Digital Panel Meters 47 Series

RTD INPUT DIGITAL PANEL METER

(4 digit, LED display type)

Model: 47LR

OPERATING MANUAL

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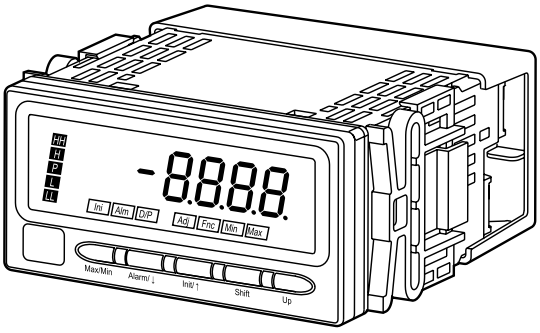
1. INTRODUCTION

1.1 BEFORE USE....

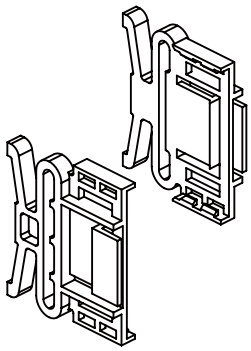
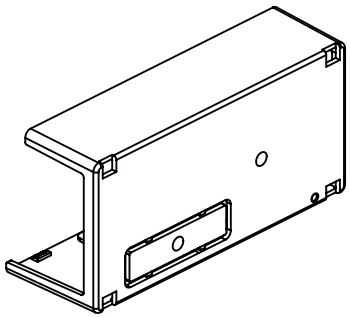
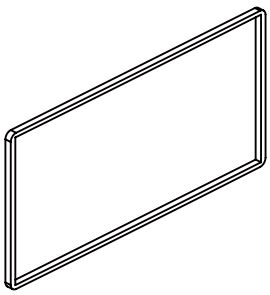
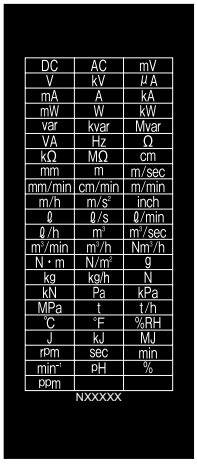
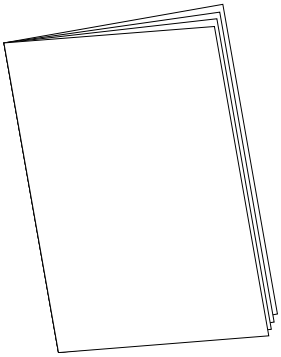
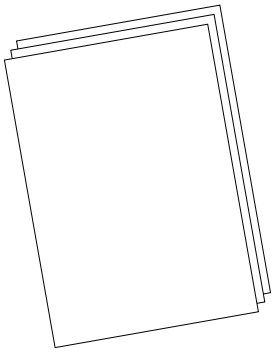
Thank you for choosing us. Before use, please check contents of the package you received as outlined below.

■ PACKAGE INCLUDES

Digital panel meter



Accessories

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

DC	AC	mV
V	kV	μA
mA	A	kA
mW	W	kW
var	kvar	Mvar
VA	Hz	Ω
kΩ	MΩ	cm
mm	m	m/sec
mm/min	cm/min	m/min
m/h	m/s²	inch
ℓ	ℓ/s	ℓ/min
ℓ/h	m³	m³/sec
m³/min	m³/h	Nm³/h
N・m	N/m²	g
kg	kg/h	N
kN	Pa	kPa
MPa	t	t/h
°C	°F	%RH
J	kJ	MJ
rPm	sec	min
min⁻¹	pH	%
ppm		

NXXXXX

■ 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 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 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.

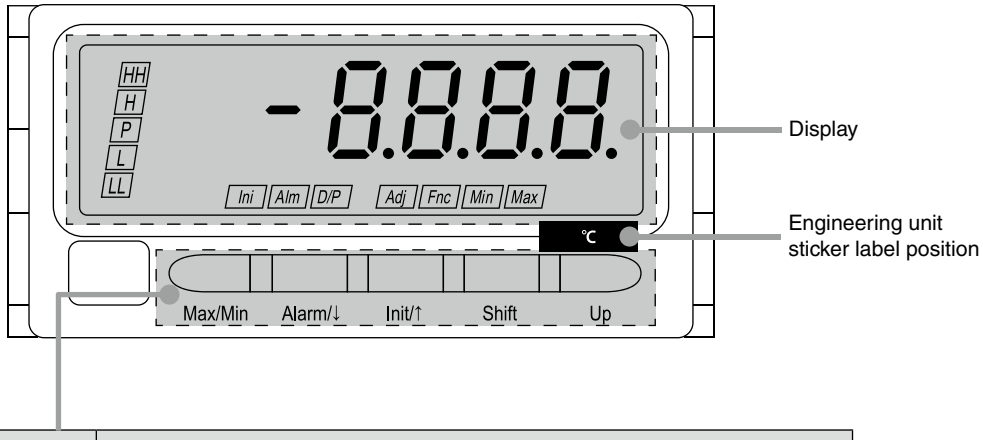
■ TO ENSURE DUSTPROOF AND WATERPROOF (degree of protection IP66)

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



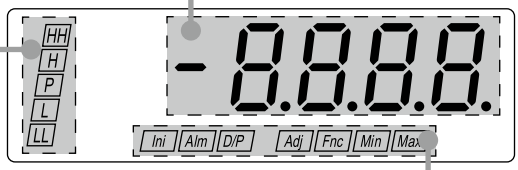
BUTTON	FUNCTION
Max/Min	Used to switch the main display to show the present value, MAX value or MIN value, and to reset the MAX and MIN values. Also used to cancel a set item.
Alarm/↓	Used to confirm the alarm setpoints, to move on to the alarm and other setting modes, or to shift through setting items in each setting mode.
Init/↑	Used to move on to the initial 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.

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**

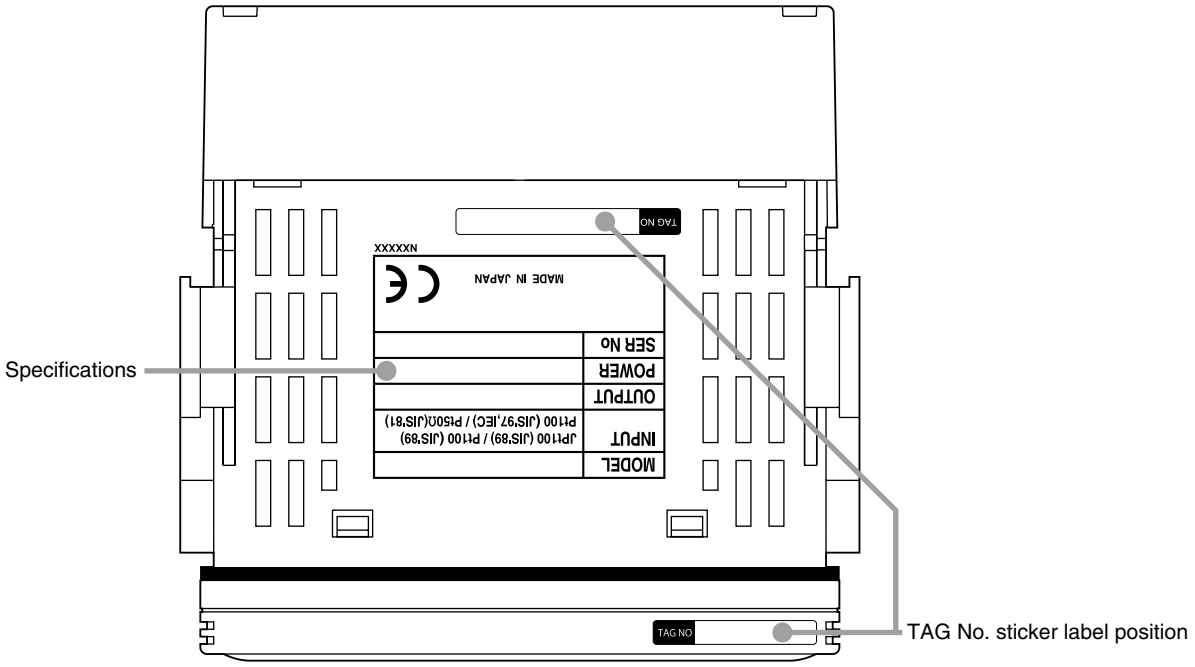
COMPONENT	FUNCTION
Main display	Indicates present, MAX and MIN values, parameters, setting values and error codes.



INDICATOR	MODE	FUNCTION
Alarm	Setting	Indicates parameters in Alarm Setting Mode. (Refer to 9. SETTING ALARM OUTPUT.)
	Confirming alarm setpoints	'HH', 'H', 'L' or 'LL' indicator blinks in confirming each alarm setpoint. (Refer to 16.1 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. 'Ini', 'Alm', 'D/P', 'Adj', 'Fnc', 'Min' and 'Max' indicators turn on in combination depending on the parameters.
		'Max' and 'Min' indicators blink when a parameter is within invalid range while setting.
	Measuring	Indicates MAX or MIN value. 'Max' or 'Min' indicator turns on. (Refer to 16.2 RETAINING MAX AND MIN VALUES.)

■ **TOP VIEW**

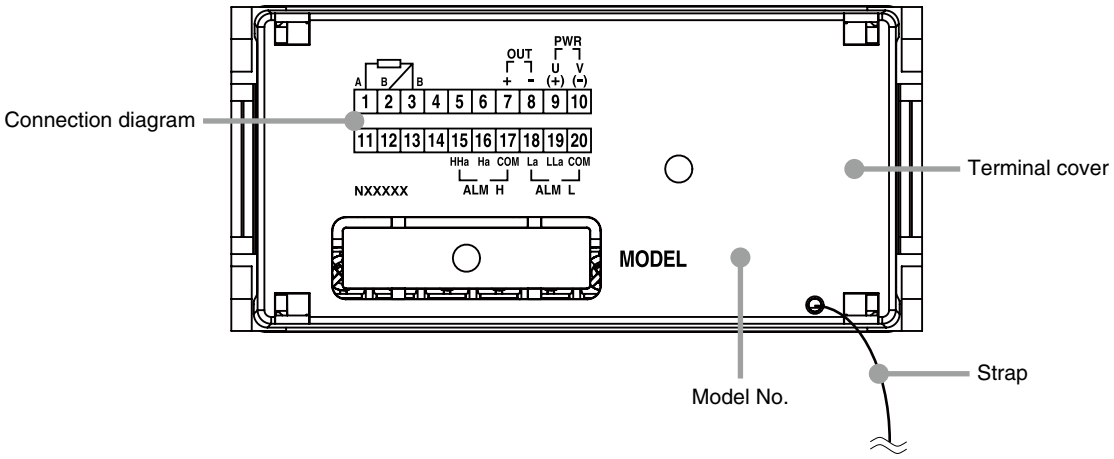


NOTE

- 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

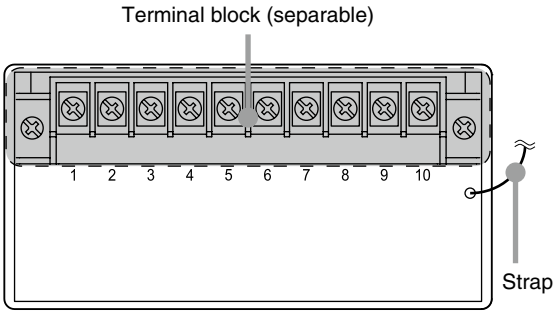


NOTE

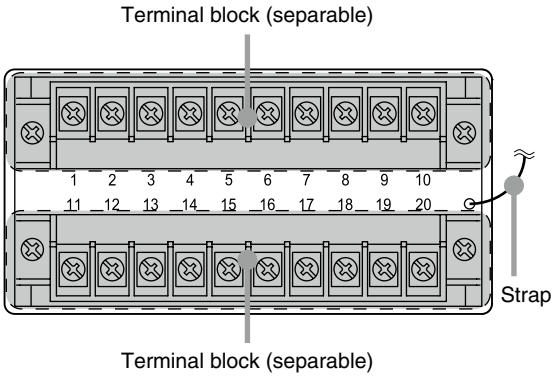
- The connection diagram depends on the specifications.
- The MODEL shows the same as that in the specification label on the top of the unit.

• Without Terminal Cover

No alarm output



Alarm output

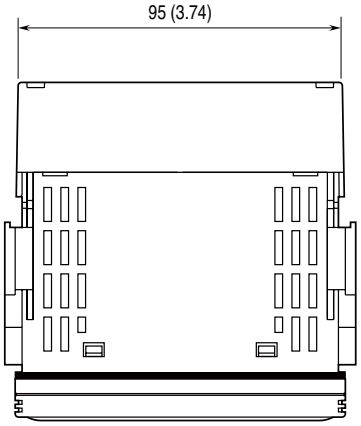


1.5 INSTALLATION

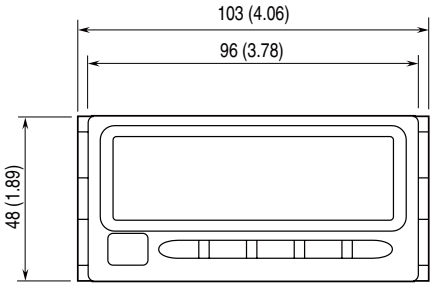
1.5.1 EXTERNAL DIMENSIONS

unit: mm (inch)

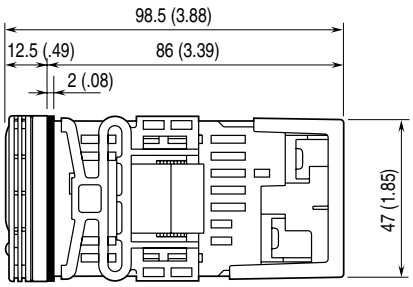
■ **TOP VIEW**



■ **FRONT VIEW**

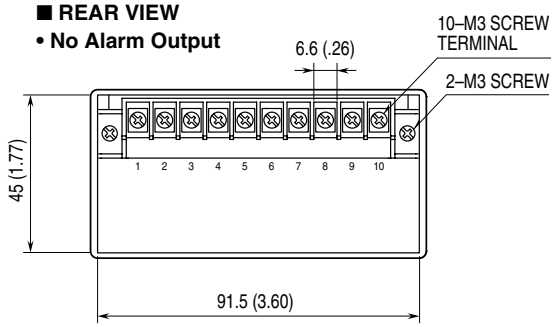


■ **SIDE VIEW**

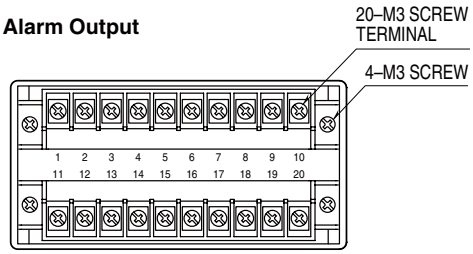


■ **REAR VIEW**

• No Alarm Output

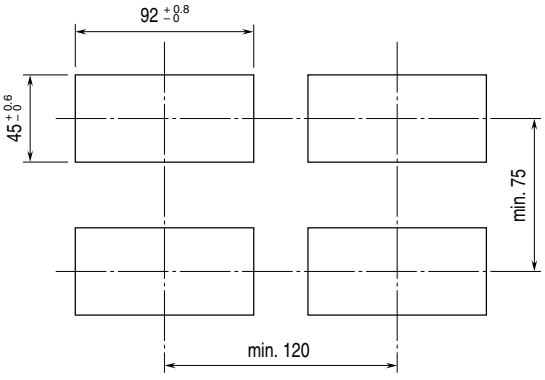


• Alarm Output



1.5.2 PANEL CUTOUT DIMENSIONS

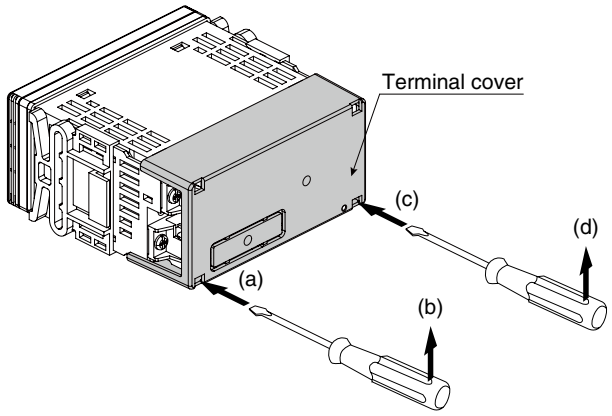
unit: mm



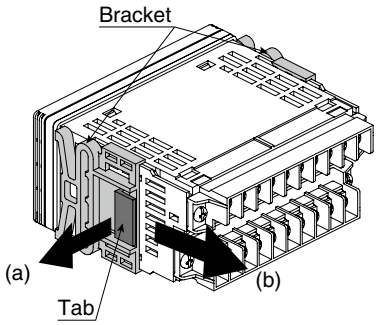
Panel thickness: 1.6 to 8.0 mm

1.5.3 INSTALLATION

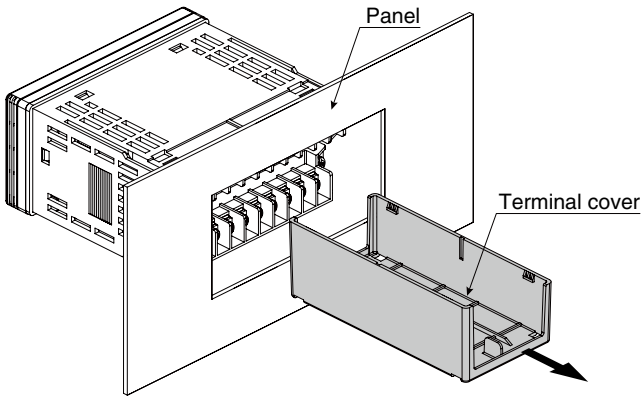
(1) Remove the terminal cover.
  (a) Insert the minus tip of a screwdriver into a hole at the lower left corner of the cover.
  (b) Pull the handle upward.
  (c) Then insert the screwdriver into a hole at the lower right corner.
  (d) Pull the handle upward to separate the terminal cover.



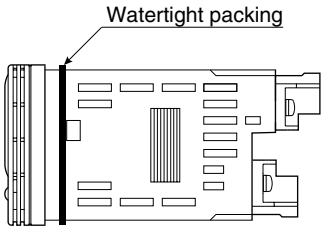
(2) Remove the mounting brackets.
  (a) Flip a tab of a bracket.
  (b) Then pull the bracket toward the terminal block to remove it.



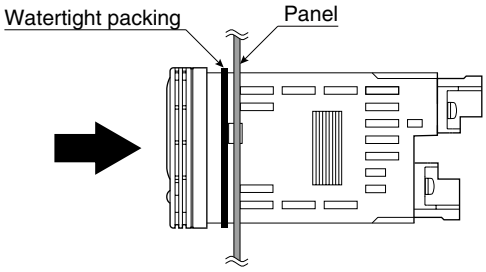
(3) Put the terminal cover through the panel cutout.



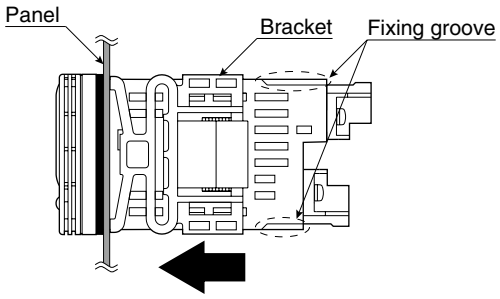
(4) Make sure that the watertight packing is placed behind the front cover regardless of necessity of water-tightness.



(5) Insert the unit into the panel cutout.



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



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

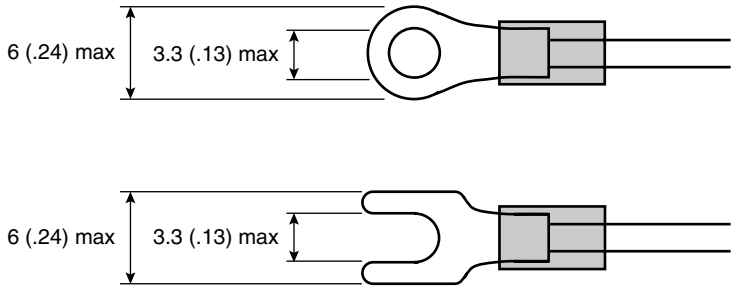
1.6.1 CAUTION IN WIRING

- 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)



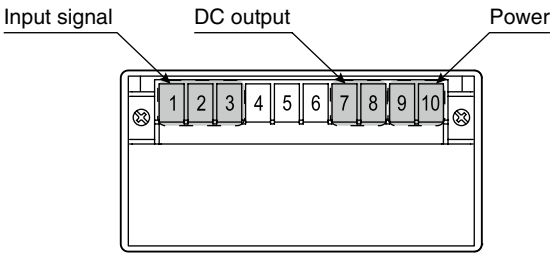
Applicable wire size: 0.25 to 1.65 mm^2
Torque: 0.6 N·m
Recommended manufacturer: Japan Solderless Terminal MFG. Co., Ltd., Nichifu Co., Ltd.

IMPORTANT

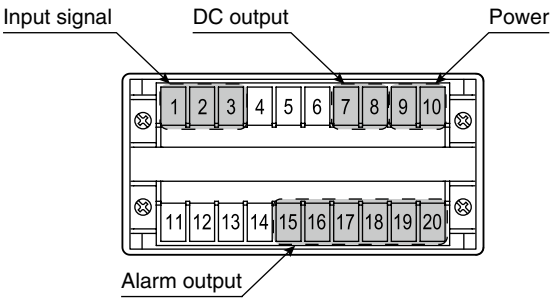
- Insulated solderless terminals are recommended.
- In using non-insulated solderless terminals, cover them with insulating caps or tubes.
- Ring tongue terminals are recommended rather than spade tongue terminals to prevent from falling off.

1.6.3 TERMINAL ASSIGNMENT

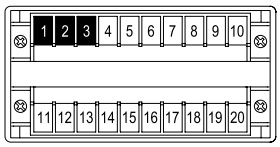
■ NO ALARM OUTPUT



■ ALARM OUTPUT



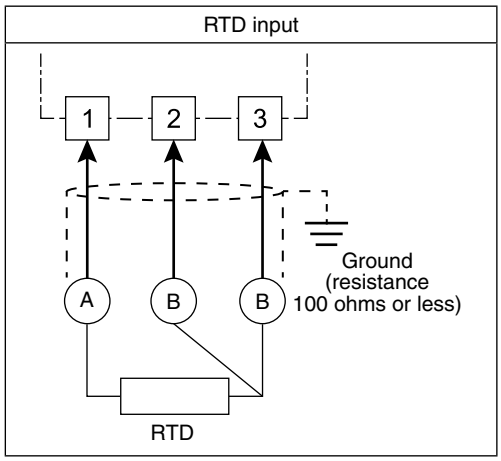
1.6.4 WIRING INPUT SIGNAL



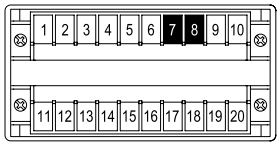
Connect a RTD.

IMPORTANT

- Use wires of the same type, width and length.
- The leadwire resistance including internal resistance such like a lightning surge protector and a barrier must be maximum 10 Ω per wire.
- The excitation is 1 mA. Use a RTD with excitation 1 mA or more.
- 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.



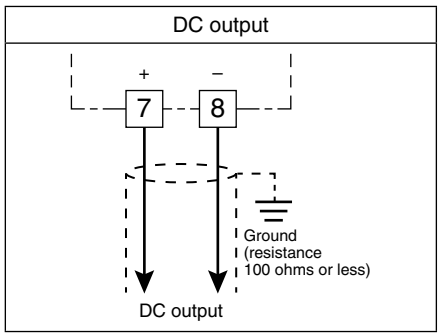
1.6.5 WIRING DC OUTPUT



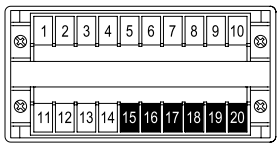
Voltage or current is output depending on the specified DC output code.

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.



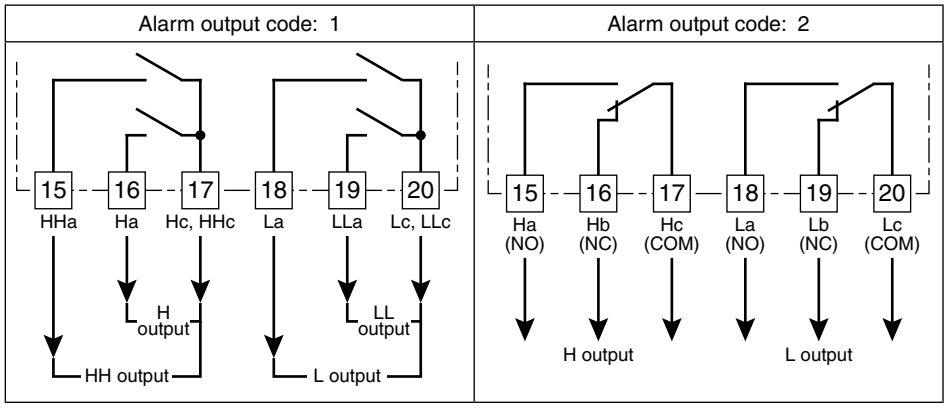
1.6.6 WIRING ALARM OUTPUT



Two or four alarm contacts are output depending on the specified alarm output code.

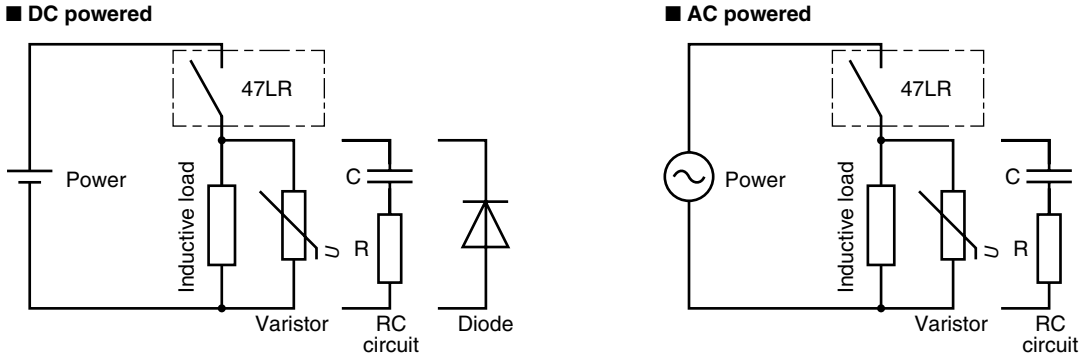
IMPORTANT

- Connect load within the specifications.
- The mechanical lifetime of the relays is 5,000,000 operations.
- With inductive load such like 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.



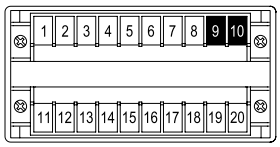
NOTE

Example of contact protection circuit with inductive load



* 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

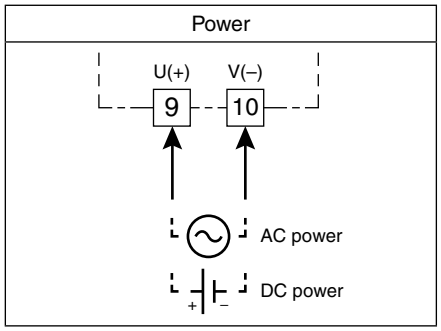


Connect power according to the power input code. The power specifications are shown in the following table.

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.



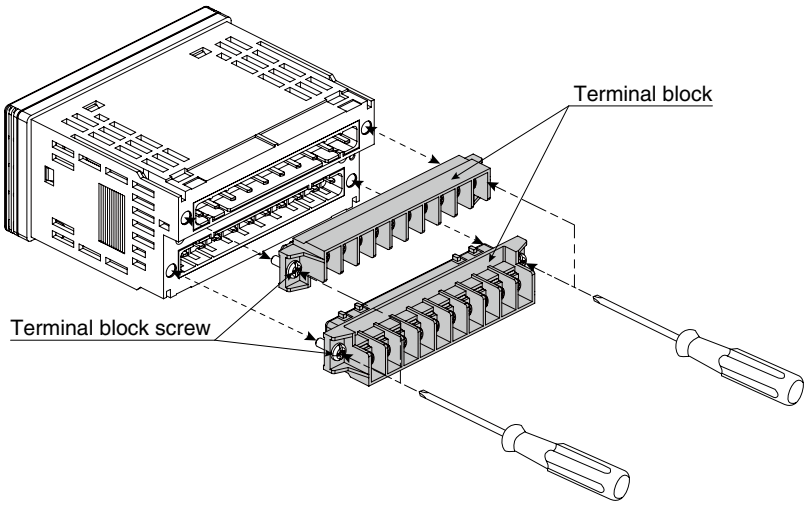
1.6.8 INSTALLING/SEPARATING TERMINAL BLOCK

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.

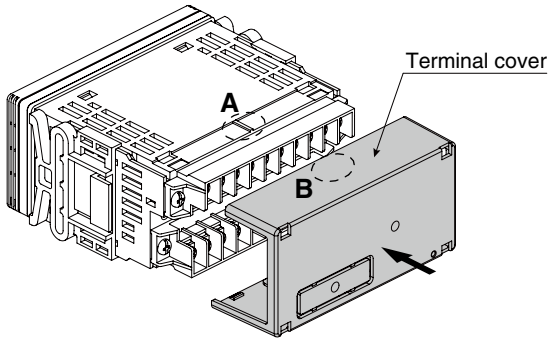


1.6.9 ATTACHING/REMOVING TERMINAL COVER

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

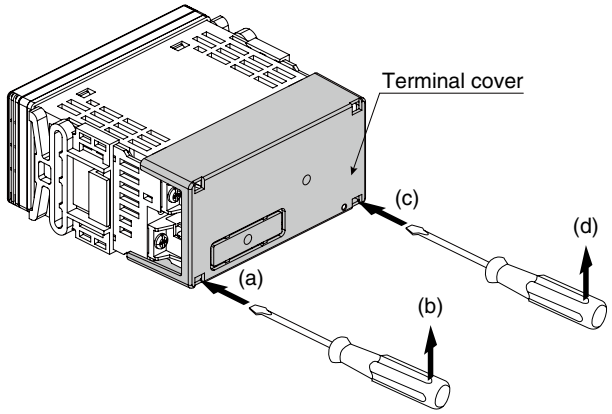
■ ATTACHING TERMINAL COVER

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.



■ **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.



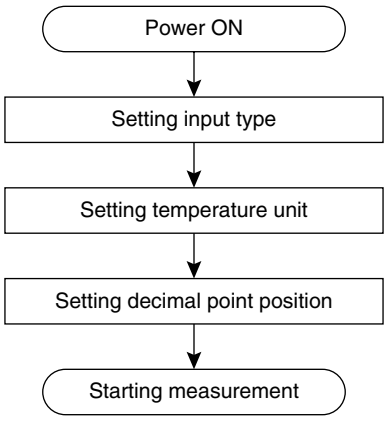
2. BASIC SETTING AND OPERATION

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 type to JPt 100 (JIS '89), the temperature unit to °C and the decimal point position to 1 decimal place as an example.

2.1.1 BASIC SETTING FLOW

The basic setting is as shown in the following flowchart.



2.1.2 BASIC SETTING PROCEDURE

The following shows the procedure to set the input type to JPt 100 (JIS '89), the temperature unit to °C and the decimal point position to 1 decimal place as an example. Set an RTD, temperature unit and decimal point position to use. Refer to 3. SETTING INPUT TYPE 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 type	1	Ini	JPt 100 (JIS '89)
Temperature unit	C	Ini	Temperature indication in °C
Decimal point position	D ON	Ini, D/P	1 decimal place

■ BASIC SETTING PROCEDURE

The basic setting procedure is as follows.

1 **Confirm the wiring, turn on the power and move on to Initial Setting Mode (measurement stopped).**

- Hold down Init/↑ button for 3 seconds or more.

2 **Set input type.**

- Press Shift button to shift the display into the setting standby mode and Up button to select the input type.

3 **Set temperature unit.**

- Press Alarm/↓ or Init/↑ 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 temperature unit.

4 **Set decimal point position.**

- Press Alarm/↓ or Init/↑ 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.

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

- Hold down Alarm/↓ or Init/↑ 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 two setting types, “numerical value setting” and “setting value 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.**

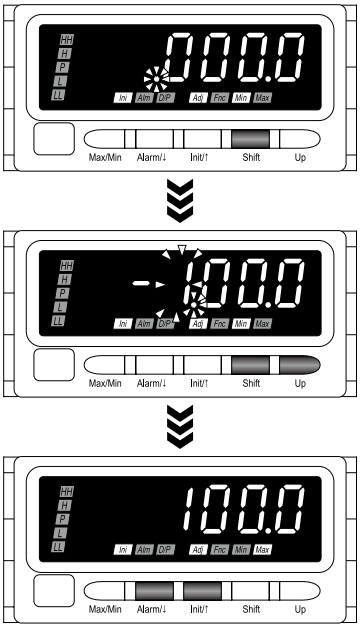
• The most significant digit starts blinking.

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 Init/↑ button to apply the new setting.**

• The next or previous parameter setting is indicated.

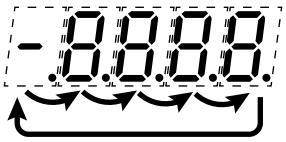


*1 Display depands on the specifications and settings.

NOTE

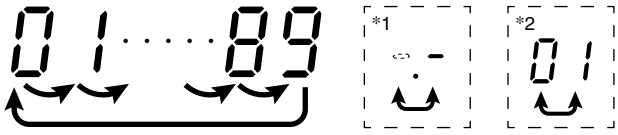
■ SHIFTING DIGITS

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. ‘0’ or ‘1’ can be set in the forth digit with negative indication. In setting an alarm setpoint, the indication following ‘9’ will be ‘-’, and the indication of the forth digit following ‘1’ will be ‘-’ with negative indication.
• The negative sign (-) must be set to the leftmost digit. For example, set ‘-0040’ instead of ‘-40’.



*1 Fifth digit
*2 Forth digit with negative indication

■ **SETTING VALUE SELECTION**

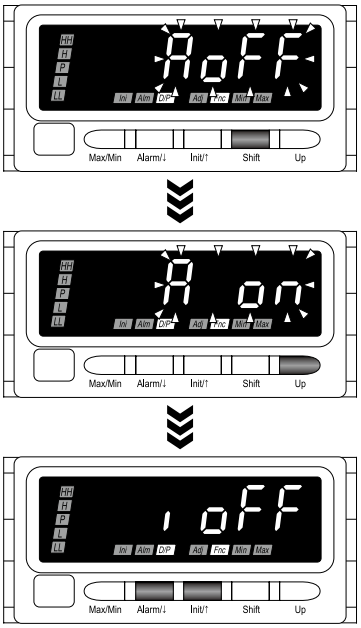
1 **Press Shift button to shift the display into the setting standby mode.**

• The current set value starts blinking.

2 **Press Up button to select your desired setting value.**

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

• The next or previous parameter setting is indicated.



*1 Display depands on the specifications and settings.

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.

– In setting the negative sign (-) to a digit other than the leftmost one.

■ **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 12. 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 19.2 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 7. PARAMETER CONFIGURATION for details.

3. SETTING INPUT TYPE

Set input type according to the RTD to use.

3.1 INPUT TYPE LIST

■ TEMPERATURE UNIT: °C

DISPLAY	FUNCTION	USABLE RANGE	CONFORMANCE RANGE	DEFAULT VALUE
4	Pt 100 (JIS '97, IEC)	-230 to +880	-200 to +850	4
5	Pt 50Ω (JIS '81)	-230 to +679	-200 to +649	
1	JPt 100 (JIS '89)	-230 to +530	-200 to +500	
3	Pt 100 (JIS '89)	-230 to +680	-200 to +650	

■ TEMPERATURE UNIT: °F

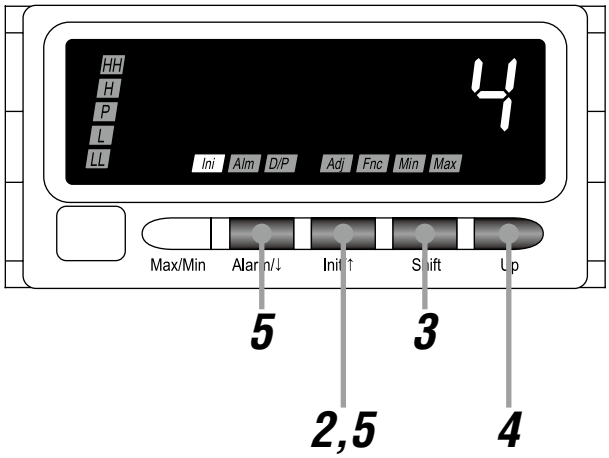
DISPLAY	FUNCTION	USABLE RANGE	CONFORMANCE RANGE	DEFAULT VALUE
4	Pt 100 (JIS '97, IEC)	-382 to +1616	-328 to +1562	4
5	Pt 50Ω (JIS '81)	-382 to +1256	-328 to +1202	
1	JPt 100 (JIS '89)	-382 to +986	-328 to +932	
3	Pt 100 (JIS '89)	-382 to +1256	-328 to +1202	

IMPORTANT

- The display accuracy is assured within the conformance range though indicating within the usable range is available.
- Indication less than '-199.9' is not available when the temperature unit is set to °C and the decimal point position to 1 decimal place.
- The input compensation is reset to the default value when the input type has been changed. All alarm setpoints are disabled (reset to '----' status) and the deadband is changed to 0001. Also other alarm parameters (except for main display blinking at alarm) are reset to the default values. It is recommended to record the current settings as necessary.

3.2 OPERATING PROCEDURE

Procedures to change the input type '4' (default) to '1' (JPt 100 (JIS '89)) are described here.



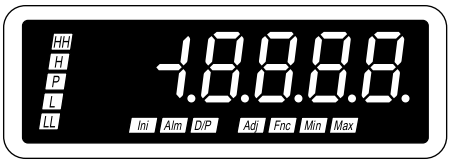
NOTE

The left figure shows a display example (default input type). The display depends on the settings.

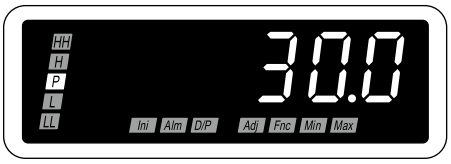
1 Confirm the wiring, and turn on the power.

- 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



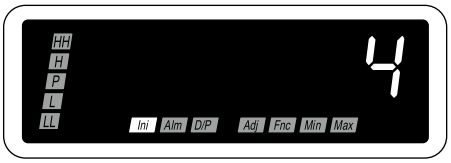
*1 Display depends on the settings and input.

NOTE

- Indication 'S.ERR' may blink, which shows the input out of the measuring range and does not show the unit failure.
- Indication 'B.ERR' may blink, which shows the input open or out of the range and does not show the unit failure.

2 Hold down Init/↑ button for 3 seconds or more to move on to Initial Setting Mode.

- The input type is indicated.
- 'Ini' indicator turns on.

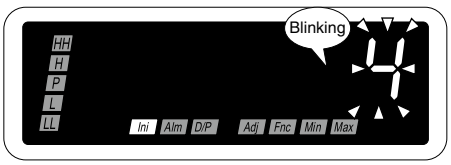


NOTE

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.

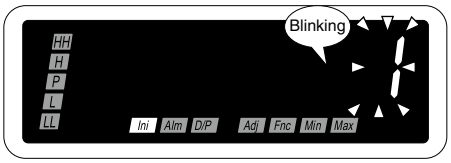
3 Press Shift button to shift the display into the setting standby mode.

- The indication '4' starts blinking, to which you can apply changes.



4 **Press Up button to select the input type.**

• Select '1' (JPt 100 (JIS '89)).



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

• And the next parameter setting is indicated.

NOTE

• Press Alarm/↓ button, and the temperature unit 'C' or 'F' will be indicated depending on the setting.
• Press Init/↑ button, and the input compensation will be indicated within the range of -1999 to 9999 depending on the setting, or the analog output 100% adjustment 'ADJ' will be indicated with DC output.

6 **■ TO GO ON TO SET THE TEMPERATURE UNIT,**
Skip to Step 3 in "4. SETTING TEMPERATURE UNIT".

■ TO QUIT,
Hold down Alarm/↓ or Init/↑ 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 3 and 4).
• 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 12. 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 3 and 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 19.2 INITIALIZING SETTING VALUES.)

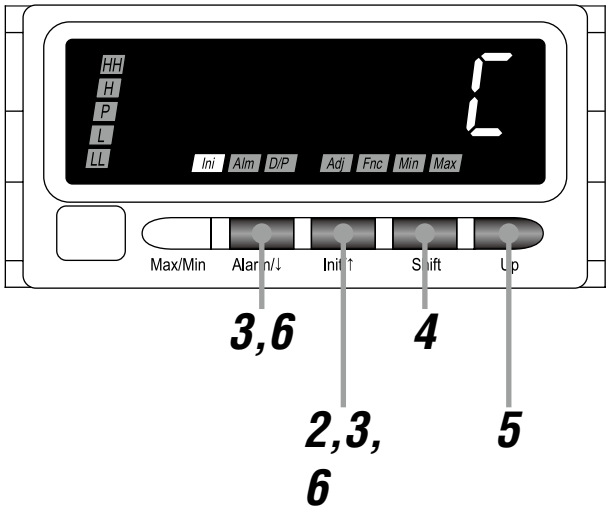
4. SETTING TEMPERATURE UNIT

The temperature indication in °C ('C') or °F ('F') can be selected. The default value is °C.

IMPORTANT

- All alarm setpoints are disabled (reset to '----' status) and the deadband is changed to 0001 when the temperature unit has been changed. Also other alarm parameters (except for alarm point and main display blinking at alarm) are reset to the default values. It is recommended to record the current settings as necessary.
- The analog output 0% and 100% must be re-set if the decimal point position is shifted due to a temperature unit change from °C to °F with the decimal point position set to 1 decimal place.
  e.g. In changing the temperature unit from °C to °F, the set value of the analog output 100% will be changed from 100.0°C to 1000°F. Because of the DC output provided for the display value, the analog output 100% will be changed from 100.0°C to 1000°F.

4.1 OPERATING PROCEDURE



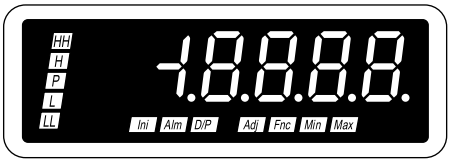
NOTE

- Procedures to change 'F' to 'C' are described here.
- To change 'C' to 'F', the procedures are same. Select 'F' in Step 5.

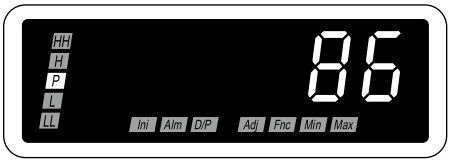
1 **Confirm the wiring, and turn on the power.**

- 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



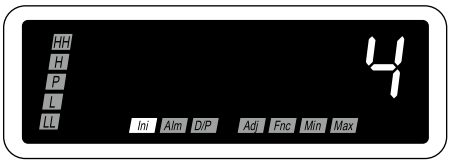
*1 Display depends on the settings and input.

NOTE

- Indication 'S.ERR' may blink, which shows the input out of the measuring range and does not show the unit failure.
- Indication 'B.ERR' may blink, which shows the input open or out of the range and does not show the unit failure.

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

- The input type is indicated.
- 'Ini' indicator turns on.



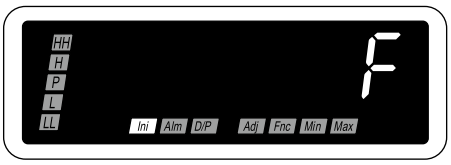
NOTE

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 Init/↑ button to go to the temperature unit setting.**

- 'F' is indicated.
- 'Ini' indicator turns on.



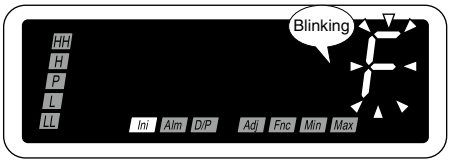
NOTE

Skip to Step 7 if the default value is acceptable.

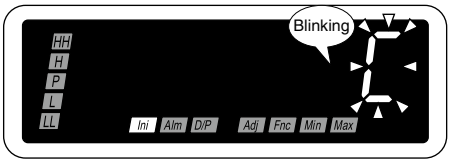
---

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 'C'.**



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

- And the next parameter setting is indicated.

NOTE

- Press Alarm/↓ button, and the decimal point position 'DOFF' will be indicated, or the input compensation will be indicated within the range of -1999 to 9999 depending on the setting with the temperature unit set to °F.
- Press Init/↑ button, and the input type will be indicated.

---

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

■ **TO QUIT,**
Hold down Alarm/↓ or Init/↑ 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 12. 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 19.2 INITIALIZING SETTING VALUES.)

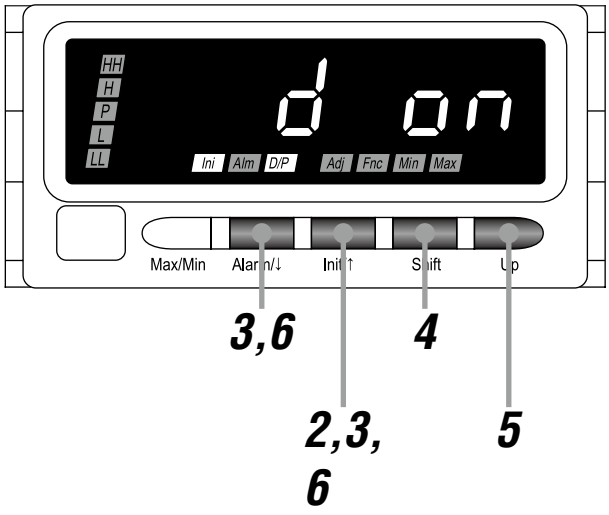
5. SETTING DECIMAL POINT POSITION

The decimal point position, 1 decimal place ('D ON') or no decimal point ('DOFF') can be selected. The default value is 1 decimal place.

IMPORTANT

- The decimal point position is disabled with the temperature unit set to °F.
- "1 decimal place" setting is automatically reset to "no decimal fraction" when the temperature unit is switched from °F to °C.
- The input compensation, analog output 0% and 100%, and alarm setpoints must be re-set if the decimal point position is shifted due to the change of the decimal point position from 1 decimal place to no decimal fraction, or vice versa.
  e.g. In changing the decimal point position from 1 decimal place to no decimal fraction, the set value of the analog output 100% will be changed from 100.0°C to 1000°C. Because of the DC output provided for the display value, the analog output 100% will be changed from 100.0°C to 1000°C.

5.1 OPERATING PROCEDURE



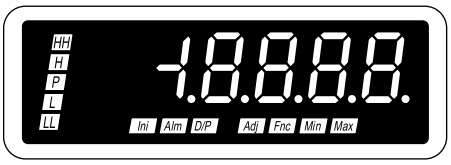
NOTE

- Procedures to change 'DOFF' to 'D ON' are described here.
- To change 'D ON' to 'DOFF', the procedures are same. Select 'DOFF' in Step 5.

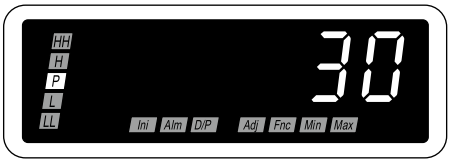
1 **Confirm the wiring, and turn on the power.**

- 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



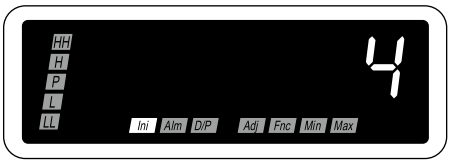
*1 Display depends on the settings and input.

NOTE

- Indication 'S.ERR' may blink, which shows the input out of the measuring range and does not show the unit failure.
- Indication 'B.ERR' may blink, which shows the input open or out of the range and does not show the unit failure.

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

- The input type is indicated.
- 'Ini' indicator turns on.

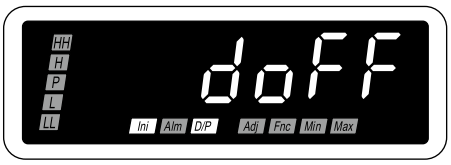


NOTE

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 Init/↑ button to go to the decimal point position setting.**

- 'DOFF' is indicated.
- 'Ini' and 'D/P' indicators turn on.

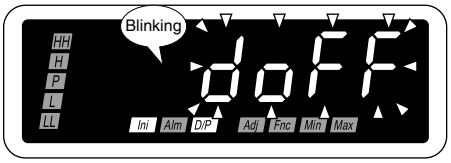


NOTE

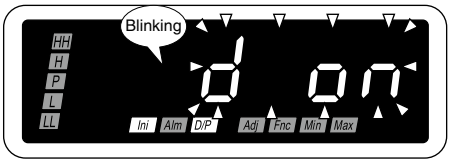
Skip to Step 7 if the default value is acceptable.

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 'D ON'.**



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

- And the next parameter setting is indicated.

NOTE

- Press Alarm/↓ button, and the input compensation will be indicated within the range of -1999 to 9999 depending on the setting.
- Press Init/↑ button, and the temperature unit 'C' will be indicated.

7 ■ **TO GO ON TO SET THE ANALOG OUTPUT,**
Skip to Step 2 in "8. SETTING ANALOG OUTPUT".

■ **TO QUIT,**
Hold down Alarm/↓ or Init/↑ 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 12. 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 19.2 INITIALIZING SETTING VALUES.)

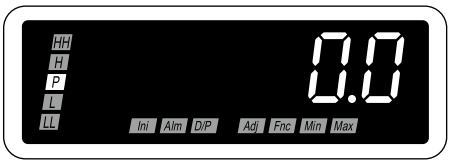
6. OPERATION

Make sure that the input JPt 100 (JIS '89), 0.0 – 100.0°C is correctly indicated.

IMPORTANT

Before operating, make sure that the wiring is correct, the input and the power supply are within the specification range.

1 **Provide 0°C input and make sure that 0.0°C is indicated.**



*1 Display depends on the settings and input.

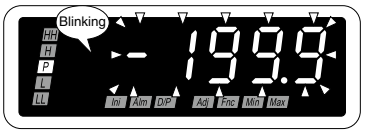
NOTE

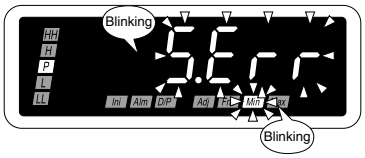
■ **WHEN THE FOLLOWING IS INDICATED…**

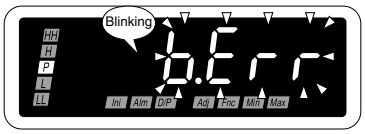
- When indication '-199.9' blinks, the input signal is under the specification temperature. Check the input type, RTD and input wiring.
- When 'S.ERR' is indicated, the input is not applied correctly. Check the input type, RTD and input wiring.
- When 'B.ERR' is indicated, one or some of the input wires is/are disconnected, or the input is beyond the 'S.ERR' indication range. Check the input type, RTD and input wiring.

■ **ALARM INDICATORS**

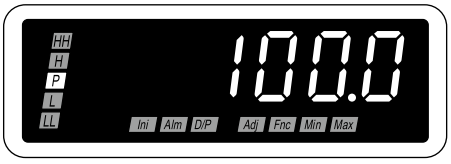
- The status of the alarm indicators depends on the alarm setpoints. The above display examples show 'P' indicator on.







2 **Provide 100°C input and make sure that 100.0°C is indicated.**



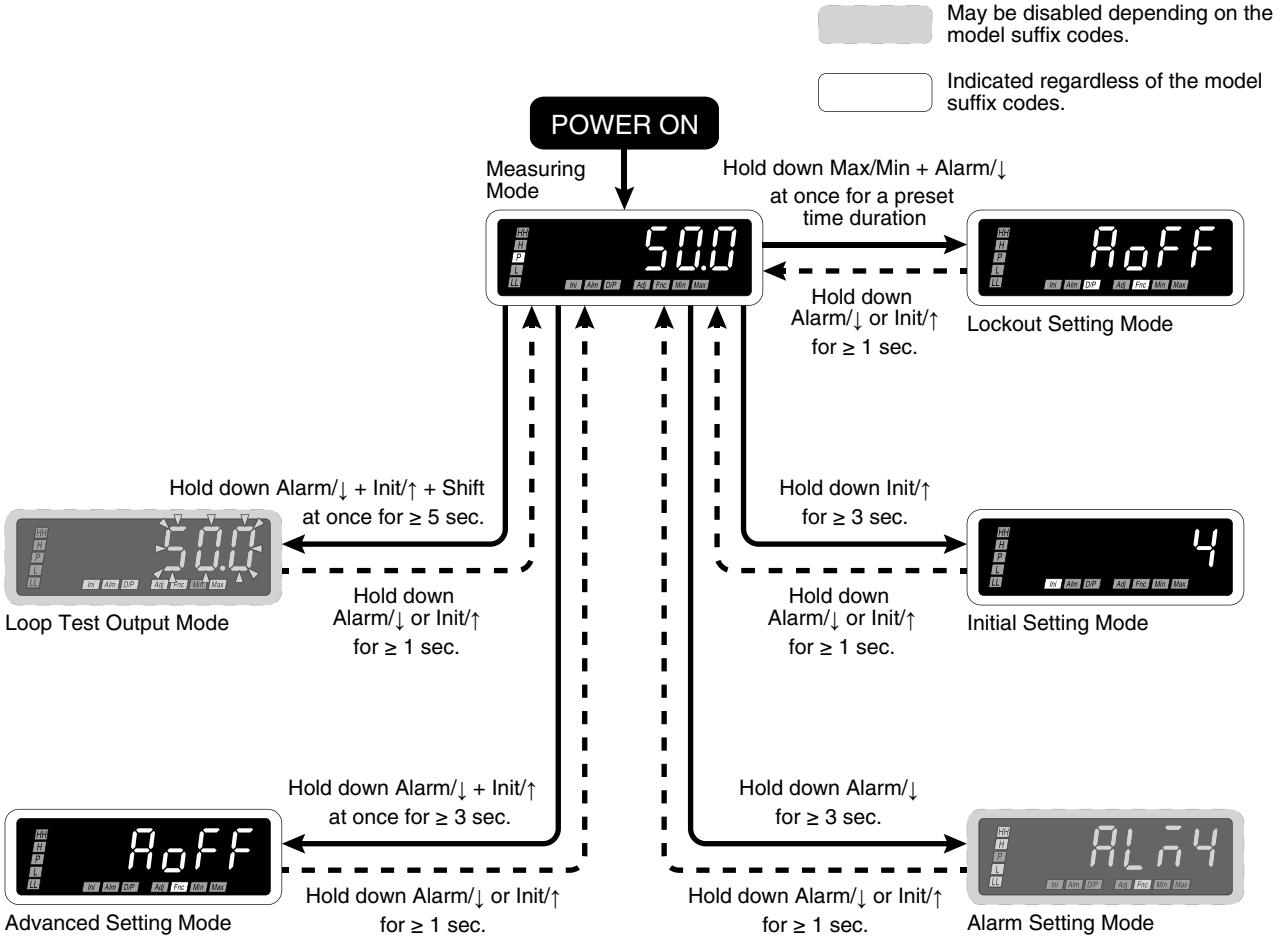
7. PARAMETER CONFIGURATION

■ MODE

Parameters can be grouped in several modes.
The 47LR 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. When the power is supplied, the unit operates in Measuring Mode.	Measuring
Initial Setting	Basic settings such like input type and temperature unit, and also Input Compensation, analog output settings and adjustments can be performed.	Measuring stopped
Alarm Setting	Alarm setpoints, trip action, deadband and ON delay time can be set.	
Advanced Setting	Moving average, brightness and burnout 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



■ TRANSITION FROM MEASURING MODE TO EACH MODE

To Initial Setting Mode	Hold down Init/↑ 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/↓ + Init/↑ 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/↓ + Init/↑ + Shift buttons at once for 5 seconds or more.

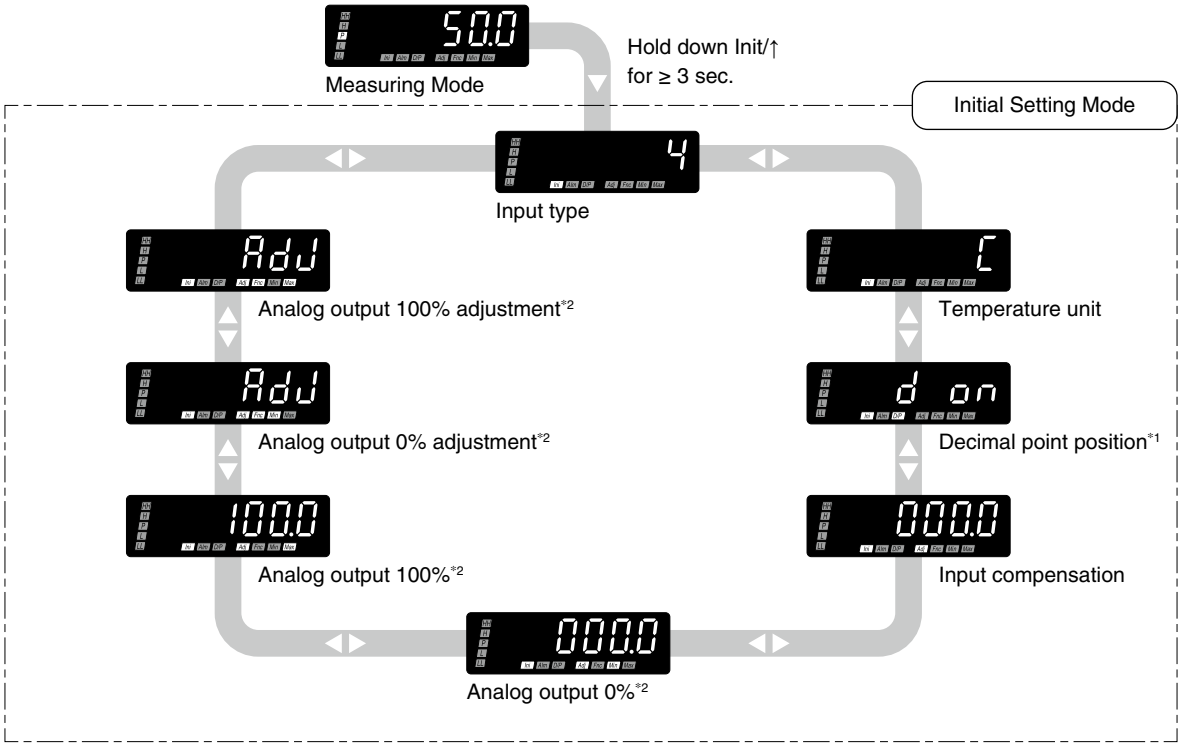
■ TRANSITION FROM EACH MODE TO MEASURING MODE

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

■ SHIFTING THROUGH SETTING PARAMETERS

(1) Parameter shifting in Initial Setting Mode

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



*1 Disabled with temperature unit set to ˚F.
*2 Disabled with no-DC-output type.

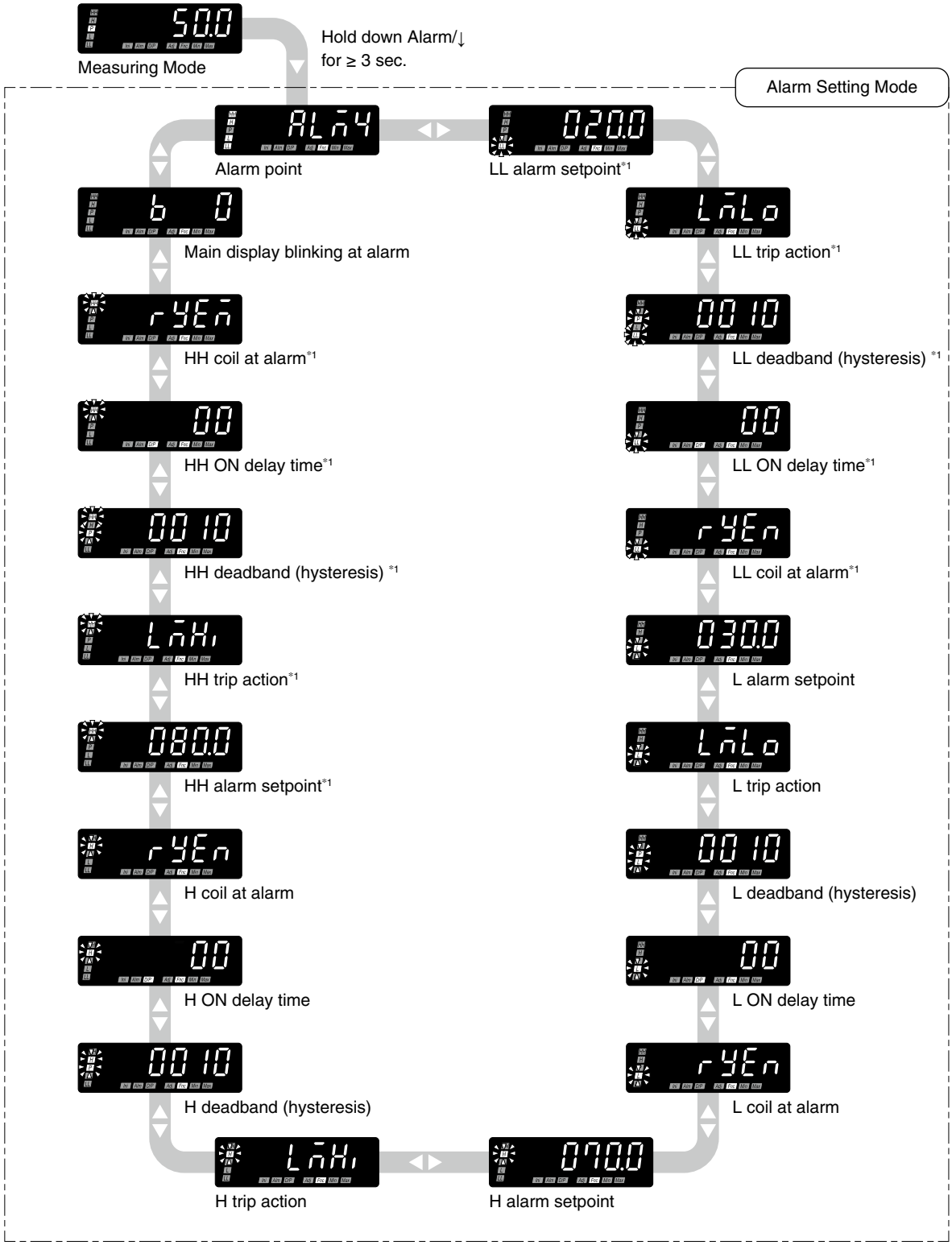
NOTE

- The display depends on the settings. The above displays show default values.
- Hold down Alarm/↓ or Init/↑ 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 Init/↑ button shifts one to the previous (counterclockwise).



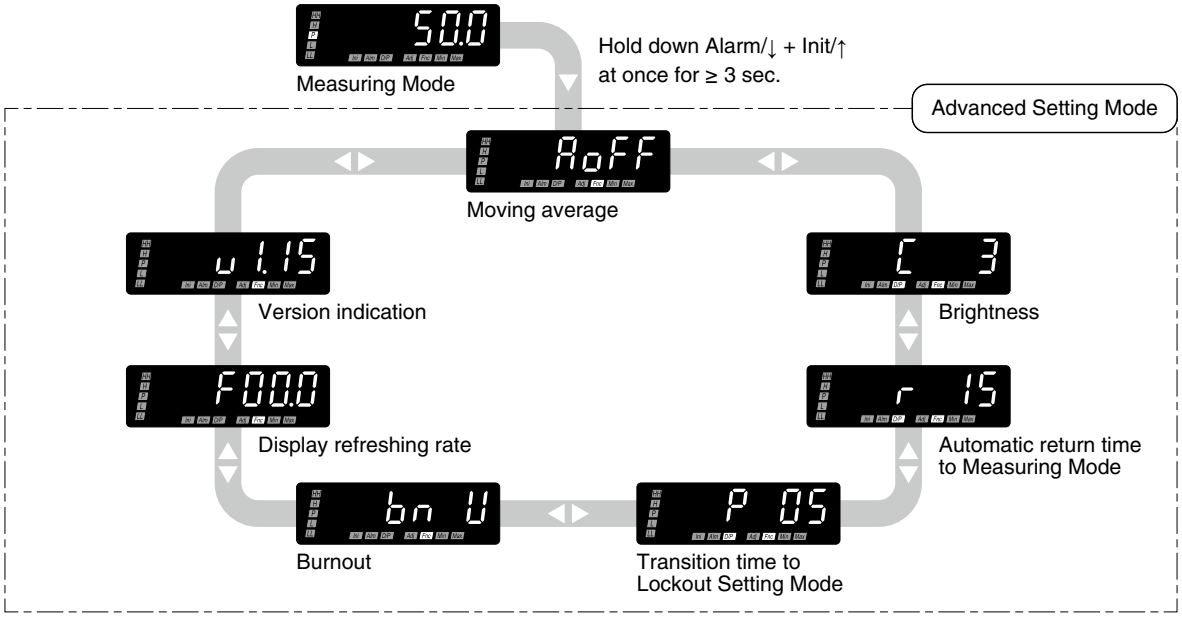
*1 Disabled with “Dual alarm” selected for the alarm point parameter.

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).
- Hold down Alarm/↓ or Init/↑ 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 Init/↑ button shifts one to the previous (counterclockwise).

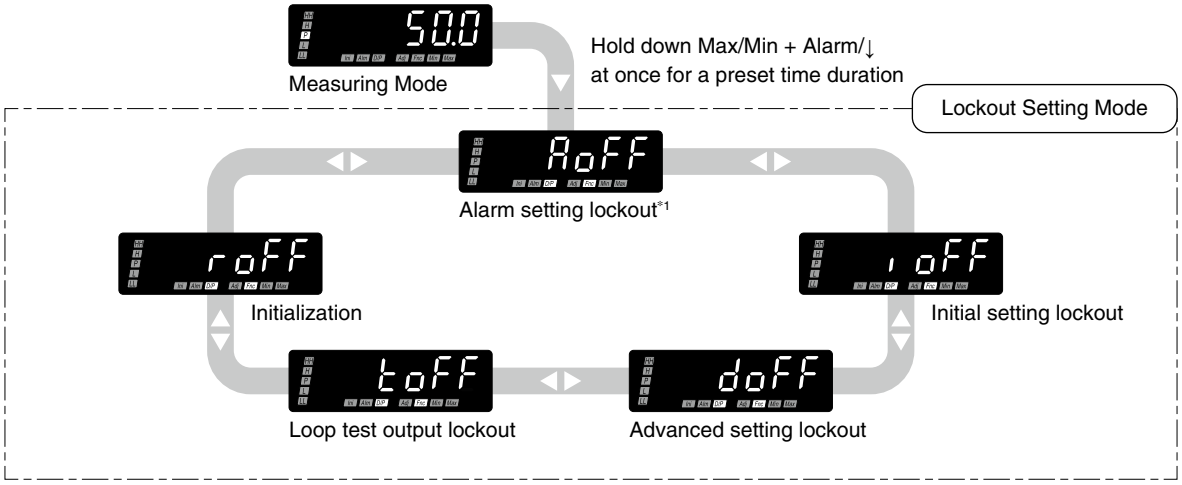


NOTE

- The display depends on the settings. The above displays show default values.
- Hold down Alarm/↓ or Init/↑ 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 Init/↑ 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.
- Hold down Alarm/↓ or Init/↑ 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.

8. SETTING ANALOG OUTPUT

The DC current or voltage output can be provided according to any input range within the usable range per input type (table below). The default values are 000.0 for analog output 0%, and 100.0 for 100%.

IMPORTANT

- Set analog output 0% value < 100% value.
- The operational range of the analog output is -5 to +105%.
- When 'B.ERR' is indicated, +105% DC output is provided with the burnout set to upscale, and -5% output is provided with the burnout set to downscale.
- The DC output is proportional to the display value affected by input compensation, moving average and display refreshing rate.
- The analog output 0% and 100% must be re-set if the decimal point position is shifted due to a temperature unit change from °C to °F with the decimal point position set to 1 decimal place, or due to the change of the decimal point position from 1 decimal place to no decimal fraction, or vice versa.

  e.g. In changing the decimal point position from 1 decimal place to no decimal fraction, the set value of the analog output 100% will be changed from 100.0°C to 1000°C. Because of the DC output provided for the display value, the analog output 100% will be changed from 100.0°C to 1000°C.

8.1 ANALOG OUTPUT SETTING RANGE

■ TEMPERATURE UNIT: °C

DISPLAY	FUNCTION	USABLE RANGE	CONFORMANCE RANGE
4	Pt 100 (JIS '97, IEC)	-230 to +880	-200 to +850
5	Pt 50Ω (JIS '81)	-230 to +679	-200 to +649
1	JPt 100 (JIS '89)	-230 to +530	-200 to +500
3	Pt 100 (JIS '89)	-230 to +680	-200 to +650

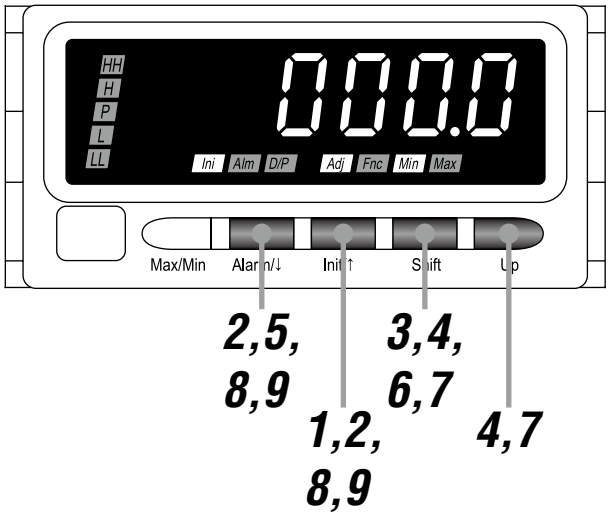
■ TEMPERATURE UNIT: °F

DISPLAY	FUNCTION	USABLE RANGE	CONFORMANCE RANGE
4	Pt 100 (JIS '97, IEC)	-382 to +1616	-328 to +1562
5	Pt 50Ω (JIS '81)	-382 to +1256	-328 to +1202
1	JPt 100 (JIS '89)	-382 to +986	-328 to +932
3	Pt 100 (JIS '89)	-382 to +1256	-328 to +1202

IMPORTANT

When the temperature unit is set to °C and the decimal point position to 1 decimal place, the minimum value of both conformance and usable ranges is -199.9.

8.2 OPERATING PROCEDURE

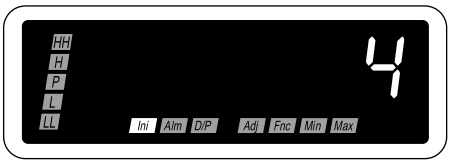


NOTE

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

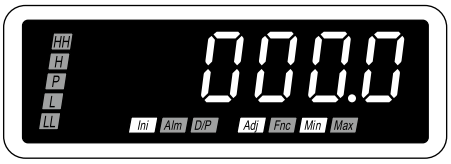
1 **Hold down Init/↑ button for 3 seconds or more to move on to Initial Setting Mode.**

- The input type is indicated.
- 'Ini' indicator turns on.



2 **Press Alarm/↓ or Init/↑ button to go to the analog output 0% setting.**

- The analog output 0% is indicated.
- 'Ini', 'Adj' and 'Min' indicators turn on.

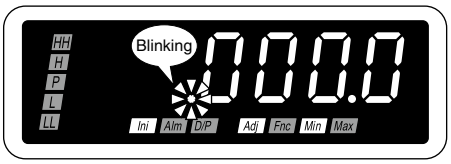


NOTE

- The analog output 0% is indicated within the range of -1999 to 9999 depending on the setting.
- Skip to Step 5 when the analog output 0% is not necessary.

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

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



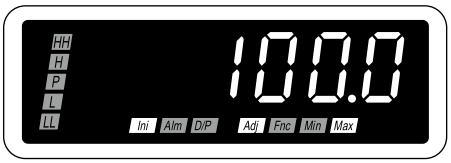
4 **Press Shift and Up buttons to set the analog output 0%.**

- Analog output 0% can be set within the usable range.

NOTE

Set without decimal point fraction when the temperature unit is set to °F or the decimal point position to no decimal fraction.

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

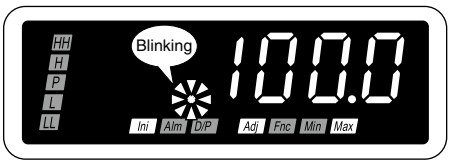


- The analog output 0% is registered.
- The analog output 100% is indicated.
- 'Ini', 'Adj' and 'Max' indicators turn on.

NOTE

- The analog output 100% is indicated within the range of -1999 to 9999 depending on the setting.
- Skip to Step 9 when the analog output 100% is not necessary.

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



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

7 **Press Shift and Up buttons to set the analog output 100%.**

- Analog output 100% can be set within the usable range.

NOTE

Set without decimal point fraction when the temperature unit is set to °F or the decimal point position to no decimal fraction.

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

- The analog output 100% is registered.
- The next parameter is indicated.

NOTE

- Press Alarm/↓ button, and the analog output 0% adjustment 'ADJ' will be indicated.
- Press Init/↑ button, and the analog output 0% will be indicated within the range of -1999 to 9999 depending on the setting.

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

9. 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 -1999 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	AL n2	Dual alarm	Alarm output code 1: AL n4
	AL n4	Quad alarm	Alarm output code 2: AL n2
Alarm setpoint	-1999 to 9999	-1999 to 9999	LL alarm setpoint: 0200 L alarm setpoint: 0300 H alarm setpoint: 0700 HH alarm setpoint: 0800
Trip action	CnLo	Lo trip	LL, L trip action: CnLo
	CnH.	Hi trip	HH, H trip action: CnH.
Deadband (hysteresis)	0000 to 9999	0000 – 9999	0010
ON delay time	00 to 99	0 – 99 seconds	00
Coil at alarm	r YEn	Coil energized at alarm	r YEn
	r Ydn	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

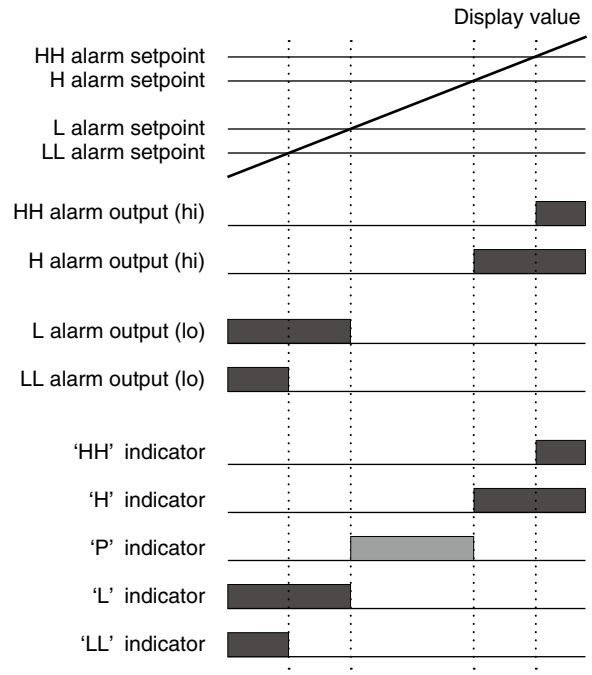
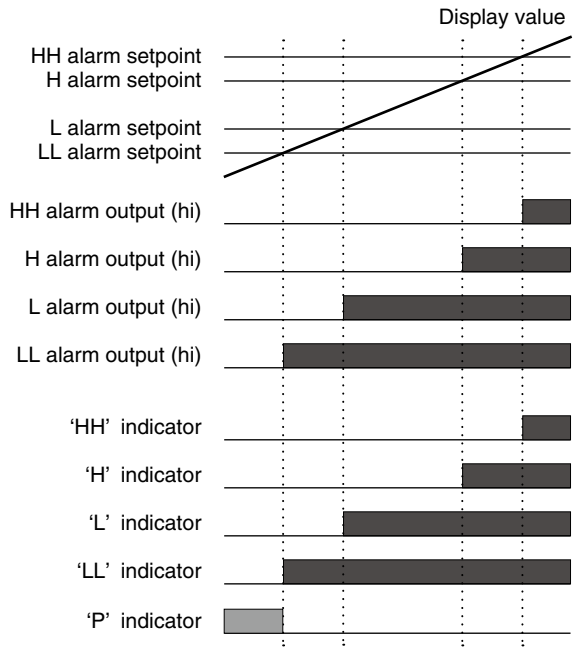


Figure 2: All trip points set to high setting



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)

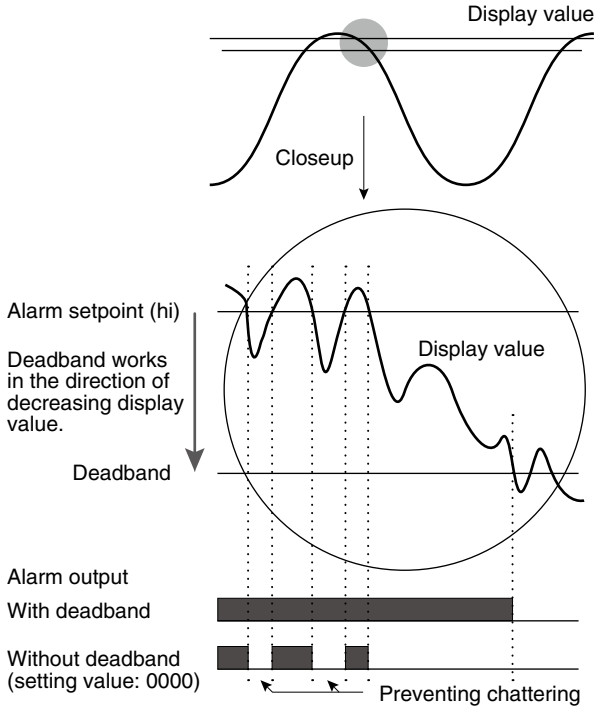
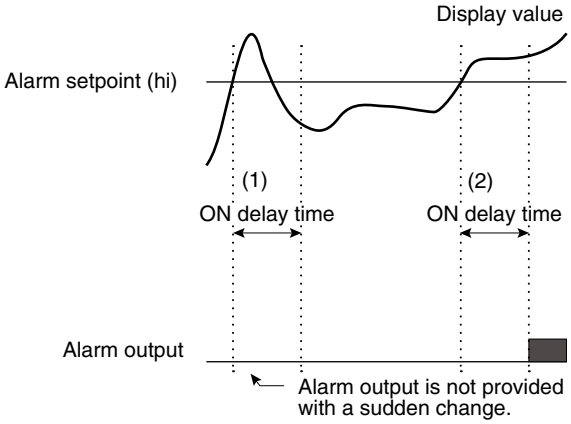


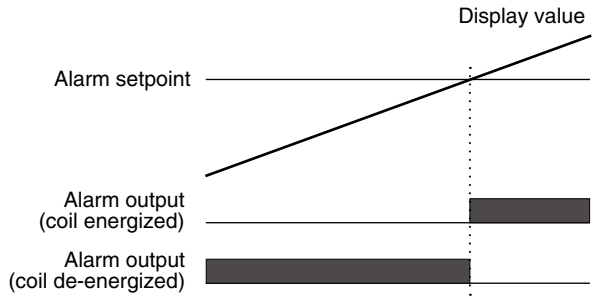
Figure 4: ON delay time



(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.

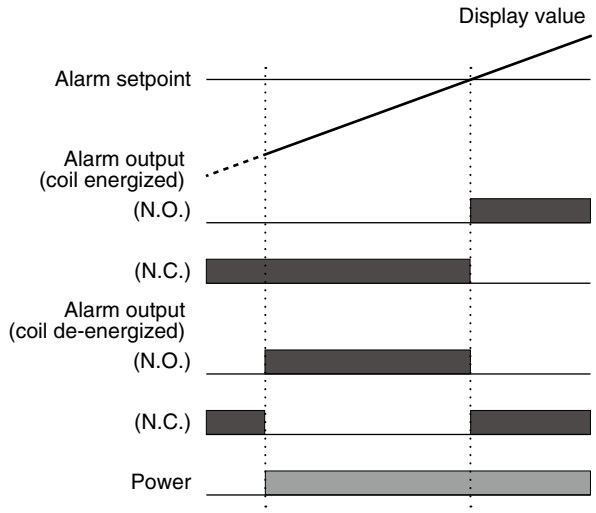
Figure 5: Coil at alarm

■ **Alarm Output Code '1' (N.O. relay contact, 4 points)**



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".

■ **Alarm Output Code '2' (SPDT relay contact, 2 points)**



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 'S.ERR' and 'Min' indicator blink, all the low alarm outputs are provided. When indication 'S.ERR' and 'Max' indicator blink, all the high alarm outputs are provided.
- When 'B.ERR' is indicated, all the high alarm outputs are provided with the 'upscale burnout' setting and all the low alarm outputs are provided with the 'downscale burnout' setting.
- The alarm point, trip action, ON delay time and coil an alarm are reset to the default values and all alarm setpoints are disabled (reset to '----' status) when the input type has been changed. Also the deadband is changed to 0001. The trip action, ON delay time and coil at alarm are reset to the default values, all alarm setpoints are disabled (reset to '----' status) and the deadband is changed to 0001 but the current alarm point is held when the temperature unit has been changed.
- The trip action, ON delay time and coil at alarm are reset to the default values and the deadband is changed to 0001 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.

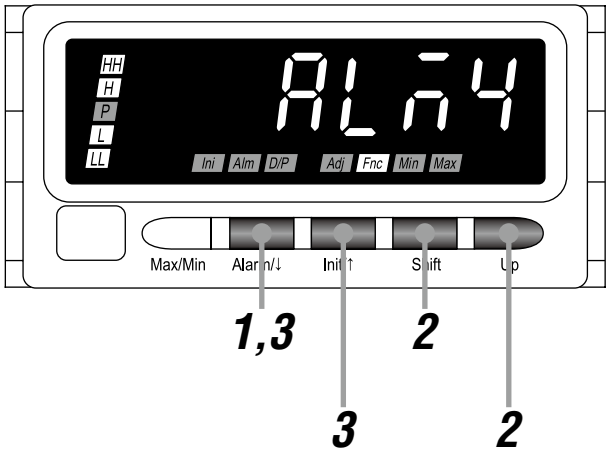
NOTE

- 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.

9.1 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.

9.1.1 OPERATING PROCEDURE

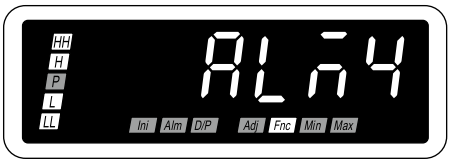


NOTE

- 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.

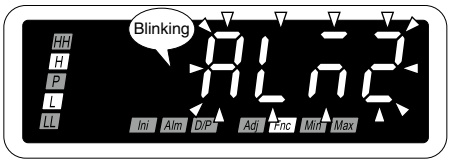


NOTE

- '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 Init/↑ 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 -1999 to 9999 depending on the setting.
- Press Init/↑ 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.

4 ■ **TO SET THE NEXT PARAMETER,**
Skip to Step 2 in “9.2 ALARM SETPOINT”.

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

9.2 ALARM SETPOINT

Alarm setpoints can be set within the usable range.
Setting the min. or max. value of the usable range as setpoint enables the unit to provide an alarm with the abnormality 'B.ERR' or 'S.ERR'.
All alarm setpoints are disabled (reset to '----' status) when the input type or temperature unit has been changed.

9.2.1 ALARM SETPOINT DEFAULT VALUE

PARAMETER	DEFAULT VALUE
LL alarm setpoint	0200
L alarm setpoint	0300
H alarm setpoint	0700
HH alarm setpoint	0800

9.2.2 ALARM SETPOINT LIST

■ TEMPERATURE UNIT: °C

DISPLAY	FUNCTION	USABLE RANGE	CONFORMANCE RANGE
4	Pt 100 (JIS '97, IEC)	-230 to +880	-200 to +850
5	Pt 50Ω (JIS '81)	-230 to +679	-200 to +649
1	JPt 100 (JIS '89)	-230 to +530	-200 to +500
3	Pt 100 (JIS '89)	-230 to +680	-200 to +650

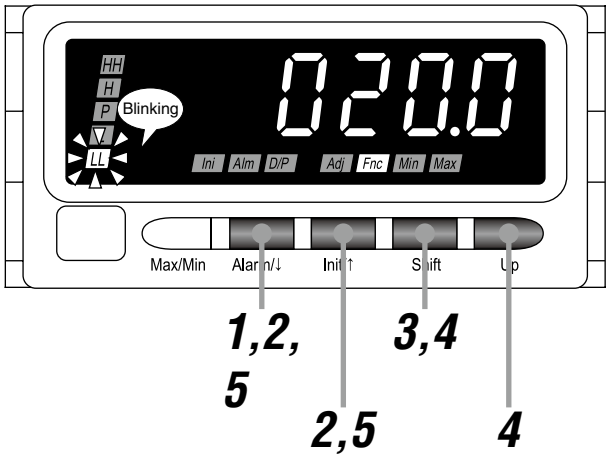
■ TEMPERATURE UNIT: °F

DISPLAY	FUNCTION	USABLE RANGE	CONFORMANCE RANGE
4	Pt 100 (JIS '97, IEC)	-382 to +1616	-328 to +1562
5	Pt 50Ω (JIS '81)	-382 to +1256	-328 to +1202
1	JPt 100 (JIS '89)	-382 to +986	-328 to +932
3	Pt 100 (JIS '89)	-382 to +1256	-328 to +1202

IMPORTANT

When the temperature unit is set to °C and the decimal point position to 1 decimal place, the minimum value of both conformance and usable ranges is -199.9.

9.2.3 OPERATING PROCEDURE

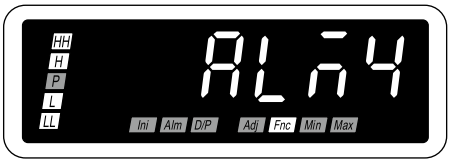


NOTE

- 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.

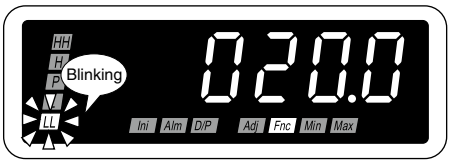


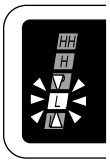
NOTE

- '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 Init/↑ button to go to the LL (L, H or HH) alarm setpoint setting.**

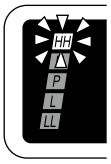
- The LL (L, H or HH) alarm setpoint is indicated.
- 'LL' ('L', 'H' or 'HH') indicator blinks and 'Fnc' indicator turns on.





■ L alarm setpoint

■ H alarm setpoint



■ HH alarm setpoint

NOTE

The setpoint is indicated within the range of -1999 to 9999 depending on the setting.

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 -1999 to 9999.

IMPORTANT

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

NOTE

Set without decimal point fraction when the temperature unit is set to °F or the decimal point position to no decimal fraction.

5 **Press Alarm/↓ or Init/↑ 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 Init/↑ 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.

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

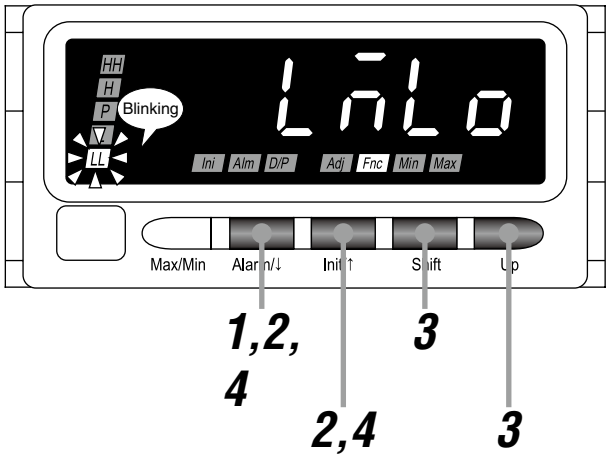
■ TO SET THE NEXT PARAMETER,
Skip to Step 2 in "9.3 TRIP ACTION (LO/HI)".

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

9.3 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.

9.3.1 OPERATING PROCEDURE

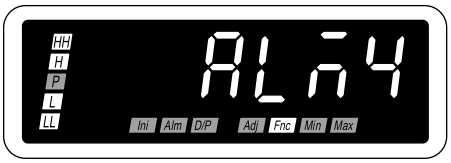


NOTE

- 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.

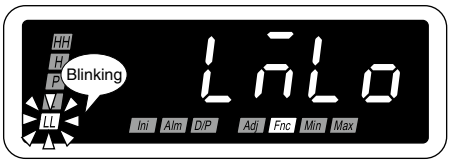


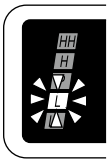
NOTE

- '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 Init/↑ button to go to the LL (L, H or HH) trip action setting.**

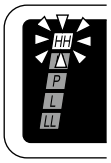
- 'LMLO' is indicated.
- 'LL' ('L', 'H' or 'HH') indicator blinks and 'Fnc' indicator turns on.





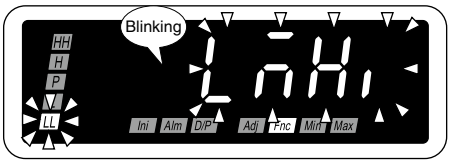
■ L trip action

■ H trip action



■ HH trip action

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



4 **Press Alarm/↓ or Init/↑ 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 Init/↑ button, and the LL (L, H or HH) alarm setpoint will be indicated within the range of -1999 to 9999 depending on the setting.

---

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

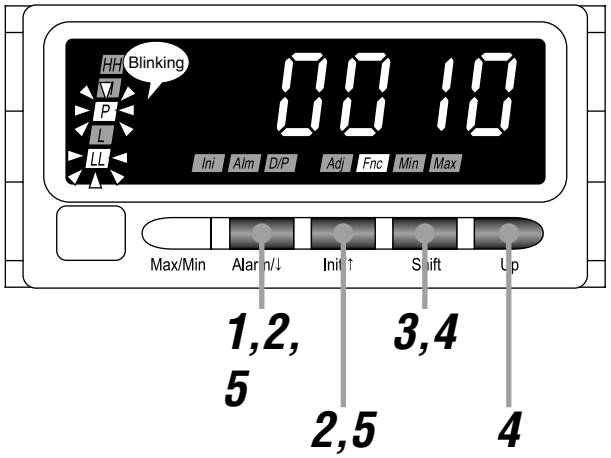
■ TO SET THE NEXT PARAMETER,
Skip to Step 2 in "9.4 DEADBAND".

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

9.4 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 0010. The deadband is changed to 0001 when the input type, temperature unit or alarm point has been changed.

9.4.1 OPERATING PROCEDURE

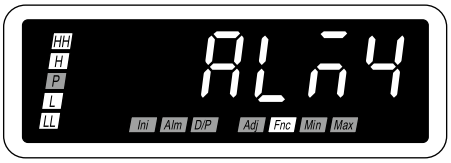


NOTE

- 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 deadbands 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.

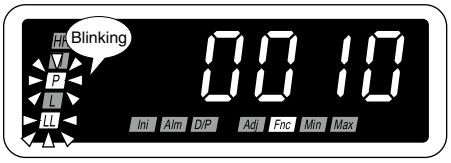


NOTE

- '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 Init/↑ 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.



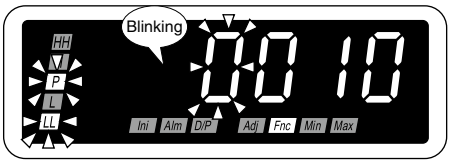
■ L deadband ■ H deadband ■ HH deadband

NOTE

The LL (L, H or HH) deadband is indicated within the range of 0000 to 9999 depending on the setting.

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 even when the decimal point position is set to 1 decimal place.

5 **Press Alarm/↓ or Init/↑ 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 Init/↑ button, and the LL (L, H or HH) trip action 'LMLO' or 'LMHI' will be indicated depending on the setting.

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

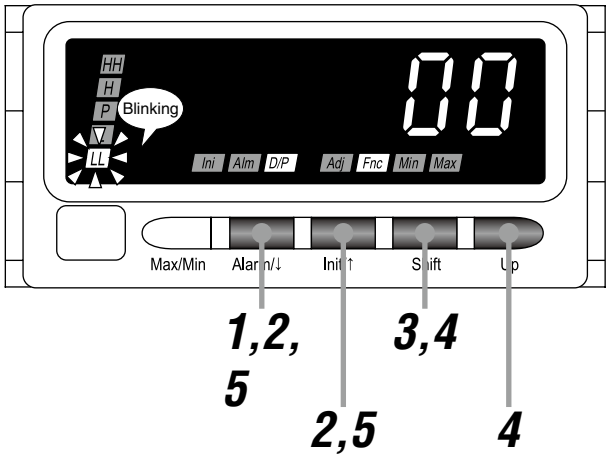
■ TO SET THE NEXT PARAMETER,
Skip to Step 2 in "9.5 ON DELAY TIME".

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

9.5 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.

9.5.1 OPERATING PROCEDURE

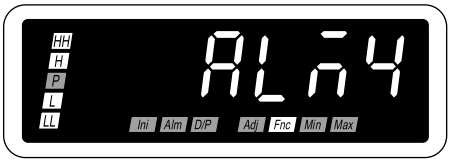


NOTE

- 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 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.

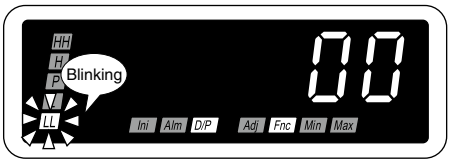


NOTE

- '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 Init/↑ 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.



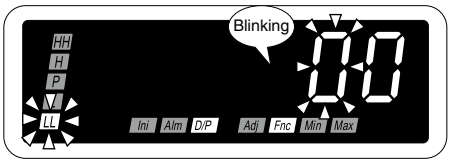
■ L ON delay time ■ H ON delay time ■ HH ON delay time

NOTE

The ON delay time is indicated within the range of 00 to 99 depending on the setting.

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 Init/↑ 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 Init/↑ button, and the LL (L, H or HH) deadband will be indicated within the range of 0000 to 9999 depending on the setting.

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

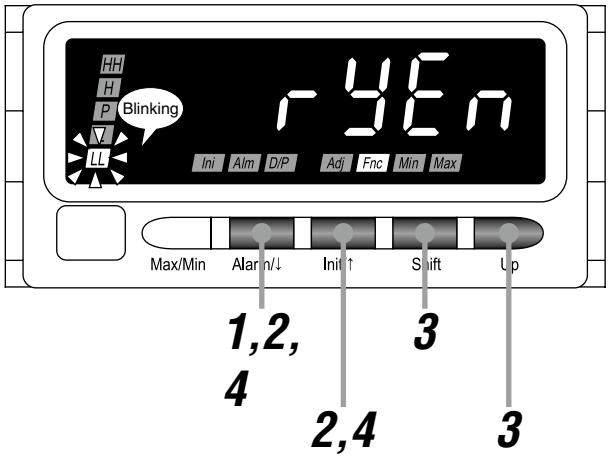
■ TO SET THE NEXT PARAMETER,
Skip to Step 2 in "9.6 ALARM OUTPUT LOGIC (coil energized or de-energized at alarm)".

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

9.6 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.

9.6.1 OPERATING PROCEDURE

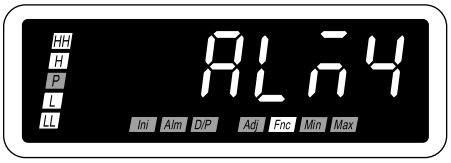


NOTE

- 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.

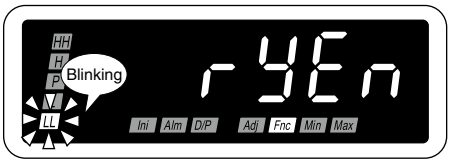


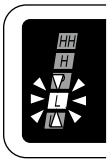
NOTE

- '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 Init/↑ button to go to the setting of the LL (L, H or HH) coil at alarm.**

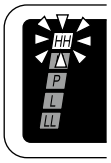
- 'RYEN' is indicated.
- 'LL' ('L', 'H' or 'HH') indicator blinks and 'Fnc' indicator turns on.





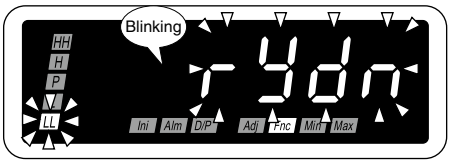
■ L coil at alarm

■ H coil at alarm



■ HH coil at alarm

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



4 **Press Alarm/↓ or Init/↑ 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 -1999 to 9999 (or 'B 0', 'B 1', 'B 2', 'B 3' or 'B 4') depending on the setting.
- Press Init/↑ 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.

---

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 "9.7 MAIN DISPLAY BLINKING AT ALARM".

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

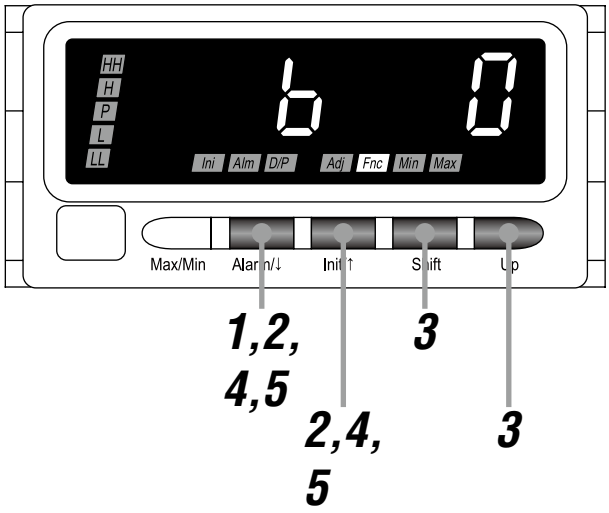
9.7 MAIN DISPLAY BLINKING AT ALARM

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	

9.7.1 OPERATING PROCEDURE

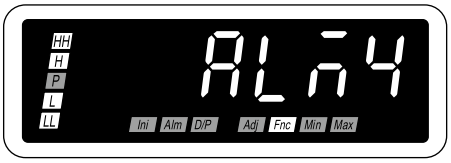


NOTE

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.

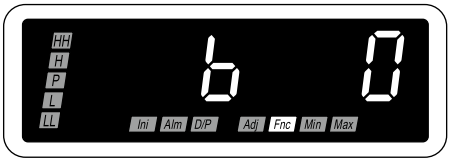


NOTE

- '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 Init/↑ 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.

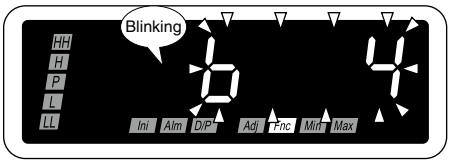


NOTE

'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 Init/↑ 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 Init/↑ button, and the HH or H coil at alarm 'RYEN' or 'RYDN' will be indicated depending on the setting.

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

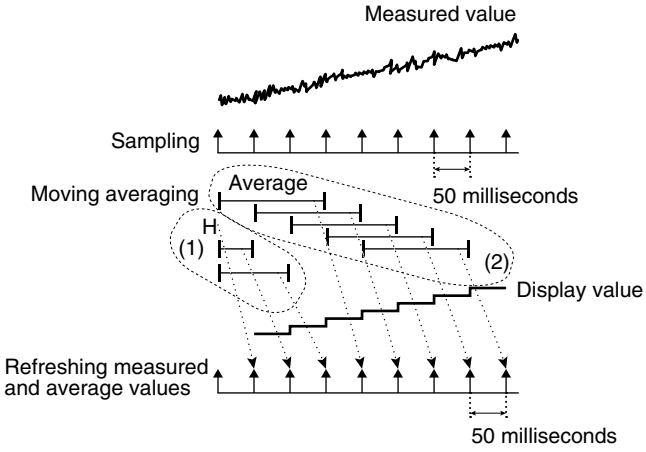
10. AVERAGING INPUT

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 (200 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

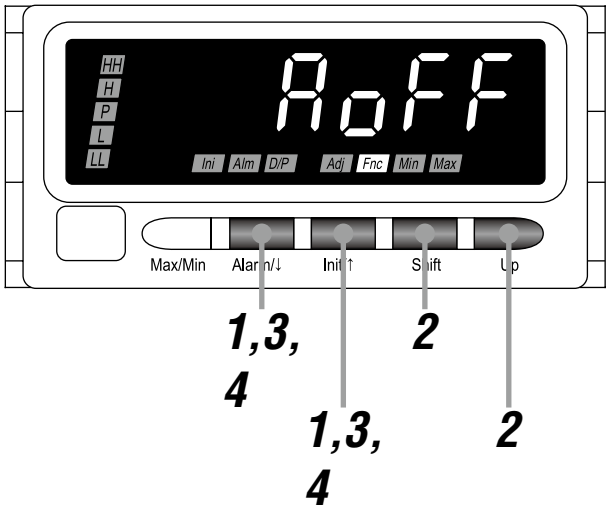
DISPLAY	FUNCTION	DEFAULT VALUE
AoFF	No moving averaging	AoFF
A 2	Moving average with 2 samples (100 millisecond intervals)	
A 4	Moving average with 4 samples (200 millisecond intervals)	
A 8	Moving average with 8 samples (400 millisecond intervals)	

■ 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 50 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.

10.1 OPERATING PROCEDURE

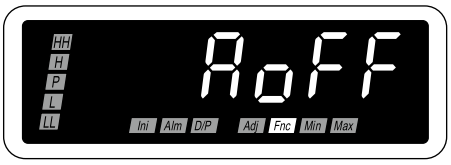


NOTE

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

1 **Hold down Alarm/↓ and Init/↑ 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.

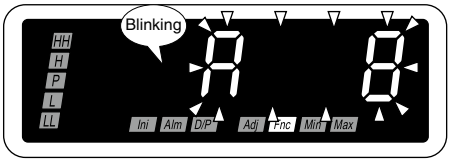


NOTE

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

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

- Select one among 'AOFF', 'A 2', 'A 4' and 'A 8'.



3 **Press Alarm/↓ or Init/↑ 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 Init/↑ button, and the version indication will be indicated.

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

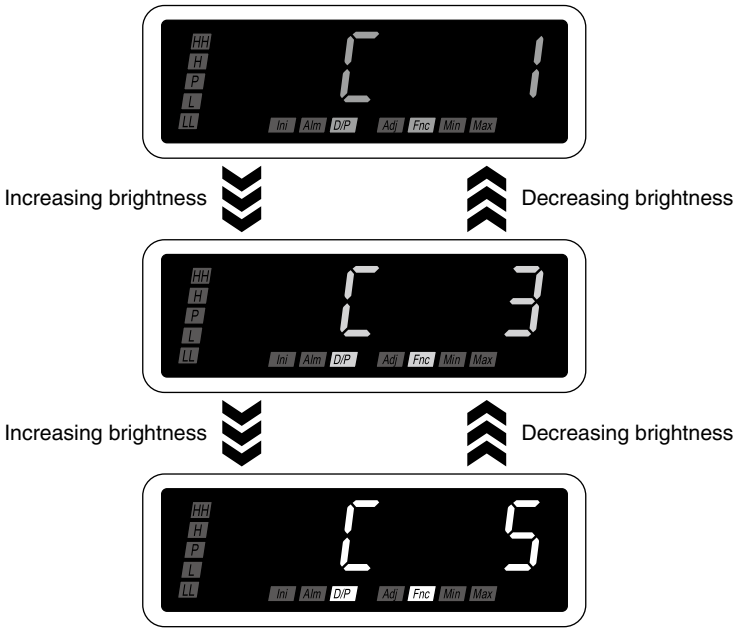
11. ADJUSTING BRIGHTNESS OF DISPLAY

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

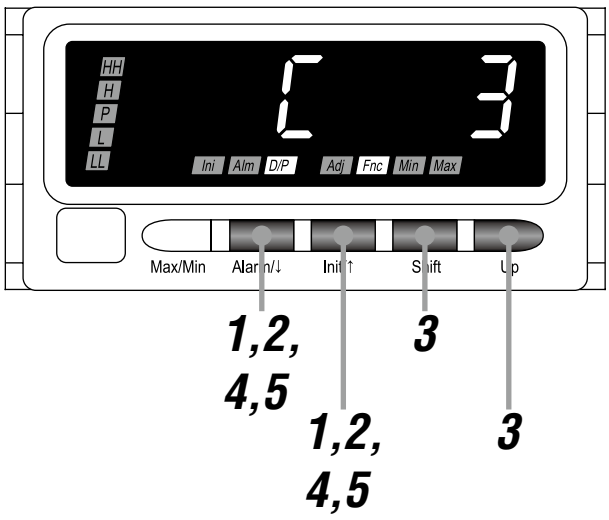
■ DISPLAY BRIGHTNESS

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



11.1 OPERATING PROCEDURE

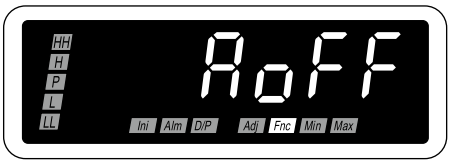


NOTE

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

1 **Hold down Alarm/↓ and Init/↑ 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.

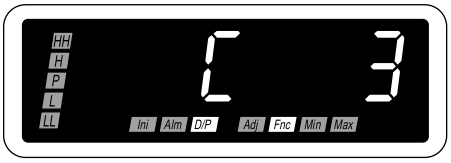


NOTE

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

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

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

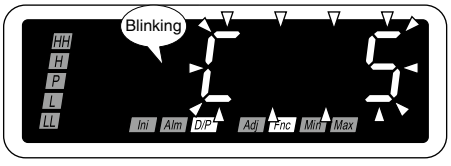


NOTE

'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 Init/↑ 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 Init/↑ button, and the moving average sampling No. 'AOFF', 'A 2', 'A 4' or 'A 8' will be indicated depending on the setting.

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

12. 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).

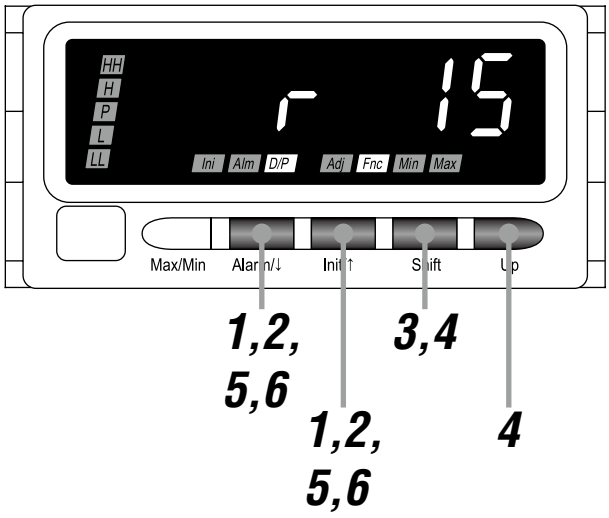
■ TABLE 1: AUTOMATIC RETURN TIME

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
Initial Setting Mode		Enabled
Alarm Setting Mode		Enabled
Advanced Setting Mode		Enabled
Lockout Setting Mode		Enabled
Loop Test Output Mode		Disabled

12.1 OPERATING PROCEDURE

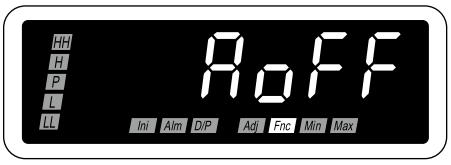


NOTE

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

1 **Hold down Alarm/↓ and Init/↑ 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.

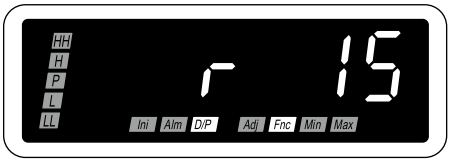


NOTE

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

2 **Press Alarm/↓ or Init/↑ 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.

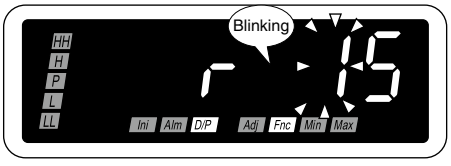


NOTE

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 Init/↑ 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 Init/↑ 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 Init/↑ button for 1 second or more to return to Measuring Mode.**

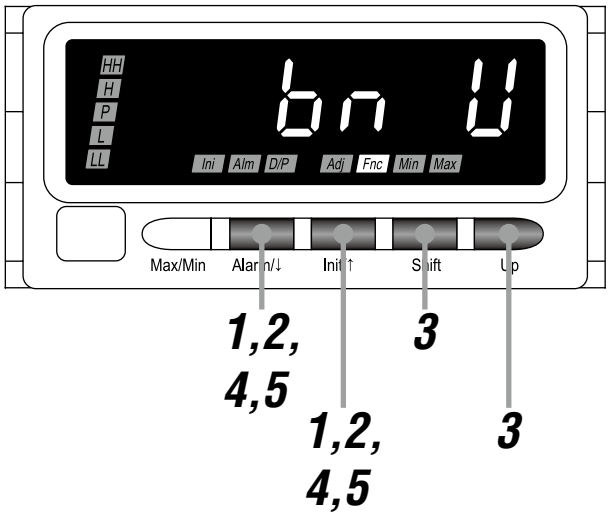
13. SETTING BURNOUT

Burnout is a function to provide a fail-safe condition for equipment and devices on site by providing max. or min. output when input is abnormal, disconnection of a wire, for instance. Burnout includes upscale burnout 'BN U' operating toward stopping heating (max. output) and downscale burnout 'BN D' operating toward maintaining heating (min. output) in detecting the input disconnection. When the unit detects the burnout, it indicates 'B.ERR'. With upscale burnout, all the high alarm outputs and +105% DC output are provided. With downscale burnout, all the low alarm outputs and -5% DC output are provided. The default is upscale burnout.

IMPORTANT

Do not change the burnout setting while 'B.ERR' is indicated.

13.1 OPERATING PROCEDURE

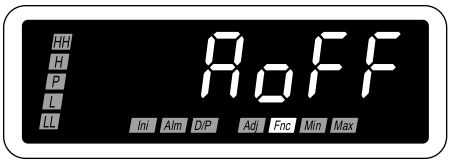


NOTE

- Procedures to change 'BN U' to 'BN D' are described here.
- To change 'BN D' to 'BN U', the procedures are same. Select 'BN U' in Step 3.

1 **Hold down Alarm/↓ and Init/↑ 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.

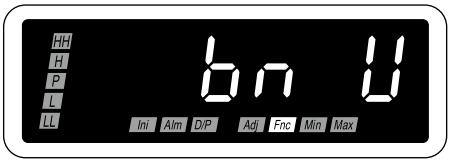


NOTE

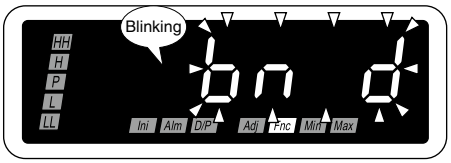
'AOFF', 'A 2', 'A 4' or 'A 8' is indicated depending on the setting.

2 **Press Alarm/↓ or Init/↑ button to go to the burnout setting.**

- 'BN U' is indicated.
- 'Fnc' indicator turns on.



3 **Press Shift or Up button to select 'BN D'.**



4 **Press Alarm/↓ or Init/↑ 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 Init/↑ 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.

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

14. ADJUSTING DISPLAY REFRESHING RATE

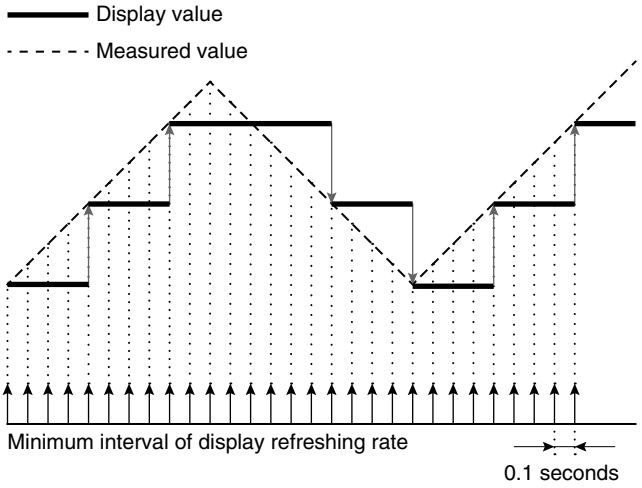
The display refreshing rate can be set within the range of 0.1 to 99.9 seconds. With this value set to 00.0, the refreshing rate will be 0.1 seconds (table below). When the input signal changes rapidly, the display refreshing rate can be slowed to suppress the display flickering.

■ DISPLAY REFRESHING RATE

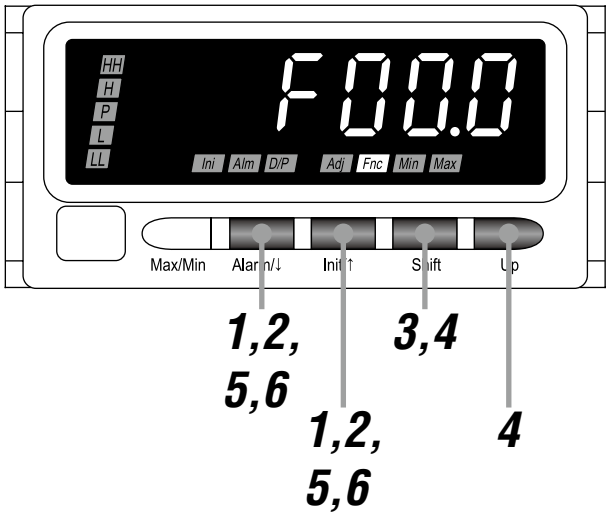
DISPLAY	FUNCTION	DEFAULT VALUE
F000	0.1 seconds	F000
F001 to F999	0.1 to 99.9 seconds	

■ DISPLAY REFRESHING IMAGE

e.g. Refreshing rate 0.4 seconds



14.1 OPERATING PROCEDURE

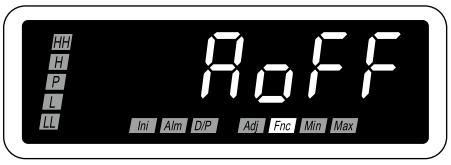


NOTE

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

1 **Hold down Alarm/↓ and Init/↑ 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.

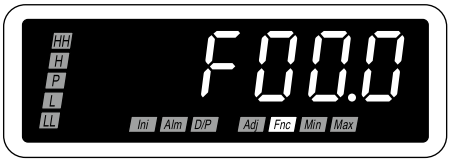


NOTE

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

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

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

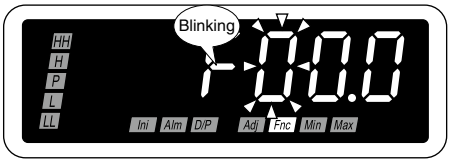


NOTE

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 Init/↑ 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 Init/↑ button, and the burnout 'BN U' or 'BN D' will be indicated depending on the setting.

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

15. LOOP TESTING

The 47LR 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 temperature values during the loop test.

15.1 LOOP TEST OUTPUT RANGE

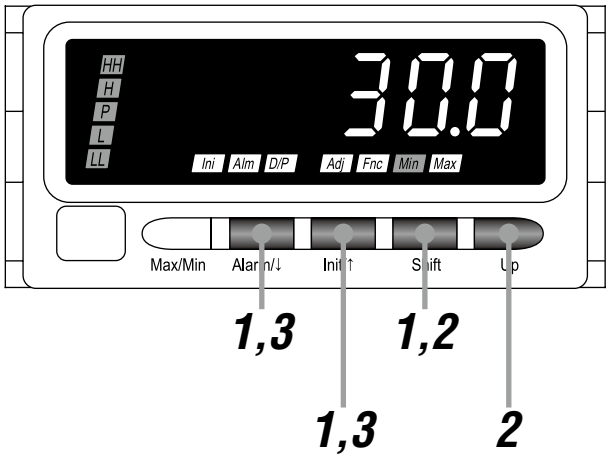
The temperature value can be set manually within the usable range per input type.

e.g. With the input type '4', the temperature unit °C and 1 decimal place, setting manually within the range of -199.9 to +880.0°C 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.

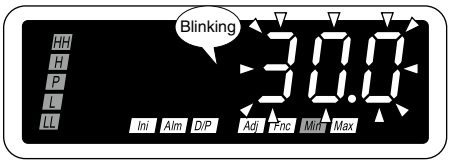
15.2 OPERATING PROCEDURE



NOTE

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

1 **Hold down Alarm/↓, Init/↑ 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.
- 'Ini', 'Alm', 'D/P', 'Adj', 'Fnc' and 'Max' indicators turn on.

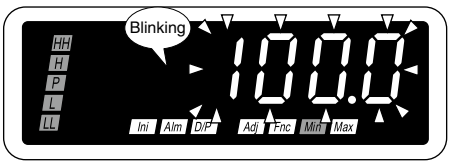
NOTE

- In moving on to Loop Test Output Mode while '-199.9' blinks, '-199.9' is indicated.
- In moving on to Loop Test Output Mode while 'S.ERR' is indicated, min. value of the usable range is indicated with 'Min' indicator blinking when the input is under the range, and max. value is indicated with 'Max' indicator blinking when above the range.
- In moving on to Loop Test Output Mode while 'B.ERR' is indicated, max. value of the usable range is indicated when the burnout is set to upscale, and min. value is indicated when the burnout is set to downscale.
- With the decimal point position set to 1 decimal place, the minimum value of the usable range is -199.9.
- When the temperature unit is set to °F or the decimal point position to no decimal fraction, the display value is indicated without decimal fraction.

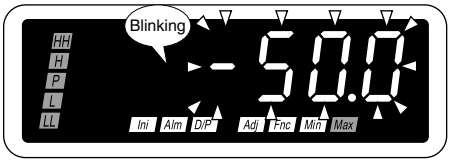
2 **Press Shift and Up buttons to adjust the display value.**

- 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 Init/↑ button for 1 second or more to return to Measuring Mode.**

• The measuring is started with the loop test output reset.

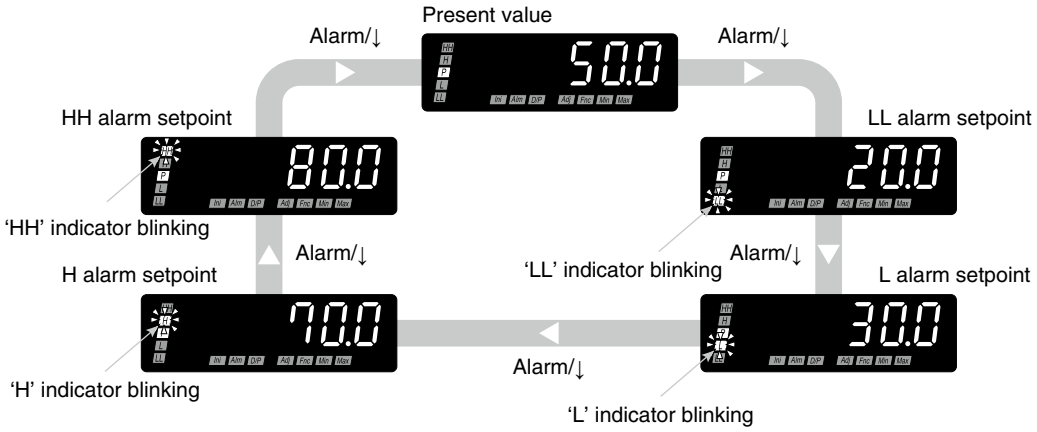
16. USEFUL FUNCTIONS

16.1 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.



*1 Display depends on the settings and input.

NOTE

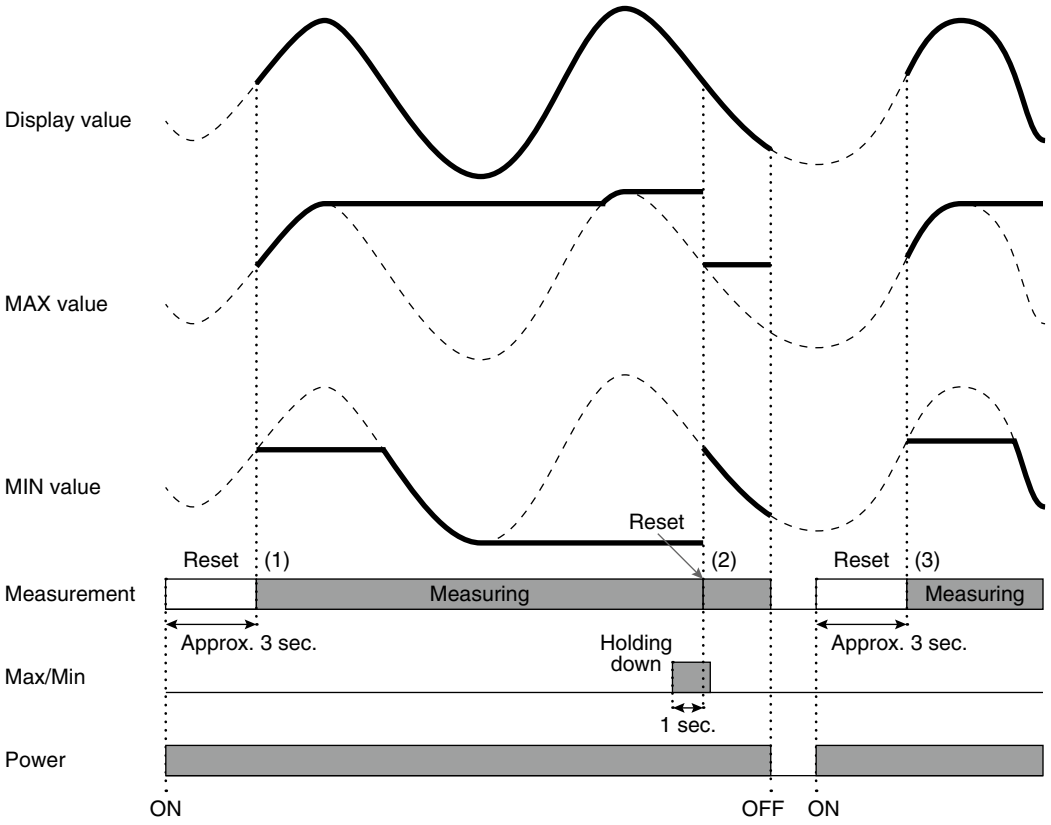
- With the alarm output code '2' (SPDT relay contact, 2 points) or "Dual alarm" selected for the alarm point parameter, the LL and HH alarm setpoints are not indicated.
- The alarm setpoints can be confirmed even when MAX or MIN value is indicated. After confirmation, the indication will be back to MAX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

16.2 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.

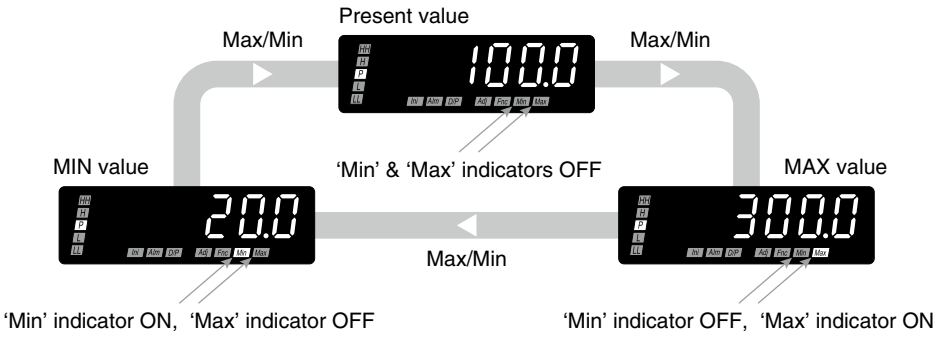


(1) The internal memory is reset for approx. 3 seconds after the power is on, and the unit starts to measure MAX and MIN values.
(2) Hold down Max/Min button for 1 second or more to reset the MAX and MIN values and then the unit starts to measure MAX and MIN values again.
(3) The internal memory is reset 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.



*1 Display depends on the settings and input.

NOTE

- Pressing Max/Min button while in confirming the alarm setpoints switches the indicators however the alarm setpoint indication is maintained.
- When '-199.9' is indicated while measuring, '-199.9' is indicated.
- When 'S.ERR' is indicated while measuring, min. or max. value of the usable range is indicated.
- When 'B.ERR' is indicated while measuring, max. value of the usable range is indicated with the burnout set to upscale, and min. value is indicated with the burnout set to downscale.
- MAX and MIN values are not indicated while 'S.ERR' or 'B.ERR' is indicated.

16.3 LIMITING BUTTON OPERATION

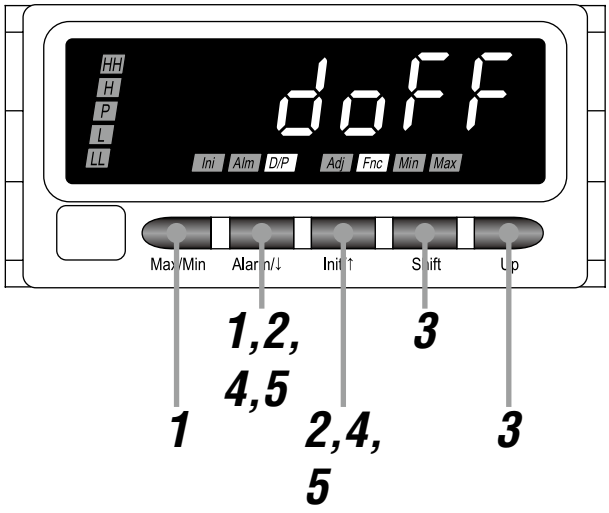
Transition from Measuring Mode to each setting mode or Loop Test Output Mode can be limited. With this setting, the transition to each mode by holding down the buttons will be disabled. In Lockout Setting Mode, the lockout per mode is selectable.

■ LOCKOUT SETTING

Following 4 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	
Initial setting lockout		ioFF	Unlock Initial Setting Mode	ioFF
		i on	Lock Initial Setting Mode	
Advanced setting lockout		doFF	Unlock Advanced Setting Mode	doFF
		d on	Lock Advanced Setting Mode	
Loop test output lockout		toFF	Unlock Loop Test Output Mode	toFF
		t on	Lock Loop Test Output Mode	

16.3.1 OPERATING PROCEDURE

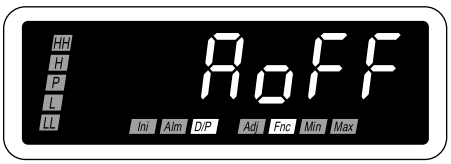


NOTE

- 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.**

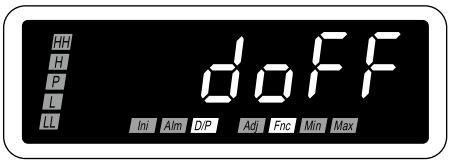
- The alarm setting lockout is indicated.
- 'D/P' and 'Fnc' indicators turn on.



NOTE

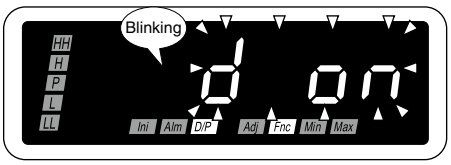
- 'AOFF' or 'A ON' is indicated depending on the setting.
- With no-alarm-output type, the initial setting lockout 'IOFF' or 'I ON' is indicated depending on the setting.

2 **Press Alarm/↓ or Init/↑ 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 Init/↑ button to apply the new setting.**

- And the next parameter setting is indicated.

NOTE

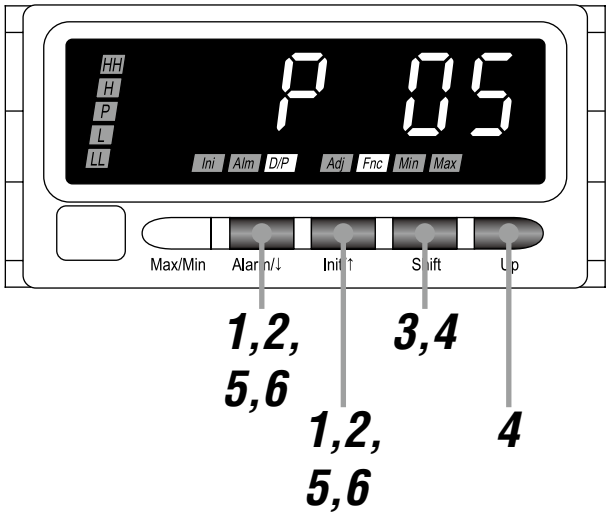
- Press Alarm/↓ button, and the loop test output lockout 'TOFF' or 'T ON' will be indicated depending on the setting.
- Press Init/↑ button, and the initial setting lockout 'IOFF' or 'I ON' will be indicated depending on the setting.

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

16.4 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.

16.4.1 OPERATING PROCEDURE

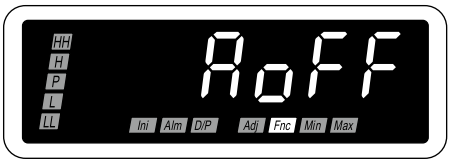


NOTE

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

1 **Hold down Alarm/↓ and Init/↑ 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.

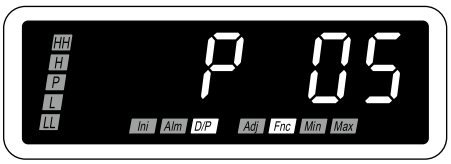


NOTE

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

2 **Press Alarm/↓ or Init/↑ 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.

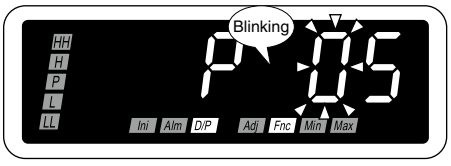


NOTE

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 Init/↑ button to apply the new setting.**

• And the next parameter setting is indicated.

NOTE

• Press Alarm/↓ button, and the burnout 'BN U' or 'BN D' will be indicated depending on the setting.
• Press Init/↑ 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.

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

17. USER CALIBRATION

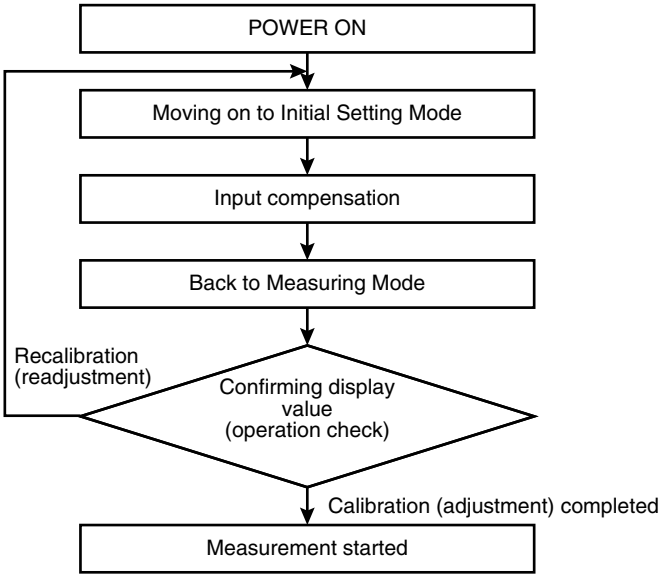
User calibration is calibration by a customer using customer's measuring instruments and standards.
To calibrate (adjust) the input signal, use "Input Compensation" function. To compensate deviation between the DC output and a device on site, use "Analog Output Adjustment" function.

17.1 INPUT COMPENSATION

You can calibrate the input signal by the Input Compensation function if you need calibration. Offset temperature value can be added at all measuring points. The data will be lost after an input type change or 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.

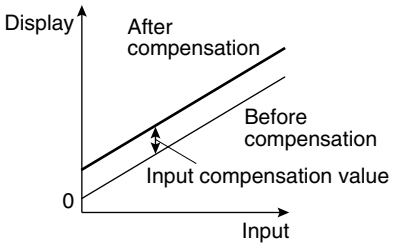
17.1.1 INPUT COMPENSATION FLOW

The Input Compensation is carried out as shown in the following flowchart.



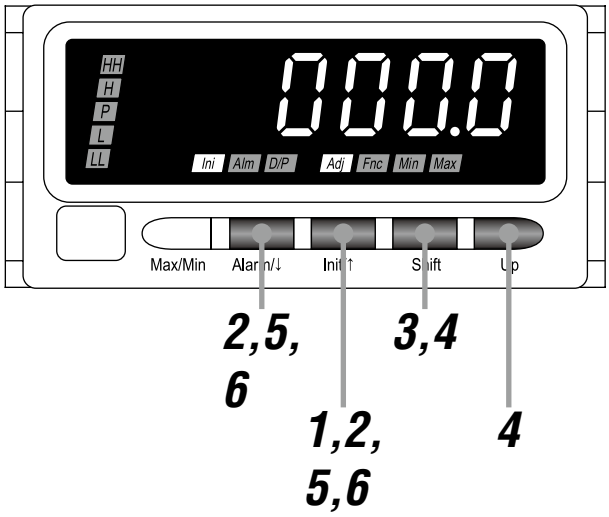
IMPORTANT

- 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.
- One calibration point can be specified.
- Set the value within the range of -1999 to 9999.



After comp. = before comp. + input comp. value
Positive comp. value: addition
Negative comp. value: subtraction

17.1.2 OPERATING PROCEDURE

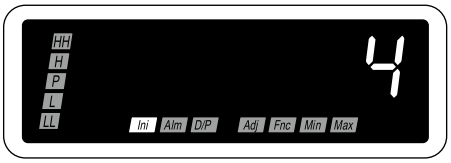


NOTE

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

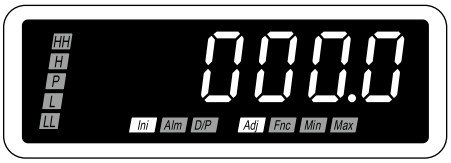
1 **Hold down Init/↑ button for 3 seconds or more to move on to Initial Setting Mode.**

- The input type is indicated.
- 'Ini' indicator turns on.



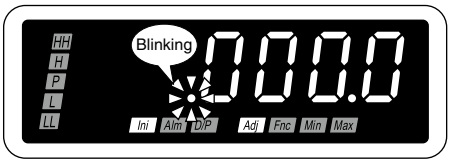
2 **Press Alarm/↓ or Init/↑ button to go to the input compensation setting.**

- The input compensation is indicated.
- 'Ini' and 'Adj' indicators turn on.



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 input compensation.**

- Set within the range of -1999 to 9999.

  * Set a positive value to set a higher value than the present one. Set a negative value to set a lower value.

NOTE

Set without decimal point fraction when the temperature unit is set to °F or the decimal point position to no decimal fraction.

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

• And the next parameter setting is indicated.

NOTE

• Press Alarm/↓ button, and the input type will be indicated, or the analog output 0% will be indicated within the range of -1999 to 9999 depending on the setting with DC output.
• Press Init/↑ button, and the decimal point position 'D ON' or 'DOFF' will be indicated depending on the setting, or 'F' will be indicated with the temperature unit set to °F.

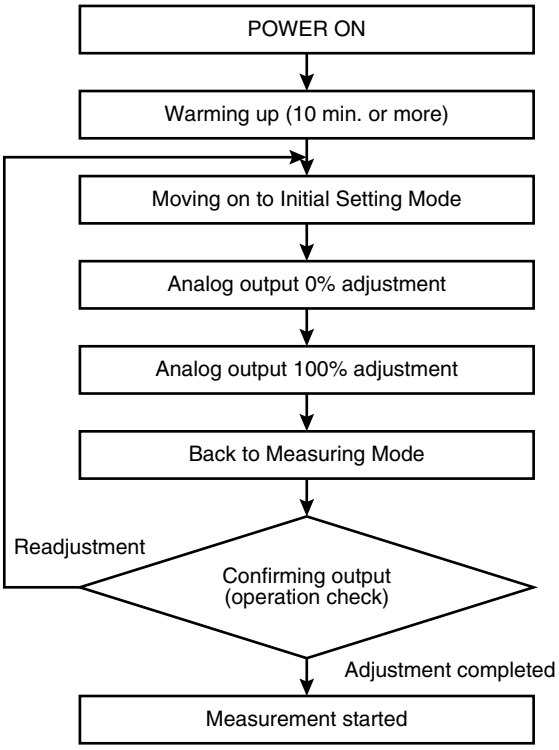
6 **Hold down Alarm/↓ or Init/↑ button for 1 second or more to return to Measuring Mode.**

17.2 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.

17.2.1 ANALOG OUTPUT ADJUSTMENT FLOW

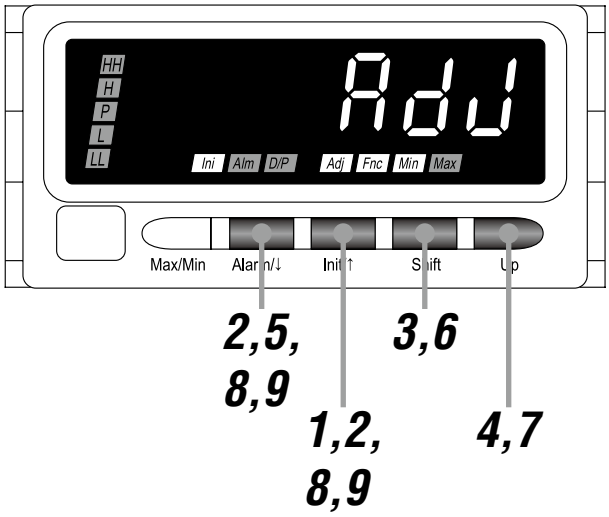
The Analog Output Adjustment is carried out as shown in the following flowchart.



IMPORTANT

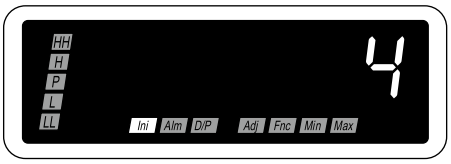
- Warm up measuring instruments, equipment and other devices on site for the time specified in each manual, and operate the unit in a stable condition.
- Adjustable ranges:
  Analog output 0% adjustment -5 to +105%
  Analog output 100% adjustment -5 to +105%
- Adjust analog output 100% in the following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

17.2.2 OPERATING PROCEDURE



1 **Hold down Init/↑ button for 3 seconds or more to move on to Initial Setting Mode.**

- The input type is indicated.
- 'Ini' indicator turns on.

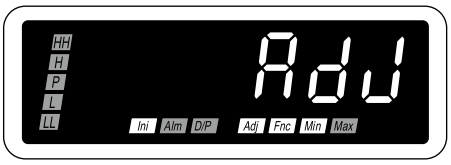


IMPORTANT

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

2 **Press Alarm/↓ or Init/↑ button to go to the analog output 0% adjustment.**

- The analog output 0% adjustment is indicated.
- 'Ini', 'Adj', 'Fnc' and 'Min' indicators turn on.

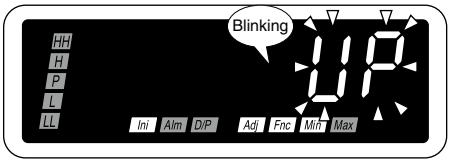


NOTE

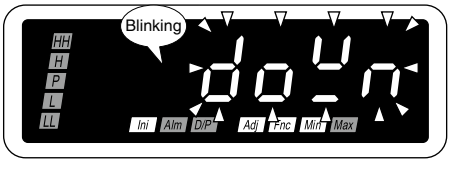
Skip to Step 5 when the analog output 0% adjustment is not necessary.

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

■ Increasing output



■ Decreasing output



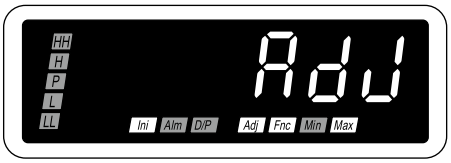
4 **Press Up button until the desired output value.**

IMPORTANT

- Confirm that the output signal is stable before pressing Up button while in checking it with a receiving instrument or a tester.
- Adjustable range is -5 to +105%.

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.
- 'Ini', 'Adj', 'Fnc' and 'Max' indicators turn on.

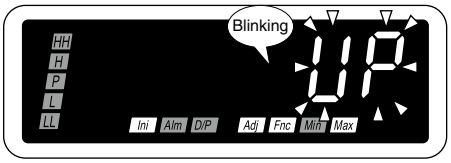


NOTE

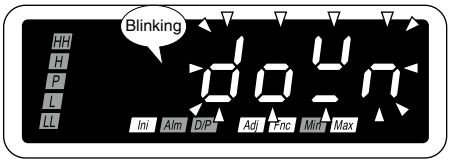
Skip to Step 9 when the analog output 100% adjustment is not necessary.

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.**

IMPORTANT

- Confirm that the output signal is stable before pressing Up button while in checking it with a receiving instrument or a tester.
- Adjustable range is -5 to +105%.

8 **Press Alarm/↓ or Init/↑ 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 type will be indicated.
- Press Init/↑ button, and the analog output 0% adjustment 'ADJ' will be indicated.

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

18. 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.

19. TROUBLESHOOTING

19.1 ERROR MESSAGES

MAIN DISPLAY	ERROR MESSAGE	WHAT TO DO
SErr	Input error, Out of the measuring range	Increase/decrease the input signal until it is back within the measuring range.
bErr	Input wire breakdown (burnout)	Check the input wires.
rErr	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
wErr	Non-volatile memory error (writing)	
iErr	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.

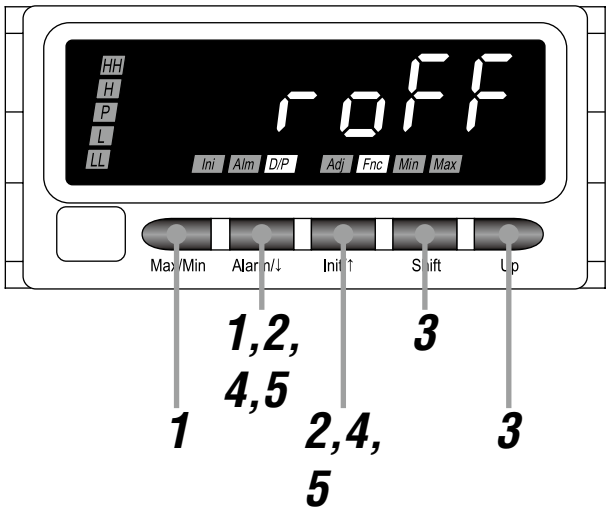
19.2 INITIALIZING SETTING VALUES

To restart setting from the default state, initialization can be used. Refer to attached 20.3 PARAMETER LIST for the default values.

IMPORTANT

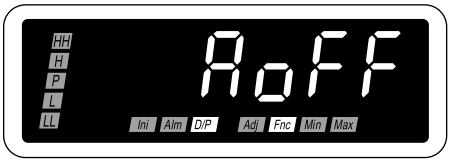
- Currently set parameters will be lost after an initialization. It is recommended to record the parameters before initialization.
- Even if the unit is shipped with the specified parameters with the option code '/SET', such parameters will be lost after an initialization. Be careful that the initialization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

19.2.1 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.

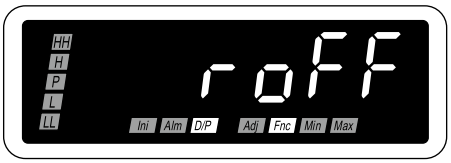


NOTE

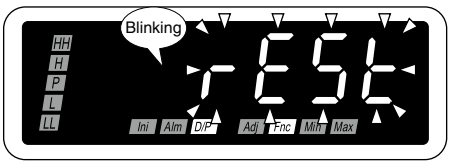
- 'AOFF' or 'A ON' is indicated depending on the setting.
- With no-alarm-output type, the Initial setting lockout 'IOFF' or 'I ON' is indicated depending on the setting.

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

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

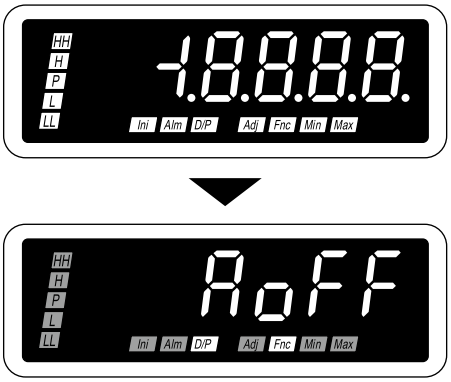


3 **Press Shift or Up button to select 'REST'.**



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

- All the indications turn on for approximately 6 seconds and then the next parameter setting is indicated.



NOTE

- Press Alarm/↓ button, and the alarm setting lockout 'AOFF' will be indicated, or the initial setting lockout 'IOFF' will be indicated with no-alarm-output type.
- Press Init/↑ button, and the loop test output lockout 'TOFF' will be indicated.

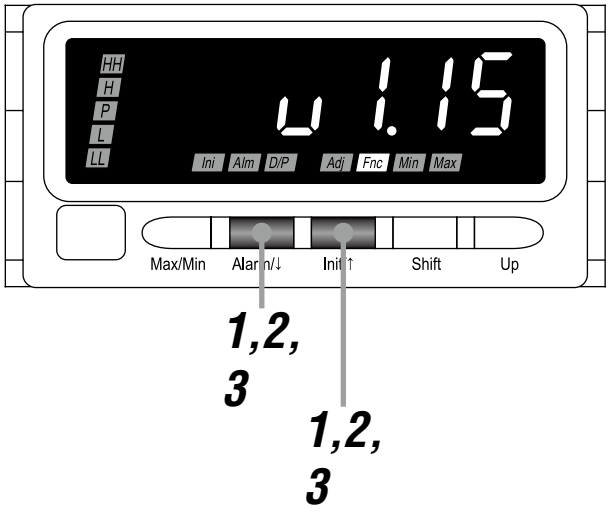
5 **Hold down Alarm/↓ or Init/↑ button for 1 second or more to return to Measuring Mode.**

19.3 CONFIRMING FIRMWARE VERSION

The firmware version of the unit can be confirmed.
Confirm the version in the following cases:

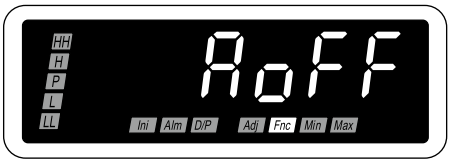
- The display is different from the one described in the operating manual.
- The firmware version is necessary to consult us for troubles.

19.3.1 OPERATING PROCEDURE



1 **Hold down Alarm/↓ and Init/↑ 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.

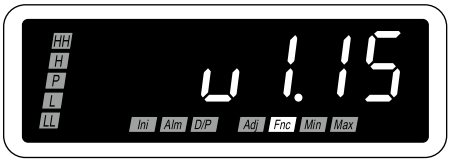


NOTE

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

2 **Press Alarm/↓ or Init/↑ 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 Init/↑ button for 1 second or more to return to Measuring Mode.**

20. APPENDICES

20.1 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
Burnout		Upscale standard; downscale optional by programming
Linearization		Standard
Setting (front button)	Initial setting mode	Input type, temperature unit, decimal point position, input compensation, analog output 0%, analog output 100%, 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, brightness, automatic return time to Measuring Mode, transition time to Lockout Setting Mode, burnout, display refreshing rate, version indication
	Lockout setting mode	Alarm setting lockout, initial setting lockout, advanced setting lockout, loop test output lockout, initialization
	Loop test output	----
Read rate		20 times/sec. (50 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		-1999 to 9999
Minimum display/setting scale		0.1°C or 1°F
Decimal point position		10^{-1} or none
Zero indication		Higher-digit zeros are suppressed
Over-range indication		'S.ERR' and 'Min' or 'Max' blinking when the input signal is out of the usable range
Burnout indication		'B.ERR' blinking
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		Ini, Alm, D/P, Adj, Fnc, Min, Max Display mode status and operation status, amber ON or blink

■ INPUT SPECIFICATIONS

RTD		3-wire RTDs	
Maximum leadwire resistance		10 Ω per wire	
Sensing current		1 mA	
Temperature range	JPt 100 (JIS '89)	Conformance range	-200*1 to +500°C, -328 to +932°F
		Usable range	-230*1 to +530°C, -382 to +986°F
	Pt 100 (JIS '89)	Conformance range	-200*1 to +650°C, -328 to +1202°F
		Usable range	-230*1 to +680°C, -382 to +1256°F
	Pt 100 (JIS '97, IEC)	Conformance range	-200*1 to +850°C, -328 to +1562°F
		Usable range	-230*1 to +880°C, -382 to +1616°F
	Pt 50Ω (JIS '81)	Conformance range	-200*1 to +649°C, -328 to +1202°F
		Usable range	-230*1 to +679°C, -382 to +1256°F

*1 -199.9 with '1 decimal place' setting.

■ 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: ≥ 5×10^6 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	±1°C ±1 digit (±2°F ±1 digit)
	Output	±0.15% (DC output = display + output)
Temp. coefficient		±0.03%/°C (±0.02%/°F) when the input range is set to the maximum span.
Input resolution		Max. 16 bits
Output resolution		Max. 13 bits
Response time		≤ 0.5 sec. (alarm output: 0 – 100% at 90% setpoint) ≤ 0.7 sec. (DC output: 0 – 90%)
Burnout response		≤ 10 sec.
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)

20.2 MODEL NUMBERING

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

INPUT– Field-selectable
1: JPt 100 (JIS '89), Pt 100 (JIS '89),
Pt 100 (JIS '97, IEC), Pt 50Ω (JIS '81)

[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-9503)

20.3 PARAMETER LIST

MODE	PARAMETER	SETTING RANGE	INDICATOR	DISPLAY	DEFAULT VALUE	DECIMAL POINT POSITION	UNIT
Measuring	Present value	-1999 – 9999	HH, H, P, L, LL	----	----	*1	°C/°F
	MAX value	-1999 – 9999	Max	----	----	*1	°C/°F
	MIN value	-1999 – 9999	Min	----	----	*1	°C/°F
	LL alarm setpoint	-1999 – 9999	LL	----	----	*1	°C/°F
	L alarm setpoint	-1999 – 9999	L	----	----	*1	°C/°F
	H alarm setpoint	-1999 – 9999	H	----	----	*1	°C/°F
	HH alarm setpoint	-1999 – 9999	HH	----	----	*1	°C/°F
Initial setting	Input type	Pt 100 (JIS '97, IEC), Pt 50Ω (JIS '81), JPt 100 (JIS '89), Pt 100 (JIS '89)	Inl	4, 5, 1, 3	4	----	----
	Temperature unit	°C, °F	Inl	C, F	C	----	----
	Decimal point position	1 decimal place, no decimal point	Inl, DIP	d on, doFF	d on	----	----
	Input compensation	-1999 – 9999	Inl, Adj	-1999 to 9999	0000	*1	°C/°F
	Analog output 0%	-1999 – 9999	Inl, Adj, Min	-1999 to 9999	0000	*1	°C/°F
	Analog output 100%	-1999 – 9999	Inl, Adj, Max	-1999 to 9999	1000	*1	°C/°F
	Analog output 0% adjustment	Adjustable range -5 to +105%	Inl, Adj, Fnc, Min	AdJ: UP (increasing) doUn (decreasing)	0% output	----	----
	Analog output 100% adjustment	Adjustable range -5 to +105%	Inl, Adj, Fnc, Max	AdJ: UP (increasing) doUn (decreasing)	100% output	----	----
Alarm setting	Alarm point	1: Quad alarm	HH, H, L, LL, Fnc (H, L, Fnc)	ALn1, ALn2	ALn1	----	----
		2: Dual alarm	H, L, Fnc	ALn2	ALn2		
	LL alarm setpoint	-1999 – 9999	LL, Fnc	-1999 to 9999	0200	*1	°C/°F
	LL trip action	High trip, low trip	LL, Fnc	LnH, LnLo	LnLo	----	----
	LL deadband (hysteresis)	0000 – 9999	P, LL, Fnc	0000 to 9999	0010	----	°C/°F
	LL ON delay time	00 – 99	LL, DIP, 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	-1999 – 9999	L, Fnc	-1999 to 9999	0300	*1	°C/°F
	L trip action	High trip, low trip	L, Fnc	LnH, LnLo	LnLo	----	----
	L deadband (hysteresis)	0000 – 9999	P, L, Fnc	0000 to 9999	0010	----	°C/°F
	L ON delay time	00 – 99	L, DIP, Fnc	00 to 99	00	----	Second
	L coil at alarm	Coil energized at alarm, de-energized at alarm	L, Fnc	rYEn, rYdn	rYEn	----	----
	H alarm setpoint	-1999 – 9999	H, Fnc	-1999 to 9999	0100	*1	°C/°F
	H trip action	High trip, low trip	H, Fnc	LnH, LnLo	LnH	----	----
	H deadband (hysteresis)	0000 – 9999	H, P, Fnc	0000 to 9999	0010	----	°C/°F
	H ON delay time	00 – 99	H, DIP, Fnc	00 to 99	00	----	Second
	H coil at alarm	Coil energized at alarm, de-energized at alarm	H, 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.

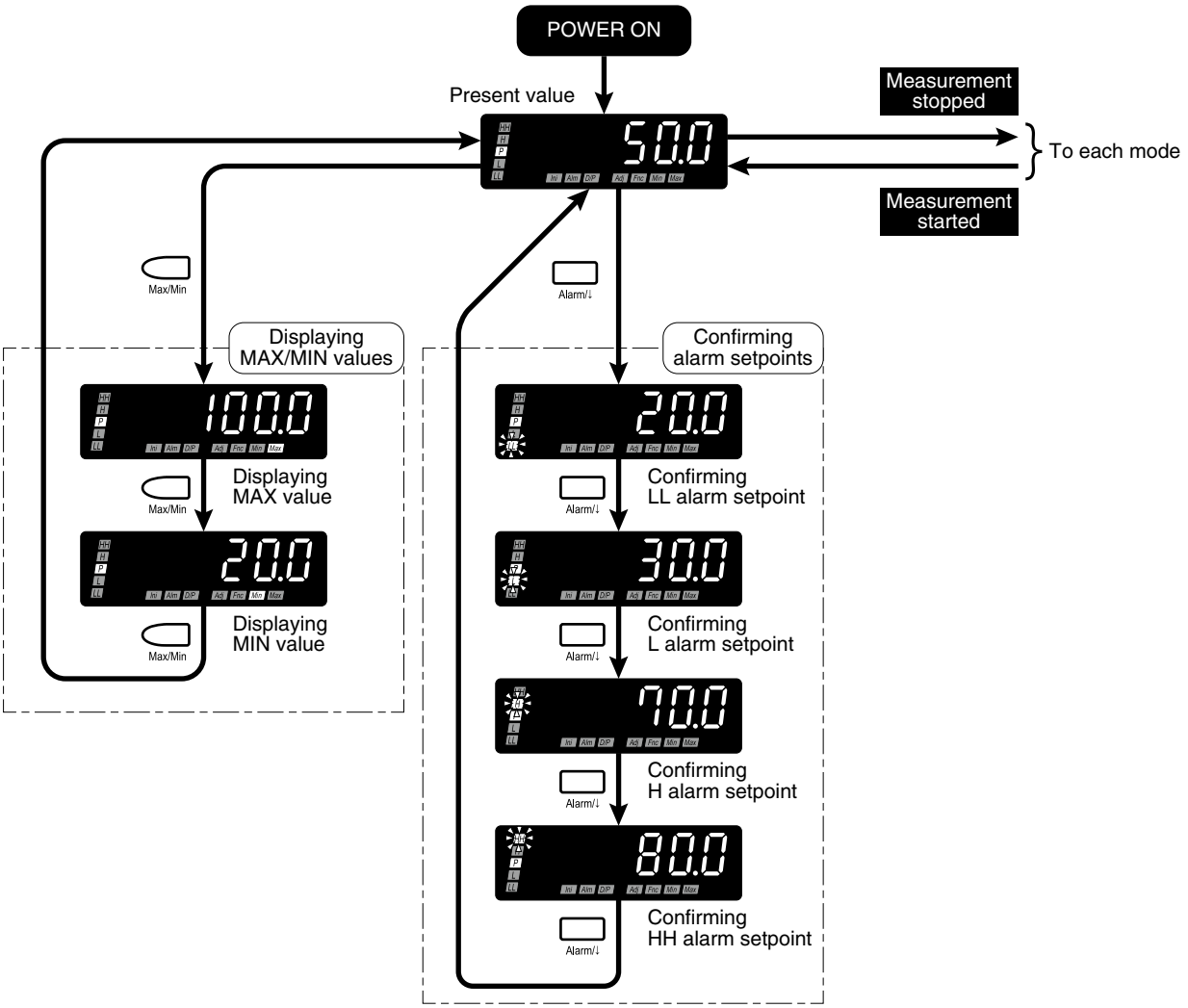
MODE	PARAMETER	SETTING RANGE	INDICATOR	DISPLAY	DEFAULT VALUE	DECIMAL POINT POSITION	UNIT
Alarm setting	HH alarm setpoint	-1999 – 9999	HH, Fnc	-1999 to 9999	0800	*1	°C/°F
	HH trip action	High trip, low trip	HH, Fnc	LoHi, LoLo	LoHi	----	----
	HH deadband (hysteresis)	0000 – 9999	HH, P, Fnc	0000 to 9999	0010	----	°C/°F
	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	Fnc	AoFF, A 2, A 4, A 8	AoFF	----	Sample
	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
	Burnout	Upscale burnout, downscale burnout	Fnc	bn U, bn d	bn U	----	----
	Display refreshing rate	00.0 – 99.9	Fnc	F000 to F999	F000	----	Second
	Version indication	----	Fnc	----	----	----	----
Lockout setting	Alarm setting lockout	OFF, ON	D/P, Fnc	AoFF, A on	AoFF	----	----
	Initial setting lockout	OFF, ON	D/P, Fnc	voFF, v on	voFF	----	----
	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		
	Initialization	OFF, initialization	D/P, Fnc	roFF, rESt	roFF	----	----
Loop test output	Loop test output	-1999 – 9999	Ini, Alm, D/P, Adj, Fnc, Max / Min	-1999 to 9999 (display blinking)	----	*1	°C/°F

*1 Conforms to decimal point position setting.

NOTE 2: INDICATOR: □ = ON, ▯ = Blinking

20.4 PARAMETER MAP

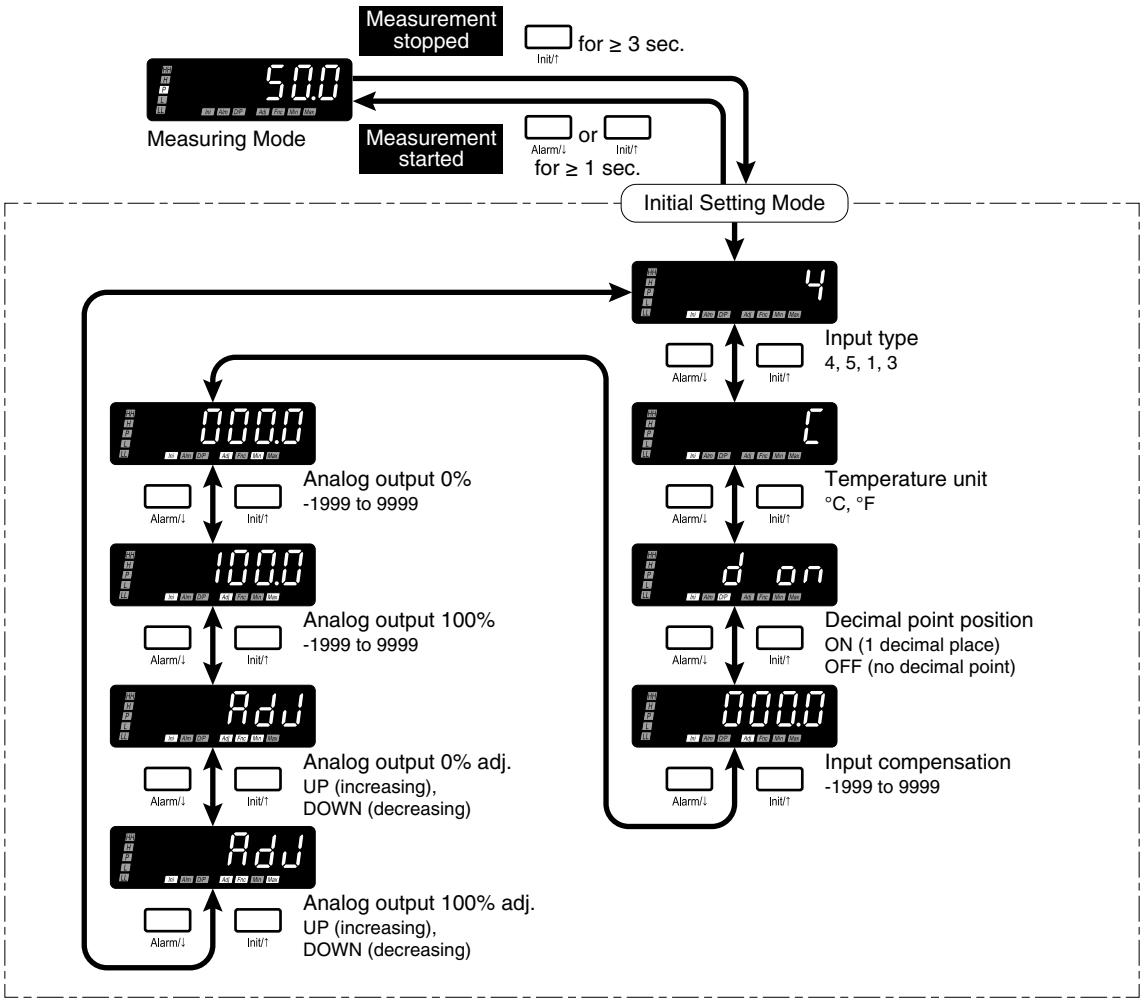
20.4.1 OPERATION IN MEASURING MODE



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.

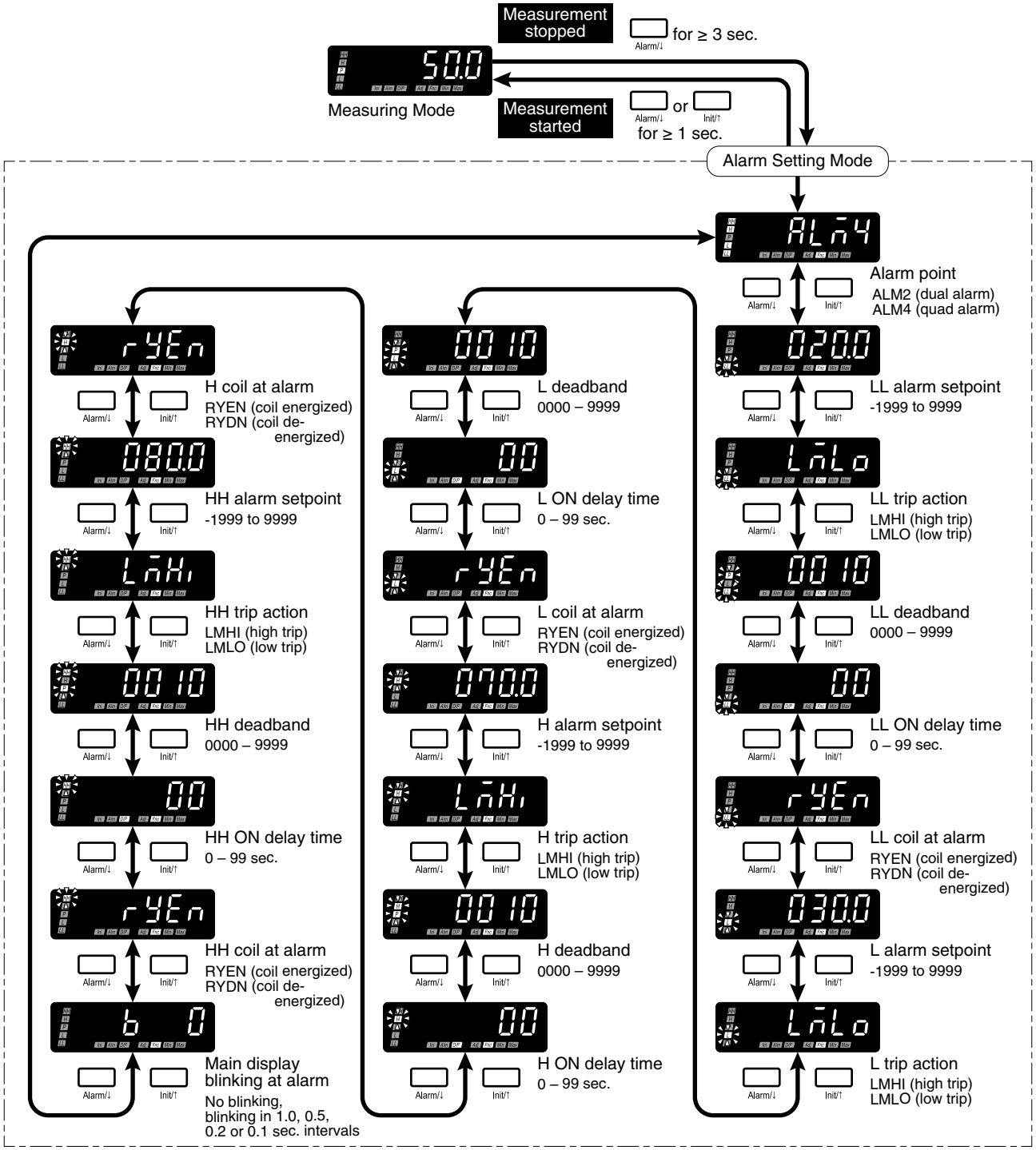
20.4.2 INITIAL SETTING MODE



NOTE

- The display depends on the settings and input.
- The decimal point position is disabled with the temperature unit set to °F.
- The analog output parameters are not indicated with no-DC-output type.

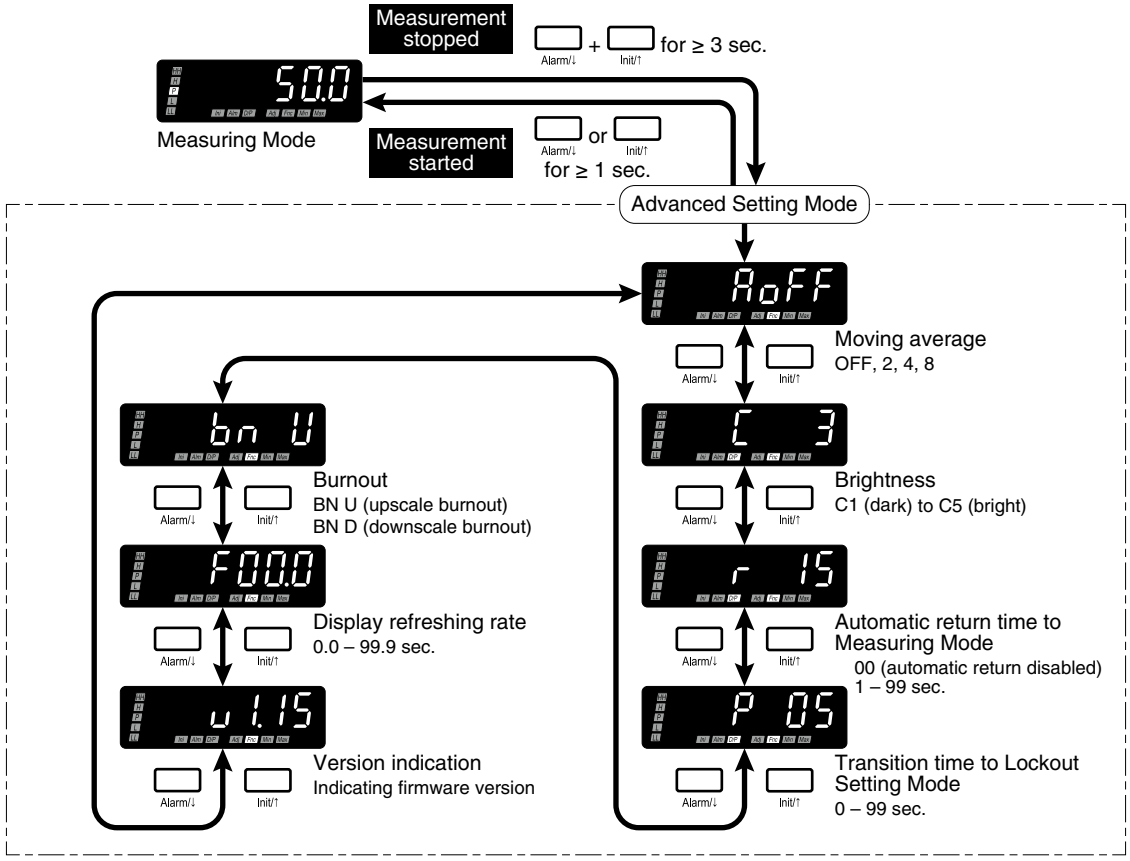
20.4.3 ALARM SETTING MODE



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.

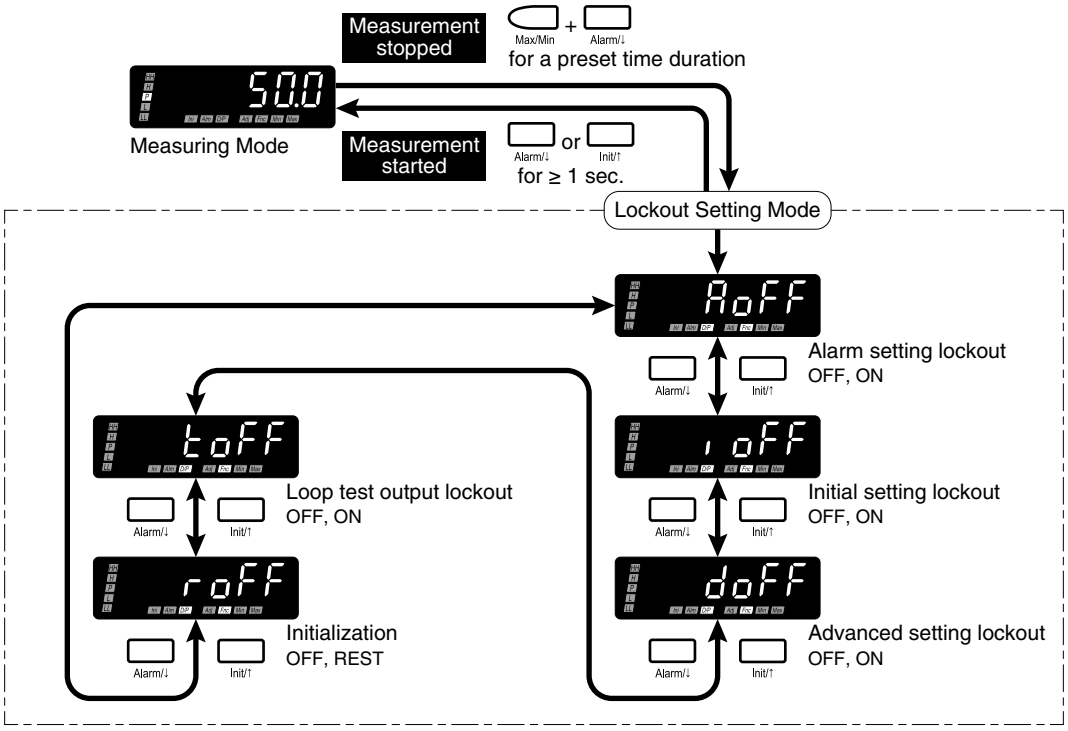
20.4.4 ADVANCED SETTING MODE



NOTE

- The display depends on the settings and input.
- Version indication is for indication only, not for setting.

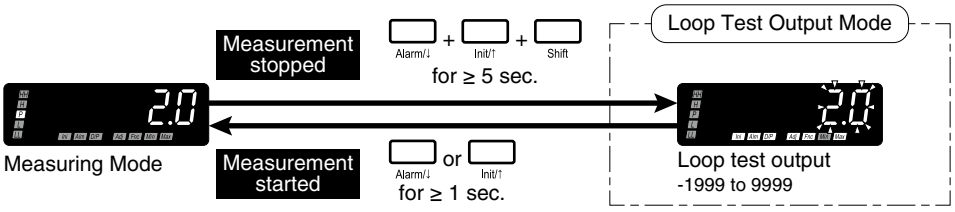
20.4.5 LOCKOUT SETTING MODE



NOTE

- The display depends on the settings and input.
- The alarm setting lockout is not indicated with no-alarm-output type. Instead, the initial setting lockout is indicated first after shifted to Lockout Setting Mode.

20.4.6 LOOP TEST OUTPUT MODE

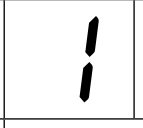
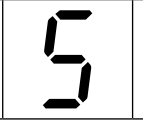
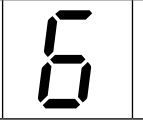


NOTE

The display depends on the settings and input.

20.5 CHARACTER SET

■ **NUMERALS AND NEGATIVE SIGN**

0	1	2	3	4	5	6	7	8	9
									

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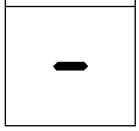

■ **ALPHABET**

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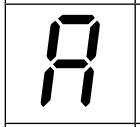	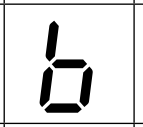	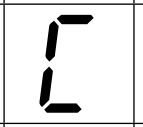	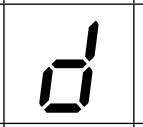	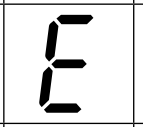	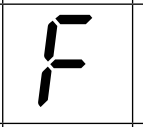	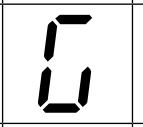	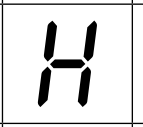	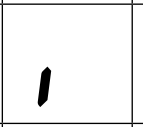	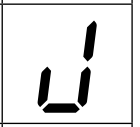
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	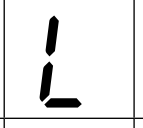	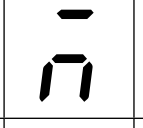	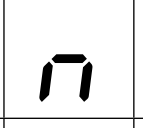	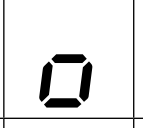	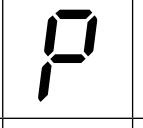	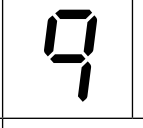	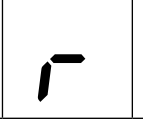	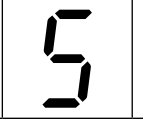	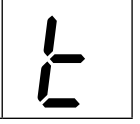
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