

• The input scaling value A is indicated.
• 'Zro' and 'Tch' indicators turn on.

> **NOTE**
>
> Some alarm indicators turn on with the function indicators. The alarm indication is due to the last status before mode transition held but does not show the unit failure.

---

3 **Press Alarm/↓ or Scale/↑ button to go to the input scaling value B setting.**

• The input scaling value B is indicated.
• 'Spn' and 'Tch' indicators turn on.

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5-2-55 Minamitsumori, Nishinari-ku, Osaka 557-0063 JAPAN

4 Press Up button to go to the teach calibration (SPAN) setting.

• 'Tch' indicator starts blinking.
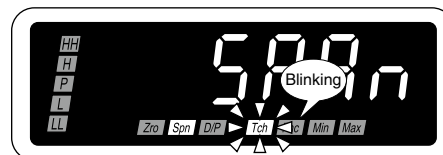
5 Apply 100% input and press Up button to register the value.

• The teach calibration (SPAN) is registered.
• 'Tch' indicator turns ON.

IMPORTANT

• Confirm that the input signal is stable before pressing Up button.
• Set 'input scaling value A + 10% of total resistance ≤ input scaling value B'.

NOTE

'Min' and 'Max' indicators start blinking when the set value is same as the input scaling value A. Return the setting within the valid range.

---

6 ■ **TO GO ON TO SET THE DISPLAY SCALING VALUE B,**
Skip to Step 3 in "3.4 STEP 4. DISPLAY SCALING VALUE B".

■ **TO QUIT,**
Hold down Alarm/↓ or Scale/↑ button for 1 second or more to return to Measuring Mode.

NOTE

■ **IF THE FRONT BUTTONS ARE LEFT UNTOUCHED…**
• The display goes back automatically to Measuring Mode after the specified time period (default: 15 sec.).
• This time period (automatic return time) is configurable. (Refer to 11. GOING BACK AUTOMATICALLY TO MEASURING MODE.)

■ **TO ABORT A SETTING…**
• Hold down Max/Min button for 1 second or more in Step 4 to return to Measuring Mode without applying the last changes.
• If you get lost in a setting mode, you can execute initialization. (Refer to 17.2 INITIALIZING SETTING VALUES.)
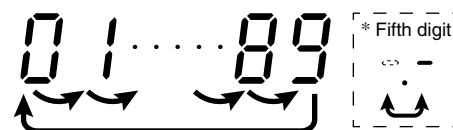
3.4 STEP 4. DISPLAY SCALING VALUE B

3.4.1 OPERATING PROCEDURE

3,6   **4,5**

2,3, 6   **5**

- -
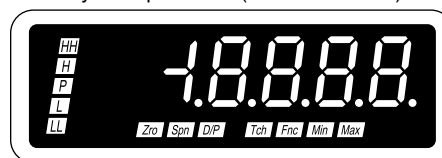
1 **Confirm the wiring, and turn on the power.**

- All the indications turn on for approximately 3 seconds and then the display moves on to Measuring Mode.

■ Immediately after power on (all indicators on)

■ Measuring Mode

*1 Display depends on the settings and input.

- -

2 **Hold down Scale/↑ button for 3 seconds or more to move on to Scaling Setting Mode.**

- The input scaling value A is indicated.
- 'Zro' and 'Tch' indicators turn on.

NOTE

Some alarm indicators turn on with the function indicators. The alarm indication is due to the last status before mode transition held but does not show the unit failure.

3 **Press Alarm/↓ or Scale/↑ button to go to the display scaling value B setting.**

- The display scaling value B is indicated.
- 'Spn' and 'D/P' indicators turn on.

```
HH
H
P          10.00
L
LL      Zro Spn D/P   Tch Fnc Min Max
```

NOTE

Skip to Step 7 if the default value is acceptable.

---

4 **Press Shift button to shift the display into the setting standby mode.**

- The fifth digit starts blinking, to which you can apply changes.

```
HH
H    Blinking  10.00
P
L
LL      Zro Spn D/P   Tch Fnc Min Max
```

---

5 **Press Shift and Up buttons to set to '10.00'.**

- Press Shift button to go to the next digit and Up button to change the blinking value.

```
        Blinking  10.00
HH
H
P
L
LL      Zro Spn D/P   Tch Fnc Min Max
```
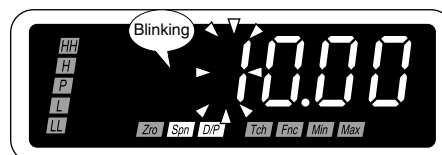
NOTE

- '10.00' is a display example. Set any value within the range of -9999 to 9999.
- The decimal point position depends on the decimal point position setting. Disregard the decimal point here.
- The negative sign (-) must be set to the leftmost digit. For example, set '-04.00' instead of '-4.00'.

---

6 **Press Alarm/↓ or Scale/↑ button to apply the new setting.**

- And the next parameter setting is indicated.

NOTE

- Press Alarm/↓ button, and the decimal point position will be indicated.
- Press Scale/↑ button, and the input scaling value B 'SPAN' will be indicated.

---

7 ■ **TO GO ON TO SET THE DECIMAL POINT POSITION,**
Skip to Step 3 in "3.5 STEP 5. DECIMAL POINT POSITION".

■ **TO QUIT,**
Hold down Alarm/↓ or Scale/↑ button for 1 second or more to return to Measuring Mode.

NOTE

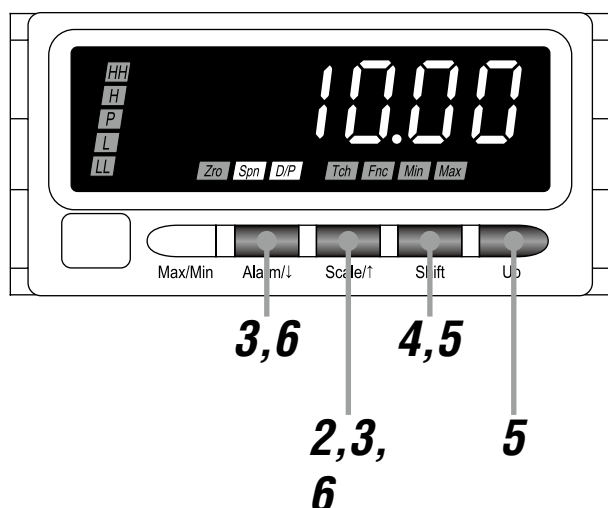■ **IF THE FRONT BUTTONS ARE LEFT UNTOUCHED…**
- The indication turns on with applying the last changes after the specified time period (default: 15 sec.) while it is in the setting standby mode (indication blinking in Step 4 and 5).
- The display goes back automatically to Measuring Mode after the specified time period (default: 15 sec.) in one of the other modes.
- This time period (automatic return time) is configurable. (Refer to 11. GOING BACK AUTOMATICALLY TO MEASURING MODE.)

■ **TO ABORT A SETTING…**
- Hold down Max/Min button for 1 second or more in the setting standby mode (indication blinking in Step 4 and 5) to return to Measuring Mode without applying the last changes.
- If you get lost in a setting mode, you can execute initialization. (Refer to 17.2 INITIALIZING SETTING VALUES.)

■ **SHIFTING DIGITS**
- Each time pressing Shift button, the blinking digit moves to the right.

■ **SETTING A NUMERICAL VALUE**
- Each time pressing Up button, the numeral is incremented by 1.

* Fifth digit

3.5 STEP 5. DECIMAL POINT POSITION

3.5.1 OPERATING PROCEDURE

3,6

**2,3,
6**

4

5
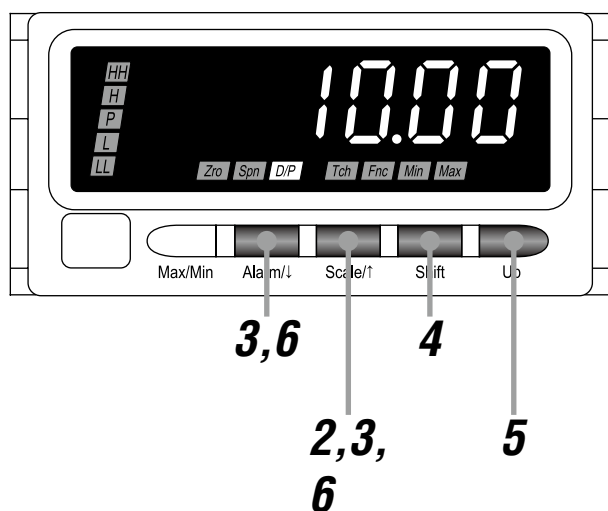
<div>
NOTE

The left figure shows a display example (display scaling value B). The display depends on the settings.
</div>

---

1 **Confirm the wiring, and turn on the power.**

• All the indications turn on for approximately 3 seconds and then the display moves on to Measuring Mode.

■ Immediately after power on (all indicators on)

■ Measuring Mode

*1 Display depends on the settings and input.

---

2 **Hold down Scale/↑ button for 3 seconds or more to move on to Scaling Setting Mode.**

• The input scaling value A is indicated.
• 'Zro' and 'Tch' indicators turn on.

<div>
NOTE

Some alarm indicators turn on with the function indicators. The alarm indication is due to the last status before mode transition held but does not show the unit failure.
</div>

3 **Press Alarm/↓ or Scale/↑ button to go to the decimal point position setting.**

- The decimal point position is indicated.
- 'D/P' indicator turns on.
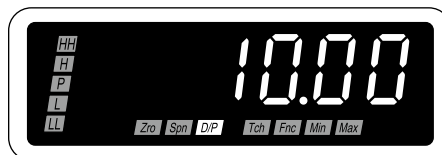
NOTE

Skip to Step 7 if the default value is acceptable.

---

4 **Press Shift button to shift the display into the setting standby mode.**

- The indication starts blinking, to which you can apply changes.

---
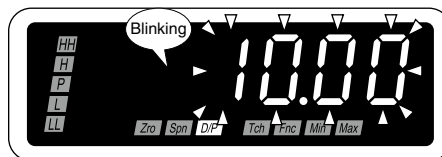
5 **Press Up button to select the decimal point position.**

- Select 1 decimal place (10^{-1}).
- Press Up button to move the decimal point.
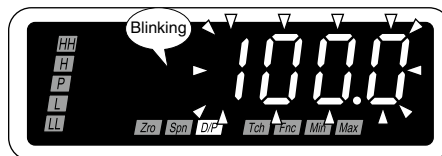
NOTE

The right figure shows a display example. Select one among "no decimal point", and "1 decimal place" to "3 decimal places".

---

6 **Press Alarm/↓ or Scale/↑ button to apply the new setting.**

- And the next parameter setting is indicated.

NOTE

- Press Alarm/↓ button, and the input scaling value A 'ZERO' will be indicated. Or with DC output, the analog output function mode 'DISP' or 'SCLE' will be indicated depending on the setting.
- Press Scale/↑ button, and the display scaling value B will be indicated within the range of -9999 to 9999 depending on the setting.

7 ■ TO GO ON TO SET THE ANALOG OUTPUT FUNCTION MODE,
Skip to Step 2 in "6. SETTING ANALOG OUTPUT FUNCTION".

■ **TO QUIT,**
Hold down Alarm/↓ or Scale/↑ button for 1 second or more to return to Measuring Mode.

NOTE

■ **IF THE FRONT BUTTONS ARE LEFT UNTOUCHED…**
- The indication turns on with applying the last changes after the specified time period (default: 15 sec.) while it is in the setting standby mode (indication blinking in Step 4 and 5).
- The display goes back automatically to Measuring Mode after the specified time period (default: 15 sec.) in one of the other modes.
- This time period (automatic return time) is configurable. (Refer to 11. GOING BACK AUTOMATICALLY TO MEASURING MODE.)

■ **TO ABORT A SETTING…**
- Hold down Max/Min button for 1 second or more in the setting standby mode (indication blinking in Step 4 and 5) to return to Measuring Mode without applying the last changes.
- If you get lost in a setting mode, you can execute initialization. (Refer to 17.2 INITIALIZING SETTING VALUES.)

■ **MOVING THE DECIMAL POINT**
- Pressing Up button moves the decimal point one place to the left.
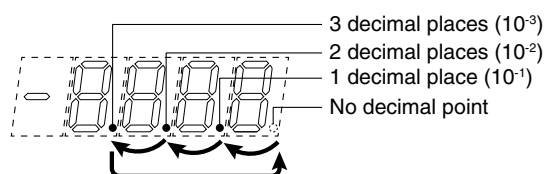
3 decimal places (10^{-3})
2 decimal places (10^{-2})
1 decimal place (10^{-1})
No decimal point

■ **DECIMAL POINT POSITION**
- "No decimal point" to "3 decimal places" can be selected in the decimal point position setting.

SETTING VALUE	FUNCTION	SETTING VALUE	FUNCTION
1000	No decimal point	*100.0*	2 decimal places (10^{-2})
100.0	1 decimal place (10^{-1})	*1.000*	3 decimal places (10^{-3})

4. OPERATION

Make sure that 0.0 – 100.0% is correctly indicated according to the input 2 – 8 kΩ provided with the total resistance 10 kΩ.

1 Apply 2 kΩ input (0%) and make sure that 0.0% is indicated.

HH
H
P
L
LL
Zro Spn D/P Tch Fnc Min Max
`0.0`
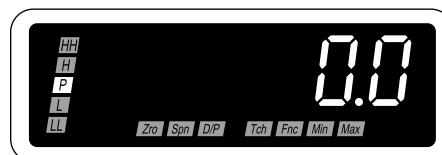
*1 Display depends on the settings and input.

NOTE

■ **WHEN THE FOLLOWING IS INDICATED…**
 • When the indication is shifted with 'Zro' and 'Fnc' indicators on, the Forced Zero is being executed. Cancel the Forced Zero. (Refer to 14.2 FORCING THE PRESENT DISPLAY VALUE TO ZERO.)

HH
H
P
L
LL
Zro Spn D/P Tch Fnc Min Max
`-5.1`

■ **ALARM INDICATORS**
 • The status of the alarm indicators depend on the alarm setpoints. The above display examples show 'P' indicator on.
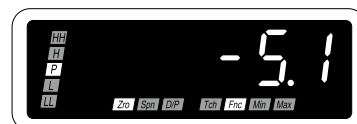
2 Apply 5 kΩ input (50%) and make sure that 50.0% is indicated.

HH
H
P
L
LL
Zro Spn D/P Tch Fnc Min Max
`50.0`

3 Apply 8 kΩ input (100%) and make sure that 100.0% is indicated.

HH
H
P
L
LL
Zro Spn D/P Tch Fnc Min Max
`100.0`

5. PARAMETER CONFIGURATION

■ MODE

Parameters can be grouped in several modes.
The 47LM has modes as shown in the following table.

MODE	FUNCTION	MEASUREMENT
Measuring	Normal measurement state where the unit takes in input and provides alarms. Present value, MAX and MIN values, alarm setpoints can be indicated in Measuring Mode. Also Forced Zero can be executed and canceled in this mode. When the power is supplied, the unit operates in Measuring Mode.	Measuring
Scaling Setting	Basic settings such like input scaling and display scaling, and also Teach Calibration, analog output function and analog output adjustments can be performed.	Measuring stopped
Alarm Setting	Alarm setpoints, trip action, deadband and ON delay time can be set.	
Advanced Setting	Moving average, low-end cutout and brightness can be set. Also the firmware version can be confirmed.	
Lockout Setting	Settings to prevent inadvertent button operation can be performed. Mode transition and set values can be locked.	
Loop Test Output	Simulated measured value can be set to perform output test.	

■ MODE TRANSITION

May be disabled depending on the model suffix codes.

Indicated regardless of the model suffix codes.

POWER ON

Measuring Mode

Hold down Max/Min + Alarm/↓ at once for a preset time duration

Hold down Alarm/↓ or Scale/↑ for ≥ 1 sec.

Lockout Setting Mode

Hold down Alarm/↓ + Scale/↑ + Shift at once for ≥ 5 sec.

Loop Test Output Mode

Hold down Alarm/↓ or Scale/↑ for ≥ 1 sec.

Hold down Scale/↑ for ≥ 3 sec.

Hold down Alarm/↓ or Scale/↑ for ≥ 1 sec.

Scaling Setting Mode

Hold down Alarm/↓ + Scale/↑ at once for ≥ 3 sec.

Advanced Setting Mode

Hold down Alarm/↓ or Scale/↑ for ≥ 1 sec.

Hold down Alarm/↓ for ≥ 3 sec.

Hold down Alarm/↓ or Scale/↑ for ≥ 1 sec.

Alarm Setting Mode

■ TRANSITION FROM MEASURING MODE TO EACH MODE

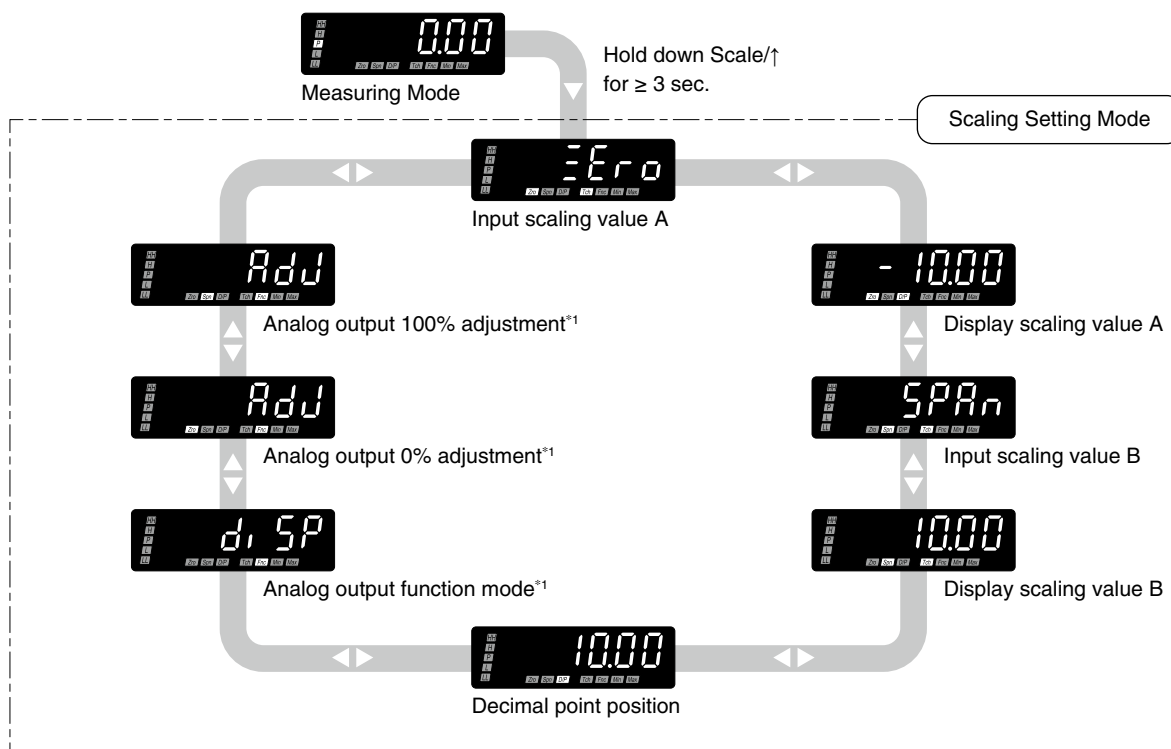| To Scaling Setting Mode	Hold down Scale/↑ button for 3 seconds or more.
To Alarm Setting Mode	Hold down Alarm/↓ button for 3 seconds or more.
To Advanced Setting Mode	Hold down Alarm/↓ + Scale/↑ buttons at once for 3 seconds or more.
To Lockout Setting Mode	Hold down Max/Min + Alarm/↓ buttons at once for a preset time duration.
To Loop Test Output	Hold down Alarm/↓ + Scale/↑ + Shift buttons at once for 5 seconds or more.

■ TRANSITION FROM EACH MODE TO MEASURING MODE

Hold down Alarm/↓ or Scale/↑ button for 1 second or more to return to Measuring Mode.

■ SHIFTING THROUGH SETTING PARAMETERS

(1) Parameter shifting in Scaling Setting Mode

In Scaling Setting Mode, pressing Alarm/↓ button shifts one parameter to the next (clockwise in the following figure).
Pressing Scale/↑ button shifts one to the previous (counterclockwise).

Measuring Mode

Hold down Scale/↑ for ≥ 3 sec.

Scaling Setting Mode

Input scaling value A

Analog output 100% adjustment[1]

Display scaling value A

Analog output 0% adjustment[1]

Input scaling value B

Analog output function mode[1]

Display scaling value B

Decimal point position

[1] Disabled with no-DC-output type.

NOTE

• The display depends on the settings. The above displays show default values.
• Hold down Alarm/↓ or Scale/↑ button for 1 second or more to return to Measuring Mode from each parameter.

(2) Parameter shifting in Alarm Setting Mode

In Alarm Setting Mode, pressing Alarm/↓ button shifts one parameter to the next (clockwise in the following figure). Pressing Scale/↑ button shifts one to the previous (counterclockwise).
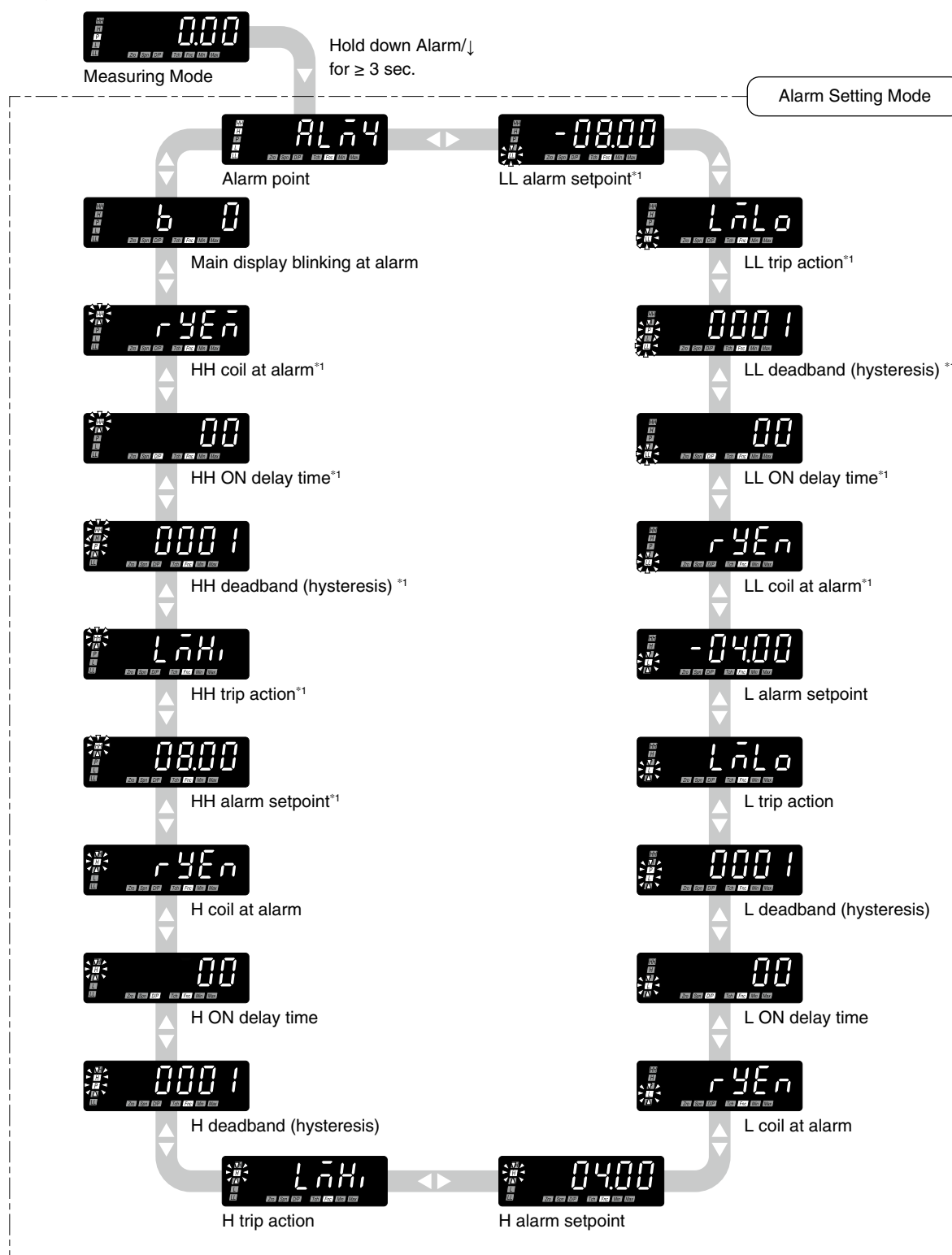

Measuring Mode — 0.00

Hold down Alarm/↓ for ≥ 3 sec.

Alarm Setting Mode

Left column	Right column
ALᴺ4 — Alarm point	-08.00 — LL alarm setpoint[*1]
b 0 — Main display blinking at alarm	LᴺLo — LL trip action[*1]
rYEᴺ — HH coil at alarm[*1]	0001 — LL deadband (hysteresis) [*1]
00 — HH ON delay time[*1]	00 — LL ON delay time[*1]
0001 — HH deadband (hysteresis) [*1]	rYEn — LL coil at alarm[*1]
LᴺHi — HH trip action[*1]	-04.00 — L alarm setpoint
08.00 — HH alarm setpoint[*1]	LᴺLo — L trip action
rYEn — H coil at alarm	0001 — L deadband (hysteresis)
00 — H ON delay time	00 — L ON delay time
0001 — H deadband (hysteresis)	rYEn — L coil at alarm
LᴺHi — H trip action	04.00 — H alarm setpoint

*1 Disabled with "Dual alarm" selected for the alarm point parameter.

NOTE

- The display depends on the settings. The above displays show default values with the alarm output code '1' (N.O. relay contact, 4 points).
- When the version is lower than 2.00, some parameters are disabled. Refer to 18.6 DIFFERENCES IN FIRMWARE VERSIONS for details.
- Hold down Alarm/↓ or Scale/↑ button for 1 second or more to return to Measuring Mode from each parameter.

(3) Parameter shifting in Advanced Setting Mode

In Advanced Setting Mode, pressing Alarm/↓ button shifts one parameter to the next (clockwise in the following figure). Pressing Scale/↑ button shifts one to the previous (counterclockwise).
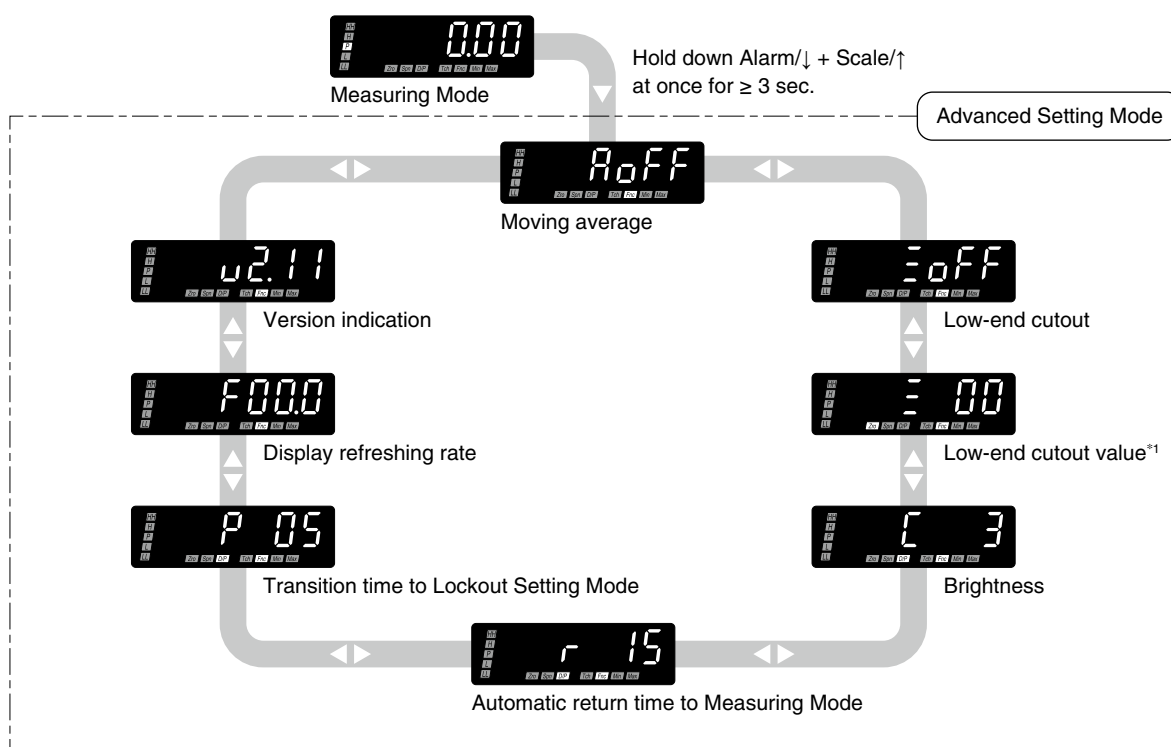

Measuring Mode

Hold down Alarm/↓ + Scale/↑ at once for ≥ 3 sec.

Advanced Setting Mode

Moving average

Version indication

Low-end cutout

Display refreshing rate

Low-end cutout value*1

Transition time to Lockout Setting Mode

Brightness

Automatic return time to Measuring Mode

*1 With the cutout set to OFF, the low-end cutout value setting is locked.

NOTE

• The display depends on the settings. The above displays show default values.
• When the version is lower than 2.00, some parameters are disabled. Refer to 18.6 DIFFERENCES IN FIRMWARE VERSIONS for details.
• Hold down Alarm/↓ or Scale/↑ button for 1 second or more to return to Measuring Mode from each parameter.

---

(4) Parameter shifting in Lockout Setting Mode
In Lockout Setting Mode, pressing Alarm/↓ button shifts one parameter to the next (clockwise in the following figure).
Pressing Scale/↑ button shifts one to the previous (counterclockwise).
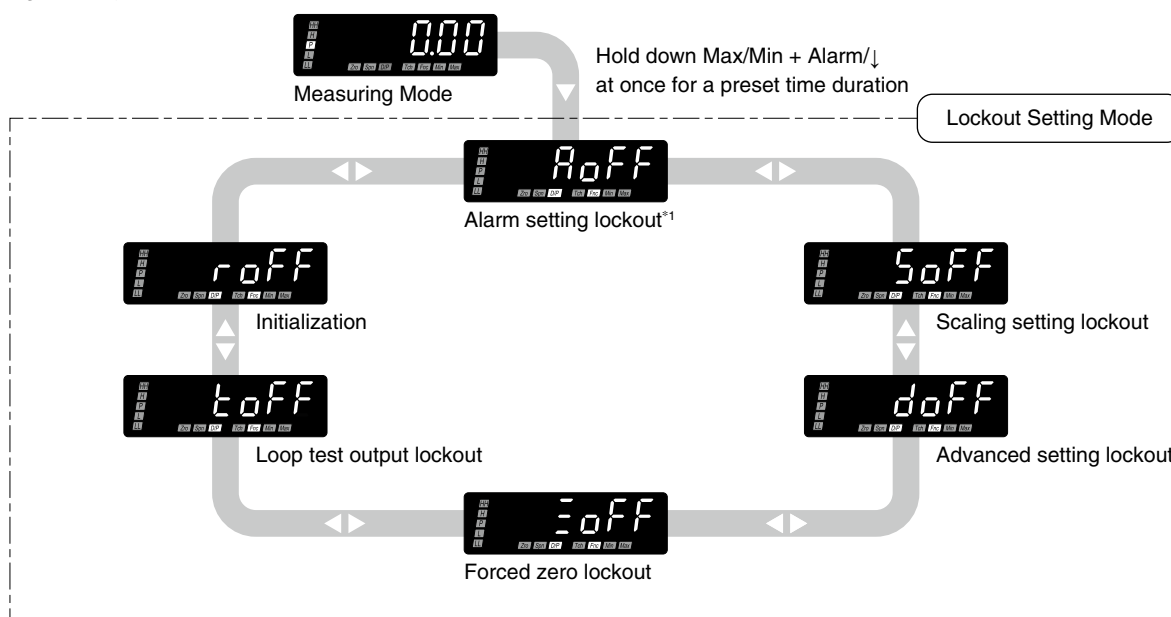
*1 Disabled with no-alarm-output type.

NOTE

- The display depends on the settings. The above displays show default values.
- When the version is lower than 2.00, some parameters are disabled. Refer to 18.6 DIFFERENCES IN FIRMWARE VERSIONS for details.
- Hold down Alarm/↓ or Scale/↑ button for 1 second or more to return to Measuring Mode from each parameter.

---

(5) Parameter shifting in Loop Test Output Mode
There is no parameter shifting in this mode.

6. SETTING ANALOG OUTPUT FUNCTION

The DC output function, "proportional to the display value" as shown in Figure 1 or "proportional to the scaling value" as shown in Figure 2, can be selected.

■ ANALOG OUTPUT FUNCTION

| ANALOG OUTPUT	DISPLAY	FUNCTION	DEFAULT VALUE
Proportional to display value	d.SP	DC output proportional to the display value affected by forced zero, moving average, low-end cutout and display refreshing rate (Figure 1).	d.SP
Proportional to scaling value	SCLE	DC output proportional to the measured value (Figure 2).	

■ DIFFERENCE OF ANALOG OUTPUT FUNCTIONS

Figures 1 and 2 show the difference of DC output functions, taking Forced Zero for example.

Figure 1: DC output proportional to display value

Figure2: DC output proportional to scaling value
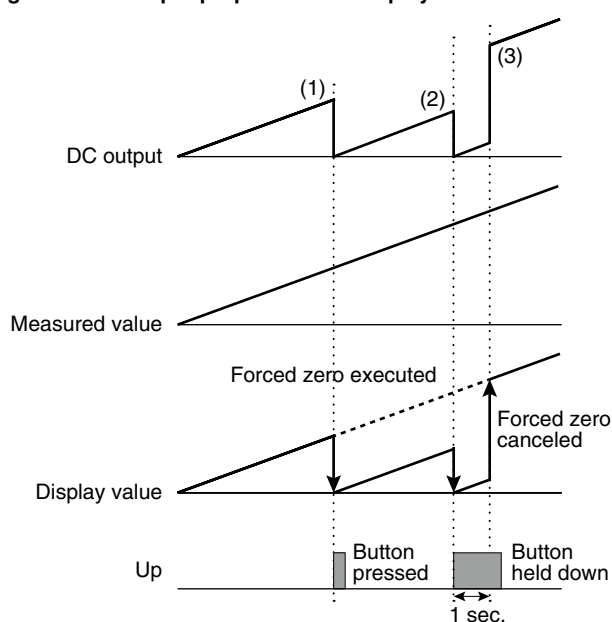
(1) Press Up button to shift the display value to zero and the DC output corresponding to the value 0 is provided.
(2) Press Up button again for 1 second or more to cancel the Forced Zero Mode. The display value is forced to 0 once and the DC output is provided in conjunction with it.
(3) When the Forced Zero Mode is canceled, the DC output is provided corresponding to the measured value.
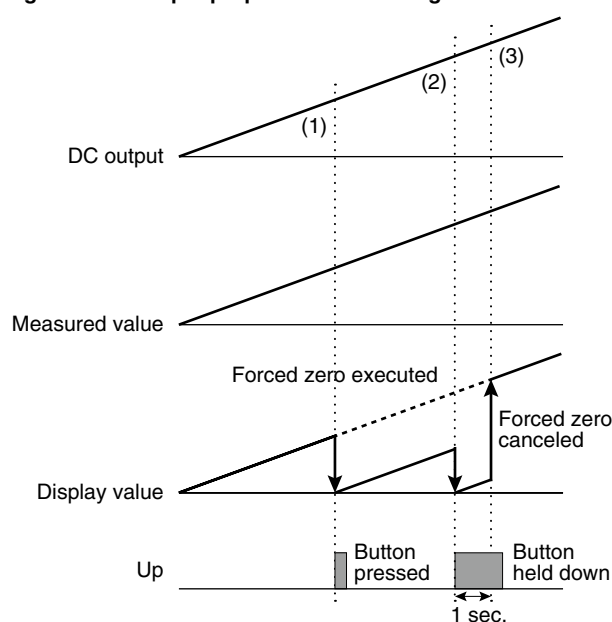
The display value is changed by Forced Zero operation, however the DC output is provided according to the measured value.

IMPORTANT

- DC output signals are output as smaller display scaling value corresponds to 0% analog output and larger display scaling value corresponds to 100% analog output.
- The operational range of the DC output is -5 to +105% of the output span after analog output 0% and 100% adjustments.
- Beyond the operational range, the output is saturated at -5% or +105%.

6.1 OPERATING PROCEDURE
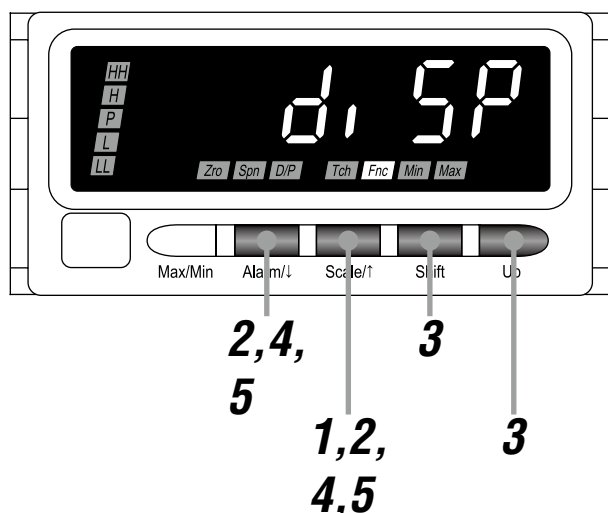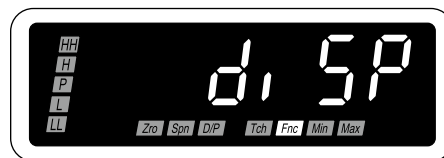

2,4, 5

3

1,2, 4,5

3

---

1 Hold down Scale/↑ button for 3 seconds or more to move on to Scaling Setting Mode.

• The input scaling value A is indicated.
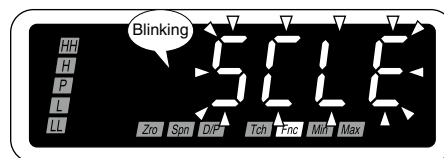• 'Zro' and 'Tch' indicators turn on.

---

2 Press Alarm/↓ or Scale/↑ button to go to the analog output function mode setting.

• 'DISP' is indicated.
• 'Fnc' indicator turns on.

---

3 Press Shift or Up button to select 'SCLE'.

---

4 Press Alarm/↓ or Scale/↑ button to apply the new setting.

• And the next parameter setting is indicated.

NOTE

• Press Alarm/↓ button, and the analog output 0% adjustment 'ADJ' will be indicated.
• Press Scale/↑ button, and the decimal point position will be indicated.

---

5 Hold down Alarm/↓ or Scale/↑ button for 1 second or more to return to Measuring Mode.

7. SETTING ALARM OUTPUT

The unit compares the present value with the alarm setpoints, and provides an alarm output (relay contact). You can configure parameters as alarm conditions as shown in Tables 1 and 2. Figures 1 to 5 show alarm examples using each parameter.

■ TABLE 1: ALARM OUTPUT PARAMETERS

PARAMETER	FUNCTION
Alarm point	Dual alarm or quad alarm
Alarm setpoint	Setpoint value within the range of -9999 to 9999 for the display value
Trip action	High or low trip Configuring typical L/H trip setting (Figure 1) or all trip points to high or low setting (Figure 2) is available. 'P' indicator turns on when none of the other alarms is tripped.
Deadband (hysteresis)	Once a high (low) trip alarm is ON, the alarm stays ON until the data becomes lower (higher) than the dead band value from the setpoint, which prevents the alarm output from chattering when the display value fluctuates slightly near the setpoint (Figure 3). Deadband works in the direction of increasing the display value for low trip and in the direction of decreasing it for high.
ON delay time	Alarm output is provided when the display value exceeds the setpoint and stayed for the specified time duration, which prevents the alarm output from being provided by a sudden change such like external disturbance (Figure 4).
Coil at alarm	Alarm output logic, coil energized or de-energized at alarm (Figure 5).
Main display blinking at alarm	Main display blinking interval at alarm can be selected among 5 intervals (Table 2).

■ TABLE 2: SETTING VALUES

PARAMETER	DISPLAY	FUNCTION	DEFAULT VALUE
Alarm point	`ALA2`	Dual alarm	Alarm output code 1: `ALA4`
	`ALA4`	Quad alarm	Alarm output code 2: `ALA2`
Alarm setpoint	`-9999` to `9999`	-9999 to 9999	LL alarm setpoint: `-0800` L alarm setpoint: `-0400` H alarm setpoint: `0400` HH alarm setpoint: `0800`
Trip action	`LoLo`	Lo trip	LL, L trip action: `LoLo`
	`LoHi`	Hi trip	HH, H trip action: `LoHi`
Deadband (hysteresis)	`0000` to `9999`	0000 – 9999	`0001`
ON delay time	`00` to `99`	0 – 99 seconds	`00`
Coil at alarm	`rYEn`	Coil energized at alarm	`rYEn`
	`rYdn`	Coil de-energized at alarm	
Main display blinking at alarm	`b 0`	No blinking	`b 0`
	`b 1`	Blinking in 1.0 second intervals	
	`b 2`	Blinking in 0.5 second intervals	
	`b 3`	Blinking in 0.2 second intervals	
	`b 4`	Blinking in 0.1 second intervals	

Figure 1: Typical L/H trip setting

HH alarm setpoint
H alarm setpoint
L alarm setpoint
LL alarm setpoint

Display value

HH alarm output (hi)

H alarm output (hi)

L alarm output (lo)

LL alarm output (lo)

'HH' indicator

'H' indicator

'P' indicator

'L' indicator
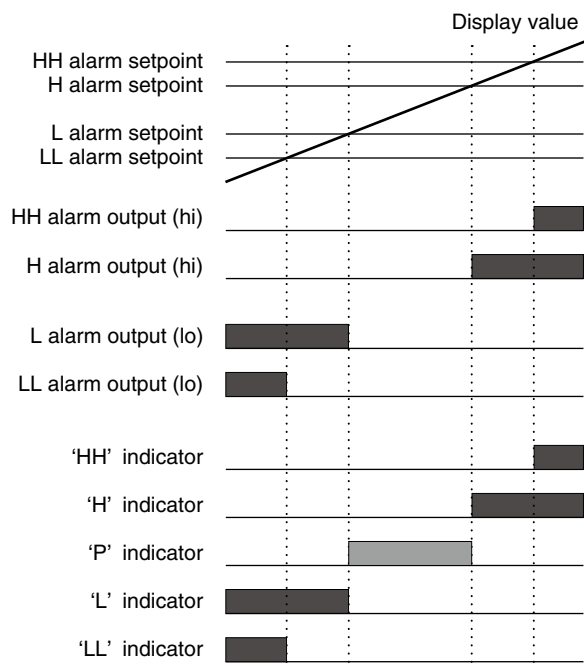
'LL' indicator

Figure 2: All trip points set to high setting

HH alarm setpoint
H alarm setpoint
L alarm setpoint
LL alarm setpoint

Display value

HH alarm output (hi)

H alarm output (hi)

L alarm output (hi)

LL alarm output (hi)

'HH' indicator

'H' indicator

'L' indicator

'LL' indicator
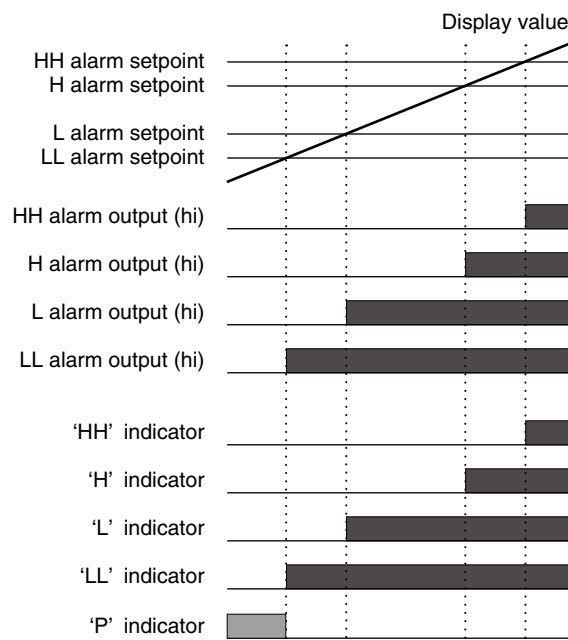
'P' indicator

Low or high trip action can be set for each alarm output.
'LL' , 'L' , 'H' and 'HH' indicators are fixed for each setpoint.
Therefore, even in case setting LL alarm output to high trip
action, for example, 'LL' indicator turns on at alarm.

Figure 3: Deadband (hysteresis)

Display value

Closeup

Alarm setpoint (hi)

Deadband works
in the direction of
decreasing display
value.

Display value

Deadband

Alarm output
With deadband

Without deadband
(setting value: 0000)

Preventing chattering
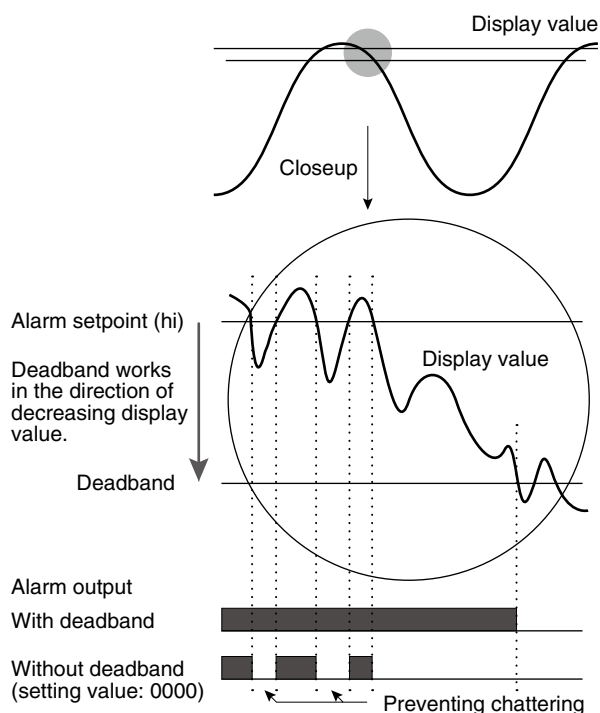
Figure 4: ON delay time

Display value

Alarm setpoint (hi)

(1)   (2)
ON delay time   ON delay time

Alarm output

Alarm output is not provided
with a sudden change.
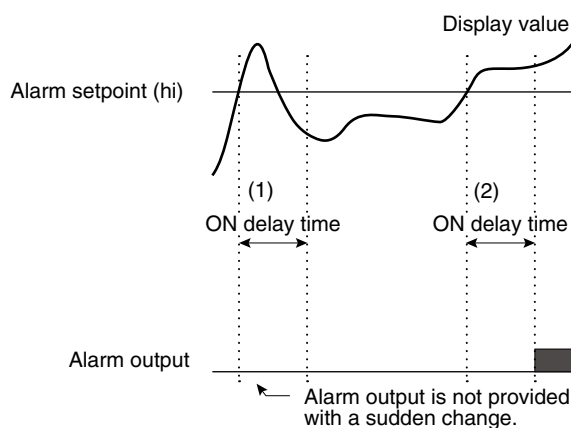
(1) The display value once exceeds the alarm setpoint but
    becomes below it during ON delay time period.
    Therefore alarm output is not provided.
(2) The display value exceeds the setpoint and stays over
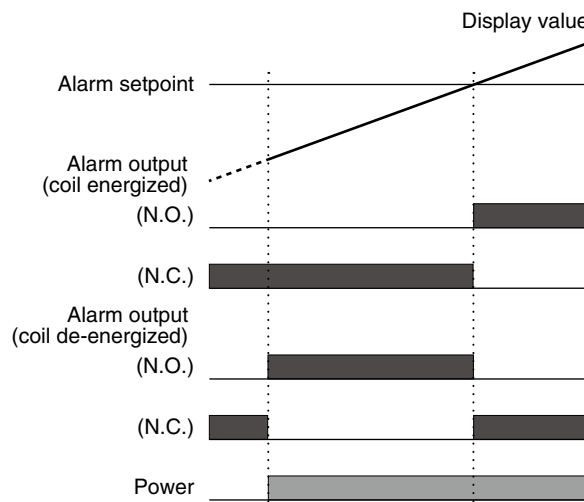   the ON delay time period. Therefore alarm output is
    provided.

Figure 5: Coil at alarm

■ **Alarm Output Code '1' (N.O. relay contact, 4 points)**   ■ **Alarm Output Code '2' (SPDT relay contact, 2 points)**
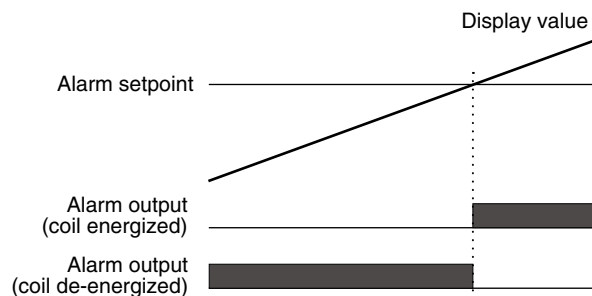
In order to stop operation of equipment when the display value exceeds the setpoint, for instance, set reversal output logic (N.C.), "coil de-energized".

In order to provide an alarm output at power OFF and at alarm, set "coil de-energized" and use the N.C. terminal.

IMPORTANT

- When indication '-9999' blinks, all the low alarm outputs are provided. When '9999' blinks, all the high alarm outputs are provided.
- The trip action, ON delay time and coil at alarm are reset to the default values when the alarm point has been changed. The current setpoints are held when quad alarm is changed to dual alarm. The current L and H setpoints are held but the LL and HH setpoints are returned to the previously set values when dual alarm is changed to quad alarm. However when a current setpoint is '----', it is returned to the previous one in any case.

NOTE

- Alarm Setting Mode is locked with the alarm output code '0' no-alarm-output type.
- Alarm point is fixed at '2' when the alarm output code '2' is specified.
- When the version is lower than 2.00, some parameters, displays and setting methods are different. Refer to 18.6 DIFFERENCES IN FIRMWARE VERSIONS for details.

7.1 ALARM POINT

The alarm point, dual alarm 'ALM2' or quad alarm 'ALM4', can be selected. The alarm point is fixed at '2' and the setting is not necessary when the alarm output code '2' (SPDT relay contact, 2 points) is specified.

7.1.1 OPERATING PROCEDURE

> **NOTE**
> • Procedures to change 'ALM4' to 'ALM2' are described here.
> • To change 'ALM2' to 'ALM4', the procedures are same. Select 'ALM4' in Step 2.

---

1 Hold down Alarm/↓ button for 3 seconds or more to move on to Alarm Setting Mode.

  • The alarm point is indicated.
  • 'HH', 'H', 'L', 'LL' and 'Fnc' indicators turn on.

> **NOTE**
> • 'ALM2' or 'ALM4' is indicated depending on the setting.
> • When "Dual alarm" is selected for the alarm point parameter, 'HH' and 'LL' indicators do not turn on.

---

2 Press Shift or Up button to select 'ALM2'.

  • 'HH' and 'LL' indicators turn off.
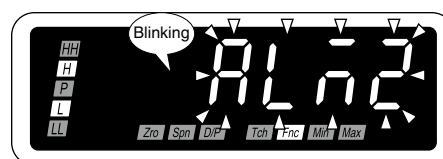
---

3 Press Alarm/↓ or Scale/↑ button to apply the new setting.

  • And the next parameter setting is indicated.

> **NOTE**
> • Press Alarm/↓ button, and the L (LL) alarm setpoint will be indicated within the range of -9999 to 9999 depending on the setting.
> • Press Scale/↑ button, and the main display blinking at alarm 'B 0', 'B 1', 'B 2', 'B 3' or 'B 4' will be indicated depending on the setting.
> • When the version is lower than 2.00, status of some indicators and parameters indicated in shifting parameters are different. Refer to 18.6 DIFFERENCES IN FIRMWARE VERSIONS for details.

4 ■ **TO SET THE NEXT PARAMETER,**
Skip to Step 2 in "7.2 ALARM SETPOINT".

■ **TO QUIT,**
Hold down Alarm/↓ or Scale/↑ button for 1 second or more to return to Measuring Mode.
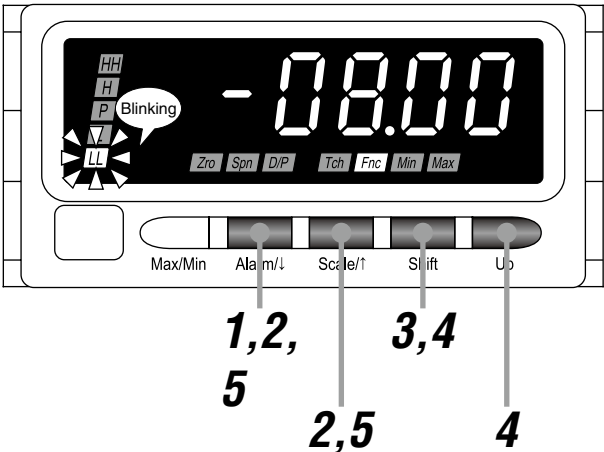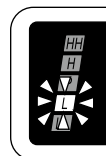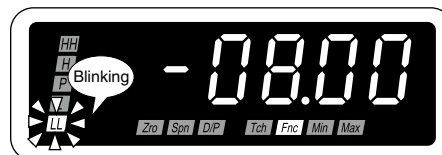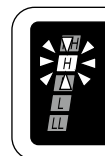
7.2 ALARM SETPOINT

Alarm setpoints can be set within the range of -9999 to 9999. However the alarm is not provided in setting the setpoint beyond the set display scaling range. Set the setpoints within the valid range.

7.2.1 ALARM SETPOINT DEFAULT VALUE

PARAMETER	DEFAULT VALUE
LL alarm setpoint	-0800
L alarm setpoint	-0400
H alarm setpoint	0400
HH alarm setpoint	0800

7.2.2 OPERATING PROCEDURE

NOTE

- The following figures are display examples. The displays depend on the settings.
- With "Dual alarm" selected for the alarm point parameter, the LL and HH alarm setpoints are disabled.

---

1 **Hold down Alarm/↓ button for 3 seconds or more to move on to Alarm Setting Mode.**

- The alarm point is indicated.
- 'HH', 'H', 'L', 'LL' and 'Fnc' indicators turn on.

NOTE

- 'ALM2' or 'ALM4' is indicated depending on the setting.
- When "Dual alarm" is selected for the alarm point parameter, 'HH' and 'LL' indicators do not turn on.

2 **Press Alarm/↓ or Scale/↑ button to go to the LL (L, H or HH) alarm setpoint setting.**

- The LL (L, H or HH) alarm setpoint is indicated.
- 'LL' ('L', 'H' or 'HH') indicator blinks and 'Fnc' indicator turns on.
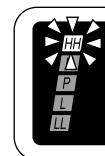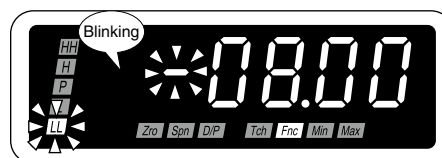

■ L alarm setpoint   ■ H alarm setpoint   ■ HH alarm setpoint

---

NOTE

- The setpoint is indicated within the range of -9999 to 9999 depending on the setting.
- When the version is lower than 2.00, status of some indicators is different. Refer to 18.6 DIFFERENCES IN FIRMWARE VERSIONS for details.

---

3 **Press Shift button to shift the display into the setting standby mode.**

- The fifth digit starts blinking, to which you can apply changes.

---

4 **Press Shift and Up buttons to set the LL (L, H or HH) alarm setpoint.**

- Set within the range of -9999 to 9999.

IMPORTANT

Specify '----' to disable the alarm output.

NOTE

Set the alarm setpoint with the decimal point position set in the decimal point position setting.

---

5 **Press Alarm/↓ or Scale/↑ button to apply the new setting.**

- And the next parameter setting is indicated.

NOTE

- Press Alarm/↓ button, and the LL (L, H or HH) trip action 'LMLO' or 'LMHI' will be indicated depending on the setting.
- Press Scale/↑ button, and the alarm point 'ALM2' or 'ALM4' (or LL, L or H coil at alarm 'RYEN' or 'RYDN') will be indicated depending on the setting.
- When the version is lower than 2.00, status of some indicators and parameters indicated in shifting parameters are different. Refer to 18.6 DIFFERENCES IN FIRMWARE VERSIONS for details.

6 ■ **TO GO ON TO SET ANOTHER ALARM SETPOINTS,**
Repeat operation from Step 2.

■ **TO SET THE NEXT PARAMETER,**
Skip to Step 2 in "7.3 TRIP ACTION (LO/HI)".

■ **TO QUIT,**
Hold down Alarm/↓ or Scale/↑ button for 1 second or more to return to Measuring Mode.

7.3 TRIP ACTION (LO/HI)

The trip action low 'LMLO' or high 'LMHI' can be selected. Configuring typical L/H trip setting or all trip points to high or low setting is available. The default values are "low trip" for the LL and L trip actions and "high trip" for the HH and H.

7.3.1 OPERATING PROCEDURE
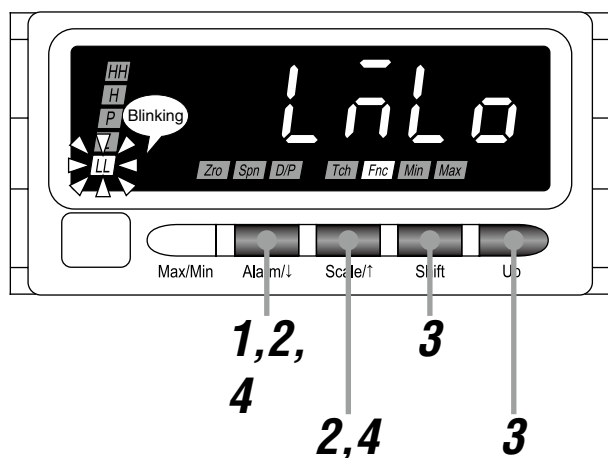
NOTE

• Procedures to change 'LMLO' to 'LMHI' are described here.
• To change 'LMHI' to 'LMLO', the procedures are same. Select 'LMLO' in Step 3.
• With "Dual alarm" selected for the alarm point parameter, the LL and HH trip actions are disabled.

---

1 **Hold down Alarm/↓ button for 3 seconds or more to move on to Alarm Setting Mode.**

• The alarm point is indicated.
• 'HH', 'H', 'L', 'LL' and 'Fnc' indicators turn on.

NOTE

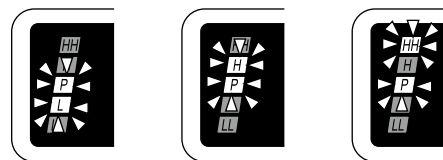• 'ALM2' or 'ALM4' is indicated depending on the setting.
• When "Dual alarm" is selected for the alarm point parameter, 'HH' and 'LL' indicators do not turn on.

---

2 **Press Alarm/↓ or Scale/↑ button to go to the LL (L, H or HH) trip action setting.**

• 'LMLO' is indicated.
• 'LL' ('L', 'H' or 'HH') indicator blinks and 'Fnc' indicator turns on.
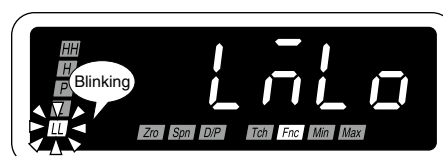
■ L trip action

■ H trip action

■ HH trip action

3 **Press Shift or Up button to select 'LMHI'.**
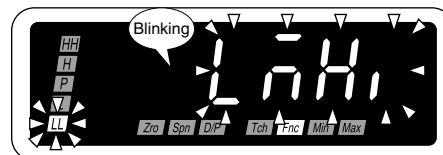
4 **Press Alarm/↓ or Scale/↑ button to apply the new setting.**

• And the next parameter setting is indicated.

NOTE

• Press Alarm/↓ button, and the LL (L, H or HH) deadband will be indicated within the range of 0000 to 9999 depending on the setting.
• Press Scale/↑ button, and the LL (L, H or HH) alarm setpoint will be indicated within the range of -9999 to 9999 depending on the setting.
• When the version is lower than 2.00, status of some indicators is different. Refer to 18.6 DIFFERENCES IN FIRMWARE VERSIONS for details.

---

5 ■ **TO GO ON TO SET ANOTHER TRIP ACTIONS,**
Repeat operation from Step 2.

■ **TO SET THE NEXT PARAMETER,**
Skip to Step 2 in "7.4 DEADBAND".

■ **TO QUIT,**
Hold down Alarm/↓ or Scale/↑ button for 1 second or more to return to Measuring Mode.

7.4 DEADBAND

Once a high (low) trip alarm is ON, the alarm stays ON until the data becomes lower (higher) than a certain range from the setpoint, which prevents the alarm output from chattering when the display value fluctuates slightly near the setpoint. This range is called deadband (hysteresis) and can be set within the range of 0000 to 9999. The default value is 0001.

7.4.1 OPERATING PROCEDURE
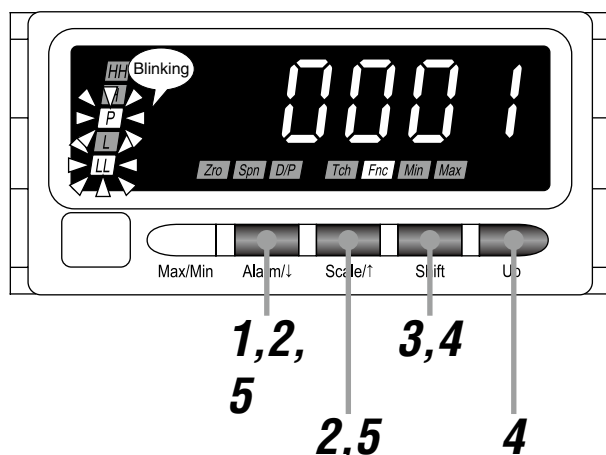
1,2, 5

3,4

2,5

4

---

1 **Hold down Alarm/↓ button for 3 seconds or more to move on to Alarm Setting Mode.**

• The alarm point is indicated.
• 'HH', 'H', 'L', 'LL' and 'Fnc' indicators turn on.

NOTE

• 'ALM2' or 'ALM4' is indicated depending on the setting.
• When "Dual alarm" is selected for the alarm point parameter, 'HH' and 'LL' indicators do not turn on.

---

2 **Press Alarm/↓ or Scale/↑ button to go to the LL (L, H or HH) deadband setting.**

• The LL (L, H or HH) deadband is indicated.
• 'LL' ('L', 'H' or 'HH') and 'P' indicators blink and 'Fnc' indicator turns on.

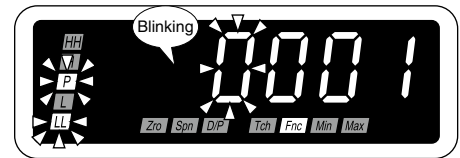■ L deadband   ■ H deadband   ■ HH deadband

---

NOTE

• The LL (L, H or HH) deadband is indicated within the range of 0000 to 9999 depending on the setting.
• When the version is lower than 2.00, status of some indicators is different. Refer to 18.6 DIFFERENCES IN FIRMWARE VERSIONS for details.

---

3 Press Shift button to shift the display into the setting standby mode.

• The forth digit starts blinking, to which you can apply changes.

4 Press Shift and Up buttons to set the LL (L, H or HH) deadband.

• Set within the range of 0000 to 9999.

NOTE

• Set the deadband for the setpoint. The decimal point is not indicated.
• When the version is lower than 2.00, the range is different. Refer to 18.6 DIFFERENCES IN FIRMWARE VERSIONS for details.

---

5 Press Alarm/↓ or Scale/↑ button to apply the new setting.

• And the next parameter setting is indicated.

NOTE

• Press Alarm/↓ button, and the LL (L, H or HH) ON delay time will be indicated within the range of 00 to 99 depending on the setting.
• Press Scale/↑ button, and the LL (L, H or HH) trip action 'LMLO' or 'LMHI' will be indicated depending on the setting.
• When the version is lower than 2.00, status of some indicators and parameters indicated in shifting parameters are different. Refer to 18.6 DIFFERENCES IN FIRMWARE VERSIONS for details.

---

6 ■ **TO GO ON TO SET ANOTHER DEADBANDS,**
Repeat operation from Step 2.

■ **TO SET THE NEXT PARAMETER,**
Skip to Step 2 in "7.5 ON DELAY TIME".

■ **TO QUIT,**
Hold down Alarm/↓ or Scale/↑ button for 1 second or more to return to Measuring Mode.

7.5 ON DELAY TIME

Alarm output is provided when the display value exceeds the setpoint and stayed for the specified time duration, which prevents the alarm output from being provided by a sudden change such like external disturbance. This time duration is called ON delay time and can be set within the range of 0 to 99 seconds. The default value is 0 second.

7.5.1 OPERATING PROCEDURE
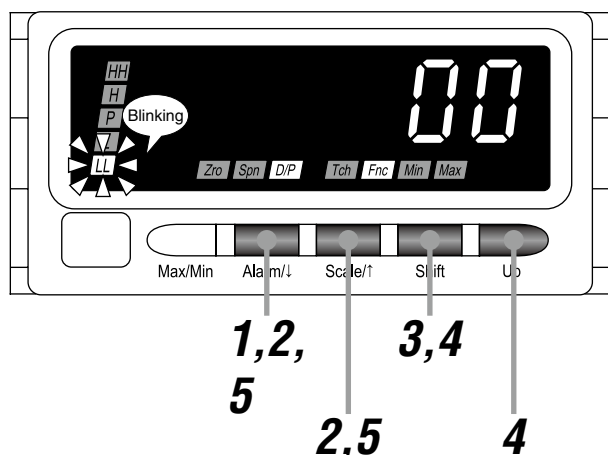
1,2,
5

3,4

2,5

4

> **NOTE**
> • The following figures are display examples. The displays depend on the settings.
> • With "Dual alarm" selected for the alarm point parameter, the LL and HH ON delay times are disabled.

1 Hold down Alarm/↓ button for 3 seconds or more to move on to Alarm Setting Mode.

• The alarm point is indicated.
• 'HH', 'H', 'L', 'LL' and 'Fnc' indicators turn on.

> **NOTE**
> • 'ALM2' or 'ALM4' is indicated depending on the setting.
> • When "Dual alarm" is selected for the alarm point parameter, 'HH' and 'LL' indicators do not turn on.

2 Press Alarm/↓ or Scale/↑ button to go to the LL (L, H or HH) ON delay time setting.

• The LL (L, H or HH) ON delay time is indicated.
• 'LL' ('L', 'H' or 'HH') indicator blinks, 'D/P' and 'Fnc' indicators turn on.
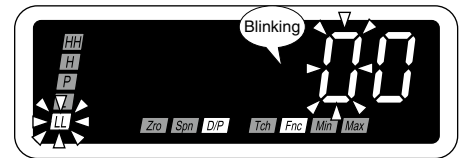

■ L ON delay time   ■ H ON delay time   ■ HH ON delay time
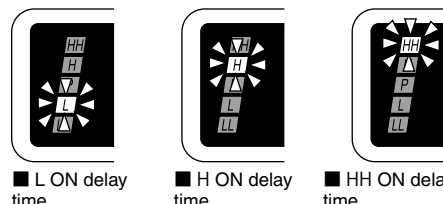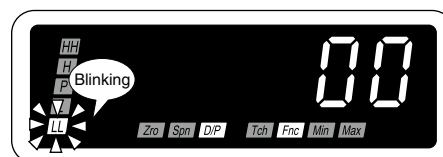
> **NOTE**
> • The ON delay time is indicated within the range of 00 to 99 depending on the setting.
> • When the version is lower than 2.00, status of some indicators is different. Refer to 18.6 DIFFERENCES IN FIRMWARE VERSIONS for details.

3 Press Shift button to shift the display into the setting standby mode.

• The second digit starts blinking, to which you can apply changes.

4 Press Shift and Up buttons to set the LL (L, H or HH) ON delay time.

• Set within the range of 00 to 99.

5 Press Alarm/↓ or Scale/↑ button to apply the new setting.

• And the next parameter setting is indicated.

NOTE

• Press Alarm/↓ button, and the LL (L, H or HH) coil at alarm 'RYEN' or 'RYDN' will be indicated depending on the setting.
• Press Scale/↑ button, and the LL (L, H or HH) deadband will be indicated within the range of 0000 to 9999 depending on the setting.
• When the version is lower than 2.00, status of some indicators and parameters indicated in shifting parameters are different. Refer to 18.6 DIFFERENCES IN FIRMWARE VERSIONS for details.

---

6 ■ **TO GO ON TO SET ANOTHER ON DELAY TIMES,**
Repeat operation from Step 2.

■ **TO SET THE NEXT PARAMETER,**
Skip to Step 2 in "7.6 ALARM OUTPUT LOGIC (coil energized or de-energized at alarm)".

■ **TO QUIT,**
Hold down Alarm/↓ or Scale/↑ button for 1 second or more to return to Measuring Mode.

7.6 ALARM OUTPUT LOGIC (coil energized or de-energized at alarm)

Alarm output logic can be selected. This parameter is called energizing direction and coil energized 'RYEN' or de-energized 'RYDN' at alarm can be selected. In selecting coil de-energized at alarm, the alarm output logic is inverted. The default setting is coil energized.

7.6.1 OPERATING PROCEDURE
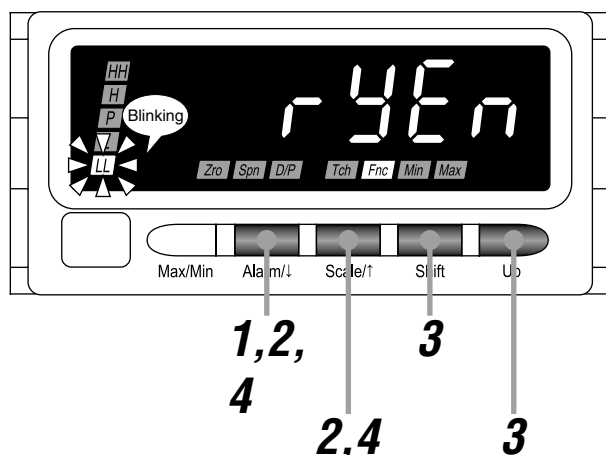
NOTE

- Procedures to change 'RYEN' to 'RYDN' are described here.
- To change 'RYDN' to 'RYEN', the procedures are same. Select 'RYEN' in Step 3.
- With "Dual alarm" selected for the alarm point parameter, the LL and HH coil at alarms are disabled.

1 Hold down Alarm/↓ button for 3 seconds or more to move on to Alarm Setting Mode.

- The alarm point is indicated.
- 'HH', 'H', 'L', 'LL' and 'Fnc' indicators turn on.

NOTE

- 'ALM2' or 'ALM4' is indicated depending on the setting.
- When "Dual alarm" is selected for the alarm point parameter, 'HH' and 'LL' indicators do not turn on.

2 Press Alarm/↓ or Scale/↑ button to go to the setting of the LL (L, H or HH) coil at alarm.

- 'RYEN' is indicated.
- 'LL' ('L', 'H' or 'HH') indicator blinks and 'Fnc' indicator turns on.
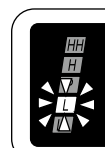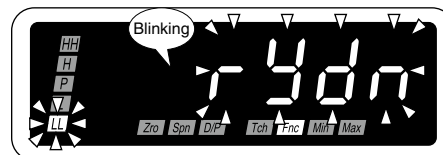

■ L coil at alarm

■ H coil at alarm

■ HH coil at alarm

3 Press Shift or Up button to select 'RYDN'.

4 Press Alarm/↓ or Scale/↑ button to apply the new setting.

• And the next parameter setting is indicated.

NOTE

• Press Alarm/↓ button, and the L (H or HH) alarm setpoint (or main display blinking at alarm) will be indicated within the range of -9999 to 9999 (or 'B 0', 'B 1', 'B 2', 'B 3' or 'B 4') depending on the setting.
• Press Scale/↑ button, and the LL (L, H or HH) ON delay time will be indicated within the range of 00 to 99 depending on the setting.
• When the version is lower than 2.00, some parameters indicated in shifting parameters are different. Refer to 18.6 DIFFERENCES IN FIRMWARE VERSIONS for details.

---

5 ■ **TO GO ON TO SET ANOTHER COIL AT ALARMS,**
Repeat operation from Step 2.

■ **TO SET THE NEXT PARAMETER,**
Skip to Step 2 in "7.7 MAIN DISPLAY BLINKING AT ALARM".

■ **TO QUIT,**
Hold down Alarm/↓ or Scale/↑ button for 1 second or more to return to Measuring Mode.

7.7 MAIN DISPLAY BLINKING AT ALARM

Main display blinking interval at alarm can be specified. The interval can be selected among those shown in the following table.

■ BLINKING INTERVAL AT ALARM

| DISPLAY	FUNCTION	DEFAULT VALUE
b 0	No blinking	b 0
b 1	Blinking in 1.0 second intervals	
b 2	Blinking in 0.5 second intervals	
b 3	Blinking in 0.2 second intervals	
b 4	Blinking in 0.1 second intervals	

7.7.1 OPERATING PROCEDURE
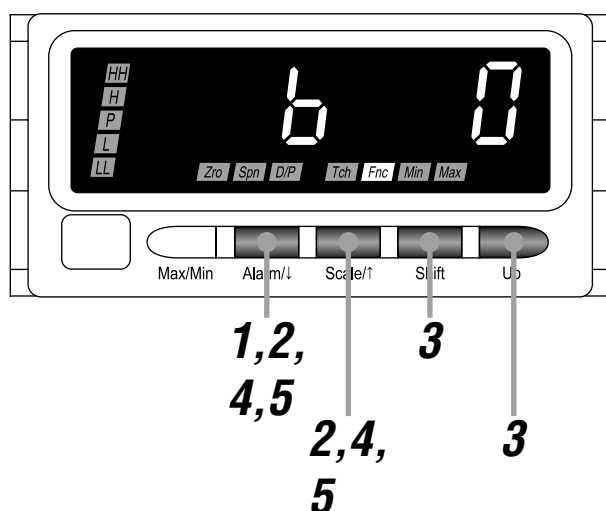
NOTE

The following figures are display examples. The displays depend on the settings.

---

1 **Hold down Alarm/↓ button for 3 seconds or more to move on to Alarm Setting Mode.**

- The alarm point is indicated.
- 'HH', 'H', 'L', 'LL' and 'Fnc' indicators turn on.

NOTE

- 'ALM2' or 'ALM4' is indicated depending on the setting.
- When "Dual alarm" is selected for the alarm point parameter, 'HH' and 'LL' indicators do not turn on.

---
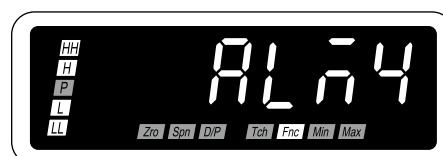
2 **Press Alarm/↓ or Scale/↑ button to go to the setting of the main display blinking at alarm.**

- The main display blinking at alarm is indicated.
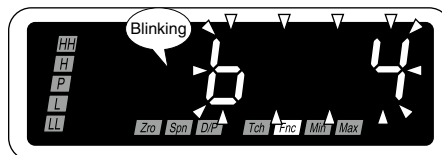- 'Fnc' indicator turns on.
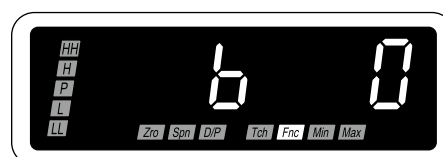
NOTE

'B 0', 'B 1', 'B 2', 'B 3' or 'B 4' is indicated depending on the setting.

---

3 **Press Shift or Up button to select.**

• Select one among 'B 0', 'B 1', 'B 2', 'B 3' and 'B 4'.

4 **Press Alarm/↓ or Scale/↑ button to apply the new setting.**

• And the next parameter setting is indicated.

> **NOTE**
>
> • Press Alarm/↓ button, and the alarm point 'ALM2' or 'ALM4' will be indicated depending on the specifications and setting.
> • Press Scale/↑ button, and the HH or H coil at alarm 'RYEN' or 'RYDN' will be indicated depending on the setting.

---

5 **Hold down Alarm/↓ or Scale/↑ button for 1 second or more to return to Measuring Mode.**

8. AVERAGING INPUT

Moving average processing of measured values is configurable. The number of samples in processing the moving average can be selected in the following table. This operation averages sampled values, and then, averages with a new sample added and the oldest one omitted. Such operation is repeated as shown in the following figure. For instance, when 'A 4' is selected, the moving average processing with 4 samples (100 millisecond intervals) is repeated. Moving average is used to remove periodic varied noise superimposed on the input signal and suppress the display flickering.

■ NUMBER OF SAMPLES

DISPLAY	FUNCTION	DEFAULT VALUE
AoFF	No moving averaging	AoFF
A 2	Moving average with 2 samples (50 millisecond intervals)	
A 4	Moving average with 4 samples (100 millisecond intervals)	
A 8	Moving average with 8 samples (200 millisecond intervals)	
A 16	Moving average with 16 samples (400 millisecond intervals)	
A 32	Moving average with 32 samples (800 millisecond intervals)	
A 64	Moving average with 64 samples (1.6 second intervals)	

■ EXAMPLE OF MOVING AVERAGE WITH 4 SAMPLES
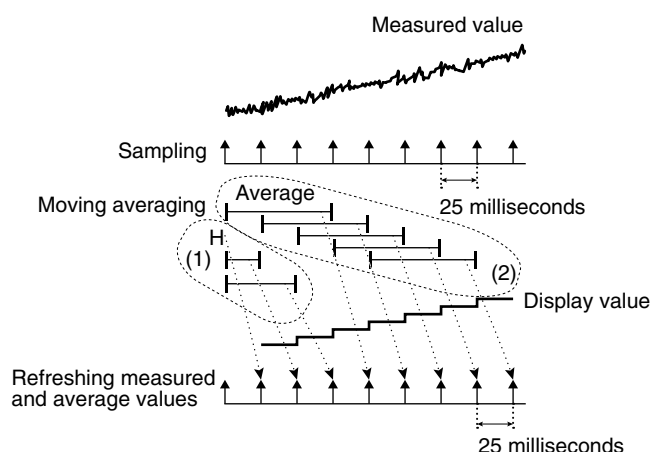
(1) The moving average operation starts immediately after the power is on or the moving average is set. Until the sampling No. reaches the set value, all samples are averaged every 25 milliseconds.

(2) After the sampling No. reaches the set value, a new sample is added to be averaged with the oldest one omitted. Such operation is repeated.

NOTE

The moving average setting affects the DC output when the analog output function mode is set to "proportional to the display value". Refer to 6. SETTING ANALOG OUTPUT FUNCTION for details.
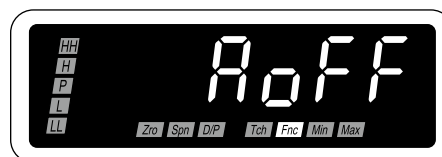

8.1 OPERATING PROCEDURE
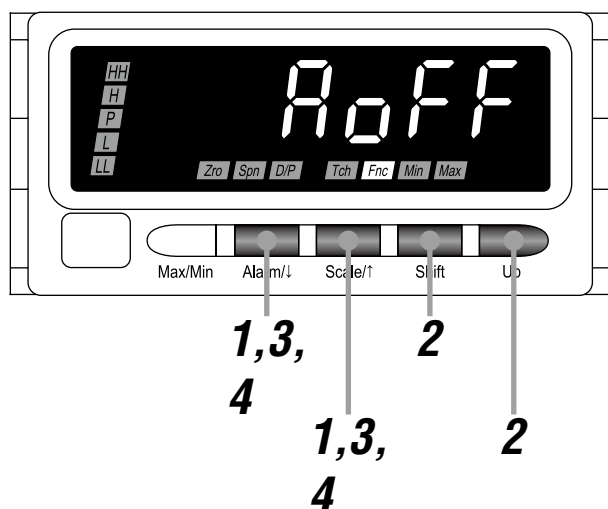
NOTE

The following figures are display examples. The displays depend on the settings.

---

1 Hold down Alarm/↓ and Scale/↑ buttons at once for 3 seconds
or more to move on to Advanced Setting Mode.

• The moving average sampling No. is indicated.
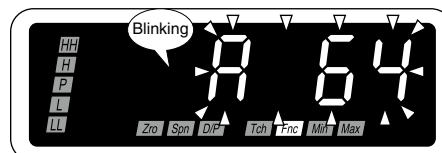• 'Fnc' indicator turns on.

NOTE

'AOFF', 'A 2', 'A 4', 'A 8', 'A 16', 'A 32' or 'A 64' is indicated depending on the setting.

---

2 Press Shift or Up button to select.

• Select one among 'AOFF', 'A 2', 'A 4', 'A 8', 'A 16', 'A 32' and 'A 64'.

NOTE

When the version is lower than 2.00, selectable moving average sampling Nos. are different. Refer to 18.6 DIFFERENCES IN FIRMWARE VERSIONS for details.

---

3 Press Alarm/↓ or Scale/↑ button to apply the new setting.

• And the next parameter setting is indicated.

NOTE

• Press Alarm/↓ button, and the low-end cutout 'ZOFF' or 'Z ON' will be indicated depending on the setting.
• Press Scale/↑ button, and the version indication will be indicated.

---

4 Hold down Alarm/↓ or Scale/↑ button for 1 second or more to return to Measuring Mode.

---

9. ELIMINATING FLUCTUATION AROUND "0"

A measured value less than the preset cutout value can be forcibly cut to 0 (figure below). This parameter is called low-end cutout and the value is called low-end cutout value. Enable the low-end cutout first (table below) and set the low-end cutout value within the range of 00 to 99. The low-end cutout is effective to eliminate slippage or fluctuation of the display values near zero.
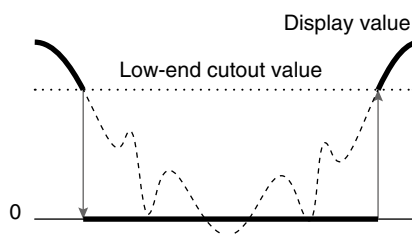
■ LOW-END CUTOUT

DISPLAY	FUNCTION	DEFAULT VALUE
EoFF	Low-end cutout OFF	EoFF
E on	Low-end cutout ON	

■ SETTING RANGE
Set the low-end cutout value for the two lowest digits of the display scaling value within the range of 00 to 99.
The default value is 00.

■ DISPLAY EXAMPLE WITH LOW-END CUTOUT ON

Fluctuation near 0 and negative reading can be cut to 0.

NOTE

• Set the display scaling value A to 0 when the low-end cutout is set to ON. Otherwise with the display scaling ±1000 and the low-end cutout value 50, for example, the indication with the scaling value -1000 to 49 will be cut to 0.
• The low-end cutout setting affects the DC output when the analog output function mode is set to "proportional to the display value". Refer to 6. SETTING ANALOG OUTPUT FUNCTION for details.

9.1 LOW-END CUTOUT

9.1.1 OPERATING PROCEDURE
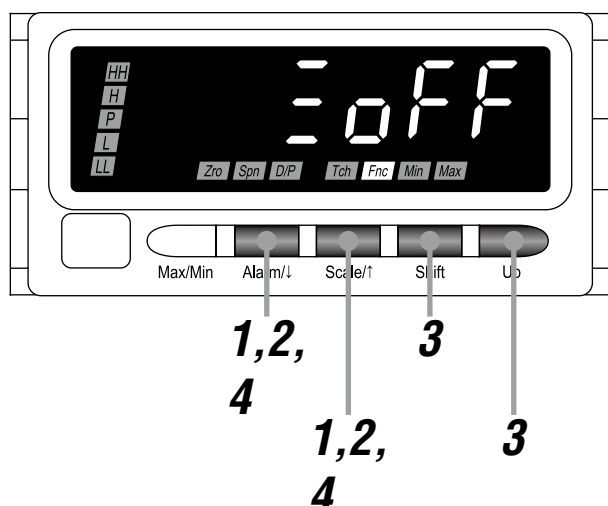
1,2, 4

3

1,2, 4

3

1 Hold down Alarm/↓ and Scale/↑ buttons at once for 3 seconds or more to move on to Advanced Setting Mode.

• The moving average sampling No. is indicated.
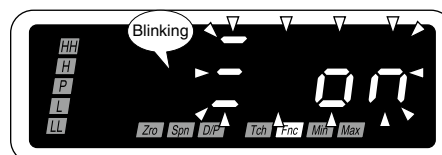• 'Fnc' indicator turns on.

NOTE

'AOFF', 'A 2', 'A 4', 'A 8', 'A 16', 'A 32' or 'A 64' is indicated depending on the setting.

2 Press Alarm/↓ or Scale/↑ button to go to the low-end cutout setting.

• 'ZOFF' is indicated.
• 'Fnc' indicator turns on.

3 Press Shift or Up button to select 'Z ON'.

Blinking

··

4 **Press Alarm/↓ or Scale/↑ button to apply the new setting.**

    • And the next parameter setting is indicated.

NOTE

• Press Alarm/↓ button, and the low-end cutout value will be indicated within the range of 'Z 00' to 'Z 99' depending on the setting. When low-end cutout OFF is selected, the brightness 'C 1', 'C 2', 'C 3', 'C 4' or 'C 5' will be indicated depending on the setting.
• Press Scale/↑ button, and the moving average sampling No. 'AOFF', 'A 2', 'A 4', 'A 8', 'A 16', 'A 32' or 'A 64' will be indicated depending on the setting.

··

5 ■**TO GO ON TO SET THE LOW-END CUTOUT VALUE,**
Skip to Step 2 in "9.2 LOW-END CUTOUT VALUE".

    ■**TO QUIT,**
Hold down Alarm/↓ or Scale/↑ button for 1 second or more to return to Measuring Mode.

9.2 LOW-END CUTOUT VALUE

9.2.1 OPERATING PROCEDURE
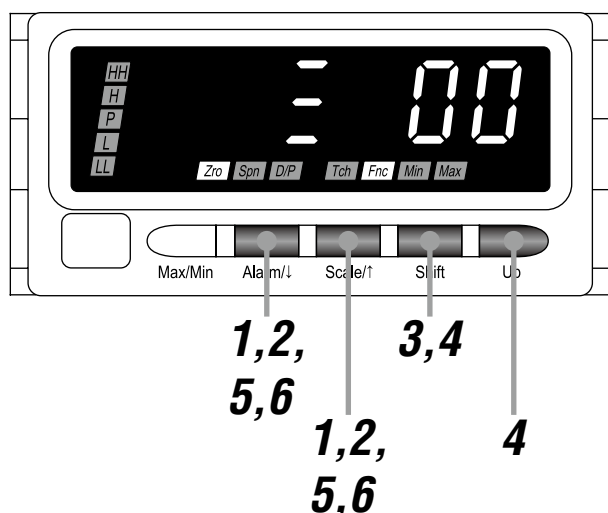
1,2, 5,6   **3,4**

1,2, 5,6   **4**

NOTE

The following figures are display examples. The displays depend on the settings.

---

1 Hold down Alarm/↓ and Scale/↑ buttons at once for 3 seconds or more to move on to Advanced Setting Mode.

- The moving average sampling No. is indicated.
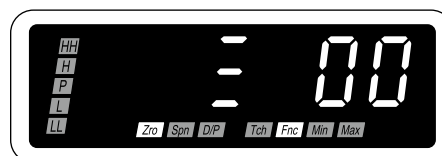- 'Fnc' indicator turns on.

NOTE

'AOFF', 'A 2', 'A 4', 'A 8', 'A 16', 'A 32' or 'A 64' is indicated depending on the setting.

**2** Press Alarm/↓ or Scale/↑ button to go to the low-end cutout value setting.

- The low-end cutout value is indicated.
- 'Zro' and 'Fnc' indicators turn on.

NOTE

The low-end cutout value is indicated within the range of 'Z 00' to 'Z 99' depending on the setting.

---

3 Press Shift button to shift the display into the setting standby mode.

- The second digit starts blinking, to which you can apply changes.

---
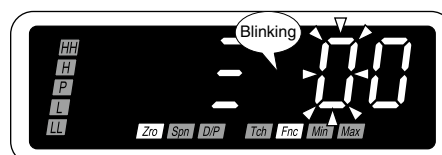
4 **Press Shift and Up buttons to set the low-end cutout value.**

• Set within the range of 'Z 00' to 'Z 99'.

NOTE

Set the value for the display scaling. The decimal point is not indicated.

---

5 **Press Alarm/↓ or Scale/↑ button to apply the new setting.**

• And the next parameter setting is indicated.

NOTE

• Press Alarm/↓ button, and the brightness 'C 1', 'C 2', 'C 3', 'C 4' or 'C 5' will be indicated depending on the setting.
• Press Scale/↑ button, and the low-end cutout 'Z ON' will be indicated.

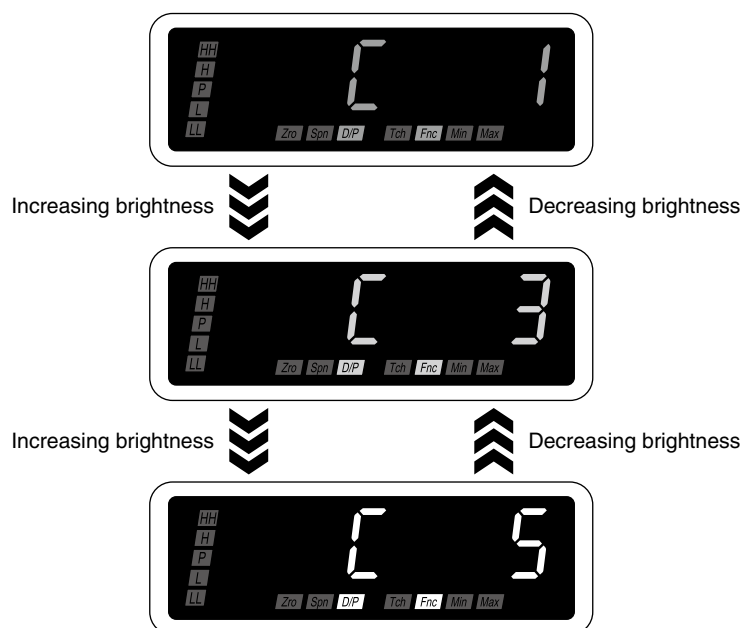**6** **Hold down Alarm/↓ or Scale/↑ button for 1 second or more to return to Measuring Mode.**

10. ADJUSTING BRIGHTNESS OF DISPLAY

The brightness of the display can be adjusted (figures below). The brightness can be selected in the following table.
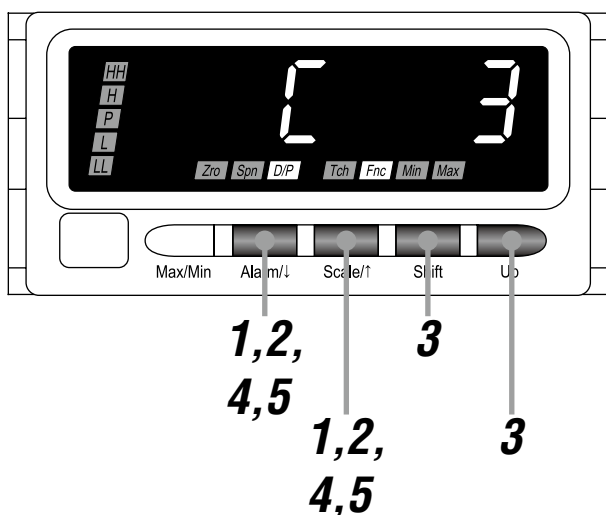
■ **DISPLAY BRIGHTNESS**

DISPLAY	FUNCTION	DEFAULT VALUE
C 1	Brightness level 1 (dark)	C 3
C 2	Brightness level 2	
C 3	Brightness level 3	
C 4	Brightness level 4	
C 5	Brightness level 5 (bright)	

■ **ADJUSTMENT IMAGE**

Increasing brightness   Decreasing brightness

Increasing brightness   Decreasing brightness

MG CO., LTD. www.mgco.jp
5-2-55 Minamitsumori, Nishinari-ku, Osaka 557-0063 JAPAN

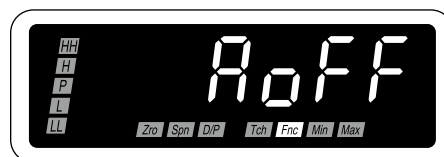## 10.1 OPERATING PROCEDURE

NOTE

The following figures are display examples. The displays depend on the settings.

---

1 Hold down Alarm/↓ and Scale/↑ buttons at once for 3 seconds or more to move on to Advanced Setting Mode.

• The moving average sampling No. is indicated.
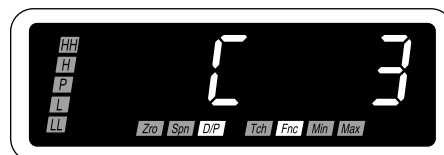• 'Fnc' indicator turns on.

NOTE

'AOFF', 'A 2', 'A 4', 'A 8', 'A 16', 'A 32' or 'A 64' is indicated depending on the setting.

---

2 Press Alarm/↓ or Scale/↑ button to go to the brightness setting.

• The brightness is indicated.
• 'D/P' and 'Fnc' indicators turn on.
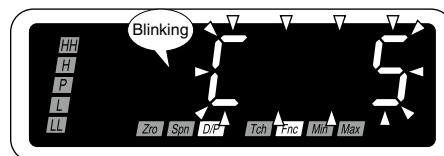

NOTE

'C 1', 'C 2', 'C 3', 'C 4' or 'C 5' is indicated depending on the setting.

---

3 Press Shift or Up button to select.

• Select one among 'C 1', 'C 2', 'C 3', 'C 4' and 'C 5'.

---

4 Press Alarm/↓ or Scale/↑ button to apply the new setting.

    • And the next parameter setting is indicated.

NOTE

• Press Alarm/↓ button, and the automatic return time to Measuring Mode will be indicated within the range of 'R 00' to 'R 99' depending on the setting.
• Press Scale/↑ button, and the low-end cutout value will be indicated within the range of 'Z 00' to 'Z 99' depending on the setting. The low-end cutout 'ZOFF' will be indicated with the cutout set to OFF.
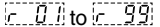
---

5 Hold down Alarm/↓ or Scale/↑ button for 1 second or more to return to Measuring Mode.

11. GOING BACK AUTOMATICALLY TO MEASURING MODE

The display goes back automatically to Measuring Mode if the front buttons are left untouched for the specified time period while it is in one of the setting modes. This time period is called automatic return time and can be set within the range of 1 to 99 seconds (Table 1). With the value set to 'R 00', the display must always be exited manually from the setting mode. The display does not go back automatically to Measuring Mode depending on the modes (Table 2).

■ **TABLE 1: AUTOMATIC RETURN TIME**

DISPLAY	FUNCTION	DEFAULT VALUE
r 00	Automatic return disabled	r 15
r 01 to r 99	1 to 99 seconds	

■ **TABLE 2: AUTOMATIC RETURN IN EACH MODE**

| MODE	OPERATION	SETTING TIME OUT
Measuring Mode	Confirming alarm setpoint	Enabled
	Displaying MAX or MIN value	Disabled
	Executing Forced Zero	Disabled
Scaling Setting Mode		Enabled
Alarm Setting Mode		Enabled
Advanced Setting Mode		Enabled
Lockout Setting Mode		Enabled
Loop Test Output Mode		Disabled

11.1 OPERATING PROCEDURE
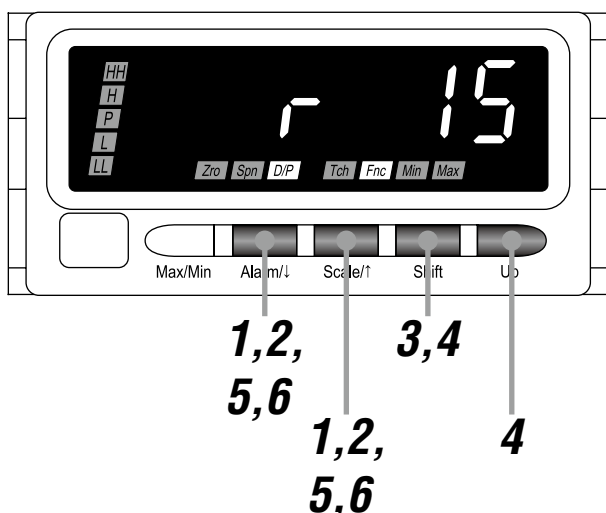
NOTE

The following figures are display examples. The displays depend on the settings.

---

1 **Hold down Alarm/↓ and Scale/↑ buttons at once for 3 seconds or more to move on to Advanced Setting Mode.**

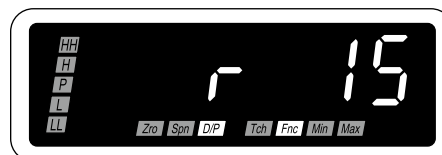- The moving average sampling No. is indicated.
- 'Fnc' indicator turns on.

NOTE

'AOFF', 'A 2', 'A 4', 'A 8', 'A 16', 'A 32' or 'A 64' is indicated depending on the setting.

---
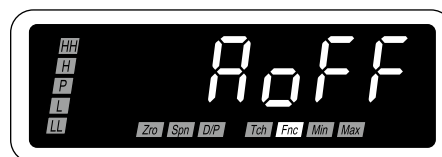
2 **Press Alarm/↓ or Scale/↑ button to go to the automatic return time to Measuring Mode setting.**

- The automatic return time to Measuring Mode is indicated.
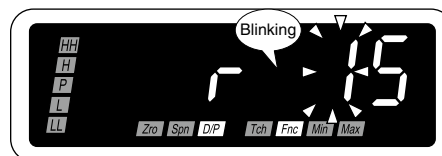- 'D/P' and 'Fnc' indicators turn on.

NOTE

The automatic return time to Measuring Mode is indicated within the range of 'R 00' to 'R 99' depending on the setting.

---

3 **Press Shift button to shift the display into the setting standby mode.**

- The second digit starts blinking, to which you can apply changes.

---

4 **Press Shift and Up buttons to set the automatic return time to Measuring Mode.**

- Set within the range of 'R 00' to 'R 99'.

---

5 Press Alarm/↓ or Scale/↑ button to apply the new setting.

• And the next parameter setting is indicated.

NOTE

• Press Alarm/↓ button, and the transition time to Lockout Setting Mode will be indicated within the range of 'P 00' to 'P 99' depending on the setting.
• Press Scale/↑ button, and the brightness 'C 1', 'C 2', 'C 3', 'C 4' or 'C 5' will be indicated depending on the setting.

---

6 Hold down Alarm/↓ or Scale/↑ button for 1 second or more to return to Measuring Mode.
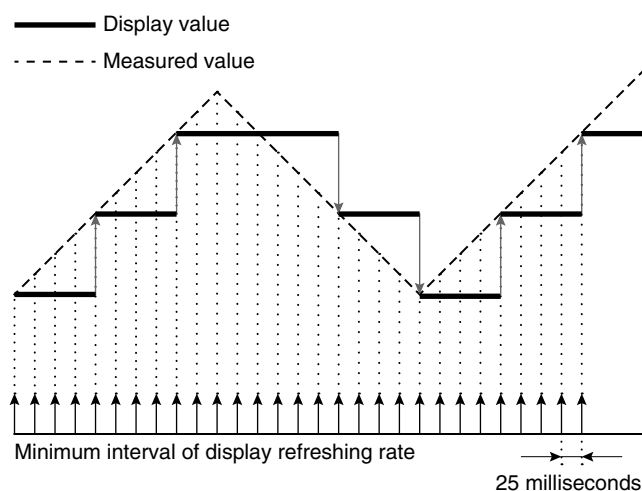
12. ADJUSTING DISPLAY REFRESHING RATE

The 47LM measures input signal at the read rate 25 milliseconds. The display refreshing rate can be slower than this rate (figure below) within the range of 0.1 to 99.9 seconds. With this value set to 00.0, the refreshing rate will be the same as the read rate (25 milliseconds) (table below). When the input signal changes rapidly, the display refreshing rate can be slowed to suppress the display flickering.

■ DISPLAY REFRESHING RATE

DISPLAY	FUNCTION	DEFAULT VALUE
F 00.0	25 milliseconds	*F 00.0*
F 00.1 to *F 99.9*	0.1 to 99.9 seconds	

■ DISPLAY REFRESHING IMAGE
   e.g. Refreshing rate 0.1 seconds

───── Display value

- - - - - Measured value
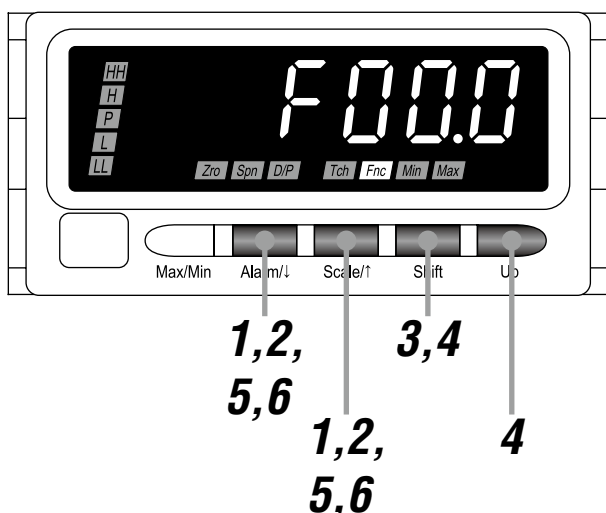
Minimum interval of display refreshing rate

25 milliseconds

NOTE

The display refreshing rate setting affects the DC output when the analog output function mode is set to "proportional to the display value". Refer to 6. SETTING ANALOG OUTPUT FUNCTION for details.
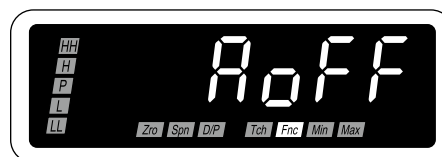
12.1 OPERATING PROCEDURE

NOTE

The following figures are display examples. The displays depend on the settings.

---

1 **Hold down Alarm/↓ and Scale/↑ buttons at once for 3 seconds or more to move on to Advanced Setting Mode.**

• The moving average sampling No. is indicated.
• 'Fnc' indicator turns on.

NOTE

'AOFF', 'A 2', 'A 4', 'A 8', 'A 16', 'A 32' or 'A 64' is indicated depending on the setting.

---

2 **Press Alarm/↓ or Scale/↑ button to go to the display refreshing rate setting.**

• The display refreshing rate is indicated.
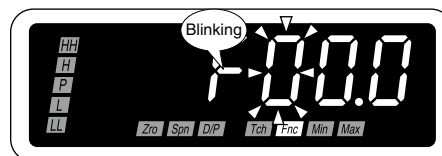• 'Fnc' indicator turns on.

NOTE

The display refreshing rate is indicated within the range of 'F00.0' to 'F99.9' depending on the setting.

---

3 **Press Shift button to shift the display into the setting standby mode.**

• The third digit starts blinking, to which you can apply changes.

---

4 **Press Shift and Up buttons to set the display refreshing rate.**

• Set within the range of 'F00.0' to 'F99.9'.

---

5 Press Alarm/↓ or Scale/↑ button to apply the new setting.

  • And the next parameter setting is indicated.

NOTE

• Press Alarm/↓ button, and the version indication will be indicated.
• Press Scale/↑ button, and the transition time to Lockout Setting Mode will be indicated within the range of 'P 00' to 'P 99' depending on the setting.

---

6 Hold down Alarm/↓ or Scale/↑ button for 1 second or more to return to Measuring Mode.

13. LOOP TESTING

The 47LM can provide simulated analog output with the display value manually adjusted. It is called loop test output. It is convenient to check or calibrate a receiving instrument. The alarm trip functions according to the scaling values during the loop test.

## 13.1 LOOP TEST OUTPUT RANGE

-10 to +110% of the display scaling span can be set manually. Setting below -9999 or over 9999 is not available.
    e.g. With the display scaling values 0.0 to 100.0, setting manually within the range of -10.0 to 110.0 is available.

The DC output is provided within the range of -5 to +105% of the output span. Output below -5% or over +105% is saturated.
    e.g. With the DC output 4 – 20 mA DC, the output can be provided within the range of 3.2 to 20.8 mA DC.
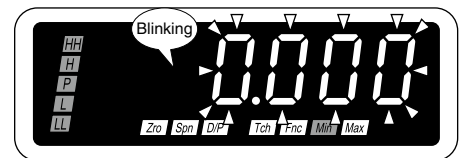
13.2 OPERATING PROCEDURE
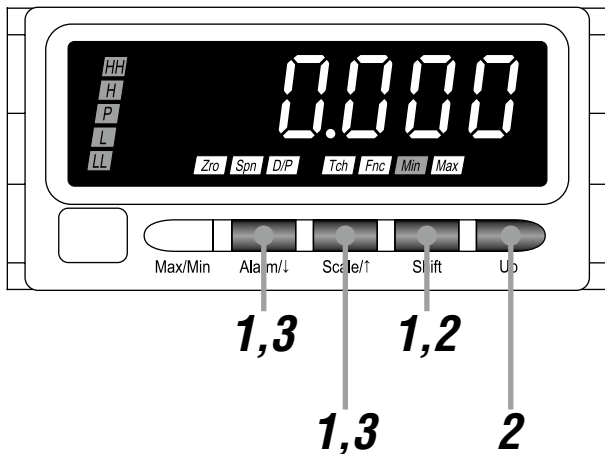
1 Hold down Alarm/↓, Scale/↑ and Shift buttons at once for 5 seconds or more to move on to Loop Test Output Mode.

- The measuring is stopped and the last measured values or status are held for the DC and alarm outputs.
- The current indication starts blinking, to which you can apply changes.
- 'Zro', 'Spn', 'D/P', 'Tch', 'Fnc' and 'Max' indicators turn on.

NOTE

- In moving on to Loop Test Output Mode while '-9999' blinks, -10% of the display scaling span or '-9999' is indicated.
- In moving on to Loop Test Output Mode while '9999' blinks, 110% of the display scaling span or '9999' is indicated.
- The specified decimal point position is applied.

2 Press Shift and Up buttons to adjust the display value.

- Press Shift button to switch the signal to increase or decrease.
    Increase with 'Max' indicator on.
    Decrease with 'Min' indicator on.
- Press Up button to control it toward the desired output value.
- Hold down Up button to control at high speed.
- The DC output changes according to the display value.
- When the display value reaches the desired one, check or calibrate the receiving instrument.

■ Increasing display value
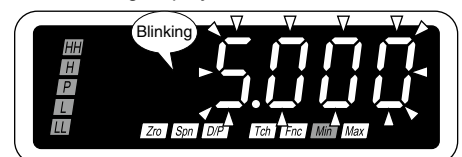
■ Decreasing display value
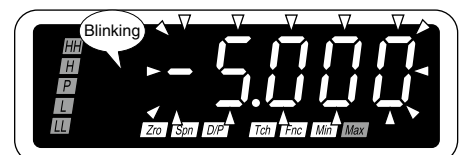
3 Hold down Alarm/↓ or Scale/↑ button for 1 second or more to return to Measuring Mode.

- The measuring is started with the loop test output reset.
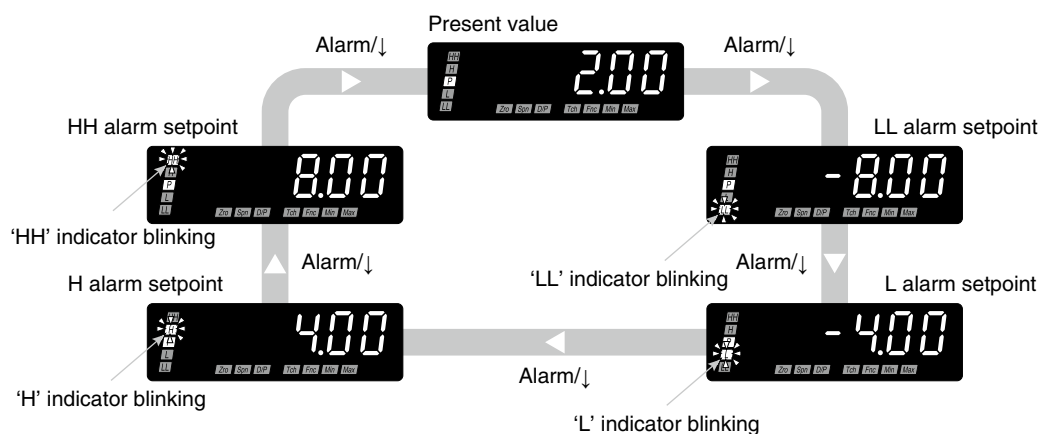
14. USEFUL FUNCTIONS

14.1 CONFIRMING ALARM SETPOINTS

The alarm setpoints set in Alarm Setting Mode can be confirmed while in Measuring Mode.
Each time pressing Alarm/↓ button during Measuring Mode, the indication is switched in the order of LL alarm setpoint to L alarm setpoint to H alarm setpoint to HH alarm setpoint and back to original indication.

■ PROCEDURE TO CONFIRM ALARM SETPOINTS

Each time pressing Alarm/↓ button in Measuring Mode, the indication is changed from the present value to LL alarm setpoint to L alarm setpoint to H alarm setpoint to HH alarm setpoint and back to present value.

Present value

Alarm/↓   Alarm/↓

HH alarm setpoint   LL alarm setpoint

'HH' indicator blinking   'LL' indicator blinking

Alarm/↓   Alarm/↓

H alarm setpoint   L alarm setpoint

'H' indicator blinking   Alarm/↓   'L' indicator blinking

*1 Display depends on the settings and input.


NOTE

- With the alarm output code '2' (SPDT relay contact, 2 points) or "Dual alarm" selected for the alarm point parameter, the LL and HH alarm setpoints are not indicated.
- The alarm setpoints can be confirmed even when MAX or MIN value is indicated. After confirmation, the indication will be back to MAX or MIN value.
- The alarm setpoints can be confirmed while in Forced Zero mode. After confirmation, the indication will be back to the display value after Forced Zero.

14.2 FORCING THE PRESENT DISPLAY VALUE TO ZERO

The display value can be forced to 0 while in Measuring Mode. Press Up button during Measuring Mode to shift the present display value to zero and to continue measuring in reference to this point. This operation is called Forced Zero. This function is useful, for example, to measure the travel distance from the present point, not from the start.

### ■ DISPLAY VALUE IN EXECUTING AND CANCELING FORCED ZERO

The display value changes as shown in the following figure when Forced Zero is executed or canceled while in measuring.
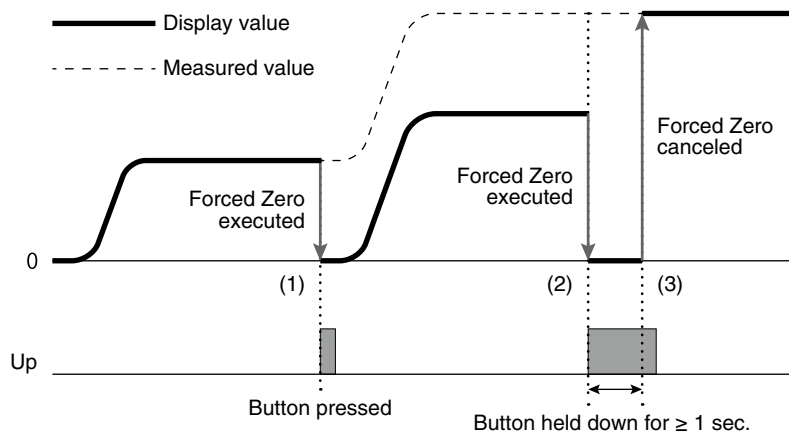
(1) Press Up button to shift the present display value to zero.
(2) Press Up button again for 1 second or more to cancel the Forced Zero mode. The display value is forced to 0 once.
(3) Then the display is back to indicate the measured value.

■ OPERATING PROCEDURE TO EXECUTE/CANCEL FORCED ZERO

(1) Press Up button in Measuring Mode to execute the Forced Zero.
(2) Hold down Up button for 1 second or more to cancel the Forced Zero mode.
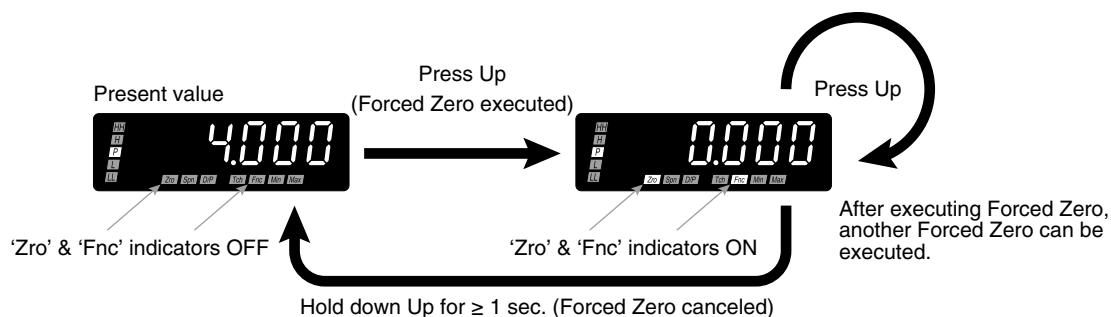
*1 Display depends on the settings and input.

NOTE

• Forced Zero cannot be executed or canceled while in the MAX/MIN Value Display mode.
• Forced Zero value is stored in memory even when the power is removed.

14.3 RETAINING MAX AND MIN VALUES

MAX and MIN values can be confirmed while in Measuring Mode. Each time pressing Max/Min button during Measuring Mode, the indication is switched in the order of MAX value to MIN value and back to original indication. Max. value is updated while it is indicated. Min. value is updated while it is indicated.
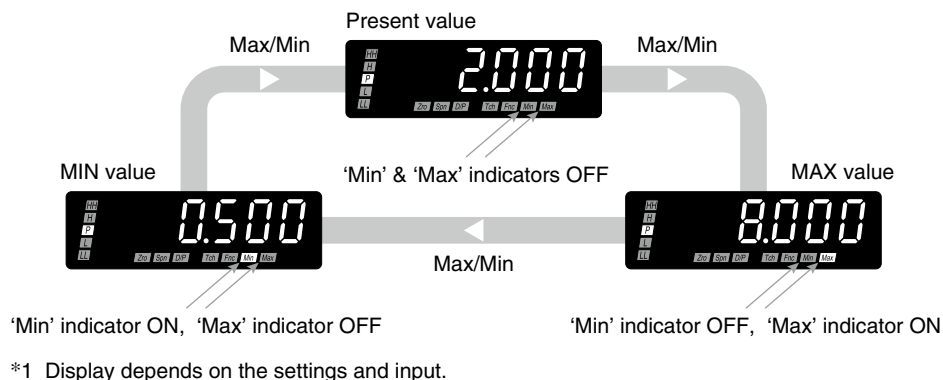
■ MAX AND MIN VALUES
MAX and MIN values are updated while in measuring.
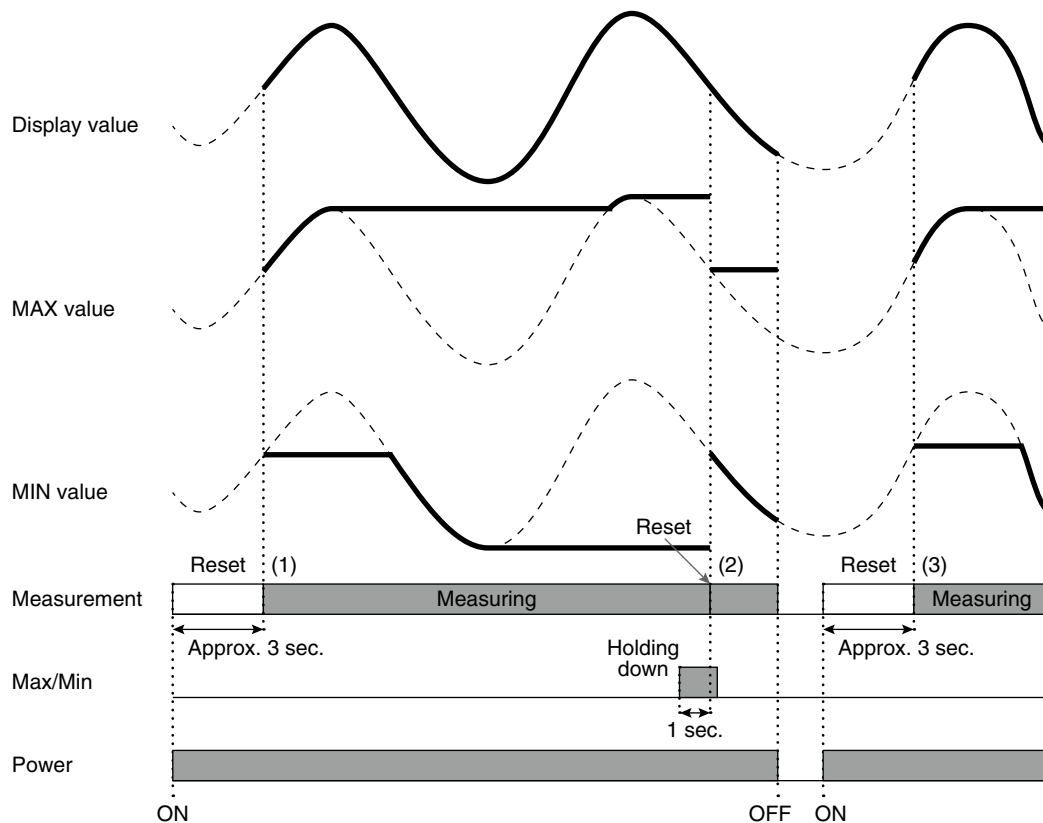
(1) The internal memory is reset for approx. 3 seconds after the power is on, and the unit starts to measure MAX and MIN values.

(2) Hold down Max/Min button for 1 second or more to reset the MAX and MIN values and then the unit starts to measure MAX and MIN values again.

(3) The internal memory is reset for approx. 3 seconds after the power is off and on again, and then the unit starts to measure MAX and MIN values again.

■ PROCEDURE TO CONFIRM MAX OR MIN VALUE

(1) Each time pressing Max/Min button during Measuring Mode, the indication is changed from the present value to MAX value, MIN value, and back to present value.

(2) Hold down Max/Min button for 1 second or more to reset the MAX and MIN values and indicate new MAX and MIN values. The MAX and MIN values are reset when the power is turned off.


Present value

Max/Min

Max/Min

'Min' & 'Max' indicators OFF

MIN value

MAX value

Max/Min

'Min' indicator ON, 'Max' indicator OFF

'Min' indicator OFF, 'Max' indicator ON

*1 Display depends on the settings and input.

NOTE

- The MAX and MIN values are not reset even when the Forced Zero is executed or canceled.
- Pressing Max/Min button while in confirming the alarm setpoints switches the indicators however the alarm setpoint indication is maintained.

14.4 LIMITING BUTTON OPERATION

Transition from Measuring Mode to each setting mode or Loop Test Output Mode can be limited. With this setting, the transition to each mode by holding down the buttons will be disabled. In Lockout Setting Mode, the lockout per mode is selectable.

■ LOCKOUT SETTING
Following 5 lockout settings are available.

PARAMETER	INDICATORS	DISPLAY	FUNCTION	DEFAULT VALUE
Alarm setting lockout	D/P, Fnc	$AoFF$	Unlock Alarm Setting Mode	$AoFF$
		$A\ on$	Lock Alarm Setting Mode	
Scaling setting lockout		$SoFF$	Unlock Scaling Setting Mode	$SoFF$
		$S\ on$	Lock Scaling Setting Mode	
Advanced setting lockout		$doFF$	Unlock Advanced Setting Mode	$doFF$
		$d\ on$	Lock Advanced Setting Mode	
Forced zero lockout		$EoFF$	Unlock (Enable) Forced Zero operation	$EoFF$
		$E\ on$	Lock (Disable) Forced Zero operation	
Loop test output lockout		$toFF$	Unlock Loop Test Output Mode	$toFF$
		$t\ on$	Lock Loop Test Output Mode	

14.4.1 OPERATING PROCEDURE
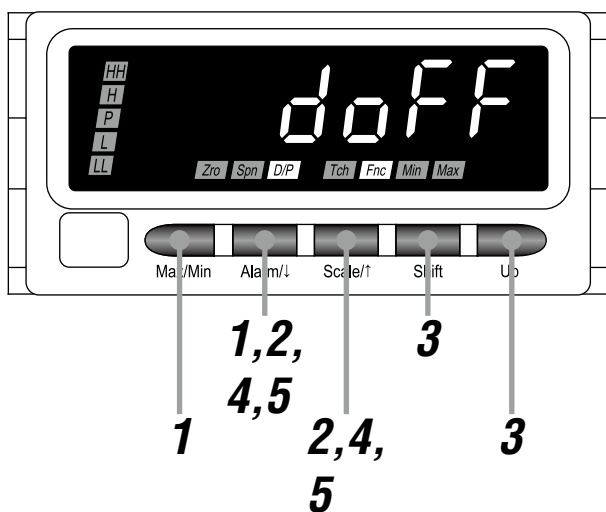
NOTE
• Procedures to lock the advanced setting mode are described here. The procedures to lock other setting modes are same. Select your desired mode to lock in Step 2.
• To cancel the limitation, select 'xOFF' in Step 3.

---

1 **Hold down Max/Min and Alarm/↓ buttons at once for a preset time duration to move on to Lockout Setting Mode.**

• The alarm setting lockout is indicated.
• 'D/P' and 'Fnc' indicators turn on.

NOTE
• 'AOFF' or 'A ON' is indicated depending on the setting.
• With no-alarm-output type, the scaling setting lockout 'SOFF' or 'S ON' is indicated depending on the setting.

2 Press Alarm/↓ or Scale/↑ button to go to the advanced setting lockout setting.

   • 'DOFF' is indicated.
   • 'D/P' and 'Fnc' indicators turn on.
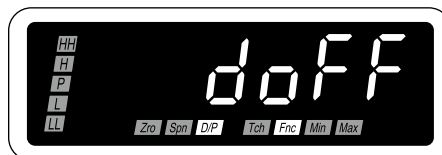
3 Press Shift or Up button to select 'D ON'.
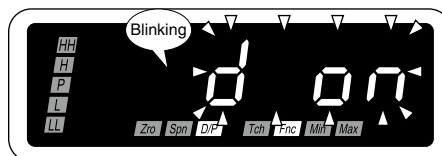
4 Press Alarm/↓ or Scale/↑ button to apply the new setting.

   • And the next parameter setting is indicated.

NOTE

• Press Alarm/↓ button, and the forced zero lockout 'ZOFF' or 'Z ON' will be indicated depending on the setting.
• Press Scale/↑ button, and the scaling setting lockout 'SOFF' or 'S ON' will be indicated depending on the setting.

---

5 Hold down Alarm/↓ or Scale/↑ button for 1 second or more to return to Measuring Mode.

14.5 TRANSITION TIME TO LOCKOUT SETTING MODE

Time duration to hold down the buttons for transition to Lockout Setting Mode can be set within the range of 0 to 99 seconds. The default value is 5 seconds.

14.5.1 OPERATING PROCEDURE
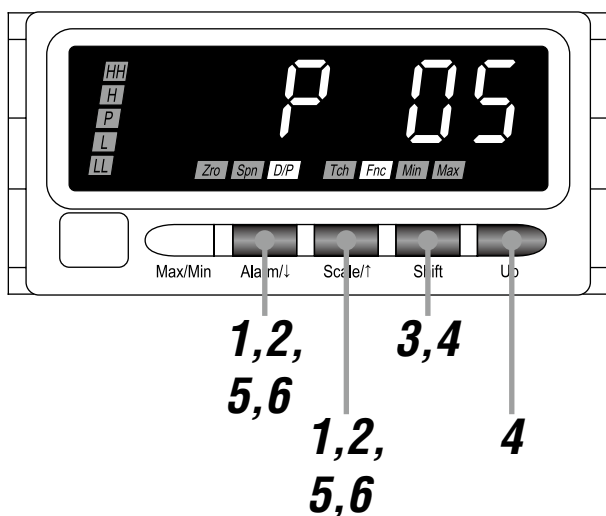
---

1 Hold down Alarm/↓ and Scale/↑ buttons at once for 3 seconds or more to move on to Advanced Setting Mode.

- The moving average sampling No. is indicated.
- 'Fnc' indicator turns on.

NOTE

'AOFF', 'A 2', 'A 4', 'A 8', 'A 16', 'A 32' or 'A 64' is indicated depending on the setting.

---

2 Press Alarm/↓ or Scale/↑ button to go to the setting of the transition time to Lockout Setting Mode.

- The transition time to Lockout Setting Mode is indicated.
- 'D/P' and 'Fnc' indicators turn on.
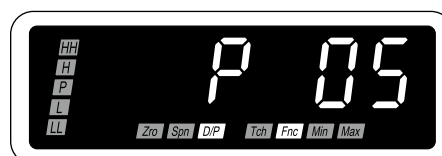
NOTE

The transition time is indicated within the range of 'P 00' to 'P 99' depending on the setting.

---

3 Press Shift button to shift the display into the setting standby mode.

- The second digit starts blinking, to which you can apply changes.
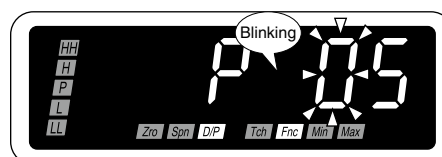
4 **Press Shift and Up buttons to set the transition time to Lockout Setting Mode.**

 • Set within the range of 'P 00' to 'P 99'.

5 **Press Alarm/↓ or Scale/↑ button to apply the new setting.**

 • And the next parameter setting is indicated.

NOTE

• Press Alarm/↓ button, and the display refreshing rate will be indicated within the range of 'F00.0' to 'F99.9' depending on the setting.
• Press Scale/↑ button, and the automatic return time to Measuring Mode will be indicated within the range of 'R 00' to 'R 99' depending on the setting.
• When the version is lower than 2.00, some parameters indicated in shifting parameters are different. Refer to 18.6 DIF-FERENCES IN FIRMWARE VERSIONS for details.

---

6 **Hold down Alarm/↓ or Scale/↑ button for 1 second or more to return to Measuring Mode.**

15. USER CALIBRATION

User calibration includes calibration by a customer using customer's measuring instruments and standards, and adjustment to compensate deviation with a device on site.

To calibrate (adjust) the input signal, use "Teach Calibration" function. To compensate deviation between the DC output and a device on site, use "Analog Output Adjustment" function.

15.1 TEACH CALIBRATION

You can calibrate the input signal by the Teach Calibration function if you need calibration.

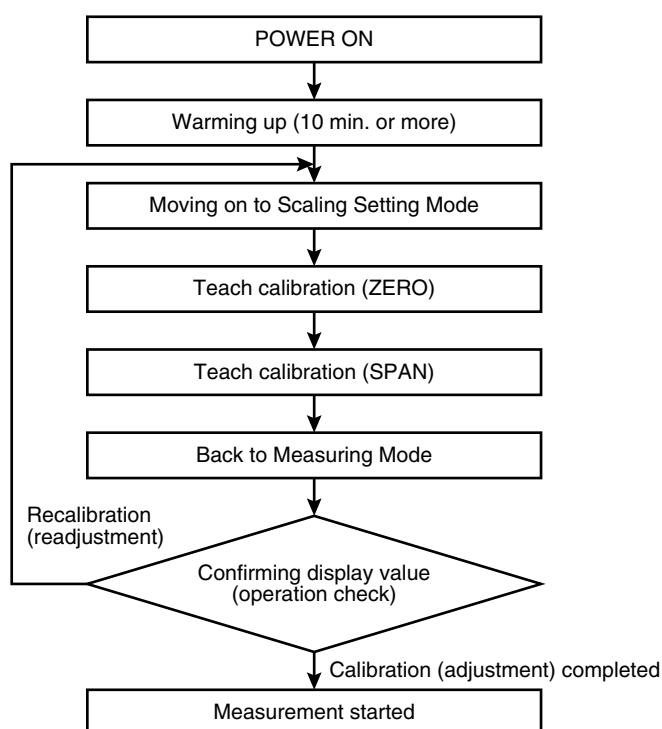The internal calibration data is overwritten every time the unit is calibrated and it is stored even if the power is turned off. However the data will be lost after an initialization.

Prepare measuring instruments and equipment for calibration by yourselves. Refer to each manual carefully for the instruments and equipment for information on handling them.

15.1.1 TEACH CALIBRATION FLOW

The Teach Calibration is carried out as shown in the following flowchart.

```
                    ┌─────────────────────────────┐
                    │          POWER ON           │
                    └─────────────────────────────┘
                                  │
                                  ▼
                    ┌─────────────────────────────┐
                    │  Warming up (10 min. or more) │
                    └─────────────────────────────┘
                                  │
                                  ▼
                    ┌─────────────────────────────┐
                    │ Moving on to Scaling Setting Mode │
                    └─────────────────────────────┘
                                  │
                                  ▼
                    ┌─────────────────────────────┐
                    │   Teach calibration (ZERO)   │
                    └─────────────────────────────┘
                                  │
                                  ▼
                    ┌─────────────────────────────┐
                    │   Teach calibration (SPAN)   │
                    └─────────────────────────────┘
                                  │
                                  ▼
                    ┌─────────────────────────────┐
                    │    Back to Measuring Mode    │
                    └─────────────────────────────┘
                                  │
                                  ▼
   Recalibration           ◇ Confirming display value ◇
   (readjustment)          ◇   (operation check)      ◇
                                  │
                                  │ Calibration (adjustment) completed
                                  ▼
                    ┌─────────────────────────────┐
                    │     Measurement started      │
                    └─────────────────────────────┘
```
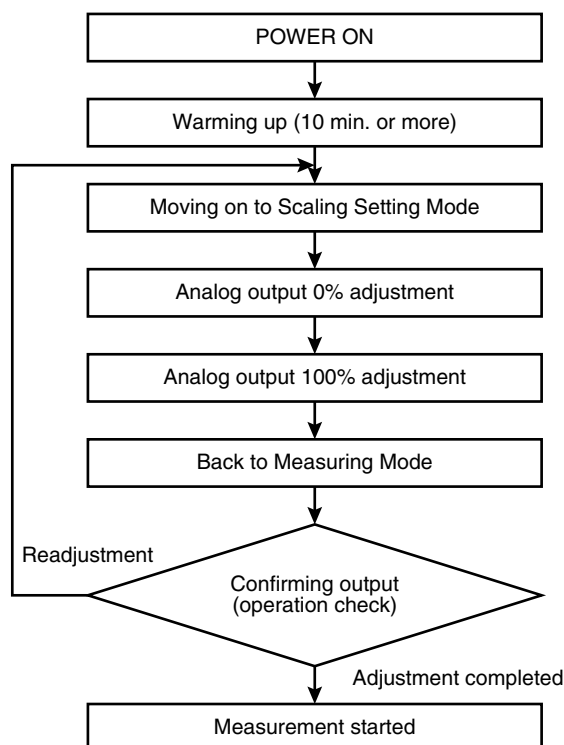

IMPORTANT

- Warm up measuring instruments, equipment and other devices on site for the time specified in each manual, and operate the unit in a stable condition.
- Refer to Steps 1 and 3 in 3. SETTING SCALING VALUES for the Teach Calibration.

15.2 ANALOG OUTPUT ADJUSTMENT

You can compensate deviation between the DC output and a device on site by the Analog Output Adjustment function.
Please note that we does not warrant the result of your own adjustment.
The internal adjustment data is overwritten every time the unit is adjusted and it is stored even if the power is turned off.
However the data will be lost after an initialization.

15.2.1 ANALOG OUTPUT ADJUSTMENT FLOW
The Analog Output Adjustment is carried out as shown in the following flowchart.

```
                    ┌─────────────────────────────┐
                    │          POWER ON           │
                    └─────────────────────────────┘
                                   │
                    ┌─────────────────────────────┐
                    │   Warming up (10 min. or more)  │
                    └─────────────────────────────┘
                                   │
          ┌──────────────►┌─────────────────────────────┐
          │               │ Moving on to Scaling Setting Mode │
          │               └─────────────────────────────┘
          │                            │
          │               ┌─────────────────────────────┐
          │               │  Analog output 0% adjustment │
          │               └─────────────────────────────┘
          │                            │
          │               ┌─────────────────────────────┐
          │               │ Analog output 100% adjustment │
          │               └─────────────────────────────┘
          │                            │
          │               ┌─────────────────────────────┐
          │               │    Back to Measuring Mode    │
          │               └─────────────────────────────┘
          │                            │
  Readjustment                  ◇ Confirming output ◇
          └─────────────────────  (operation check)
                                       │
                                 Adjustment completed
                    ┌─────────────────────────────┐
                    │     Measurement started      │
                    └─────────────────────────────┘
```

IMPORTANT

• Warm up measuring instruments, equipment and other devices on site for the time specified in each manual, and operate the unit in a stable condition.
• Adjustable ranges:
    Analog output 0% adjustment -5 to +100%
    Analog output 100% adjustment 0 to 105%
• Adjust analog output 100% in the following condition:
    Analog output 0% + 5% of output span ≤ Analog output 100%

15.2.2 OPERATING PROCEDURE
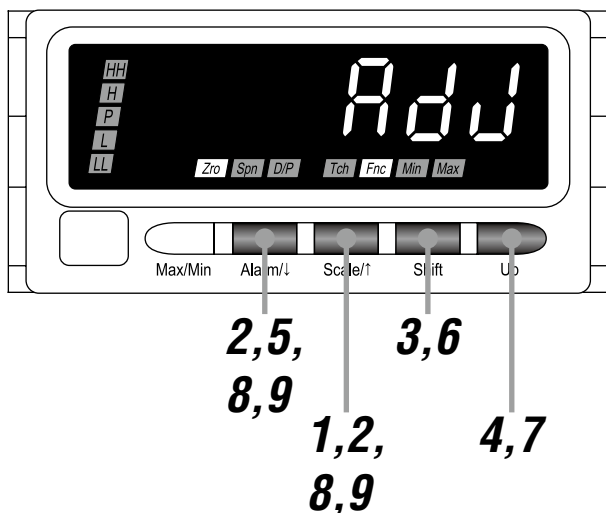
1 **Hold down Scale/↑ button for 3 seconds or more to move on to Scaling Setting Mode.**

- The input scaling value A is indicated.
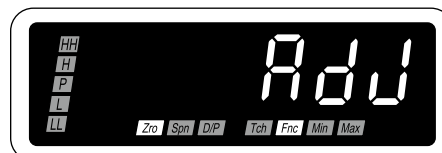- 'Zro' and 'Tch' indicators turn on.

IMPORTANT

Warm up the unit for 10 minutes or more before carrying out the Analog Output Adjustment.

---

2 **Press Alarm/↓ or Scale/↑ button to go to the analog output 0% adjustment.**
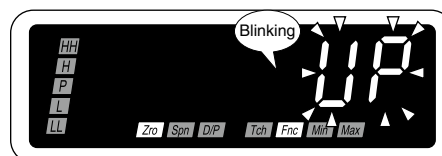
- The analog output 0% adjustment is indicated.
- 'Zro' and 'Fnc' indicators turn ON.

NOTE

Skip to Step 5 when the analog output 0% adjustment is not necessary.

---

3 **Press Shift button to switch the signal to increase (indication 'UP') or decrease ('DOWN').**

■ Increasing output

■ Decreasing output

4 Press Up button until the desired output value.

5 Press Alarm/↓ button to register the analog output 0% adjustment and go to the analog output 100% adjustment.

　• The analog output 0% adjustment is registered.
　• The analog output 100% adjustment is indicated.
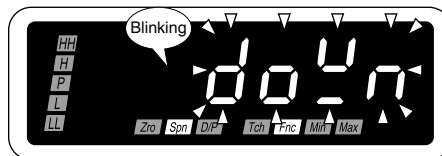　• 'Spn' and 'Fnc' indicators turn on.
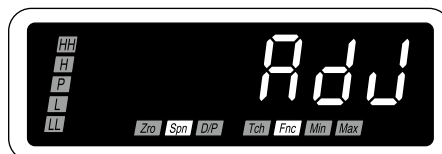
NOTE

Skip to Step 9 when the analog output 100% adjustment is not necessary.

6 Press Shift button to switch the signal to increase (indication 'UP') or decrease ('DOWN').
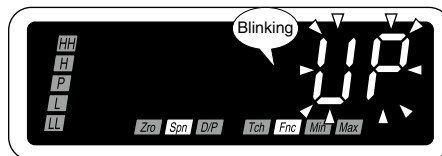
■ Increasing output

■ Decreasing output

7 Press Up button until the desired output value.

8 **Press Alarm/↓ or Scale/↑ button to register the analog output 100% adjustment.**

• The analog output 100% adjustment is registered.
• The next parameter is indicated.

NOTE

• Press Alarm/↓ button, and the input scaling value A 'ZERO' will be indicated.
• Press Scale/↑ button, and the analog output 0% adjustment 'ADJ' will be indicated.

*9* **Hold down Alarm/↓ or Scale/↑ button for 1 second or more to return to Measuring Mode.**

16. INSPECTION / CLEANING

To use the unit in the normal and best conditions, inspect and clean the unit routinely or periodically.

- When the display and the buttons have dirt, wipe them with wet soft cloth. Do not use organic solvent such like benzine, thinner and alcohol. Doing so may result in deformation or discoloration of the unit.
- Make sure that abnormality such like smokes, unusual smell or abnormal noises is not found. Using the unit continuously with such abnormality may result in a fire or electric shock.
- Check the terminal screws periodically. In checking the screws, for safety, interrupt electricity to the power, input and alarm output.
- Check the terminal block screws periodically. In checking the screws, for safety, interrupt electricity to the power, input and alarm output.
- Make sure periodically that the mounting brackets are fixed tightly. Loosened brackets may cause drop of the unit.

17. TROUBLESHOOTING

17.1 ERROR MESSAGES

MAIN DISPLAY	ERROR MESSAGE	WHAT TO DO
r.Err	Non-volatile memory error (reading)	While the error message is on the display, press Up button for 3 seconds or more, go to the lockout setting mode and initialize the unit to its factory default status.*1
W.Err	Non-volatile memory error (writing)	
i.Err	Internal data error	Repair is needed if the display does not recover after the power is reset.

*1 If the unit does not recover its function after the initialization, repairing in the factory may be required.

17.2 INITIALIZING SETTING VALUES

To restart setting from the default state, initialization can be used. Refer to attached 18.3 PARAMETER LIST for the default values.

IMPORTANT

- Currently set parameters will be lost after an initialization. It is recommended to record the parameters before initialization.
- Even if the unit is shipped with the specified parameters with the option code '/SET', such parameters will be lost after an initialization. Be careful that the initialization does not recover the ex-factory settings.

17.2.1 OPERATING PROCEDURE
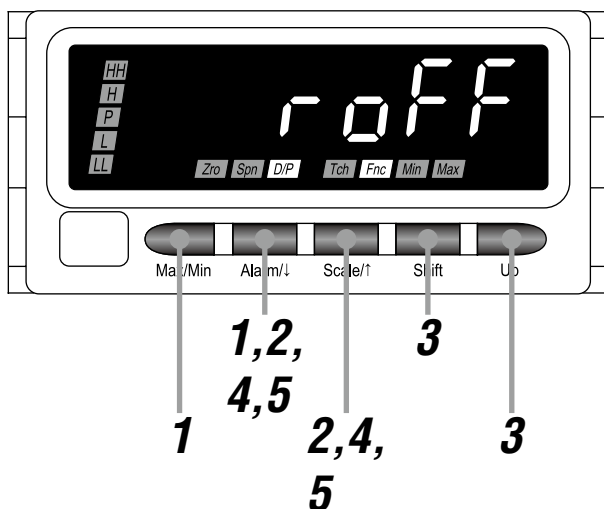
1 Hold down Max/Min and Alarm/↓ buttons at once for a preset time duration to move on to Lockout Setting Mode.

- The alarm setting lockout is indicated.
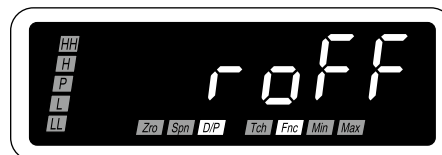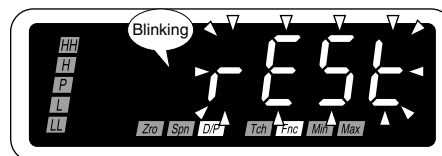- 'D/P' and 'Fnc' indicators turn on.

NOTE

- 'AOFF' or 'A ON' is indicated depending on the setting.
- With no-alarm-output type, the scaling setting lockout 'SOFF' or 'S ON' is indicated depending on the setting.

---

2 Press Alarm/↓ or Scale/↑ button to go to the initialization.

- 'ROFF' is indicated.
- 'D/P' and 'Fnc' indicators turn on.

```
HH
H        roFF
P
L
LL       Zro Spn D/P  Tch Fnc Min Max
```

3 Press Shift or Up button to select 'REST'.

```
HH       Blinking  ▽   ▽  ▽   ▽
H        rESt
P
L
LL       Zro Spn D/P  Tch Fnc Min Max
```

4 Press Alarm/↓ or Scale/↑ button to execute the initialization.

- All the indications turn on for approximately 5 seconds and then the next parameter setting is indicated.

```
HH
H       -1.8.8.8.8.
P
L
LL       Zro Spn D/P  Tch Fnc Min Max
```

▼

```
HH
H        AoFF
P
L
LL       Zro Spn D/P  Tch Fnc Min Max
```

NOTE

- Press Alarm/↓ button, and the alarm setting lockout 'AOFF' will be indicated, or the scaling setting lockout 'SOFF' will be indicated with no-alarm-output type.
- Press Scale/↑ button, and the loop test output lockout 'TOFF' will be indicated.
- When the version is lower than 2.00, the time period all the indications turn on and parameters indicated in shifting parameters are different. Refer to 18.6 DIFFERENCES IN FIRMWARE VERSIONS for details.

---

5 Hold down Alarm/↓ or Scale/↑ button for 1 second or more to return to Measuring Mode.
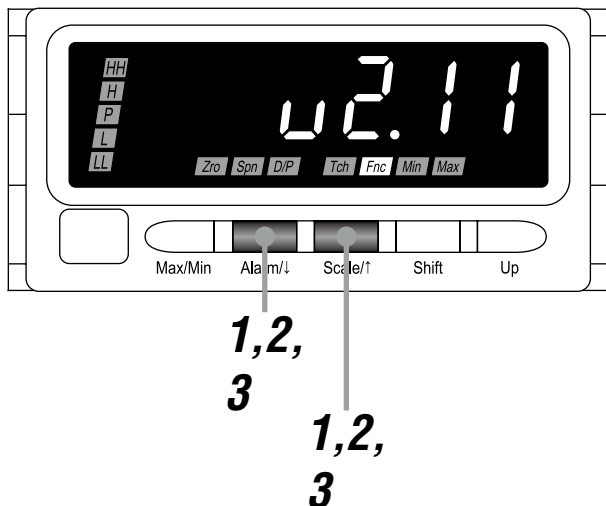
17.3 CONFIRMING FIRMWARE VERSION

The firmware version of the unit can be confirmed.
Confirm the version in the following cases:
- The display is different from the one described in the operating manual.
- Some parameters cannot be configured.
- The firmware version is necessary to consult us for troubles.

17.3.1 OPERATING PROCEDURE

---

1 Hold down Alarm/↓ and Scale/↑ buttons at once for 3 seconds
or more to move on to Advanced Setting Mode.

- The moving average sampling No. is indicated.
- 'Fnc' indicator turns on.

NOTE

'AOFF', 'A 2', 'A 4', 'A 8', 'A 16', 'A 32' or 'A 64' is indicated depending on the setting.

---

2 Press Alarm/↓ or Scale/↑ button to go to the version indication.

- The firmware version number is indicated.
- 'Fnc' indicator turns on.
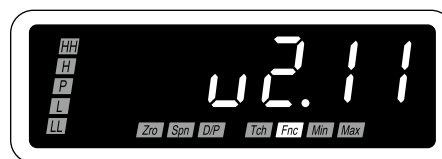
NOTE

The displays depend on the firmware version number.

---

3 Hold down Alarm/↓ or Scale/↑ button for 1 second or more to return to Measuring Mode.

18. APPENDICES

18.1 SPECIFICATIONS

■ GENERAL SPECIFICATIONS

Construction		Panel flush mounting
Degree of protection		IP66; Applicable to the front of the panel meter mounted according to the specified panel cutout.
Connection		M3 separable screw terminal (torque 0.6 N·m)
Screw terminal		Nickel-plated steel (standard) or stainless steel
Housing material		Flame-resistant resin (gray)
Isolation		Input to DC output to HH output or H output to L output or LL output to power
Setting (front button)	Scaling setting mode	Input scaling value A and B, display scaling value A and B, decimal point position, analog output function mode, analog output 0% adjustment, analog output 100% adjustment
	Alarm setting mode	Alarm point, HH, H, L and LL alarm setpoint, HH, H, L and LL trip action, HH, H, L and LL deadband (hysteresis), HH, H, L and LL ON delay time, HH, H, L and LL coil at alarm, main display blinking at alarm
	Advanced setting mode	Moving average, low-end cutout, low-end cutout value, brightness, automatic return time to Measuring Mode, transition time to Lockout Setting Mode, display refreshing rate, version indication
	Lockout setting mode	Alarm setting lockout, scaling setting lockout, advanced setting lockout, forced zero lockout, loop test output lockout, initialization
	Loop test output	----
Read rate		40 times/sec. (25 msec.)
Averaging		None or moving average
Lockout setting		Prohibiting certain operations; protecting settings

■ DISPLAY

Display		16 mm (.63) high, 4 digits, 7-segment LED
Display range		-9999 to 9999
Decimal point position		10^{-1}, 10^{-2}, 10^{-3}, or none
Zero indication		Higher-digit zeros are suppressed
Over-range indication		'-9999' or '9999' blinking for display values out of the display range
Alarm status indication	LL indicator	Green turns on when the LL alarm is tripped
	L indicator	Green turns on when the L alarm is tripped
	H indicator	Red turns on when the H alarm is tripped
	HH indicator	Red turns on when the HH alarm is tripped
	P indicator	Amber turns on when none of the other alarms is tripped. Only 'P' turns on with no-alarm-output type. 'LL' or 'HH' does not turn on with dual-alarm-output type. All setpoints can be independently set either for Hi or Lo alarm trip.
Function indicators		Zro, Spn, D/P, Tch, Fnc, Min, Max Display mode status and operation status, amber ON or blink

■ INPUT SPECIFICATIONS

Total resistance	100 Ω – 10 kΩ
Minimum span	10% of total resistance
Excitation	1.2 V DC

■ OUTPUT SPECIFICATIONS

DC output	DC current	Load resistance (output range)	4 – 20 mA DC: ≤ 550 Ω 0 – 20 mA DC: ≤ 550 Ω
		Operational range	-5 – +105%
	DC voltage	Load resistance (output range)	0 – 10 V DC: ≥ 10 kΩ 0 – 5 V DC: ≥ 5000 Ω 1 – 5 V DC: ≥ 5000 Ω -10 – +10 V DC: ≥ 10 kΩ
		Operational range	-5 – +105%
Alarm output			Relay contact Rated load: 250 V AC @ 3 A (cos ø = 1) 30 V DC @ 3 A (resistive load) Maximum switching voltage: 250 V AC, 30 V DC Maximum switching power: 750 VA, 90 W (resistive load) Minimum load: 5 V DC @ 10 mA Mechanical life: ≥ 5 × 10⁶ cycles (rate 180 cycles/min.)

■ INSTALLATION

Power consumption	AC power	100 – 240 V AC	Operational voltage range 85 – 264 V AC, 50/60 Hz Approx. 6.5 VA
	DC power	24 V DC	Operational voltage range 24 V DC ±10% Ripple 10% p-p max. Approx. 3 W
		110 V DC	Operational voltage range 85 – 150 V DC Ripple 10% p-p max. Approx. 3 W
Operating temperature			-10 to +55°C (14 to 131°F)
Operating humidity			30 to 90% RH (non-condensing)
Mounting			Panel flush mounting
Weight			300 g (0.66 lb)

■ PERFORMANCE

Accuracy	Display	±0.1% ±1 digit
	Output	±0.1% (DC output = display + output)
Temp. coefficient		±0.015%/°C (±0.008%/°F)
Input resolution		Max. 16 bits
Output resolution		Max. 14 bits
Response time		≤ 0.5 sec. (alarm output: 0 – 100% at 90% setpoint) ≤ 0.5 sec. (DC output: 0 – 90%)
Line voltage effect		±0.1% over voltage range
Insulation resistance		≥ 100 MΩ with 500 V DC
Dielectric strength		2000 V AC @ 1 minute (input to DC output to HH output or H output to L output or LL output to power to ground)

■ STANDARDS & APPROVALS

EU conformity	EMC Directive
	  EMI EN 61000-6-4
	  EMS EN 61000-6-2
	Low Voltage Directive
	  EN 61010-1
	    Measurement Category II (alarm output)
	    Installation Category II (power)
	    Pollution degree 2
	    Input or DC output to alarm output to power: Reinforced insulation (300 V)
	    Input to DC output: Basic insulation (300 V)
	RoHS Directive

Protection against access to the terminal blocks	Finger protection (VDE 0660-514)

18.2 MODEL NUMBERING

Code number: **47LM–1[1][2][3]–[4][5]**

INPUT
  1: Total resistance 100 Ω – 10 kΩ

[1] DC OUTPUT
   0: Without
  Current
   A: 4 – 20 mA DC (load resistance 550 Ω max.)
   D: 0 – 20 mA DC (load resistance 550 Ω max.)
  Voltage
   4: 0 – 10 V DC (load resistance 10 kΩ min.)
   5: 0 – 5 V DC (load resistance 5000 Ω min.)
   6: 1 – 5 V DC (load resistance 5000 Ω min.)
   4W: -10 – +10 V DC (load resistance 10 kΩ min.)

[2] ALARM OUTPUT
  0: None
  1: N.O. relay contact, 4 points
  2: SPDT relay contact, 2 points

[3] DISPLAY COLOR
  R: Red
  YR: Orange
  G: Green
  BG: Bluegreen
  B: Blue
  W: White

[4] POWER INPUT
  AC Power
   M2: 100 – 240 V AC (operational voltage range
      85 – 264 V, 50/60 Hz)
  DC Power
   R: 24 V DC (operational voltage range 24 V ±10%,
      ripple 10% p-p max.)
   P: 110 V DC (operational voltage range 85 – 150 V,
      ripple 10% p-p max.)

[5] OPTIONS
  Blank: None
  /Q: With options (specify the specification)

■ **SPECIFICATIONS OF OPTION: Q**
COATING (For the detail, refer to our web site.)
 Moving parts and indicators are not coated.
   /C01: Silicone coating
   /C02: Polyurethane coating
   /C03: Rubber coating
TERMINAL SCREW MATERIAL
   /S01: Stainless steel
EX-FACTORY SETTING
   /SET: Preset according to the Ordering Information Sheet (No. ESU-9504)

18.3 PARAMETER LIST

MODE	PARAMETER	SETTING RANGE	INDICATOR	DISPLAY	DEFAULT VALUE	DECIMAL POINT POSITION	UNIT
Measuring	Present value	-9999 – 9999	HH, H, P, L, LL	----	----	*1	User-defined
	MAX value	-9999 – 9999	Max	----	----	*1	User-defined
	MIN value	-9999 – 9999	Min	----	----	*1	User-defined
	Forced zero	-9999 – 9999	Zro, Fnc	----	----	*1	User-defined
	LL alarm setpoint	-9999 – 9999	LL	----	----	*1	User-defined
	L alarm setpoint	-9999 – 9999	L	----	----	*1	User-defined
	H alarm setpoint	-9999 – 9999	H	----	----	*1	User-defined
	HH alarm setpoint	-9999 – 9999	HH	----	----	*1	User-defined
Scaling setting	Input scaling value A	----	Zro, Tch	ЕЕrо	----	----	----
	Display scaling value A	-9999 – 9999	Zro, D/P	-9999 to 9999	-1000	*1	User-defined
	Input scaling value B	----	Spn, Tch	SPAn	----	----	----
	Display scaling value B	-9999 – 9999	Spn, D/P	-9999 to 9999	1000	*1	User-defined
	Decimal point position	No decimal point, or 10⁻¹ to 10⁻³	D/P	1000 1000 1000 1000	1000	----	----
	Analog output function mode	Proportional to the display value, Proportional to the scaling value	Fnc	di.SP SCLE	di.SP	----	----
	Analog output 0% adjustment	Adjustable range -5 to +100%	Zro, Fnc	AdJ : UP (increasing) doːn (decreasing)	0% output	----	----
	Analog output 100% adjustment	Adjustable range 0 to 105%	Spn, Fnc	AdJ : UP (increasing) doːn (decreasing)	100% output	----	----
	Teach calibration (ZERO)	----	Zro, Tch	ЕЕrо	----	----	----
	Teach calibration (SPAN)	----	Spn, Tch	SPAn	----	----	----
Alarm setting	Alarm point	1: Quad alarm	HH, H, L, LL, Fnc (H, L, Fnc)	ALn4 ALn2	ALn4	----	----
		2: Dual alarm	H, L, Fnc	ALn2	ALn2		
	LL alarm setpoint	-9999 – 9999	LL, Fnc	-9999 to 9999	-0800	*1	User-defined
	LL trip action	High trip, low trip	LL, Fnc	LnHi LnLo	LnLo	----	----
	LL deadband (hysteresis)	0000 – 9999	P, LL, Fnc	0000 to 9999	0001	----	User-defined
	LL ON delay time	00 – 99	LL, D/P, Fnc	00 to 99	00	----	Second
	LL coil at alarm	Coil energized at alarm, de-energized at alarm	LL, Fnc	rYEn rYdn	rYEn	----	----
	L alarm setpoint	-9999 – 9999	L, Fnc	-9999 to 9999	-0400	*1	User-defined
	L trip action	High trip, low trip	L, Fnc	LnHi LnLo	LnLo	----	----
	L deadband (hysteresis)	0000 – 9999	P, L, Fnc	0000 to 9999	0001	----	User-defined
	L ON delay time	00 – 99	L, D/P, Fnc	00 to 99	00	----	Second
	L coil at alarm	Coil energized at alarm, de-energized at alarm	L, Fnc	rYEn rYdn	rYEn	----	----

*1 Conforms to decimal point position setting.

NOTE 1: Indicators with the present value in Measuring Mode depend on the set alarm trip action.
NOTE 2: INDICATOR: ☐ = ON, ⸨ ⸩ = Blinking
NOTE 3: 1 and 2 in the column of Alarm point in Alarm Setting Mode show alarm output codes.
NOTE 4: The indicators in parentheses in the column of Alarm point in Alarm Setting Mode show those with dual alarm selected.
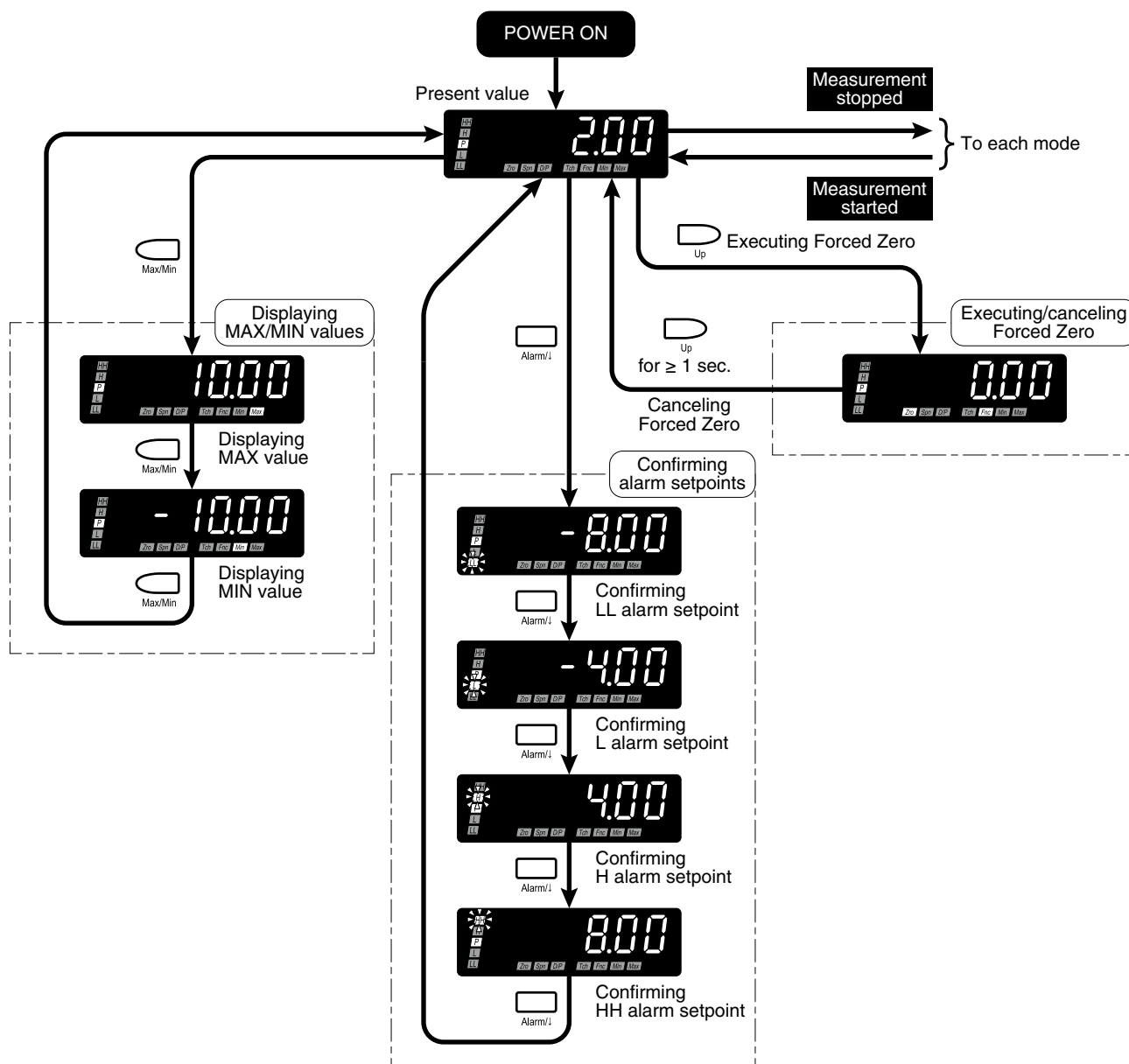
MODE	PARAMETER	SETTING RANGE	INDICATOR	DISPLAY	DEFAULT VALUE	DECIMAL POINT POSITION	UNIT
Alarm setting	H alarm setpoint	-9999 – 9999	[H], [Fnc]	-9999 to 9999	0400	*1	User-defined
	H trip action	High trip, low trip	[H], [Fnc]	LnHi LnLo	LnHi	----	----
	H deadband (hysteresis)	0000 – 9999	[H], [P], [Fnc]	0000 to 9999	0001	----	User-defined
	H ON delay time	00 – 99	[H], [D/P], [Fnc]	00 to 99	00	----	Second
	H coil at alarm	Coil energized at alarm, de-energized at alarm	[H], [Fnc]	rYEn rYdn	rYEn	----	----
	HH alarm setpoint	-9999 – 9999	[HH], [Fnc]	-9999 to 9999	0800	*1	User-defined
	HH trip action	High trip, low trip	[HH], [Fnc]	LnHi LnLo	LnHi	----	----
	HH deadband (hysteresis)	0000 – 9999	[HH], [P], [Fnc]	0000 to 9999	0001	----	User-defined
	HH ON delay time	00 – 99	[HH], [D/P], [Fnc]	00 to 99	00	----	Second
	HH coil at alarm	Coil energized at alarm, de-energized at alarm	[HH], [Fnc]	rYEn rYdn	rYEn	----	----
	Main display blinking at alarm	No blinking, blinking in 1.0, 0.5, 0.2, 0.1 sec. intervals	[Fnc]	b 0, b 1, b 2, b 3, b 4	b 0	----	Second
Advanced setting	Moving average	None, 2, 4, 8, 16, 32, 64	[Fnc]	AoFF, A 2, A 4, A 8, A 16, A 32, A 64	AoFF	----	Sample
	Low-end cutout	OFF, ON	[Fnc]	EoFF E on	EoFF	----	----
	Low-end cutout value	00 – 99	[Zro], [Fnc]	E 00 to E 99	E 00	----	User-defined
	Brightness	1 (dark) to 5 (bright)	[D/P], [Fnc]	C 1, C 2, C 3, C 4, C 5	C 3	----	----
	Automatic return time to Measuring Mode	00 (automatic return disabled) 01 – 99	[D/P], [Fnc]	r 00 to r 99	r 15	----	Second
	Transition time to Lock-out Setting Mode	00 – 99	[D/P], [Fnc]	P 00 to P 99	P 05	----	Second
	Display refreshing rate	00.0 – 99.9	[Fnc]	F00.0 to F99.9	F00.0	----	Second
	Version indication	----	[Fnc]	----	----	----	----
Lockout setting	Alarm setting lockout	OFF, ON	[D/P], [Fnc]	AoFF A on	AoFF	----	----
	Scaling setting lockout	OFF, ON	[D/P], [Fnc]	SoFF S on	SoFF	----	----
	Advanced setting lockout	OFF, ON	[D/P], [Fnc]	doFF d on	doFF	----	----
	Loop test output lockout	OFF, ON	[D/P], [Fnc]	toFF t on	toFF		
	Forced zero lockout	OFF, ON	[D/P], [Fnc]	EoFF E on	EoFF	----	----
	Initialization	OFF, initialization	[D/P], [Fnc]	roFF rESE	roFF	----	----
Loop test output	Loop test output	-9999 – 9999	[Zro], [Spn], [D/P], [Tch], [Fnc], [Max] / [Min]	-9999 to 9999 (display blinking)	----	*1	User-defined

*1 Conforms to decimal point position setting.

NOTE 2: INDICATOR: ☐ = ON, ⌐⌐ = Blinking

18.4 PARAMETER MAP

18.4.1 OPERATION IN MEASURING MODE

POWER ON

Present value

Measurement
stopped

2.00

To each mode

Measurement
started

Up Executing Forced Zero

Max/Min

Displaying
MAX/MIN values

Alarm/↓

Up
for ≥ 1 sec.

Executing/canceling
Forced Zero

10.00

Canceling
Forced Zero

0.00

Displaying
MAX value

Max/Min

- 10.00

Confirming
alarm setpoints

Displaying
MIN value

Max/Min

- 8.00

Confirming
LL alarm setpoint

Alarm/↓

- 4.00

Confirming
L alarm setpoint

Alarm/↓

4.00

Confirming
H alarm setpoint

Alarm/↓

8.00

Confirming
HH alarm setpoint

Alarm/↓

NOTE

- The display depends on the settings and input.
- Alarm setpoints cannot be confirmed with no-alarm-output type.
- When the alarm output code '2' (SPDT relay contact, 2 points) or "Dual alarm" for the alarm point parameter is selected,
  the LL and HH alarm setpoints are not indicated.
- Forced zero cannot be executed or canceled when the operation is disabled with the forced zero lockout setting.

18.4.2 SCALING SETTING MODE

___
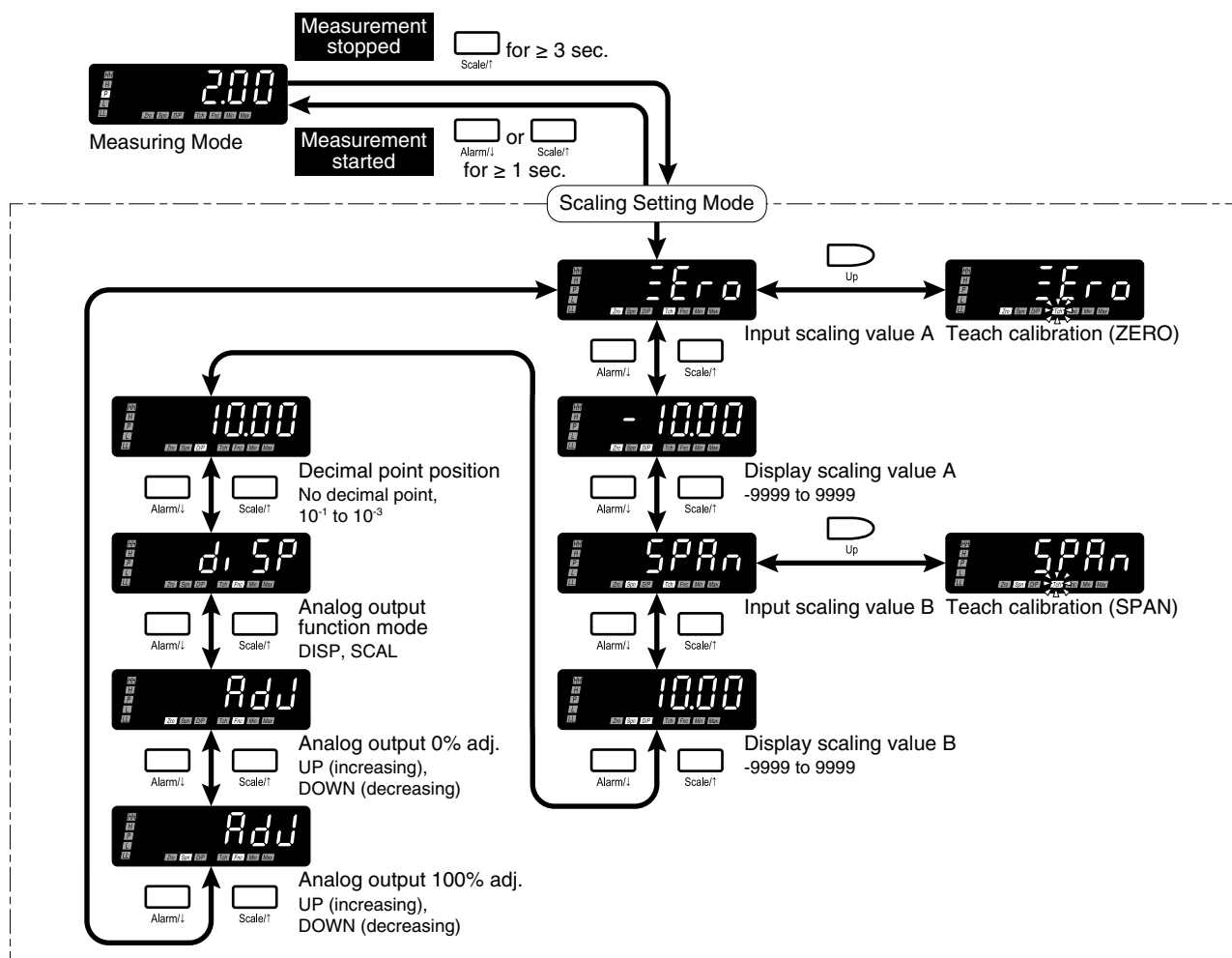
> ### *NOTE*
>
> • The display depends on the settings and input.
> • The analog output parameters are not indicated with no-DC-output type.

18.4.3 ALARM SETTING MODE

Measurement stopped — Alarm/↓ for ≥ 3 sec.

2.00 — Measuring Mode

Measurement started — Alarm/↓ or Scale/↑ for ≥ 1 sec.

Alarm Setting Mode

ALm4

Alarm/↓ / Scale/↑ — Alarm point
ALM2 (dual alarm)
ALM4 (quad alarm)

-08.00 — LL alarm setpoint
-9999 to 9999

LmLo — LL trip action
LMHI (high trip)
LMLO (low trip)

0001 — LL deadband
0000 – 9999

00 — LL ON delay time
0 – 99 sec.

rYEn — LL coil at alarm
RYEN (coil energized)
RYDN (coil de-energized)

-04.00 — L alarm setpoint
-9999 to 9999

LmLo — L trip action
LMHI (high trip)
LMLO (low trip)

0001 — L deadband
0000 – 9999

00 — L ON delay time
0 – 99 sec.

rYEn — L coil at alarm
RYEN (coil energized)
RYDN (coil de-energized)

04.00 — H alarm setpoint
-9999 to 9999

LmHi — H trip action
LMHI (high trip)
LMLO (low trip)

0001 — H deadband
0000 – 9999

00 — H ON delay time
0 – 99 sec.

---

rYEn — H coil at alarm
RYEN (coil energized)
RYDN (coil de-energized)

08.00 — HH alarm setpoint
-9999 to 9999

LmHi — HH trip action
LMHI (high trip)
LMLO (low trip)

0001 — HH deadband
0000 – 9999

00 — HH ON delay time
0 – 99 sec.

rYEn — HH coil at alarm
RYEN (coil energized)
RYDN (coil de-energized)

b 0 — Main display blinking at alarm
No blinking, blinking in 1.0, 0.5, 0.2 or 0.1 sec. intervals

NOTE

• The display depends on the settings and input.
• Alarm Setting Mode is locked with no-alarm-output type.
• When the alarm output code '2' (SPDT relay contact, 2 points) or "Dual alarm" for the alarm point parameter is selected, the LL and HH parameters are disabled.

18.4.4 ADVANCED SETTING MODE
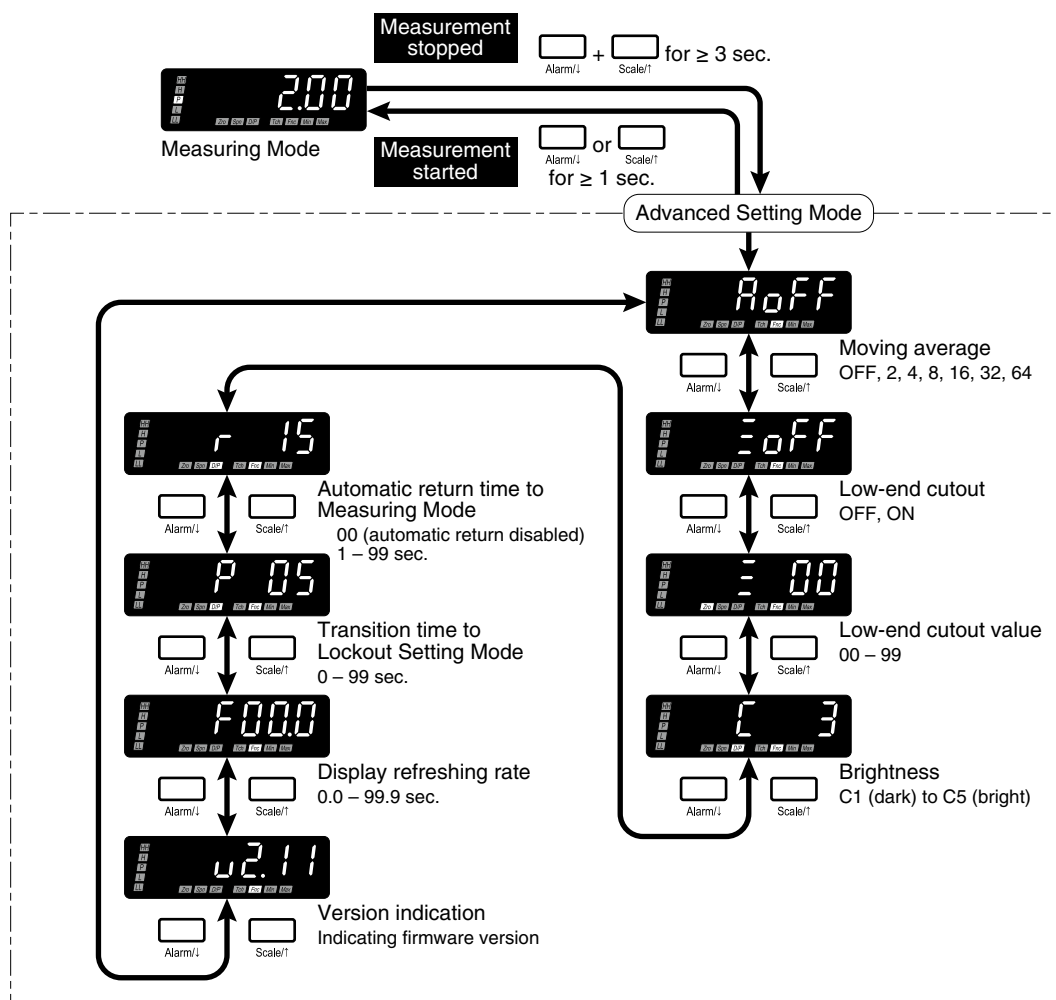
NOTE

• The display depends on the settings and input.
• With the low-end cutout set to OFF, the low-end cutout value setting is locked.
• Version indication is for indication only, not for setting.

18.4.5 LOCKOUT SETTING MODE
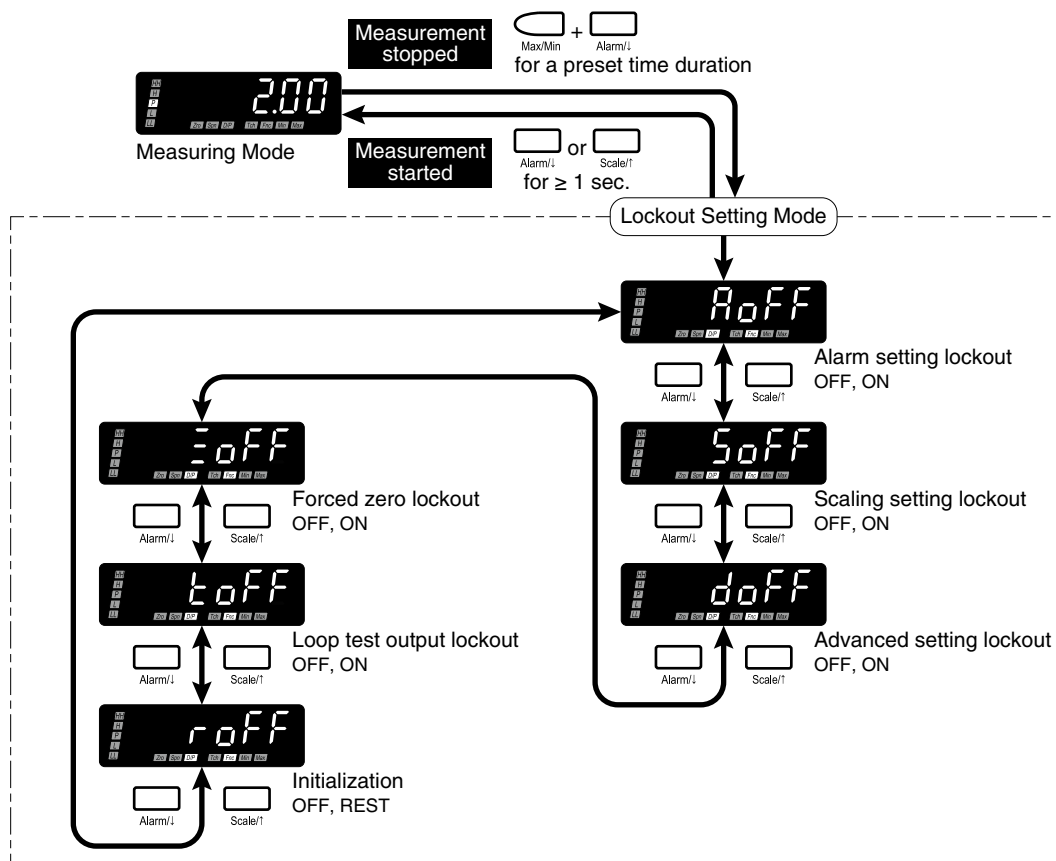
> **NOTE**
>
> • The display depends on the settings and input.
> • The alarm setting lockout is not indicated with no-alarm-output type. Instead, the scaling setting lockout is indicated
>   first after shifted to Lockout Setting Mode.

18.4.6 LOOP TEST OUTPUT MODE
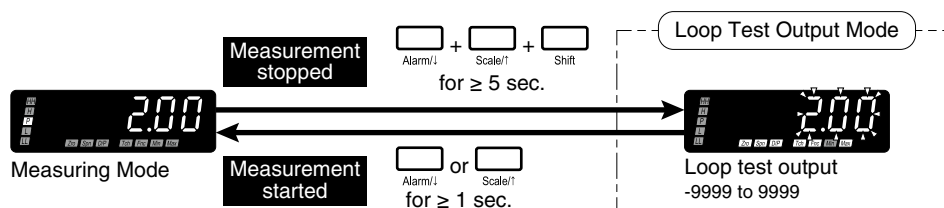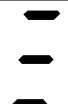
> **NOTE**
>
> The display depends on the settings and input.

18.5 CHARACTER SET

■ NUMERALS AND NEGATIVE SIGN

0	1	2	3	4	5	6	7	8	9
0	1	2	3	4	5	6	7	8	9

-
—

■ ALPHABET

A	B	C	D	E	F	G	H	I	J
A	b	C	d	E	F	G	H	i	J

K	L	M	N	O	P	Q	R	S	T
Y	L	m	n	o	P	q	r	S	t

U	V	W	X	Y	Z
U	u	Y	u	Y	Z

18.6 DIFFERENCES IN FIRMWARE VERSIONS

Some parameters and displays depend on the firmware versions.

18.6.1 ADDED PARAMETERS

Parameters added since the firmware version 2.00 are shown in the following table.

MODE	PARAMETER
Scaling Setting	Analog output function mode
	Analog output 0% adjustment
	Analog output 100% adjustment
Alarm Setting	LL, L, H and HH trip action
	LL, L, H and HH coil at alarm
	Main display blinking at alarm
Advanced Setting	Display refreshing rate
Lockout Setting	Loop test output lockout
Loop Test Output	----

18.6.2 ADDED SETTINGS

Settings added since the firmware version 2.00 are shown in the following table.

MODE	PARAMETER	SETTING
Advanced Setting	Moving average	16, 32 and 64 samples

18.6.3 DISPLAY

■ ALARM INDICATORS IN MODE TRANSITION

The last status of alarm indicators before mode transition from Measuring Mode is held in the firmware version **2.00 or later**. Therefore some alarm indicators turn on in setting parameters in each mode.

■ DECIMAL POINT POSITION IN SETTING NUMERICAL VALUES

In the firmware version **2.00 or later**, the decimal point position stays in going to other digits to set "display scaling values A & B" in Scaling Setting Mode and "LL, L, H and HH alarm setpoints" in Alarm Setting Mode.

■ ALARM SETPOINTS

In the firmware version **lower than 2.00**, the setpoints must be "**LL alarm setpoint < L alarm setpoint < H alarm setpoint < HH alarm setpoint**". For instance, the LL alarm setpoint must be smaller than the L alarm setpoint even while setting. Therefore it may be necessary to change the setting order to meet the above condition. In the firmware version **2.00 or later**, the alarm setpoints can be set regardless of this.

■INDICATORS IN ALARM SETTING MODE

The status of the indicators in Alarm Setting Mode depends on the firmware versions as shown in the following table.

PARAMETER	VERSION < 2.00	VERSION ≥ 2.00
LL alarm setpoint	LL, Fnc	LL, Fnc
LL deadband	H, LL, Fnc	P, LL, Fnc
LL ON delay time	LL, D/P, Fnc	LL, D/P, Fnc
L alarm setpoint	L, Fnc	L, Fnc
L deadband	H, L, Fnc	P, L, Fnc
L ON delay time	L, D/P, Fnc	L, D/P, Fnc
H alarm setpoint	H, Fnc	H, Fnc
H deadband	H, Fnc	H, P, Fnc
H ON delay time	H, D/P, Fnc	H, D/P, Fnc
HH alarm setpoint	HH, Fnc	HH, Fnc
HH deadband	HH, H, Fnc	HH, P, Fnc
HH ON delay time	HH, D/P, Fnc	HH, D/P, Fnc

■ DEADBAND

The deadband range is changed from "**0001** – 9999" to "**0000** – 9999" in the firmware version **2.00 or later**.

■ INITIALIZATION

The time all the indications turn on in executing initialization is changed from "**approx. 2 sec.**" to "**approx. 5 sec.**" in the firmware version **2.00 or later**.